

Parking dimension. Parking key performance characteristics

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Sustainable Transportation within the Framework of Green Deal - SPHERE

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Introduction

Parking facilities are essential components of transportation systems and urban infrastructure. Every private vehicle requires a parking space at both the origin and destination of a trip. Therefore, the design of parking facilities directly influences traffic efficiency, road safety, land use, accessibility, and user convenience.

Proper parking design requires two important considerations:

1. **Parking dimensions**, which determine the size and layout of parking spaces, aisles, ramps, and access points.
2. **Parking performance characteristics**, which evaluate how efficiently a parking facility is being used.

Transportation engineers and urban planners use established standards and performance indicators to design parking facilities that are safe, efficient, economical, and environmentally sustainable. Parking areas should provide adequate space for vehicles to enter, park, and exit comfortably while maximizing land use and minimizing traffic conflicts.

This lecture introduces the principles of parking dimensions, explains design standards, and discusses the key performance characteristics used to evaluate parking facilities.



Parking Dimensions

Definition

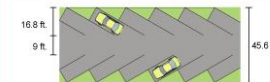
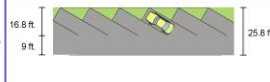
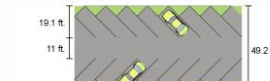
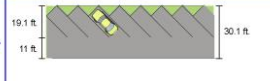
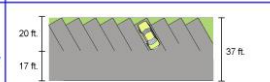
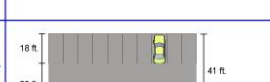
Parking dimensions refer to the **physical measurements and layout specifications of parking facilities**, including parking spaces, drive aisles, entrances, exits, ramps, and circulation areas.

Proper dimensions ensure that vehicles can:

- Enter safely.
- Park conveniently.
- Exit without difficulty.
- Avoid collisions with other vehicles or pedestrians.

Parking dimensions are generally determined by:

- Vehicle size.
- Parking angle.
- Traffic circulation.
- Local building regulations.
- Accessibility requirements.
- Type of land use.

Double row	Single row
	
	
	
	

Standard Parking Space Dimensions

Although standards vary slightly by country, typical dimensions for passenger vehicles are as follows.

A. Standard Parking Space

Typical dimensions:

- Width: **2.4–2.7 meters**
- Length: **4.8–5.5 meters**

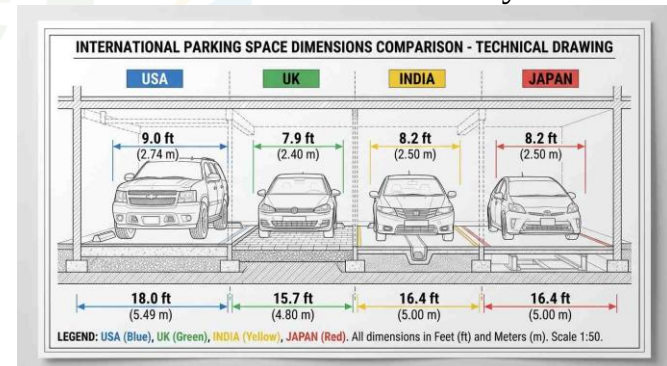
These dimensions accommodate most passenger cars while allowing drivers to enter and exit comfortably.

B. Compact Car Space

Typical dimensions:

- Width: **2.3 meters**
- Length: **4.5 meters**

Compact spaces save land and are suitable for smaller vehicles.



Parking Angles

The parking angle affects parking capacity, maneuverability, and traffic flow.

A. Parallel Parking (0°)

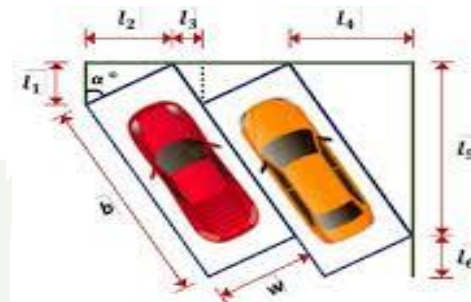
Vehicles park parallel to the roadway.

Advantages

- Requires minimal road width.
- Suitable for urban streets.

Disadvantages

- Difficult maneuvering.
- Lower parking capacity.



b = Length of the parking space

w = Width of the parking space

α = Parking angle

$$l_1 = w \cdot \cos(\alpha); l_2 = w \cdot \sin(\alpha)$$

$$l_3 = x_1 \cdot \cot(\alpha); l_4 = b \cdot \cos(\alpha)$$

$$l_5 = b \cdot \sin(\alpha); l_6 = w \cdot \cos(\alpha)$$

Drive Aisle Dimensions

Drive aisles allow vehicles to circulate safely within the parking facility.

Typical widths include:

Parking Angle	Recommended Drive Aisle Width
Parallel	3.0–3.5 m
45°	3.5–4.0 m
60°	5.0–5.5 m
90° (One-way)	6.0 m
90° (Two-way)	7.0–7.5 m

Parking Layout Design Considerations

Effective parking facilities should provide:

Safe circulation

Clearly defined traffic flow with minimal conflict points.

Visibility

Drivers should have unobstructed views of:

- Pedestrians.
- Other vehicles.
- Entrances and exits.

Pedestrian Safety

Design should include:

- Sidewalks.
- Crosswalks.
- Protective barriers.
- Adequate lighting.

Drainage

Proper drainage prevents water accumulation and pavement damage.

Lighting

Good lighting improves:

- Security.
- Driver visibility.
- Pedestrian safety.

Modern Trends in Parking Design

Contemporary parking facilities increasingly incorporate:

- Smart parking sensors.
- Automated parking systems.
- Electric vehicle charging stations.
- Solar-powered parking structures.
- Green parking lots with permeable pavement.
- Mobile parking reservation applications.
- Artificial Intelligence (AI) for demand prediction.
- Intelligent Transportation Systems (ITS) integration.

These technologies improve operational efficiency and support sustainable urban mobility.



Conclusion

Parking dimensions and parking performance characteristics are fundamental aspects of transportation engineering and parking management. Appropriate parking dimensions ensure that vehicles can be parked safely, comfortably, and efficiently, while performance characteristics such as occupancy, turnover, duration, and capacity enable engineers to evaluate how effectively parking facilities operate.

By applying engineering standards, conducting regular parking surveys, and implementing modern parking management technologies, cities can optimize parking resources, reduce congestion, improve accessibility, and support sustainable transportation systems.

THANK YOU!