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Technical Report of Road Safety Countermeasure Planning

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Technical Report of Road Safety Countermeasure Planning

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Synopsis

In this report, examples of the accident analysis and road safety countermeasures at Hazardous Spots were collected and analyzed using the data in the traffic accident countermeasure database for planning of more effective road safety countermeasures according to accident factor. The process of accident analysis and road safety countermeasure planning has been arranged.

Keywords: Accident factor, Road safety countermeasure, Hazardous Spot

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1. Introduction

1.1 Objectives

In recent years, the numbers of road traffic fatalities and injuries have declined, but the absolute numbers continue to remain high with more than 800,000 traffic fatalities and injuries each year.

Promotion of traffic safety education, enhanced vehicle safety, and different types of road traffic safety countermeasures have contributed greatly to reducing the number of traffic accidents. However, spots where traffic safety countermeasures are implemented by road administrators are individually unique in terms of road traffic environment and spot conditions, and accident factors vary as well. No text book can provide road safety countermeasures that address every single road traffic environment and spot conditions, and therefore road administrators are faced with a complex task of planning countermeasures for each different spot.

With this in mind, a "Technical Report of Road Safety Countermeasure Planning" has been prepared to assist in planning and implementing proper road safety countermeasures based on accident factors in individual spots.

1.2 Positioning and contents of this Report

This Report is designed to assist road administrators in planning countermeasures at arterial road spots where any countermeasure is deemed to be required, based on accident data, etc.

Included in this Report are "2. Methods of countermeasure planning" summarizing the overall flow and methods to implement each step of the planned countermeasures, and "3. Supportive file for accident factor analysis and countermeasures' planning (association table)" designed to assist in planning proper countermeasures based on accident factors.

In the "3. Supportive file for accident factor analysis and countermeasures' planning (association table)", relevance among accident occurrence process, accident factors, targets of countermeasure, and detailed countermeasures are listed in a table format according to accident types, with the focus on countermeasure planning by the road administrator. In addition, road safety countermeasures for Hazardous Spots are implemented by both the road administrator and the Public Safety Commission, and therefore the detailed countermeasures (signal, pedestrian crossing, stop line, etc.) conducted by the Public Safety Commission are partly included in the Supportive file for accident factor analysis and countermeasures' planning (association table).

The above are based on the "Road Safety Manual at Hazardous Spots" (no.165, March 2004, TECHNICAL NOTE of National Institute for Land and Infrastructure Management), as well as the collection and organizing of actual countermeasures (about 8,000) implemented at hazardous spots and stored in the accident countermeasure data base.

Our plan is to revise and enhance this Report based on updated contents which will be registered in the accident countermeasure data base in future, as well as comments from users of this Report.

2. Methods of countermeasures' planning

2.1 Overall flow

Figure 2-1 indicates a general process for countermeasure planning at spots where road safety countermeasures are required, based on accident data, etc. Generally, road safety countermeasures are planned in 7 steps; (1) Collection and sorting of data, (2) Setting target accident status, (3) Assuming accident occurrence process, (4) Analyzing accident factors, (5) Studying countermeasures' purpose, (6) Listing detailed countermeasures, and (7) Selection of detailed countermeasures.

The next paragraph shows the implementation methods (approach) and reminders for each of the (1) - (7) steps.

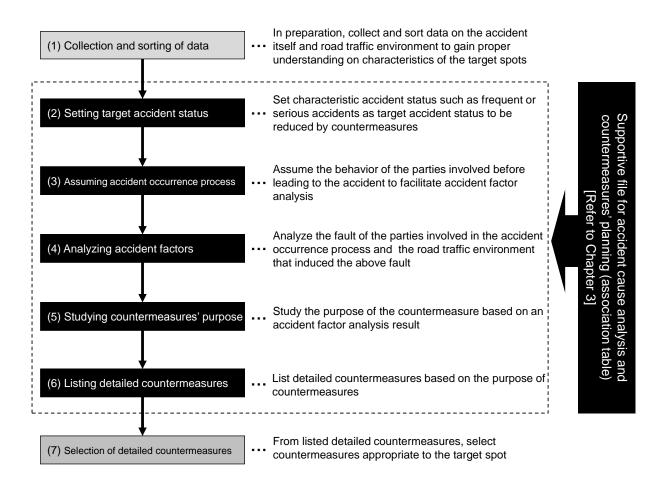


Figure 2-1 General study process for countermeasure planning by a road administrator

2.2 Implementation methods (approach) and reminders for each step

(1) Collection and sorting of data

In preparation for countermeasure planning, data on the accident itself and the road traffic environment need to be collected and sorted.

1) Collection and sorting of accident data

Accident data are key factors for (2) Setting of target accident status, (3) Assuming accident occurrence process, and (4) Analyzing accident factor.

The factor of traffic accidents vary, depending on accident type, parties involved, and occurrence points, and therefore it is necessary to identify the "when, where, who, and how" to make a proper analysis factors at the target spots. For these reasons, we recommend to focus on the following items when collecting the data:

- Occurrence time periods: midday, night, etc.
- Road surface condition: dry, wet, freezing, snow, etc.
- Occurrence point: non-intersection, intersection, near intersection, roadway, road shoulder, bicycle & pedestrian lane, pedestrian crossing, etc.
- Parties involved: automobile, motorcycle, bicycle, pedestrian, etc. (belonging to primary and secondary parties)
- Accident type: pedestrian-vehicle, head-on collision, rear-end collision, head-to-side collision, right/left turn collision, single vehicle
- Travel direction and behavior: Through, right-turn, left-turn, crossing, standing, etc.

These items may be available from the following data in Japan:

a) Traffic Accidents Databases

Traffic Accidents Databases, maintained by the Institute for Traffic Accident Research and Data Analysis (ITARDA), are the accumulation of traffic accidents and road traffic census data. Both the Traffic Accidents Databases and the road traffic census data target the same roads.

b) Sketch of the accident and the location

A sketch of the accident and the location is a file containing the occurrence point, parties involved, accident occurrence process, and other records of individual accidents.

The above data are used to organize the information below:

a) Organize fatal and injury accidents' characteristics

The Traffic Accident Databases for the past few years are combined to identify trends in individual accident occurrences ("high ratio of rear-end collision accident", "high ratio of motorcycle accidents", or "more accidents during night time"), as well as any changes over the period. Then, based on the above learnings, the accident characteristics of target spots are organized.

b) Preparation of a collision diagram

Information such as the occurrence point, types of parties involved, and traveling direction of individual accidents are used to prepare a collision diagram to understand the types of individual accidents and accident-prone points or areas. To ensure a smooth

analysis/study of the (2) Setting of target accident status, it is recommended to mark accident points with different colors according to their types to quickly recognize the accident characteristics.

Refer to the "ROAD SAFETY MANUAL" (published by PIARC) to learn more about preparing the collision diagram.

2) Collection and sorting of data

The road traffic environmental data (road structure, traffic conditions, existing traffic safety facilities, etc.) are key factors for the (4) Analyzing accident factor, (5) Studying Countermeasures' purpose, (6) Listing detailed countermeasures, and (7) Selection of detailed countermeasures.

In step (1) Collection and sorting of data, information on road structure (road shape such as non-intersection, intersection, etc., road alignment, lane structure, etc.), traffic conditions (traffic volume, congestion level, average traveling speed, etc.) and such are collected to the possible extent. When implementing steps starting from (4) Analyzing Accident factors, it is recommended to add existing road safety facilities, traffic signal phase, and other detailed information as appropriate.

Also, it will be helpful to conduct a field survey in each step to confirm the actual road traffic environment.

(2) Setting of target accident status

The collision diagram, etc. is used to set target accident status for the target spots.

In this step, study should be made from the below two approaches. In addition, there is no need to summarize target accident status to a single case; instead, screen and select all status with certain characteristics.

- a) Multiple accidents with identical accident types, parties involved, and occurrence point Accidents happen randomly, but if they occur at the same point and in the same types, most likely these accidents have a common factor. It also suggests that eradicating its common factor would effectively elevate the safety of the target spots.
 - Based on the above, it is recommended to take a multifaceted approach and look for common characteristics which multiple accidents have, such as identical accident types, identical parties involved and same accident timing, and to set them as target accident status.
- b) Fatal, serious injury, and other major accidents

Types of accidents that resulted in fatality and serious injury accidents should be set as target accident status, even if low in number, to prevent further major accidents from occurring.

(3) Assuming accident occurrence process

Assumptions are made in this step on the developments of the parties involved and nearby vehicles that led to an accident in the target accident status, based on the collected data and observation of traffic conditions.

A traffic accident occurs during the successive traffic behaviors of the parties involved and nearby vehicles, and it is believed that a factor can be found in the above development that caused the accident. For this reason, prior to analyzing accident factors, the developments of the primary and secondary parties as well as nearby vehicles up to the accident should be assumed as accurately as possible.

In addition, traffic conditions can be recorded on a video to identify hazardous situations, even if these do not come under target accident status.

(4) Analyzing accident factors

The factors of an accident, set as target accident status, are analyzed in this step.

Many traffic accidents are directly caused by faults of parties involved such as failure to check or safety, oversight. However, road traffic environment can induce faults of parties involved and trigger an accident as well, and therefore an approach from the road itself should be included in the traffic accident prevention.

This means that studies of both the faults of parties involved that led to the accidents, as well as the road traffic environment that induced such faults, if any, should be included in the accident factor analysis. Specifically, focus will be placed on the behaviors of individual parties involved that led to the accident, in order to estimate the faults they made in terms of recognition, judgment, or maneuvering. Then, an analysis is made to identify whether such faults they made in terms of recognition, judgment, or maneuvering was induced by a road traffic environment, and what kind of environment if it did take place.

It should be noted that most traffic accidents are caused by a fault of not just the party involved, but by multiple parties involved or the nearby vehicles. Therefore, analyzing should be made from the viewpoints of all parties involved in the accident, including vehicles and pedestrians.

Accident types are categorized in the original report form, based on the final outcome of the accident. It is also good to remember that with some traffic accidents, accident prevention actions (sudden deceleration or lane change, etc.) can trigger another traffic accident. One example is a case where a vehicle traveling on a main lane was rear-ended by a following vehicle after making a sudden deceleration/stop to prevent a collision (head-to-side collision) with a vehicle attempting to join the main lane from a roadside. This emphasizes the point that actions and behaviors of all vehicles and pedestrians involved in the accident should be organized, in addition to actions of the primary party involved that caused an accident.

(5) Studying countermeasures' purpose

The next step is to study the purpose of countermeasures for the accident factors that were analyzed. The study should center on the purpose of countermeasures that improve road traffic environment inducing faults of the parties involved, for the purpose of a complete eradication of accident factors. When accident factors are predominantly due to dozing or overspeed, warning alert policies to control traffic faults of the offender should be studied.

(6) Listing detailed countermeasures

List up several recommendations on detailed countermeasures in line with the purpose of countermeasures.

(7) Selection of detailed countermeasures

The outcome of countermeasures and conditions including costs, time line required to implement countermeasures, etc. are organized for each of the recommended countermeasures. During this step, it is recommended to assume changes in traffic behavior resulting from implementing the countermeasures, and study the possibility of occurrence/increase in accidents other than the target accident status in focus. If there is a concern that accidents other than the target accident status in focus may occur, ensure to identify recommended detailed countermeasures to control them.

When organizing countermeasures, it would be helpful to refer to the changes in number of accidents per type before/after implementing the countermeasures in individual spots. These information are stored in the accident countermeasure database.

Next, select detailed countermeasures from among the organized and recommended detailed countermeasure list that are both appropriate and according to the conditions (spot specific and road structural constraints, etc.) of the target spot. During this process, ensure to compare the advantages and disadvantages of each of the recommended detailed countermeasures, and determine whether these are appropriate to the target spot. Also, take into consideration the road development planning nearby and other plans that impact the road traffic to select appropriate detailed countermeasures.

3. Supportive file for accident factor analysis and countermeasures' planning (association table)

"Supportive file for accident cause analysis and countermeasures' planning (association table)" has been prepared as a reference for planning countermeasures according to accident factors, based on "2.Method of countermeasures' planning." Traffic accidents are categorized to types, non-intersections, and intersections in this file that provides a step-by-step selection in the order of assumed accident status, accident occurrence process, accident factors, purpose of countermeasures, and detailed countermeasures in a table configuration (refer to Figure 3-1).

The supportive file for accident factor analysis and countermeasures' planning (association table) is based on past studies on road safety countermeasures that are registered in the accident countermeasures database. Remember that the study process does not cover all accidents; use this file as a reference to plan countermeasures that are well-founded on spot characteristics.

Starting from below, 3.1 lists target accident status covered by the supportive file for accident factor analysis and countermeasures' planning (association table), 3.2 describes how to use the supportive file for accident factor analysis and countermeasures' planning (association table), 3.3 explains usage method and reminders on the supportive file for accident factor analysis and countermeasures' planning (association table), and 3.4 contains the actual supportive file for accident factor analysis and countermeasures' planning (association table).

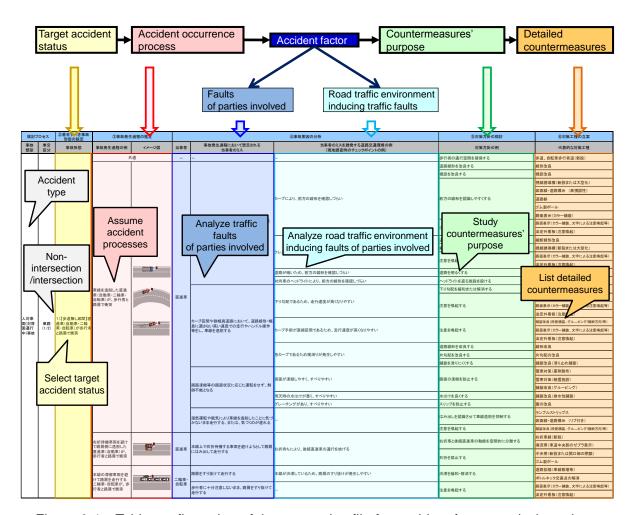


Figure 3-1 Table configuration of the supportive file for accident factor analysis and countermeasures' planning (association table)

[Reference 1: Field usage examples of the supportive file for accident factor analysis and countermeasures' planning (association table) and preparation method]

The supportive file for accident factor analysis and countermeasures' planning (association table) is prepared with the below assumed usage in mind for the traffic safety staff:

- 1) Prepared in a table configuration in line with the general study process for countermeasures' planning, to confirm assumed accident occurrence process, accident factors analysis, study of countermeasures' purpose based on accident factors, and plan of detailed countermeasures based on the purpose of countermeasures.
- 2) Recorded accident factors are organized per accident type, designed for first-timers engaging in traffic safety task; simply follow the table file to make general countermeasures' planning, and assume accident factors unique to the spot based on contents described in the table.
- 3) The three items are categorized and organized separately, enabling staff to start countermeasures' planning from areas where possible, as the difficulty in the level of assuming the accident occurrence process, faults of parties involved, and road traffic environment that induces traffic faults is different in each spot.

The following methods can be employed to assume the accident occurrence process, faults of parties involved, and road traffic environment that induces traffic faults:

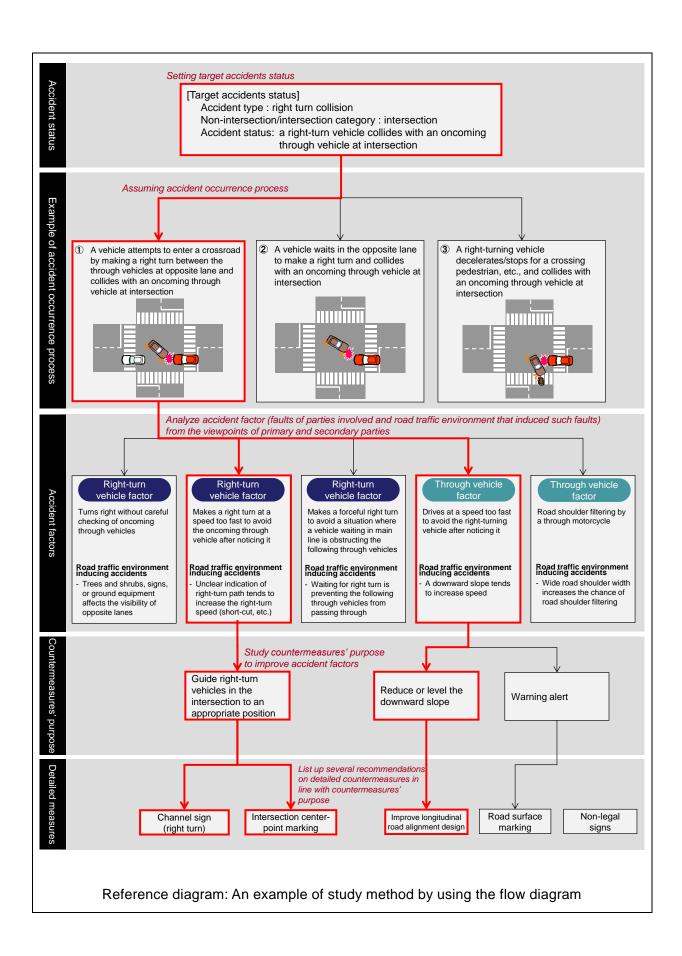
- Accident occurrence process: video recording of the spot
- Faults of parties involved:
 - assume the accident occurrence process or road traffic environment that induced fault of parties involved, as well as the cause-and-effect relationship with the above
- Road traffic environment that induced traffic fault of the offender: visit the spot for confirmation

In addition to the above, the table file is designed to recognize any overlooked points when studying fault of parties involved and road traffic environment that induces the fault during the accident factors' analysis process.

[Reference 2: Study method using the fault tree diagram]

A fault tree diagram is an effective tool in developing traffic safety countermeasures. Assumed accident occurrence processes, accident factors, countermeasures' purpose, and detailed countermeasures are already laid out in this flow diagram according to individual accident type, which are followed in sequence based on spot conditions and characteristics of the study targets.

A reference diagram on next page shows how to conduct a study with this diagram, using an example of a collision accident at intersection between right-turning vehicle and oncoming through vehicle (right turn collision). The thick line (red color) indicates the step-by-step sequence to follow the items in each phase based on the countermeasures' planning study process. The supportive file for accident factor analysis and countermeasures' planning (association table) refers to the study method using the fault tree diagram, and put them into a flow diagram facing sideways.



3.1 Target accident type in the supportive file for accident factor analysis and countermeasures' planning (association table)

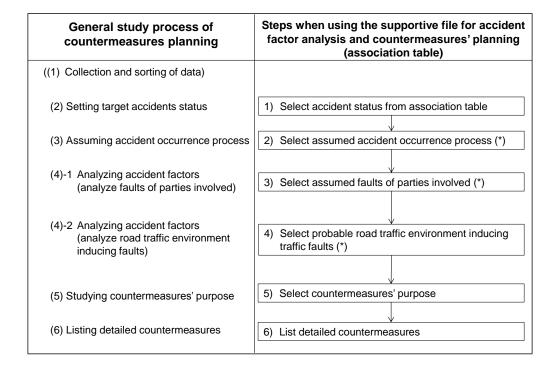
For the supportive file for accident factor analysis and countermeasures' planning (association table), eight key accident types as shown in table 3-1 were selected from the status classification of the Traffic Accidents Databases.

Table 3-1 Accident types between Traffic Accidents Databases and the supportive file for accident factor analysis and countermeasures' planning (association table)

Clas	sification of accident types based on Traffic Accidents Databases		for accident factor analysis and countermeasures' planning (association table)
		No	Accident type
	Walking facing the traffic	1	Pedestrian-vehicle
	Walking with their back to the traffic	1	(walking)
Ped	Crossing the crosswalk		
Pedestrian-vehicle	Crossing near the crosswalk	2	Pedestrian-vehicle
ian-	Crossing near the pedestrian bridge	2	(Crossing)
vehi	Crossing the road other than the above		
cle	Playing on the road	-	-
	Working on the road	-	-
	Others	-	-
	Head-on collision	3	Head-on collision
	Collision when passing each other		rieau-on comsion
	Rear-end collision		
<	Collision when changing direction	4	Rear-end collision
Vehicle-vehicle	Collision when overtaking		
le-v	Head-to-side collision	5	Head-to-side collision
ehic	Left turn collision	6	Left turn collision
le	Right turn collision	7	Right turn collision
	Collision when making U-turn		Right turn comsion
	Collision when reversing	-	-
	Others	-	-
Š	Collision with a structures		
	Road departure	8	Single-vehicle accident
ngle-vehicle	Collision with a parked vehicle (no driver)		Single-veinere accident
hicl	Rolling		
е	Others	-	-
Train		-	-
Unkn	own	-	-

3.2 Steps in using the supportive file for accident factor analysis and countermeasures' planning (association table)

Figure 3-2 describes the steps when using the supportive file for accident factor analysis and countermeasures' planning (association table), based on the general study process for countermeasures' planning, shown in Figure 2-1. First, set the target accident status from the collision diagram, etc., and select the appropriate accident status from the supportive file for accident factor analysis and countermeasures' planning (association table). Next, select the accident occurrence process, fault of parties involved, road traffic environment that induced the fault of parties involved, countermeasures' purpose, and detailed countermeasures, according to the steps shown in Figure 3-2.



* In steps 2) - 3) of the "Steps when using the supportive file for accident factor analysis and countermeasures' planning (association table)", select multiple items if more than one accident occurrence process or faults of parties involved are assumed. Then, in 4), identify a combination from the items you selected that is most probable in the spot.

Figure 3-2 Steps in the general study process for countermeasures' planning and the usage method of the supportive file for accident factor analysis and countermeasures' planning (association table)

[Points to remember] When studying accident types not specified in this Report

The supportive file for accident factor analysis and countermeasures' planning (association table) lists as many accident status as possible, including the accident occurrences process, fault of parties involved, road traffic environment that induced fault of parties involved, countermeasures' purpose, and detailed countermeasures, which are based on past studies on road safety countermeasures. However, not all accidents are included in this file, as accident type and spot conditions vary and it is difficult to list up all of them. When planning countermeasures for an accident status not specified in this file, it would be good to refer to incidents with similar accident status and/or occurrence process. Also consider reviewing the combination as necessary, mentioned earlier in this Report.

3.3 Usage method and reminders on supportive file for accident factor analysis and countermeasures' planning (association table)

After implementing the "(1) Collection and sorting of data" as part of the general study process for countermeasures' planning, follow the below usage method and reminders on supportive file for accident factor analysis and countermeasures' planning (association table) for each of the remaining steps starting from "(2) Setting target accidents status".

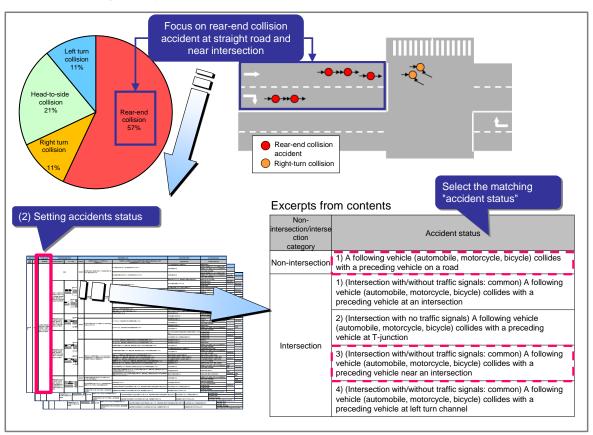
(1) Collection and sorting of data

In preparation for countermeasure planning, data on the accident itself and the road traffic environment need to be collected and sorted.

(2) Setting target accidents status

First, screen out target accident status (combination of accident types of parties involved, traveling direction, and occurrence spot), then select the accident type that matches the above from the applicable listed items in "(2) Setting target accidents status" of the supportive file for accident factor analysis and countermeasures' planning (association table).

The accident status row with the word "common" means that the accident types are specified with common countermeasures' purpose, and detailed countermeasures regardless of their accident status. In this case, when implementing step "(5) Studying countermeasures' purpose", check whether countermeasures' purpose applicable to the above row are suited to the spot.



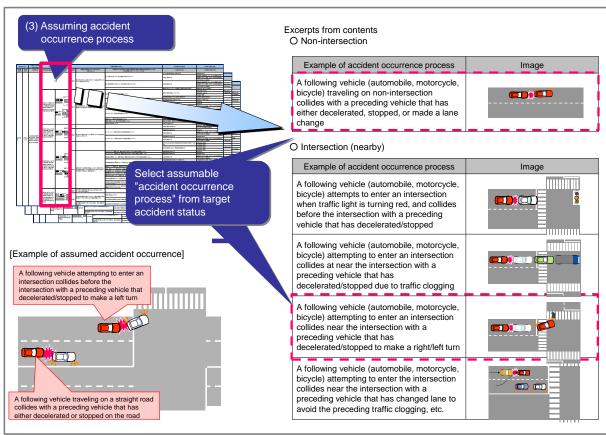
(3) Assuming accident occurrence process

In the "(3) Assuming accident occurrence process" column, select the assuming accident occurrence process at the target spot from the accident occurrence process list on the right side and under the selected accident status.

Select multiple choices if the incident cannot be limited to a single accident occurrence process.

In addition, regarding accidents that occurred from attempting to prevent an accident (i.e. a main lane vehicle makes a sudden deceleration to prevent a head-to-side collision with another vehicle exiting from a roadside IN/OUT, and was hit by a following vehicle), ensure to study from both the accident for which prevention was attempted (head-to-side collision in above case) and the actual accident (rear end collision in above case).

The accident occurrence process row with the word "common" means that the accident statuses are specified with common accident factors or countermeasures' purpose regardless of their accident occurrence processes. For the rows in which the word "common" is written, check whether accident factors and countermeasures' purpose are suited to the spot in the step of "(4) Analyzing accident factors" or "(5) Studying countermeasures' purpose".



(4) Accident factor analysis

In the "(4) Accident factor analysis" column, select the assumed accident factors at the target spot from the accident factor list on the right side and under the selected accident occurrence process.

The "(4) Accident factor analysis" column of the supportive file for accident factor analysis and countermeasures' planning (association table) is classified into "Parties involved", "Assumed faults of parties involved at the time of accident occurrence process", and "Examples of road traffic environment that induces faults of parties involved." When items in the "Examples of road traffic environment that induces faults of parties involved" are marked with a "-" sign, it means that the fault of parties involved is due to aimless driving or other causes that are irrelevant to the road traffic environment.

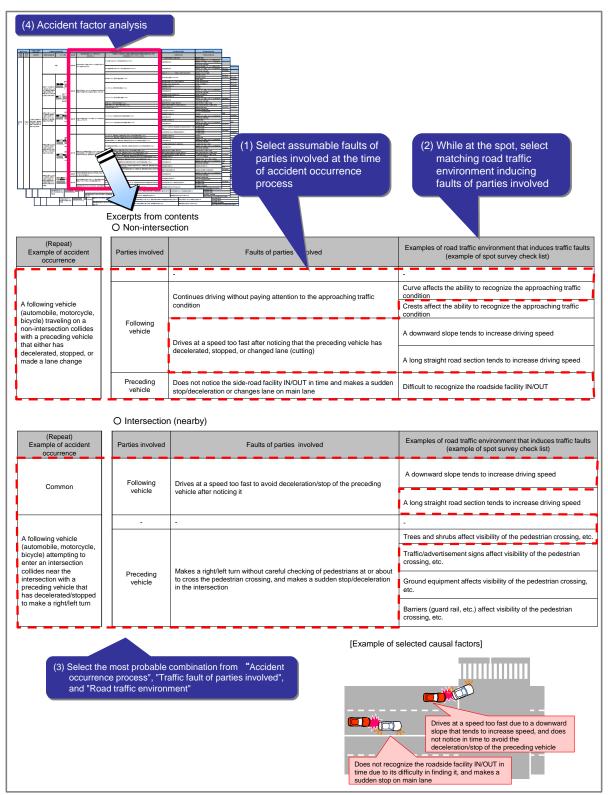
Begin the study by selecting the assumed faults of both the first and second parties involved from the "Assumed faults of parties involved at the time of accident occurrence process" column, and based on (3) Assumed accident occurrence process. It is recommended to select all possible faults by parties involved, as it is very difficult to assume the fault at this stage. In addition, if common accident factors are specified in the selected accident status including the accident occurrence process, study the above accident factors as well.

Next, compare the contents described in right side of the selected faults of parties involved found in the "Examples of road traffic environment that induces faults" with the road traffic environment in the spot, assume the road traffic environment that induces faults, then select the applicable item.

Lastly, review the selected "Examples of accident occurrence process", "Assumed faults of parties involved at the time of accident occurrence process", and the "Examples of road traffic environment that induces faults", and identify the most probable combination of them. If several combinations seem probable, then select multiple combinations.

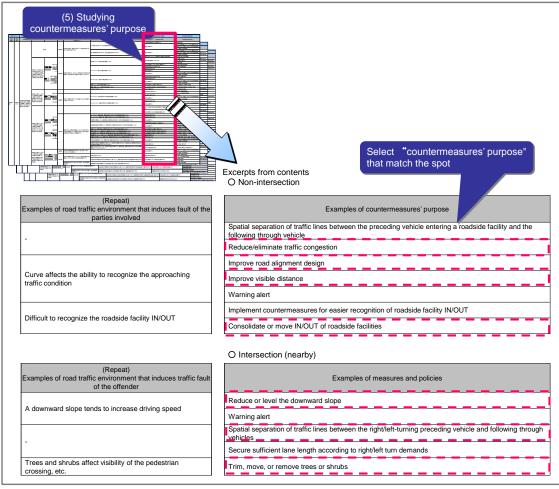
When all items in the "Parties involved", "Assumed faults at the time of accident occurrence process" and "Examples of road traffic environment that induces faults" are marked with a "-" sign, consider whether the countermeasures and policies are applicable to the spot in the phase of "(5) Studying countermeasures' purpose."

Contents in the "Examples of road traffic environment that induces faults" are listed with maximum cases of road traffic environment (road structure, traffic condition, existing traffic safety facilities, etc.) that should be checked at the target spot, assuming that the above are used as a checklist for field survey, etc. For this reason, a survey should be conducted at the spot to confirm whether any of the road traffic environments applies. Please note that the road traffic environment listed in the supportive file for accident factor analysis and countermeasures' planning (association table) is not exhaustive, and therefore the study should include the possibility of an unlisted road traffic environment that has induced a fault of parties involved.



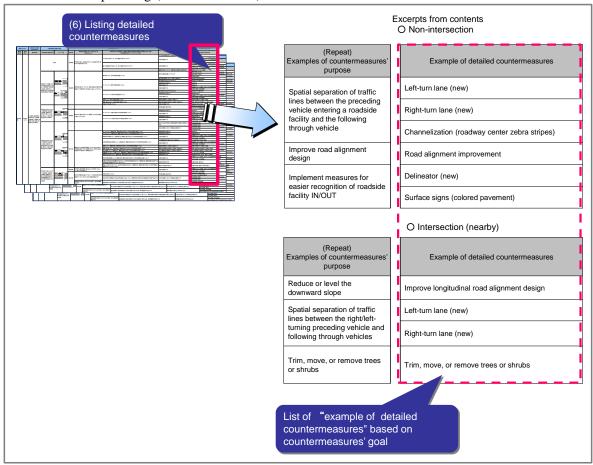
(5) Studying countermeasures' purpose

The "(5) Studying countermeasures' purpose" of the supportive file for accident factor analysis and countermeasures' planning (association table) lists examples of common countermeasures' purpose to accident type or status, examples of countermeasures' purpose to improve road traffic environment that induces faults of parties involved, or examples of countermeasures' purpose to limit faults of parties involved. Use the above examples as reference to select suitable countermeasures' purpose for the spot. In case when several traffic environments that induce driving faults are identified, select improvement countermeasures' purpose for each of them.



(6) Listing detailed countermeasures

Key cases in the "(6) Listing detailed countermeasures' planning" of the supportive file for accident factor analysis and countermeasures' planning (association table) are used as a reference to list up several recommended countermeasures that describe countermeasures' purpose in detail.



3.4 Supportive file for accident factor analysis and countermeasures' planning (association table)

The supportive file for accident factor analysis and countermeasures' planning (association table) lists accidents according to accident types in the order shown in Table 3-2.

Table 3-2 Accidents per accident type in the supportive file for accident factor analysis and countermeasures' planning (association table)

No	Accident	Straight	Page
	type	road/intersection	
1	Pedestrian-vehicle (Walking)	Non-intersection	P. 1-2
2	Pedestrian-vehicle	Non-intersection	P. 3-4
2	(Crossing)	Intersection	P. 5-10
2	TT 1 11: '	Non-intersection	P. 11-12
3	Head-on collision	Intersection	P. 12
	D 1 111 1	Non-intersection	P. 13
4	Rear-end collision	Intersection	P. 14-18
_		Non-intersection	P. 19-20
5	Head-to-side collision	Intersection	P. 21-23
		Non-intersection	P. 24
6	Left-turn collision	Intersection	P. 25-27
_		Non-intersection	P. 28-29
7	Right-turn collision	Intersection	P. 30-32
		Non-intersection	P. 33
8	Single-vehicle accident	Intersection	P. 34

Study	r process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures	
			Con	nmon	-	-	-	Secure passage for pedestrians	Sidewalk, bicycle & pedestrian lane (newly laid)	
								Improve road alignment design	Road alignment improvement	
								Improve sight distance	Sight distance improvement	
									Delineator (new or larger type)	
									Road markings (highly visible)	
							Curve affects the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	Road studs	
									Rubber pole	
									Colored pavement	
						Enters into a curve section without paying full attention to the road alignment and departs from the lane		Warning alert	Colored pavement & road marking (words'warning)	
								warning alert	Non-legal signs (warning alert)	
								Improve road alignment design	Improve longitudinal road alignment design	
							Crests affect the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	Delineator (new or larger type)	
							Crests affect the ability to recognize the north road anymhent	Warning alert	Colored pavement & road marking (words'warning)	
								warning alert	Non-legal signs (warning alert)	
								Insufficient road lighting affects recognition of the front road alignment	Improve road lighting	Road lighting (new, improved, add, move)
							Headlights of an oncoming vehicle affect visibility of the front road alignment	Install objects to block headlights	Glare prevention plates	
			A through vehicle	0				Reduce or level the downward slope	Improve longitudinal road alignment design	
			collided with a pedestrian (automobile, motorcycle,		Through vehicle		A downward slone tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))	
	(a	bicycle) at road shoulder section with no A through				A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)		
								Non-legal signs (warning alert)		
Pedestrian	Non- intersection	vehicle (automobile, motorcycle, bicycle)		-00-00-10		Speed or steering at curve section and narrow road is not suitable to the road alignment and road width, causing the vehicle to depart from the lane	Driving speed tends to increase when there is a straight section before the curve		Improve pavement (bunping pavement, grooving (lateral))	
(Walking)		collides with a pedestrian at road		-00				Warning alert	Colored pavement & road marking (words'warning)	
		shoulder					A wheel skid is likely to occur due to a sharp curve		Non-legal signs (warning alert)	
								Improve road alignment design	Road alignment improvement	
								Improve superelevation	Superelevation improvement	
								Reduce pavement slipperiness	Improve pavement (anti-skid pavement)	
									Snow/cold countermeasures (chemical application)	
						Fails to maneuver the vehicle according to surface	Road surface tends to get icy and slippery	Prevent road surface from icing	Snow/cold countermeasures (snow melting facility)	
						condition (icy road, etc.) and vehicle becomes out of control			Improve pavement (grooving)	
						Control	Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)	
							Slippery surface due to grating cover	Prevent slips	Improve grating cover	
						Aimless driving or drowsiness causes lane departure and		Alert the driver to limit lane departure	Ramble strips	
						continues to drive without realizing it or too late to notice	-	Alert the driver to limit lane departure	Road markings (ribbed)	
								Warning alert	Improve pavement (bunping pavement, grooving (lateral))	
			A through vehicle					Spatial separation of traffic lines between right-turn and through	Right-turn lane (new)	
			(automobile) departs from lane to avoid a vehicle			Departs to road shoulder to avoid a main lane vehicle	Waiting for right turn is preventing the following through vehicles from passing through	vehicles	Channelization (roadway center zebra stripes)	
			waiting for right turn, and collides with a pedestrian		vehicle	waiting for right turn	Training for the provening the temperature and the state of the state	Prohibit right turn	Median strips (new or close cut area)	
			on road shoulder					Prohibit right turn	Rubber pole	
		A motorcycle/hicycle rides			Drives on a road shoulder	Traffic connection on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)		
			A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic		Motorcycle/	Sirves on a road strouder	Traffic congestion on main lane increases motorcycles going through on road shoulder	Trouble and Congestori	Eradicate bottleneck intersections	
			stationary traffic on traffic lane and collides with a		bicycle	Drives on a road shoulder without paying full attention to		Warning plant	Colored pavement & road marking (words'warning)	
L		lane and collides with a pedestrian			pedestrians		Warning alert	Non-legal signs (warning alert)		
					_					

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non- intersection/inte r-section	Accident status	Example of accident occurrence process	lmage	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures	
	category								Consolidate IN/OUT of roadside or move away from the main lane	
			Cor	mmon	-	-	-	Consolidate or move IN/OUT of roadside	Move IN/OUT of roadside	
							Diese of a viaduat affect visibility of the cidewalk	Warning plant	Colored pavement & road marking (words'warning)	
							Piers of a viaduct affect visibility of the sidewalk	Warning alert	Non-legal signs (warning alert)	
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)	
							Piers of a pedestrian bridge affect visibility of the sidewalk	Warning alert	Colored pavement & road marking (words'warning)	
								vvarning alert	Non-legal signs (warning alert)	
						Enters a sidewalk without careful checking of pedestrians on sidewalk	Trees and shrubs affect visibility of the sidewalk	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs	
				1			Traffic/advertisement signs affect visibility of the sidewalk	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs	
		2) [Road section with a sidewalk] A left/right-turn	A		Right/left		Ground equipment affects visibility of the sidewalk	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment	
	motore collide	vehicle (automobile, motorcycle, bicycle)	A vehicle (automobile, motorcycle, bicycle)		turn vehicle		Guard fence (guard rail, etc.) affect visibility of the sidewalk	Improve the design of guard fences	Use guard pipe for improvement	
		collides with a pedestrian at a s	pedestrian at a sidewalk					Insufficient sidewalk lighting affects visibility	Improve road lighting	Road lighting (new, improved, add, move)
			facility and collides with a pedestrian at a sidewalk				Standing vehicles affect visibility of the sidewalk	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)	
				ū				Spatial separation of traffic lines between left-turn and through vehicles	Left-turn lane (new)	
						Makes a forceful right/left turn to avoid a situation where		Spatial separation of traffic lines between right-turn and through	Right-turn lane (new)	
							Waiting for right/left turn is preventing the following through vehicles from passing through	vehicles	Channelization (roadway center zebra stripes)	
						anough volucios		Prohibit right turn	Median strips (new or close cut area)	
Pedestria -vehicle	n Non- intersection	1						To a substitution	Rubber pole	
(Walking)	(2/2)				Left-turn	Fails to recognize the roadside IN/OUT in time and makes a sudden left turn, and enters a sidewalk without	Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new)	
					vehicle	careful checking of pedestrians			Colored pavement	
								Secure a sidewalk width according to the traffic volume	Sidewalk and bicycle & pedestrian lane (widened)	
					Pedestrian	Sidewalk passage is obstructed by other pedestrians and a bicycle, and rushes out to the road	Sidewalk width is too narrow for the traffic volume	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.	
								Prevent pedestrians from rushing out to the road	Gurd fences for pedestrians and bicycles (to prevent crossing)	
								Reduce or level the downward slope	Improve longitudinal road alignment design	
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))	
		[Road section with a sidewalk] A vehicle	A vehicle (automobile, motorcycle, bicycle)	n ≪			A communa stope what to introduce driving special	Warning alert	Colored pavement & road marking (words'warning)	
		(automobile, motorcycle,	collides with a pedestrian that has rush out into the			Driving speed is too fast to avoid collision with a			Non-legal signs (warning alert)	
		pedestrian on a road	road		Through	pedestrian that has rushed out to the road			Improve pavement (bunping pavement, grooving (lateral))	
					vehicle		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)	
									Non-legal signs (warning alert)	
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)	
						Drives without anticipating pedestrians rushing out to the		Warning alert	Colored pavement & road marking (words'warning)	
						road		Tananag aloit	Non-legal signs (warning alert)	
		4) [Road section with a sidewalk] A through bicycle collides with a pedestrian at a bicycle & pedestrian lane	A bicycle weaves through people and collides with a pedestrian on a bicycle & pedestrian lane	9 4.6	Bicycle	The bicycle swerves left and right to avoid collision with pedestrians	There is the opportunity when pedestrians conflict with bicycles on the sidewalk (Bicycles passes thorough the sidewalk)	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.	

Study	y process	(2) Setting target accidents' status	(3) Assuming accider	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Common		-	-	-	Spatial separation of traffic lines between the automobile and crossing pedestrians	Pedestrian bridge (new)
			Com	nmon	-	-	-	Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Traffic signal (new)
							Course off cate visibility of the freet adjection expenses or its currencyling.	Improve road alignment design	Road alignment improvement
								Improve sight distance	Sight distance improvement
							Curve affects visibility of the front pedestrian crossing or its surroundings	Warring plant	Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
								Improve road alignment design	Improve longitudinal road alignment design
							Crests affect visibility of the front pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
								warning alert	Non-legal signs (warning alert)
						Enters a pedestrian crossing without careful checking of	Piers of a viaduct affect visibility of the front pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
						pedestrians at or about to cross the pedestrian crossing	Tiels of a viaduct affect visionity of the from pedestrial crossing of its sufformings	warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the front pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the front pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the front pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
					Through vehicle		Guard fences (guard rail, etc.) affect visibility of the front pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Insufficient lighting affects visibility of the front pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
							Standing vehicles on road affect visibility of the front pedestrian crossing or its surroundings	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)
						Headl	Headlights of an oncoming vehicle affect visibility of the front pedestrian crossing or its surroundings	Install objects to block headlights	Glare prevention plates
		[Pedestrian crossing					A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
Pedestria		with no traffic signal] A	A through vehicle						Improve pavement (bunping pavement, grooving (lateral))
-vehicle (Crossing		(automobile, motorcycle,	(automobile, motorcycle, bicycle) enters a					Warning alert	Colored pavement & road marking (words'warning)
			pedestrian crossing and collides with a pedestrian			Enters a pedestrian crossing at a speed too fast to avoid collision with a crossing pedestrian			Non-legal signs (warning alert)
		pedestrian crossing	at or near the pedestrian crossing						Improve pavement (bunping pavement, grooving (lateral))
							A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Fails to, or does not recognize in time the crossing	Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing	Road markings (highly visible)
						pedestrian when entering the pedestrian crossing		-	Colored pavement
							Road curve affects visibility of vehicles approaching the pedestrian crossing	Improve road alignment design	Road alignment improvement
							Crests affect visibility of vehicles approaching the pedestrian crossing	Improve road alignment design	Improve longitudinal road alignment design
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
						Crosses a pedestrian crossing without careful checking of an approaching vehicle	Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					Pedestrian		Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
							Standing vehicles affect visibility of vehicles approaching the pedestrian crossing	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)
					<u>-</u>	Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	A pedestrian is able to cross a road without using the pedestrian crossing	Prevent pedestrians from crossing a road other than the pedestrian crossing	Gurd fences for pedestrians and bicycles (to prevent crossing)
						Crosses a road without careful checking of vehicles		Warning alert	Colored pavement & road marking (words'warning)
						approaching the pedestrian crossing		g diore	Non-legal signs (warning alert)

Accident ir type		(2) Setting target accidents' status	(3) Assuming accide	in occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A decreased along hands to force and do fine around		Improve pavement (bunping pavement, grooving (lateral))
			A through vehicle				A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
			(automobile, motorcycle, bicycle) enters a						Non-legal signs (warning alert)
			pedestrian crossing when the traffic signal for			Drives at high speed and makes a forceful entry to the pedestrian crossing when traffic signal is turning red			Improve pavement (bunping pavement, grooving (lateral))
			vehicles is turning red,	Yellow		,		Warning alert	Colored pavement & road marking (words'warning)
			and collided with a pedestrian who has						Non-legal signs (warning alert)
			started crossing the road before the traffic signal for	Red			-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
			pedestrians turns green				-	Inform drivers to stop	Stop line (widen its width)
					Podostrian	Hastily starts crossing when traffic signal changes		Warning alert	Colored pavement & road marking (words'warning)
					i edesiriari	Trastily starts crossing when traine signal changes		wanning alert	Non-legal signs (warning alert)
									Traffic signal (LED lighting)
							Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (enlarge size)
							Sunset allects visibility of the trains signal		Traffic signal (install extra lights)
								Move traffic signal to a more visible position	Traffic signal (improve installment position)
								Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
			A through vehicle					Improve road alignment design	Road alignment improvement
		[Pedestrian crossing with traffic signals] A	iffic signals] A bicycle) enters a				Road curve affects visibility of the traffic signal	Improve sight distance	Sight distance improvement
		through vehicle (automobile, motorcycle,	pedestrian crossing when	Red		Fails to perceive the traffic signal's sign and enters the		Warning alert	Colored pavement & road marking (words'warning)
		bicycle) collides with a	vehicles is red, and	·····	vehicle	pedestrian crossing at red traffic signal		wanning alert	Non-legal signs (warning alert)
		crossing	trian collides with a pedestrian when the traffic signal for					Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
			pedestrians is green	Green			Crests affect visibility of the traffic signal	Improve road alignment design	Improve longitudinal road alignment design
							Clests arect visibility of the traint signal	Warning alert	Colored pavement & road marking (words'warning)
								Walling diot	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the traffic signal	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
					1		Total a harding on the state of		
Pedestrian	icle intersection						Traffic/advertisement signs affect visibility of the traffic signal	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
-vehicle i		A Infolian Venicle				Headlights of an oncoming vehicle affect visibility of the traffic signal	Coordinate, move, or remove traffic/advertisement signs Install objects to block headlights	Coordinate, move, or remove traffic/advertisement signs Glare prevention plates	
	intersection		A through venicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for	Green → Red		Unable to cross the road while the traffic signal is green	Headlights of an oncoming vehicle affect visibility of the traffic signal	-	· · · · · ·
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when	Green	Pedestrian	Unable to cross the road while the traffic signal is green and remains in the pedestrian crossing		Install objects to block headlights Provide a waiting space between the up and down lanes for	Glare prevention plates
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for	Green Green	Padastrian	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road	Glare prevention plates Traffic island
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian	and remains in the pedestrian crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval)
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Padastrian	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new)
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility)
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing)
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning)
-vehicle i	intersection		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long - The pedestrian bridge is provided but with poor accessibility - The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words warning) Non-legal signs (warning alert)
-vehicle i	intersection (2/2)		(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long - The pedestrian bridge is provided but with poor accessibility - The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning)
-vehicle i	intersection (2/2)	3) A through vehicle (automobile, motorcycle,	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long - The pedestrian bridge is provided but with poor accessibility - The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
-vehicle i	intersection (2/2)	A through vehicle (automobile, motorcycle, bicycle) collides with a pedestrian on the road	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long - The pedestrian bridge is provided but with poor accessibility - The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian -	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long - The pedestrian bridge is provided but with poor accessibility - The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert Reduce or level the downward slope	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral))
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian Through	Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing the road	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long The pedestrian bridge is provided but with poor accessibility The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning)
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian Through	and remains in the pedestrian crossing Ignores traffic signals and cross the pedestrian crossing at red traffic signal Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long The pedestrian bridge is provided but with poor accessibility The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert Reduce or level the downward slope	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian Through	Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing the road	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long The pedestrian bridge is provided but with poor accessibility The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road A downward slope tends to increase driving speed	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert Reduce or level the downward slope Warning alert	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve pavement (bunping pavement, grooving (lateral))
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian Through	Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing the road	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long The pedestrian bridge is provided but with poor accessibility The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert Reduce or level the downward slope	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning)
-vehicle i	intersection (2/2)	(automobile, motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green , and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green. A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is green, and collides with a pedestrian when the traffic signal for pedestrians is red	Red Green	Pedestrian - Pedestrian Through	Ignores traffic signals and cross the pedestrian crossing at red traffic signal - Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road Drives without anticipating pedestrians randomly crossing the road	Headlights of an oncoming vehicle affect visibility of the traffic signal The green interval of traffic signal for pedestrian is too short for the crossing distance Traffic signal interval (pedestrian crossing light) is too long The pedestrian bridge is provided but with poor accessibility The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road A downward slope tends to increase driving speed	Install objects to block headlights Provide a waiting space between the up and down lanes for pedestrians who could not cross the road Secure time to cross the road Respond to the crossing demand by pedestrians Secure time to cross the road Install a crossing facility according to crossing demands Improve accessibility of the pedestrian bridge Prevent crossing other than at the pedestrian crossing Warning alert Warning alert Reduce or level the downward slope Warning alert	Glare prevention plates Traffic island Improve traffic signal phase (reallocation of green interval) Traffic signal for pedestrian (push-button type) Improve traffic signal phase (reallocation of green interval) Pedestrian crossing (new) Pedestrian bridge (with good accessibility) Gurd fences for pedestrians and bicycles (to prevent crossing) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Improve pavement (bunping pavement, grooving (lateral))

Study	process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
		=======================================						Spatial separation of traffic lines between the automobile and crossing pedestrians	Pedestrian bridge (new)
			Common		-		-	Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Improve traffic signal phase (pedestrians and vehicles separation light system)
			Con	mmon	-	-	-	Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Traffic signal (new)
		Ī						Improve road alignment design	Road alignment improvement
							Road curve affects visibility of the front pedestrian crossing or its surroundings		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
								Improve road alignment design	Improve longitudinal road alignment design
							Crests affect visibility of the front pedestrian crossing or its surroundings		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
									Colored pavement & road marking (words'warning)
						Enters an intersection without careful checking of	Piers of a viaduct affect visibility of the front pedestrian crossing or its surroundings	Warning alert	Non-legal signs (warning alert)
						pedestrians at or about to cross the pedestrian crossing		Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
						Piers of a pedestrian bridge affects visibility of the front pedestrian crossing or its surroundings		Colored pavement & road marking (words'warning)	
								Warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the front pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the front pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the front pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
					Through		Guard fences (guard rail, etc.) affect visibility of the front pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
					vehicle		Insufficient lighting affects visibility of the front pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
								Reduce or level the downward slope	Improve longitudinal road alignment design
									Improve pavement (bunping pavement, grooving (lateral))
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
				•		Enters an intersection at a speed too fast to avoid			Non-legal signs (warning alert)
Pedestrian	Intersection	1) [Intersection with no				Enters an intersection at a speed too fast to avoid collision with the crossing pedestrian after seeing him/her			Improve pavement (bunping pavement, grooving (lateral))
-vehicle(Crossing)	(1/6)		A through vehicle				A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
		motorcycle, bicycle)	(automobile, motorcycle, bicycle) enters an			ľ			Non-legal signs (warning alert)
		pedestrian at or near the	intersection and collides with a pedestrian at or				-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
		pedestrial crossing	near the pedestrian crossing						Road markings (highly visible)
		ľ	crossing				Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing	Colored pavement
						Fails to, or does not recognize in time the crossing			Colored pavement
						pedestrian and enters the intersection	Poor visibility of the intersection	Improve visibility of the intersection	Guide signs, warning signs, non-legal signs ("Intersection
									Ahead") Colored pavement & road marking (words'warning)
							The pedestrian bridge affects drivers' anticipation of pedestrians/cyclists randomly crossing the traffic lane	Warning alert	Non-legal signs (warning alert)
							Road curve affects visibility of vehicles approaching the pedestrian crossing	Improve road alignment design	Road alignment improvement
							Crests affect visibility of vehicles approaching the pedestrian crossing	Improve road alignment design	Improve longitudinal road alignment design
								Marianda	Colored pavement & road marking (words'warning)
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
						Crosses a pedestrian crossing without careful checking of an approaching vehicle	Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warring alors	Colored pavement & road marking (words'warning)
						or an approaching version		Warning alert	Non-legal signs (warning alert)
					_		Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
					Pedestrian		Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
								Prevent pedestrians from crossing a road other than the pedestrian	Gurd fences for pedestrians and bicycles (to prevent crossing)
						Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	A pedestrian is able to cross a road without using the pedestrian crossing	crossing Coordinate positions of the pedestrian traffic and pedestrian crossing	
						diversión de not anticipate a pedestriali un a tudo	The pedestrian bridge is provided but with poor accessibility	Improve accessibility of the pedestrian bridge	Pedestrian bridge (with good accessibility)
							· · · · · · · · · · · · · · · · · · ·		Colored pavement & road marking (words'warning)
					Crosses a road without careful checking of vehicles approaching the pedestrian crossing	-	Warning alert	Non-legal signs (warning alert)	
			l	<u> </u>	I		I		

Study	process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward along tends to increase driving appeal		Improve pavement (bunping pavement, grooving (lateral))
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
			A through vehicle (automobile, motorcycle,	Red					Non-legal signs (warning alert)
			bicycle) attempts to enter an intersection when the	Ye	Through vehicle	Drives at high speed and makes a forceful entry to the intersection when traffic signal is turning red			Improve pavement (bunping pavement, grooving (lateral))
			traffic signal for vehicles is turning red, and collides				A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
			with a pedestrian who has started crossing the road						Non-legal signs (warning alert)
			before the traffic signal for pedestrians turns green				-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
							-	Inform drivers to stop	Stop line (widen its width)
					Pedestrian	Starts crossing the road without checking any approaching vehicles and before the traffic signal for	-	Warning alert	Colored pavement & road marking (words'warning)
					rodoctian	pedestrian turns green		Taning asi	Non-legal signs (warning alert)
			A through vehicle					Reduce the size of the intersection	Improve intersection (make it compact)
			(automobile, motorcycle, bicycle) enters an			Makes a mistake in judgment of whether to stop or go when the traffic signal is turning red, and enters the	Intersection is large and takes time to pass through		Stop line (move forward)
			olcycle) enters an intersection when the traffic signal for vehicles is turning red but could not pass through, and collides with a pedestrian who has started crossing the road when the traffic signal for pedestrians		Through vehicle	intersection but cannot pass through		Improve recognition of the intersection size	Colored pavement
				Red	vernoie		-	Inform drivers to stop	Stop line (widen its width)
				Green		Makes a forceful entry to the intersection when the traffic signal is turning red and cannot pass through	Green interval of traffic signal is too short for the section with more traffic inflow	Secure intersection entry time for the section with more traffic inflow	Improve traffic signal phase (reallocation of green interval)
			signal for pedestrians turns green		Pedestrian	Starts crossing the pedestrian crossing without checking any approaching vehicles and before/immediately after	-	Warning alert	Colored pavement & road marking (words'warning)
		2) [Intersection with traffic signals] A through vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at pedestr	A through vehicle (automobile, motorcycle, bicycle) enters an intersection immediately after the traffic signal for			the traffic signal turns green		Ü	Non-legal signs (warning alert)
				Green → Red	Pedestrian	Unable to cross the road while the traffic signal is green and remains in the pedestrian crossing	The green interval of traffic signal for pedestrian is too short for the crossing distance	Shorten the crossing distance	Pedestrian crossing (orthogonal)
			after the traffic signal for vehicles has turned	Green				Provide a waiting space inside the intersection for pedestrians who could not complete the crossing	Traffic island
Pedestrian -vehicle (Crossing)	Intersection (2/6)		vehicles has turned green, and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green					Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)
		crossing					Sunset affects visibility of the traffic signal		Traffic signal (LED lighting)
								Improve visibility of the traffic signal	Traffic signal (enlarge size)
									Traffic signal (install extra lights)
								Move traffic signal to a more visible position	Traffic signal (improve installment position)
								Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
			A through vehicle					Improve road alignment design	Road alignment improvement
			(automobile, motorcycle, bicycle) attempts to enter				Road curve affects visibility of the traffic signal	Improve sight distance	Sight distance improvement
			an intersection when the traffic signal for vehicles		Through	Fails to check the traffic signal, or mistakenly looks at the traffic signal of adjacent intersection, and enters the		Warning alert	Colored pavement & road marking (words'warning)
			is red, and collides with a pedestrian at pedestrian	Red Green	vehicle	intersection against a red traffic signal			Non-legal signs (warning alert)
			crossing when the traffic signal for pedestrians is					Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
			green				Crests affect visibility of the traffic signal	Improve road alignment design	Improve longitudinal road alignment design
							,	Warning alert	Colored pavement & road marking (words'warning)
								-	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the traffic signal	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the traffic signal	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Intersections are too near to each other	Consolidate the intersections	Consolidate IN/OUT of roadside or move away from the main lane
				Green	Pedestrian	Ignores traffic signals and crosses the pedestrian crossing at red traffic signals	Traffic signal interval (pedestrian crossing light) is too long	Respond to the crossing demand by pedestrians	Traffic signal for pedestrian (push-button type)
			automobile, motorcycle, icycle) attempts to enter	Red ;				Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)

Study	process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
							Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							Tiers of a viaduce affect visibility of pedestrial crossing of its surroundings	waning aent	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning clost	Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
						Turns left without careful checking of pedestrians at or about to cross the pedestrian crossing	Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Corner building offsets visibility of the pedestrian greening or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							Corner building affects visibility of the pedestrian crossing or its surroundings	waning alert	Non-legal signs (warning alert)
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
					Left-turn vehicle		Pedestrian crossing setback tends to increase the speed of the approaching vehicle before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
							Road design with a blunt intersection angle tends to increase the left-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
						Malana laft torra et a annual tra franta avaid a annual a	Pedestrian crossing setback tends to increase the speed of the approaching vehicle before the pedestrian crossing	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
						Makes a left turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	Road design with a blunt intersection angle tends to increase the left-turn speed	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
		[Common between intersection with/without	A vehicle (automobile,	<u> </u>		Makes a forceful left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for left turn is preventing the following through vehicles from passing through	Spatial separation of traffic liness between left-turn and through vehicles	Left-turn lane (new)
Pedestrian -vehicle	Intersection	traffic signals] A left-turn vehicle (automobile,	motorcycle, bicycle) that has turned left at			Takes a left turn without anticipating the crossing	The pedestrian bridge affects drivers' anticipation of pedestrians crossing the main line	Warning alert	Colored pavement & road marking (words'warning)
(Crossing)	(3/6)		intersection collides with a pedestrian at or near the			pedestrian bridge			Non-legal signs (warning alert)
		pedestrian at or near the pedestrian crossing	pedestrian crossing			Makes a left turn without anticipating crossing	_	Warning alert	Colored pavement & road marking (words'warning)
						pedestrians			Non-legal signs (warning alert)
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
						Crosses a pedestrian crossing without careful checking of a left-turning vehicle	Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
					Pedestrian		Corner building affects visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
							, , , , , , , , , , , , , , , , , , ,	-	Non-legal signs (warning alert)
								Shorten the crossing distance	Pedestrian crossing (orthogonal)
						Unable to cross the road while the traffic signal is green and remains in the pedestrian crossing	The green interval of traffic signal for pedestrian is too short for the crossing distance	Provide a waiting space inside the intersection for pedestrians who could not complete the crossing	Traffic island
								Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)
						Crosses a place (other than padastrian processed where	A pedestrian is able to cross a road without using the pedestrian crossing	Prevent pedestrians from crossing a road other than the pedestrian crossing	Gurd fences for pedestrians and bicycles (to prevent crossing)
						Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road		Coordinate positions of the pedestrian traffic and pedestrian crossing	Pedestrian crossing (move forward)
							The pedestrian bridge is provided but with poor accessibility	Improve accessibility of the pedestrian bridge	Pedestrian bridge (with good accessibility)
						Crosses without anticipating a left-turning vehicle	-	Warning alert	Colored pavement & road marking (words warning)
									Non-legal signs (warning alert)

Stud	ly process	(2) Setting target accidents' status	(3) Assuming acciden	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures						
Accider type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures						
	Jan							W	Colored pavement & road marking (words'warning)						
							Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Non-legal signs (warning alert)						
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)						
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Wassian slad	Colored pavement & road marking (words'warning)						
								Warning alert	Non-legal signs (warning alert)						
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs						
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs						
							Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment						
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement						
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)						
						Turns right without careful checking of pedestrians at or about to cross the pedestrian crossing	Difficult to check both the oncoming through vehicle and pedestrians/bicycle simultaneously when making a right turn	Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians	Traffic signals (right-turn only phase)						
								Temporal separation of traffic lines between the automobile and crossing pedestrians	Improve traffic signal phase (pedestrians and vehicles separation light system)						
							Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)						
							The fight dam lance die provided and get distracted by fight tarning verifices in parallel direction	Clear indication of right-turn path in the intersection	Channel marking (right-turn)						
					Right-turn vehicle		Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve the pedestrian crossing position	Pedestrian crossing (move forward)						
							Road design with a blunt intersection angle tends to increase the right-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)						
						Unclear indication of right turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)							
						pedestrian crossing or its surroundings		Intersection center-point marking							
		Intersection with no A vehicle (autom)	A vehicle (automobile,					Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)						
Pedestria -vehicle	Intersection		turned right at intersection			Makes a right turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Improve the pedestrian crossing position	Pedestrian crossing (move forward)						
(Crossin	(4/6)	a pedestrian at or near	collides with a pedestrian at or near the pedestrian				Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)						
		the pedestrian crossing	crossing				Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)						
									Intersection center-point marking						
												Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)
						Takes a right turn without anticipating the crossing		Wassian slant	Colored pavement & road marking (words'warning)						
						pedestrian, assuming that pedestrian is going to use the pedestrian bridge	The pedestrian bridge affects drivers' anticipation of pedestrians/cyclists randomly crossing the traffic lane	Warning alert	Non-legal signs (warning alert)						
						Takes a right turn without anticipating crossing		Warning slort	Colored pavement & road marking (words'warning)						
						pedestrians		Warning alert	Non-legal signs (warning alert)						
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)						
							Section for the section of th		Non-legal signs (warning alert)						
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)						
							Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)						
						Crosses a pedestrian crossing without careful checking of a right-turning vehicle			Non-legal signs (warning alert)						
							Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs						
					Pedestrian		Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs						
							Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment						
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement						
						Creaces a place (ather-the-re-de-trivial)	A pedestrian is able to cross a road without using the pedestrian crossing	Prevent pedestrians from crossing a road other than the pedestrian crossing	Gurd fences for pedestrians and bicycles (to prevent crossing)						
						Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road		Coordinate positions of the pedestrian traffic and pedestrian crossing	Pedestrian crossing (move forward)						
							The pedestrian bridge is provided but with poor accessibility	Improve accessibility of the pedestrian bridge	Pedestrian bridge (with good accessibility)						
						Crosses without anticipating a right-turning vehicle	-	Warning alert	Colored pavement & road marking (words warning)						
						. 5 5 6 6			Non-legal signs (warning alert)						

Study	process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	category						Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							3		Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
								warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
						Turns right without careful checking of pedestrians at or	Difficult to check both the oncoming through vehicle and pedestrians/bicycle simultaneously when making a right turn	Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians	Traffic signals (right-turn only phase)
						about to cross the pedestrian crossing		Temporal separation of traffic lines between the automobile and crossing pedestrians	Improve traffic signal phase (pedestrians and vehicles separation light system)
							Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)
							Two night-runn lailes are provided and get distracted by right-running vehicles in parallel direction	Clear indication of right-turn path in the intersection	Channel marking (right-turn)
					Right-turn vehicle		Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
				Greer			Road design with a blunt intersection angle tends to increase the right-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)
				Green			Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
							pedestrian crossing or its surroundings		Intersection center-point marking
							-	Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)
		turned right at intersection collides with a pedestrian at or near the pedestrian crossing				Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Improve the pedestrian crossing position	Pedestrian crossing (move forward)	
					Makes a right turn at a speed too fast to avoid a crossing	Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)	
			rossing			pedestrian after recognizing the pedestrian	Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
		5) [Intersection with					one and a second of the second	Calco right tan romoto in the intersection to an appropriate position	Intersection center-point marking
Pedestrian -vehicle (Crossing)	Intersection (5/6)	traffic signals] A right- turn vehicle (automobile, motorcycle) collides with a pedestrian at or near		Green Green		Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)
		the pedestrian crossing				Takes a right turn without anticipating crossing pedestrians	The grade separation facility affects drivers' anticipation of pedestrians/cyclists randomly crossing the main line	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
									Colored pavement & road marking (words'warning)
							-	Warning alert	Non-legal signs (warning alert)
									Colored pavement & road marking (words/warning)
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing		Colored pavement & road marking (words'warning)
						Crosses a pedestrian crossing without careful checking		Warning alert	Non-legal signs (warning alert)
						of a right-turning vehicle	Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					Pedestrian		Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
I							A section is able to section of the	Prevent pedestrians from crossing a road other than the pedestrian	Gurd fences for pedestrians and bicycles (to prevent crossing)
I						Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	A pedestrian is able to cross a road without using the pedestrian crossing	Coordinate positions of the pedestrian traffic and pedestrian crossing	Pedestrian crossing (move forward)
						antoro do not anticipate a pedestriari ori a rodu	The pedestrian bridge is provided but with poor accessibility	Improve accessibility of the pedestrian bridge	Pedestrian bridge (with good accessibility)
1								W	Colored pavement & road marking (words'warning)
						Crosses without anticipating a right-turning vehicle	- 	Warning alert	Non-legal signs (warning alert)
									Improve intersection (make it compact)
						Makes a mistake in judgment of whether to stop or go	Intersection is large and takes time to pass through	Reduce the size of the intersection	Stop line (move forward)
		A right-turn vehicle (automobile, motorcycle)			when the traffic signal is turning red, and enters the intersection but cannot pass through		Improve recognition of the intersection size	Colored pavement	
			enters an intersection	Yellow	vehicle		-	Inform drivers to stop	Stop line (widen its width)
		when the traffic signal vehicles is turning red and collides with a pedestrian who could cross the road while the traffic signal for	when the traffic signal for vehicles is turning red,	i i i i i i i i i i i i i i i i i i i		Makes a forceful entry to the intersection when the traffic			Traffic signals (right-turn only phase)
			and collides with a			signal is turning red and cannot pass through	Right-turn traffic signal cycle is too short	Secure time for the right-turn traffic signal cycle	Improve traffic signal phase (extended green, etc.)
			cross the road while the					Shorten the crossing distance	Pedestrian crossing (orthogonal)
			cross the road while the	Green → Red	Pedestrian	Unable to cross the road while the traffic signal is green and remains in the pedestrian crossing	The green interval of traffic signal for pedestrian is too short for the crossing distance	Provide a waiting space inside the intersection for pedestrians who could not complete the crossing	Traffic island
1								Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)
-								•	• • • • • • • • • • • • • • • • • • • •

Study	Study process (2) Setting target accidents' status		(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Spatial separation of traffic lines between the automobile and crossing pedestrians	Consolidate IN/OUT of roadside or move away from the main lane
			Common		-	-		Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Traffic signal (new)
							Diare of a viadual affect visibility of podestrian processing or its surroundings	Warning slort	Colored pavement & road marking (words warning)
							Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
								warning alert	Non-legal signs (warning alert)
		6) [Intersection between				Enters to intersection without careful checking of pedestrians at or about to cross the pedestrian crossing	Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
		a arterial road and a narrow street with no			Entering vehicle		Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		traffic signal] A through vehicle (automobile,	An entering vehicle	_			Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
		motorcycle, bicycle) collides with a	(automobile, motorcycle, bicycle) from a cross road				Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
		pedestrian at pedestrian crossing	to intersection collides with a pedestrian at the				Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
			pedestrian crossing				Corner building affects visibility of the pedestrian crossing or its surroundings	Improve visibility of the pedestrian crossing surroundings	reflective mirrors
						Fails to, or does not recognize in time the crossing pedestrian and enters the intersection	Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing	Road markings (highly visible)
	,						1 our visionity of the pedestrian crossing	improve visibility of the pedestrian crossing	Colored pavement
					Pedestrian	Crosses a pedestrian crossing without careful checking of an approaching vehicle	Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
Pedestrian	Interpostion						Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
-vehicle(Crossing)	Intersection (6/6)						Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
							Corner building affects visibility of vehicles approaching the pedestrian crossing	Improve visibility of the pedestrian crossing surroundings	reflective mirrors
			Cor	mmon	-	-		Abolish left-turn channel	Remove the left-turn channel
						Turns left without careful checking of pedestrians at or about to cross the pedestrian crossing	Trees and shrubs affect visibility of the turn channel pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the turn channel pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the turn channel pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
					Left-turn		Gurd fences (guard rail, etc.) affect visibility of the turn channel pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
		7) [Common between			vehicle		Insufficient lighting affects visibility of the turn channel pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
			(automobile, motorcycle,				Larger corner-cut radius of the left turn channel tends to increase the left-turn speed, causing drivers to pay less attention to the turn channel pedestrian crossing or its surroundings	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)
		motorcycle, bicycle) collides with a pedestrian at or near the left-turn channel	bicycle) in the left turn channel collides with a pedestrian at or near the left-turn channel			Makes a left turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	Larger corner-cut radius of the left turn channel tends to increase the left-turn speed	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)
			pedestrian crossing	<u> </u>			Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
						Crosses a pedestrian crossing without careful checking	Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
						of an approaching vehicle	Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
						Crosses a road without careful checking of vehicles approaching the pedestrian crossing			Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)

Study	process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	category		Common		-	-		Spatial separation of traffic lines between through vehicles and oncoming through vehicle	Median strips(new)
								Widen the narrow lane width to an appropriate width	Road widening
									Ramble strips
					-		•	Alert the driver to limit lane departure	Road studs
									Road markings (ribbed)
								Improve road alignment design	Road alignment improvement
								Improve sight distance	Sight distance improvement
									Delineator (new or larger type)
									Road markings (highly visible)
							Curve affects the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	Road studs
									Rubber pole
						Enters into a curve section without paying full attention to the road alignment and departs from the lane			Colored pavement
								Maria dat	Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
								Improve road alignment design	Improve longitudinal road alignment design
				Q				Provide indications for easier recognition of road alignment	Delineator (new or larger type)
				A LO			Crests affect the ability to recognize the front road alignment		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
								Reduce or level the downward slope	Improve longitudinal road alignment design
			A through vehicle (automobile, motorcycle)						Improve pavement (bunping pavement, grooving (lateral))
			departs from the lane and collides with an oncoming vehicle traveling on the opposing lane	nd ng		Speed or steering at curve section and narrow road is not suitable to the road alignment and road width, causing the vehicle to depart from the lane	A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
					Through vehicle		Driving speed tends to increase when there is a straight section before the curve	Warning alert	Improve pavement (bunping pavement, grooving (lateral))
					Vernoie				Colored pavement & road marking (words'warning)
					_				Non-legal signs (warning alert)
		A through vehicle (automobile, motorcycle) collides with an oncorning vehicle on a road		-00 (A wheel skid is likely to occur due to a sharp curve	Improve road alignment design	Road alignment improvement
Head-on	Non-							Improve superelevation	Superelevation improvement
collision	intersection (1/2)							Reduce pavement slipperiness	Improve pavement (anti-skid pavement)
							Road surface tends to get icy and slippery	Prevent road surface from icing	Snow/cold countermeasures (chemical application)
									Snow/cold countermeasures (snow melting facility)
						Fails to maneuver the vehicle according to surface condition (icy road, etc.) and vehicle becomes out of			Improve pavement (grooving)
						control	Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)
							Slippery surface due to grating cover	Prevent slips	Improve grating cover
						Does not pay attention to travel position and the vehicle departs from the lane	Pond drainage is had in wet weather, affecting the shills to discours travel position	Improve drainage	Improve pavement (porous pavement)
							Road drainage is bad in wet weather, affecting the ability to discern travel position	Provide indications for easier recognition of travel position in wet weather	Road markings (highly visible)
							Difficult to check travel position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible)
									Ramble strips
						Aimless driving or drowsiness causes lane departure and		Alert the driver to limit lane departure	Road studs
						continues to drive without realizing it or too late to notice it			Road markings (ribbed)
								Warning alert	Improve pavement (bunping pavement, grooving (lateral))
								Improve road alignment design	Road alignment improvement
							Curve affects the ability to recognize the front road alignment	Improve sight distance	Sight distance improvement
								Limit take-over	Ramble strips
									Road studs
								Improve road alignment design	Improve longitudinal road alignment design
			A through vehicle	- (D)		Enters the opposite lane to overtake the preceding	Difficult to determine the traffic condition in front due to the crest	Provide indications for easier recognition of the front road alignment	Delineator (new or larger type)
			(automobile, motorcycle) entered the opposite lane		Through	vehicle, without paying full attention to what is ahead		Limit take-over	Ramble strips
			for overtake, and collides with an oncoming vehicle		vehicle				Road studs
			on the road				Standing vehicle area and main lane are either not separated or insufficient in space, and standing vehicles obstruct the traffic of following through vehicles	Separate the standing vehicle space and main lane	Improve standing zone
							Bus stop area and main line are either not separated or insufficient in space, and traffic of the following through vehicles is obstructed when a bus stops	Address traffic obstruction by the standing bus	Improve bus bay
							·	Dravide quateling engeting to	Additional overtake lane
						'	No overtaking opportunity for a long distance	Provide overtaking opportunity	Climbing lane
						Enters the opposite lane to overtake the bicycle in front	Lack of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
<u></u>						without making a full safety check		1 , , , , , , , , , , , , , , , , , , ,	

Study	process	(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Cor	mmon	-	-	-	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
			A through vehicle					Spatial separation of traffic lines between right-turn and through	Right-turn lane (new)
			(automobile) departs from lane to avoid a vehicle waiting for right-turn, and		Through	Departs to road shoulder to avoid a main lane vehicle	Waiting for right turn is preventing the following through vehicles from passing through	vehicles	Channelization (roadway center zebra stripes)
		2) A through vohicle	collides with a bicycle		vehicle	waiting for right turn	weating for right turn is preventing the following unrough verticles from passing unrough	Drobibit right turn	Median strips (close the cut area)
		A through vehicle (automobile, motorcycle, bicycle) collides at road	traveling the wrong way at a road shoulder					Prohibit right turn	Rubber pole
	Non-	shoulder with a bicycle					Traffic appropriate on main lane increases meterousles gains through an road aboutles	Deduce/aliminate traffic congention	Widen road width (increase the number of lanes)
	intersection (2/2)		A motorcycle/bicycle rides on road shoulder to avoid		4	Drives on a road shoulder	Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Eradicate bottleneck intersections
	(2/2)		stationary traffic on traffic lane, and collides with a		Motorcycle/ bicycle		Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
			bicycle traveling the wrong way			Drives on a road shoulder without paying full attention on oncoming bicycles	-	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
Head-on collision		A bicycle collides with an oncoming bicycle on a bicycle & pedestrian lane	A cyclist weaving through pedestrians hits an oncoming bicycle on a bicycle & pedestrian lane	0 0 0	Bicycle	The bicycle swerves left and right to avoid hitting pedestrians and bicycles	Passage between bicycles and pedestrians is not separated	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
							A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
						Notices the oncoming vehicle but driving too fast to avoid		Warning alert	Improve pavement (bunping pavement, grooving (lateral))
									Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
		A through vehicle (automobile, motorcycle)	A through vehicle (automobile, motorcycle)			it		Warning alert	Improve pavement (bunping pavement, grooving (lateral))
	Intersection (1/6)	collides with an oncoming vehicle at	collides with an oncoming vehicle at irregular or		Through vehicle		A long straight road section tends to increase driving speed		Colored pavement & road marking (words'warning)
		intersection	other types of intersections						Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Continues driving without paying attention to the traveling position in the intersection las a gentle curve or is irregular and it is difficult to identify the traveling position	Intersection has a gentle curve or is irregular and it is difficult to identify the traveling position	Improve intersection alignment	Improve intersection (address the irregular shape)
								Guida vahicles in the intersection to an appropriate resition	Channel marking (right-turn)
							Guide vehicles in the intersection to an appropriate position	Intersection center-point marking	

Study	process	(2) Setting target accidents' status	(3) Assuming acciden	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	category		·						Left-turn lane (new)
								Spatial separation of traffic lines between the preceding vehicle	Right-turn lane (new)
					-	-	-	entering a roadside and the following through vehicle	Channelization (roadway center zebra stripes)
									Widen road width (increase the number of lanes)
								Reduce/eliminate traffic congestion	Eradicate bottleneck intersections
								Improve road alignment design	Road alignment improvement
							Compatible the skills to see a significant and all seconds	Improve sight distance	Sight distance improvement
							Curve affects the ability to recognize the front road alignment	Warning alert	Colored pavement & road marking (words'warning)
						Continues driving without paying attention to the traffic		Walling alert	Non-legal signs (warning alert)
						condition in front		Improve road alignment design	Improve longitudinal road alignment design
							Difficult to determine the traffic condition in front due to the crest	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							Headlights of an oncoming vehicle affect visibility of the traffic condition in front	Install objects to block headlights	Glare prevention plates
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
						Drives at a speed too fast after noticing that the		Warning alert	Colored pavement & road marking (words'warning)
						preceding vehicle has decelerated, stopped, or changed			Non-legal signs (warning alert)
						lane (cutting)	A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bunping pavement, grooving (lateral))
					Following vehicle		A long straight road section tends to increase driving speed	warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					verlicie			Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
								Ose arranti-skiu pavement to reduce the braking/stopping distance	Snow/cold countermeasures (chemical application)
			motorcycle, intersection collides with a preceding vehicle that			Fails to maneuver the vehicle according to surface condition (icy road, etc.) and vehicle becomes out of control	Road surface tends to get icy and slippery	Prevent road surface from icing	Snow/cold countermeasures (snow melting facility)
							Total outside to get by and emppory		Improve pavement (grooving)
							Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)
							Slippery surface due to grating cover	Prevent slips	Improve grating cover
						Fails to, or does not notice in time the sudden stop/deceleration of the preceding vehicle due to aimless driving or drowsiness	A long straight road section tends to make drivers less attentive	Warning alert	Improve pavement (bunping pavement, grooving (lateral))
									Colored pavement & road marking (words'warning)
		1) A following vehicle		cycle, in non- s with a that					Non-legal signs (warning alert)
Rear-end	Non-	(automobile, motorcycle, bicycle) collides with a				Fails to, or does not notice in time the sudden stop/deceleration of the preceding vehicle due to inattentive driving	Existence of eye-catching objects, other than traffic safety facilities	Warning alert	Colored pavement & road marking (words'warning)
collision		preceding vehicle on a							Non-legal signs (warning alert)
		road	stopped, or made a lane change			Fails to, or does not anticipate in the time the sudden		Wasterday	Colored pavement & road marking (words'warning)
			onango	-00		stop, deceleration, or lane change (cutting) of the preceding vehicle	-	Warning alert	Non-legal signs (warning alert)
						Does not notice the roadside IN/OUT in time and makes a sudden stop/deceleration or changes lane on traffic lane		Implement countermoscures for easier recognition of readside IN/OLIT	Delineator (new)
							Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Colored pavement
					I I.			Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane
				───				Consolidate of move in Conference	Remove IN/OUT of roadside
							Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new)
									Colored pavement Consolidate IN/OUT of roadside or move away from the main
								Consolidate or move IN/OUT of roadside	lane
									Remove IN/OUT of roadside
					'		Piers of a viaduct affect visibility of the roadside IN/OUT	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
						Does not notice the vehicle going in or coming out from the roadside in time and makes a sudden		Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
						stop/deceleration or changes lane on main lane	Piers of a pedestrian bridge affect visibility of the roadside IN/OUT		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
					Preceding vehicle		Trees and shrubs affect visibility of the roadside IN/OUT	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the roadside IN/OUT	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
Ī							Ground equipment affects visibility of the roadside IN/OUT	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the roadside IN/OUT	Improve the design of guard fences	Use guard pipe for improvement
						Makes a sudden stop/deceleration or change lane on	Waiting area for the median-cut is too narrow and waiting for a right-turn obstructs the following through vehicle	Secure enough waiting space for the right-turn vehicle	Channelization (roadway center zebra stripes)
						traffic lane to make a right turn or U-turn at median-cut	Training and for the median out is too harrow and walling for a hymrum obstitude the following through vehicle	Prohibit the right-turn or U-turn	Median strips (close the cut area)
						Makes a sudden stop/deceleration or changes lane on traffic lane to avoid collision with a standing vehicle on road	The standing vehicle is over the lane, obstructing vehicles traveling on the main lane	Separate the standing vehicle space and main lane	Improve standing zone
						Makes a sudden stop/deceleration or changes lane on traffic lane to avoid collision with the stopped bus	Bus stop area and main lane are either not separated or insufficient in space, and traffic of the following through vehicles are obstructed when a bus stops	Address traffic obstruction by the standing bus	Improve bus bay
									Guide signs, warning signs
	 			'	Does not notice the change in lane operation in time, and	Change in lane operation, including changes from through lane to left-turn lane, or transition runoff from two lanes to a single lane	Give advanced warning on change in lane operation	Non-legal signs (indication of lane-use control)	
1		 				makes a sudden lane change			Road markings
	<u> </u>					ı		1	

Stud	ly process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
							Padusa/aliminata traffic connection	Widen road width (increase the number of lanes)	
					_			Reduce/eliminate traffic congestion	Eradicate bottleneck intersections
								Improve road alignment design	Road alignment improvement
							Curve affects the ability to recognize the front road alignment	Warning alert	Colored pavement & road marking (words'warning)
						Enters an intersection without careful checking of traffic		warning alert	Non-legal signs (warning alert)
			A following vehicle			congestion at outflow side		Improve road alignment design	Improve longitudinal road alignment design
			(automobile, motorcycle,				Crests affect the ability to recognize the front road alignment	Warning alert	Colored pavement & road marking (words'warning)
			bicycle) enters an intersection and collides					Training diox	Non-legal signs (warning alert)
			with a preceding vehicle that has					Reduce or level the downward slope	Improve longitudinal road alignment design
			decelerated/stopped due		Following vehicle		A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
			to traffic clogging of road ahead				A communication to institute and in any operation	Warning alert	Colored pavement & road marking (words'warning)
						Enters an intersection at a speed too fact to avoid			Non-legal signs (warning alert)
						Enters an intersection at a speed too fast to avoid collision after noticing the traffic clog			Improve pavement (bunping pavement, grooving (lateral))
							A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
								Inform drivers to stop	Stop line (widen its width)
		1) [Intersection with/without traffic						Secure enough space for the left-turn vehicle to wait for the crossing pedestrians and bicycles	Pedestrian crossing (setback)
					-	Drives at a speed too fast to avoid the preceding vehicle that has decelerated or stopped Makes a left turn at a speed too fast to avoid the preceding vehicle that has decelerated or stopped Fails to, or does not notice in time that the preceding vehicle has stopped/decelerated	-	Spatial separation of traffic lines between preceding left-turning vehicle and following through vehicles	Left-turn lane (new)
1								Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
								Ů	Eradicate bottleneck intersections
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed	Warning alert	Improve pavement (bunping pavement, grooving (lateral))
		signals: common] A following vehicle							Colored pavement & road marking (words'warning)
Rear-end collision		on (automobile, motorcycle, bicycle) collides with a preceding vehicle at intersection [continues on next page]	A following vehicle (automobile, motorcycle, bicycle) enters an intersection and collides with a preceding left- turning vehicle that has						Non-legal signs (warning alert)
COMBION	(1/0)						A long stock and a set of the death in a constant	Warring plant	Improve pavement (bunping pavement, grooving (lateral))
					Following vehicle		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
								Use an anti-plied and consent to an electric the band in a fine and a second	Non-legal signs (warning alert)
							Pour de de la constitue de la	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
							Road design with a blunt intersection angle tends to increase speed before the pedestrian crossing	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
							-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
						<u> </u>			Colored pavement & road marking (words'warning)
							Piers of viaduct affect visibility of pedestrian crossing, its surroundings, or traffic after the left turn	Warning alert	Non-legal signs (warning alert)
			decelerated/stopped in front of pedestrian					Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
			crossing				Piers of viaduct affect visibility of pedestrian crossing, its surroundings, or traffic after the left turn		Colored pavement & road marking (words'warning)
							, , , , , ,	Warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
						Makes a left turn without careful checking of pedestrians at or about to cross the pedestrian crossing, or the traffic congestion after the left turn, and makes a sudden	Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Improve the design of guard fences	Use guard pipe for improvement
					vehicle	stop/deceleration immediately before the pedestrian crossing	Pedestrian crossing with insufficient lighting affects visibility of the pedestrian crossing, its surroundings, or traffic after the left	Improve road lighting	Road lighting (new, improved, add, move)
									Colored pavement & road marking (words'warning)
1							Corner building affects visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Warning alert	Non-legal signs (warning alert)
							Pedestrian crossing setback tends to increase the speed before the pedestrian crossing, causing drivers to pay less attention to pedestrian crossing, its surroundings, or traffic after the left turn	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
							Road design with a blunt intersection angle tends to increase the left-turn speed, causing drivers to pay less attention to pedestrian crossing, its surroundings, or traffic after the left turn	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed, causing drivers to pay less attention to pedestrian crossing, its surroundings, or traffic after the left turn	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)

Stud	Study process (2) Setting target accidents' status		(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	lmage	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Spatial separation of traffic lines between the preceding right-turn waiting vehicle and following through vehicles	Right-turn lane (new)
					-	-	-		Widen road width (increase the number of lanes)
								Reduce/eliminate traffic congestion	Eradicate bottleneck intersections
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
							A dominate steps to list to institute diffing opposit	Warning alert	Colored pavement & road marking (words'warning)
						Drives at a speed too fast to avoid the preceding vehicle			Non-legal signs (warning alert)
						that has decelerated or stopped			Improve pavement (bunping pavement, grooving (lateral))
							A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
					Following vehicle				Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
							Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)
		[Continues from previous page]				Makes a right turn at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
									Intersection center-point marking
						Fails to, or does not notice in time that the preceding vehicle has stopped/decelerated when making a right turn	-	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							Piers of viaduct affect visibility of pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
		[Intersection							Non-legal signs (warning alert)
Rear-end		with/without traffic					Pedestrian bridge affects visibility of pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
collision	(2/5)	following vehicle						Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Improve the design of guard fences	Use guard pipe for improvement
					Preceding	Makes a right turn without careful checking of pedestrians at or about to cross the pedestrian crossing, oncoming vehicles, or the traffic congestion after the right	Pedestrian crossing with insufficient lighting affects visibility of the pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Improve road lighting	Road lighting (new, improved, add, move)
						turn, and makes a sudden stop/deceleration while making l	Pedestrian crossing setback tends to increase the speed before the pedestrian crossing, causing drivers to pay less attention to pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
							Road design with a blunt intersection angle tends to increase the right-turn speed, causing drivers to pay less attention to pedestrian crossing, its surroundings, oncoming traffic, or traffic after the left turn	Improve intersection angle	Improve intersection (orthogonal)
							Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
							pedestrian crossing or its surroundings, oncoming traffic, or traffic after the left turn	Guide right-turn verticles in the intersection to an appropriate position	Intersection center-point marking
							Difficult to make simultaneous checking of the oncoming traffic, pedestrian crossing or its surroundings while making a right turn	Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians	Traffic signals (right-turn only phase)
								Temporal separation of traffic lines between the automobile and crossing pedestrians	Improve traffic signal phase (pedestrians and vehicles separation light system)
								Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)
							Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Clear indication of right-turn path in the intersection	Channel marking (right-turn)
								Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	odlogoly							Improve road alignment design	Road alignment improvement
								Improve sight distance	Sight distance improvement
							Curve affects the ability to recognize the front road alignment		Colored pavement & road marking (words'warning)
						Continues driving without paying attention to the traffic condition in front		Warning alert	Non-legal signs (warning alert)
								Improve road alignment design	Improve longitudinal road alignment design
							Difficult to determine the traffic condition in front due to the crest		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward along tonds to increase driving around		Improve pavement (bunping pavement, grooving (lateral))
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
						Drives at a speed too fast after noticing that the			Non-legal signs (warning alert)
						preceding vehicle has decelerated, stopped, or changed lane (cutting)			Improve pavement (bunping pavement, grooving (lateral))
							A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
					Following vehicle				Non-legal signs (warning alert)
								Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
									Snow/cold countermeasures (chemical application)
						Fails to maneuver the vehicle according to surface	Road surface tends to get icy and slippery	Prevent road surface from icing	Snow/cold countermeasures (snow melting facility)
						condition (icy road, etc.) and vehicle becomes out of control			Improve pavement (grooving)
						ooralo.	Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)
							Slippery surface due to grating cover	Prevent slips	Improve grating cover
						Fails to, or does not notice in time the sudden			Improve pavement (bunping pavement, grooving (lateral))
		[Intersection between a arterial road and a	oad and a eet with no al] A following utomobile, motorcycle, bicycle) near intersection collides with a preceding				s A long straight road section tends to make drivers less attentive	Warning alert	Colored pavement & road marking (words'warning)
_		narrow street with no traffic signal] A following							Non-legal signs (warning alert)
Rear-end collision	(3/5)	vehicle (automobile, motorcycle, bicycle)				Fails to, or does not notice in time the sudden stop/deceleration of the preceding vehicle due to inattentive driving Fails to anticipate or did not notice in time the lane change (cutting) of the preceding vehicle	Existence of eye-catching objects, other than traffic safety facilities	Warning alert	Colored pavement & road marking (words'warning)
		collides with a preceding vehicle at intersection	decelerated/stopped at intersection				, , , ,	,	Non-legal signs (warning alert)
		between a arterial road and a narrow street					-	Warning alert	Colored pavement & road marking (words'warning)
						change (cutting) of the preceding vehicle			Non-legal signs (warning alert)
									Delineator (new)
						Fails to notice the crossroad in time and makes a sudden		Improve visibility of the crossroad (local street)	Road marking (corner curb, dot-line marking)
						Fails to notice the crossroad in time and makes a sudden stop/deceleration on traffic lane	Poor visibility of the crossroad (local street)		Colored pavement Guide signs, warning signs, non-legal signs ("Intersection
									Ahead") Consolidate IN/OUT of roadside or move away from the main
								Close the crossroad (local street)	lane
									Delineator (new)
								Improve visibility of the crossroad (local street)	Road marking (corner curb, dot-line marking)
							Poor visibility of the crossroad (local street)		Colored pavement Guide signs, warning signs, non-legal signs ("Intersection
									Ahead') Consolidate IN/OUT of roadside or move away from the main
					Preceding vehicle			Close the crossroad (local street)	lane
							Piers of a viaduct affect visibility of the crossroad (local street)	Warning alert	Colored pavement & road marking (words warning)
						Fails to notice the entering vehicle from a crossroad in			Non-legal signs (warning alert)
						time and makes a sudden stop/deceleration on traffic lane	Diagraph a padestrips bridge offert visibility of the	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the crossroad (local street)	Warning alert	Colored pavement & road marking (words'warning)
							Trace and should affect visibility of the accorded (lead street)	Trim mous or remove trace or short-	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the crossroad (local street)	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the crossroad (local street) Ground on immort affects visibility of the crossroad (local street)	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
						Ground equipment affects visibility of the crossroad (local street)	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment	
							Guard fences (guard rail, etc.) affect visibility of the crossroad (local street)	Improve the design of guard fences	Use guard pipe for improvement
						Insufficient lighting at crossing road (local street) affects its visibility	Improve road lighting	Road lighting (new, improved, add, move)	

Part	Stud	/ process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accordance Acc		intersection/inte r-section	Accident status		lmage		Faults of parties involved	·	Examples of countermeasures' purpose	Example of detailed countermeasures
Part		outogory							Reduce or level the downward slope	Improve longitudinal road alignment design
Part									·	
A								A downward slope tends to increase driving speed	Warning alert	
Part						Following	Drives at a speed too fast to avoid the preceding vehicle			Non-legal signs (warning alert)
A				Con	mmon					
Part								A long straight road section tends to increase driving speed	Warning alert	
Part										
Part								-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
Rate of the control										Traffic signal (LED lighting)
Read								Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (enlarge size)
Part										Traffic signal (install extra lights)
									Move traffic signal to a more visible position	Traffic signal (improve installment position)
March Marc									Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
Part					Yello				Improve road alignment design	Road alignment improvement
Marie				bicycle) attempts to enter	=			Road curve affects visibility of the traffic signal	Improve sight distance	Sight distance improvement
Part						Following			Wassian slad	Colored pavement & road marking (words'warning)
March				is turning red, and collides		vehicle			warning alert	Non-legal signs (warning alert)
Part									Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
Part								Create offeet visibility of the traffic sizes!	Improve road alignment design	Improve longitudinal road alignment design
Part				decelerated stopped	Red Gree			Crests affect visibility of the traffic signal	Warning sleet	Colored pavement & road marking (words'warning)
Part									warriing alert	Non-legal signs (warning alert)
March Marc								Trees and shrubs affect visibility of the traffic signal	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
A finding water and an international control of the protein plant to the plant to								Traffic/advertisement signs affect visibility of the traffic signal	Coordinate, move, or remove traffic/advertisement signs	
A								Intersections are too near to each other	Consolidate the intersections	Consolidate IN/OUT of roadside or move away from the main lane
Part						_	_	-	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
A Part of the control										Eradicate bottleneck intersections
Promotion of the control of the co			bit en co co int with/without traffic signals: common] A ha	bicycle) attempting to	IIIIIIIIII				Improve road alignment design	Road alignment improvement
Processory of the processor of the processory of the processor of the proc								Curve affects the ability to determine the traffic situation after the intersection outflow	Warning alert	Colored pavement & road marking (words'warning)
Solicio Solici				intersection with a	■				3	Non-legal signs (warning alert)
March Marc						venicie			Improve road alignment design	
In Express or price was the pr								Crests affect the ability to determine the traffic situation after the intersection outflow	Warning alert	Colored pavement & road marking (words'warning)
A following which is well of the published from the published and make production of			bicycle) collides with a							
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Secure sufficient use length secording is intelligible tim memoral. Pre-city in pre-city in the public visibility of the pedestrate noising, its summandings, or ancorang staffs.						-		-	preceding verticle and following unought verticles	
A blowing which is not interaction profit or presentation consisting of the presentation consisting of the presentation consisting of the presentation consisting of the presentation consisting that interaction controlled interaction profit or the presentation consisting of the presentation consisting that interaction controlled interaction profit or the presentation controlled interaction controlled interactio									Secure sufficient lane length according to right/left turn demands	
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A following vehicle (Internation, motorycle, learned in the production in mining and the production of								Crests affect visibility of the pedestrian crossing, its surroundings, or oriconning trainic	improve road alignment design	•
A following vehicle fluctomation, monotogical particular forms an interaction colder near the elementation with a management of the processing white forms are a rightfelt turn without control checking of the processing white pr								Piers of viaduct affect visibility of pedestrian crossing, its surroundings, or oncoming traffic	Warning alert	· · · · · · · · · · · · · · · · · · ·
Pleas of pedestrian bridge affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic move, or remove trees or shrubs. A following which a feature for the pedestrian bridge affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic makes a right feet transmission with a season of the processing through which as a right feet transmission with a season of the processing through which as a right feet transmission with a season of the processing through which as a right feet transmission with a season of the processing through which as a right feet transmission with a preceding traffic charging starts are the processing through which as a right feet transmission with a preceding traffic charging tr	1								Remove or move the pedestrian bridge	
where an intersection colless rare the intersection with a situation with a situation with a situation of the concoming frough vehicles, and markes a subdivide affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or oncoming traffic common the pedestrian crossing, its surroundings, or					<u> </u>			Piers of pedestrian bridge affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Nombre of more the pedestrial bridge	
Intersection with a proceeding vehicle that has decelerated stopped private that has				enter an intersection					Warning alert	
Proceeding whiche that has decelerated stopped to make a right left turn between the control programs of the control process of the control programs of the control process of the process of the control process of the control process of the process of the control process of the process of the control process of the contr							Makes a right/left ture without careful should be	Trees and shrubs affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Trim, move, or remove trees or shrubs	
or the concerning frough vehicles, and makes a suddle of the pedestrian crossing, as surroundings, or oncoming traffic Coordinate, move, or remove the ground equipment of Guard fences (guard rail, etc.) affect viability of the pedestrian crossing, its surroundings, or oncoming traffic Inprove the design of guard fences. Use guard pep for improvement Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Inprove the design of guard fences. Use guard pep for improvement Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Insurroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing, its surroundings, or oncoming traffic Varieties (fluing affects viability of the pedestrian crossing				preceding vehicle that		Preceding				
Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic insufficient lighting at pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic consists of the peace traffic corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Under peace traffic corner buildings, or oncoming traffic Under peace traffic corner buildings, or o						vehicle	or the oncoming through vehicles, and makes a sudden			
Insufficient lighting at pedestrian crossing, affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic Larger corner-cut radius subjects to pay less attention to the pedestrian crossing, its surroundings, or oncoming traffic Larger corner-cut radius subjects to pay less attention to the pedestrian crossing, its surroundings, or oncoming traffic Colored pavement & road marking (words warning) Improve intersection angle Improve intersection angle Improve intersection angle Improve corner-cut radius Impro								Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic		
Comer building affects visibility of the pedestrian crossing, is surroundings, or oncoming traffic A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle that has changed vehicle that has changed vehicle that has changed vehicle that has changed vehicle to avoid the preceding vehicle that has changed vehicle that has changed in the preceding traffic cologging, etc. Does not notice the change in lane operation in time, and								Insufficient lighting at pedestrian crossing affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Improve road lighting	Road lighting (new, improved, add, move)
Non-legal signs (warning alert) Road design with a blunt intersection angle tends to increase the left-turn speed, causing drivers to pay less attention to pedestrian crossing, its surroundings, or oncoming traffic Larger corner-cut radius tends to increase the left-turn speed, causing drivers to pay less attention to the pedestrian crossing, its surroundings, or oncoming traffic A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle tank has changed lane to avoid the preceding vehicle than the schanged lane to avoid the preceding traffic clogging, etc. A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle than the schanged lane to avoid the preceding vehicle than the schanged lane to avoid the preceding traffic clogging did on the preceding traffic clogging and the control of through vehicles in through lane to avoid the preceding traffic clogging and the traffic clogging traffic clogging in the control of through vehicles in through lane to avoid the preceding traffic clogging and the preceding traffic clogging the control of through vehicles in through lane to avoid the preceding traffic clogging the control of through vehicles in through lane to avoid the preceding traffic clogging and the traffic clogging than the right/left-turn lane control of through vehicles in through lane to avoid the preceding traffic clogging the control of through vehicles in through lane to right/left-turn lane operation in time, and change in lane operation in time, and change in lane operation to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lane to right/left-turn lane of through vehicles in through lan	1							Corner building affects visibility of the pedactrian executed, its surroundings, or consists traffic	Warning alert	Colored pavement & road marking (words'warning)
Preceding vehicle intersection with a preceding vehicle avoid the preceding vehicle of cologing, etc. A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle intersection with a preceding vehicle than scharged lane to avoid the preceding vehicle of cologing, etc. A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle than scharged lane to avoid the preceding vehicle solution, etc. A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle without making a safety check of the next lane								Corner building affects visibility of the pedestrian crossing, its surroundings, or oriconning trainic	warning alert	Non-legal signs (warning alert)
A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection with a preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool wind a preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool wind preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool wind preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool wind preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool wind preceding vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging, etc. Tool word the preceding vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane to avoid the preceding traffic clogging vehicle that has changed lane operation in time, and vehicle in through lane to right/left-turn lane (extended) Tools not notice the change in lane operation in time, and vehicle in through lane to right/left-turn lane (avoid warning on change in lane operation) Warning alert Warning alert Widen road width (increase the number of lanes) Eradicate bottleneck intersections Line of vehicles waiting to make right/left-turn lane, and the last vehicle in through lane is obstructing traffic clogging wehicle in through lane is obstructing traffic congestion Secure sufficient lane length according to right/left turn demands obstructing traffic clogging wehicle that have a sufficient lane land with (increase the number of lanes) Eradicate bottleneck intersections Line of vehicles waiting to make right/left-turn lane in through lane to right/left-tur									Improve intersection angle	Improve intersection (orthogonal)
A following vehicle (automobile, motorcycle, bicycle) attempting to enter the intersection collides near the intersection with a preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. A following vehicle (cutting) of the preceding vehicle V									Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
Automobile, motorcycle, bicycle) attempting to enter the intersection collides near the intersection with a preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Automobile, motorcycle, bicycle) attempting to enter the intersection collides near the intersection with a preceding vehicle that has changed lane to avoid the preceding traffic clogging wehicle that has changed in the preceding traffic clogging, etc. Automobile, motorcycle, bicycle) attempting to enter the intersection on the intersection on the intersection on the preceding traffic congestion				A following vehicle					Warning alert	Colored pavement & road marking (words'warning)
enter the intersection collides near the intersection with a preceding vehicle that has changed lane to avoid the preceding raffic clogging, etc. Proceding vehicle that has changed lane to avoid the preceding raffic clogging, etc. Proceding vehicle that has changed lane to avoid the preceding traffic clogging without making a safety check of the next lane vehicle in through lane is obstructing traffic of through vehicles in through lane is obstructing traffic of through vehicles in through lane to right/left-turn lane. Proceding vehicle that has changed lane to avoid the preceding traffic clogging without making a safety check of the next lane vehicle in through lane is obstructing traffic of through vehicles in through lane in lane operation, including changes from through lane to right/left-turn lane. Prone to traffic congestion Eradicate bottleneck intersections Line of vehicles waiting to make right/left-turn lane, and the last vehicle in through lane is obstructing traffic of through vehicles in through lane obstructing traffic of through vehicles in through lane of right/left-turn lane. Give advanced warning on change in lane operation. Give advanced warning on change in lane operation. Give advanced warning on change in lane operation.				(automobile, motorcycle,	111111	vehicle	(cutting) of the preceding vehicle		J	Non-legal signs (warning alert)
collides near the intersection with a preceding vehicle that has changed lane to avoid the preceding traffic clogging wehicle that has changed lane to avoid the preceding traffic clogging, etc. Changes lane to avoid the preceding traffic clogging without making a safety check of the next lane without maki					——————————————————————————————————————			Prone to traffic congestion	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
preceding vehicle that has changed lane to avoid the preceding traffic clogging, etc. Does not notice the change in lane operation in time, and clogging, etc. Line of vehicles waiting to make right/left turn lane, and the last vehicle in through lane is Secure sufficient lane length according to right/left turn demands vehicle in through lane in Secure sufficient lane length according to right/left turn demands vehicle in through lane in solger than the right/left turn demands vehicle in through lane is Secure sufficient lane length according to right/left turn demands vehicle in through lane in lane operation in time, and length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to right/left turn demands vehicle in through lane is sufficient lane length according to r				collides near the						Eradicate bottleneck intersections
has changed lane to avoid the preceding traffic clogging, etc. Clogging, etc. Change in lane operation in time, and clogging lane operation, including changes from through lane to right/left-turn lane							without making a safety check of the next lane	Line of vehicles waiting to make right/left-turn is longer than the right/left-turn lane, and the last vehicle in through lane is	Secure sufficient lane length according to right/left turn demands	Left-turn lane (extended)
clogging, etc. Clogging, etc. Change in lane operation, including changes from through lane to right/left-turn lane Change in lane operation, including changes from through lane to right/left-turn lane Change in lane operation				has changed lane to					J J g	Right-turn lane (extended)
Non-legal signs (indication of lane-use control)							Does not notice the change in lane operation in time, and Change in I	Change in lane operation, including changes from through lane to right/left-turn lane	Give advanced warning on change in lane operation	
							makes a sudden iane change			Non-legal signs (indication of lane-use control)

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Con	nmon	-	-	-	Close the turn channel	Remove the left-turn channel
						Makes a left turn at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	Larger corner-cut radius of the left turn channel tends to increase the left-turn speed	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)
							Trees and shrubs affect visibility of the pedestrian crossing and its surroundings of the turn channel, or outflow traffic	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing and its surroundings of the turn channel, or outflow traffic	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		Intersection with/without traffic	A following vehicle			Drives without careful checking of pedestrians at or about to cross the pedestrian crossing, or the vehicles traveling	Ground equipment affects visibility of the pedestrian crossing and its surroundings of the turn channel, or outflow traffic	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
Rear-end collision	Intersection (5/5)	following vehicle (automobile, motorcycle,	(automobile, motorcycle, bicycle) in left-turn channel collides at the left-turn channel with a			on the traffic lane, and makes a sudden stop/deceleration in the turn channel	Gurd fences (guard rail, etc.) affect visibility of the pedestrian crossing and its surroundings of the turn channel, or outflow traffic	Improve the design of guard fences	Use guard pipe for improvement
		preceding vehicle at left turn channel	preceding vehicle that has either decelerated or stopped		Preceding vehicle		Pedestrian crossing with insufficient lighting affects visibility of the pedestrian crossing and its surroundings of the turn channel, or outflow traffic	Improve road lighting	Road lighting (new, improved, add, move)
			Stopped					Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
						Fails to merge smoothly and makes a sudden stop/deceleration before the merge	Traffic congestion affects merging opportunity at merge area	Ensure smoother merging at merge area (secure sufficient merging lane length)	Intersection improvement (extend merging lane)
						'	Traffic after the merge (main lane) is heavy with little space between vehicles, affecting merging opportunity at merge area	Ensure smoother merging at merge area (secure sufficient merging lane length)	Intersection improvement (extend merging lane)

Study	process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Common		_			Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane
			Common		-			Consolidate of move in/OoT of foadside	Remove IN/OUT of roadside
					_			Prohibit right-turn from the roadside	Median strips (new or close cut area)
								- Combangan tan nomba roccosto	Rubber pole
							Main lane curve affects visibility of the main lane through vehicles	Improve road alignment design	Road alignment improvement
								Improve sight distance	Sight distance improvement
							Main lane crests affect visibility of the main lane through vehicles	Improve road alignment design	Improve longitudinal road alignment design
							Piers of a viaduct affect visibility of the main lane through vehicles	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
						Enters main lane without careful checking of main lane through vehicles	Piers of a pedestrian bridge affect visibility of the main lane through vehicles	Warning alert	Colored pavement & road marking (words'warning)
					Entering				Non-legal signs (warning alert)
		A			vehicle		Trees and shrubs affect visibility of the main lane through vehicles	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the main lane through vehicles	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
Head-to- side	Non- intersection						Ground equipment affects visibility of the main lane through vehicles	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
collision	(1/2)	with a main lane through			ĺ		Gurd fences (guard rail, etc.) affect visibility of the main lane through vehicles	Improve the design of guard fences	Use guard pipe for improvement
			traveling on main road and collides with a main				Standing vehicles on road affect visibility of the main lane through vehicles	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)
			road through vehicle on the road					Provide indications for easier recognition of travel position and speed of through vehicles	Delineator (new)
						Misreads the traveling position and speed of the main lane through vehicles, and enters main lane	-	Warning alert	Colored pavement & road marking (words'warning)
								Ü	Non-legal signs (warning alert)
				-				Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
								Warning alert	Colored pavement & road marking (words'warning)
						Drives at a speed too fast to avoid a vehicle going in or			Non-legal signs (warning alert)
					Through	coming out from a roadside after noticing it			Improve pavement (bunping pavement, grooving (lateral))
					vehicle		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words warning)
									Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Drives without anticipating vehicles going in or coming	-	Warning alert	Colored pavement & road marking (words warning)
						out from roadside			Non-legal signs (warning alert)

Study	process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
							Maio long guns offeets visikility of the maio long road shoulder.	Improve road alignment design	Road alignment improvement
							Main lane curve affects visibility of the main lane road shoulder	Improve sight distance	Sight distance improvement
							Main lane crests affect visibility of the main lane road shoulder	Improve road alignment design	Improve longitudinal road alignment design
							No. of a sindust off at in 18.70, a father and a boundary	Marianalan	Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of the main lane road shoulder	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the main lane road shoulder	Warning plant	Colored pavement & road marking (words'warning)
						Attempts to enter main lane without careful checking of motorcycles and bicycles		Warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the main lane road shoulder	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
					Entering vehicle		Traffic/advertisement signs affect visibility of the main lane road shoulder	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					70111010		Ground equipment affects visibility of the main lane road shoulder	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the main lane road shoulder	Improve the design of guard fences	Use guard pipe for improvement
								Improve main lane visibility	reflective mirrors
		2) An entering vehicle	A vehicle (automobile, motorcycle, bicycle)				Buildings near the roadside IN/OUT affect visibility of the main lane road shoulder	Warning alert	Colored pavement & road marking (words'warning)
		bicycle) from a roadside	attempts to enter between the through vehicles					warning alert	Non-legal signs (warning alert)
		shoulder with a	traveling on main road and collides with a					Provide indications for easier recognition of travel position and speed of motorcycles	Delineator (new)
		traveling on main road	motorcycle/bicycle traveling on a road			Misreads the traveling position and speed of motorcycles, and enters main lane	-	Warning alert	Colored pavement & road marking (words'warning)
			shoulder					Warning don	Non-legal signs (warning alert)
						Fails to anticipate bicycles and attempts to enter main lane without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
								Reduce or level the downward slope	Improve longitudinal road alignment design
						Drives on road shoulder at a speed too fast to avoid a vehicle going in or coming out from a roadside after noticing it	A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
Head-to-	Non-							Taning act	Non-legal signs (warning alert)
side collision	intersection (2/2)						A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
					Motorcycle/ bicycle		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
							Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
						Drives on a road shoulder			Eradicate bottleneck intersections
							Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
						Drives on road shoulder without anticipating vehicles	-	Warning alert	Colored pavement & road marking (words'warning)
						going in or coming out from roadside		-	Non-legal signs (warning alert)
							Piers of a viaduct affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
			A vehicle (automobile, motorcycle, bicycle)		Entoring	Enters main lone without careful sheeking of hisyeles	Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
		(automobile, motorcycle,		• •		Enters main lane without careful checking of bicycles traveling on bicycle & pedestrian lane	Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		collides with a through	to enter main road collides with a bicycle				Ground equipment affects visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
		pedestrian lane	traveling on the bicycle & pedestrian lane				Gurd fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Improve the design of guard fences	Use guard pipe for improvement
								Improve bicycle & pedestrian lane visibility	reflective mirrors
							Buildings near the roadside IN/OUT affect visibility of bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							Insufficient bicycle & pedestrian lane lighting affects its visibility	Improve road lighting	Road lighting (new, improved, add, move)
					Bicycle	Drives without anticipating vehicles going in or coming out from side road	-	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)

Study	/ process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Common		-	-	-	Spatial separation of traffic lines between the main lane through vehicles and entering vehicle from a crossroad	Grade crossing
								Spatial separation of traffic lines between the main lane through vehicles and entering vehicle from a crossroad	Consolidate IN/OUT of roadside or move away from the main lane
			Cor	mmon	-	-	-	Temporal separation of traffic lines between the main lane through vehicles and entering vehicle from crossroad	Traffic signal (new)
								Prohibit through traffic or right-turn from a crossroad	Median strips (new or close cut area)
							Main lane curve affects visibility of the main lane through vehicles	Improve road alignment design	Road alignment improvement
							Main lane crests affect visibility of the main lane through vehicles	Improve road alignment design	Improve longitudinal road alignment design
							Diers of a viadual offest visibility of the main lone through vehicles	Warning plant	Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of the main lane through vehicles	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the main lane through vehicles		Colored pavement & road marking (words'warning)
				<u> </u>				Warning alert	Non-legal signs (warning alert)
						Enters an intersection without careful checking of the main lane through vehicles	Trees and shrubs affect visibility of the main lane through vehicles	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the main lane through vehicles	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the main lane through vehicles	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Gurd fences (guard rail, etc.) affect visibility of the main lane through vehicles	Improve the design of guard fences	Use guard pipe for improvement
1					Entering			Improve main lane visibility	reflective mirrors
					vehicle		Corner building affects visibility of the main lane through vehicles		Colored pavement & road marking (words'warning)
		Intersection with no traffic signal] An entering		11111111111			Control Sanding and Control National Action Control Co	Warning alert	Non-legal signs (warning alert)
Head-to-	Intersection		9						Colored pavement & road marking (words'warning)
side collision	(1/3)	vehicle (automobile, motorcycle, bicycle) from	An entering vehicle				-	Warning alert	Non-legal signs (warning alert)
		a crossing road collides at intersection with a	(automobile, motorcycle, bicycle) from crossroad	<u> </u>					Colored pavement
		through vehicle	enters between the through vehicles traveling				Difficult to recognize that it is an intersection	Improve visibility of the intersection	Guide signs, warning signs, non-legal signs ("Intersection Ahead")
			on main road and collides at intersection with a main	_		Fails to recognize intersection or misunderstands give- way rules involving the crossroad, and enters the			Colored pavement
			road through vehicle			intersection	Difficult to perceive a give-way rule with the crossroad	Improve indication of give-way rules	Road marking (corner curb, dot-line marking)
									Place a center line at major road side
								Provide indications for easier recognition of travel position and speed	Delineator (new)
						Misreads the traveling position and speed of the main	-	of through vehicles	Colored pavement & road marking (words'warning)
						lane through vehicles, and enters an intersection		Warning alert	Non-legal signs (warning alert)
								Reduce or level the downward slope	Improve longitudinal road alignment design
									Improve pavement (bunping pavement, grooving (lateral))
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
						Drives at a speed too fast to avoid a vehicle coming out from a crossroad after noticing it			Improve pavement (bunping pavement, grooving (lateral))
					Through		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
					vehicle				Non-legal signs (warning alert)
								Use an anti-skid payament to reduce the braking/steeping distance	
								Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Drives without anticipating vehicles coming out from a		Warning plant	Colored pavement & road marking (words'warning)
						Drives without anticipating vehicles coming out from a crossroad		Warning alert	Road marking (corner curb, dot-line marking)
	1								Non-legal signs (warning alert)

Study	process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Spatial separation of traffic lines between the main lane through vehicles and entering vehicle from a crossroad	Consolidate IN/OUT of roadside or move away from the main lane
			Сог	mmon	-	-	-	Temporal separation of traffic lines between the main lane through vehicles and entering vehicle from crossroad	Traffic signal (new)
								Prohibit through traffic or right-turn from a crossroad	Median strips(new)
							Main lane curve affects visibility of road shoulder at outflow side	Improve road alignment design	Road alignment improvement
							Main lane crests affect visibility of road shoulder at outflow side	Improve road alignment design	Improve longitudinal road alignment design
							Piers of a viaduct affect visibility of road shoulder at outflow side	Warning alert	Colored pavement & road marking (words'warning)
							Field of a viaduct affect visibility of foad shoulder at dufflow side	waning aen	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of road shoulder at outflow side	Warning alert	Colored pavement & road marking (words'warning)
						Enters an intersection without careful checking of		waning alert	Non-legal signs (warning alert)
						motorcycles and bicycles at outflow side	Trees and shrubs affect visibility of road shoulder at outflow side	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
					Entering		Traffic/advertisement signs affect visibility of road shoulder at outflow side	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					vehicle		Ground equipment affects visibility of road shoulder at outflow side	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
		2) [Intersection with no					Guard fences (guard rail, etc.) affect visibility of road shoulder at outflow side	Improve the design of guard fences	Use guard pipe for improvement
		Intersection with no traffic signalt] An	A vehicle (automobile, motorcycle, bicycle) in			Corner building affects visibility of road shoulder at outflow side Misreads the traveling position and speed of motorcycles, and enters an intersection		Improve visibility of road shoulder at outflow side	reflective mirrors
Head-to-		entering vehicle (automobile, motorcycle,					Wassian slant	Colored pavement & road marking (words'warning)	
side collision	Intersection (2/3)	bicycle) from a crossroad collides at						Warning alert	Non-legal signs (warning alert)
		intersection outflow side with a motorcycle/bicycle	enter between the					Provide indications for easier recognition of travel position and speed of motorcycles	Delineator (new)
		of the outflow side	through vehicles traveling on main road and collides at intersection with a				-		Colored pavement & road marking (words'warning)
			motorcycle/bicycle traveling on a road					Warning alert	Non-legal signs (warning alert)
			shoulder of outflow side			Fails to anticipate bicycles and enters an intersection without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
								Reduce or level the downward slope	Improve longitudinal road alignment design
				Xalpo			A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
						Drives on road shoulder at a speed too fast to avoid a		Wanning dient	Non-legal signs (warning alert)
						vehicle coming out from a crossroad after noticing it	A long straight road costion tonds to increase driving coold	Warning alert	Colored pavement & road marking (words'warning)
							A long straight road section tends to increase driving speed	waning aert	Non-legal signs (warning alert)
					Motorcycle/		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
					bicycle		Traffic connection on main lane increases motorcycles oning through as road choulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
						Drives on a road shoulder	Traffic congestion on main lane increases motorcycles going through on road shoulder	neduce/ellillidate tranic congestion	Eradicate bottleneck intersections
							Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
									Colored pavement & road marking (words warning)
						Drives on road shoulder without anticipating vehicles coming out from a crossroad	-	Warning alert	Road marking (corner curb, dot-line marking)
L									Non-legal signs (warning alert)

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	January					Makas a mistaka in judament of whether to also as a		Shorten the intersection cross distance	Improve intersection (make it compact)
			A through vehicle (automobile, motorcycle,		Through	Makes a mistake in judgment of whether to stop or go when the traffic signal is turning red, enters the intersection, and cannot pass through	Intersection is large and takes time to pass through	Limit the number of standing vehicles is intersection	Stop line (move forward)
			bicycle) could not cross the intersection when	Red	vehicle	intersection, and cannot pass unough		Limit the number of standing vehicles in intersection	Improve traffic signal phase (extend clearance time, etc.)
			traffic sign for vehicle is turning red, and collides			Makes a forceful entry to the intersection when the traffic		Improve recognition of the intersection size	Colored pavement
			at intersection with a vehicle that has started	Gree		signal is turning red and cannot pass through	Green interval of traffic signal is too short for the section with more traffic inflow	Secure intersection entry time for the section with more traffic inflow	Improve traffic signal phase (reallocation of green interval)
			from a crossroad	Gree	Entering	Enters an intersection upon, or immediately after the traffic signal turns green, and without careful checking of	-	Warning alert	Colored pavement & road marking (words'warning)
					vehicle	intersection traffic		3	Non-legal signs (warning alert)
									Traffic signal (LED lighting)
							Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (enlarge size)
		3) [Intersection with					Ourset arrects visibility of the famile signal		Traffic signal (install extra lights)
		traffic signals] Through vehicle (automobile,						Move traffic signal to a more visible position	Traffic signal (improve installment position)
		motorcycle, bicycle) traveling on main road						Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
		collides at intersection with a entering vehicle						Improve road alignment design	Road alignment improvement
		from a crossroad	A through vehicle (automobile, motorcycle,	<u> </u>			Road curve affects visibility of the traffic signal	Improve sight distance	Sight distance improvement
			bicycle) enters intersection when the		Through	Fails to check the traffic signal, or mistakenly looks at the traffic signal of adjacent intersection, and enters the		Warning clark	Colored pavement & road marking (words'warning)
		n	traffic signal for vehicles is red, and collides with	Re Gree	vehicle	intersection against a red traffic signal		Warning alert	Non-legal signs (warning alert)
			another vehicle entering from a crossroad	300			Crests affect visibility of the traffic signal	Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
				Gree				Improve road alignment design	Improve longitudinal road alignment design
Head-to- side	Intersection								Colored pavement & road marking (words'warning)
collision	(3/3)							Warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the traffic signal	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the traffic signal	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Intersections are too near to each other	Consolidate the intersections	Consolidate IN/OUT of roadside or move away from the main lane
							Diagn of a viaduat offeet visibility of the eidewell	Marsing clart	Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of the sidewalk	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the sidewalk		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
		A) fl. (1)	An entering vehicle				Trees and shrubs affect visibility of the sidewalk	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
		[Intersection with no traffic signal] An entering	(automobile motorcycle			Enters an intersection without careful checking of bicycles	Traffic/advertisement signs affect visibility of the sidewalk	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		vehicle (automobile, motorcycle, bicycle) from	enters between the				Ground equipment affects visibility of the sidewalk	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
		a crossroad collides with a through bicycle at	on main road and collides with a bicycle traveling on				Guard fence (guard rail, etc.) affect visibility of the sidewalk	Improve the design of guard fences	Use guard pipe for improvement
		pedestrian crossing	pedestrian crossing					Improve visibility of bicycles traveling on sidewalk	reflective mirrors
							Corner building affects visibility of sidewalk		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
							Insufficient sidewalk lighting affects its visibility	Improve road lighting	Road lighting (new, improved, add, move)
						Drives without anticipating vehicles coming out from a			Colored pavement & road marking (words'warning)
					Bicycle	crossroad	-	Warning alert	Non-legal signs (warning alert)
	1			l	l	1		1	

Study	process	(2) Setting target accidents' status	(3) Assuming accider	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
	odiogory	.							Consolidate IN/OUT of roadside or move away from the main lane
			Common		-	-		Consolidate or move IN/OUT of roadside	Remove IN/OUT of roadside
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the roadside IN/OUT		Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
							Diagonal a visabust offeet visibility of the conduide IN/OLIT	Warning plant	Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of the roadside IN/OUT	Warning alert	Non-legal signs (warning alert)
						Fails to notice the roadside IN/OUT in time and makes a	Trees and shrubs affect visibility of the roadside IN/OUT	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
						sudden left turn	Traffic/advertisement signs affect visibility of the roadside IN/OUT	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the roadside IN/OUT	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Gurad fences (guard rail, etc.) affect visibility of the roadside IN/OUT	Improve the design of guard fences	Use guard pipe for improvement
					Left-turn vehicle		Standing vehicles on road affect visibility of the roadside IN/OUT	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)
							Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new)
								<u>g</u>	Colored pavement
			A vehicle (automobile,			Makes a forceful left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for left turn is preventing the following through vehicles from passing through	Spatial separation of traffic liness between left-turn and through vehicles	Left-turn lane (new)
		An left-turn vehicle (automobile, motorcycle)	motorcycle) turning left to enter a roadside collides			Turns left without careful checking of motorcycles and		Warning plant	Colored pavement & road marking (words'warning)
	motorcycle	collides with a through motorcycle/bicycle on toad shoulder	with a motorcycle/bicycle traveling on a road			bicycles		Warning alert	Non-legal signs (warning alert)
			shoulder			Misreads the traveling position and speed of motorcycles		Warning alert	Colored pavement & road marking (words'warning)
						and bicycles, and turns left		waning alert	Non-legal signs (warning alert)
						Fails to anticipate bicycles and makes a left turn without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
Left-turn	Non-							Reduce or level the downward slope	Improve longitudinal road alignment design
collision	intersection						A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
						Drives on road shoulder at a speed too fast to avoid the		Training don	Non-legal signs (warning alert)
						preceding vehicle making a left turn after noticing it	A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
							3,	g	Non-legal signs (warning alert)
					Motorcycle/ bicycle		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
							Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
						Drives on a road shoulder		-	Eradicate bottleneck intersections
							Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
						Drives on a road shoulder without anticipating and paying full attention to preceding vehicles making a left turn	-	Warning alert	Colored pavement & road marking (words'warning)
						2			Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
						Makes a left turn without careful checking of bicycles	Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
		2) An left-turn vehicle	A vehicle (automobile		Left-turn	traveling on bicycle & pedestrian lane	Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane Ground on immort affects visibility of the bicycle & pedestrian lane.	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		(automobile, motorcycle,	A vehicle (automobile, motorcycle) turning left to enter a roadside collides		vehicle		Ground equipment affects visibility of the bicycle & pedestrian lane Gurd fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment Improve the design of guard fences	Coordinate, move, or remove the ground equipment Use guard pipe for improvement
		bicycle on bicycle &	with a bicycle traveling on bicycle & pedestrian lane				Insufficient bicycle & pedestrian lane lighting affects its visibility	Improve the design of guard rences	Road lighting (new, improved, add, move)
		,	,				Standing vehicles on road affect visibility of the bicycle & pedestrian lane	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone,
						Makes a forceful left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for left turn is preventing the following through vehicles from passing through	Spatial separation of traffic liness between left-turn and through vehicles	no parking regulations, etc.) Left-turn lane (new)
					Bicycle	Drives without anticipating left-turn vehicles	-	Warning alert	Colored pavement & road marking (words'warning)
					,	. 🧸		-	Non-legal signs (warning alert)

Study	process	(2) Setting target accidents' status	(3) Assuming accider	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Common					Spatial separation of traffic lines between left-turn and through vehicles	Consolidate IN/OUT of roadside or move away from the main lane
			Common		-			Temporal separation of traffic lines between left-turn and through vehicles	Improve traffic signal phase (Left-turn only phase)
							Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
						Drives on a road shoulder	Trains congestion on main tane are eases more bytes going arreagn on read should	Treads of a minute traine of the second	Eradicate bottleneck intersections
			Com	nmon	Motorcycle/ bicycle		Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
						Drives on a road shoulder without anticipating and paying		Warning alert	Colored pavement & road marking (words'warning)
						full attention to preceding vehicles making a left turn		Walning dicit	Non-legal signs (warning alert)
							Piers of a viaduct affect visibility of the traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
							Ties of a vadact ancet visioning of the trains area and left tall	Walning dicit	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
						"" the traffic after the left turn, and makes a cudden		Walning dicit	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the traffic after the left turn	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the traffic after the left turn	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					Left-turn		Ground equipment affects visibility of the traffic after the left turn	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
			Abisla (ada.asabila		vehicle	stop/deceleration in the intersection	Guard fences (guard rail, etc.) affect visibility of the traffic after the left turn	Improve the design of guard fences	Use guard pipe for improvement
			A vehicle (automobile, motorcycle)				Corner building affects visibility of the traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
			decelerates/stops in the act of left-turn at intersection, and collides with a motorcycle/bicycle traveling on a road shoulder at intersection						Non-legal signs (warning alert)
		1) [Intersection					Road design with a blunt intersection angle tends to increase the left-turn speed, causing drivers to pay less attention to the traffic after the left turn	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed, causing drivers to pay less attention to the traffic after the left turn	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
							-	Reduce/eliminate traffic congestion after the left-turn	Widen road width (increase the number of lanes)
Left-turn collision	(1/3)	with/without traffic signals: common] A left-						,	Eradicate bottleneck intersections
		turn vehicle (automobile, motorcycle) collides with						Reduce or level the downward slope	Improve longitudinal road alignment design
		a through motorcycle/bicycle at					A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
		intersection				Drives at a speed too fast to avoid the preceding vehicle		-	Non-legal signs (warning alert)
					bicycle	making a left turn after noticing it	A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
								, and the second	Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Makes a left turn at a speed too fast to avoid the	Road design with a blunt intersection angle tends to increase the left-turn speed	Improve intersection angle	Improve intersection (orthogonal)
						motorcycle/bicycle after noticing it	Larger corner-cut radius tends to increase the left-turn speed	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
						Makes a forceful left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for left turn is preventing the following through vehicles from passing through	Spatial separation of traffic liness between left-turn and through vehicles	Left-turn lane (new)
					Left-turn	Turns left without careful checking of motorcycles and		Warning plant	Colored pavement & road marking (words'warning)
					vehicle	bicycles	- 	Warning alert	Non-legal signs (warning alert)
			A left-turning vehicle			Misreads the traveling position and speed of motorcycles		Waster start	Colored pavement & road marking (words'warning)
			(automobile, motorcycle) collides at intersection with a motorcycle/bicycle			and bicycles, and turns left	-	Warning alert	Non-legal signs (warning alert)
			with a motorcycle/bicycle traveling on a road shoulder and in parallel direction	' = = [Fails to anticipate bicycles and makes a left turn without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Colored pavement & road marking (words'warning)
					Matar			Warning alert	Non-legal signs (warning alert)
					bicycle	Drives at a speed too fast to avoid the preceding vehicle making a left turn after noticing it			Colored pavement & road marking (words/warning)
							A long straight road section tends to increase driving speed	Warning alert	Non-legal signs (warning alert)
								Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						I		and one paromont to reduce the braning stopping distalle	

Study	process	(2) Setting target accidents' status	(3) Assuming accide	ent occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
							Diare of a viadual affect vicibility of podectrian proceing or its curroundings	Warning plant	Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
								warning alert	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
						Turne left with out asset all the soliton of his value	Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
						Turns left without careful checking of bicycles	Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Corner building affects visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							Control building directs visionity of the pedecular directing of its buildings	Warning dort	Non-legal signs (warning alert)
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
				Left-turn vehicle		Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve the pedestrian crossing position	Pedestrian crossing (move forward)	
							Road design with a blunt intersection angle tends to increase the left-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)
							Larger corner-cut radius tends to increase the left-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
		[Intersection with/without traffic signals: common] A left-					Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
						Makes a left turn at a speed too fast to avoid the bicycle after noticing it	Road design with a blunt intersection angle tends to increase the left-turn speed	Improve intersection angle	Improve intersection (orthogonal)
L oft turn	Interpostion						Larger corner-cut radius tends to increase the left-turn speed	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)
Left-turn collision	Intersection (2/3)	motorcycle) collides with		⊒		Makes a forceful left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for left turn is preventing the following through vehicles from passing through	Spatial separation of traffic liness between left-turn and through vehicles	Left-turn lane (new)
		,				Misreads the traveling position and speed of bicycle, and		Warning alert	Colored pavement & road marking (words'warning)
						turns left		waning aert	Non-legal signs (warning alert)
								Clear indication of bicycles' traveling position	Road marking (fixed-post delineator)
						Fails to anticipate bicycles and makes a left turn without making a safety check	-	Warning alert	Colored pavement & road marking (words'warning)
								warning alert	Non-legal signs (warning alert)
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
							т кого от такиос силост тольшу от тольного аррговоляту иле решевилал словалу	Training diett	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
						Crosses a pedestrian crossing without careful checking of a left-turning vehicle	Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
					Bicycle		Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
							Corner building affects visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning)
						Corn	Control bullaring alreads visibility of vertices approaching the pedestital Liussing	Training diett	Non-legal signs (warning alert)
						Crosses the pedestrian crossing without anticipating left-		Warning alert	Colored pavement & road marking (words'warning)
						turn vehicles		Warning alert	Non-legal signs (warning alert)

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
			Con	nmon	-	-		Abolish left-turn channel	Remove the left-turn channel
							Trees and shrubs affect visibility of the turn channel pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the turn channel pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the turn channel pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
					Left-turn	Enters the left turn channel without careful checking of bicycles at or near the pedestrian crossing	Gurd fences (guard rail, etc.) affect visibility of the turn channel pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
					vehicle		Insufficient lighting affects visibility of the turn channel pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
		[Intersection with/without traffic signals: common] A left-turn vehicle (automobile, motorcycle) collides with a bicycle traveling the left turn channel	A left-turn vehicle (automobile, motorcycle) in the left turn channel				Larger corner-cut radius of the left turn channel tends to increase the left-turn speed, causing drivers to pay less attention to the turn channel pedestrian crossing or its surroundings	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)
				-		Drives through the left-turn channel at a speed too fast to avoid the bicycle after noticing it	Larger corner-cut radius of the left turn channel tends to increase the left-turn speed	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)
Left-turn collision	Intersection (3/3)		channel				Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
						Crosses a pedestrian crossing without careful checking	Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					Bicycle	of vehicles approaching the pedestrian crossing	Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
					Dicycle		Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
						Drives without careful checking of vehicles approaching	_	Warning alert	Colored pavement & road marking (words'warning)
						the pedestrian crossing		Talling act	Non-legal signs (warning alert)
		Intersection with/without traffic	A vehicle (automobile,					Secure the waiting area	Sidewalk and bicycle & pedestrian lane (secure waiting area)
		signals: common] A left- turn vehicle (automobile, motorcycle) collides with	motorcycle) turns left at intersection and collides with a standing bicycle at			-	-	Separate the boundary between sidewalk and road	Guard fence (to prevent run-over by vehicle)
	a standing bic	a standing bicycle at corner of the intersection	with a standing bicycle at corner of intersection					populate the boundary between studental and road	Rubber pole

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Acciden type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Spatial separation of traffic lines between right-turn and oncoming through vehicles	Median strips (new or close cut area)
									Consolidate IN/OUT of roadside or move away from the main lane
			Common		-	-		Consolidate or move IN/OUT of roadside	Remove IN/OUT of roadside
								Temporal separation of traffic lines between right-turn and oncoming through vehicles	Traffic signal (new)
								Prohibit right turn	Rubber pole
							Curve affects the visibility of opposite lanes	Improve road alignment design	Road alignment improvement
							out to under the following of appeared series	Improve sight distance	Sight distance improvement
							Crests affect the visibility of opposite lanes	Improve road alignment design	Improve longitudinal road alignment design
							Piers of viaduct affect visibility of opposite lanes	Warning alert	Colored pavement & road marking (words'warning)
						Turns right without careful checking of oncoming through	The Grander and Craiming of opposite tunos		Non-legal signs (warning alert)
							Trees and shrubs affect the visibility of opposite lanes	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of opposite lanes	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
					Right-turn vehicle		Right-turning vehicle at opposite lane affects the visibility of opposite lanes	Improve visibility of the oncoming through vehicles when making a right	Right-turn lane (new or improve position)
			A vehicle (automobile, motorcycle) attempts to enter a roadside by making a right turn between the through vehicles at opposite lane and collides with an oncoming through vehicle					turn	Channelization (roadway center zebra stripes)
Right-turn	Non- intersection	A right-turn vehicle (automobile, motorcycle)					Headlights of an oncoming vehicle affect visibility of the opposite lane	Install objects to block headlights	Glare prevention plates
collision	(1/2)					Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through	Right-turn lane (new)
						through vehicles Misreads the traveling position and speed of oncoming through vehicles, and turns right		vehicles	Channelization (roadway center zebra stripes)
								Provide indications for easier recognition of travel position and speed of oncoming through vehicles	Delineators (install at opposite lane)
							-	Warning alert	Colored pavement & road marking (words'warning)
			on the road					-	Non-legal signs (warning alert)
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
								Warning alert	Colored pavement & road marking (words'warning)
						Drives at a speed too fast to avoid the right-turning			Non-legal signs (warning alert)
					Through	vehicle after noticing it			Improve pavement (bunping pavement, grooving (lateral))
					vehicle		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Drives without anticipating right-turn vehicles		Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)

Study	/ process	(2) Setting target accidents' status	(3) Assuming accider	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
								Improve road alignment design	Road alignment improvement
							Curve affects visibility of road shoulder of opposite lanes	Improve sight distance	Sight distance improvement
							Crests affect visibility of road shoulder of opposite lanes	Improve road alignment design	Improve longitudinal road alignment design
									Colored pavement & road marking (words'warning)
							Piers of a viaduct affect visibility of road shoulder of opposite lanes	Warning alert	Non-legal signs (warning alert)
						Turns right without careful checking of motorcycles and bicycles	Trees and shrubs affect visibility of road shoulder of opposite lanes	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of road shoulder of opposite lanes	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Dight turning unhigh at appeals long offeets visibility of road shoulder of appeals longer	Improve visibility of the oncoming through vehicles when making a right	Right-turn lane (new or improve position)
							Right-turning vehicle at opposite lane affects visibility of road shoulder of opposite lanes	turn	Channelization (roadway center zebra stripes)
					Right-turn vehicle		Automobiles and motorcycles traveling in parallel direction affect visibility of road shoulder of opposite lanes	Limit going through on road shoulder	Reduce road shoulder width
							Headlights of oncoming vehicles affect visibility of road shoulder of opposite lanes	Install objects to block headlights	Glare prevention plates
						Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through	Right-turn lane (new)
			A vehicle (automobile, motorcycle) attempts to	_		through vehicles	Walting for right turn is preventing the following through ventices from passing through	vehicles	Channelization (roadway center zebra stripes)
			enter a roadside by making a right turn					Provide indications for easier recognition of travel position and speed of oncoming motorcycles	Delineators (install at opposite lane)
			between the through			Misreads the traveling position and speed of oncoming motorcycles, and turns right	-	Warning alert	Colored pavement & road marking (words'warning)
		motorcycle/bicycle on	vehicles at opposite lane and collides with an oncoming motorcycle/bicycle traveling on a road shoulder					waning acre	Non-legal signs (warning alert)
		t				Fails to anticipate bicycles and makes a tight turn without making a safety check		Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
							Lack of, or no indication of bicycle passage	Warning alert	Colored pavement & road marking (words'warning)
								- Jan	Non-legal signs (warning alert)
						Drives on road shoulder at a speed too fast to avoid the right-turning vehicle after noticing it		Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
	Non-								Non-legal signs (warning alert)
Right-turn collision	intersection (2/2)						A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
	(2/2)				Mataravala		* *	-	Non-legal signs (warning alert)
					Motorcycle/ bicycle		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
						Drives on a road shoulder Traffic congestion on main lane increases motorcycles going through on road shoulder Wide road shoulder width increases motorcycles going through on road shoulder Drives on a road shoulder without anticipating and paying full attention to vehicles making a right turn Traffic congestion on main lane increases motorcycles going through on road shoulder	Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
									Eradicate bottleneck intersections
							Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
							-	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							Piers of a viaduct affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words'warning)
						Turns right without careful shooking of his vales on his vale			Non-legal signs (warning alert)
			A vehicle (automobile, motorcycle) attempts to		Dight turn	& pedestrian lane	Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
			enter a roadside by making a right turn		Right-turn vehicle		Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
		motorcycle) collides with a bicycle on a bicycle &	vehicles at opposite lane	**			Ground equipment affects visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
1			and collides with a bicycle traveling on a bicycle &				Gurd fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Improve the design of guard fences	Use guard pipe for improvement
1			pedestrian lane				Insufficient bicycle & pedestrian lane lighting affects its visibility	Improve road lighting	Road lighting (new, improved, add, move) Consider countermeasures for standing vehicles (standing zone,
						Makes a fareaful right turn to avoid a situation where a	Standing vehicles on road affect visibility of the bicycle & pedestrian lane	Limit standing vehicles	no parking regulations, etc.)
1				_			Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)
						through vehicles		volitoido	Channelization (roadway center zebra stripes)
1					Bicycle	Drives without anticipating right-turn vehicles		Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)

Accident type steed of the type steed of type steed		Example of accident occurrence process Common	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
category		Common		-				
					-		Spatial separation of traffic lines between right-turn and oncoming through vehicles	Grade crossing Consolidate IN/OUT of roadside or move away from the main lane
							Temporal separation of traffic lines between right-turn and oncoming through vehicles	Traffic signals (right-turn only phase)
						Curve affects the visibility of opposite lanes	Improve road alignment design	Road alignment improvement
						Crests affect the visibility of opposite lanes	Improve road alignment design	Improve longitudinal road alignment design
								Colored pavement & road marking (words'warning)
						Piers of viaduct affect visibility of opposite lanes	Warning alert	Non-legal signs (warning alert)
							Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
						Piers of a pedestrian bridge affect visibility of opposite lanes	Wassing sleet	Colored pavement & road marking (words'warning)
							Warning alert	Non-legal signs (warning alert)
						Trees and shrubs affect the visibility of opposite lanes	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
						Traffic/advertisement signs affect visibility of opposite lanes	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
						Right-turning vehicle at opposite lane affects the visibility of opposite lanes	Improve visibility of the oncoming through vehicles when making a right	Right-turn lane (new or improve position)
							Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)
					Turns right without careful checking of oncoming through vehicles	Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Clear indication of right-turn path in the intersection	Channel marking (right-turn)
					Verilloids			Channel marking (right-turn)
						Right-turn waiting position is bad, affecting the visibility of opposite lanes	Guide right-turn vehicles in the intersection to an appropriate position	Intersection center-point marking
						Road design with a blunt intersection angle obscures the right-turn waiting position, causing drivers to wait at an inappropriate position with poor visibility of the opposite lane	Improve intersection angle	Improve intersection (orthogonal)
						Bad road drainage in wet weather obscures the right-turn waiting position, causing drivers to wait at an inappropriate position with soor visibility of the opposite lane Inclear right-turn waiting position after dark causes drivers to wait at an inappropriate position with poor visibility of the opposite	Improve drainage	Improve pavement (porous pavement)
				Right-turn vehicle	Makes a right turn at a speed too fast to avoid the		Improve visibility of right-turn waiting position in wet weather	Road markings (highly visible)
							Improve visibility of right-turn waiting position after dark	Road markings (highly visible)
						lane		Road lighting (new, improved, add, move)
						Road design with a blunt intersection angle tends to increase the right-turn speed, causing drivers to pay less attention to the opposite lane	Improve intersection angle	Improve intersection (orthogonal)
Diabet to one distance a stir	n 1) [Intersection	A vehicle (automobile,				Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), causing drivers to pay less attention to the opposite lane	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
Right-turn Intersection (1/3)		motorcycle) attempts to enter a crossroad by						Intersection center-point marking
	vehicle (automobile,	making a right turn				Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)
	motorcycle) collides with an oncoming through	vehicles at opposite lane				Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
	vehicle at intersection [continues on next page]	and collides with an oncoming through vehicle at intersection			1	Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles
								Provide indications for easier recognition of travel position and speed of oncoming through vehicles
				 	Misreads the traveling position and speed of oncoming through vehicles, and turns right			Colored pavement & road marking (words'warning)
					anough venicios, and turns right		Warning alert	Non-legal signs (warning alert)
							Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
					Fails to anticipate bicycles and makes a tight turn without making a safety check	Lack of, or no indication of bicycle passage	Wasting alors	Colored pavement & road marking (words'warning)
					3		Warning alert	Non-legal signs (warning alert)
							Reduce or level the downward slope	Improve longitudinal road alignment design
						A downward slone tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
						A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
					Drives at a speed too fast to avoid the right-turning			Non-legal signs (warning alert)
					vehicle after noticing it			Improve pavement (bunping pavement, grooving (lateral))
						A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
				_				Non-legal signs (warning alert)
				Through vehicle		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
					Drives without anticipating right-turn vehicles		Warning alert	Colored pavement & road marking (words'warning)
					- Family Tyrk Controlled			Non-legal signs (warning alert)
						Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)
					Drives on a road shoulder (motorcycles, bicycles)	0		Eradicate bottleneck intersections
						Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Reduce road shoulder width
					Drives on a road shoulder (motorcycles, bicycles) without	-	Warning alert	Colored pavement & road marking (words'warning)
					paying full attention to right-turning vehicles			Non-legal signs (warning alert)

Stud	/ process	(2) Setting target accidents' status	(3) Assuming accider	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
							Intersection with an irregular shape affects the ability to discern right-turn waiting position	Improve intersection alignment	Improve intersection (address the irregular shape)
							Sharply-angled intersection affects the ability to discern right-turn waiting position	Improve intersection angle	Improve intersection (orthogonal)
									Channel marking (right-turn)
							No indication of right-turn waiting position or intersections' center position affects the ability to discern right-turn waiting position	Guide right-turn vehicles to wait at appropriate position inside the intersection	Intersection center-point marking
						Waits inside the opposite lane to make a right turn			Colored pavement
					Right-turn vehicle		Pad road drainage in wet weather affects the visibility of the right turn waiting position	Improve drainage	Improve pavement (porous pavement)
					verlicie		Bad road drainage in wet weather affects the visibility of the right-turn waiting position	Provide indications for easier recognition of waiting position	Road markings (highly visible)
							Poor vicibility of right turn waiting position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible)
			A vehicle (automobile, motorcycle) waits inside				Poor visibility of right-turn waiting position after dark	Provide indications for easier recognition of travel position	Road lighting (new, improved, add, move)
			the opposite lane to make a right turn and collides with an oncoming through vehicle at intersection			Waits in the opposite lane to avoid a situation where a vehicle waiting in main lane is obstructing the following through vehicles	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
							A downward slope tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
					Through	Drives at a speed too fast to avoid the right-turning			Non-legal signs (warning alert)
					vehicle	vehicle after noticing it	A long straight road section tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
								Warning alert	Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
							-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
		[continues from previous page] 1) [Intersection with/without traffic signals: common] A right-turn vehicle (automobile, motorcycle) collides with an oncoming through vehicle at intersection					Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							The bit a reduct direct helding of pedecinal electrical angle	Training don	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
Right-turn	Intersection						Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
collision	(2/3)							3	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
						Makes a right-turn without careful checking of	Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
					vehicle		Road design with a blunt intersection angle tends to increase speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)
			A right turning vehicle				Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
1			decelerates/stops for a				pedestrian crossing or its surroundings		Intersection center-point marking
			crossing pedestrian, etc., and collides with an oncoming through vehicle				Difficult to make simultaneous checking of the oncoming traffic, pedestrian crossing or its surroundings while making a right turn	Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians	Traffic signals (right-turn only phase)
			at intersection					Temporal separation of traffic lines between the automobile and crossing pedestrians	Improve traffic signal phase (pedestrians and vehicles separation light system)
							Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)
								Clear indication of right-turn path in the intersection	Channel marking (right-turn)
							-	Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)
								Reduce or level the downward slope	Improve longitudinal road alignment design
							A downward slope tends to increase driving speed		Improve pavement (bunping pavement, grooving (lateral))
								Warning alert	Colored pavement & road marking (words'warning)
						Drives at a speed too fast to avoid the right-turning			Non-legal signs (warning alert)
1						vehicle after noticing it		Warning alert	Improve pavement (bunping pavement, grooving (lateral))
1							A long straight road section tends to increase driving speed		Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
								Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)

Stud	y process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
									Traffic signals (right-turn only phase)
					Right-turn	Makes a forceful entry to the intersection when traffic	Right-turn traffic signal cycle is too short	Secure time for the right-turn traffic signal cycle	Improve traffic signal phase (extended green, etc.)
						signal is turning red		Waster Land	Colored pavement & road marking (words'warning)
		2) [Intersection with	A vehicle (automobile, motorcycle) starts to				•	Warning alert	Non-legal signs (warning alert)
		verlicie (automobile,	make a right turn when traffic light is turning red,	Yellov	1				Improve intersection (make it compact)
		motorcycle) collides with an oncoming through	and collides with an	Yellow		Makes a mistake in judgment of whether to stop or go	Intersection is large and takes time to pass through	Reduce the size of the intersection	Stop line (move forward)
		vehicle at intersection	oncoming through vehicle at intersection		Through	when the traffic signal is turning red, and enters the intersection		Improve recognition of the intersection size	Colored pavement
					vehicle		-	Inform drivers to stop	Stop line (widen its width)
						Makes a forceful entry to the intersection when traffic signal is turning red	Green interval of traffic signal is too short for the section with more traffic inflow	Secure intersection entry time for the section with more traffic inflow	Improve traffic signal phase (reallocation of green interval)
							Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
							Tiels of a viaduct affect visibility of pedestrial of ossing of its suffoundings	waning deri	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning)
								waning deri	Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the pedestrian crossing or its surroundings	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the pedestrian crossing or its surroundings	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings	Improve the design of guard fences	Use guard pipe for improvement
							Insufficient lighting affects visibility of the pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
						Makes a right turn at a speed too fast to avoid the bicycle	Difficult to make simultaneous checking of the oncoming traffic, pedestrian crossing or its surroundings while making a right turn	Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians	Traffic signals (right-turn only phase)
								Temporal separation of traffic lines between the automobile and crossing pedestrians	Improve traffic signal phase (pedestrians and vehicles separation light system)
							wo right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction	Address right-turning vehicles traveling in parallel direction	Reduce the number of lanes (one right-turn lane only)
								Clear indication of right-turn path in the intersection	Channel marking (right-turn)
Right-turn	Intersection (3/3)		A vehicle (automobile, motorcycle) makes a right-turn between the through vehicles at opposite lane and collides with an oncoming bicycle traveling at or near the pedestrian crossing		Right-turn vehicle		Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
Comsion	(3/3)	signals: common] A right-turn vehicle (automobile, motorcycle) collides with a bicycle at or near the pedestrian					Road design with a blunt intersection angle tends to increase the right-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings	Improve intersection angle	Improve intersection (orthogonal)
							Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
							pedestrian crossing or its surroundings	3	Intersection center-point marking
							-	Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)
							Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Improve the pedestrian crossing position	Pedestrian crossing (move forward)
		crossing					Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)
						after noticing it	Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
									Intersection center-point marking
						Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for right turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)
								Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
						Fails to anticipate bicycles and makes a right turn without making a safety check	Lack of, or no indication of bicycle passage	Warning alert	Colored pavement & road marking (words'warning)
								Warning alert	Non-legal signs (warning alert)
							Piers of viaduct affect visibility of vahicles approaching the pedactrian exercises	Warning alert	Colored pavement & road marking (words'warning)
							Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Non-legal signs (warning alert)
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Piers of pedstrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warning slart	Colored pavement & road marking (words'warning)
						Crosses a pedestrian crossing without careful checking of a right-turning vehicle		Warning alert	Non-legal signs (warning alert)
					Bicycle		Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of vehicles approaching the pedestrian crossing	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing	Improve the design of guard fences	Use guard pipe for improvement
						Crosses the pedestrian crossing without anticipating		Warning plant	Colored pavement & road marking (words'warning)
						right-turn vehicles	-	Warning alert	Non-legal signs (warning alert)

Page	Study	process	(2) Setting target accidents' status	(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Part		intersection/inte r-section	Accident status		Image		Faults of parties involved		Examples of countermeasures' purpose	Example of detailed countermeasures
Part		category								Removal/consolidation of structures
									Remove of consolidate collision-prone objects	Remove power poles
										Guard fence (for roadside and median)
									Install facilities to absorb collision-impact	Crash attenuators
				Con	nmon	-	-	-	Widen the narrow lane width to an appropriate width	
										1
									Alert the driver to limit lane departure	
									Improve road alignment design	
									improve signi distance	
								Curve affects the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	
Part								out to direction the desire, to recognize the north read diagrament	Trovide indications for easier recognition or road diignment	
Part										· ·
Part							the road alignment and departs from the lane		Warning alert	
A Purply of the Control of Cont										Improve longitudinal road alignment design
Part								Crests affect the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	
Part									Warning alert	
Part										
A Promotive of the Control of the Co			bicycle) collides with a					Headlights of an oncoming vehicle affect visibility of the opposite lane		
A COUNTY OF THE PARTY OF THE				A through vehicle (automobile, motorcycle, bicycle) runs off the road	, i		ph By Speed or steering at curve section and narrow road is not suitable to the road alignment and road width, causing		Reduce or level the downward slope	
Row Fig. Part								A downward slope tends to increase driving speed	Warning alert	Improve pavement (bunping pavement, grooving (lateral))
March Marc										Colored pavement & road marking (words'warning)
Part					-00					Non-legal signs (warning alert)
Part						VOTIIOIC				Improve pavement (bunping pavement, grooving (lateral))
Marriad Marr				Toddoldo oli doldi o				Driving speed tends to increase when there is a straight section before the curve	Warning alert	Colored pavement & road marking (words'warning)
Part	Single									Non-legal signs (warning alert)
A formation in the control of the co	vehicle	1							Improve road alignment design	Road alignment improvement
A finally shorted and shorted	accident	intersection			00 8			A wheel skid is likely to occur due to a sharp curve	Improve superelevation	Superelevation improvement
Part to remove the vericle scoreding to sorting operation of together from the land of sorting operation of ope									Reduce pavement slipperiness	Improve pavement (anti-skid pavement)
A Prough vehicle for both of the form of t							condition (icy road, etc.) and vehicle becomes out of control		Prevent road surface from icing	Snow/cold countermeasures (chemical application)
Special season of the season o								Road surface tends to get icy and slippery		Snow/cold countermeasures (snow melting facility)
Signy subtands due to point similaring or distings Figure 3 publicade due to point similaring or distings Figure 3 publicade due to point similaring or distings Figure 4 publicade due to point si										Improve pavement (grooving)
Does not got alteration to travel position and the vehicle department from the tame of control position and the vehicle department on the vehicle de								Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)
Does not pay altered on to travel position on travel position or trave								Slippery surface due to grating cover	Prevent slips	Improve grating cover
Separate from the lane Common							Does not pay attention to travel position and the vehicle	Road drainage is bad in wet weather, affecting the ability to discern travel position		
A fromosing in the road or continuence accuses lane departure and continuence to drive without reading or too lase to rotate at the parking of drowness causes lane departure and continuence to drive without reading or too lase to rotate at the parking of the parking space and man lane. Through validation of the parking space and man lane. A from you have been at a speed too fast to avoid the parked vehicle after rotating it. A from you have been at a speed too fast to avoid the parked vehicle after rotating it. A from you have been at a speed too fast to avoid the parked vehicle after rotating it. A from you have been at a speed too fast to avoid the parked vehicle after rotating it. A from you have been at the parked vehicle and rotating it. A fro									weather	Road markings (highly visible)
Almites driving or droverioes causes inne departure an continues to drive without realizing or too late to notice it. A formula is a section from the parked vehicle in control in the parked vehicle in control in the parked vehicle or road shoulder. A formula vehicle (automobile, motoroycle, indication) broycle (cellides with a parked vehicle on road shoulder to make an original parked vehicle on road shoulder the make an original parked vehicle on road shoulder the make an original parked vehicle on road shoulder the make an original parked vehicle on road shoulder the make an original parked vehicle on road shoulder the make an original parked vehicle on road shoulder the make an or	1							Difficult to check travel position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible)
Control of other without realizing of tool late to notice it of drive without realizing of tool late to notice it of drive without realizing of tool late to notice it of drive without realizing of tool late to notice it is necessary to the parked without realizing of tool late to notice it is necessary to the parked without road all increases and inc										
Common C								-	Alert the driver to limit lane departure	
Common							continues to drive without realizing or too late to notice it			
Reduce or level the downward slope A through vehicle (autimobile, motorcycle, biscycle) collides with a parked vehicle (not or road shoulder A motorcycle-bicycle rides on road shoulder to avoid stationary radiic on trails stationar										
A through vehicle (automobile, motorcycle, bicycle) of road shoulder or road shoulder or road shoulder or road shoulder or road shoulder for road shoulder or road shoulder for road shoulder for road shoulder or road shoulder for	1			Con	nmon	-	-	-		
A through vehicle (automobile, motorcycle, bicycle) on road of shoulder road shoulder road shoulder road shoulder a parked vehicle on divergo in the road or an ad shoulder road shoulder a parked vehicle on the road or road shoulder road sho									Reduce or level the downward slope	
A through vehicle (automobile, motorcycle, bicycle) or road shoulder road or road shoulder filtering without paying full aparted. A motorcycle/bicycle idea or road shoulder to a parted vehicle on road shoulder to a parted vehicle or road shoulder filtering without paying full or road shoulder filtering without			_					A downward slope tends to increase driving speed		
after noticing it 2) A through wehicle (automobile, motorcycle bicycle) collides with a parked vehicle (no diver) on the road or road shoulder A motorcycle-bicycle ides on road shoulder to avoid stationary traftic on traftic ane, and collides with a parked vehicle on shoulder to avoid shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives on a road shoulder within increases motorcycles going through on road shoulder Drives	1								warning alert	
2) A through vehicle (automobile, motorcycle) in coad colleges with a parked vehicle on the road or road shoulder food shoulder for a shoulder on road shoulder for a shoulder on road shoulder vehicle at road shoulder on road shoulder on road shoulder on road shoulder for a shoulder on road shou					* [5]					
(automobile, motorcycle bicycle colides with a parked vehicle (in or odd shoulder vehicle) (in or odd shoul				bicycle) on road collides			and honoring it		lar a san ta a	
bicycle) collides with a parked vehicle (no driver) on the road or road shoulder A motorcycle/bicycle rides on road shoulder to avoid stationary traffic a nord collides with a parked vehicle at road shoulder to avoid shoulder to avoid shoulder to avoid stationary traffic a nord ad shoulder to avoid shoulder to avoid shoulder to avoid stationary traffic a nord ad shoulder to avoid shoulder to aparked vehicle at road shoulder to avoid shoulder to aparked vehicle at road shoulder to aparked vehicle are and collides with a parked vehicle at road shoulder to aparked vehicle at road shoulder to aparked vehicle at road shoulder to aparked vehicle are road collides with a parked vehicle at road shoulder to aparked vehicle are road shoulder tiltering without paying full aparked vehicle are road shoulder tiltering without paying full aparked vehicle are road shoulder tiltering without paying full aparked vehicle are road shoulder tiltering without paying full aparked vehicle are road shoulder tiltering without paying full aparked vehicle are road and shoulder tiltering without paying full aparked vehicle are road and shoulder tiltering without paying full aparked vehicle are road and shoulder tiltering without paying full aparked vehicle are road and shoulder tiltering without paying full aparked vehicle are road and shoulder tiltering without paying full aparked vehicle on road shoulder to aparked vehicle on road shoulder traffic congestion on main lane increases motorcycles going through on road shoulde			(automobile, motorcycle,			V SI III OIE		ia long straight road section tends to increase driving speed	vvarning alert	
driver) on the road or road shoulder A motorcycle/bicycle rides on road shoulder on road shoulder is stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder is provided websides on a road shoulder is parked vehicle at road shoulder is parked vehicle on road shoulder is parked vehicle on road shoulder is parked vehicle at road shoulder width increases motorcycles going through on road shoulder is parked vehicle at road marking (words'warning) Warning alert Colored pavement (mith-stack pavement (bicycle) collides with a							
A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder and collides with a parked vehicle at road shoulder and collides with a parked vehicle at road shoulder and collides with a parked vehicle at road shoulder and collides with a parked vehicle at road shoulder and collides with a parked vehicle at road shoulder with increases motorcycles going through on road shoulder w	1		driver) on the road or					-	Use an anti-skid pavement to reduce the braking/stopping distance	
A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder of avoid shoulder of a void shoulder of a void shoulder of a void shoulder of a void stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder of a void shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road shoulder width increases motorcycles going through on road shoulder or a void vehicle at road vehicle			road shoulder				Fails to discern the parked vehicle on road		Warning alert	
A motorcycle/bicycle rides on road shoulder for a road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder width increases motorcycles going through on road shoulder for a road shoulder width increases motorcycles going through on road shoulder width increases motorcycles g										
on road shoulder to avoid stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder Drives on a road shoulder Wide road shoulder Wide road shoulder width increases motorcycles going through on road shoulder Limit going through on road shoulder Eradicate bottleneck intersections Wide road shoulder Wide road shoulder width increases motorcycles going through on road shoulder Drives on a road shoulder width Drives on a road shoulder width increases motorcycles going through on road shoulder Warning alert			_					Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	
lane, and collides with a parked vehicle at road shoulder				on road shoulder to avoid		Motorcycle				
shoulder Warning alert				lane, and collides with a				Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	
			_						Warning alert	Colored pavement & road marking (words'warning)
							attention to parked vehicles on road		<u> </u>	Non-legal signs (warning alert)

Study	Study process (2) Setting target accidents' status		(3) Assuming accide	nt occurrence process			(4) Analyzing accident factor	(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non- intersection/inte r-section category	Accident status	Example of accident occurrence process	Image	Parties involved	Faults of parties involved	Examples of road traffic environment that induces faults of parties involved (examples of accident spot check list)	Examples of countermeasures' purpose	Example of detailed countermeasures
		_	Common		-	-		Install facilities to absorb collision-impact	Crash attenuators
						Turns right without fully discorning the modian strip	Poor visibility of the median strip	Improve road lighting	Road lighting (new, improved, add, move)
						Turns right without fully discerning the median strip	Foot visibility of the median strip	Improve visibility of the median strip	Median tip indicator (obstacle indicator, etc.)
						Makes a right turn at a speed too fast to avoid the	Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)
		Intersection with/without traffic				median strip after noticing it		Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
		signals: common] A right-turn vehicle	A right-turning vehicle (automobile, motorcycle)		Right-turn		Road design with a blunt intersection angle affects the ability to discern the traveling position	Improve intersection angle	Improve intersection (orthogonal)
		(automobile, motorcycle) collides at intersection	collides with a median strip at the intersection		vehicle		Intersection is large and it is difficult to discern travel position	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)
		with a structure				Turns right without paying attention to the traveling	intersection is large and it is difficult to discern travel position	Guide highi-turn vehicles in the intersection to an appropriate position	Intersection center-point marking
						position in the intersection	Road drainage is bad in wet weather, affecting the ability to discern travel position	Improve drainage	Improve pavement (porous pavement)
							Toda dramage is dad in wet weather, anecoming the ability to discern travel position	Provide indications for easier recognition of travel position in wet weather	Road markings (highly visible)
							Difficult to check travel position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible)
		2) [Intersection				Drives without fully discerning the median strip		Improve road lighting	Road lighting (new, improved, add, move)
							Poor visibility of the median strip	Improve visibility of the median strip	Median tip indicator (obstacle indicator, etc.)
Single- vehicle	Intersection							Warning alert	Non-legal signs (indication of intersection shape)
accident	Intersection					Drives at a speed too fast to avoid the median strip after	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
								Warning alert	Improve pavement (bunping pavement, grooving (lateral))
							A dominate stope to has to include driving speed		Colored pavement & road marking (words'warning)
									Non-legal signs (warning alert)
		with/without traffic signals: common] A	A through vehicle (automobile, motorcycle)			noticing it			Improve pavement (bunping pavement, grooving (lateral))
		through vehicle (automobile, motorcycle)	collides with a front median strip at irregular		Through vehicle		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)
		collides with a work piece at intersection	or other types of intersections						Non-legal signs (warning alert)
		,		<u> </u>			-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
								Improve intersection alignment	Improve intersection (address the irregular shape)
							Intersection has a gentle curve or is irregular and it is difficult to identify the traveling position	Guide vehicles in the intersection to an appropriate position	Channel marking (right-turn)
						Continues driving without paying attention to the traveling			Intersection center-point marking
						position in the intersection	Road drainage is bad in wet weather, affecting the ability to discern travel position	Improve drainage	Improve pavement (porous pavement)
								Provide indications for easier recognition of travel position in wet weather	Road markings (highly visible)
							Difficult to check travel position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible)