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High-Definition Map (HD Maps) Content Specification for Hong Kong

（Consultation Document）

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Contents

Introduction

The rapid advancement of autonomous driving technology has propelled the demand for High-Definition Maps (HD Maps). Serving as a crucial component within autonomous driving systems, HD Maps provide vehicles with accurate and real-time geographical information, facilitating efficient perception of the environment and intelligent decision-making.

This standard aims to establish consistent technical specifications and quality standards to produce HD Maps. Its primary objective is to ensure the accuracy and reliability of map data. By defining standardized requirements for the collection, storage, and utilization of HD Map data, this standard seeks to foster collaboration and interoperability across the industry. It endeavours to provide robust support for the widespread implementation of autonomous driving technology, thereby advancing the intelligence and safety of transportation systems.

Foreword

Please note that certain contents of this document may involve patents. The issuing organization does not assume responsibility for identifying patents.

Organizations participating in the drafting of this standard:

Otto Poon Charitable Foundation Smart Cities Research Institute

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Drafters of this Standard:

1. Scope of application

This standard (draft) applies to the first level of High-Definition Map (HD Map), specifically, the base map of the static map section, which includes stipulations on the physical and logical demarcation of crucial geographic data, coordinate systems, road hierarchies, data models, geometric abstraction and representation, traffic signs, etc. It applies to data acquisition and base map production for autonomous driving.

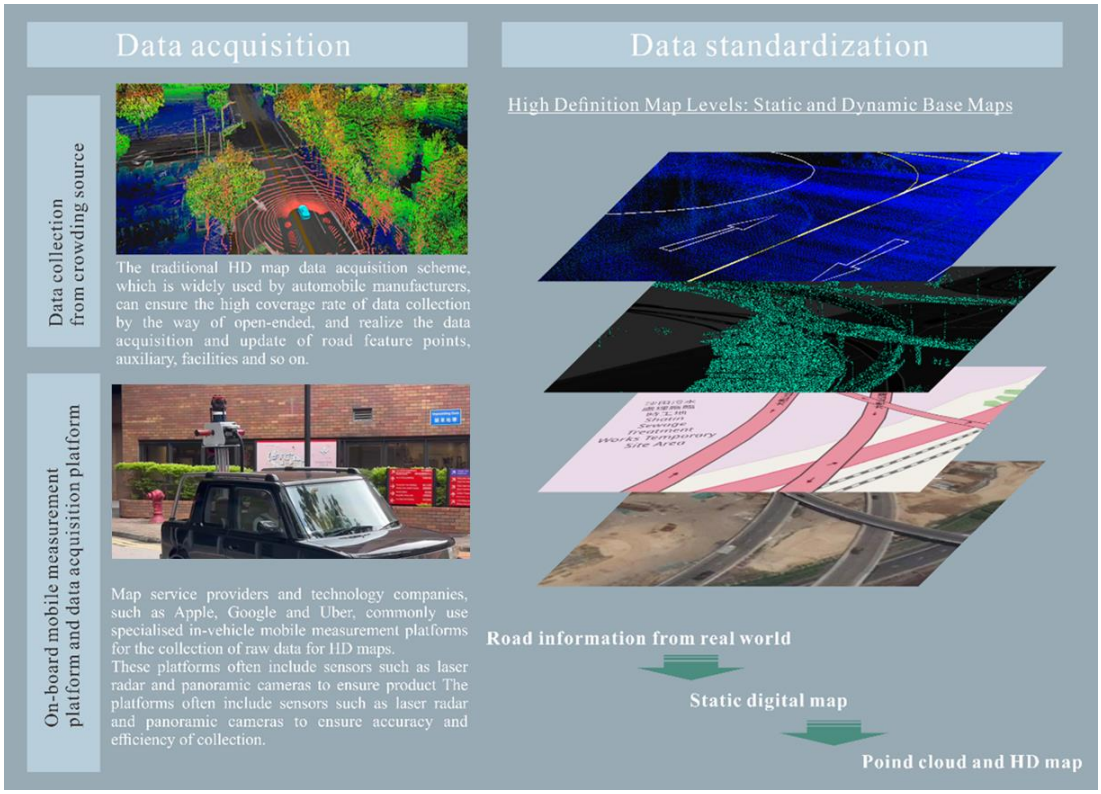


Figure 1 Role of HD Map in autonomous driving

As shown in Figure 1, this standard delineates the scope within the supply chain framework for autonomous driving technology. The fundamental structure of the technology supply chain for autonomous driving is divided into two parts: (i) the generation of the base map leveraging mapping technology, which is primarily executed by car manufacturers and (ii) the dynamic updating of the logic layer map based on various end-use applications such as crowdsourcing strategies used by different autonomous driving platforms, which is usually undertaken by conventional car manufacturers, associated industry departments, and research institutions.

The generation of the base map involves the collection of raw data from a variety of sensors, typically utilizing mapping-grade sensors that ensure sufficient accuracy of road scene data. The raw data is then processed using object extraction and detection techniques to extract map elements in line with pertinent standards. In this standard, the HD Map is divided into 17 layer groups, with different layers of categorized elements according to the specific situation of Hong Kong. Furthermore, a benchmark database, offering enhanced

adaptability in reading, writing, and visualizing map elements, has been crafted to cater to the specific conditions of Hong Kong. Performance evaluations have been executed on select road scenes, thereby offering valuable insights for the industry.

Dynamic map updating is crucial to maintain HD maps. As elements of road scenes evolve over time - such as the installation of traffic lights at various intersections or the replanting of roadside trees - the actual road scenes may no longer align with the existing base map. Consequently, it is vital to maintain high accuracy by adding and deleting road elements as per the specific situation. Currently, due to the complexity of the scenes, conditions, and changes involved in dynamic updating tasks, it is challenging for a single organization to accomplish this task. As a result, most have adopted a crowdsourcing model, in which different road features, including autonomous vehicles and other vehicles, scan the road scenes. The observed data is then matched and compared with the base map. Incremental methods are usually used to achieve high update efficiency. Some applications can now upload and match the scanned data in real time, accelerating the update process and enhancing the safety and efficiency of road traffic.

2. Citation standards and normative citation files

The subsequent regulations, standards, or documents serve as normative references within this standard for designing the data model, fields description, feature types, data types and supporting the collection and labelling of example data for HD maps applicable to Hong Kong. If a referenced document is denoted with a specific date or version, only that date or version is applicable to this standard. Conversely, if no date or version is specified, the most recent version - inclusive of all revisions or additions - is utilized as the reference standard.

- **Transport Department**
  - *the Road Users' Code* Chapter 8 language of the road last updated 06.2020.
- **Highways Department**
  - *Geographical Information System (GIS) Specifications for Engineering Surveys of Highways Department Version 3.0 (released on 06.09.2019)*
  - *Structures Design Manual for Highways and Railways (2013 Edition)*
  - *List of Provisionally Approved Mix Designs for Bituminous Materials for Roads Maintained or to be Maintained by Highways Department (As at 1 June 2022)*
  - *RD/GN/032 Guidance Notes On Road Surface Requirements For Expressways And High Speed Roads*
  - *RD/GN/015B Catalogue of Road Defects*
  - *RD/GN/036A Road Markings*
- **Others**
  - *DB11/T 1880—2021 Technical specification of autonomous driving map feature localization data*
  - *HD Maps Data Contents and Formats Standard (Taiwan Association of Information and Communication Standards)*
  - *Practice Guide for Cloud Computing Security [ISPG-SM04] Version 1.2*

3. Related terms and definitions

The following terminology and definitions apply to this standard.

3.1. High-Definition maps

HD maps (High-Definition maps) provide robust and reliable base map information for autonomous driving technology, thereby enhancing the precision of autonomous driving decisions. This standard delineates the accuracy requirements for HD Maps in terms of both position accuracy and point cloud density.

3.2. MangoDB

A free and source-available cross-platform document-oriented database management system that adheres to the ACID protocol.

3.3. EGM96

The geodetic horizon, the gravitational isotope in the Earth's gravity field that coincides with, or is closest to, the mean sea surface at free rest. An equirectangular cylindrical map projection is an orthographic projection.

3.4. Mercator Projection

An isometric cylindrical map projection method whose projection method belongs to the orthographic projection.

3.5. World Geodetic System

World Geodetic system (WGS84) is a geodetic system standard commonly used in cartography, geodesy, and navigation.

3.6. Hong Kong 1980 Grid System

Hong Kong 1980 Grid System (HK80) is a Transverse Mercator projection system based on International Hayford (1910) as the reference ellipsoid. The origin point is 819069.80m N 836694.05m E.

3.7. Digital Terrain Model

Digital terrain model (DTM) represents the spatial distribution of actual terrain features in numerical form.

3.8. Orthoimage

Orthoimage is aerial imagery that has been geometrically corrected ("orthorectified") such that the scale is uniform: the photo or image follows a given map projection.

3.9. Point of Interest

The point of interest (POI) is a landmark or scenic spot on the electronic map, and must contain data such as name, category, longitude, latitude, and altitude to be presented on the electronic map.

3.10. Shared Data

Shared data stores data that is common to all module components in the database.

3.11. Volatile Data

Volatile data refers to data or attribute content that changes over time, such as speed limits on specific road segments.

3.12. Advanced Driver Assistance Systems

Advanced driver assistance systems (ADAS) are one of the technologies towards smart vehicles in recent years, in order to make the driverless technology stage of the technological development process, the main function of ADAS is to provide information analysis of the current driving conditions of the driving vehicle and changes in the surrounding environment, and warn of potential dangerous conditions in advance, so that drivers can take appropriate countermeasures as soon as possible to avoid accidents.

3.13. Routing

Routing represents the geometric topology of various types of roads, and its functions include route calculation, map matching, route guidance, and advanced driver assistance.

3.14. Link

A link is used to describe a road segment between two intersections that represents a road or a lane.

3.15. Attribute

Information used to describe the content of a feature or the details of a function.

3.16. Description

Contains information about variable database contents and database properties, which can refer to data recorded for information such as specific map displays and road plans.

3.17. Fixed Attribute

Required (or mandatory) information that describes and defines characteristics. They are stored with each corresponding function and always store values.

3.18. Flexible Attribute

Flexible attribute is additional or special information about a feature. Flexible attribute can be combined to form attribute groups. Attribute groups allow the flexibility to simulate real-world situations.

3.19. Travel Direction

The direction in which the vehicle is traveling in the lane. May differ from the direction of the connecting road segment.

3.20. Lane Connected ID

Lane Connected ID is a mechanism set up to connect lanes to each other, using lanes of different segments to encode the connection relationship between lanes.

3.21. Lane Group

A lane group is a series of one or more lanes, and all lanes in a group have the same direction of travel. The compiler assigns the corresponding properties to real-world

features that contain information such as lane group ID, feature reference, lane connection, lane boundary, lane direction, etc.

3.22. Split
Lane splitting refers to the beginning of one or more new lanes, and one lane is split into multiple lanes.

3.23. Merge
Lane merging refers to the merging of adjacent lanes with each other, merging adjacent lanes.

3.24. Validity Range
Used to define the length of a lane group.

3.25. Regulatory lane boundary line
The regulatory lane boundary line refers to the road boundary line marked on the general road, representing the lane boundary line that is allowed to travel by regulations.

3.26. Physical lane boundary line
The boundary line on which a vehicle can travel often exceeds the bounds of the regulatory lane boundary line.

3.27. Traffic light
Traffic lights control movements of all road users.

3.28. Traffic sign
Traffic sign is used to give instructions, warnings or directions to motorists and cyclists.

3.29. Road marking
Road marking is used to give instructions, warnings or directions to motorists and cyclists.

3.30 Feature localization
A localisation method in which the features of real-world road traffic facilities and surrounding objects are observed by sensors on the vehicle and matched with the feature data of the facility in the autopilot map to obtain the location and attitude of the vehicle.

3.31 Feature localization data
Feature data for positioning that can be recognised by the sensor. It is the sensor-visible part of the HD map elements, including image data, point cloud data, and vector data.

4. Basic Regulations
With the development of autonomous driving technology, HD Maps are being widely used in vehicle navigation systems, promoting the development and production of high-precision navigation data in various countries and regions. By using HD maps as static base map and combining with real-time environmental awareness information, self-driving vehicles can achieve precise positioning and utilize advanced driver assistance systems and lane-level routing to make efficient and reliable driving decisions. HD maps are high-precision, finely detailed maps that require sub-meter accuracy to distinguish between

lanes, which necessitates the formatting and storage of various traffic elements, including road network data, lane network data, lane lines, and traffic signs from traditional maps. Today, with the evolution of positioning technology, high-accuracy positioning in complex environments has become feasible. Consequently, the collection and production of HD map data, HD map functionalities, and information security should also be subject to regulation.

4.1 Data Regulation

To facilitate accurate navigation for autonomous vehicles during road travel, navigation systems must supply comprehensive information on road topology and geometry. This standard draws upon the OpenDRIVE and other HD Maps standards published by the Association for Standardization of Automation and Measuring Systems (ASAM). It also integrates the "Road Safety", "Rules for the Installation of Traffic Signs and Markings", and "Road Survey Guidelines" issued by the Transport Department and Highways Department of Hong Kong, as well as the "Geographical Information System (GIS) Specifications for Engineering Surveys". This amalgamation of standards and guidelines ensures a comprehensive approach to autonomous vehicle navigation.

For the HD Maps in this standard, the basic geographic data is organised at the level of "Area - Layer Group - Layer - Feature" and its logical structure is shown in Figure 2. The Layer 1 is the area layer, which can be divided into different areas according to administrative districts or arbitrary polygons and assigned area codes for identification. Layer 2 and Layer 3 are composed of layer groups and layers. To enhance the convenience of each feature in writing, reading, and modifying of the database, these two Layers will logically classify the features of the urban road environment, i.e., according to the different functions of the features in the urban traffic, and the autonomous driving norms and habits. The Layer 4 is the feature layer, where each element is stored according to certain rules. Features of point, line and surface should be expressed as 3D points, 3D (curved) lines and 3D polygons respectively. The geometrical representation of road network groups and lane network groups shall comply with the requirements for constructing topological connections.

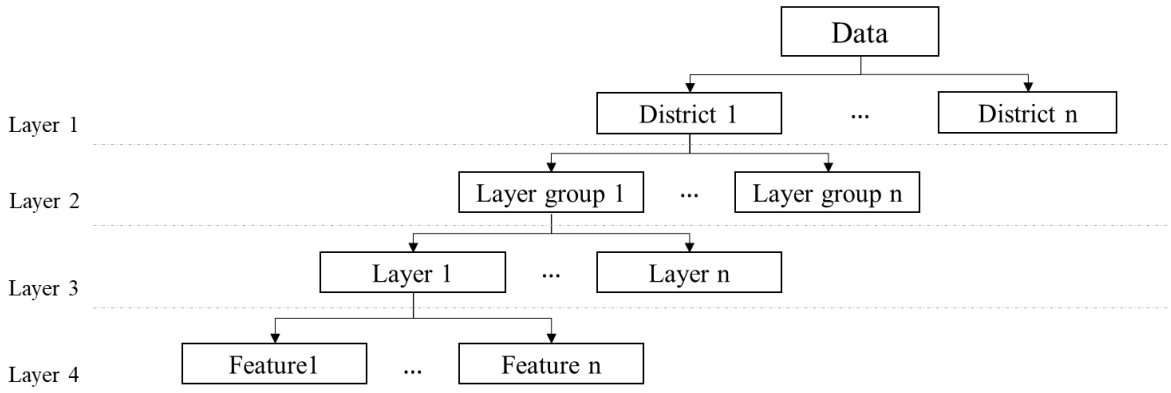


Figure 2 Logical organisation of the geographical data

Considering the special geographical location of Hong Kong and the distribution of urban activities, the division of Layer1 is based on the administrative districts of Hong Kong, as shown in Table 1. The administrative boundaries of Hong Kong are shown in Figure 3. Some smaller neighbouring districts are merged. Specifically, Districts 10 to 14 are merged as one, and District 15 and District 18 are merged. In addition, the original District 7 is divided into two districts, namely District 7 and District 8.

The other logical layers will be analysed in Section 5.

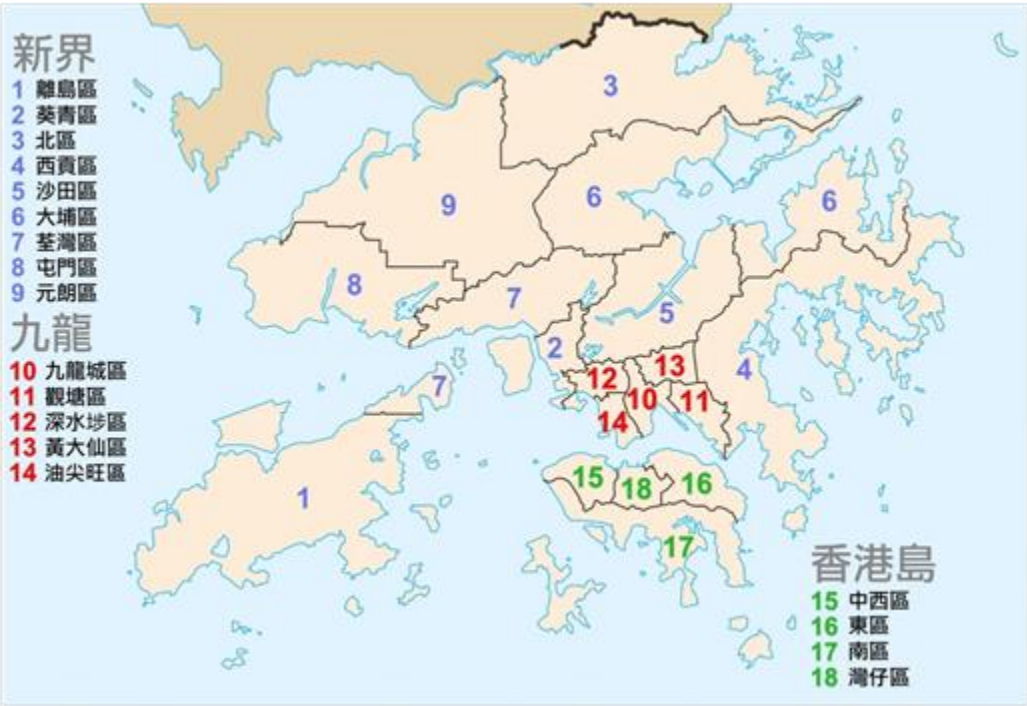


Figure 3 The administrative boundaries of Hong Kong

Table 1 Data and administritive boundary

Draft Divisions	Administrative Divisions of Hong Kong
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	7
9	8

10	9
11	10，11，12，13，14
12	15，18
13	16
14	17

4.2 Data collection and production regulations

4.2.1 Spatial and temporal reference system

The spatial coordinate system should be Hong Kong 1980 Grid System (HK80). The time system should use Coordinated Universal Time (UTC).

4.2.2 Position accuracy requirements

The absolute accuracy of the planar position of the feature localization data is less than or equal to 0.1 m.

4.2.3 Requirements of point cloud density

In scenarios where the positioning accuracy meets the requirements of Section 4.2.3, the point cloud density obtained by LiDAR should not be less than 2500 points per square meter.

4.3 Functional and information security regulations

The transmission security of feature localization data between the vehicle end and the service end is in line with the requirements of ISO/IEC 29180:2012 and Practice Guide for Cloud Computing Security [ISPG-SM04] Version 1.2.

The security of storage of feature localization data at the service end should be in line with the requirements of (ISO/IEC 27040:2015) and Practice Guide for Cloud Computing Security [ISPG-SM04] Version 1.2.

4.4 Feature localization data application process

The process of collecting, processing, and applying the feature localization data is from the vehicle end to the service end, and from the service end to the vehicle end, and it is desirable to realize rapid updating. The following requirements should be met:

a) Vehicle end uploads feature localization data collected based on different sensors to the server side and assists vehicle positioning based on feature localization data released by the server side; when the feature points detected by the sensors and the feature localization data are inconsistent, the self-driving vehicle uploads the feature points of the inconsistent road sections to the server side.

b) The server side releases the feature localization data to the autonomous driving vehicle after automated fusion and quality evaluation of the multi-vehicle feature localization data.

5. Data model

Based on the logical structure of the geodata defined in Section 4, this section introduces layer groups, layers, and features. The data model designed in this standard (draft) is flexible and extensible, which has a well-developed structure and a system that can extend feature types. Therefore, the designed data model can be easily converted with the standard data of these government departments, so that these data can be better applied to autonomous driving and intelligent transportation.

5.1. Basic elements of urban road environment

Firstly, the basic elements of the urban road scene are analysed. Most of the road information and related facilities are primarily for vehicles. Road information can generally be divided into on-road and off-road information. On-road information includes various types of lane information, such as driving lanes, stop lines and turning lanes, as well as information for pedestrians, such as zebra crossings. Off-road information is generally more complex and can be divided into traffic signs, road signs and auxiliary facilities in terms of function. Traffic signs convey traffic signals while road signs provide detailed lane and directional information. Auxiliary facilities are more complex and generally include lane barriers, dividers, roadside trees, and roadside shrubs.

5.2. Analysis of hierarchical group logic

Based on the above analysis, the urban road scene elements for the HD Maps are divided into 17 layer groups in this draft. The code, name and description of each layer group are given in Table 2. The layer groups are classified according to different types of road elements, which facilitates the subsequent abstraction and datafication of road elements.

Table 2 Classification of layer groups

Code of layer group	Name of layer group	Description
1	Road reference lines	Road reference lines for both carriageway and pedestrian needs, generally comprising solid and dashed lines.
2	Lane reference lines	Road reference lines for carriageways, generally comprising solid and dashed lines.
3	Road links	Indication of changes in road class, changes in the number and bondaries of lanes, changes in the material and type of road surface, etc.
4	Lane links	Indication of changes in lane classes, changes in number of lanes and restrictions, etc.
5	Service Facilities	Including car parks and toll booths on highway sections, etc.
6	Management Facilities	Including various toll stations, checkpoints, monitoring stations, etc.

7	Road Boundary	Boundary demarcation of motor vehicles, non-motor vehicles and footpaths, etc.
8	Linear road traffic markings	Includes all types of lane markings, horizontal markings, etc.
9	Faceted road traffic markings	Includes parking indication areas, various types of functional face lines.
10	Road traffic signs	Includes various types of signs, such as warning, prohibition, directional, wayfinding and other traffic signs with different functions.
11	Traffic lights	Mainly traffic signals and lane indicators.
12	Point Smart Devices	Various types of intelligent equipment, such as traffic weather monitoring equipment, vehicle intelligent monitoring and recording equipment, automatic red light recording equipment, automatic violation of traffic regulations recording equipment, motor vehicle tachographs, motor vehicle interval speed detection equipment, traffic safety violation evidence collection equipment, traffic signal control equipment.
13	Linear Smart Devices	Ditto
14	Faceted Smart Devices	Ditto
15	Support Structures	Various types of poles, including common street light poles, traffic light poles, etc.
16	Linear Auxiliaries	Various types of speed bumps, guardrails, green belts, etc.
17	Faceted Auxiliaries	Various safety and protection facilities such as fireboxes, crash strips.

The above layer groups do not give specific road features. The standard refines the layer groups according to the specific circumstances of Hong Kong and further subdivides them into corresponding layers for road features (elements). These elements will become the specific descriptive objects for the HD Maps in this draft. The contents of the road elements are provided in Table 3.

Table 3 Relationship between Layer group and Layer

Code	Layer group	Layer	Feature
1	Road reference lines	Road reference lines	Road reference line solid/dotted line
2	Lane reference lines	Lane reference lines	Lane reference line solid/dotted line

3	Road links	Road links	Road grade change point Lane number change point Pavement material change point Structure type change point Road restriction change point Other change points
4	Lane links	Lane links	Road break location Lane type change point Change point of left lane marking type Right adjacent lane marking type change point Lane restriction change point Other change points
5	Service Facilities	Car Park	Car park complex Indoor car park Outdoor car park Charging stations Changing stations
		Service Area	Expressway service area Road service station
6	Management Facilities	Toll/checkpoints	Toll Checkpoint Inspection station
7	Road Boundary	Road Boundaries	Motorway boundary line
8	Linear road traffic markings	Road Markings giving Warning and Information	
		Road markings giving orders	
9	Faceted road traffic markings	Road Markings giving Warning and Information	
		Road markings giving orders	
10	Road traffic signs	Traffic Signs giving Orders	
		Traffic Signs giving Warning	
		Temporary Signs and Road Markings	
		Direction Signs	

		Traffic Signs giving Information	
11	Traffic lights	Traffic Lights for Drivers and Cyclists	Green Yellow Red Red-yellow
		Lane Signals	Lane signals for trunk roads/expressways Lane signals for tunnels
12	Point Smart Devices	Point Smart Devices	Microwave vehicle detector Geomagnetic vehicle detector Coil vehicle detector Video vehicle detector Integrated traffic event video detector Traffic weather environmental monitoring equipment Vehicle intelligence monitoring and recording equipment Automatic red light recording device Automatic recording device for violation of prohibition of traffic regulations Speedometer for motor vehicles Speed measuring equipment for motor vehicles Traffic safety violation evidence collection equipment Traffic signal control equipment Traffic safety warning equipment
13	Linear Smart Devices	Linear Smart Devices	Common dowel bar Solar dowel bar Active dowel bar Wireless dowel bar Lighting facilities
14	Faceted Smart Devices	Faceted Smart Devices	Traffic Information Display Equipment Emergency phone booths Intelligent streetlights
15	Support Structures	Vertical Rods	Street light poles Traffic light poles Traffic sign poles Signposts Gantry poles Smart equipment poles Wire poles Height limit poles Bridge piers

		Lateral Rods	Gantry pole crosses Wire rod crossbars
16	Linear Auxiliaries	Speed reduction facilities	Speed ramp Road speed bump
		Roadside and protection	Road edge Side ditches Tunnel sidewalls Slopes Mountains Retaining walls Green belts Acoustic barriers Anti-drop fences Concrete bollards Corrugated parapets Rope guardrail Concrete parapets Metal parapets for bridges Traffic dividers Barriers Movable parapets Construction barriers Roadway baselines
		Roadblock	Stone piers Lifting columns Warning posts Road cones Water barricade
		Upper Structures	Separate overpasses
17	Faceted Auxiliaries	Safe Facilities	Fire box Convex mirror
		Protective facilities	Anti-collision strip

5.3 Attribute structure definition for layer groups

The data structure is central to the accurate representation of HD Maps elements in the database. Based on the current rules and practices of commonly used databases, this draft provides geometric abstraction and data structure requirements for the above-mentioned layer groups and corresponding road elements. Specifically, a set of data structure criteria is specified for each layer and element, which includes name, data type, value and description, attribute description, and whether an option is required. An example is provided in Figure 4. As can be seen from the example, the element is expressed using 5 fields, where the corresponding attributes are known to the intelligent body in the database by obtaining the index value. A value of '1' means that the road is two-way, so that an intelligent body, such as a self-driving vehicle, can adjust its driving strategy.

The association in the data structure corresponds to the actual road scene. In general, association rules can exist within the same layer or between different layers; they can be between elements and elements, or between elements and layers. Figure 5 gives an indication of the direct relationship between elements and layer groups. It is important to note that the associations in Figure 5 are based on normal urban road scenes. While in some cases, special associations may exist which should be added or changed.

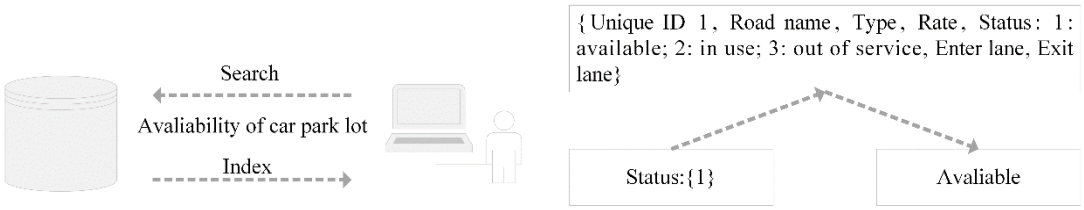


Figure 4 Examples of data structure usage

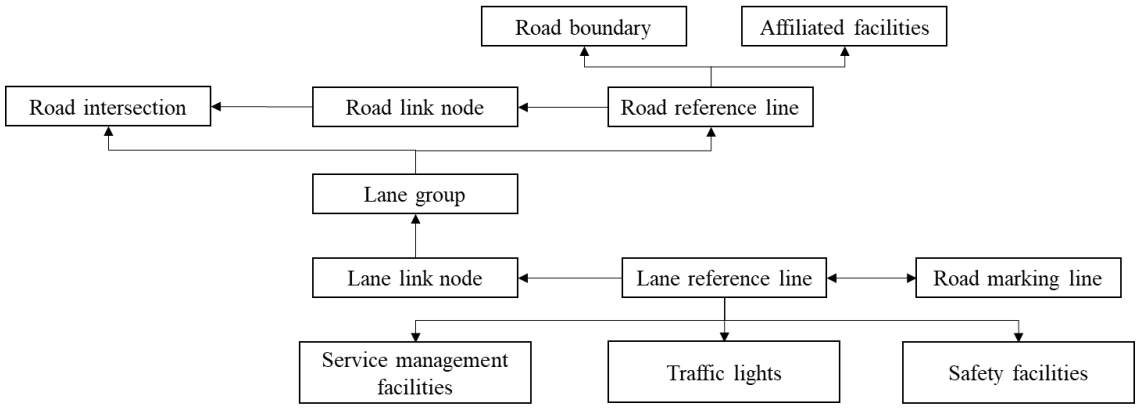


Figure 5 Common relationships between different elements and layer groups

The 17 layer groups are introduced in 5 categories based on their functionality, corresponding to sections 5.3.1 - 5.3.5. The attributes of the features belonging to each layer will be introduced in section 5.3.1 – 5.3.5.

5.3.1 Attributes structure for the road network group

The Road Network Group is the basic layer group of the HD Maps, which categorises the basic road information. Based on the specific situation in Hong Kong, the Road Network Group contains three layers, namely road reference line, road link node and road intersection, as shown in Figure 6.

The road reference lines include detailed basic road information that provides detailed guidance strategies for the 'Road Smart'; the road links include the attributes of the different links, such as access to the road; and the road junctions give the type of junction, for example, whether the junction is a roundabout. Table 4, 5, and 6 give the specific data structure requirements for the three components.

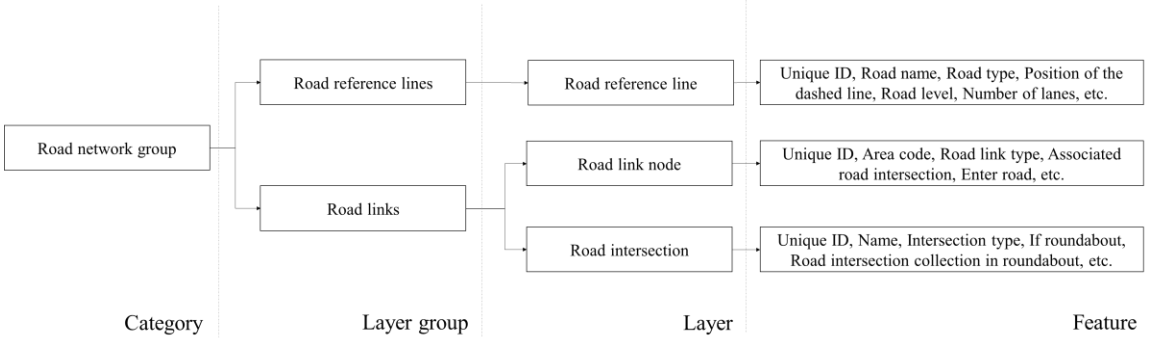


Figure 6 Road network group classification

Table 4 Road reference line

Name	Data type	Value and description	Relational attributes	Mandatory
Unique ID	Integer	Unique identification code	Basic	√
Road name	String	Road name, or "no name" if there is no road name	Basic	√
Road type	Integer	1. Solid road reference lines 2. Dashed road reference lines	Basic	√
Position of the dashed line	Integer	1. Road junctions 2. Road intersection 3. Ferry crossings 4. No traffic channelization area 0. Others	Basic	
Road level	Integer	1. Expressways 2. Trunk Roads 3. Secondary Roads 4. Slip roads 5. Motorways 6. Primary roads 7. Secondary roads 8. Tertiary roads 9. Class IV roads 0. Others	Basic	√
Number of lanes	Integer	Number of lanes	Basic	√
Pavement material	Integer	1. Asphalt mix 2. Cement mix 3. Gravel 4. Sand and gravel 5. Metal 6. Unpaved road 0. Others	Basic	√
Structure type	Integer	1. Roadbeds	Basic	√

		2. Bridge roads 3. Tunnel roads 4. Intersection roads 5. Culvert roads 0. Other roads		
Road status	Integer	1. Not under construction 2. Under construction (collection of no-passing signs, construction, etc.)	Basic	√
Traffic situation	Integer	1. Two-way traffic 2. One-way traffic 3. Prohibition of passage	Basic	√
Upstream and downstream separation	Boolean	0. Yes 1. No	Basic	√
Width	Float	Width of road (meter)	Basic	√
Length	Float	Length of road (meter)	Basic	√
Primary and secondary road markings on the elevated level	Integer	1. Primary road 2. Secondary road	Basic	
Primary and secondary road markings on the ground	Integer	1. Primary road 2. Secondary road	Basic	
Restricted vehicle type	String	1. Car 2. Extra large bus 3. Large buses 4. Medium bus 5. Heavy duty vehicle 6. Medium truck 7. Low speed truck 8. Special work vehicle 9. Light truck 10. Mini truck 11. Hazardous chemicals 12. Transporter 13. Diesel truck 0. Others Note: Multiple records can be recorded at the same time, and the attribute values are separated by ","	Basic	
Restricted direction	String	1. Turn left 2. Go straight	Basic	

		3. Turn right 4. U-turn Note: Multiple records can be recorded at the same time, and the attribute values are separated by a half-width ","		

Table 5 Road link nodes

Name	Data type	Value and description	Relational attributes	Mandatory
Unique ID	Integer	Unique Identification Code	Basic	√
Area code	Integer	Area code to which the road node belongs	Basic	√
Road link type	String	1. Road grade change node 2. Lane number change node 3. Pavement material change node 4. Structural Type Change node 5. Road restriction change node 6. Other change node (Multiple records can be recorded at the same time, and the attribute values are separated by ",")	Basic	√
Associated road intersection	Integer	Road junctions associated with this node	Relation	√
Enter road	String	Unique code for the enter road, more than one can be recorded at the same time, the values are separated by a ","	Relation	√
Area code of the enter road	Integer	Area code of the enter road	Relation	√
Exit road	String	Unique code for the exit road, more than one can be recorded at the same time, the values are separated by a ","	Relation	√
Area code of the exit road	Integer	Area code of the exit road	Relation	√

Table 6 Road intersection

Name	Data type	Value and description	Relational attributes	Mandatory
Unique ID	Integer	Unique Identification Code	Basic	√
Name	String	The name of the road intersection, or if the intersection name does not exist, the name of the main road starting directly north and going clockwise, where road A intersects road B.	Basic	√
Intersection type	Integer	1. Crossroads 2. Y-intersection 3. Five-way intersections 4. Monstrous intersections 5. Roundabout intersections 6. Turn-around intersections 0. Others	Basic	√
If roundabout	Boolean	0. No 1. Yes	Basic	
Road intersection collection in roundabout	String	Collection of unique codes for road junctions within roundabouts, separated by ","	Basic	
Road link node collection	String	Collection of unique codes for road link nodes separated by ","	Relation	√
Lane group collection	String	Collection of unique codes for lane groups, separated by “,”	Relation	√

5.3.2 Attributes structure for lane network groups

The Lane Network Group describes the physical information of a vehicle. It categorises the basic information on carriageways. Based on the specific situation in Hong Kong, the Lane Network Group is divided into three major components, namely the Lane group, the Lane reference line and the Lane link node, as shown in Figure 7.

The lane group provides detailed information of the basic lanes: the roads to which they belong, the associated lanes, the start and end connections, and the front and rear lane groups. This information provides detailed guidance on strategies for the road user community. The lane reference line contains the basic attributes of a reference line, including location, lane type, lane status, turning information, length and width, various types of restrictions, various lane coincident and contra direction markings, lane start and stop points, etc. The lane link node gives information such as the type of connection, associated junctions and the entry and exit of lane groups. Tables 7-9 give the specific data structure requirements for the three components.

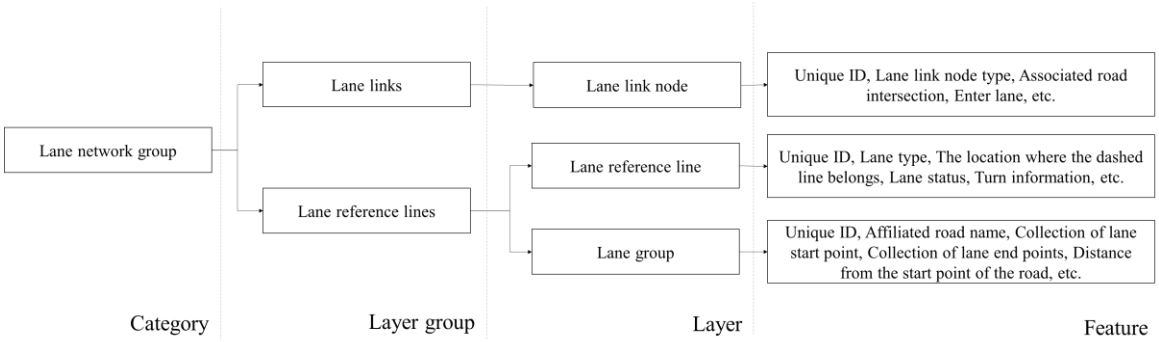


Figure 7 Lane network layer group classification

Table 7 Lane group

Name	Data type	Value and description	Relational attributes	Mandatory
Unique ID	Integer	Unique identification code	Basic	√
Affiliated road	Integer	The unique code of the road	Relation	√
Associated lanes	String	Collection of unique codes for all lane reference lines, filled in the order of lane codes, separated by ","	Relation	√
Collection of lanes start points	String	Collection of start points for all lanes for the lane group, separated by ","	Relation	√
Collection of lanes end points	String	Collection of end points for all lanes for the lane group, separated by ","	Relation	√
Distance from the start point of the road	Float	Distance between the start of the lane group and the start of the road to which it belongs	Relation	√
Distance from the end of the road	Float	Distance between the end of the lane group and the end of the road to which it belongs	Relation	√
Front lane group	Integer	Front lane group with unique code	Relation	
Rear lane group	Integer	Rear lane group with unique code	Relation	

Table 8 Lane reference line

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Lane type	Integer	1. Lane reference solid line 2. Lane reference dashed line	Basic	√

The location where the dashed line belongs	Integer	1. Road intersection 2. Crossing 3. Ferry 4. No traffic channelization area 0. Others	Basic	
Lane type	Integer	1. Normal lane 2. Entrance lane 3. Exit lane 4. Connection lane 5. Bus lane 6. Emergency lane 7. Parking lane 8. Emergency parking lane 9. Acceleration lane 10. Deceleration lane 11. Truck escape lane 12. Toll booth lane (manual) 13. Toll booth lane (ETC) 14. Checkpoint lanes 15. U-turn lane 16. Regular reversible lane 17. Tidal lane 18. Non-motorized lanes 19. Straight ahead waiting area lane 20. Turn right waiting area lane 21. Climbing lane 22. Overtaking lanes 23. Intermediate lane 0. Others (Multiple records can be recorded at the same time, separated by ",")	Basic	√
Lane status	Integer	0. Close 1. Open	Basic	√
Turn information	Text type	1. Turn left 2. Go straight 3. Turn right 4. U-turn 5. Straight left 6. Straight right 7. Turn left or right 8. Make a U-turn in a straight line 9. Turn right and make a U-turn 10. Left converging 11. Right converging 12. U-turns are prohibited	Basic	√

		0. Miscellaneous (Multiple records can be recorded at the same time, separated by a half-width "," between attribute values)		
width	Float	Land width (meters).	Basic	√
length	Float	Land length (m).	Basic	√
Limit weight	Float	Limit weight (tons).	Basic	
Limit height	Float	Limit height (m).	Basic	
Limit width	Float	Limit width (m).	Basic	
Limit length	Float	Limit length (m).	Basic	
Maximum speed	Float	Limits the maximum speed (m/s).	Basic	
Minimum speed	Float	Limits the minimum speed (m/s).	Basic	
Limit the axle load	Float	Limit the maximum axle load (tons).	Basic	
Limit information priority	Integer	Record the priority of the restriction information, the high overrides the low priority restriction information, and the newer overwrite the old restriction information	Basic	
Restricted time	Time	Restricted time (buses, lanes, etc.).	Basic	
Restricted vehicles	String	1. Car 2. Heavy trucks 3. Medium-sized trucks 4. Low speed truck 6. Special operation vehicle 7. Light trucks 8. Mini truck 9. Dangerous chemical vehicle 10. Diesel trucks 0. Others (Multiple records can be recorded at the same time, property values separated by ",")	Basic	
Restrict the direction	String	1. Left 2. Straight 3. right 4. U-turn (Multiple attribute values can be recorded at the same time, separated by a ",")	Basic	

Affiliated lane group	String	The unique code of the lane group to which it belongs, separated by ","	Relation	√
Lane mark of left lane in the same direction	Integer	Unique code for left adjacent lane markings in the same direction	Relation	
Lane mark of right lane in the same direction	Integer	Unique code for right adjacent lane markings in the same direction	Relation	
Left facing the reverse lane markings	Integer	Unique code for left adjacent reverse lane markings	Relation	
The right is facing the reverse lane markings	Integer	Unique code for right adjacent reverse lane markings	Relation	
Lane link start node	Integer	Unique code for lane link start node	Relation	√
Lane link end node	Integer	Unique code for lane link end node	Relation	√

Table 9 Lane link node

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Lane link node type	String	1. Road interruption location node 2. Lane type change node 3. Left adjacent lane marking type change node 4. Right adjacent lane marking type change node 5. Lane restriction change node 6. Other change node (Multiple records can be recorded at the same time, and the attribute values are separated by ",")	Basic	√
Associated road intersection	Integer	Road junctions associated with this node	Relation	√

Enter lane	String	Unique code for the enter lane more than one can be recorded at the same time, the values are separated by a ","	Relation	√
Exit lane	String	Unique code for the enter lane more than one can be recorded at the same time, the values are separated by a ","	Relation	√

5.3.3 Attributes structure for service management facilities group

The Service Management Facilities group is used to describe specific information about the various types of management facilities. Based on the specific situation in Hong Kong, the Service Management Facilities Group is divided into three major components, namely car parks, roadside parking lot and toll station, as shown in Figure 8.

The core element is the car park described by the height limit, the number of storeys, the number of parking spaces, the validity of the parking period, the charging status, the current number of remaining spaces, the availability of charging facilities, the drive-in and drive-out lanes, etc., which provides detailed guidance on the strategy for the main vehicle users. While roadside parking includes the name and ID of the road to which it belongs, and its availability. Toll stations are generally located at various intersections and include both manual lanes and ETC lanes. Tables 10-12 give the specific data structure requirements for the three components mentioned above.

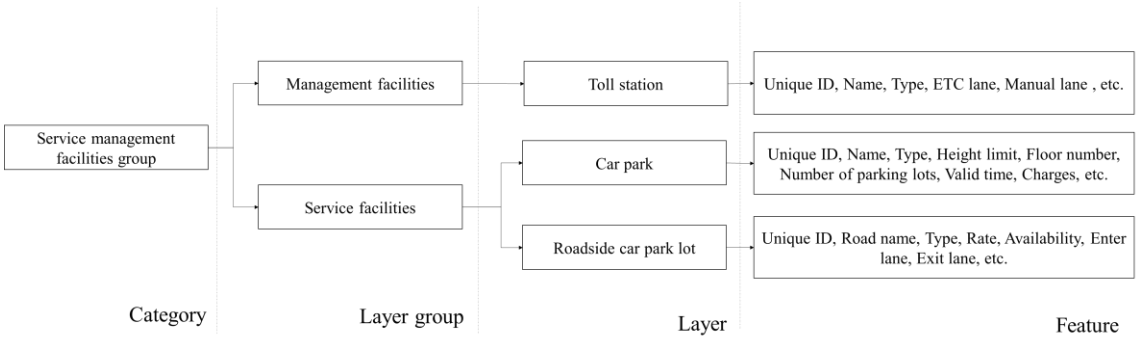


Figure 8 Service management facilities group classification

Table 10 Car park

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for car park	Basic	√
Name	String	Ownership	Basic	
Type	Integer	1. Integrated parking 2. Indoor parking	Basic	√

		3. Outdoor parking 4. Charging station 5. Substation		
Height limit	Float	Restricted height (m)	Basic	√
Floor number	Integer	Floor	Basic	√
Number of parking lots	Integer	Number of parking lots	Basic	√
Valid time	String	Valid time	Basic	
Charges	Integer	1. charge 2. free	Basic	√
Current remaining parking lots	Integer	Remaining parking spaces (0 to the maximum number of parking lots) to the maximum number of parking lots)	Basic	
Charging device	Boolean	0. yes 1. no	Basic	√
Enter lane	String	Associate a collection of unique codes for all enter lanes, filled in the lane code sequence, separated by "," between attribute values	Basic	√
Exit lane	String	Associate a collection of unique codes for all exit lanes, fill in the lane code order, and separate the attribute values from each other by a half-width ","	Basic	√

Table 11 Roadside car park lot

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for roadside car park lot	Basic	√
Road name	String	Name of the road	Basic	√
Type	Integer	1. Smart parking meters 2. General parking meters 3. No parking meters	Basic	√
Rate	Float	Hourly rate	Basic	
Availability	Integer	1. Available 2. In use 3. Out of service	Basic	√
Enter lane	String	Unique code for enter lane	Basic	√
Exit lane	String	Unique code for exit lane	Basic	√

Table 12 Toll station

Name	Data type	Value and description	Basic association properties	Required
Unique ID	Integer	Unique ID for toll station	Basic	√
Name	String	Name of the toll station	Basic	√
Type	Integer	Type of the toll station 1. ETC toll booth 2. Manual toll booth 0. Others		
ETC Lane	String	Associating all ETC lanes unique codes, with "," separating the attribute values	Relation	√
Manual lane	String	Associating all manual lanes unique codes, with "," separating the attribute values	Relation	√

5.3.4 Attributes structure for road safety facilities

The Road Safety Facilities Group is used to describe specific information on the various management facilities that support road safety. It categorises the basic information on the various types of service management facilities. Based on the specific situation in Hong Kong, the Road Safety Facilities Section is divided into 7 layers, as shown in Figure 9. Tables 13-19 provide the specific data structure for the 7 layers.

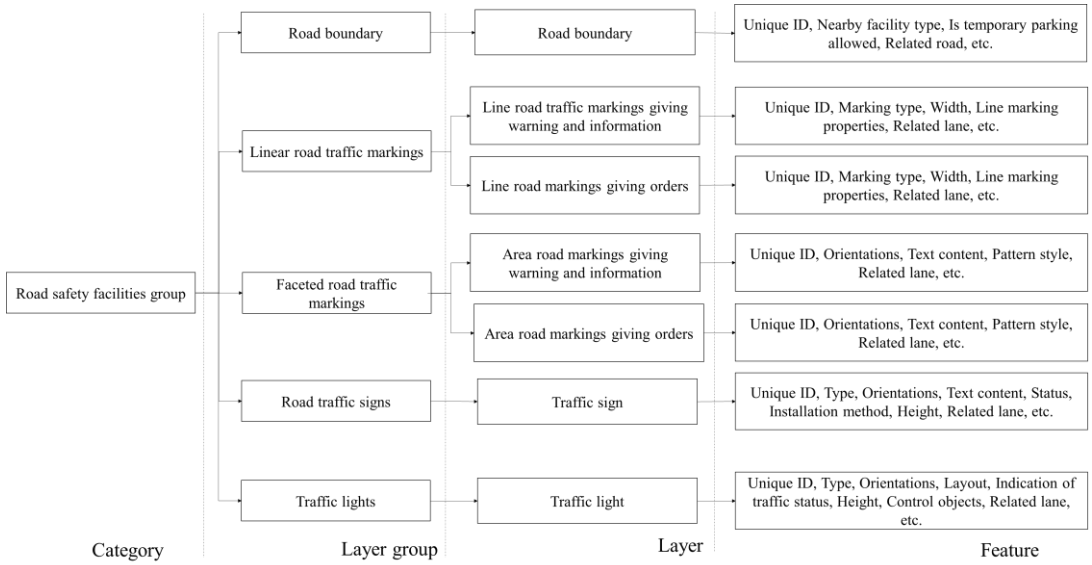


Figure 9 Road safety facilities classification

Table 13 Road boundary

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for road boundary	Basic	√
Nearby facility type	Integer	1. Non-motorized lanes 2. road verge 3. waterfront 0. Others	Basic	√
Is temporary parking allowed	Boolean	0. Yes 1. No	Basic	
Related road	String	Unique ID of related road	Relation	√

Table 14 Line road markings giving warning and information

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for line road marking	Basic	√
Marking type	Integer	1. Lane line 2. Centre line 3. Warning line 4. Warning hatched marking 5. Edge line of carriageway (continuous) 6. Edge line of carriageway (broken) 7. Edge of the road at a junction 8. Edge of the road at a lay-by, passing place or bus stop 9. Transverse yellow bar marking 0. Others See Appendix A1 for details	Basic	√
Width	Float	Width of the mark line (meter)	Basic	
Line marking properties	Integer	1. Dash line 2. Solid line 0. Others	Basic	
Related lane	String	Unique ID of related road	Relation	√

Table 15 Area road markings giving warning and information

Name	data type	Value and description	Relational attributes	Required

Unique ID	Integer	Unique ID for area road marking	Basic	√
Marking type	Integer	1. Kerbside marking at pedestrian crossing 2. Crossing area for pedestrians 3. Remind drivers to get into the appropriate lane 4. Lane information 5. Slow – Hazard ahead 6. Get over to the left/ right 7. Entrance to deceleration lane on the left/ right 8. Bus lane open for vehicles turning left 9. End of bus lane on left/ right, open for all vehicles 10. Marking at end of bus lane 11. Start of the speed limit as shown 12. Bicycles and tricycles only 13. Multi-cycles only 14. Keep clear 15. Give way to buses 0. Others See Appendix A1 for details	Basic	√
Orientations	Double	The starting direction is due north, noted as 0 degrees, clockwise is positive and takes values from 0 degrees to 360 degrees	Basic	
Text content	String	Ground text content	Basic	
Pattern style	Integer	1. Vertical line segments 2. Horizontal line segments 3. Inclined line segments 4. Circles 5. Grid 6. Solid 0. Others	Basic	
Related lane	String	Unique ID of related lane	Relation	√

Table 16 Line road markings giving orders

Name	data type	Value and description	Relational attributes	Required

Unique ID	Integer	Unique ID for line road marking	Basic	√
Marking type	Integer	1. Double white lines 2. Double white lines with hatching 3. Double white lines where the line nearest to driver is solid 4. Double white lines where the line nearest to driver is broken 5. Hatched traffic island marking for two-way traffic 6. Hard shoulder for emergency use only 7. Stop' line at traffic light junction 8. No stopping at any time 9. No stopping at times shown on 'Time plate' 10. No parking at any time or at times shown on 'Time plate' 11. Pedestrian crossing 12. Yellow striped markings at light signal crossing 0. Others See Appendix A2 for details	Basic	√
Width	Float	Width of the mark line (meter)	Basic	
Line marking properties	Integer	1. Dash line 2. Solid line 0. Others	Basic	
Related lane	String	Unique ID of related lane	Relation	√

Table 17 Area road markings giving orders

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for area road marking	Basic	√
Marking type	Integer	1. Merging chevron marking 2. Diverging chevron marking 3. Start of bus lane marking with time shown	Basic	√

4. Light rail vehicle only lane
5. 'Stop' lines and markings at 'Stop' priority junction
6. 'Give way' lines and warning marking at 'Give way' priority junction
7. Stop' line at traffic light junction
8. Ahead only in this lane
9. Turn left in this lane
10. Turn right in this lane
11. Ahead or turn left in this lane
12. Ahead or turn right in this lane
13. Turn left or right in this lane
14. Ahead, turn left or turn right in this lane
15. Parking space marked with lines
16. Parking space marked with road studs
17. Parking space for disabled person with parking permit only
18. Zebra crossing including its "Give way" lines and zebra controlled areas (marked with zigzag lines) markings
19. Box junction marking – do not enter unless exit is clear
20. Tram and North-west Railway crossing box marking – do not enter unless exit is clear
21. No parking on yellow hatched area
22. Bus stop area marked with lines
23. Public light bus stand or taxi stand
24. Light rail stop

		25. Tram stop (stop and give way to pedestrians crossing to or from tram) 26. Buses only 27. Trams only 28. Light rail vehicles only 29. Taxi pick up and drop off only 30. "Auto-toll" lane guide Mark 0. Others See Appendix A2 for details		
Orientations	Double	The starting direction is north, noted as 0 degrees, clockwise is positive and takes values from 0 degrees to 360 degrees	Basic	
Text content	String	Ground text content	Basic	
Pattern style	Integer	1. Vertical line segments 2. horizontal line segments 3. inclined line segments 4. circles 5. grid 6. solid 0. Others	Basic	
Related lane	String	Unique ID of related lane	Relation	√

Table 18 Traffic sign

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for area road marking	Basic	√
Type	Integer	1. Signs give orders, see Appendix B1 for details 2. Signs give warnings, see Appendix B2 for details 3. Signs give directions or information, see Appendix B3 for details 4. Prohibitory sign 5. Mandatory sign 6. Hazards ahead signs 7. Warning sign with supplementary plate 8. Other signs	Basic	√

Orientations	Double	The starting direction is due north, noted as 0 degrees, clockwise is positive and takes values from 0 degrees to 360 degrees	Basic
Text content	String	Text content on the sign	Basic
Status	Integer	1. Permanent 2. Temporary	Basic
Installation method	Integer	1. Portal bracing 2. Single hanging 3. Double hanging 4. Attaching 0. Others	Basic
Height	Float	Distance of the lower edge of the sign from the ground	Basic
Related lane	String	Unique ID of related lane, attribute value separated by ‘,’	Relation

Table 19 Traffic light

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique ID for area road marking	Basic	√
Type	Integer	1. Traffic light for drivers, see Appendix C1 for details 2. Traffic lights for pedestrians, see Appendix C3 for details 3. Lane signals, see Appendix C2 for details	Basic	√
Orientations	Double	The starting direction is due north, noted as 0 degrees, clockwise is positive and takes values from 0 degrees to 360 degrees	Basic	
Layout	Integer	1. Horizontal combination of 2 lights 2. Vertical combination of 2 lights 3. Horizontal combination of 3 lights 4. Vertical combination of 3 lights 5. Single light 0. Others	Basic	√

Indication of traffic status	String	1. Go straight 2. Turn left 3. Turn right 4. U-turn 5. Stop 0. Miscellaneous Multiple records can be recorded at the same time, separated by a half-width "," between attribute values	Basic	√
Height	Float	Distance of the lower edge of the light plate from the ground	Basic	
Control objects	Integer	1. Vehicles 2. Rail vehicles 3. Pedestrians 0. Others	Basic	
Related lane	String	Unique ID of related lane, attribute value separated by ‘,’	Relation	

5.3.5 Attributes structure of other road facilities

Other road facilities group contains the four remaining layers: smart devices, support structures, linear auxiliaries, and faceted auxiliaries. Based on the geometric form and function of the features, the features belonging to each layer are defined in Table 20-30.

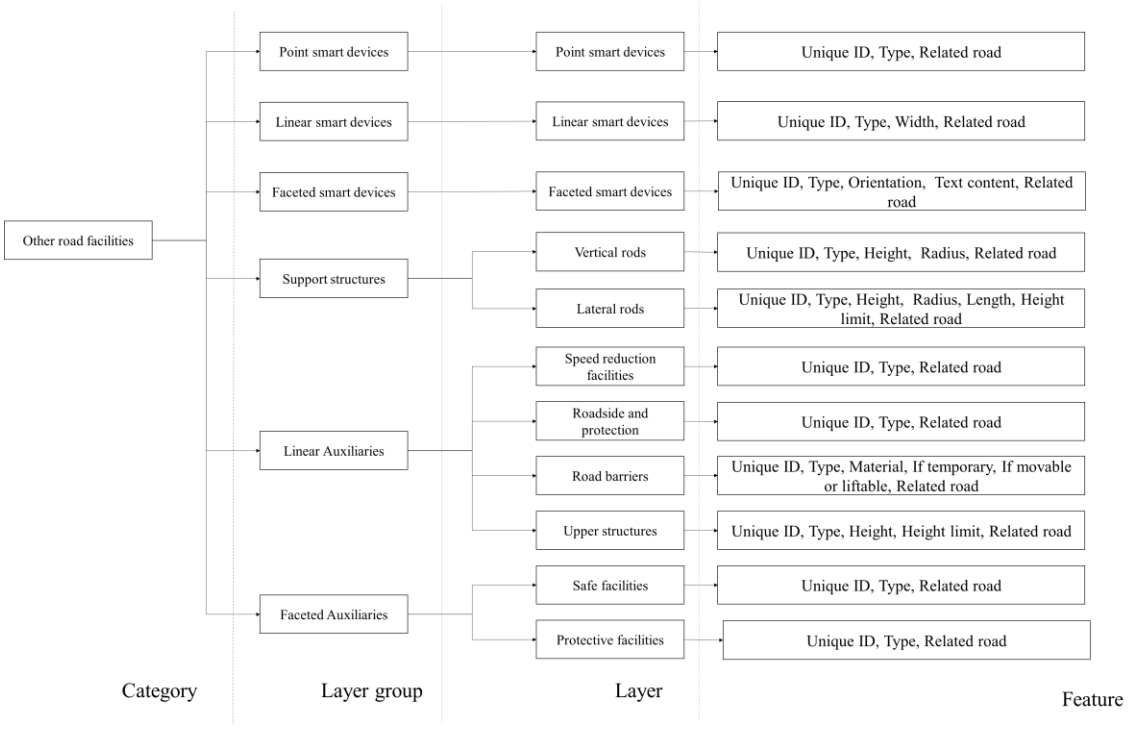


Figure 10 Other road facilities classification

Table 20 Point smart device

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	See appendix D	Basic	√
Related road	String	Unique ID of the road reference line, with "," separating the attribute values	Relation	√

Table 21 Linear smart device

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Common dowel bar 2. Solar dowel bar 3. Active dowel bar 4. Wireless dowel bar 5. Lighting facilities 6. Others	Basic	√
Width	Float	Width of the device (meter)	Basic	√
Related road	String	Unique ID of the road reference line, with "," separating the attribute values	Relation	√

Table 22 Faceted smart device

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Traffic information display equipment 2. Emergency phone booths 3. Intelligent street lights	Basic	√
Orientations	Double	The starting direction is due north, noted as 0 degrees, clockwise is positive and takes values from 0 degrees to 360 degrees	Basic	
Text content	String	Information provided by the device	Basic	

Related road	String	Unique ID of the road reference line, with "," separating the attribute values	Relation	√

Table 23 Vertical rods

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	See appendix E	Basic	√
Height	Float	Height from the top to the bottom of the main body of the pole (meter)	Basic	
Radius	Double	Maximum radius of the outer circle at the base (meter)	Basic	
Related road	String	Unique ID of the road reference line	Relation	√

Table 24 Lateral rods

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Gantry pole crossbars 2. Wire pole crossbars 0. Others	Basic	√
Height	Float	Height from the top to the bottom of the main body of the pole (meter)	Basic	
Radius	Double	Maximum radius of the outer circle at the base (meter)	Basic	
Length	Double	Length of the bar (meter)	Basic	
Height limit	Double	Height limit of the cross bar	Basic	
Related road	String	Unique ID of the road reference line	Relation	√

Table 25 Speed reduction facility

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Speed ramp 2. Road speed bump	Basic	√

		3. Others		
Related road	String	Unique ID of the road reference line	Relation	√

Table 26 Roadside and protection

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	See appendix F	Basic	√
Related road	String	Unique ID of the road reference line	Relation	√

Table 27 Road barriers

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	See appendix G	Basic	√
Material	Integer	1. Plastic 2. Metals 3. Polymeric materials 0. Other	Basic	
If temporary	Boolean	0: No 1: Yes	Basic	√
If movable or liftable	Boolean	0: No 1: Yes	Basic	
Related road	String	Unique ID of the road reference line	Relation	√

Table 28 Upper structures

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Separate overpass 2. Others	Basic	√
Height	Float	Height from the top to the bottom of the main body of the structure	Basic	√
Height limit	Double	Height limit of the structure	Basic	√
Related road	String	Unique ID of the road reference line, with "," separating the attribute values	Relation	√

Table 29 Safe facilities

Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Fire box 2. Convex mirror 3. Others	Basic	√
Related road	String	Unique ID of the road reference line	Relation	√

Table 30 Protective facilities

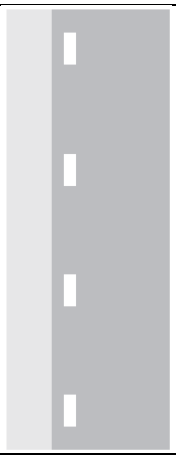
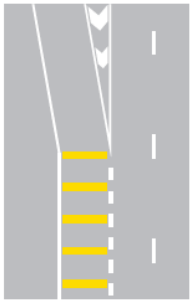
Name	data type	Value and description	Relational attributes	Required
Unique ID	Integer	Unique identification code	Basic	√
Type	Integer	1. Anti-collision strip 2. Others	Basic	√
Related road	String	Unique ID of the road reference line	Relation	√

Appendix

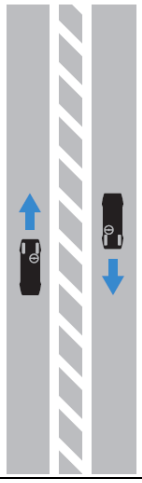
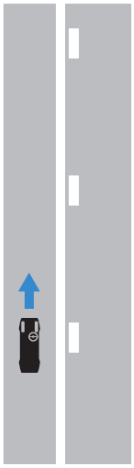
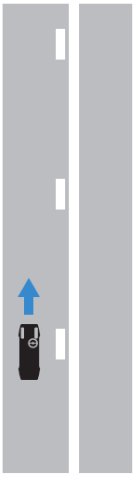
A Road markings

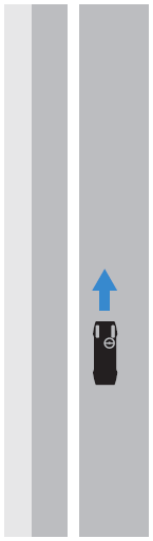
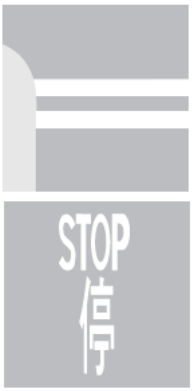
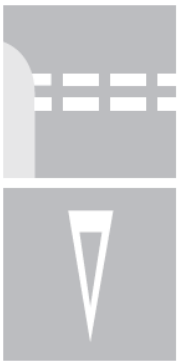
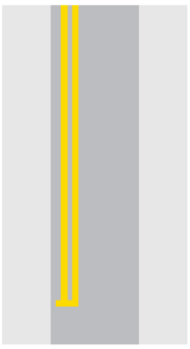
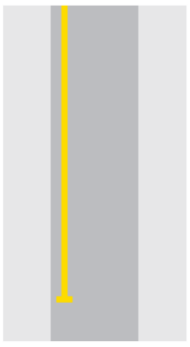
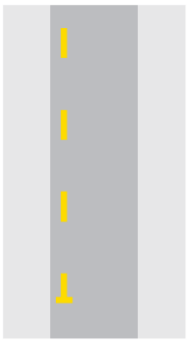
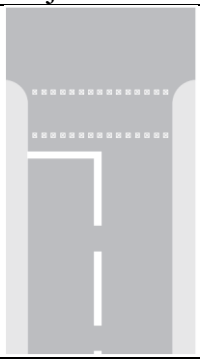
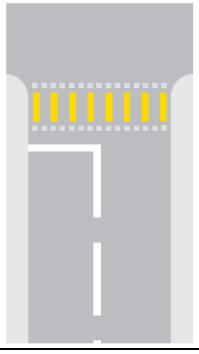
A1 Road markings giving warning and information

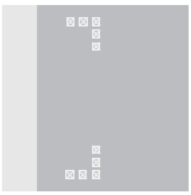
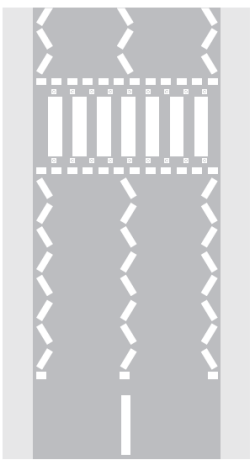
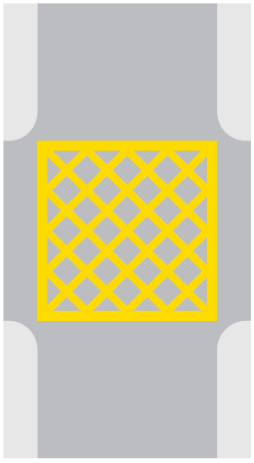
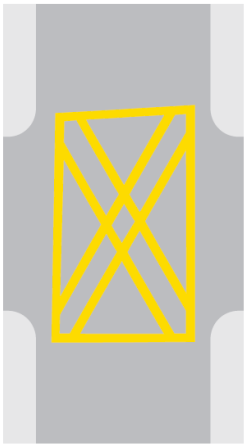
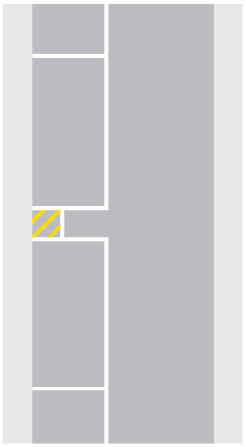
				
Lane line Line dividing traffic lanes	Centre line Line dividing two-way traffic	Warning line Replace lane or centre line near a hazard	Warning hatched marking	Edge line of carriageway (continuous)

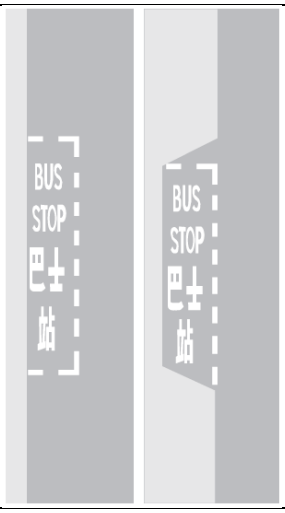
				
Edge line of carriageway (broken)	Edge of the road at a junction	Edge of the road at a lay-by, passing place or bus stop	Transverse yellow bar marking Reduce speed in approaching exit to slip road / roundabout/ toll plaza	Kerbside marking at pedestrian crossing Indicate to pedestrians direction looking for approaching traffic
				
Crossing area for pedestrians	Remind drivers to get into the appropriate lane	Lane information	Slow – Hazard ahead	Get over to the left (right if marking reversed)
				
Entrance to deceleration lane on the left (right if marking reversed)	Bus lane open for vehicles turning left	End of bus lane on left, open for all vehicles (right of marking reversed)	Marking at end of bus lane	Start of the speed limit as shown

A2 Road markings giving orders

			
Double white lines Do not cross or drive on	Double white lines with hatching Do not cross or enter hatched area	Double white lines where the line nearest to you is solid Do not cross or drive on	Double white lines where the line nearest to you is broken May cross to overtake
			
Merging chevron marking Do not cross or enter hatched area	Diverging chevron marking Do not cross or enter hatched area	Hatched traffic island marking for two-way traffic Do not cross or enter hatched area	Start of bus lane marking with time period shown

			
Light rail vehicle only lane	Hard shoulder for emergency use only	'Stop' line at traffic light junction	'Stop' lines and markings at 'Stop' priority junction
			
'Give way' lines and warning marking at 'Give way' priority junction	No stopping at any time	No stopping at times shown on 'Time plate'	No parking at any time or at times shown on 'Time plate'
			
Pedestrian crossing	Yellow striped markings at light signal crossing	Ahead only in this lane	Turn left in this lane

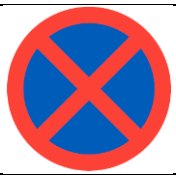
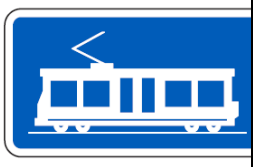
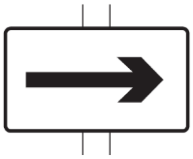
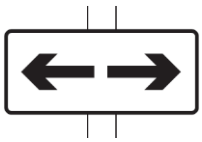
	(no stopping of vehicles over the markings)		
			
Turn right in this lane	Ahead or turn left in this lane	Ahead or turn right in this lane	Turn left or right in this lane
			
Ahead, turn left or tur right in this lane	Parking space marked with lines	Parking space marked with road studs	Parking space for disabled person with parking permit only
			
Zebra crossing including its ‘Give way’ lines and zebra controlled areas (marked with zigzag lines) markings	Box junction marking – do not enter unless exit is clear	Tram and North-west Railway crossing box marking – do not enter unless exit is clear	No parking on yellow hatched area

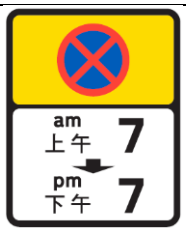
			
Bus stop area marked with lines	Public light bus stand or taxi stand	Light rail stop	Tram stop (stop and give way to pedestrians crossing to or from tram)
			
Buses only	Trams only	Light rail vehicles only	Taxi pick up and drop off only
			
‘Autotoll lane’ guide mark			

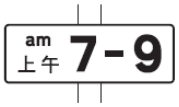
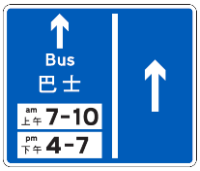
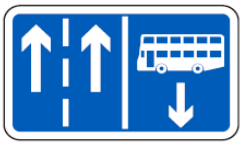
B Traffic sign

B1 Signs giving orders

Signs giving orders includes prohibitory sign and mandatory sign. A prohibitory sign means that something must not be done. It usually has a red border. A mandatory sign means that something must be done. It is usually blue in colour. The following table lists all signs giving orders, without distinguishing between the mandatory sign and the prohibitory sign.

				
1. Give way to traffic on major road	2. Stop and give way	3. No stopping	4. No parking	5. No entry for all vehicles
				
6. Ahead only	7. Keep left (keep right if symbol reversed)	8. Turn left (turn right if symbol reversed)	9. Turn left at junction ahead (turn right if symbol reversed)	10. One way traffic
				
11. Vehicles must stop at the sign (sign used by police)	12. Vehicles must stop at the sign (sign used by school crossing patrol)	13. No lane changing	14. Segregated pedestrian and bicycle/tricycle route. No motor vehicles	15. Bicycle/ tricycle route. No motor vehicles
				
16. Segregated pedestrian route and multi-cycle ground. No motor vehicles	17. Multicycle ground. No motor vehicles	18. Cycling restriction – cyclists must dismount and push their cycles	19. End of cycling restriction	20. Light rail vehicles and trams only
				
21. Dual carriageway ahead	22. Direction in which the prohibition or Restriction applies (symbol may be reversed)	23. Prohibition or restriction applies in both directions	24. Prohibition or Mandatory order applies to vehicle class shown	25. One way road ahead

				
26. No stopping during time shown	27. End of 'no stopping' restriction	28. No stopping for public light buses during time shown	29. End of public light buses 'no stopping' restriction	30. Restriction does not apply to vehicle classes shown to pick up or drop off passengers (wording may be varied to loading/ unloading goods)
				
31. Pedestrian priority zone	32. Vehicles prohibited as indicated by supplementary plate	33. No motor vehicles	34. No motor vehicles except motorcycles and motor tricycles	35. No motorcycles and motor tricycles
				
36. No buses and coaches	37. No public light buses	38. No goods vehicles	39. No motor vehicles driven by learner drivers	40. No left-turn (No right-turn if symbol reversed)
				
41. No U-turn	42. No pedestrians	43. No pedestrians, pedestrian controlled vehicles, bicycles, and tricycles	44. No bicycles and tricycles	45. No use of horn
				
46. No overtaking	47. No vehicles over width shown (including load)	48. No vehicles or combinations of vehicles over	49. No vehicles over height shown (including load)	50. No vehicles over gross vehicle weight shown (including load)

		length shown (including load)		
				
51. No vehicles over axle weight shown (including load)	52. Speed limit (in km/h)	53. Variable speed limit (in km/h)	54. Prohibition does not apply to vehicles gaining access to premises adjacent to the road	55. Prohibition or mandatory order applies to vehicles over the length shown
				
56. Prohibition or mandatory order applies to goods vehicles over the gross vehicle weight shown	57. Prohibition or mandatory order does not apply to vehicle classes shown	58. Time plate	59. Day plate	60. Time and day plate
				
61. Length over which the prohibition or hazard exists	62. End of the prohibition, restriction or warning	63. Left lane shows bus lane for franchised buses only during the time shown	64. Left lane shows bus lane for franchised and other buses during the time shown	65. Contraflow bus lane for franchised buses only
				
66. End of bus lane	67. End of tram only lane	68. End of rail only lane for light rail vehicles	69. No wind susceptible vehicles (vehicles with an overall height exceeding 1.6m, motorcycles and motor tricycles)	70. Sign marking start of tunnel area
				

71. Sign marking end of tunnel area	72. No vehicles carrying dangerous goods of specified categories	73. Sign when used with Sign 72 to indicate the categories of dangerous goods	74. Parking place for specified vehicle class or type shown on sign	75. Parking place for vehicles other than medium and heavy goods vehicles, buses, coaches, motorcycles, and pedal cycles
				
76. Parking place for goods vehicles only	77. Parking place for buses and coaches only	78. Parking place for motorcycles only	79. Parking place for pedal cycles only	80. Start and continuation of an expressway
				
81. End of an expressway	82. Taxi stand	83. Urban taxi stand used with Sign 82	84. New Territories taxi stand, used with Sign 82	85. Lantau taxi stand, used with Sign 82
				
86. Cross-harbour taxi stand, used with Sign 82	87. End of New Territories taxis operating area	88. End of Lantau taxis operating area	89. Green minibus stop	90. Green minibus stand
				
91. Red minibus stop	92. Red minibus stand	93. Vehicle must keep left except when overtaking	94. Time plate for taxi stand and taxis parking at other times	95. Time plate for public light bus stand and public light buses parking at other times
				
96. Hard shoulder – do not use except in an emergency	97. Lay-by, use in an emergency	98. Cyclists must dismount and use crossing to cross	99. Way out for vehicles	100. No exit for vehicles

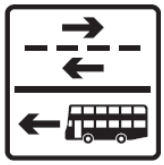
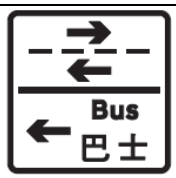
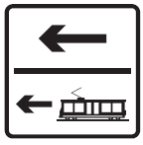
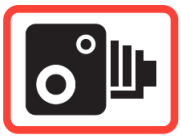
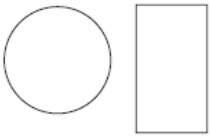
		the road		
				
101. Way in for vehicles	102. No entry for vehicles	103. Autotoll booth	104. Autotoll traffic lane	

B2 Signs giving warning

These signs give warning of hazards ahead. Most of them are triangular, with the apex at the top. They are sometimes supplemented by rectangular plates giving additional information as may be necessary.

			
1. Stop or give way ahead	2. Distance to ‘Give way’ line, used with Sign 1	3. Distance to ‘Stop’ line, used with Sign 1	4. Bend to left ahead (right if symbol reversed)
			
5. Left bend sign with ‘reduce speed now’ (right if symbol reversed)	6. Double bend ahead first to right (symbol may be reversed)	7. Dual carriageway ends ahead	8. Roundabout ahead
			
9. Road narrows on right ahead (left if symbol reversed)	10. Road narrows on both sides ahead	11. Reduce speed now	12. Lowering of speed limit to that shown ahead
			

13. Sharp deviation of route to left (right if symbol reversed)	14. Traffic signals ahead	15. Steep hill upwards ahead	16. Steep hill downwards ahead
			
17. Use low gear	18. Use low gear for distance shown	19. Keep in low gear	20. Single file traffic ahead
			
21. Cyclists to keep left	22. Cyclists to walk on steep road	23. Traffic accident blackspot ahead	24. Pedestrian accident Blackspot ahead
			
25. Cross roads ahead	26. Staggered junction ahead (symbol may be reversed)	27. Side road to right ahead (left if symbol reversed)	28. T-junction ahead (Symbol may be reversed)
			
29. Traffic merging from left	30. Merging into main traffic on right	31. Slip road traffic merging from left	32. Merging into main traffic on right
(Symbol may be reversed)		Merging traffic from slip road should give priority to main traffic on expressway (blue colour for trunk roads)	
			
33. Overhead electric cable ahead	34. Disabled persons ahead	35. Level crossing with barrier ahead	36. Quayside or river bank ahead
			
37. Restricted headroom ahead	38. Pedestrian crossing ahead	39. Children ahead	40. Risk of falling or fallen rocks ahead

			
41. Horses ahead	42. Cattle ahead	43. Fog or mist ahead	44. Bus lane ahead (Franchised buses)
			
45. Bus lane ahead (All buses)	46. Bus lane (Franchised buses) on major road ahead	47. Bus lane (All buses) on major road ahead	48. Warning to pedestrians crossing road with bus lane
			
49. Light rail vehicles or trams ahead	50. Light rail vehicle lane or tram lane ahead	51. Light rail vehicle lane or tram lane on major road ahead	52. Pedestrians on or crossing road ahead
			
53. Cycleway ahead (cyclists on or crossing road ahead)	54. Cyclists ahead	55. Uneven road surface ahead	56. Road hump ahead
			
57. Two-way traffic across a one-way road ahead	58. Two-way traffic ahead	59. Red light/speed camera ahead	60. Red light camera control zone
			
61. Plate used with Sign 33 to state the safe height	62. School ahead, plate used with Sign 39	63. Playground ahead, plate used with Sign 39	64. Distance as shown to hazard
			

65. Red-on the left edge of a road	66. White-on the right edge of a single carriageway	67. Amber-on the right edge of the central reservation of a dual carriageway	
(Hazard markers - facing drivers to indicate the edge of a carriageway or an obstruction near that edge)			

B3 Signs giving directions or information

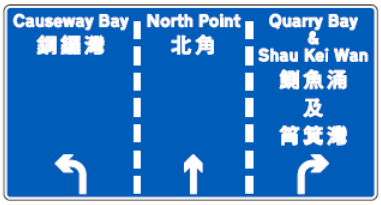
- Signs giving directions

Direction signs guide users to their destination. All important traffic routes have direction signs, most are blue with a white border, but signs on expressways are green.

Most strategic trunk roads have route numbers shown on shields on direction signs, which enable motorists to quickly find the most convenient and direct route from one district to another.

Direction signs are normally provided on the approach to and at junctions. Those on the approach to junctions are ‘advance direction signs’.

		
A simple advance direction sign showing the destinations.	The advance direction signs may also show a simple map of the junction layout – the more important the road from the junction, the thicker the line on the sign.	
		
Advance direction signs for a roundabout showing the exit arrangement. Exit to expressway or local destination	At multilevel junctions on roads with faster traffic, information about the junction is usually given at least 500m in advance and repeated at the beginning of the deceleration lane.	

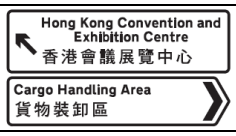
is shown in green or white background respectively.	
	 
Advance direction signs may also give advance indications of prohibitions or warning of dangers ahead.	Lane information may also be given on an advance direction sign or marked on the road.

- Signs giving information

These signs normally give road users information or guidance about the route and about places and facilities of particular value or interest. Most informatory signs are rectangular in shape but signs giving route directions at a junction usually have one end pointed.

Advance direction signs and direction signs normally have a blue background but on expressways, they are green. When the signs are for local destinations or temporary diversions, they have a white or yellow background respectively.

	
On busy roads, signs may be placed on gantries above the roads. (The panel on the right indicates the lane to Sha Tin through a road tunnel.) The arrow below the destinations points to the lane for these destinations, and you should select your destination and get in appropriate lane.	Symbols for the three cross-harbour tunnels are marked with E, C and W to indicate the directions to the Eastern Harbour Crossing, Cross-Harbour Tunnel and Western Harbour Crossing respectively. The arrow below the destinations points to the lane for these destinations, and you should select your destination and get in appropriate lane. The middle two lanes can equally lead you to all destinations shown in the middle panel.

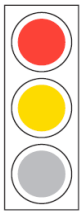
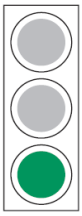
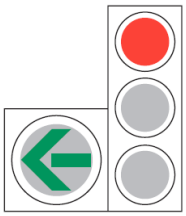
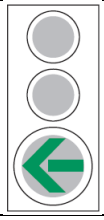
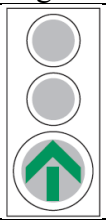
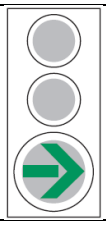
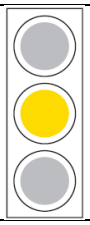
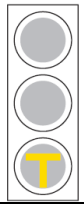
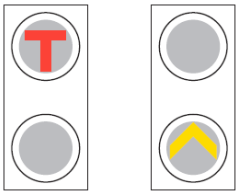
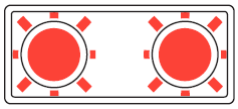
			
Chainage marker to give position along strategic routes	Direction sign showing exit number along strategic route	Direction sign showing destination and its associated exit number along strategic route	Direction sign to expressway. Destination, route number and expressway logo are shown.
			
Direction sign for local destination (black on white background)	Pointed direction sign at junction marks the turn to the destination shown	Route number along Strategic route	Continuation of expressway with route number
			
Urban taxi pick up and drop off only	New Territories taxi pick up and drop off only	Lantau taxi pick up and drop off only	Give way to buses
			
Direction to parking place	Direction to airport	Direction to nearby hospital with accident and emergency services	Route for cyclists
			
Route for pedestrians	Direction to hillside escalators	Direction to Mass Transit Railway (MTR) Station	Direction to subway

			
An international symbol of accessibility may appear on signs to indicate suitable routes or entrances to facilities for the disabled	Carriageway narrows on right (background in green if on expressway)	No through road	No through road on left
	 300m	 200m	 100m
No through road on right	Countdown markers used to indicate the distance to an exit on the left side of a road (Background in green if on expressway) (Symbols may be reversed to indicate exit on right)		
			
Sign showing lane indication arrows for each lane or temporary lane closure at junction ahead	Start of dual carriageway ahead	Place for temporary stopping of vehicle to allow others to pass	Sign at start of single track road
			
Private road	For use by police at accident site	Prepare to stop if signaled to do so	Stop at ‘Census point’

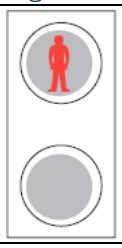
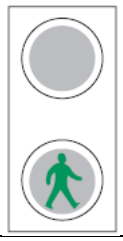
			
Census point	Advance warning of a need for lane selection		

C Traffic light

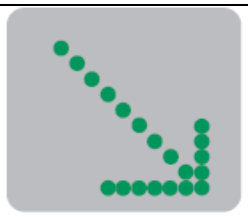
C1 Traffic lights for drivers and cyclists

			
Stop behind the ‘Stop’ line	Stop behind the ‘Stop’ line and prepare to start when green light shows	Go if way is clear	Go but only in the direction of the left arrow
			
Go, but turn left only	Go, but ahead only	Go, but turn right only	Stop behind the ‘Stop’ line unless unsafe to do so
			
Traffic light signal for trams only	Traffic light signal for light rail vehicles only	Stop behind the signals, when flashing alternately	

C3 Traffic lights for pedestrian

		
Do not cross	Cross with care	Do not start to cross

C2 Lane signals

			
Do not proceed beyond the signal in this lane	Proceed in this lane if it is safe to do so	Change lanes to left	Change lanes to right
			
Leave expressway at next exit on the left ahead	Leave expressway at next exit on the right ahead	Do not proceed beyond the signal in this lane	Warning signal – slow down and prepare to stop
			
Proceed in this lane if it is safe to do so	Drive with caution and prepare to change lanes or stop	No wind susceptible vehicles (vehicles with an overall height exceeding 1.6m in height, motor cycles and motor tricycles)	

D Feature type of point smart service

Microwave vehicle detector

Geomagnetic vehicle detector

Coil vehicle detector

Video vehicle detector

Integrated traffic event video detector

Traffic weather environmental monitoring equipment

Vehicle intelligence monitoring and recording equipment

Automatic red light recording device

Automatic recording device for violation of prohibition of traffic regulations

Speedometer for motor vehicles

Speed measuring equipment for motor vehicles

Traffic safety violation evidence collection equipment

Traffic signal control equipment

Traffic safety warning equipment

E Feature type of vertical rods object

1. Street light poles
2. Traffic light poles
3. Traffic sign poles
4. Billboard poles
5. Gantry poles
6. Intelligent equipment poles
7. Wire poles vertical poles
8. Height limit poles
9. Bridge piers

F Feature type of roadside and protection

1. Road edge
2. Side ditches
3. Tunnel sidewalls
4. Slopes
5. Mountains
6. Retaining walls
7. Green belts

8. Acoustic barriers
9. Anti-drop fences
10. Concrete bollards
11. Corrugated parapets
12. Rope guardrail
13. Concrete parapets
14. Metal parapets for bridges
15. Traffic dividers
16. Barriers
17. Movable parapets
18. Construction barriers
19. Roadway baselines

G Feature type of road barriers

1. Stone piers
2. Lifting columns
3. Warning posts
4. Road cones
5. Water safety barriers

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