The Kingdom of Thailand
Ministry of Transport

THE PROJECT ON CAPACITY IMPROVEMENT FOR ROAD TRAFFIC SAFETY INSTITUTIONS AND IMPLEMENTATION IN THAILAND

Project Completion Report

August 2024

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ALMEC CORPORATION
ORIENTAL CONSULTANTS GLOBAL CO., LTD.
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NIPPON KOEI CO., LTD.

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Table of Contents

Figures and Tables

Abbreviation

ABS	Antilock Brake System
AHP	Analytic Hierarchy Process
AI	Artificial Intelligence
ARMS	Accident Report Management System
ATRANS	Asian Transportation Research Society
B-TAIMS	Bus and Truck Accident Information Management System
C/P	counterpart
CBS	Combi Brake System
CBT	Computer based testing
DDPM	Department of Disaster Prevention and Mitigation
DLT	Department of Land Transport
DOH	Department of Highways
DRR	Department of Rural Roads
EXAT	Expressway Authority of Thailand
FTB	Freight Transport Bureau
GIS	Geographic Information System
GPS	Global Positioning System
GPSTM	GPS Transportation Management
HAIMS	Highway Accident Information Management System
HAIMS	Highway Accident Information Management System
HSMS	Highway Safety Management System
ICTC	Information Communication Technology Center
ITARDA	Institute for Traffic Accident Research and Data Analysis
JCC	Joint Coordinating Committee
JET	JICA Expert Team
JICA	Japan International Cooperation Agency
LTSB	Land Transport Safety Bureau
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOF	Ministry of Finance
MOI	Ministry of Interior
MOPH	Ministry of Public Health
MOT	Ministry of Transport
MOU	Memorandum of Understanding
New-TRAMS	New Transport Road Accident Management System
NH	National highway
NIEM	National Institute for Emergency Medicine
OPS	Office of Permanent Secretary
OTP	Office of Transport and Traffic Policy Planning
PCG	Project Coordinating Group
PDM	Project Design Matrix
PDPA	Personal Data Protection Act

PET	Post Encroachment Time
PM	Project Manager
PTB	Passenger Transport Bureau
RAI	New Transport Road Accident Management system
RD	Record of Discussions
RSA	Road Safety Audit
RTP	Royal Thai Police
RVP	Road Accident Victims Protection Company Limited
SRT	State Railway of Thailand
SSG	Specific Study Group
TAIA	Thai Automotive Industry Association
TICA	Thailand International Cooperation Agency
TIMS	Traffic Information Management System
TMEA	Thai Motorcycle Enterprise Association
TRAMS	Transport Road Accident Management System
TSM	Transport Safety Management
TSM	Transport Safety Manager
TSOC	Traffic Safety Operation Center
TTC	Time to Collision
UN	United Nations
VMS	variable message sign
WB	World Bank
WG	Working Group
WHO	World Health Organization

1 Outline of the Project

1.1 Project Background

The Kingdom of Thailand has achieved steady economic growth, with its GDP reaching approximately US$505 billion in 2018, 1.73 times higher than in 2008, according to the World Bank (WB). On the other hand, as motorization in Thailand is accelerating along with its economic growth, the deterioration of the traffic environment, such as serious traffic congestion and frequent traffic accidents, is becoming remarkable. According to the "Global Status Report on Road Safety 2015" published by the World Health Organization (WHO) in 2015, the traffic fatalities per 100,000 population in Thailand in 2012 were estimated to reach 36.2. It was the highest rate among ASEAN countries and the second-highest globally.

The Ministry of Transport (MOT) is also deeply concerned about the worst-class traffic fatalities and is proceeding with traffic safety measures to reduce the number of traffic fatalities by half of 2010 by 2020 in line with the “Decade of Action for Road Safety 2011–2020” (United Nations [UN] General Assembly Resolution 64/255; hereinafter referred to as the "UN Resolution") the UN resolved on 2nd March 2010. However, the effects have not been as expected. According to the recently released “Global Status Report on Road Safety 2018,” the number of fatalities in traffic accidents per 100,000 population in the country is estimated to be 32.7, the highest rate among ASEAN countries and the ninth in the world.

The project research of Japan International Cooperation Agency (JICA), Traffic Safety Initiatives in Developing Countries (June 2016), reported that 70% of fatal traffic accidents in Thailand were caused by motorcycles (including three-wheeled vehicles). The main accident factor is human errors such as speeding, insufficient confirmation when changing lanes, and non-maintenance of inter-vehicle distance. In addition, MOT, Royal Thai Police (RTP), Ministry of Public Health (MOPH), hospitals, and private organizations such as insurance companies have different traffic accident data, and they do not share information among themselves. The actual situation and the causes of traffic accidents are not fully understood for that reason.

In order to address these situations, the Minister of Transport requested to the Minister of Land, Infrastructure, Transport and Tourism in Japan that Thailand would like to learn the know-how on traffic safety measures from Japan. A memorandum of understanding was

signed between the two ministers on 6 August 2016. Based on this memorandum, a working group (WG) was established comprising staff from both Thailand and Japanese government agencies and with the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan (MLIT-WG) as in charge. Through this MLIT-WG, discussions and advice on measures against accident black spots have been provided through training of staff (of the Thailand government agencies) and dispatching officials from industry-government-academia in the traffic safety field by the MLIT. After several MLIT-WG activities, cooperation has been established to improve the traffic safety situation in Thailand; however, it was confirmed that the traffic safety situation must be improved more systematically and in the medium- to long-term MLIT-WG activities. Therefore, MOT requested the Japanese government to implement the "Project for Improving Organizational Capacity and Implementation Capacity for Traffic Safety" (hereinafter referred to as “the Project”).

1.2 Project Purpose

The Record of Discussions (hereinafter referred to as “RD”), which stipulates the framework of the Project, was signed by MOT and JICA on 23 March 2020. The project period was planned to be three years, but due to travel restrictions caused by the coronavirus disease 2019 (COVID-19), the activities in the first year were mainly online and did not make the planned progress. Therefore, the Joint Coordinating Committee (JCC) decided to set the duration of the first year to one year and six months, and the project duration to three years and six months. The project outline stipulated on the RD is as follows.

Overall Goal:	The fatalities by road traffic accidents are reduced in Thailand.
Project Purpose:	The capacity improvement of road traffic safety institutions and implementation is realized.
Expected Achievement:	As indicated in Table 1.2.1
Project Duration:	December 2020 to June 2024 (three and a half years)

Table 1.2.1 The Outline of the Expected Achievements and Activities

Expected Achievement	Outline of Activities
Output 1: The reliability and utilization of New Transport Road Accident Management System (New-TRAMS) are improved.	1.1 Review the New Transport Road Accident Management System (New-TRAMS) that is cooperating with the Royal Thai Police (RTP), Ministry of Public Health (MOPH), Ministry of Interior (MOI), and e-claim (insurance company). 1.2 Formulate a new framework for accident investigation based on the accident levels, such as fatality accidents, serious or minor injury accidents, property damage accidents, etc. 1.3 Conduct the training on the road traffic accident investigation for MOT and the organizations concerned. 1.4 Improve the reliability of the New-TRAMS with the data in designated local area(s) on a trial basis. 1.5 Improve the capacity of MOT and the organizations concerned for in-depth accident analysis. 1.6 Issue quarterly and annual road traffic accident reports, including the results of data analysis. 1.7 Review the detail functions of the Transport Safety Operation Center (TSOC) and propose the action plan on TSOC.
Output 2: The countermeasures for safer road engineering are developed and implemented through the activities in the pilot sections on National Highways and /or Motorways.	2.1 Collect accident data and information related to accident black spots on National Highways and/or Motorways. 2.2 Classify the accident black spots and select priority road sections as pilot projects. 2.3 Prepare the improvement plans of accident black spots for the pilot project. 2.4 Assist the MOT and the organizations concerned to implement the pilot projects for accident reduction at black spots. 2.5 Evaluate the effectiveness of the pilot projects based on the before-after traffic flows analysis. 2.6 Prepare a road safety engineering manual, "Good Practices in Road Safety Engineering," including good practices based on the results of the pilot projects.
Output 3: Comprehensive road safety programs on the Rural and/or Local	3.1 Select pilot areas based on the discussion with the MOT and organizations concerned. 3.2 Collect data on users, vehicles and road environment, and identify high risk spots and sections as well as risk behaviors on the Rural and/or Local Roads in the pilot areas in cooperation with local residents through the participatory

Roads are implemented in the pilot areas.	approach. 3.3 Determine the relationship between behaviors and countermeasures, and prepare comprehensive road safety programs including engineering, education, and enforcement countermeasures in the pilot areas in consideration of a safety program for vulnerable road users including children and their parents. 3.4 Assist the MOT and organizations concerned to implement the comprehensive road safety programs, including the training of instructors for road safety education and enforcement as well as awareness activities, in the pilot areas. 3.5 Develop the monitoring and evaluation method for the effectiveness of the comprehensive road safety programs.
Output 4 Land transport administration for road safety on driver licensing and operation management for commercial vehicle is improved.	4.1 Improve the licensing system including examination, education and training programs for motorcycle. 4.2 Develop the training materials for the license examination, education and training programs. 4.3 Encourage the acquisition of motorcycle license in the pilot areas. 4.4 Propose re-education program for traffic offenders and the license renewers. 4.5 Collect and analyze the traffic accident data of commercial vehicles. 4.6 Assist the MOT to supervise the transport safety operation management of commercial vehicles.

1.3 Project Area

The project area covers the entire country of Thailand. Each year, a pilot province is selected to implement the projects effectively, as shown below.

Table 1.3.1 Pilot Provinces

Year	Pilot Province
First year	Nakhon Ratchasima
Second Year	Suphan Buri
Third Year	Samut Sakhon

Source: JET

1.4 Counterparts

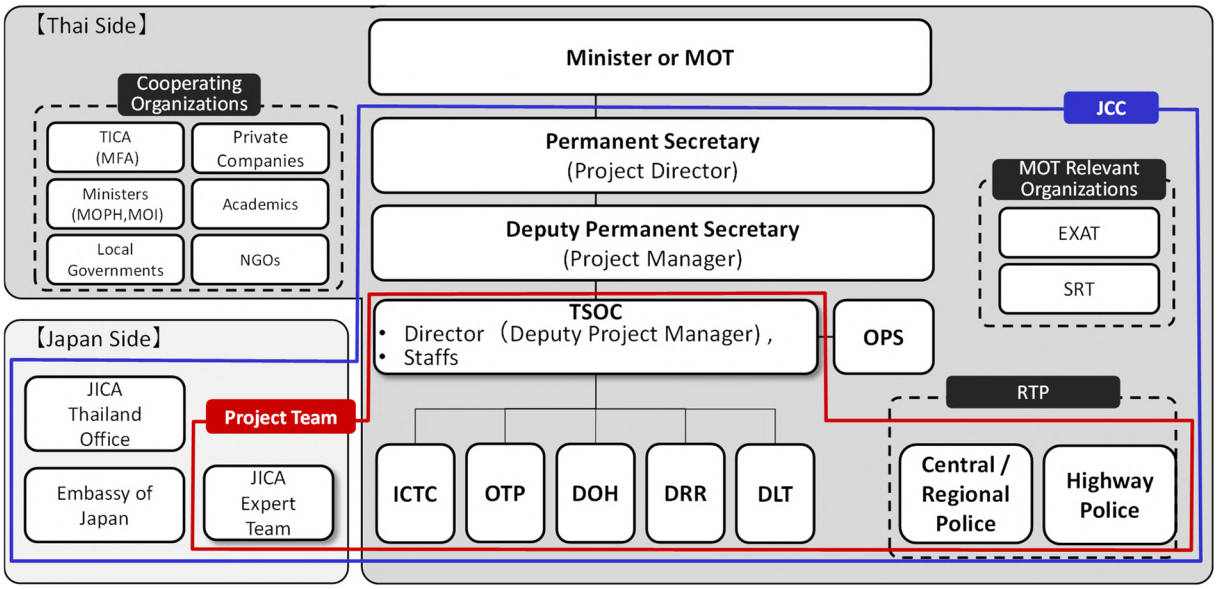
The counterpart (C/P) agencies are listed as follows.

Agency	Department	Description
MOT	Transport Safety Operation Center (TSOC)	TSOC was established in 2020 as the focal agency for MOT's traffic safety projects. It is the main C/P agency in the Project.
	Information Communication Technology Center (ICTC)	ICTC oversees the operation and maintenance of communication technology in MOT. It operates TRAMS, the traffic accident database of MOT.
	Office of Transport and Traffic Policy Planning (OTP)	OTP is responsible for the traffic and transport planning in MOT and, previously, traffic safety before TSOC was established. It has been involved in the Project's workshops and training.
	Department of Highways (DOH)	DOH oversees the construction, operation, and maintenance of national highways. It is the main C/P for the activities in Output 2.
	Department of Rural Roads (DRR)	DRR oversees the construction, operation, and maintenance of rural roads. It is the main C/P for the activities in Output 3.
	Department of Land Transport (DLT)	DLT handles the land transport administration, such as driver's license, vehicle registration, and commercial vehicle operation management. It is the main C/P for the activities in Output 4.
RTP	Central / Regional Police	RTP central and regional offices handle traffic enforcement and traffic accident investigation.
	Highway Police	The Highway Police is related to traffic enforcement on the national highways.

Source: JET

1.5 Implementation Structure

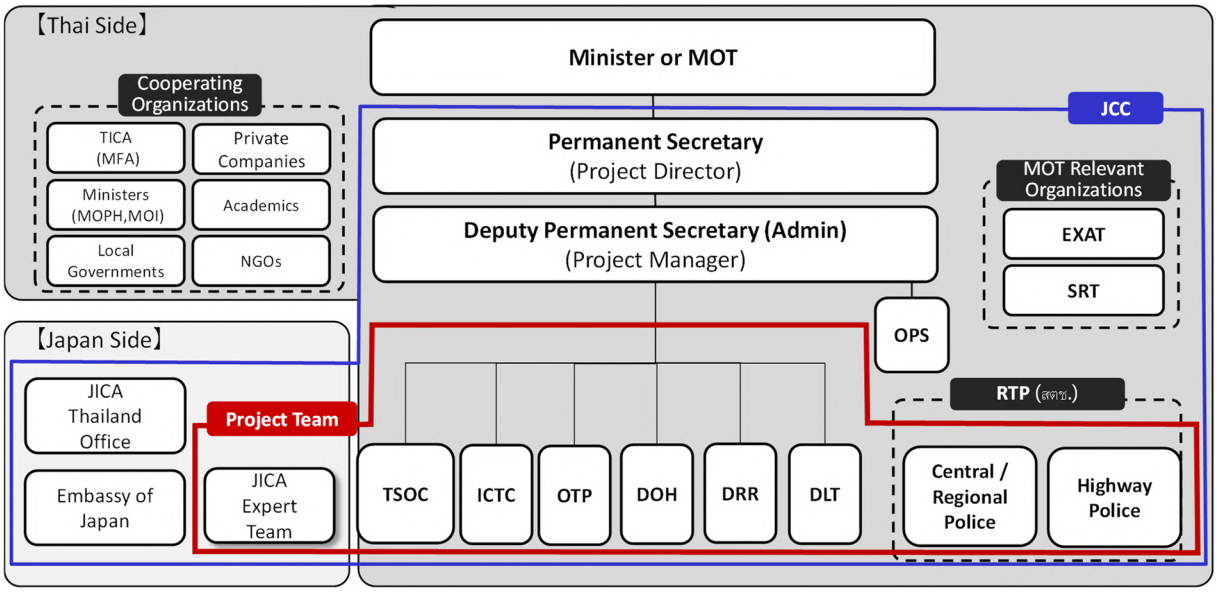
The implementation structure as of the beginning of the project is shown in Figure 1.5.1. TSOC was moved from the focal agency of the project to a project member in the second JCC, as shown in Figure 1.5.2, since its organizational structure had not been established. In the fourth JCC meeting, as shown in Figure 1.5.3, TSOC was reassigned as the focal agency, and a director of TSOC was appointed as the project manager (PM) since TSOC's director was assigned in October 2022.



Note: EXAT: Expressway Authority of Thailand, MFA: Ministry of Foreign Affairs, OPS: Office of Permanent Secretary, SRT: State Railway of Thailand, TICA: Thailand International Cooperation Agency

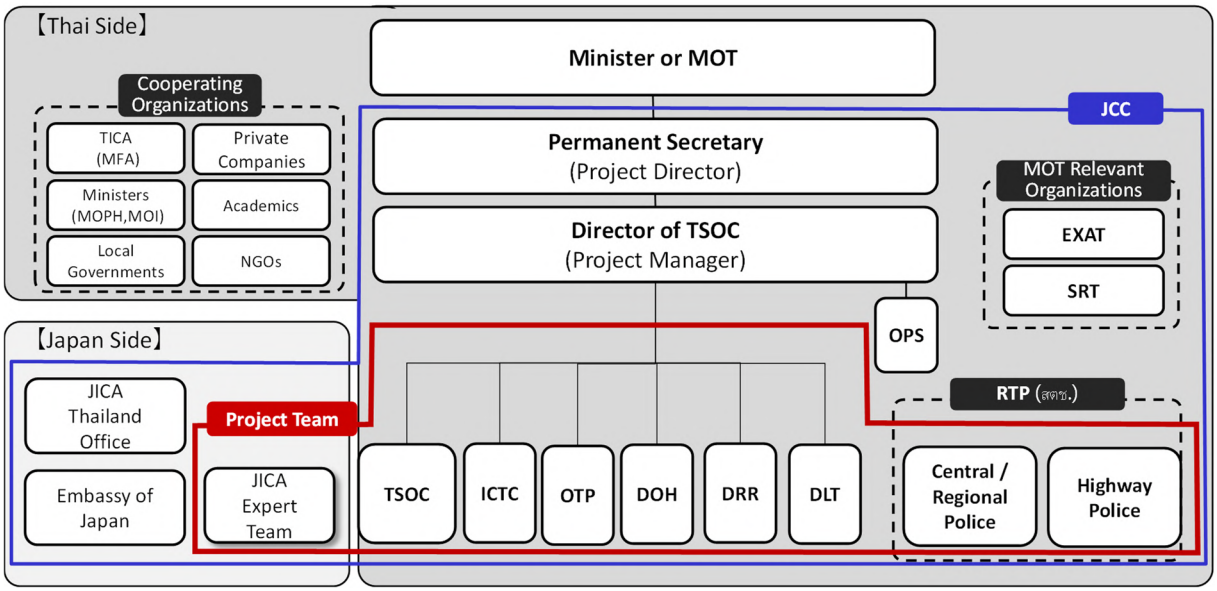
Source: JICA Expert Team (JET)

Figure 1.5.1 Implementation Structure (as of the beginning of the Project)



Source: JET

Figure 1.5.2 Implementation Structure (Agreed in the Second JCC)



Source：JET

Figure 1.5.3 Implementation Structure (Agreed in the Fourth JCC)

Table 1.5.1 and Table 1.5.2 show the list of members of the Project.

Table 1.5.1 Thai C/P Project Member List

Organization		Name	Position
MOT			
1	Permanent Secretary, MOT	Mr. Chayatan Phromsorn	Project Director / Chairman of JCC
2	Deputy Permanent Secretary, MOT Director of TSOC (from the beginning of the project to Sep 2022)	Mr. Anon Luangboriboon	PM (from the beginning of the project to Sep 2022)
3	Deputy Permanent Secretary, MOT	Mr. Pisak Jitviriyavasin	Vice Chairman of JCC
4	Deputy Permanent Secretary, MOT Director of TSOC (from Mar 2024 to the end of the project)	Mr. Wittaya Yamuang	PM (from Mar 2024 to the end of the project)
5	Principal Advisor on Land Transport Economics Director of TSOC (from Oct 2022 to Feb 2024)	Mr. Chakree Bumrungwong	PM (from Oct 2022 to Feb 2024)
TSOC			
6	Advisor	Mr. Sujin Mungnimit	Chairman of WG1 / Member of WG2, WG3 and WG4
7	Computer Technical Officer, Senior Professional Level	Mr. Adisorn Kasempannarai	Member of WG1
8	Plan and Policy Analyst, Practitioner Level	Ms. Nuttaya Panjamaphon	Member of WG1
9	Plan and Policy Analyst, Practitioner Level	Mr. Theeraphat Luangpongrat	Member of WG1
10	Statistician	Mr. Kitti Anusin	Member of WG1
11	Statistician	Ms. Romrat Khampantip	Member of WG1

12	Policy and Plan Analyst	Mr. Wittawat Phongklawkam	Member of WG1
13	Policy and Plan Analyst	Ms. Maneerat Sappol	Member of WG1
14	Civil Engineer	Mr. Jettaphat Phum-ampa	Member of WG2 and WG3
15	Civil Engineer	Mr. Passagon Pun-ngam	Member of WG2 and WG3
16	Civil Engineer	Ms. Mayurachat Vichaikul	Member of WG4
17	Public Relations Officer	Ms. Nattamon Udomporn	Member of WG4
DOH			
18	Deputy Director of Bureau of Highway Safety	Mr. Jakraphop Watcharamontien	Chairman of WG2
19	Director of Safety Standard Section, Bureau of Highway Safety	Mr. Thawatchai Saengrath	Member of WG2
20	Civil Engineer, Expert Level	Dr. Songrit Chayanan	Member of WG1
21	Civil Engineer, Senior Professional Level	Mr. Apivat Jotisankasa	Member of WG1
22	Statistician, Senior Professional Level	Ms. Somsuda Kraisingsom	Member of WG1
23	Civil Engineer, Professional Level	Mr. Chaiwut Karnjanasuntisuk	Member of WG2
24	Civil Engineer	Mr. Chakron Chaorai	Member of WG2
25	Civil Engineer	Mr. Eakkalak Boonchu	Member of WG2
DRR			
26	Director Bureau of Traffic Safety	Mr. Sasawat Pooripussarakul	Chairman of WG3
27	Director of Monitoring and Evaluation Group	Mr. Phromchat Chuathong	Member of WG1
28	Civil Engineer, Practitioner Level	Mr. Pongsatorn Ngowkarnjananak	Member of WG1
29	Head of Traffic Engineering Division	Mr. Santiparp Siriyong	Member of WG3
30	Civil Engineer, Professional Level	Mr. Khajonsak Jermprapai	Member of WG3
31	Civil Engineer, Practitioner Level	Mr. Pitcha Wachiropathum	Member of WG3
DLT			
32	Director of Land Transport Safety Bureau	Mr. Titipat Thaijongrak	Chairman of WG4
33	Chief of Transportation Safety Planning Group	Ms. Kobkul Intharat	Member of WG1
34	Transport Technical Officer, Practioner Level	Ms. Sujintra Pancharoen	Member of WG1 and WG4
35	Senior Transport Techinical Officer	Ms. Jiraporn Jittawin	Member of WG1
36	Transport Technical Officer, Practitioner Level	Mr. Montakan Boonsriwong	Member of WG1
37	Transport Technical Officer, Practioner Level	Mr. Thanawit Ratidet	Member of WG1
38	Chief of Transport Safety Promotion Group	Mrs. Wilawon Kanthothong	Member of WG4
39	Chief of the Driving License and School Standard Division	Ms. Nisakorn Chartsiri	Member of WG4
40	Transport Technical Officer (Professional Level)	Mr. Tanyawee Churdchoo	Member of WG4
ICTC			
41	Computer Technical Officer, Professional Level	Mr. Sumate Vanaleesuksun	Member of WG1, WG2, WG3, and WG4
42	Computer Technical Officer, Professional Level	Mr. Nopadol Jongcharoen	Member of WG1, WG2, WG3, and WG4
43	Computer Technical Officer, Professional Level	Ms. Aompilai Manorat	Member of WG1, WG2, WG3, and WG4
OTP			

44	Plan and Policy Analyst, Professional Level	Ms. Usanisa Jikyong	Member of WG1
45	Plan and Policy Analyst, Practitioner Level	Ms. Chadaporn Sookjam	Member of WG1
RTP			
46	Commander of Highway Police Division	Pol. Maj. Gen. Ekkaraj Limsakkas	Member of WG2
47	Deputy Commander of Highway Police Division	Pol.Col. Suksawat Koosittiphol	Member of WG2
48	Superintendent of Traffic Planning	Pol. Col. Suriyan Vinitmontri	Member of WG1, WG2, WG3, and WG4
49	Superintendent of Information and Communication Technology Management	Pol. Col. Atsadang Muangsri	Member of WG1, WG2, WG3, and WG4

Source：JET

Table 1.5.2 JET Member List

Name		Organization	Position	Note
1	Mr. TAKAGI Michimasa	ALMEC Corporation	Team Leader/ Traffic Safety Planning and Policy (1)	
2	Mr. NISHINO Ken	ALMEC Corporation	Deputy Team Leader/ Traffic Safety Planning and Policy (2)	
3	Mr. IRIE Tetsushi	Oriental Consultants Co., Ltd.	Traffic Accidents Database and Macro Analysis	
4	Mr. MATSUNUMA Takeshi	Oriental Consultants Global Co., Ltd.	In-depth Traffic Accident Analysis	
5	Mr. FUKASAWA Hideyuki	ALMEC Corporation	Traffic Accident Investigation	
6	Mr. INOUE Kiyoji	ALMEC Corporation	Traffic Accident Investigation (2)	From April 2023
7	Mr. OHATA Takeshi	Oriental Consultants Co., Ltd.	Road Engineering	
8	Mr. USHIROOKA Hisanari	Nippon Koei Co., Ltd.	Traffic Safety Education	
9	Ms. INAGAKI Natsumi	ALMEC Corporation	Community Participation/ Training Plan	
10	Ms. ROY ANANYA	ALMEC Corporation	Community Participation/ Training Plan (2)	From June 2022
11	Mr. MURAYAMA Yoshinaga	ALMEC Corporation	Traffic Regulation/ Enforcement (1)	
12	Ms. IWAMOTO Akiko	ALMEC Corporation	Traffic Regulation/ Enforcement (2)	
13	Mr. TANAKA Kenshiro	ALMEC Corporation	Driving License System	
14	Mr. ONO Manabu	ALMEC Corporation	Traffic Operation Management	
15	Ms. SAKAI Yukiko	Nippon Koei Co., Ltd.	Awareness and PR Activity	Until March 2022
16	Mr. HAYASHI Ryohei	Nippon Koei Co., Ltd.	Awareness and PR Activity	From April 2022
17	Mr. NISHIDA Shin	ALMEC Corporation	Traffic Accident Data Management	
18	Mr. NAKASHIMA Hirotaka	ALMEC Corporation	Road Safety Management	From April 2022
19	Mr. OMURA Takashi	ALMEC Corporation	Road Safety Management	From May

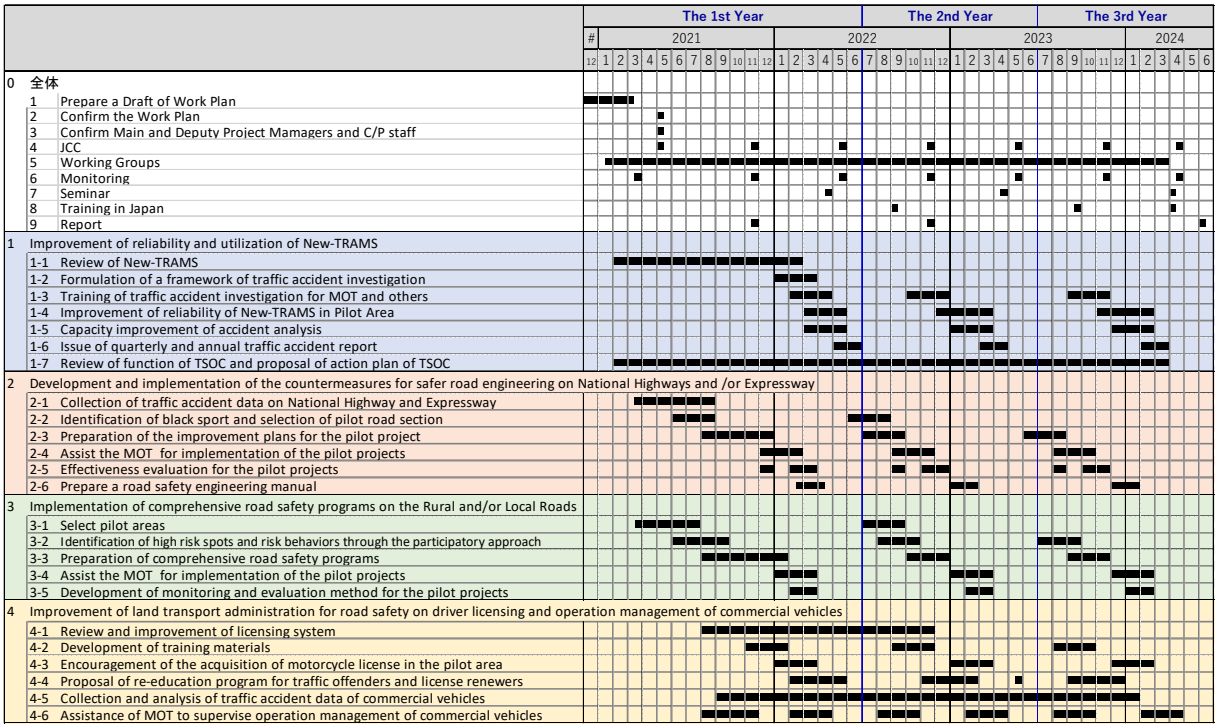
				2022
20	Dr. TANSAWAT Tithiwach	ALMEC Corporation	Project Coordinator	
21	Prof. FUKUDA Atsushi	ALMEC Corporation	Organization Establishment	From September 2022

Source: JET

2 Implementation Schedule

2.1 Implementation Schedule

The original project duration was three years from December 2020, but in the second JCC, it was agreed to extend until June 2024 due to the COVID-19 pandemic.



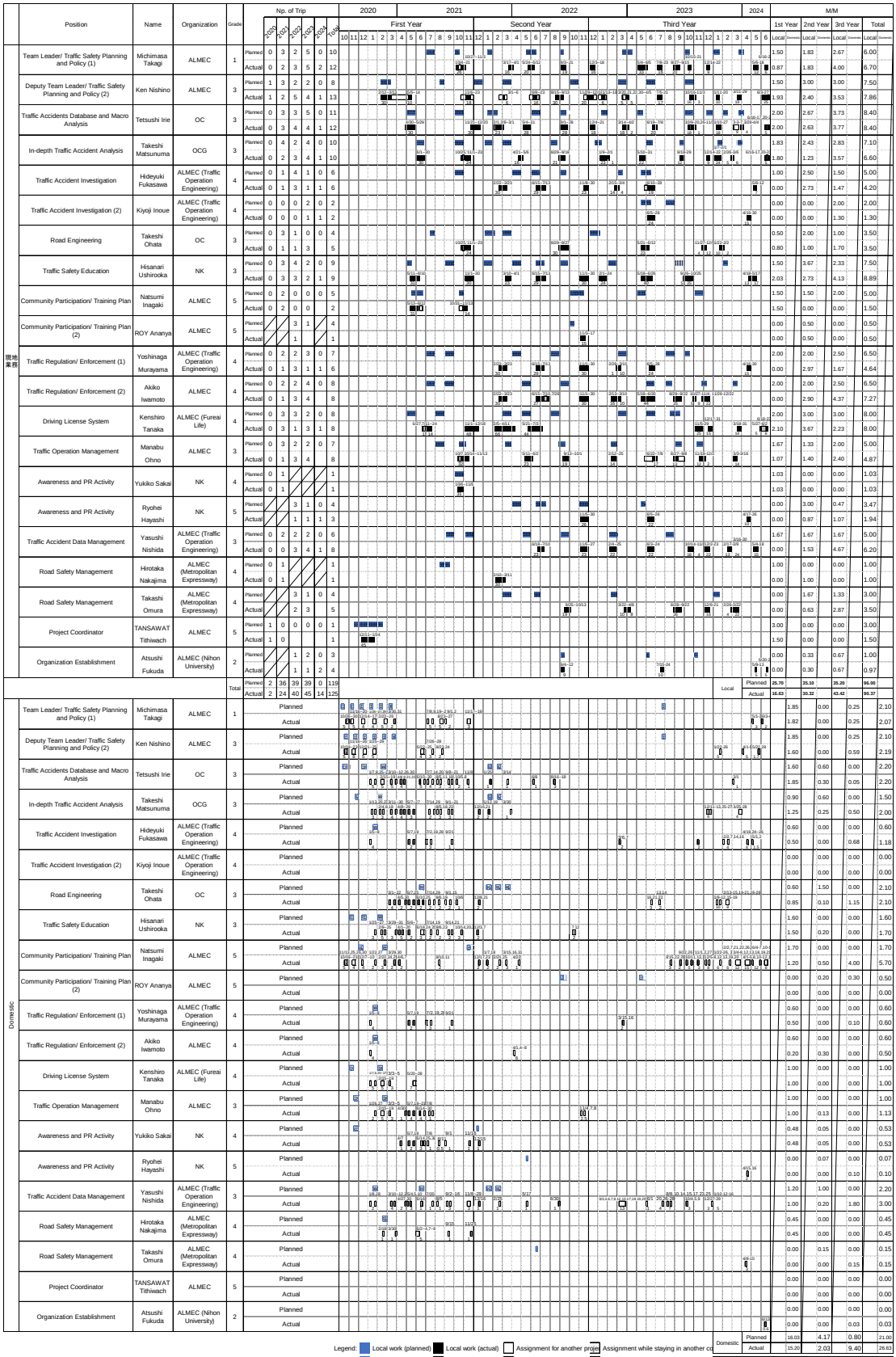
Source: JET

Figure 2.1.1 Implementation Schedule

2.2 Assignment Schedule

The assignment schedule and record of Japanese experts are shown in Table 2.2.1.

Table 2.2.1 Assignment Schedule and Record of Japanese Experts



Source: JET

3 Overall Activities

3.1 Outline

The overall activities include confirming the work plan, selecting project managers and C/P staff, holding JCC meetings, monitoring progress, and conducting seminars and training in Japan. Project Coordinating Group (PCG) meetings were held to share the progress of the activities and exchange opinions.

3.2 Work Plan Preparation and Confirmation

JET drafted the work plan and presented it to MOT, RTP, and related organizations. The final version was submitted to the first JCC meeting, where it was also approved.

3.3 Selection of Main and Deputy Project Managers and C/P Staffs

The main and deputy PM and C/P members were announced by MOT in the first JCC on 7 May 2021. The RD signed on 23 March 2020 mentioned that the PM would be the deputy permanent secretary, and the deputy PM would be the director of TSOC. However, the deputy permanent secretary of MOT was also the director of TSOC at the beginning of the Project. Therefore, the deputy permanent secretary was appointed as both PM and deputy PM of the Project until his retirement in September 2022.

The new director of TSOC was assigned in October 2022 and, in the same month, was appointed as PM and deputy PM. This was approved in the fourth JCC in January 2023. Furthermore, the next director of TSOC was appointed in March 2024, then as PM and deputy PM of the Project after that month.

3.4 JCC

The JCC convened to monitor the progress of activities and make critical decisions for the Project. Over the course of the Project, six JCC meetings took place. The permanent secretary of MOT chaired the meetings.

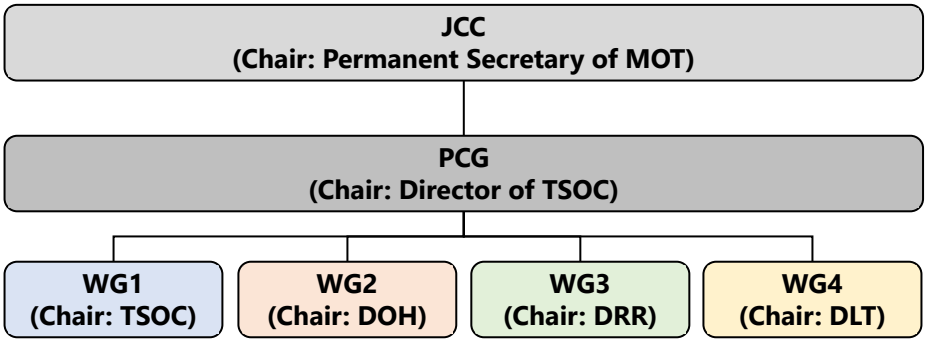
Table 3.4.1 List of JCC Meetings

#	Date	Main Topics
First	7 May 2021	· Confirmation of Work Plan · Selection of PM, deputy PM and counterpart members · Selection of the pilot provinces · Confirmation of the objectively verifiable indicators on Project Design Matrix (PDM)
Second	25 November 2021	· Extension of the project period · Modification of the project implementation structure · Explanation of the action plan from each WG · Report of the progress of activities · Submission and approval of monitoring sheet version 2
Third	9 June 2022	· Function of TSOC in the project · Report of the progress of activities · Cooperation with other agencies to accelerate traffic accident data sharing · Agreement of establishment of a common traffic accident data format in MOT · Agreement of provision of trainings for RTP · Submission and approval of monitoring sheet version 3
Fourth	18 January 2023	· Modification of the project implementation structure · Report of the progress of activities · Outline of the first training in Japan · Submission and approval of monitoring sheet version 4
Fifth	18 October 2023	· Direction of establishment of TSOC · Cooperation with organizations other than MOT · Confirmation of a term of “the areas intervened by the project” on PDM · Report of the delay of activities to improve New-TRAMS and the delay of implementation of the pilot project and alternative actions in Output 2 · Outline of the first training in Japan · Submission and approval of monitoring sheet version 5
Sixth	21 June 2024	· Evaluation result of the project activities · Submission and approval of the final report

Source: JET

3.5 PCG

The PCG was established between JCC and the Working Groups (WG). Its purpose was to share the progress of activities and discuss common issues with the project members. Throughout the Project period, five meetings were held, with the Director of TSOC as the chair.



Source：JET

Figure 3.5.1 Structure of each Committees and Meetings

Table 3.5.1 List of PCG Meetings

#	Data	Topics
First	23 December 2020	· Explanation and discussion on Work Plan
Second	11 March 2021	· Selection of the pilot provinces · Report of the progress of activities by each WG
Third	26 April 2021	· Report of the progress of activities by each WG · Discussion and clarification of topics in the first JCC
Fourth	14 October 2021	· Report of the progress of activities by each WG · Demarcation of traffic safety education activities in MOT · Confirmation of extension of the project period due to delay of the activities by COVID-19 pandemic
Fifth	14 March 2022	· Report of the progress of activities by each WG · Confirmation of the objectively verifiable indicators on PDM · Outline of the seminar · Outline of the first training in Japan

Source：JET

	
The First PCG Meeting	The Second PCG Meeting
	
The Fourth PCG Meeting	The Fifth PCG Meeting

Source：JET

Figure 3.5.2　Photos of PCG Meeting

Since 2023, monthly and follow-up meetings have been held instead of the PCG meeting. The monthly meetings focused on progress updates from each WG as reported by WG leaders from the Thai C/Ps. The follow-up meetings focused on progress monitoring and discussing issues between TSOC and JET.

Table 3.5.2　List of Monthly Meeting and Follow Up Meeting

Meeting	Date
First Monthly Meeting	11 January 2023
Second Monthly Meeting	8 February 2023
Third Monthly Meeting	13 March 2023
Fourth Monthly Meeting	4 April 2023
First Follow Up Meeting	26 April 2023

Second Follow Up Meeting	3 May 2023
Fifth Monthly Meeting	10 May 2023
Sixth Monthly Meeting	12 June 2023
Third Follow Up Meeting	23 June 2023
Seventh Monthly Meeting	12 July 2023
Fourth Follow Up Meeting	26 July 2023
Eighth Monthly Meeting	9 August 2023
Fifth Follow Up Meeting	25 August 2023
Nineth Monthly Meeting	13 September 2023
Sixth Follow Up Meeting	28 September 2023
Tenth Monthly Meeting	11 October 2023
Seventh Follow Up Meeting	2 November 2023
Eleventh Monthly Meeting	6 November 2023
Eighth Follow Up Meeting	1 December 2023
Twelfth Monthly Meeting	10 January 2024
Nineth Follow Up Meeting	24 January 2024
Thirteenth Monthly Meeting	8 February 2024
Tenth Follow Up Meeting	1 March 2024

3.6 Technical WG

Four working groups were established to implement the activities for each output in this project, as shown in Figure 3.5.1. TSOC chairs WG1, DOH chairs WG2, DRR chairs WG3, and DLT chairs WG4. The contents of activities in each WG are described in Chapters 4 to 7.

3.7 Selection of Pilot Provinces

The project team comprises several organizations, including TSOC, ICTC, OTP, DOH, DRR, DLT, and RTP. All members are responsible for traffic safety. In order to establish a cooperative system with other organizations in traffic safety activities, pilot provinces were selected through discussions with project members during the PCG meeting as a "practice of cooperation."

The themes for each year were set for the shortlisting of provinces, and the analytic hierarchy process (AHP) was applied to select the pilot provinces from the shortlist. The themes and criteria for the selection of pilot provinces are shown in Table 3.7.1.

Table 3.7.1 Themes and Criteria for the Shortlisting of Provinces

Item	First Year	Second Year	Third Year
Theme	Serious accidents	Motorcycle accidents	Road users' behavior and traffic safety education
Criteria for the Shortlist	· Among the top 10 provinces based on the number of black spots · Within 200 km from Bangkok	· Among the top 10 provinces based on the number of motorcycle accidents per population · Within 200 km from Bangkok	· Among the top 10 provinces based on the number of traffic accidents per population
Shortlisted Provinces	· Nakhon Ratchasima · Suphan Buri · Nakhon Sawan · Kanchanaburi	· Nakhon Ratchasima · Suphan Buri · Nakhon Sawan	· Nakhon Ratchasima · Chon Buri · Suphan Buri · Tak · Ayutthaya · Chiang Mai · Surat Thani · Pathum Thani · Samut Sakhon · Songkhla

Source: JET

A questionnaire survey was carried out with DOH, DRR, and DLT, the main organizations for the pilot projects' implementation, to weigh the criteria on the shortlisted provinces. The evaluation results, as shown in Table 3.7.3 to Table 3.7.5, indicate that Suphan Buri Province ranked the highest in the first year. However, DRR requested to avoid Suphan Buri due to difficulties securing the budget for the province in the first year. Consequently, after further discussions in the PCG meeting, Nakhon Ratchasima, which ranked second in the AHP, was selected as the pilot province for the first year. Suphan Buri Province was selected for the second year, and Samut Sakhon for the third year. Table 1.3.1 shows the selected pilot provinces.

Table 3.7.2 Criteria for Selection of Pilot Provinces

Criteria	First Year	Second Year	Third Year
Emergency	Number of black spots	Number of motorcycle accidents per population in the province	Number of traffic accidents per population

Necessary	Population of the province	Population of the province	Population of the province
Effect	Capacity and ability of the provincial office in each organization	Capacity and ability of the provincial office in each organization	Capacity and ability of the provincial office in each organization

Source：JET

Table 3.7.3 Evaluation Results of Candidate Provinces in the First Year by AHP

Province (Shortlist)	Criteria			Result	Rank
	Number of Black Spot	Population	Capacity and Ability		
Weight	0.209	0.069	0.723		
Suphan Buri	0.082	0.011	0.208	0.301	1
Nakhon Ratchasima	0.055	0.033	0.181	0.269	2
Nakhon Sawan	0.059	0.013	0.190	0.262	3
Kanchanaburi	0.012	0.011	0.145	0.168	4

Source：JET

Table 3.7.4 Evaluation Results of Candidate Provinces in the Second Year by AHP

Province (Shortlist)	Criteria			Result	Rank
	Number of Motorcycle Accidents per Population	Population	Capacity and Ability		
Weight	0.364	0.084	0.552		
Suphan Buri	0.213	0.016	0.216	0.444	1
Nakhon Sawan	0.089	0.020	0.190	0.298	2
Nakhon Ratchasima	0.062	0.049	0.147	0.258	3

Source：JET

Table 3.7.5 Evaluation Results of the Candidate Provinces in the Third Year by AHP

Province (Shortlist)	Criteria			Result	Rank
	Number of Traffic Accidents per Population	Population	Capacity and Ability		
Weight	0.371	0.088	0.541		
Samut Sakhon	0.077	0.004	0.060	0.142	1
Suphan Buri	0.049	0.006	0.063	0.118	2
Chiang Mai	0.033	0.012	0.072	0.117	3
Chon Buri	0.034	0.011	0.066	0.111	4
Ayutthaya	0.053	0.006	0.052	0.110	5
Nakhon Ratchasima	0.021	0.018	0.058	0.097	6
Tak	0.039	0.005	0.043	0.087	7
Songkhla	0.021	0.010	0.043	0.074	8
Surat Thani	0.020	0.007	0.046	0.073	9
Pathum Thani	0.024	0.008	0.037	0.070	10

Source：JET

3.8 Monitoring

Monitoring the progress of the Project was carried out using a monitoring sheet every six months. The modification of the PDM was discussed and agreed upon in the JCC meetings, as shown in Table 3.8.1.

Table 3.8.1 Main Updated of PDM

Confirmed by	Updated Points
First JCC	· Setting of the objectively verifiable indicators of Outputs 2, 3 and 4. · An objectively verifiable indicator of Output 1 was updated from "X cases of in-depth accident analysis" to "6 cases of in-depth accident analysis including motorcycle accidents are implemented."
Second JCC	· Setting of the objectively verifiable indicators of Output 1.
Third JCC	· Clarification of the objectively verifiable indicators of Output 1.

Fourth JCC	· N/A
Fifth JCC	· Confirmation of the term "the area intervened by project" of the objectively verifiable indicator of the project purpose.
Sixth JCC	· Confirmation of the achievement of the objectively verifiable indicators.

Source：JET

3.9 Seminars

The first seminar was on 9 September 2022 at the Royal Princess Larn Luang in Bangkok. Seventy persons attended in person, while 230 attended online. Most attendees were from the provincial offices of DOH, DRR, and DLT.

Presentation

Presenters and Main Attendees

Figure 3.9.1 Photos of the First Seminar

The attendees were requested to answer a questionnaire survey to evaluate the seminar's program, and 51 responded. Ninety-six percent had positive responses. The shares of interest in Outputs 1 to 4 are mostly even.

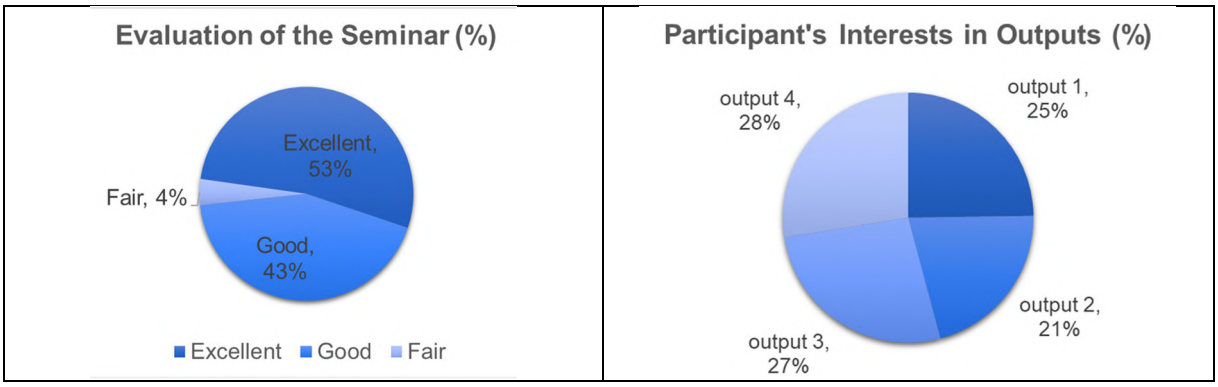


Figure 3.9.2 Result of Evaluation Questionnaire

The following comments, such as "necessary of one traffic accident database," "necessary of cooperation with residents," and "increasing of opportunity of traffic safety education," which are in line with the project activities, were provided.

- Accident data should come from a single source and follow one standard.
- The target number of 700,000 high school students per year participating in the safe driving training course is quite high.
- Community cooperation is needed.
- Thai citizens do not receive traffic safety education regularly. A more frequent education program is needed.

On 17 June 2024, the second seminar took place at the Royal Princess Larn Luang in Bangkok. It focused on presenting the activities and technical documents to related organizations. There were 50 in-person attendees and 30 online. Most attendees were from offices of MOT, TSOC, ICTC, DOH, DRR, DLT, and RTP.

Presentation

Presenters and Main Attendees

Figure 3.9.3 Photos of the Second Seminar

Table 3.9.1 Agenda for the Second Seminar

Agenda	
1:00 PM	**Registration**
1:30 PM	**1-1. Opening Remarks** Mr. Wittaya Yamuang, Deputy Permanent Secretary, MOT
1:35 PM	**1-2. Opening Remarks** Japan International Cooperation Agency (JICA) Thailand Office
1:40 PM	**2. Keynote Speech** Pro. Atsushi Fukuda, Advisor of JICA Project
2:10 PM	**3. Outline of the Project** Mr. Michimasa Takagi, JET
2:20 PM	**4. Improvement of Traffic Accident Database and Utilization of Database** Mr. Tetsushi Irie, JET
2:40 PM	**5. Black Spots Improvement and Good Practice Manual** Mr. Takeshi Matsunuma, JET
3:00 PM	**6. Result of Training Tours in Japan** Representatives from Training Tour Member
3:25 PM	**Coffee Break**
3:40 PM	**7. Comprehensive Road Safety Program** Mr. Hisanari Ushirooka, JET
4:00 PM	**8. Improvement of Driving License Handbook and Textbook** Mr. Kenshiro Tanaka, JET
4:20 PM	**9. Transport Safety Manager System and its Guideline** Mr. Manabu Ono, JET
4:40 PM	**10 Discussion** (Moderator: MOT)
5:00 PM	**11. Closing Remarks** Mr. Wittaya Yamuang, Deputy Permanent Secretary, MOT

3.10 Training in Japan

The Training in Japan in 2021 and 2022 were canceled due to COVID-19, but instead were held in November 2023 and May 2024.

The outlines of the first training in November 2023 and the second in May 2024 are shown in the table below.

Table 3.10.1 Outline of the First Training in Japan

Purpose	・ To deepen the understanding of the various activities implemented in the Project, especially i) traffic accident data collection and analysis, ii) engineering measures, and iii) implementation of the PDCA cycle through the participation of residents ・ To acquire practical skills in reducing fatalities in traffic accidents in Thailand by

	learning about traffic safety measures and participating in activities conducted by related organizations in Japan. ・ To examine ways of cooperation with relevant organizations to realize traffic safety through discussions with participants from other organizations during the training period.
Duration	8 to 21 November 2023 (13 nights) (Preliminary online lectures were conducted on 31 October and 1 and 2 November 2023)
Participant	9 persons (1 from TSOC, 2 from ICTC, 2 from DLT, 2 from DOH, and 2 from DRR)
Contents (lecturer or site)	・ Road Safety Audit in Japan (Prof. Kobayakawa, Nihon University) ・ Traffic safety measures by using big data in the case of Funabashi City (Funabashi City) ・ Site visit of national roads (National Road [NR] 357, NR 14, and NR 51) where Road Safety Audit were conducted, and a black spot was treated) ・ Workshop on visualization of traffic accident data ・ Site visit of community roads (Narashinodai area and Yakuendai area, Funabashi City) ・ Traffic accident data collection and analysis (ITARDA) ・ Traffic safety measures on national/prefectural roads (Lecture by Mr. Furuki and site visit of Ageo Road, Zone 30 Plus in Saitama City, and "Jiko Zero Plan")

Table 3.10.2 Outline of the Second Training in Japan

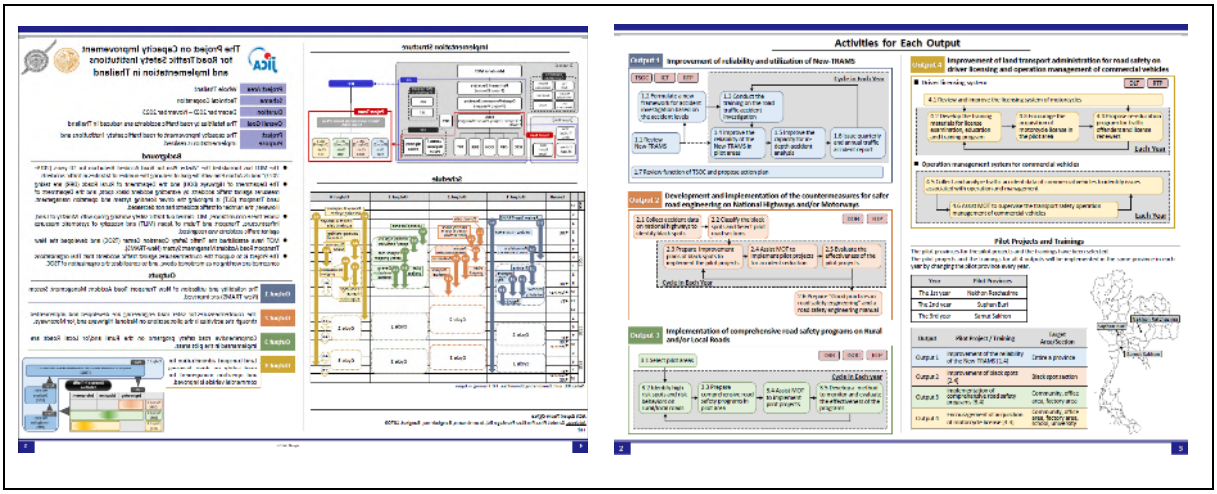
Purpose	・ To deepen the understanding of the various activities implemented in the Project, especially the driving license system and transport safety management, and acquire practical skills for reducing fatalities in traffic accidents in Thailand by learning traffic safety measures and participating in activities conducted by related organizations in Japan. ・ To examine ways of cooperation with relevant organizations to realize traffic safety through discussions with participants from other organizations during the training period.
Duration	15 to 29 May 2024 (14 nights) (Preliminary online lectures were conducted on 13 and 14 May 2024)
Participant	10 persons (2 from TSOC, 1 from ICTC, 6 from DLT, and 1 from OTP)
Contents (site)	・ Aptitude test and guidance lectures for safe operation of commercial vehicles (National Agency for Automotive Safety and Victims' Aid) ・ Operation management by truck operator (1) (Aoba Transport Co., Ltd.) ・ Operation management by truck association (Japan Trucking Association)

	・ Operation management by bus operator (1) (Airport Transport Service Co., Ltd.) ・ Operation management by truck operator (2) (Nishitetsu Logistics Co., Ltd.) ・ Operation management by truck operator (3) (Yuki Transport and Warehousing Co., Ltd.) ・ Safe Driving Training for Individuals and corporates (Honda Traffic Education Center Rainbow Saitama) ・ Training and Practical Test at Private Driving School (1) (Honda Rainbow Motor School Wako) ・ Training and Practical Test at Private Driving School (2) (Smart Driver School Tokorozawa Chuo) ・ Operation management by bus operator (Keio Dentetsu Bus Co., Ltd.) ・ Utilization of ICT for operation management (YAZAKI Corporation) ・ Data analysis of traffic accidents by commercial vehicle (Institute for Traffic Accident Research and Data Analysis)

3.11 Public Relation

3.11.1 Project Brochure

The project brochure shows the project purpose, outputs 1 to 4 outline, the pilot project outline, the implementation structure, and the implementation schedule in English and Thai. This brochure was used in meetings with other organizations to explain the project.



Source：JET

Figure 3.11.1 Project Brochure

3.11.2 PR for Seminar

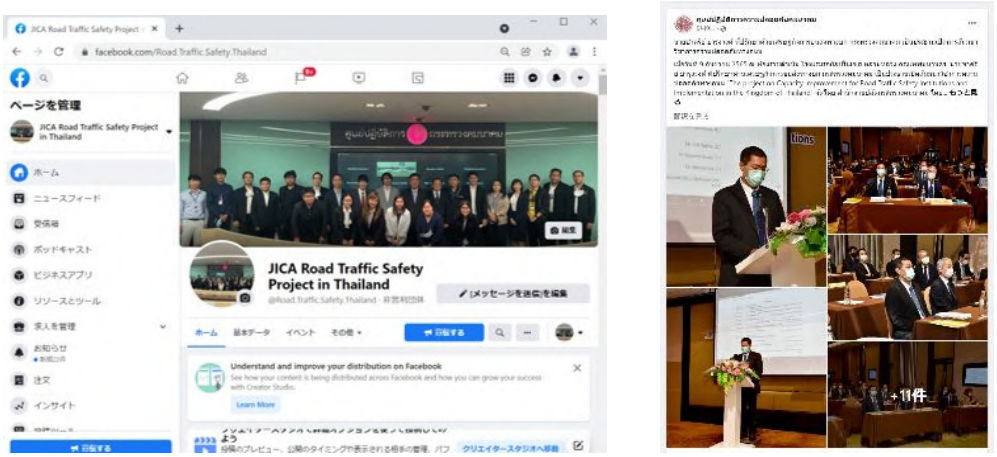
Banners and flyers for the seminars were prepared for the participants.

Figure 3.11.2 Design of Banners for the First Seminar

3.11.3 PR for the Project Activities

(1) Facebook Page (JET and TSOC)

The project activities were shared on the Facebook Pages of the Project and TSOC. The Project's Facebook Page is at this link: https://www.facebook.com/Road.Traffic.Safety.Thailand and TSOC's Facebook Page is accessible here: https://www.facebook.com/profile.php?id=100069022156073.



Source: JET

Figure 3.11.3 Example of Facebook Page

(2) Project Website

The Project's website was launched to disseminate basic knowledge of traffic rules and regulations in Thailand. Additionally, it provides an overview of the Project and the most up-to-date schedule of events.

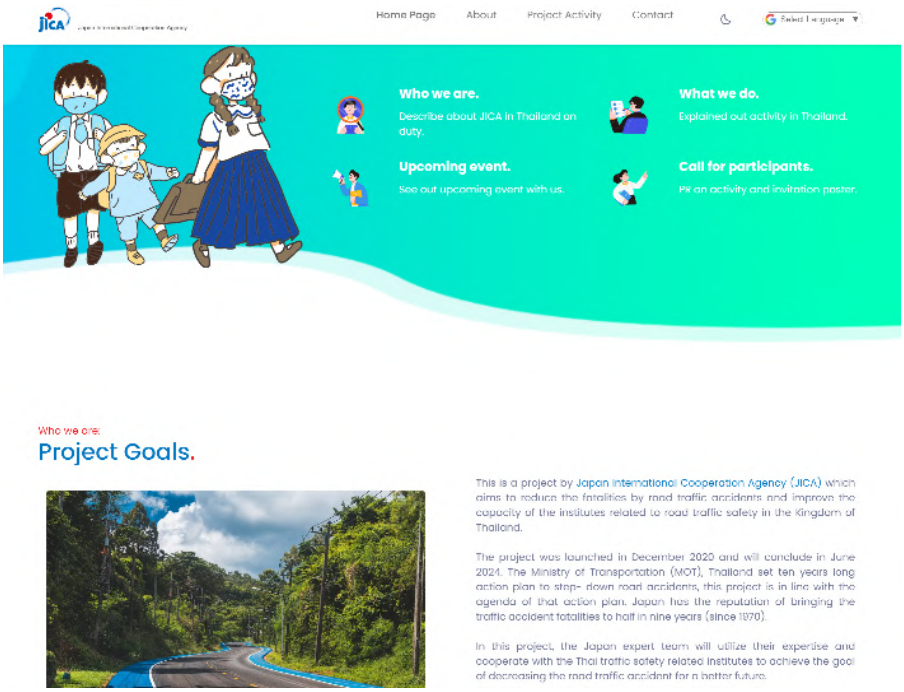


Figure 3.11.4 Project Website

3.11.4 PR for the Pilot Project

When each WG implemented the pilot projects, the corresponding PR activities were also carried out. A traffic safety awareness activity was conducted in Prachin Buri Province as part of a pilot project of WG2. In WG3, the traffic safety campaigns were conducted in the pilot projects in three pilot provinces. The campaigns featured flyers and message boards displaying traffic safety slogans, encouraging behavioral change among road users. Further details about the PR activities will be provided in the subsequent chapters.

3.12 Preparation of Project Concretion Report

The project completion report details the project activities, achievement of the objectively verifiable indicators, and recommendations for other projects. This report was presented to Thai C/Ps and submitted to the JICA Thai office.

4 The Reliability and Utilization of New Transport Road Accident Management System (New-TRAMS) are Improved (Output 1)

4.1 Outline

Output 1 comprises seven activities in the PDM. Its objective verifiable indicators are shown in Table 4.1.1.

Table 4.1.1 Objective Verifiable Indicators of Output 1

1-1: The difference between the New-TRAMS and MOPH data on road fatalities is retained within 10%.
1-2: In addition to the number of road fatalities, the New-TRAMS contains the necessary items such as accident location, accident pattern, collision diagram, driver's behavior, etc.
1-3: Six cases of in-depth accident analysis, including motorcycle accidents, are implemented.

4.2 Record of Meetings

Under the chairmanship of TSOC, there were fourteen WG1 meetings with participants from ICTC, OTP, DOH, DRR, DLT, and RTP. Additionally, individual consultations with external entities, such as Road Accident Victims Protection Company Limited (RVP) and MOPH, were conducted to ascertain the status of New-TRAMS.

Since July 2021, TSOC staff and JET members of WG1 had consistent weekly meetings to enhance the capabilities of TSOC staff. The record of WG1 meetings and consultations with various agencies are compiled in Table 4.2.1.

Table 4.2.1 Record of Meetings (WG1)

Date	Meeting / Organization	Contents
2020		
13 November	Meeting with TSOC	· Confirmation of TSOC's role and structure
2021		
27 January	1st WG meeting (Joint of WG1, WG2, WG3, WG4)	· Presentation of the implementation contents and schedule of each WG · Confirmation of each WG chairperson · Confirmation of the schedule of the next WG
15 February	2nd WG1 meeting	· Status of Thailand's accident database (New-TRAMS) · Recent accident occurrence situation in Japan
26 March	3rd WG1 meeting	· Overview of accident data management (DOH, DRR, DLT)

Date	Meeting / Organization	Contents
		in Thailand · Introduction to accident data management in Japan
1 April	RTP (Bang Yi Khan Police Station) Interview	· How to conduct a traffic accident investigation · How to conduct traffic enforcement
30 April	Meeting with RTP	· Activities of Japanese police officers
13 May	4th WG1	· Institute for Traffic Accident Research and Data Analysis (ITARDA)'s activities · RTP traffic accident data management · New-TRAMS data items
18 May	Meeting with DLT	· Understanding the status of DLT's accident/ license/vehicle registration database
19 May	Meeting with DRR	· Collection of DRR accident data and understanding of the status of accident investigation
20 May	RTP Highway Police	· Understanding the status of traffic accident investigation activities by the Highway Police
28 May	Meeting with DOH	· Understanding the status of the DOH accident database and issues and expectations for utilizing New-TRAMS
23 June	Meeting with ICTC	· Confirmation of New-TRAMS system · Understanding the issues of New-TRAMS improvement from the system administrator side
30 June	5th WG1 meeting	· Flow of traffic accident investigation by Japanese police · Meeting on accident investigation training in pilot provinces
20 July	Meeting with DOH	· Update of Highway Accident Information Management System (HAIMS) database
20 July	Meeting with DOH and consultant of HAIMS	· Interview and exchange of opinions regarding the HAIMS update that DOH is currently working on
5 August	6th WG1 meeting	· Review of New-TRAMS · Request for information to police in pilot prefectures
19 August	Meeting with RVP	· About RVP's accident data · Request from RVP to provide further accident data to New-TRAMS
27 August	Meeting with RTP	· Information sharing between the RTP accident database and New-TRAMS · Memorandum of Understanding (MOU) regarding the provision of accident data for RTP and MOT
2 September	Meeting with Mitsui Sumitomo Insurance Thailand Branch	· Thailand's traffic accident insurance system
21 September	Meeting with DOH and DRR (sub-WG1)	· Collision type (Accident code) in an accident report · About the common accident report
8 October	Meeting with RVP sub-WG1)	· Status of the New-TRAMS · Request for additional items from RVP's accident database and the necessity of updating the MOU
8 October	7th WG1 meeting	· Introduction to ongoing efforts regarding MOPH's accident database

Date	Meeting / Organization	Contents
		· Introduction of TSOC's efforts towards MOPH
23 November	Meeting with TSOC advisor	· Confirmation of action plans and JCC materials related to WG1 activities with TSOC advisors
25 November	Meeting with ICTC	· Request for cooperation in improvement activities regarding the accident database to the new ICTC director and person in charge
3 December	Meeting with ICTC	· Request for organizing New-TRAMS data by road · Data screening
3 December	Meeting with DLT	· B-TAIMS (DLT accident data) · Possibility of linking with vehicle registration and license registration data
7 December	Meeting with DRR	· Basic data items of accident records · Status of duplicate data screening
8 December	Meeting with DOH	· Basic data items of accident records · Status of duplicate data screening
15 December	Meeting with RVP	· Checking of the status of data provided by RVP · How to proceed with the MOU conclusion for continuous data provision
15 December	Meeting with DOH	· Exchange of opinions regarding project evaluation indicators
16 December	8th WG1 meeting	· New-TRAMS current data and macro analysis · Basic data items (draft)
2022		
12 January	Meeting with Pasco Company	· Pasco's proposal for accident database, etc., to TSOC
17 February	Meeting with MOPH and National Institute for Emergency Medicine (NIEM)	· Confirmation of MOPH data currently provided to New-TRAMS · Provision of personal information for accident data screening (license plate, personal ID number, etc.)
23 February	Meeting with TSOC advisor	· Confirmation of consultation schedule with TSOC and RTP
24 February	Meeting with DLT Information Bureau (ICTC)	· Outline explanation of the JICA project · Vehicle registration in the Japanese accident database · Explanation of the integration status of driver's license data · Meeting on linking New-TRAMS and DLT-managed vehicle registration and driver's license data
25 February	9th WG1 meeting	· About PDM evaluation indicators (overall goal, project goal, outcome) · Shared the status of WG1 activities based on the action plan
9 March	Meeting with RTP	· RTP request for cooperation in this project
4 April	Meeting with RTP	· Sharing of current situation of traffic police and · Consideration of policy regarding future training activities
10 May	Meeting with DOH	· Monitoring indicators · Duplicate data screening
17 May	10th WG1 meeting	· What was confirmed and understood through local

Date	Meeting / Organization	Contents
		activities by traffic police and JET members · Accident investigation and accident data collection activities
24 May	Meeting with ICTC	· Duplicate data screening process
30 May	Meeting with DOH	· Screening for duplicate data
16 June	Meetings with system developer, ICTC, and TSOC	· Confirmed and requested a meeting with New-TRAMS system developer regarding duplicate data screening process
17 June	Meeting with RTP	· Future activity plans with RTP
20 June	Meeting with the next TSOC director	· Procedures for formal approval at DRR with Dr. Chakree and TSOC
21 June	Meeting with RTP	· ITARDA and Japan's data analysis usage examples to the RTP Accident Reduction and Prevention Committee Chairman, and discussing activities with RTP
22 June	Meeting with TSOC advisor	· Utilization of accident database · Contents and implementation method of the first seminar
27 June	Meeting with RTP	· Hearing with the data team · Discussion current issues and future policies
14 September	Meeting with EXAT	· EXAT accident data and database (TFP) · Exchange of opinions on the concept of an integrated accident database within MOT
15 September	11th WG1 meeting	· Duplicate data screening (ICTC, DOH, DRR) · About the concept of an integrated accident database within MOT
15 September	RTP high official visit	· Greetings to the Deputy Commissioner of the National Police Agency and request for cooperation in the project
2 September	Meeting with MOT advisor	· Greetings to Dr. Chuck Lee and exchange of opinions on WG1 activities
23 September	Meeting with ICTC	· How to proceed with the screening for duplicated accident data · Concerns regarding the integrated accident database within MOT, system configuration
27 September	Meeting with TSOC	· Comparative analysis of DOH and DRR data from the perspective of first party, accident cause, and road shape using New-TRAMS data
2 November	Meeting with TSOC	· Progress of WG1 to the new director of TSOC
7 November	Meeting with TSOC	· Training on preparing quarterly/annual reports, etc.
7 November	Meeting with R TP	· Training for RTP · Meeting with Mr. Suriyan
8 November	Courtesy visit to RTP	· Courtesy visit to RTP Deputy Director
10 November	Meeting with TSOC	· Training on preparing quarterly/annual reports, etc.
15 November	Meeting with TSOC	· Interview with Mr. Sujin about how to proceed with future projects. · Training on preparing quarterly/annual reports, etc.
29 November	Meeting with RTP	· Reduction of accidents with training for RTP. · Report to Chairman Werecat of the subcommittee and discuss future activities with RTP

Date	Meeting / Organization	Contents
		· considerations for activities with Mr. Suriyan and RTP
7 December	Meeting with TSOC	· Exchange of opinions on WG1 activities with new TSOC Director · Two ICTC members also participated.
8 December	12th WG1 meeting	· Detailed analysis of traffic accident data · New-TRMS seen from accident data analysis
8 December	Meeting with RTP	· Requests from RTP, such as holding accident data analysis seminars
9 December	Meeting with TSOC	· Detailed explanation meeting of the accident data system Road Accident Investigation (RAI) started by TSOC Director
13 December	Meeting with DOH WG1 members	· Confirmation of screening work status for duplicate accident data · Concept of ICTC creation of MOT integrated accident database
15 December	Meeting with DRR WG1 members	· Confirmation of screening work status for duplicate accident data · Concept of ICTC creation of an integrated accident database as MOT
16 December	Meeting with RTP	· Meeting regarding accident data with Major General Weerapaht, Mr. Sriyan, Ms. Duangredy, and six other members of the RTP Traffic Accident Prevention and Mitigation Subcommittee (explanation of additional record data request items, accident data sharing) · Schedule of the accident data analysis seminar.
16 December	Meeting with TSOC	· AI system review results to TSOC advisors and staff · Concept of ICTC creation of MOT integrated accident database
19 December	Meeting with ICTC	· Confirmation of screening work status for duplicate accident data · Concept of ICTC creation of MOT integrated accident database
20 December	Meeting with TSOC	· AI system review report from JET · About MOT integrated accident database · Exchange of opinions regarding RTP meeting report and accident data analysis seminar holding policy
2023		
11 January	6th PCG Meeting	· Confirmation of activity progress of each WG · Confirmation of training preparation schedule in Japan
8 February	7th Monthly Meeting	· Checking of progress of activities
23 February	1st Accident Data Analysis Workshop for RTP	· Japanese examples of traffic accident data and data analysis · Accident data handled by Thai police
16 March	Meeting with TSOC Director	· Meeting regarding general WG1 activities
17 March	Meeting with JICA HQs and Thailand Office	· Sharing the details of the meeting with the Director of TSOC

Date	Meeting / Organization	Contents
21 March	ICTC and New-TRAMS developers	· Meeting with the Thai side for an explanation of the response policy for the budget of the year for the New-TRAMS
23 March	Meeting with JICA Thailand Office	· Training in Japan · Explanation of WG1 activities to the Thailand office
30 March	Meeting with ICTC	· Explanation and meeting of proposal documents from JET regarding the New-TRAMS update plan
30 March	13th WG1 meeting	· Detailed accident data analysis (Songkran analysis) · Explanation from ICTC about current plans for New-TRAMS updates
31 March	JICA Thailand Office	· Report to the Thailand Office and Mr. Endo regarding WG1 activities, etc., during this stay in Thailand
5 April	9th Monthly Meeting	· Checking of progress of activities
26 April	1st Follow -up Meeting	· Confirmation of issues in implementing activities
10 May	10th Monthly Meeting	· Checking of progress of activities
12 May	14th WG1 meeting	· Accident investigation program content of RTP training · Regarding the development status of the accident database promoted by RTP
31 May	2nd Follow-up Meeting	· Confirmation of issues in implementing activities
12 June	11th Monthly Meeting	· Checking of progress of activities
23 June	2nd Accident Data Analysis Workshop (MOT staff)	· Status and utilization of New-TRAMS data · Accident data analysis in Japan
23 June	3rd Follow-up Meeting	· Confirmation of progress of activities and issues in implementing activities
12 July	12th Monthly Meeting	· Checking of progress of activities
26 July	4th Follow-up Meeting	· Confirm the progress of activities and issues in implementing activities
8 August	Meeting with TSOC	· Checking of progress and updates · Monthly meeting materials
9 August	13th Monthly Meeting	· Checking of progress of activities
17 August	TSOC Director Meeting	· Description of RAI data analysis in TSOC
25 August	5th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
29 August	Meeting with TSOC	· Checking of progress and updates · Explanation of New-TRAMS and RAI data analysis results from JET
13 September	14th Monthly Meeting	· Checking of progress of activities
26 September	6th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
11 October	15th Monthly Meeting	· Checking of progress of activities
18 October	5th JCC	· Activity progress report · Checking the progress of TSOC approval procedures · Confirmation of future cooperation with institutions other than MOT · Checking the need for PDM updates
18 October	Meeting with ICTC	· Regarding New-TRAMS improvements and update

Date	Meeting / Organization	Contents
		schedule
20 October	Meeting with TSOC	· Common accident format and RAI improvement points
31 October	Meeting with DOH	· HAIMS update status, accident common form
2 November	7th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
6 November	16th Monthly Meeting	· Checking of progress of activities
1 December	8th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
12 December	Meeting with RTP	· Meeting about data analysis workshop for RTP
14 December	Meeting with RTP	· Meeting about data analysis workshop for RTP
18 December	Visit to Huai Yang Provincial Police	· Interview with local police regarding the investigation of a bus accident that occurred on December 5th
21 December	2nd Accident Data Analysis Workshop for RTP	· 2nd Data analysis workshop held at RTP HQ for RTP officers
2024		
10 January	17th Monthly Meeting	· Checking of progress of activities
17 January	Meeting with DRR WG1 members	· Discussion about the common accident record form
24 January	8th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
25 January	Meeting with TSOC Director	· In-depth Analysis and Outcome 1 Metrics
8 February	18th Monthly Meeting	· Checking of progress of activities
16 February	Online training for Accident investigation and in-depth accident analysis (MOT staff)	· Explanation of accident investigation by Japanese police · Case study of ITARDA detailed accident analysis · Questions and opinions exchange. 30 MOT staff.
27 February	9th Follow-up Meeting	· Confirmation of the progress of activities and issues in implementing activities
5 March	Meeting with TSOC	· Discussion on Common Accident form
28 March	Meeting with TSOC	· Confirmation on Common Accident form · New-TRAMS data and MOPH, DDPM data
3 April	Meeting with TSOC	· Confirmation on Common Accident form · Discussion on Objective Verifiable Indicators
9 to 10 May	3rd Accident Investigation and Data Analysis Workshop for RTP	· Contributing factors (road, vehicle, human) · Onsite investigation · Traffic accident analysis · Accident influential factors · Group discussion

Source: JET

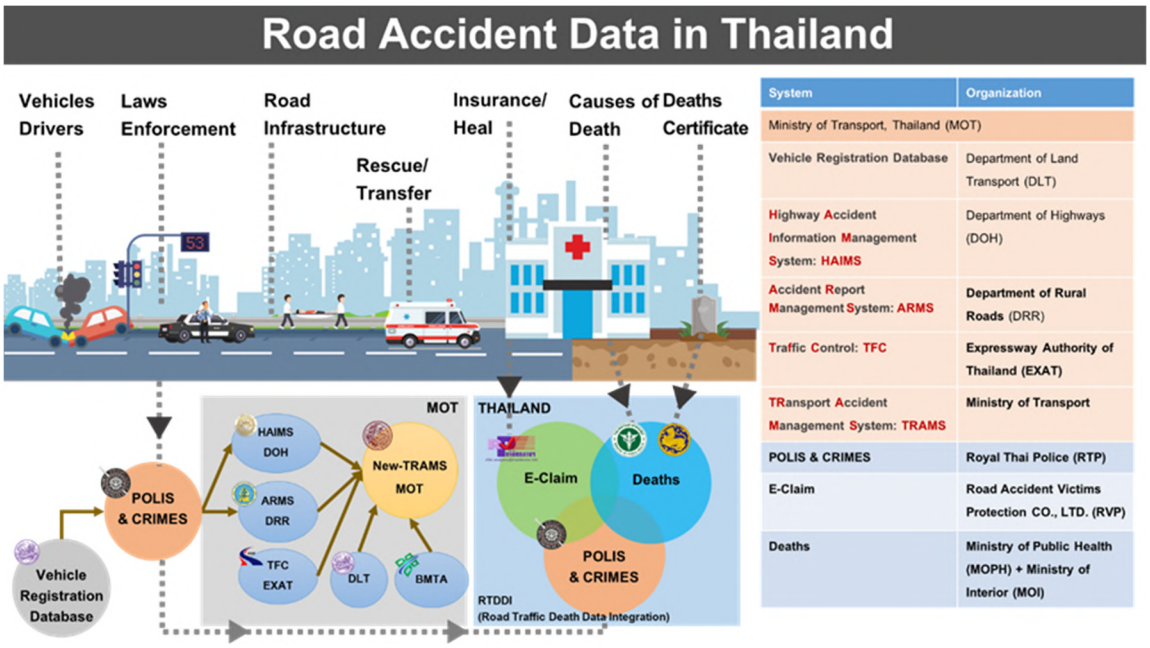
4.3 Activities

4.3.1 Review of the New Transport Road Accident Management System (New-TRAMS)

(1) Current Status of New-TRAMS

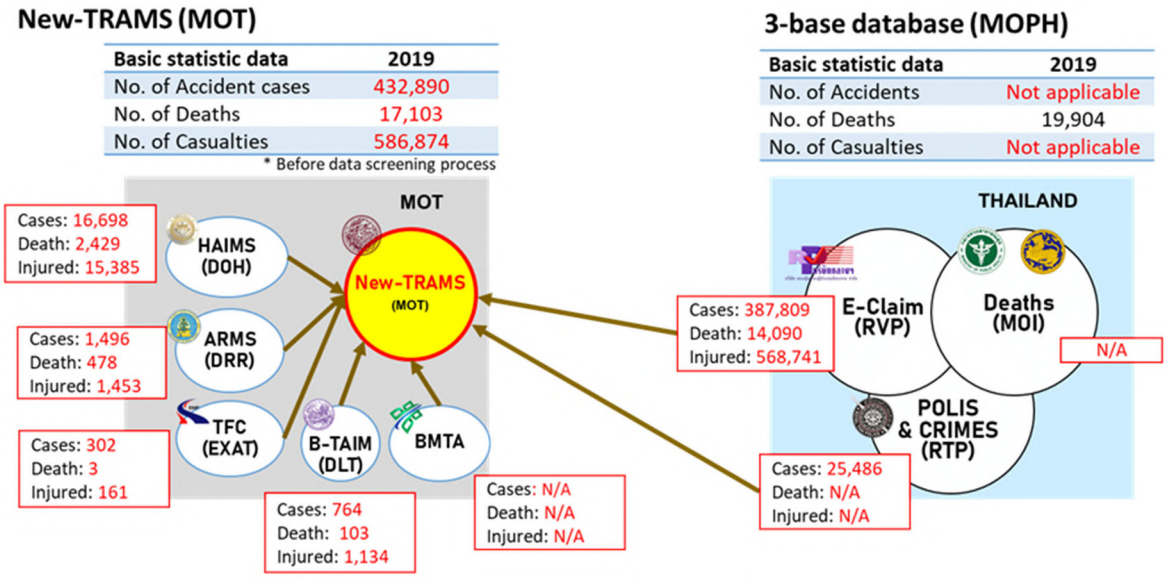
The statistical data on the number of traffic accident fatalities across Thailand is reported to the WHO based on three foundational datasets (3-Base Database) which is organized by the MOPH. The 3-Base Database is created using information from RTP, RVP, and MOPH (including data from the MOI) to ascertain the number of traffic accident fatalities. The 13-digit Personal ID number of Thai nationals eliminates duplicate data among these datasets.

On the other hand, the New-TRAMS traffic accident database of the MOT is currently intended to utilize data from DOH, DRR, DLT, EXAT, as well as RTP, RVP, and the National Institute for Emergency Medicine (NIEM) under MOPH. However, as of the end of 2022, there are instances where the cooperation systems, both quantitative and qualitative (data items), are not sufficiently established. TSOC is actively working to finalize agreements through a Memorandum of Understandings (MOUs) or official documents (official letters) with related government agencies other than those under MOT, but no undertakings were concluded during the project period. Specifically, the 2019 data from RTP only contains the geographic coordinates (latitude and longitude), representing approximately 25% of the total data, and lacks differentiation between data on fatal and non-fatal injury accidents.



Source: TSOC

Figure 4.3.1 Various Traffic Accident Databases in Thailand



Source: JET

Figure 4.3.2 Differences between New-TRAMS (MOT) and the 3-Base Data (MOPH)

Table 4.3.1 Comparison between New-TRAMS and 3-Base Data

		Database	Utilization in New-TRAMS	Utilization in 3-Base Data	Remarks
MOT	DOH	HAIMS	✓	✘ Due to limited personal ID information.	70% of the original data is from police notes.
	DRR	ARMS	✓	✘ Due to limited personal ID information.	90% of the original data from police notes.
	DLT	B-TAIM	✓	✘ Due to limited personal ID information.	Data is only for commercial vehicles.
	EXAT	TFC		✘ Due to limited personal ID information.	Besides accidents, the system also deals with incidents such as falling objects
RTP	Crime Police	CRIME	✓2019 only	✓	Traffic accident records as criminal records
	Traffic Police	PAD	To be shared	—	A new format was initiated by the traffic police in January 2022.
RVP		e-Claim	✓	✓	Data from the Traffic Accident Victims Protection Corporation.
MOPH	NIEM	NIEMS	✓	✓	Data are from emergency medical centers.
	MOPH +MOI	DEATH	✓	✓	Data of accident victims, including death certificates, are from hospitals and MOI.

Source: JET

Table 4.3.2 Number of Accident Cases in New-TRAMS Data

	2018	2019	2020
DOH	16,361	16,998	19,791
DRR	1,543	1,496	1,206
EXAT	400	302	789
DLT	1,022	764	487
RTP	1,524	25,486	3
RVP	354,809	387,809	211,887
MOPH	-	-	190,010
Total	**375,659**	**432,890**	**424,173**

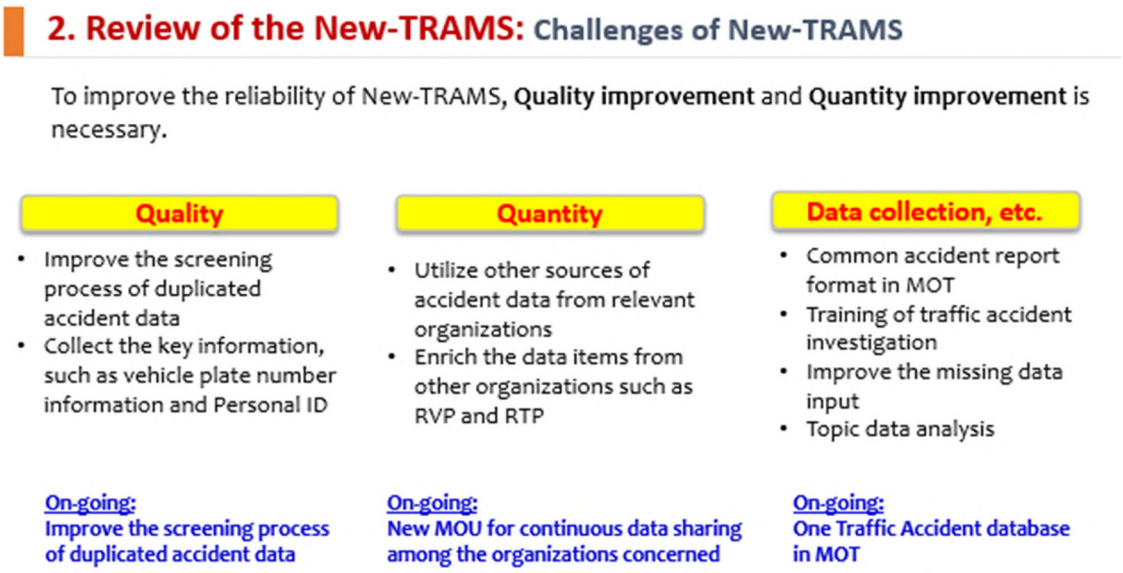
Source: ICTC, TSOC

(2) Activities Towards the Improvement of New-TRAMS

For a more reliable New-TRAMS, from the perspectives of data quality and quantity, the following activities had been carried out in consultation with relevant agencies:

- Screening of duplicate traffic accident data from various agencies.
- Continuous acquisition of traffic accident data from agencies such as the police and enhancement of provided data items (concluding MOUs).
- Standardization of a unified accident database and common accident form within MOT-affiliated agencies (DOH, DRR, EXAT).

Details of these activities are described in section 4.3.4.

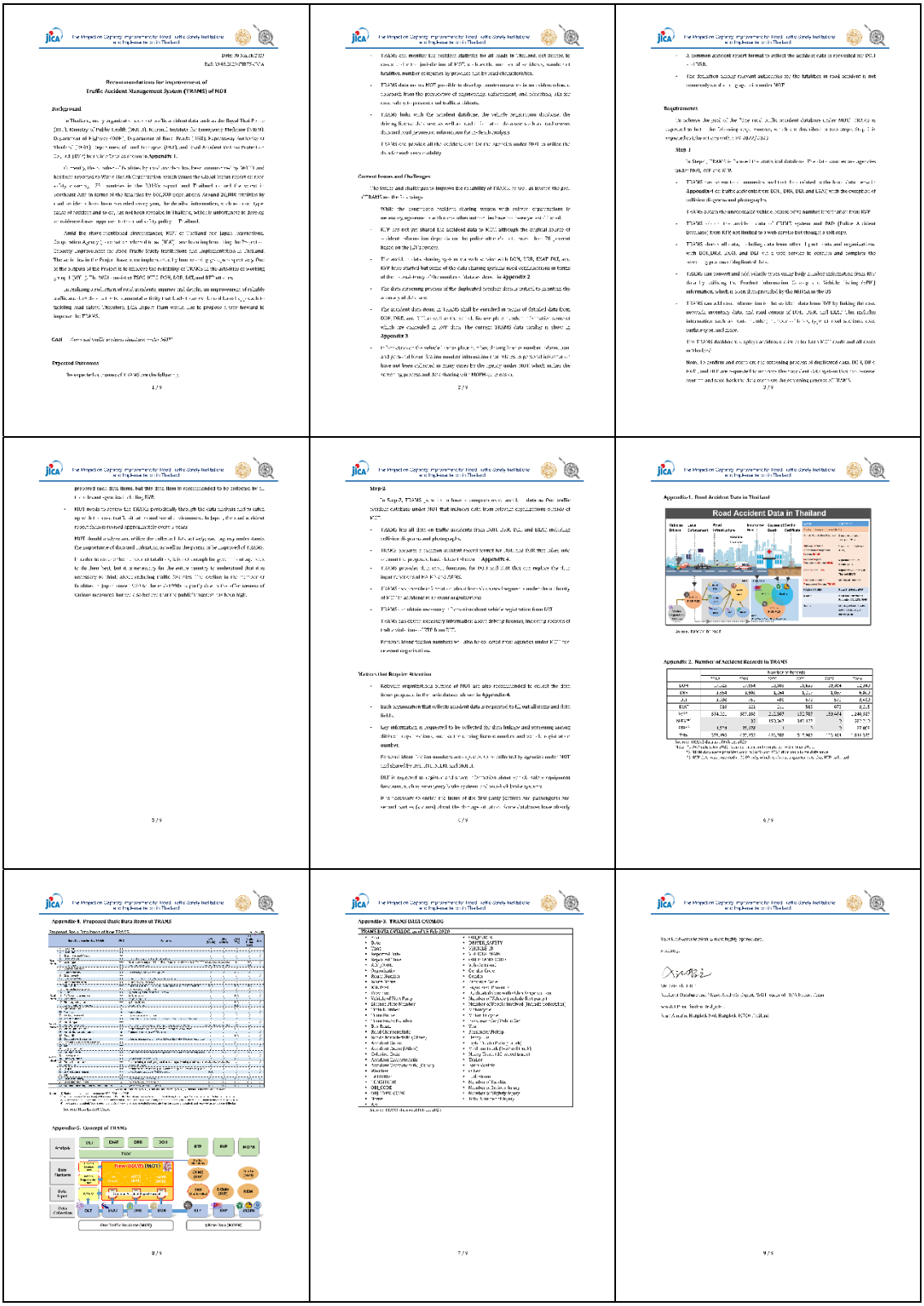


Source: JET

Figure 4.3.3 Challenges for improving the reliability of New-TRAMS

(3) Proposals for the Improvement of New-TRAMS

JET prepared and submitted the proposal for improving the New-TRAMS in March 2022. Below are the proposals submitted to TSOC and ICTC.



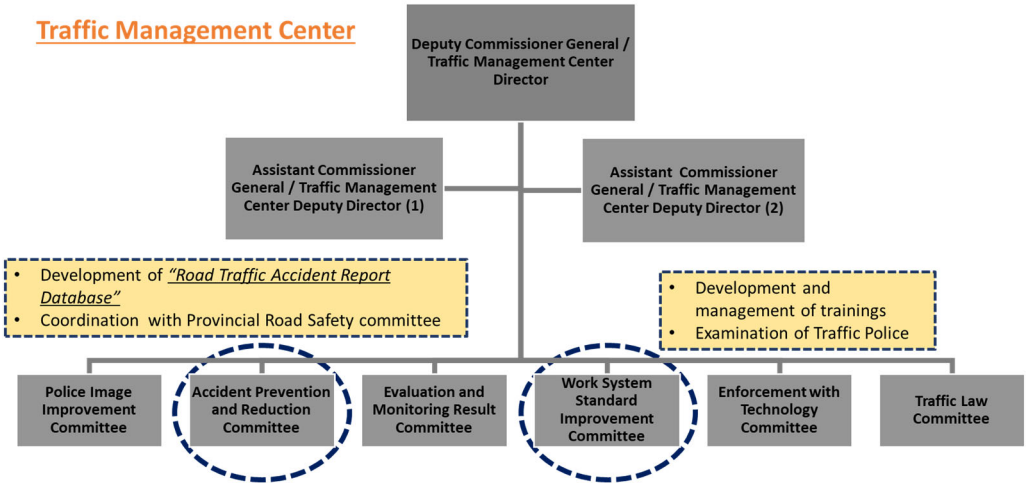
Source : JET

Figure 4.3.4 Proposals for the Improvement of New-TRAMS

4.3.2 Formulation of a New Framework for Traffic Accident Investigation

In March 2022, JET members responsible for traffic accident investigation made their first trip to Thailand. A project office was set up in the RTP headquarters. The team started the discussions with relevant agencies and extended a courtesy visit to the RTP's General Traffic Management Center (established in 2021 and overseen by the Deputy Commissioner General to confirm future cooperation). RTP is presently engaged in transformative initiatives, including assessing the knowledge and ethics of the police officers within the traffic department and optimizing accident investigations through smartphone utilization. Moreover, RTP is initiating the deployment of a system where the Traffic Accident Prevention and Reduction Committee, established under the purview of the Traffic Management Center, conducts a monthly review of regional accident statuses and recommends remedial measures.

JET confirmed with RTP and other relevant agencies that the accident investigation framework under consideration in the Project must align with ongoing reforms to ensure seamless advancement.



Source: JET

Figure 4.3.5 Traffic Management Center of RTP

Meeting with "Accident Reduction and Prevention Committee"

Meeting with "Work System Standard Improvement Committee"

Source: JET

Figure 4.3.6 Meeting with Traffic Accident Prevention and Reduction Committee, and Work System Standard Improvement Committee

(1) Process of considering a "New Framework for Traffic Accident Investigation"

The following procedure was used to study the new framework for accident investigation.

1) Study the status of the accident investigation of RTP
   - Hearings with police officers in charge of the investigation
   - Introduction of the Japanese method of accident investigation at the training and interviews with the training participants
2) Proposal of framework

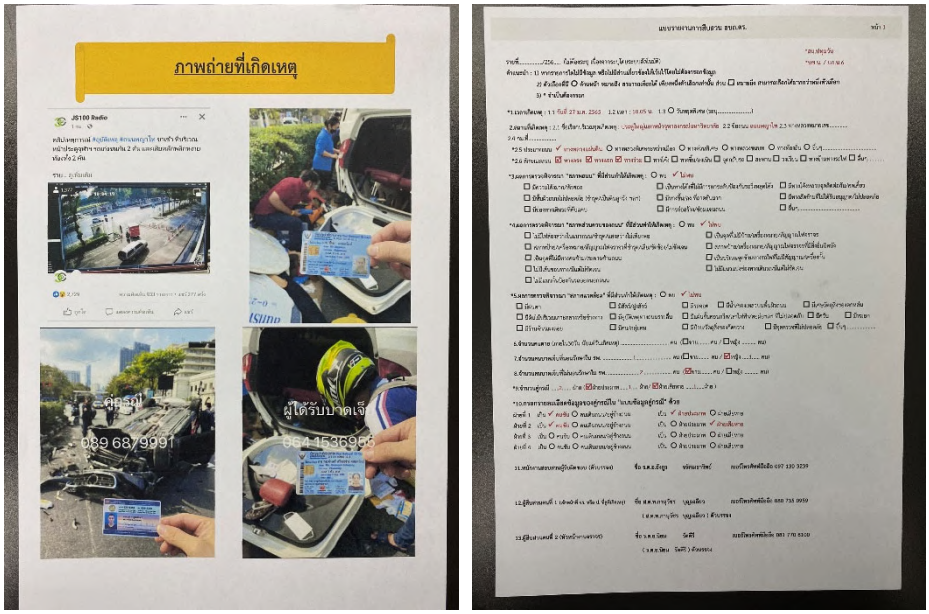
1) Study the status of the accident investigation of RTP

Through the Traffic Accident Prevention and Reduction Committee, interviews were conducted with the Pathumwam Police Station in Bangkok Metropolitan Administration and several police stations in Nakhon Ratchasima Province, the first-year pilot project area. As shown in the next figure, JET confirmed the format used for recording accident data, including the involved elements. However, the forms are still under development and not yet used in the entire country. The Bangkok police station reported that they use the form and "all accident records are prepared according to the form," while the Nakhon Ratchasima police stations indicated limited use, citing the necessity to interview officers from the investigation section to complete the form. In Thailand, the "Investigation Division" is responsible for investigating traffic accidents and various crimes; however, oftentimes, the individual tasked with

inputting accident records belongs to a different section, such as the General Affairs Division. The coordination between these divisions varies from one police station to another. Despite establishing the Traffic Management Center at the headquarters to comprehensively address traffic issues, the chain of command in rural areas was observed as inconsistent. Discussions were held with the RTP to improve this situation.

Source: JET

Figure 4.3.7 Interviews with the Police Stations



Source: JET

Figure 4.3.8 Accident Data Recording Form shown at the Pathumwan Police Station

The severity of accidents considered within the Project is pertinent to determining whether a case should be referred. Responses from interviews regarding the necessity for referral criteria are outlined below. The accident data recording form is prepared separately from the documents required for referral, which the Investigation Department prepares, as described below.

- The criteria for referral are as follows. Hospitals determine whether the injury is minor or serious.
  - If the injury is minor or a settlement has been reached, the case is not sent to court.
  - In the event of a serious injury where the patient requires more than 20 days of hospitalization, a mandatory referral is initiated, irrespective of the presence of settlement. Similarly, if a fatality occurs, the case is sent to court under the same condition.
- The following are the required documents prepared by an Investigations Division police officer for referral.
  - Deposition (driver, victim, etc.)
  - Hospital diagnosis
  - Forensic report
  - Report on levels of alcohol consumption
  - Report on the cause of the accident

  The law stipulates submitting the case to the police within one year, but the internal recommendation suggests submitting it within two months.

In Japan, all cases reported to the police are investigated, and a record is kept by the police even if the case is not referred to them. However, according to the following responses from several police officers in Thailand, procedures may not always be recorded.

- There are two types of "cases that do not lead to recording an accident:"
  1. If an accident occurs and no one reports it to the police and a settlement is reached between the involved parties, the incident may not be reported to the authorities.
  2. If the parties involved in the accident have settled, but a witness or another individual reports the accident to the police, law enforcement may arrive at the scene. However, if the situation has been resolved and the parties have reached an agreement, the police may only control traffic flow and not officially document the incident as an accident.

  In certain instances, even if the parties involved in the accident have settled, the police may still investigate if there are inquiries from the insurance company or if the accident settlement is not finalized.

During discussions and training sessions where JET emphasized that "prevention of recurrence" is a crucial objective of accident investigation in Japan, RTP responded that

their approach to accident investigation primarily focuses on determining the percentage of fault without explicitly considering the perspective of "prevention of recurrence." This suggested a potential gap in their approach. In subsequent discussions with MOT and RTP, it was agreed to support the current data collection process recommended by RTP while proposing a framework for accident investigation that addresses the perceived deficiencies identified by the expert team. According to RTP's premise that all reported and recognized accidents fall within their jurisdiction, rather than categorizing accidents based on scale, it was decided not to establish specific accident scale categories.

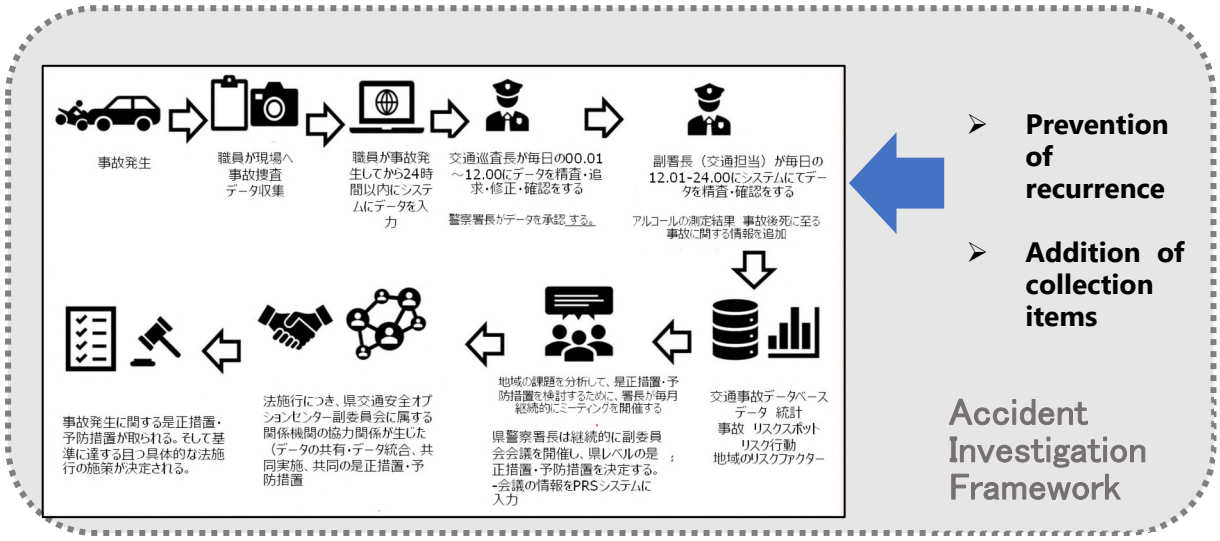
Source: RTP Headquarters

Figure 4.3.9 Data Collection and Input Process recommended by the RTP

2) Proposal of framework

In order to facilitate the process of improving the data collection, as promoted by the RTP Headquarters and headed by the Traffic Accident Prevention and Reduction Committee, the project team proposed a framework that serves as the foundation for the process and adds the following points considered lacking with a view to data analysis.

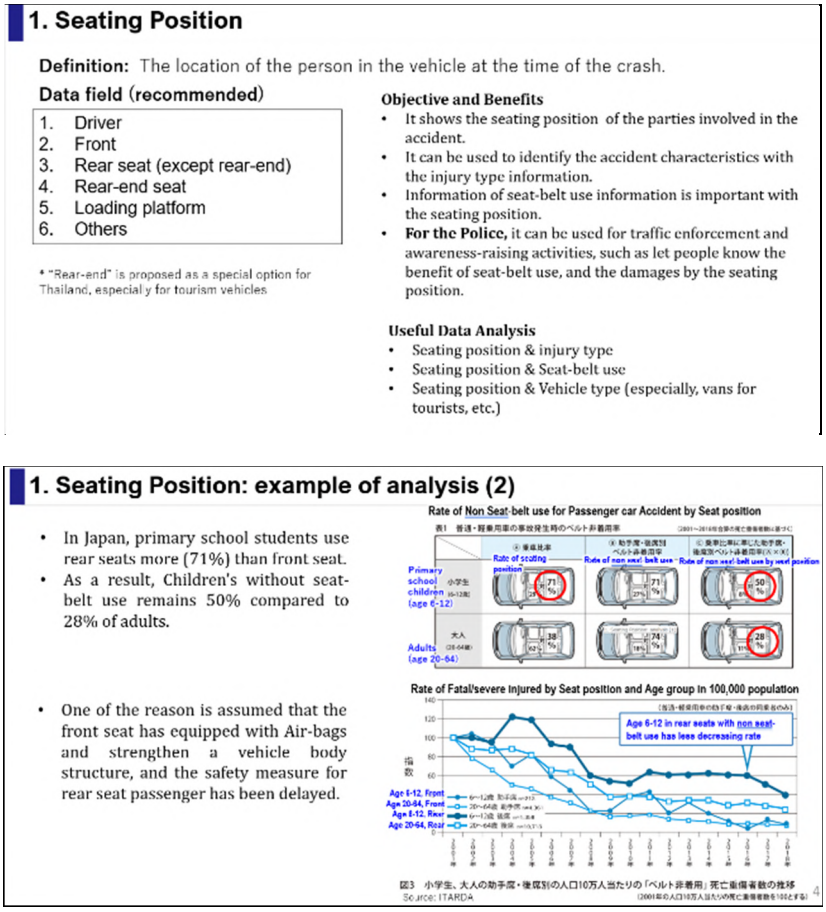
i) One of the objectives of accident investigation must include "prevention of recurrence."
ii) Adding the collection of missing data items, such as maximum speed limit, seating position, purpose of trip, and collision type.



Source: JET

Figure 4.3.10 Accident Investigation Framework (Proposed by Project)

The data collection and input process include a cycle aimed at devising countermeasures for accidents. However, RTP highlighted a lack of understanding on the concept. Consequently, it was decided to continue the training sessions on this matter and incorporate it into education materials. Upon scrutinizing the new accident record form implemented by the traffic police, the fundamental items, such as maximum speed limit, seating position, purpose of trip, and collision type, were missing. Accordingly, these were recommended to be included. RTP inquired about the usage and significance of these additional items, prompting JET to organize and provide comprehensive responses as part of the reply materials. It was confirmed that the investigation items proposed through these projects were integrated into the accident investigations conducted by RTP as of December 2023, marking an improvement in the framework of accident investigations.



Source: JET

Figure 4.3.11 Proposals for Traffic Police Accident Records and Explanatory Material on the Significance of Obtaining Some of the Data Items

4.3.3 Conducting Training on the Road Traffic Accident Investigation for MOT and the Organizations Concerned

The "prevention of recurrence" objective was missing from RTP's current framework for accident investigation; therefore, it was agreed to incorporate this into the framework proposed in the Project. During the initial year of the Project, the expert team also aimed to assess the practical skill level of the RTP headquarters staff and field police officers. The primary emphasis of the first year of training sessions was instructing participants in preparing the Accident Scene Diagram, as depicted in the figure below.

(1) The First-Year Training

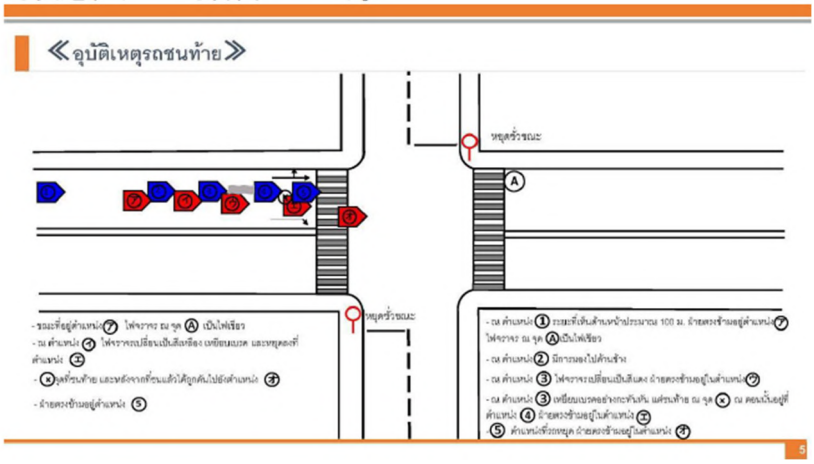
Date: 21–23 November 2022

Venue: RTP's Central Tactic Training Center in Nong Sarai

Participants:

- 3 TSOC officers
- 18 police officers with jurisdiction over the pilot project area
- 3 RTP headquarters officials
- 2 police academy instructors

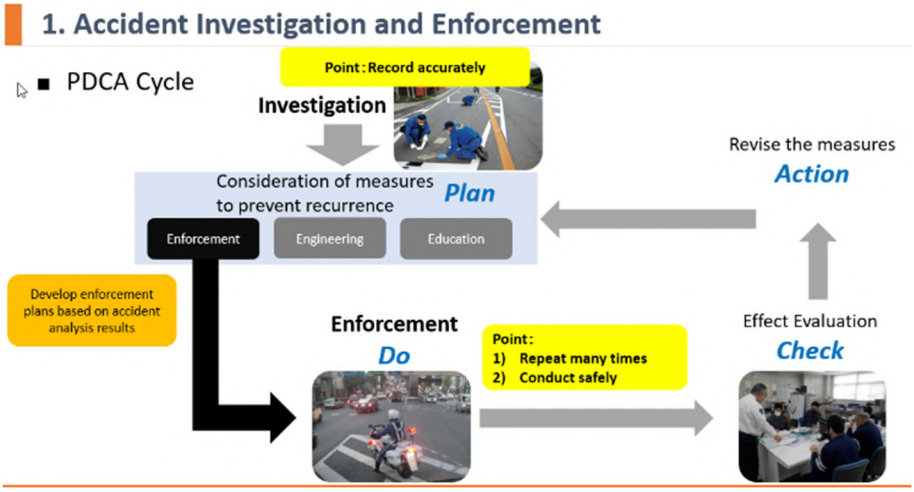
Although the Zoom links and invitations for the lecture were sent to other related agencies, such as DOH, DRR, and DLT, none attended online.



Source: JET

Figure 4.3.12 Example of the Accident Scene Diagram

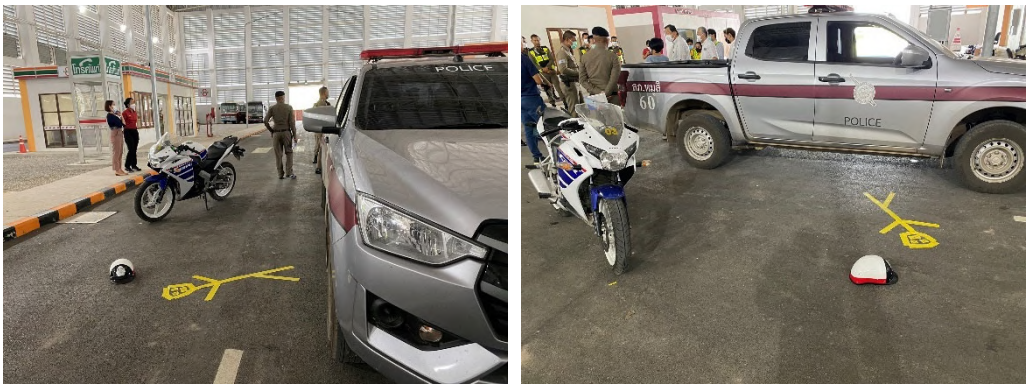
During the lecture, JET elucidated the objectives of accident investigation and investigation procedures aligned with the Japanese legal system, as well as highlighted key points emphasized and illustrated in actual accident investigations. The importance of familiarizing with the cycle of traffic accident investigation and enforcement planning by each police officer, as shown in the following figure, was also emphasized. This cycle aims to utilize high-quality investigation results to promptly devise an enforcement plan and implement measures to prevent recurrence, using Japanese case examples as references. Staff members from RTP responsible for investigations and who participated in the lecture remarked that while there may be differences in investigative methods between Thailand and Japan, the metrics used for measurement are largely similar.



Source: JET

Figure 4.3.13 PDCA Cycle for Traffic Accident Investigation and Enforcement Planning

Practical exercises were conducted on a simulated road designed to replicate the accident scene, allowing participants to create actual diagrams based on the scene, further reinforcing the concepts discussed during the lecture.



Source: JET

Figure 4.3.14 Accident Investigation Training

Upon scrutinizing the behaviors of each officer, the expert team verified that the RTP staff had grasped the fundamental principles. However, they also observed that the scope of the investigation was narrower compared to Japan, with less emphasis on on-the-spot accident inspections. Moreover, it was noted that despite attempts at traffic control, nearby residents often intervened and cleared the scene before the police arrived, owing to the prevalence of traffic congestion. During the practical training session after the lecture, participating staff members shared several observations regarding the disparities between Thailand and Japan. Some of these comments are listed as follows.

- The accident investigation method is the same in Thailand. However, even data on small accidents must also be investigated in Thailand.
- Although traffic investigations in both countries are similar, the method in Japan cannot be done in Thailand because the investigation must not cause traffic congestion. .
- Implementing Japanese investigation methods in Thailand would be difficult due to the necessity of understanding locals to regulate traffic.
- In Thailand, society prioritizes cars, which is another reason for the difficulty.
- Conducting an on-the-spot investigation while preserving the scene is challenging. The Japanese method of returning to the scene of the crime and interviewing the people involved at a later time seems effective.
- After participating in the practical training, the participants learned that the distance of traffic control for site preservation in Thailand is shorter than in Japan.

In the second year, the Project team members, including RTP, agreed that the training would focus on ways of collecting data items, which were added in the project proposal, during investigations and ways of preserving the scene of the accident, a problem highlighted in the results of the first year.

(2) The Second-Year Training

Discussions for the second year of training occurred at CCTC, RTP's Nong Sarai facility. It was confirmed that RTP expressed interest in inviting more police academy instructors during the second year so instructors can gain insights into practical training methods and exchange ideas with MOT to enhance their efficiency in accident response.

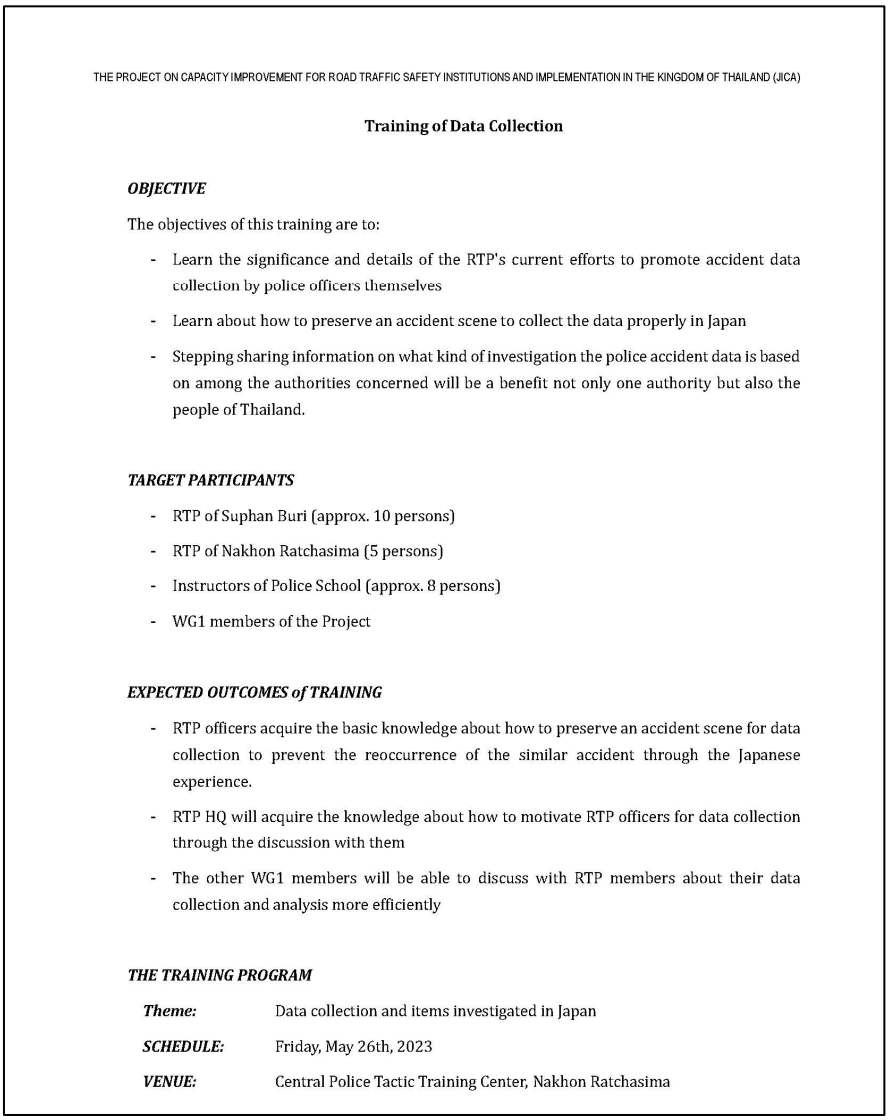
Source: JET

Figure 4.3.15 Discussion with the Directors of the RTP Training Facility

Based on the outcomes in the first year and the overarching policy of the Project, the following program was formulated, and training materials were devised through

collaborative discussions aimed at enhancing trainee education. Consequently, adding a new expert specializing in preserving accident scenes to the project team was agreed upon.

A proposal was put forward in conjunction with RTP, and a program was devised to enable greater participation of members from MOT, particularly those from WG1. However, despite these efforts, the training could not be executed beyond the second year, as per the request of MOT.



THE PROJECT ON CAPACITY IMPROVEMENT FOR ROAD TRAFFIC SAFETY INSTITUTIONS AND IMPLEMENTATION IN THE KINGDOM OF THAILAND (JICA)

Training of Data Collection

OBJECTIVE

The objectives of this training are to:

- Learn the significance and details of the RTP's current efforts to promote accident data collection by police officers themselves
- Learn about how to preserve an accident scene to collect the data properly in Japan
- Stepping sharing information on what kind of investigation the police accident data is based on among the authorities concerned will be a benefit not only one authority but also the people of Thailand.

TARGET PARTICIPANTS

- RTP of Suphan Buri (approx. 10 persons)
- RTP of Nakhon Ratchasima (5 persons)
- Instructors of Police School (approx. 8 persons)
- WG1 members of the Project

EXPECTED OUTCOMES of TRAINING

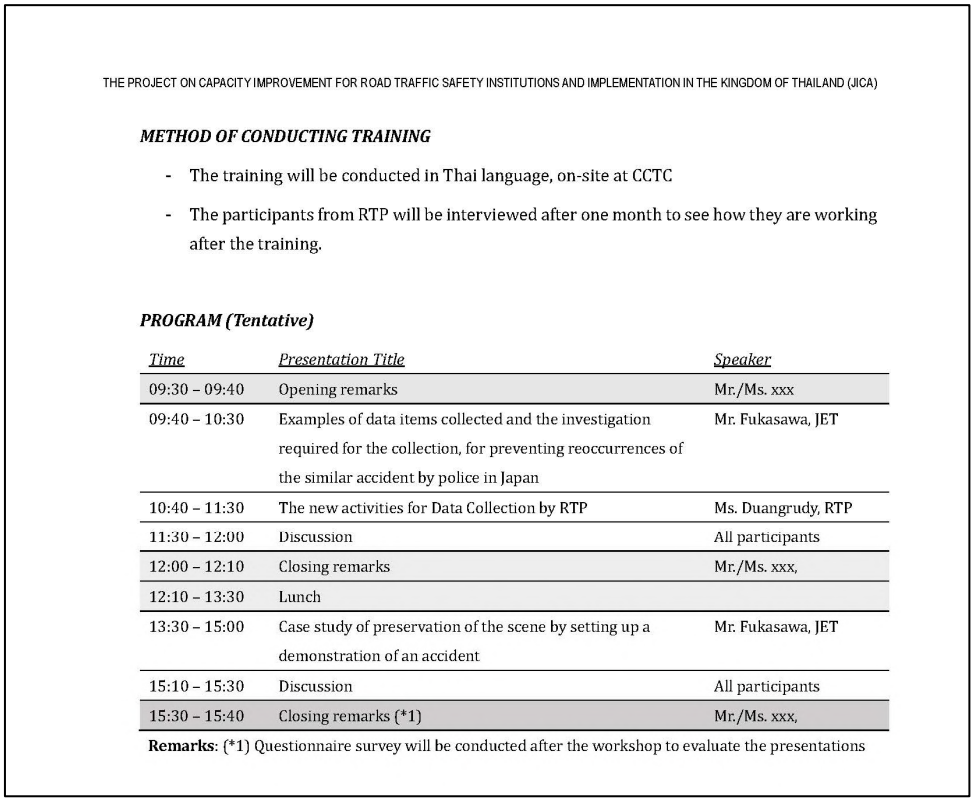
- RTP officers acquire the basic knowledge about how to preserve an accident scene for data collection to prevent the reoccurrence of the similar accident through the Japanese experience.
- RTP HQ will acquire the knowledge about how to motivate RTP officers for data collection through the discussion with them
- The other WG1 members will be able to discuss with RTP members about their data collection and analysis more efficiently

THE TRAINING PROGRAM

Theme:	Data collection and items investigated in Japan
SCHEDULE:	Friday, May 26th, 2023
VENUE:	Central Police Tactic Training Center, Nakhon Ratchasima

Source: JET

Figure 4.3.16 Proposed Program of the Second-Year Accident Investigation Training (1)



THE PROJECT ON CAPACITY IMPROVEMENT FOR ROAD TRAFFIC SAFETY INSTITUTIONS AND IMPLEMENTATION IN THE KINGDOM OF THAILAND (JICA)

METHOD OF CONDUCTING TRAINING

- The training will be conducted in Thai language, on-site at CCTC
- The participants from RTP will be interviewed after one month to see how they are working after the training.

PROGRAM (Tentative)

Time	*Presentation Title*	*Speaker*
09:30 – 09:40	Opening remarks	Mr./Ms. xxx
09:40 – 10:30	Examples of data items collected and the investigation required for the collection, for preventing reoccurrences of the similar accident by police in Japan	Mr. Fukasawa, JET
10:40 – 11:30	The new activities for Data Collection by RTP	Ms. Duangrudy, RTP
11:30 – 12:00	Discussion	All participants
12:00 – 12:10	Closing remarks	Mr./Ms. xxx,
12:10 – 13:30	Lunch	
13:30 – 15:00	Case study of preservation of the scene by setting up a demonstration of an accident	Mr. Fukasawa, JET
15:10 – 15:30	Discussion	All participants
15:30 – 15:40	Closing remarks (*1)	Mr./Ms. xxx,

Remarks: (*1) Questionnaire survey will be conducted after the workshop to evaluate the presentations

Source: JET

Figure 4.3.17 Proposed Program of the Second-Year Accident Investigation Training (2)

(3) The Third-Year Training

Online training on accident investigation was conducted for MOT staff using the accident investigation manual created through previous training sessions in conjunction with an in-depth accident analysis to gain a better understanding of the relation between accident investigation and in-depth analysis. The contents of the training are described in section 4.3.5.

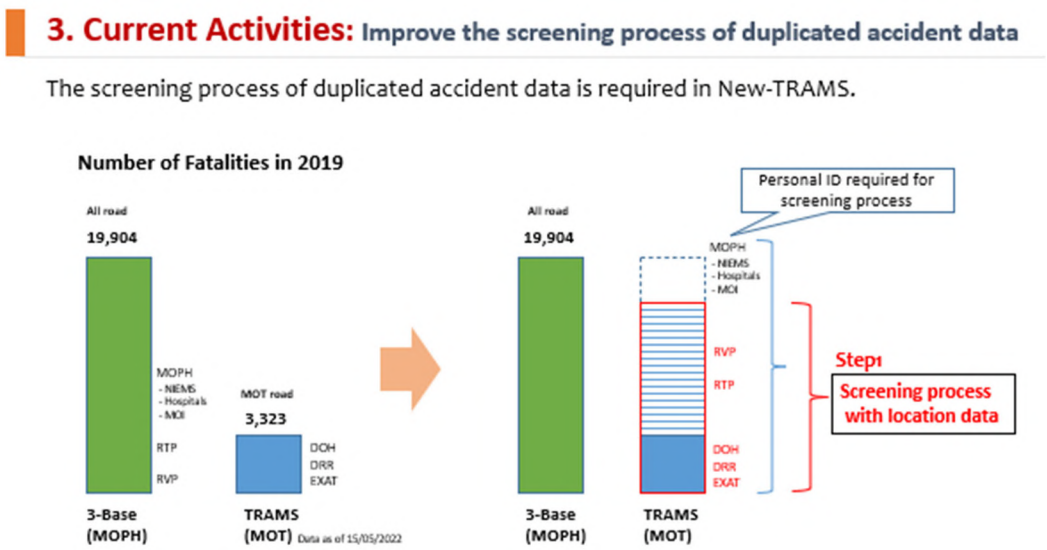
4.3.4 Improvement of the Reliability of New-TRAMS with the Data in Pilot Area(s)

This section organizes activities aimed at improving the reliability of New-TRAMS as a whole and not only on data of specified areas, including the activities mentioned in 4.3.1.

(1) Screening of Duplicate Data in New-TRAMS

The purpose of duplicate data screening is to verify the number of traffic accident fatalities, the number of traffic accident injuries, and the number of accidents recorded in New-TRAMS as part of the MOT roads. Currently, each agency collects accident data separately, leading to duplications, like one traffic accident being counted as two, hence the need to

screen duplicate data. Figure 4.3.18 shows the numbers for New-TRAMS as of May 2022, which only cover traffic accidents under the MOT, namely, DOH, DRR, EXAT, and DLT. The number of traffic accident fatalities for the base year of this project, 2019, is significantly lower at 3,323 compared to the 3-Base Database.



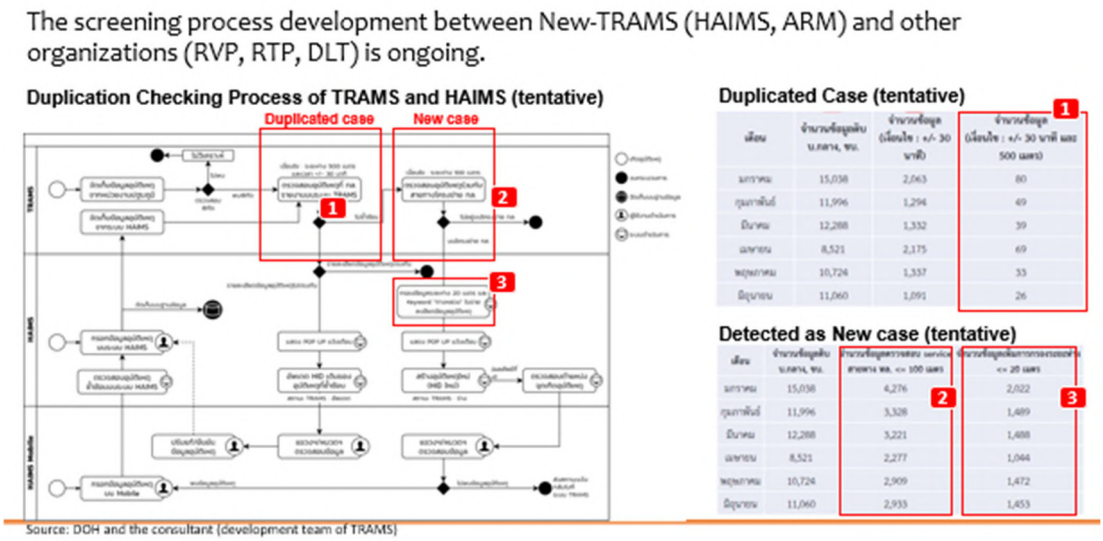
Source: JET

Figure 4.3.18 Number of Road Fatalities in New-TRAMS

Step 1: Duplicate Data Screening Based on Traffic Accident Location Information

For the number of traffic accident fatalities in New-TRAMS to be near the numbers in the 3-Base Database, it is imperative to incorporate other accident data. Despite the constraint in personal ID numbers, there is a consensus to collaborate with DOH, DRR, and ICTC on screening duplicate data by using latitude and longitude information of accident locations.

Specifically, at the 11th WG1 meeting in September 2022 of the second year, there was a progress report on screening duplicate accident data from DOH, DRR, and ICTC, which manages the system operations of New-TRAMS under MOT. DOH indicated they would conduct tests within the year and reflect the results in the next year.



Source: JET

Figure 4.3.19 Challenges for Improving the Reliability of New-TRAMS

Step 2: Duplicate Data Screening Using Personal Information

Efforts are currently underway to collect the following accident information currently not collected by agencies under MOT. However, due to Thailand's Personal Data Protection Act (PDPA), this process is anticipated to take time. The priority, therefore, is screening duplicate data based on location information from Step 1 while continuously working with related agencies.

- Personal identification number
- Vehicle license plate number
- Driving license number

(2) Continuous acquisition of information and enrichment of data items from relevant agencies, including the police

The connection status between New-TRAMS and various traffic accident databases is shown in the following table. The connection between DOH and DRR databases started in 2022 using a web-based service, which shares information approximately every 15 minutes. On the other hand, an online connection with MOPH has not been established yet. With RTP, only the 2019 database has been shared. There are continuous efforts to conclude a new MOU between MOT and RTP.

Table 4.3.3 Connection status between New-TRAMS and various traffic accident databases

		Road Accident Database	Connection with New-TRAMS
MOT	DOH	HAIMS	Both directional via Web-service
	DRR	ARMS	Both directional via Web-service
	DLT	B-TAIM	Partly connection (not via web-service)
	EXAT	TFC	Both directional via Web-service
RTP	Crime Police	CRIME	Partly provided
	Traffic Police	PAD *new form	Not provided
RVP		e-Claim	One directional via Web-service
MOPH	NIEM	NIEMS	One directional via Web-service
	MOPH+MOI	DEATH	Not provided

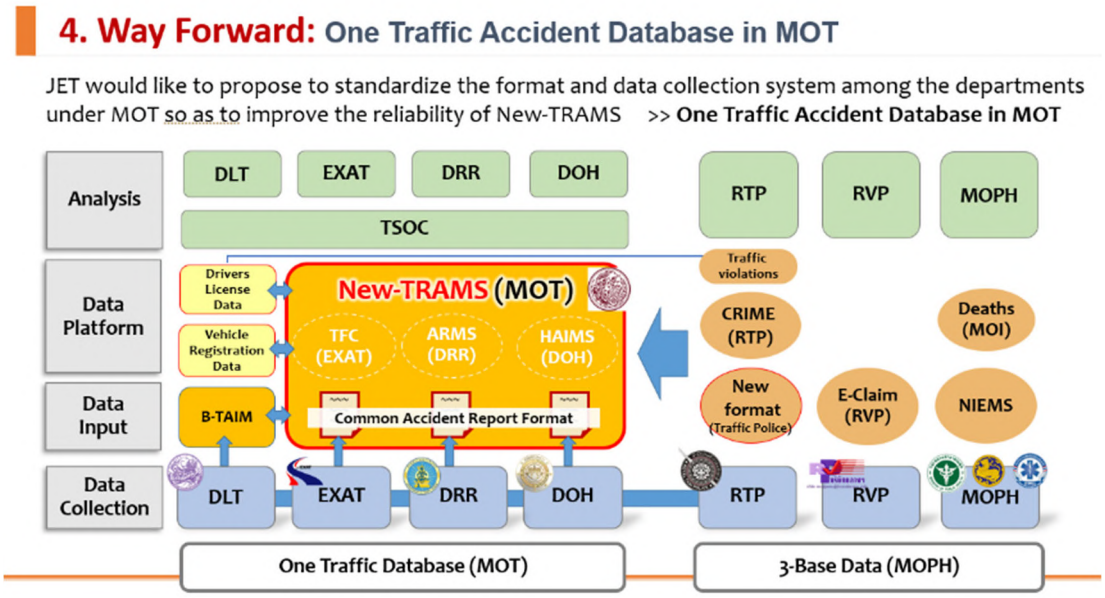
Source: JET

(3) Standardization of accident databases and common accident forms under MOT

Single Accident Database under MOT Agencies

At the 3rd JCC, the organizations under MOT were confirmed aiming toward a single integrated accident database. However, the agencies such as DOH, DRR, and EXAT continue to maintain their accident databases. Unifying these as a consolidated database in New-TRAMS under MOT presents several challenges, including the need for data entry functions not currently available in New-TRAMS, standardization of accident record formats, budget allocation for significant system updates, and integration with existing systems.

The integrated accident database of MOT is planned to be concretized under the leadership of ICTC while outlining its system structure.



Source: JET

Figure 4.3.20 Concept of Single Accident Database under MOT Agencies (Draft)

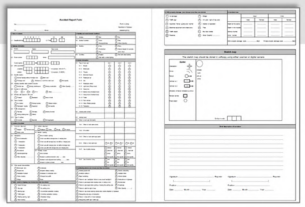
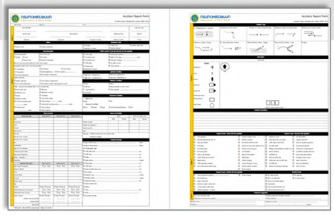
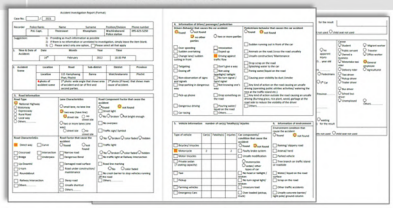
Common Accident Record Format

At the 8th WG1 meeting, the direction was confirmed by re-presenting to DOH the setting of basic items for traffic accident data (mandatory items based on trends in Japan and WHO). DOH emphasized the significance of adding new items to the updated accident record forms for RTP and recommended continuing efforts in collaboration with RTP.

Specific additional item proposals are as follows. The DOH and DRR accident record formats will be unified simultaneously.

- Maximum speed (to be added to DOH, RTP)
- Purpose of travel (to be added to DOH, DRR, RTP)
- Seat position (to be added to DOH, DRR, RTP)
- Number plate information (to be added to DOH only)
- Type of collision (to be added to RTP only)

New items to DOH	New items to DRR	New items to RTP
● Speed limit ● Seating position ● Purpose of journey ● Driving license number ＊ Vehicle type shall be identified as "taxi use or not"	● Seating position ● Purpose of journey ＊ Vehicle type shall be identified as "taxi use or not"	● Collision type ● Speed limit ● Seating position ● Purpose of journey Thank you to RTP, added in the new report format by Traffic Police (as of March 2022) ➢ Lighting condition ➢ Number of lanes ➢ Work-zone related

Source: JET

Figure 4.3.21 Proposed New Items of Traffic Accident Data

Table 4.3.4 Comparison of Accident Data Items with WHO Recommendation, DOH/DRR/RTP, and Japan

Proposed Basic Data item of New-TRAMS (draft ver.2.0)							ver. Jul 2022
	Basic Data item for New-TRAMS	WHO	Remarkis	DOH (HAIMS)	DRR (ARMS)	RTP (Investigation Report Form)	Japan
Crash related	1 Crash date	★★		✓	✓	✓	✓
	2 Crash time	★★		✓	✓	✓	✓
	3 Crash municipality/place	★★		✓	✓	✓	✓
	4 Crash location	★★	Coordinates (long,lat), with larndmark, address	✓	✓	✓	✓
	5 **Crash type**	★★	Person & vehicle, single vehicle, multiple veihicle, etc. >> collision code in DOH/DRR	in collision type	in collision type	N/A	✓
	6 Impact type	★★	Heads-on, read-end, etc	in collision type	in collision type	N/A	✓
	7 Weather conditions	★★		✓	✓	✓	✓
	8 Light conditions	★★	Daylight, twilight, dark with street light, etc.	✓	✓	N/A	✓
	9 Crash severity	★★		✓	✓		✓
Road related	10 Type of roadway	★★	In Thai: DOH, DRR, EXAT, Motorway, Municipal road	✓	✓	✓	✓
	11 Road functional class	★★	In Thai: route no, road name	✓	✓	✓	✓
	12 **Speed limit**	★★	Regulation speed of the road accident section. New item for DOH, DRR and RTP	N/A	✓	N/A	✓
	13 Road surface conditions	★★	Dry, wet, slipery, frost, flood , etc.	✓	✓	✓	✓
	14 Junction	★★	T-junction, Y-junciton, roundabout, U-turn etc.	✓	✓	✓	✓
	15 Traffic control at junction	★★	Traffic light or not,	✓	✓	✓	✓
	16 Road curve	★★	Straight, sharp curve,	✓	✓	✓	✓
	17 Road segment grade	★★	uphill, downhill, etc	✓	✓	✓	✓
	18 Location relative to roadway	★	Station Km (Km post)	✓	✓	✓	✓
	19 Number of lanes	★		✓	✓	✓	✓
	20 Markings	★	Road markings	✓	✓	✓	✓
	21 Work-zone related	★	road section under construction	✓	✓	✓	✓
Vehicle related	22 Vehicle number	★★	Unique vehicle number assigned to identify each vehicle involved in the crash.	✓	✓	✓	✓
	23 Vehicle type	★★		✓	✓	✓	✓
	34 Vehicle manoeuvre	★★	Start moving, driving straight, overtaking, turning right, turning left, etc…	in collision type	in collision type	ongoing	✓
	25 Vehicle special function	★★	No special function, taxi, bus, police/military, emergency vehcle, others	✓	✓	ongoing	✓
	26 Registration number	★	In Thai: Vehicle license plate number	✓	✓	✓	✓
Person related	27 Person ID	★★		✓	✓	✓	✓
	28 Occupant's vehicle number	★★	Unique number assigned for this crash to the motor vehicle in which the person was an occupant	✓	✓	✓	✓
	29 Pedestrian's linked vehicle number	★★		✓	✓	✓	✓
	30 Sex	★★		✓	✓	✓	✓
	31 Type of road user	★★		✓	✓	✓	✓
	32 **Seating position**	★★	In Thai: number of passenger in seating position and outside the seats/loading space	N/A	N/A	N/A	✓
	33 Injury severity	★★		✓	✓	✓	✓
	34 Safety equipment	★★	Seat-belt, Childe restraint / Helmet,	✓	✓	✓	✓
	35 Pedestrian manoeuvre	★★	Crossing, walking on carriageway, standing on carriageway, walking on sidewalk, standing on saidewalk,	in collision type	in collision type	✓	✓
	36 Alcohol use	★★	degree of drungness	✓	✓	✓	✓
	37 Drug use	★★	No suspicion or evidence of drug use, Suspicion of drug use, Evidence of drug use, no	✓	✓	✓	✓
	38 **Driving license issue date**	★★	In Thai: License number (not issue date)	N/A	✓	✓	✓
	39 Age	★★		✓	✓	✓	✓
	40 **Purpose of journey**	★	New item for DOH, DRR and RTP	N/A	N/A	N/A	✓
	41 Risk-recognition Speed	-	New item for DOH, DRR and RTP	N/A	N/A	N/A	✓
	42 Accident contributing factor (esp. Human factor)	-	New item for DOH, DRR and RTP (Human:perception failuare/decision failure etc, vehicle, environment)	N/A	N/A	N/A	✓
		★★ Minimum dataset by WHO, ★Additional data shown by WHO		5	3	7	

Source: JET

Below is a draft of the common accident data report form for DOH and DRR.

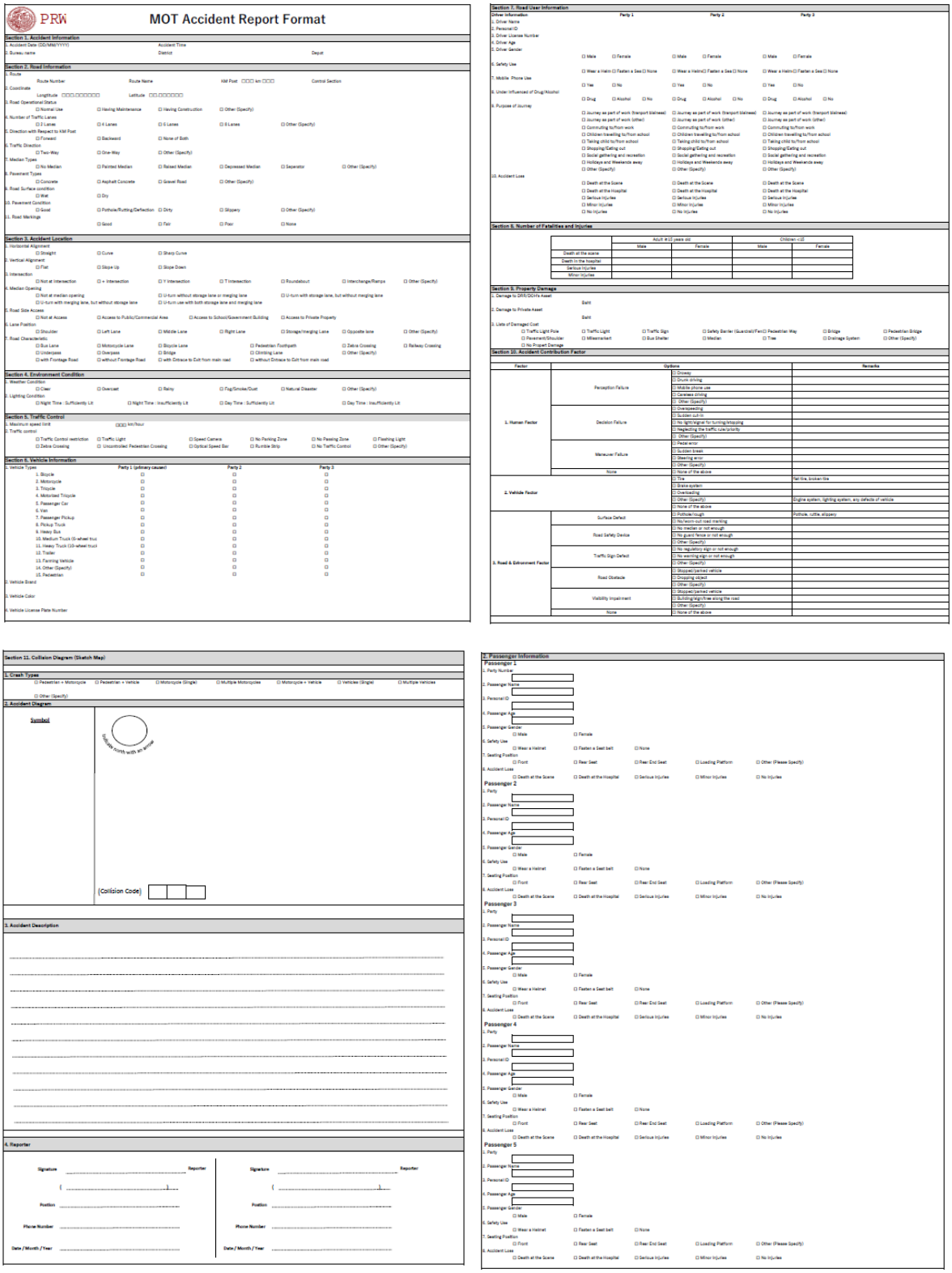
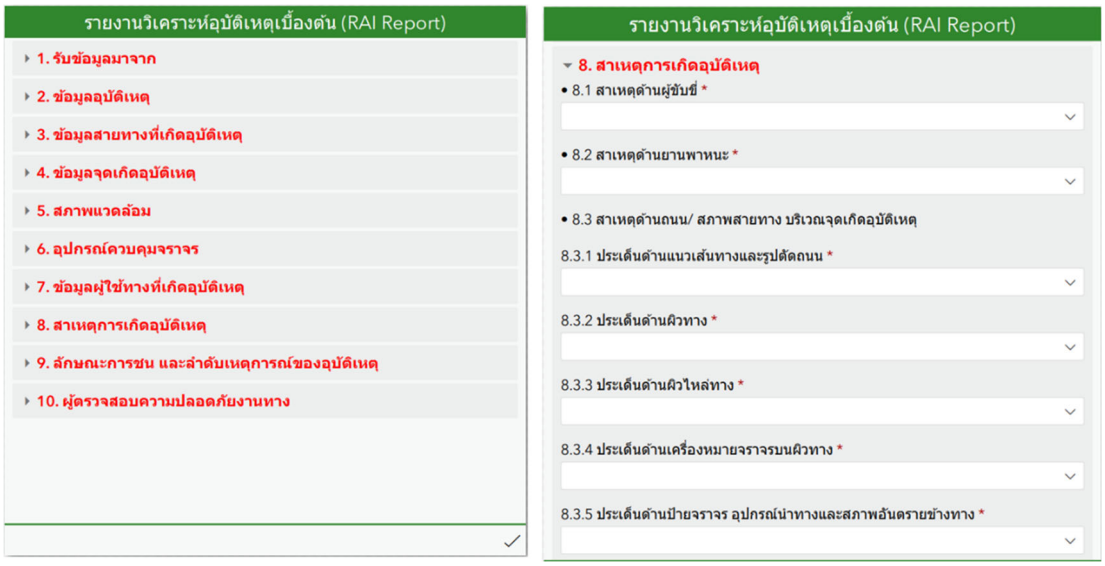


Figure 4.3.22 Draft Accident Record Form for MOT (DOH and DRR)

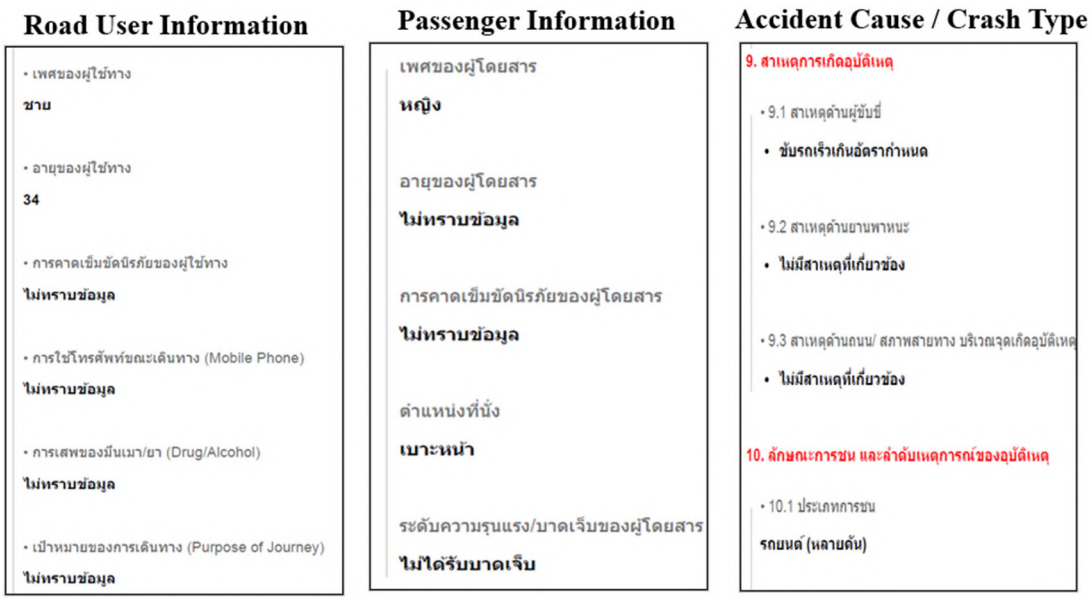
The common accident form was drafted and agreed upon by the DOH and DRR, but actual system updates require securing a budget and implementation. The Thai MOT plans to work on unification in the future.

Meanwhile, under the new Director of TSOC (Dr. Chakree Bumrungwong), the New Transport Road Accident Management (RAI) system, developed using the system from ESRI, has been implemented. In this system, the adoption of the common accident record form has been carried out. TSOC connected New-TRAMS and RAI, and JET recognized that this connection is the improved New-TRAMS. TSOC has been further improving the transfer automation of the New-TRAMS database.



Source: TSOC

Figure 4.3.23 Input Screen of the Common Accident Record Form Implemented in the RAI



Source: TSOC

Figure 4.3.24 Examples of Items in the Common Accident Record Form Implemented in the RAI

(4) Data Analysis for Reducing Traffic Fatality Numbers in Pilot Areas

In this section, New-TRAMS data and other sources were utilized to understand the characteristics of traffic accidents in pilot provinces (Nakhon Ratchasima Province, Suphan Buri Province, and Samut Sakhon Province). Additionally, this analysis assisted in categorizing accident characteristics that should be prioritized for reducing the number of fatalities. This analysis guided the selection of accident countermeasures in pilot areas for Output 2 and 3.

The data used for the analysis included the 2019–2022 New-TRAMS data, supplemented by RAI data. In order to determine the main targets for a 30% reduction in fatal accidents, the data was analyzed based on road type, collision type, vehicle type, and cause of the accidents for each pilot province.

1. **Analysis for finding Target Groups to reduce fatal accidents (TRAMS data)**
   - Target Road Characteristics in Pilot Provinces
   - Target Collision type in Pilot Provinces
   - Target Vehicle type in Pilot Provinces
   - Target Accident Cause in Pilot Provinces

2. **Analysis for finding relations between the keywords and accidents (RAI data with some TRAMS data)**
   - The number of lanes
   - Over speeding
   - The number of accident parties (road users involved in an accident)

Figure 4.3.25 New-TRAMS Data Analysis for 30% Reduction of Fatalities in Road Accidents

[TRAMS] Target Road Characteristics in Pilot Provinces

Road characteristics that shall be targeted are:

- **Straight section**
- **Wide/normal curve section**
- **Intersection**

Fatal accident cases by Road Characteristics share (%) in Pilot Provinces (2019 to 2022)

		DOH		DRR	
Straight section		73 %	(64 – 82%)	59 %	(53 – 56%)
Wide/normal curve	93%	12 %	(6 – 22 %)	22 %	(10 – 41%)
Intersection		8 %	(5 – 16%)	19 %	(6 – 31%)
Entrance to roadside property		3 %	(0 – 6%)		-
Others		4 %	(1 – 9%)		-

Figure 4.3.26 Target Groups in Terms of Road Characteristics

[TRAMS Data] Fatal Accident x Road Characteristics

- The **fatal accidents** on **straight section** and **wide/normal curve** are **more than 80%** on DOH roads and DRR roads.
- In terms of **fatal accidents at intersection, DRR** roads have **more accidents** (DOH: 8.1%, DRR 16.0%), and **DOH roads** in **Suphan buri** have also **many accidents at intersection**.

Fatal Accident Cases by Road Characteristics on DOH roads (2019 to 2022)

	Straight section	Wide/normal curve	Intersection	Entrance to roadside property	Bridge/underpath	Sharp curve	Other	U-tum point	Interchange/ramp	Railway crossing	Zebra crossing	Grand Total	No. of fatal accident case	Straigh + Wide/normal curve
Nakhon Ratchasima	81.7%	5.8%	5.6%	5.8%	0.3%	0.6%	0.0%	0.3%	0.0%	0.0%	0.0%	100.0%	(360)	87.5%
Suphan Buri	63.5%	12.4%	15.9%	5.9%	1.4%	0.0%	0.3%	0.0%	0.0%	0.5%	0.0%	100.0%	(370)	75.9%
Samut Sakhon	75.8%	6.1%	7.6%	0.0%	9.1%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	100.0%	(66)	81.8%
(Prachin Buri)	69.8%	21.7%	4.7%	1.6%	1.6%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	100.0%	(129)	91.5%
Nationwide	72.2%	12.7%	8.1%	4.2%	1.8%	0.4%	0.2%	0.2%	0.1%	0.1%	0.1%	100.0%	(8559)	84.9%

Fatal Accident Cases by Road Characteristics on DRR roads (2019 to 2022)

	Straight section	Wide/normal curve	Intersection	Entrance to roadside property	Bridge/underpath	Sharp curve	Other	U-tum point	Interchange/ramp	Railway crossing	Zebra crossing	Grand Total	No. of fatal accident case	Straigh + Wide/normal curve
Nakhon Ratchasima	52.9%	41.2%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(17)	94.1%
Suphan Buri	58.6%	10.3%	31.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(29)	69.0%
Samut Sakhon	66.7%	13.3%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(15)	80.0%
Nationwide	56.3%	24.5%	16.0%	0.0%	0.0%	2.8%	0.0%	0.1%	0.3%	0.0%	0.0%	100.0%	(1541)	80.8%

Figure 4.3.27 Details by the Pilot Provinces (fatal accident x road characteristics)

[Summary] Pilot section and area in the Pilot Provinces

		DOH	DRR
Nakhon Ratchasima	ROAD	Combination of **straight** section and **curve** section	Area including **curve** section
	COLLISION	**Same direction**, **off-carriageway** on straight/curve	**Off-carriageway** on curve, **same direction**
	VEHICLE	Passenger car/van, **Pickup truck**	**Motorcycle, Passenger car/van**
	CAUSE	**Over-speeding**	**Over-speeding**, **people/car/animal cross in front**
Suphan Buri	ROAD	**Straight section** with **intersection** (T-junction)	Area including **intersection**
	COLLISION	**Same direction** (rear-end/side-swipe)	**Intersection crash**
	VEHICLE	**Motorcycle**, passenger car/van, pickup truck	**Motorcycle, passenger car/van, truck** , trailer
	CAUSE	Over-speeding, suddenly cutting in	**People/car/animal cross in front, over-speeding,**
Samut Sakhon	ROAD	**Straight** section with **intersection**	Area including **straight** section
	COLLISION	Same direction, **Hit pedestrian** accident	**Off-carriageway** on straight, **same direction**
	VEHICLE	**Motorcycle**, passenger car/van, **pickup truck**	**Motorcycle, passenger car/van**
	CAUSE	Over-speeding, **people/car/animal close in front (suddenly cut-in)**	**Over-speeding, people/car/animal cross in front, drunk driving**
Prachin Buri	ROAD	Wide/normal curve section	-
	COLLISION	**Off-carriageway on curve**	-
	VEHICLE	Truck/**trailer**	-
	CAUSE	**Over-speeding**, **defects of vehicle** system	-

Figure 4.3.28 Target Groups by the Pilot Provinces

The full report is shown in the following slides.

TRAMS data analysis and RAI data analysis for 30% reduction of fatalities in road accidents

THE PROJECT ON CAPACITY IMPROVEMENT FOR ROAD TRAFFIC SAFETY INSTITUTIONS AND IMPLEMENTATION IN THE KINGDOM OF THAILAND

August 2023
WG1, JICA Expert Team

1

Contents

1. **Analysis for finding Target Groups to reduce fatal accidents (TRAMS data)**
   - Target Road Characteristics in Pilot Provinces
   - Target Collision type in Pilot Provinces
   - Target Vehicle type in Pilot Provinces
   - Target Accident Cause in Pilot Provinces
2. **Analysis for finding relations between the keywords and accidents (RAI data with some TRAMS data)**
   - The number of lanes
   - Over speeding
   - The number of accident parties (road users involved in an accident)

2

Data used in this Analysis

TRAMS data:
- TRAMS data: **1.9 million** accident cases from 2019 to 2022 (approx. **10,000 fatal accident** cases of DOH and DRR)

RAI data:
- RAI data: approx. **4,500** accident cases from Dec.2022 (approx. **1,200 fatal accident** cases)

3

- TRAMS Data Analysis -

Analysis for finding Target Groups to reduce fatal accidents

1. Target Road Characteristics in Pilot Provinces
2. Target Collision type in Pilot Provinces
3. Target Vehicle type in Pilot Provinces
4. Target Accident Cause in Pilot Provinces
5. Summary

4

[TRAMS] Target Road Characteristics in Pilot Provinces

Road characteristics that shall be targeted are:
- **Straight section**
- **Wide/normal curve section**
- **Intersection**

Fatal accident cases by Road Characteristics share (%) in Pilot Provinces (2019 to 2022)

		DOH		DRR	
Straight section		73 %	(64 – 82%)	59 %	(53 – 56%)
Wide/normal curve	93%	12 %	(6 – 22 %)	22 %	(10 – 41%)
Intersection		8 %	(5 – 16%)	19 %	(6 – 31%)
Entrance to roadside property		3 %	(0 – 6%)		-
Others		4 %	(1 – 9%)		-

5

[TRAMS Data] Fatal Accident x Road Characteristics

- The **fatal accidents** on **straight section** and **wide/normal curve** are **more than 80%** on DOH roads and DRR roads.
- In terms of **fatal accidents at intersection, DRR** roads have **more accidents** (DOH: 8.1%, DRR 16.0%), and **DOH roads** in **Suphan buri** have also **many accidents at intersection**.

Fatal Accident Cases by Road Characteristics on DOH roads (2019 to 2022)

	Straight section	Wide/normal curve	Intersection	Entrance to roadside property	Bridge/underpath	Sharp curve	Other	U-turn point	Intercha ngeram p	Railway crossing	Zebra crossing	Grand Total	No. of fatal accident case	Straigh + Wide/nor mal curve
Nakhon Ratchasima	81.7%	5.8%	5.6%	5.8%	0.3%	0.6%	0.0%	0.3%	0.0%	0.0%	0.6%	100.0%	(360)	87.5%
Suphan Buri	63.5%	12.4%	15.9%	5.9%	1.4%	0.0%	0.3%	0.0%	0.0%	0.5%	0.0%	100.0%	(370)	75.9%
Samut Sakhon	75.8%	6.1%	7.6%	0.0%	9.1%	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	100.0%	(66)	81.8%
(Prachin Buri)	68.8%	21.7%	4.7%	1.6%	1.6%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	100.0%	(129)	91.5%
Nationwide	72.2%	12.7%	8.1%	4.2%	1.6%	0.4%	0.2%	0.2%	0.1%	0.1%	0.1%	100.0%	(8599)	84.9%

Fatal Accident Cases by Road Characteristics on DRR roads (2019 to 2022)

	Straight section	Wide/normal curve	Intersection	Entrance to roadside property	Bridge/underpath	Sharp curve	Other	U-turn point	Interchangeram p	Railway crossing	Zebra crossing	Grand Total	No. of fatal accident case	Straigh + Wide/normal curve
Nakhon Ratchasima	52.9%	41.2%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(17)	94.1%
Suphan Buri	58.6%	10.3%	31.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(29)	68.0%
Samut Sakhon	66.7%	13.3%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	(15)	80.0%
Nationwide	56.3%	24.5%	16.0%	0.6%	0.0%	2.6%	0.0%	0.1%	0.3%	0.0%	0.6%	100.0%	(1541)	80.8%

6

[TRAMS] Target Collision type in Pilot Provinces

The collision type that shall be considered are:
- **Same direction crash (e.g. rear-end, side-swipe)**
- **Off carriageway on straight**
- **Intersection crash**

Fatal accident cases by Collision type share (%) in Pilot Provinces (2019 to 2022)

	DOH		DRR	
Same direction crash	40 %	(37 – 46%)	31 %	(53 – 69%)
Opposite direction crash	10 %	(3 – 15%)	15 %	(7 – 18%)
Off carriageway on straight	22 %	(20 – 26%)	29 %	(3 – 13%)
Off carriageway on curve	6 %	(3 – 14%)	2 %	(0 – 10%)
Intersection crash	3 %	(0 – 8%)	17 %	(0 – 6%)

7

[TRAMS Data] Fatal Accident x Collision type in Pilot Provinces

- **Same direction accident** is the top collision type on DOH and DRR roads.
- **Samut Sakhon** on DOH roads has relatively high number of *pedestrian involved* accidents.

Fatal Accident Cases by Collision Type on DOH roads (TRAMS 2019 to 2022)

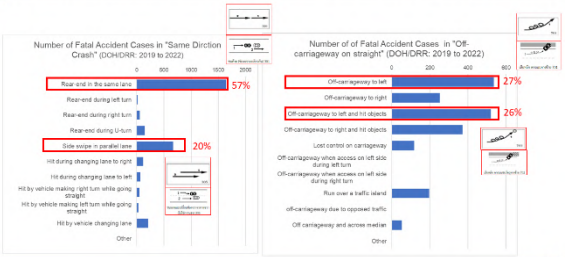
	Hit Pedestrian	Intersect on crash	Opposite direction crash	Same direction crash	Wrong manouvering	Overtaking crash	Hit objects on path	Off carriageway on straight	Off carriageway on curve	Others	Grand Total	No. of fatal accident case
Nakhon Ratchasima	8.9%	2.5%	13.6%	40.3%	8.1%	1.1%	2.2%	20.9%	2.5%	0.0%	100.0%	(360)
Suphan Buri	4.9%	7.6%	10.5%	56.8%	3.0%	1.6%	6.8%	6.5%	0.5%	0.5%	100.0%	(370)
Samut Sakhon	19.6%	0.0%	3.0%	45.5%	0.0%	0.0%	9.1%	22.7%	0.0%	1.5%	100.0%	(66)
(Prachin Buri)	1.6%	2.3%	14.7%	40.3%	0.8%	0.8%	4.7%	20.2%	14.0%	0.8%	100.0%	(129)
Nationwide	5.7%	5.9%	13.2%	55.1%	2.1%	1.4%	5.3%	24.0%	7.7%	0.5%	100.0%	(8599)

Fatal Accident Cases by CollisionType on DRR roads (TRAMS 2019 to 2022)

	Hit Pedestrian	Intersect on crash	Opposite direction crash	Same direction crash	Wrong manouvering	Overtaking crash	Hit objects on path	Off carriageway on straight	Off carriageway on curve	Others	Grand Total	No. of fatal accident case
Nakhon Ratchasima	0.0%	0.0%	17.6%	17.6%	0.0%	11.8%	5.9%	17.6%	23.5%	5.9%	100.0%	(17)
Suphan Buri	0.0%	27.6%	10.3%	34.5%	0.0%	3.4%	0.0%	10.3%	3.4%	3.4%	100.0%	(29)
Samut Sakhon	0.0%	6.7%	20.0%	26.7%	0.0%	0.0%	0.0%	46.7%	0.0%	0.0%	100.0%	(15)
Nationwide	5.1%	8.0%	16.6%	29.3%	6.4%	5.8%	3.3%	17.3%	15.4%	6.6%	100.0%	(1541)

8

[TRAMS Data] What is 'Same direction Crash' and 'Off carriageway" accident?



9

[TRAMS] Target Vehicle type in Pilot Provinces

The vehicle type of the 1st party that caused an accident, the followings will be targeted:

- **Motorcycle**
- **Passenger car/ van, Pickup truck**
- **Truck/trailer**

Fatal accident cases by Vehicle type (1st party) share (%) in Pilot Provinces (2019 to 2022)

	DOH	DRR
Motorcycle	40 % (26 – 55%)	63 % (53 – 69%)
Passenger car/ van	16 % (12 – 25%)	12 % (7 – 18%)
Pickup truck	23 % (17 – 28%)	10 % (3 – 13%)
Truck/ trailers	16 % (8 – 29%)	5 % (0 – 10%)
Bus	1 % (0 – 2%)	3 % (0 – 6%)

10

[TRAMS Data] Fatal Accident x Vehicle type in Pilot Provinces

- **Passenger car, van and pickup truck** is approximately 40%, as well as motorcycle is 44% on n DOH roads.
- Motorcycle is 52% to 69% as the 1st party of vehicle **on DRR** roads in pilot provinces.

Fatal Accident Cases by Vehicle (1st party) on DOH roads (TRAMS 2019 to 2022)

	Pedestrian	Bicycle/Tricycle	Motorcycle	Car/van	Pickup truck	Truck	Trailer	Bus	Other	Grand Total	No. of fatal accident case	Car/van + pickup
Nakhon Ratchasima	2.2%	1.7%	38.6%	19.4%	29.1%	6.4%	0.7%	1.7%	1.4%	100.0%	(300)	48.5%
Suphan Buri	0.8%	2.7%	54.9%	12.4%	19.7%	4.1%	0.3%	1.1%	3.9%	100.0%	(370)	32.2%
Samut Sakhon	0.0%	1.5%	48.4%	13.1%	25.5%	6.1%	1.5%	1.5%	2.2%	100.0%	(66)	37.9%
(Prachin Buri)	0.0%	0.8%	26.4%	24.8%	17.1%	10.9%	17.8%	2.3%	0.0%	100.0%	(129)	41.9%
Nationwide	1.5%	1.6%	44.1%	17.0%	23.4%	4.9%	0.5%	0.8%	1.3%	100.0%	(8559)	40.3%

Fatal Accident Cases by Vehicle (1st party) on DRR roads (TRAMS 2019 to 2022)

	Pedestrian	Bicycle/Tricycle	Motorcycle	Car/van	Pickup truck	Truck	Trailer	Bus	Other	Grand Total	No. of fatal accident case	Car/van + pickup
Nakhon Ratchasima	0.0%	0.0%	52.9%	17.6%	11.8%	0.0%	5.9%	5.9%	5.9%	100.0%	(17)	29.4%
Suphan Buri	0.0%	3.4%	69.0%	13.8%	3.4%	6.9%	3.4%	3.4%	0.0%	100.0%	(29)	17.2%
Samut Sakhon	0.0%	6.7%	66.7%	6.7%	13.3%	0.0%	0.0%	0.0%	6.7%	100.0%	(15)	20.0%
Nationwide	0.0%	0.0%	55.6%	11.1%	22.2%	0.0%	0.6%	5.6%	0.0%	100.0%	(18)	33.3%

11

[TRAMS] Target Accident Cause in Pilot Provinces

The accident causes that shall be considered are:

- **Over-speeding**
- **People/car/animal close in front**
- **Drunk driving (DRR)**

Fatal accident cases by Accident cause share (%) in Pilot Provinces (2019 to 2022)

	DOH	DRR
Over-speeding	77 % (58 – 86%)	44 % (31 – 58%)
People/car/animal close in front	13 % (5 – 24%)	16 % (10 – 41%)
Doze-off	3 % (5 – 16%)	3 % (0 – 6%)
Disobeying traffic lights/signs	2 % (0 – 3%)	-
Defects of vehicle system	2 % (0 – 7%)	-
Drunk driving	1 % (0 – 2%)	9% (0 – 21%)

12

[TRAMS Data] Fatal Accident x Accident Cause in Pilot Provinces

- **Over-speeding** is the **dominant accident cause** on DOH and DRR roads.
- Next is **people/car/animal cutting in front**, **dose-off**, and **drunk driving**.
- Each **top 3 causes** have more than **90% on DOH** and more than **70% on DRR** roads.

Fatal Accident Cases by Accident Cause on DOH roads (TRAMS 2019 to 2022)

	Over-speeding	People/car/animal close in front	Doze-off	Disobeying traffic lights/signs	Defects of vehicle system	Drunk driving	Illegal overtaking	Unfamiliar route	Others	Total	No. of fatal accident case	Top 3 accumulated
Nakhon Ratchasima	80.8%	11.9%	2.8%	1.1%	0.6%	1.7%	0.3%	0.6%	0.8%	100.0%	(366)	95.6%
Suphan Buri	87.8%	24.3%	8.6%	3.2%	1.6%	0.5%	1.6%	0.3%	1.9%	100.0%	(370)	90.8%
Samut Sakhon	86.4%	9.1%	9.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.5%	100.0%	(66)	95.5%
(Prachin Buri)	82.9%	4.7%	1.6%	3.1%	7.0%	0.0%	0.0%	0.0%	0.8%	100.0%	(129)	89.1%
Nationwide	71.6%	14.8%	5.0%	2.6%	1.4%	1.4%	1.0%	0.4%	1.8%	100.0%	(8559)	91.4%

Fatal Accident Cases by Accident Cause on DRR roads (TRAMS 2019 to 2022)

	Over-speeding	Drunk driving	People/car/animal close in front	Doze-off	Suddenly change lane	Driving too close	Illegal overtaking	Unfamiliar route	Others	Total	No. of fatal accident case	Top 3 accumulated
Nakhon Ratchasima	58.8%	5.9%	5.9%	5.9%	0.0%	0.0%	5.9%	5.9%	11.8%	100.0%	(17)	70.6%
Suphan Buri	31.0%	0.0%	20.7%	0.0%	10.3%	6.9%	0.0%	3.4%	27.6%	100.0%	(29)	51.7%
Samut Sakhon	42.9%	21.4%	21.4%	0.0%	0.0%	0.0%	7.1%	0.0%	7.1%	100.0%	(14)	85.7%
Nationwide	57.1%	10.2%	5.4%	3.4%	2.4%	2.3%	2.3%	2.3%	14.6%	100.0%	(1539)	72.7%

13

[Summary] Targets for the Pilot Provinces

	DOH	DRR
Road Characteristics	• Straight section • Wide/normal curve section • Intersection	• Straight section • Wide/normal curve section • Intersection
Collision type	• Same direction accident • Off-carriageway on straight/ curve • Hit pedestrian accident	• Same direction accident • Off-carriageway on straight/ curve • Intersection
Vehicle type	• Motorcycle • Passenger car/ van, Pickup truck • Truck/trailer	• Motorcycle • Passenger car/ van, Pickup truck
Accident Cause	• Over-speeding • People/car/animal close in front	• Over-speeding • People/car/animal close in front • Drunk driving

14

[Summary] Pilot section and area in the Pilot Provinces

		DOH	DRR
Nakhon Ratchasima	ROAD	Combination of straight section and curve section	Area including curve section
	COLLISION	Same direction, off-carriageway on straight/curve	Off-carriageway on curve, same direction
	VEHICLE	Passenger car/van, Pickup truck	Motorcycle, Passenger car/van
	CAUSE	Over-speeding	Over-speeding, people/car/animal cross in front
Suphan Buri	ROAD	Straight section with intersection (T-junction)	Area including intersection
	COLLISION	Same direction (rear-end/side-swipe)	Intersection crash
	VEHICLE	Motorcycle, passenger car/van, pickup truck	Motorcycle, passenger car/van, truck , trailer
	CAUSE	Over-speeding, suddenly cutting in	People/car/animal cross in front, over-speeding,
Samut Sakhon	ROAD	Straight section with intersection	Area including straight section
	COLLISION	Same direction, Hit pedestrian accident	Off-carriageway on straight, same direction
	VEHICLE	Motorcycle, passenger car/van, pickup truck	Motorcycle, passenger car/van
	CAUSE	Over-speeding, people/car/animal close in front (suddenly cut-in)	Over-speeding, people/car/animal cross in front, drunk driving
Prachin Buri	ROAD	Wide/normal curve section	-
	COLLISION	Off-carriageway on curve	-
	VEHICLE	Truck/trailer	-
	CAUSE	Over-speeding, defects of vehicle system	-

15

RAI Data Analysis

Analysis for finding relations between the keywords and accidents (RAI data with some TRAMS data)

1. The number of lanes
2. Over speeding
3. The number of accident parties (road users involved in an accident)

16

[RAI] Additional analysis of RAI Data

The relation between the following keywords and accident was analyzed.

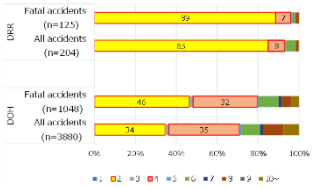
- The number of lanes
- Over speeding
- The number of accident parties (road users involved in an accident)

The analysis was carried out from the viewpoint of fatal accidents and all accidents (fatal, injured and non injured).

17

[RAI] Number of accidents by the number of lanes and organization

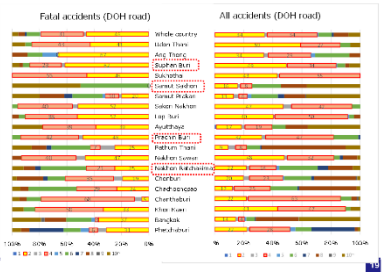
- This figure shows the percentage of accidents by the number of lanes and organization (DOH, DRR).
- Most of the accidents of DRR roads occurred at 2-lane roads.
- Most of the accidents of DOH roads occurred at 2-lane and 4-lane roads.



18

[RAI] Number of accidents by the number of lanes and province

- This figure shows the percentage of accidents of DOH road by the number of lanes and province.
- The distribution by the number of lanes differs among provinces.
- The accident characteristics of 2-lane roads is different from that of 4-lane roads as shown in the following slides.



19

[RAI] Number of accidents by road geometry and the number of lanes caused by motorcycle

- This figure shows the distributions of accidents caused by motorcycle of 2-lane and 4-lane roads by road geometry.
- More accidents occurred at "straight section" on 4-lane roads.
- More accidents occurred at "T-intersection" and "wide curve" on 2-lane roads.

Number of lanes	All		Motorcycle			
			2 lanes		4 lanes	
Road geometry	All accidents	Fatal accidents	All accidents	Fatal accidents	All accidents	Fatal accidents
U-turn	2.5	3.2	2.7	2.8	2.6	1.9
T-shaped intersection	4.6	5.7	**5.1**	**5.9**	**2.6**	**1.0**
Y-shaped intersection	1.1	1.4	1.3	1.6	0.5	-
way 4 intersection	2.7	2.3	2.0	2.0	2.6	1.9
other intersections	1.1	1.1	1.3	1.2	0.5	-
Narrow curves / sharp corners	1.4	1.6	2.3	2.8	-	-
wide arch	10.3	11.0	**14.2**	**15.0**	**7.8**	**11.4**
link	1.3	1.4	0.3	0.4	2.1	2.6
direct (Straight section)	73.7	71.4	**71.4**	**68.5**	**80.2**	**80.6**
roundabout	0.4	0.5	0.3	-	0.5	1.0
unknown information	0.4	0.2	0.3	0.4	0.5	-
Total	100.0	100.0	100.0	100.0	100.0	100.0
(number)	715	444	395	254	192	105

20

[RAI] Number of accidents by road geometry and vehicle type

- This figure shows the distributions of accidents occurred on 2-lane roads by road geometry and vehicle type (first party).
- More accidents were caused by passenger car at "straight section"
- More accidents were caused by motorcycle and pickup truck at "T-intersection".

Number of lanes	2 lanes					
Vehicle type of First party	Motorcycle		4 wheel pickup truck		Passenger car (personal)/sedan	
Road geometry	All accidents	Fatal accidents	All accidents	Fatal accidents	All accidents	Fatal accidents
U-turn	1.5	2.0	-	-	1.2	2.7
T-shaped intersection	**5.1**	**5.9**	**2.7**	**6.8**	**2.1**	**2.1**
Y-shaped intersection	1.3	1.6	0.5	-	0.0	0.7
way 4 intersection	2.0	2.0	1.1	1.4	1.5	2.7
other intersections	1.3	1.2	-	-	0.3	-
Narrow curves / sharp corners	2.3	2.8	3.7	1.4	2.1	0.7
wide arch	**14.2**	**15.0**	**16.9**	**13.7**	**10.5**	**10.3**
link	0.3	0.4	-	-	0.0	1.4
direct (Straight section)	**71.4**	**68.5**	**74.8**	**76.7**	**80.5**	**79.5**
roundabout	0.3	-	-	-	-	-
unknown information	0.3	0.4	0.2	-	0.3	-
Total	100.0	100.0	100.0	100.0	100.0	100.0
(number)	395	254	437	73	334	146

21

[RAI] Number of accidents by road geometry and vehicle type on over speeding

- This figure shows the number of accidents on 2-lane roads by road geometry, over speeding and vehicle type (first party).
- The percentage of accidents caused by over speeding of pickup truck is higher than that of motorcycle or passenger car at any category of road geometry.

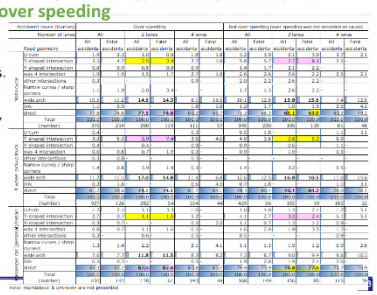
Number of lanes	2-lane					
Vehicle type of First party	Motorcycle		4 wheel pickup truck		Passenger car (personal)/sedan	
Road geometry	All accidents	Fatal accidents	All accidents	Fatal accidents	All accidents	Fatal accidents
Number of accidents by over speeding: T-shaped intersection	5	4	11	4	2	1
Narrow curves / sharp corners	4	4	11	1	4	0
wide arch	29	17	48	8	21	7
direct	155	89	209	40	146	50
All	200	119	282	54	178	61
Percentage of accidents by over speeding (%): T-shaped intersection	25.0	26.7	91.7	80.0	28.6	33.3
Narrow curves / sharp corners	44.4	57.1	68.8	100.0	57.1	-
wide arch	51.8	44.7	64.9	80.0	60.0	46.7
direct	55.0	51.1	65.9	71.4	54.3	43.1
All	50.6	46.9	64.5	78.0	53.3	41.8

Note: A bar graph is not shown in case that the value is 2 or less.

22

[RAI] Number of accidents by vehicle type, road geometry, the number of lanes and over speeding

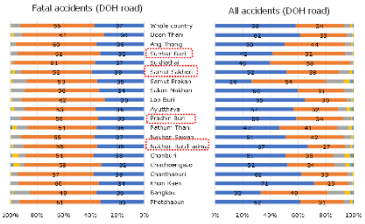
- This figure shows the summary of the results shown in the previous slides.
- The percentages of accidents by road geometry, vehicle type, over speeding and the number of lanes is shown.
- The feature of accidents caused by over speeding differs in items.



23

[TRAMS] Number of accidents by the number of accident parties by province on DOH roads

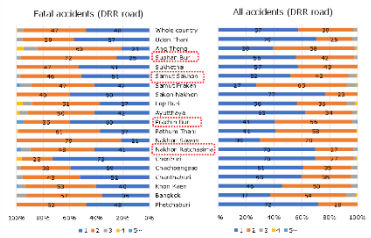
- This figure shows the percentage of accidents of DOH road by the number of accident parties and province (TRAMS data analysis).
- The percentage of fatal accidents of one accident party is lower than that of two accident parties at every province.



24

[TRAMS] Number of accidents by the number of accident parties by province on DRR roads

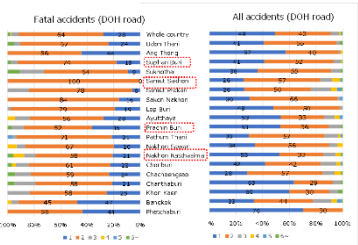
- This figure shows the percentage of accidents of DRR road by the number of accident parties and province (TRAMS data analysis).
- The percentage of fatal accidents of one accident party is larger than that of two accident parties in several province.



25

[RAI] Number accidents by the number of accident parties

- This figure shows the percentage of accidents of DOH roads by the number of accident parties and province (RAI data).
- The pattern of the left figure is different from the pattern of the left figure shown in the previous slide.
- This means that attentions are required to understand/ explaining the results.



26

[RAI] Summary of RAI analysis

Number of lanes

- The accident characteristics of 2-lane roads are different from that of 4-lane roads.
- The number of lanes is one of the key factors when accident countermeasures are examined.

Over speeding

- The feature of accidents caused by over speeding differs in items.
- The countermeasures for over speeding should be discussed based on detailed accident analysis.

27

[RAI] Summary of RAI analysis

Number of accident parties

- The percentage of fatal accidents of one accident party is larger than that of two accident parties in several province on DRR roads.
- Safety measures for single vehicle accident are necessary for those provinces.

28

Reference data

- **TRAMS: Number of Fatalities, Fatal/Injury Accident Cases in Pilot Provinces**
- **Basic Accident Statistics of Pilot Provinces**

29

[TRAM Data] Number of Fatalities, Fatal/Injury Accident Cases in Pilot Provinces

- The accumulated number of **fatal accident cases** from **2019 to 2022** are **796 cases for DOH** and **61 cases for DRR.**
- The fatal accident rate of the pilot provinces are in the range of 0.17 to 0.29, which means **1 fatal accident in every 3 to 6 cases** except for property damage only accidents.

Number of Fatalities, Fatal accident cases and Fatal/Injury cases

		DOH					DRR				
		2019	2020	2021	2022	Total	2019	2020	2021	2022	Total
Nakhon Ratchasima	Fatalities	123	131	95	83	432	6	6	5	5	22
	Fatal cases	**102**	**100**	**87**	**71**	**360**	**5**	**5**	**4**	**3**	**17**
	Fatal/Injury cases	472	420	395	387	1,674	17	42	24	17	100
Suphan Buri	Fatalities	119	102	100	99	420	12	16	1	6	35
	Fatal cases	**100**	**88**	**93**	**89**	**370**	**10**	**14**	**1**	**4**	**29**
	Fatal/Injury cases	472	571	516	408	1,967	34	35	14	18	101
Samut Sakhon	Fatalities	17	23	19	19	78	6	1	5	5	17
	Fatal cases	**16**	**21**	**15**	**14**	**66**	**4**	**1**	**5**	**5**	**15**
	Fatal/Injury cases	119	99	91	96	395	43	14	16	16	89
Nationwide	Fatalities	2,799	2,855	2,399	2,282	10,135	549	445	413	334	1,741
	Fatal cases	**2,183**	**2,422**	**2,003**	**1,953**	**8,561**	**477**	**402**	**373**	**291**	**1,543**
	Fatal/Injury cases	10,996	11,141	10,228	9,975	41,400	1,493	1,118	1,068	947	4,626
Total of 3 pilot provinces	Fatalities	259	256	213	197	925	24	23	11	16	74
	Fatal cases	**218**	**209**	**195**	**174**	**796**	**19**	**20**	**10**	**12**	**61**
	Fatal/Injury cases	1,063	1,090	992	891	4,036	94	91	54	51	290

Table. Fatal Accident rate

	DOH	DRR
Nakhon Ratchasima	0.22	0.17
Suphan Buri	0.19	0.29
Samut Sakhon	0.17	0.17
Nationwide	0.21	0.34

Note: No. of fatal accident cases / no. of fatal & injury accident cases, Data 2019 to 2022 cumulative

30

[TRAM and other source data] Basic Accident Statistics of Pilot Provinces

- **Nakhon Ratchasima has the largest road fatalities** among 3 pilot provinces, the next is Suphan buri and then Samut Sakhon.
- As for the **fatalities per population**, **Suphan buri** is the **highest** on DOH and DRR roads.
- As for the **fatalities per road km**, **Samut Sakhon** is the **highest** on DOH and DRR roads.

Table. Basic statistics of population, vehicle registration, road km, and fatalities in pilot provinces

	Population (2023)	Number of vehicle registration (2023)	Road Km (DOH)	Road Km (DRR)	All roads			DOH (average of 2019 to 2020)			DRR (average of 2019 to 2020)		
					Fatalites (2020, DDPM)	Fatality per 100000 population (2020, DDPM)	Fatality per 100000 vehicles (2020)	Fatalities per year (TRAMS)	Fatality per 100,000 population	Fatality per 100km of DOH road	Fatalities per year (TRAMS)	Fatality per 100,000 population	Fatality per 100km of DRR road
Nakhon Ratchasima	2,627,513	1,197,214	1,764	1,598	**798**	30.2	63.3	**108.0**	4.1	6.1	**5.5**	0.2	0.3
Suphan Buri	827,798	514,631	892	964	**328**	38.9	63.7	**105.0**	12.7	11.8	**8.8**	1.1	0.9
Samut Sakhon	590,750	262,607	127	346	**139**	25.4	52.9	**17.8**	3.0	14.0	**4.3**	0.7	1.2
Nationwide	66,054,830	43,969,211	52,325	49,634	**17,831**	27.2	22.2	**2,633.5**	3.8	4.84	**435**	0.7	0.9

31

Thank you

32

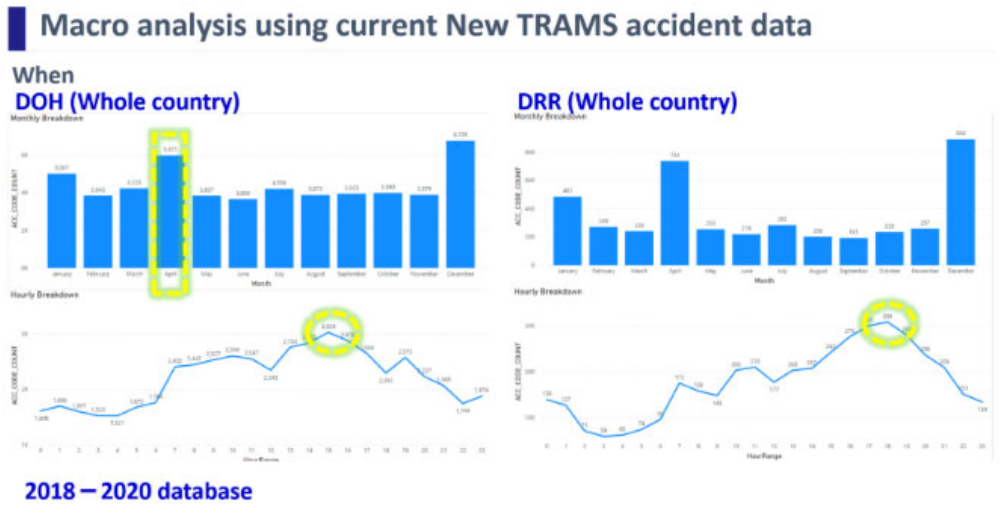
Source: JET

Figure 4.3.29 Reports for 30% Reduction of Fatalities in Road Accidents

4.3.5 Improvement of the Capacity of MOT and the Organizations Concerned for In-depth Accident Analysis

(1) Accident Data Analysis

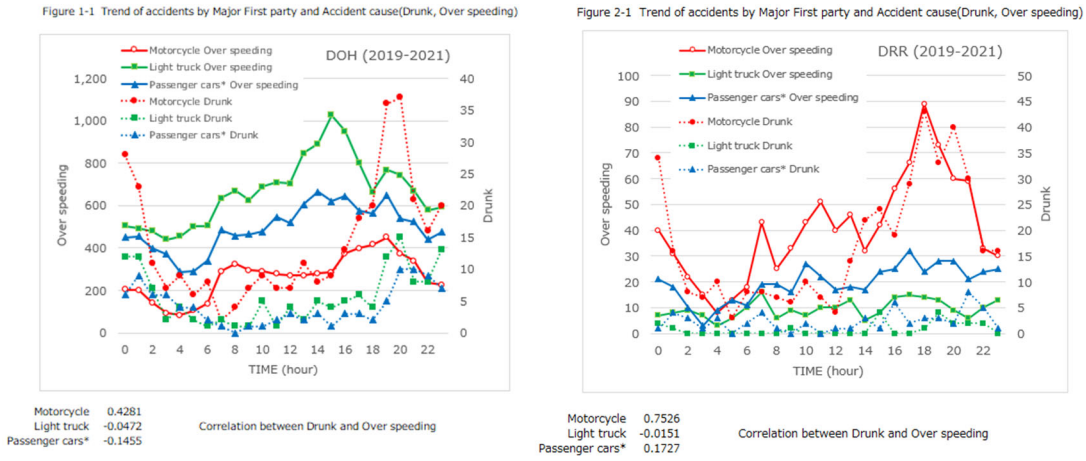
Using data from New-TRAMS, macro analysis based on the 5W1H (when, where, who, what, how, and why) was presented at WG1 meetings, demonstrating the utility of traffic accident analysis. Additionally, detailed accident analyses were conducted using the data of pilot provinces collected using the common accident format.



Source: Created by JET based on data analysis results by TSOC

Figure 4.3.30 Macro Analysis Using New-TRAMS

Within the New-TRAMS data, the most detailed accident data from DOH and DRR were used to conduct practical training on accident analysis for TSOC staff based on combinations of accident occurrence times, accident causes, the primary party involved, and road configurations.



Source: JET

Figure 4.3.31 Thematic Analysis Example: Number of Accidents by Time of Day, Primary Party Involved, and Cause of the Accident (left DOH, right DRR)

(2) Accident Data Analysis Workshops and Training

Accident Data Analysis Workshop for MOT officers

An accident data analysis workshop was held for MOT officers in June 2023.

Program

Time	*Presentation Title*	*Speaker*
09:30 – 09:40	Opening remarks	TSOC
09:40 – 10:30	Current New-TRAMS data and how can we utilize the data with incompleteness	Mr. Irie, JET
10:30 – 10:45	Tea break	
10:45 – 11:30	Examples of data analysis and countermeasures for preventing traffic accidents in Japan	Mr. Nishida, JET
11:30 – 11:55	Discussion	All participants
11:55 – 12:00	Closing remarks	TSOC,

Source: JET

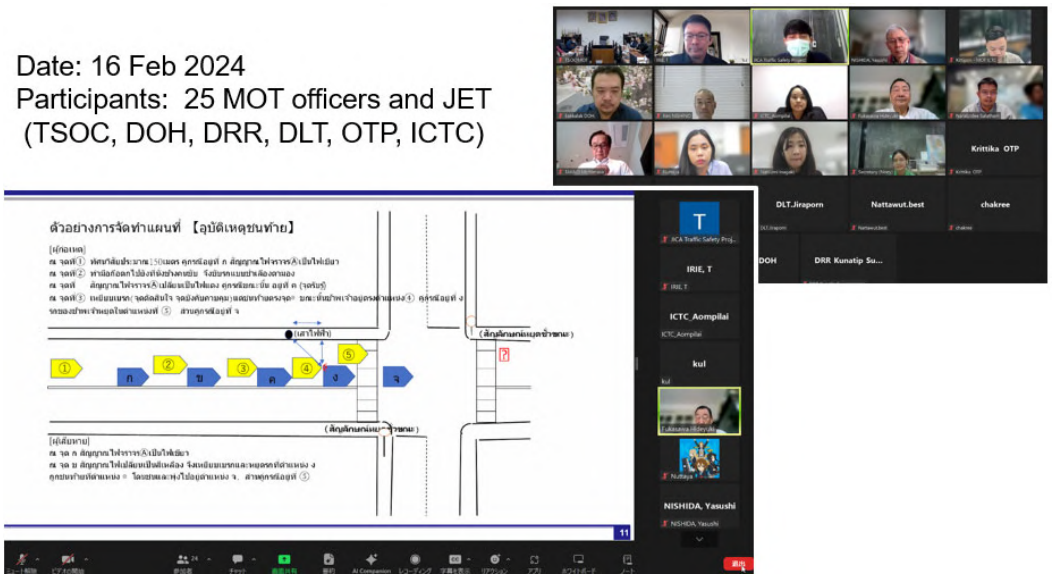
Figure 4.3.32 Program and Photo of the Accident Data Analysis Workshop for MOT

Online Training of Accident Investigation and in-depth Analysis in Japan

An online training for accident investigation and in-depth analysis done in Japan for the MOT officers was held in February 2023.

Program

Time	*Presentation Title*	*Speaker*
10:00 – 10:00	Introduction	Mr. Irie, JICA Expert Team
10:05 – 10:15 (10 min)	In-depth analysis of road accidents in Japan - Objective of in-depth analysis - Contents of in-depth analysis in Japan	Mr. Nishida, JICA Expert Team
10:15 – 10:55 (40 min)	Road Accident investigation in Japan - Outline of accident investigation - Examples of diagram of an accident scene - Driving speed and skid marks	Mr. Fukasawa, JICA Expert Team
10:55 – 11:05 (10 min)	Q &A and discussion	All participants
11:05 – 11:45 (40 min)	Points for in-depth analysis - Examples of in-depth analysis - Important points for the in-depth analysis	Mr. Nishida, JICA Expert Team
11:45 – 11:55 (10 min)	Q &A and discussion	All participants
11:55 – 12:00	Closing remarks	TSOC



Source: JET

Figure 4.3.33 Program and Screenshots of the Online Training for Accident Investigation and In-Depth Analysis in Japan for MOT

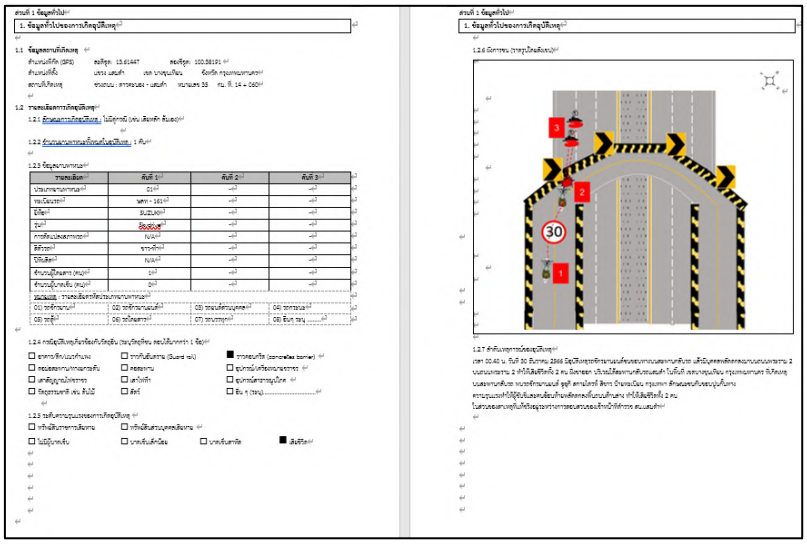
(3) In-depth Accident Data Report by TSOC

During the 2024 New Year's holiday (December 2023–January 2024), the TSOC staff

conducted seven detailed accident investigations, including a traffic accident scene investigation.

Table 4.3.5 List of In-depth Accident Data Reports by TSOC during the 2024 New Year's Holiday

	Date	Province	Type of Accident
1	30 December 2023	Bangkok	A single **motorcycle** crashed heavily to a barrier of grade-separated U-turn bridge
2	30 December 2023	Samut Sakhon	A **light truck** rear-ended a **passenger pickup.**
3	30 December 2023	Sara Buri	A **pickup truck** hit another **pickup truck** at the intersection.
4	01 January 2024	Bangkok	A **passenger car** rear-ended a **motorcycle.**
5	01 January 2024	Chachoengsao	A **passenger car** rear-ended a **pickup truck.**
6	01 January 2024	Chachoengsao	A **passenger car** hit the guard fence, and another **passenger car** was rear-ended.
7	02 January 2024	Samut Prakan	Multiple vehicle crash with 2 **passenger cars** and 2 **pickup trucks.**



Source: TSOC

Figure 4.3.34 In-depth Accident Data Report by TSOC

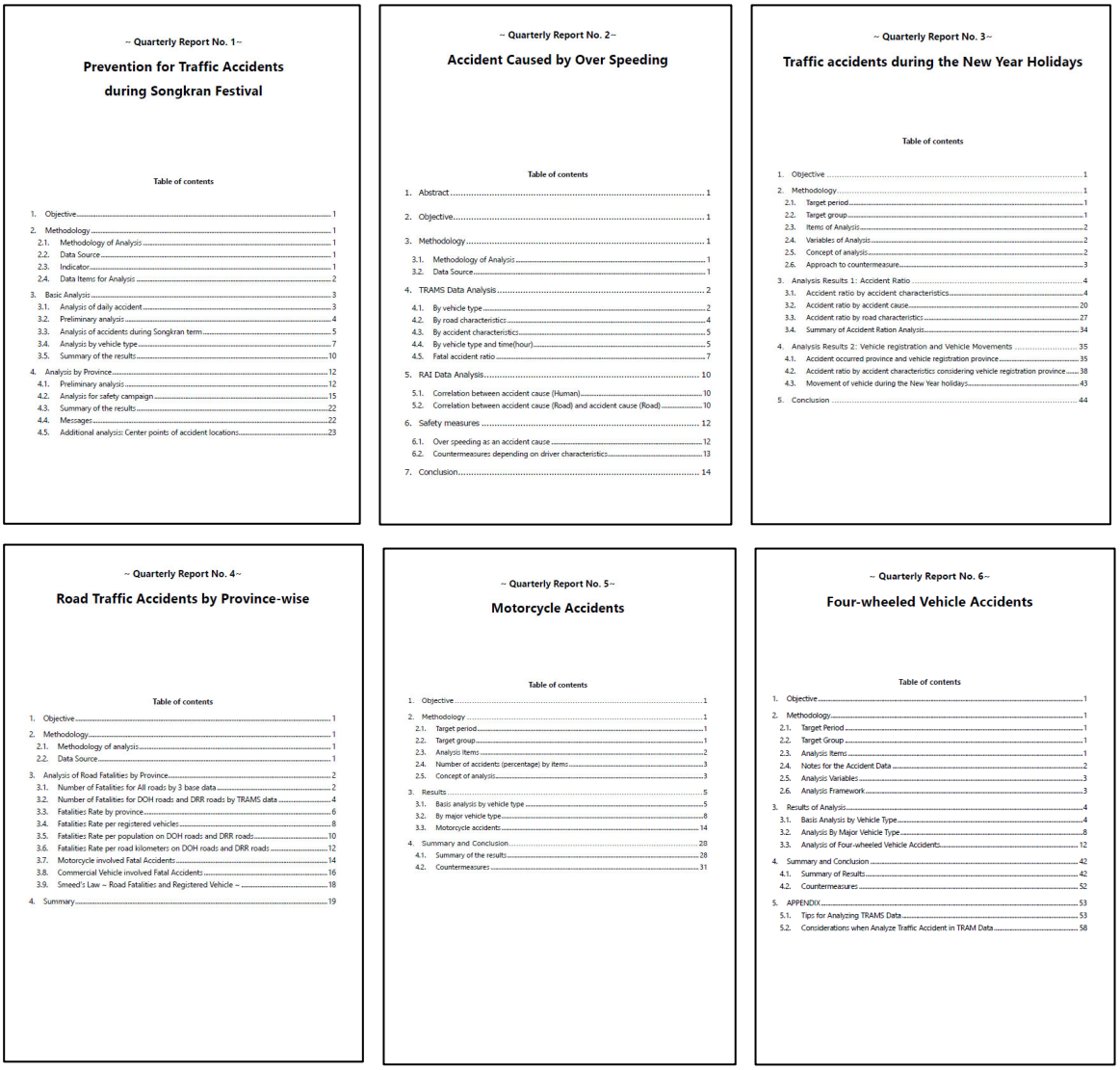
4.3.6 Issuance of Quarterly and Annual Traffic Accident Reports including the Result of Data Analysis

Upon consulting with TSOC, WG1 members selected themes considered important as quarterly reports and produced quarterly and annual reports.

(1) Quarterly Reports

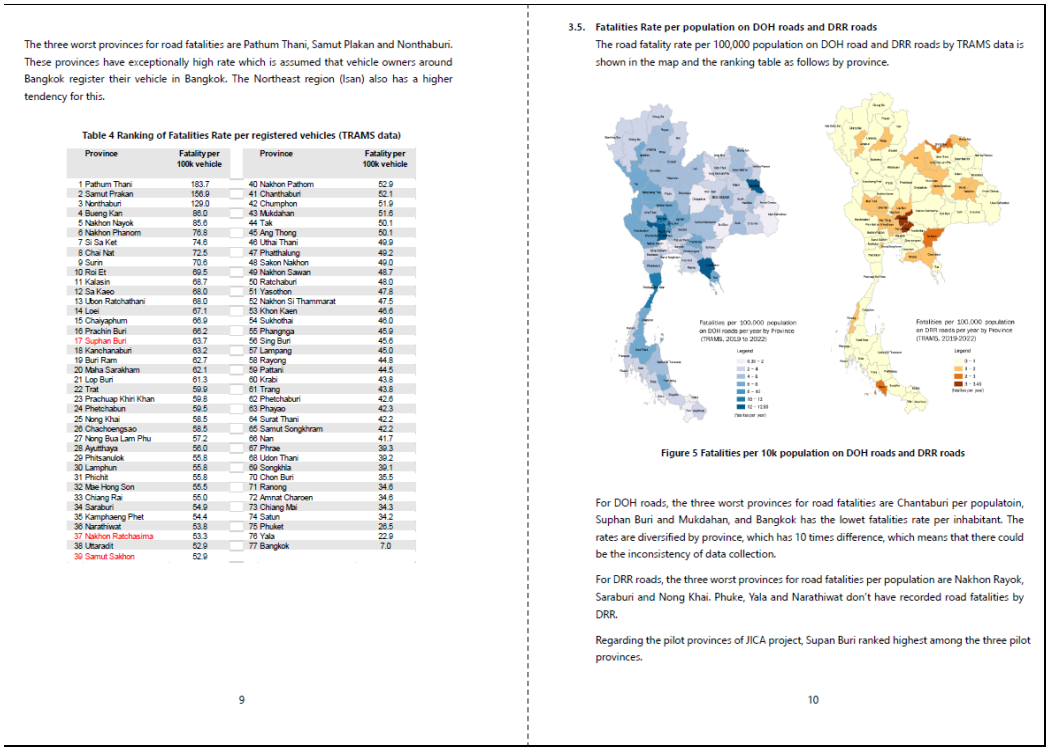
WG1 produced quarterly reports into six themes.

- Analysis of accident data during the Songkran period
- Analysis of accident data on speeding accidents
- Analysis of accident data during the New Year period
- Analysis of accident data by prefecture
- Analysis of motorcycle accident data
- Analysis of car accident data



Source: JET

Figure 4.3.35 Cover Page of Quarterly Reports (English version)



The three worst provinces for road fatalities are Pathum Thani, Samut Plakan and Nonthaburi. These provinces have exceptionally high rate which is assumed that vehicle owners around Bangkok register their vehicle in Bangkok. The Northeast region (Isan) also has a higher tendency for this.

Table 4 Ranking of Fatalities Rate per registered vehicles (TRAMS data)

Province	Fatality per 100k vehicle	Province	Fatality per 100k vehicle
1 Pathum Thani	183.7	40 Nakhon Pathom	52.9
2 Samut Prakan	156.9	41 Chanthaburi	52.1
3 Nonthaburi	129.0	42 Chumphon	51.9
4 Bueng Kan	86.0	43 Mukdahan	51.6
5 Nakhon Nayok	85.6	44 Tak	50.1
6 Nakhon Phanom	76.8	45 Ang Thong	50.1
7 Si Sa Ket	74.6	46 Uthai Thani	49.9
8 Chai Nat	72.5	47 Phatthalung	49.2
9 Surin	70.6	48 Sakon Nakhon	49.0
10 Roi Et	69.5	49 Nakhon Sawan	48.7
11 Kalasin	68.7	50 Ratchaburi	48.0
12 Sa Kaeo	68.0	51 Yasothon	47.8
13 Ubon Ratchathani	68.0	52 Nakhon Si Thammarat	47.5
14 Loei	67.1	53 Khon Kaen	46.6
15 Chaiyaphum	66.9	54 Sukhothai	46.0
16 Prachin Buri	66.2	55 Phangnga	45.9
17 Suphan Buri	63.7	56 Sing Buri	45.6
18 Kanchanaburi	63.2	57 Lampang	45.0
19 Buri Ram	62.7	58 Rayong	44.8
20 Maha Sarakham	62.1	59 Pattani	44.5
21 Lop Buri	61.3	60 Krabi	43.8
22 Trat	59.9	61 Trang	43.8
23 Prachuap Khiri Khan	59.8	62 Phetchaburi	42.6
24 Phetchabun	59.5	63 Phayao	42.3
25 Nong Khai	58.5	64 Surat Thani	42.2
26 Chachoengsao	58.5	65 Samut Songkhram	42.2
27 Nong Bua Lam Phu	57.2	66 Nan	41.7
28 Ayutthaya	56.0	67 Phrae	39.3
29 Phitsanulok	55.8	68 Udon Thani	39.2
30 Lamphun	55.8	69 Songkhla	39.1
31 Phichit	55.8	70 Chon Buri	35.5
32 Mae Hong Son	55.5	71 Ranong	34.6
33 Chiang Rai	55.0	72 Amnat Charoen	34.6
34 Saraburi	54.9	73 Chiang Mai	34.3
35 Kamphaeng Phet	54.4	74 Satun	34.2
36 Narathiwat	53.8	75 Phuket	26.5
37 Nakhon Ratchasima	53.3	76 Yala	22.9
38 Uttaradit	52.9	77 Bangkok	7.0
39 Samut Sakhon	52.9		

9

3.5. Fatalities Rate per population on DOH roads and DRR roads

The road fatality rate per 100,000 population on DOH road and DRR roads by TRAMS data is shown in the map and the ranking table as follows by province.

Figure 5 Fatalities per 10k population on DOH roads and DRR roads

For DOH roads, the three worst provinces for road fatalities are Chantaburi per populatoin, Suphan Buri and Mukdahan, and Bangkok has the lowet fatalities rate per inhabitant. The rates are diversified by province, which has 10 times difference, which means that there could be the inconsistency of data collection.

For DRR roads, the three worst provinces for road fatalities per population are Nakhon Rayok, Saraburi and Nong Khai. Phuke, Yala and Narathiwat don't have recorded road fatalities by DRR.

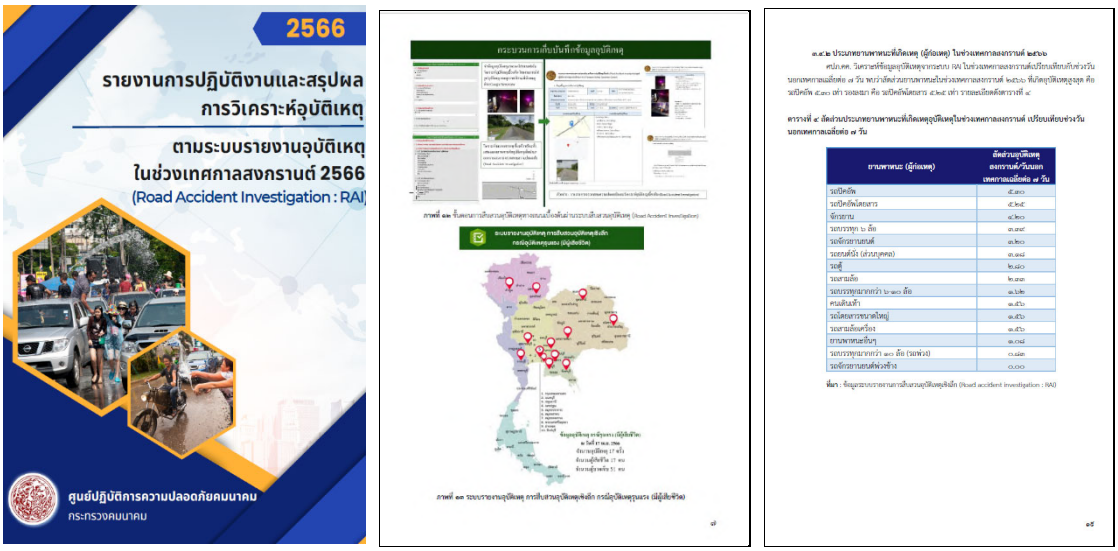
Regarding the pilot provinces of JICA project, Supan Buri ranked highest among the three pilot provinces.

10

Source: JET

Figure 4.3.36 Example of Quarterly Reports: Province-Wise Analysis

Furthermore, regarding the Songkran accident data analysis in 2023, the TSOC staff created a report incorporating the analysis methods used by JET. It was found that TSOC had not focused on the specific themes of traffic accidents, such as accidents involving pickup trucks and motorcycles.

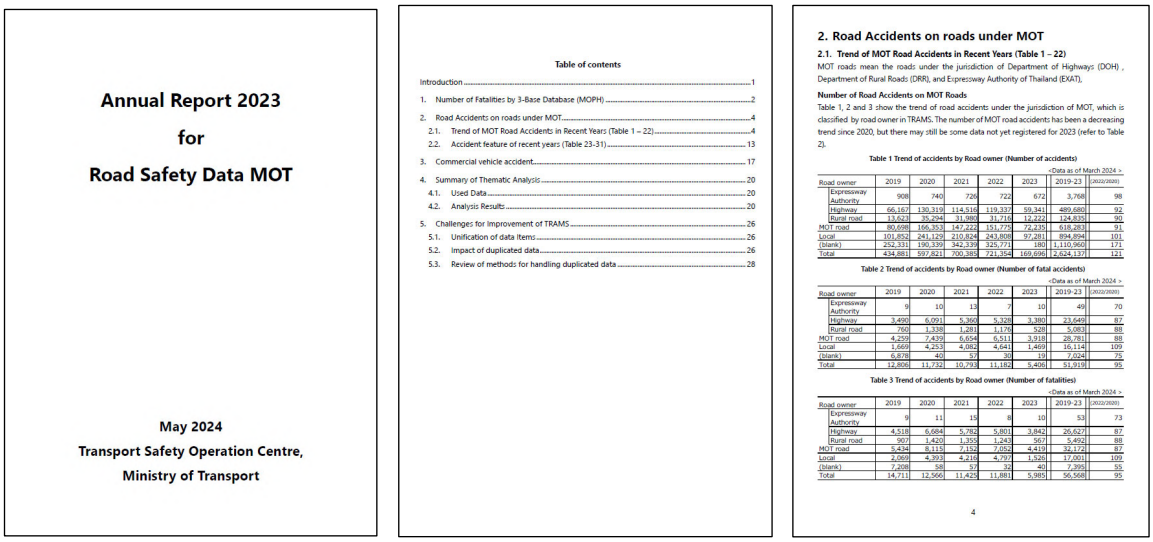


Source: TSOC

Figure 4.3.37 Traffic Accident Report during the Songkran Festival Prepared by TSOC

(2) Annual Report

New-TRAMS, using data as of February 2024, compiled as an annual report for FY2023, five-year trends from 2019 to 2023, traffic accident statistics for roads under MOT jurisdiction, and an analysis report.



Annual Report 2023
for
Road Safety Data MOT

May 2024
Transport Safety Operation Centre,
Ministry of Transport

Table of contents

2. Road Accidents on roads under MOT

2.1. Trend of MOT Road Accidents in Recent Years (Table 1 – 22)

MOT roads mean the roads under the jurisdiction of Department of Highways (DOH), Department of Rural Roads (DRR), and Expressway Authority of Thailand (EXAT).

Number of Road Accidents on MOT Roads

Table 1, 2 and 3 show the trend of road accidents under the jurisdiction of MOT, which is classified by road owner in TRAMS. The number of MOT road accidents has been a decreasing trend since 2020, but there may still be some data not yet registered for 2023 (refer to Table 2).

Table 1 Trend of accidents by Road owner (Number of accidents)

<Data as of March 2024 >

Road owner	2019	2020	2021	2022	2023	2019-23	(2022/2020)
Expressway Authority	908	740	726	722	672	3,768	98
Highway	66,167	130,319	114,516	119,337	59,341	489,680	92
Rural road	13,623	35,294	31,980	31,716	12,222	124,835	90
MOT road	80,698	166,353	147,222	151,775	72,235	618,283	91
Local	101,852	241,129	210,824	243,808	97,281	894,894	101
(blank)	252,331	190,339	342,339	325,771	180	1,110,960	171
Total	434,881	597,821	700,385	721,354	169,696	2,624,137	121

Table 2 Trend of accidents by Road owner (Number of fatal accidents)

<Data as of March 2024 >

Road owner	2019	2020	2021	2022	2023	2019-23	(2022/2020)
Expressway Authority	9	10	13	7	10	49	70
Highway	3,490	6,091	5,360	5,328	3,380	23,649	87
Rural road	760	1,338	1,281	1,176	528	5,083	88
MOT road	4,259	7,439	6,654	6,511	3,918	28,781	88
Local	1,669	4,253	4,082	4,641	1,469	16,114	109
(blank)	6,878	40	57	30	19	7,024	75
Total	12,806	11,732	10,793	11,182	5,406	51,919	95

Table 3 Trend of accidents by Road owner (Number of fatalities)

<Data as of March 2024 >

Road owner	2019	2020	2021	2022	2023	2019-23	(2022/2020)
Expressway Authority	9	11	15	8	10	53	73
Highway	4,518	6,684	5,782	5,801	3,842	26,627	87
Rural road	907	1,420	1,355	1,243	567	5,492	88
MOT road	5,434	8,115	7,152	7,052	4,419	32,172	87
Local	2,069	4,393	4,216	4,797	1,526	17,001	109
(blank)	7,208	58	57	32	40	7,395	55
Total	14,711	12,566	11,425	11,881	5,985	56,568	95

4

Figure 4.3.38 Annual Report 2023

4.3.7 Review of the detail functions of the TSOC and Proposal of the Action Plan on TSOC

(1) Proposed Organizational Structure of TSOC

TSOC was established as the supervisory agency for transport safety within the MOT, covering road traffic as well as maritime and aviation. However, at the beginning of the Project, TSOC was not officially recognized as a formal organization within the MOT, and its roles and authority were not clearly defined. By the end of the Project, the organizational structure of TSOC comprises one director (deputy permanent secretary or other MOT's executive officers appointed by the permanent secretary as additional position) and 16 staff members. Two full-time TSOC staff were employed in June 2023, but only one was employed since the beginning of the Project. Most TSOC staff members are employed fixed term, so most have been changed.

Regarding the Director of TSOC, the Deputy Permanent Secretary of MOT took on the role at the beginning of the Project and retired from MOT in September 2022. In October 2022, the Principal Advisor on Land Transport Economics to MOT was appointed the Director of TSOC. Subsequently, in March 2024, the Director of TSOC was changed to another Deputy

Permanent Secretary of MOT.

JET made the following proposal in the first year of the Project regarding the roles and functions of TSOC.

Table 4.3.6 Proposal for the Roles and Functions of TSOC

■ Responsibility of TSOC (1) To prepare policy and direction of traffic safety project in MOT / To compile and manage traffic safety plans in MOT (if OTP is in charge of policy making) (2) To promote awareness of traffic safety (3) To establish cooperation with other relevant national and international agencies on road safety
■ Function of TSOC (1) To analyze macro traffic accident data (2) To analyze micro traffic accident data including investigation on specific theme (3) To issue traffic accidents reports (annual report, white book) (4) To formulation and compile basic direction of traffic safety project in MOT (5) To implement awareness activities (6) To promote behavior modification activities for traffic safety (7) To promote traffic safety education (8) To coordinate with other organizations and international agencies on traffic safety

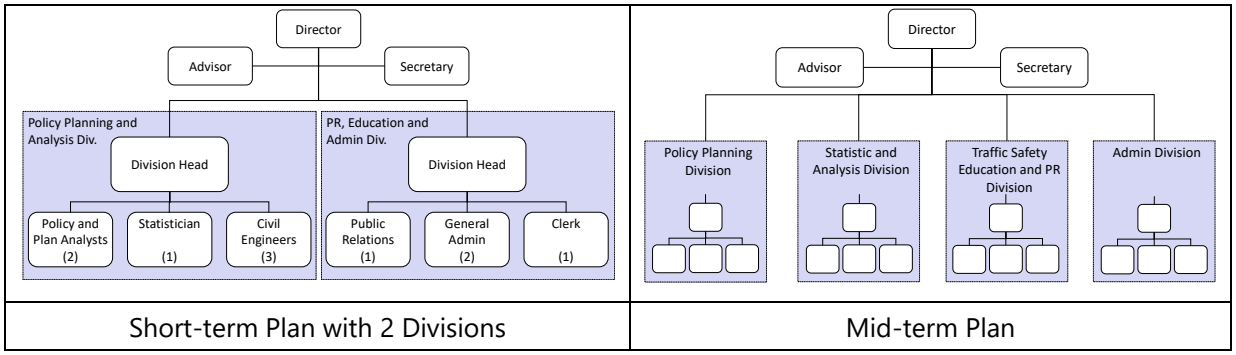
Source: JET

On the other hand, the following proposal is for the division of roles with other departments within MOT for traffic safety projects. MOT intends to initially assign TSOC a role similar to that of an investigative committee for serious accidents, not limited to road traffic but also including aviation and maritime.

Table 4.3.7 Proposal for the Division of Roles within MOT for Traffic Safety Projects

Category	Accidents Investigation	Accidents Data Management	Macro Data Analysis	Policy Making	Planning, Safety Measures	Public Relation
Road	DOH / DRR / **TSOC**	ICTC / **TSOC**	**TSOC**	**TSOC**	DOH / DRR (Engineering)	DOH / DRR / **TSOC**
Human	DOH / DRR / **TSOC**	ICTC / **TSOC**	**TSOC**	**TSOC**	**TSOC** (Awareness)	**TSOC**
Vehicle	DLT / **TSOC**	DLT / ICTC	**TSOC**	**TSOC**	DLT (Engineering, Enforcement)	DLT / **TSOC**

Source: JET



Short-term Plan with 2 Divisions	Mid-term Plan

Source: JET

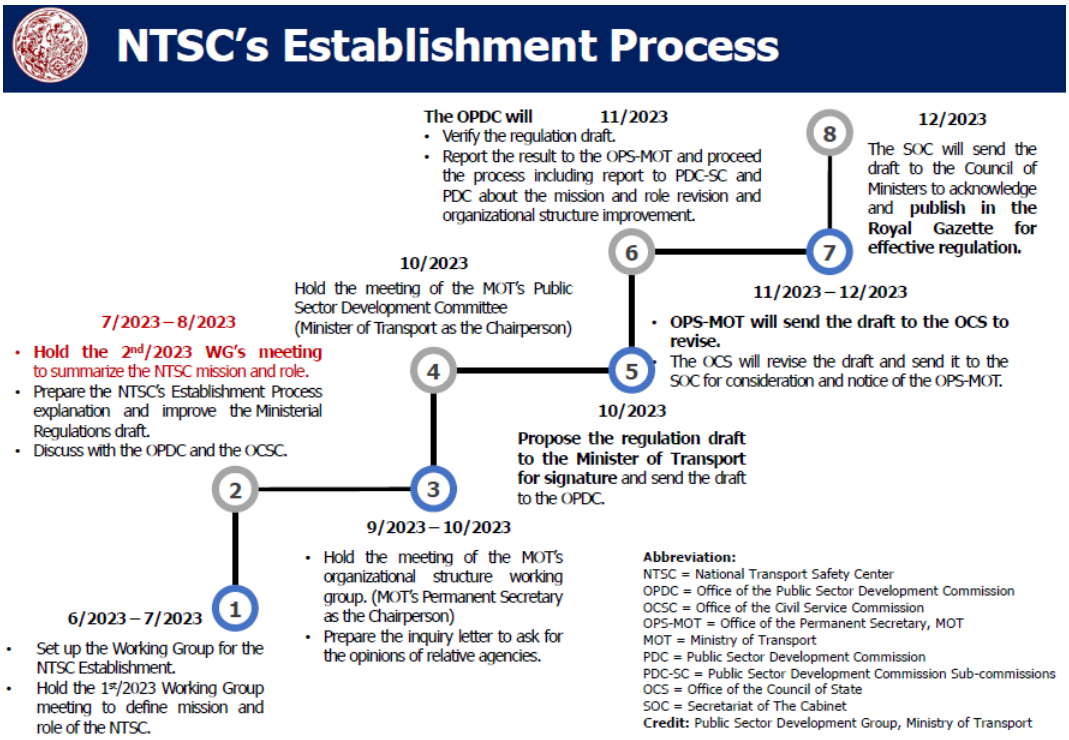
Figure 4.3.39 Proposal of TSOC Structure

(2) Recommendations for the First Year Phase

TSOC was established assuming it would become the supervisory body for traffic safety projects within the MOT. It serves as the main C/P for this Project. Therefore, through the activities of this Project, TSOC is expected to have established its position as the supervisory body for traffic safety projects within MOT and its staff's capabilities enhanced to fulfill their roles. However, its role still has not been clearly defined, organizational structure has not been established, and most staff are fixed-term employees. Therefore, it is necessary to continue discussions and requests with MOT to clarify the roles and establish the organizational structure of TSOC.

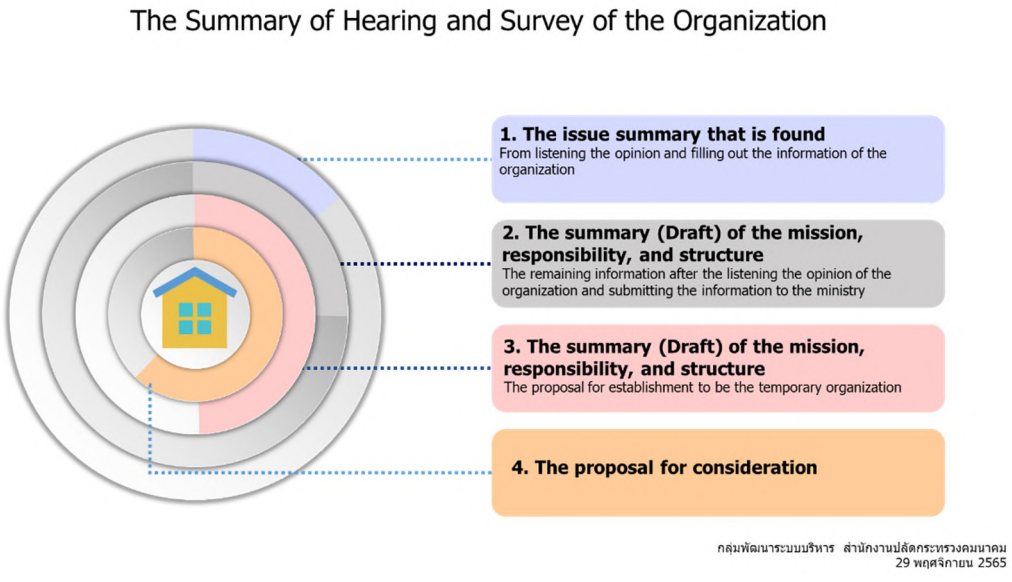
(3) Formal Approval and Future Vision of TSOC

TSOC was officially established in MOT during the Project period. Furthermore, the Thai side has envisioned the following organizational form for TSOC. According to the director, the intention is to eventually transform TSOC into the National Transport Safety Center (NTSC), independent from MOT, aiming for a system similar to the United States' National Transportation Safety Board.



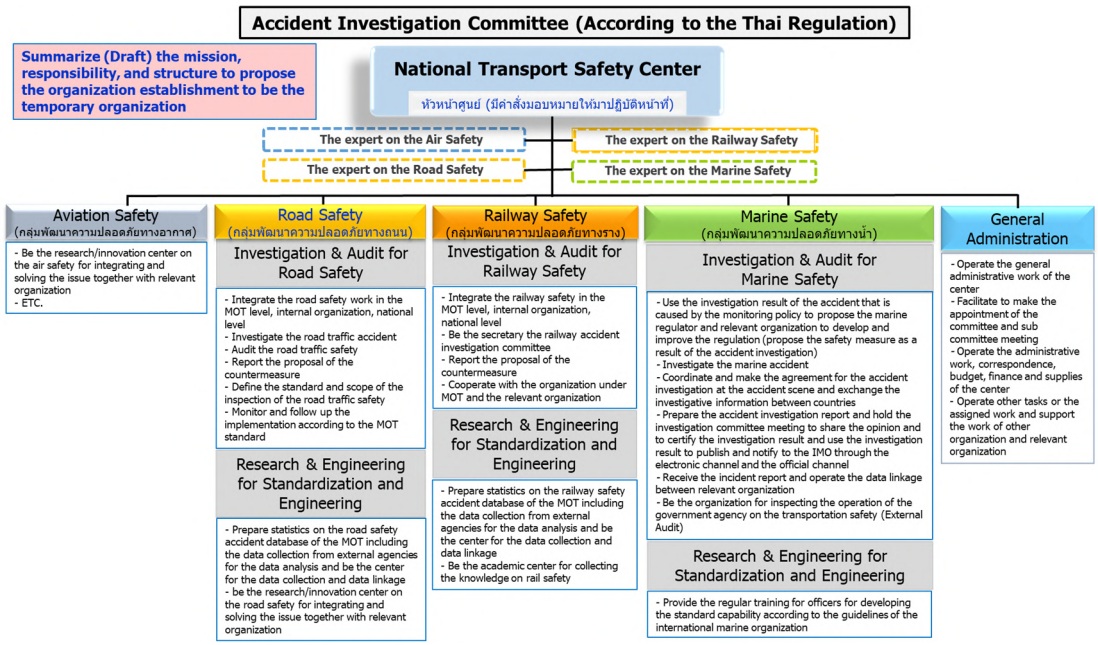
Source: TSOC (5th JCC Material)

Figure 4.3.40 Schedule for the Formal Approval of NTSC



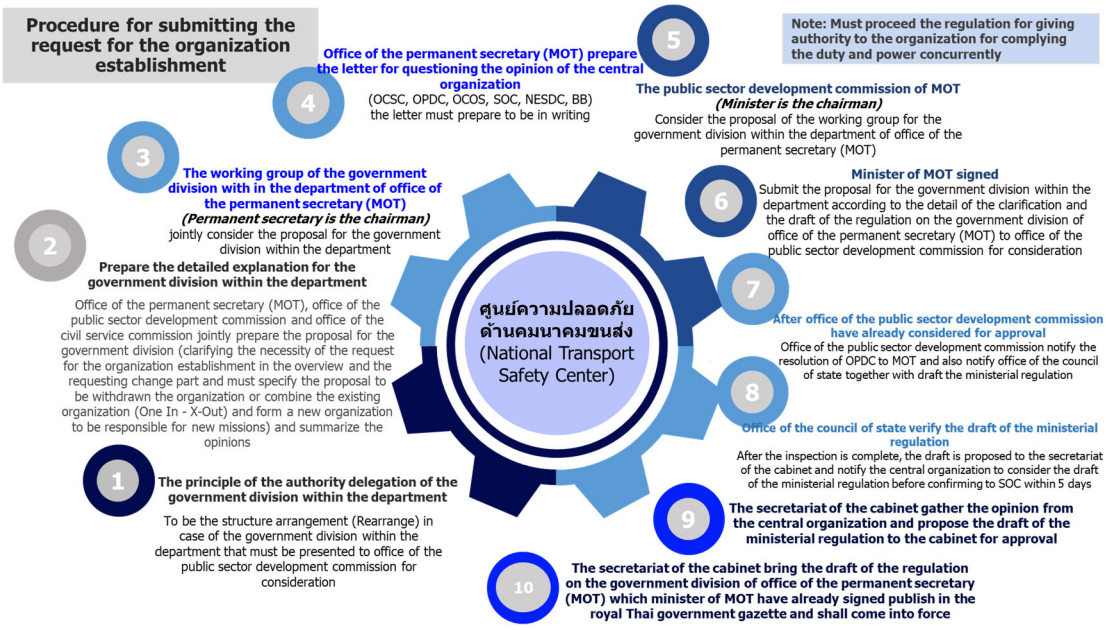
Source: TSOC (4th JCC Material)

Figure 4.3.41 Draft Organizational Overview of TSOC (1)



Source: TSOC (4th JCC Material)

Figure 4.3.42 Draft Organizational Overview of TSOC (2)



Source: TSOC (4th JCC Material)

Figure 4.3.43 Draft Organizational Overview of TSOC (3)

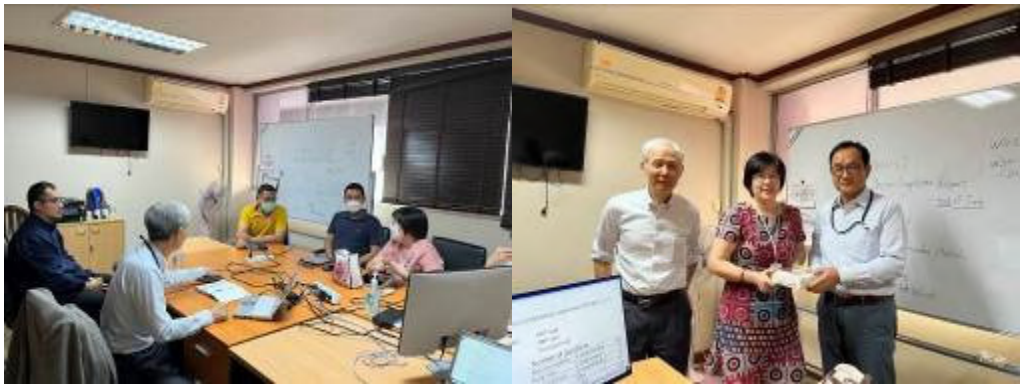
4.3.8 Activities Related to Capacity Improvement in Data Analysis for RTP (Additional Activities)

Since improving police activities and capacity building of police officers and MOT are essential to achieve road safety, activities related to data analysis for RTP were implemented from December 2023 as an additional activity at the request of JICA.

(1) Meetings on data analysis workshop

JET drafted a presentation on the importance of collecting data, and several meetings were held with RTP Headquarters' officials on the content of the presentation.

Currently, RTP Headquarters has a firm policy to promote data collection. However, there are many deficiencies in the data sent from the field, and the consultants hired by RTP Headquarters must correct each of them, which is a time-consuming process. As a first step toward improving the skills of the police officers in charge of data entry, JET pointed out specific errors, such as dates in accident records being in character format, and RTP Headquarters was informed during the meetings. In the course of presenting such specific improvement plans, the RTP executives asked JET to see the site of a serious bus accident to observe the investigation by the police officers. The accident happened on 5 December 2023, in which 15 people died.



Source: JET

Figure 4.3.44 Meeting at the RTP Headquarters

(2) Interview to the Police Station in charge of the Investigation of the Serious Bus Accident

Huai Yang provincial police were in charge of the serious bus accident on midnight of 5 December 2023 at Petchkasem Road, Route 4, under the jurisdiction of DOH. Fifteen passengers and bus company employees were killed. At the request of RTP Headquarters, JET visited the scene of the accident and interviewed the police. JET received the investigation reports from RTP, DOH, and DLT in advance and had a general understanding

of the situation before visiting the site.

The purpose of the visit was not to investigate the accident itself but to observe the investigation conducted by the police, so the interviews focused on what items were checked.

Source: JET

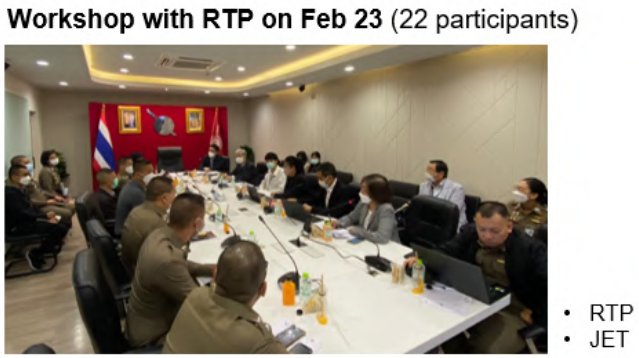
Figure 4.3.45 Interview at Huai Yang Provincial Police

As a result, JET confirmed that although the accident investigation method is like in Japan, in which it is conducted based on the statements of the parties involved, including the parties concerned, and on-site inspections, it lacks basic evidence collection, such as corroboration of statements. For example, in Japan, a driver's statement for causing an accident is because they took cold medicine and had been working the day before must be corroborated. Such investigation in Thailand, however, would not be conducted. Either there is no need to investigate or the prosecutors are unlikely required to do so when they refer a case to the police.

(3) Data Analysis Workshop for RTP

The first accident data analysis workshop for the RTP was in February 2023 with 22 participants from RTP. The program is as follows:

Time	*Presentation Title*	*Speaker*
09:30 – 09:40	Opening remarks	RTP
09:40 – 11:00	Examples of data analysis and countermeasures for preventing traffic accidents in Japan	Mr. Nishida, JET
11:00 – 11:20	Responsibilities and activities of Police Accident Data (PAD) of RTP	RTP
11:20 – 11:50	Discussion	All participants
11:50 – 12:00	Closing remarks	RTP



Source: JET

Figure 4.3.46 Accident Data Analysis Workshop for RTP

About 10 executives, including Mr. Weerapat, Head of Traffic Safety at RTP headquarters, attended the second workshop in December 2023, and more than 100 police stations nationwide participated online. After the presentation by JET, many questions about the police system and investigation in Japan were sent to JET online.

Source: JET

Figure 4.3.47 Second Accident Data Analysis Workshop for RTP

The third workshop was held in Pattaya, Chonburi province for over two days, from the 9 to 10 May 2024, with participants of around 50 RTP officers, supported by ATRANS. The main topic was data collection through traffic accident investigation and data analysis using the collected data. This workshop consisted of lectures as well as onsite investigative studies and group work.

Program on 9th May 2024

Time	*Presentation Title*	*Speaker*
09:00 – 09:05	Introductory Remarks	Mr. Ryoichi Kawabe, JICA
09:05 – 09:10	Welcome speech	Pol.Maj.Gen.Veerapat Sivabadeya, RTP
09:20 – 09:50	Lecture 1: Contributing Factor - Road &	Dr. Paramet Luathep,

	Environment - Road Infrastructure and Road Safety - Physical Infrastructure/Road Engineering and How It involves as a Contributing Factor in Road Traffic Accident	ATRANS Mr. Chaiwut Kanjanasantisuk, DOH
09:50 – 10:10	Lecture 2: Contributing Factor – Vehicles - Fundamental knowledge/background on 2-wheeled and 4-wheeled Vehicle Safety and How It involves as a Contributing factor in Road Safety/Road Traffic Accident	Mr. Hiroyuki Nozaki, ATRANS
10:10 – 10:40	Lecture 3: Contributing Factor – Human Behavior - STEERING SAFETY: How Effective Law Enforcement Reshapes Driving Habits - Road Safety Education for Thai Children and Youth: the Beginning of Road Safety Culture Development	Dr. Waiphot Kulachai, Suan Sunandha Rajabhat University Dr. Shitta Jaensirisak, Ubonratchathani University
10:40 – 11:00	Break	-
11:00 – 12:30	Lecture 4: Lecture before field observation - Onsite Accident Data Collection Method, in-depth Accident Investigation - Statistical Data analysis of RTP accident data and Analytical results - What kind of data should be collected in order to develop two-wheel and four-wheel technology and how to utilize the accident data for data analytics	Mr. Hideyuki Fukasawa, JET Mr. Yasushi Nishida, JET Mr. Hiroyuki Nozaki, ATRANS
12:30 – 13:30	Lunch Break	-
13:30 – 15:30	Onsite Observation and Investigative Study	Mr. Hideyuki Fukasawa, JET
15:45 – 16:00	Questions and Answers	Mr. Hideyuki Fukasawa, JET Mr. Yasushi Nishida, JET
16:00 – 17:00	Group Discussion	All

Program on 10th May 2024

Time	*Presentation Title*	*Speaker*
09:00 – 09:20	Lecture 5 - Traffic Accident Analysis for Deriving Countermeasures in Japan and Some Trials in Thailand	Dr. Atsushi Fukuda, Advisor of JET and ATRANS
09:20 – 12:00	Group discussion on data analytics	All
12:00 – 13:00	Lunch Break	-
13:00 – 13:15	Lecture 6 - Exploring Accident Influential Factors: Preliminary Analysis Using Multiple Correspondence Analysis	Dr. Varameth Vichiensan, Kasetsart University
13:15 – 16:00	Finalization of Group Discussion and presentation	All
16:00 – 16:30	Q & A and recommendations	All

16:30 – 17:00	Certification (awarding) and close the session	Mr. Michimasa Takagi, JET

Lecture

Group Discussion and Analysis

Presentation of Analysis Result

Group Photo

Source: JET

Figure 4.3.48 Third Accident Data Analysis Workshop for RTP

4.4 List of Technical Document

Technical documents created through activities in Output 1 is shown in below.

Table 4.4.1 List of Technical Document

No	Title	Reference No.
1	Quarterly Report 1) Songkran festival 2) Over speeding 3) New-Year Holidays	TD1-1

	4) Provincial-wise 5) Motorcycle 6) Four-Wheeler	
2	Annual Report	TD1-2
3	Road Traffic Accident Investigation Manual	TD1-3

5 The Countermeasures for Safer Road Engineering are Developed and Implemented through the Activities in the Pilot Sections on National Highways and /or Motorways (Output 2)

5.1 Outline

Output 2 is composed of six activities in the PDM, and its objectively verifiable indicators are set, as shown in Table 5.1.1.

Table 5.1.1 Objectively Verifiable Indicators

2-1 The countermeasures for safer road engineering at three black spots in the pilot sections on National Highways and/or Motorways are implemented. 2-2 The self-rating of MOT staff's capability on road safety engineering for National Highways and/or Motorways exceeds 70% on average.

5.2 Record of Meetings

WG2 meetings have been held regularly with participants from the DOH Highway Safety Bureau, Highway Police, TSOC, and, as needed, the Highway Bureau (local office) and District Office overseeing pilot projects. The discussions comprise a range of activities, and ad hoc meetings were held in conjunction with consultations involving external agencies for black spot countermeasures. Technical working group meetings were carried out to transfer technical knowledge on specialized topics. The outcome of the collaboration with various agencies are summarized in Table 5.2.1.

In the first year of the project, the main activities involved studying for countermeasures for a section in the pilot province Nakhon Ratchasima. Additionally, upon the request of DOH, another pilot section in Prachin Buri province was added. This section in Prachin Buri province has several continuous steep slopes and sharp curves of 7 km length on National Highway (NH) No. 304 and it has made several severe accidents in past years. DOH expressed the need for technical support from JET, and this section was added as an additional pilot section.

For a timely evaluation of measures, the pilot projects in Suphan Buri and Samut Sakhon provinces were concurrently considered as activities in the second year. It came to light that the pilot projects in Nakhon Ratchasima and Suphan Buri provinces cannot be completed within the project period due to the substantial scale and time requirements for budget allocation and construction. Therefore, at one of the intersections in NH 3201

in Suphan Buri province where traffic safety measures are planned to be implemented was selected as an additional pilot section.

It's important to note that this report provides an overview of activities conducted in the project. Details on technical aspect of each pilot project are described in the "Technical Report for Good Practice Guide on Road Safety Engineering".

Table 5.2.1 Record of Meetings (WG2)

Date	Meeting / Organization	Content
2021		
27 January	1st WG (Jointly by WG1,2,3,4)	・ Explanation of the contents and schedule of each WG ・ Confirmation of the chairperson of each WG
18 February	2nd WG2	・ Discussion of the state of traffic safety measures at DOH ・ Presentation of the trend analysis of traffic accidents on national roads
02 March	DOH Highway Safety Bureau	・ Presentation of brief description of the project ・ Explanation of DOH's traffic safety measures ・ Explanation and discussion of the pilot province selection method
30 March	3rd WG2	・ Introduction of the Japanese traffic safety measures and procedures for studying engineering measures ・ Introduction of the procedures for engineering measures on national roads in Thailand ・ Presented a brief description of black spots in Prachin Buri Province
10 June	4th WG2	・ Presentation of the Prachin Buri Black Spot Traffic Accident Analysis and Prachin Buri Black Spot Road Safety Audit ・ Introduced Japanese speed suppression measures
18 June	TSOC	・ Interviews with members ・ Confirmation on how to proceed with WG2
21 June	DOH Highway Safety Bureau	・ Discussion of the following: – how WG2 will proceed and the outputs for the year, – Prachin Buri Black Spot Traffic Accident Analysis, – selection of the pilot section of Nakhon Ratchasima, – how to conduct a baseline survey, and – preparation of an action plan for the next JCC.
23 June	TSOC	・ Discussion of following: – how WG2 will proceed and the outputs for the year, – Prachin Buri Black Spot Consideration, – selection of the Nakhon Ratchasima pilot section, – how to conduct a baseline survey, and – preparation of an action plan for the next JCC.
24 June	Site visit in Nakhon Ratchasima	・ Confirmation of the situation in the accident-prone areas with DOH, TSOC, and Highway Police
25 June	5th WG2	・ Discussion of the following: – overview of Nakhon Ratchasima Province,

		– DOH Black Spot in Nakhon Ratchasima, and – status of the pilot section, accident analysis.
26 June	Prachin Buri Black Spot site visit	・ Confirmation of the situation of accident-prone areas with DOH, TSOC, and Highway Police
28 June	RTP Highway Police	・ Review enforcement of the speed limits ・ Review pilot prefectures
29 July	6th WG2	・ Selection of road safety measures for the pilot sections of Prachin Buri and Nakhon Ratchasima Provinces
19 August	WG2 2nd Technical Meeting	・ Presentation of the: – legal and regulated speeds in Thailand and Japan, – Nakhon Ratchasima Accident Analysis, – Prachin Buri Study of measures for pilot section, and – draft action plan.
01 September	7th WG2	・ Proposal of measures for the Prachin Buri pilot section ・ Presentation of results of the Nakhon Ratchasima Province Traffic Accident Analysis
03 September	TSOC WG2	・ Technical transfer of the location maps for the measures for Prachin Buri Pilot Section
10 September	Kajima Road	・ Discussion of the application of non-slip colored pavement (NEET method) in Thailand
15 September	8th WG2	・ Discussion of the action plan and baseline survey ・ Sharing of the situation of motorcycle traffic accidents on national roads
21 September	TSOC WG2	・ Technology transfer for preparation of measures maps for Prachin Buri pilot section
06 October	WG2 3rd Technical Meeting	・ Proposal of the video survey and image analysis of dangerous driving behavior in Nakhon Ratchasima pilot section ・ Discussion of the application of non-slip pavement (NEET method) in Thailand ・ Assignment of roles for the study of the implementation of the Prachin Buri pilot project
02 November	Discussion with DOH Deputy Director General	・ WG2 activities ・ Exchange of opinions on measures to prevent traffic accidents on national roads
	Discussions with DOH Highway Safety Bureau	・ Schedule of activities during the group's visit and assignment of task teams on DOH side
5 November	DOH Highway Safety Bureau	・ Discussion of the details of Prachin Buri Pilot Project
6 November	Prachin Buri Black Spot and Nakhon Ratchasima on-the-spot inspection	・ Inspection of the the study section (on site) together with the DOH local office ・ Highway Bureau visit
10 November	DLT Global Positioning System (GPS) Center	・ GPS Center visit ・ Data request for WG2 activities
15 November	DOH Highway Safety Bureau Standard	・ Discussion of the details of Prachin Buri Pilot Project

	Group	
17 November	9th WG2	・ Discussion of the details of Prachin Buri Pilot Project and how to realize the action plan
18 November	Prachin Buri Black Spot on-the-spot inspection	・ Discussion of the feasibility of the action points with DOH and local offices
19 November	Nakhon Ratchasima Black Spot site visit	・ Discussion of the video survey locations and methods with DOH field office and re-consultant
22 November	DOH Highway Safety Bureau (Director, etc.)	・ Wrap-up meeting; reported the activities during the trip and policy for future activities
13 December	DOH Highway Safety Bureau and TSOC	・ Discussion of the proposed measures for the Prachin Buri pilot project
22 December	Kashima Road Thailand	・ Consultation on the application of anti-slip pavement (Neat Method) in Thailand
2022		
11 January	DOH/PASCO	・ Hearing on SDGs Case Study (Mobile Mapping)
20 January	DOH District Office	・ Confirmation on the preconditions for measures (linear improvement) in Nakhon Ratchasima pilot project
27 January	DOH District Office	・ Discussion with DOH on a long list of measures to monitor progress and effectiveness of implementation
17 February	Kashima Road Thailand	・ Hearing on estimates for anti-slip pavement (Neat Method), etc.
17 February	DOH Highway Safety Bureau	・ Discussion on installing cameras for a video survey in Nakhon Ratchasima pilot section
17 February	DOH Highway Safety Bureau and subcontractors	・ Discussion the status of the study of future measures (linear improvement) in the Nakhon Ratchasima pilot section
25 February	DOH Highway Safety Bureau	・ Discussion of the contents of the proposed measures for the Prachin Buri pilot project
03 March	DOH Highway Safety Bureau and Kashima Road Thailand	・ Explanation to DOH regarding anti-slip pavement (Neat Method) (cost, materials, etc.)
07 March	EXAT and DOH Highway Safety Bureau	・ Hearing on the implementation of anti-slip pavement to EXAT
09 March	DOH Highway Safety Bureau	・ Explanation to DOH on the status of the anti-slip pavement comparison between Japan and Thailand, etc.
10 March	10th WG2 Meeting	・ Results of the field verification of Nakhon Ratchasima pilot section (analysis of accident factors, etc.) ・ Explained the study status (video survey, linear improvement, etc.) in the Nakhon Ratchasima pilot project
30 March	DOH Highway Safety Bureau	・ Discussion on installing the bollards in the Prachin Buri pilot project measures
22 April	TSOC	・ Presentation of Artificial Intelligence (AI) Image Analysis
25 April	DOH Highway Safety Bureau	・ Presentation of the work plan for the travel period
28 April	DOH Prachin Buri district office	・ Sharing of the pilot project's concept plan in Prachin Buri Province

		・ Request for creating the detailed design
02 May	DOH Highway Safety Bureau	・ Details of the video survey and analysis of driving behavior using AI image analysis
03 May	DOH Highway Safety Bureau	・ Discussion of the measures for Nakhon Ratchasima pilot project
05 May	DOH Highway Safety Bureau	・ Discussion of the evaluation on the effectiveness of traffic safety measures
24 June	Meeting with DOH Highway Safety Bureau	・ Discussion of the second year of activities
04 August	WG2 meeting once every two years	・ Review of the first year of activities and progress of pilot projects ・ Discussion of the second year of activities
30 August	DOH Highway Safety Bureau	・ Sharing of activities during JET's travel period
31 August	DOH Highway Safety Bureau	・ Discussion of the results of the expert review of the detailed design of the Prachin Buri pilot project by DOH
02 September	DOH Suphan Buri District Office	・ Presentation of progress report on measures implemented in the MLIT and IATSS study and site visit of measures currently being implemented
06 September	DOH Highway Bureau No. 10	・ Discussion of the detailed design of measures in the Prachin Buri and Nakhon Ratchasima pilot projects (check points for the next day)
07 September	DOH Highway Safety Bureau Highway No. 10 and District Office	・ Coordination meeting and site visit ・ Discussion on finalizing the detailed design of measures for the Prachin Buri and Nakhon Ratchasima pilot projects
08 September	DOH Suphan Buri District Office	・ Discussion of the black spots in Suphan Buri ・ Site visit
12 September	DOH Samut Sakhon District Office	・ Discussion of the black spots in Samut Sakhon Province ・ Site visit
15 September	DOH Highway Safety Bureau	・ Feedback from field visits to Samut Sakhon and Samut Sakhon provinces ・ Exchange of opinions on the selection of pilot areas
23 September	DOH Highway Safety Bureau	・ Discussion of the additional measures in the Nakhon Ratchasima pilot project
29 September	DOH Highway Safety Bureau	・ Discussion of the public relations measures for the Pyro business in Prachin Buri and Nakhon Ratchasima
29 September	DOH Prachin Buri District Office, PrachinBuri Provincial Police	・ Discussion of the public relations measures for the Prachin Buri and Nakhon Ratchasima pilot projects
04 October	VOLVO Truck and Bus Thailand Company Limited.	・ Hearing on the process of driving safely on steep grades for large trucks
05 October	HINO MOTOR SALES (THAILAND) Company Limited.	・ Hearing on the process of driving on steep grades for large trucks
07 October	TSOC (WG2)	・ Discussion of the preliminary video survey of the Prachin Buri pilot section
12 October	DOH Highway Safety	・ Discussion of the preliminary video survey of the Prachin

	Bureau, Highway No. 10	Buri pilot section
14 December	DOH/WG2 (Online)	・ Presentation of progress report on the first-year pilot project and upcoming schedule ・ Discussion on selecting of the second-year pilot project section
2023		
10 January	DOH Highway Safety Bureau Deputy Director	・ Presentation of the work plan for the travel period
11 January	TSOC Dr. Chakree, Mr. Sujin	・ Confirmation of contents of JCC and monthly meetings ・ Results of first training in Japan, progress of WG2 activities Japanese training /WG2 activity report, etc.
12 January	DRR	・ Exchange opinions on DRR's AI image analysis software
16 January	DOH Suphan Buri distr0ict office	・ Conducted site visit of pilot section
18 January	PASCO	・ Discussion on utilizing MMS data of Prachin Buri pilot section taken by MLIT operations
23 January	DOH Highway Safety Bureau Director	・ Pilot project in Prachni Buri presentation ・ Report on the study of Escape Ramp
24 January	DOH Highway Safety Bureau	・ Discussion on the process of organizing a workshop in Suphan Buri
25 January	WG2 Workshop in Suphan Buri	・ Workshop on Suphan Buri Pilot Project
26 January	MLIT MMS meeting MLIT, PASCO, DOH Highway Safety Bureau	・ Discussion of MMS for MLIT project
30 January	DOH Highway Safety Bureau, etc.	・ Online training on QGIS (Geographic Information System) and AI image analysis (DOH, TSOC, ATRANS participated)
31 January	DOH Highway Safety Bureau Deputy Director	・ Results of activities during the trip and sharing of views on the contents of the report at the Monthly Meeting
22 March	DOH Highway Safety Bureau	・ Lecture related to safety measures prior to the training in Japan and discussions on the composition, scenario, and production schedule of the PR video being created
22 March	DOH PR office	・ Explanation of the PR video and its contents ・ Requested for introduction to video production companies
28 March	UD Trucks Thailand	・ Request for confirmation on the PR video contents
30 March	DOH PR office/filming firm	・ Introduction of candidate companies for video production from DOH ・ Confirmation of candidate companies' video production track record
31 March	Hino Trucks Thailand	・ Request for confirmation on the PR video content
24 April	WG2 Meeting	・ Presentation of: – accident factors and countermeasures for Suphan Buri Pilot Project, – the Prachin Buri Publicity Video, and – the AI image analysis at the pilot section of Prachin Buri.

11 May	DOH Highway Safety Bureau new director	・ Report on the summary of activities
12 May	DOH Highway Safety Bureau	・ Discussion of work plan during JET's stay
18 May	PR subcontractor and DOH Highway Safety Bureau	・ Discussion of the created promotional video
18 May	DOH Highway Safety Bureau	・ Discussion on selecting the pilot section of Samut Sakhon
19 May	Samut Sakhon District Office, DOH Highway Safety Bureau	・ Discussion and site visit for the selection of the Samut Sakhon pilot section
23 May	Suphan Buri District Office, DOH Highway Safety Bureau	・ Discussion and site visit regarding the measures for Suphan Buri pilot project
25 May	Deputy Director, DOH Highway Safety Bureau	・ Details of the measures of the Prachin Buri pilot project, etc.
26 May	DOH Highway Safety Bureau	・ Discussion on selecting the pilot section of Samut Sakhon
29 May	PR subcontractor and DOH Highway Safety Bureau	・ Discussion on creating the promotional video
29 May	Director, DOH Highway Safety Bureau	・ Discussion and site visit for the selection of the Samut Sakhon pilot section ・ Discussion of measures for the Suphan Buri pilot project
15 June	DOH Highway Safety Bureau Director	・ Discussion of budget execution for WG2 pilot project
20 June	DOH Highway Safety Bureau Director	・ Preliminary discussions for WG2 Workshop
21 June	DOH Highway Safety Bureau Director	・ Workshop at Samut Sakhon
07 July	DOH Highway Safety Bureau Director	・ Confirmation of budget and construction timing for pilot projects
14 July	DOH Highway Safety Bureau Director	・ Proposal of measures for Suphan Buri
30 August	DOH Highway Safety Bureau	・ Confirmation of the contents of proposed measures in Suphan Buri (pilot section and additional section)
31 August	DOH Highway Safety Bureau	・ Report on the results of the Highway Safety Bureau's workshop at Samut Sakhon (pilot section) and confirmation of the proposed countermeasures
08 September	Highway Safety Bureau	・ Proposal of countermeasures in Suphan Buri and Samut Sakhon based on the site survey and proposals from the Highway Safety Bureau and discussions
14 September	Consultation with DOH District Office in Suphan Buri	・ Request for description and detailed design of the proposed measures in Suphan Buri (pilot section and additional section)
18 September	Consultation with DOH District Office in	・ Request for description and detailed design of the proposed measures at Samut Sakhon (pilot section)

	Samut Sakhon	
08 November	DOH Samut Sakhon District Office	・ Agreement on the draft concept for a pilot project
28 November	DOH Highway Safety Bureau	・ Discussion on the video survey of Samut Sakhon
01 December	Site survey in Samut Sakhon	・ Drone survey at Samut Sakhon pilot section
04 December	DOH Highway Safety Bureau	・ Exchange of opinions on: – policy measures for the Samut Sakhon pilot section – how to implement lectures on analytical know-how for maintenance effectiveness analysis
07 December	Site survey in Suphan Buri	・ Drone surveys in the original and additional sections of Suphan Buri
8 December	DOH Highway Safety Bureau	・ Discussion of the direction of measures for additional section of Suphan Buri
13 December	DOH Highway Safety Bureau	・ Discussion of the publicity plan for Samut Sakhon pilot section
18 December	DOH Highway Safety Bureau	・ Exchange of opinions on publicity activities for Samut Sakhon pilot section
20 December	DOH Samut Sakhon District Office	・ Explanation of the concept plan for the Samut Sakhon pilot project and exchange of opinions on publicity activities
21 December	DOH Highway Safety Bureau	・ Checking of progress of the Prachin Buri pilot project, PR activities of Prachin Buri for the New Year holidays ・ Best practice information gathering, etc.
2024		
09 January	DOH Highway Safety Bureau (WG2)	・ Checked the progress of pilot projects
10 January	17th Monthly Meeting	・ Checked the progress of activities
15 January	DOH Suphan Buri District Office	・ Additional pilot section measures
24 January	9th Follow-up Meeting	・ Reviewed the progress and challenges in implementing activities
25 January	DOH Highway Safety Bureau (WG2)	・ Confirmation of the points raised in the follow-up meeting (to what extent measures can be taken within the project timeframe) ・ Composition of technical data, etc.
29 January–2 February	DOH Highway Safety Bureau (WG2)	・ Training in analyzing and evaluating accident factors using AI image analysis
31 January	DOH Highway Safety Bureau (WG2)	・ Briefing on the activities to the new Highway Safety Bureau Deputy Director
29 February	DOH Highway Safety Bureau (WG2)	・ Confirmation on the questionnaire's contents regarding effectiveness assessment of pilot projects and technology transfer to DOH staff
04 March	DOH Highway Safety Bureau (WG2)	・ Technology transfer of effectiveness assessment of pilot projects using image analysis (Suphan Buri)
06 March	DOH Highway Safety Bureau (WG2)	・ Presentation of progress of the pilot project and technology transfer for evaluating the effectiveness of the pilot project using image analysis (Samut Sakhon)

14 March	DOH Highway Safety Bureau, DOH Samut Sakhon depot (WG2)	・ Post-evaluation in the pilot section (Samut Sakhon)
20 March	DOH Highway Safety Bureau, DOH Suphan buri district office (WG2)	・ Post-evaluation in the pilot section (Suphan buri additional section)

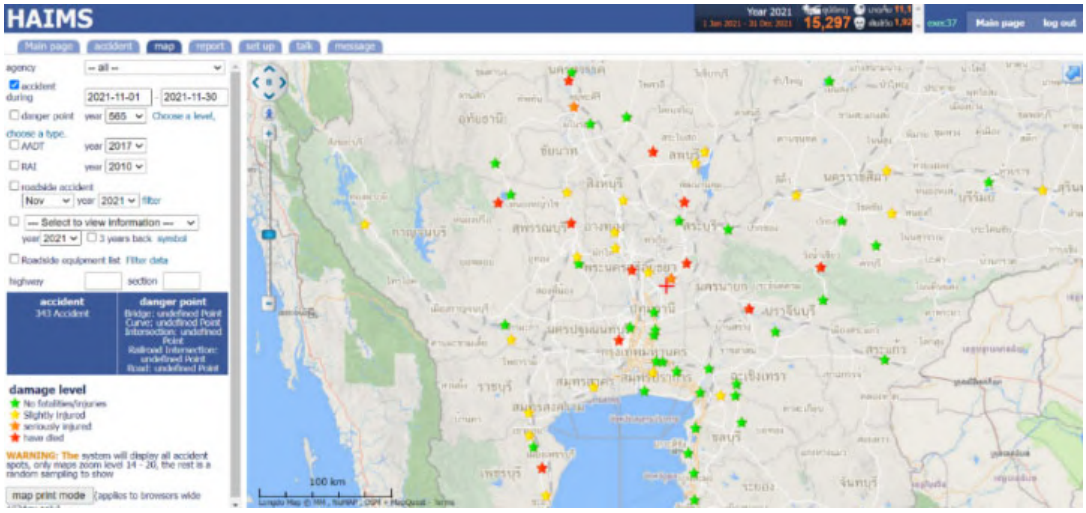
Source: JET

5.3 Activities

5.3.1 Collection of Accident Data and Information Related to Accident Black Spots on National Highways and/or Motorways

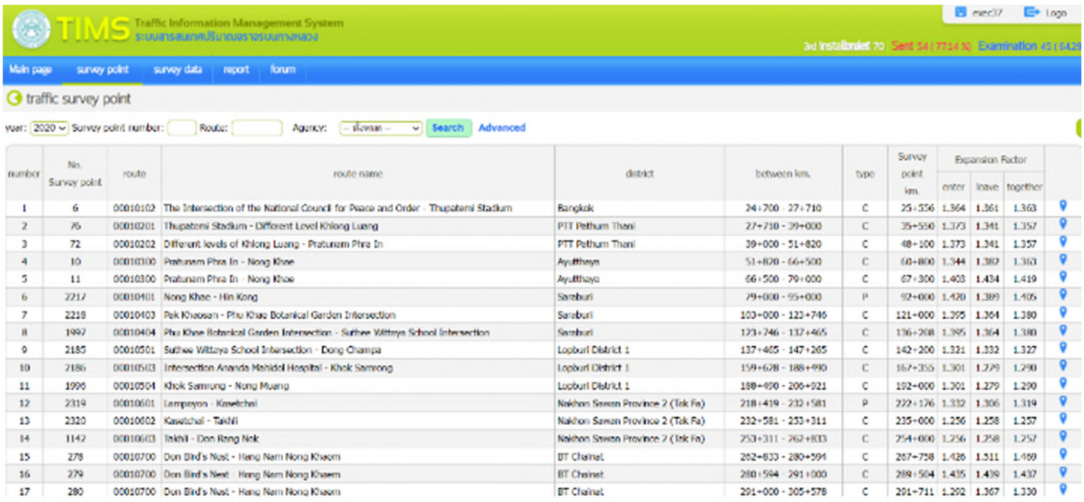
The Highway Safety Bureau of DOH, the main C/P of WG2, has and operates the Highway Accident Information Management System (HAIMS) traffic accident database. The HAIMS collects data on traffic accidents that cause damage to roadway facilities on national highways under the jurisdiction of the DOH and serious accidents. In the event of an accident, the nearest DOH District Office staff goes to the accident site and obtains the data according to the accident report form. The DOH District Office staff then visits the police station several times a month to supplement the data according to the accident record form, using the police officer's notes as a reference. Data on minor traffic accidents is not fully collected because it has less information to record than the items on the accident record form of DOH. As a result, the number of accidents in HAIMS is lower than the police data. JET and DOH are currently studying the improvement of HAIMS with a minimum number of items to be collected to share data with New-TRAMS. In addition, the Highway Safety Bureau of the DOH has a Traffic Information Management System (TIMS) that manages traffic volume data for each road segment and the Highway Safety Management System (HSMS) that manages roadway facility inventories and data on various traffic safety facilities.

In the activities of WG2, DOH provided accounts for these databases, which JET used for macro analysis of accidents and detailed analysis of accident locations.



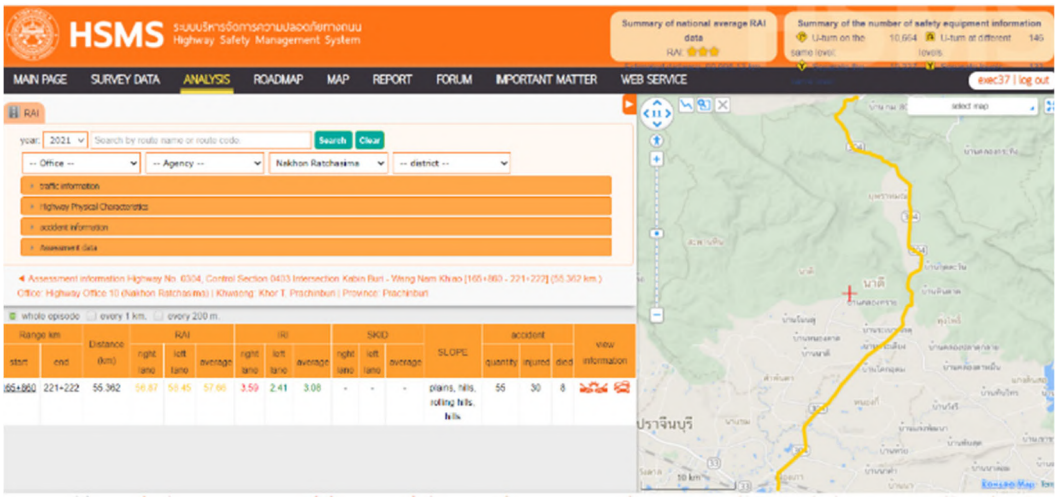
Source: DOH Highway Safety Bureau

Figure 5.3.1 Highway Accident Information Management System (HAIMS)



Source: DOH Highway Safety Bureau

Figure 5.3.2 Traffic Information Management System (TIMS)

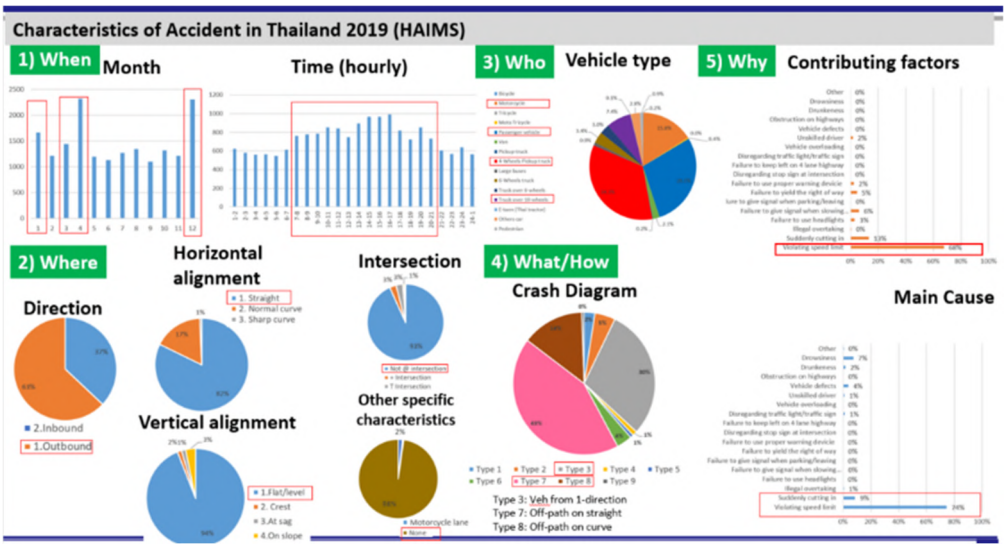


Source: DOH Highway Safety Bureau

Figure 5.3.3 Highway Safety Management Systems (HSMS)

[First year activities]

Using the data from HAIMS, a macro-level analysis was conducted using the 5W1H approach for the nationwide and the pilot provinces, Nakhon Ratchasima and Prachin Buri. This analysis aimed to address who, what, when, where, why, and how aspects of accidents. The findings confirmed that the most prevalent type of accident on the national highways in both provinces, under the jurisdiction of DOH, was road departure resulting from speeding on single-lane sections.



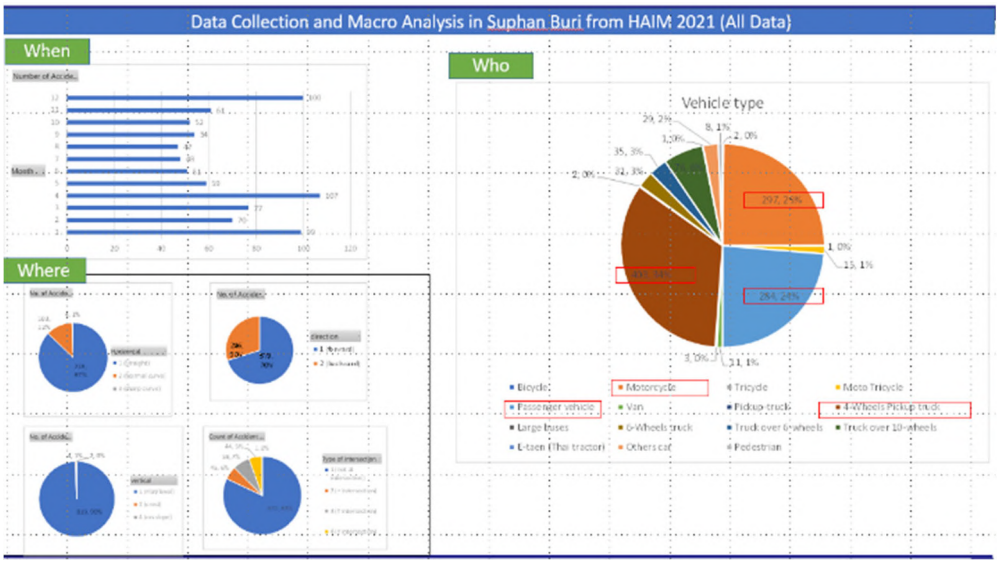
Source: JET

Figure 5.3.4 5W1H Analysis using HAIMS Data

[Second year activities]

In the second year, the same methodology from the first year was applied to the Suphan Buri and Samut Sakhon provinces. DOH led the collection of accident data, macro-level analysis, and the selection of accident-prone locations (candidates for pilot areas) based on the lessons learned from the first year. JET provided guidance and tutorial videos on analyzing accident data in both provinces using HAIMS, similar to the approach taken in the first year.

While the pilot areas in the first year, Prachin Buri and Nakhon Ratchasima provinces, primarily faced issues related to accidents involving large vehicles on sharp curves, long downhill slopes, and sections with poor road alignment, the second year in Suphan Buri and Samut Sakhon provinces revealed distinct characteristics of accidents in urban areas. Specific features included locations such as U-turn points on straight sections, intersections, crossing points with side roads, and vehicle-specific characteristics like a higher prevalence of accidents involving motorcycles, passenger cars, pickup trucks, etc.



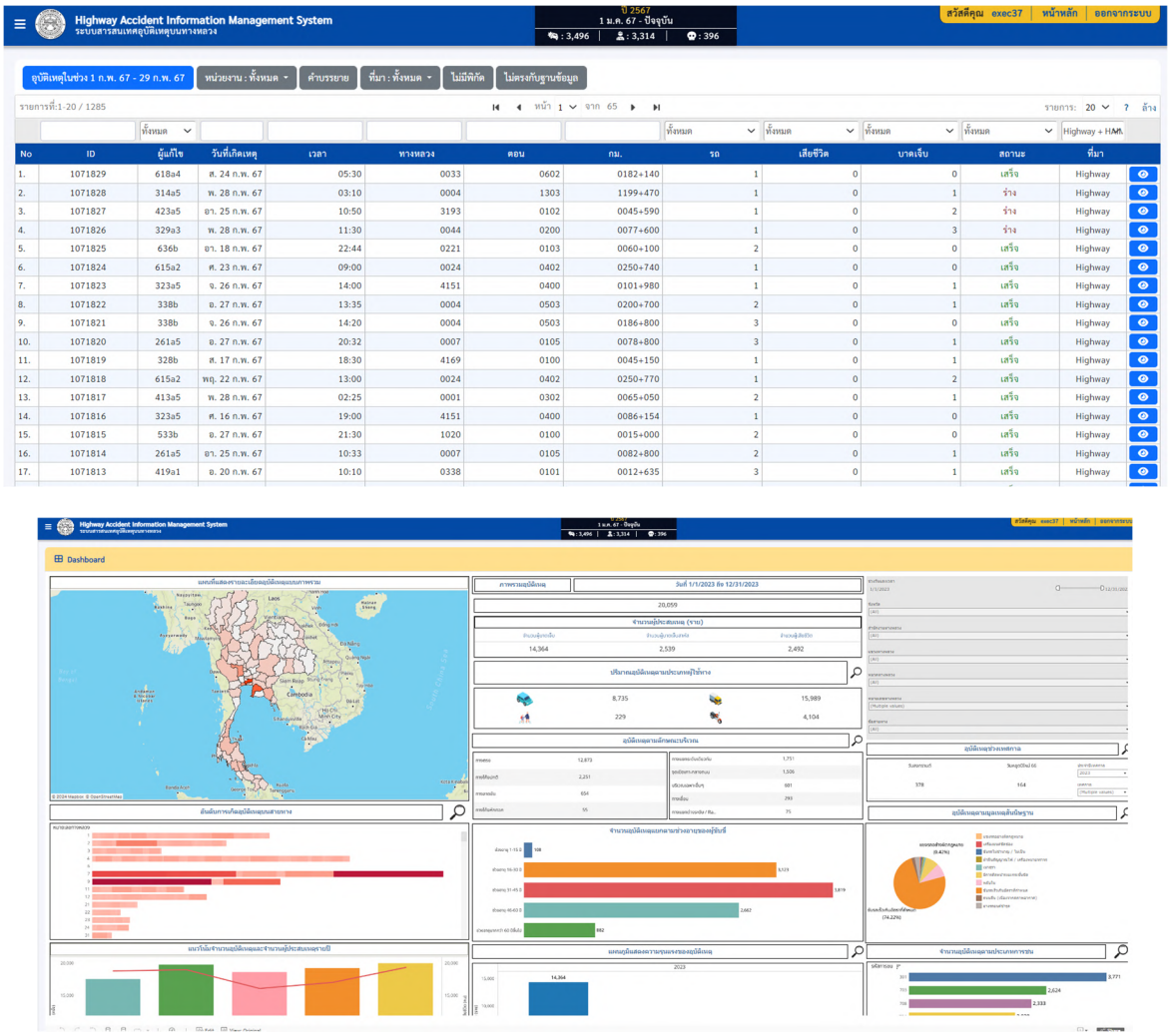
Source: DOH Highway Safety Bureau

Figure 5.3.5 Example of Accident Macro-Analysis for Suphan Buri Province

Furthermore, as mentioned above, DOH supplements accident data with its investigations in police notes and registers them in the accident database HAIMS. However, many cases were found not recorded, particularly those settled or the road facilities of DOH had no damages. In the pilot areas of the first year, such as Prachin Buri and Nakhon Ratchasima, where numerous accident damages on DOH road facilities occurred, many cases were recorded. In the second year, in Samut Sakhon province, many accidents by motorcycles and passenger cars involving minor injuries or property damage were observed. Although residents and district offices recognized these as hazardous locations, some cases were not registered in the database as accident data. The lack of accident data poses a significant challenge in implementing accident prevention measures. In response, there were video surveys to analyze the factors contributing to the accidents.

[Third year activities]

The DOH Highway Safety Bureau staff have acquired skills in conducting 5W1H analysis using accident data, enabling independent analysis. Additionally, the HAIMS system was updated by DOH, enhancing dashboard functionalities and facilitating access to data from TRAMS. Furthermore, improvements were made to the accident report forms, specifically in the contribution factor items. These enhancements now allow for more detailed data recording in three categories: road environment, vehicle condition, and driving behavior (including legal violations).



Source: DOH Highway Safety Bureau

Figure 5.3.6 HAIMS Updated Version (upper row: accident list, lower row: dashboard)

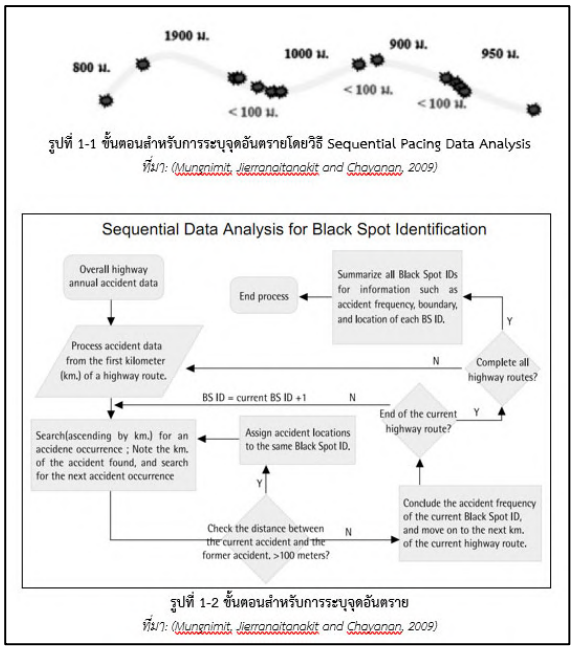
5.3.2 Classification of the Accident Black Spots and Selection of Priority Sections as a Target of Pilot Projects

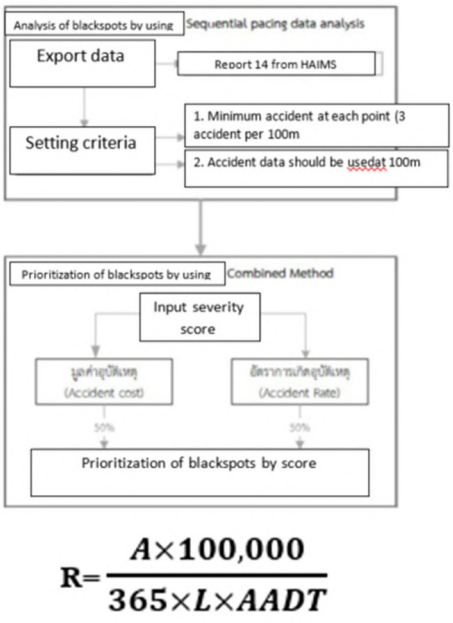
[First activities]

DOH has developed a methodology to identify accident-prone locations, called Black Spots, as shown in Figure 5.3.7. This methodology entails aggregating accident data yearly, segmenting every 100 meters, and sections where three or more accidents have transpired are designated Black Spots. Additionally, DOH integrates this accident data with traffic volume information employing original formulas to compute accident rates and associated losses by their original formulas. This compiled data is utilized to generate a ranking of Black Spots, thereby facilitating prioritization for preventive measures.

In this project, JET created a heatmap of accident locations, as shown in Figure 5.3.8. This figure was overlaid with Black Spots identified by DOH for verification purposes. Consequently, the methodology, which shares similarities with Japan's accident rate calculations, was confirmed to be appropriate. While the analysis in Japan typically involves data spanning multiple years (around four years), DOH uses accident data annually due to continuous road construction and evolving traffic conditions.

Additionally, hands-on training was conducted on creating heatmap diagrams using QGIS, facilitating technical transfer as part of the project.

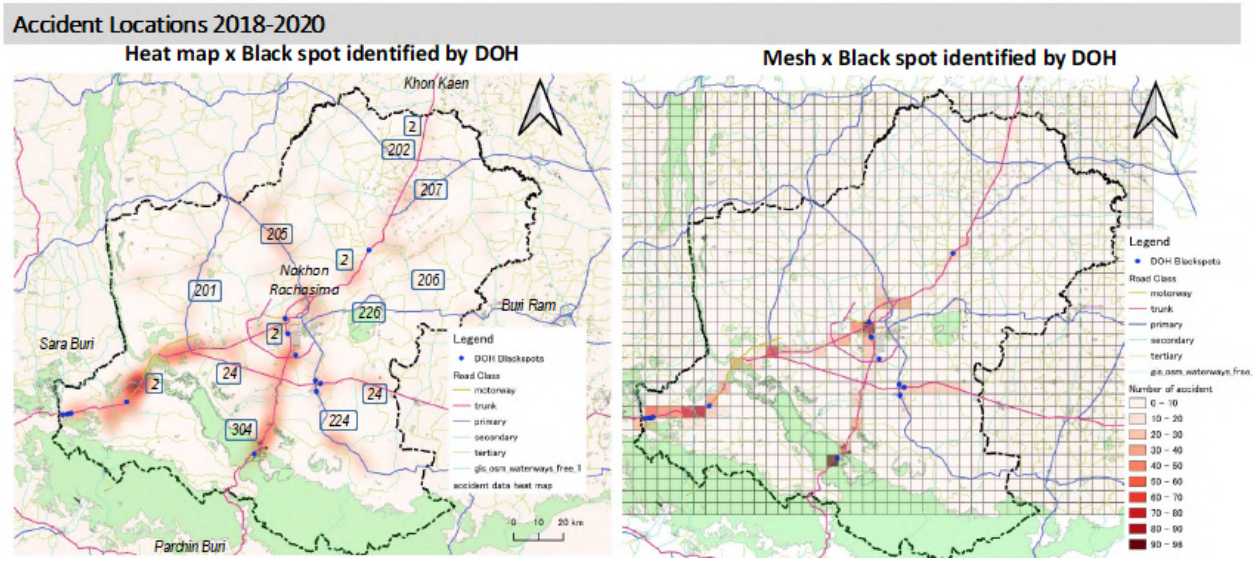




$$R=\frac{A\times 100{,}000}{365\times L\times AADT}$$

Source: DOH Highway Safety Bureau

Figure 5.3.7 Selection Method for DOH's Black Spots and the Calculation Methods for Accident Losses, and Accident Rates



Source: JET

Figure 5.3.8 Accident-Prone Locations Map in Nakhon Ratchasima and the Black Spots Location Map Identified by DOH (in blue)

Regarding selecting the pilot section, each black spot was inspected on-site by JET, the DOH Highway Safety Bureau, and the district office responsible for road maintenance. Through the on-site investigation, participants agreed to designate the section of NH No. 304 from kilometer point 243+114 to 222 as the pilot section. Although DOH implemented improvement in this section four years ago to mitigate traffic accidents, recent data indicates a resurgence in accidents, with no interventions or considerations for measures in the current fiscal year.

Source: DOH

Figure 5.3.9 On-site Inspections in Nakhon Ratchasima Province

[Second year activities]

In Suphan Buri and Samut Sakhon provinces, accident-prone sites based on the results of macro analysis of accident data and the list of black spots provided by the local DOH District Office were inspected through a collaboration among the DOH District Office, DOH Safety Bureau, TSOC, and JET. The objective was to assess the local situation and identify factors contributing to accidents.

Based on the on-site inspection results and to cover a diverse accident classification throughout the project period, specific sections were identified as candidates for the pilot project. Pilot sections were selected based on representative accident types, including location, cause, collision type, vehicle type, etc. (refer to Table 5.3.1 for the selected pilot sections). According to the analysis of road accident data conducted by DOH, the primary characteristics of accidents were on straight sections (78%), ordinary curves (13%), and intersections (8%). The main vehicle types involved in DOH road accidents were pickup trucks (26%), motorcycles (34%), passenger cars (16%), and trailer trucks (7%).

Considering these factors, the selected pilot sections encompass major accident factors observed over three years. In the first year, a section comprising a combination of straight and curved segments in Nakhon Ratchasima Province was selected. Additionally, in response to a request from DOH, a section in Prachin Buri Province with continuous steep downhill slopes and sharp curves spanning 7 km was selected. In the second year, two sections were chosen. A section in Suphan Buri Province has had high-frequency motorcycle accidents on straight stretches. Another section in Samut Sakhon Province has had fatal pedestrian accidents also on straight stretches. The final decision regarding choosing these sections was made with careful consideration of these factors, as well as ongoing insights and understanding provided by DOH. (Refer to technical documents for details.)

Source: DOH

Figure 5.3.10 On-site Inspection at Black Spots in Suphan Buri and Samut Sakhon

Table 5.3.1 List of Selected Pilot Sections

Pilot Section	Accident Location	Accident Cause	Collision Type	Vehicle Type	Remark
Nakhon Ratchasima 1st year	Straight Normal Curve	✓ Violating speed limit ✓ Suddenly cutting in	Off-carriageway	Pick-up Passenger car	Broken back curve, 500m
Suphan Buri 2st year	Straight Curve U-turn, T-junction	✓ Violating speed limit ✓ Suddenly cutting in ✓ Failure to give signal	Side-Swipe, Rear-end	MC Pickup	Reverse driving Access road(DRR), 350m
Samut Sakhon 2st year	Straight + Crossing	✓ Violating speed limit ✓ Suddenly cutting in	Side-Swipe, Hit pedestrian	MC, Mix traffic Pedestrian	Jaywalking Shopping mall 300m
Prachin Buri 1st year	Normal Curve + On slope	✓ Violating speed limit ✓ Suddenly cutting in ✓ Vehicle Defects	Off-carriageway	10 wheel truck 6 wheel truck Passenger car	Long down hill DOH emergency request (7km)

Goals	Over speeding , motorcycle, mixed traffic accidents reduce 30% in Pilot sections
Objectives	To promote the safe operation & maintenance and improvement of existing road infrastructure for prevention of major crash type by scientific approaches

Source: JET

[Third year activities]

Due to the change in government, a delay was evident in the execution of the budget for construction until April 2024, which is later than the typical physical year-end period. Consequently, it became apparent that the construction would not be completed within the project period. In order to ensure the earliest possible impact of the measures, JET and DOH agreed to separate and implement short-term measures that are both cost-effective and feasible in terms of procurable and executable. This process was carried out in two stages, utilizing funds from the maintenance budget. A pre-evaluation was conducted using video observation and image analysis technology to evaluate the effectiveness of the measures. As part of the technical transfer, the entire process was transferred to enable DOH to independently analyze and evaluate the effectiveness after the completion of construction.

Despite these efforts, part of the construction has been confirmed not to be completed within the project period. Therefore, the project manager suggested adding a pilot project that could be evaluated for effectiveness within the project period. In response, DOH proposed an additional pilot section where they planned to implement congestion countermeasures on NH No. 321 in Suphan Buri Province. Considering the accident data and findings from on-site inspections, more measures for road safety were discussed and agreed upon among the DOH District Office and JET. Currently, construction is underway within the project period, and there are efforts to evaluate the effectiveness of the measures.

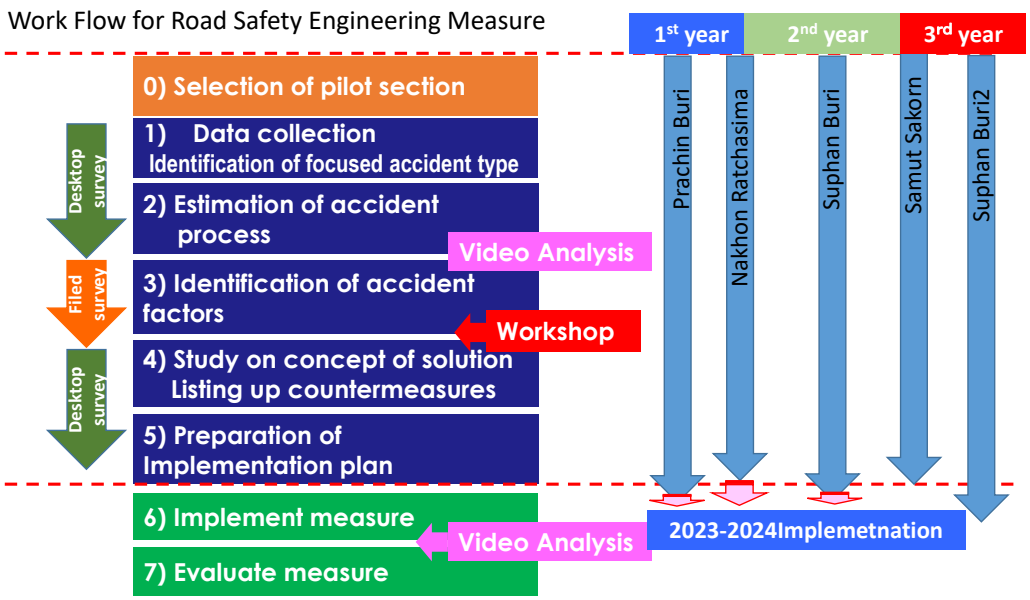
5.3.3 Preparation of the Improvement Plans of Accident Black Spots for the Pilot Project Implementation

JET proposed the workflow in Figure 5.3.11 for a systematic analysis of accident data, identification of accident factors, and consideration of appropriate countermeasures. The workflow contains an analysis of driving behaviors to estimate the mechanism and factors of accidents by analyzing video recordings with AI image processing technology. After implementing countermeasures, a subsequent round of video recording was conducted to evaluate the effectiveness of the implemented countermeasures by comparing situations before and after the implementation.

In the first year, JET took the lead in a series of processes, from analyzing accident data to drafting countermeasure concepts. JET transferred the know-how and technique to the C/Ps in the DOH Highway Safety Bureau (Headquarters), Highway Bureau No. 10 (District National Highway Bureau), Prachin Buri and Nakhon Ratchasima District Office (provincial office), and TSOC staff through several meetings. DOH and JET conducted a joint field survey of the pilot section in Nakhon Ratchasima and Prachin Buri Provinces, exchanging opinions on the Thai traffic situation, road conditions, driver acceptability, and local applicability of signage and road surface markings, and developed a concept for the proposed improvement plan.

In the second year, a workshop was held in Suphan Buri with representatives from the DOH Highway Safety Bureau, Highway Bureau No. 13, District Office, related organizations, and the community to analyze the causes of accidents and discuss proposed countermeasures. JET explained the methodology, the District Office staff served as a facilitator, and the participants were divided into four groups for discussion and presentation. In Samut Sakhon, the DOH Highway Safety Bureau initiated a workshop using the methods learned in Suphan Buri and developed a concept plan for the pilot project section based on the ideas gained from the workshop. Through these activities, know-how and techniques were transferred to the DOH.

In the third year, a pilot project in the added section in Suphan Buri Province was considered besides the DOH's intersection improvement project. In order to clarify the accident mechanism and study countermeasures, DOH and JET held a workshop to understand the current dangerous situation of each section and the opinions of the concerned parties.



Source: JET

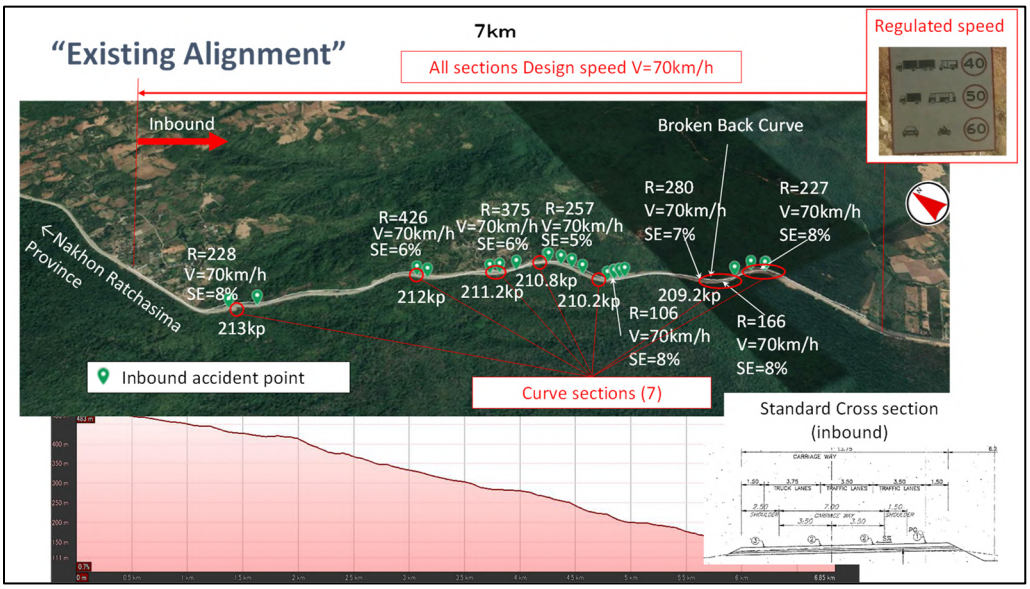
Figure 5.3.11 Workflow for Traffic Safety Engineering Measures

The following describes the main activities conducted in each pilot project.

(1) Black Spot in Prachin Buri Province (Pilot Project 1)

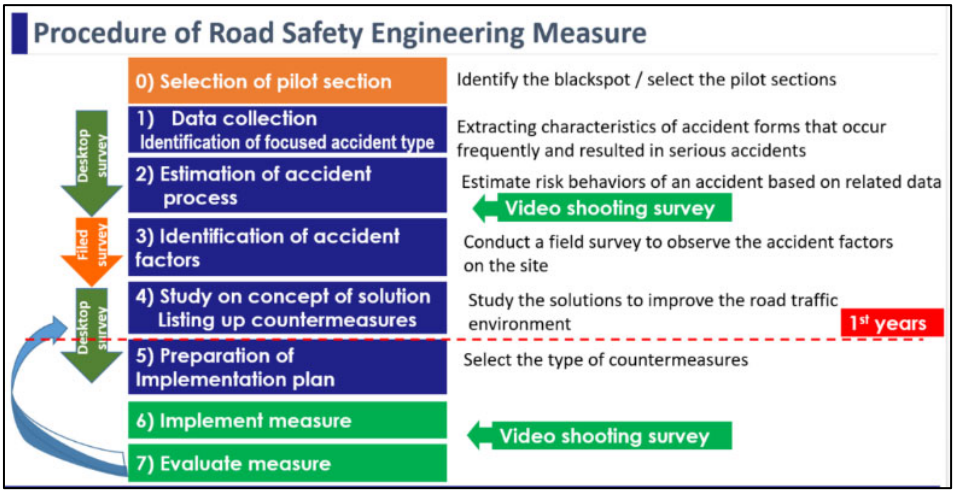
Accident Occurrence Situation

A section of NH No. 304 in Prachin Buri Province has continuous long downslopes with a maximum gradient of 7–8% and sharp curves due to land constraints within a national park. In 2019 alone, 29 traffic accidents were reported, highlighting its critical status necessitating urgent intervention by DOH. Implementing effective measures in this challenging terrain poses a significant challenge. The locations of accident occurrences are described in Figure 5.3.12. WG2 members had collaborative discussions to formulate mitigation measures by following the procedure outlined in Figure 5.3.13, encompassing the analysis of accident data and proposal development. An accident location map was also created, as shown in Figure 5.3.14, to gain a comprehensive understanding of the accident situation.



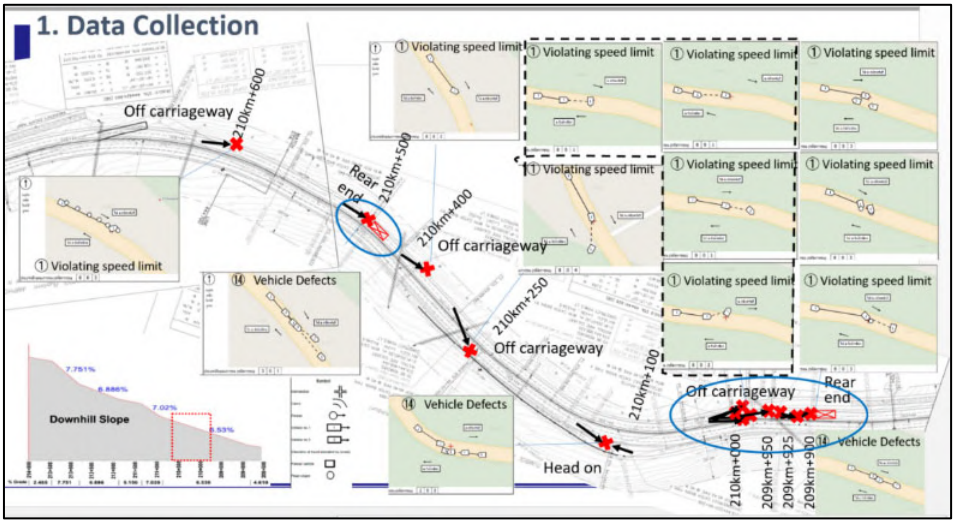
Source: JET

Figure 5.3.12 Accident Location Map on a Pilot Section in Prachin Buri Province



Source: JET

Figure 5.3.13 Procedure for Considering Accident Countermeasures



Source: JET

Figure 5.3.14 Accidents Location Map

Accident Factor Analysis and Countermeasure Consideration

Based on the analysis of traffic accident data obtained from the HAIMS database, it was discerned that many accidents involved large freight vehicles on downhill slopes. The accidents are caused by speeding going off-carriageway and collisions with stationary vehicles, often due to the failure to use low-speed gears, frequently stemming from brake failures. Following a site inspection, DOH and JET identified accident factors and logically considered highly feasible and cost-effective short-term countermeasures. These deliberations are illustrated in Figure 5.3.15. Specifically, JET proposed the following measures in response to the identified factors:

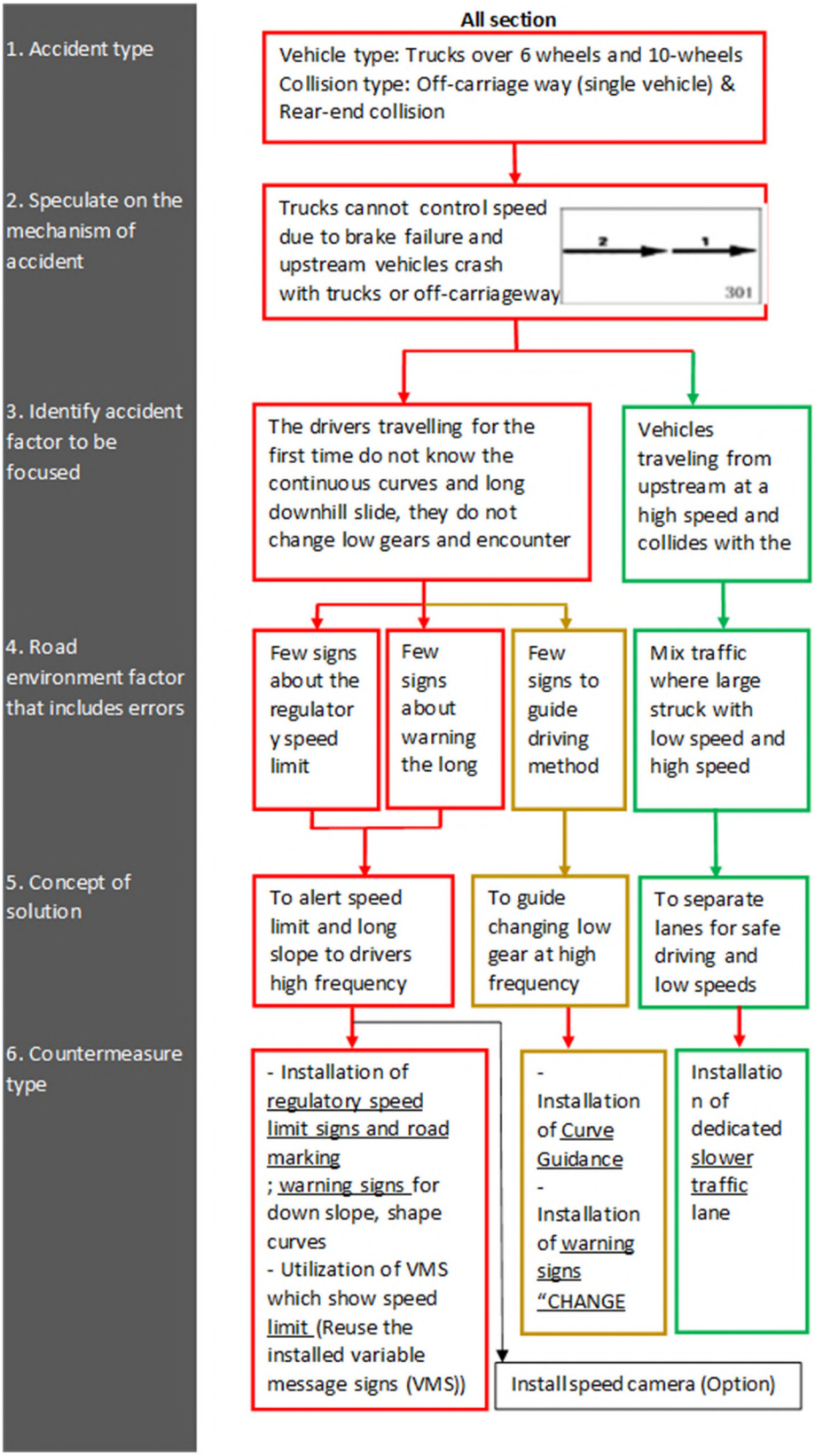
1. use of large and small warning signs,

2. promotion of low-speed gear use for large vehicles through warnings and the installation of slow lanes,

3. speed control measures by repairing existing road information boards (VMS) for use as warning signs, and

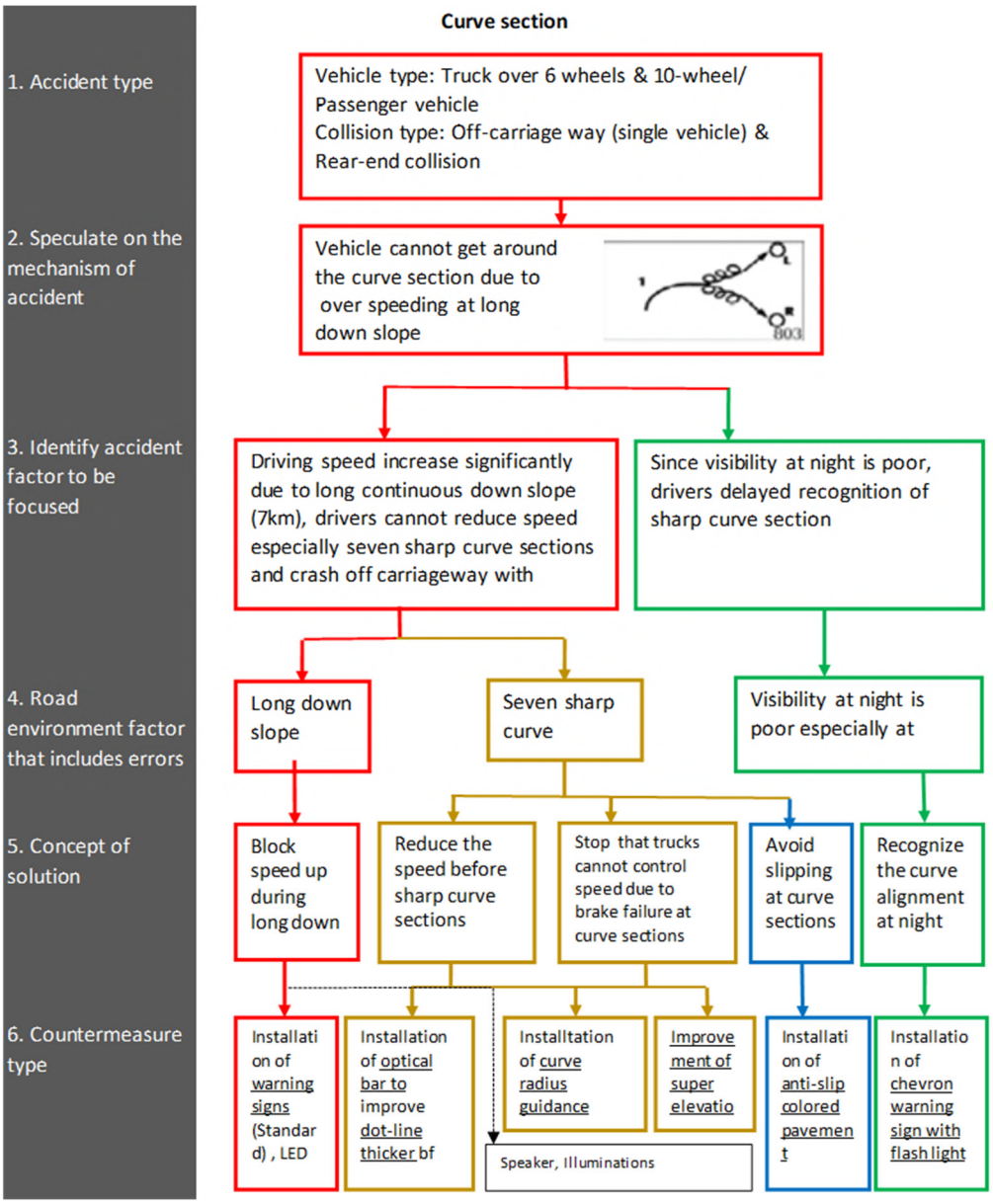
4. warning measures in curve sections, including road markings and various facilities along with anti-slip pavement.

Systematically organizing factor analysis and planning countermeasures using a “fault tree” methodology, which was not previously carried out by DOH, has piqued considerable interest and positive reception.



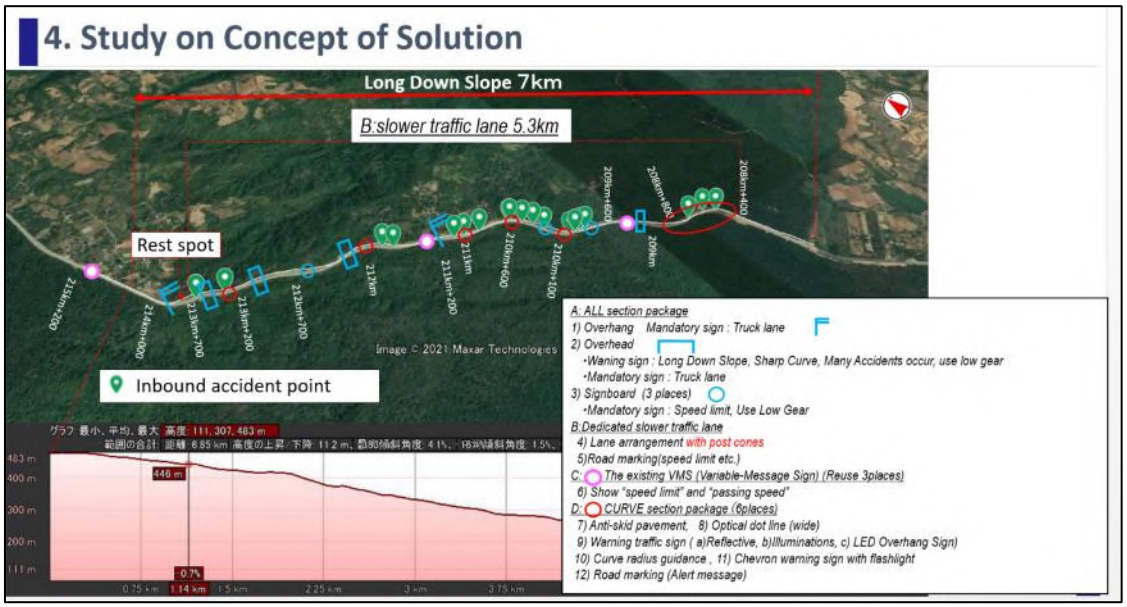
Source: JET

Figure 5.3.15 Process of Accident Factor Analysis and Countermeasure Planning Utilizing a Fault Tree (for All Sections)



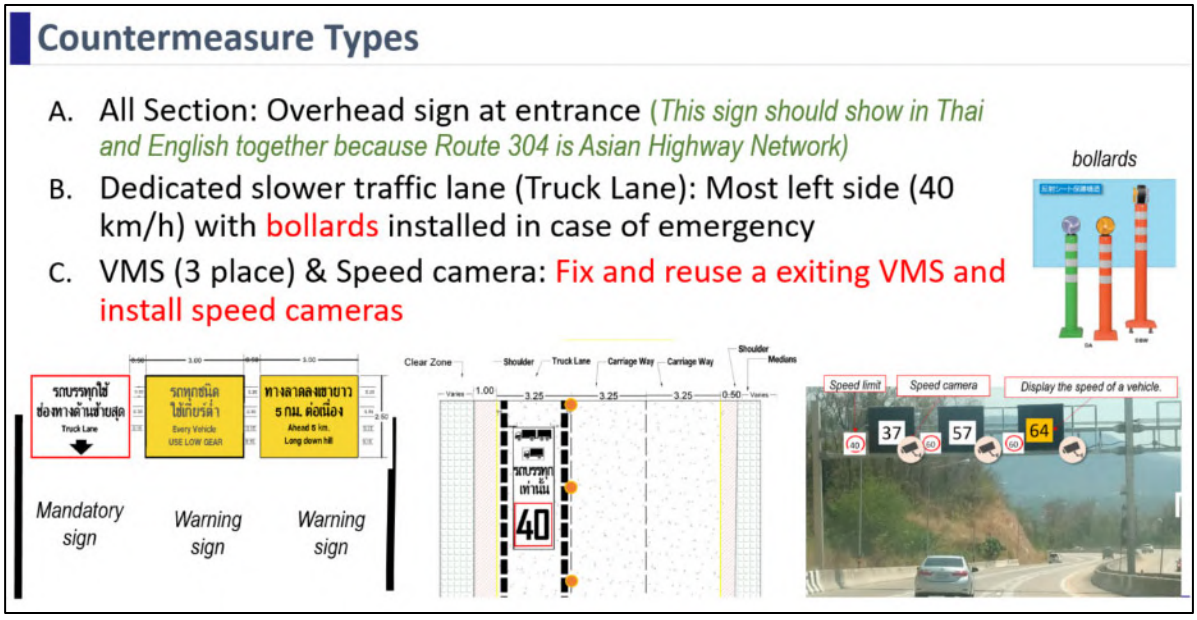
Source: JET

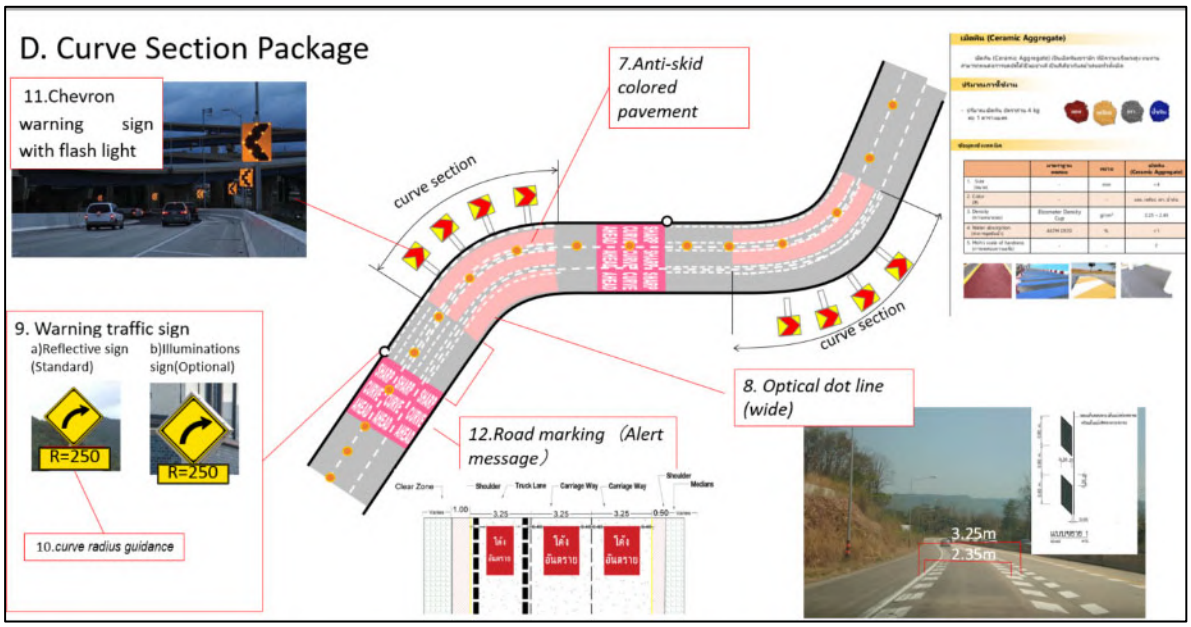
Figure 5.3.16 Process of Accident Factor Analysis and Countermeasure Planning Utilizing a Fault Tree (for Curve Sections)



Source: JET

Figure 5.3.17 Location Map of the Accident Prevention Concept Plan in the Prachin Buri Province





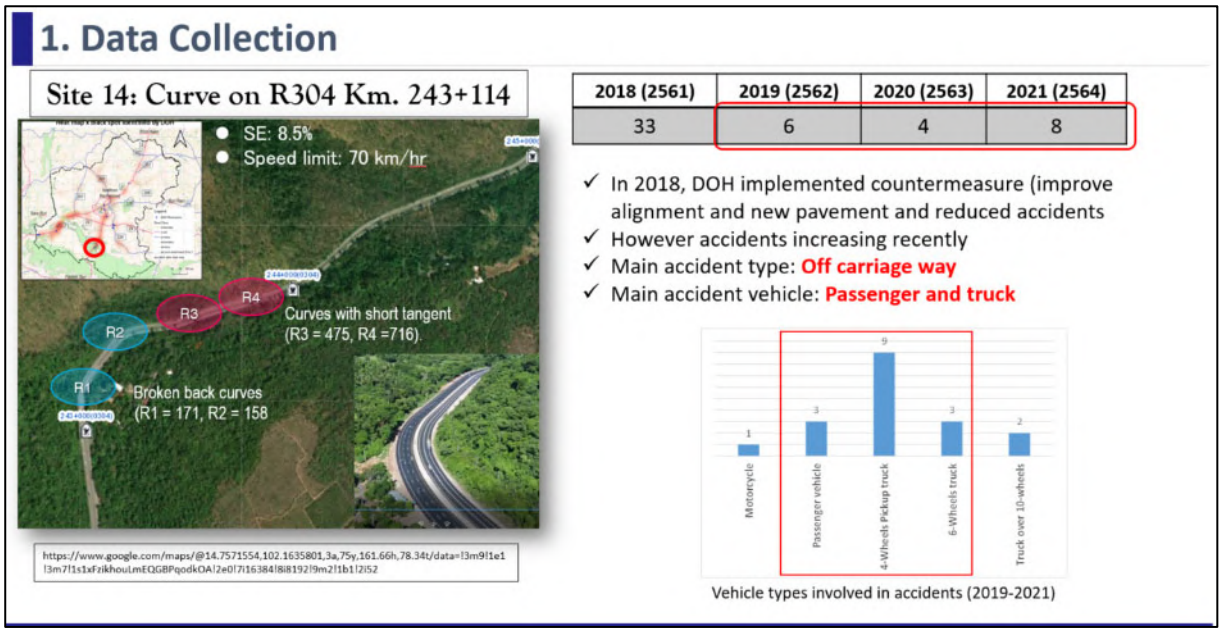
Source: JET

Figure 5.3.18 Concept Plan for Countermeasure in the Pilot Section in Prachin Buri Province

(2) Black Spot in Nakhon Ratchasima Province (Pilot Project 2)

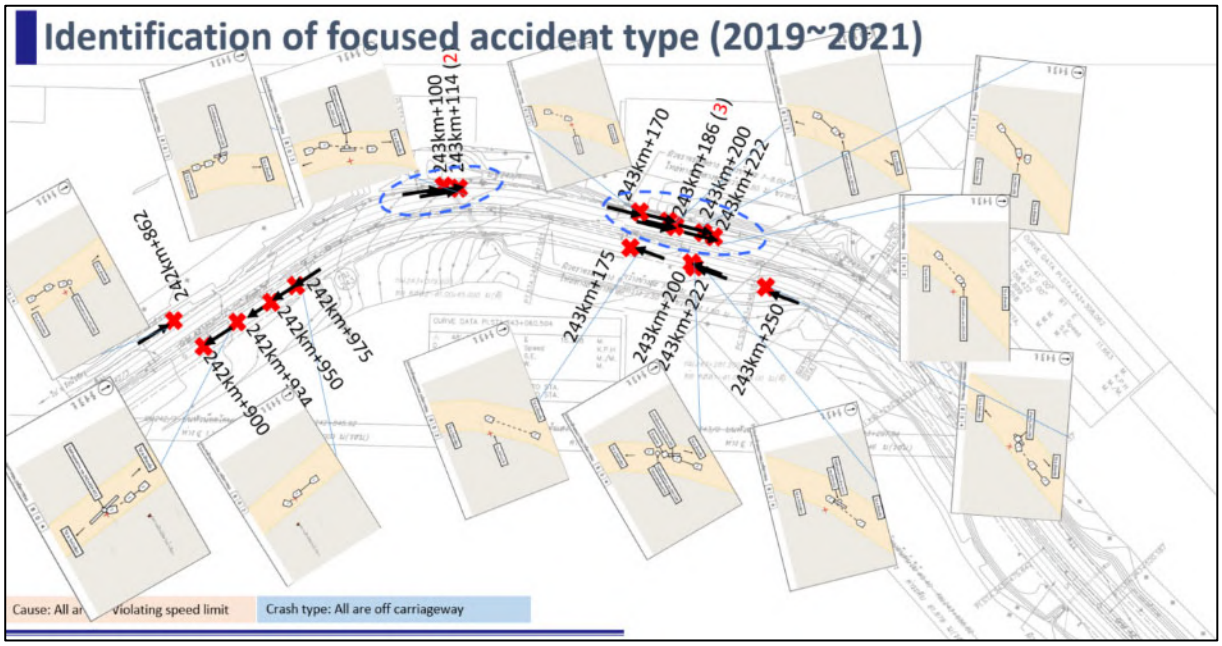
Accident Occurrence Situation

This section goes downhill with broken-back curves on NH No. 304 in Nakhon Ratchasima Province. It is a combination of curves where a short straight line is inserted between curves bending in the same direction. This configuration can create an optical illusion for drivers, making it seem they are turning in the opposite directions. DOH conducted pavement replacement and linear improvements, including significantly increasing the curve radius, four years ago. While the number of accidents temporarily decreased, it has been increasing again in recent years.



Source: JET

Figure 5.3.19 Overview of the Pilot Area in Nakhon Ratchasima Province



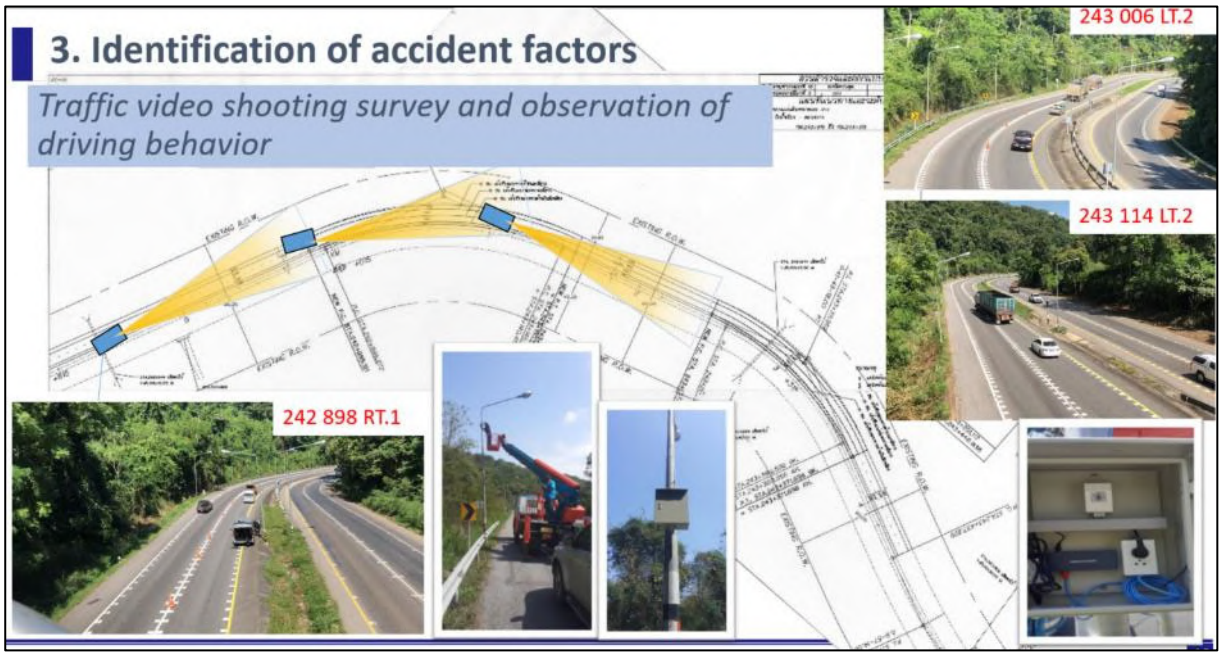
Source: JET

Figure 5.3.20 Accident Location Map of Pilot Area in Nakhon Ratchasima Province

Accident Factor Analysis and Countermeasure Consideration

Data showed that off-carriageway accidents due to speeding were frequent, although the specific driving behaviors leading to these accidents remain unclear. Therefore, JET reviewed and proposed analyzing driving behaviors leading to accidents by utilizing video

surveys and image analysis. Video surveys in the pilot section, where speeding and risky behaviors were anticipated, used network cameras installed on light poles to capture the traffic conditions. While the execution of the video survey was subcontracted locally, support from DOH's District Office, including the use of elevated work platforms, was received, and technology transfer regarding the survey methods took place through these activities.



Source: JET

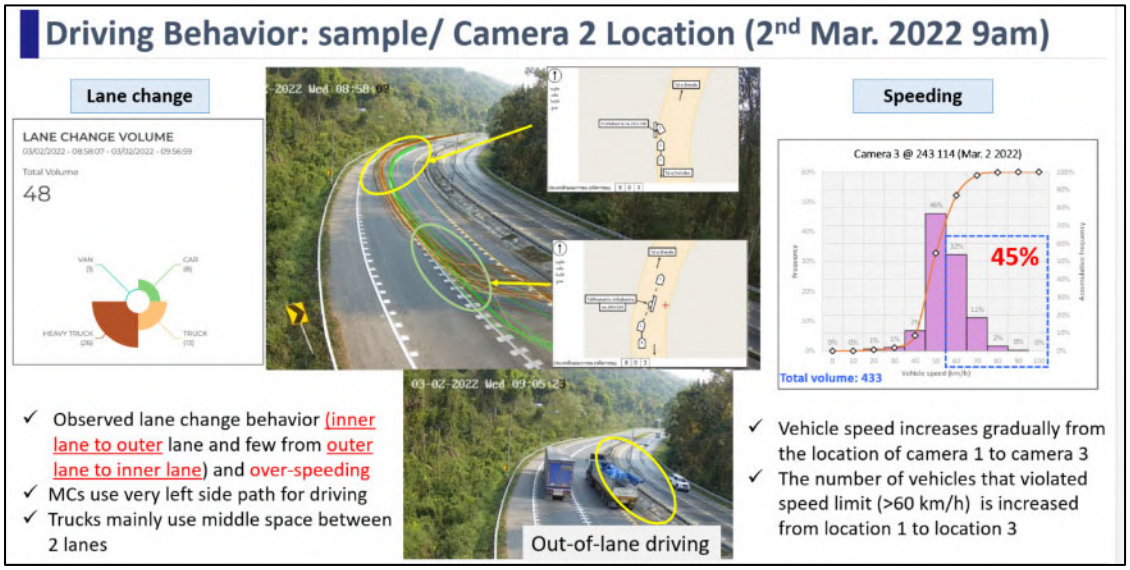
Figure 5.3.21 Road Alignment and the Location of Video Cameras

In the pilot section, the road alignment is vulnerable to driver errors due to a road configuration known as the "broken back curve," as previously mentioned. Video surveys were conducted to dissect the root causes of traffic accidents in this section. An AI image analysis software called Good Vision was used to analyze vehicle speeds and driving behavior automatically. Good Vision allows users to upload videos online and configure them to measure traffic volume, speeds, and vehicle trajectories. It was chosen to ensure continued use by the Thai side after the project.

Source: JET

Figure 5.3.22 Sample Image of AI Image Analysis

Based on the image analysis results, it was observed that many vehicles switch lanes at the curve sections or the straight section between the curve sections. Additionally, many vehicles exceed the regulated speed limit in this area. The road layout, a broken back curve, features a straight section between curve segments, creating an undesired road geometry where drivers may mistake the straight segment for the opposite curve. Consequently, frequent lane changes and speeding occur, contributing to traffic accidents. These observations were validated through the acquired data. The findings and the operation method of the software were transferred to DOH and TSOC.



Source: JET

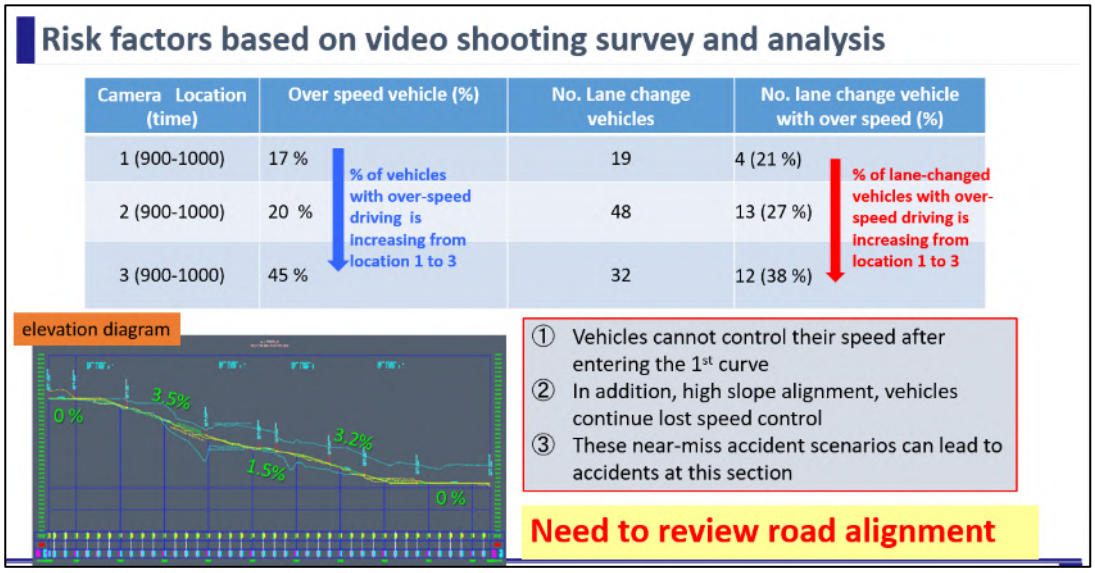
Figure 5.3.23 Speed Distribution at Each Analyzed Point Obtained from Image Analysis (Represents the Percentage of Vehicles Exceeding the Speed Limit of 60 km/h)

Based on the results of the traffic accident causation analysis:

There are more vehicles exceeding the speed limit after the first curve.

Drivers did unreasonable lane changes in the curve section with a down slope, which creates an optical illusion that affects vehicle control.

The analysis identified drivers engaging in unsafe driving behaviors, such as excessive speeding after the first curve and challenging lane changes.



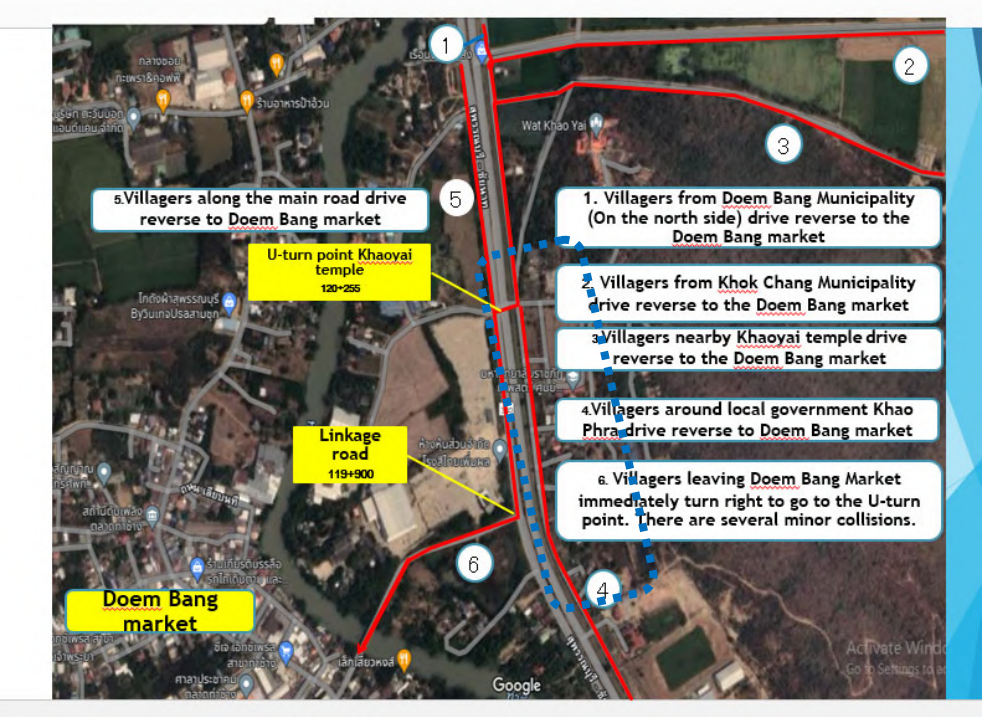
Source: JET

Figure 5.3.24 Causes of Accidents Identified through Video Image Analysis

(3) Black Spot in Suphan Buri Province (Pilot Project 3)

Accident Occurrence Situation

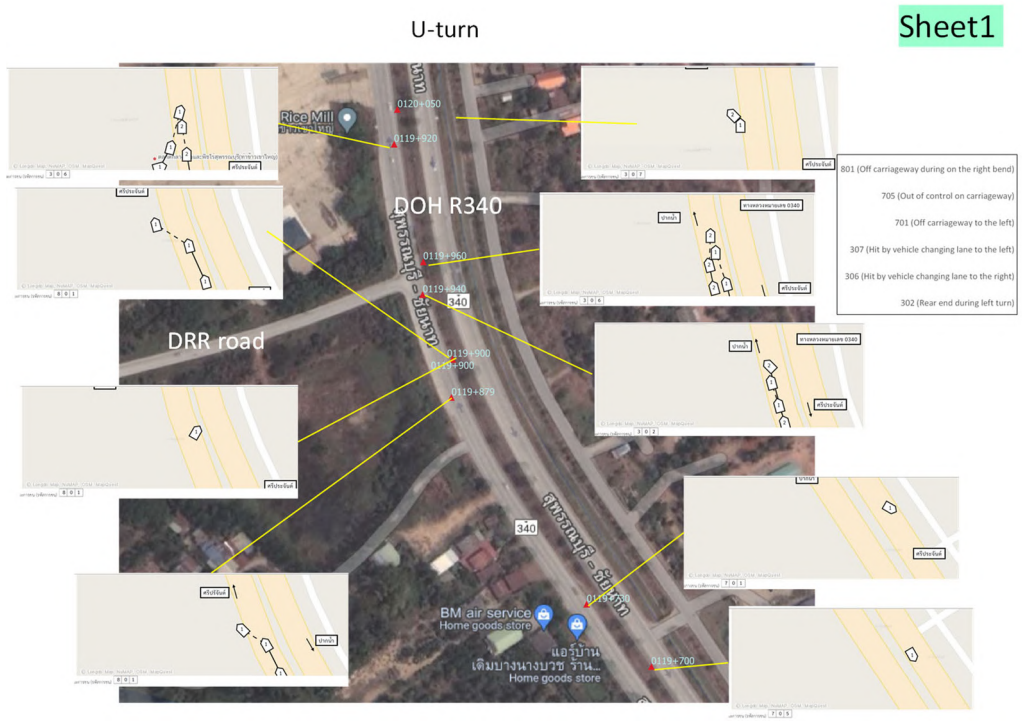
The pilot section in Suphan Buri Province, selected for the second year of the pilot project, is located along NH No. 340 at kilometer point 119+700. It includes straight sections containing a T-intersection and a single lane (for cars and motorcycles) approaching U-turn areas.



Source: JET

Figure 5.3.25 Overview of the Pilot Area in Suphan Buri Province

Before the on-site inspection, DOH and JET reviewed the accident data from HAIMS. Subsequently, DOH and JET had a site visit with the DOH District Office staff to gain insights into the actual traffic conditions. During the site visit, it was observed that the designated area serves as both the starting and ending points for major traffic routes, particularly with limited alternatives leading to the market. A significant number of motorcycles were traveling in the opposite direction, posing a notable risk of accidents. Furthermore, the short distance section where vehicles turn from the connected road to the market on a DRR road experiences frequent lane changes, heightening the risk of accidents.



Source: JET

Figure 5.3.26 Accidents Location Map in Pilot Area in Supan Buri Province

Source: JET

Figure 5.3.27 Example of Recorded Vehicle Behaviors DOH's Drone (Including Reversing Vehicles)

Accident Factor Analysis and Countermeasure Consideration

A workshop was convened to analyze the causes of accidents and discuss potential measures for accident prevention. The workshop participants included representatives

from various key stakeholders encompassing DOH Safety Bureau, Highway Bureau No.12, Suphan Buri District Office No.1, DRR District Office responsible for connecting roads, Highway Police, local municipalities, and the Department of Disaster Prevention and Mitigation (DDPM), totaling 30 participants. Following expert presentations, the participants were divided into four groups to engage in focused discussions on a situation specific to the area, identify accident causes, and propose measures aligned with these causes. Each group deliberated on the challenges and intricacies of a designated area. Subsequently, presentations were delivered by each group to share their findings and recommendations.

Agenda of workshop for pilot project in Suphan Buri R340 + 117km

- **Objectives:**

To learn how to analyze/assume accident mechanism by using accident data, traffic data, and consider the solution

- Date & Time **January 25th, 2023 13:30~16:30**
- Venue: Suphan Buri district office No.1
- **Attendee:**

DOH (Highway safety bureau, Highway No.12 ,Suphan Buri district office No.1, Depo) , DDPM, TSOC, DRR district office, Highway police, Local community

	Items	Presenter	Time
1.	Opening remark	DOH	13:30~13:35
2.	Introduction (how to analyze accident factors, consider solution)	JET	13:35~14:05
3.	Explanation for group work	JET	14:05~14:30
4.	Group work (3~4Groups)	Participants	14:30~15:30
5.	Presentation from each group and Q&A	Participants	15:40~16:25
6.	Closing remark	DOH	16:25~16:30

Source: JET

Figure 5.3.28 Workshop Program


Source: DOH

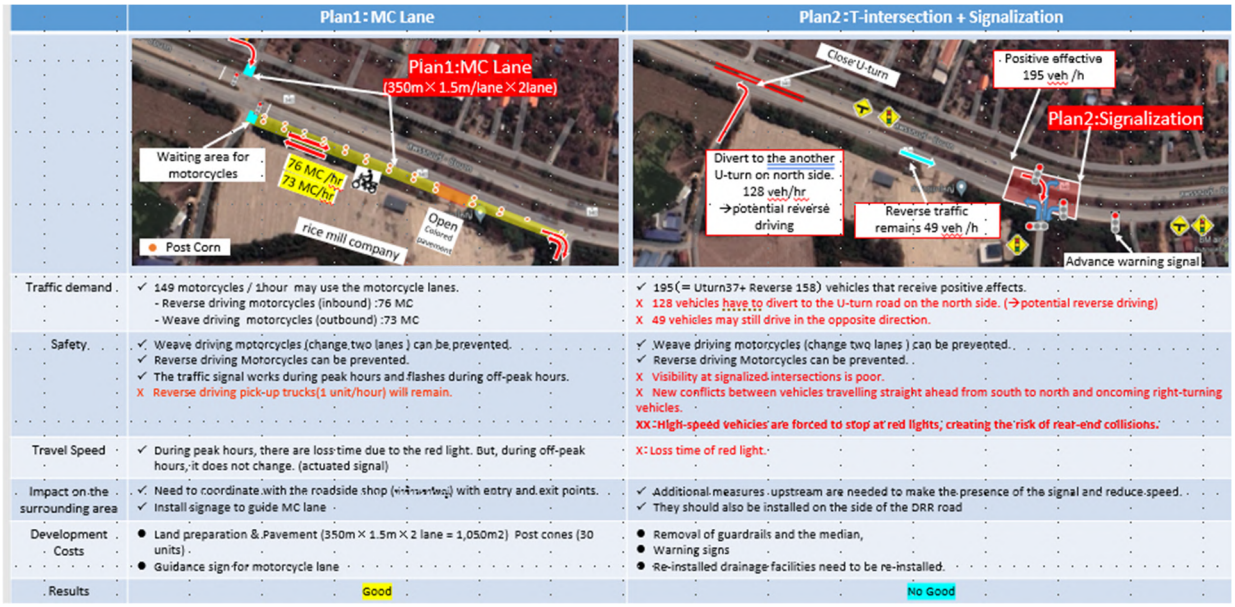
Figure 5.3.29 Workshop

Based on the inputs from the workshop participants, DOH and JET discussed further to consider factors and proposed measures. The area exhibits typical traffic accident patterns observed in rural area in Thailand, where high-speed vehicles frequently rear-end motorcycles as they attempt to change lanes within the short distance from the connecting road (under the jurisdiction of the DRR) to the U-turn slot. Furthermore, the connecting road served as the sole route to the market, leading to a scenario where motorcycles and vehicles frequently travel in the opposite direction, exacerbating the risk of accidents.

Taking into account accident data and vehicle behavior analysis, short-term and medium- to long-term solutions to address these two issues were discussed with the counterpart agency. The issues identified in this area are (1) collisions between high-speed vehicles and motorcycles attempting to U-turn from the intersecting DRR-controlled road and (2) motorcycles traveling in opposite directions for market access. Two proposals were made during the workshop (in January) to address these challenges. The first proposal is developing dedicated motorcycle lanes on the side roads and restricting crossing points, and the second is designing signalized intersections. Each proposal's pros and cons were compared and evaluated, determining the final conceptual plan.

Source: DOH

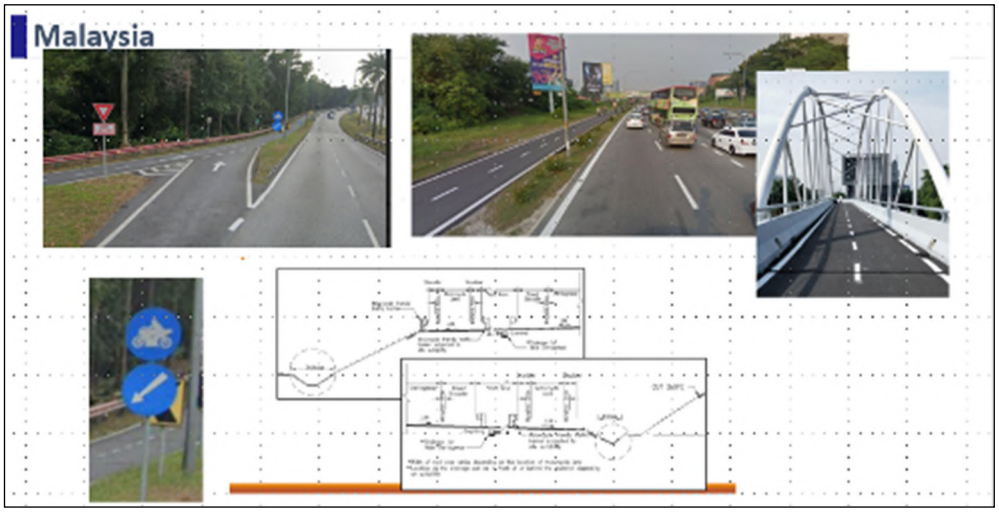
Figure 5.3.30 On-site Inspection in Suphan Buri



Source: DOH

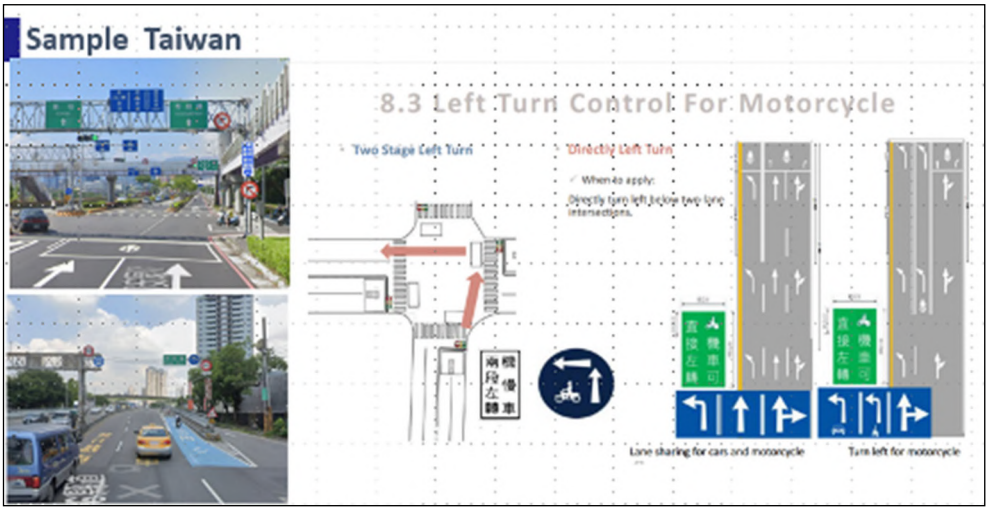
Figure 5.3.31 Comparative Evaluation of Proposed Countermeasures for the Pilot Section in Suphan Buri Province

Regarding the standardization of signs and markings for the motorcycle lane, there were discussions with DOH to solidify the proposed improvement plan. JET presented examples from Malaysia and Taiwan, highlighting dedicated lanes for motorcycles. Additionally, references were made to DOH's existing bicycle lane markings, and proposals were made for motorcycle lane specifications, including width, crossing positions, signs, and road markings. DOH considered these inputs for the standardization of motorcycle lanes.



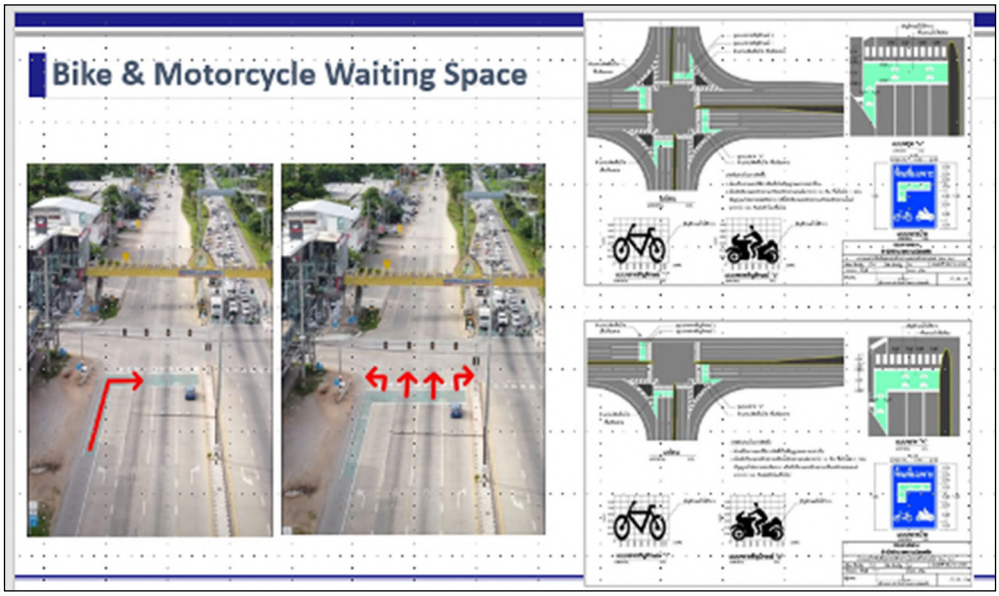
Source: JET

Figure 5.3.32 Example of a Motorcycle Lane in Malaysia



Source: JET

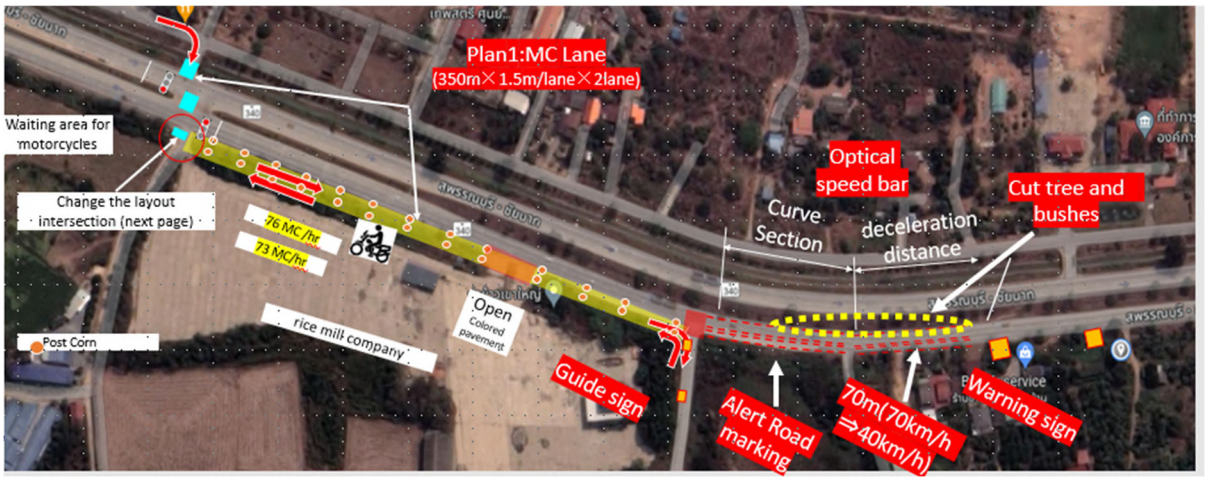
Figure 5.3.33 Example of Motorcycle Left Turn Lane in Taiwan



Source: DOH

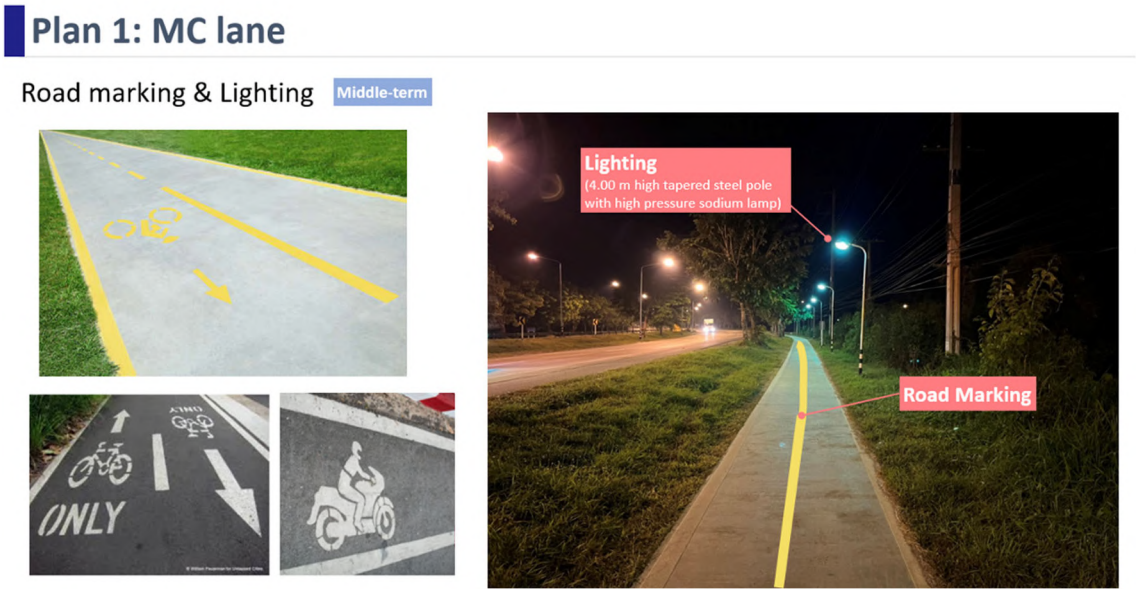
Figure 5.3.34 Example of Motorcycle-Bicycle Shared Lane in DOH Road

The final improvement plan was deliberated with DOH's Suphan Buri District Office. By analyzing accident data and on-site inspections, it was identified that the primary causes of accidents in the area stemmed from contacts between motorcycles entering from DRR roads and vehicles traveling straight on the main road, often exceeding the speed limit. Additionally, the practice of motorcycles traveling in opposite directions in the motorcycle lane poses a significant safety concern. Therefore, a proposed solution was developed involving the installation of an off-road motorcycle lane to prevent vehicle conflicts and the implementation of road markings, signs to guide motorcycles, and streetlights for improved visibility during nighttime. This proposal was discussed and agreed upon with DOH.



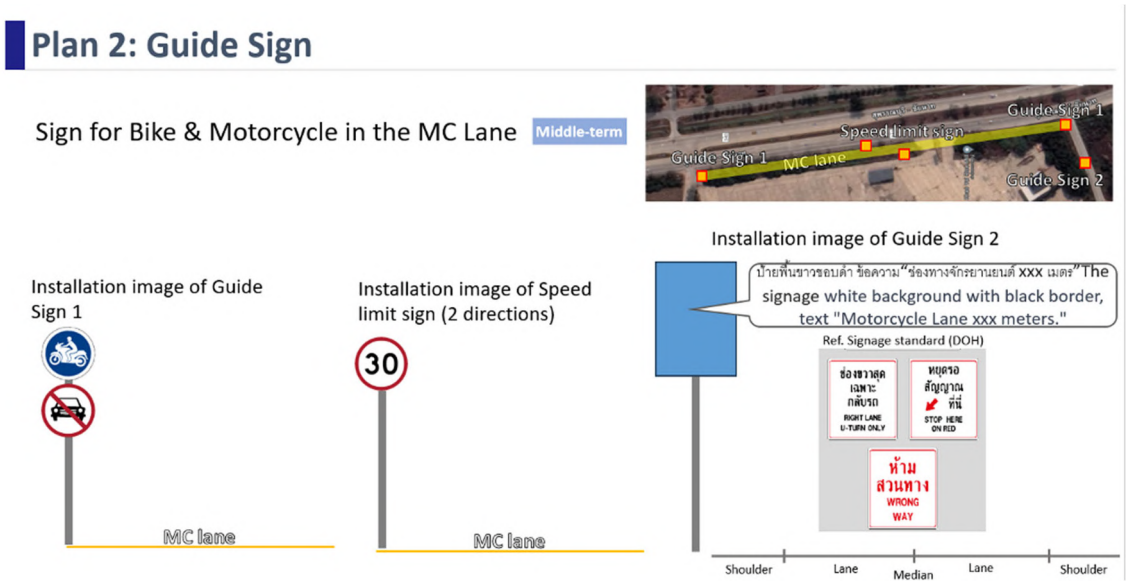
Source: JET

Figure 5.3.35 Proposed Improvement Plan of Pilot Project in Suphan Buri Province



Source: JET

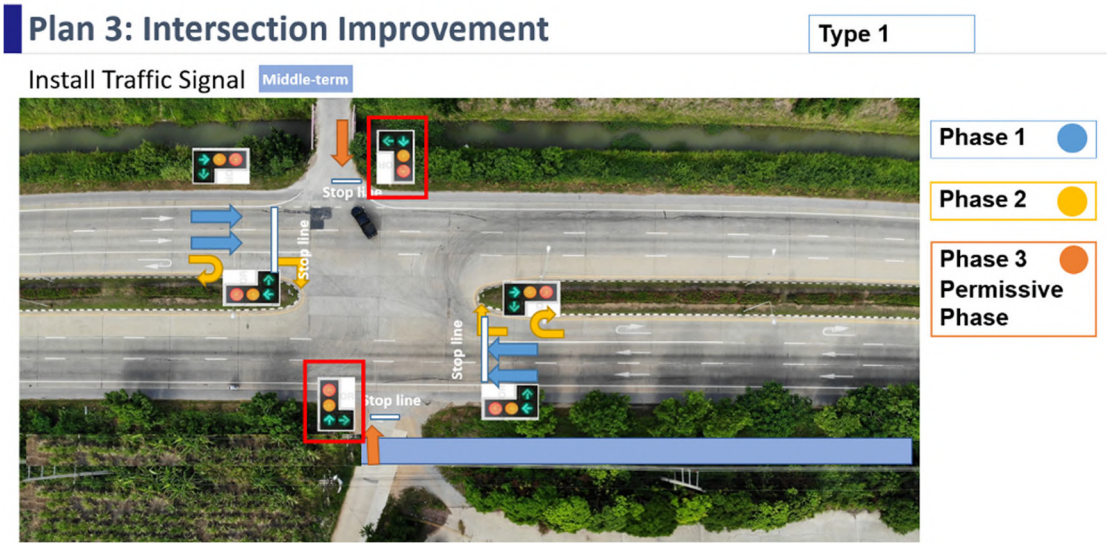
Figure 5.3.36 Development of Dedicated Lanes for Motorcycles



Source: JET

Figure 5.3.37 Signage to Guide Motorcycles towards the Dedicated Motorcycle Lanes

In addition to the proposed measures, JET proposed right-turn signals for motorcycles at certain U-turn locations to restrict their crossing. However, DOH's Suphan Buri District Office expressed concerns based on previous experiences in neighboring areas where the installation of signals increased accidents. This increase was attributed to speeding vehicles making abrupt stops, resulting in rear-end collisions. Therefore, there was hesitancy toward installing signals at this stage. Consequently, it was decided to defer the installation for the time being and reconsider this option if accidents were to increase following the implementation of motorcycle lanes.

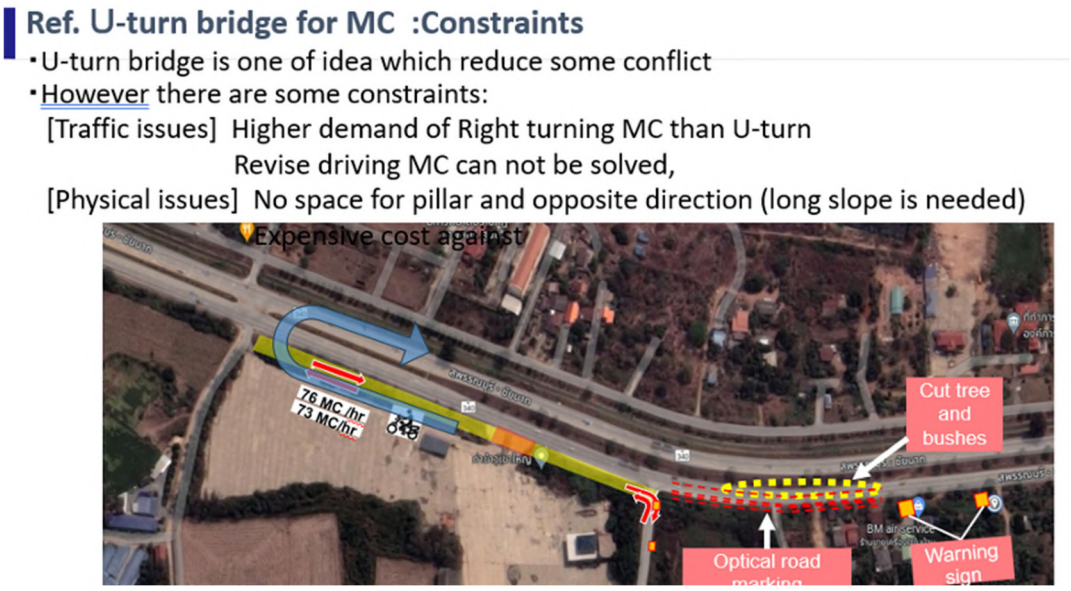


Source: JET

Figure 5.3.38 Installation of Signals at U-turn Locations

DOH proposed a U-turn bridge for motorcycles; however, it was explained that this might not be a suitable solution for the following reasons:

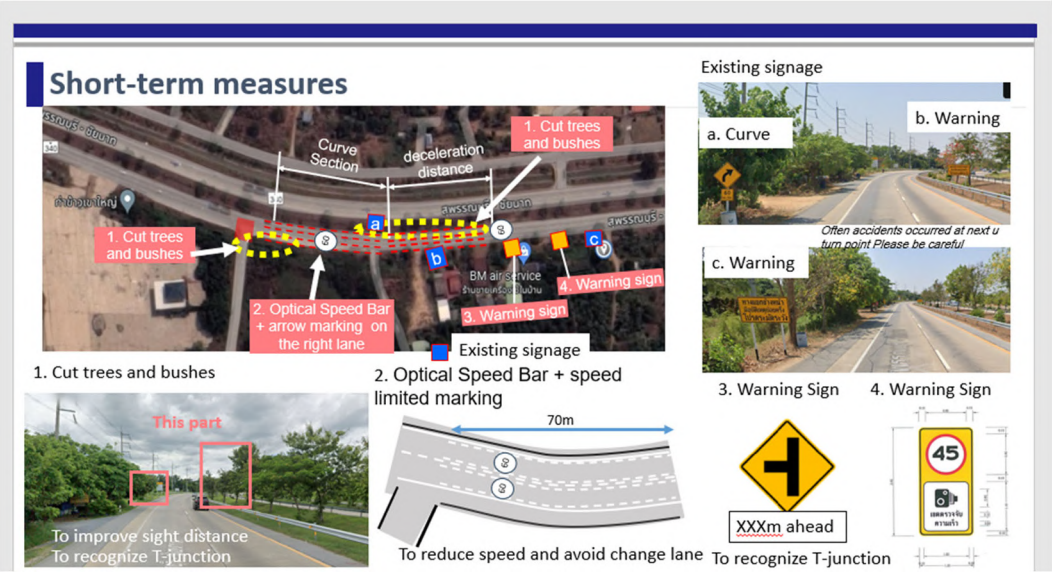
- The prevalence of right-turning vehicles.
- The U-turn bridge may not address the issue of vehicles traveling in the wrong direction.
- The potential for elongated slopes.
- Limited space for pillar installation on the side road.



Source: JET

Figure 5.3.39 Conceptual Image of U-turn Bridge Installation

On the other hand, the following were suggested as short-term measures to reduce speed on the main road: 1) clearing vegetation to improve visibility, 2) installing optical speed bars with road markings for speed limit control, 3) installing warning signs indicating a T-intersection, and 4) installing warning signs to encourage speed reduction.



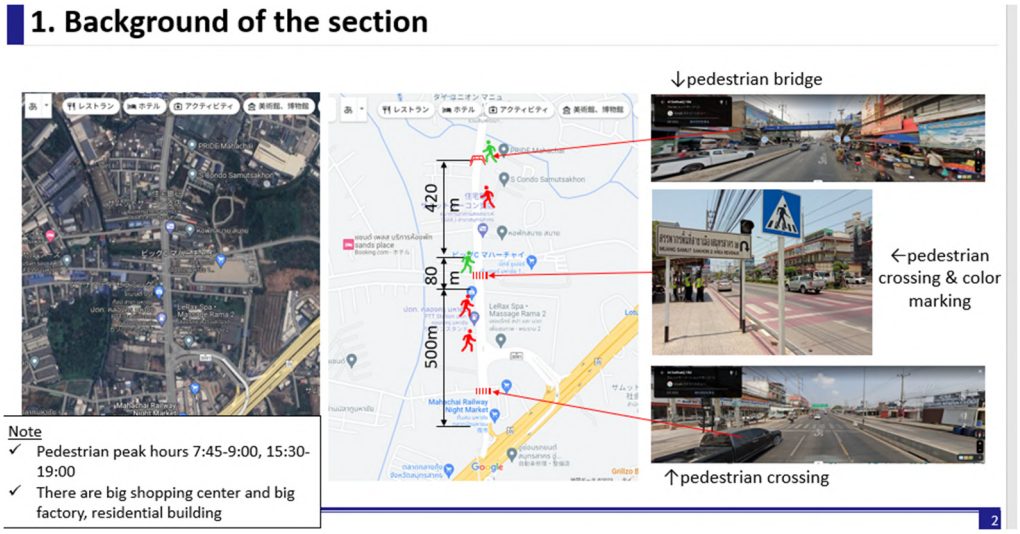
Source: JET

Figure 5.3.40 Conceptual Image of U-turn Bridge Installation

(4) Black Spot in Samut Sakhon Province (Pilot Project 4)

Accident Occurrence Situation

In Samut Sakhon Province, the pilot section was selected among the routes except NH 35 (because of a motorway construction for road environment improvement) even though it is a main trunk road and traffic accidents frequently occur With few reports of accidents from the police on other routes and little information available in the HAIMS accident database, the District Office was interviewed for their opinion. Since pedestrian accidents are common in the province, the following section of Route 3091 near the Km 19+000 shopping mall was selected among several candidates as the pilot section for pedestrian accident prevention measures.



Source: JET

Figure 5.3.41 Outline of the Pilot Section in Samut Sakhon Province

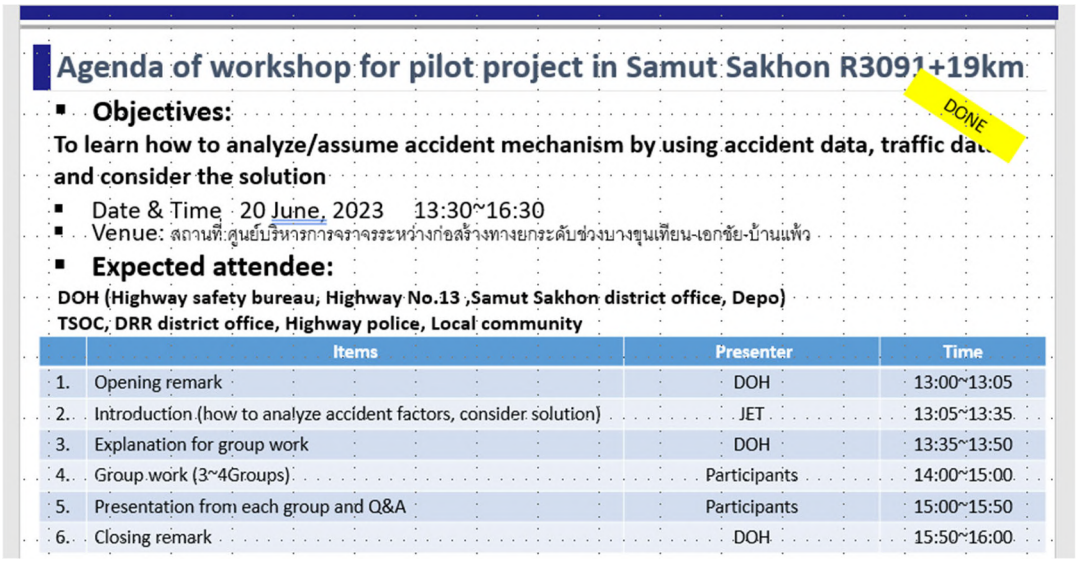
Source: JET

Figure 5.3.42 Accidents Location Map in the Pilot Section in Samut Sakon Province

A workshop was conducted to address the factors and measures associated with the accidents in the pilot areas. This marked as the second workshop, following the one in Suphan Buri, intending to strengthen the ownership of DOH's Highway Safety Bureau. The bureau was delegated with material explanation and hosting, and the workshop participants are officials from DOH headquarters, local offices, and stakeholders. The participants were divided into three groups to discuss accident factors and propose solutions. Their findings were presented afterward.

Source: DOH

Figure 5.3.43 Workshop in Samut Sakhon Province



Agenda of workshop for pilot project in Samut Sakhon R3091+19km

DONE

- **Objectives:**

To learn how to analyze/assume accident mechanism by using accident data, traffic dat… and consider the solution

- Date & Time 20 June, 2023 13:30~16:30
- Venue: สถานที่: ศูนย์บริหารการจราจรระหว่างก่อสร้างทางยกระดับช่วงบางขุนเทียน-เอกชัย-บ้านแพ้ว
- **Expected attendee:**

DOH (Highway safety bureau, Highway No.13 ,Samut Sakhon district office, Depo)
TSOC, DRR district office, Highway police, Local community

	Items	Presenter	Time
1.	Opening remark	DOH	13:00~13:05
2.	Introduction (how to analyze accident factors, consider solution)	JET	13:05~13:35
3.	Explanation for group work	DOH	13:35~13:50
4.	Group work (3~4Groups)	Participants	14:00~15:00
5.	Presentation from each group and Q&A	Participants	15:00~15:50
6.	Closing remark	DOH	15:50~16:00

Source: JET

Figure 5.3.44 Workshop Program in Samut Sakhon Province

Based on the feedback received during the workshop, DOH presented proposals for accident analysis and countermeasures. A thorough analysis was carried out, given the proven effectiveness of previous technology transfers. Additional insights from JET were incorporated, and proposals for countermeasures were discussed.

Location		✓ In front of Big-C Super market
1. Accident type	Vehicle type	✓ MC, Passenger car, Pickup truck, Truck and Pedestrian
	Collision type	✓ Sudden Lane changes, overspeed, crossing at non-designated locations. ✓ Motorcycle crashes with pedestrians, motorcycle crashes with motorcycles.
2. Estimate the accident mechanism		✓ Pedestrians crossing outside designated areas, motorcycles reversing to make a U-turn. ✓ Both drivers and pedestrians do not adhere to traffic rules. ✓ Pedestrians attempt to cross when there is a short gap between vehicles, causing large vehicles to slow down but not able to brake in time, resulting in collisions.
3. Identify accident factor to be focused		✓ Crosswalks and pedestrian overpasses are available at 400-meter intervals. Some pedestrians tend to jaywalk even when these facilities are nearby, as they may find the detour inconvenient or dislike using pedestrian overpass stairs. However, many pedestrians do use the designated facilities. ✓ Motorcyclists passing through alongside vehicles create blind spots, increasing the risk of not noticing jaywalking pedestrians, especially those crossing unexpectedly from unexpected positions. ✓ Furthermore, some jaywalking pedestrians attempt to dash across the road, trying to exploit short gaps, but the road having three lanes poses a longer distance to cross.
4. Road environment factor that induces errors		✓ Inconvenient conditions for injured or sick pedestrians on pedestrian bridges. ✓ Frequent jaywalking.
5. Concept of solution		1) To reduce accidents and losses, increase awareness and proper use of vehicles and roads, and change the behavior of drivers. 2) To reduce pedestrian accidents, efforts should be made to seek cooperation from businesses and conduct public awareness campaigns. 3) Implement traffic discipline training programs to promote adherence to traffic rules. 4) Enforce traffic rules through the deployment of traffic police checkpoints. 5) Designate specific crossing points for pedestrians to enhance safety. 6) Encourage reduced reversing and speed in residential areas to minimize potential accidents.
6. Countermeasure type		1. Improve pedestrian crossings using traffic signals. 2. Clearly designate crossing points. 3. Create convenient and safe crossings for everyone. 4. Increase warning signs for pedestrian crossings. 5. Establish specific times when trucks are prohibited. 6. Install fence at the road island to enforce pedestrian crossings only in designated areas. 7. Enforce traffic laws

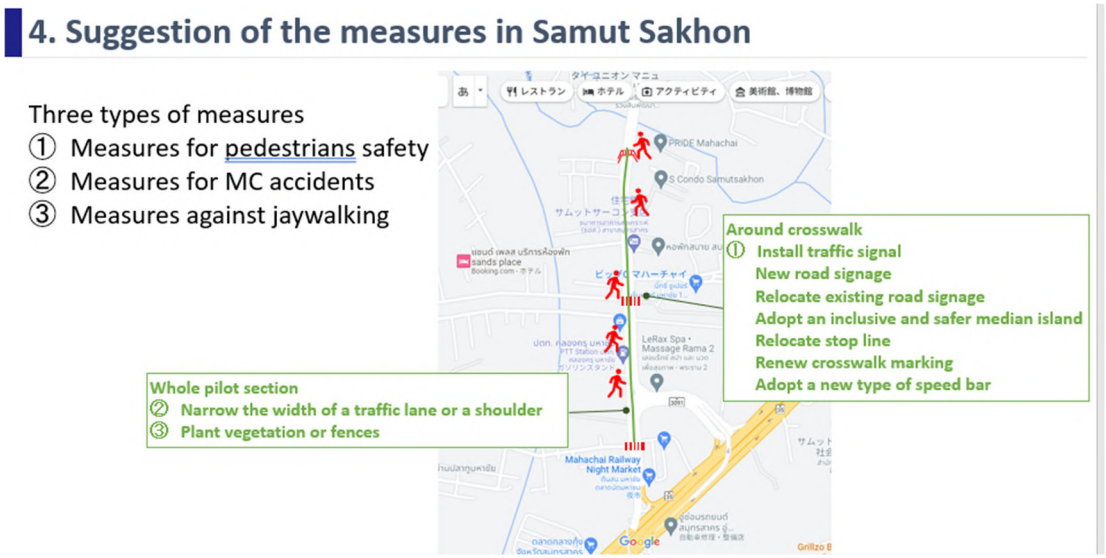
Source: JET

Figure 5.3.45 Proposed Concepts for the Countermeasures in Samut Sakhon Province

The suggested concept plan was established from the on-site inspection and upon considering the aforementioned accident analysis and countermeasure proposals from DOH.

The section has a four-lane carriageway as a bus route, with shops and large commercial facilities. It is an area with relatively high pedestrian traffic. Analysis of accident data reveals a high frequency of accidents involving pedestrians crossing the road and collisions between motorcycles changing lanes.

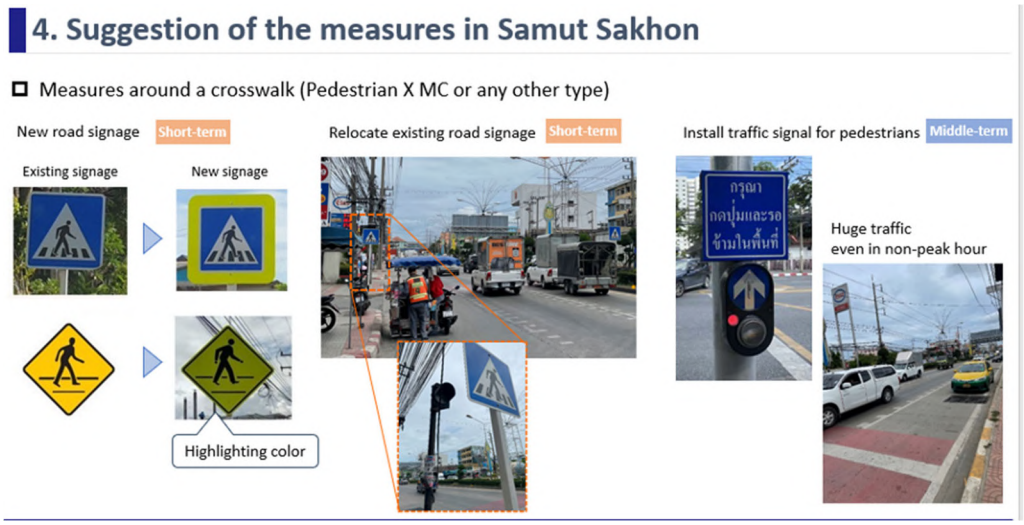
The proposed accident prevention measures are 1) pedestrian safety measures, 2) safety measures for two-wheelers, and 3) prevention of jaywalking. These ideas were discussed with DOH during the on-site visit, aiming to formulate specific measures for implementation.



Source: JET

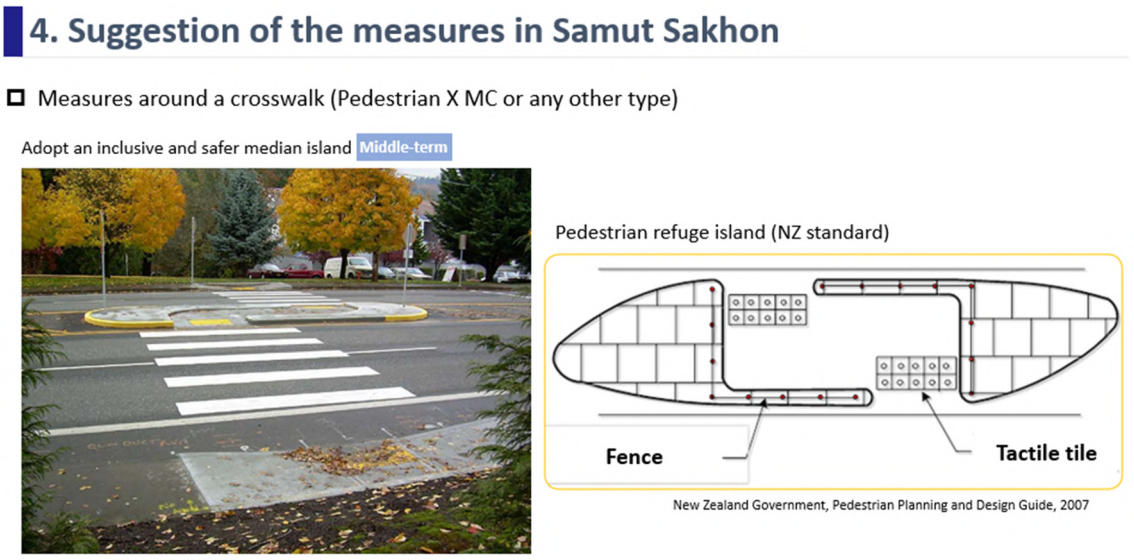
Figure 5.3.46 Outline of Countermeasures for the Pilot Section in Samut Sakhon Province

The proposal for pedestrian safety includes enhancing the visibility of caution signs, adjusting flashlight placement, and introducing pedestrian signal buttons. Additionally, installing a two-stage pedestrian crossing facility to improve the safety of pedestrians crossing the four lanes on one side was suggested.



Source: JET

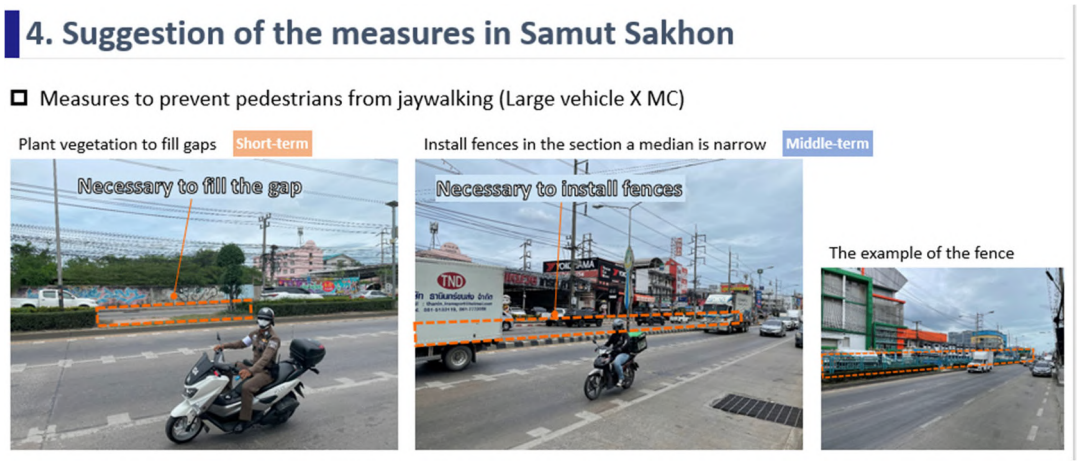
Figure 5.3.47 Pedestrian Safety Measures



Source: JET

Figure 5.3.48 Installation of Two-Stage Pedestrian Crossing Facility (Concept Image)

Furthermore, a proposal was made to relocate the stop line before the pedestrian crossing and set up a new type of optical speed bar (zigzag pattern proposed by DOH, referencing UK's case with proven effectiveness) to control two-wheeler accidents. Other suggested measures were to restrict crossing points and prevent pedestrians from crossing the main road.

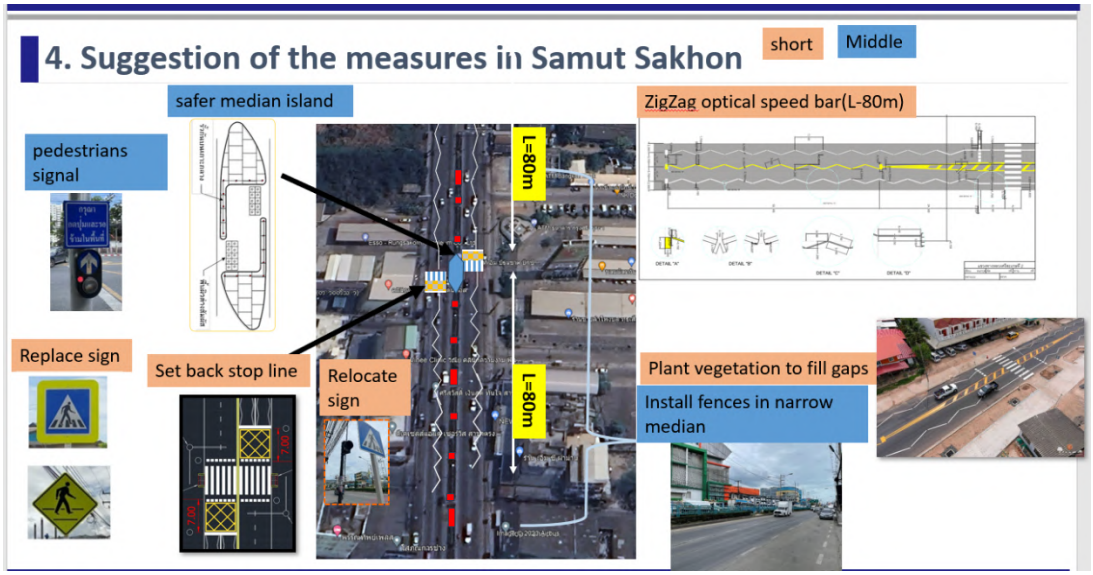


Source: JET

Figure 5.3.49 Installation of Jaywalking Prevention Fence

The above-mentioned improvement plan was discussed and finalized through a meeting with the Highway Safety Bureau, Highway Bureau No. 13, Samut Sakhon District Office, and JET. Due to budget constraints, the countermeasures were divided into short- and medium-term plans. For the short term, measures within the maintenance budget of the

District Office were agreed upon, aiming for implementation within the project period. Considering accidents involving jaywalkers and motorcycles, these short-term measures include continuous tree planting for jaywalking prevention, installation of new fences for pedestrian crossings, reconsideration of sign placement and visibility to emphasize the presence of pedestrian crossings, repositioning of stop lines in front of pedestrian crossings, introduction of two-stage pedestrian crossing facilities, and installation of road markings (specifically the zigzag optical speed bars with proven speed reduction effects from another DOH location).



Source: JET

Figure 5.3.50 Concept Plan on Countermeasure for the Pilot Project in Samut Sakhon Province

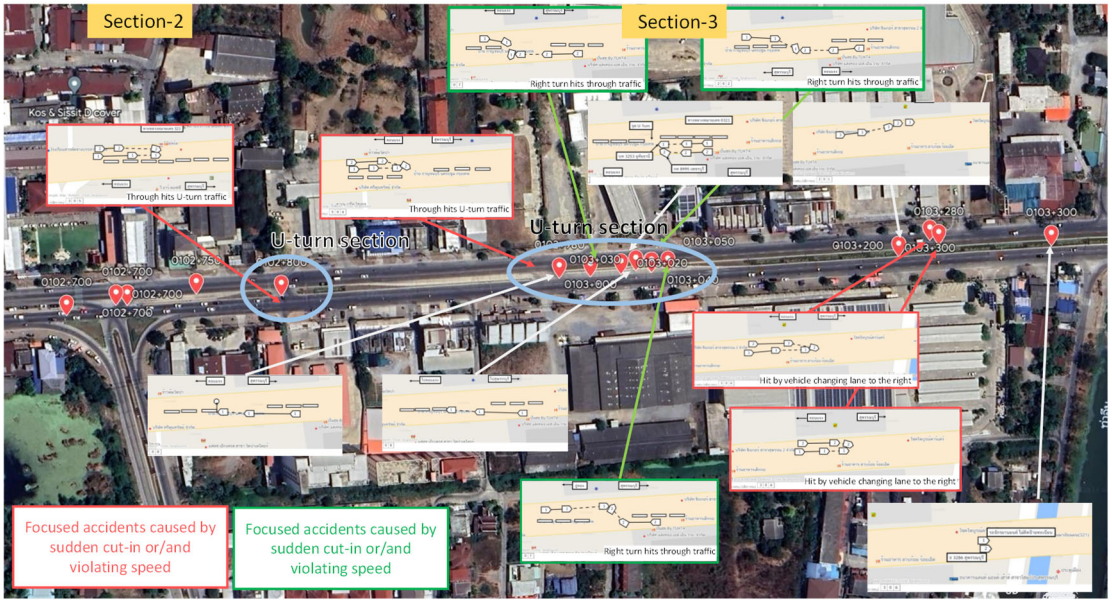
(5) Additional Black Spot in Suphan Buri (Pilot Project 5)

In the meeting last June 2023 with TSOC, DOH, and DRR, the project manager suggested adding a pilot project that could be evaluated for its effectiveness within the project period. DOH proposed the addition of a section on NH No. 321 in Suphan Buri province as the supplementary pilot section. DOH had plans for intersection improvement projects in this section, and it considered utilizing some of the budget allocated for those projects and road repair costs. The causes of the accidents on the straight sections of NH No. 321 were analyzed, and cost-effective countermeasures implementable within the short term were studied.

Accident Occurrence Situation

Based on the accident data analysis, there is a high frequency of accidents along the

straight parts of the identified section, primarily involving vehicle-to-vehicle collisions and rear-end accidents. The main contributing factors to these accidents are complex lane changes near intersections and confusion at U-turn locations.



Source: JET

Figure 5.3.51 Accidents Location Map in Additional Pilot Area

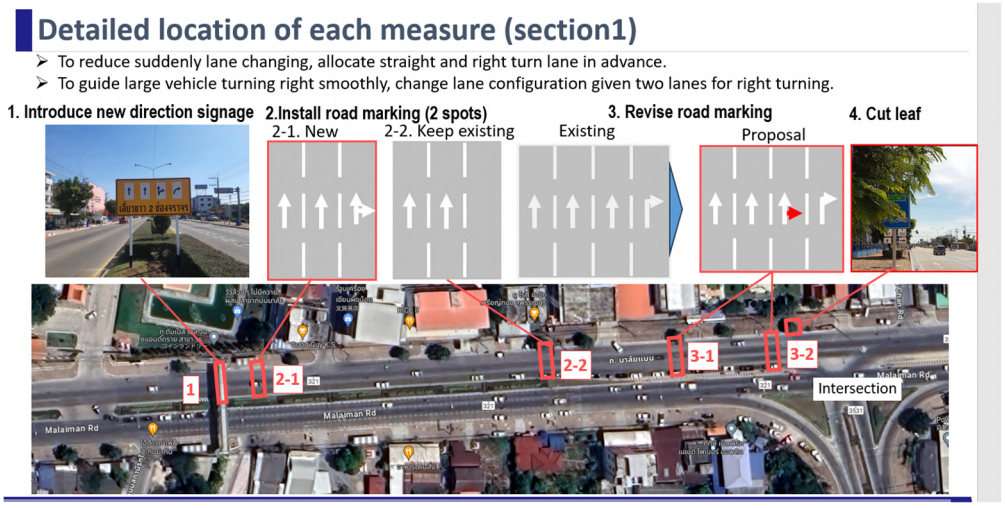
During the consideration phase, workshops were not conducted due to time constraints but, instead, a thorough examination of accident data, on-site observations, and AI image analysis to identify the occurrence and factors of accidents were conducted. After extensive consultations between the Highway Safety Bureau and the Suphan Buri District Office, the proposed measures include installing signs for pedestrian guidance, road markings, prominent signage for U-turn locations, and optical speed bars for speed control (road markings), optimizing lane operations through appropriate signage, and installing and repairing flashlights. The Suphan Buri office initiated detailed design and procurement for early implementation.

Summarized table

Location		✓ Straight section close to U-turn spots or a modified Intersection
1.Accident type	Vehicle type	✓ Passenger car, 4-wheels Pickup truck, MC
	Collision Type	✓ Sudden cut-in, Overspeed
2. Estimate the mechanism of accident		Side-by –side accident in front of the intersection ✓ A vehicle that cut in from the second lane collided with a vehicle traveling in the third lane (the right-turn lane) near the intersection from left side Side-by-side accident close to the U-turn spot ✓ A vehicle traveling in the second lane suddenly changes to the third lane to use U-turn section and collided with a vehicle traveling in the third lane from left side. Head-on accident in the U-turn spot ✓ A vehicle attempting to make a U-turn within the U-turn zone collides head-on with a vehicle traveling in the opposite direction
3. Identify accident factor to be focused		a) road structure × b) traffic conditions ✓ This route is a main road in the area and has a heavy traffic volume of about 60,000 vehicles/day in both direction ✓ The capacity to turn right in the intersection has been increasing to be two lanes from one lane. ✓ There are several U-turn sections within a short stretch of the road. c) Danger in driving behavior. ✓ There are vehicles that carelessly change lanes to the right side just before the intersection in order to make a right turn at the intersection. ✓ There are vehicles that carelessly change lanes to the right side just before the designated U-turn spot in order to use it. ✓ Despite the presence of vehicles attempting to make a U-turn using the designated spot, there are vehicles traveling in the opposite lane that do not decelerate before reaching that U-turn spot.
4. Road environment factor that induces errors		1) It is difficult to discern the travel direction in each lane at the intersection for vehicles approaching the intersection 2) Poor visibility of directional signages 3) U-turn spot is not easily recognizable 4) No warning facilities of a head-on collision
5. Concept of solution		1) Designate a travel direction in each lane 2) Make the U-turn spot more easily identifiable 3) Raise awareness of the drivers before the U-turn sections about potential dangers of head-on accidents
6. Countermeasure type		✓ Introduce direction signages and Install/Revise road marking in each lane <- accident factor -1) ✓ Cut leaves <- accident factor -2) ✓ Install U-turn signages <- accident factor -3) ✓ Introduce Yellow marking <- accident factor -3) ✓ Change road marking <- accident factor -3) ✓ Install or fix flash lights in both directions <- accident factor -3, 4) ✓ Remove inworking studs and Install new luminous studs <- accident factor -3, 4) ✓ Install warning signages against head-on collisions <- accident factor -4) ✓ Introduce optical speed bar

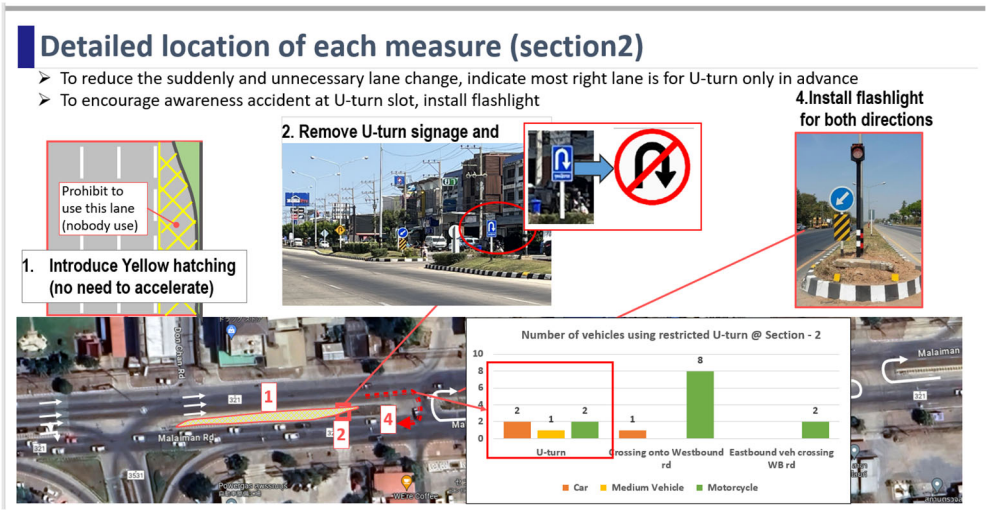
Source: JET

Figure 5.3.52 Results of Accident Cause Analysis and Countermeasure



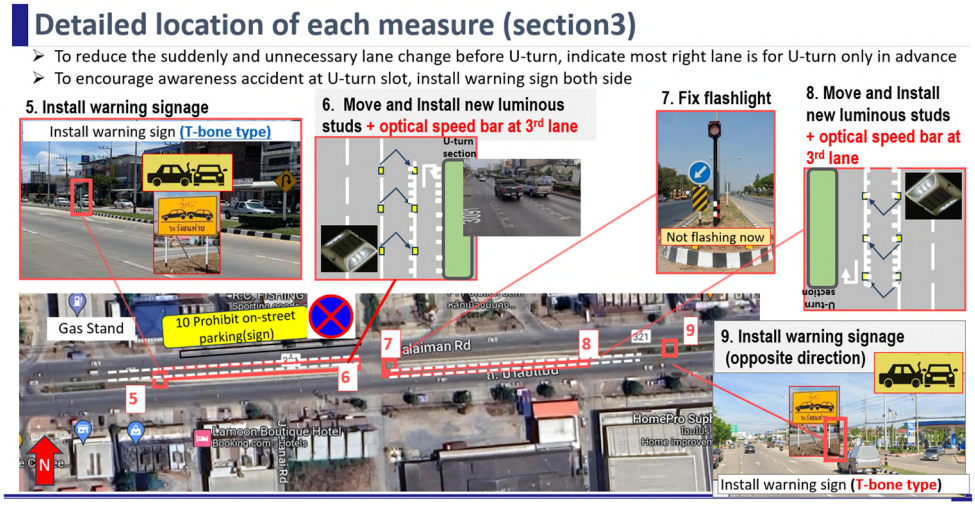
Source: JET

Figure 5.3.53 Countermeasure 1 for Additional Pilot Project Area



Source: JET

Figure 5.3.54 Countermeasure 2 for Additional Pilot Project Area



Source: JET

Figure 5.3.55 Countermeasure 3 for Additional Pilot Project Area

5.3.4 Assistance of MOT and Organizations Concerned to Implement the Pilot Projects for the Accident Reduction at Black Spots

Previous traffic safety intervention projects by DOH have been conducted as part of road maintenance. Regional Highway Bureaus and their subordinate district offices conduct drawing, quantity calculation, and cost estimation for proposed measures. These results are submitted to the Highway Safety Bureau at the headquarters. The bureau reviews the results against the standard drawings, and upon approval, budget allocation is granted.

For each pilot project, detailed designs are developed based on the agreed concept plans with JET, and implementation is carried out by DOH's Highway Safety Bureaus and District

Offices. Larger projects requiring linear improvements or extensive construction, such as the pilot projects in Prachin Buri and Nakhon Ratchasima provinces, involve design and estimation at the Central Design Bureau of DOH. On the other hand, smaller-scale projects like road markings and signages, not requiring major road reconstruction, are designed and quantified by the relevant Highway Bureau or District Office (or even their subordinate Depots). Construction is then fulfilled by a contracted company (or handled in-house for minor maintenance).

JET supported the introduction of each measure by engaging in discussions and on-site confirmations with each district office. It was confirmed that due to the change in government, budget execution would be delayed until April 2024, later than the typical fiscal year. Completing the construction within the project period was, therefore, not feasible. In order to evaluate the effectiveness of the measures as early as possible, discussions were held with DOH to identify cost-effective short-term measures that could be implemented in two stages, utilizing maintenance budgets for implementation.
As of the end of May 2024, the implementation status of each project is as follows.

Table 5.3.2 Implementation Status of the Pilot Projects (as of Feb. 2024)

Pilot Province	Proposed final countermeasure	Current Status (Completed as of may,2024)	Short term countermeasure (by September 2024)	Middle term countermeasure (by September 2025)		Long term
				Items	expected schedule	whether consider countermeasure or not
Prachin buri (7km, long down slope)	1) Warning sign (Overhead sign 2, Overhang Sign 4) 2) Truck lane + Rehabilitation of pavement, Road Marking 3) Curve package 4) Repair and maintenance for VMS (already get budget by HTOC)	4) Repair and maintenance for VMS (already get budget by HTOC)	2) Rehabilitation of pavement + Median Opening for Emergency Access	1) Warning sign (Overhead sign 2, Overhang Sign 4) 2) Truck lane , Road Marking 3) Curve package (without anti-skid)	Waiting for budget approval for next fiscal year Procurement : October - December, 2024 (3 months) Construction : January - June ,2025 (6 months)	2) Truck Rest Area 3) CCTV (law enforcement)
Nakhon Ratchasima (500m)	1) Changing Alignment 2) Warning sign +road marking	-	-	1) Changing Alignment 2) Warning sign +road marking	Waiting for budget approval for next fiscal year Procurement : October - December, 2024 (3 months) Construction : January - September, 2025 (9 months)	-
Suphan buri (350m +Uturn)	1) Motorcycle lane (400m) 2) Traffic Signal (1 location) 3) Road marking for crossing 4) Warning sign	4) Warning sign before T-junction, cut bush and tree in median + Introducting opitical speed bar at 1st & 2nd lane	1) Motorcycle lane (400m)	-	-	2) Traffic Signal (1 location)
Samut Sakorn (300m)	1) New pedestrian crossing 2) Pedestrian signal 3) Barrier for prevention against jaywalking 4) Replace Warning sign 5) Zigzag marking, shif stopline	4) Replace warning sign	5) Zigzag marking, shift stopline	1) New pedestrian crossing 2) Pedestrian signal 3) Barrier for prevention against jaywalking	Waiting for budget approval for next fiscal year Procurement : October - December, 2024 (3 months) Construction : January - June ,2025 (6 months)	-
Suphanburi (Alternative Location)	1) reducing the size of the traffic islands to increase the capacity of the turning lanes on highway 3531 from 1 lane to 2 lanes. 2) Road marking for direction change before intersection 3) Introducing yellow hatching 4) Removing U-turn signage and install prohibited u-turn sign 5) Installing warning sinage 6) Moving and installing new luminous 7) Fix flash light 8) Introducting opitical speed bar at 3rd lane	1) reducing the size of the traffic islands to increase the capacity of the turning lanes on highway 3531 from 1 lane to 2 lanes. 2) Road marking for direction change before intersection 3) Introducing yellow hatching 4) Removing U-turn signage and install prohibited u-turn sign 5) Installing warning sinage 6) Moving and installing new luminous 7) Fix flash light 8) Introducting opitical speed bar at 3rd lane	-	-	-	-

Source: JET

The implementation status, challenges, and considerations for each pilot project are as follows.

(1) Black Spot in Prachin Buri Province (Pilot Project 1)

Regarding the pilot project in Prachin Buri Province, DOH and JET conducted (in November 2022) a detailed on-site examination of various warning signs where the placement and applicability of the signs were confirmed. Subsequently, the District Office and the relevant regional office (Office of Highways 10) conducted detailed design and cost estimation as they planned to submit a budget request. However, due to the large-scale nature of the 7 km project, the discussions with DOH's Design Bureau resulted in additional measures such as the construction of escape ramps, new rest facilities, pavement replacement, and the installation of nearby U-turns.

Implementation Status

DOH implemented one of the proposed measures, the repair of three variable message signs (VMS). Though JET proposed VMS displaying vehicle speeds using measuring equipment for warning purposes, the repaired VMS only display speed limit. DOH will improve usage of the VMS when implementing other proposed measures.

The decision to implement other proposed measures was taken up with the Deputy Director General of DOH because the project is large-scale and DOH is involved even if without experience implementing the measures. As a result, it was decided to incorporate some collaborative measures proposed by JET into the fiscal year 2024 budget (starting in October). These measures are divided into two phases. Phase 1 involves the installation of U-turn lanes (outside the proposed measures), and Phase 2 includes the pavement replacement and the implementation of the proposed measures.

Some challenges are the unprecedented scale of the project and the need for approval from higher authorities within DOH. Additionally, the large-scale nature of the project introduces complexities, and finalizing the scope of the measures required discussions with the DOH Design Bureau. The project has innovative solutions, such as VMS and escape ramps, which require careful consideration and coordination with various stakeholders. Furthermore, the decision-making process within DOH involves multiple levels of approval, which can impact the implementation timeline. Overall, addressing these challenges requires ongoing collaboration and communication between DOH, JET, and other stakeholders involved in the project.

Source: DOH

Figure 5.3.56 Repaired VMS

Challenges and Considerations for Implementation

1) Introduction of Anti-skid Pavement

Regarding the planned implementation of anti-skid pavement in Prachin Buri Province, information gathering was through discussions with a Japanese road company with a local subsidiary in Thailand, as well as consultations with EXAT. The feasibility of introducing the Neat method, commonly used in Japan, and other pavement options were studied. Based on the information obtained, the materials used in the anti-skid pavement, such as the aggregates and resin binders for the Neat method commonly used in Japan, would be challenging to source locally in Thailand, necessitating importation and resulting in higher costs. As a supposedly sustainable solution, this approach was deemed impractical. On the other hand, DOH explored locally available materials for anti-skid pavement, and proposals from local contractors were considered. Multiple discussions were held with the Highway Safety Bureau staff.

Consequently, considering the overall project cost, DOH decided on using locally sourced materials for the anti-skid pavement rather than the Neat method. However, DOH experienced multiple accidents and received public complaints related to anti-skid pavement made of different materials in the past. As a result, implementing this measure seems likely to be postponed. JET proposed an alternative solution involving the creation of slits in the pavement but received no response; therefore, JET suggested including the advantages of this alternative solution in technical documents, aiming for its future utilization.

Comparison

1. Materials

Item	Cold Plastic Anti-skid Pavement	Anti-skid Resin Pavement
Top coat	**None**	• Acrylic-resin-base topcoat
Aggregate	• Cold plastic materials type2(mix with glass beads) - Glass beads type 1 - Fine aggregate • Fine aggregate ✓ Particle size: around 1-3 mm **Not mentioned about hardness**	1. Black hard aggregate - Emery (Grain size: 1.5-3.5 mm, Classical Mohs hardness: 8-9) - Ferrochrome slag 2. Colored ceramic aggregate (Grain size: 3.3-2.0, 2.0-1.0, 1.0-0.5 (mm), 7-8) 3. Silicon carbide aggregate (Grain size: 3.5-2.0, 2.0-1.0(mm))
Binder	• MMA dr. fixit punchite. anti-skid set - dr. fixit, manufacturer and distributor of perfect construction chemicals. (dr-fixit.co.th) (Hardening time: 7-15 minutes -> can be open the traffic)	1. Solvent less flexible epoxy resins 2. MMA-based resins are suitable. (Semi-hardening time : 6h or less)
Primer	• A chemical solution (depends on suppliers)	1. PPN: primer for flexible epoxy resins 2. PPN-M: primer for MMA-based resins (Semi-hardening time:2h or less)

2. Cost

Material	Cold Plastic Anti-skid Pavement	Anti-skid Resin Pavement (Loss rate 20%)
Top coat	None	750 THB/kg ⇒ **180,000** THB/1000 sqm
Aggregate	150 THB/kg (PMMA coating material) Coating materials cost mixed with 30 % aggregate 5.00 kg/sq.m. @ 150.14 baht/kg ⇒ **750,000** THB/1000 sqm	95 THB/kg ⇒ **741,000** THB/1000 sqm
Binder		850 THB/kg ⇒ **816,000** THB/1000 sqm
Primer	120THB/kg (Primer material cost (Primer glue) (1,200 / 10)) ⇒ **24,000** THB/1000sqm	800 THB/kg ⇒ **96,000** THB/1000 sqm
Hardener	100.03 THB/sqm (Hardener cost (0.25 kg/sq.m. @ 400.14 baht/kg)) ⇒**100,000** THB/1000sqm	Binder:850 THB/kg ⇒ **816,000** THB/1000 sqm Primer:800THB/kg ⇒ **96,000** THB/1000 sqm Total: **912,000** THB/1000sqm
Total	**874,000** THB/1000sqm	**2,745,000** THB/ 1000sqm
	Example of boq	Quotation of Kajima Road (1 Yen = 3.45 THB)

3. Amount of material

Item	Cold Plastic Anti-skid Pavement	Anti-skid Resin Pavement
Top coat	None	0.2 kg/sqm
Aggregate	5kg/sqm	6.5kg/sqm
Binder		1.9kg/sqm
Primer	0.2kg/sqm	0.2kg/sqm
Example Boq		RPN-301

4. Performance

Items	Cold Plastic Anti-skid Pavement	Anti-skid Resin Pavement
Skid Resistance Value	• >= 55 While test with EN13197 Road marking materials	• >=70 (BPN: British portable skid resistance number) (Portable Skid Resistance Tester)
Erosion Factor	• Less than 10% Wear simulator turntable without sprinkles the glass beads on the surface up to 4,000,000 times(EN13197)	None

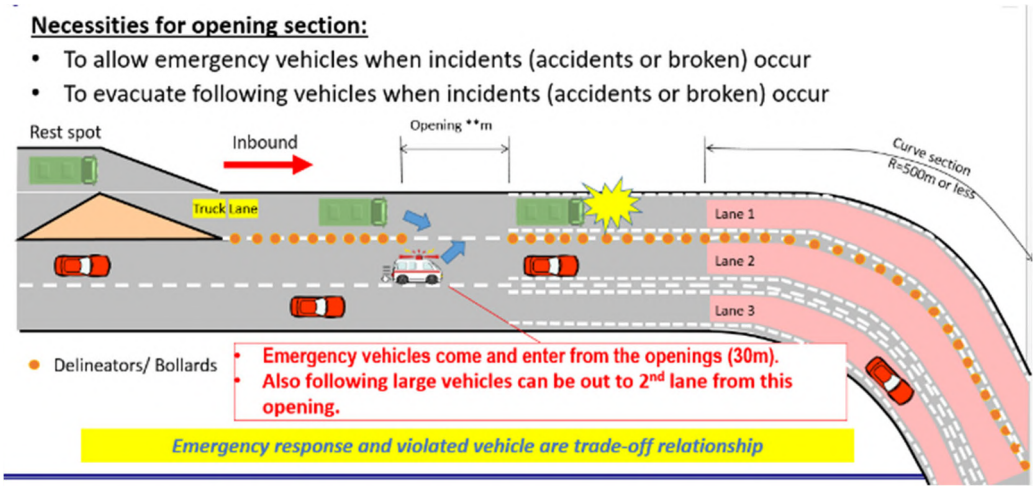
Source: DOH

Figure 5.3.57 Comparison of Anti-skid Pavement Materials (Japan vs. Thailand)

Installation of Bollards

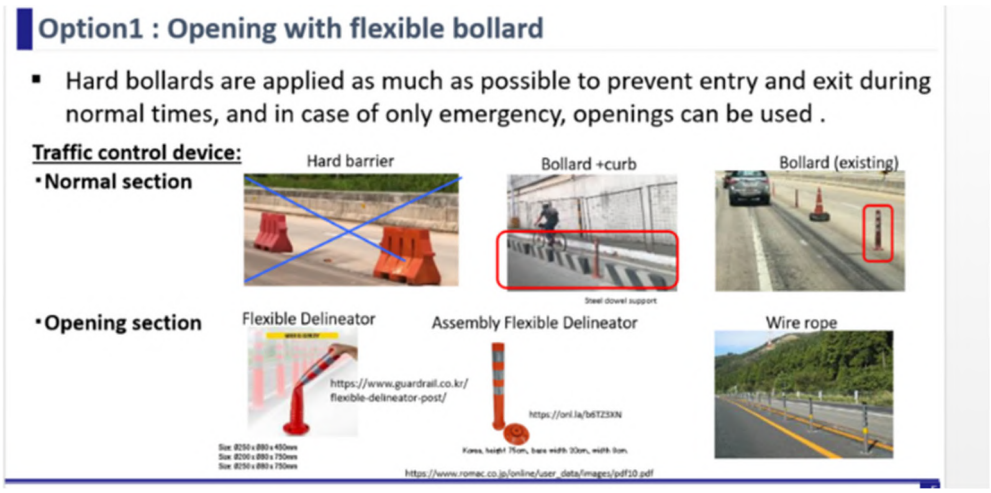
There is a proposal to create a truck lane to separate large vehicles from regular passenger

cars and for the former to travel at a lower speed by engaging a lower gear to address the issue of speeding, which has been the primary cause of incidents on the pilot section in the Prachin Buri Province. Physical separation of this lane from others is necessary, and thus, the installation spacing, types, specifications of bollards, and emergency opening intervals have been explained with reference to Japanese cases. Discussions with DOH have covered the physical separation methods and installation range, including emergency responses. Due to the high cost of bollards used for lane separation in Thailand, it was decided to install them only in the initial 1 to 1.5 km section and assess the situation before determining if additional installations are needed.



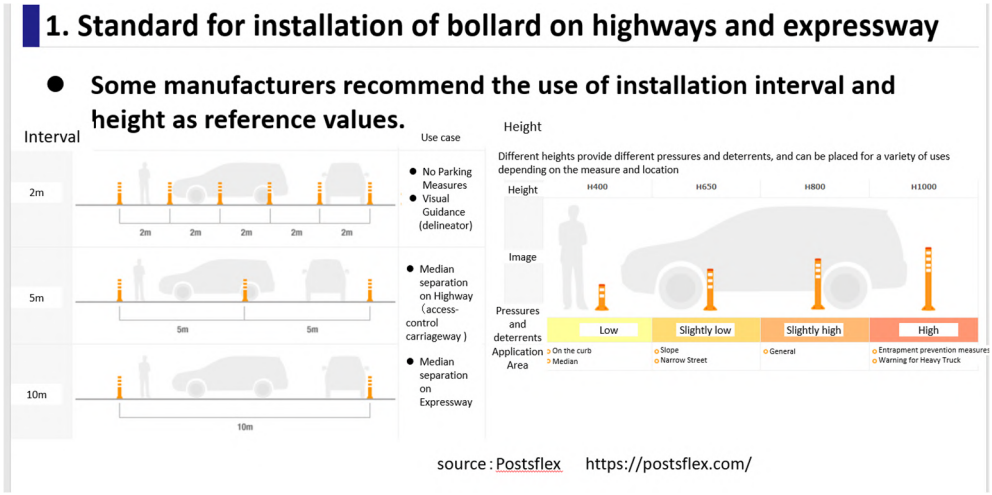
Source: JET

Figure 5.3.58 Concept Plan of the Installation of Bollards for Separating a Truck-Lane with Emergency Openings



Source: JET

Figure 5.3.59 Study on Material of Bollards for Separating a Truck-Lane

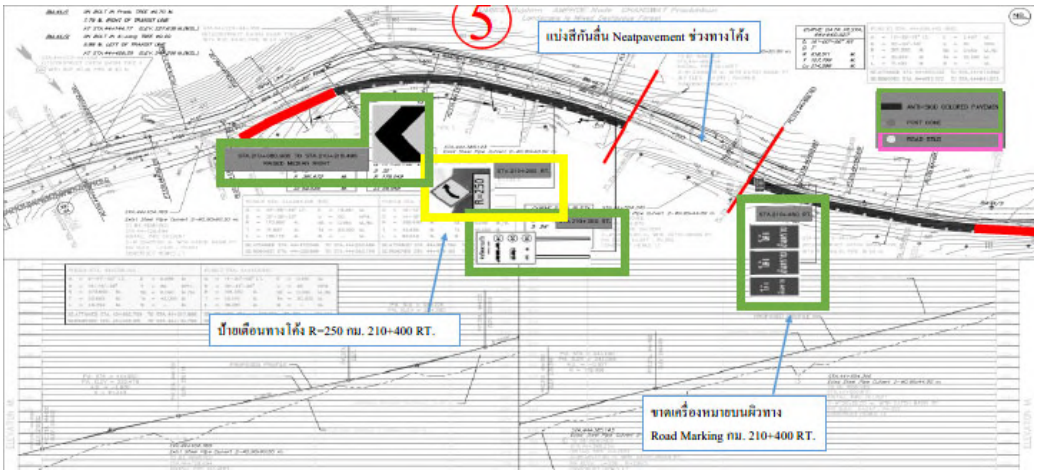


Source: JET

Figure 5.3.60 Types and Intervals of Bollards

Review and Finalization of Detailed Design

Based on the concept plan, the DOH's local office (Highway Bureau No. 10) carried out the detailed design and cost estimation. JET conducted a review, and the DOH Highway Safety Bureau, DOH Highway Bureau No. 10, DOH District Office, TSOC, Highway Police, and JET had a meeting and on-site inspection on the 5th of September 2022. During this meeting, the review results were reported, and improvement suggestions, including adjustments to implementing the measures due to cost constraints, were discussed. Using the outcomes of this meeting, DOH finalized the detailed design, applied for the budget, and proceeded with the procurement and construction of the pilot project.

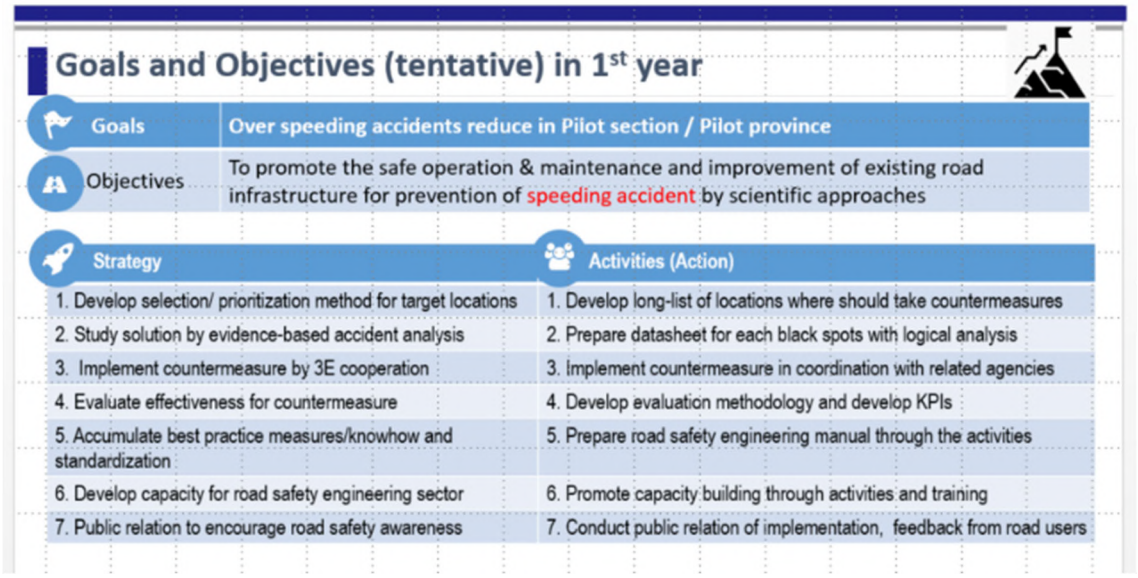


Source: JET

Figure 5.3.61 Example of Detailed Design of the Pilot Section in Prachin Buri Province

Development of a Public Relations (PR) Plan to Maximize the Impact of the Pilot Project

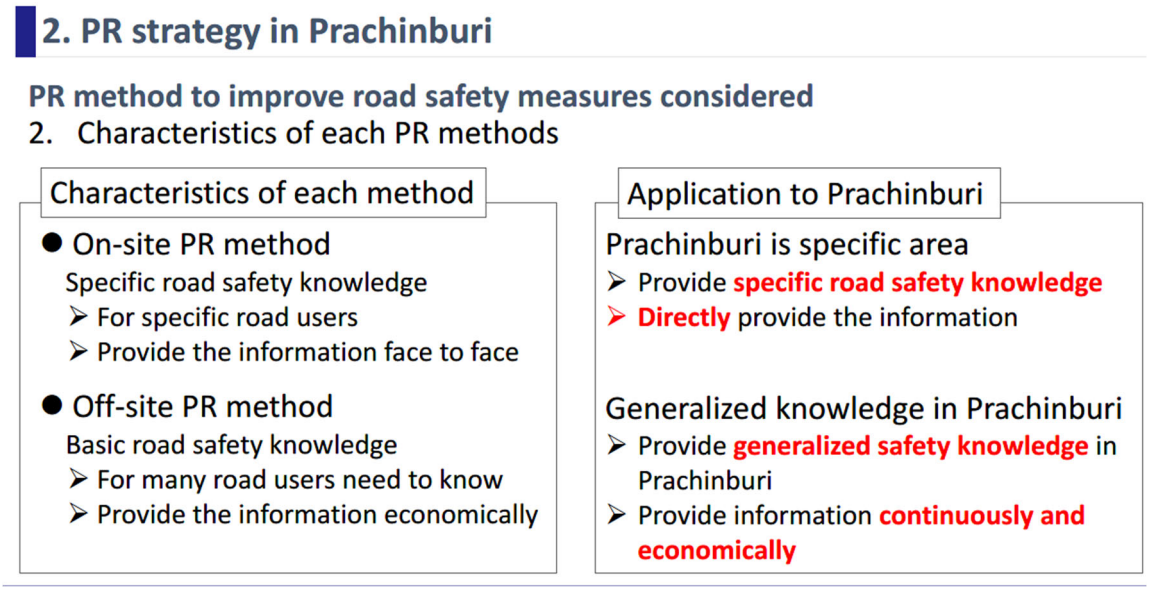
The pilot project primarily focuses on engineering solutions, but to maximize its effectiveness, a comprehensive approach involving education and enforcement is essential. Therefore, JET proposed publicity initiatives to enhance traffic safety awareness.



Source: JET

Figure 5.3.62 Strategy and Activities of the Pilot Project

A PR plan was developed through brainstorming and discussions with DOH and relevant agencies before initiating the Pilot Project in Prachin Buri Province. This is to maximize the effectiveness of engineering measures. The proposed PR plan includes on-site and off-site activities, as outlined below.



Source: JET

Figure 5.3.63 Strategy of PR Activity for the Pilot Section in Prachin Buri Province

Two videos, live-action and animated versions, on traffic safety enlightenment were created as part of the PR content. The key message conveyed was that relying solely on the foot brake could lead to vapor lock issues, and the crucial preventive measures are utilizing the low-speed gear, engine brake, and exhaust brake. Inputs from two truck manufacturers and the DLT were incorporated after interviews, and the videos were then finalized.

After completing the live-action and animation production to promote improved driving behaviors in the pilot section in the Prachin Buri Province, the next step involves disseminating these videos through various DOH media channels and other areas for further publicity efforts.

Source: JET

Figure 5.3.64 Awareness Videos for Speed Control of Large Vehicles (Left: Live-action Version, Right: Animation Version)

As part of the on-site PR promotion activity, it was proposed to broadcast the awareness

videos at the entrance of the rest area, at the same time separating lanes for large vehicles. DOH traditionally conducts campaigns at national highway rest areas, promoting safe driving during extended holidays, like New Year and Songkran, while distributing beverages and the like. The DOH District Office organized a traffic safety campaign near the pilot area before the New Year break in 2024. The created video promotes safe driving during this campaign.

Source: JET

Figure 5.3.65 Traffic Safety Campaign at Rest Area in Prachin Buri before the New Year Holidays

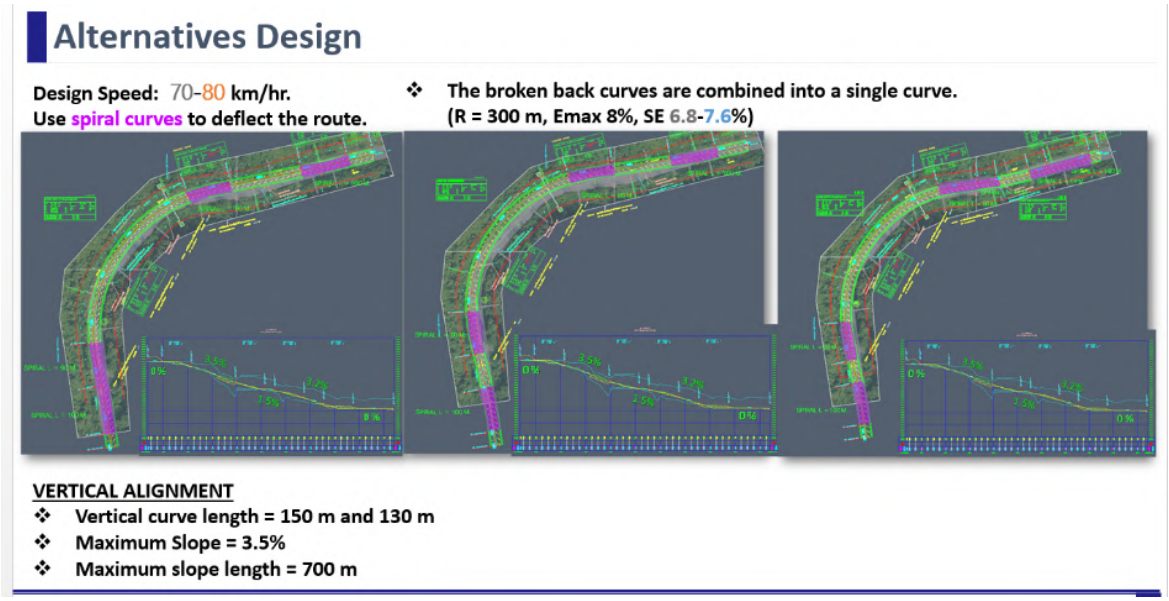
The awareness video promotes safe driving practices on a steep downhill for large vehicles and is not exclusive to this section. Therefore, efforts are being made to disseminate it through various channels, including DOH's social media platforms.

Source: JET

Figure 5.3.66 Various Media Envisaged for the Pilot Project's Public Relations

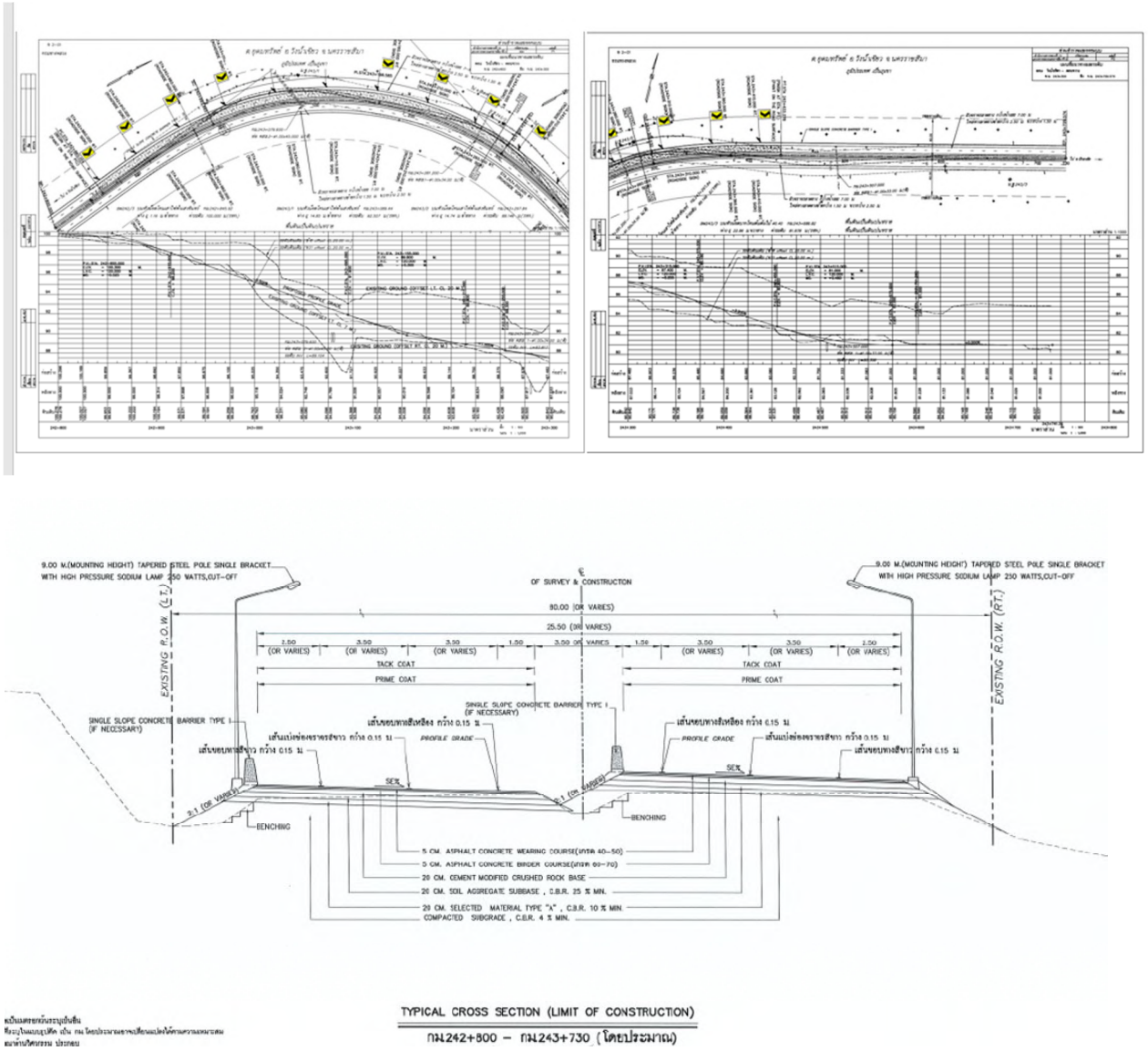
(2) Black Spot in Nakhon Ratchasima Province (Pilot Project 2)

Based on the analysis of traffic accident data and video surveys, road alignment improvements were determined as necessary. JET proposed three alignment improvement alternatives based on the DOH design standard, AASHTO, and ASIAN HIGHWAY design standards. JET consulted JET on these alternatives, considering the estimated project costs and the merits and demerits of each alternative. Ultimately, it was concluded that the alternative on the left, minimizing cut and fill as much as possible, was the most favorable as it considers both cost and land acquisition for ongoing traffic management. DOH Highway No. 10 subsequently conducted a detailed design and cost estimation for this option.



Source: JET

Figure 5.3.67 Comparison of 3 Alternatives for Road Alignment Improvements



Source: DOH

Figure 5.3.68 Proposed Detailed Design for Road Alignment Improvements in the Pilot Section in Nakhon Ratchasima Province

Cutting volume on the mountainside is a challenge, and per discussions from a meeting with DOH, it was decided to address this issue by increasing the curve radius and shifting towards the valley side. Additionally, for Nakhon Ratchasima, while only road alignment improvements have been detailed in the design, DOH considered implementing measures such as warning signs and anti-skid pavement based on the example of the pilot project in Prachin Buri province. This was reviewed by JET.

Implementation Status

Due to the large-scale construction involving road alignment improvements, securing the

budget has taken time. Completing the construction within the project period is not expected to be possible.

Challenges and Considerations for Implementation

Implementing one-way traffic during construction will be necessary during the road alignment improvements, leading to an extended construction period. While correcting the broken-back curves is expected to bring significant improvements, in case there are still frequent serious accidents, additional measures such as anti-skid pavement have been proposed.

(3) Black Spot in Suphan Buri Province (Pilot Project 3)

In the process of realizing the concept plan in the pilot section, DOH proposed a standard design for a dedicated motorcycle lane and an installation of signal displays. Both proposals were based on local conditions, and their application was based on discussions with experts. Additionally, in response to the new motorcycle lane proposal, the Deputy Director emphasized standardizing signage and markings related to motorcycle lanes before conducting local briefings and detailed designs. This led to collaborative brainstorming between DOH and JET on these considerations.

Simultaneously, discussions were held on the crossing methods for motorcycles at U-turn locations and measures to address speeding issues with passenger cars.

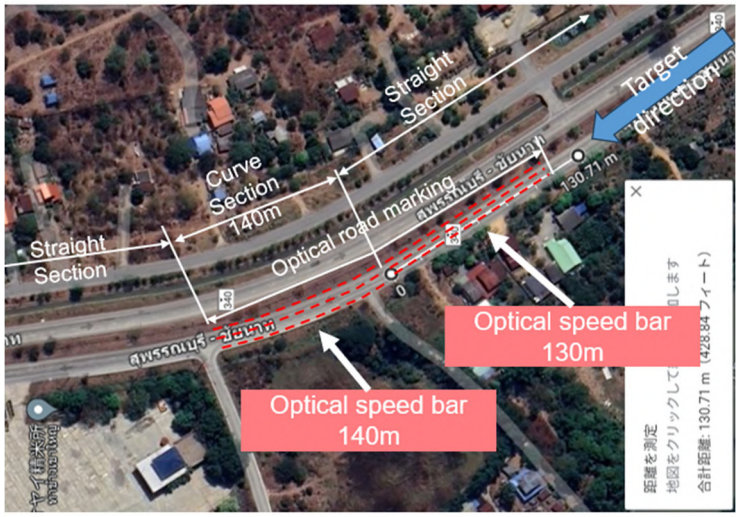
Source: DOH

Figure 5.3.69 Installation of a Dedicated Motorcycle Lane

Source: JET

Figure 5.3.70 Study on Crossing Method during Installation of Motorcycle Lanes

The calculation for the necessary extension for the optical speed bars to decelerate speeds before the T-intersection, as part of short-term measures, was based on the curved section and DOH standard drawings.



Source: JET

Figure 5.3.71 Extension of Optical Speed Bars

Implementation Status

The plantings around the pilot site were cut down as an implementation of the proposed short-term measure to ensure visibility. This allows for better visibility of vehicles entering from the DRR road onto the main road.

According to the DOH, they have already secured a budget of 20 million baht for establishing a motorcycle lane, a proposed medium-term measure, and will complete the

construction by September 2024. Regarding the signal installation at the U-turn section, the DOH will decide based on the traffic situation after the motorcycle lane construction.

Source: JET

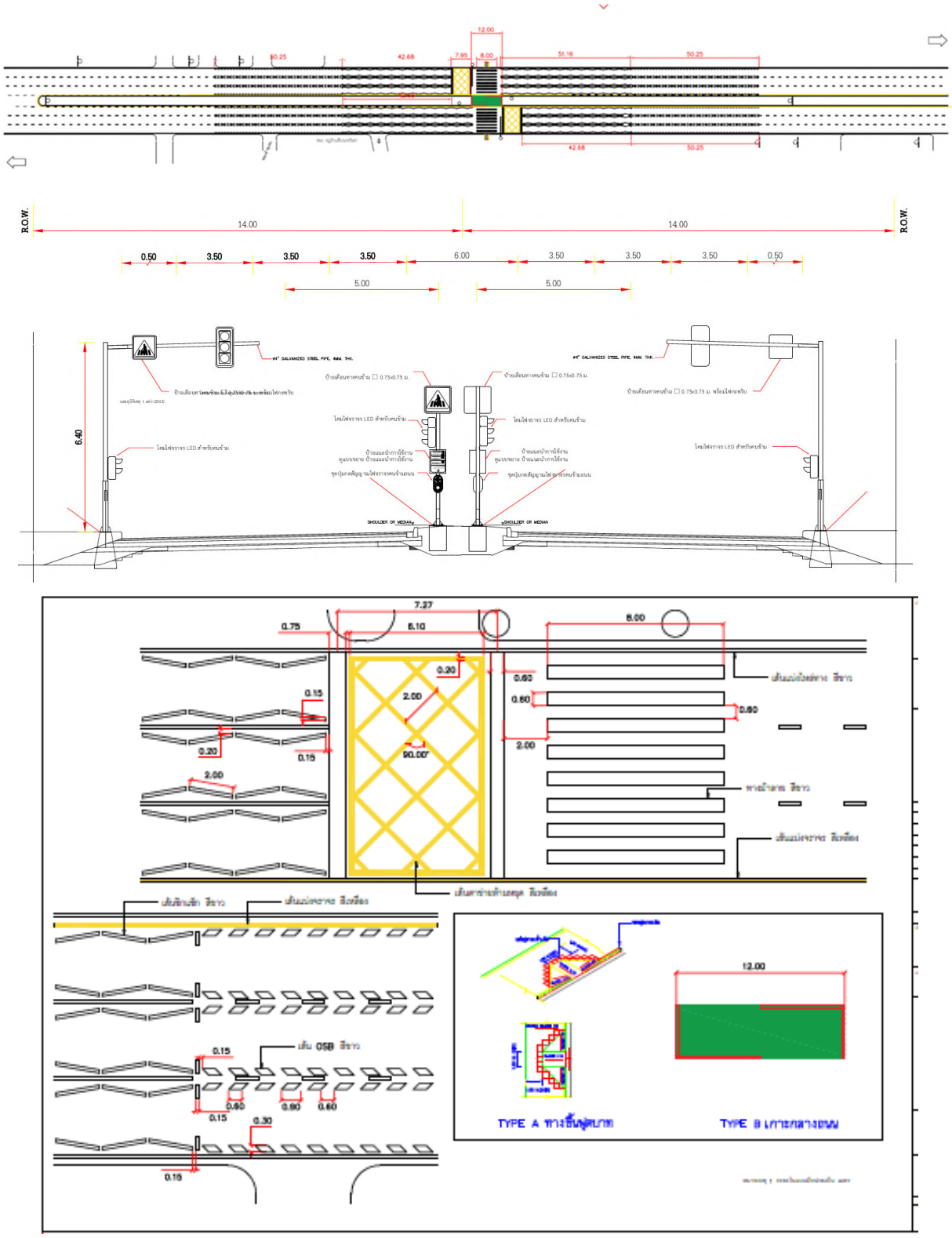
Figure 5.3.72 After Implementation of Vegetation Clearing

Challenges and Considerations for Implementation

The proposal for a dedicated motorcycle lane is a measure to distinguish between motorcycles and fast-moving passenger vehicles. The effectiveness of this measure hinges on active utilization by motorcycle users. While there have been instances of introducing motorcycle lanes in the Suphan Buri region within the jurisdiction of DOH, the widespread adoption of this measure is still challenging. Clarifications and promotional efforts for the community are therefore essential to emphasize the significance of this solution and encourage its use among the locals. As part of these efforts, workshops have been conducted with local representatives on this project. Effective communication with the District Office, Highway Police, local communities, and residents is crucial during the implementation of this measure.

(4) Black Spot in Samut Sakhon Province (Pilot Project 4)

The proposed concept plan served as the basis for the detailed design of pedestrian safety measures by DOH. To avoid duplicating road construction efforts, it was necessary to simultaneously carry out road marking and pavement replacement. Consequently, the implementation and completion of comprehensive measures such as zigzag road markings and the installation of traffic islands within the project period became unattainable. Below are the drawings designed by DOH for reference.



Source: JET

Figure 5.3.73 Plan of Detailed Design for Road Markings in the Pilot Section in Samut Sakhon Province

Implementation Status

As of May 2024, only "High Visibility" and "Relocation of Pedestrian Crossing Signs" have been implemented. Others will be implemented in conjunction with pavement rehabilitation.

Source: JET

Figure 5.3.74 Implemented Counter Measures (change to high-visibility signs in both directions)

Challenges and Considerations for Implementation

The ZigZag speed control road markings proposed in this pilot project have been introduced to other DOH highways before, but this is the first they are being implemented in this area. Additionally, there is no track record of introducing two-stage pedestrian crossings on DOH highways. The significance of these measures and encouraging their use require introduction and promotion to the locals. As part of these activities, workshops involving local representatives have been conducted on this project. Proper communication and campaigns on traffic safety involving the District Office, Highway Police, local communities, and residents will be crucial during the implementation of these measures. JET emphasized that prevention of reckless crossing cannot be solely achieved

through engineering measures. They introduced examples from Japan and suggested that promoting traffic safety awareness among locals is essential. They also proposed coordinating with nearby large supermarkets and the highway police for a comprehensive traffic safety campaign once the measures are implemented.

Source: JET and DRR

Figure 5.3.75 Examples of Proposed Traffic Safety Campaign Activities in the Pilot Section

(5) Additional Black Spot in Suphan Buri (Pilot Project 5)

According to DOH, the improvement of the intersection between National Road No. 321 and No. 3531 was implemented as Phase 1. This improvement includes the widening of the shoulder of the left turn lane and the making of 2 straight lanes from 1 lane by shortening the medial in accordance with the initial plan.

The additional measures proposed by JET for the straight section (budget not to exceed 500,000 baht) were implemented in April 2024 as Phase 2 of the proposed measures, except for the luminous studs.

Source: JET

Figure 5.3.76 Improved Intersection in the Additional Pilot Section in Suphan Buri Province

Figure 5.3.77 Countermeasure Implemented at Suphan Buri Rd. 321 at U-turn Section

5.3.5 Evaluation of the Effectiveness of Pilot Projects

DOH has a process for selecting black spots and implementing countermeasures. However, there has been no post-measure effectiveness verification. In response to this, JET proposed adopting an evaluation mechanism with examples from Japan. As part of the pre-effectiveness estimation, a Logic Tree diagram was proposed to estimate the reduced number of accidents.

Moreover, to comprehend the effects of accident prevention measures resulting from improvements in the road traffic environment, a proposed methodology involves comparing accident data before and after the implementation of measures and examining changes in risky driving behaviors before and after the interventions.

(1) Evaluation by Accident Data

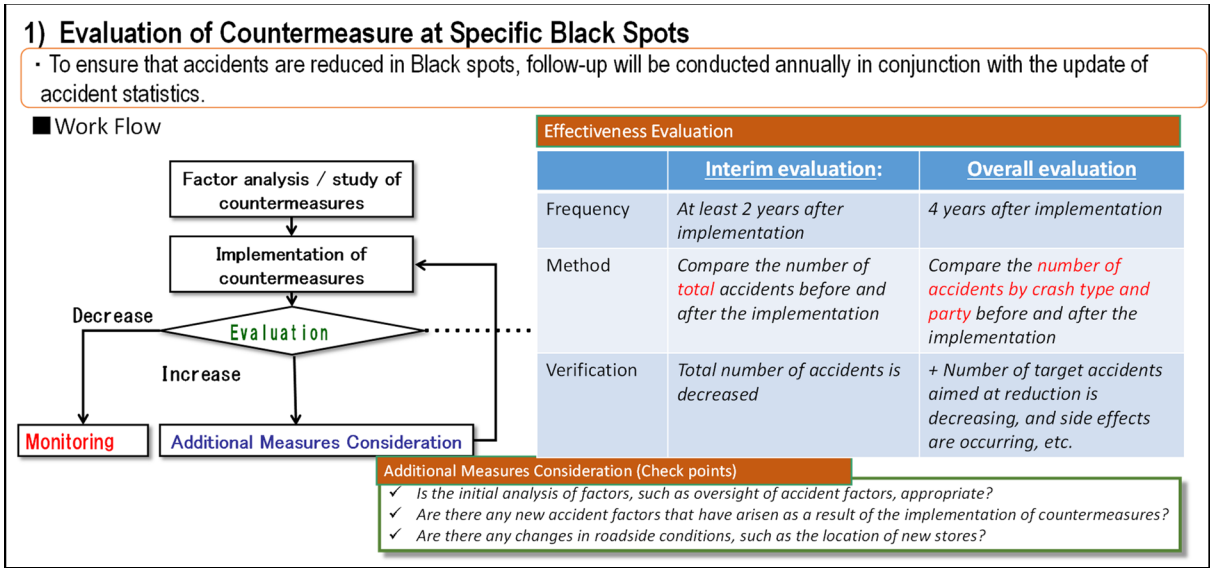
It is necessary to accumulate accident data for at least two years to ensure reliable evaluation. Since traffic incidents occur due to accidental and complex factors, using

short-term traffic accident data, such as over a few months or a single year, is inadequate to make reliable evaluations.

Generally, the evaluation using accident data involves midterm and overall:

– Midterm Evaluation: Comparing the total number of accidents in the project area for two years before and after implementing the measures.

– Overall Evaluation: Comparing the total number of accidents in the project area for four years before and after implementing the measures, including the number of target accidents.



Source: JET

Figure 5.3.78 Evaluation Measures by using Accident Data Analysis

If the number of accidents decreases in the midterm evaluation, continuous monitoring will take place, and a final evaluation will be made after four years. On the other hand, if the number of accidents remains stable or increases in the midterm evaluation, an investigation will be conducted at the site to identify the types of accidents that are increasing. Based on the findings, additional measures will be studied as necessary.

(2) Evaluation by Driving Behavior Analysis

As it takes several years to collect post-implementation accident data, the evaluation focused on analyzing dangerous driving behaviors leading to accidents. Most traffic accidents are attributed to delays or mistakes in "perception," "judgment," and

"operation." The aim was to quickly verify the effectiveness of countermeasures by observing changes in vehicle behavior before and after implementation through video observation.

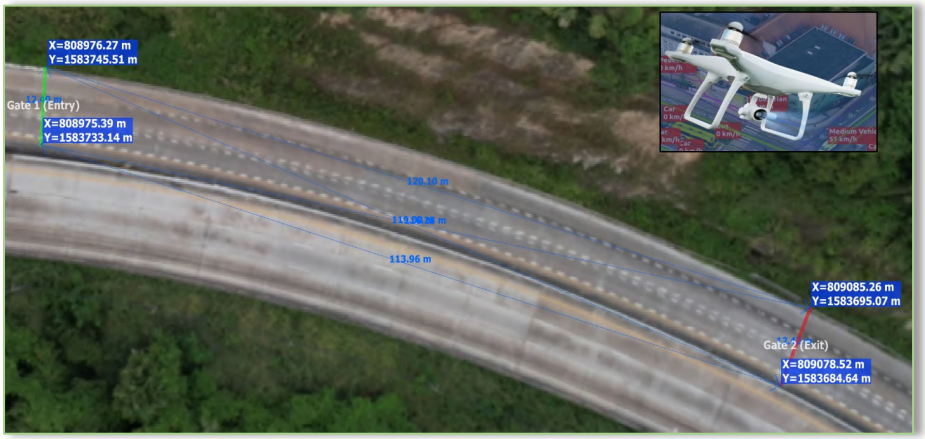
DOH and JET conducted video surveys and analyzed pre-implementation driving behaviors using AI image processing. Table 5.3.3 shows the evaluation indicators.

Table 5.3.3 Evaluation Indicators for Accident Types and Driving Behavior

Pilot Section	Collision Type	Vehicle Type	Indicator / Criteria	Evaluation before implementation
Nakhon Ratchasima	Off-carriageway	Pick-up Passenger car	✓ Rate of violating speed limit (%) ✓ No.lane change vehicle with over speed (%)	Done
Suphan Buri	Side-Swipe, Rear-end	MC Pickup	✓ Rate of violating speed limit (%) ✓ No. vehicle of changing lane ✓ No. vehicle of reverse driving ✓ PET (post-encroachment time)	Under analysis
Samut Sakhon	Side-Swipe, Hit pedestrian	MC, Mix traffic Pedestrian	✓ Rate of jaywalking (%) ✓ Rate of sudden braking	Under video shooting
Prachin Buri	Off-carriageway	6 where truck	✓ Rate of violating speed limit (%) ✓ Vehicle occupancy per lane ✓ Vehicle position within a lane	Done

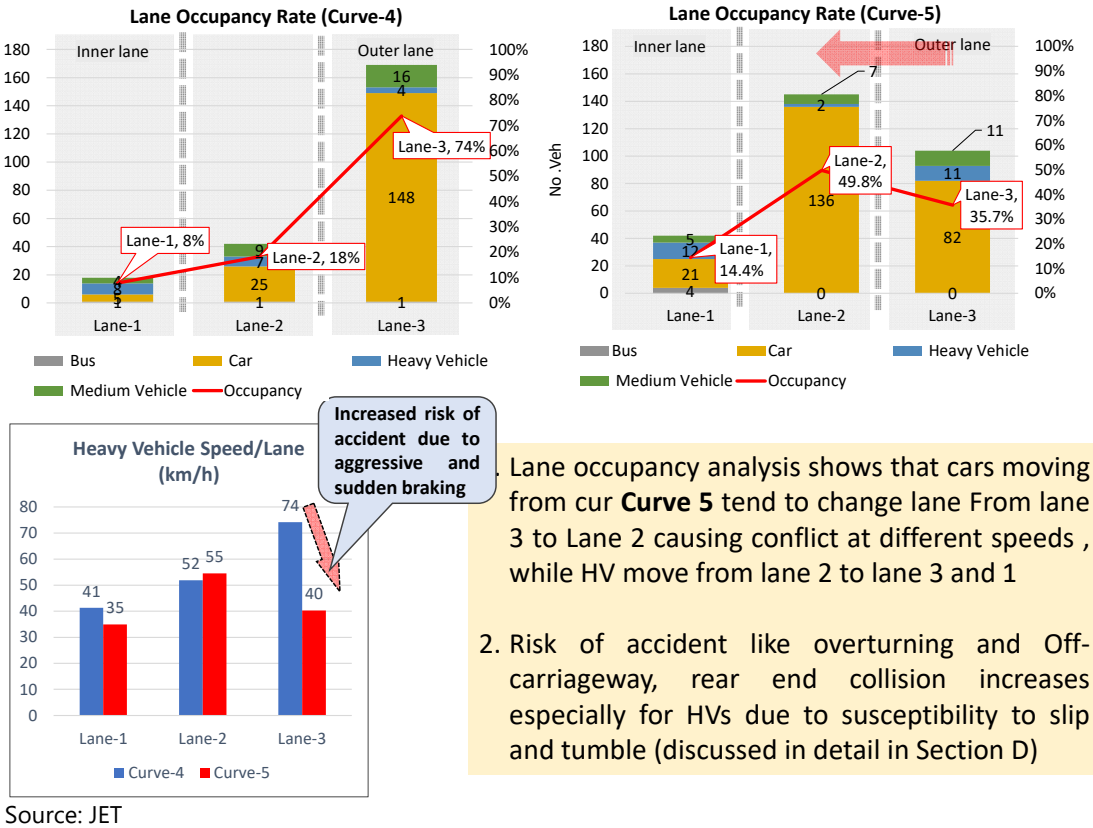
Source: JET

Using the recorded videos and AI image processing analysis software, it is possible to track the trajectory of each vehicle (with timestamp and location information). The software allows analysis of traffic volume, travel speeds, lane changes, and the positioning relationship with surrounding vehicles, including the classification of vehicle types, within the specified area. In recent years, there have been web-based services (such as Data From Sky and Good Vision) that do image analysis of uploaded videos, providing a cost-effective way to analyze each vehicle's speeds, accelerations (presence of sudden braking), and more.



Source: JET

Figure 5.3.79 Vehicle Trajectories Analyzed by AI Image Processing



1. Lane occupancy analysis shows that cars moving from cur **Curve 5** tend to change lane From lane 3 to Lane 2 causing conflict at different speeds , while HV move from lane 2 to lane 3 and 1

2. Risk of accident like overturning and Off-carriageway, rear end collision increases especially for HVs due to susceptibility to slip and tumble (discussed in detail in Section D)

Source: JET

Figure 5.3.80 Example of Analysis Using Data Output from AI Image Processing

For the video survey, drones owned by DOH and JET and network cameras were used. The survey was conducted with the cooperation of DOH, TSOC, and local entities, while the JET remotely verified and supported the implementation.

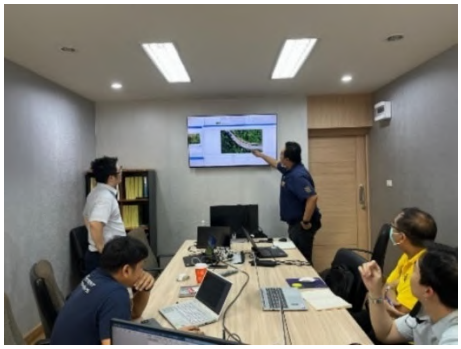
Source: JET

Figure 5.3.81 Video Angle Captured by Drone

Source: JET

Figure 5.3.82 Installation Work of Network Cameras

A four-day training session was held at DOH Highway Safety Bureau on the utilization of AI image processing analysis (Data From Sky) and the subsequent analysis of data for identifying traffic accident factors. Using the pilot project in Suphan Buri province as a case study, lectures covered the analysis methods for lane-specific traffic volume, lane-specific distance-based spot speeds, lane changes, and instances of sudden brakes. The training materials employed in these sessions have been provided to counterparts as supplementary technical documentation.




Source: JET

Figure 5.3.83 AI Image Analysis Training

Table 5.3.4 Evaluation Indicators for Accident Types and Driving Behavior

Date	Subject	About the analysis tools	Today's Goal
29/01 /2024 Mon.	• How to set up DFS • Basic output analysis files	➢ DFS : Tracking log > Manual Geo-Registration ➢ DFS : Tracking log > Adding Gate, Region etc	☐ Upload the video file to DFS to the DFS server. ☐ Understand frequently used DFS operations.
	• Index4. MC lane usage rate (Lane usage rate)	➢ DFS : Analysis > Trajectories Gate to Gate ➢ DFS : Analysis > Gate Crossing Events	☐ Understand the capabilities of DFS for counting traffic by lane and Origin Destination traffic volume.
30/01 /2024 Tue.	• Index1. Approach speed to curve	➢ DFS : Analysis > Trajectories Gate to Gate ➢ DFS : Analysis > Gate Crossing Events	☐ Calculate the point speed from the difference between the position and time of two points on the trajectory of one vehicle.
31/01 /2024 Wed.	• Index2. Number of weaving and lane change vehicles	➢ DFS : Analysis > Trajectories all ➢ DFS : Analysis > Trajectories Gate to Gate ➢ DFS : Analysis > Gate Crossing Events	☐ Measure the position of lane changes.
01/02 /2024 Thu.	• Index3. Number of heavy breakings when weaving	➢ DFS : Analysis > Trajectories Gate to Gate ➢ DFS : Analysis > Safety Analysis > Heavy Braking	☐ Identify the location of sudden deceleration

Source: JET

(3) Evaluation Result of the Pilot Projects

As shown in Table 5.3.2, the countermeasures were prepared for five pilot sections but implemented only on three. The countermeasures for the pilot sections of Suphan Buri (R340) and Samut Sakhon (R3091) were implemented partially as short-term measures. Most of the proposed countermeasures for Suphan Buri (R321) were implemented except for some parts. Driving behavior before and after the implementation was video recorded using drones to aid in the evaluation of the countermeasures by comparing the behavior. The videos of the movements of vehicles before and after the implementation were compared and analyzed. The results are described below.

1. Suphan Buri (R340)

The evaluation indicators for this pilot project include the vehicle entry speed into the

curve section, the number of vehicles changing lanes, the frequency of sudden braking during lane changes, and the utilization rate of motorcycle-exclusive lanes.

As of May 2024, the countermeasures of converting pedestrian crossing signs to high-visibility and cutting select trees were implemented. A summary of the implemented countermeasures is shown in Table 5.3.5, and significant behavior changes were observed in two out of four indicators. Detailed information can be found in the Annex.

Table 5.3.5 Suphan Buri Rd.340 Countermeasure Performance Summary (partial implementation)

	Indicator	Pre-Countermeasure	Post-Countermeasure	Performance of countermeasure	Target performance after full implementation
1	Approach speed to Curve	85 Kmph approach speeds to curve and exit at about the same speeds	~90 Kmph approach speeds were observed	Not confirmed (Need to implement other proposed countermeasures)	Reduction of speed
2	Number of Weaving vehicles	Weaving was observed throughout the section until about 100 m from the minor road	Weaving events were decreased by about 21% and all events were localized within 40 m of the minor road	Improved (Weaving section was shortened from 100 m to 40 m)	Almost 0% weaving after implementation of excusive motorcycle lane
3	Motorcycle lane usage rate	88% of motorcycles entered the curve at the shoulder side lane, which led to motorcycles weaving with other vehicles until about 100 m from the DRR road	About 45% of motorcycles entered the weaving zone from the shoulder, reducing sudden interruptions, and the weaving zone was reduced to 30 m	Improved (43points) Lane discipline (exclusive motorcycle lane has not been implemented)	100% Usage of motorcycle lane after implementation of exclusive motorcycle lane
4	Number of heavy braking when weaving	No braking observed	Braking was observed after vehicles crossed the additional lane One heavy vehicle slowed down on the approaching shortened lane	Observed events are not of serious concern (Need to implement other proposed countermeasures)	Almost 0% heavy braking after implementation of exclusive motorcycle lane

Note: As of May 2024, the only implemented countermeasures are the converted pedestrian crossing signs to high-visibility and relocation measures. The table provided above reflects data post-implementation of these measures.

2. Samut Sakhon (R3091)

The evaluation indicators for this pilot project include the number of jaywalking incidents, the percentage of vehicles stopping before the pedestrian crossing, the distance between vehicles and pedestrian crossing at vehicles start to slow down, post encroachment time (PET), and vehicle speed. As of May 2024, the only implemented were the installed high-visibility pedestrian crossing signs and relocated pedestrian crossing signs. A summary of the implemented countermeasures is shown in Table 5.3.6. Vehicle behavior changes were observed in 5 out of 6 indicators. Detailed information can be found in the Annex.

Table 5.3.6 Samut Sakhon countermeasure performance summary (partial implementation)

No	Indicator	Pre-Countermeasure	Post-Countermeasure	Performance of countermeasure	Target performance after full implementation
1	Jaywalking	Jaywalk count either side = 16	Jaywalk count = 6 (Decreased Jaywalkers)	Improved (38%)	No jaywalking
2	Vehicles pass without stopping before pedestrians cross the street	Top to bottom Lane 6 33% Lane 5 33% Lane 4 33%	All lanes 0%	Improved (100%)	Vehicles pass without stopping before pedestrian crossing decreased.
		Bottom to top Lane 6 45%, Lane 5 82%, Lane 4 86%, Lane 3 68%, Lane 2 92%, Lane 1 40%	All lanes 0%	Improved (100%)	
3	Stopping distance from crosswalk	Left to right: Total 18 vehicles slowed 30-60m upstream: 2	Left to right: Total 44 vehicles slowed 30-60m upstream: 17	Partial improvement (slow down vehicle increased 140% but stop just before the pedestrian crossing)	Vehicle deceleration will begin at a position farther from the pedestrian crossing.
		Right to left: Total 16 vehicles slowed 30-60m upstream: 2	Right to left: Total 22 vehicles slowed 30-60m upstream: 4		
4	PET	20% of vehicles under risk with PET<=3 sec	25% of Vehicles under risk with PET <=3 sec	Not improved (Need to implement original proposed countermeasure)	PET will become longer, events with shorter PET will decrease. Number of PET value <= 3sec will decrease.
5	Vehicle speed variation	Left to right (Lanea 4, 5, and 6) Decelerating just before a pedestrian crossing	Left to right (Lanes 4, 5, and 6) Deceleration is seen from 30–60 m at crosswalks	Moderate improvement	Average travel speed in all lanes will be 30 km/h within 50 m before the pedestrian crossing.
		Right to left (Lanea 3, 2, and 1) Decelerating just before a pedestrian crossing	Right to left (Lanes 3, 2, and 1) Deceleration is seen from 30-60m at crosswalks	Moderate improvement	
6	Reduced pedestrian waiting time before crossing	70% had a waiting time of less than 10 seconds. The remaining approximately 30% waits between 10 and 20 seconds when crossing.	80% had a waiting time of less than 10 seconds. The remaining approximately 20% wait between 10 and 20 seconds when crossing.	Improved	Around 100% have a waiting time of less than 10 seconds.

Note: As of May 2024, the only implemented countermeasures are the converted pedestrian crossing signs to high-visibility and relocation. The table provided above reflects data post-implementation of these measures.

3. Suphan Buri (R321)

The evaluation indicators for this pilot project include PET, time to collision (TTC) between four-wheeled vehicles and motorcycles using U-turn points, the vehicle speed, the vehicle occupancy rate in each lane, and the U-turn position at U-turn points. A summary of the implemented countermeasures is shown in Table 5.3.7. Behavior changes were apparent, as observed in all five indicators. Detailed information can be found in the Annex.

Table 5.3.7 Suphan Buri Road 321 Countermeasure Performance Summary

	Indicator	Pre-Countermeasure	Post-Countermeasure	Performance of countermeasure
1	Post encroachment time (No. of conflicts PET<=2 s/ directional exit volume)	EB: 9.2% of the east exiting vehicles are seen to be at risk	EB: Number of incidents observed has decreased by 4%	Improved (5.2 point)
		WB: 3.1% (1.21 + 1.44 + 0.43) of Motorcycles exiting at west were at risk	WB: Motorcycle risks are reduced to 2.3 %,	Improved (0.8 point)
2	Average TTC	WB: Motorcycle X Car Average TTC = 0.7 s	WB: Motorcycle X Car Average TTC= 2.2 s	Improved (214%)
	No of TTC (<=2 s) in U-turn Lane +lane3 (westbound Road)	WB: No. of TCC (<=2 s) total 16 cases	WB: No. of TCC (<=2 s) total 11 cases	Improved (31%)
3	Vehicle speed travelling in the opposite lane (Eastbound Road)	EB: Lane 3 Approach speed to entry at 60 kph and at exit minimum speed are >20 kph	EB: Lane 3 Decreased approach speed to entry to 50 kmph and at exit minimum speed is 5 kmph	Improved Entry: 60 kph->50 kph Exit (near U-turn): 20 kph→5 kph
		WB: Lane 3 Approach speed to entry at 40 kph and at exit minimum speed are >10 kph	WB: Lane 3 Increased approach speed to entry to 60 kmph and at exit minimum speed is 0 kph	Partially improved Exit (near U-turn): 10 kph→0 kph Entry: 40 kph->60 kph Because of no obstruction from sudden changing lane
4	Lane positions of vehicles	EB: 22% of motorcycles changed lane from lane 2 during approaching	EB: 4 motorcycles changed lane from lane 2 during approach	Improved (81%)
		WB: 19% motorcycles changed lane during approaching U-turn	WB: No motorcycles changed lane during approaching U-turn	Improved (100%)
5	U-turning behavior by measuring position of vehicles at U-turn section	23% of vehicles took risky U-turn maneuvers and about 1% took Illegal turns driving opposite directions	Decrease risky U-turn maneuvers to 3%	Improved (20%) Still illegal reversing and turning motorcycle was observed

(4) Progress and Evaluation Results of Each Pilot Project

As indicated in the previous section, among the five pilot projects, the proposed measures were partially implemented as short-term for two pilot projects in Suphan Buri (R340) and Samut Sakhon (R3091). For Suphan Buri (R321), most of the proposed measures were implemented. The countermeasures led to changes in driving behavior, reducing accidents. In addition, the implementation schedule for the remaining countermeasures was planned by DOH. A summary of the pilot project, including the implementation status and the implementation schedule of remaining countermeasures, is presented in the table below.

Table 5.3.8 Progress and Evaluation Results of Each Pilot Project

Province	Section	Major countermeasures	Status	Performance Evaluation	Schedule after the project
Nakhon Ratchasima (NH304)	Straight + Normal Curve	▪ Improve alignment ▪ Warning signs	Completed Detailed Design	–	Oct-Dec, 2024: Procurement Jan-Sep, 205 :Construction
Suphan Buri (NH340)	Straight U-turn, T-junction	▪ Exclusive MC lane ▪ Optical speed bar ▪ Warning signs, etc.	Partially Implemented (cut tree, signages)	▪ Weaving section was shortened by 60m ▪ Lane discipline improved (reduced sudden changed lane 43%)	May 2024: OSB ~Sep 2024: Motorcycle lane (400m)
Samut Sakhon (NH3091)	Straight Crossing	▪ Pedestrian island (2 steps crossing) ▪ Shift stop line ▪ Zigzag road marking ▪ Pedestrian barriers	Partially Implemented (Relocate signages)	▪ Jaywalking reduced by 38% ▪ Slow down vehicle increased by 140% ▪ Waiting time decreased	~Sep 2024: Rehabilitation of pavement, Zigzag marking, shift stop line Oct-Dec,2024 : Procurement, Jan-June, 2025: Construction
Prachin Buri (NH304)	Curve on sharp slope	▪ Overhead signages ▪ Dedicated slower lane ▪ Fix VMS with camera ▪ Curve package	Completed Detailed Design	–	~Sep 2024: Rehabilitation of pavement, Oct-Dec,2024 : Procurement, Jan-June, 2025: Construction
Suphan Buri (NH321)	Straight U-turn, T-junction	▪ Optical speed bar ▪ Warning signs ▪ Replace flashlights	Implemented (Signages, OSB)	▪ Significance Improved :PET*, TTC * ▪ Approach speed reduced ▪ Risky U-turn reduced	–

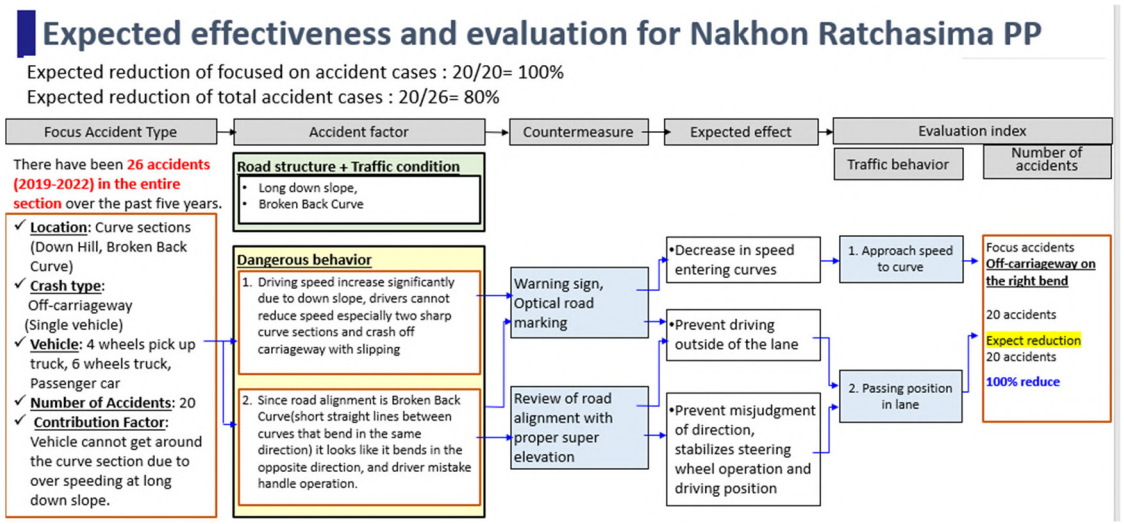
*PET: Post encroachment time, TTC: Time to Collision, *OSB: Optical Speed Bar

(5) Feasibility of Reducing Traffic Fatalities by 30% in the Section Covered by the Pilot Project

A tree diagram was created that forms the mechanisms of accidents and evaluates the feasibility of the countermeasures to estimate the effectiveness of the various countermeasures in reducing the number of fatalities by 30%, which is an indicator of the project purpose.

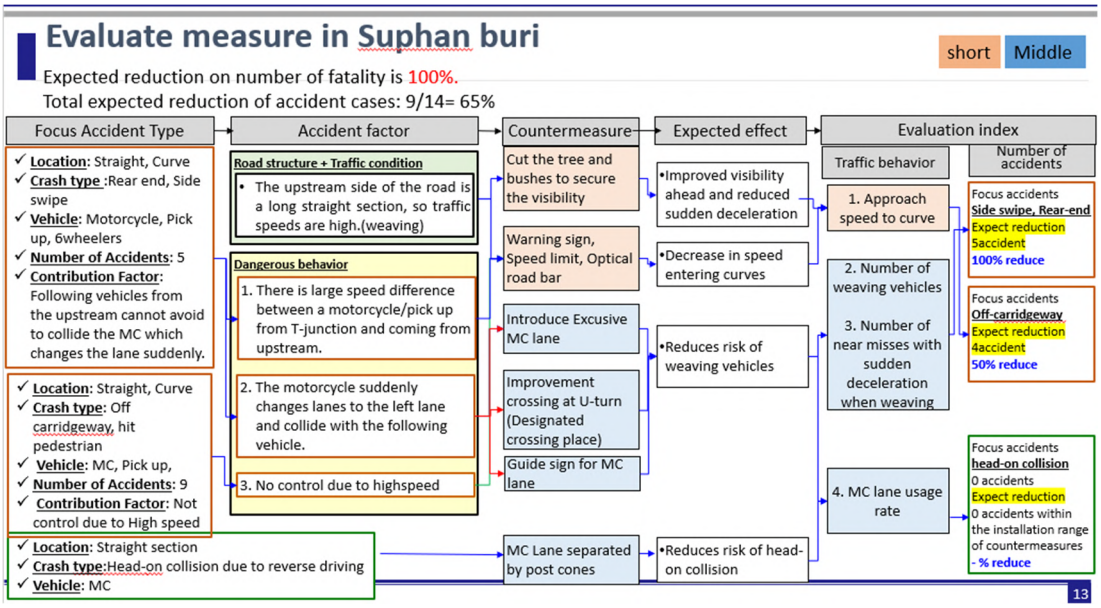
In the analysis of pre- and post-behavior changes following the partial implementation of the countermeasures as short-term measures, the effects shown as “vehicle behavior” in the tree diagram were observed. This suggests that reducing traffic fatalities by 30% can be achieved if the proposed countermeasures are fully implemented.

Below are the preliminary evaluation results for each pilot project.



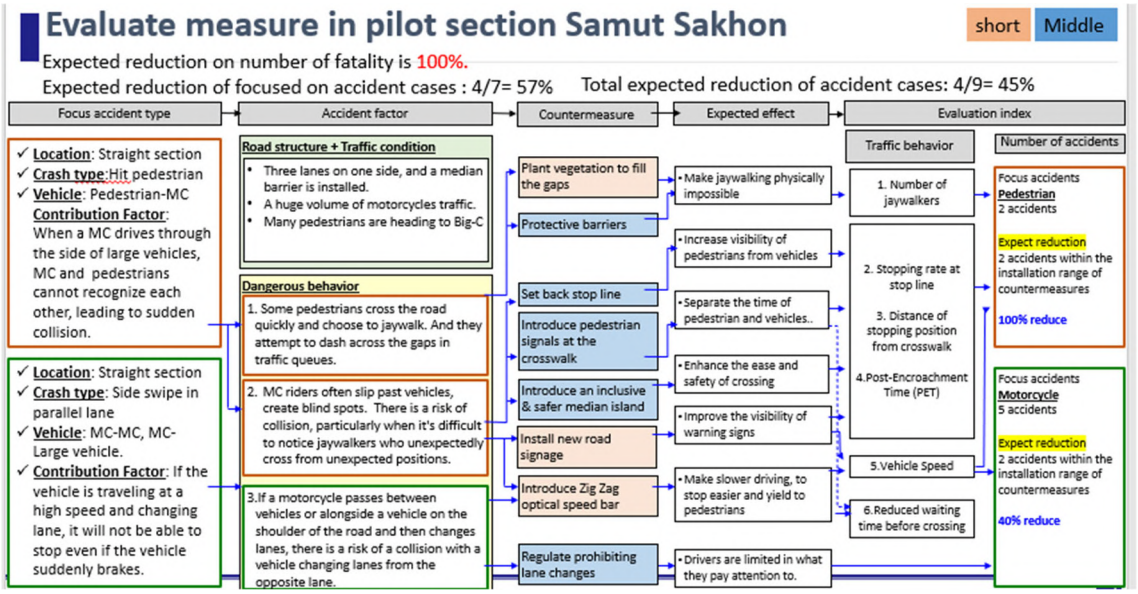
Source: JET

Figure 5.3.84 Preliminary Evaluation of the Pilot Project in Nakhon Ratchasima Province



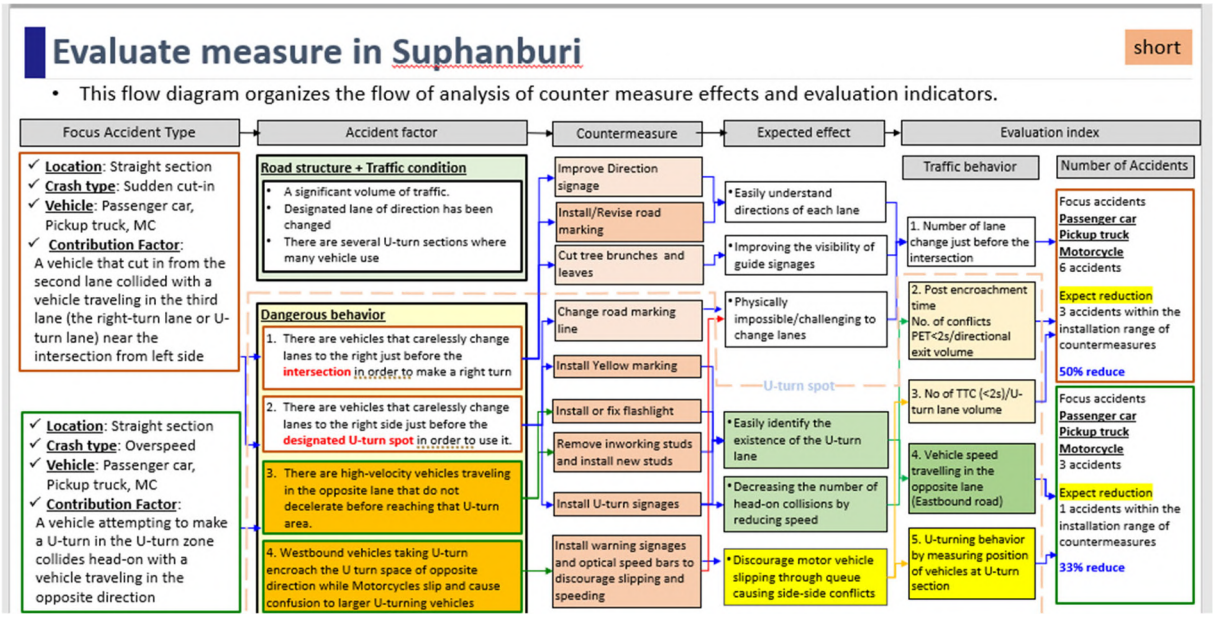
Source: JET

Figure 5.3.85 Preliminary Evaluation of the Pilot Project in Suphan Buri Province



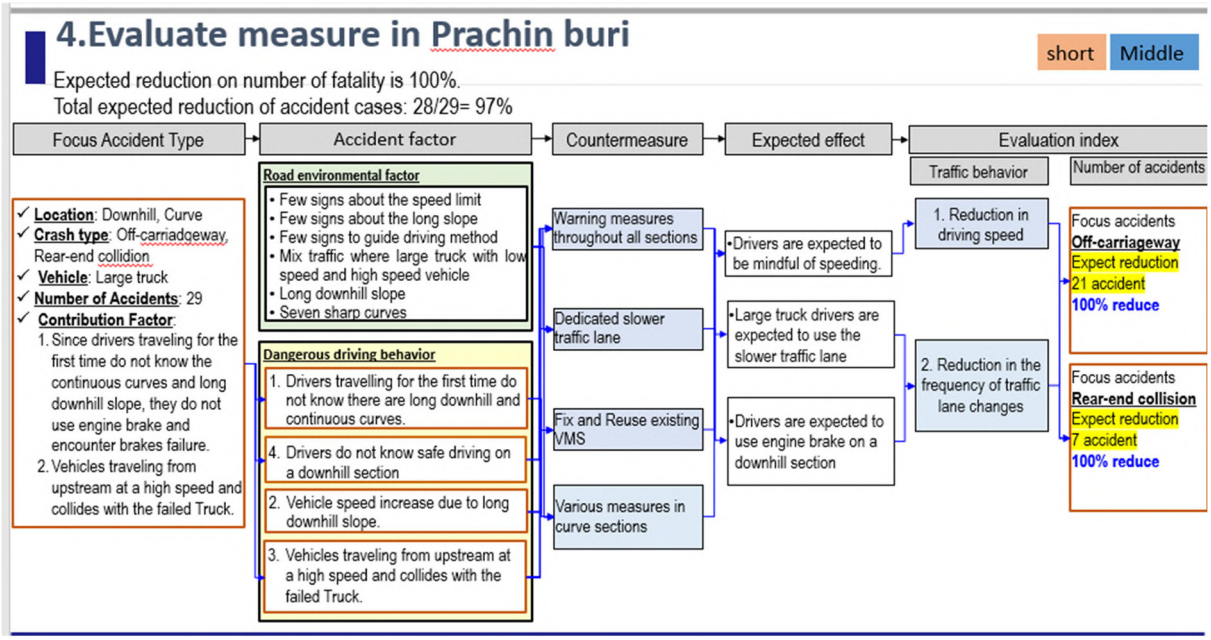
Source: JET

Figure 5.3.86 Preliminary Evaluation of the Pilot Project in Samut Sakhon Province



Source: JET

Figure 5.3.87 Preliminary Evaluation of the Additional Pilot Project in Suphan Buri Province



Note: Accident numbers use data from 2020.
Source: JET

Figure 5.3.88 Preliminary Evaluation of the Pilot Project in Prachin Buri Province

The table below summarizes the number of accidents from 2018 to 2022 and the estimated number of accident reductions for each pilot project based on the above analysis. If all proposed countermeasures are implemented, the number of traffic fatalities is expected to be reduced by 100% and the total number of accidents by at least 30% in all locations.

Table 5.3.9 Number of Accidents and Expected Accident Reduction Rate for 2018–2022

Province	Section		Accident Type	2018	2019	2020	2021	2022	2018-2022	Expected Reduction	Reduction Rate
Nakhon Ratchasima (NH304)	Km242+730 – Km242+835,	Straight + Normal Curve (500m)	all accident	32	6	4	8	8	**26**	**20**	**77%**
			faital accident	0	0	0	0	0	**0**	**0**	**100%**
			Death	0	0	0	0	0	**0**	**0**	**100%**
Suphan Buri (NH340)	Km119+000- Km120+000,	Straight U-turn, T-junction (350m)	all accident	1	3	1	5	4	**14**	**9**	**64%**
			faital accident	1	0	0	0	0	**1**	**1**	**100%**
			Death	1	0	0	1	0	**2**	**2**	**100%**
Samut Sakhon (NH3091)	Km18+500 – Km19+500,	Straight Crossing (300m)	all accident	4	1	3	1	0	**9**	**4**	**44%**
			faital accident	0	0	1	0	0	**1**	**1**	**100%**
			Death	0	0	1	0	0	**1**	**1**	**100%**
Prachin Buri (NH304)	Km 215+000– Km207+000	Normal Curve On slope (7km)	all accident	1	40	29	32	54	**156**	**150**	**96%**
			faital accident	0	9	8	2	5	**24**	**24**	**100%**
			Death	0	13	8	2	5	**28**	**28**	**100%**
Suphan Buri (NH321)	Km102+700- Km103+300,	Straight +T-junction	all accident	0	3	6	5	3	**17**	**9**	**53%**
			faital accident	0	1	0	0	0	**1**	**1**	**100%**
			Death	0	1	0	0	0	**1**	**1**	**100%**

* For Nakhon Ratchasima, since new surface was implemented in 2018, prediction was caluculated using 2019-2022 accident

Source: JET

(6) Recommendations for a 30% Reduction in Traffic Fatalities in the Pilot Province

The number of traffic fatalities from 2018 to 2022 in the four provinces where the pilot project was conducted was 1,077. As shown in Table 5.3.10, 1,074 traffic fatalities occurred in straight sections, normal curves, and intersections, where the project team studied the countermeasures through the pilot projects. If effective countermeasures are implemented in the sections of high accident frequency, a 30% reduction in traffic fatalities in the pilot provinces can be achieved by referring to the "Good Practices Guide on Road Safety Engineering Measures," created in this project. This document compiles the process from planning to implementing countermeasures in the pilot project and other good practices by DOH in the past.

Table 5.3.10 Number of Fatalities by Road Characteristics on DOH Highways in Pilot Province from 2018 to 2022

	Straight	Normal curve	Intersection	Others	Total
Nakhon Ratchasima	371	30	31	3	436
Suphan Buri	295	57	68	0	420
Samut Sakhon	61	5	5	0	71
Prachin Buri	104	37	9	0	150
					1077

Source: JET

(7) Capacity Development Results from Technical Cooperation Project Activities

Thirteen DOH Highway Safety Bureau officers took a quiz survey for a capacity assessment for the activities in this project. The quiz focused on the methods employed in each phase of engineering traffic safety measures. Results indicated that, on average, 82% of respondents answered correctly, demonstrating a solid understanding of traffic safety measures. It is expected that the technical documents created in this project will be disseminated to other regional offices headed by the Highway Safety Bureau to enhance the overall capacity of DOH staff. Additionally, these technical documents are expected to be updated regularly as necessary, ensuring their continued relevance.

Evaluation for Objective Verifiable Indicators

2-2. The self-rating of MOT staff's capability on road safety engineering for National Highways and/or Motorways exceeds 70% on average.

Objectives	To evaluate how much C/P's capacity development through the project activities
Target Respondent	DOH: Highway Safety Bureau (Standard division)*, Highway Bureau No.10, 12 and 13, Prachin Buri, Nakhon Ratchasima, Suphan Buri ,Samut Sakhon District office
Tool	Questionnaire survey by Google form
Contents	Self-rating of skill level improvement for road safety engineering activities through the examination style questionnaire

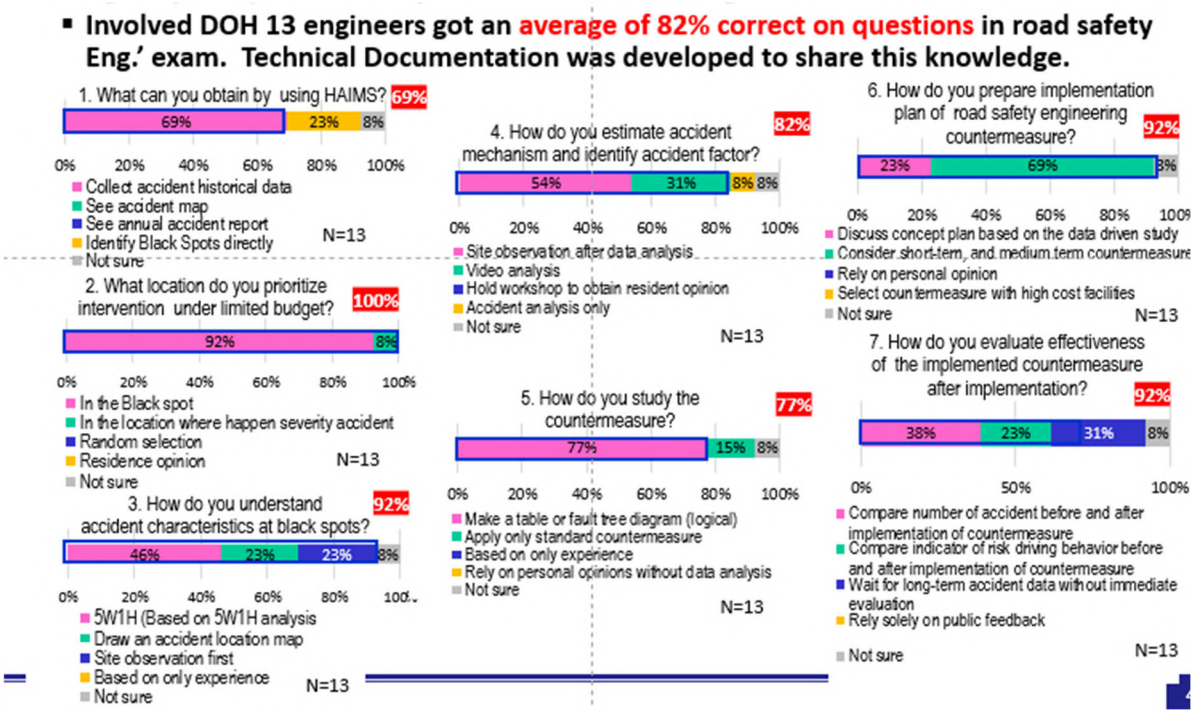
Activities

1) Data collection
Identification of focused accident type
2) Estimation of accident process
3) Identification of accident factors
4) Study on concept of solution Listing up countermeasures
5) Preparation of implementation plan
6) Implementation of measure
7) Evaluation of measure

* Regarding evaluate measure, for only Highway Safety Bureau

Source: JET

Figure 5.3.89 Assessment Methodology for Implemented Capacity Development



Source: JET

Figure 5.3.90 Assessment Results on Capacity Development

5.3.6 Development of "Good Practice Guide on Road Safety Engineering Measures" Including Achievements from the Pilot Projects

DOH has manuals on geometrical design, safety guidelines, traffic safety audit, and signage/road marking. However, there is no documentation on the various steps and methods involved in the analysis of accidents, consideration of safety measures, and their implementation, as conducted in this project. As a result of discussions with DOH, it has been decided to create a technical document titled "Good Practice Guide on Road Safety Engineering." The content covers the results of the pilot projects conducted in the Project described above. The guide aims to serve as a technical manual for traffic safety.

The table of contents, as agreed upon with DOH, includes explanations of the engineering processes involved in each pilot project's activities, the selection of pilot project sections, and the documentation of each pilot project as a case study. Additionally, since there are only five pilot project sections, information on good practices was gathered from the 13 Highway Bureaus across DOH's regions to provide references.

Table of Contents

■ Technical report for good practice guide on road safety

Source: JET

Figure 5.3.91 Table of Contents for the Technical Document " Good Practices Guide on Road Safety Engineering Measures"

5.4 List of Technical Document

The technical document created through activities in Output 2 is shown below.

Table 5.4.1 List of Technical Document

No	Title	Reference No.
1	Good Practices Guide on Road Safety Engineering Measures	TD2-1