

Road Safety Facilities Implemented in Japan

Road Safety Facilities

1. Guard Fence
2. Road Lighting
3. Other Road Safety Facilities

Road Safety Facilities

1. Guard Fence

2. Road Lighting

3. Other Road Safety Facilities

Classification of Guard Fences

1) Traffic Barrier:

- To prevent a motor vehicle traveling in an incorrect course

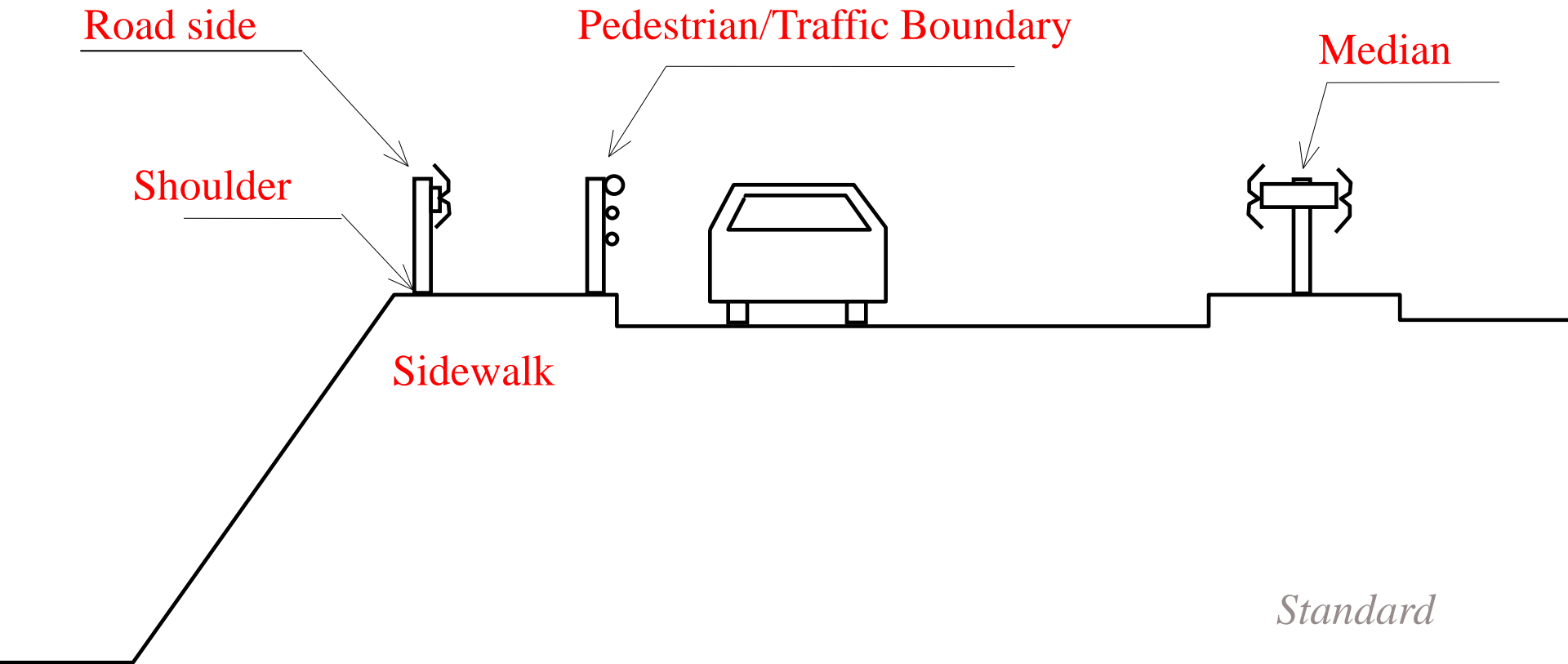
2) Fences for pedestrians/cyclists :

- To prevent pedestrians and cyclists from falling or recklessly crossing streets.

Traffic Barriers

- **Primarily**
 - To prevent a vehicle traveling in an incorrect course from deviating into an off-road area, into a lane used by oncoming traffic, or into a pedestrian sidewalk,
 - To minimize injuries to its occupants and damage to the vehicle,
- **Secondary**
 - To guide the line of sight of drivers.

Installation Location of Traffic Barriers



Installation Section (1)

- To prevent personal injury to occupants of a vehicle caused by its deviation into the off-road area.
 - embankments, precipices, and retaining walls, and on bridges and viaducts.
 - close to the sea, a lake, a river, a marsh, or a canal.
 - entrance to a bridge, viaduct, tunnel etc. or close to some structure.

Installation Section (2)

- To prevent personal injuries to third parties caused by a motor vehicle deviating into the off-road area
 - Section crossing over a railway line or an arterial road
 - Median of national expressways and motorways.
 - Median of sections of which vertical or horizontal alignment is severer or where traffic moves at higher speed than common sections.

Installation Section (3)

- To prevent pedestrians from serious accidents on the boundaries between the traffic lane and sidewalks
 - Sections of roads where traffic moves at high speed

Traffic Barrier Categories for Application

Road Category	Design Speed	Ordinary Section	Serious Injury Section	Crossing or Close to Shinkansen
Expressways Motor Ways	80km/h \leq	A	SB	SS
	60km/h		SC	SA
Other Roads	60km/h \leq	B	A	SB
	\leq 50km/h	C	B	

Role of a Traffic Barrier

I . Roadway Deviation Prevention

(To prevent motor vehicles from deviating into off-road areas)

II . Occupant Safety

(To preserve the safety of occupants)

III . Motor Vehicle Guidance

(To guide motor vehicles)

IV . Prevention of Accident

Caused by Broken Traffic Barriers Parts

(To prevent accidents caused by broken traffic barrier parts.)

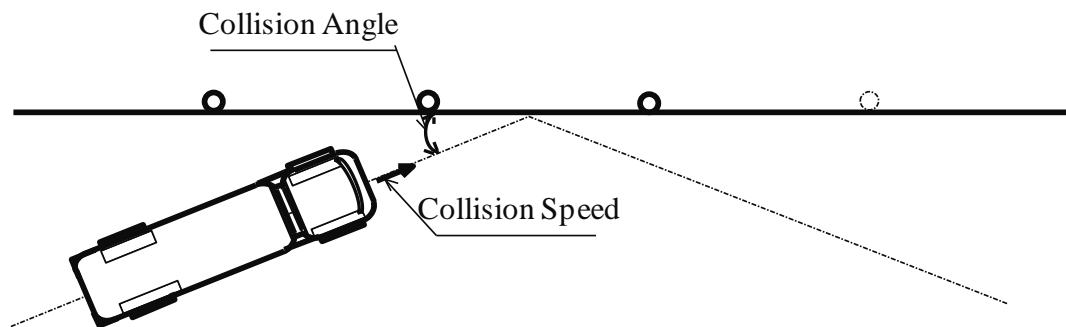
Collision Test for Confirmation of Performance

- Confirming by two kinds of collision tests
 - Collision A : 25 tonf truck
 - Collision B : 1 tonf passenger car

Collision Test A

- Vehicle: 25 tonf truck
- Collision Angle : 15 degree
- Collision Speed :

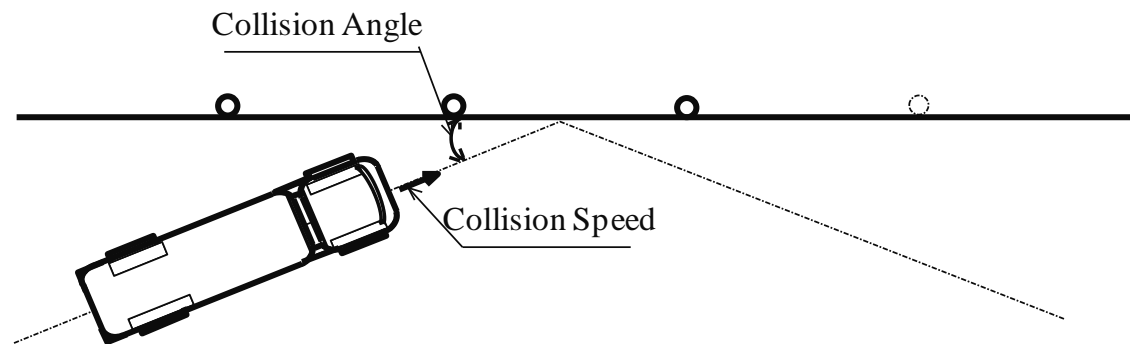
Traffic Barriers Category	C	B	A	SC	SB	SA	SS
Collision speed (km/h)	26	30	45	50	65	80	100



Collision Test B

- Vehicle : 1 tonf passenger car
- Collision Angle : 20 degree
- Collision Speed : C, B : 60km/h

A--SS : 100km/h



Collision Test

I . Roadway Deviation Prevention (Collision Test A)

- A traffic barrier must not be broken through.

Collision Test

II . Occupant Safety (Collision Test B)

- The collision deceleration loaded on the body of an occupant in a vehicle impacting a traffic barrier must be lower than evaluation standard values by category of collision speed

Category	Collision Speed	Deceleration Maximum Value
B, C	60km/h	9-12G
A	100km/h	15-18G
SC, SB, SA, SS	100km/h	18-20G

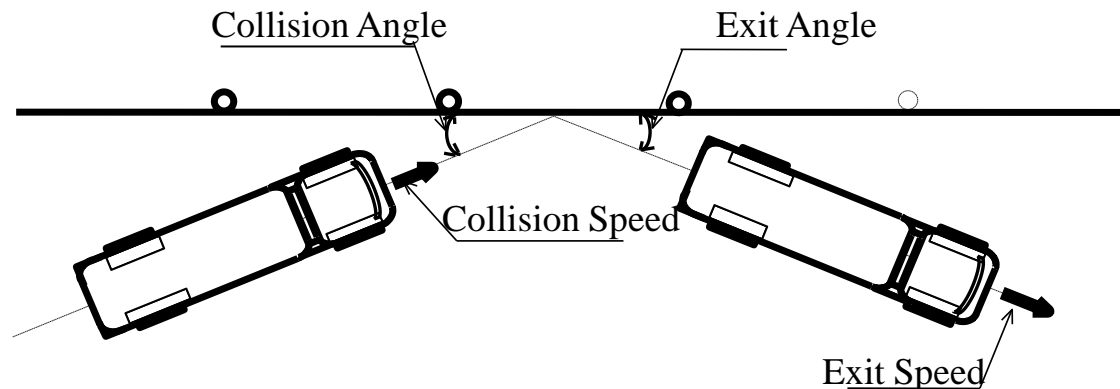
G : Gravity acceleration

Collision Test

III. Motor Vehicle Guidance

(Collision Test A, B)

- After striking the traffic barrier, a motor vehicle must not overturn etc., and its exit speed and exit angle must satisfy the stipulated values
 - Exit speed shall be greater than 60% of collision speed
 - Exit angle shall be smaller than 60% of collision angle



Collision Test

IV. Prevention of Accidents Caused by Broken Traffic Barrier Parts (Collision Test A, B)

- After a motor vehicle strikes a traffic barrier, traffic barriers parts must not be scattered very far.

Example of Traffic Barriers

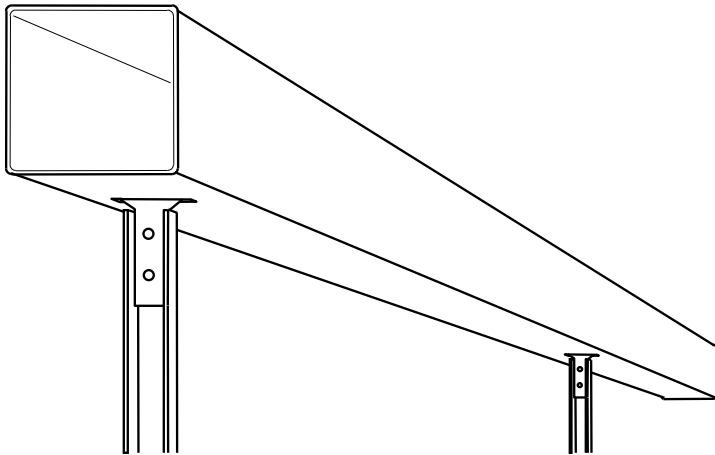
Median Barrier

Guard Rail



Example of Traffic Barriers

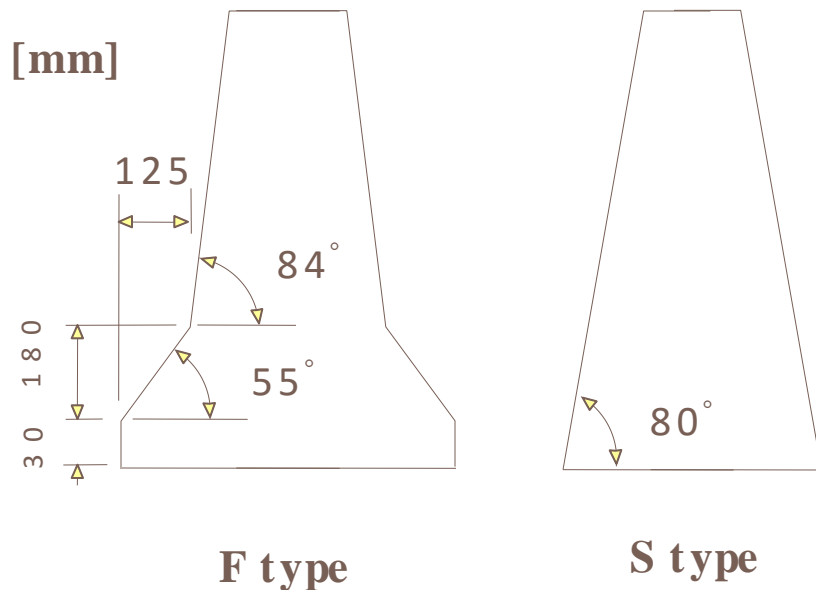
Median Barrier
Box Beam



Example of Traffic Barriers

Median Barrier

Concrete Traffic Barrier



Example of Traffic Barriers

Roadside Barrier

Guard Rail



Example of Traffic Barriers

Roadside Barrier Guard Pipe



Example of Traffic Barriers

Roadside Barrier Guard Cable



Example of Traffic Barriers

Roadside Barrier

Bridge Railing



Consideration of Scenery -Problem-



Consideration of Scenery

-Guard Pipe with Slim Members-



Consideration of Scenery -Timber Rail-



Road Safety Facilities

1. Guard Fence

2. Road Lighting

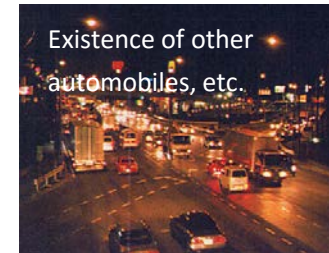
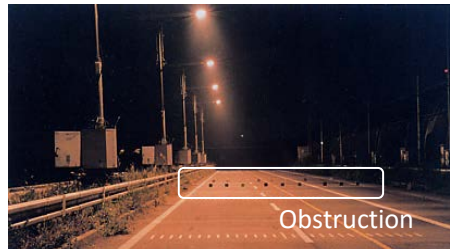
3. Other Road Safety Facilities

Purpose of Road Lighting

- Road lighting is installed so drivers can accurately understand road conditions and traffic conditions at night, or at locations where brightness changes abruptly, such as tunnels.

Purpose of Road Lighting

- Visual information necessary to clarify road conditions and traffic conditions
 - ✓ Existence and location of obstructions, pedestrians, etc. on the road
 - ✓ Road width, road alignment, and other features of road structure
 - ✓ Existence and location of special locations on the road (intersection, divergence, or curve, etc.)
 - ✓ State of road surface in the travelling lane (dry/wet, bumpy, etc.)
 - ✓ Existence, type, speed, direction of motion of other automobiles
 - ✓ State of road surroundings



Types of Road Lighting

- Continuous lighting

In a road section, lighting are installed at fixed intervals to continuously illuminate the section.

- Localized lighting

This type locally illuminates intersections, bridges, sidewalks, interchanges, rest areas and other locations where it is necessary.

- Tunnel lighting

This type illuminates inside of tunnels



Continuous lighting



Localized lighting
(intersection)



Tunnel lighting

Continuous Lighting Installation Sections (Standard)

- 1) Ordinary national highways etc.
in urban areas.

 - Sections with dangers of pedestrians crossing the road where the traffic volume of vehicles and pedestrians is high.
 - High traffic volume sections where there are dangers of automobiles deviating from the traffic lane.
 - Sections where there are special conditions requiring continuous lighting except the above conditions.

Continuous Lighting Installation Sections (Standard)

2) National Expressways

- Sections in urban areas where the light of buildings etc. along the roads impacts road traffic
- Sections where there are special conditions requiring continuous lighting except the above conditions

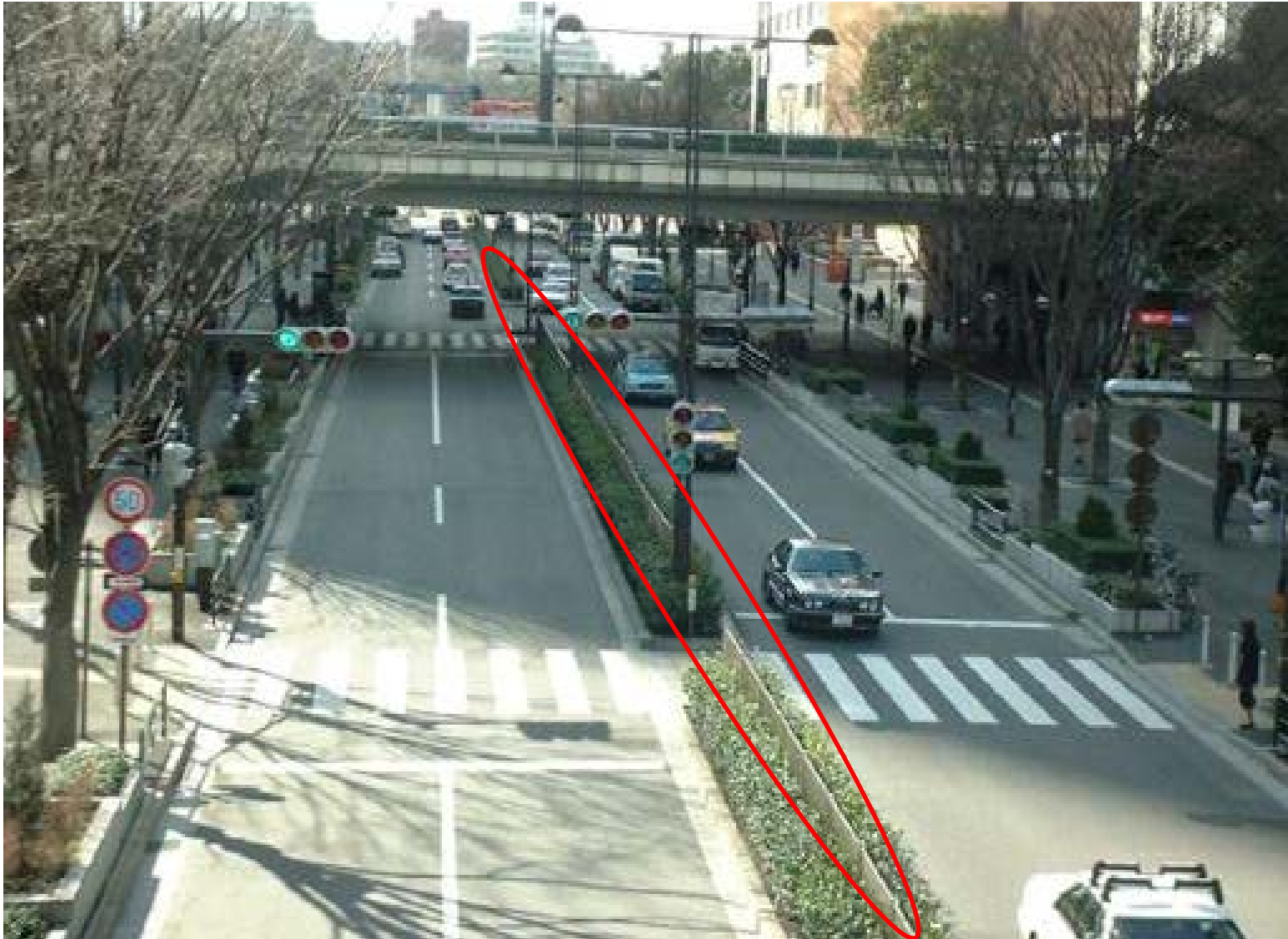
Road Safety Facilities

1. Guard Fence

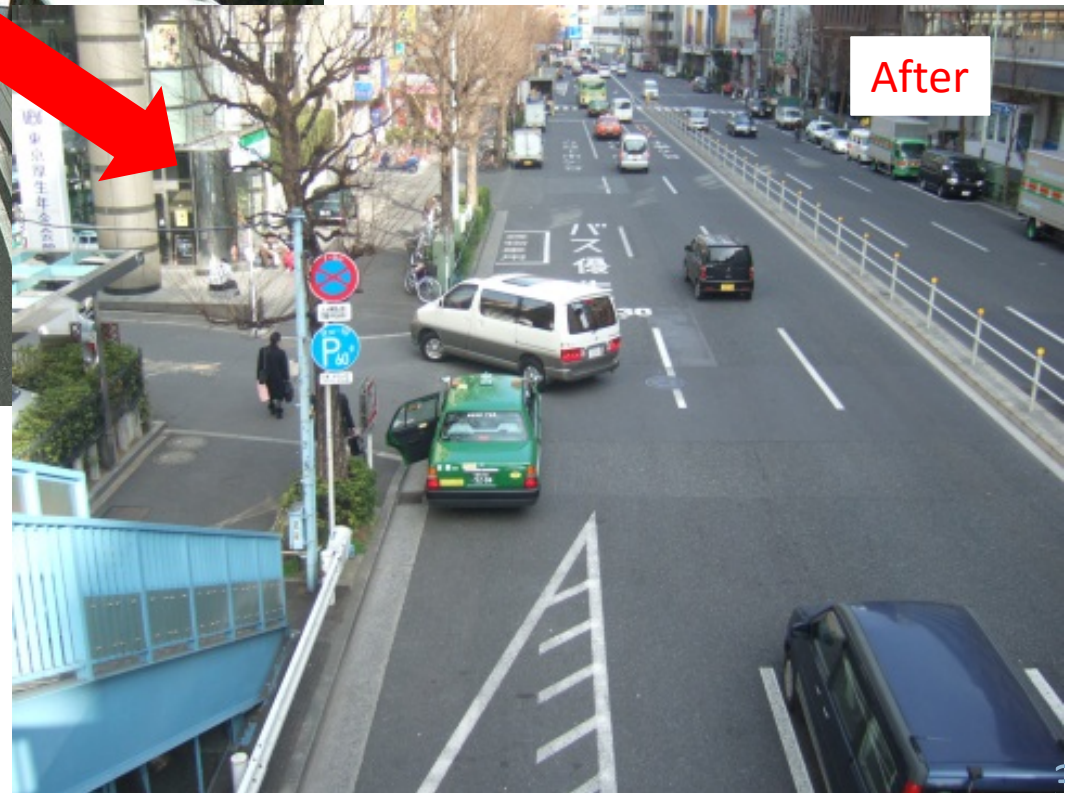
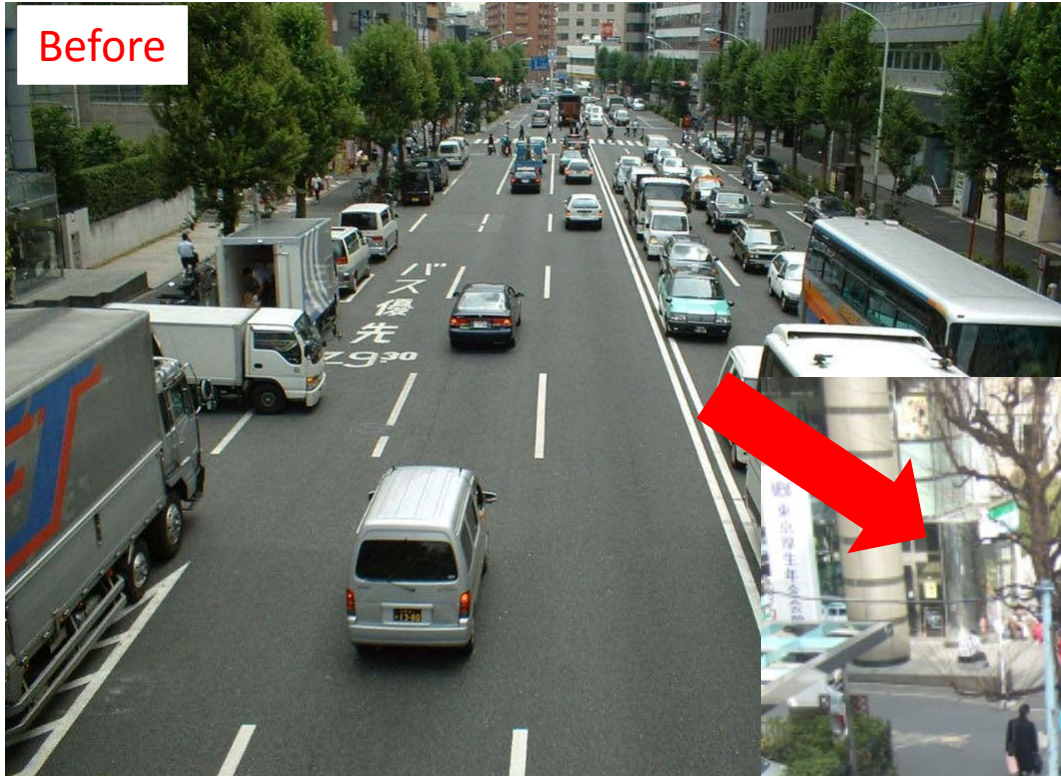
2. Road Lighting

3. Other Road Safety Facilities

Median Strips (Example 1)



Median Strips (Example 2)



Sidewalk

Before



After



元の撮影：道路修繕時期：2012年5月

Bicycle paths and bicycle lanes

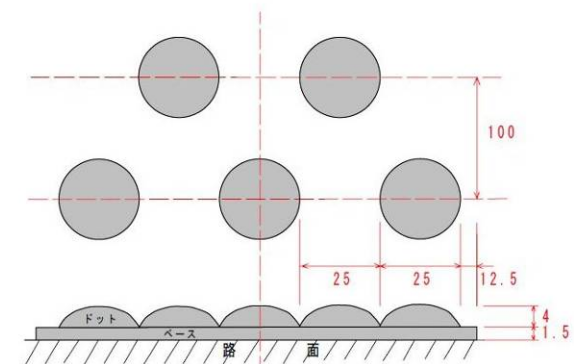
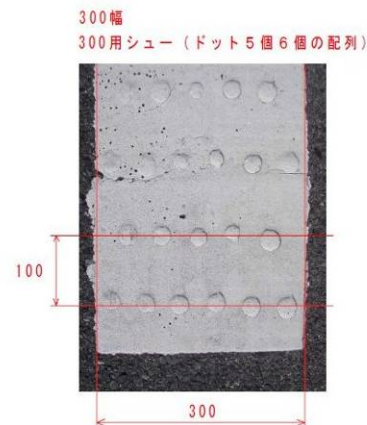
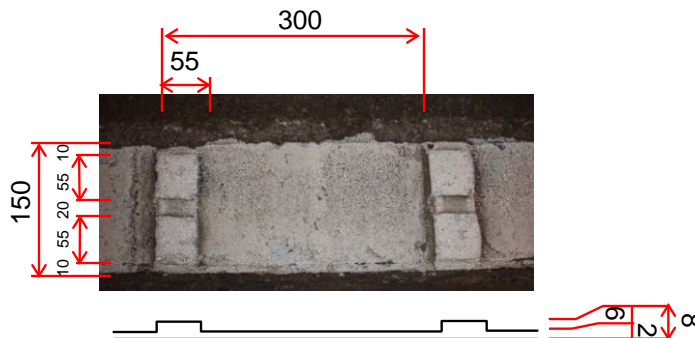
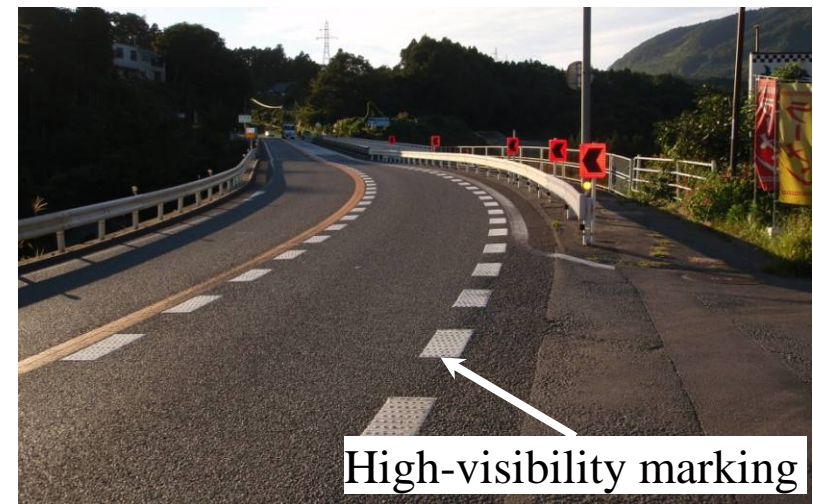
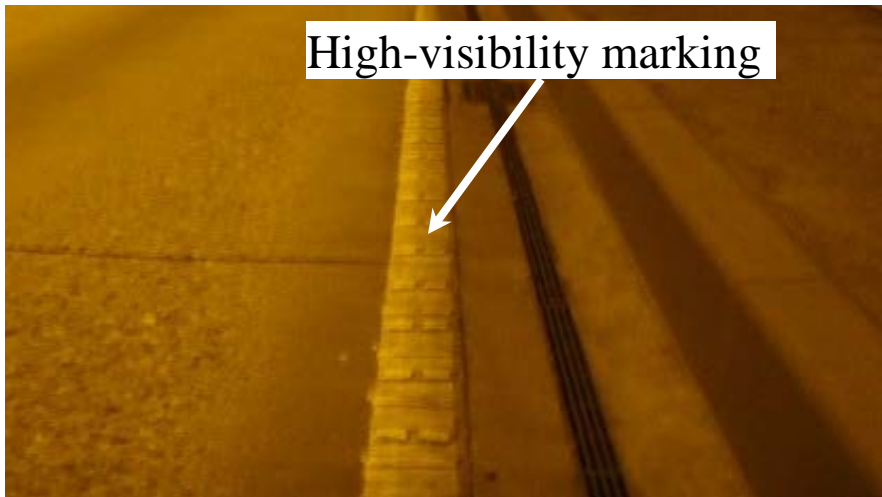


Separate pedestrian and vehicle traffic signals



High-visibility Markings

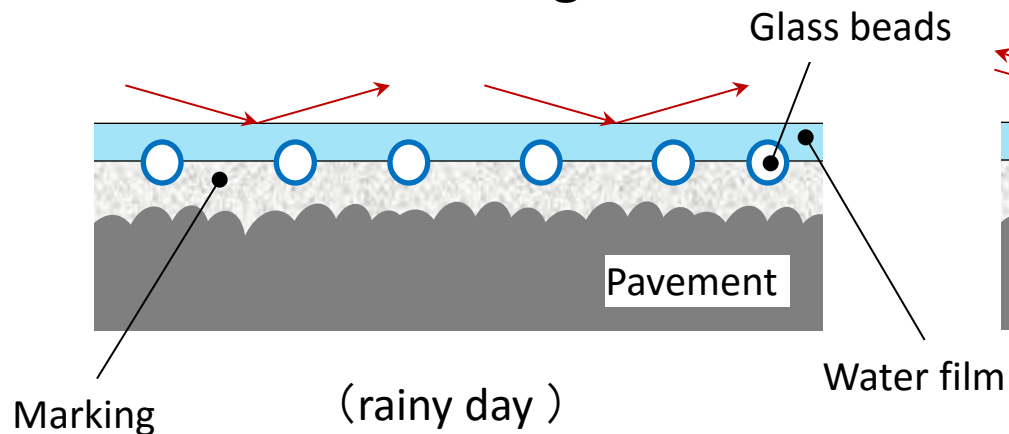
- Running off the lane prevented by vibration and sound caused by projections on the marking



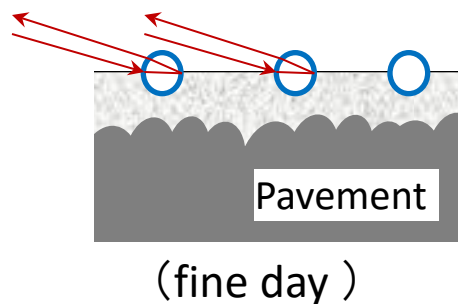
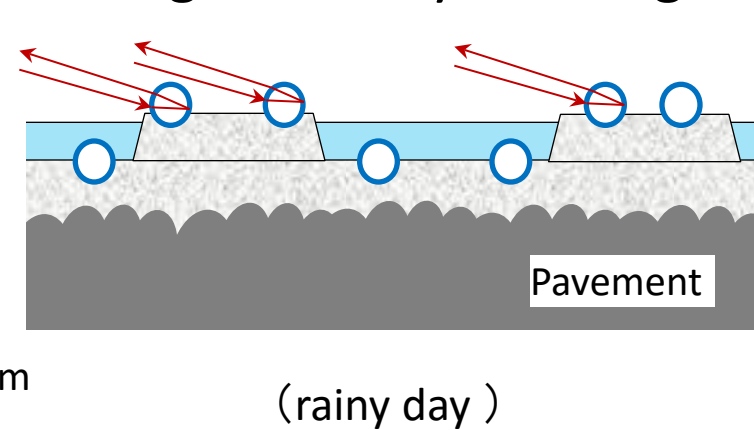
High-visibility Markings

- High retroreflective performance for headlights even in the rainy nighttime

【 Normal marking 】

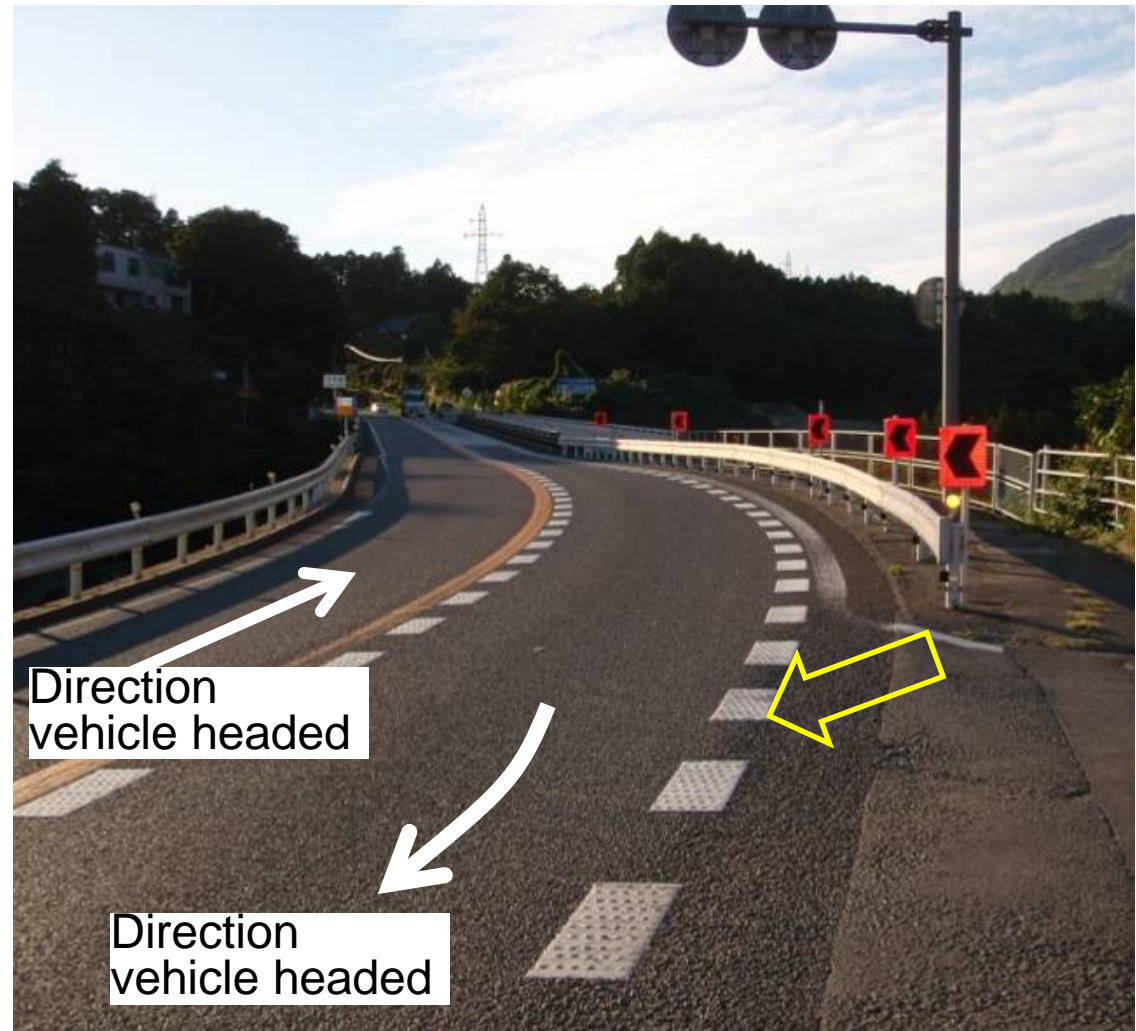


【 High visibility marking 】

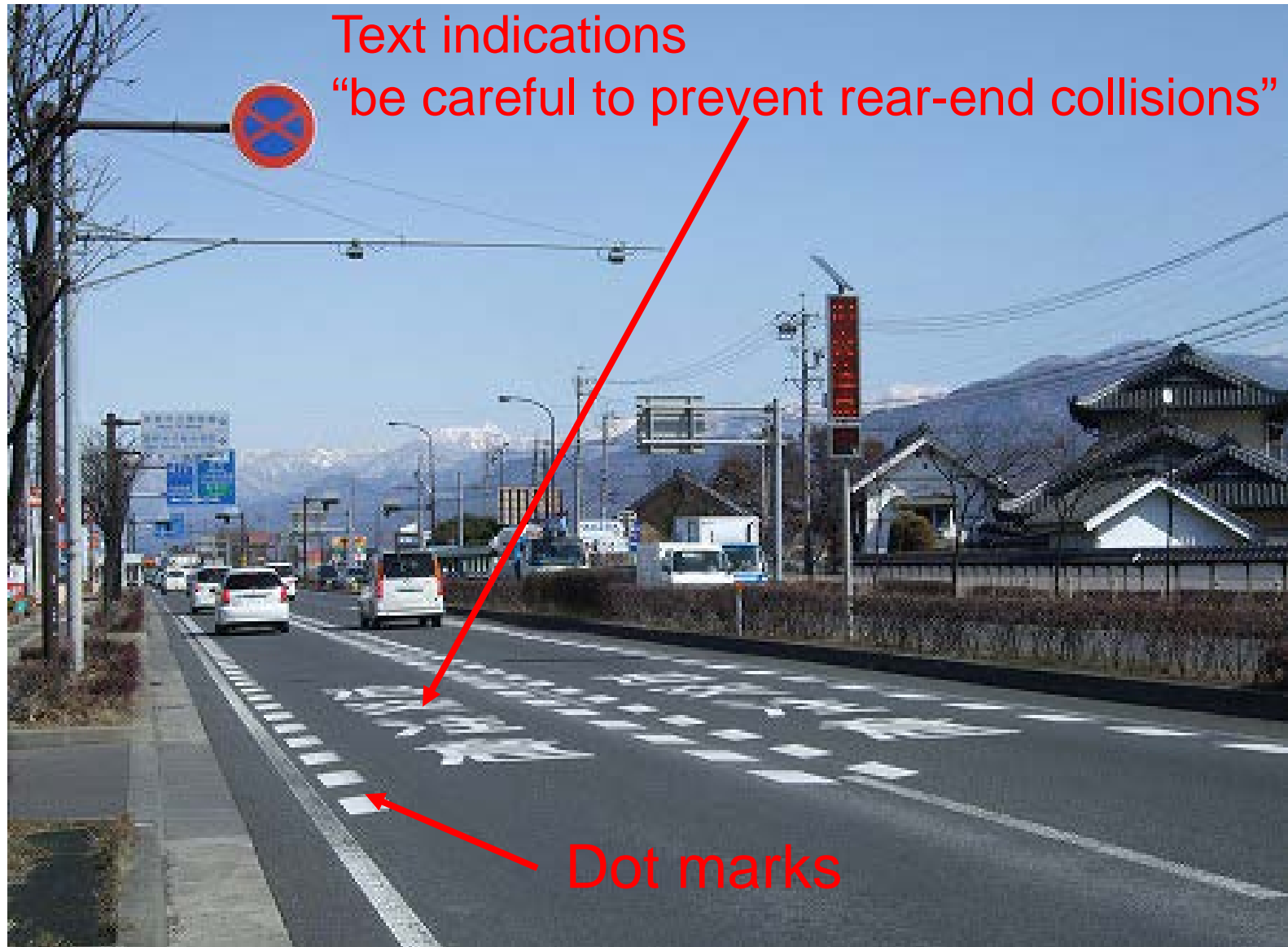


High-visibility Markings (Example 1)

- Curved section in the suburb
- Radius of curve 135 meter
- Gradient 5.6%
- Prevention of running off the road due to over speed



Road Marking



Colored Pavement

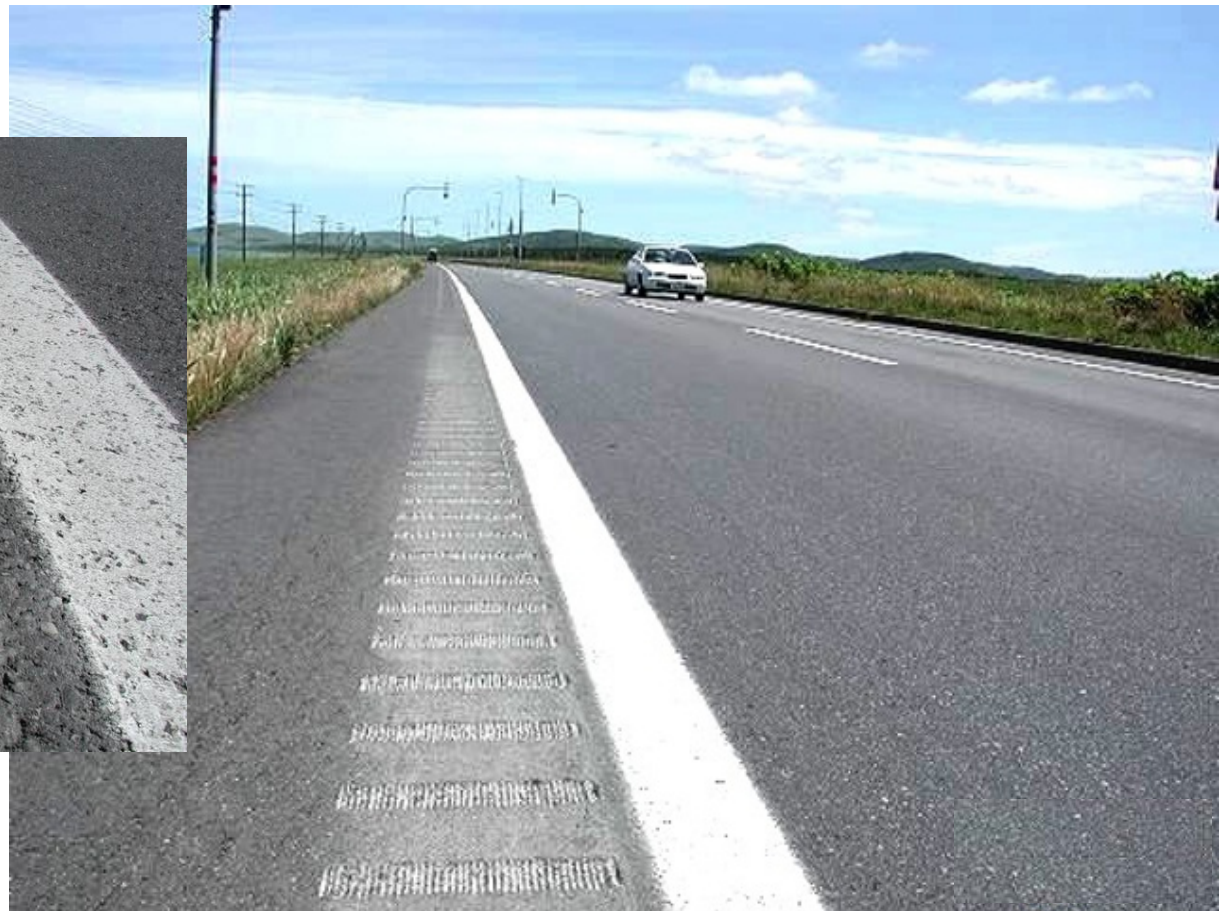
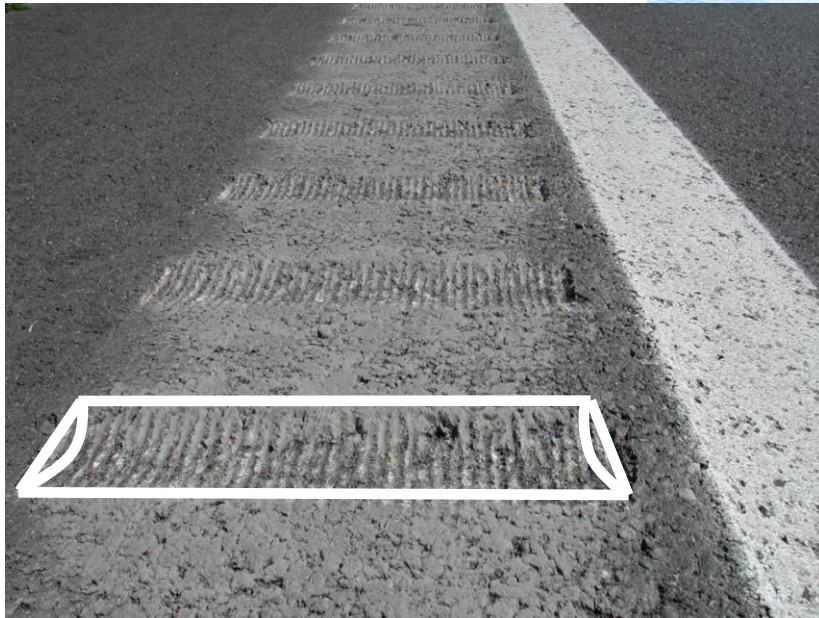


Speed Bumps

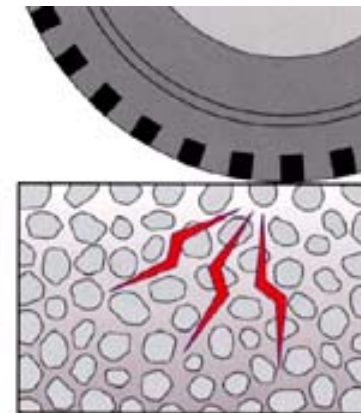
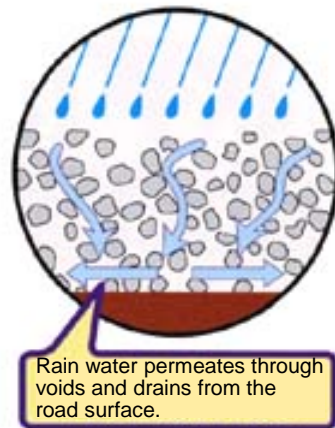


Rumble Strips

- Running off the road prevented by vibration and sound caused by grooves

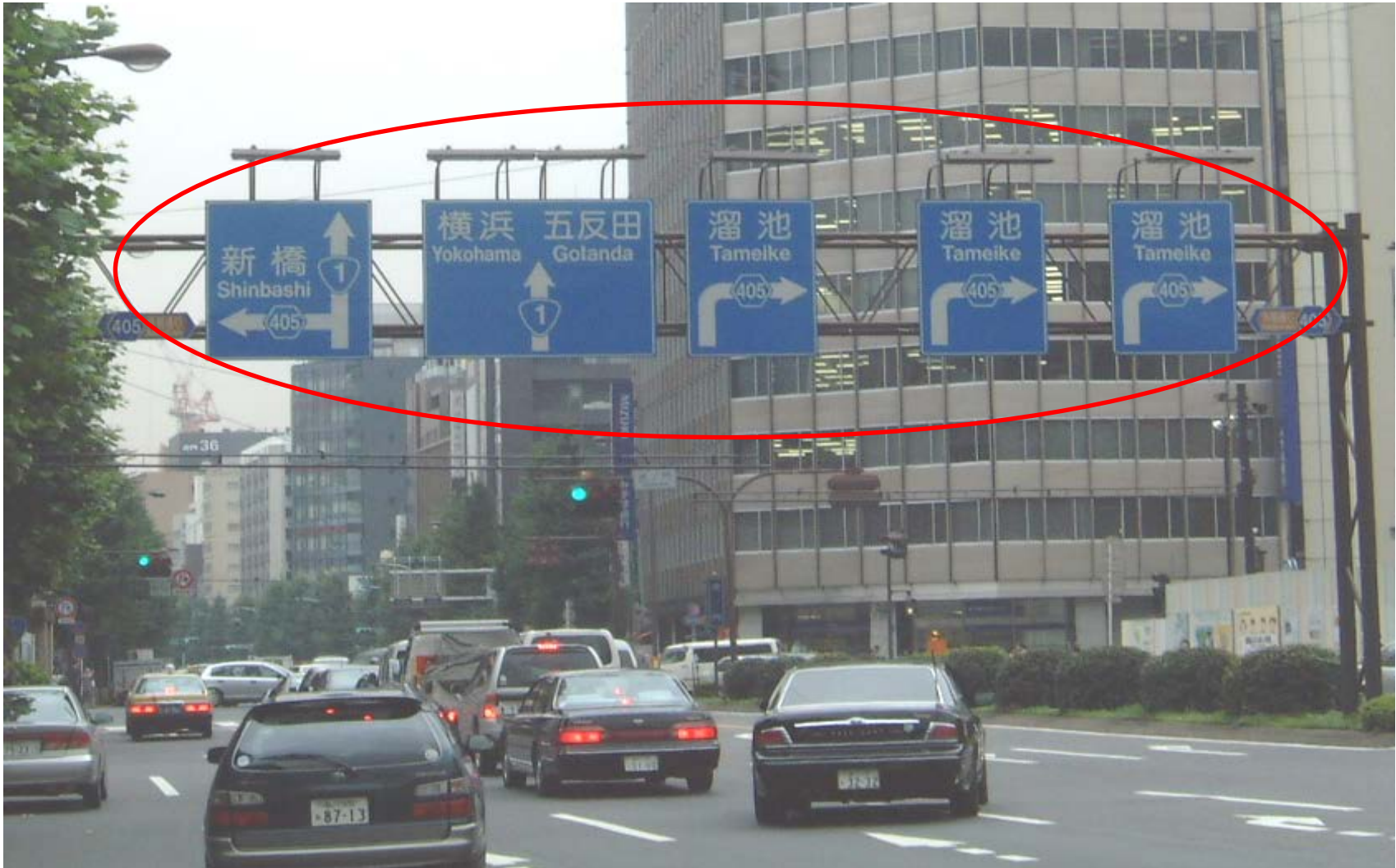


Porous Pavement



Air escapes through voids and the road noise decreases.

Road Signs (Guide Signs)



Types of Signs and Comprehension

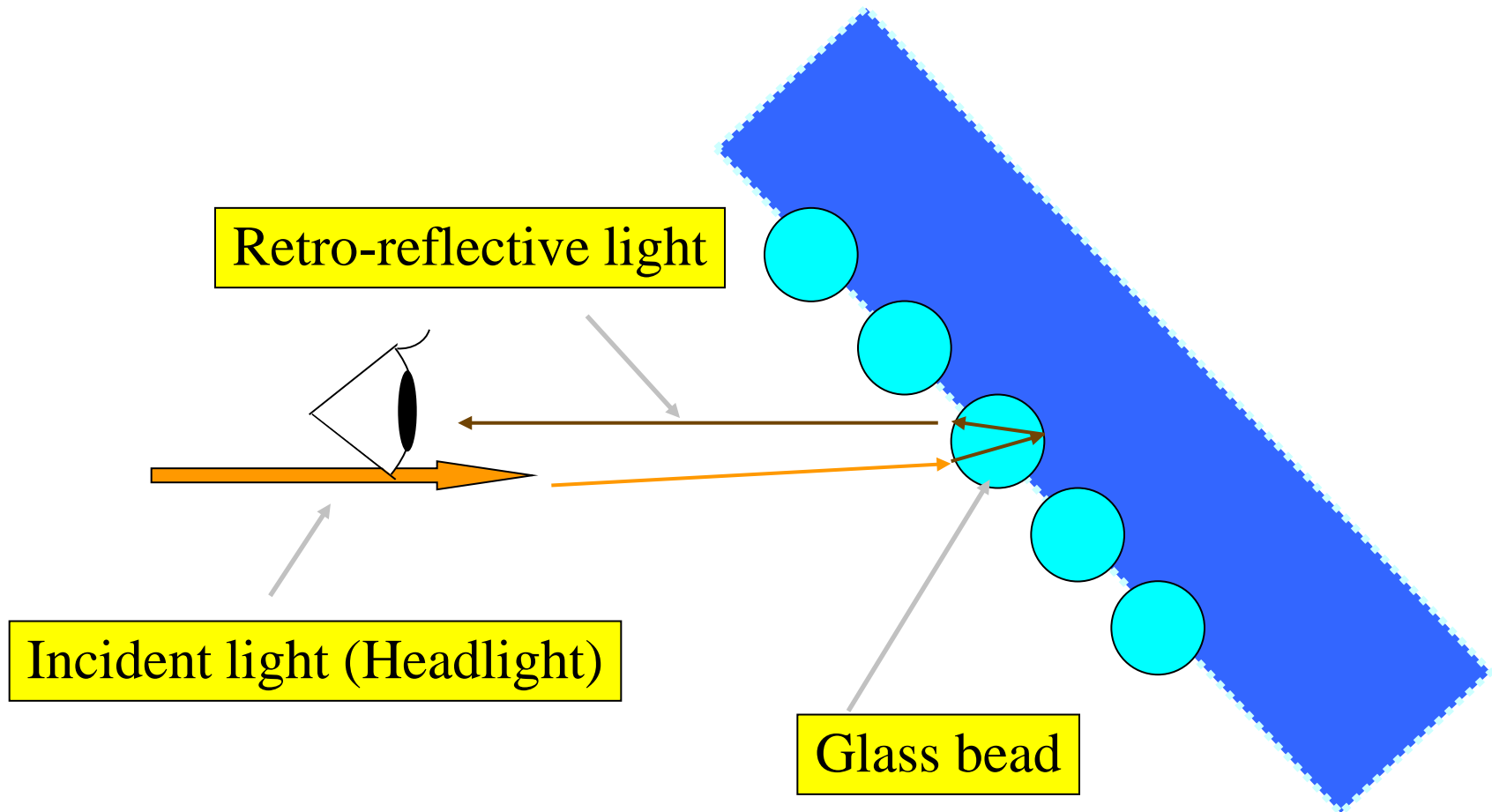


Illustration type



Stack-up type

Visibility at Night



Appearance at Night



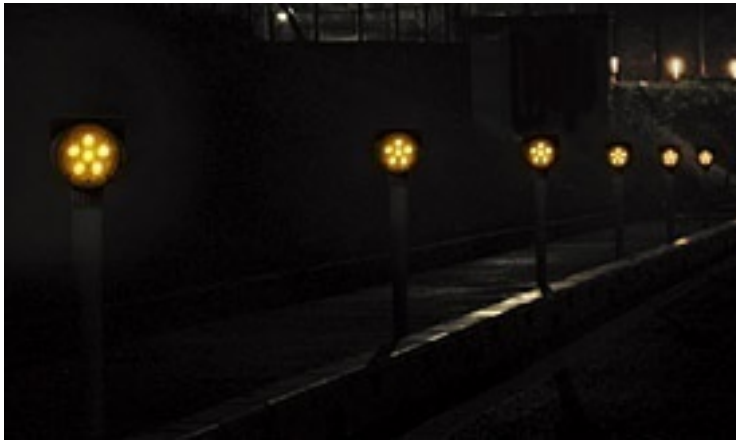
Delineator



Photograph by SEKISUI JUSHI Corporation

Delineator

- Self-lighting delineator



- Self-lighting road studs



Photograph by SEKISUI JUSHI Corporation

Delineator

Self-lighting linear delineator



Self-lighting obstruction warning light



Photograph by SEKISUI JUSHI Corporation

Curve Sign



Rubber Pole

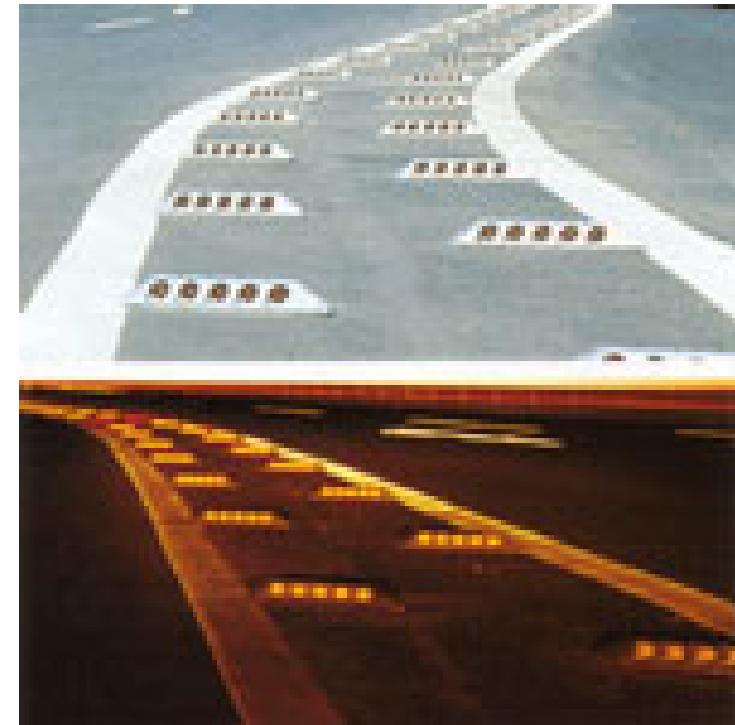


Rubber Pole for Reducing the radius of the corners

(the corner cut is reduced using zebra markings or rubber poles)



Road Studs



Approaching oncoming car indicator device



Right turn lane (Example1)



Right turn lane (Example2)



Right turn direction marking



Reflective Mirrors



Glare Prevention Plates



Crash Attenuators



Attenuator Barrels /Sand Attenuators

