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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 42517.1-2023

**Intelligent transportation systems - Intelligent driving electronic
road data model and expression specification - Part 1:
Controlled access road**

智能运输系统 智能驾驶电子道路图数据模型与表达 第1部分：封闭道路

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Table of Contents

3 Introduction...	4
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	5
4 Framework data model...	6
4.1 Element model...	6
4.2 Coordinate frame system...	8
4.3 Accuracy...	9
4.4 Range of expression...	10
4.5 Expression of general attributes of roads...	10
5 Roads and lanes...	11
5.1 Road data model and expression...	11
5.2 Lane data model and expression...	16
5.3 Junction data model and expression...	29
6 Road facilities...	31
6.1 Road traffic signs...	31
6.2 Roadside traffic facilities...	35
6.3 Road traffic markings...	40
6.4 Traffic lights...	42
6.5 Speed bumps...	45
6.6 Toll booths...	47
6.7 Checkpoints...	49
6.8 Upper obstacle...	50
6.9 Roadside structures...	51
6.10 Pole-like objects...	53
6.11 Gantry...	55
6.12 Tunnel...	56

1 Scope

GB/T 42517.1-2023 defines the map an automated vehicle drives on. A high-definition map for intelligent driving is not a navigation map with more detail: it is a model in which lanes

are objects with geometry, boundaries, connectivity and rules, accurate to centimetres, because the vehicle localises itself against it and plans within it. Whether two suppliers' maps can be used interchangeably, and whether a vehicle can cross from one map provider's coverage to another's, depends entirely on the data model being the same. This part specifies the framework data model for controlled access roads within the electronic road data model for intelligent driving, together with the data model and expression of roads, lanes and roadside facilities. Controlled access roads - motorways and expressways - come first for good reason: they are the environment where automated driving is deployed earliest, having no pedestrians, no intersections and predictable geometry. It applies to the production and application of such maps. Under intelligent transport systems, it is written for map providers, for automated driving developers, and for the road authorities whose infrastructure data feeds it.

This document specifies the framework data model of controlled access roads in the electronic road data model for intelligent driving, the data model and expression of roads and lanes, road facilities. This document is applicable to the production and application of intelligent driving electronic road data models, which use controlled access roads as the main scene.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, for dated references, only the version corresponding to the date applies to this document; for undated references, the latest version (including all amendments) applies to this document.

GB/T 20267-2006 Criterion of digital map production for automotive navigation system

GB/T 35645-2017 Framework data exchange format for navigation electronic map

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Road reference line In the intelligent driving electronic road data model, the vector geometric line segment representing the road AND is drawn along the road according to the rules, which is composed of three-dimensional polylines in space.

3.2 Virtual road reference line It is a vector line segment, that connects two road reference lines, does not represent the actual road segment, but is only used to maintain the topological relationship between the road reference lines.

3.3 Pole-like objects The general term for upright rod-shaped objects, such as columns, used to support traffic signs, street lights, traffic lights, gantry and other traffic facilities, as well as billboard support columns.

3.4 Controlled access road An access road, which is specially designed for motor vehicles to drive in different directions and lanes, where the access is controlled.

3.5 Non-controlled access road A road for mixed driving of motor vehicles and non-motor vehicles.

4.1 Element model

4.1.1 Overview The element model in the electronic road data model for intelligent driving shall comply with the provisions of

4.1.1 in GB/T 35645-2017. It is composed of four aspects: element, attribute, geometry, relationship, as shown in Figure 1. The main characteristics of elements and their relationships are as follows:

- a) Each element has spatial geometric information, has one or more attributes, can establish a relationship with one or more other elements. According to the abstract level and complexity of elements, elements can be divided into simple elements and complex elements. According to the functions and characteristics of the elements in the real road traffic network, they are divided into different element themes and element classes.
- b) Geometry is generally divided into points, lines, surfaces, volumes. It is generally expressed as three-dimensional point coordinates or coordinate sequences, in the Figure 26 -- Data model of roadside traffic facilities

6.2.2 Attributes of roadside traffic facilities

6.2.2.1 Categories of facilities Roadside traffic facilities shall include the following categories:

- c) Tunnel walls;
- e) Concrete piers;
- f) protective net;
- g) Soundproof walls;
- h) Normal New Jersey guardrail;
- i) Single-tube New Jersey guardrail;
- j) Multi-tube New Jersey guardrail;
- k) Wave guardrail;
- m) Beam-column bridge guardrail;
- n) Mesh guardrail;

o) Tubular movable guardrail;

6.2.2.2 Materials The material categories of roadside traffic facilities is as follows:

e) Soil and plastic;

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