Planning and Zoning Commission
August 2, 2023 - Regular Meeting

To:	Dillon Planning and Zoning Commission
From:	Ned West, AICP, Sr. Town Planner
Subject:	Commercial Parking
Agenda Item:	9

Discussion Item:
Introduction to considering potential Dillon Municipal Code (***"DMC"*** or ***"Code"***) amendments related to requirements and design guidelines for Commercial Parking.

Background/Time Frame:
- March 31, 2023: Planning Commission discussion
- August 2, 2023: Planning Commission discussion

Supporting Information:

During the previous discussion on the subject the Planning Commission was mixed on how to apply parking schedules to such uses as music venues and bowling alleys.

Based on a review of numerous municipal codes, Town staff believes the current requirement of four (4) parking space per alley, plus an additional space per employee aligns well as an industry standard.

Town staff has consulted with design professionals experienced with music venues and based upon their recommendations of providing one (1) parking space for every two and a half (2-1/2) people, staff seeks Planning Commission direction for a potential Code Amendment.

Town staff also seeks input on bicycle parking requirements and if there is a desired ratio of bicycle parking spaces to those required for vehicles. Refer to bicycle parking guidance documents in Exhibit 'B'

Exhibit 'A'
Currently Adopted Parking Requirements

ARTICLE VI Off-Street Parking and Loading

Sec. 16-6-10. Intent.

The intent of this Article is to require the provision of off-street parking related to the development of projects throughout the Town in order to facilitate the parking needs of the community.

Sec. 16-6-20. General regulations.

Off-street parking spaces and loading areas shall be provided as specified in Section 16-6-30 for any development proposed within the Town, including additions and/or conversions of a building or portion of a building to a use that is more intensive than the existing use, as that use relates to the requirements for additional parking spaces.

Sec. 16-6-30. Off-street parking requirements.

A parking fee and agreement to join a parking district are required for off-street parking.

Sec. 16-6-40. General parking requirements.

(a) The following number of parking spaces shall be provided for any new development, addition to an existing development or change of use:

Use	Required Spaces
Residential	
Single-family	2 spaces
Duplex	2 spaces/unit
Multi-Family Residential and Hotels	
Efficiency, studio, 1-bedroom	1.5 spaces/unit
2-bedroom unit	2 spaces/unit
3-bedroom or greater unit	2 spaces/unit
Lodging, hotel, motel, hotel/motel suites, dormitories, bed & breakfast	1.1 spaces/bedroom
Schools	
Child care center	1 space/employee + 1 space/10 children
Elementary, middle school	2 spaces/classroom
High school, college	.25 spaces/student capacity + 1 per faculty member
Commercial/Miscellaneous	
Retail sales, commercial, general office, medical office, dental office	1 space/400 gross sq. ft.
Church	1 space/400 gross sq. ft.
Auto service establishment	1 space/employee + 1 space/service bay
Restaurant, sit-down	1 space/120 gross sq. ft.
Restaurant, drive-in	1 space/100 gross sq. ft.

Restaurant, outdoor seating	Outdoor seating that does not exceed 20% of the size of the restaurant, based on gross square footage, shall be exempt. Outdoor seating in excess of 20% shall provide parking for those portions of the seating area in excess of 20% at the same rate as the restaurant itself
Conference center or public meeting room	1 space/every 250 square feet
Licensed premises of marijuana hospitality and sales establishment	1 space/120 gross sq. ft.
Licensed premises of retail marijuana store	1 space/400 gross sq. ft.
Entertainment	
Auditorium, theater	1 space/4 seats
Bowling alleys	4 spaces/alley + 1 space/employee

(b) All parking requirements that are not whole numbers shall be rounded upward to the next highest whole number.

(c) The number of parking spaces required for uses not listed within this Section shall be determined by the Planning and Zoning Commission, after review and recommendation by the Town Manager, based on the impacts anticipated by the proposed use, and shall relate to the anticipated demand created by each proposed use.

(Ord. 19-96 §6.00; Ord. 01-99 §1; Ord. 08-99 §4; Ord. 08-02 §1; Ord. 06-12 §§2, 3; Ord. 07-17 §1; Ord. 01-21 §4; Ord. 05-22 , §1)

Sec. 16-6-50. Participation in future parking improvements and parking fees.

(a) In those instances where the applicant for a development permit within the Core Area, including a request for a change of use, cannot or desires not to provide all parking spaces required in this Chapter, the applicant may request to enter into an agreement with the Town to pay a fee per deficient parking space as set forth below; such request may be granted or denied in the Town Council's sole discretion. Fees per deficient parking spaces shall only be charged for the number of required parking spaces a development is deficient, and no fee per deficient parking space shall be charged for parking spaces actually provided.

(b) The right of an applicant to request and, if granted, to enter into such an agreement and make such payments, and the authority of the Town to accept such payments, shall be subject to the following limitations:

(1) Not applicable to residential uses. Requests to pay fees in lieu of providing parking spaces in the amount required in this Chapter shall not be granted for parking as required for residential uses. The full amount of parking spaces as required for residential uses must be provided on-site.

(2) Agreement. The agreement shall specify the number of spaces the project is deficient, shall indicate the applicant's agreement to pay the fee per deficient parking space, and shall be entered into prior to the issuance of a building permit.

(3) Amount of fee per deficient parking space. The amount of the fee per deficient parking space shall be contingent on the number of parking spaces the project is deficient as set forth in Chapter 19 of this Code.

(4) Payment of fee per deficient parking space. The fee per deficient parking space shall be paid in full to the Town prior to the issuance of a building permit for the project or, at the discretion of the Town, at

another time as agreed to between the Town and applicant, if the fee is guaranteed by a letter of credit.

a. Except as provided in Subsection (7) below, fees paid to the Town are nontransferable and nonrefundable. Any fee paid in connection with the development of a particular lot, tract or parcel shall run with the land for which the fee is paid, and is nontransferable to any other lot, tract or parcel.

b. If the development permit for which a fee has been paid has expired, and a new application for a development permit is thereafter filed for the same parcel within five (5) years, the Town shall credit any previous payments of fees per deficient parking spaces toward any fees due for the new application.

c. If a change in use of a property results in a reduced requirement for off street parking under the provisions of this Chapter, no refund shall be paid by the Town with respect to off street parking spaces which are no longer required.

(5) Use of fees per deficient parking space by Town. The fees collected by the Town pursuant to this Section may be expended by the Town only for the following purposes:

a. Acquisition of real property for the construction of municipal parking facilities within the Core Area, or any area located within one-half (½) mile of the Core Area if the Town Council determines that the Core Area will benefit from the provision of parking on such property.

b. Development, expansion, design or capital repair of municipal parking spaces or facilities within the Core Area, or any area located within two thousand (2,000) feet of the Core Area, including but not limited to, construction costs, surveying costs, engineering, design and similar expenses related thereto.

c. Payment of the principal, interest and other costs of bonds, notes and other obligations issued or undertaken by or on behalf of the Town to finance the acquisition, development, expansion or capital repair of municipal parking spaces and facilities within the Core Area or within two thousand (2,000) feet of the Core Area.

(6) Fees in lieu of deficient parking shall not be used to remedy any deficiency in capital facilities that exists without regard to the proposed development.

(7) Refund or credit of fees paid in lieu of providing parking.

a. Refund. Any fees in lieu of providing parking, or portion thereof, collected pursuant to this Section which have not been expended or which have not been committed for expenditure for eligible parking improvements or design within twenty-five (25) years from the date of payment shall be refunded, upon application, to the record owner of the property for which the fee was paid, together with interest thereon at the legal rate earned thereon by the Town from the date of collection to the date of refund.

b. Credit. In the event the Town forms a special improvement district for the purpose of providing public parking facilities within or adjacent to the Core Area, all parking fees (not including interest) paid within a ten-year time period immediately prior to the formation of the district shall be credited toward the assessments of each lot for which the fees were previously paid.

(8) Parking account.

a. The Finance Director shall establish an interest-bearing account into which all fees per deficient parking space collected by the Town pursuant to this Section shall be deposited. Interest earned on the account into which the fees are deposited shall be considered funds of the account and shall be used solely for eligible parking design and improvements as authorized in this Section.

The fees collected and the interest earned thereon shall not be commingled with any other funds of the Town.

b. The Finance Director shall establish adequate financial and accounting controls to ensure that the fees per deficient parking space disbursed from the account are utilized solely for eligible parking design and improvements as authorized in this Section.

(Ord. 05-99 §1; Ord. 02-02; Ord. 05-03 §2; Ord. 01-04 §§1-3; Ord. 14-20 §3; Ord. 13-21 §§4, 5)

Sec. 16-6-60. Design standards for off-street parking spaces and facilities.

Each off-street parking space or facility provided within the Town shall conform to the following design standards:

(1) Size of parking stalls/spaces.

a. Within a parking facility containing four (4) or more spaces, the minimum parking stall sizes shall be:

	Length	***Width***
30 to 90 degree parking	18 feet	9 feet
Parallel parking	25 feet	8 feet
Enclosed parking	18 feet	9 feet

b. For all other parking facilities, including single-family, duplex or any other uses where a parking facility contains less than four (4) parking spaces, the minimum parking stall sizes shall be:

	Length	***Width***
30 to 90 degree parking	18 feet	9 feet
Parallel parking	25 feet	8 feet
Enclosed parking	18 feet	9 feet

(2) Width of parking aisles. The following minimum aisle widths shall be required for all off-street parking facilities provided within the Town:

Angle of Parking Stalls	***Minimum Aisle Width***
45 degrees	14 ft. (one-way traffic only)
60 degrees	18 ft. (one-way traffic only)
75 degrees	20 ft. (one-way traffic only)
90 degrees	24 ft. (one- or two-way traffic)

(3) Maximum grades.

a. Single-family and duplex uses. The maximum grade allowed for single-family and duplex uses shall not exceed ten percent (10%), with the exception that the first twenty (20) feet immediately adjacent to any garage shall not exceed eight percent (8%), or twelve percent (12%) if heated.

b. Summer seasonal parking lots. The maximum grade allowed for parking spaces shall not exceed six and one-half percent (6.5%) in any direction. The maximum grade allowed for drive aisles adjacent to parking spaces shall not exceed six and one-half percent (6.5%) in any direction. The maximum grade allowed for access driveways between the public road and the parking spaces shall not exceed ten percent (10%) in any direction.

c. All other uses. The maximum grade allowed for parking spaces shall not exceed four percent (4%) in any direction. The maximum grade allowed for drive aisles adjacent to parking spaces shall not exceed four percent (4%) in any direction. The maximum grade allowed for access driveways between the public road and the parking spaces shall not exceed ten percent (10%) in any direction.

d. Access drives crossing sidewalks. When an access drive crosses a public sidewalk or a designated accessible route, the slope of the drive aisle shall not exceed two percent (2%) to maintain the cross-slope of the sidewalk or accessible route. This is typically accomplished by the installation of a concrete curbcut for sidewalks attached to the curb along a roadway.

(4) Paving. All parking spaces, including driveways, shall be surfaced with asphalt, concrete or equivalent.

(5) Lighting. Any lighting proposed for the purpose of providing lighting for a parking facility shall be designed in a manner where the light is directed away from any adjoining properties. In addition, lighting fixtures for parking lots within the Core Area shall be compatible with the light fixtures provided by the Town to light Town parking lots and public ways.

(6) Accessibility. All off-street parking spaces and facilities shall have legal, unobstructed access to a public street or alleyway.

(7) Backing onto public street.

a. Except for single-family and duplex parking areas, all other parking stalls and spaces shall be so designed, located and served by maneuvering lanes so their use will under no circumstances require a backing movement onto any public street.

b. In cases where portions of a Town owned right-of-way are used as primarily public parking, and where the portion of the right-of-way used as primarily public parking also does not have a street name designation, backing into the drive aisle adjacent to the parking spaces shall be permitted.

c. In the Core Area Zone District, upon determination by the Town Manager that no other option for accessible parking is available for a particular building, accessible parking spaces for such building may be allowed to back into the right-of-way in order to provide accessible parking for such building.

(8) Landscaping. All off-street parking facilities containing four (4) or more spaces shall be adequately screened from any adjacent residentially zoned parcel or public street by a strip of land at least ten (10) feet in width (fifteen [15] feet if in a front yard) densely landscaped with a combination of trees and shrubs adequate to screen the adjacent property or right-of-way from the parking lot. This landscaping area shall contain a minimum of one (1) tree per ten (10) linear feet, with the trees being a minimum of eight (8) feet in height, and having a mixture of evergreens and deciduous trees at a ratio of 50:50.

(9) Snow storage.

a. Summer seasonal parking lots are not required to have additional snow storage areas.

b. Unless designed with a snow melt system, all other parking areas shall be provided with snow storage areas adequate to meet the needs of the parking facilities. This shall include the provision of a minimum of snow storage equal to twenty-five percent (25%) of the area to be cleared of snow. Such snow storage areas shall be located in a manner to reasonably facilitate the snow removal process. The snow storage areas shall be landscaped in a manner that does not interfere with the snow storage process.

(10) Accessible parking.

a. Parking facilities shall be designed and constructed with accessible parking and accessible access routes in conformance with the federal 2010 ADA Standards for Accessible Design.

b. Parking facilities shall provide the minimum number of required accessible parking spaces per Section 208 of the federal 2010 ADA Standards for Accessible Design.

c. At least one (1) van-accessible parking space is required for every six (6) or fraction of six (6) accessible parking spaces required per this Section.

d. The width of an accessible parking space may be reduced to a minimum of eight (8) feet wide when adjacent to an access aisle that is a minimum of eight (8) feet wide.

Sec. 16-6-70. Maintenance of off-street parking spaces and facilities.

(a) It shall be the responsibility of the owner to maintain the off-street parking spaces or facilities in a state of good repair and in an unobstructed condition so as to ensure that all required off-street parking spaces are available for use on a daily basis.

(b) Upon an accumulation snow depth of four (4) inches of uncompacted snow, all off-street parking spaces shall be substantially cleared of snow within twenty-four (24) hours. The removed snow shall be stacked in such a way so as not to impair lines of sight or disrupt the proper flow of vehicular or pedestrian traffic.

(c) Snow removal is not required in summer seasonal parking lots. Summer seasonal parking lots may be used for snow storage.

(Ord. 19-96 §6.00; Ord. 02-02; Ord. 07-13 §5)

Sec. 16-6-80. Use restrictions for off-street parking facilities.

(a) The required number of off-street parking spaces shall be maintained for the parking of operable passenger vehicles of residents, customers, patrons and employees only, and shall not be used as parking for vehicles which are being used as a residence, for storage of vehicles or materials.

(b) Unless otherwise allowed in this Section, required off-street parking spaces shall not be used for the parking or storage of trailers, boats, detached campers, disabled or inoperable vehicles or other objects that will render the parking space unusable according to the intent and purpose of this Article.

(c) Parking spaces located within summer seasonal parking lots may be used for the storage of trailers, boats and snow as approved by the Town Manager.

(Ord. 19-96 §6.00; Ord. 07-13 §§6, 7)

Sec. 16-6-90. Off-street loading spaces.

Every project used for commercial, retail or industrial purposes with a gross floor area of over twenty thousand (20,000) square feet shall be required to have a minimum of one (1) off-street loading area provided on site.

Exhibit 'B'
Bicycle Parking Guidelines

"Essentials of Bike Parking"
By
Association of Pedestrian and Bicycle Professionals

And

"Lesson 17: Bicycle Parking and Storage"
Federal Highway Administration University Course
on Bicycle and Pedestrian Transportation

ESSENTIALS OF

BIKE PARKING

Selecting and installing bicycle parking that works

apbp

Association of Pedestrian and Bicycle Professionals

Expertise for Active Transportation

Essentials of Bike Parking
Revision 1.0, September 2015

Acknowledgments

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Cover image: *Sign D4-3 from Standard Highway Signs, 2004 Edition, http://mutcd.fhwa.dot.gov/ser-shs_millennium_eng.htm*

APBP is an association of professionals who plan, implement and advocate for walkable and bicycle-friendly places.

Association of Pedestrian and Bicycle Professionals

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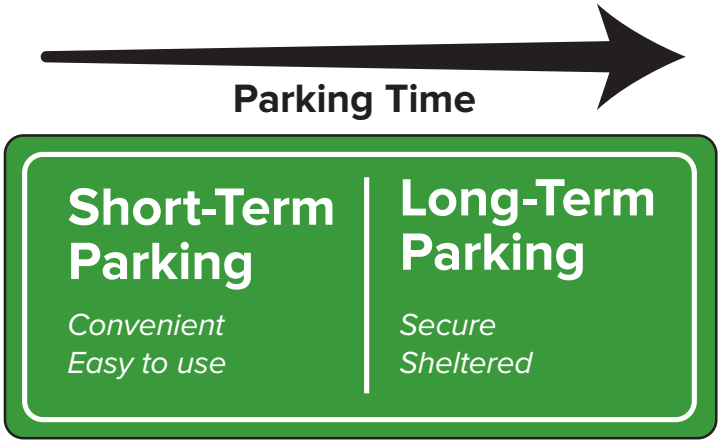
INTRODUCTION

Among the necessary supports for bicycle transportation, bike parking stands out for being both vital and easy. Still, it requires some attention to get it right. Bike parking may go unused if it's not more appealing to users than the nearest sign post. A minor mistake in installation can make a quality rack unusable. The variety of bicycle sizes, shapes, and attachments continues to increase, and good bike parking should accommodate all types.

The Association of Pedestrian and Bicycle Professionals (APBP) prepared this guide for people planning to purchase or install bike parking fixtures on a limited scale. It is a brief overview of APBP's comprehensive *Bicycle Parking Guidelines* handbook, available at www.apbp.org.

This guide divides bike parking into short-term and long-term installations. These two kinds of parking serve different needs, and the starting point for most bike parking projects is recognizing whether the installation should serve short-term users, long-term users, or both. If users will typically be parking for two hours or longer, they are likely to value security and shelter above the convenience and ease that should characterize short-term parking.



SHORT-TERM PARKING

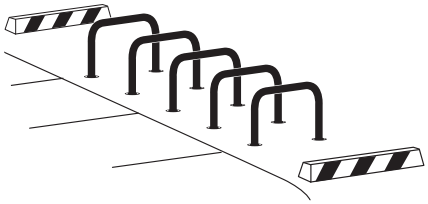
Effective bike parking for short-term users depends on two main factors: 1) proximity to the destination and 2) ease of use.

Short-term parking is designed to meet the needs of people visiting businesses and institutions, and others with similar needs—typically lasting up to two hours. Short-term users may be infrequent visitors to a location, so the parking installation needs to be readily visible and self-explanatory.

INVERTED U

POST & RING

CORRAL



SITE PLANNING

Location

Short-term bike parking should be visible from and close to the entrance it serves—50' or less is a good benchmark. Weather-protected parking makes bicycle transportation more viable for daily and year-round use, and it can reduce the motivation for users to bring wet bicycles into buildings. Area lighting is important for any location likely to see use outside of daylight hours.

Security

All racks must be sturdy and well-anchored, but location determines the security of short-term parking as much as any other factor. Users seek out parking that is visible to the public, and they particularly value racks that can be seen from within the destination. Areas with high incidence of bicycle theft may justify specific security features such as specialty racks, tamper-proof mounting techniques, or active surveillance.

Quantity

Many jurisdictions have ordinances governing bike parking quantity. APBP's full *Bicycle Parking Guidelines* offers complete recommendations for the amount and type of parking required in various contexts. In the absence of requirements, it's okay to start small—but bear in mind that perceived demand may be lower than the demand that develops once quality parking appears.

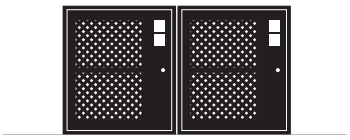
BIKE CORRALS

Some cities with limited sidewalk space and strong bicycle activity place bike parking in on-street "bike corrals" located in the street area adjacent to the curb. Bike corrals can sometimes make use of on-street areas that are unsuitable for auto parking. When replacing a single auto parking space, a corral can generally fit 8 to 12 bicycles. APBP's full *Bicycle Parking Guidelines* provides details about designing and siting bike corrals. **apbp.org**

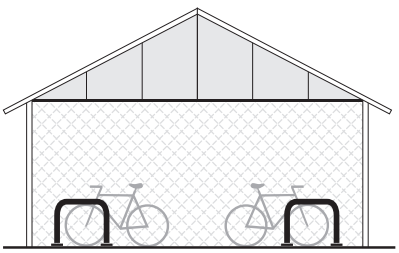
LONG-TERM PARKING

Users of long-term parking generally place high value on security and weather protection. Long-term parking is designed to meet the needs of employees, residents, public transit users, and others with similar needs. These users typically park either at home or at a routine destination such as a workplace. They often leave their bicycles unmonitored for a period of several hours or longer, so they require security and weather protection that let them park without unreasonable concern for loss or damage.

Long-term parking can take a variety of forms, including a room within a residential building or workplace, a secure enclosure within a parking garage, or a cluster of bike lockers at a transit center. Some long-term parking is open to the public—such as a staffed secure enclosure at a transit hub—and some of it is on private property with access limited to employees, residents, or other defined user groups.



BIKE LOCKERS



SHELTERED SECURE ENCLOSURE

SITE PLANNING

Location

Appropriate locations for long-term parking vary with context. Long-term parking users are typically willing to trade a degree of convenience for weather protection and increased security. Long-term installations emphasize physical security above public visibility. Signage may be needed for first-time users.

Security

Security is paramount for quality long-term parking. Access to parked bicycles can be limited individually (as with lockers) or in groups (as with locked bike rooms or other secure enclosures). Options for access control include user-supplied locks, keys, smart cards, and other technologies.

Quantity

Refer to local ordinances or the comprehensive APBP *Bicycle Parking Guidelines* to determine the amount and type of parking required for various contexts.

SPECIAL CONSIDERATIONS FOR LONG-TERM PARKING

In many ways, short-term and long-term parking function similarly and are served by the same guidelines. Some exceptions are noted below.

Density

The competition of uses for high-security and sheltered locations creates particular pressure on long-term parking to fit more bicycles in less space. When parking needs cannot be met with standard racks and spacing recommended in this guide, consider rack systems designed to increase parking density. See the high-density racks table on page 7. Note that increasing density without careful attention to user needs can create parking that excludes people because of age, ability, or bicycle type. This may result in people parking bicycles in other less desirable places or choosing not to bike at all.

Bicycle design variety

Long-term parking facilities should anticipate the presence of a variety of bicycles and accessories, including—depending on context—recumbents, trailers, children's bikes, long-tails, and others. To accommodate trailers and long bikes, a portion of the racks should be on the ground and should have an additional 36" of in-line clearance.

Performance criteria

The bike rack criteria in the next section apply to racks used in any installation, regardless of its purpose. Long-term installations often use lockers and group enclosures not discussed in this guide. Such equipment raises additional considerations that are discussed in detail in APBP's full *Bicycle Parking Guidelines*. **apbp.org**

INSTALLATION

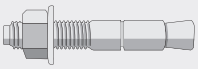
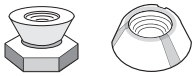
Selecting an appropriate installation surface and technique is key to creating bicycle parking that remains secure and attractive over time.

INSTALLATION SURFACE

A sturdy concrete pad is an ideal surface for installing bicycle parking. Other surfaces often encountered include asphalt, pavers, and soft surfaces such as earth or mulch. These surfaces can accommodate in-ground mounting or freestanding bike racks such as inverted-U racks mounted to rails. See APBP's *Bicycle Parking Guidelines* for details. **apbp.org**

INSTALLATION FASTENERS

When installing racks on existing concrete, consider the location and select appropriate fasteners. Drill any holes at least three inches from concrete edges or joints. Some locations benefit from security fasteners such as concrete spikes or tamper-resistant nuts on wedge anchors. Asphalt is too soft to hold wedge and spike anchors designed for use in concrete. Installing bike parking on asphalt typically requires freestanding racks and anchor techniques specific to asphalt.

FASTENERS		
CONCRETE SPIKE		Installs quickly in concrete with a hammer. Tamper-resistant. Removal may damage concrete and/or rack.
CONCRETE WEDGE ANCHOR		Allows for rack removal as needed. Not tamper-resistant, but can accommodate security nuts (below).
SECURITY NUTS		Use with concrete wedge anchors. Security nuts prevent removal with common hand tools.

INSTALLATION TECHNIQUES

When installing racks on existing concrete, choose those with a surface-mount flange and install with a hammer drill according to the specifications of the mounting hardware selected. When pouring a new concrete pad, consider bike parking fixtures designed to be embedded in the concrete. Because replacing or modifying an embedded rack is complicated and costly, this installation technique requires particular attention to location, spacing, rack quantity, and material.

BICYCLE RACK SELECTION

PERFORMANCE CRITERIA FOR BIKE PARKING RACKS

These criteria apply to any rack for short- or long-term use.

CRITERIA	DETAILS
Supports bike upright without putting stress on wheels	The rack should provide two points of contact with the frame—at least 6" apart horizontally. Or, if a rack cradles a bicycle's wheel, it must also support the frame securely at one point or more. The rack's high point should be at least 32".
Accommodates a variety of bicycles and attachments	The racks recommended on page 6 ("racks for all applications") serve nearly all common bike styles and attachments—if installed with proper clearances (see placement section). Avoid designs and spacing that restrict the length, height, or width of bicycles, attachments, or wheels.
Allows locking of frame and at least one wheel with a U-lock	A closed loop of the rack should allow a single U-lock to capture one wheel and a closed section of the bike frame. Rack tubes with a cross section larger than 2" can complicate the use of smaller U-locks.
Provides security and longevity features appropriate for the intended location	Steel and stainless steel are common and appropriate materials for most general-use racks. Use tamper-resistant mounting hardware in vulnerable locations. Rack finish must be appropriate to the location (see materials and coatings section).
Rack use is intuitive	First-time users should recognize the rack as bicycle parking and should be able to use it as intended without the need for written instructions.

RACK STYLES

The majority of manufactured bike racks fall into one of the categories on pages 6-8. Within a given style, there is wide variation among specific racks, resulting in inconsistent usability and durability. APBP recommends testing a rack before committing broadly to it.

RACKS FOR ALL APPLICATIONS

When properly designed and installed, these rack styles typically meet all performance criteria and are appropriate for use in nearly any application.

INVERTED U
also called staple, loop

Common style appropriate for many uses; two points of ground contact. Can be installed in series on rails to create a free-standing parking area in variable quantities. Available in many variations.

POST & RING

Common style appropriate for many uses; one point of ground contact. Compared to inverted-U racks, these are less prone to unintended perpendicular parking. Products exist for converting unused parking meter posts.

WHEELWELL-SECURE

Includes an element that cradles one wheel. Design and performance vary by manufacturer; typically contains bikes well, which is desirable for long-term parking and in large-scale installations (e.g. campus); accommodates fewer bicycle types and attachments than the two styles above.

This guide analyzes the most common styles of bike racks, but it is not exhaustive. Use the performance criteria on page 5 to evaluate rack styles not mentioned. Custom and artistic racks can contribute to site identity and appearance, but take care that such racks don't emphasize appearance over function or durability.

HIGH-DENSITY RACKS

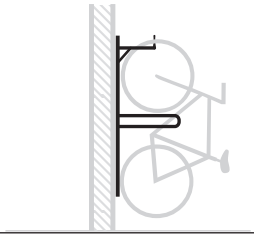
These rack styles do not meet all performance criteria but may be appropriate in certain constrained situations.

High-density rack systems can maximize the use of limited parking space, but they don't work for all users or bicycles. If installing these racks, reserve additional parking that accommodates bicycles with both wheels on the ground for users who are not able to lift a bicycle or operate a two-tier rack, or for bikes that are not compatible with two-tier or vertical racks.

STAGGERED WHEELWELL-SECURE

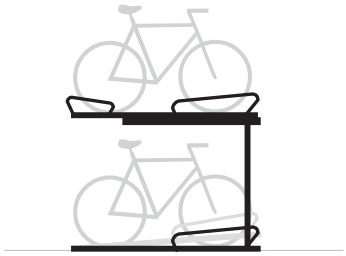
Variation of the wheelwell-secure rack designed to stagger handlebars vertically or horizontally to increase parking density. Reduces usability and limits kinds of bikes accommodated, but contains bikes well and aids in fitting more parking in constrained spaces.

VERTICAL



Typically used for high-density indoor parking. Not accessible to all users or all bikes, but can be used in combination with on-ground parking to increase overall parking density. Creates safety concerns not inherent to on-ground parking.

TWO-TIER



Typically used for high-density indoor parking. Performance varies widely. Models for public use include lift assist for upper-tier parking. Recommend testing before purchasing. Creates safety concerns not inherent to on-ground parking, and requires maintenance for moving parts.

RACKS TO AVOID

Because of performance concerns, APBP recommends selecting other racks instead of these.

WAVE
also called undulating or serpentine

Not intuitive or user-friendly; real-world use of this style often falls short of expectations; supports bike frame at only one location when used as intended.

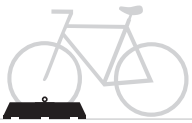
SCHOOLYARD
also called comb, grid

Does not allow locking of frame and can lead to wheel damage. Inappropriate for most public uses, but useful for temporary attended bike storage at events and in locations with no theft concerns. Sometimes preferred by recreational riders, who may travel without locks and tend to monitor their bikes while parked.

COATHANGER

This style has a top bar that limits the types of bikes it can accommodate.

WHEELWELL



Racks that cradle bicycles with only a wheelwell do not provide suitable security, pose a tripping hazard, and can lead to wheel damage.

BOLLARD

This style typically does not appropriately support a bike's frame at two separate locations.

SPIRAL

Despite possible aesthetic appeal, spiral racks have functional downsides related to access, real-world use, and the need to lift a wheel to park.

SWING ARM SECURED

These racks are intended to capture a bike's frame and both wheels with a pivoting arm. In practice, they accommodate only limited bike types and have moving parts that create unneeded complications.

RACK MATERIALS & COATINGS

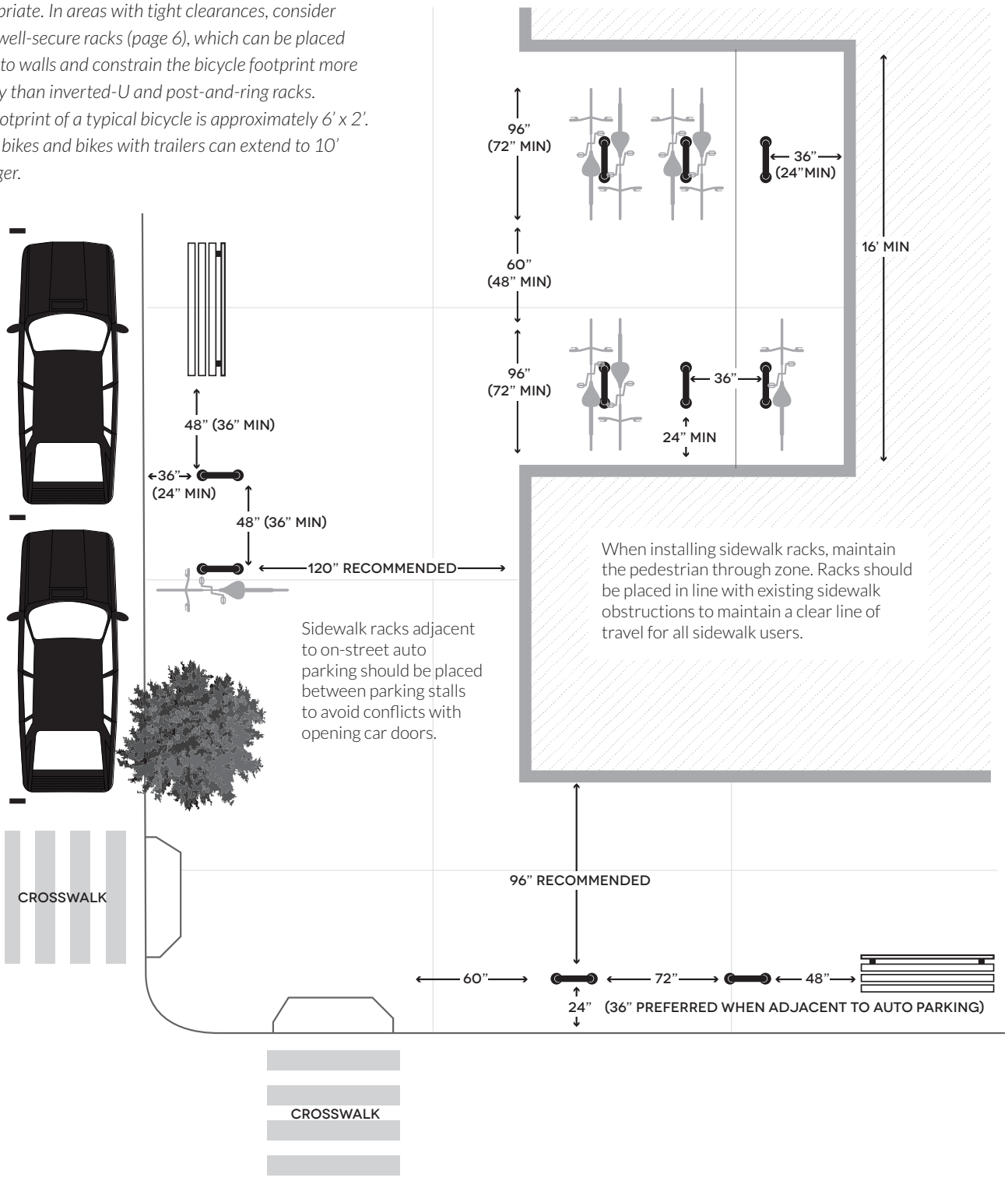
Most bicycle parking racks are made of carbon steel or stainless steel. Carbon steel requires a surface coating to resist rust while appropriate grades of stainless steel need no coating. Not all materials and coatings with the same name perform equally. Square tubing provides a security advantage as round tubing can be cut quietly with a hand-held pipe cutter. Before purchasing racks, talk to suppliers about your particular conditions and choose a material and coating that suit your needs. The following are common choices, depending on local considerations and preferences.

RACK MATERIAL – COATING	RELATIVE PURCHASE COST	DURABILITY	CAUTIONS
Carbon steel - galvanized	Usually lowest	Highly durable and low-maintenance; touch-up, if required, is easy and blends seamlessly	Utilitarian appearance; can be slightly rough to the touch
Carbon steel - powder coat* (TGIC or similar)	Generally marginally higher than galvanized	Poor durability	Requires ongoing maintenance; generally not durable enough for long service exposed to weather; not durable enough for large-scale public installations
Carbon steel - thermoplastic	Intermediate	Good durability	Appearance degrades over time with scratches and wear; not as durable as galvanized or stainless
Stainless steel - no coating needed, but may be machined for appearance	Highest	Low-maintenance and highest durability; most resistant to cutting	Can be a target for theft because of salvage value; maintaining appearance can be difficult in some locations

** When applied to carbon steel, TGIC powder coat should be applied over a zinc-rich primer or galvanization to prevent the spread of rust beneath the surface or at nicks in the finish.*

PLACEMENT

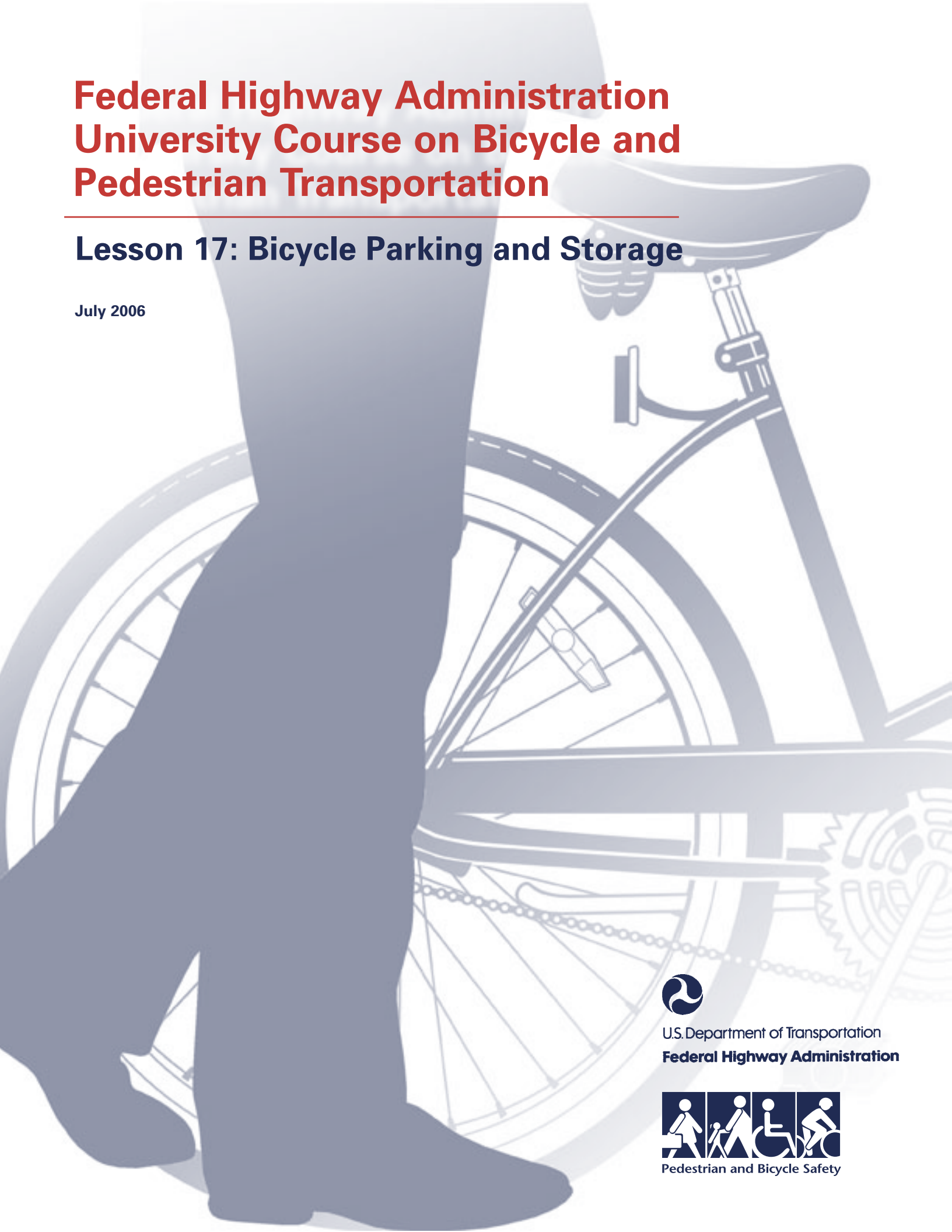
The following minimum spacing requirements apply to some common installations of fixtures like inverted-U or post-and-ring racks that park one bicycle roughly centered on each side of the rack. Recommended clearances are given first, with minimums in parentheses where appropriate. In areas with tight clearances, consider wheelwell-secure racks (page 6), which can be placed closer to walls and constrain the bicycle footprint more reliably than inverted-U and post-and-ring racks. The footprint of a typical bicycle is approximately 6' x 2'. Cargo bikes and bikes with trailers can extend to 10' or longer.



Federal Highway Administration University Course on Bicycle and Pedestrian Transportation

Lesson 17: Bicycle Parking and Storage

July 2006



U.S. Department of Transportation
Federal Highway Administration

Pedestrian and Bicycle Safety

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	$candela/m^2$	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	$candela/m^2$	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

Table of Contents

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LESSON 17:

BICYCLE PARKING AND STORAGE

17.1 Introduction

Bicycle parking is an important supporting element in bicycle programs. Quite simply, bicyclists need a safe and convenient place to park or store their bicycles along or at the end of most trips. This lesson contains the following information on developing an effective bicycle parking program: basic bicycle parking strategies; bicycle rack designs, specifications, and costs; and bicycle parking ordinances. The major sections of this lesson are as follows:

- 17.1 Introduction.
- 17.2 Overview of the Problem.
- 17.3 Overview of Bicycle Parking Strategies.
- 17.4 Implementing Bicycle Parking Strategies.
- 17.5 Student Exercise.
- 17.6 References and Additional Resources.

This lesson on bicycle parking and storage has been primarily derived from the "Bicycle Parking" chapter of *Implementing Bicycle Improvements at the Local Level*.[1] Other sources of information are listed at the end of the lesson.

17.2 Overview of the Problem

Providing secure bicycle parking is a key ingredient in efforts to encourage bicycling at the local level (see figure 17-1). Many bicycle trips end somewhere other than the bicyclist's home, and as a result, the bicyclist must park his or her bicycle. And for those who live in apartment complexes, college dormitories, or other high-density settings, the issue of where to leave a bike while at home is also a serious issue. In short, at one time or another, most bicyclists have experienced the frustration of finding no secure place to leave their bikes.

While providing secure bicycle parking is not the entire solution to the problem of theft, it certainly can help, and it can increase bicyclists' comfort in leaving their bicycles unattended. As a result, many bicycle owners may be encouraged to make bicycle trips that they might otherwise forego.

Figure 17-1. Photo. Effective bicycle parking improves security and reduces theft.

17.3 Overview of Bicycle Parking Strategies

An effective bicycle parking program should include the following basic strategies:

- **Provide bicycle parking in public rights-of-way.** Provide well-located secure bicycle parking at popular destinations in business districts and at other public sites:

  - Install bicycle parking at public centers.
  - Install bicycle parking on public rights-of-way in neighborhood commercial and downtown business districts.
  - Encourage private businesses to provide bicycle parking for their customers.
  - Install bicycle parking at transit stops and in parking garages.
  - Encourage the installation of high-security bicycle parking at existing worksites, schools, and high-density residential developments.

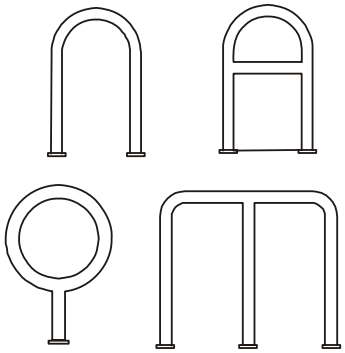
- **Provide bicycle parking in private development.** Encourage bicycle parking at existing developments and require new commercial, public, and high-density residential developments to include plans for bicycle parking:

  - Encourage existing businesses to provide bicycle parking for their customers.
  - Add provisions to local zoning regulations requiring bicycle parking as part of new developments, particularly commercial, public, and high-density residential developments.
  - Make these requirements part of the process of getting a building permit.

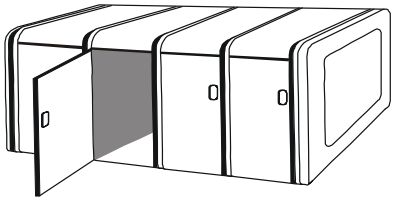
Typically, the provision of bicycle parking at public facilities helps to convince business owners of the need for bicycle parking on private development. The use of zoning regulations or bicycle parking ordinances helps in the long-term to ensure bicycle parking in newly developed areas.

Bicycle parking can be provided for these strategies using three types of devices (see figure 17-2):

1. **Bicycle racks.** These are open-air devices to which a bicycle is locked and work well for short-term parking.
2. **Bicycle lockers.** These are stand-alone enclosures designed to hold one bicycle per unit and are a good choice at sites that require long-term parking for a variety of potential users.
3. **Bicycle lock-ups.** These are site-built secure enclosures that hold one or more bicycles and are often used for long-term parking for a limited number of regular and trustworthy users.



Bicycle Racks



Bicycle Locker

Bicycle Lock-up
(*Note cage enclosure*)

Figure 17-2. Illustrations and photo. Examples of common bicycle parking devices.

17.4 Implementing Bicycle Parking Strategies

This section describes one possible approach to implement bicycle parking. Other approaches are possible and encouraged, particularly if the bicycle parking program is managed by city or county government. This approach is organized chronologically by major steps.

Step 1—Identify Key Implementers

Each of the strategies described previously requires the cooperation of a different group of constituencies. Bicycle parking in public spaces requires the cooperation of public agencies who control or manage the property involved. Sidewalks are typically controlled by the streets or public works department, whereas a parks and recreation department typically has responsibility for open spaces and recreational areas. There may be an agency (similar to the Federal Government's General Services Administration) in charge of all public property. Or agencies that run specific services (e.g., libraries, public health clinics) may control their own sites.

Encouraging businesses to install bicycle parking may require the cooperation of such groups as the local chamber of commerce, downtown business association, or shopping center manager. In addition, agencies that routinely deal with businesses should be enlisted as outlets for any literature developed as part of the program.

Altering zoning regulations to require consideration of bicycle parking in new developments requires close cooperation with city planning and zoning agency staff, as well as assistance from appointed zoning boards and builders' associations. Typically, regulations are revised on a schedule; therefore, the time or opportunity to revisit bicycle parking requirements will need to be coordinated with these schedules.

Step 2—Structure the Program

In some communities, a reactive program that simply fills orders and answers questions can be successful. This success would be most likely in a bicycle-friendly community with a high degree of interest in bicycling matters. However, in many places, a reactive approach will result in little and disorganized response. Business owners and managers of large employment centers or residential complexes often see bicycles as clutter and a problem to be eliminated rather than as a solution to traffic congestion or air quality problems. As a result, a successful bicycle parking program should include elements of marketing and promotion.

With the help of the key implementers identified in step 1, one could create three ad hoc task groups to cover three primary thrusts. The groups should create the ground rules and materials necessary for the following tasks:

- Task Group 1: Public Bicycle Parking.
    - Install bicycle parking at public centers.
    - Install bicycle parking on public rights-of-way.
    - Install bicycle parking at transit stops and in parking garages.
- Task Group 2: Private Bicycle Parking.
    - Encourage private businesses to provide bicycle parking for their customers.
    - Encourage installation of high-security bicycle parking at worksites, schools, and high-density residential developments.
- Task Group 3: Zoning Regulation Revision.
    - Add provisions to local zoning regulations requiring bicycle parking.
    - Make these requirements part of the process of getting a building permit.

Step 3—Identify Priority Locations that Need Bicycle Parking

The International Bicycle Fund (IBF) provides the following information on identifying locations for bicycle parking:[2]

> Various mechanisms can be used for determining where bicycle parking is needed. Almost all the ones that are sited with bicyclist input are in heavy use. It is more likely that those sited for political consideration will be underutilized. Siting bicycle parking doesn't have to be scientific. Some of the best deterrents for bicycle parking are:
>
> - **Visual observation:** Look for where bikes are parked illegally due to lack of legal parking. The (car) parking patrol people can probably do this for you in a week.
>
> - **User input:** Ask bicyclists (through clubs or advocacy groups) to create a list of most-needed spots for bike parking.
>
> - **Land use criteria:** Target every coffee shop, bookstore, video arcade, teen/young adult clothing store.
>
> - **Public-private partnership:** Have a grant program whereby businesses can request bike parking for customers and employees, paying for the installation themselves, but getting the racks paid for by the grant.
>
> - **Building code:** Require all new development or change of business to install bike parking proportionate to car parking requirements.
>
> More scientific criteria may be useful for determining exactly what kind of bicycle parking device to install and exactly where.
>
> - **Visibility:** Cyclists should easily spot short-term parking when they arrive from the street. A highly visible location discourages theft and vandalism. Avoid locations “off on the side,” “around the corner” or in un-supervised parking structures or garages.
>
> - **Access:** The parking area should be convenient to building entrances and street access, but away from normal pedestrian and auto traffic. Avoid locations that require bicycles to travel over stairs.
>
> - **Security:** Surveillance is essential to reduce theft and vandalism. For security, locate parking within view of passersby, retail activity, or office windows. Better yet: officially assign building security, a parking lot attendant, or other personnel to watch for suspicious behavior.
>
> - **Lighting:** Bicycle parking areas should be well lit for theft protection, personal security and accident prevention.
>
> - **Weather protection:** Whenever possible, protect bicycle parking area from weather. An existing overhang or covered walkway is recommended.

Alternatively, construct a canopy or roof—either freestanding or attached to an existing building.

- **Avoid conflict with pedestrians:** Locate racks so that parked bicycles don't block the pedestrian path. Select a bike rack with no protruding bars that could trip or injure cyclists or pedestrians. Very low bar-type racks can be a hazard to pedestrians and are not recommended.

- **Avoid conflict with automobiles:** Separate bicycle parking, auto parking, and road areas with space and a physical barrier. This prevents motor vehicles from damaging parked bicycles and keeps some thieves at a distance. Most professional bike thieves use vans or similar vehicles to hide their activities and make a getaway with their loot concealed. The closer bicycle parking is to automobile parking, alleys, roads, etc., the better the opportunity for a bike thief.

The following location criteria have been gathered from guidelines used by the cities of Denver and Seattle for placing bicycle racks:

- Racks should be located within 15.2 meters (m) (50 feet (ft)) of building entrances (where bicyclists would naturally transition into pedestrian mode).

- Racks should be installed in a public area within easy viewing distance from the main pedestrian walkway, usually on a wide sidewalk with 1.5 m (5 ft) or more of clear sidewalk space remaining (a minimum of 61 centimeters (cm) (24 inches) of clear space from the parallel wall and 76 cm (30 inches) from the perpendicular wall).

- Racks are placed to avoid conflicts with pedestrians. They are usually installed near the curb and at a reasonable distance from building entrances and crosswalks.

- Racks can be installed at bus stops or loading zones only if they do not interfere with boarding or loading patterns and there are no alternative sites.

Step 4—Choose Appropriate Bicycle Parking Devices

As described earlier, bicycle parking can be accomplished with three basic devices: racks, lockers, or lock-ups (see figure 17-2). Packets of information should be assembled for available bicycle parking devices, along with the pros and cons of each device. In a joint meeting(s) with all three task groups, adopt a set of criteria and decide which devices are to be endorsed. Typical criteria used to evaluate bicycle parking devices are security (and how well the device works with common bicycle locks), durability and resistance to vandalism, ease of use, aesthetics, and cost.

The Association of Pedestrian and Bicycle Professionals (APBP) publication, *Bicycle Parking Guidelines*, suggest that bicycle racks should:[3]

- Support the bicycle upright by its frame in two places.
- Prevent the wheel of the bicycle from tipping over.
- Enable the frame and one or both wheels to be secured.
- Support bicycles without a diamond-shaped frame with a horizontal top tube (e.g., a women's or other frame).

- Allow front-in parking: a U-lock should be able to lock the front wheel and the down tube of an upright bicycle.
- Allow back-in parking: a U-lock should be able to lock the rear wheel and the seat tube of the bicycle.
- Resist being cut or detached using common hand tools.

The American Association of State Highway and Transportation Officials' (AASHTO) *Bicycle Guidelines* recommend that bicycle racks should:[4]

- Not bend wheels or damage other bicycle parts.
- Accommodate high-security U-shaped bike locks.
- Accommodate locks securing the frame and both wheels (preferably without removing the front wheel from the bicycle).
- Not impede or interfere with pedestrian traffic.
- Be easily accessed from the street and protected from motor vehicles.
- Be visible to passersby to promote usage and enhance security.
- Be covered where users will leave their bikes for a long time.
- Have as few moving parts as possible.
- Accommodate a wide range of bicycle shapes and sizes.
- Be simple to operate.

Figure 17-3 illustrates a variety of bicycle racks that meet these requirements, whereas figure 17-4 illustrates types of bicycle racks that are not recommended because they fail to meet one or more of these requirements. The average cost for typical bicycle racks ranges from $75 to $100 per rack; a single rack typically holds one or two bicycles. The cost for bicycle lockers ranges considerably more, from about $500 to $1,500 per bicycle.

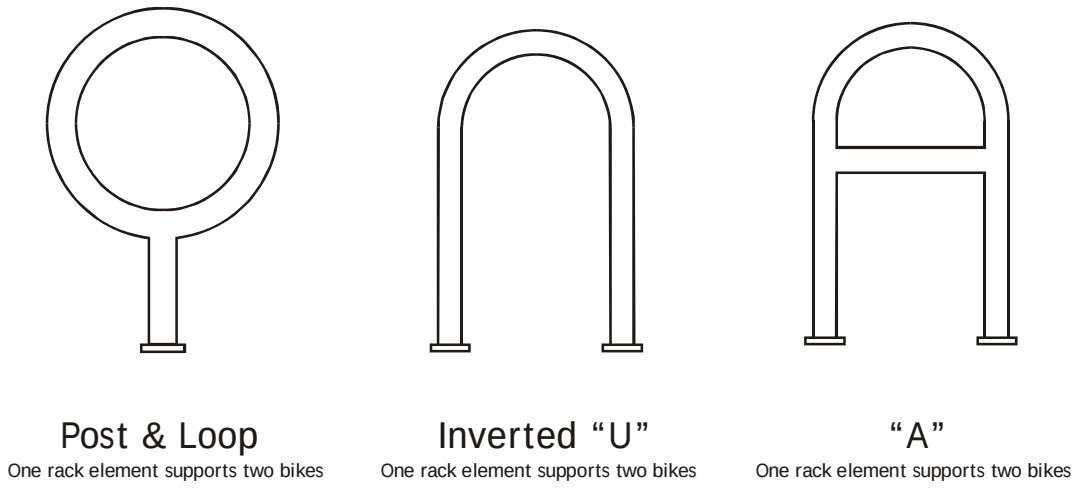
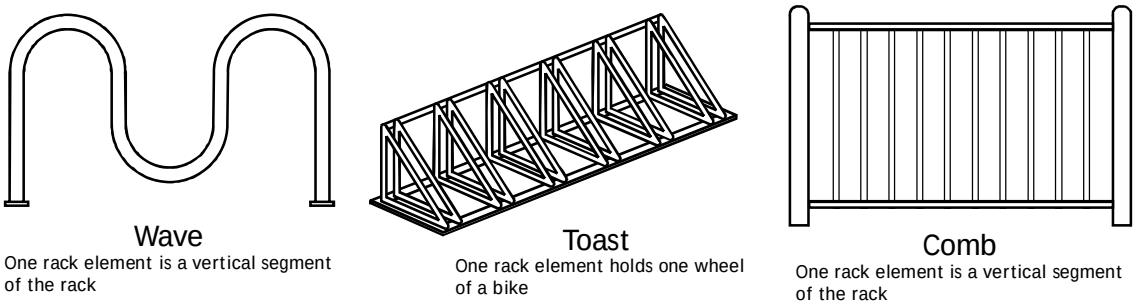


Figure 17-3. Illustrations. Recommended types of bicycle racks.
Source: *Bicycle Parking Guidelines*[3]



These bicycle racks are not recommended

Figure 17-4. Illustrations. Bicycle rack types that are not APBP-recommended.
Source: *Bicycle Parking Guidelines*[3]

In addition to the basic bicycle rack design, the layout of bicycle rack areas will need to be designed. The APBP *Bicycle Parking Guidelines* provides some minimum recommended dimensions for bicycle rack areas (see figure 17-5).[3] Their guidelines also suggest that large rack areas with a high turnover rate have more than one entrance. If possible, the rack area should be protected from weather elements.

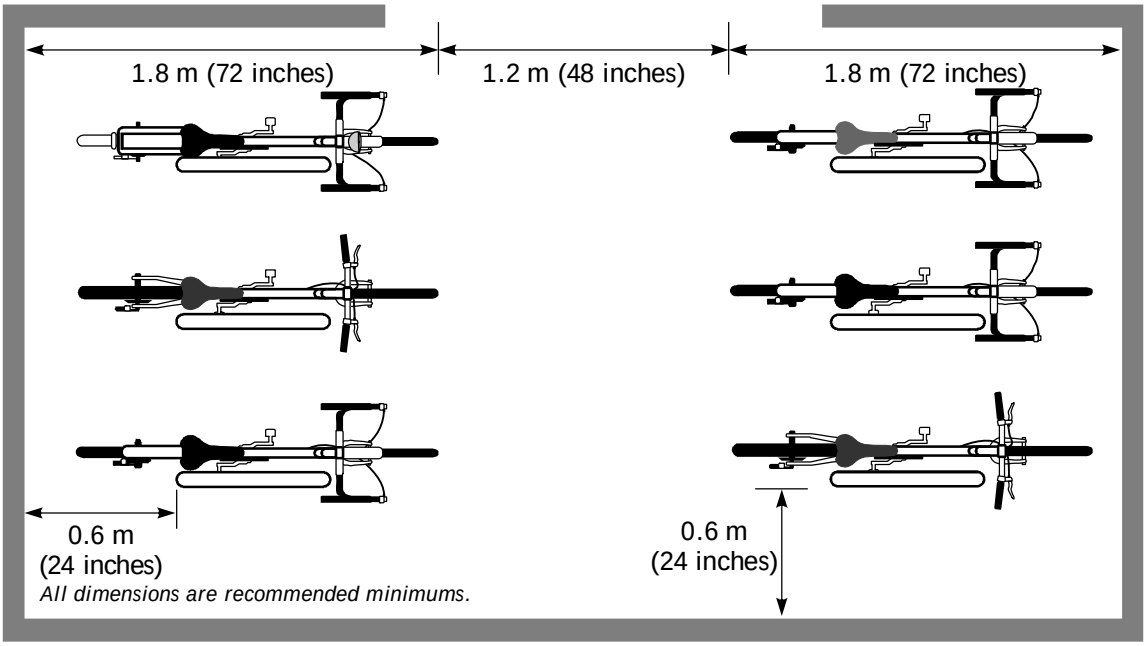


Figure 17-5. Illustration. APBP-recommended design dimensions for bicycle rack areas.
Source: *Bicycle Parking Guidelines*[3]

Step 5a—Tasks for Developing Public Bicycle Parking

The first task group should set criteria for installing bicycle parking on sidewalks as well as at public destinations. For sidewalks, criteria could include such items as minimum width of sidewalk, rack position on sidewalk and proximity to other street furniture and vegetation, and number per block or number per site. For public sites, they could include proximity to the main entrance, and minimum number of bicycle parking spaces per installation (i.e., based on the type of facility served).

Next, they should create a step-by-step procedure for planning and installation. This should include initial identification of the potential site, discussion with relevant agency personnel, determination of the specific site's needs (number of parking devices and location), cost analysis and budgeting, procurement, installation, and followup.

To support this activity, they should create a project sheet for rack installation that includes places for the source of the request (if any), signatures of any required agency personnel, a schematic diagram of the site, installation date, and any comments.

Next, they should estimate the total bicycle parking need for public places given a list of potential sites. Estimates can be conservative and based to some extent on existing bicycle traffic, as long as participants recognize that latent demand may be significant. For this reason, phased installation may be particularly appropriate.

For sidewalks, a base number of racks to be installed during a fiscal year (e.g., 100, 500, or 750) should be decided, along with a map showing priority areas. For instance, downtown might be a top-priority area, neighborhood commercial areas could be second, and strip development areas might be third.

Finally, the first task group should set an annual budget for the program and decide how the bicycle parking will be funded. Potential sources include a wide variety of Federal transportation programs, as well as local funding opportunities.

Step 5b—Tasks for Developing Private Bicycle Parking

The second task group should assemble a packet of information for potential private-sector bicycle parking providers. The packet should include a cover letter describing the importance of bicycle parking to businesses and giving any organizational endorsements for the program; a list of available parking devices, along with information on how to order them and which are best suited for which settings; tips on deciding how many bikes need to be accommodated; and tips on locating and installing the devices.

The second task group should also work out details of any promotional activities that will need to be planned. For instance, they should develop a list of groups to talk with, determine who should be responsible for reaching each one, and start making contacts. To this end, the task group should develop a standard presentation, possibly including slides and handouts.

Step 5c—Tasks for Revising Zoning Regulations

The third task group should start by identifying passages in the existing zoning codes where motor vehicle parking is discussed. They should find out when the regulations are going to be modified and use that in determining their schedule of work. They should then assemble sample bicycle parking laws from other communities. Based on the sample laws, they should create a draft revision to the regulations and circulate it for comment. Once comments have been received and considered, they should forward a final draft revision for action at the proper time.

Based upon examples from several locations (e.g., Ann Arbor, MI, Madison, WI, Denver, CO, and San Francisco, CA), bicycle parking ordinances should include these elements:

1. **Number of spaces required.** Bike parking ordinances should clearly indicate how many bicycle parking spaces are required, either as a function of the type of development (retail, office, residential, etc.) or as a standard percentage of the required off-street automobile parking. For

example, the City of Denver requires that off-street automobile parking facilities of 20 spaces or more provide bicycle parking equal to 5 percent of the automobile parking space requirement.

2. **Type(s) of permitted racks.** Bicycle racks that support the bike by the wheel should not be permitted.

3. **Location of bicycle racks.** Bicycle racks should be located at least as close to the building entrance as to the nearest parking space (excluding accessible parking spaces).

4. **Other elements.** The requirements can also address lighting of bicycle racks, requirements to retrofit existing public buildings, and protection from weather.

A growing number of communities have included bicycle parking requirements in their development regulations. By so doing, they ensure that bicycle parking is included in the normal course of development. Figure 17-6 contains excerpts about bicycle parking from the off-street parking ordinance in Madison, WI.[5] Figure 17-7 illustrates the City of Philadelphia's standard for bicycle rack placement in business districts.[6] Bicycle parking ordinances from numerous other cities can be found by searching a particular city's website for their planning, development, or land use ordinances.

Step 6—Implement the Program

With the program established, materials prepared, and initial funding identified, implementation of the program can begin. Routine responsibilities for the various tasks should be taken care of by the agencies identified through the previous steps. Oversight of the program may require the attention of a project coordinator. This may be a task delegated to a member of the planning department or public works staff.

Step 7—Evaluate Progress

As the work is proceeding, keep track of successes and failures. Early on, get the word out to the bicycling public that: (1) the program exists and (2) they should submit comments and ideas for potential parking sites. Keep a record of how many parking devices have been installed, how many comments have been received, how many information packets have been sent out, what proportion of public places has adequate bicycle parking, how well the parking is working (i.e., whether the public likes it, whether it holds up well to vandalism), and how successful the zoning regulations appear to be (once they are adopted). Use this feedback to fine-tune the program and determine future levels of funding.

Excerpts from "28.11 OFF-STREET PARKING AND LOADING FACILITIES"

(1) Statement of Purpose

…

(d) Providing adequate and safe facilities for the storage of bicycles.

(2) General Regulations

(a) Scope of Regulations

…

4. Bicycle parking facilities shall be provided as required for all new structures and uses established as provided in Sec. 28.11(2)(a)1. or for changes in use as provided in Secs. 28.11(2)(a)2. and 3; however, bicycle parking facilities shall not be required until the effective date of this paragraph. Notwithstanding Secs. 28.08(1)(i), 28.09(1)(i), and 28.09(5)(a), bicycle parking facilities shall be provided in all districts including districts in the Central Area.

…

(3) Off-Street Parking Facilities

(a) Utilization

1. In the residence district, accessory off-street parking facilities provided for uses listed herein shall be solely for the parking of passenger automobiles (including passenger trucks) and bicycles of patrons, occupants, or employees. Such vehicles are limited in size to less than one (1) ton in capacity.

…

(e) Size … Required bicycle parking spaces shall be at least 0.6 m by 1.8 m (2 ft by 6 ft). An access aisle of at least 1.5 m (5 ft) shall be provided in each bicycle parking facility. Such space shall have a vertical clearance of at least 1.8 m (6 ft).

…

(h) Design and Maintenance. … 2. d. Bicycle Parking Facilities. Accessory off-street parking for bicycle parking shall include provision for secure storage of bicycles. Such facilities shall provide lockable enclosed lockers or racks or equivalent structures in or upon which the bicycle may be locked by the user. Structures that require a user-supplied locking device shall be designed to accommodate U-shaped locking devices. All lockers and racks must be securely anchored to the ground or the building structure to prevent the racks and lockers from being removed from the location. The surfacing of such facilities shall be designed and maintained to be mud and dust free.

…

(i) Location. … 3. Bicycle parking facilities shall be located in a clearly designated safe and convenient location. The design and location of such facility shall be harmonious with the surrounding environment. The facility location shall be at least as convenient as the majority of automobile parking spaces provided.

…

(l) Schedule of Required Off-Street Parking Facilities. … 1. Bicycle parking facility spaces shall be provided in adequate number as determined by the Zoning Administrator. In making the determination, the Zoning Administrator shall consider when appropriate, the number of dwelling units or lodging rooms, the number of students, the number of employees, and the number of automobile parking spaces in accordance with the following guidelines:

(continued on next page)

Figure 17-6. Photo. Excerpts from off-street parking ordinance in Madison, WI.

Source: *Code of Ordinances*[5]

(l) Schedule of Required Off-Street Parking Facilities (continued)

Off-Street Bicycle Parking Guidelines

Land Use	Bike Space
Dwellings/lodging rooms	1 per dwelling unit or 3 lodging rooms
Clubs/lodges	1 per lodging room plus 3% of person capacity
Fraternities/sororities	1 per 3 rooms
Hotels/lodging houses	1 per 20 employees
Galleries/museums/libraries	1 per 10 automobile spaces
Colleges/universities/junior high and high schools	1 per 4 employees plus 1 per 4 students
Nursery/elementary schools	1 per 10 employees plus students above second grade
Convalescent and nursing homes/institutions	1 per 20 employees
Hospitals	1 per 20 employees
Places of assembly, recreation, entertainment, and amusement	1 per 10 automobile spaces
Commercial/manufacturing	1 per 10 automobile spaces
Miscellaneous/other	To be determined by the Zoning Administrator based on the guidelines for the most similar use listed above

(l) 1. a. In all cases where bicycle parking is required, no fewer than two spaces shall be required.
b. After the first fifty (50) bicycle parking spaces are provided, additional bicycle parking spaces required are 0.5 (one-half) space per unit listed.
c. Where the expected need for bicycle parking for a particular use is uncertain due to unknown or unusual operating characteristics of use, the Zoning Administrator may authorize that construction and provision of not more than 50 percent of the bicycle parking spaces be deferred. Land area required for provision of deferred bicycle parking spaces shall be maintained in reserve.
…

Figure 17-6. Photo. Excerpts from off-street parking ordinance in Madison, WI—*Continued*
Source: Madison, WI, *Code of Ordinances*[5]

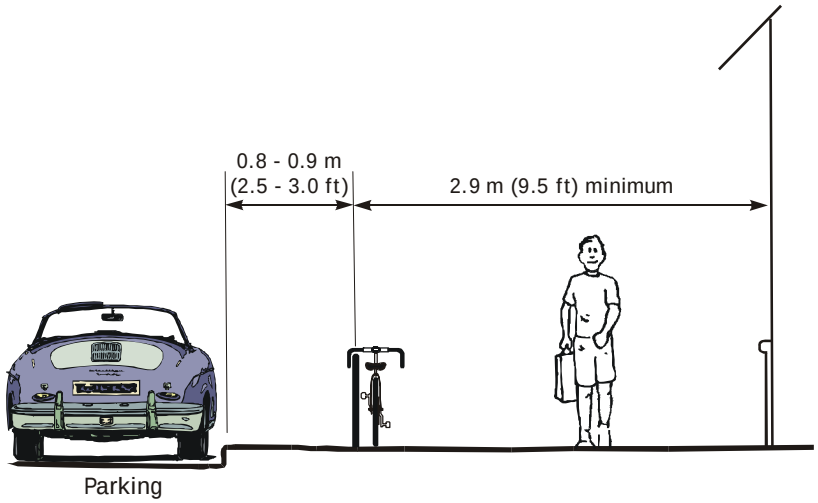


Figure 17-7. Illustration. Philadelphia's standard for bike rack placement in business districts.

Source: *City of Philadelphia Bicycle Parking Specifications*[6]

17.5 Student Exercise

Exercise A

Do an inventory of need for bicycle storage facilities and a preliminary site design for an activity center in your community.

Exercise B

Develop a bicycle parking ordinance for your local community. Have students consider the features discussed in this chapter.

17.6 References and Additional Resources

The references for this lesson are:

1. Williams, J., B. Burgess, and B. Wilkinson, *Implementing Bicycle Improvements at the Local Level*, Federal Highway Administration, Publication No. FHWA-RD-98-105, Washington, DC, 1998.

2. *Bicycle Parking Criteria, Bike Rack, Bicycle Locker, Cycle Stands & Bike Storage Systems*, International Bicycle Fund, 2004, available online at http://www.ibike.org/engineering/parking.htm, accessed March 9, 2004.

3. *Bicycle Parking Guidelines*, Association of Pedestrian and Bicycle Professionals, Spring 2002, available online at http://www.apbp.org/pdfs/bikepark.pdf or http://www.bicyclinginfo.org/pdf/bikepark.pdf, accessed March 23, 2004.

4. *Guide for the Development of Bicycle Facilities*, American Association of State Highway and Transportation Officials, Washington, DC, 1999.

5. *Code of Ordinances*, City of Madison, WI.

6. *City of Philadelphia Bicycle Parking Specifications*, 1998.

Additional resources for this lesson include:

- *Bicycle Parking*, Bicycling Info Website, available online at http://www.bicyclinginfo.org/de/park.htm, accessed April 12, 2004.

- *Bicycle Parking Facility Guidelines*, City of Portland,OR, Office of Transportation, available online at http://www.trans.ci.portland.or.us/bicycles/parkguide.htm, accessed April 20, 2004.

- Fletcher, Ellen, *Bicycle Parking*, 1990.

- *Pro Bike News*, Bicycle Federation of America, April 1996.

- *Source Book of Designs, Manufacturers, and Representatives*, Bicycle Federation of America, 1992.

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