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Section 310 General

All bikeway and pedestrian facility development and construction provided and intended for public use shall conform to the following standard specifications. In addition, the City uses the Oregon Bicycle and Pedestrian Plan published by the Oregon Department of Transportation and the Guide for Development of Bicycle Facilities published by the American Association of State Highway and Transportation Officials as guidelines in design of bikeway and pedestrian facilities.

Additional sources of information are the Beaverton Active Transportation Plan the Washington County Bicycle Facility Design Toolkit and the National Association of City Transportation Officials (NACTO).

Section 320 Shared-Use Paths

320.1 Width and Clearance

The minimum paved width for shared-use paths shall be twelve (12) feet. In extenuating circumstances that are due to unique topographic or other constraints such as transitions to existing narrower paths, the City Engineer may approve path widths as narrow as eight (8) feet. A path width of 14 feet is desirable in areas with high density and mixed use and in areas where a high volume of path users is expected.

A minimum 1-foot width clear area shall be maintained adjacent to both sides of the pavement; however, two (2) feet or more is desirable to provide clearance from trees, poles, walls, fences, guardrails, or other lateral obstructions.

The vertical clearance to obstructions shall be a minimum of eight (8) feet. However, vertical clearance may need to be greater to permit passage of maintenance vehicles and, in undercrossing and tunnels, a vertical clearance of ten (10) feet is desirable for adequate vertical clearance.

320.2 Horizontal Curves

Shared-use path horizontal curves shall have a minimum 35-foot centerline curve radius. Easements or right-of-way shall be provided as needed to preserve required sight distance.

The super-elevation rate (i.e., a raised elevation of one side of the path) may vary from a minimum of two (2) percent (the minimum necessary to provide adequate drainage) to a maximum of five (5) percent (beyond which maneuvering difficulties by slow bicyclists and adult tri-cyclists might be expected).

320.3 Pavement Structure

See the table associated with Figure 210.1 in Chapter 2 for the minimum acceptable pavement structure. The path subgrade shall be placed over a soil surface stripped free of any organic material and compacted to 95 percent dry density.

Pavement design is required for heavy vehicle traffic. Confer with the City to determine the appropriate design vehicle.

Concrete pavement, of a comparable design section, is an acceptable path surface alternative. Longitudinal joints should be avoided.

320.4 Grade

Steep grades on shared-use paths should be avoided, especially long inclines. Grades steeper than six (6) percent are undesirable because the ascents are difficult for many bicyclists to climb and the descents cause some bicyclists to exceed the speeds at which they are competent. Where terrain dictates, grades over six (6) percent and less than 100 feet in length are acceptable if adequate sight distance and stopping distances are provided. In areas of generally steep terrain, it may be desirable to meander path alignments in order to attain reasonable grades for steep slope ascent. In no case should the approach grade of the intersection of a shared-use path to a sidewalk or street exceed six (6) percent for the last 50 feet.

320.5 Sight Distance

Adequate sight distance should be provided at curves and intersections to maintain user safety. Along the path, a minimum sight distance of 125 feet shall be provided. On two-way paths, a minimum sight distance of 250 feet is desirable. At path intersections with streets or other paths, all abutting fences, landscaping, and other objects interfering with users' line of sight shall not exceed three (3) feet in height above the path centerline grade for 15 feet from the intersecting right-of-way.

320.6 Landscaping

There are several important design considerations to review when selecting materials and planning planting schemes. Trees are the primary concern regarding location and variety.

Specifically, placement and selection of trees should evaluate:

A. Tree rooting characteristics - to avoid potential path surface upheaval.

B. Tree size - trees should be of satisfactory caliper to permit a minimum trimmed height of eight (8) feet to the lowest branch.

C. Tree placement - to avoid creating "hiding" areas or permitting foliage to block path lighting (if present).

D. Foliage characteristics - The fallen leaves from many species of deciduous trees can create voluminous leaf piles and slippery hazards during the fall season of the year. Therefore, judgment should be given to tree selection based on the respective foliage "shedding" characteristics and the potential to produce resultant hazards.

Selection of shrubbery, bushes, and ground covers should include low maintenance varieties that are drought hardy, require little pruning, and are low growing (under three (3) feet at mature height). Location and placement of these materials should not promote growth over or onto the path surface.

All proposed plant materials shall be approved by the Landscape Section of the Operations Department.

320.7 Intersections

When intersections occur at grade, a major consideration is the establishment of right-of-way. The type of traffic control to be used (signal, stop sign, yield sign, etc.) shall be selected by application of the warrants in the *MUTCD*. Bicycles shall be counted as vehicles in these determinations, and thus bicycles may be given priority at some intersections.

Shared-use path intersections and approaches should be on relatively flat grades (see sections on Grade and Sight Distance). Stopping sight distances at intersections should be checked and adequate warning should be given to permit bicyclists and other users to stop before reaching the intersection, especially on downgrades.

Where a shared-use path intersects another shared-use path, a minimum radius of five (5) feet shall be provided at all corners of the intersection.

Where ramps are used at street intersections, the ramp shall have a minimum width of eight (8) feet.

320.8 Signing and Marking

Signing and markings shall be provided in accordance with the *MUTCD*.

320.9 Structures

Shared-use paths constructed on steep hillside slopes or along drainage ditches where the fill is steeper than 3 to 1 shall be protected with a handrail system.

An overpass, underpass, small bridge, or facility on a highway bridge may be necessary to provide continuity to a shared-use path. The minimum clear width shall be the same as the approach clear width of the shared-use path as required by 320.1.

Railings, fences, or barriers on both sides of a shared-use path bridge shall be a minimum of 4.5 feet high. Smooth rub rails should be attached to the barriers at a handlebar height of 3.5 feet.

Bridges designed exclusively for bicycle traffic may be designed for pedestrian live loadings. On all bridge decks, special care should be taken to ensure that bicycle safe expansion joints are used. Decking boards shall be placed so that board joints are transverse to the direction of normal bike travel.

320.10 Lighting

Fixed-source lighting reduces conflicts along paths and at intersections. In addition, lighting allows users to see the shared-use path direction surface conditions and obstacles. Lighting for shared-use paths is important and should be provided for shared-use paths serving commuters, providing access to transit stops, and at highway intersections. Lighting should also be considered through underpasses or tunnels and when nighttime security could be a problem. However, lighting is not appropriate in some wildlife habitat areas where wildlife may be disturbed. The City and the appropriate natural resource agencies shall determine whether or not lighting shall be provided for shared-use paths in significant natural resource and significant wildlife areas.

Depending on the location, average maintained horizontal illumination levels of 0.5 foot-candle (5 lux) to 2 foot-candles (22 lux) shall be considered. Where special security problems exist, higher illumination levels may be considered. Light standards (poles) shall meet the required horizontal and vertical clearances. Luminaires and standards shall be at a scale appropriate for a shared-use path.

320.11 Vehicle Traffic Restrictions

Shared-use paths often need some form of physical barrier at roadway intersections to prevent unauthorized motor vehicles from using the facilities. Provisions can be made for a lockable, removable post (or "bollard") to permit entrance by authorized vehicles. See the standard drawing for Removable Vehicle Barrier Post. A single bollard in the center of the path is preferred in order to allow two-way bicycle travel. When more than one post is used, a 5-foot spacing between posts is desirable. Wider spacing can allow entry to motor vehicles, while narrower spacing might prevent entry by adult tricycles and bicycles with trailers.

An alternative method of restricting entry of motor vehicles is to split the entryway into two 5-foot sections separated by low landscaping. Emergency vehicles can still enter, if necessary, by straddling the landscaping. The higher maintenance costs associated with landscaping should be acknowledged and approved by the Operations Director before this alternative method is selected.

320.12 Property Dedication

If the shared-use path is intended for public use, it shall be located in a property corridor having a minimum width of 15 feet. At the time of site development, the property corridor shall be dedicated to the public or to an appropriate public agency. The dedication may be as an easement, right-of-way, or dedication of property. Documents showing such dedication shall be submitted for the City's approval prior to issuance of a site development permit.

Section 330 On-Street Facilities

330.1 Bicycle Lanes On-Street

Bicycle lanes shall always be one-way facilities and carry traffic in the same direction as adjacent motor vehicle traffic. Wrong-way riding is a major cause of bicycle accidents and violates the Rules of the Road stated in the *Uniform Vehicle Code.* Bicycle lanes on one-way streets should be on the right side of the street, except in areas where a bicycle lane on the left would decrease the number of conflicts (e.g., those caused by heavy bus traffic).

The minimum width for bike lanes shall be five (5) feet. On arterial streets, buffered or protected bicycle lanes should be considered whenever practicably possible. Where a longitudinal joint exists (such as the joint between street paving and gutter) within the bike lane, there shall be a minimum clear width of 3.5 feet between the joint and the edge of the bike lane.

330.2 Shared Roadway

On roadway sections without bicycle lanes, a right lane wider than 12 feet can better accommodate both bicycles and motor vehicles in the same lane and thus is beneficial to both bicyclists and motorists. In many cases where there is a wide curb lane, motorists will not need to change lanes to pass a bicyclist. Shared Lane Markings (Sharrows) should be considered on low speed facilities. See the MUTCD for placement.

Also, more maneuvering room is provided when drivers are exiting from driveways or in areas with limited sight distance. In general, a lane width of 14 feet of usable pavement width is desired for a shared lane. Usable pavement width would normally be from curb face to lane stripe, or from edge line to lane stripe, but adjustments need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. Widths greater than 15 feet can encourage the undesirable operation of two motor vehicles in one lane, especially in urban areas, and consideration should be given to striping as a bicycle lane when wider widths exist.

Section 340 Bicycle Parking Standards

340.1 Number and Location of Bicycle Parking Spaces

A. The number and location of bicycle parking spaces required in new development is specified in the *Development Code*.

B. Bicycle parking shall be visible and conveniently located for cyclists.

C. Bicycle parking shall offer security in the form of either a stationary rack to which the bicycle can be locked, a bicycle locker, or inside a building or lockable enclosure.

D. Bicycle parking spaces shall not obstruct walkways.

E. Bicycle parking for multiple uses may be clustered in one or several locations.

F. Short-term bicycle parking is encouraged to be located on site within 50 feet of a primary entrance. If there are site, setback, building design, or other constraints, short-term bicycle parking shall be located no more than 100 feet from a primary entrance in the closest available area to the primary entrance as determined by the decision-making authority.

G. For buildings with multiple entrances, short-term bicycle parking spaces shall be distributed proportionately.

H. Directional signage to the bicycle parking should be provided if the parking is not directly visible and obvious from an entrance or public right-of-way.

340.2 Bicycle Parking Design

A. A bicycle parking space shall measure at least two (2) feet wide by six (6) feet long, so staple racks, which hold two bicycles, shall be installed at least 36 inches apart. Bicycle parking spaces shall also be a minimum of six (6) feet in length and shall have a vertical clearance of seven (7) feet. A width of three (3) feet is encouraged.

B. The minimum distance between rows of bicycle parking spaces shall be five (5) feet.

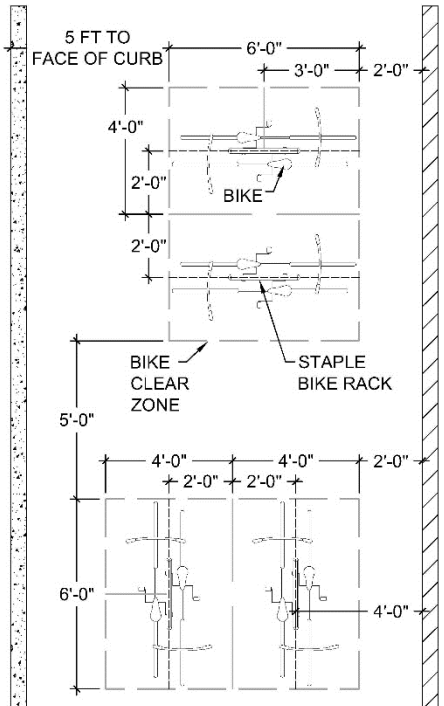
C. Minimum clearance between a bicycle parking space and a wall or structure shall be two (2) feet.

D. Bicycle parking spaces next to the curb shall be separated by at least two (2) feet, although a width of three (3) feet is encouraged.

E. Every bicycle parking space shall be accessible without moving another bicycle.

F. Developments that are required to have bike parking must demonstrate that such facilities will meet projected demand.

Figure 340.1 – Bicycle Parking Design



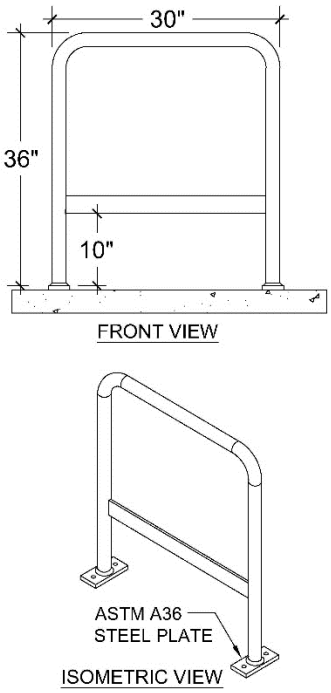
340.3 Covered Bicycle Parking Spaces

A. Required covered bicycle parking spaces shall be provided in a location that protects the bicycle from prolonged direct exposure to the elements. The location shall be acceptable to the City review authority. Examples include but are not limited to: inside a building or a bicycle locker, under a roof overhang or awning, within or visible from an individual's office, or in the case of multi-family residential units, within a unit.

B. Cover for required long-term bicycle parking is required. School buildings are exempt from covering long-term bicycle parking.

340.4 Bicycle Parking Facility Design

Figure 340.2 – Bicycle Facility Design



A. A bicycle rack shall accommodate common bicycle frame sizes and styles including bicycles without kickstands;

B. A bicycle rack shall support the bicycle frame at a minimum of two contact points; one contact point shall be the frame.

C. A rack shall allow both the frame and two wheels to be locked to the rack with the use of a cable or the frame and one wheel to be locked to the rack with a U-type lock.

D. Bicycle racks and bicycle lockers shall be securely anchored to concrete with vandal-resistant concrete mounting hardware.

E. Racks are to be a minimum of 30 inches wide by 36 inches tall.

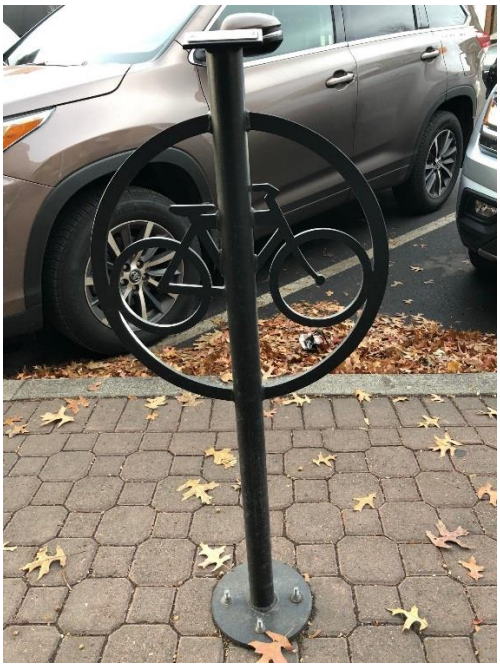
F. For indoor bicycle parking facilities ("bike rooms"), wall-mounted racks are permitted, provided that at least a portion of the bicycle parking spaces are provided by floor-mounted racks. Wall-mounted racks are exempt from the requirements of section 340.2, but shall be installed according to the rack manufacturer's recommendations and may be subject to City review.

G. The inverted "U" or staple style bicycle racks are common and meet the requirements of this section. Other types of bicycle racks or innovative designs, that meet the requirements of this section, will be considered on a case by case basis and must be approved by the City Traffic Engineer prior to fabrication. Innovative and/or unusual designs will also need to be approved by the Beaverton Planning Department.

Figure 340.3 – Bicycle Rack Examples







340.5 Bicycle Parking Lighting

Bicycle parking spaces shall be lighted to the standards of section 450.