Traffic safety measures on arterial roads

1. Outline of Studies and Activities

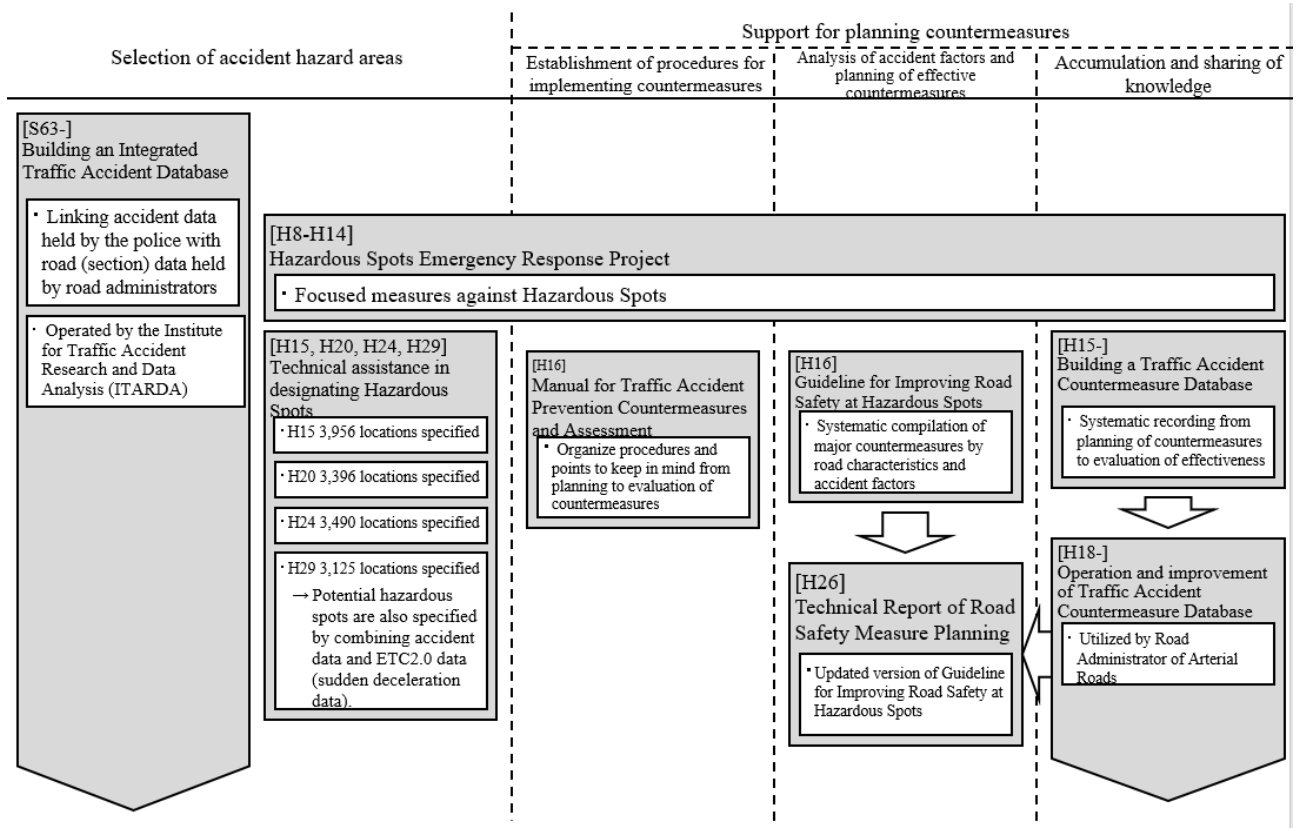
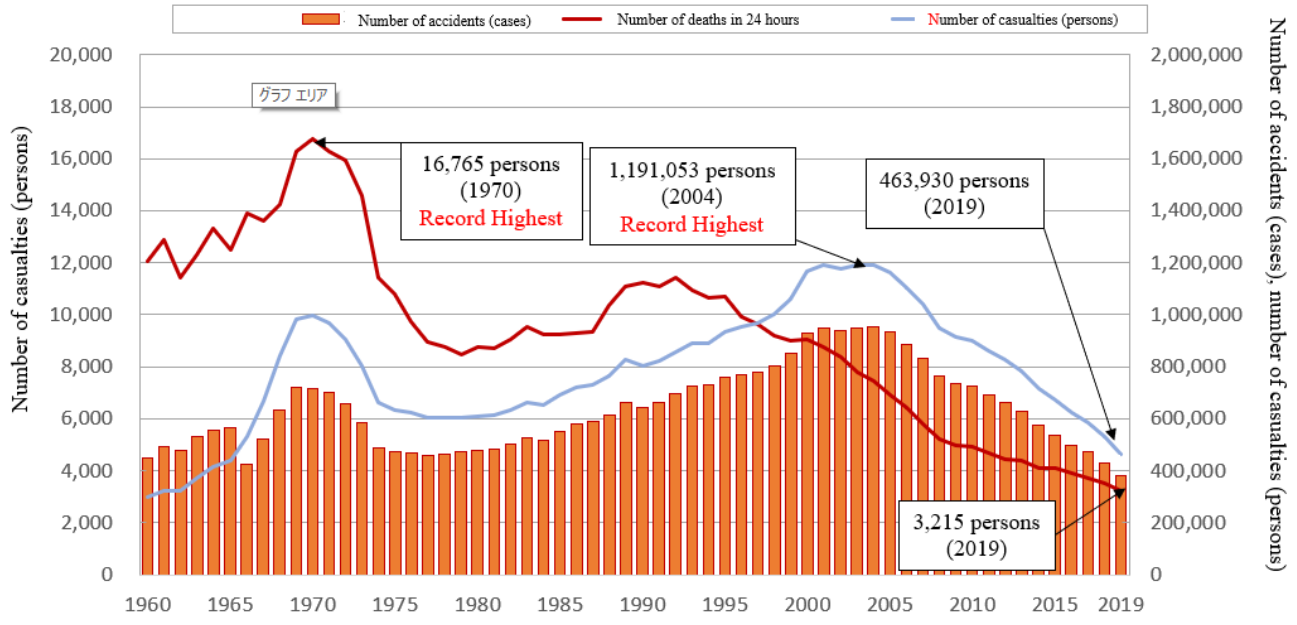


Figure-1 Relationship between traffic safety measures on arterial roads and research findings



Source: Prepared by MLIT based on NPA published materials

Figure-2 Traffic accidents

1) Social Needs and Policy Flow

The number of traffic accidents once decreased after the period known as the First Traffic War, but continued to increase again after 1978. The National Police Agency (NPA) and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) established the "Hazardous Spot Emergency Measures Program" in FY1996 to focus on spots with high accident frequency, as a traffic safety measure for arterial roads, because accidents on arterial roads are concentrated in certain spots. Based on the results of these emergency measures, a system was established to effectively reduce traffic accidents by identifying "hazardous spots" based on traffic accident data and other data, and then focusing on these risk spots. Since 2003, this system has been used as the basis for arterial roads countermeasures, and in 2003, 2008, 2012, and 2017, the national government designated hazardous spots for traffic accidents and implemented priority countermeasures. As a result of these efforts, the number of traffic accidents and casualties peaked in 2004 and has continued to decline ever since.

2) Outline of Research and Activities

The Road Traffic Department has supported road administrators in implementing countermeasures by conducting research on "selection of hazardous spots" and "support for planning countermeasures" (establishment of countermeasure implementation procedures, analysis of accident factors and planning of effective countermeasures, and accumulation and sharing of knowledge).

[Selection of Hazardous Spots]

In light of the fact that traffic accidents on arterial roads such as national and prefectural roads are concentrated in certain spots, the NPA and MLIT have jointly designated intersections and road sections with high fatality and injury accident rates as "hazardous spots" and implement countermeasures in cooperation with prefectural public safety committees and road administrators.

The Integrated Traffic Accident Database, which was developed in 1988, combines accident data held by the police and road data (road segments) held by road administrators, in order to objectively and efficiently identify hazardous spots. NILIM has been conducting research on how to select hazardous spots based on the characteristics of the Integrated Traffic Accident Database (segmentation method, calculation method of selection indices, sensitivity analysis for setting selection criteria, etc.), and hazardous spots have been selected based on the results of this research.

Furthermore, with the recent widespread use of ETC2.0 on-board equipment, research is also being conducted to select potential hazardous spots based on information regarding vehicle sudden deceleration. The program currently uses a system that selects hazardous spots by combining accident locations based on the Integrated Traffic Accident Database and potential hazardous spots based on ETC2.0 data.

[Support for Planning Countermeasures]

Although the Hazardous Spot Emergency Measures Program implemented in FY1996 had a significant deterrent effect on accidents as a whole, there were cases where the number of accidents did not decrease despite the implementation of countermeasures, and more effective planning methods and knowledge sharing through countermeasures were required.

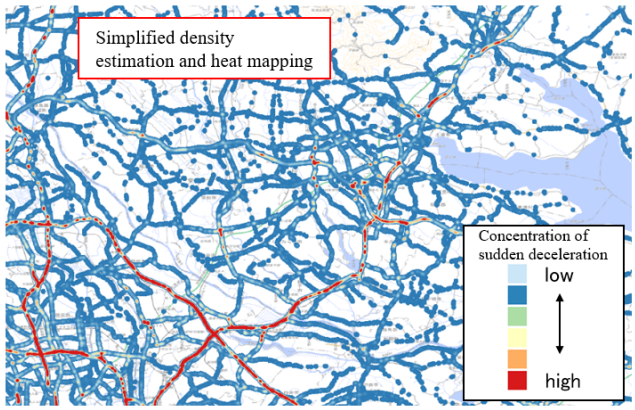
Therefore, in order to support effective countermeasure planning, NILIM has conducted research on countermeasure implementation procedures, methods for analyzing accident factors, and the provision of tools for accumulating and sharing knowledge, based on the accumulation of accident cases and countermeasure effects to date.

The research results have been published as the “Manual for Traffic Accident Prevention Countermeasures and Assessment” (Traffic Bureau of NPA, and Road Bureau of MLIT) and the “Guidelines for Improving Road Safety at Hazardous Spots” (NILIM) to support the formulation of countermeasures, and a “Traffic Accident Countermeasure Database” has been established in NILIM as a system to facilitate sharing countermeasure casebooks.

2. Main Research Results

◆ How hazardous spots are selected

Research is being conducted on methods for selecting hazardous spots using the Integrated Traffic Accident Database (segmentation methods, calculation methods for indicators used in selection, sensitivity analysis for setting selection criteria, etc.). In consideration of the recent widespread use of ETC2.0 equipment, research is also being conducted to introduce ETC2.0 probe information as a method for selecting potential hazardous spots. The results of these studies have been used to select hazardous spots.



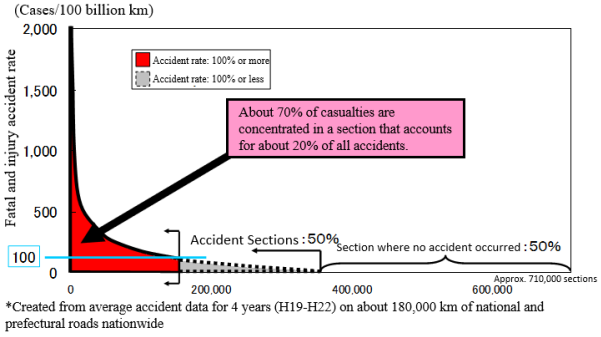


Figure-3 National (arterial road) casualty rates

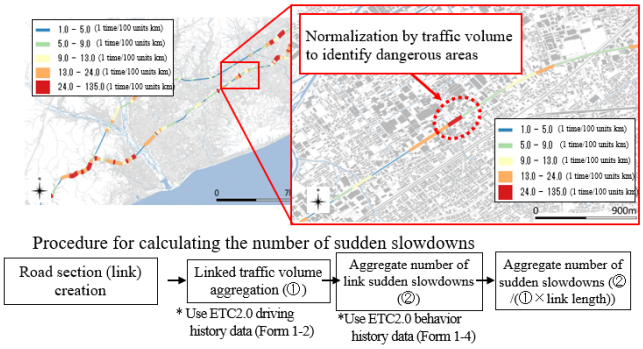


Figure-4 Extraction of potential hazardous spot (sudden deceleration spot) using ETC2.0 probe information

◆Support for planning countermeasures (establishment of procedures for implementing countermeasures)

A survey was conducted on the Hazardous Spot Emergency Measures Program from 1996 to 2002, and a draft of the "Manual for Traffic Accident Prevention Countermeasures and Assessment" was prepared by organizing a series of procedures and points to keep in mind from planning to evaluation of countermeasures.

◆Support for planning countermeasures (analysis of accident factors and planning of effective countermeasures)

Among the countermeasure procedures, particularly with regard to the methods of analyzing factors and studying countermeasures, a survey was conducted on road characteristics, accident factors, countermeasures and their effects, etc. for each spot of the Hazardous Spot Emergency Measures Program. The results were compiled in the "Guidelines for Improving Road Safety at Hazardous Spots" to assist road administrators in selecting countermeasures. These were distributed through the MLIT in 2004.

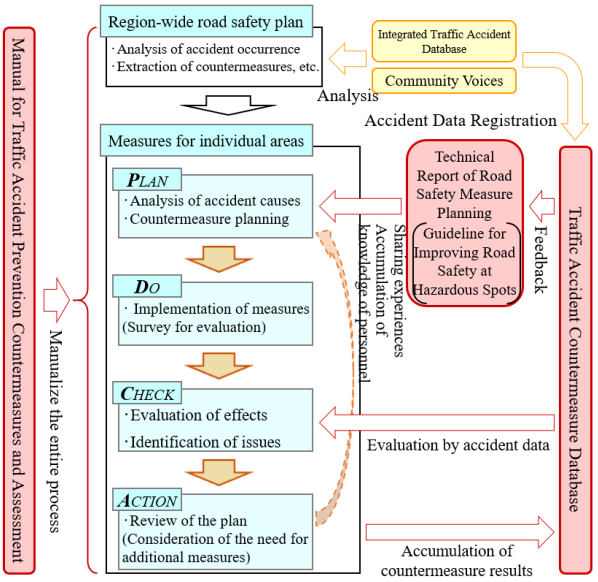


Figure-5 How to proceed with traffic safety measures on arterial roads

In 2014, based on the content accumulated in the Traffic Accident Countermeasure Database described below, NILIM compiled and published the "Technical Report of Road Safety Measure Planning," an updated collection of the Guidelines for Improving Road Safety at Hazardous Spots.

◆Support for planning countermeasures (accumulation and sharing of knowledge)

Since the analysis of countermeasures in the Hazardous Spot Emergency Measures Program that began in 1996 was limited in scope, the Traffic Accident Countermeasure Database was established in 2003 to systematically record information from planning to effectiveness evaluation of countermeasures, so that knowledge on the countermeasures implemented afterward can be accumulated and used in the study of new countermeasures. The database was put into operation in 2006 and has been utilized by road administrators of arterial roads to this day.

Item		Description
Accident patterns to focus on	Accident location	Ascending, descending, inflow parts, etc.
	Day and night	Day and night, etc.
	Road surface condition	Dry, wet, etc.
	Related party	Mutual automobile and pedestrian involvement, etc.
	Type of accident	Rear-end collisions, right-turns, head-on collisions, head-on collisions, passing, overtaking, etc.
Accident process		Speculate on specific occurrences
Checkpoints for road traffic environment		Elements that cause frequent sudden stops, decelerations, lane changes, etc.
Accident-inducing road environment		Traffic congestion on the main line, availability of entrances and exits to roadside facilities, etc.
Countermeasures policy		Alerting drivers, reviewing the line shape, etc.
Specific countermeasure type		Installation of signage and road surface markings, installation of conduit zones, etc.

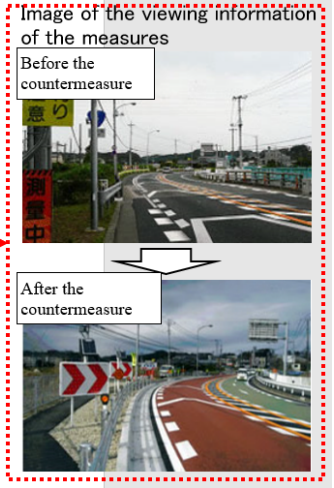


Figure-6 Overview of the description of the Traffic Accident Countermeasure Database and image of the information on viewing countermeasures

3. List of Related Reports and Technical Documents

"Macro Traffic Accident Analysis using the Comprehensive Databases for Traffic Accident," NILIM Technical Note No. 48, 2002.3

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0048.htm

"Analysis of Road Networks and Traffic Accidents in Urban Areas," NILIM Technical Note No. 49, March 2002

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0049.htm

"Guidelines for Improving Road Safety at Hazardous Spots," NILIM Technical Note No. 165, March 2004

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0165.htm

"Investigation of Causes and Countermeasures of Dangerous Phenomena on the Roads," NILIM Technical Note No. 166, January 2004

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0166.htm

"Road Safety Manual of Hazardous Spots," NILIM Technical Note No. 238, March 2005 (English version of No. 165)

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0238.htm

"Technical Report of Road Safety Measure Planning," NILIM Technical Note No. 787, April 2014

http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0787.htm

4. Future Outlook

"Implement countermeasures before an accident occurs"

Traffic safety measures on arterial roads have been effective by analyzing actual accident data and formulating

countermeasures for hazardous spots. In recent years, with the widespread use of ETC2.0 on-board equipment, big data such as ETC2.0 probe information has become available, making it possible to extract potential hazardous spots such as spots with large amounts of sudden deceleration data. Research on the utilization of such big data for traffic safety is also underway, and will be effectively combined with accident data analysis, including on residential roads.