Road Geometry Design Ordinance
- A New Way of Building Roads -

The Road Bureau of

the Ministry of Land,
Infrastructure and Transport

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Objectives of the Road Geometry Ordinance

The Road Geometry Ordinance outlines the general technical standards of road design geometry and geometry to be applied in the construction and reconstruction of roads.

- The road geometry needs to be decided specifically according to the projected functions of the road and the nature of the natural and external conditions of the surrounding area.
- Implementation of works that do not conform to the Road Geometry Ordinance is permissible in cases such as repair or disaster recovery.
- Leaving existing roads as they are does not violate the provision of the ordinance, even if they do not conform to the Road Geometry Ordinance.

1.Overview of the Concept

1-1 Wide Range of Road Functions

1-2 New Procedures for Road Planning and Designing

1-3 Flexible Enforcement of the Road Geometry Ordinance

2. Road Geometry to Meet the Functions of the Road

2-1 Motor Vehicles

2-2 Pedestrians and Bicycles

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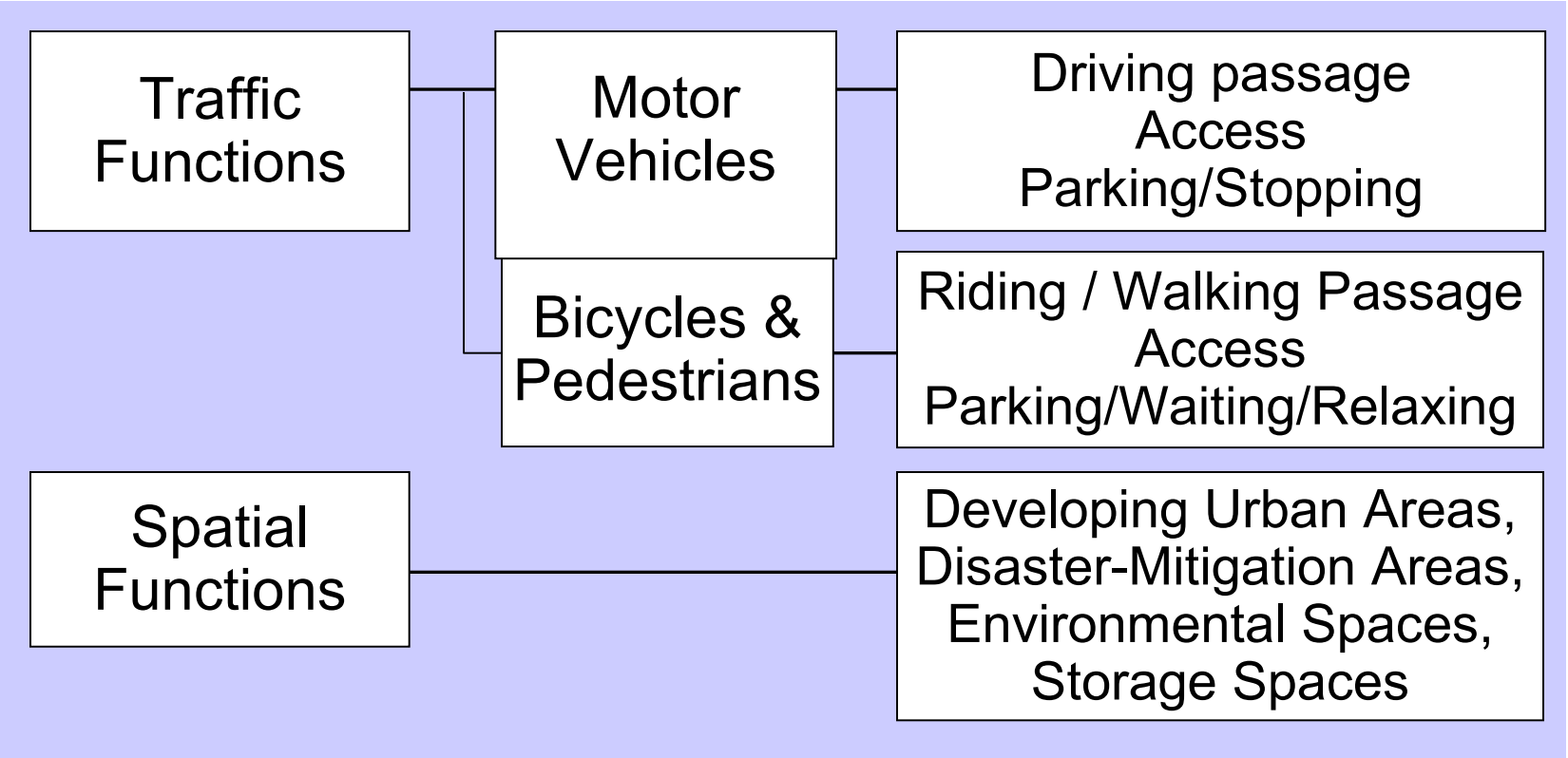
1.Overview of the Concept

1-1 A Wide Range of Road Functions

(1) The Role and the Function of Roads

◆ Roads perform a variety social functions and are a basic part of the social infrastructure, which is crucial to our lives and economic activities.



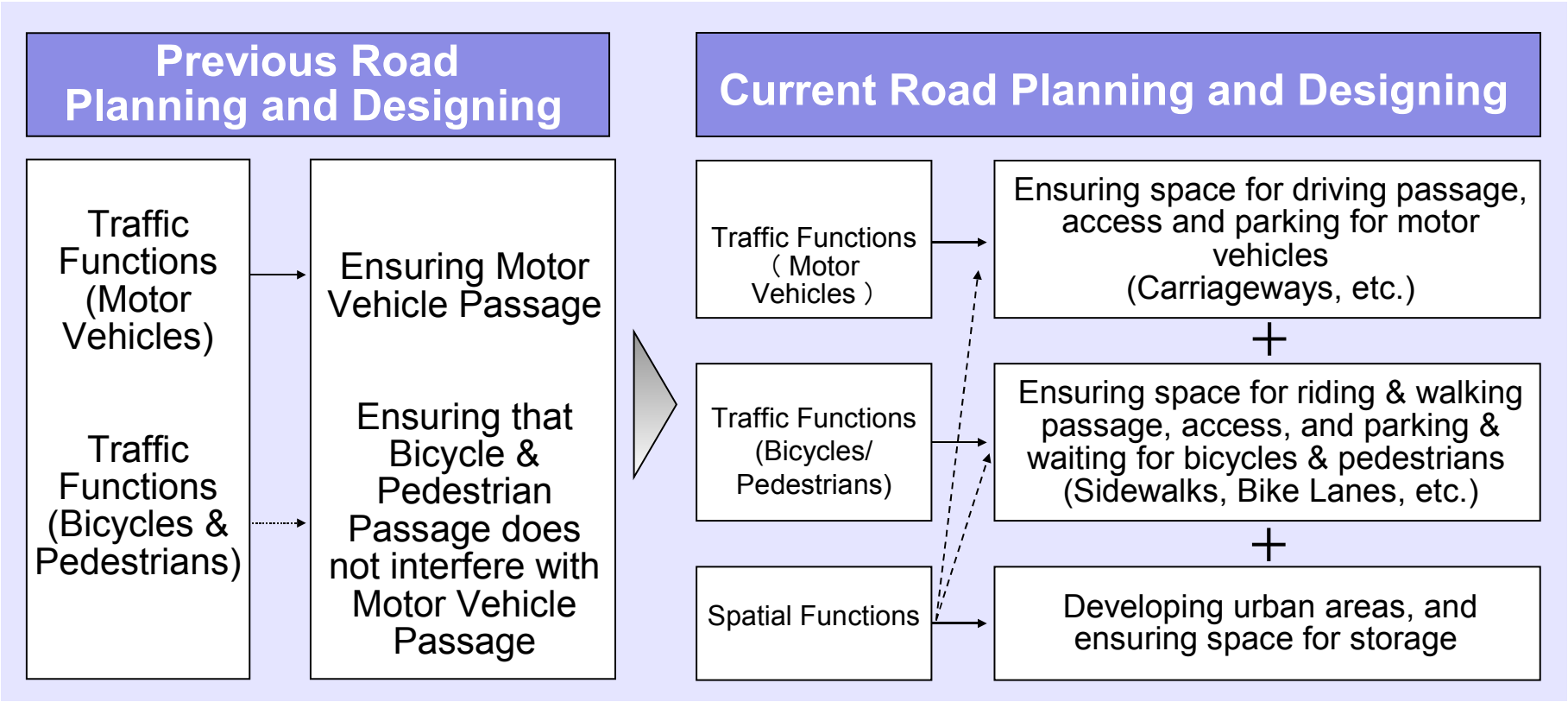
Different Functions of Roads

1. Overview of the Concept

1-1 A Wide Range of Road Functions

(1) New Emphasis on the Wide Range of Road Functions

◆ The needs of Motor Vehicles used to be considered the most important. But now, all functions must be considered.

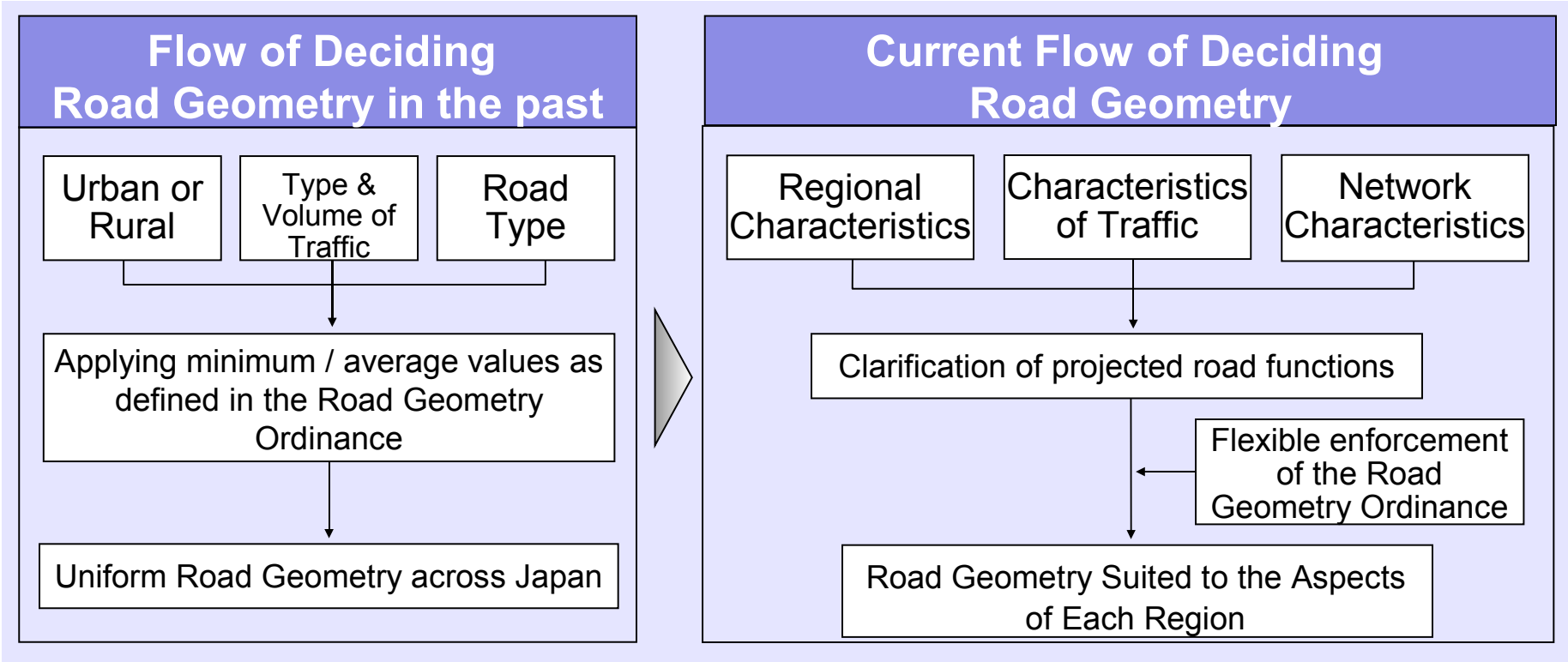


The Ideas behind Road Planning and Designing

1. Overview of the Concept

1-2 New Procedures for Road Planning and Designing

◆ Road geometry and design should be decided based on the exact requirements of the road. Correct road design must ensure that the essential road functions are met.



Flow of Making Decisions about Road Design

1-3 Flexible Enforcement of the Road Geometry Ordinance (1)

■ Cases Requiring Flexible Enforcement

1. Adapting Road Geometry to meet increased Local Needs

The Road Geometry Ordinance allows for the technical geometric elements and values of the road to be applied to meet the preferred needs of the area, instead of uniformly applying the minimal allowable values.

2. Adopting Minimum Road Geometry Values

Within the range allowed by the Ordinance, special provisions can be flexibly enforced and can be considered in order to reduce construction costs where local needs allow.

1-3 Flexible Enforcement of the Road Geometry Ordinance (2)

■ Notes on Enforcement

◆ Flexible enforcement with regard to minimum values should be applied only when truly necessary, and should not be applied for the purpose of easing the implementation of works.

◆ Standards related to traffic safety should not be lowered without extreme caution and consideration.

◆ The Road Geometry Ordinance regulates completed road constructions. Roads in temporary service are not necessarily required to meet the standards of the Road Geometry Ordinance, though they must satisfy the basic needs of the moment.

1. Overview of the Concept

1-3 Flexible Enforcement of the Road Geometry Ordinance (3)

Examples of Flexible Enforcement of Standards

Installation of sidewalks on rural roads, etc.

◆ Case 1: Where installing a sidewalk on both sides of the road is not necessary due to the volume of pedestrian traffic and the conditions of the area.

▼

Therefore providing only one sidewalk is permissible

◆ Case 2: Where the volume of pedestrian traffic is very small

▼

Therefore a sidewalk or bike lane may not be obligatory

1. Overview of the Concept

1-3 Flexible Enforcement of the Road Geometry Ordinance (4)

Example of the Road Geometry Ordinance regulations regarding

Basic Regulations

(Bike Lane/Sidewalk)

Article 10.2.1	A bike lane/sidewalk shall be provided on both sides of the road with a large traffic volume of motor vehicles.

(Sidewalk)

Article 11.1	A sidewalk shall be provided on both sides of the road with a large traffic volume of pedestrians.
Article 11.2	Just one sidewalk shall be provided on roads with a small traffic volume of pedestrians where it is required to ensure safe and smooth motor vehicle traffic.

Special Provision (applies to each of the above)

The requirements as specified above must be applied, except for roads which, for special reasons, do not permit such requirements.

1-3 Flexible Enforcement of the Road Geometry Ordinance (5)

■ Examples of Flexible Enforcement

Restructuring the Cross Section of an Existing Intersections

◆ Where the area or traffic requirements of an existing road constructed under the Road Geometry Ordinance have changed

▼

the restructuring and improvement of the road is permitted

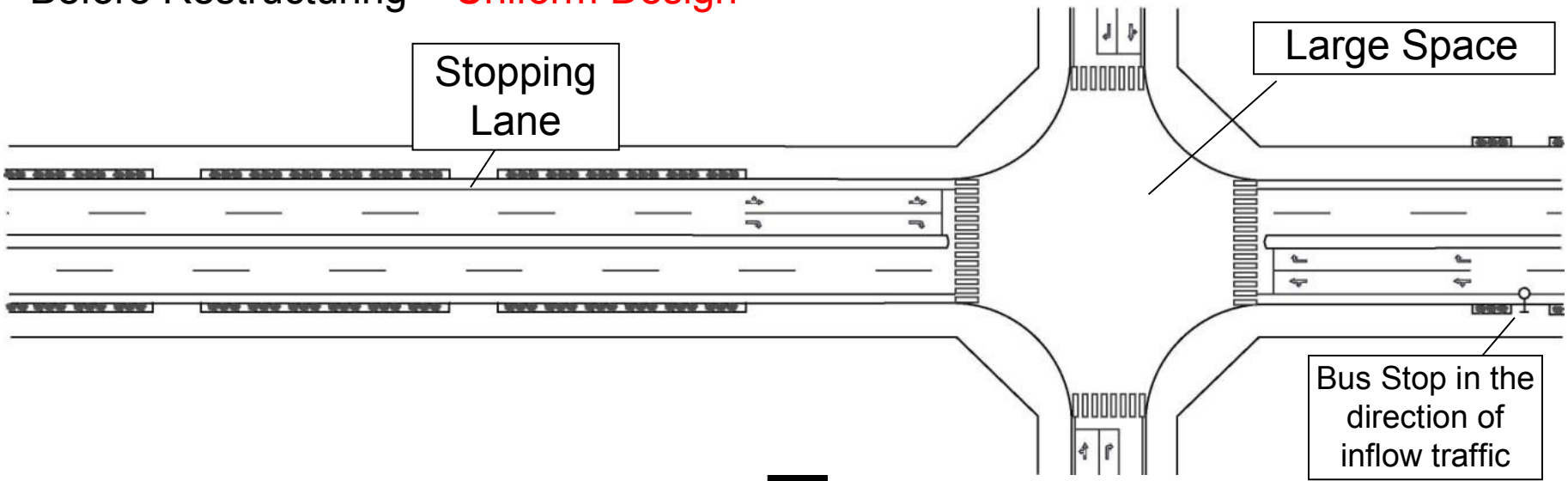
e.g. Removal of a stopping lane near an intersection

> To ensure sufficient waiting space for pedestrians (Article 11.2)

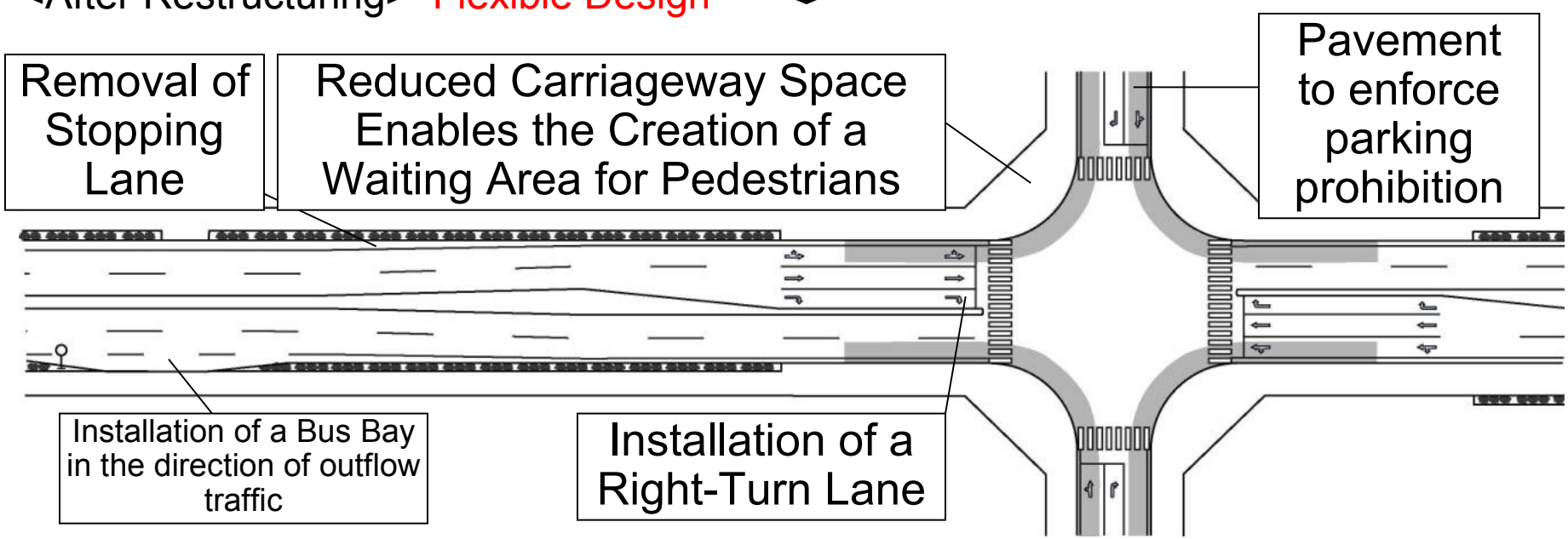
> Reduction of lane width and/or increase of the number of lanes near an intersection (Article 27.3)

An Example of Restructuring a Cross Section at an Intersection

<Before Restructuring> Uniform Design



<After Restructuring> Flexible Design



Objectives of the Road Geometry Ordinance

1.Overview of the Concept

1-1 A Wide Range of Road Functions

1-2 New Procedures for Road Planning and Designing

1-3 Flexible Enforcement of the Road Geometry Ordinance

2. Road Geometry to Meet the Functions of the Road

2-1 Motor Vehicles

2-2 Pedestrians and Bicycles

2-3 Spatial Functions

3. Road Geometry to meet Regional Requirements

3-1 Urban Areas

3-2 Mountainous Areas

4. Road Geometry Suitable for Freight Vehicles

4-1 Vertical Clearance of Road Structures over the Carriageway

4-2 Climbing Lanes

2. Road Geometry to Meet the Functions of the Road

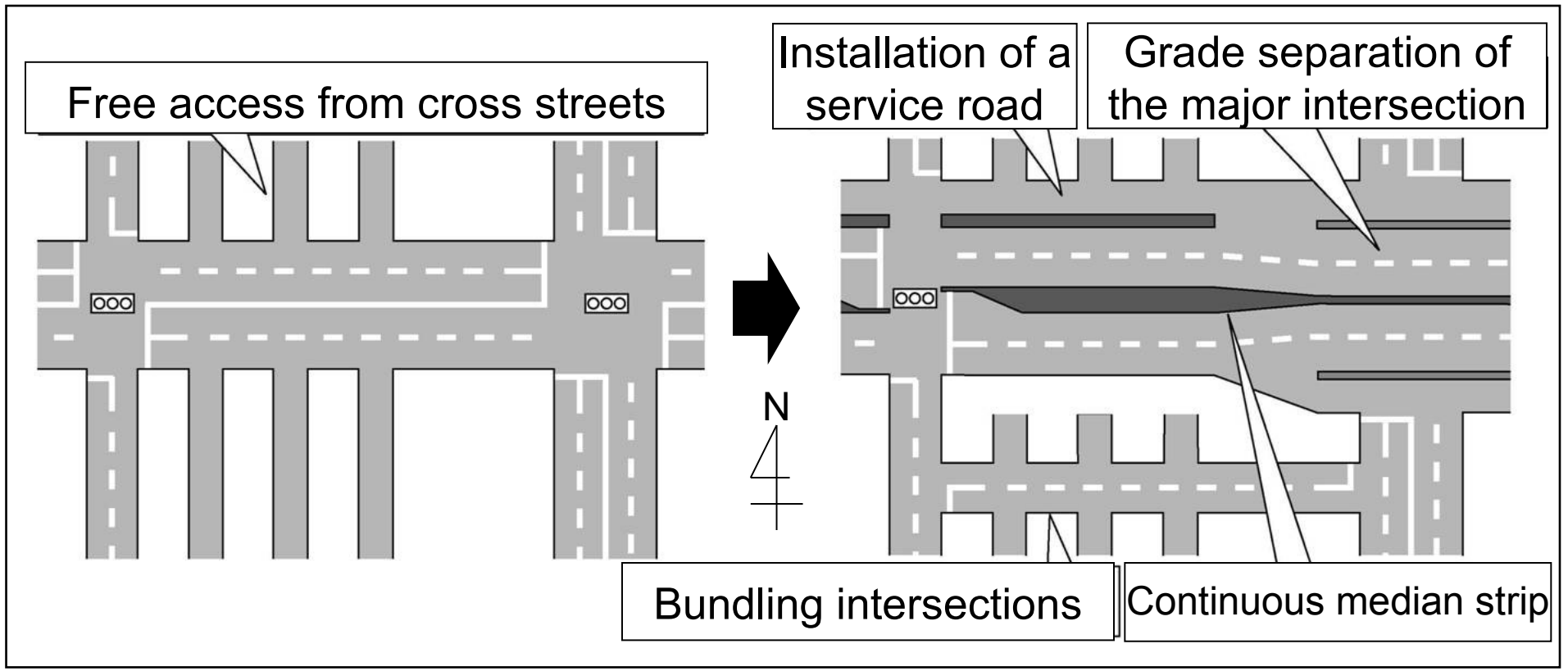
2-1 Motor Vehicles: Traffic Functions and Road Design (1)

Traffic Functions of Motor Vehicles			
	Driving / Passage Functions	Smooth flow of traffic	- High-standard roads, e.g. with access control. - Correct number of lanes to accommodate traffic volume - Prevention of bottlenecks, along with basic traffic capacity (e.g. sagging or diverging sections of roads)
		Safety	-Correct horizontal width, vertical incline elements of roads - Assurance of visibility at the intersections and diverging or merging sections
		Reliability	- Resistance to Earthquakes, Slope structure - Road width allowing for snow removal and piled snow - Installation of snow clearance/melting facilities
		Comfort	- Consideration of the surrounding views from the vehicles - Provision of traffic information to save time & avoid stress
	Access Functions	Ensuring Accessibility	- Enabling direct access from and to the main roads - Enforcing appropriate distances between intersections - Installation of stopping lanes and loading/unloading spaces - Areas in front of train stations and bus bays
	Spatial Functions	Ensuring Spaces	- Parking lots, taxi stands and bus stops - Service areas, parking areas and roadside stations

2. Road Geometry to Meet the Functions of the Road

2-1 Motor Vehicles: Traffic Functions and Road Design (2)

◆ Constructing / reconstructing highly advanced roads, which include such design functions as the introduction of access controls to very busy roads used by many motor vehicles.

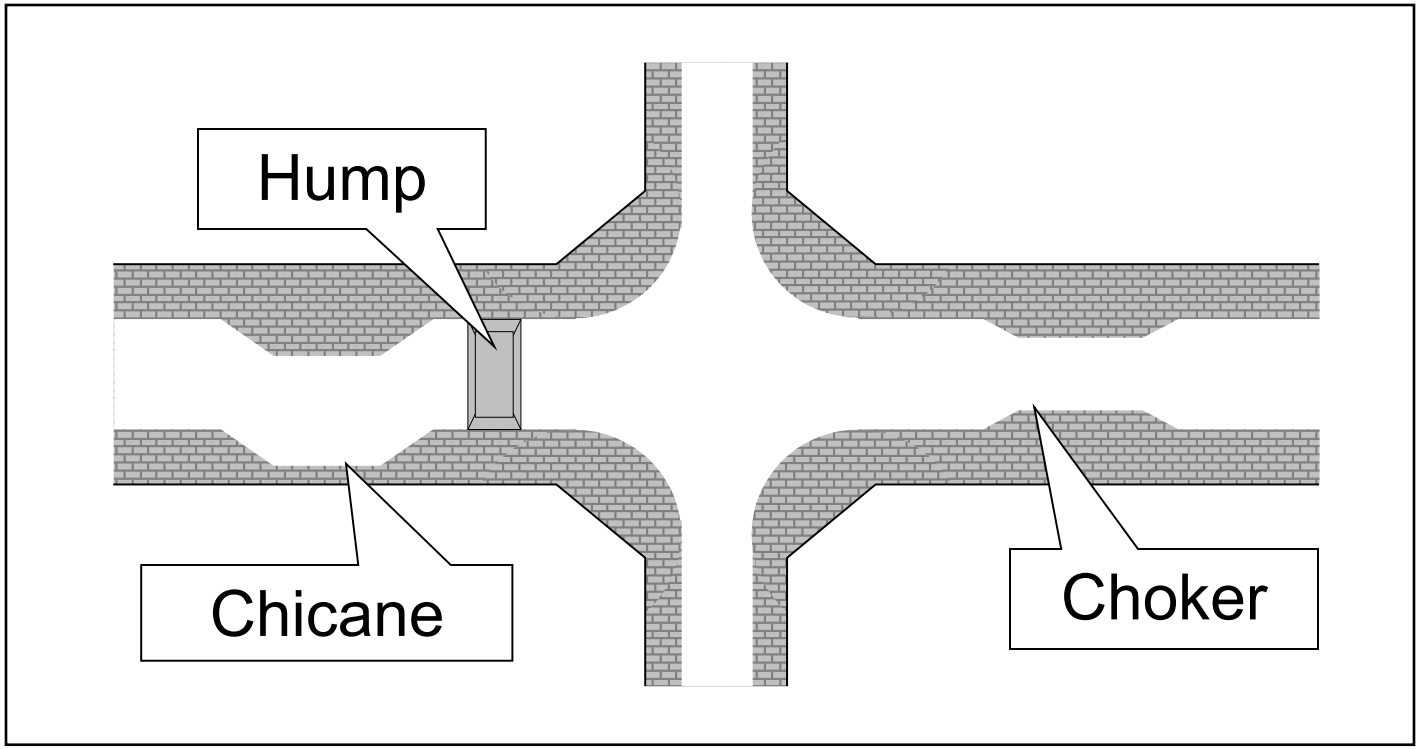


An example of Advanced Road Design controlling road access

2. Road Geometry to Meet the Functions of the Road

2-1 Motor Vehicles: Traffic Functions and Road Design (3)

◆ Different measures can be adopted when it is necessary to limit the driving speed of motor vehicles; e.g. in cities or residential areas.



Road designs suitable for reducing driving speed

2. Road Geometry to Meet the Functions of the Road

2-2 Pedestrians and Bicycles: Traffic Functions and Road Design (1)

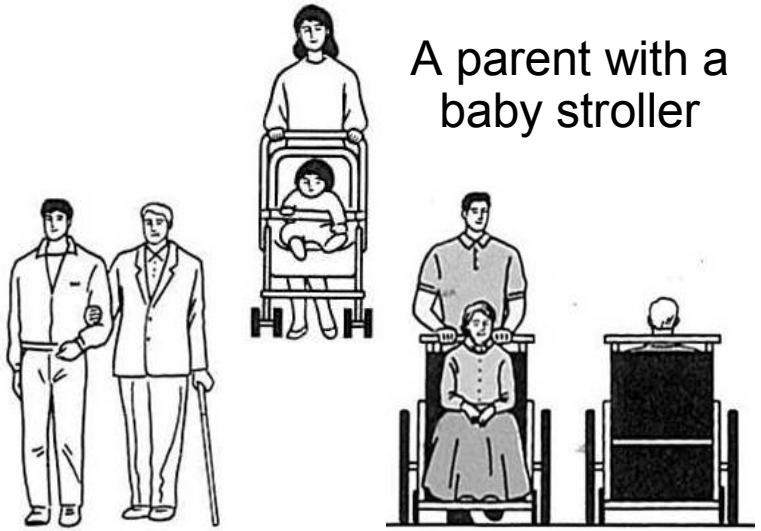
Traffic Functions for Pedestrians and Bicycles			
Walking & Riding Passage Functions	Continuity	- Providing continuous sidewalks and road space for pedestrians and bicycles.
	Safety	- Separating pedestrians, bicycles and motor vehicles. - Ensuring the safety of roads used by for both pedestrians and vehicles in local communities
	Ensuring mobility for all users	- Taking into account wheelchairs etc when planning the width, flatness and slope of sidewalks - Providing pedestrian support facilities, such as elevators and escalators
	Aesthetic comfort	- Pavement materials - Landscaping, shape and color of public constructions
Access Functions	Accessibility	- Providing pedestrian decks - Promoting barrier-free bus stops and open spaces in front of railroad stations
Relaxation Functions	Gathering Spaces	- Securing waiting spaces for buses or at crossings - Providing facilities e.g. benches and open spaces - Providing bicycle-parking areas

2. Road Geometry to Meet the Functions of the Road

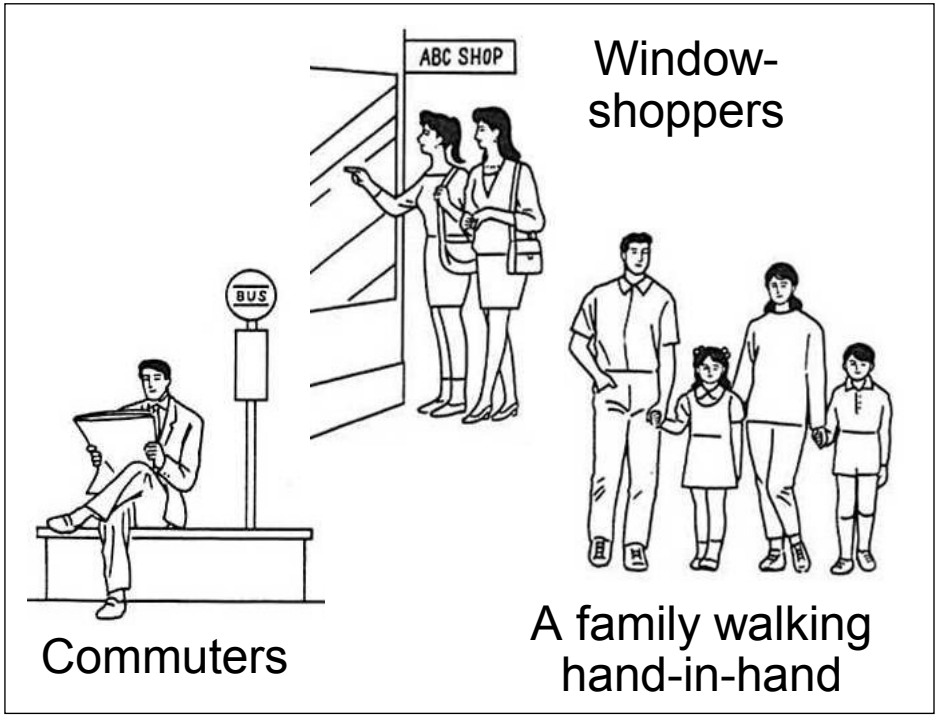
2-2 Pedestrians and Bicycles: Traffic Functions and Road Design (2)

◆ Ensuring Pedestrian Mobility for a variety of users and places.

■ Areas around hospitals and welfare facilities



■ Downtown



Patterns of Pedestrian Usage

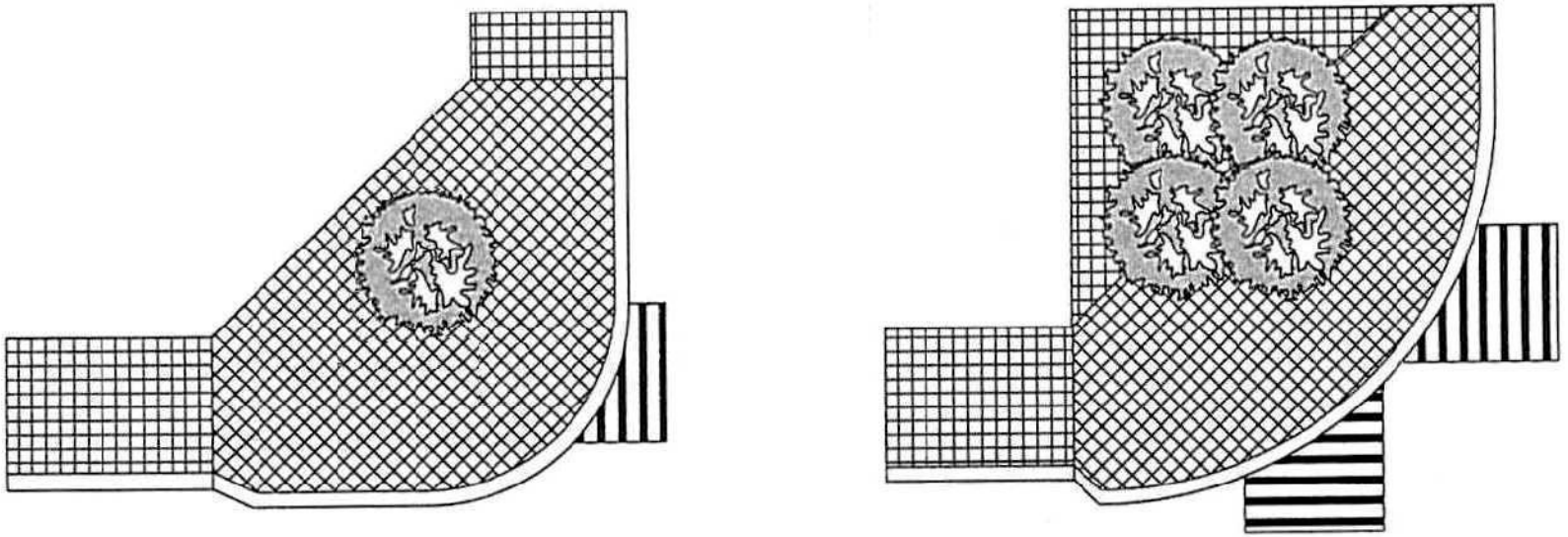
2. Road Geometry to Meet the Functions of the Road

2-2 Pedestrians and Bicycles: Traffic Functions and Road Design (3)

◆ Ensuring sufficient gathering spaces and provision of benches.

■ 1) Creating an open space at corners by widening the cutoff

■ 2) Enlarging the corner by integrating it with part of the landowner's private property



2 Examples of forming open spaces by developing corners

2. Road Geometry to Meet the Functions of the Road

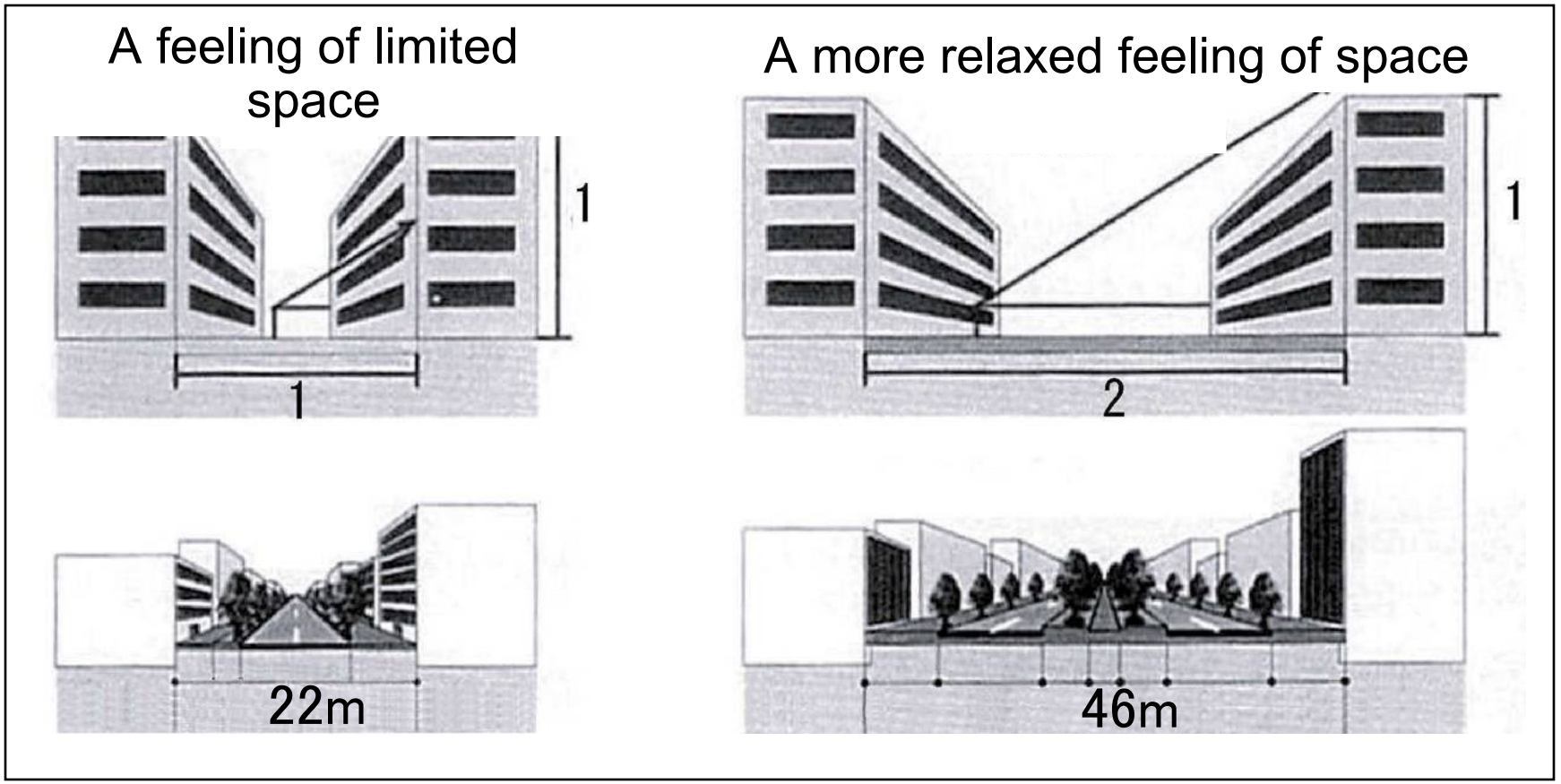
2-2 Spatial Functions: Road Design (1)

Spatial Functions	Developing Urban Areas	Forming the framework of cities and districts	-Securing road widths which form a balanced landscape and framework of the city. (wide dividers and sidewalks, etc.)
		Promoting roadside development	-Road geometry designs that make the usage of roadside easier. (securing accessibility)
	Disaster-Mitigation Areas	Areas that can mitigate the effects of a disaster	-Ensuring correct road widths in terms of fire prevention. -Planting, laying underground utility lines.
	Environmental Spaces	Trees and Flowers	-Roadside planting, setting up planting zones, divider planting
		Forming landscapes	-Landscaping by planting, by laying underground utility lines etc… -Designing aesthetic public structures
		Reducing noise pollution	-Adopting underground structures -Adopting sound insulation walls and buffer zones -Introducing low-noise pavements
	Storage Spaces	Storing utilities and public facilities	-Installing tram tracks -Storing public utility common ducts and electricity and telephone cable ducts

2. Road Geometry to Meet the Functions of the Road

2-2 Spatial Functions: Road Design (2)

◆ Deciding road widths in consideration of the balance between the height of the buildings and the width of the road.



Ratios between the width of the road and the height of the buildings

2. Road Geometry to Meet the Functions of the Road

2-2 Spatial Functions: Road Design (3)

◆ Ensuring road widths in accordance with the function of preventing and controlling the spread of fire.

◆ Mitigating the effects of disasters by planting and/or laying underground utility lines

Establishing "Blocked Zones" to prevent fire spreading in Tokyo

Unburnable rate above 80% - Road Widths of 11 – 16 meters
Unburnable rate above 60% - Road Widths of 16 – 24 meters
Unburnable rate above 40% - Road Widths of 24 – 27 meters
Unburnable rate under 40% - Road Widths above 27 meters

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3-1 Road Geometry Suitable for Roads in Urban Areas (1)

■ Measures to mitigate congestion in different areas

When the capacity of the road must be expanded and developed immediately but there are problems securing the necessary amount of land for full development, the road standards can be scaled down.

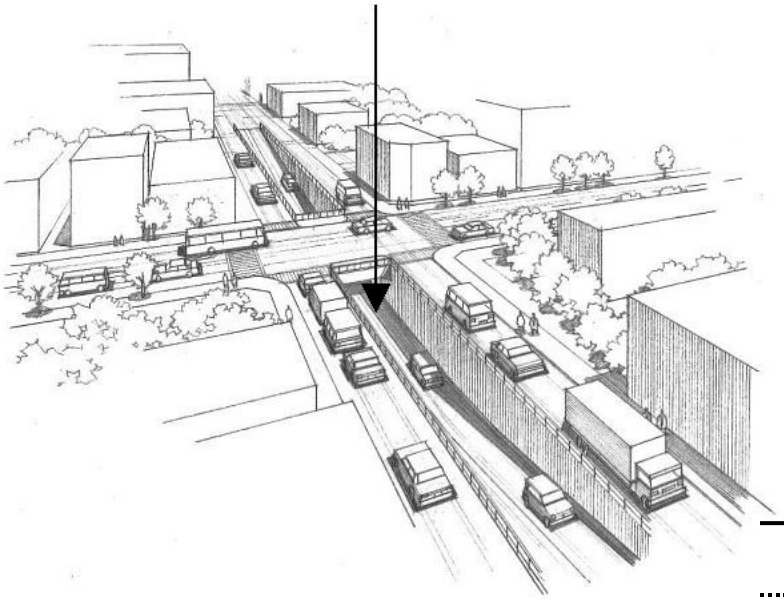
▼

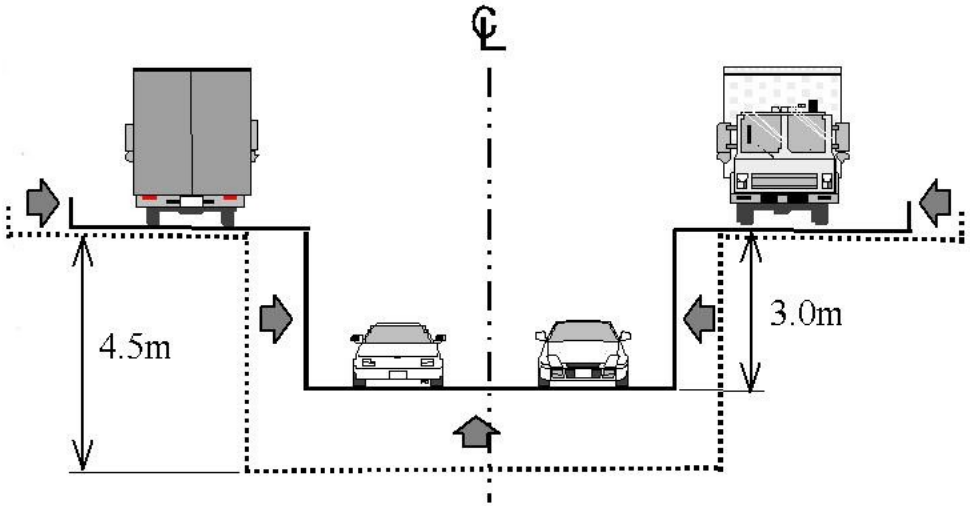
E.g. A passenger vehicle only road can be built that permits the access of passenger and light goods vehicles only.

3. Road Geometry to Meet Regional Requirements

3-1 Road Geometry Suitable for Roads in Urban Areas (2)

Developing an Underpass for passenger vehicles only





Geometry of a Road for Passenger Vehicles

(e.g. an underpass)

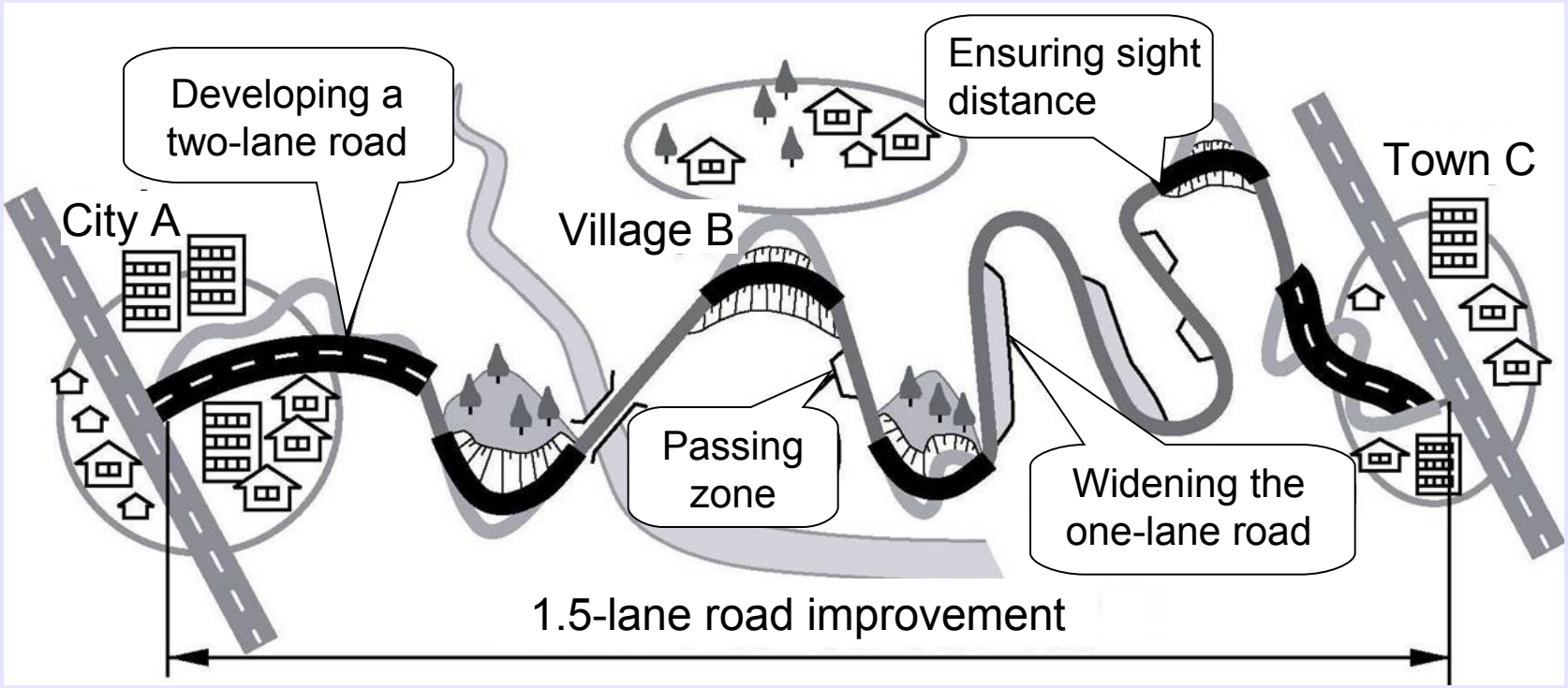
3. Road Geometry to Meet Regional Characteristics

3-2 Road Geometry Suitable for Roads in Mountainous Areas

When the overall traffic volume is light, but the road needs immediate improvement to meet the needs of people in their daily lives, a road geometry which ensures the minimum passage function of the road is required.

▼

E.g. A single-lane road that would, under normal circumstances be made into two lanes, can be developed with the implementation of the “1.5-lane improvement”.
This is a combination of the development of two-lane sections, widening the one-lane, and partial improvements.



- **Improvement to a two-lane road (Type 3, Level 3-4)**
  On sections of the road that: experience heavy traffic near or between communities or that require a passing lane
- **Widening the one-lane road (Type 3, Level 5)**
  On sections of the road that: require a proper sight distance or some other way to prevent disasters.
- **Passing Zones**
  Install where necessary
- **Utilization of the existing roads**
  On sections of the road that are not experiencing any problems

An Example of "1.5-Lane" Road Improvement

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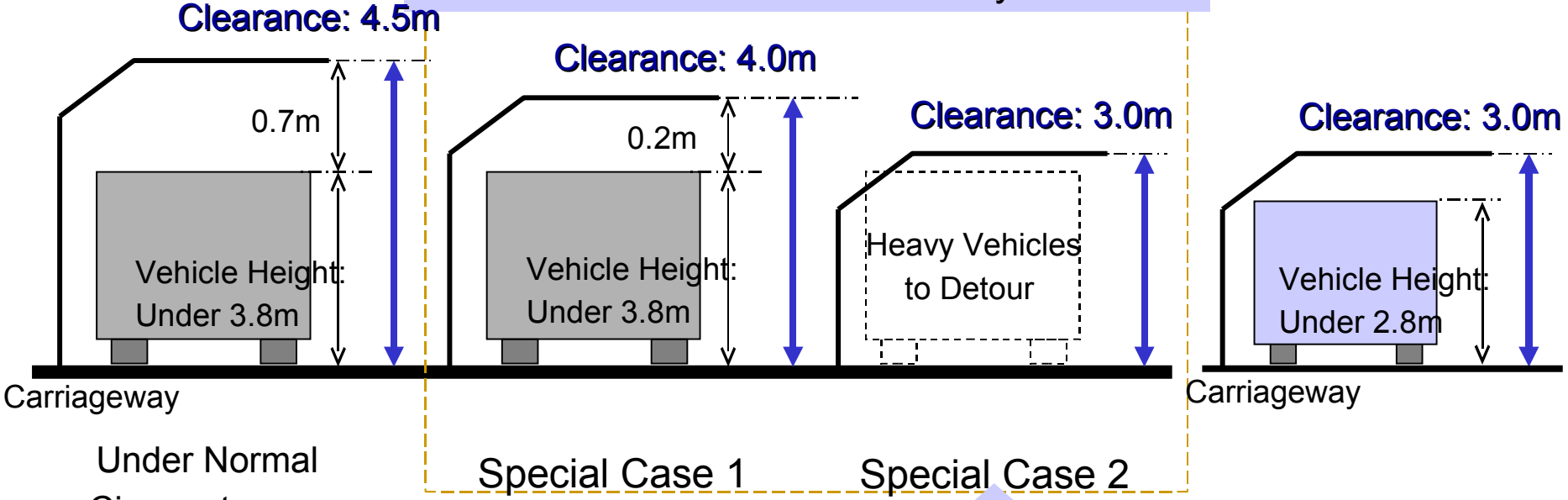
4-1 Vertical Clearance of Road Structures over the Carriageway

Ensuring clearance heights for heavy goods vehicles
- and exceptions to the rule.

■ All Purpose Road

Exceptions to the normal clearance specifications which can be applied on municipal roads where the projected traffic volume is under 500 vehicles/day

■ Passenger-Vehicle-Only Road



When the volume of traffic on the road is very light, and alternative routes are available.

4. Road Geometry Suitable for Freight Vehicles

4-2 Climbing Lanes

Setting up a climbing lane on slopes where heavy vehicles compromise the flow of traffic for other road users.

■ Criteria of Setting Up Climbing Lanes

◆ Where the Vertical Gradient is above 5 %

（Exception: 3% on slopes where the designated speed is 100km/hr or over)

◆ Width of Climbing Lane：3m

■ Conditions to be considered when planning a climbing lane

Road Conditions

i. Service Level

ii. Level of Vertical Gradient

- Length of Vertical Gradient

Traffic Conditions

- Planned Volume / Capacity of Traffic
- % of traffic as Heavy Vehicles → When a large % of the traffic is heavy vehicles, the traffic capacity, safety, and driving comfort will lower.

Thank you very much.