Systematic Process of Road Safety Countermeasures
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1. Process of traffic safety countermeasures
2. Collection of basic data
3. Analysis of accident factors
   - Planning of countermeasures
4. Implementation of countermeasures
5. Evaluation of countermeasures
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1. Process of traffic safety countermeasures

Flow of planning and evaluation countermeasures shown in the Manual

- Identification of target locations
- Planning measures
  - Collection of basic data
  - Analysis of accident factors
  - Planning of countermeasures
    - (Survey for post evaluation)
- Implementation of countermeasures
- Evaluation of the countermeasures
  - Collection of evaluation data
  - Analysis of accidents
  - Evaluation of effectiveness of the countermeasures

Guideline for Road Safety Countermeasures
(【Technical Report of Road Safety Countermeasure Planning】)

Accident Countermeasure Database

Prefectural Advisory Meeting
1. Process of traffic safety countermeasures


- Systematically organizing the procedures and points to keep in mind for the planning and evaluation of traffic safety countermeasures.
- Organizing the data necessary for planning countermeasures, examination, collection method of data, and points to keep in mind for examination.

Procedure of traffic safety countermeasures shown in the manual

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and

“Guideline for Improving Road Safety at Hazardous Spots”
Systematic Process of Road Safety Countermeasures

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2. Collection of basic data

Collection and management of accident data

Local Police Station

Local Police Headquarters

daily fatalities report
monthly accidents report

National Police Agency

quick estimation report

Daily fatalities report (ITARDA web)
Monthly traffic accidents statistics (NPA web)

※1 Abbreviation of “Institute for Traffic Accident Research and Data Analysis”
2. Collection of basic data

Contents of accident data to collect

Each accident data include minimum 67 items

- **Environment;**
  - number of the people involved, date, time, weather, road surface, road environments, type of accident, etc...

- **Road User information; (include passenger information)**
  - user type, driving qualification and experience, head light, vehicle speed, traveling direction, damage part, drink driving, pedestrian’s reflector, violation, behavior, mobile phone use, navigation use, gender, age, nationality, occupation, residence, injury level, seatbelt/CRS/helmet use, air bags, injury condition, main injury body part, vehicle part inflicting injury, etc...

- **Additional in expressway accident**
  - road segment, structure, curve radius, cross slope, accident type, number of involved vehicle, traffic hindrance, travel distance, etc...
2. Collection of basic data

Institute for Traffic Accident Research and Data Analysis (ITARDA)

- Non-profit foundation established in 1992
- Achievement of safe traffic society
- Activities
  1. Collect and manage the traffic accident-related data
  2. Independent In-depth investigation
  3. Comprehensive and scientific research and analysis of human factors, traffic environment, vehicles
  4. Disseminate knowledge about traffic accidents, and ideas about traffic safety

- License registration (NPA) 81mil
- Vehicle registration (MLIT) 82mil
- Traffic census (MLIT)
- Integrated Database
- Multi-angular Data Analysis
- Safety equipment (JAMA)
- Permanent disability (Automobile Insurance)
- Trauma registration (JAST)
2. Collection of basic data

**Integrated Traffic Accident Database**

Contain

- All accidents on arterial road except Property Damage Only accident

- Data about accident and driver/pedestrian same as Traffic Accident Statistical Data
- Detailed spot where the accident occurs
- Traffic volume of each type of vehicle
- Road side situation
- Detailed situation about road, traffic safety facilities and so on
2. Collection of basic data

Integrated Traffic Accident Database
2. Collection of basic data

Integrated Traffic Accident Database
2. Collection of basic data

Arterial Roads: Accidents are concentrated at specific locations.

Implementation of focused road traffic environment countermeasures for hazardous spots (black spots)

Legend

- Less than 100 (cases/100 million vehicle-km)
- Less than 200 (cases/100 million vehicle-km)
- Less than 300 (cases/100 million vehicle-km)
- 300 or more (cases/100 million vehicle-km)
2. Collection of basic data

Collision diagram
2. Collection of basic data

Collection of detailed information such as the road environment by field works

Example) Viewpoint of the field work

a) Sight distance
   • Is the prospect of the intersection secured enough?
   • Is the pedestrian crossing (pedestrian, bicycle) at the position that it is easy to look at from a driver?

b) Road surface
   • Is there not the point affecting the runs of the car such as a wheel track or an irregularity?
   • Does the drainage of the sidewalk function enough?

c) Road marking • Traffic sign
   • Are the indication contents easy to understand a mark and the road surface indication?
     In addition, is the setting place appropriate?
   • Do you not confuse a driver for there being too much number of the setting of the road sign?

d) Traffic behavior
   • Is there a big gap between the speed limit and actual speeds?
   • Are vehicle lanes blocked by automobiles turning right and turning left?
   • Is there road congestion ahead?
   • At intersections, is there interference between automobiles or between automobiles, bicycles and pedestrians?
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3. Analysis of accident factors • Planning of countermeasures

Guideline for Road Safety at Hazardous Spots

Past countermeasures studies at hazardous spot

Guideline for Road Safety Countermeasures

(Guideline for Improving Road Safety at Hazardous Spots)

Road situation    Type of accident    Accident factor

Countermeasures

Effective countermeasures based on the Guideline
3. Analysis of accident causes • Planning of countermeasures

Guideline for Improving Road Safety at Hazardous Spots

Step 1: Selection of road structure type to be studied.
- Intersection – signal installed
- Multi-lane road * 2-lanes or less

Step 2: Selection of the repetitive accident type
- Rear-end collision
- Right turn collision

Step 3-1: Selection of Accident Occurrence Process based on Collision Diagram

Step 3-2: Identification of the caused factors and selection corresponding Measure Code

Accident occurrence process
- Inadequate awareness of confirming safety
- Failure to stop
- Inadequate confirmation
- Delayed confirmation
- Inadequate confirmation

Road traffic environment check points
- Slow curve before an intersection
- Steep long downhill section
- Crest
- Long straight section before intersection

Feature of Intersection
- Large corner cut radius
- Small corner cut radius
- Acute angle intersection
- Obtuse angle intersection

Alignment
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8

Analysis of accident causes
- Rear-end collision
- Right turn collision

Planning of countermeasures
- Isn’t there an obstruction that blocked the driver’s vision?
- Isn’t there an object that made drivers inattentive?

Road Safety Engineering and Management, JSPP 21, Jun. 25, 2015
### 3. Analysis of accident causes • Planning of countermeasures

#### Guideline for Improving Road Safety at Hazardous Spots

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<th>Objective</th>
<th>Measures</th>
<th>Important Notice for selecting and implementing measures</th>
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<td>Provide information of an intersection ahead</td>
<td>Install a warning sign e.g. indicating an intersection</td>
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</table>
|              | 2         | Improve road structures to provide necessary visibility | Alignment improvement | Improve the alignment just before the intersection  
Study in cases where it is possible to implement large scale improvement | 136 |
|              | 3         | Control a traffic light so that vehicles can stop safely | | | 137 |
|              | 4         | Control vehicles turning right and oncoming to prevent them from simultaneous entering the intersection | | | 138 |

**Step 4-1:** Select the code designated

**Step 4-2:** Select measures from the list corresponded code

Refer to measure samples on the listed page
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4. Implementation of countermeasures

Traffic safety projects implemented by road administrators and public safety commissions (intersection)

- Right-turn lane
- Bicycle crossing
- Directional line (road marking)
- Road lighting
- Paving improvement (drainage paving)
- Improving traffic signal patterns (Special light pattern for right turns)
- Pavement improvement (non-slip paving) (colored paving)
4. Implementation of countermeasures

Traffic safety projects implemented by road administrators and public safety commissions (road section)

- Urban roads
  - Road lighting
  - Traffic signal
  - Median Strips
  - Pedestrian crossing
  - Paving improvement (drainage pavement) (colored pavement) (non-slip pavement)
  - Guard fence

- Rural mountainous roads
  - Road lighting
  - Traffic information sign
  - Curve sign (Guidelight etc.)
  - Warning board
  - Road surface indicators
  - Pavement improvements (non-slip paving) (bumpy paving)
  - Guard fence
  - Drainage pavement
  - Overtaking prohibition
  - Road studs
4. Implementation of countermeasures

Efforts to prevent traffic accidents

- Measures to prevent traffic accidents at a road section

Before

![Before measure image]

After

![After measure image]

“Slow down” signs on road surface

Simple median (blocks, rubber posts)

- Number of accidents at the road section before and after the measures were taken

**Source: Ministry of Land, Infrastructure, Transport and Tourism**

**Number of accidents at the road section before and after the measures were taken**

- Yearly average number of accidents

  - Rear-end Collisions
  - Other
  - Head-on Collisions

**Source: Ministry of Land, Infrastructure, Transport and Tourism**
4. Implementation of countermeasures

Efforts to prevent traffic accidents

- Measures to prevent traffic accidents at an intersection

Before

After

- Number of accidents at the intersection before and after the countermeasures were taken

**Source: Ministry of Land, Infrastructure, Transport and Tourism**
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Evaluation of the measures

1) Evaluation based on accident data
   - This can directly and quantitatively clarify the effectiveness of a countermeasure.
   - It takes time to accumulate accident data.
   - The occurrence of traffic accidents fluctuates seasonally and from year to year.
   - It is necessary to collect at least one year of accident data (about 4 years for an appropriate evaluation).
   - It is necessary to also study accident patterns focused on countermeasure selection time in order to evaluate the effectiveness of a countermeasure.

2) Evaluation based on traffic behavior
   - This can evaluate the effectiveness of countermeasures, which cannot be clarified by traffic accident data; reducing opportunities for mutual interference between automobiles for example.
   - This can clarify whether or not countermeasure effectiveness is manifest without waiting to accumulate traffic accident data.

3) Evaluation based on questionnaires
   - This qualitatively compares change of consciousness of road users passing through the object location after the execution of the countermeasure to evaluate the countermeasure.
   - It can evaluate from the perspectives of road users, by improving feelings of security while passing through the same location after the countermeasure.