3.1 USER CHARACTERISTICS

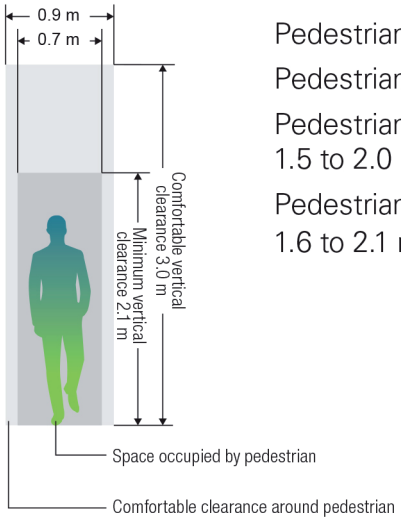
Understanding the operating characteristics of users of pedestrian and cycling facilities is essential to planning and designing high quality facilities. This ensures that not only people who already walk and bicycle will be served well, but also helps attract people who are interested in walking and bicycling. General characteristics of pedestrians and cyclists to consider when designing their facilities are presented in the following sections 3.1.1 -3.1.3. The characteristics of other users, and equipment, such as in-line skaters, skateboards, scooters, e-bikes, tandems, etc. generally fall within these ranges.

Pedestrian and cycling facilities must also accommodate maintenance vehicles. For facilities separated from the roadway, equipment used may differ from those deployed to maintain the roadway. This will affect the width of the facilities, pavement and structural design for live loads, and overhead clearance.

3.1.1 Pedestrians

OPERATING SPACE OF PEDESTRIAN:

WIDTH & HEIGHT:



LENGTH:

Pedestrian stride: 0.5 to 1.0 m

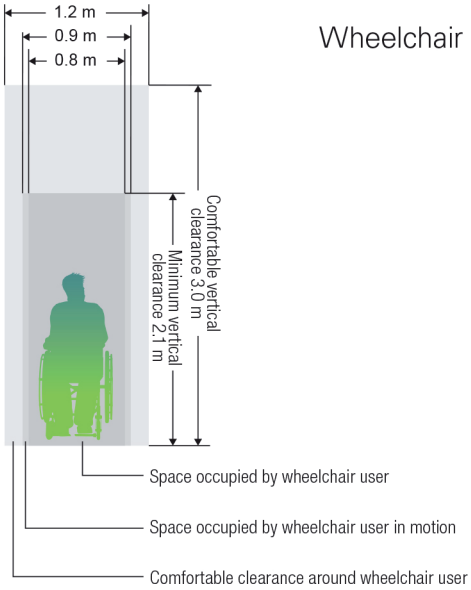
Pedestrian with guide dog: 1.0 m

Pedestrian with guide cane: 1.5 to 2.0 m

Pedestrian with stroller: 1.6 to 2.1 m

OPERATING SPACE OF WHEELCHAIR USER:

WIDTH & HEIGHT:



LENGTH:

Wheelchair user: 1.4 m

OPERATING SPEED (ON FLAT GRADE):

Mobility-impaired pedestrian: 0.3 m/s or more

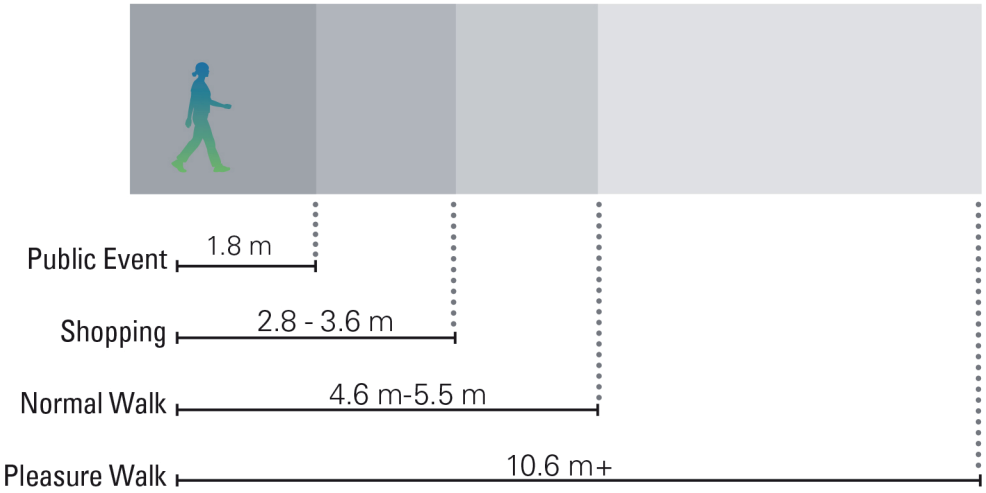
Senior and child pedestrian: 0.9 to 1.6 m/s

Able-bodied adult pedestrian: 1.2 to 2.1 m/s

Runners: 3 km/h to 18 km/h or more

SPATIAL BUBBLE FOR PEDESTRIANS

The spatial bubble refers to the preferred distance of unobstructed forward vision one experiences while walking in various cases.

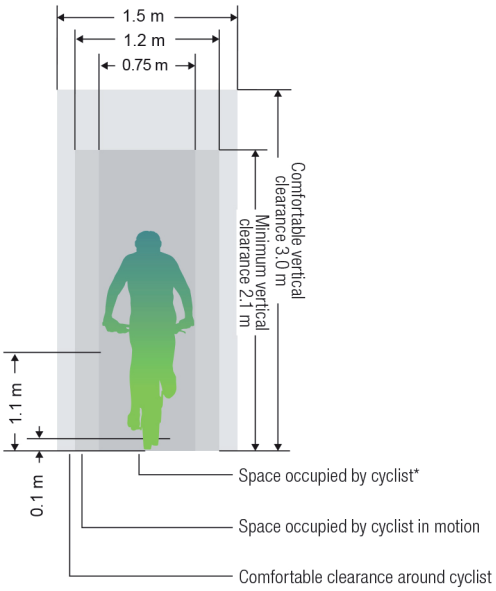


Source: Adapted from American Association of State Highway and Transportation Officials, Guide for the Planning, design and operation of Pedestrian Facilities, July 2004

3.1.2 Cyclists

OPERATING SPACE OF CYCLIST

WIDTH & HEIGHT:



**Note that for a cyclist carrying a trailer-bike or trailer, the space occupied by the cyclist may increase to up to 0.80 m.*

Source: Adapted from AASHTO Guide to Bicycle Facilities, 4th Edition and OTM Book.

LENGTH:

Child bicycle: 1.5 m
Adult bicycle: 1.8 m
Tandem bicycle: 2.75 m
Bicycle with trailer-bike or trailer: 3.0 m

OPERATING SPEED (ON FLAT GRADE):

Unstable under 5 km/h

Weaves side to side for balance (typical speed for young children): 6 to 10 km/h

Cruising speed for most cyclists: 11 to 20 km/h

Continual, moderate effort: 21 to 25 km/h

More intense effort: 30 km/h

Competitive cyclists: 40 to 65 km/h (sprint)

TURNING RADII

Radii for cyclists is dependent on travel speed and lean angle, however the formula below can be applied to calculate an appropriate radius, based on the operating speed:

$$R = \frac{0.0079V^2}{\tan\mathcal{O}}$$

R = minimum radius (m)
V = design speed (km/hr)
$\mathcal{O}$ = lean angle from the vertical (°) - typical max of 20°

Source: Adapted from AASHTO Guide to Bicycle Facilities, 4th Edition

3.1.3 Maintenance Vehicles

Maintenance vehicles for facilities separated from the roadway:
Tractor width: 1.1 to 1.2 m typical
Blade/sweeper width: 1.2 to 1.8 m typical

For additional details on maintenance, please refer to Chapter 10.