

# PARKING PLANNING AND DESIGN

## In This Issue...

Overview.....	1
Parking Planning.....	2
Parking Demand.....	2
Accessibility.....	3
Organizational Parking.....	4
Off-Street Parking.....	5
On-Street Parking.....	7

## Overview

### Parking Challenges on Military Installations

Parking is a common problem on many military installations. These issues typically fall into two main categories: not enough parking spaces and poorly planned parking areas.

Parking shortages are most noticeable in high-traffic areas like commissaries, exchanges, barracks, and major workplaces. When there are not enough spaces, people often park in places they should not, which can create safety hazards and reduce overall efficiency.

Poor planning can cause problems anywhere on base — from office buildings and warehouses to gyms and training areas. Without proper design, parking lots may not accommodate the demand, be hard to navigate, or even contribute to accidents.

When designing parking areas, two of the most important things to get right are the size and layout. A well-sized lot meets the actual demand and makes smart use of available space. Good layout — including features like traffic islands, spacing between cars, and well-placed entrance and exit lanes — helps traffic flow and makes parking maneuvers easier. On the other hand, a poorly designed parking lot can lead to safety and operational issues.

This bulletin will focus on how to properly design parking areas, with attention to layout, accessibility, and the correct size and markings for parking stalls — both for on-street and off-street parking.

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# Planning

When planning a new facility, it is essential to allocate sufficient space for parking. Generally, off-street parking is preferred over on-street parking as it typically results in fewer accidents. Surface parking lots are often favored over parking garages due to their lower construction costs, provided there is adequate land available. However, in areas with limited space and high parking demand, a parking structure may be a more practical and economical solution.

Another critical consideration in planning is the proximity of the parking lot to the building it serves. The acceptable walking distance depends on the type of facility and the surrounding environment.

## Maximum Walking Distance for Land Use Types

Parking Characteristic	Average Walking Distance (feet)
Average, preferred for suburban areas	500
Long-term Parking in Central Business Districts	1000
Special or Sporting Event Parking	1500
Maximum	3000

Image Source: TEA Pamphlet 55-17

For short-term stops, such as gas stations or commissaries, parking should be located close to the facility, as people are less likely to tolerate long walks for quick errands. Conversely, for long-term parking, such as at office buildings, individuals are generally more willing to walk farther from their vehicles. In some cases, shuttle services can be implemented to bridge the gap between parking areas and building entrances, particularly on larger or highly urbanized installations.

A frequent issue on military bases is the placement of large buildings on one side of a busy road and their parking lots on the opposite side of the road. This arrangement leads to a higher volume of pedestrian traffic crossing the street, an increased need for crosswalks, and an elevated risk of pedestrian-vehicle accidents. These challenges can often be mitigated through careful planning and improved site design.

# Parking Demand

To effectively plan for future parking needs, parking generation rates serve as a valuable tool. These rates help estimate the required parking capacity based on predictable factors such as the number of employees, building size, or population. Standard parking generation rates for various facility types are available in the Institute of Transportation Engineers' (ITE) *Parking Generation Manual* (2023) and the Unified Facilities Criteria (UFC) 3-201-01 *Civil Engineering*, Section A-2.6, Table A-2.

For existing facilities, the best way to measure actual demand is by conducting a parking utilization study. This involves tracking how many vehicles are parked at a location and comparing it to the number of available spaces.

- For long-term parking areas (such as office buildings), surveys should be done on a typical weekday between 9:00–11:00 AM and again between 1:00–3:00 PM.
- For short-term parking (such as commissaries and convenience centers), checks should be made every 1 to 2 hours.
- High-traffic locations like base exchanges and food courts should be surveyed during the lunch hour.
- Commissaries and exchanges should also be monitored during peak shopping periods, including weekends.

As a general guideline, short-term parking areas should operate at no more than 85% capacity, while long-term parking lots should not exceed 90% capacity. If these thresholds are consistently surpassed, it may indicate the need to expand parking facilities.

In cases where adding more parking is not available due to space constraints, there are still options such as:

- Using nearby lots to handle overflow
- Improving the layout to use space more efficiently
- Reducing the demand (e.g., promote carpooling or shuttles)
- Building an additional parking lot or parking structure

# Accessibility

Accessible parking spaces are required by law to ensure that people with disabilities can safely and conveniently access buildings and facilities. Two main standards apply:

- ☑ **PROWAG** (Public Rights-of-Way Accessibility Guidelines) covers on-street parking.
- ☑ **ABA** (Architectural Barriers Act Standards) covers off-street parking, such as parking lots and garages.

## Parking Lots (Off-Street Parking)

### Minimum Number of Accessible Spaces (ABA)

At least 1 in every 6 accessible spaces must be van accessible. For parking areas with less than 6 spaces, there must still be at least 1 van-accessible parking space.

TOTAL NUMBER OF PARKING SPACES IN A PARKING LOT OR STRUCTURE	MINIMUM NUMBER OF REQUIRED ACCESSIBLE PARKING SPACES FOR PARKING LOT OR STRUCTURE
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1,000	2 percent of the total
1,001 and over	20, plus 1 for each 100, or fraction thereof, over 1,000

Image Source: TEA Pamphlet 55-17

### Location and Design

Accessible parking spaces should be as close as possible to building entrances or curb ramps (if no building entrances are immediately nearby). In remote lots and parking structures, accessible spaces should be located near where pedestrians exit the facility.

## Dimension, Signing and Markings

Accessible spaces must be marked clearly with:

- ☑ The International Symbol of Accessibility painted on the pavement (standard size: 24" x 28").
- ☑ A vertical sign [*Manual on Uniform Traffic Control Devices (MUTCD)* sign R7-8] at the head of each stall indicating it is reserved for accessible parking. (Note that off-street parking may utilize the option of white on brown accessible signing).
- ☑ For van-accessible spaces, an additional sign should be posted stating "Van Accessible" plaque R7-8aP.
- ☑ Access aisles must be marked (usually with 6-inch white diagonal lines) to prevent misuse.

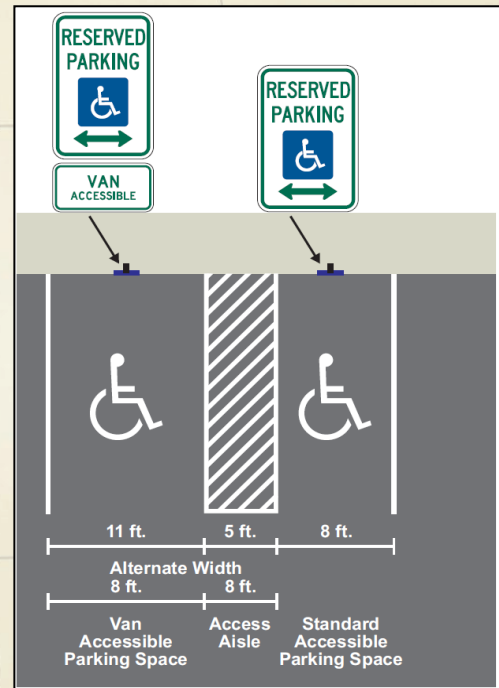


Image Source: TEA Pamphlet 55-17

Pavement markings may also include the accessible symbol on a blue background with a white border.



Image Source: MUTCD

Blue lines (minimum 4 inches wide) may be added alongside white stall lines on the side where the space is reserved.

## Accessible On-Street Parking

In general, the rules for accessible parking signage, striping, and the number of required spaces for on-street parking are similar to those for off-street lots and garages. However, there are a few important differences.

Only the *MUTCD* R7-8 sign (the **standard blue and white** accessible parking sign) is allowed for on-street parking. Other sign colors, such as brown, are not permitted.

PROWAG and ABA guidelines are aligned for parking facilities up to 200 vehicle stalls.

Total Number of Metered or Designated Parking Spaces	Minimum Required Number of Accessible Parking Spaces
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 and over	4 percent of total

Image Source: PROWAG

## Stall Dimensions

Accessible stalls must be a minimum of 13 feet wide and 24 feet long.

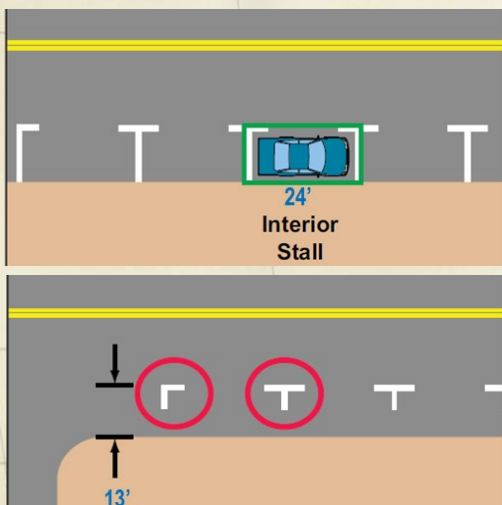


Image Source: TEA

## Additional Information

- Cannot provide off-street parking in lieu of on-street parking. They must be treated separately.
- On-street parking spaces reserved only for residential use (such as resident permit zones) are not required to meet accessibility requirements.
- On-street parking spaces reserved exclusively for commercial or law enforcement vehicles are also exempt from accessibility requirements.

## Organizational Parking

In the civilian world, it's becoming more common for businesses to reserve parking spaces for specific uses—such as online order pickup, expectant mothers, or veterans. Military installations have traditionally designated additional types of reserved parking.

The number and type of reserved spaces on a military base are typically determined by the installation commander or higher headquarters. Common examples include:

- Spaces for high-ranking personnel
- Pickup spots near exchanges and commissaries
- Parking for fuel efficient/electric vehicles

While these designations are allowed, there is no requirement that they must be used. Installations are encouraged to use reserved spaces sparingly, especially in busy parking lots. Overusing reserved spaces — particularly when they go unused — can reduce the total number of available spaces and negatively impact parking efficiency.

One common issue is poor visibility of the signs marking reserved spaces. These signs are often ground mounted or on curb stops, which drivers may not see until they are already turning into the space. To mitigate this, signs should follow the *MUTCD* guidance which requires:

- Mounting signs on a post
- Ensuring the bottom of the sign is at least 7 feet above the ground in pedestrian areas

# Off-Street Parking Design

Parking lot design involves more than just striping lines on pavement. A variety of factors must be considered to ensure the space is functional, safe, and efficient. Key design elements include:

- ☑ Site characteristics (e.g., topography, dimensions, and vehicle types)
- ☑ Access points, buffer zones, and setbacks
- ☑ Stall and aisle dimensions
- ☑ Layout of stalls and stall angles
- ☑ Drive aisles, cross aisles, and end islands/caps
- ☑ Employee and accessible parking locations
- ☑ Pavement markings and wheel stops
- ☑ Surface treatments, drainage, lighting, and landscaping
- ☑ Sight distance

For early-stage planning, each parking space is estimated at approximately 350 square feet. This includes the parking stall itself, plus space for drive aisles and circulation routes.

## Access and Circulation

Pedestrian activity, traffic patterns, turning restrictions, and overall traffic volume all play a critical role in determining how vehicles navigate entry and exit points within a parking lot. When planning and designing access points, consider the following key factors:

- ☑ The design of entrance radii should accommodate the largest expected vehicle usage.
- ☑ Driveways should be at least 24 feet wide.
- ☑ Locate entrances at least 200 feet away from intersections to follow access management best practices.
- ☑ An engineer should be consulted to determine the exact placement and spacing of access points.
- ☑ Engineers must also consider emergency vehicles and delivery trucks, ensuring they can safely enter, maneuver within, and exit the parking facility.

## Setbacks and Buffer Zones

Incorporate buffer zones between parking areas and adjacent buildings or roadways. These buffer zones enhance safety, improve visibility, and contribute to overall aesthetics. Additionally, they create a clear separation between vehicle and pedestrian spaces, minimizing potential conflicts between parking and roadway traffic.

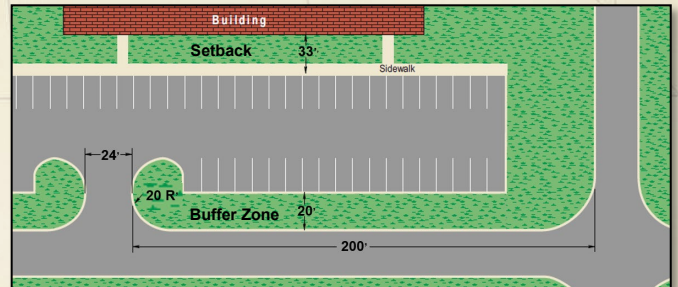


Image Source: TEA Pamphlet 55-17

## Design Fundamentals

The most efficient parking lots are typically rectangular in design, featuring parking spaces aligned on both sides of the access aisles. To optimize space utilization and traffic flow, a 90-degree (perpendicular) layout with two-way drive/access aisles is generally recommended. This configuration maximizes parking capacity within a given area, ensuring high operational efficiency.

In areas where space is constrained or a high turnover rate is anticipated, such as short-term parking facilities, angled parking at 60 or 45 degrees may be a more suitable option. Angled parking facilitates easier maneuvering for drivers when entering and exiting spaces, particularly in one-way aisles. However, this design choice is accompanied by certain trade-offs:

- ☑ One-way aisles can be less convenient to navigate.
- ☑ Drivers may ignore the intended direction, increasing the risk of conflicts.

To enhance pedestrian safety and convenience, parking rows should ideally be oriented perpendicular to building entrances whenever feasible. This layout is most effective when the rows are at least 130 feet in length. However, if space limitations make a perpendicular arrangement impractical, aligning parking rows parallel

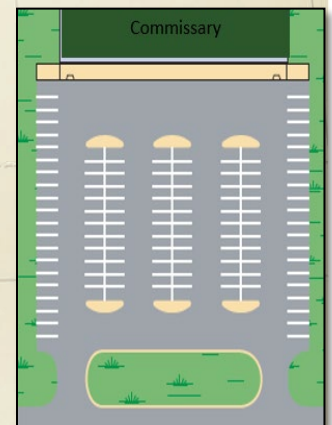


Image Source: TEA Pamphlet 55-17

to the front of buildings is a more suitable alternative. To mitigate safety concerns, parking spaces should not be positioned too close to entrances. This prevents vehicles from reversing into sidewalks or obstructing incoming traffic during maneuvering.

In pedestrian areas, ensure walkways are sufficiently wide to allow comfortable movement, particularly in areas where vehicle bumpers may encroach into the walking space. Depending on the parking lot layout and pedestrian requirements, walkways can be designed to run through the aisles or along the outer edges of the parking area.

### Parking Aisles and Layout

Parking aisles are most effective when aligned parallel to the longest side of the lot, as this configuration can increase parking capacity by up to 20%. In larger parking lots, incorporating a cross aisle approximately every 30 spaces enhances traffic flow and accessibility. To ensure safety, keep the ends of aisles unobstructed to provide clear visibility and facilitate safe turning. Use white paint or raised islands to clearly mark these areas and guide drivers effectively.

### End Islands

Raised islands serve multiple purposes, such as accommodating signs or light poles, enhancing visibility at intersections, and accommodating landscaping. However, designers should consider the impact on snow removal operations, as islands can obstruct plows and complicate maintenance during winter conditions.

### Parking Space Sizes

Parking space dimensions depend on the layout and intended use. Standard parking spaces are generally 9 feet by 18.5 feet, while compact car spaces, measuring 8 feet by 16 feet, can be implemented if there is consistent demand. Motorcycle spaces are optional and should only be included if they are utilized year-round. For specific dimensions based on parking angles and vehicle types, refer to TEA Pamphlet 55-17 for detailed guidelines.

### Pavement Markings

Parking spaces are usually delineated with white lines that are 4 inches wide. Optional blue markings can be used to designate accessible parking spaces. Parking lot striping is not required to meet *MUTCD* retroreflectivity standards.

### Wheel Stops

Wheel stops are used to prevent vehicles from rolling into restricted areas like sidewalks, buildings, or drainage zones. However, they can pose as tripping hazards for pedestrians as well as collect debris.

According to *UFC 3-201-01*, Section 2-11.3, wheel stops should:

- Be 6 feet long
- Be placed 2.5 feet from the protected area
- Be anchored to the pavement in spots next to sidewalks, buildings, stormwater features, steep slopes, or other areas where vehicles should not encroach

Use them selectively and only where necessary to avoid creating pedestrian or maintenance issues.



### Lighting

Proper lighting in parking lots is essential for ensuring safety, security, and functionality. Well-designed lighting enhances visibility for drivers and pedestrians and reduces the risk of accidents. The ideal placement for light poles is within center or side islands, protected by raised curbs. If poles must be located within parking rows, they should be placed at the junction between stalls to minimize obstruction.

For parking lot lighting requirements, refer to *UFC 3-530-01, Interior and Exterior Lighting Systems*.

### Landscaping

The primary objectives of parking lot landscaping are to enhance aesthetics, establish buffers between different land uses, support environmental compliance, and reduce the visual impact of large, paved areas. Landscaping plans, including the selection of plants and trees, should be carefully designed to avoid obstructing driver and pedestrian visibility or interfering with vehicle movements, both currently and as vegetation matures.

Adequate space should be provided around plants to prevent damage from vehicle overhangs. Landscape areas are typically determined based on a ratio of green space to paved areas, which is often regulated by local jurisdictions.

### Grades

Proper grading is essential to prevent standing water, which can create safety hazards, particularly in cold climates where ice formation is a concern. Drainage and grading design should conform to the requirements outlined in *UFC 3-201-01, Civil Engineering*. As a general guideline, provide minimum parking lot slopes of:

- ☑ 1% for asphalt
- ☑ 0.5% for concrete

## On-Street Parking

Approximately 1 in 5 urban crashes involves parked vehicles. On-street parking is generally discouraged on arterial and collector roads due to higher traffic speeds and volumes, which increase the risk of accidents. However, it is considered acceptable on lower speed and volume roadways, such as residential streets, where it can contribute to traffic calming by reducing vehicle speeds.

### Parking Types:

- ☑ Perpendicular and angled parking offers more space per curb length than parallel parking. However, it creates visibility issues when drivers back out, especially if a large vehicle is parked nearby.
- ☑ Parallel parking provides fewer spaces per curb length compared to other layouts; however, it is the preferred option when prioritizing safety.

### Accessibility Requirements:

- ☑ In non-residential areas, on-street parking must comply with PROWAG standards.
- ☑ Parallel accessible spaces must be at least 24 feet long and 13 feet wide.

### Regulations:

- ☑ The *MUTCD* defines parking stall sizes and sets no-parking zone lengths near crosswalks.
- ☑ Control of parking is done through signs, pavement markings, and enforcement.
- ☑ Additional regulations are outlined in the Uniform Vehicle Code.

### Other Parking Restrictions

Common parking restrictions often include minimum distance requirements from:

- ☑ Public or private driveways
- ☑ Intersections
- ☑ Fire hydrants
- ☑ Railroad crossings
- ☑ Bridges

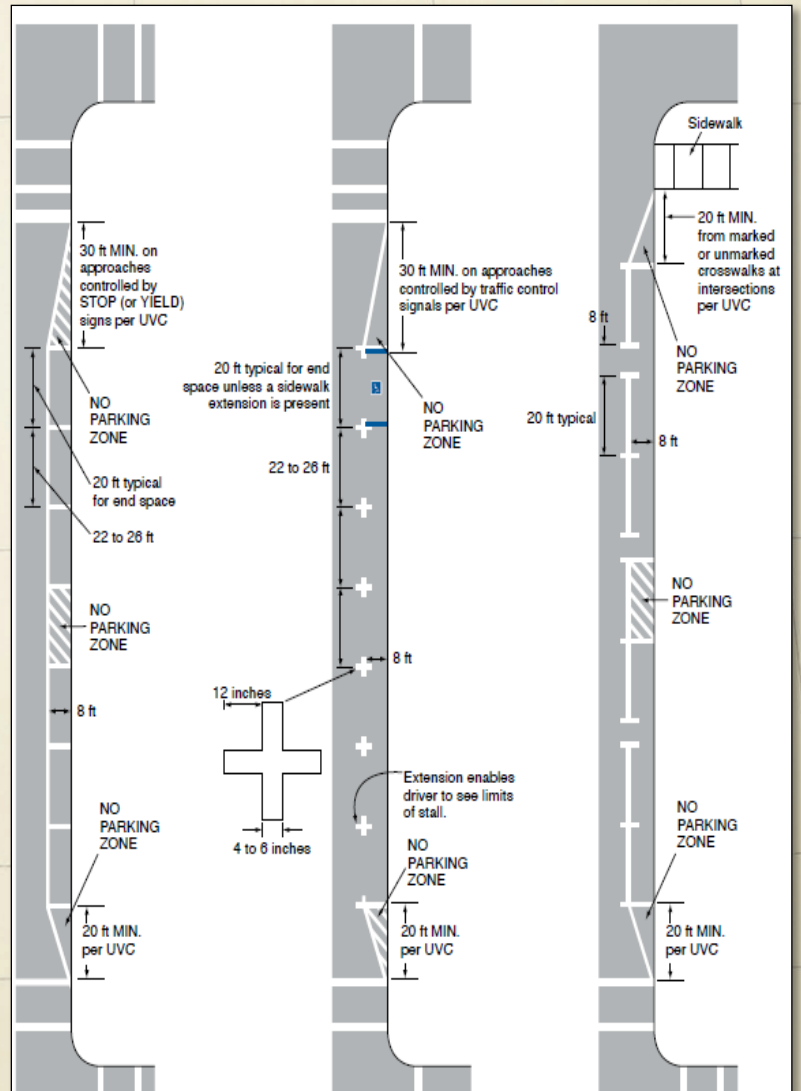


Image Source: MUTCD

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for pamphlets, bulletins and studies

## Reference List

- ☑ [Transportation Engineering Agency \(TEA\) Homepage](#)
- ☑ [\*Better Military Traffic Engineering\*, TEA Pamphlet 55-17. 2016.](#)
- ☑ [Federal Highway Administration: Manual on Uniform Traffic Control Devices, 11th Edition.](#)
- ☑ [DOD Supplement to the MUTCD, TEA, 2015](#)
- ☑ [Institute of Transportation Engineers \(ITE\) \*Parking Generation Manual\*, 2023](#)
- ☑ [Unified Facilities Criteria: UFC 3-201-01 and UFC 4-530-01](#)

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