

## Appendix B

### Bicycle Parking Rack Selection<sup>1</sup>

#### **Background**

Madison's zoning ordinance regarding bicycle parking [MGO 28.11, see esp. Subsections (3)(e) and (3)(h)2d] specifies some basic bicycle parking space and rack design criteria. These design criteria are based on the dimensions of standard adult sized bicycles, and the spatial needs for accessing each space. This is similar to the City's car parking lot design requirements. The table below lists typical bicycle dimensions, and the resultant design criteria included in the ordinance.

Measurement	Typical Dimension	Madison Zoning Ordinance Design Criteria
Width		2 feet
Drop Handlebars (road bike)	15 - 18 inches	
Flat Handlebars (mountain bike / hybrid)	20 - 24 inches	
Pedals	16 inches	
Length of Bicycle	68 inches	6 feet
Access Aisle		5 feet
Vertical Clearance (adult height)		6 feet

In addition to meeting these spatial requirements, bicycle parking racks must also accommodate the use of all popular locking devices used by bicyclists. These include U-shaped locks such as Kryptonite, Citadel, the Bike Club and others that have similar designs. Most bicyclists use a U-lock to lock the front wheel and bicycle frame to something solid. Some bicyclists will lock the back wheel and frame, and a few will remove the front wheel and lock it along with the back wheel and frame to something solid. The rack should accommodate any and all of these ways of using a U-shaped lock.

It should be noted that these design criteria are not unique to Madison. Most other communities across the country that require bicycle parking as part of their zoning ordinances (and there are many such communities) have similar design criteria. Despite the commonness of these design criteria, few manufacturers of bicycle parking racks build racks to meet them. Below is a discussion of criteria for evaluating bicycle parking racks.

Madison's ordinance also specifies criteria for the location of bicycle parking racks on the property. "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 auto parking spaces provided." Further, "All . . . racks shall be securely anchored to the ground or building structure . . . [and] . . . the surface of such facilities shall be designed and maintained to be mud and dust free." [MGO 28.11(3)(I)3 and 28.11(3)(h)2d]

<sup>1</sup> Source: City of Madison Department of Transportation

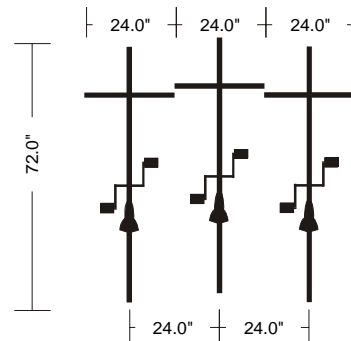
In general, bicycle parking should be located in a visible location, as close to the building entrance as possible. The area should also be lit at night. Bicycle parking located in areas where many people pass by decreases the chances that a bike thief will have time to steal a bike. Bike racks located in remote areas, behind fences or shrubs, or out back by the dumpster, for example, give bike thieves cover and time to steal bicycles. Poor rack locations will lead to the racks not being used as bicyclists will have a hard time finding them, or will find something closer the their destination to lock up to.

**Criteria for Evaluating Bicycle Parking Racks**

The best racks have the following qualities:

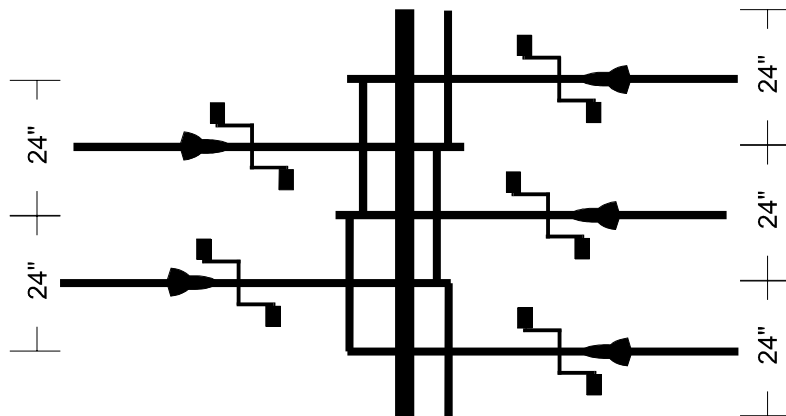
- Spaces clearly at least 2 feet wide (2 feet from center of one space to center of adjacent spaces is another way to conceptualize this. See figure 1);
- Simple design that needs no explanation as to how the rack works (which direction does the bike go in, how is the lock attached, every space is useable for any standard bicycle with typical accessories such as lights and fenders, etc.),the rack is difficult to mis-use, and will not cause problems for others (either other bicyclists using the rack, or pedestrians).
- Each space accommodates all types of user supplied locking mechanisms, including U-shaped locks, with the lock used to lock the bicycle frame and wheel(s) to the rack.
- Spaces that are clearly designated for each bicycle (it is obvious to the user where each space is) whether the rack is designed for single or double sided loading. For example, a rack designed for double sided loading with four bicycles on each side at two foot spacings is placed near a wall resulting in single sided use of the rack. Does the user see 8 one foot wide spaces or four two foot wide spaces? This type of confusion can lead to either fewer spaces being available as bicycles are loaded randomly into the spaces, or crowding and difficulty getting bicycles out if users try to squeeze more bikes in than the rack is designed to hold. Note that these problems will occur with this type of rack under double sided loading conditions as well.

**Figure 1**

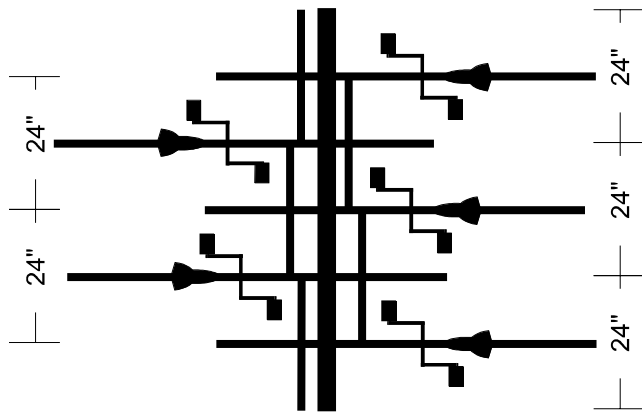


**Special Considerations for Double-Sided Rack Design**

Racks that are intended for loading bicycles from both sides can park more bicycles in given width, but require additional length for both the second row of bicycles plus a second access aisle. Note, however, that the width savings will only occur as long as the handlebars of the bicycles parked on each side do not overlap. If the handlebars overlap (as with wave or loop type racks), then the width space savings of double-sided loading racks is lost. Figures 2 - 4 illustrate this point.



**Figure 2** Double-sided rack, handlebars do not overlap the rack. Five bikes can be parked in the width of three, provided the location has adequate length (20 feet total: 10 feet for bicycles, assuming 1 foot of overlap, plus two 5-foot access aisles, one behind each row of bicycles).



**Figure 3** *Double-sided rack, handlebars overlap rack.* Even though spaces on each side are 2 feet wide, it is difficult for the user to place/remove bicycle into/from the rack without having to lift the bike up and over other bicycles. This design is unacceptable.

**Figure 4** *Double-sided racks where the handlebars overlap the rack* require a full 2 foot width for each bicycle regardless of which side the bicycle is loaded from, thus there is no width saving from double sided loading with this design.

Note also that the height of the rack should be below the handlebars so that the bicycles do not have to be lifted up and over the rack.

A single sided rack will save space lengthwise, or a double sided rack where the handlebars do not overlap the rack will better utilize the space, accommodating more bicycles.

Different racks will be more or less appropriate for different locations. For more information on bicycle rack designs generally, or for specific rack information, contact the City of Madison's Bicycle Coordinator at 266-6225.

