

ISSN 1346-7328
Technical Note of NILIM no.849
May 2015

TECHNICAL NOTE of National Institute for Land and Infrastructure Management

No.849

May 2015

Technical Report of Road Safety Countermeasure Planning

Advanced Road Design and Safety Division
(now as Road Division)

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Advanced Road Design and Safety Division

**National Institute for Land and Infrastructure Management,
Ministry of Land, Infrastructure, Transport and Tourism, Japan**

TECHNICAL NOTE of National
Institute for Land and
Infrastructure Management

Technical Note of NILIM

Technical Report of Road Safety Countermeasure Planning

Masayuki Yabu*, Azuma Takemoto**, Yuta Ozaki***, Sho Kamiya****

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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- * Head, Advanced Road Design and Safety Division, Road Department
(now as Head, Foundation, Tunnel and Substructures Division, Road Structures Department)
 - ** Researcher, Advanced Road Design and Safety Division, Road Department
(now as Unit Chief, Research Evaluation and International Section, Planning and Management Division, Planning and Research Administration Department, Public Works Research Institute)
 - *** Researcher, Advanced Road Design and Safety Division, Road Department
(now as Researcher, Road Division, Road Traffic Department)
 - **** Guest Research Engineer, Advanced Road Design and Safety Division, Road Department
(now as Guest Research Engineer, Road Division, Road Traffic Department)

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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.

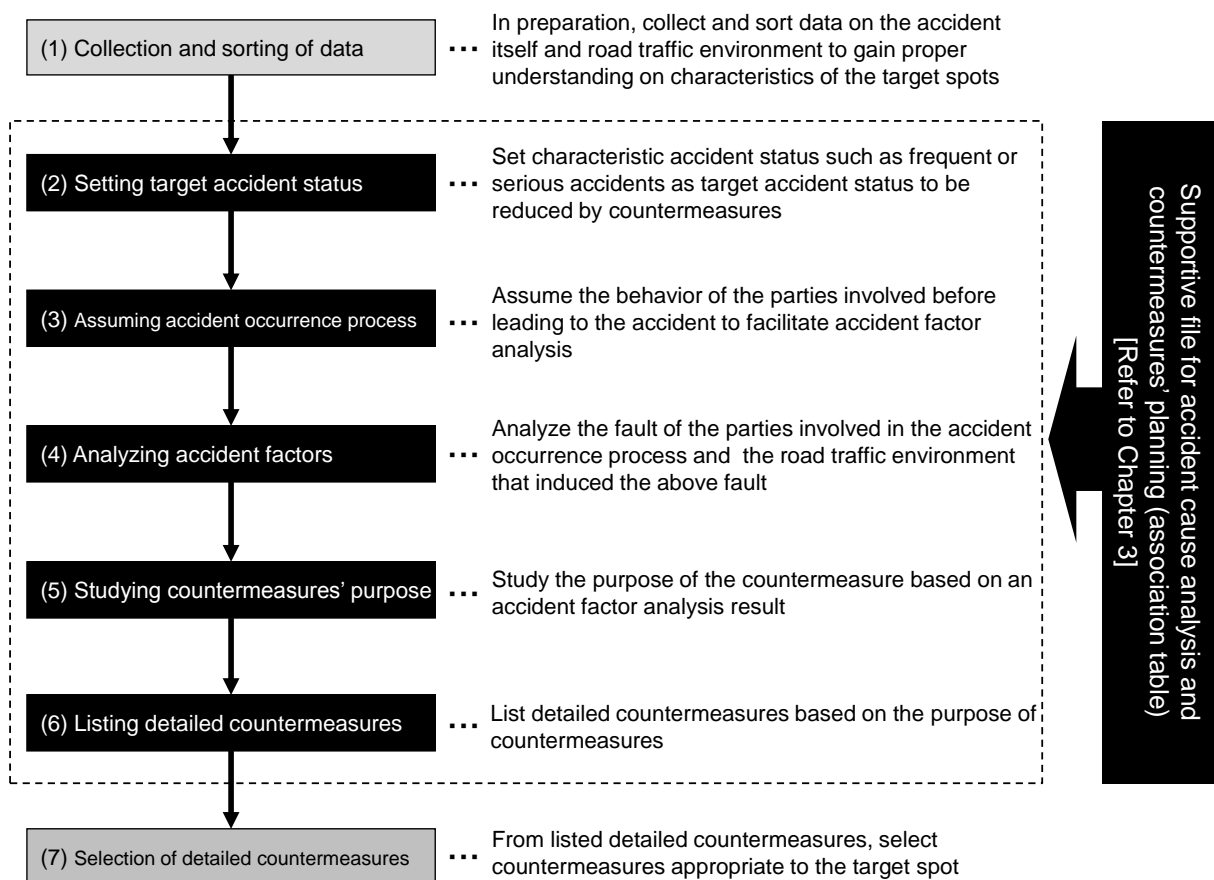


Figure 2-1 General study process for countermeasure planning by a road administrator

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).

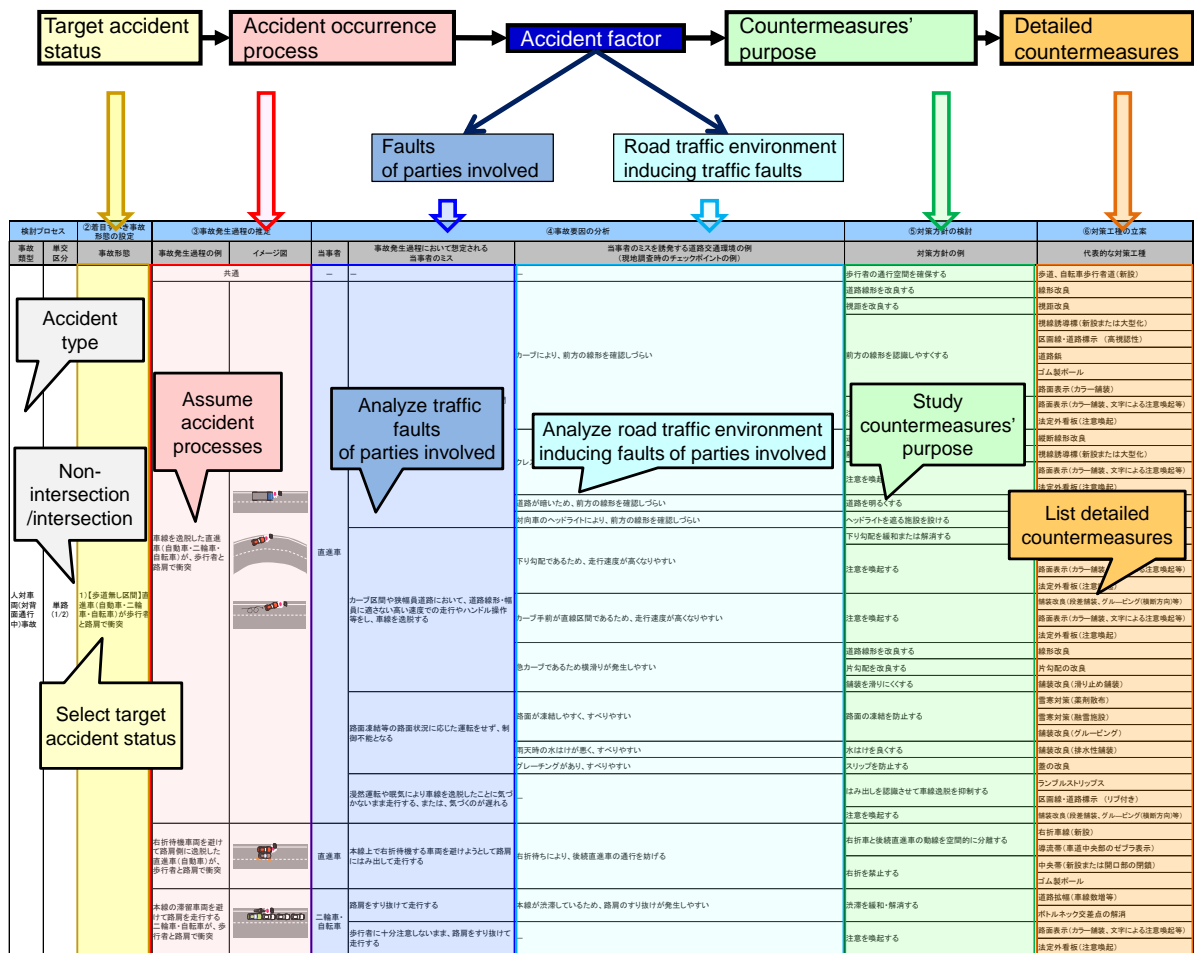


Figure 3-1 Table configuration of the supportive file for accident factor analysis and countermeasures' planning (association table)

[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:

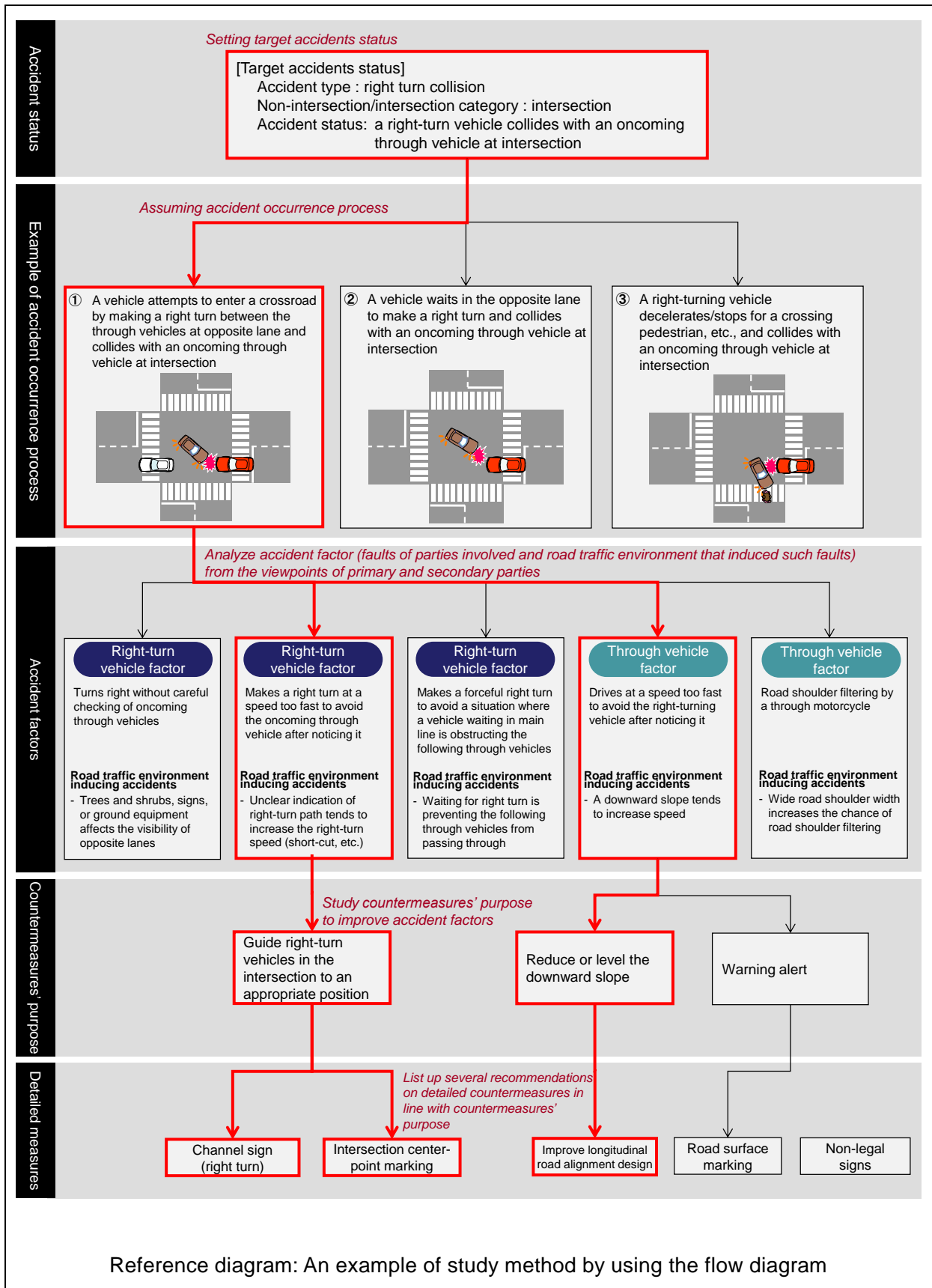
- Accident occurrence process: video recording of the spot
- Faults of parties involved:
 - assume the accident occurrence process or road traffic environment that induced fault of parties involved, as well as the cause-and-effect relationship with the above
- Road traffic environment that induced traffic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

Classification of accident types based on Traffic Accidents Databases		Accident types based on supportive file for accident factor analysis and countermeasures' planning (association table)	
		No	Accident type
Pedestrian-vehicle	Walking facing the traffic	1	Pedestrian-vehicle (walking)
	Walking with their back to the traffic		
	Crossing the crosswalk	2	Pedestrian-vehicle (Crossing)
	Crossing near the crosswalk		
	Crossing near the pedestrian bridge		
	Crossing the road other than the above		
	Playing on the road	-	-
	Working on the road	-	-
	Others	-	-
Vehicle-vehicle	Head-on collision	3	Head-on collision
	Collision when passing each other		
	Rear-end collision		
	Collision when changing direction	4	Rear-end collision
	Collision when overtaking		
	Head-to-side collision	5	Head-to-side collision
	Left turn collision	6	Left turn collision
	Right turn collision	7	Right turn collision
	Collision when making U-turn		
	Collision when reversing	-	-
	Others	-	-
Single-vehicle	Collision with a structures	8	Single-vehicle accident
	Road departure		
	Collision with a parked vehicle (no driver)		
	Rolling		
	Others	-	-
Train	-	-	
Unknown	-	-	

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.

General study process of countermeasures planning	Steps when using the supportive file for accident factor analysis and countermeasures' planning (association table)
((1) Collection and sorting of data)	
(2) Setting target accidents status	1) Select accident status from association table
(3) Assuming accident occurrence process	↓ 2) Select assumed accident occurrence process (*)
(4)-1 Analyzing accident factors (analyze faults of parties involved)	↓ 3) Select assumed faults of parties involved (*)
(4)-2 Analyzing accident factors (analyze road traffic environment inducing faults)	↓ 4) Select probable road traffic environment inducing traffic faults (*)
(5) Studying countermeasures' purpose	↓ 5) Select countermeasures' purpose
(6) Listing detailed countermeasures	↓ 6) List detailed countermeasures

* 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

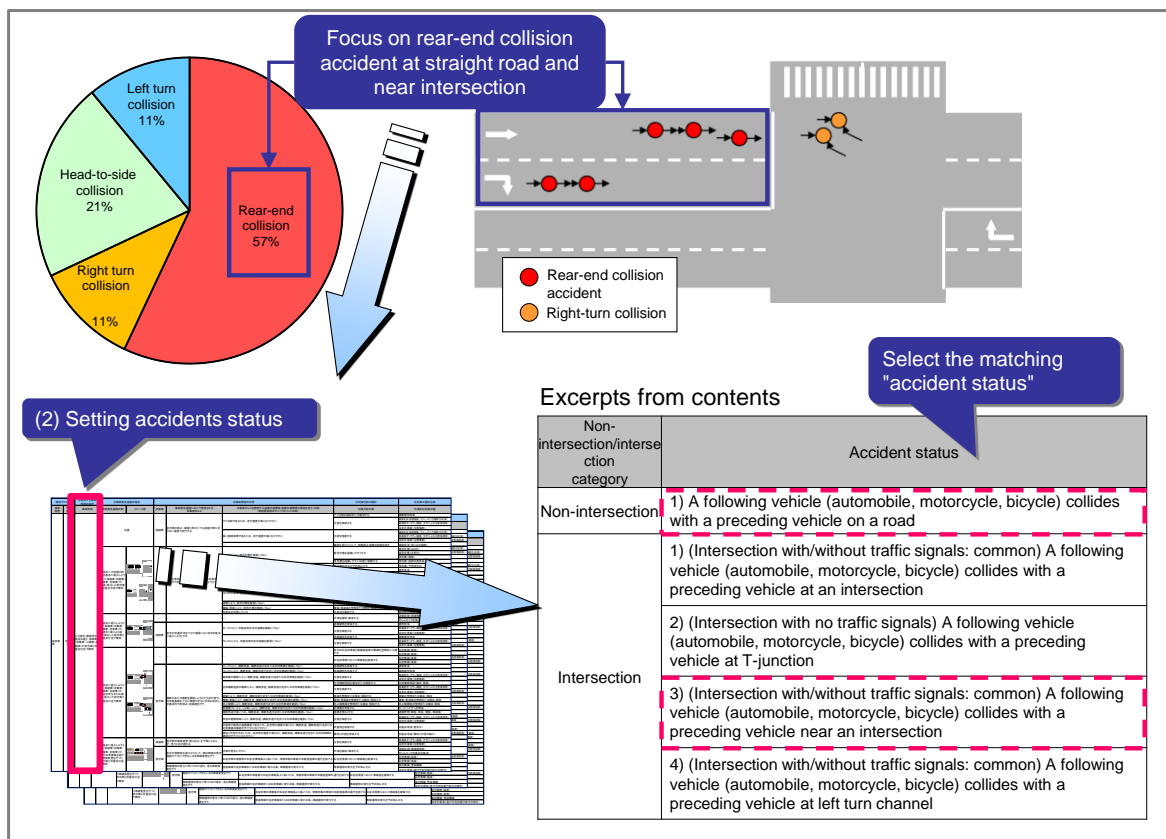
In preparation for countermeasure planning, data on the accident itself and the road traffic environment need to be collected and sorted.

(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.

«Example of countermeasures' planning using the supportive file for accident factor analysis and countermeasures' planning (association table)»



(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.

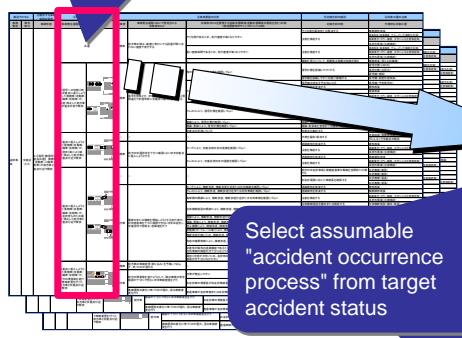
Select multiple choices if the incident cannot be limited to a single accident occurrence process.

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".

«Example of countermeasures' planning using the supportive file for accident factor analysis and countermeasures' planning (association table)»

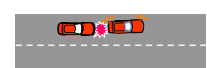
(3) Assuming accident occurrence process



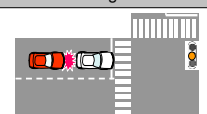

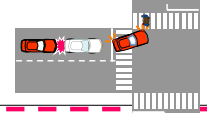

Select assumable "accident occurrence process" from target accident status

Excerpts from contents

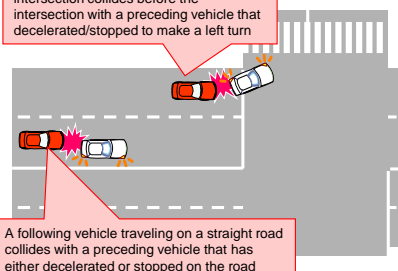
- Non-intersection

Example of accident occurrence process	Image
A following vehicle (automobile, motorcycle, bicycle) traveling on non-intersection collides with a preceding vehicle that has either decelerated, stopped, or made a lane change	

- Intersection (nearby)

Example of accident occurrence process	Image
A following vehicle (automobile, motorcycle, bicycle) attempts to enter an intersection when traffic light is turning red, and collides before the intersection with a preceding vehicle that has decelerated/stopped	
A following vehicle (automobile, motorcycle, bicycle) attempting to enter an intersection collides at near the intersection with a preceding vehicle that has decelerated/stopped due to traffic clogging	
A following vehicle (automobile, motorcycle, bicycle) attempting to enter an intersection collides near the intersection with a preceding vehicle that has decelerated/stopped to make a right/left turn	
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.	

[Example of assumed accident occurrence]



A following vehicle attempting to enter an intersection collides before the intersection with a preceding vehicle that decelerated/stopped to make a left turn

A following vehicle traveling on a straight road collides with a preceding vehicle that has either decelerated or stopped on the road

(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.

«Example of countermeasures' planning using the supportive file for accident factor analysis and countermeasures' planning (association table)»

(4) Accident factor analysis

(1) Select assumable faults of parties involved at the time of accident occurrence process

(2) While at the spot, select matching road traffic environment inducing faults of parties involved

Excerpts from contents
○ Non-intersection

(Repeat) Example of accident occurrence	Parties involved	Faults of parties involved	Examples of road traffic environment that induces traffic faults (example of spot survey check list)
A following vehicle (automobile, motorcycle, bicycle) traveling on a non-intersection collides with a preceding vehicle that either has decelerated, stopped, or made a lane change	-	-	-
	Following vehicle	Continues driving without paying attention to the approaching traffic condition Drives at a speed too fast after noticing that the preceding vehicle has decelerated, stopped, or changed lane (cutting)	Curve affects the ability to recognize the approaching traffic condition Crests affect the ability to recognize the approaching traffic condition A downward slope tends to increase driving speed A long straight road section tends to increase driving speed
	Preceding vehicle	Does not notice the side-road facility IN/OUT in time and makes a sudden stop/deceleration or changes lane on main lane	Difficult to recognize the roadside facility IN/OUT

○ Intersection (nearby)

(Repeat) Example of accident occurrence	Parties involved	Faults of parties involved	Examples of road traffic environment that induces traffic faults (example of spot survey check list)
Common	Following vehicle	Drives at a speed too fast to avoid deceleration/stop of the preceding vehicle after noticing it	A downward slope tends to increase driving speed A long straight road section tends to increase driving speed
A following vehicle (automobile, motorcycle, bicycle) attempting to enter an intersection collides near the intersection with a preceding vehicle that has decelerated/stopped to make a right/left turn	-	-	-
	Preceding vehicle	Makes a right/left turn without careful checking of pedestrians at or about to cross the pedestrian crossing, and makes a sudden stop/deceleration in the intersection	Trees and shrubs affect visibility of the pedestrian crossing, etc. Traffic/advertisement signs affect visibility of the pedestrian crossing, etc. Ground equipment affects visibility of the pedestrian crossing, etc. Barriers (guard rail, etc.) affect visibility of the pedestrian crossing, etc.

(3) Select the most probable combination from "Accident occurrence process", "Traffic fault of parties involved", and "Road traffic environment"

[Example of selected causal factors]

(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.

«Example of countermeasures' planning using the supportive file for accident factor analysis and countermeasures' planning (association table)»

(5) Studying countermeasures' purpose

Select "countermeasures' purpose" that match the spot

Excerpts from contents
 Non-intersection

(Repeat) Examples of road traffic environment that induces fault of the parties involved	Examples of countermeasures' purpose
-	Spatial separation of traffic lines between the preceding vehicle entering a roadside facility and the following through vehicle
Curve affects the ability to recognize the approaching traffic condition	Reduce/eliminate traffic congestion
Difficult to recognize the roadside facility IN/OUT	Improve road alignment design
	Improve visible distance
	Warning alert
	Implement countermeasures for easier recognition of roadside facility IN/OUT
	Consolidate or move IN/OUT of roadside facilities

Intersection (nearby)

(Repeat) Examples of road traffic environment that induces traffic fault of the offender	Examples of measures and policies
A downward slope tends to increase driving speed	Reduce or level the downward slope
-	Warning alert
Trees and shrubs affect visibility of the pedestrian crossing, etc.	Spatial separation of traffic lines between the right/left-turning preceding vehicle and following through vehicles
	Secure sufficient lane length according to right/left turn demands
	Trim, move, or remove trees or shrubs

(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.

«Example of countermeasures' planning using the supportive file for accident factor analysis and countermeasures' planning (association table)»

The diagram illustrates the process of deriving detailed countermeasures from an association table. On the left, a large table titled "(6) Listing detailed countermeasures" is shown with a red box highlighting a specific section. An arrow points from this section to two detailed tables on the right.

Excerpts from contents

○ Non-intersection

(Repeat) Examples of countermeasures' purpose	Example of detailed countermeasures
Spatial separation of traffic lines between the preceding vehicle entering a roadside facility and the following through vehicle	Left-turn lane (new) Right-turn lane (new) Channelization (roadway center zebra stripes)
Improve road alignment design	Road alignment improvement
Implement measures for easier recognition of roadside facility IN/OUT	Delineator (new) Surface signs (colored pavement)

○ Intersection (nearby)

(Repeat) Examples of countermeasures' purpose	Example of detailed countermeasures
Reduce or level the downward slope	Improve longitudinal road alignment design
Spatial separation of traffic lines between the right/left-turning preceding vehicle and following through vehicles	Left-turn lane (new) Right-turn lane (new)
Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs

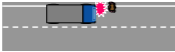


List of "example of detailed countermeasures" based on countermeasures' goal

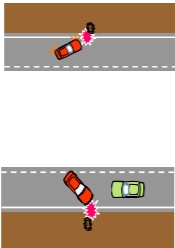
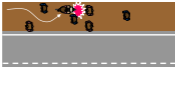
3.4 Supportive file for accident factor analysis and countermeasures' planning (association table)




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.

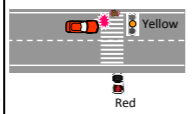
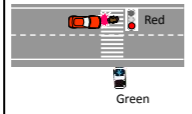
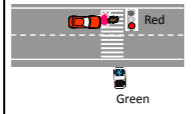
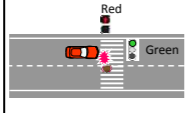
Table 3-2 Accidents per accident type in the supportive file for accident factor analysis and countermeasures' planning (association table)

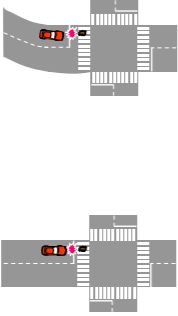
No	Accident type	Straight road/intersection	Page
1	Pedestrian-vehicle (Walking)	Non-intersection	P. 1-2
2	Pedestrian-vehicle (Crossing)	Non-intersection	P. 3-4
		Intersection	P. 5-10
3	Head-on collision	Non-intersection	P. 11-12
		Intersection	P. 12
4	Rear-end collision	Non-intersection	P. 13
		Intersection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

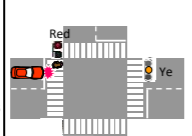

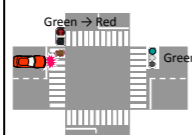
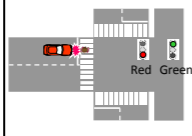
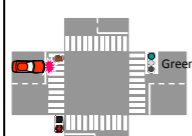
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures		
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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		
Pedestrian-vehicle (Walking)	Non-intersection (1/2)	1) [Road section with no sidewalk] A through vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at road shoulder	Common		-	-	-	Secure passage for pedestrians	Sidewalk, bicycle & pedestrian lane (newly laid)		
								Improve road alignment design	Road alignment improvement		
									Improve sight distance	Sight distance improvement	
								Curve affects the ability to recognize the front road alignment	Provide indications for easier recognition of road alignment	Delineator (new or larger type)	
										Road markings (highly visible)	
										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)	
										Non-legal signs (warning alert)	
								Crests affect the ability to recognize the front road alignment	Improve road alignment design	Improve longitudinal road alignment design	
										Provide indications for easier recognition of road alignment	Delineator (new or larger type)
										Warning alert	Colored pavement & road marking (words/warning)
											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 departed from a lane and collided with a pedestrian (automobile, motorcycle, bicycle) at road shoulder		Through vehicle	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
										Warning alert	Improve pavement (bumping pavement, grooving (lateral))
											Colored pavement & road marking (words/warning)
											Non-legal signs (warning alert)
									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	Warning alert	Improve pavement (bumping pavement, grooving (lateral))
											Colored pavement & road marking (words/warning)
											Non-legal signs (warning alert)
									A wheel skid is likely to occur due to a sharp curve	Improve road alignment design	Road alignment improvement
										Improve superelevation	Superelevation improvement
							Reduce pavement slipperiness	Improve pavement (anti-skid pavement)			
						Fails to maneuver the vehicle according to surface condition (icy road, etc.) and vehicle becomes out of control	Prevent road surface from icing	Snow/cold countermeasures (chemical application)			
						Slippery surface due to poor rainwater drainage	Improve drainage	Snow/cold countermeasures (snow melting facility)			
						Slippery surface due to grating cover	Prevent slips	Improve pavement (grooving)			
						Aimless driving or drowsiness causes lane departure and continues to drive without realizing it or too late to notice it		Improve pavement (porous pavement)			
							Alert the driver to limit lane departure	Ramble strips			
							Warning alert	Road markings (ribbed)			
								Improve pavement (bumping pavement, grooving (lateral))			
			A through vehicle (automobile) departs from lane to avoid a vehicle waiting for right turn, and collides with a pedestrian on road shoulder		Through vehicle	Departs to road shoulder to avoid a main lane vehicle waiting for right turn	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)		
								Prohibit right turn	Channelization (roadway center zebra stripes)		
									Median strips (new or close cut area)		
									Rubber pole		
			A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic lane and collides with a pedestrian		Motorcycle/bicycle	Drives on a 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		
								Warning alert	Colored pavement & road marking (words/warning)		
									Non-legal signs (warning alert)		


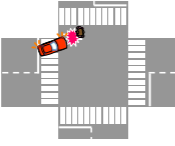
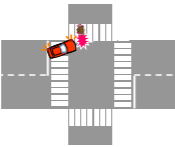
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures		
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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		
Pedestrian-vehicle (Walking)	Non-intersection (2/2)	2) [Road section with a sidewalk] A left/right-turn vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at a sidewalk	A vehicle (automobile, motorcycle, bicycle) makes a left/right turn to enter into a roadside facility and collides with a pedestrian at a sidewalk		Right/left turn vehicle	Common	-	Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane Move IN/OUT of roadside		
							Piers of a viaduct affect visibility of the sidewalk	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)		
							Piers of a pedestrian bridge affect visibility of the sidewalk	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)		
							Trees and shrubs affect visibility of the sidewalk	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs		
							Traffic/advertisement signs affect visibility of the sidewalk	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs		
							Ground equipment affects visibility of the sidewalk	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment		
							Guard fence (guard rail, etc.) affect visibility of the sidewalk	Improve the design of guard fences	Use guard pipe for improvement		
							Insufficient sidewalk lighting affects visibility	Improve road lighting	Road lighting (new, improved, add, move)		
							Standing vehicles affect visibility of the sidewalk	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)		
							Makes a forceful right/left turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Waiting for right/left turn is preventing the following through vehicles from passing through	Spatial separation of traffic lines between left-turn and through vehicles	Left-turn lane (new)	
		Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new) Channelization (roadway center zebra stripes)								
		Prohibit right turn	Median strips (new or close cut area) Rubber pole								
		Left-turn vehicle	Fails to recognize the roadside IN/OUT in time and makes a sudden left turn, and enters a sidewalk without careful checking of pedestrians	Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new) Colored pavement					
					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	Secure a sidewalk width according to the traffic volume	Sidewalk and bicycle & pedestrian lane (widened)
										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)
		Through vehicle	Driving speed is too fast to avoid collision with a pedestrian that has rushed out to the road	A downward slope tends to increase driving speed A long straight road section tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design					
					Warning alert	Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)					
Warning alert	Improve pavement (bunping pavement, grooving (lateral)) 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)										
Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)										
Bicycle	A bicycle weaves through people and collides with a pedestrian on a bicycle & pedestrian lane	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.					
					4) [Road section with a sidewalk] A through bicycle collides with a pedestrian at a bicycle & pedestrian lane						



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/inter-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	
Pedestrian-vehicle (Crossing)	Non-intersection (1/2)	1) [Pedestrian crossing with no traffic signal] A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing and collides with a pedestrian at or near the pedestrian crossing	A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing and collides with a pedestrian at or near the pedestrian crossing	  	Through vehicle	Common	-	-	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	Traffic signal (new)
						Curve affects visibility of the front pedestrian crossing or its surroundings	-	-	Improve road alignment design	Road alignment improvement
							-	-	Improve sight distance	Sight distance improvement
							-	-	Warning alert	Colored pavement & road marking (words'warning)
							-	-		Non-legal signs (warning alert)
						Crests affect visibility of the front pedestrian crossing or its surroundings	-	-	Improve road alignment design	Improve longitudinal road alignment design
							-	-	Warning alert	Colored pavement & road marking (words'warning)
							-	-		Non-legal signs (warning alert)
						Enters a pedestrian crossing without careful checking of pedestrians at or about to cross the pedestrian crossing	-	-	Piers of a viaduct affect visibility of the front pedestrian crossing or its surroundings	Warning alert
							-	-		Colored pavement & road marking (words'warning)
							-	-		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
						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.)
						Headlights of an oncoming vehicle affect visibility of the front pedestrian crossing or its surroundings	-	-	Install objects to block headlights	Glare prevention plates
						A downward slope tends to increase driving speed	-	-	Reduce or level the downward slope	Improve longitudinal road alignment design
							-	-	Warning alert	Improve pavement (bumping pavement, grooving (lateral))
							-	-		Colored pavement & road marking (words'warning)
							-	-		Non-legal signs (warning alert)
						Enters a pedestrian crossing at a speed too fast to avoid collision with a crossing pedestrian	-	-		Improve pavement (bumping pavement, grooving (lateral))
	-	-		Colored pavement & road marking (words'warning)						
	-	-		Non-legal signs (warning alert)						
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 pedestrian when entering the pedestrian crossing	-	-	Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing						
	-	-		Road markings (highly visible)						
	-	-		Colored pavement						
Pedestrian					Pedestrian	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)		
						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		
						Standing vehicles affect visibility of vehicles approaching the pedestrian crossing	Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)		
						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 approaching the pedestrian crossing	-	Warning alert	Colored pavement & road marking (words'warning)							
	-		Non-legal signs (warning alert)							

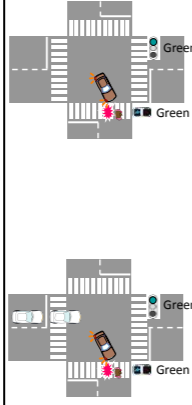
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures																																												
Accident type	Non-intersection/inter-section category	Accident 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																																												
Pedestrian-vehicle (Crossing)	Non-intersection (2/2)	2) [Pedestrian crossing with traffic signals] A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is turning red, and collided with a pedestrian who has started crossing the road before the traffic signal for pedestrians turns green	A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is turning red, and collided with a pedestrian who has started crossing the road before the traffic signal for pedestrians turns green		Through vehicle	Drives at high speed and makes a forceful entry to the pedestrian crossing when traffic signal is turning red	A downward slope tends to increase driving speed	-	Reduce or level the downward slope	Improve longitudinal road alignment design																																											
											A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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)																																		
																				Pedestrian	Hastily starts crossing when traffic signal changes	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)																													
																									Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (LED lighting) Traffic signal (enlarge size) Traffic signal (install extra lights)																										
																												Road curve affects visibility of the traffic signal	Give advance notice of the traffic signal ahead Improve road alignment design Improve sight distance	Traffic signal (improve installment position) Traffic signal (advance traffic signal head) Road alignment improvement Sight distance improvement																							
																															Crests affect visibility of the traffic signal	Give advance notice of the traffic signal ahead Improve 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														
		Headlights of an oncoming vehicle affect visibility of the traffic signal	Install objects to block headlights	Glare prevention plates																																																	
					A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green	A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for pedestrians is green		Through vehicle	Fails to perceive the traffic signal's sign and enters the pedestrian crossing at red traffic signal	-	-	-	-																																								
														A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is red, and collides with a pedestrian when the traffic signal for pedestrians is green	A through vehicle (automobile, motorcycle, bicycle) enters a pedestrian crossing when the traffic signal for vehicles is red, and collides with a pedestrian when the traffic signal for pedestrians is green																									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 between the up and down lanes for pedestrians who could not cross the road	Traffic island								
																	-	Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)																																		
																				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	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		Pedestrian	Ignores traffic signals and cross the pedestrian crossing at red traffic signal																						Traffic signal interval (pedestrian crossing light) is too long	-	Respond to the crossing demand by pedestrians	Traffic signal for pedestrian (push-button type)				
																									-	Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)																										
																												Common	-	-																				-	Install a crossing facility according to crossing demands	Pedestrian crossing (new)	
																															Pedestrian	Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	The pedestrian bridge is provided but with poor accessibility																				-
																																		-	Prevent crossing other than at the pedestrian crossing	Gurd fences for pedestrians and bicycles (to prevent crossing)																	
																																					Through vehicle	Drives without anticipating pedestrians randomly crossing the road	The pedestrian bridge affects drivers' anticipation of pedestrians randomly crossing the road														
A downward slope tends to increase driving speed	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)																																																		
				A long straight road section tends to increase driving speed	-	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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)																																											

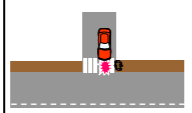
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non-intersection/intersection category	Accident status	Example of accident occurrence 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	
Pedestrian-vehicle (Crossing)	Intersection (1/6)	1) [Intersection with no traffic signal] A through vehicle (automobile, motorcycle, bicycle) enters an intersection and collides with a pedestrian at or near the pedestrian crossing	A through vehicle (automobile, motorcycle, bicycle) enters an intersection and collides with a pedestrian at or near the pedestrian crossing		Through vehicle	Common	-	-	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)
						Common	-	-	Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Traffic signal (new)
						Road curve affects visibility of the front pedestrian crossing or its surroundings	Improve road alignment design	Road alignment improvement		
						Warning alert	Colored pavement & road marking (words/warning)			
							Non-legal signs (warning alert)			
						Crests affect visibility of the front pedestrian crossing or its surroundings	Improve road alignment design	Improve longitudinal road alignment design		
						Warning alert	Colored pavement & road marking (words/warning)			
							Non-legal signs (warning alert)			
						Piers of a viaduct affect visibility of the front pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words/warning)		
							Non-legal signs (warning alert)			
						Piers of a pedestrian bridge affects visibility of the front pedestrian crossing or its surroundings	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)		
						Warning alert	Colored pavement & road marking (words/warning)			
							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		
						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)		
						A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design		
							Warning alert	Improve pavement (bumping pavement, grooving (lateral))		
								Colored pavement & road marking (words/warning)		
								Non-legal signs (warning alert)		
						A long straight road section tends to increase driving speed		Improve pavement (bumping 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)		
						Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing	Road markings (highly visible)		
		Colored pavement								
Fails to, or does not recognize in time the crossing pedestrian and enters the intersection	Improve visibility of the intersection	Colored pavement								
		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)								
		Colored pavement & road marking (words/warning)								
		Non-legal signs (warning alert)								
Pedestrian	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	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)							
	Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words/warning)							
			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							
	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 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							
		Coordinate positions of the pedestrian traffic and pedestrian crossing								
The pedestrian bridge is provided but with poor accessibility	Improve accessibility of the pedestrian bridge	Pedestrian crossing (move forward)								
		Pedestrian bridge (with good accessibility)								
Crosses a road without careful checking of vehicles approaching the pedestrian crossing	-	Warning alert								
		Colored pavement & road marking (words/warning)								
		Non-legal signs (warning alert)								

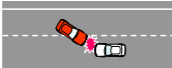
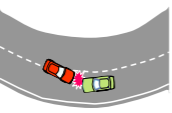
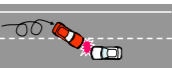
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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
Pedestrian-vehicle (Crossing)	Intersection (2/6)	2) [Intersection with traffic signals] A through vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at pedestrian crossing	A through vehicle (automobile, motorcycle, bicycle) attempts to enter an intersection when the traffic signal for vehicles is turning red, and collides with a pedestrian who has started crossing the road before the traffic signal for pedestrians turns green		Through vehicle	Drives at high speed and makes a forceful entry to the intersection when traffic signal is turning red	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
							Warning alert	Improve pavement (bumping pavement, grooving (lateral))	
							Warning alert	Colored pavement & road marking (words'warning)	
							Warning alert	Non-legal signs (warning alert)	
							Warning alert	Improve pavement (bumping pavement, grooving (lateral))	
							Warning alert	Colored pavement & road marking (words'warning)	
			-	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 pedestrian turns green	-	Warning alert	Colored pavement & road marking (words'warning)		
			-	-	Non-legal signs (warning alert)				
			A through vehicle (automobile, motorcycle, bicycle) 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 turns green		Through vehicle	Makes a mistake in judgment of whether to stop or go when the traffic signal is turning red, and enters the intersection but cannot pass through	Intersection is large and takes time to pass through	Reduce the size of the intersection	Improve intersection (make it compact)
						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	Improve recognition of the intersection size	Stop line (move forward)
						-	Inform drivers to stop	Stop line (widen its width)	
						-	Secure intersection entry time for the section with more traffic inflow	Improve traffic signal phase (reallocation of green interval)	
			Pedestrian	Starts crossing the pedestrian crossing without checking any approaching vehicles and before/immediately after the traffic signal turns green	-	Warning alert	Colored pavement & road marking (words'warning)		
			-	-	Non-legal signs (warning alert)				
			A through vehicle (automobile, motorcycle, bicycle) enters an intersection immediately after the traffic signal for vehicles has turned green, and collides with a pedestrian who could not cross the road while the traffic signal for pedestrians was green		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)
						-	-	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)
						-	-	Improve visibility of the traffic signal	Traffic signal (LED lighting)
-	-	Move traffic signal to a more visible position				Traffic signal (enlarge size)			
-	-	Traffic signal (install extra lights)				Traffic signal (install extra lights)			
-	-	Give advance notice of the traffic signal ahead				Traffic signal (improve installment position)			
-	-	Improve road alignment design				Traffic signal (advance traffic signal head)			
-	-	Improve sight distance				Road alignment improvement			
-	-	Warning alert				Sight distance improvement			
A through vehicle (automobile, motorcycle, bicycle) attempts to enter an intersection when the traffic signal for vehicles is red, and collides with a pedestrian at pedestrian crossing when the traffic signal for pedestrians is green		Through vehicle	Fails to check the traffic signal, or mistakenly looks at the traffic signal of adjacent intersection, and enters the intersection against a red traffic signal	Sunset affects visibility of the traffic signal	Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)			
			-	Road curve affects visibility of the traffic signal	Improve road alignment design	Road alignment improvement			
			-	-	Improve sight distance	Sight distance improvement			
			-	-	Warning alert	Colored pavement & road marking (words'warning)			
			-	-	Warning alert	Non-legal signs (warning alert)			
			-	-	Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)			
			-	-	Improve road alignment design	Improve longitudinal road alignment design			
			-	-	Warning alert	Colored pavement & road marking (words'warning)			
-	-	Warning alert	Non-legal signs (warning alert)						
A through vehicle (automobile, motorcycle, bicycle) attempts to enter an intersection when the traffic signal for vehicles is green, and collides with a pedestrian at pedestrian crossing when the traffic signal for pedestrians is red		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)			
			-	-	Secure time to cross the road	Improve traffic signal phase (reallocation of green interval)			
			-	-	-	-			
			-	-	-	-			
-	-	-	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				

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/intersection 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					
Pedestrian-vehicle (Crossing)	Intersection (3/6)	3) [Common between intersection with/without traffic signals] A left-turn vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at or near the pedestrian crossing	A vehicle (automobile, motorcycle, bicycle) that has turned left at intersection collides with a pedestrian at or near the pedestrian crossing		Left-turn vehicle	Turns left without careful checking of pedestrians at or about to cross the pedestrian crossing	Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)					
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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					
							Corner building affects visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) 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)					
							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)					
								Pedestrian	A vehicle (automobile, motorcycle, bicycle) that has turned left at intersection collides with a pedestrian at or near the pedestrian crossing	Makes a left turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	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)	
				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)								
				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 lines between left-turn and through vehicles					Left-turn lane (new)			
				Takes a left turn without anticipating the crossing pedestrian, assuming that pedestrian is going to use the pedestrian bridge	The pedestrian bridge affects drivers' anticipation of pedestrians crossing the main line	Warning alert					Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
				Makes a left turn without anticipating crossing pedestrians	-	Warning alert					Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
					Pedestrian	A vehicle (automobile, motorcycle, bicycle) that has turned left at intersection collides with a pedestrian at or near the pedestrian crossing					Crosses a pedestrian crossing without careful checking of a left-turning vehicle	Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
												Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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
												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) Non-legal signs (warning alert)					
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 Provide a waiting space inside the intersection for pedestrians who could not complete the crossing Secure time to cross the road	Pedestrian crossing (orthogonal) Traffic island Improve traffic signal phase (reallocation of green interval)											
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 Coordinate positions of the pedestrian traffic and pedestrian crossing	Gurd fences for pedestrians and bicycles (to prevent 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)											



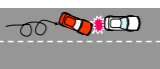
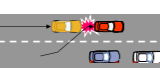
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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
Pedestrian-vehicle (Crossing)	Intersection (4/6)	4) [Intersection with no traffic signal] A right-turn vehicle (automobile, motorcycle) collides with a pedestrian at or near the pedestrian crossing	A vehicle (automobile, motorcycle) that has turned right at intersection collides with a pedestrian at or near the pedestrian crossing	 	Right-turn vehicle	Turns right without careful checking of pedestrians at or about to cross the pedestrian crossing	Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
						Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)	
						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)	
						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)	
						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 pedestrian crossing or its surroundings	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) 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)	
							Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)
						Makes a right turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	Channel marking (right-turn)	Channel marking (right-turn)	
							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	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 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	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
						Takes a right turn without anticipating crossing pedestrians	-	Warning alert	Colored pavement & road marking (words'warning) 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)
						Crosses a pedestrian crossing without careful checking of a right-turning vehicle	Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							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 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)						
	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) Non-legal signs (warning alert)						

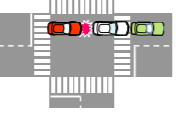
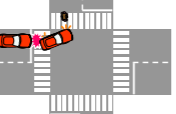
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures				
Accident type	Non-intersection/intersection category	Accident status	Example of accident occurrence 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				
Pedestrian-vehicle (Crossing)	Intersection (5/6)	5) [Intersection with traffic signals] A right-turn vehicle (automobile, motorcycle) collides with a pedestrian at or near the pedestrian crossing	A vehicle (automobile, motorcycle) that has turned right at intersection collides with a pedestrian at or near the pedestrian crossing		Right-turn vehicle	Turns right without careful checking of pedestrians at or about to cross the pedestrian crossing	<ul style="list-style-type: none"> Piers of a viaduct affect visibility of pedestrian crossing or its surroundings Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings Trees and shrubs affect visibility of the pedestrian crossing or its surroundings Traffic/advertisement signs affect visibility of the pedestrian crossing or its surroundings Ground equipment affects visibility of the pedestrian crossing or its surroundings Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing or its surroundings Insufficient lighting affects visibility of the pedestrian crossing or its surroundings Difficult to check both the oncoming through vehicle and pedestrians/bicycle simultaneously when making a right turn Two right-turn lanes are provided and get distracted by right-turning vehicles in parallel direction Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing, affecting drivers' attention to pedestrian crossing or its surroundings Road design with a blunt intersection angle tends to increase the right-turn speed, affecting drivers' attention to pedestrian crossing or its surroundings Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to pedestrian crossing or its surroundings 	<ul style="list-style-type: none"> Warning alert Remove or move the pedestrian bridge Warning alert Trim, move, or remove trees or shrubs Coordinate, move, or remove traffic/advertisement signs Coordinate, move, or remove the ground equipment Improve the design of guard fences Improve road lighting Temporal separation of traffic lines between the right-turn vehicle and oncoming through vehicle/crossing pedestrians Temporal separation of traffic lines between the automobile and crossing pedestrians Address right-turning vehicles traveling in parallel direction Clear indication of right-turn path in the intersection Improve the pedestrian crossing position Improve intersection angle Guide right-turn vehicles in the intersection to an appropriate position Provide an emergency space in front of the pedestrian crossing to avoid collision 	<ul style="list-style-type: none"> Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Trim, move, or remove trees or shrubs Coordinate, move, or remove traffic/advertisement signs Coordinate, move, or remove the ground equipment Use guard pipe for improvement Road lighting (new, improved, add, move) Traffic signals (right-turn only phase) Improve traffic signal phase (pedestrians and vehicles separation light system) Reduce the number of lanes (one right-turn lane only) Channel marking (right-turn) Pedestrian crossing (move forward) Improve intersection (orthogonal) Channel marking (right-turn) Intersection center-point marking Pedestrian crossing (setback) Pedestrian crossing (move forward) Improve intersection (orthogonal) Channel marking (right-turn) Intersection center-point marking Right-turn lane (new) 				
						Makes a right turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	<ul style="list-style-type: none"> Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing Road design with a blunt intersection angle tends to increase the right-turn speed Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.) 	<ul style="list-style-type: none"> Improve the pedestrian crossing position Improve intersection angle Guide right-turn vehicles in the intersection to an appropriate position 	<ul style="list-style-type: none"> Pedestrian crossing (move forward) Improve intersection (orthogonal) 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 crossing pedestrians	<ul style="list-style-type: none"> The grade separation facility affects drivers' anticipation of pedestrians/cyclists randomly crossing the main line - 	<ul style="list-style-type: none"> Warning alert Warning alert 	<ul style="list-style-type: none"> Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) 				
						Pedestrian	Crosses a pedestrian crossing without careful checking of a right-turning vehicle	<ul style="list-style-type: none"> Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing Trees and shrubs affect visibility of vehicles approaching the pedestrian crossing Traffic/advertisement signs affect visibility of vehicles approaching the pedestrian crossing Ground equipment affects visibility of vehicles approaching the pedestrian crossing Guard fences (guard rail, etc.) affect visibility of vehicles approaching the pedestrian crossing 	<ul style="list-style-type: none"> Warning alert Remove or move the pedestrian bridge Warning alert Trim, move, or remove trees or shrubs Coordinate, move, or remove traffic/advertisement signs Coordinate, move, or remove the ground equipment Improve the design of guard fences 	<ul style="list-style-type: none"> Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Trim, move, or remove trees or shrubs Coordinate, move, or remove traffic/advertisement signs Coordinate, move, or remove the ground equipment Use guard pipe for improvement 			
								Crosses a place (other than pedestrian crossing) where drivers do not anticipate a pedestrian on a road	<ul style="list-style-type: none"> A pedestrian is able to cross a road without using the pedestrian crossing The pedestrian bridge is provided but with poor accessibility 	<ul style="list-style-type: none"> Prevent pedestrians from crossing a road other than the pedestrian crossing Coordinate positions of the pedestrian traffic and pedestrian crossing Improve accessibility of the pedestrian bridge 	<ul style="list-style-type: none"> Gurd fences for pedestrians and bicycles (to prevent crossing) Pedestrian crossing (move forward) Pedestrian bridge (with good accessibility) 		
								Crosses without anticipating a right-turning vehicle	-	Warning alert	<ul style="list-style-type: none"> Colored pavement & road marking (words'warning) Non-legal signs (warning alert) 		
								Right-turn vehicle	Makes a mistake in judgment of whether to stop or go when the traffic signal is turning red, and enters the intersection but cannot pass through	Intersection is large and takes time to pass through	<ul style="list-style-type: none"> Reduce the size of the intersection Improve recognition of the intersection size Inform drivers to stop 	<ul style="list-style-type: none"> Improve intersection (make it compact) Stop line (move forward) Colored pavement Stop line (widen its width) 	
									Makes a forceful entry to the intersection when the traffic 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	<ul style="list-style-type: none"> Traffic signals (right-turn only phase) Improve traffic signal phase (extended green, etc.) 	
									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	<ul style="list-style-type: none"> Shorten the crossing distance Provide a waiting space inside the intersection for pedestrians who could not complete the crossing Secure time to cross the road 	<ul style="list-style-type: none"> Pedestrian crossing (orthogonal) Traffic island Improve traffic signal phase (reallocation of green interval)


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/intersection 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	
Pedestrian-vehicle (Crossing)	Intersection (6/6)	6) [Intersection between a arterial road and a narrow street with no traffic signal] A through vehicle (automobile, motorcycle, bicycle) collides with a pedestrian at pedestrian crossing	Common		-	-	-	Spatial separation of traffic lines between the automobile and crossing pedestrians	Consolidate IN/OUT of roadside or move away from the main lane	
								Temporal separation of traffic lines between the automobile and pedestrians at the pedestrian crossing	Traffic signal (new)	
			Piers of a viaduct affect visibility of pedestrian crossing or its surroundings					Warning alert	Colored pavement & road marking (words'warning)	
			Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings					Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)	
			Warning alert					Colored pavement & road marking (words'warning)		
			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)	
			Corner building affects visibility of the pedestrian crossing or its surroundings					Improve visibility of the pedestrian crossing surroundings	reflective mirrors	
			Enters to intersection without careful checking of pedestrians at or about to cross the pedestrian crossing					Poor visibility of the pedestrian crossing	Improve visibility of the pedestrian crossing	Road markings (highly visible)
			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				
				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	Improve visibility of the pedestrian crossing surroundings	reflective mirrors				
				Common	-	-	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	
							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	
Insufficient lighting affects visibility of the turn channel pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)								
Left-turn vehicle	Turns left without careful checking of pedestrians at or about to cross the pedestrian crossing	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)						
		Makes a left turn at a speed too fast to avoid a crossing pedestrian after recognizing the pedestrian	Improve the left-turn channel corner-cut radius	Improve intersection (reduce left-turn channel corner-cut radius)						
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						
		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 a road without careful checking of vehicles approaching the pedestrian crossing	-	Warning alert	Colored pavement & road marking (words'warning)						
			Non-legal signs (warning alert)							



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/inter-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	
Head-on collision	Non-intersection (1/2)	1) A through vehicle (automobile, motorcycle) collides with an oncoming vehicle on a road	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	
					-	-	-	Alert the driver to limit lane departure	Ramble strips Road studs Road markings (ribbed)	
					Through vehicle	Enters into a curve section without paying full attention to the road alignment and departs from the lane	Curve affects the ability to recognize the front road alignment	Improve road alignment design	Road alignment improvement	
								Improve sight distance	Sight distance improvement	
								Provide indications for easier recognition of road alignment	Delineator (new or larger type)	
									Road markings (highly visible)	
									Road studs	
									Rubber pole	
								Colored pavement		
								Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
								Crests affect the ability to recognize the front road alignment	Improve road alignment design	Improve longitudinal road alignment design
									Provide indications for easier recognition of road alignment	Delineator (new or larger type)
									Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
								Through vehicle	A downward slope tends to increase driving speed	A downward slope tends to increase driving speed
					Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)				
					Driving speed tends to increase when there is a straight section before the curve	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Improve road alignment design	Road alignment improvement			
					Through vehicle	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 wheel skid is likely to occur due to a sharp curve	Improve superelevation	Superelevation improvement	
								Reduce pavement slipperiness	Improve pavement (anti-skid pavement)	
								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
					Slippery surface due to poor rainwater drainage	Improve drainage	Improve pavement (porous pavement)			
					Through vehicle	Slippery surface due to grating cover	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	Road drainage is bad in wet weather, affecting the ability to discern travel position	Improve drainage
Through vehicle	Difficult to check travel position after dark	Difficult to check travel position after dark	Provide indications for easier recognition of travel position in wet weather	Road markings (highly visible)						
			Provide indications for easier recognition of travel position	Road markings (highly visible)						
Through vehicle	A through vehicle (automobile, motorcycle) entered the opposite lane for overtake, and collides with an oncoming vehicle on the road	Through vehicle	Enters the opposite lane to overtake the preceding vehicle, without paying full attention to what is ahead	Curve affects the ability to recognize the front road alignment	Alert the driver to limit lane departure	Ramble strips Road studs Road markings (ribbed)				
					Warning alert	Improve pavement (bumping pavement, grooving (lateral))				
					Difficult to determine the traffic condition in front due to the crest	Improve road alignment design	Road alignment improvement			
						Improve sight distance	Sight distance improvement			
						Limit take-over	Ramble strips Road studs			
					Standing vehicle area and main lane are either not separated or insufficient in space, and standing vehicles obstruct the traffic of following through vehicles	Improve road alignment design	Improve longitudinal road alignment design			
						Provide indications for easier recognition of the front road alignment	Delineator (new or larger type)			
					Bus stop area and main lane are either not separated or insufficient in space, and traffic of the following through vehicles is obstructed when a bus stops	Limit take-over	Ramble strips Road studs			
						Separate the standing vehicle space and main lane	Improve standing zone			
					No overtaking opportunity for a long distance	Address traffic obstruction by the standing bus	Improve bus bay			
						Provide overtaking opportunity	Additional overtake lane Climbing lane			
					Through vehicle	Enters the opposite lane to overtake the bicycle in front without making a full safety check	Lack of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.	

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/intersection 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
Head-on collision	Non-intersection (2/2)	2) A through vehicle (automobile, motorcycle, bicycle) collides at road shoulder with a bicycle traveling the wrong way	Common		Through vehicle	Departs to road shoulder to avoid a main lane vehicle waiting for right turn	Waiting for right turn is preventing the following through vehicles from passing through	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.
			A through vehicle (automobile) departs from lane to avoid a vehicle waiting for right-turn, and collides with a bicycle traveling the wrong way at a road shoulder		Through vehicle	Departs to road shoulder to avoid a main lane vehicle waiting for right turn	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) Channelization (roadway center zebra stripes)
		A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic lane, and collides with a bicycle traveling the wrong way		Motorcycle/bicycle	Drives on a road shoulder	Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	Median strips (close the cut area) Rubber pole	
		Wide road shoulder width increases motorcycles going through on road shoulder	-	Limit going through on road shoulder	Widen road width (increase the number of lanes) Eradicate bottleneck intersections				
		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)				
		3) 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		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.
	Intersection (1/6)	1) A through vehicle (automobile, motorcycle) collides with an oncoming vehicle at intersection	A through vehicle (automobile, motorcycle) collides with an oncoming vehicle at irregular or other types of intersections		Through vehicle	Notifies the oncoming vehicle but driving too fast to avoid it	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
							Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
							A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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 driving without paying attention to the traveling position in the intersection	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) Intersection center-point marking

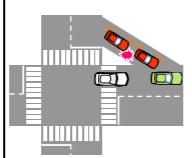
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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	
Rear-end collision	Non-intersection	1) A following vehicle (automobile, motorcycle, bicycle) collides with a preceding vehicle on a road	A following vehicle (automobile, motorcycle, bicycle) traveling on non-intersection collides with a preceding vehicle that has either decelerated, stopped, or made a lane change	   	Following vehicle	-	-	-	Spatial separation of traffic lines between the preceding vehicle entering a roadside and the following through vehicle	Left-turn lane (new) Right-turn lane (new) Channelization (roadway center zebra stripes)
						-	-	-	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes) Eradicate bottleneck intersections
						Continues driving without paying attention to the traffic condition in front	Curve affects the ability to recognize the front road alignment	Improve road alignment design Improve sight distance Warning alert	Road alignment improvement Sight distance improvement Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
							Difficult to determine the traffic condition in front due to the crest	Improve road alignment design Warning alert	Improve longitudinal road alignment design 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	
						Drives at a speed too fast after noticing that the preceding vehicle has decelerated, stopped, or changed lane (cutting)	A downward slope tends to increase driving speed	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
							A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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 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 (chemical application) Snow/cold countermeasures (snow melting facility) 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 (bumping pavement, grooving (lateral)) Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
				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) Non-legal signs (warning alert)			
				Fails to, or does not anticipate in the time the sudden stop, deceleration, or lane change (cutting) of the preceding vehicle	-	Warning alert	Colored pavement & road marking (words/warning) 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	Difficult to recognize the roadside IN/OUT	Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new) Colored pavement			
						Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane Remove IN/OUT of roadside			
						Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new) Colored pavement			
						Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main 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 stop/deceleration or changes lane on main lane	Piers of a pedestrian bridge affect visibility of the roadside IN/OUT	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)	
						Piers of a pedestrian bridge affect visibility of the roadside IN/OUT	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)		
						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		
						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 traffic lane to make a right turn or U-turn at median-cut	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 Prohibit the right-turn or U-turn	Channelization (roadway center zebra stripes) 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							
Does not notice the change in lane operation in time, and makes a sudden lane change	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	Guide signs, warning signs Non-legal signs (indication of lane-use control) Road markings							

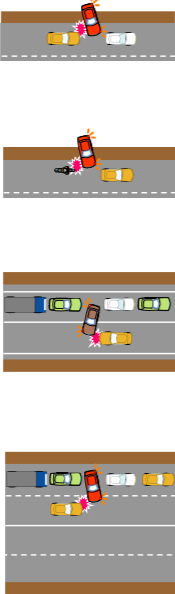
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures						
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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						
Rear-end collision	Intersection (1/5)	1) [Intersection with/without traffic signals: common] A following vehicle (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 vehicle that has decelerated/stopped due to traffic clogging of road ahead		Following vehicle	-	-	-	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes) Eradicate bottleneck intersections					
						Enters an intersection without careful checking of traffic congestion at outflow side	Curve affects the ability to recognize the front road alignment	Improve road alignment design Warning alert	Road alignment improvement Colored pavement & road marking (words'warning) Non-legal signs (warning alert)						
						Enters an intersection at a speed too fast to avoid collision after noticing the traffic clog	Crests affect the ability to recognize the front road alignment	Improve road alignment design Warning alert	Improve longitudinal road alignment design Colored pavement & road marking (words'warning) Non-legal signs (warning alert)						
						A downward slope tends to increase driving speed	A downward slope tends to increase driving speed	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)						
								A long straight road section tends to increase driving speed	A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)				
										-	Use an anti-skid pavement to reduce the braking/stopping distance Inform drivers to stop	Improve pavement (anti-skid pavement) Stop line (widen its width)			
								A following vehicle (automobile, motorcycle, bicycle) enters an intersection and collides with a preceding left-turning vehicle that has decelerated/stopped in front of pedestrian crossing		Preceding vehicle	-	-	-	Secure enough space for the left-turn vehicle to wait for the crossing pedestrians and bicycles Spatial separation of traffic lines between preceding left-turning vehicle and following through vehicles Reduce/eliminate traffic congestion	Pedestrian crossing (setback) Left-turn lane (new) Widen road width (increase the number of lanes) Eradicate bottleneck intersections
											Drives at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	A downward slope tends to increase driving speed A long straight road section tends to increase driving speed	Warning alert Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
															-
						Makes a left turn at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	Road design with a blunt intersection angle tends to increase speed before the pedestrian crossing Larger corner-cut radius tends to increase the left-turn speed				Improve intersection angle Improve corner-cut radius	Improve intersection (orthogonal) Improve intersection (reduce corner-cut radius)			
													Fails to, or does not notice in time that the preceding vehicle has stopped/decelerated	-	Warning alert
						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 stop/deceleration immediately before the pedestrian crossing	-				-	-			
			Piers of viaduct affect visibility of pedestrian crossing, its surroundings, or traffic after the left turn	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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										
			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										
			Pedestrian crossing with insufficient lighting affects visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Improve road lighting	Road lighting (new, improved, add, move)										
			Corner building affects visibility of the pedestrian crossing, its surroundings, or traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning) 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)										



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/intersection 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	
Rear-end collision	Intersection (2/5)	[Continues from previous page] 1) [Intersection with/without traffic signals: common] A following vehicle (automobile, motorcycle, bicycle) collides with a preceding vehicle at an intersection	A following vehicle (automobile, motorcycle, bicycle) enters the intersection and collides with a right-turning vehicle that has decelerated/stopped in front of pedestrian crossing		Following vehicle	-	-	-	Spatial separation of traffic lines between the preceding right-turn waiting vehicle and following through vehicles	Right-turn lane (new)
						-	-	-	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes) Eradicate bottleneck intersections
						Drives at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	A downward slope tends to increase driving speed	Warning alert	Reduce or level the downward slope	Improve longitudinal road alignment design
						A long straight road section tends to increase driving speed	-	Warning alert	Improve pavement (bumping pavement, grooving (lateral))	Colored pavement & road marking (words'warning)
						-	-	-	Non-legal signs (warning alert)	-
						-	-	-	Improve pavement (bumping pavement, grooving (lateral))	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)
						Makes a right turn at a speed too fast to avoid the preceding vehicle that has decelerated or stopped	Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection angle	Improve intersection (orthogonal)	-
						-	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
						-	-	-	Colored pavement & road marking (words'warning)	Non-legal signs (warning alert)
						-	-	-	Warning alert	Colored pavement & road marking (words'warning)
					-	-	-	-	Non-legal signs (warning alert)	
					Preceding vehicle	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 turn, and makes a sudden stop/deceleration while making a right turn	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)	
						-	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)	
						-	-	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	
						-	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)	
						-	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 pedestrian crossing or its surroundings, oncoming traffic, or traffic after the left turn	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn)							
-	-	-	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)							
-	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)							

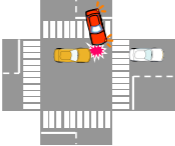
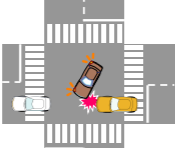
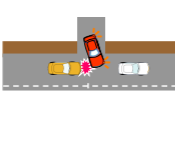

Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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	
Rear-end collision	Intersection (3/5)	2) [Intersection between a arterial road and a narrow street with no traffic signal] A following vehicle (automobile, motorcycle, bicycle) collides with a preceding vehicle at intersection between a arterial road and a narrow street	A following vehicle (automobile, motorcycle, bicycle) near intersection collides with a preceding vehicle that has decelerated/stopped at intersection	 	Following vehicle	Continues driving without paying attention to the traffic condition in front	Curve affects the ability to recognize the front road alignment	Improve road alignment design	Road alignment improvement	
								Improve sight distance	Sight distance improvement	
								Warning alert	Colored pavement & road marking (words'warning)	
									Non-legal signs (warning alert)	
									Improve longitudinal road alignment design	
									Colored pavement & road marking (words'warning)	
									Non-legal signs (warning alert)	
									Reduce or level the downward slope	Improve longitudinal road alignment design
									Improve pavement (bumping pavement, grooving (lateral))	
									Colored pavement & road marking (words'warning)	
									Non-legal signs (warning alert)	
									Improve pavement (bumping pavement, grooving (lateral))	
							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)		
							Snow/cold countermeasures (chemical application)			
							Snow/cold countermeasures (snow melting facility)			
							Improve pavement (grooving)			
							Improve drainage	Improve pavement (porous pavement)		
							Prevent slips	Improve grating cover		
								Improve pavement (bumping pavement, grooving (lateral))		
								Colored pavement & road marking (words'warning)		
								Non-legal signs (warning alert)		
								Colored pavement & road marking (words'warning)		
				Non-legal signs (warning alert)						
				Colored pavement & road marking (words'warning)						
				Non-legal signs (warning alert)						
				Colored pavement & road marking (words'warning)						
				Non-legal signs (warning alert)						
				Delineator (new)						
				Road marking (corner curb, dot-line marking)						
				Colored pavement						
				Guide signs, warning signs, non-legal signs ("Intersection Ahead")						
				Close the crossroad (local street)						
				Consolidate IN/OUT of roadside or move away from the main lane						
				Delineator (new)						
				Road marking (corner curb, dot-line marking)						
				Colored pavement						
				Guide signs, warning signs, non-legal signs ("Intersection Ahead")						
				Close the crossroad (local street)						
				Consolidate IN/OUT of roadside or move away from the main lane						
				Colored pavement & road marking (words'warning)						
				Non-legal signs (warning alert)						
				Pedestrian bridge (remove/move)						
				Colored pavement & road marking (words'warning)						
				Non-legal signs (warning alert)						
				Trim, move, or remove trees or shrubs						
				Trim, move, or remove trees or shrubs						
				Coordinate, move, or remove traffic/advertisement signs						
				Coordinate, move, or remove traffic/advertisement signs						
				Coordinate, move, or remove the ground equipment						
				Coordinate, move, or remove the ground equipment						
				Improve the design of guard fences						
				Use guard pipe for improvement						
				Improve road lighting						
				Road lighting (new, improved, add, move)						

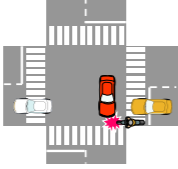

Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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
Rear-end collision	Intersection (4/5)	3) [Intersection with/without traffic signals: common] A following vehicle (automobile, motorcycle, bicycle) collides with a preceding vehicle near an intersection	Common		Following vehicle	Drives at a speed too fast to avoid the preceding vehicle after noticing deceleration/stop of it	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
							A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
			A following vehicle (automobile, motorcycle, bicycle) attempts to enter an intersection when traffic signal for vehicles is turning red, and collides before the intersection with a preceding vehicle that has decelerated/stopped		Following vehicle	Fails to check the traffic light, or mistakenly looks at the traffic signal of adjacent intersection, and attempts to enter the intersection against a red traffic signal	Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (LED lighting) Traffic signal (enlarge size) Traffic signal (install extra lights)
							Road curve affects visibility of the traffic signal	Move traffic signal to a more visible position	Traffic signal (improve installment position)
							Crests affect visibility of the traffic signal	Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
							Trees and shrubs affect visibility of the traffic signal	Improve road alignment design	Road alignment improvement
							Traffic/advertisement signs affect visibility of the traffic signal	Improve sight distance	Sight distance improvement
							Intersections are too near to each other	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
								Give advance notice of the traffic signal ahead	Traffic signal (advance traffic signal head)
								Improve road alignment design	Improve longitudinal road alignment design
								Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
								Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
			A following vehicle (automobile, motorcycle, bicycle) attempting to enter an intersection collides at near the intersection with a preceding vehicle that has decelerated/stopped due to traffic clogging		Following vehicle	Attempts to enter the intersection without careful checking of the preceding traffic situation	Curve affects the ability to determine the traffic situation after the intersection outflow	Improve road alignment design	Road alignment improvement
							Crests affect the ability to determine the traffic situation after the intersection outflow	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
								Improve road alignment design	Improve longitudinal road alignment design
								Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
			A following vehicle (automobile, motorcycle, bicycle) attempting to enter an intersection collides near the intersection with a preceding vehicle that has decelerated/stopped to make a right/left turn		Preceding vehicle	Makes a right/left turn without careful checking of pedestrians at or about to cross the pedestrian crossing, or the oncoming through vehicles, and makes a sudden stop/deceleration in the intersection	Curve affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Improve road alignment design	Road alignment improvement
							Crests affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Improve road alignment design	Improve longitudinal road alignment design
							Piers of viaduct affect visibility of pedestrian crossing, its surroundings, or oncoming traffic	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Piers of pedestrian bridge affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
							Trees and shrubs affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Traffic/advertisement signs affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Ground equipment affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Guard fences (guard rail, etc.) affect visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
Insufficient lighting at pedestrian crossing affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Improve the design of guard fences	Use guard pipe for improvement							
Corner building affects visibility of the pedestrian crossing, its surroundings, or oncoming traffic	Improve road lighting	Road lighting (new, improved, add, move)							
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	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)							
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	Improve intersection angle	Improve intersection (orthogonal)							
	Improve corner-cut radius	Improve intersection (reduce corner-cut radius)							
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.		Following vehicle					Fails to, or does not anticipate in time the lane change (cutting) of the preceding vehicle		Warning alert
			Preceding vehicle	Changes lane to avoid the preceding traffic clogging without making a safety check of the next lane	Prone to traffic congestion	Reduce/eliminate traffic congestion		Widen road width (increase the number of lanes) Eradicate bottleneck intersections	
		Preceding vehicle			Does not notice the change in lane operation in time, and makes a sudden lane change	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 obstructing traffic of through vehicles in through lane	Secure sufficient lane length according to right/left turn demands	Left-turn lane (extended) Right-turn lane (extended)	
				Change in lane operation, including changes from through lane to right/left-turn lane		Give advanced warning on change in lane operation	Guide signs, warning signs Non-legal signs (indication of lane-use control)		

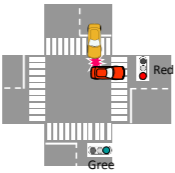
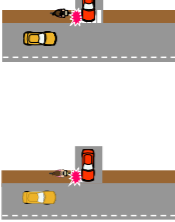
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/intersection category	Accident status	Example of accident occurrence 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
Rear-end collision	Intersection (5/5)	4) [Intersection with/without traffic signals: common] A following vehicle (automobile, motorcycle, bicycle) collides with a preceding vehicle at left turn channel	A following vehicle (automobile, motorcycle, bicycle) in left-turn channel collides at the left-turn channel with a preceding vehicle that has either decelerated or stopped		-	-	-	Close the turn channel	Remove the left-turn channel
					Following vehicle	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)
					Preceding vehicle	Drives without careful checking of pedestrians at or about to cross the pedestrian crossing, or the vehicles traveling on the traffic lane, and makes a sudden stop/deceleration in the turn channel	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
							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
							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
							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)
Fails to merge smoothly and makes a sudden stop/deceleration before the merge	Traffic congestion affects merging opportunity at merge area	Reduce/eliminate traffic congestion	Widen road width (increase the number of lanes)						
	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)						
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 accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-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
Head-to-side collision	Non-intersection (1/2)	1) An entering vehicle from a roadside collides with a main lane through vehicle (automobile, motorcycle, bicycle) on the road	A vehicle (automobile, motorcycle, bicycle) attempts to enter between the through vehicles traveling on main road and collides with a main road through vehicle on the road		-	-	-	Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane Remove IN/OUT of roadside
					-	-	-	Prohibit right-turn from the roadside	Median strips (new or close cut area) Rubber pole
					Entering vehicle	Enters main lane without careful checking of main lane through vehicles	Main lane curve affects visibility of the main lane through vehicles	Improve road alignment design Improve sight distance	Road alignment improvement 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)
							Piers of a pedestrian bridge affect visibility of the main lane through vehicles	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
							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
							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.) Delineator (new)
							Misreads the traveling position and speed of the main lane through vehicles, and enters main lane	-	Provide indications for easier recognition of travel position and speed of through vehicles Warning alert Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					Through vehicle	Drives 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	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bunping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
							A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bunping pavement, grooving (lateral)) 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 out from roadside	-	Warning alert Colored pavement & road marking (words'warning) Non-legal signs (warning alert)

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/inter-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
Head-to-side collision	Non-intersection (2/2)	2) An entering vehicle (automobile, motorcycle, bicycle) from a roadside collides on road shoulder with a motorcycle/bicycle traveling on main road	A vehicle (automobile, motorcycle, bicycle) attempts to enter between the through vehicles traveling on main road and collides with a motorcycle/bicycle traveling on a road shoulder		Entering vehicle	Attempts to enter main lane without careful checking of motorcycles and bicycles	Main lane curve affects visibility of the main lane road shoulder	Improve road alignment design Improve sight distance	Road alignment improvement Sight distance improvement
							Main lane crests affect visibility of the main lane road shoulder	Improve road alignment design	Improve longitudinal road alignment design
							Piers of a viaduct affect visibility of the main lane road shoulder	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Piers of a pedestrian bridge affect visibility of the main lane road shoulder	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words/warning) 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
							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
							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
							Buildings near the roadside IN/OUT affect visibility of the main lane road shoulder	Improve main lane visibility Warning alert	reflective mirrors Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Misreads the traveling position and speed of motorcycles, and enters main lane	-	Provide indications for easier recognition of travel position and speed of motorcycles 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.				
		3) An entering vehicle (automobile, motorcycle, bicycle) from a roadside collides with a through bicycle on a bicycle & pedestrian lane	A vehicle (automobile, motorcycle, bicycle) attempts to wait on bicycle & pedestrian lane to enter main road collides with a bicycle traveling on the bicycle & pedestrian lane		Entering vehicle	Enters main lane without careful checking of bicycles traveling on bicycle & pedestrian lane	Piers of a viaduct affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words/warning) Non-legal signs (warning alert)
							Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs
							Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs
							Ground equipment affects visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment
							Guard fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Improve the design of guard fences	Use guard pipe for improvement
							Buildings near the roadside IN/OUT affect visibility of bicycle & pedestrian lane	Improve bicycle & pedestrian lane visibility Warning alert	reflective mirrors 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)
							Drives without anticipating vehicles going in or coming out from side road	-	Warning alert


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/intersection 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	
Head-to-side collision	Intersection (1/3)	1) [Intersection with no traffic signal] An entering vehicle (automobile, motorcycle, bicycle) from a crossing road collides at intersection with a through vehicle	An entering vehicle (automobile, motorcycle, bicycle) from crossroad enters between the through vehicles traveling on main road and collides at intersection with a main road through vehicle	   	-	-	-	Spatial separation of traffic lines between the main lane through vehicles and entering vehicle from a crossroad	Grade crossing	
					Common	-	-	-	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
					Common	-	-	-	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
					-	-	-	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)
					-	-	-	Piers of a pedestrian bridge affect visibility of the main lane through vehicles	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
					-	-	-	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
					-	-	-	Corner building affects visibility of the main lane through vehicles	Improve main lane visibility	reflective mirrors
					-	-	-	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					-	-	-	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					-	-	-	Difficult to recognize that it is an intersection	Improve visibility of the intersection	Colored pavement Guide signs, warning signs, non-legal signs ("Intersection Ahead")
					-	-	-	Fails to recognize intersection or misunderstands give-way rules involving the crossroad, and enters the intersection	Improve indication of give-way rules	Colored pavement Road marking (corner curb, dot-line marking) Place a center line at major road side
					-	-	-	Difficult to perceive a give-way rule with the crossroad	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 an intersection	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					-	-	-	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design
					-	-	-	Drives at a speed too fast to avoid a vehicle coming out from a crossroad after noticing it	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					-	-	-	A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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 coming out from a crossroad	Warning alert	Colored pavement & road marking (words'warning) Road marking (corner curb, dot-line marking) Non-legal signs (warning alert)					

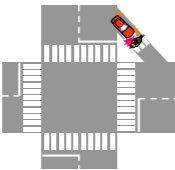

Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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
Head-to-side collision	Intersection (2/3)	2) [Intersection with no traffic signal] An entering vehicle (automobile, motorcycle, bicycle) from a crossroad collides at intersection outflow side with a motorcycle/bicycle riding on a road shoulder of the outflow side	A vehicle (automobile, motorcycle, bicycle) in crossroad attempts to enter between the through vehicles traveling on main road and collides at intersection with a motorcycle/bicycle traveling on a road shoulder of outflow side	 	-	Common	-	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
					-	-	-	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)
					Entering vehicle	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) Non-legal signs (warning alert)	
						Piers of a pedestrian bridge affect visibility of road shoulder at outflow side	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
						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	
						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	
						Ground equipment affects visibility of road shoulder at outflow side	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment	
						Guard fences (guard rail, etc.) affect visibility of road shoulder at outflow side	Improve the design of guard fences	Use guard pipe for improvement	
						Corner building affects visibility of road shoulder at outflow side	Improve visibility of road shoulder at outflow side Warning alert	reflective mirrors Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
						Misreads the traveling position and speed of motorcycles, and enters an intersection	-	Provide indications for easier recognition of travel position and speed of motorcycles Warning alert	Delineator (new) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
					Motorcycle/bicycle	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.
						Drives on road shoulder at a speed too fast to avoid a vehicle coming out from a crossroad after noticing it	A downward slope tends to increase driving speed	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
							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 on a 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
						Drives on road shoulder without anticipating vehicles coming out from a crossroad	-	Warning alert	Colored pavement & road marking (words'warning) Road marking (corner curb, dot-line marking) Non-legal signs (warning alert)



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/intersection 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			
Head-to-side collision	Intersection (3/3)	3) [Intersection with traffic signals] Through vehicle (automobile, motorcycle, bicycle) traveling on main road collides at intersection with a entering vehicle from a crossroad	A through vehicle (automobile, motorcycle, bicycle) could not cross the intersection when traffic sign for vehicle is turning red, and collides at intersection with a vehicle that has started from a crossroad		Through vehicle	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	Shorten the intersection cross distance Limit the number of standing vehicles in intersection Improve recognition of the intersection size	Improve intersection (make it compact) Stop line (move forward)			
						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 (extend clearance time, etc.) Colored pavement		
					Entering vehicle	Enters an intersection upon, or immediately after the traffic signal turns green, and without careful checking of intersection traffic	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Through vehicle	Fails to check the traffic signal, or mistakenly looks at the traffic signal of adjacent intersection, and enters the intersection against a red traffic signal		Sunset affects visibility of the traffic signal	Improve visibility of the traffic signal	Traffic signal (LED lighting) Traffic signal (enlarge size) Traffic signal (install extra lights)	
					Road curve affects visibility of the traffic signal			Move traffic signal to a more visible position	Traffic signal (improve installment position)			
					Crests affect visibility of the traffic signal				Give advance notice of the traffic signal ahead		Traffic signal (advance traffic signal head)	
					Trees and shrubs affect visibility of the traffic signal				Improve road alignment design	Road alignment improvement		
					Traffic/advertisement signs affect visibility of the traffic signal			Improve sight distance	Sight distance improvement			
					Intersections are too near to each other			Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
					4) [Intersection with no traffic signal] An entering vehicle (automobile, motorcycle, bicycle) from a crossroad collides with a through bicycle at pedestrian crossing	An entering vehicle (automobile, motorcycle, bicycle) enters between the through vehicles traveling on main road and collides with a bicycle traveling on pedestrian crossing		Entering vehicle	Enters an intersection without careful checking of bicycles	Piers of a viaduct affect visibility of the sidewalk	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
									Piers of a pedestrian bridge affect visibility of the sidewalk	Remove or move the pedestrian bridge		Pedestrian bridge (remove/move)
									Trees and shrubs affect visibility of the sidewalk	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs	
		Traffic/advertisement signs affect visibility of the sidewalk	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs								
		Ground equipment affects visibility of the sidewalk	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment								
		Guard fence (guard rail, etc.) affect visibility of the sidewalk	Improve the design of guard fences	Use guard pipe for improvement								
		Corner building affects visibility of sidewalk	Improve visibility of bicycles traveling on sidewalk	reflective mirrors								
		Insufficient sidewalk lighting affects its visibility	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)								
		Bicycle	Drives without anticipating vehicles coming out from a crossroad	-					Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)		




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/inter-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									
Left-turn collision	Non-intersection	Common			-	-		Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane Remove IN/OUT of roadside									
								Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)									
								Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)									
								Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)									
								Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs									
								Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs									
								Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment									
								Improve the design of guard fences	Use guard pipe for improvement									
								Limit standing vehicles	Consider countermeasures for standing vehicles (standing zone, no parking regulations, etc.)									
								Implement countermeasures for easier recognition of roadside IN/OUT	Delineator (new) Colored pavement									
		Left-turn vehicle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder			-	Fails to notice the roadside IN/OUT in time and makes a sudden left turn	Piers of a pedestrian bridge affect visibility of the roadside IN/OUT	Spatial separation of traffic lines between left-turn and through vehicles	Left-turn lane (new)							
									Piers of a viaduct affect visibility of the roadside IN/OUT	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)							
									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							
									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							
									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) Colored pavement							
									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 lines between left-turn and through vehicles	Left-turn lane (new)						
									Turns left without careful checking of motorcycles and bicycles	-	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)						
		Motorcycle/bicycle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder			-	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 lines between left-turn and through vehicles	Left-turn lane (new)							
									Misreads the traveling position and speed of motorcycles and bicycles, and turns left	-	Warning alert	Colored pavement & road marking (words/warning) 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.						
									Motorcycle/bicycle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder			-	A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design	
																Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
																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)
Motorcycle/bicycle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a motorcycle/bicycle traveling on a road shoulder			-	Drives 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									
							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) Non-legal signs (warning alert)									
Left-turn vehicle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a bicycle traveling on bicycle & pedestrian lane	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a bicycle traveling on bicycle & pedestrian lane			-	Makes a left turn without careful checking of bicycles traveling on bicycle & pedestrian lane	Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)									
							Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs									
							Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs									
							Ground equipment affects visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment									
							Guard fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Improve the design of guard fences	Use guard pipe for improvement									
							Insufficient bicycle & pedestrian lane lighting affects its visibility	Improve road lighting	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, no parking regulations, etc.)									
							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 lines between left-turn and through vehicles	Left-turn lane (new)								
							Bicycle	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a bicycle traveling on bicycle & pedestrian lane	A vehicle (automobile, motorcycle) turning left to enter a roadside collides with a bicycle traveling on bicycle & pedestrian lane			-	Drives without anticipating left-turn vehicles	-	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)		
														-	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)		



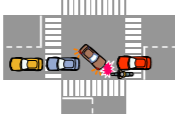
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures				
Accident type	Non-intersection/intersection category	Accident status	Example of accident occurrence 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				
Left-turn collision	Intersection (1/3)	Common	Common	-	-	-	-	Spatial separation of traffic lines between left-turn and through vehicles	Consolidate IN/OUT of roadside or move away from the main lane				
								Temporal separation of traffic lines between left-turn and through vehicles	Improve traffic signal phase (Left-turn only phase)				
								Common	Motorcycle/bicycle	Drives on a 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)
										Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Eradicate bottleneck intersections	
								A vehicle (automobile, motorcycle) decelerates/stops in the act of left-turn at intersection, and collides with a motorcycle/bicycle traveling on a road shoulder at intersection	Left-turn vehicle	Attempts to make a left turn without careful checking of the traffic after the left turn, and makes a sudden stop/deceleration in the intersection	Piers of a viaduct affect visibility of the traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
											Piers of a pedestrian bridge affect visibility of the traffic after the left turn	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
											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
											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
											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
											Corner building affects visibility of the traffic after the left turn	Warning alert	Colored pavement & road marking (words'warning)
											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)
											-	-	Eradicate bottleneck intersections
											A left-turning vehicle (automobile, motorcycle) collides at intersection with a through motorcycle/bicycle	Motorcycle/bicycle	Drives at a speed too fast to avoid the 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)			
								-	Warning alert	Non-legal signs (warning alert)			
								-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)			
								-	-	-			
								-	-	-			
								A left-turning vehicle (automobile, motorcycle) collides at intersection with a motorcycle/bicycle traveling on a road shoulder and in parallel direction	Left-turn vehicle	Makes a left turn at a speed too fast to avoid the motorcycle/bicycle after noticing it	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)
											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 lines between left-turn and through vehicles
Turns left without careful checking of motorcycles and bicycles	-	Warning alert	Colored pavement & road marking (words'warning)										
Misreads the traveling position and speed of motorcycles and bicycles, and turns left	-	Warning alert	Non-legal signs (warning alert)										
Motorcycle/bicycle	Drives at a speed too fast to avoid the preceding vehicle making a left turn after noticing it	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.								
		A downward slope tends to increase driving speed	Reduce or level the downward slope	Improve longitudinal road alignment design									
		A long straight road section tends to increase driving speed	Warning alert	Colored pavement & road marking (words'warning)									
		-	Warning alert	Non-legal signs (warning alert)									
		-	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)									

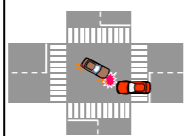
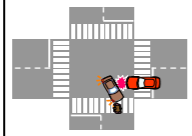
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non-intersection/intersection category	Accident status	Example of accident occurrence 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	
Left-turn collision	Intersection (2/3)	2) [Intersection with/without traffic signals: common] A left-turn vehicle (automobile, motorcycle) collides with a bicycle crossing the pedestrian crossing	A vehicle (automobile, motorcycle) turns left at intersection and collides with a bicycle crossing the pedestrian crossing		Left-turn vehicle	Turns left without careful checking of bicycles	Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
							Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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	
							Corner building affects visibility of the pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) 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)	
							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)	
							Bicycle	Crosses a pedestrian crossing without careful checking of a left-turning vehicle	Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Improve the pedestrian crossing position
					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)	
					Makes a left turn at a speed too fast to avoid the bicycle after noticing it	Improve intersection angle Improve corner-cut radius			Improve intersection (orthogonal) 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 lines between left-turn and through vehicles Left-turn lane (new)	
					Misreads the traveling position and speed of bicycle, and turns left	-			Warning alert Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
					Bicycle	Crosses the pedestrian crossing without anticipating left-turn vehicles	Fails to anticipate bicycles and makes a left turn without making a safety check	-	Warning alert Clear indication of bicycles' traveling position Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert) Colored pavement & road marking (words'warning) 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)	
							Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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	
							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) Non-legal signs (warning alert)								
Crosses the pedestrian crossing 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 accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures			
Accident type	Non-intersection/intersection 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			
Left-turn collision	Intersection (3/3)	3) [Intersection with/without traffic signals: common] A left-turn vehicle (automobile, motorcycle) collides with a bicycle traveling the left turn channel	Common		-	-	-	Abolish left-turn channel	Remove the left-turn channel			
								Left-turn vehicle	Enters the left turn channel without careful checking of bicycles at or near 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
										Guard 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
										Insufficient lighting affects visibility of the turn channel pedestrian crossing or its surroundings	Improve road lighting	Road lighting (new, improved, add, move)
										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)
								Bicycle	Crosses a pedestrian crossing without careful checking of vehicles approaching the pedestrian crossing	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)
										Drives through the left-turn channel at a speed too fast to avoid the bicycle after noticing it		
								Bicycle	Crosses a pedestrian crossing without careful checking of vehicles approaching the pedestrian crossing	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
								-	Drives without careful checking of vehicles approaching the pedestrian crossing	-	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
-												
-	4) [Intersection with/without traffic signals: common] A left-turn vehicle (automobile, motorcycle) collides with a standing bicycle at corner of the intersection		-	-	-	-	Secure the waiting area	Sidewalk and bicycle & pedestrian lane (secure waiting area)				
							-	-	-	-	Separate the boundary between sidewalk and road	Guard fence (to prevent run-over by vehicle) Rubber pole

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/inter-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		
Right-turn collision	Non-intersection (1/2)	Common			-	-		Spatial separation of traffic lines between right-turn and oncoming through vehicles	Median strips (new or close cut area)		
								Consolidate or move IN/OUT of roadside	Consolidate IN/OUT of roadside or move away from the main lane 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		
		1) A right-turn 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 on a road	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 on the road		Right-turn vehicle	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	Sight distance improvement Improve longitudinal road alignment design			
						Piers of viaduct affect visibility of opposite lanes	Warning alert	Colored pavement & road marking (words'warning) 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 turn	Right-turn lane (new or improve position) Channelization (roadway center zebra stripes)			
						Headlights of an oncoming vehicle affect visibility of the opposite lane	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 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 Channelization (roadway center zebra stripes)			
						Misreads the traveling position and speed of oncoming through vehicles, and turns right	-	Provide indications for easier recognition of travel position and speed of oncoming through vehicles Delineators (install at opposite lane) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Through vehicle	Drives at a speed too fast to avoid the right-turning vehicle after noticing it		A downward slope tends to increase driving speed	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
									A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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)							

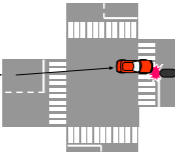
Study process		(2) Setting target accidents' status	(3) Assuming accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures
Accident type	Non-intersection/inter-section category	Accident status	Example of accident occurrence 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
Right-turn collision	Non-intersection (2/2)	A right-turn vehicle (automobile, motorcycle) collides with an oncoming motorcycle/bicycle on road shoulder	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 motorcycle/bicycle traveling on a road shoulder	 	Right-turn vehicle	Curve affects visibility of road shoulder of opposite lanes	Improve road alignment design	Road alignment improvement	
						Improve sight distance	Sight distance improvement		
						Crests affect visibility of road shoulder of opposite lanes	Improve road alignment design	Improve longitudinal road alignment design	
						Piers of a viaduct affect visibility of road shoulder of opposite lanes	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
						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	
						Right-turning vehicle at opposite lane affects visibility of road shoulder of opposite lanes	Improve visibility of the oncoming through vehicles when making a right turn	Right-turn lane (new or improve position) Channelization (roadway center zebra stripes)	
						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 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) Channelization (roadway center zebra stripes)
		Misreads the traveling position and speed of oncoming motorcycles, and turns right	-	Provide indications for easier recognition of travel position and speed of oncoming motorcycles	Delineators (install at opposite lane)				
		Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)						
		Fails to anticipate bicycles and makes a tight turn without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.				
		Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)						
		3) An right-turning vehicle (automobile, motorcycle) collides with a bicycle on a bicycle & pedestrian lane	A vehicle (automobile, motorcycle) attempts to enter a roadside by making a right turn between the through vehicles at opposite lane and collides with a bicycle traveling on a bicycle & pedestrian lane		Right-turn vehicle	Piers of a viaduct affect visibility of the bicycle & pedestrian lane	Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)	
						Piers of a pedestrian bridge affect visibility of the bicycle & pedestrian lane	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)	
						Warning alert	Colored pavement & road marking (words/warning) Non-legal signs (warning alert)		
						Trees and shrubs affect visibility of the bicycle & pedestrian lane	Trim, move, or remove trees or shrubs	Trim, move, or remove trees or shrubs	
						Traffic/advertisement signs affect visibility of the bicycle & pedestrian lane	Coordinate, move, or remove traffic/advertisement signs	Coordinate, move, or remove traffic/advertisement signs	
						Ground equipment affects visibility of the bicycle & pedestrian lane	Coordinate, move, or remove the ground equipment	Coordinate, move, or remove the ground equipment	
Gurd fences (guard rail, etc.) affect visibility of the bicycle & pedestrian lane	Improve the design of guard fences					Use guard pipe for improvement			
Insufficient bicycle & pedestrian lane lighting affects its visibility	Improve road lighting					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, no parking regulations, etc.)			
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) Channelization (roadway center zebra stripes)		
Bicycle	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 accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures		
Accident type	Non-intersection/intersection 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		
Right-turn collision	Intersection (1/3)	1) [Intersection with/without traffic signs: common] A right-turn vehicle (automobile, motorcycle) collides with an oncoming through vehicle at intersection [continues on next page]	A vehicle (automobile, motorcycle) attempts to enter a crossroad by making a right turn between the through vehicles at opposite lane and collides with an oncoming through vehicle at intersection	  	Right-turn vehicle	-	-	-	Spatial separation of traffic lines between right-turn and oncoming through vehicles	Grade crossing	
						Common	-	-	-	Temporal separation of traffic lines between right-turn and oncoming through vehicles	Consolidate IN/OUT of roadside or move away from the main lane
						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			
						Piers of viaduct affect visibility of opposite lanes	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Piers of a pedestrian bridge affect visibility of opposite lanes	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)			
						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 turn	Right-turn lane (new or improve position)			
						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	Reduce the number of lanes (one right-turn lane only)			
						Right-turn waiting position is bad, affecting the visibility of opposite lanes	Clear indication of right-turn path in the intersection	Channel marking (right-turn)			
						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	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) Intersection center-point marking			
						Bad road drainage in wet weather 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)			
						Unclear right-turn waiting position after dark causes drivers to wait at an inappropriate position with poor visibility of the opposite lane	Improve drainage	Improve pavement (porous pavement)			
						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 visibility of right-turn waiting position in wet weather	Road markings (highly visible)			
						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	Improve visibility of right-turn waiting position after dark	Road markings (highly visible) Road lighting (new, improved, add, move)			
						Makes a right turn at a speed too fast to avoid the oncoming through vehicle after noticing it	Improve intersection angle	Improve intersection (orthogonal)			
						Makes a forceful right turn to avoid a situation where a vehicle waiting in traffic lane is obstructing the following through vehicles	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) Intersection center-point marking			
						Misreads the traveling position and speed of oncoming through vehicles, and turns right	Spatial separation of traffic lines between right-turn and through vehicles	Right-turn lane (new)			
						Fails to anticipate bicycles and makes a tight turn without making a safety check	Provide indications for easier recognition of travel position and speed of oncoming through vehicles	Delineators (install at opposite lane) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Drives 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			
						Drives on a road shoulder (motorcycles, bicycles)	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Drives on a road shoulder (motorcycles, bicycles) without paying full attention to right-turning vehicles	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Through vehicle	A downward slope tends to increase driving speed	Warning alert			
						A long straight road section tends to increase driving speed	Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						Drives without anticipating right-turn vehicles	Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)			
						Drives on a road shoulder (motorcycles, bicycles)	Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion			
Wide road shoulder width increases motorcycles going through on road shoulder	Limit going through on road shoulder	Widen road width (increase the number of lanes) Eradicate bottleneck intersections									
Drives on a road shoulder (motorcycles, bicycles) without paying full attention to right-turning vehicles	Warning alert	Reduce road shoulder width Colored pavement & road marking (words'warning) Non-legal signs (warning alert)									

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/intersection 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
Right-turn collision	Intersection (2/3)	A vehicle (automobile, motorcycle) waits inside the opposite lane to make a right turn and collides with an oncoming through vehicle at intersection		Right-turn vehicle	Waits inside the opposite lane to make a right turn	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)	
						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	Channel marking (right-turn) Intersection center-point marking Colored pavement	
						Bad road drainage in wet weather affects the visibility of the right-turn waiting position	Improve drainage Provide indications for easier recognition of waiting position	Improve pavement (porous pavement) Road markings (highly visible)	
						Poor visibility of right-turn waiting position after dark	Provide indications for easier recognition of travel position	Road markings (highly visible) Road lighting (new, improved, add, move)	
				Through vehicle	Drives at a speed too fast to avoid the right-turning vehicle after noticing it	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)	
				A downward slope tends to increase driving speed		Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)		
				A long straight road section tends to increase driving speed		Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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)		
				-		-	-		
		A right turning vehicle (automobile, motorcycle) decelerates/stops for a crossing pedestrian, etc., and collides with an oncoming through vehicle at intersection		Right-turn vehicle	Makes a right-turn without careful checking of pedestrians at or about to cross the pedestrian crossing, and makes a sudden stop/deceleration immediately before the pedestrian crossing	Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)	
						Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Remove or move the pedestrian bridge Warning alert	Pedestrian bridge (remove/move) Colored pavement & road marking (words'warning) 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)	
						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)	
						Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.), affecting drivers' attention to pedestrian crossing or its surroundings	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) 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 Temporal separation of traffic lines between the automobile and crossing pedestrians	Traffic signals (right-turn only phase) 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 Clear indication of right-turn path in the intersection	Reduce the number of lanes (one right-turn lane only) Channel marking (right-turn)							
-	Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)							
Through vehicle	Drives at a speed too fast to avoid the right-turning vehicle after noticing it	A downward slope tends to increase driving speed	Reduce or level the downward slope Warning alert	Improve longitudinal road alignment design Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning) Non-legal signs (warning alert)					
A long straight road section tends to increase driving speed		Warning alert	Improve pavement (bumping pavement, grooving (lateral)) 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)						

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/inter-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			
Right-turn collision	Intersection (3/3)	2) [Intersection with traffic signs] A right-turn vehicle (automobile, motorcycle) collides with an oncoming through vehicle at intersection	A vehicle (automobile, motorcycle) starts to make a right turn when traffic light is turning red, and collides with an oncoming through vehicle at intersection		Right-turn vehicle	Makes a forceful entry to the intersection when traffic signal is turning red	Right-turn traffic signal cycle is too short	Secure time for the right-turn traffic signal cycle	Traffic signals (right-turn only phase) Improve traffic signal phase (extended green, etc.)			
					Through vehicle	Makes a mistake in judgment of whether to stop or go when the traffic signal is turning red, and enters the intersection	Intersection is large and takes time to pass through	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)			
						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	Reduce the size of the intersection Improve recognition of the intersection size Inform drivers to stop	Improve intersection (make it compact) Colored pavement Stop line (widen its width)			
					3) [Intersection with/without traffic signals: common] A right-turn vehicle (automobile, motorcycle) collides with a bicycle at or near the pedestrian crossing	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	Turns right without careful checking of bicycles	Piers of a viaduct affect visibility of pedestrian crossing or its surroundings	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)
										Piers of pedestrian bridge affect visibility of the pedestrian crossing or its surroundings	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)
										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)								
		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)								
		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)								
		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 pedestrian crossing or its surroundings	Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) Intersection center-point marking								
			Provide an emergency space in front of the pedestrian crossing to avoid collision	Pedestrian crossing (setback)								
		Makes a right turn at a speed too fast to avoid the bicycle after noticing it	Pedestrian crossing setback tends to increase the approaching vehicle speed before the pedestrian crossing	Pedestrian crossing (move forward)								
			Road design with a blunt intersection angle tends to increase the right-turn speed	Improve intersection (orthogonal)								
			Unclear indication of right-turn path tends to increase the right-turn speed (short-cut, etc.)	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)							
		Fails to anticipate bicycles and makes a right turn without making a safety check	Lack of, or no indication of bicycle passage	Provide space for bicycle passage	Bicycle lane, bicycle path, etc.							
				Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)							
Bicycle	Crosses a pedestrian crossing without careful checking of a right-turning vehicle	Piers of viaduct affect visibility of vehicles approaching the pedestrian crossing	Warning alert	Colored pavement & road marking (words'warning) Non-legal signs (warning alert)								
		Piers of pedestrian bridge affect visibility of vehicles approaching the pedestrian crossing	Remove or move the pedestrian bridge	Pedestrian bridge (remove/move)								
		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 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 accident occurrence process		(4) Analyzing accident factor			(5) Studying countermeasures' purpose	(6) Listing detailed countermeasures	
Accident type	Non-intersection/inter-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	
Single-vehicle accident	Non-intersection	1) A through vehicle (automobile, motorcycle, bicycle) collides with a structure off the road, or overturned	Common		-	-	-	Remove or consolidate collision-prone objects	Removal/consolidation of structures	
								Remove power poles	Guard fence (for roadside and median)	
								Install facilities to absorb collision-impact	Crash attenuators	
								Widen the narrow lane width to an appropriate width	Road widening	
								Alert the driver to limit lane departure	Ramble strips	
									Road studs	
									Road markings (ribbed)	
								Improve road alignment design	Road alignment improvement	
									Improve sight distance	Sight distance improvement
									Provide indications for easier recognition of road alignment	Delineator (new or larger type)
										Road markings (highly visible)
										Road studs
									Rubber pole	
								Colored pavement		
		Warning alert	Colored pavement & road marking (words/warning)							
			Non-legal signs (warning alert)							
		Improve road alignment design	Improve longitudinal road alignment design							
			Provide indications for easier recognition of road alignment	Delineator (new or larger type)						
		Warning alert	Colored pavement & road marking (words/warning)							
			Non-legal signs (warning alert)							
		Install objects to block headlights	Glare prevention plates							
			Reduce or level the downward slope	Improve longitudinal road alignment design						
		Warning alert		Improve pavement (bumping pavement, grooving (lateral))						
			Colored pavement & road marking (words/warning)							
		Non-legal signs (warning alert)								
		Improve pavement (bumping pavement, grooving (lateral))	Colored pavement & road marking (words/warning)							
			Non-legal signs (warning alert)							
		Improve road alignment design	Road alignment improvement							
Improve superelevation	Superelevation improvement									
Reduce pavement slipperiness	Improve pavement (anti-skid pavement)									
	Prevent road surface from icing	Snow/cold countermeasures (chemical application)								
Snow/cold countermeasures (snow melting facility)										
Improve pavement (grooving)										
Improve drainage	Improve pavement (porous pavement)									
	Prevent slips	Improve grating cover								
Improve drainage	Improve pavement (porous pavement)									
	Provide indications for easier recognition of travel position in wet weather	Road markings (highly visible)								
Provide indications for easier recognition of travel position	Road markings (highly visible)									
	Alert the driver to limit lane departure	Ramble strips								
Road studs										
Road markings (ribbed)										
Warning alert	Improve pavement (bumping pavement, grooving (lateral))									
2) A through vehicle (automobile, motorcycle, bicycle) collides with a parked vehicle (no driver) on the road or road shoulder	A through vehicle (automobile, motorcycle, bicycle) on road collides with a parked vehicle on the road or road shoulder	Common		Through vehicle	-	-	-	Separate the parking space and main lane	Improve standing zone	
								Reduce or level the downward slope	Improve longitudinal road alignment design	
								Warning alert	Improve pavement (bumping pavement, grooving (lateral))	
									Colored pavement & road marking (words/warning)	
								Non-legal signs (warning alert)		
								Improve pavement (bumping pavement, grooving (lateral))	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)								
		Warning alert	Colored pavement & road marking (words/warning)							
	Non-legal signs (warning alert)									
	A motorcycle/bicycle rides on road shoulder to avoid stationary traffic on traffic lane, and collides with a parked vehicle at road shoulder	Motorcycle/bicycle	-		-	-	-	Traffic congestion on main lane increases motorcycles going through on road shoulder	Reduce/eliminate traffic congestion	
								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)	
	Non-legal signs (warning alert)									

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/intersection 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	
Single-vehicle accident	Intersection	Common			-	-	-	Install facilities to absorb collision-impact	Crash attenuators	
		1) [Intersection with/without traffic signals: common] A right-turn vehicle (automobile, motorcycle) collides at intersection with a structure	A right-turning vehicle (automobile, motorcycle) collides with a median strip at the intersection		Right-turn vehicle	Turns right without fully discerning the median strip	Poor visibility of the median strip		Improve road lighting	Road lighting (new, improved, add, move)
						Makes a right turn at a speed too fast to avoid the median strip after noticing it	Road design with a blunt intersection angle tends to increase the right-turn speed		Improve visibility of the median strip	Median tip indicator (obstacle indicator, etc.)
									Improve intersection angle	Improve intersection (orthogonal)
									Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)
									Improve intersection angle	Improve intersection (orthogonal)
									Guide right-turn vehicles in the intersection to an appropriate position	Channel marking (right-turn) Intersection center-point marking
									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)			
		2) [Intersection with/without traffic signals: common] A through vehicle (automobile, motorcycle) collides with a work piece at intersection	A through vehicle (automobile, motorcycle) collides with a front median strip at irregular or other types of intersections		Through vehicle	Drives without fully discerning the median strip	Poor visibility of the median strip		Improve road lighting	Road lighting (new, improved, add, move)
									Improve visibility of the median strip	Median tip indicator (obstacle indicator, etc.)
									Warning alert	Non-legal signs (indication of intersection shape)
									Reduce or level the downward slope	Improve longitudinal road alignment design
							Warning alert	Improve pavement (bumping pavement, grooving (lateral)) Colored pavement & road marking (words'warning)		
							Warning alert	Non-legal signs (warning alert)		
							Use an anti-skid pavement to reduce the braking/stopping distance	Improve pavement (anti-skid pavement)		
			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)					
			Guide vehicles in the intersection to an appropriate position	Channel marking (right-turn) Intersection center-point marking						
			Continues driving without paying attention to the traveling position in the intersection	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)					