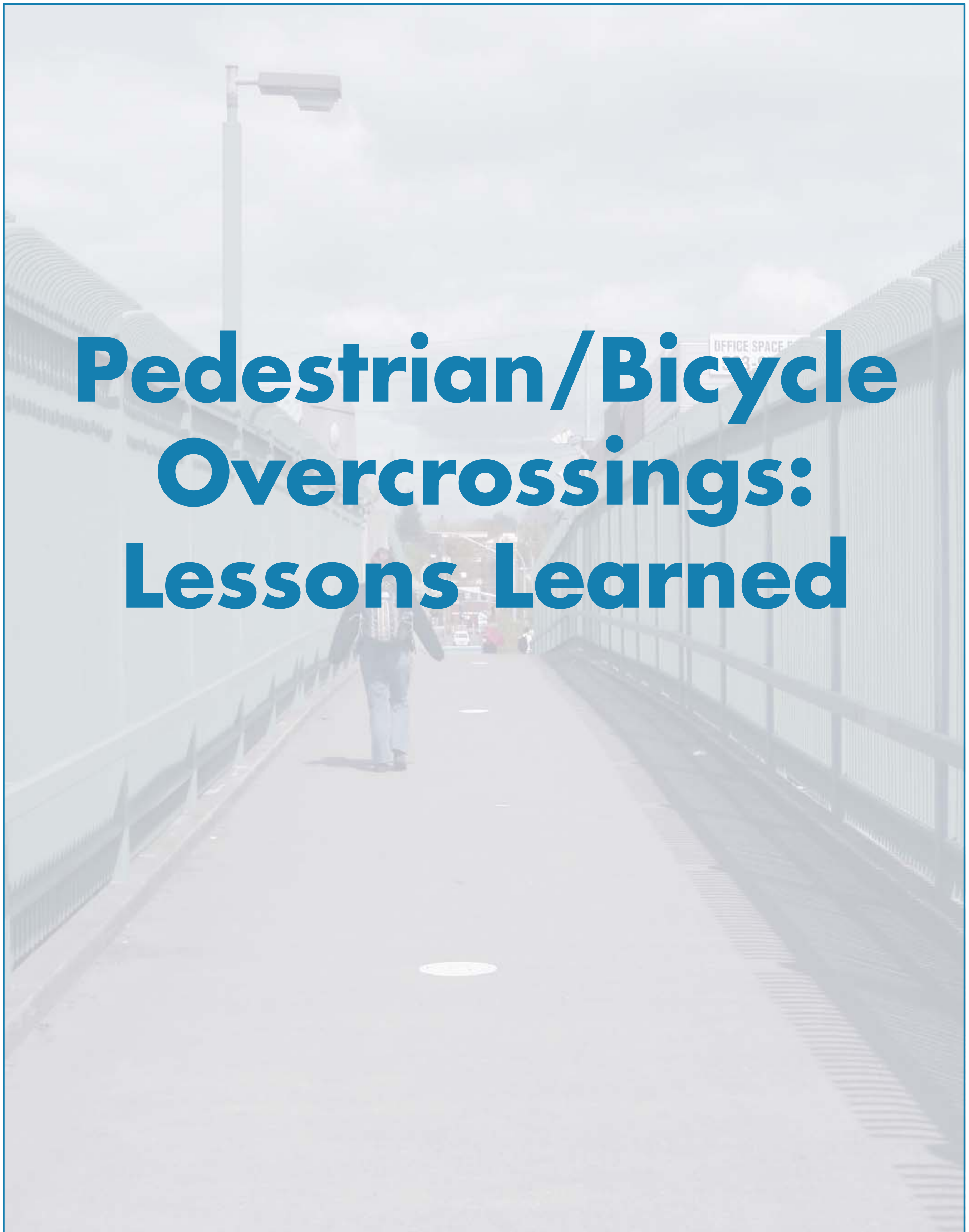

Pedestrian/Bicycle Overcrossings: Lessons Learned

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Introduction: Why are pedestrian/bicycle overcrossings important?

Pedestrian/bicycle overcrossings serve many users, including bicyclists, walkers, joggers, in-line skaters, pedestrians with strollers, wheelchair users, and others. These facilities can represent one of the most important elements of a community's non-motorized transportation network. Overcrossings provide critical links in the bicycle/pedestrian system by joining areas separated by a variety of "barriers."[1] Overcrossings can address real or perceived safety issues by providing users a formalized means for traversing "problem areas" such a deep canyons, waterways or major transportation corridors.[2]

In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. For instance, an overcrossing may be appropriate where moderate to high pedestrian/bicycle demand exists to cross a freeway in a specific location.[3] Pedestrian/bicycle bridges also overcome barriers posed by railroads, and are appropriate in areas where frequent or high-speed trains would create at-grade crossing safety issues, and in areas where trains frequently stop and block a desired pedestrian or bicycle crossing point.[4] They may also be an appropriate response to railroad and other agency policies prohibiting new at-grade railroad crossings, as well as efforts to close existing at-grade crossings for efficiency, safety, and liability reasons.[5]

Pedestrian/bicycle overcrossings also respond to user needs where existing at-grade crossing opportunities exist but are undesirable for any number of reasons. In some cases, high vehicle speeds and heavy traffic volumes might warrant a grade-separated crossing. Hazardous pedestrian/bicycle crossing conditions (e.g., few or no gaps in the traffic stream, conflicts between motorists and bicyclists/pedestrians at intersections, etc.) could also create the need for overcrossings.[6] Overcrossings might also be appropriate in locations where large numbers of school children cross busy streets, or where high volumes of seniors or mobility-impaired users need to cross a major roadway.[7]

[1] ITE, 19.
[2] USDOT (Case Study #35), 2.
[3] AASHTO (Pedestrian Guide), 95.
[4] USDOT (Rails-with-Trails), 70.
[5] USDOT (Rails-with-Trails), 70.
[6] WSDOT (Design Manual), 1025-11.
[7] AASHTO (Pedestrian Guide), 95.

Purpose of this Study

This study examines location, design and other parameters of pedestrian/bicycle overcrossings, and evaluates how well they serve their intended users. The findings are based on detailed field assessments of 29 diverse bridges in terms of age, length, access provisions, what they cross, and several other elements. A review of national and local design guidelines, case studies and other reports also informed the findings of this report. This study aims to inform planners, designers and other parties in developing new pedestrian/bicycle overcrossings, and as they set out to improve existing facilities.

Background Literature

The following sections briefly describe the background literature cited in this report.

Federal Publications

Several publications provide guidance for pedestrian/bicycle facility location and design, and include reference to overcrossings. The American Association of State Highway and Transportation Officials (AASHTO) published the *Guide for the Development of Bicycle Facilities* in 1999, and the *Guide for the Planning, Design, and Operation of Pedestrian Facilities* in 2004. These publications do not set forth design standards; rather, they are intended to provide sound guidelines for jurisdictions nationwide. The guidelines prescribed in these publications incorporate requirements set by the 1990 Americans with Disabilities Act (ADA), as well as the Americans with Disabilities Act Accessibility Guidelines (ADAAG).

The U.S. Department of Transportation (USDOT) published *Rails-with-Trails: Lessons Learned* in 2002. Through a review of background literature and numerous case studies, the document examines planning, design, and liability issues associated with developing shared use paths along active railroad corridors. The report includes a section discussing grade-separated trail-rail crossings.

Among its "BIKESAFE" case studies, the USDOT published a report focusing on pedestrian/bicycle overcrossings. This report discusses overall purposes of grade-separated crossings, with a detailed discussion of existing facilities in the Boulder, Colorado region.

State Publications

The Washington State Department of Transportation's (WSDOT) *Design Manual* (2006) and the *Pedestrian Facilities Guidebook* (1997) each discuss pedestrian/bicycle overcrossings and shared use paths. The design specifications in these publications serve as mandatory standards for pedestrian/bicycle facilities on State highways, but serve as guidelines for local communities.

The Oregon Department of Transportation (ODOT) published the *Oregon Bicycle and Pedestrian Plan* in 1995 (this Plan is currently being updated). The Plan presents guidelines for the planning and design of non-motorized transportation facilities, including pedestrian/bicycle overcrossings. The specifications are mandatory for facilities on State highways as well as for local projects receiving State funding. In all other cases, the Plan serves as guidance for local communities.

Other Publications

A report entitled, *Improving the Pedestrian Environment through Innovative Transportation Design* was prepared for the Institute of Transportation Engineers (ITE) in 2005. Chapter 3 focuses on pedestrian/bicycle overcrossings and tunnels, and includes several case studies of U.S. and Canadian bridges. The report focuses on design elements contributing to bridges' roles as community gathering places.

Overcrossings Evaluated for this Study

Illustrated on the "Overcrossing Locations Map" (Figure 1), this report's findings are based on detailed inventories of 29 pedestrian/bicycle overcrossings. Built between 1938 and 2006, the bridges include 25 overcrossings in the Portland, Oregon metropolitan area, three bridges in Eugene, Oregon, and one structure in Washington State's Puget Sound region. Ranging in length from about 75 feet to nearly 700 feet, the structures cross four major types of "barriers" including freeways, major streets, railroads, and waterways. Bridge ownership typically belongs to state, county or city transportation departments, or regional transit agencies. The overcrossings reviewed for this study were selected because they provide a diverse array of characteristics. Appendix A provides side-by-side comparisons of the 29 overcrossings, while Appendix B provides detailed information for each individual structure.

Overcrossing Inventory Process

Site visits were conducted at each of the 29 sites to inventory the overcrossing structure, access provisions, and the surrounding pedestrian/bicycle environment. The site visits included various measurements including bridge and access ramp lengths and widths, vertical and horizontal clearances, fence and railing heights, and other relevant data. The visits also included an inventory and assessment of other parameters, including elements precluding or discouraging at-grade crossings, connections between the bridge area and the surrounding transportation system, and obstructions that could complicate pedestrian or bicycle travel. In some cases, agencies provided "as-built" drawings highlighting detailed structure elements which proved useful in the inventory process.

Data Collection Challenges

For various reasons, this report omits some information that could be of further use in studying pedestrian/bicycle overcrossings. Mentioned earlier, as-built drawings provide highly-detailed bridge design information, including grades, clearances, and other data that could be difficult to measure in the field. Citing security reasons, several agencies denied requests for these drawings. This complicated the evaluation of several parameters such as bridge and access ramp grades. This report also omits pedestrian and bicycle volume data, simply because agencies have conducted very few user counts on these structures. This constraint precluded a reliable bridge usage assessment. Finally, agencies also encountered difficulties obtaining cost data either due to a bridge's relatively old age or because the overcrossing was constructed as part of a larger transportation project lacking readily-available itemized cost information.

Location Elements

This section discusses pedestrian/bicycle overcrossings with respect to location elements. These elements include the relationship between overcrossings and major pedestrian/bicycle destinations, and how well these bridges serve current and/or desired non-motorized travel routes. This section also discusses overcrossings within the context of the overall pedestrian/bicycle network, and then focuses in scale on bicyclist/pedestrian transitions between bridges and adjacent facilities.

Pedestrian/Bicycle Destinations and Desired Routes

This section discusses the ability of overcrossings to directly connect users with their desired destinations. This refers to a bridge's location relative to nearby pedestrian and bicycle trip generators, as well as its location within the context of logical or desired travel routes. Generally, pedestrian/bicycle overcrossings work best when they overcome major barriers hindering direct travel between origins (e.g., residential neighborhoods) and destinations (e.g., schools, commercial areas, and transit stops).[8]

Pedestrian and Bicycle Destinations

Major pedestrian and bicycle destinations are generally similar to those reached by other modes (e.g., schools and parks). Nearly all bridges evaluated for this study lie within relatively close proximity of major destinations including the following:

- Elementary, middle and high schools; community colleges and universities
- Parks, open spaces and community gardens
- Community centers, libraries, convention centers and hospitals
- Residential neighborhoods
- Bus stops, light rail stations and multi-modal transit centers
- Business districts and employment centers
- Stadiums and arenas

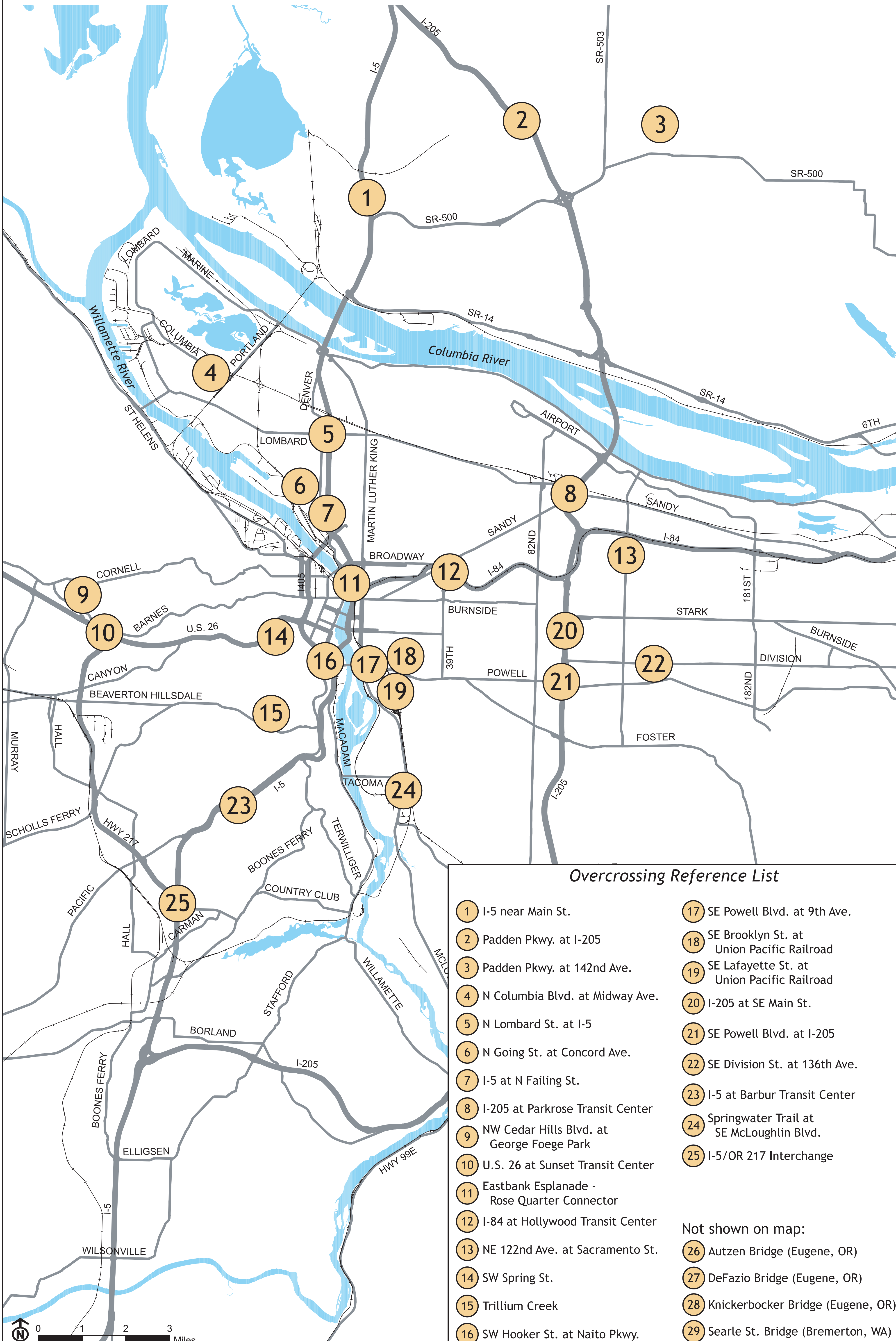
It should be noted that several overcrossings surveyed for this report yield potential to connect with future pedestrian and bicycle destinations. Several bridges along Interstate 205 (I-205) for instance lie adjacent to or near planned light rail transit stations (see Figure 2). Ultimately, bridges within close proximity of nearby destinations yield greater potential for higher use among foot and bicycle traffic.

Figure 2 – Light rail station under construction near the I-205 at SE Main St. Bridge

[8] AASHTO (Pedestrian Guide), 96.

Figure 1 - Overcrossing Locations Map

Portland Metro Area



Overcrossing Reference List

1. I-5 near Main St.
2. Padden Pkwy. at I-205
3. Padden Pkwy. at 142nd Ave.
4. N Columbia Blvd. at Midway Ave.
5. N Lombard St. at I-5
6. N Going St. at Concord Ave.
7. I-5 at N Failing St.
8. I-205 at Parkrose Transit Center
9. NW Cedar Hills Blvd. at George Foege Park
10. U.S. 26 at Sunset Transit Center
11. Eastbank Esplanade - Rose Quarter Connector
12. I-84 at Hollywood Transit Center
13. NE 122nd Ave. at Sacramento St.
14. SW Spring St.
15. Trillium Creek
16. SW Hooker St. at Naito Pkwy.
17. SE Powell Blvd. at 9th Ave.
18. SE Brooklyn St. at Union Pacific Railroad
19. SE Lafayette St. at Union Pacific Railroad
20. I-205 at SE Main St.
21. SE Powell Blvd. at I-205
22. SE Division St. at 136th Ave.
23. I-5 at Barbur Transit Center
24. Springwater Trail at SE McLoughlin Blvd.
25. I-5/OR 217 Interchange

Not shown on map:

26. Autzen Bridge (Eugene, OR)
27. DeFazio Bridge (Eugene, OR)
28. Knickerbocker Bridge (Eugene, OR)
29. Searle St. Bridge (Bremerton, WA)

Some bridges evaluated in this study lie within close proximity of pedestrian/bicycle destinations, but provide no connections to these areas. For instance, the Padden Parkway at I-205 Bridge lies immediately adjacent to Vancouver, Washington's Sunnyside and Walnut neighborhoods, along with a community center directly below the bridge. However, users must travel at least one-half mile to reach the nearest cross street, and then double-back another one-half mile to reach these areas.

Walking and Bicycling Routes

Many overcrossings evaluated for this study are situated on logical walking and bicycling routes, and provide reasonably direct connections between adjacent areas. Some bridges function as part of regional path systems, while others are stand-alone structures primarily intended to link adjacent neighborhoods.

Street connectivity plays a major role in linking overcrossings with surrounding areas. Well-connected streets with short blocks and limited cul-de-sacs (as shown in Figure 3) can provide direct access to an overcrossing from surrounding areas, whereas less-connected streets (see Figure 4) can increase real or perceived out-of-direction travel and diminish a bridge's attractiveness.

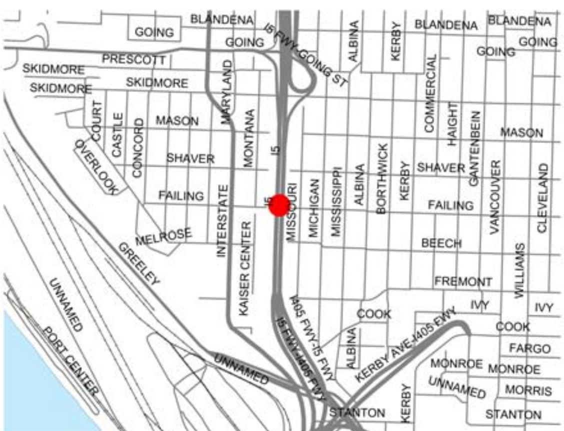


Figure 3 – A generally well-connected street network surrounds the I-5 at N Failing St. bridge

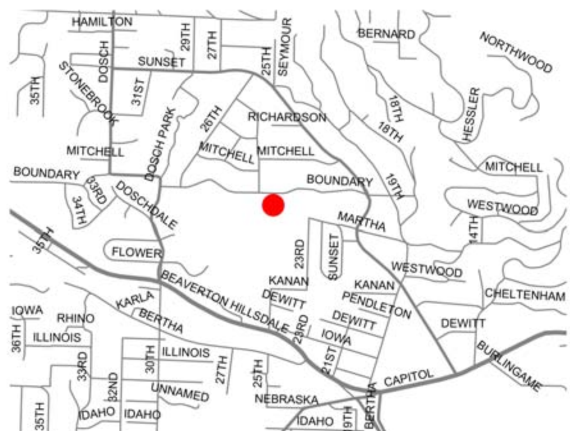


Figure 4 – Streets with limited connectivity surround the Trillium Cr. Bridge

In several locations, informal paths (also known as "demand paths") suggest that some formalized bridge access routes might not adequately serve their intended users. The presence of informal paths may indicate either that the bridge itself or the approaching paths may not be located along desired or direct pedestrian/bicycle travel routes. For instance, a shared use path links the Knickerbocker Bridge with the nearby North Bank Trail, but several informal paths between the bridge and the trail (created by joggers and bicyclists) highlight "short-cutting" behaviors (see Figure 5).

Several overcrossings exist on logical walking and bicycling routes, but specific access provisions limit or discourage some users. Stairways for instance, provide the only access at several overcrossings, as shown in Figure 6. Although bicyclists are permitted to use these structures, the inconvenient access provisions discourage bicyclist use and are often equated with out-of-direction travel. A later section in this report discusses specific bridge access provisions and their impacts on various user groups.

Figure 5 – Informal path leading to the Knickerbocker Bridge

Figure 6 – Stairways are the only access provision at the SE Brooklyn St. at Union Pacific Railroad Bridge

Using an Overcrossing versus Crossing At-Grade

An overcrossing's effectiveness in conveniently serving its intended users typically depends on its location relative to desired pedestrian and bicycle travel routes and nearby destinations. The presence or lack of alternative crossings also plays a role. Generally, the type of barrier being traversed influences the number of alternative crossing opportunities as well as their distance from a particular bridge. Bridges traversing freeways and rivers may serve as the only crossing point in the immediate area, effectively forcing pedestrians and bicyclists to use the bridge regardless of its location on a convenient or inconvenient route. For example, the closest alternative Willamette River crossing to the Knickerbocker Bridge is another pedestrian/bicycle overcrossing about 3,500 feet away.

On the other hand, bridges crossing surface streets typically compete with several alternative crossings. Surface streets may or may not include treatments discouraging at-grade crossings. Observed treatments discouraging at-grade crossings include concrete center dividers, signage, or no measures altogether. In many cases, the street itself (in the form of high vehicle speeds or heavy traffic volumes) discourages at-grade crossings.

Many bridges surveyed for this study lie within close proximity of alternative crossings. For instance, two at-grade crossings exist within about 65 feet of the NE 122nd Avenue at Sacramento Street Bridge. In areas where multiple crossing opportunities exist, pedestrians and bicyclists hold overcrossings to a higher "convenience" standard. They consider not only the bridge's location with respect to logical walking or bicycling routes; they also consider the distance and travel time associated with accessing the bridge structure itself, and weigh this against the perceived risk of crossing at-grade (if physically possible). In other words, pedestrians and bicyclists consider the degree of real or perceived out-of-direction travel when weighing their options. Overcrossings with "easy" and "convenient" access provisions have greater potential for attracting users. The Lombard Street at

Interstate 5 (I-5) Bridge for instance, provides pedestrians and bicyclists a safe alternative to walking across a freeway on-ramp. However some users choose to cross at-grade given the relatively short distance of traversing one lane of traffic. The WSDOT *Design Manual* states that "a structure might be underutilized if the additional walking distance for 85 percent of pedestrians exceeds one-quarter mile."[9] The AASHTO *Pedestrian Guide* cites conclusions drawn by a 1998 ITE study:

- 70 percent of pedestrians would use an overpass if the travel time equaled the at-grade crossing travel time;
- Very few pedestrians would use an overpass if the travel time were 50 percent longer than the at-grade crossing travel time[10]

Overcrossings within the Overall Pedestrian/Bicycle Network

An overcrossing's location within the overall surrounding bicycle/pedestrian network can greatly impact its use. Bridges sited in areas with more-comprehensive non-motorized facilities might attract higher use through the relatively easy access offered by the surrounding network. In areas with fragmented facilities (e.g., discontinuous sidewalks), overcrossings may suffer from real or perceived difficult access.

The bridges surveyed for this report each vary in terms of the quantity and quality of facilities offered by the surrounding pedestrian/bicycle network. Common facilities include shared use paths, bicycle lanes, low-volume streets suitable for bicycle travel, and sidewalks. The following sections briefly discuss these facilities in greater detail.

Shared Use Paths

Depicted in Figure 7, shared use paths lie within close proximity and directly connect with many overcrossings surveyed for this report. While most pedestrian/bicycle facilities serve utilitarian purposes, shared use paths potentially yield the greatest potential to attract a greater mix of utilitarian and recreational users. In many cases, the bridge itself functions as part of a surrounding shared use path system, providing a key system link over a major barrier. This can translate into greater utilitarian and recreational use of overcrossings.

Figure 7 – Shared use path near the Autzen Bridge

Bicycle Lanes

Bicycle lanes can provide convenient, comfortable and potentially safer bicycle access to bridges from the surrounding street system. Streets with bicycle lanes directly and

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[9] WSDOT (Design Manual), 1025-11.

[10] AASHTO (Pedestrian Guide), 96.

indirectly connect with several overcrossings surveyed for this study. In some cases, the overcrossing traverses a street with bicycle lanes thereby offering greater bicycle access opportunities (assuming direct connections exist between the bridge and the street). Other bridges lie within relatively close proximity of streets with bicycle lanes.

Low-Volume Streets

Low-volume streets represent the most common bicycle facility found near the overcrossings surveyed for this report. Low-volume streets typically serve local vehicle traffic and are residential in character. While some bicyclists prefer dedicated bicycle lanes on higher-order streets, lower-volume corridors can attract recreational riders and families.

Figure 8 – Many streets near the I-5 at Barbur Transit Center Bridge lack sidewalks

Sidewalks

Sidewalks, with varying levels of "completeness" and condition, provide access to most of the bridges surveyed for this study. Where sidewalks do not exist, pedestrians accessing a bridge area must either walk on roadway shoulders (if they exist) or share the street with motor vehicles. Figure 8 depicts an example of a local street lacking sidewalks.

Overcrossings and Adjacent Pedestrian/Bicycle Facilities

While the previous section discusses overcrossings within the context of the overall bicycle and pedestrian network, this section focuses on non-motorized accommodations immediately adjacent to bridges. Bridges and access ramps may suitably accommodate their intended users, but immediate connections to surrounding transportation facilities hold equal importance. A later section discusses specific bridge access provisions.

Shared Use Paths

In many locations shared use paths connect bridge users to the surrounding transportation network, and several bridges surveyed for this report function as part of a shared use path system.

Figure 9 – Neighborhood accessway near the NW Cedar Hills Blvd. at George Foege Park Bridge

Neighborhood Accessways

Accessways are short path segments providing direct pedestrian/bicycle connections in areas with limited street connectivity (e.g., by connecting cul-de-sacs with other nearby paths or streets). For example, an accessway connects the NW

Cedar Hills Boulevard at George Foege Park Bridge with an adjacent residential subdivision (see Figure 9). An accessway has also been built to better connect the Springwater Trail at SE McLoughlin Boulevard Bridge with Portland's Sellwood neighborhood.

Cycletracks

Used sparingly in the United States, cycletracks serve bicyclists on sidewalks while minimizing conflicts with pedestrians through a variety of signage and pavement marking treatments. In Portland, a cycletrack passes through the Hollywood Transit Center, providing access to the nearby Interstate 84 (I-84) at Hollywood Transit Center Bridge.

Sidewalks

Sidewalks represent the most common facility linking bridges with the surrounding street system. Relatively-complete sidewalk networks exist near most bridges surveyed for this report, however bridge users encounter fragmented sidewalks in some areas. Missing or fragmented sidewalks complicate bridge access for mobility-impaired users, especially wheelchairs. For instance, the N Columbia Boulevard at Midway Avenue Bridge provides ADA-compliant access ramps, but sidewalk gaps create difficult transitions to the surrounding street system (as shown in Figure 10).

Figure 10 – Sidewalk gap complicates access to the N Columbia Blvd. at Midway Ave. Bridge

Pedestrian/Bicycle Accommodations at Nearby Intersections

Most overcrossings referenced in this report (especially those in urbanized areas) exist within close proximity of street intersections. The quantity and quality of pedestrian/bicycle accommodations varies by location. Intersection treatments observed near the study bridges include the following:

- Curb ramps: Most intersections include ADA-compliant curb ramps to facilitate convenient crossings for wheelchair users. Curb ramps also benefit other users, including pedestrians experiencing trouble negotiating curbs (e.g., persons with crutches), as well as pedestrians with strollers. Intersections near some bridges however lack curb ramps, complicating travel for the users listed above.
- Raised crosswalks: Raised crosswalks serve as traffic calming devices by

Figure 11 – Raised crosswalk near the I-205 at Parkrose Transit Center Bridge

raising the street pavement to the sidewalk level. Similar to a speed hump, raised crosswalks force approaching motorists to reduce their speeds. Figure 11 (previous page) shows a raised crosswalk near the I-205 at Parkrose Transit Center Bridge, where pedestrians leaving a nearby light rail station cross motor vehicle traffic.

- Audible pedestrian signals: Audible pedestrian signals serve visually-impaired pedestrians at signalized intersections. These devices emit a unique sound corresponding with the traditional WALK signal, and differing sounds are used corresponding with specific directional traffic flows.
- Bicycle "scrambler" signals: Bicycle scrambler signals facilitate convenient and safe bicycle crossings at intersections with greater vehicle/bicycle conflict potential. A scrambler signal exists at the intersection of NE Interstate Avenue at Oregon Street, immediately east of the Eastbank Esplanade-Rose Quarter Connector Bridge. Cyclists leaving the bridge activate an in-ground loop detector, triggering an "all-red" signal for all approaching vehicles. With all motorists stopped, bicyclists are permitted to travel freely in any direction through the intersection. This device is particularly useful for the high volumes of bicycle traffic leaving the bridge during afternoon peak travel periods.

Wayfinding Tools

Wayfinding tools represent one of the most cost-effective, visible, and critical elements of a non-motorized system. Wayfinding tools supplement traditional infrastructure by orienting users to and along pedestrian/bicycle routes and important destinations. These tools are especially important in areas where bicyclists and pedestrians must negotiate circuitous transportation networks to reach desired destinations. In a 2006 survey of Portland metropolitan bicyclists for instance, improved wayfinding ranked high among the desired improvements for addressing the circuitous path system near the Interstate Bridge.[11] In addition to directing pedestrians and bicyclists to an overcrossing, wayfinding instruments can also delineate specific bridge access routes for certain users (e.g., directing wheelchair users to access ramps) as shown in Figure 12. Discussed further below, wayfinding tools (in the form of signage and pavement markings) were observed at several bridges surveyed for this report.

Figure 12 – Signage identifying ADA-accessible route to the I-84 at Hollywood Transit Center Bridge

Wayfinding signage

Wayfinding signage exists in a variety of forms with varying levels of information. General wayfinding signage denotes nearby destinations such as shared use paths, major streets,

[11] City of Vancouver, Washington.

transit centers, and universities. Signage on the Eastbank Esplanade-Rose Quarter Connector provides detailed information for nearby destinations in terms of distances and bicycle "riding time". Other signs direct users to a bridge from surrounding areas, as in the case of the I-5 at N Failing Street Bridge (see Figure 13). Some overcrossings also include signage denoting their role as part of a surrounding path system. In cases where bridges lack wayfinding signage for pedestrians and bicyclists, users must rely on nearby signs oriented toward motorists.

Pavement markings

Pavement markings can effectively orient bicyclists and pedestrians, and denote designated routes and other key information. Portland's "bicycle boulevards" (low-volume streets retrofitted to prioritize bicycle travel through traffic calming treatments) incorporate the use of small bicycle pavement marking symbols to denote the bicycle boulevard route, and are placed at key intersections and user "decision points." The "40s Bikeway" (a north-south boulevard) incorporates the I-84 at Hollywood Transit Center Bridge, and several boulevard markings guide bicyclists to and across the bridge structure (see Figure 14). Shared use path mileage markers represent another common pavement marking observed at overcrossings surveyed for this report.

Figure 13 – Signage orienting pedestrians and bicyclists to the I-5 at N Failing St. Bridge


Figure 14 – "Bicycle boulevard" pavement markings on the I-84 at Hollywood Transit Center Bridge

Design Elements

Earlier sections of this report discuss pedestrian/bicycle overcrossings within the context of the overall surrounding non-motorized network, and also discuss bicycle/pedestrian conditions within immediate vicinity of bridge areas. This section provides an additional level of detail, discussing user access to and from the actual bridge structure. The following text describes various bridge access types, and evaluates them in terms of how well they serve their intended users. The evaluation assesses the various bridge access types with respect to real or perceived out-of-direction travel, and their ability to serve multiple users (e.g., pedestrians, bicyclists, mobility-impaired users, etc.). These factors hold great importance because the effectiveness of grade-separated crossings usually depends on their perceived ease of accessibility.[12] A discussion of other important design considerations follows in later sections.

Overcoming Vertical Rises

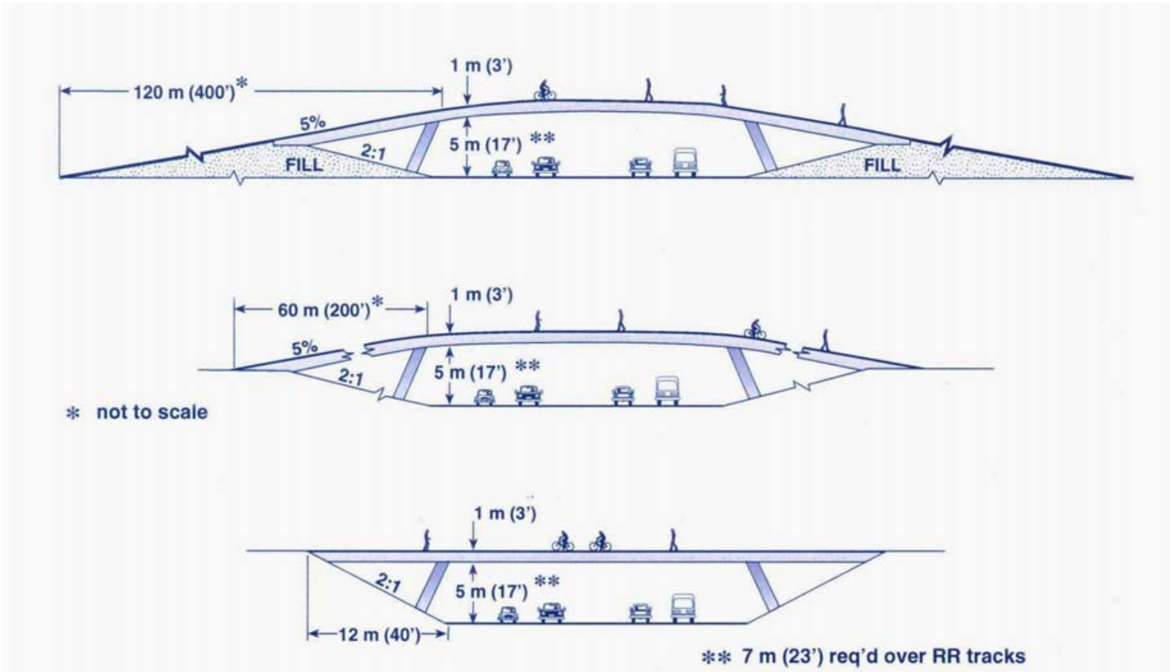
The vertical difference between an overcrossing and the natural ground line often influences the degree of real or perceived out-of-direction travel. Freeways, railroads and major streets depressed below the natural ground line enable pedestrian/bicycle overcrossings to be sited flush with surrounding streets or paths, thereby reducing or eliminating the need for lengthy access ramps. On the other hand, many freeways, railroads, major streets and rivers lie on the natural ground line, requiring bridges to overcome minimum vertical clearance requirements mandated by various agencies. Consequently, access ramps are necessary to connect pedestrians and bicyclists to the bridge. The vertical elevation gain and ADA grade requirements strongly influence access ramp lengths, as shown in Figure 15 on the following page. The *Oregon Bicycle and Pedestrian Plan* illustrates the following scenario for a hypothetical pedestrian/bicycle bridge traversing a major roadway that is not depressed below the natural ground line:

- The bridge must achieve a minimum 17-foot vertical clearance from the roadway below
- Bridge structures typically include a 3-foot depth
- The minimum clearance and structural depth create a combined 20-foot vertical rise for bridge users
- The ADA allows a 5 percent maximum grade for approach ramps
- These parameters result in access ramps approximately 400 feet long at each bridge end[13]

This example demonstrates that bridges sited above the natural ground line are challenged both with providing suitable access for multiple users while offering a reasonable level of convenience (e.g., minimizing real or perceived out-of-direction travel).

Most overcrossings surveyed for this report lie above the natural ground line, thereby requiring stairways and/or access ramps. Among bridges with available data, the vertical rise between the structure and surrounding streets and paths ranges between approximately 16 and 25 feet. The bridges surveyed for this report include various access provisions, often depending on the vertical rise necessary to reach the bridge structure coupled with the amount of available space to situate the access ramps or stairs. The following section discusses various bridge access types and their affect on real or perceived out-of-direction travel.

[12] WSDOT (Pedestrian Facilities Guidebook), 152.
[13] ODOT, 119.



Source: *Oregon Bicycle and Pedestrian Plan*

Figure 15 – Overcrossings rising above the natural ground line usually require longer access ramps

Linear Paths/Access Ramps

In areas with minimal physical constraints, linear paths and ramps can provide easy transitions to and from the overcrossing for all users, and facilitate continuous movement for "wheel" users (e.g., bicyclists and wheelchairs). Linear paths can also minimize real or perceived out-of-direction travel by eliminating the need for circuitous ramps or switchbacks. Although linear ramps and paths facilitate easy transitions between overcrossings and the surrounding transportation system, the length necessary to provide reasonable grades could result in these facilities meeting the street system at lengthy distances from the bridge structure. This could create a perception of out-of-direction travel for users wishing to reach destinations immediately adjacent to the overcrossing. For instance, the linear access ramps on the SW Hooker Street at Naito Parkway Bridge require users to double-back to reach transit stops directly below the overcrossing (shown in Figure 16).

Figure 16 – Linear access ramps at the SW Hooker Street at Naito Pkwy. Bridge, and bus stop directly below the structure

Curvilinear Paths/Access Ramps

Depicted in Figure 17, curvilinear paths and access ramps integrate broad turns to overcome vertical elevation gains in areas somewhat constrained by topography and other physical elements. Curvilinear paths do not include tight turns common on switchback ramps, but they could create the perception of longer travel distances to reach a bridge. At several overcrossings surveyed for this report, bridge users have responded by creating informal paths serving as short-cuts. In extreme cases, bridge users have cut holes in fences to create shorter routes, as shown in Figure 18.

Figure 17 – Curvilinear access path near the I-205 at SE Main St. Bridge

Figure 18 – Users have cut a hole in the fence to create a shorter access route to the I-5 at Main St. Bridge

Spiral Ramps

Spiral ramps can effectively serve bridge users in physically-constrained areas. These facilities transition users to and from the overcrossing via a continuous "loop" (see Figure 19). Depending on the tightness of curve, spiral ramps facilitate slow but continuous movement for "wheel" users, thereby potentially minimizing perceived out-of-direction travel. Caution should be used in spiral ramp design to ensure sufficient sight distances and adequate widths to accommodate bi-directional traffic. Consideration should also be given to perceived out-of-direction travel for pedestrians, especially if spiral ramps are the only access provision.

Figure 19 – Spiral ramp on the N Going St. at Concord Ave. Bridge

Switchback Ramps

In physically-constrained areas, switchback ramps provide bridge access for bicyclists, wheelchairs and other users (e.g., pedestrians with strollers, etc.). Although switchback ramps usually meet the needs of mobility-impaired users, bicyclists and other users might

Figure 20 – Bicyclist preparing to negotiate a narrow switchback turn approaching the I-84 at Hollywood Transit Center Bridge

Figure 21 – Wide ramps with broad switchbacks on the Eastbank Esplanade-Rose Quarter Connector

avoid them for several reasons. First, numerous switchbacks create the perception of circuitous travel and long travel times to overcome relatively short distances. For instance, the north ramp at the I-84 at Hollywood Transit Center Bridge includes seven switchbacks, while the north ramp at the Padden Parkway at NE 142nd Avenue Bridge includes nine switchbacks. Second, narrow switchback ramps can be difficult to maneuver on a bicycle or in a wheelchair, especially when users must negotiate 180-degee turns in relatively tight spaces (see Figure 20). Switchback ramps can better accommodate multiple users through wider widths and a minimal number of turns, as in the case of the Eastbank Esplanade-Rose Quarter Connector (see Figure 21). It should be noted however that despite the presence of wide switchback ramps, some bicyclists were observed carrying their bikes on adjacent stairways, suggesting that some users may always equate switchback ramps with out-of-direction travel regardless of their quality. Furthermore, some users might avoid bridges altogether if switchback ramps provide the only access option.

Stairways

Stairways provide the most direct bridge access for able-bodied pedestrians, and can be built in space-constrained areas. Stairways provide access to numerous bridges surveyed for this report, and stairways compliment adjacent curvilinear or switchback ramps. In addition to providing bridge access options for able-bodied pedestrians, stairways can be built with “bike gutters” to serve bicyclists wishing to avoid lengthy ramps. Depicted in Figure 22, a bike gutter is a small grooved concrete trough located between the stairway and adjacent

Figure 22 – Stairways near the I-84 at Hollywood Transit Center Bridge include “bike gutters”

railing, providing a smooth surface to push a bicycle while walking up or down stairs.[14]

Stairways serve as the only bridge access provision at several overcrossings surveyed for this report. Stairways serving as only the means of access effectively render a bridge unusable for wheelchairs, and can be unattractive to bicyclists even if bike gutters are provided.

Elevators

Elevators serve multiple users by overcoming vertical elevation changes in space-constrained areas. Among the overcrossings surveyed for this study, elevators connect pedestrians and bicyclists to the I-84 at Hollywood Transit Center Bridge, and the U.S. 26 at Sunset Transit Center Bridge.

Other Bridge Access Observations

The real or perceived out-of-direction travel to access an overcrossing structure can vary based on a user's travel path. Some bridges provide direct access ramps or stairs in some locations while limiting access to other locations. For instance, shared use paths and accessways directly connect the NW Cedar Hills Boulevard at George Foege Park Bridge with points immediately south; however direct access is not provided to and from the north. The orientation of stairways at the NE 122nd Avenue at Sacramento Street Bridge also creates perceived out-of-direction travel for users approaching the bridge from certain directions, as illustrated in Figure 23 below.

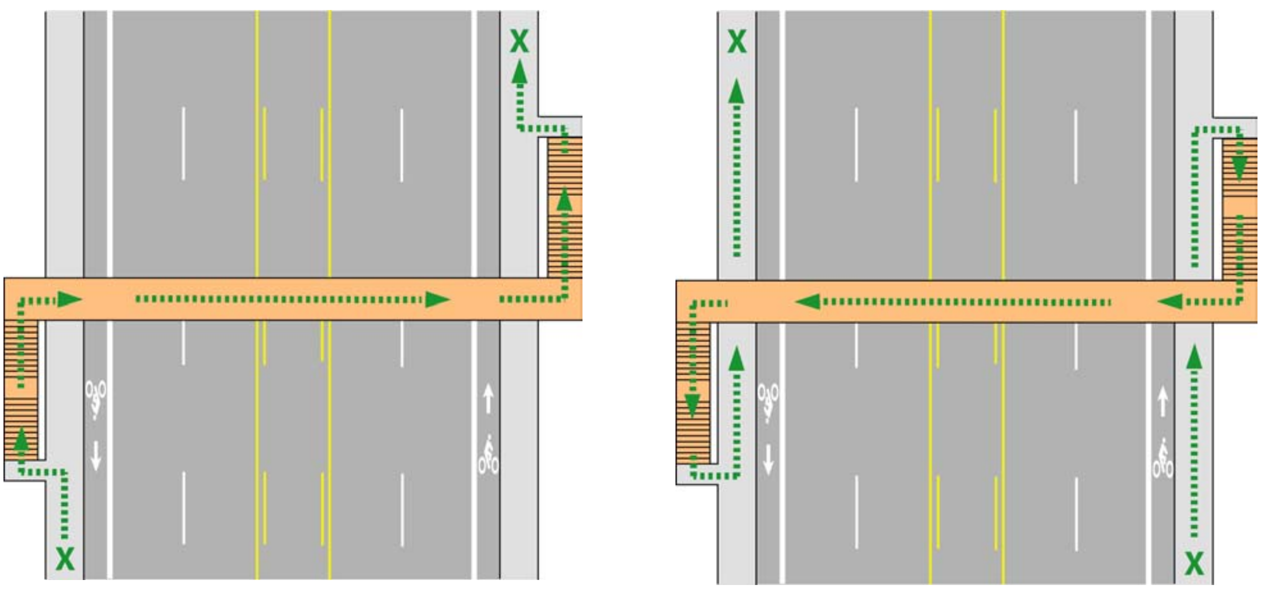


Figure 23 – Overcrossings with limited access provisions only offer direct routes for users traveling in certain directions

[14] ODOT, 124.

Other Design Considerations

Width/Horizontal Clearance

Bridges and approaches should provide sufficient width/horizontal clearance to accommodate multiple users (e.g., faster-moving bicyclists and slower-moving pedestrians), and to accommodate maintenance and emergency vehicles as necessary. Described below, both AASHTO and other bicycle/pedestrian design guides outline recommended horizontal clearances for shared use paths and pedestrian/bicycle overcrossings.

Shared Use Path Widths

Because shared use paths provide access to roughly half of the overcrossings surveyed for this report, a brief discussion of width guidelines for these facilities is relevant. Table 1 summarizes recommended shared use path widths as prescribed by AASHTO, ODOT, and WSDOT. The guidelines include a minimum 10-foot width to accommodate bi-directional traffic and to provide safe passing opportunities. Wider widths are recommended in "higher-use" areas and to accommodate maintenance and emergency vehicles. Widths less than 10 feet should only be used in physically-constrained areas and where pedestrian/bicycle volumes are expected to be low (although "low" is not defined in these publications). The WSDOT *Design Manual* also recommends use of warning signage and pavement markings to alert bicyclists of narrow path segments.[15] Shoulders are recommended to provide lateral clearance from fences, walls, signs and other potential obstructions.

Table 1: Recommended Shared Use Path Widths

Publication	Recommended Shared Use Path Width
AASHTO Bicycle Facilities Guide	• Minimum: 8' (only when use is expected to be low, and where safe and frequent passing opportunities exist) • Recommended: 10' plus 2-3' shoulders each side; 12-14' in high-use areas and/or to accommodate maintenance and emergency vehicles
Oregon Bicycle & Pedestrian Plan	• Minimum: 8' (in physically-constrained areas only) • Recommended: 10' plus 2-3' shoulders on each side; 12' in high-use areas
WSDOT Design Manual	• Minimum: 10' plus 2' shoulders each side • Recommended: 12-14' in high-use areas and/or if maintenance vehicles will be using the path

Sources: *AASHTO Guide for the Development of Bicycle Facilities*, *Oregon Bicycle and Pedestrian Plan*, *WSDOT Design Manual*.

Among the overcrossings surveyed for this report, shared use path and access ramp widths vary by location. Generally, narrower paths and access ramps correspond with older structures while newer bridges provide wider ramps and paths. In several locations, narrow paths and access ramps may complicate user access, especially for bicyclists as well as bi-directional users attempting to pass one-another. Shared use path and access ramp

[15] WSDOT (Design Manual), 1025-3.

widths on some bridges exceed AASHTO and State guidelines. Access ramps on Portland's Eastbank Esplanade-Rose Quarter Connector and on Eugene's DeFazio Bridge are at least 15 feet wide, reflecting the bridges' high use and popularity among pedestrians and bicyclists.

Overcrossing Widths

Determining appropriate overcrossing widths involves consideration of several factors:

- Anticipated pedestrian and bicycle use (e.g., volumes)
- The need for sufficient maneuvering space to avoid fixed objects (e.g., railings and barriers)
- Potential conflicts between differing users (e.g., users traveling at differing speeds, users traveling in opposite directions, users stopped on the bridge)
- Real or perceived safety issues (e.g., the "tunnel effect" created by some enclosed structures)
- Anticipated use by maintenance and emergency vehicles

Wider overcrossings generally best address the major considerations listed above. Providing additional maneuvering space, wider structures reduce the potential for user conflicts (e.g., faster-moving bicyclists and slower-moving pedestrians), and allow bicyclists to avoid fixed objects such as railings, walls and fences.[16] Overcrossings traversing freeways and major streets often include fully enclosed fencing to prevent debris from falling or being dropped on the roadway below. To minimize the potential "tunnel effect" created by enclosed fencing, bridges should be wider to provide a greater sense of security and to compensate for the visual perception of narrowness.[17] Table 2 (on Page 21) summarizes recommended overcrossing widths prescribed by various design guidance documents. The widths roughly reflect recommended shared use path widths, although additional horizontal clearance is recommended in some cases to address the issues described above.

The overcrossing field inventory conducted for this study included horizontal clearance measurements for each individual structure. The width measurement identified the minimum horizontal clearance for each bridge, adjusting for objects narrowing the passable space such as railings or signs. As shown in Table 3 (on Page 22), overcrossing widths vary widely, ranging from under 4 feet to approximately 14 feet. The widths demonstrate that mixed bi-directional pedestrian/bicycle travel could occur with minimal conflicts on some overcrossings, while users could experience difficulties on others.

[16] WSDOT (Design Manual), 1025-8.
[17] AASHTO (Pedestrian Guide), 97.

Table 2: Recommended Overcrossing Widths

Publication	Recommended Overcrossing Width
AASHTO Bicycle Facilities Guide	• At least as wide as the approaching path, plus 2' of clear area on each side • 14' if bicycle use is anticipated
AASHTO Pedestrian Facilities Guide	• 8' minimum "clear" width, but wider to match approaching sidewalks/paths that exceed 8' in width • 14' if bridge is fully enclosed • Wider widths may be necessary if shared bicycle/pedestrian use is anticipated
Rails-with-Trails: Lessons Learned	• At least as wide as the approaching path, plus 2' of clear area on each side • Wider widths may be necessary if maintenance/emergency vehicles will use the bridge
Oregon Bicycle & Pedestrian Plan	• At least as wide as the approaching path, plus 2' of clear area on each side
WSDOT Design Manual	• At least as wide as the approaching path, plus additional horizontal clearance • 14' if bridge is fully enclosed, or if shared bicycle/pedestrian use is anticipated
WSDOT Pedestrian Facilities Guidebook	• 12' railing-to-railing width (mandatory if used by maintenance/emergency vehicles)

Sources: *AASHTO Guide for the Development of Bicycle Facilities*, *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities*, *Oregon Bicycle and Pedestrian Plan*, *Rails-with-Trails: Lessons Learned*, *WSDOT Design Manual*, *WSDOT Pedestrian Facilities Guidebook*.

Table 3: Minimum Observed Overcrossing Widths

Approx. Width	Overcrossing
3′ 9″	• SW Spring St.
5′ 2″	• NE 122nd Ave. at Sacramento St.
5′ 6″	• Trillium Cr. • SE Powell Blvd. at 9th Ave.
5′ 7″	• SE Brooklyn St. at Union Pacific Railroad
5′ 9″	• SE Lafayette St. at Union Pacific Railroad (west end)
5′ 11″	• SE Division St. at 136th Ave.
6′ 0″	• N Columbia Blvd. at Midway Ave.
6′ 4″	• SE Lafayette St. at Union Pacific Railroad (east end)
6′ 10″	• N Going St. at Concord Ave.
7′ 6″	• Searle St. Bridge
8′ 0″	• N Lombard St. at I-5 • I-5 at N Failing St.
10′ 0″	• Padden Pkwy. at NE 142nd Ave. • NW Cedar Hills Blvd. at George Foege Park • I-205 at SE Main St.
11′ 0″	• I-5 at Barbur Transit Center
11′ 1″	• U.S. 26 at Sunset Transit Center
11′ 6″	• I-84 at Hollywood Transit Center
12′ 0″	• I-5 near Main St. • I-205 at Parkrose Transit Center • Springwater Trail at SE McLoughlin Blvd. • Autzen Bridge
13′ 0″	• Knickerbocker Bridge
14′ 0″	• Eastbank Esplanade-Rose Quarter Connector • Padden Pkwy. at I-205 • SE Powell Blvd. at I-205 • DeFazio Bridge
14′ 6″	• I-5/Oregon 217 Interchange

Note: Widths reflect minimum horizontal clearances (e.g., "rail-to-rail", "fence-to-fence" widths).

Height/Vertical Clearance

Sufficient clearance between the bridge deck and overhead elements is necessary to ensure safe pedestrian and bicycle travel on overcrossings. Common overhead elements include fencing (either partial or full enclosure), other structures (e.g., ramps), and vegetation (e.g., tree braches). Generous overhead clearances should also be provided to minimize users' perceptions of isolation. The AASHTO *Bicycle Guide*[18], the *Rails-with-Trails* Report[19], and the *Oregon Bicycle and Pedestrian Plan*[20] prescribe an 8-foot minimum clearance, although 10 feet is desirable. The reports also state that higher clearances may be needed to accommodate maintenance and emergency vehicles.

[18] AASHTO (Bicycle Guide), 36.
[19] USDOT (Rails-with-Trails), 79.
[20] ODOT, 117.

Nearly half of the overcrossings surveyed for this report lack overhead elements, while fences, structures and vegetation lie immediately above the remaining bridges. The range of vertical clearances varies from less than 8 feet on the Searle Street Bridge, to over 10 feet on the Eastbank Esplanade-Rose Quarter Connector. Some bridges with relatively narrow widths and low vertical clearances evoke a sense of isolation from the surrounding area, which can create safety and security concerns for some users (see Figure 24).

Figure 24 – A relatively low vertical clearance creates the perception of isolation on the Trillium Cr. Bridge

Figure 25 – Horizontal railings create a tight "pinch point" at both ends of the Trillium Cr. Bridge

Obstructions

Obstructions in the pedestrian/bicycle travelway could create horizontal or vertical "pinch points." Obstructions can pose both convenience and safety issues, and should be addressed if not prevented from occurring in the first place. Horizontal and vertical obstructions were observed at several bridges surveyed for this report, and can be categorized as design-related and maintenance-related issues.

Design-Related Obstructions

Design-related obstructions refer to permanent physical objects that may or may not have been integrated with an overcrossing's original design. Regardless, these elements create or have the potential to create issues for bridge users. For instance, in an apparent effort to prevent bicycling on the bridge structure, the Trillium Creek Bridge includes two sets of railings in the travelway at each end, providing only 34 inches of horizontal clearance (as shown in Figure 25 above). Although this treatment succeeds in blocking bicycle traffic, this measure also prevents wheelchairs and other mobility devices from using the bridge. "Wheel" users might also experience difficulty using the SW Spring Street Bridge. Depicted in Figure 26, the bridge's west access ramp leads directly to a raised sidewalk with no ramp (the presence of parked cars immediately adjacent to the sidewalk also complicates bicycle access). Finally, the overcrossings at NE 122nd Avenue at Sacramento Street, and at SE Division Street at 136th Avenue present safety issues where less than 7 feet of vertical clearance separates the uncovered bridge decks with low-hanging electrical wires above (see Figure 27).

Figure 26 – Parked vehicles and a lack of curb ramps complicates access to and from the SW Spring St. Bridge

Figure 27 – Low-hanging electrical wires create safety issues at the SE Division St. at 136th Ave. Bridge

Maintenance-Related Obstructions

The most common observed maintenance-related obstructions include minor to moderate vegetation encroachment on overcrossing structures and access ramps. Minor encroachments include weeds or other small plants growing between pavement cracks and joints. Major encroachments include tree branches and large plants narrowing the passable width of a bridge or access ramps. Other common obstructions include glass, gravel, litter and debris. Overhead structures can also obstruct the travelway, as in the case of the "sinking" overhead fence on the SE Brooklyn Street at Union Pacific Railroad Bridge.

Grades

Keeping the grade (also known as the "running slope") of a bridge and access ramp to a minimum benefits all users, and is especially important for bicyclists, wheelchairs and mobility-impaired users. Although steeper grades can reduce real or perceived out-of-direction travel in the form of shorter access ramps, they could complicate travel for all users especially in wet or icy conditions. The bicycle and pedestrian design guides published by Federal and state agencies include relevant ADA provisions. Generally, bridges and approach ramps should include a maximum 5 percent grade, although grades as high as 8.33 percent may be allowed on short segments if level landings are provided.[21] Where landings are necessary (e.g., when grades exceed 5 percent), they should be provided for every 2.5 feet of rise in elevation; they must be at least 5 feet long and span the entire width of the bridge or ramp (see Figure 28 on Page 25).[22] Additional options for mitigating steep grades including providing additional bridge/ramp width to permit slower speed movements and to provide bicyclists a dismount/walking zone. Other options include providing signage to alert users of steep downgrades, and providing adequate stopping sight distance.[23]

[21] ODOT, 118.
[22] WSDOT (Design Manual), 1025-11.
[23] WSDOT (Design Manual), 1025-8.

Limitations on available data partially constrained the evaluation of grades for the overcrossings surveyed in this report. Visual observations indicate that in most cases, bridge and access ramp grades appear to meet ADA requirements. However some overcrossings include fairly steep access ramps that could pose difficulties for all users. The access ramps on several surveyed bridges also lack level landings where they appear to be needed. It should be noted that most bridges evaluated for this study were constructed before the 1990 Americans with Disabilities Act.

Figure 28 – Access ramp with level landings on the I-5 at N Failing St. Bridge

Surface Conditions

Overcrossing users (especially bicyclists, wheelchairs and other "wheel" users) value bridges and access ramps with good surface conditions. Smooth pavement facilitates convenient bicycle and wheelchair travel and also minimizes tripping hazards. Most bridges surveyed for this report include pavement or other surfacing in relatively good condition. Pavement "lips" and expansion joint gaps represent the most common observed surface issue. Shown in Figure 29, pavement "lips" typically form as concrete or asphalt settles, creating abrupt uneven surfaces. They may also form during the bridge construction process when adjacent pavement slabs are not poured evenly. Expansion joint gaps can inconvenience bicyclists and pose hazards to wheelchairs and other users. These gaps are typically found where the bridge deck meets approaching paths or access ramps. Other observed pavement condition issues include water ponding (which could be hazardous in icy conditions), pavement cracking and heaving, and wooden surfaces that become slippery when wet.

Figure 29 – Pavement "lip" at the I-5/ Oregon 217 Interchange Bridge

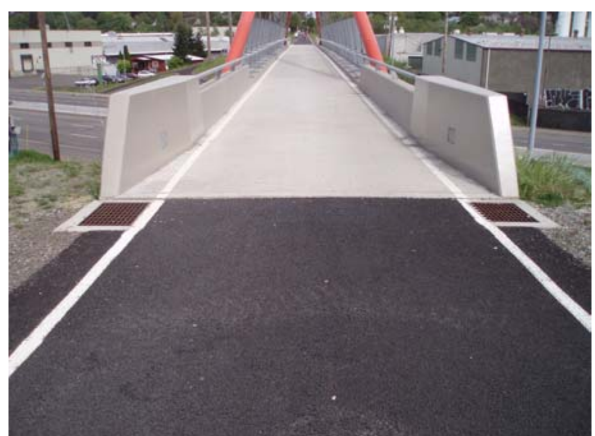


Figure 30 – Drainage grates placed outside the pedestrian/ bicycle travelway near the Springwater Trail at SE McLoughlin Blvd. Bridge

Drainage grates and manhole covers could also impact surface conditions on bridges and access ramps. Most pedestrian/bicycle design guidance documents recommend placing drainage grates and manhole covers off paths or as far away from the bicycle/pedestrian travelway as possible (see Figure 30 on Page 25). If located on the bridge or path, drainage grates should include openings narrow and short enough to prevent bicycle tires from dropping into the grates. Where drainage grates and manhole covers must be located within the pedestrian/bicycle travelway, they should be constructed flush with the surrounding pavement.

Fences and Railings

All pedestrian/bicycle overcrossings include varying types of fences, walls, and/or railings. In some cases, fences are constructed at relatively large heights or they fully enclose a bridge to prevent debris from falling or being thrown below. The AASHTO *Bicycle Guide* recommends a minimum 42-inch fence, wall, and railing height to prevent bicyclists from toppling over the bridge structure.[24] The WSDOT *Design Manual* prescribes a minimum 42-inch height for fences and barriers,[25] while the WSDOT *Pedestrian Facilities Guidebook* prescribes a 54-inch height for railings.[26] The *Oregon Bicycle and Pedestrian Plan* recommends a minimum 54-inch height for fences, walls and railings.[27]

Figure 31 – Fencing on the I-5 near Main St. Bridge is about 10' 5" tall

Among the bridges surveyed for this study, most fence heights far exceed the recommended height guidelines, as shown in Figure 31. Heights range from approximately 6 feet, 7 inches to about 10 feet, 6 inches. Some bridges include railings on one side only or lack railings altogether. Railings exist on both sides of most other bridges with heights ranging from about 32 inches to about 55 inches.

Figure 32 – Bicycle "rub rail" on the SE Powell Blvd. at I-205 Bridge

The *Oregon Bicycle and Pedestrian Plan* recommends a maximum 6-inch width

[24] AASHTO (Bicycle Guide), 55.
[25] WSDOT (Design Manual), 1025-6.
[26] WSDOT (Pedestrian Facilities Guidebook), 154.
[27] ODOT, 121.

between openings in the railing.[28] With the exception of some overcrossings, most bridges surveyed for this report include railing openings 6 inches wide or smaller. This is especially true for bridges with cyclone fencing or mesh siding. It should be noted that railings on the relatively-new SE Powell Boulevard at I-205 Bridge include a smooth, wide "rub rail" to prevent bicycle handlebars from catching the vertical bars should a bicyclist come into contact with the railing (see Figure 32 on Page 26).

Lighting

Among AASHTO's "attributes of well-designed grade-separated crossings" is the provision of a well-lit facility to offer an increased user sense of security.[29] Lighting can enhance an overcrossing's real or perceived sense of security, and should be provided if night usage is expected.[30] Among the overcrossings studied for this report, the amount of lighting varies widely by location. Lighting is provided on both the bridge structure and adjacent access ramps/stairways at several locations (see Figure 33), while some overcrossings provide lighting on either the bridge or access ramps only. In many cases, bridge users must rely on ambient freeway or street lighting, potentially posing visibility and user comfort issues. Lighting maintenance issues also exist at several bridges, as missing or broken lights were observed at some locations (see Figure 34). At the Trillium Creek Bridge, debris collecting on the overhead fence partially blocks overhead lighting above, which partially contributes to the bridge's sense of isolation from surrounding elements.

Figure 33 – Pedestrian-scale lighting on the Eastbank Esplanade-Rose Quarter Connector

Figure 34 – Missing light at the N Columbia Blvd. at Midway Ave. Bridge

Overcrossings Serving Multiple Functions

Pedestrian/bicycle overcrossings can be designed to serve functions beyond simply transitioning users from one point to another. In fact, overcrossings can be designed to transform walking or bicycling across a bridge into a pleasurable experience. While overcrossings can be the most expensive part of a non-motorized system, they can also be most visible element. Bridges could incorporate local architectural themes to add aesthetic

[28] ODOT, 123.
[29] AASHTO (Pedestrian Guide), 95.
[30] AASHTO (Bicycle Guide), 56.

value, and other elements could be added to make the bridge serve as a destination.[31] In Austin, Texas, the James Pfluger Pedestrian and Bicycle Bridge (shown in Figure 35) incorporates various elements enabling the bridge to function not only as a means for crossing the city's Town Lake, but also as a visual icon and gathering place. Curvilinear in form, the overcrossing provides a wide cross-section for through traffic in addition to benches and planters serving as congregating areas. Architectural elements include pavement texturing and coloring treatments, ornamental lighting, and diverse vegetation.

Several bridges surveyed for this study include elements that add aesthetic value. Architectural details have created aesthetically pleasing overcrossings, including Padden Parkway at NE 142nd Avenue, NW Cedar Hills Boulevard at George Foege Park, Springwater Trail at SE McLoughlin Boulevard, and the DeFazio Bridge. Designers have taken additional steps by creating viewpoints and congregating areas on bridges and approach ramps, as exhibited at the Eastbank Esplanade-Rose Quarter Connector, and at the Autzen, DeFazio, and Knickerbocker Bridges (see Figure 36).

Figure 35 – James Pfluger Bridge in Austin, Texas

Figure 36 – Viewpoints on the DeFazio Bridge

Lessons Learned

This section presents conclusions drawn from the topics covered in previous sections, and presents overall "lessons learned." These lessons should be considered as agencies set out to improve existing pedestrian/bicycle overcrossings; they should also inform planners and designers in developing new facilities.

Purpose and Function

Pedestrian/bicycle overcrossings can represent one of the most important elements of a community's non-motorized transportation network, and can overcome major barriers hindering direct travel. Overcrossings can address real or perceived safety and convenience issues by providing a formalized means for traversing these "problem areas."

[31] ITE, 19.

Relationship with the Surrounding Pedestrian/Bicycle Network

Overcrossings should be sited on logical walking and bicycling routes, and should be easy to access from the surrounding network. This includes identifying existing and desired pedestrian/bicycle travel patterns, which could be achieved through discussions with the local walking and bicycling community. This also requires providing the infrastructure and other components (e.g., sidewalks, bicycle lanes, intersection treatments, wayfinding tools, etc.) necessary to conveniently access the bridge area.

Relationship with Alternative Crossings

Pedestrians and bicyclists will hold overcrossings to a higher standard when other crossing opportunities exist. When users choose whether to cross at-grade or use an overcrossing, the bridge's location relative to their desired travel routes, the distance and travel time required to access the bridge structure, and the perceived risk of crossing at-grade all inform the decision-making process.

Relationship with the Barrier Being Crossed

Pedestrian/bicycle overcrossings work best when the "barrier" being traversed is depressed below the natural ground line. Bridges situated flush with surrounding streets and paths minimize the need for access ramps to overcome a vertical elevation gain. On the other hand, bridges sited above the natural ground line are challenged with providing suitable access for multiple users while offering a reasonable level of convenience (e.g., minimizing real or perceived out-of-direction travel). The planning and design of future highways, roads and rail corridors should include this consideration whenever possible.

Bridge Access

In many cases, overcrossings need to rise above the natural ground line to cross major barriers, thus requiring stairways, access ramps or other provisions. From the perspective of various user groups, the major bridge access types each offer benefits and drawbacks from a functional and convenience standpoint. For this reason, it is critically important to provide access choices. In most cases, bridge users will seek the most direct bridge access route. Bicyclists for instance, may choose to carry their bikes up stairways even if a ramp is provided. The solution to this specific case would include both an access ramp and a "bike gutter" on the stairway. Overcrossings should also include necessary provisions for mobility-impaired users (e.g., elevators, or ramps with level landings). Wider stairways and access ramps with broader turns (e.g., avoiding switchbacks) facilitate easier maneuverability for all users, and can minimize potential conflicts between users traveling at varying speeds.

Other Design Elements

Overcrossings should include the components necessary to enhance user comfort, safety and security. Wider structures not only facilitate easier travel by minimizing user conflicts, they could also minimize the perception of isolation (especially for bridges with fully-enclosed fencing). Overcrossings should also provide sufficient vertical clearances to accommodate various users including maintenance and emergency vehicles as needed.

Bridges and access ramps should be designed with appropriate grades, landings, railings, fences and lighting to promote user safety and comfort.

Aesthetics

Through the use of various architectural elements, overcrossings can be designed to serve as visual icons and community gathering places. Bridges with aesthetically-pleasing elements not only have the potential to attract bicyclists and pedestrians traveling between adjacent areas, but could also attract residents and visitors using the bridge as a destination in and of itself.

Maintenance

Overcrossings require on-going maintenance. Agencies should perform routine bridge inspection and maintenance to address surface conditions (e.g. pavement cracking), remove obstructions (e.g., glass and debris), replace lighting, and address any other relevant issues as needed.

Learning from Past Experiences

Although most overcrossings surveyed for this report could benefit from improvements, it should be noted that they continue to play an important role in their respective non-motorized transportation networks. Pedestrians and bicyclists often depend on these structures despite their flaws. With additional improvements, these structures yield potential to better serve their intended users. Agencies should identify opportunities for improving the function, quality and convenience of existing overcrossings. This involves considering the recommendations discussed above.

Although pedestrians and bicyclists may continue to use existing overcrossings with various deficiencies, planners and designers should not use this to justify building inadequate bridges in the future. Lessons learned from previous experiences should guide the design of high-quality overcrossings meeting the functional and convenience needs of pedestrians and bicyclists.

Appendix A: Overcrossing Inventory Summary Matrix

General Information							Location Relative to Other Crossings		Access Provisions							Other Design Elements					
Overcrossing	Map reference #	General location	Ownership	Year built	Crossing type	Length	Distance to nearest alternate crossing	Elements discouraging/ precluding at-grade crossings	Vertical rise necessary to reach bridge	Linear paths/ ramps	Curvilinear paths/ ramps	Spiral ramps	Switchback ramps	Stairways	Elevator	Min. vertical clearance	Min. horizontal clearance	Horiz./ vertical obstruction issues	Fences, walls, railings on bridge	Surface conditions issues	Lighting
I-5 near Main St.	1	Vancouver, WA	WSDOT	2001	Freeway	~245'	~500'	Fencing	Yes	No	Yes	No	No	No	No	Uncovered	~12' 0"	Yes	Fences	Yes	No
Padden Pkwy. at I-205	2	Clark County, WA	WSDOT	2003	Freeway	~560'	~2,700'	Fencing	Yes	Yes	No	No	No	No	No	Uncovered	~14' 0"	No	Fences	Yes	No
Padden Pkwy. at NE 142nd Ave.	3	Clark County, WA	Clark County	2001	Freeway	~110'	~850'	Sound Walls	Yes	No	No	No	Yes	Yes	No	Uncovered	~10' 0"	No	Fences	No	Yes
N Columbia Blvd. at Midway Ave.	4	Portland, OR	City of Portland	1969, 2006	Major street	~82'	~100'	Fencing	Yes	No	No	No	Yes	No	No	~9' 3"	~6' 0"	Yes	Railings	No	Yes
N Lombard St. at I-5	5	Portland, OR	ODOT	1965	Freeway ramp	~240'	~625'	None	Yes	Yes	No	Yes	No	No	No	~11' 7"	~8' 0"	No	Railings	No	No
N Going St. at Concord Ave.	6	Portland, OR	City of Portland	1975	Major street	~75'	~675'	Sound walls	Yes	No	No	Yes	No	No	No	~8' 6"	~6' 10"	Yes	Fences, walls	No	Yes
I-5 at N Failing St.	7	Portland, OR	ODOT	1963, 2000	Freeway	~142'	~1,350'	Fencing, sound walls	Yes	No	No	No	Yes	Yes	No	~9' 6"	~8' 0"	No	Fences, railings	No	No
I-205 at Parkrose Transit Center	8	Portland, OR	TriMet	2001	Freeway	~157'	~800'	Fencing	No	Yes	No	No	No	No	No	Unavailable	~12' 0"	No	Fences, railings	Yes	Yes
NW Cedar Hills Blvd. at George Foege Park	9	Beaverton, OR	Washington County	1999	Major street	~148'	~400'	None	No	Yes	No	No	No	No	No	Unavailable	~10' 0"	Yes	Railings	Yes	No
U.S. 26 at Sunset Transit Center	10	Beaverton, OR	TriMet	1998	Freeway, railroad	~290'	~1,130'	Fencing, barriers	Yes	Yes	No	No	No	Yes	Yes	~11' 0"	~11' 1"	No	Fences, railings	No	Yes
Eastbank Esplanade-Rose Quarter Connector	11	Portland, OR	City of Portland	2001	Railroad	~187'	~250'	Fencing	Yes	No	Yes	No	Yes	Yes	No	~10' 3"	~14' 0"	Yes	Fences, railings	No	Yes
I-84 at Hollywood Transit Center	12	Portland, OR	ODOT	1985	Freeway, railroad	~268'	~700'	Fencing, sound walls	Yes	Yes	No	No	Yes	Yes	Yes	Uncovered	~11' 6"	No	Fences, railings	No	Yes
NE 122nd Ave. at Sacramento St.	13	Portland, OR	City of Portland	1966, 1993	Major street	~80'	~65'	None	Yes	No	No	No	No	Yes	No	Uncovered	~5' 2"	Yes	Railings	No	No
SW Spring St.	14	Portland, OR	City of Portland	1938, 1961	Gully	~195'	~270'	Topography	No	Yes	Yes	No	No	No	No	Uncovered	~3' 9"	Yes	Fences	Yes	Yes
Trillium Cr.	15	Portland, OR	City of Portland	1953, 1990	Waterway	~204'	~1,200'	Topography	No	Yes	Yes	No	No	No	No	~8' 4"	~5' 6"	Yes	Fences, walls, railings	Yes	Yes
SW Hooker St. at Naito Pkwy.	16	Portland, OR	City of Portland	1957, 1981	Major street	~140'	~530'	None	Yes	Yes	No	No	No	No	No	~8' 0"	~10' 0"	No	Fences	Yes	No
SE Powell Blvd. at 9th Ave.	17	Portland, OR	City of Portland	1985	Major street	~94'	~20'	None	Yes	No	No	Yes	No	No	No	Uncovered	~5' 6"	No	Walls, railings	Yes	No

Notes: ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation; UPRR = Union Pacific Railroad.

General Information							Location Relative to Other Crossings		Access Provisions							Other Design Elements					
Overcrossing	Map reference #	General location	Ownership	Year built	Crossing type	Length	Distance to nearest alternate crossing	Elements discouraging/ precluding at-grade crossings	Vertical rise necessary to reach bridge	Linear paths/ ramps	Curvilinear paths/ ramps	Spiral ramps	Switchback ramps	Stairways	Elevator	Min. vertical clearance	Min. horizontal clearance	Horiz./ vertical obstruction issues	Fences, walls, railings on bridge	Surface conditions issues	Lighting
SE Brooklyn St. at UPRR	18	Portland, OR	City of Portland	1976	Railroad	~75'	~620'	Fencing	Yes	No	No	No	No	Yes	No	~8' 6"	~5' 7"	Yes	Fences, railings	Yes	No
SE Lafayette St. at UPRR	19	Portland, OR	UPRR	1943	Railroad	~128'	~1,270'	Fencing, signage	Yes	No	No	No	No	Yes	No	Uncovered	~5' 9"	Yes	Fences	Yes	No
I-205 at SE Main St.	20	Portland, OR	ODOT	1978	Freeway	~575'	~1,500'	Fencing	Yes	No	Yes	No	No	No	No	Uncovered	~10' 0"	No	Fences, railings	Yes	Yes
SE Powell Blvd. at I-205	21	Portland, OR	ODOT	2003	Major street	~216'	~500'	Signage	Yes	Yes	Yes	No	No	No	No	Uncovered	~14' 0"	No	Fences, railings	Yes	Yes
SE Division St. at 136th Ave.	22	Portland, OR	City of Portland	1966	Major street	~83'	~110'	None	Yes	No	No	No	No	Yes	No	Uncovered	~5' 11"	Yes	Railings	No	No
I-5 at Barbur Transit Center	23	Portland, OR	ODOT	1976	Freeway	~155'	~1,120'	Fencing	Yes	Yes	No	No	No	Yes	No	Uncovered	~11' 0"	Yes	Fences, walls, railings	Yes	Yes
Springwater Trail at SE McLoughlin Blvd.	24	Portland, OR	City of Portland	2006	Major street	~300'	~530'	Barrier	Yes	Yes	No	No	Yes	No	No	Unavailable	~12' 0"	No	Fences, railings	Yes	No
I-5/Oregon 217 Interchange	25	Tigard, OR	ODOT	2001	Freeway	~251'	~2,000'	Fencing, barriers	No	Yes	No	No	No	No	No	~10' 6"	~14' 6"	Yes	Fences, railings	Yes	No
Autzen Bridge	26	Eugene, OR	City of Eugene	1970	Waterway	~670'	~3,500'	Waterway	No	Yes	No	No	No	No	No	Uncovered	~12' 0"	No	Walls, railings	Yes	Yes
DeFazio Bridge	27	Eugene, OR	City of Eugene	1999	Waterway	~613'	~300'	Waterway	Yes	Yes	Yes	No	No	Yes	No	Unavailable	~14' 0"	No	Railings	Yes	Yes
Knickerbocker Bridge	28	Eugene, OR	City of Eugene	1979	Waterway	~525'	~3,500'	Waterway	No	Yes	No	No	No	No	No	Uncovered	~13' 0"	No	Railings	Yes	Yes
Searle St. Bridge	29	Bremerton, WA	WSDOT	1974	Freeway	~233'	~1,500'	Fencing	No	Yes	No	No	No	No	No	~7' 6"	~7' 6"	Yes	Fences, railings	Yes	Yes

Notes: ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation; UPRR = Union Pacific Railroad.

Appendix B: Overcrossing Inventory Sheets

Interstate 5 near Main Street

Location: Vancouver, WA

Location Map Reference #: 1

Crosses over: Interstate 5

Source: Google Earth

Year built: 2001

Owned by: Washington State Dept. of Transportation

Nearby destinations:
- Lincoln neighborhood
- Rosemere neighborhood
- Discovery Middle School
- Leverich Park
- Kiggins Bowl
- Hazel Dell Ave. commercial businesses

Shared use path in Leverich Park

Misc. observations: Litter and graffiti present on bridge and surrounding paths; graffiti present on wayfinding signs

Location Elements

Nearest alternative formalized crossing(s):
- I-5 at Main St. (no sidewalks), ~500' north of bridge
- I-5 at E. 39th St., ~2,200' south of bridge

The nearest alternative crossing (I-5 at Main St.) lacks sidewalks

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on both sides of I-5

Bike/ped accommodations immediately adjacent to bridge:
- Shared use paths
- Curb ramps provided where shared use paths meet the street system

Surrounding bike/ped network:
- Discovery Trail
- Ellen Davis Trail
- Bicycle lanes on Main St.
- Low-volume streets with sidewalks in Rosemere neighborhood

Discovery Trail

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Depends on user (bridge is part of a recreational path system, therefore circuitous approach paths may not be an issue for bicyclists
- Pedestrian: Bridge is located at least 1/4 mile from nearby destinations, resulting in longer walking travel times

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Circuitous path on east end creates a perceived sense of out-of-direction travel, especially for users travel to/from the south
- Pedestrian: Stairways not provided on east end to address perceived out-of-direction travel; users have created informal paths to reduce travel distances

Informal path created by bridge users to reduce out-of-direction travel

Wayfinding or other signage/ pavement markings: Wayfinding signage to nearby trails and streets

Wayfinding signage directing bridge users to nearby trails and streets

Design Elements

Bridge access provisions: Bridge is part of a surrounding shared use path network

Surrounding shared use paths provide direct access to the bridge

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path
- Shared use path width: ~12'

Fence/wall/railing heights:
- Shared use paths: No immediate fences, walls or railings
- Bridge: ~10' 5" fence, no walls or railings

Railings not present on bridge structure

Lighting: Ambient freeway lighting only

The only source of lighting is provided by surrounding light poles on I-5

Bridge structure length (excluding access ramps): ~245'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~12'

12' curb-to-curb width on bridge structure

Surface conditions:
- Bridge: Pavement in good condition; large expansion joint gaps at bridge ends (creates issues for "wheel" users)
- Shared use paths: Pavement in good condition
- No drainage grates on bridge or paths

Expansion joint gap at west end of bridge structure

Horizontal/vertical obstructions: Minor vegetation encroachment on surrounding shared use paths

Padden Parkway at Interstate 205

Location: Clark County, WA

Location Map Reference #: 2

Crosses over: Interstate 205

Source: Google Earth

Year built: 2003

Owned by: Washington State Dept. of Transportation

Nearby destinations:
- Sunnyside neighborhood
- Walnut neighborhood
- Crossroads Community Center

Crossroads Community Center

Misc. observations: No connections provided to immediate surrounding areas

Location Elements

Nearest alternative formalized crossing(s):
- Padden Pkwy. at NE Andresen Rd., signalized at-grade crossing, ~2,700' west of bridge
- Padden Pkwy. at NE 94th Ave., signalized at-grade crossing, ~4,200' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on both sides of I-205

Bike/ped accommodations immediately adjacent to bridge:
- Sidewalks and curb ramps lacking at some nearby intersections
- Shared use path on south side of Padden Pkwy.

The bridge is part of the Padden Parkway shared use path

Surrounding bike/ped network:
- Shared use path along Padden Pkwy.

Shared use path along Padden Pkwy.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge is located on a logical east-west travel path, however no connections to surrounding destinations (e.g., neighborhoods, community center) are provided
- Pedestrian: The lack of connections to adjacent destinations requires excessive out-of-direction travel (and long travel times) for pedestrians

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of shared use path approaches: Data unavailable
- Bicycle: Linear approach ramps eliminate ouf-of-direction travel and facilitate continuous bicycle travel
- Pedestrian: Linear approach ramps eliminate out-of-direction travel (switchbacks and stairs not necessary)

Linear access ramps facilitate continuous bicycle travel

Wayfinding or other signage/ pavement markings: Pavement markings on shared use path serving as mileage markers

Mileage markers on Padden Pkwy. shared use path

Design Elements

Bridge access provisions: Bridge is part of a surrounding shared use path network

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path
- Shared use path width: ~14'
- Twin bollards near east end of bridge (4' 7" horiz. clearance on outer ends; 3' 9" horiz. clearance between bollards); minimal reflectivity and height could create vision difficulties for nighttime path users

Twin bollards near east end of bridge

Fence/wall/railing heights:
- Shared use path approach ramps:
  - West ramp: ~54" railings
  - East ramp: ~31" lower railings, ~54" upper railings
- Bridge: ~9' fence, ~54" railings

Railing and fence on bridge structure

Lighting: Ambient freeway lighting only

Bridge structure length (excluding access ramps): ~560'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~14'

Bridge cross-section includes a 14' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition; large expansion joint gaps at bridge ends (creates issues for "wheel" users); drainage grates on far edges of pavement
- Shared use paths: Pavement in generally good condition (some cracking on path east of bridge)

Drainage grate and expansion joint on bridge structure

Horizontal/vertical obstructions: None

Padden Parkway at NE 142nd Avenue

Location: Clark County, WA

Location Map Reference #: 3

Crosses over: Padden Pkwy.

Source: Google Earth

Year built: 2001

Owned by: Clark County

Nearby destinations:
- Sifton neighborhood
- Orchards neighborhood
- Heritage High School
- Tiger Tree Park

Sifton neighborhood

Misc. observations: Architectural elements add aesthetic value to the bridge

Location Elements

Nearest alternative formalized crossing(s):
- Padden Pkwy. at NE 137th Ave., signalized at-grade crossing, ~850' west of bridge
- Padden Pkwy at NE 152nd Ave., signalized at-grade crossing, ~2,650' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Sound walls

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided where access ramps meet the street system
- Fragmented sidewalks on NE 142nd Av.
- Shared use path on south side of Padden Pkwy.

A smooth transition is provided at the base of the bridge's south access ramp with NE 142nd Ave.

Surrounding bike/ped network:
- Shared use path along Padden Pkwy.
- Sidewalks along most streets
- Low-volume residential streets

Shared use path along Padden Pkwy.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle:
  - North end: Excessive out-of-direction travel on north access ramp (9 switchbacks); "bike gutter" not provided on adjacent stairways to provide alternative routing
  - South end: Depends on direction of travel (switchback ramp creates some out-of-direction travel for bicyclists traveling to/from the north, south, and west); "bike gutter" not provided on adjacent stairway to provide alternative routing
- Pedestrian:
  - North end: Depends on user (stairways provided as an alternative to switchback ramp; switchback ramp creates long travel distances for wheelchair users)
  - South end: Depends on user (stairways provided as an alternative to switchback ramp; switchback ramp creates long travel distances

Narrow access ramp with multiple switchbacks complicates bicycle access on the bridge's north end

Wayfinding or other signage/pavement markings: "No skateboarding" signs

Design Elements

Bridge access provisions:
- Switchback ramp with level landings on north end (9 switchbacks)
- Stairways with landings on north end
- Linear ramp with landing on south end (# of switchbacks depends on direction of travel)
- Stairway with landings on south end
- "Bike gutter" not provided on stairways
- Center bollard present where south access ramp meets NE 142nd Ave. (6' 2" horiz. clearance on each side of bollard)

North access ramp

Access ramp length/width:
- North ramp: ~220'/~6' 6"
- South ramp: ~280'/~6'

Fence/wall/railing heights:
- Ramps/stairways: ~35" lower railings, ~42" upper railings
- Bridge: No railings, ~122" fence

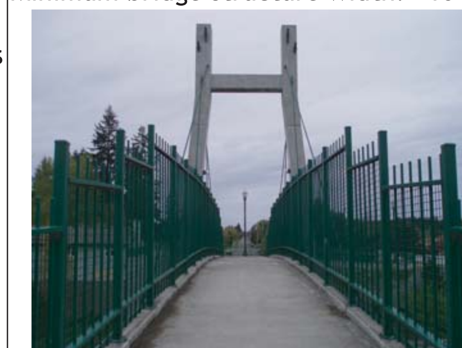
Railings not provided on bridge structure

Lighting: Provided on bridge structure and access ramps

Bridge structure length (excluding access ramps): ~110'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~10'



Bridge cross-section includes a 10' curb-to-curb width

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition

The bridge and access ramps benefit from relatively good pavement conditions

Horizontal/vertical obstructions: None

N. Columbia Boulevard at Midway Avenue

Location: Portland, OR

Location Map Reference #: 4

Crosses over: N. Columbia Blvd.

Source: Google Earth

Year built: 1969
(overhead fence added: 2006)

Owned by: City of Portland

Nearby destinations:
- St. Johns neighborhood
- George Middle School
- George Park
- TriMet bus stops

George Middle School

Misc. observations: Glass present on bridge; high truck volumes on Columbia Blvd.

Location Elements

Nearest alternative formalized crossing(s):
- N. Columbia Blvd. at Midway Ave., unsignalized at-grade crossing, ~100' east of bridge
- N. Columbia Blvd. at Bank St., unsignalized at-grade crossing, ~350' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area:
Fencing on south side of Columbia Blvd.

Fencing on south side of Columbia Blvd. discourages at-grade crossings near George Middle School, and encourages students to use the bridge

Bike/ped accommodations immediately adjacent to bridge:
- Fragmented sidewalks where bridge access ramps meet the street system
- Curb ramps lacking at adjacent intersections

Gap between bridge access ramp and sidewalk on N. Columbia Blvd.

Surrounding bike/ped network:
- Low-volume streets north and south of N. Columbia Blvd.
- Residential streets with limited sidewalk network

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Although the bridge is located within a well-connected street grid, it is not located on a designated bicycle route; the bridge's access provisions (switchback ramps) may also discourage bicycle use
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between George Middle School and surrounding neighborhoods)

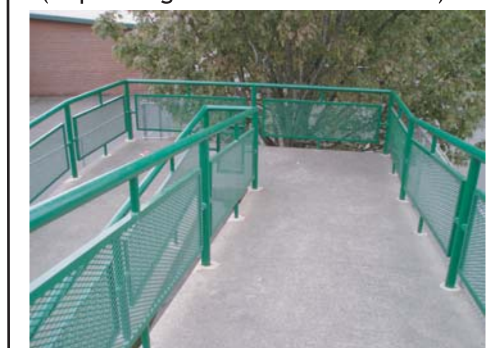
Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~16'
- Bicycle: Numerous switchbacks on access ramps discourage bicycle use
- Pedestrian: Numerous switchbacks on access ramps increase travel distances; pedestrians may opt to use nearby at-grade crossings

Bridge users must negotiate through several switchbacks on both ends of the structure

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- Switchback ramps with level landings
- 2 switchbacks on south access ramp
- 2-3 switchbacks on north access ramp (depending on direction of travel)



Access ramp with level landings

Access ramp length/width:
- South ramp: ~145'/~6'
- North ramp: ~175'/~6'

Fence/wall/railing heights:
- Access ramps: ~42" railings
- Bridge: ~42" railings

Railing style on access ramps and bridge

Lighting: Provided on north and south ends of bridge; lights missing or broken in some locations

Missing light on south side of bridge

Bridge structure length (excluding access ramps): ~82'

Bridge structure vertical clearance: ~9' 3"

Minimum bridge structure width: ~6'

Bridge cross-section includes a 6' rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition
- No drainage grates on bridge or ramps

Horizontal/vertical obstructions: Encroaching vegetation on north sidewalk near bridge access ramp

Encroaching vegetation on sidewalk near bridge

N. Lombard Street at Interstate 5

Location: Portland, OR

Location Map Reference #: 5

Crosses over: I-5 southbound on-ramp

Source: Google Earth

Year built: 1965

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Arbor Lodge neighborhood
- Kenton neighborhood
- Piedmont neighborhood
- Kenton Elem. School
- N. Lombard Transit Center MAX station
- Commercial businesses on N. Lombard St. and N. Interstate Ave.

Commercial area near bridge

Misc. observations: Numerous pedestrians observed avoiding bridge and crossing at-grade

Location Elements

Nearest alternative formalized crossing(s):
- N. Lombard St. at Interstate Ave., signalized at-grade crossing, ~625' west of bridge
- N. Lombard St. at Mississippi Ave., unsignalized at-grade crossing, ~850' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: None

No physical or other elements exist to discourage at-grade crossings of the I-5 entrance ramp

Bike/ped accommodations immediately adjacent to bridge:
- Sidewalk on N. Lombard St.
- No curb ramp between N. Lombard St. and bridge (bicyclists must ride on sidewalk to access bridge)

Transition between sidewalk and bridge access ramp

Surrounding bike/ped network:
- Sidewalks on N. Lombard St.
- Bicycle lanes on N. Interstate Ave.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Although the bridge eliminates conflicts between through bicycle traffic and vehicles entering I-5, the lack of smooth transitions between Lombard St. and the bridge (e.g., curb ramps) discourages bicyclists' use of the bridge
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route, representing a continuation of the N. Lombard St. sidewalk)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Bridge's "spiral" route could encourage some bicycle use, however bicyclists may choose to remain in the vehicle travel lane (which would reduce travel time)
- Pedestrian: Bridge's circuitous path perceived as inconvenient for some pedestrians, as exhibited in several observed at-grade crossing behaviors; stairways not provided to address perceived out-of-direction travel

Observed at-grade crossing behaviors indicate that some pedestrians view the bridge as requiring excessive out-of-direction travel

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- Linear and "spiral" ramps
- No level landings

East access ramp

Access ramp length/width:
- East ramp: ~43'/~8'
- West ramp: ~40'/~8'

Fence/wall/railing heights:
- Access ramps: ~40" railings
- Bridge: ~40" railings

Railing style on access ramps and bridge

Lighting: Ambient street and freeway lighting only

Light poles on N. Lombard St. are the bridge's primary illumination source

Bridge structure length (excluding access ramps): ~240'

Bridge structure vertical clearance:~11' 7" (where ramps cross under bridge structure)

Minimum bridge structure width: ~8'

Bridge cross-section includes an 8' curb-to-curb width

~11' 7" vertical clearance between bridge and access ramp below

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition
- No drainage grates on bridge or ramps

Horizontal/vertical obstructions: None

N. Going Street at Concord Avenue

Location: Portland, OR

Location Map Reference #: 6

Crosses over: N. Going Street

Source: Google Earth

Year built: 1975

Owned by: City of Portland

Nearby destinations:
- Overlook neighborhood
- Beech Elem. School
- Peninsula Childrens Center
- Beech Community Garden
- N. Prescott St. MAX Station

Overlook neighborhood

Misc. observations: Heavy recreational and commuting use; graffiti present on bridge structure

Location Elements

Nearest alternative formalized crossing(s): N. Interstate Ave. at Going St., signalized at-grade crossing, ~675' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Sound walls on north and south sides of Going St.

Sound wall discourages at-grade crossings and encourages use of the bridge

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided at adjacent intersections
- Large "lip" on driveway apron providing access to bridge's north entrance (could complicate travel for wheelchair users)

"Lip" on driveway apron at bridge's north access point

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Bicycle lanes on N. Interstate Ave.
- Low-volume residential streets
- Well-connected street grid

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route connecting nearby destinations)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~18'
- Bicycle: "Spiral" ramps minimize travel distance to overcome vertical rise, and permit slow but continuous bicycle movement
- Pedestrian: "Spiral" ramps minimize travel distance to overcome vertical rise; stairways not provided

"Spiral" access ramp on bridge's south side

Wayfinding or other signage/ pavement markings: Wayfinding signage to Prescott St. MAX station

Wayfinding signage directing bridge users to nearby MAX station

Design Elements

Bridge access provisions:
- "Spiral" ramps
- No level landings
- No bollards where access ramps meet streets
- Ramp slope becomes especially steep where ramps meet the bridge

Access ramp slope is relatively steep immediately near the bridge structure

Access ramp length/width:
- South ramp: ~175'/~8'
- North ramp: ~160'/~8'

Fence/wall/railing heights:
- Access ramps: ~30" walls, ~42" railings
- Bridge: ~30" walls, no railings

South access ramp

Lighting: Provided on south access ramp; otherwise ambient street lighting only

Bridge structure length (excluding access ramps): ~75'

Bridge structure vertical clearance: ~8' 6"

Minimum bridge structure width: ~6' 10"

Extruded curbs reduce the bridge's usable width

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition; drainage grates are flush with pavement

Drainage grates are flush with the pavement, thereby easing travel for "wheel" users

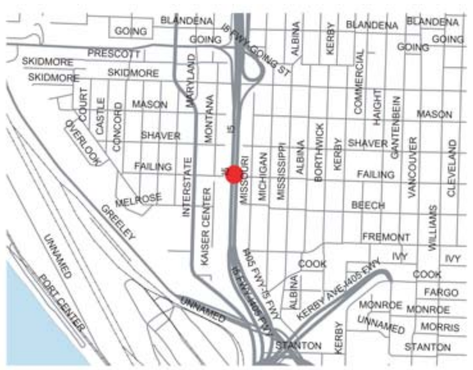
Horizontal/vertical obstructions:
- Encroaching vegetation on both access ramps

Encroaching vegetation on north access ramp

Interstate 5 at N. Failing Street

Location: Portland, OR

Location Map Reference #: 7



Crosses over: Interstate 5

Source: Google Earth

Year built: 1963
(access ramps re-built: 2000)

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Boise neighborhood
- Overlook neighborhood
- Overlook Park
- Overlook Park MAX Station
- Commercial businesses on N. Interstate Ave. and N. Mississippi Ave.

Overlook neighborhood

Misc. observations: Heavy commuting use; graffiti present on bridge and access ramps

Location Elements

Nearest alternative formalized crossing(s):
- I-5 at N. Skidmore St., ~1350' north of bridge

Elements precluding/discouraging at-grade crossings in bridge area:
Fencing and sound walls on both sides of I-5

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps and driveway aprons present where access ramps meet the street system
- Sidewalks on N. Failing St.

Sidewalks and curb ramps facilitate easy transitions between the bridge and surrounding street system

Driveway apron on the bridge's east end facilitates easy bicycle transitions to/from the street

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Bicycle lanes on N. Interstate Ave.
- Low-volume residential streets
- Well-connected street grid

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical east-west bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between two commercial districts)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: Switchback ramps create perceived out-of-direction travel; "bike gutter" not provided on adjacent stairways to provide alternative routing
- Pedestrian: Stairways provided on both bridge ends, reducing travel time

Stairways offer direct pedestrian access to the bridge

Wayfinding or other signage/pavement markings: Wayfinding signage directing directing pedestrians/bicyclists to the bridge

Wayfinding signage on N. Mississippi Ave. and on N. Interstate Ave.

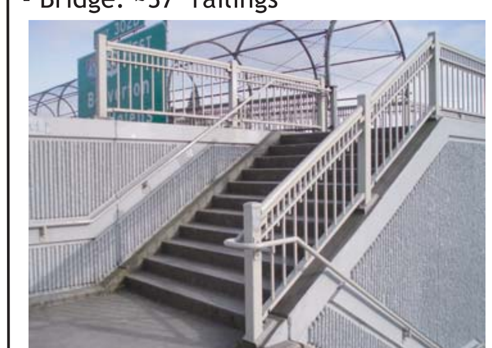
Design Elements

Bridge access provisions:
- Switchback ramps with level landings
- 1 switchback on east and west access ramps
- Stairways with level landings

Level landings provided on stairways and access ramps

Access ramp length/width:
- West ramp: ~280'/~8'
- East ramp: ~280'/~8'

Fence/wall/railing heights:
- Access ramps: ~35" railings, ~42" walls
- Stairways: ~35" railings
- Bridge: ~37" railings



Railings 35" tall provided on stairways

Lighting: Ambient freeway lighting only

Bridge structure length (excluding access ramps): ~142'

Bridge structure vertical clearance: ~9' 6"

Minimum bridge structure width: ~8'

Bridge cross-section includes an 8' curb-to-curb width

Surface conditions:
- Bridge: Pavement in good condition; drainage grates placed outside the bridge's curb-to-curb width
- Access ramps: Pavement in good condition; minor water ponding at base of east access ramp

Drainage inlets placed out of the bicycle/pedestrian travelway

Horizontal/vertical obstructions: None

Interstate 205 at Parkrose Transit Center

Location: Portland, OR

Location Map Reference #: 8

Crosses over: I-205 (northbound lanes)

Source: Google Earth

Year built: 2001

Owned by: TriMet

Nearby destinations:
- Cully/Sumner neighborhood
- Parkrose neighborhood
- Parkrose/Sumner Transit Center and MAX Station

Parkrose/Sumner MAX Station

Misc. observations: Heavy traffic volumes on I-205 cause bridge to vibrate and bounce

Location Elements

Nearest alternative formalized crossing(s):
- No other crossings provide access to MAX station (located on freeway median)
- Nearby I-205 crossings include NE Sandy Blvd. (~800' south of bridge), and NE Columbia Blvd. (~800' north of bridge)

Elements precluding/discouraging at-grade crossings in bridge area:
Fencing on east side of I-205

Bike/ped accommodations immediately adjacent to bridge:
- Raised crosswalk at bridge's east end
- Sidewalk leading to NE Sandy Blvd.
- I-205 path

Raised crosswalk at bridge's east end

Surrounding bike/ped network:
- I-205 path
- Sidewalks on NE Sandy Blvd.

The bridge connects directly with the I-205 path

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge lies on the most direct path between the transit center and MAX station)
- Pedestrian: Minimal out-of-direction travel (bridge lies on the most direct path between the transit center and MAX station)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: No out-of-direction travel (bridge is at roughly the same elevation as the transit center and MAX station, therefore requiring no circuitous ramps)
- Pedestrian: No out-of-direction travel (bridge is at roughly the same elevation as the transit center and MAX station, therefore requiring no stairs or circuitous access ramps)

The minimal elevation difference between the bridge and surrounding areas eliminates the need for stairways and circuitous access ramps

Wayfinding or other signage/pavement markings: Signage advising bridge users of cross-traffic on the I-205 path

Design Elements

Bridge access provisions:
- Access ramp on west side
- Access ramp not necessary on east side (bridge and transit center are at the same elevation)

West access ramp

Access ramp length/width:
- West ramp: ~85'/~10.5'

Fence/wall/railing heights:
- West access ramp: ~32" railings, 42" barrier (west side)
- Bridge: ~42" railings

The bridge structure includes 42" high railings on both sides

Lighting: Provided on bridge, bridge approaches, at MAX station and transit center

Overhead lighting on bridge

Bridge structure length (excluding access ramps): ~157'

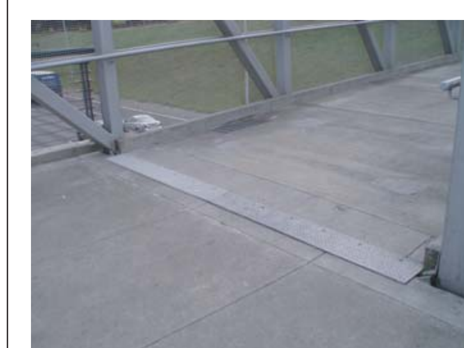
Bridge structure vertical clearance: varies

Minimum bridge structure width: ~12'

Bridge cross-section includes a 12' rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition; small drainage grates at west end; minor expansion joint "lip" at west end
- Access ramps: Pavement in good condition; drainage grates are flush with pavement

Drainage grate at bridge's west end



Expansion joint "lip" at bridge's west end

Horizontal/vertical obstructions: None

NW Cedar Hills Boulevard at George Foege Park

Location: Beaverton, OR

Location Map Reference #: 9

Crosses over: NW Cedar Hills Blvd.

Source: Google Earth

Year built: 1999

Owned by: Washington County

Nearby destinations:
- Cedar Mill neighborhood
- George Foege Park

George Foege Park

Misc. observations: High vehicle speeds on NW Cedar Hills Blvd.

Location Elements

Nearest alternative formalized crossing(s):
- NW Cedar Hills Blvd. at NW Leahy Rd., unsignalized at-grade crossing, ~400' north of bridge

Elements precluding/discouraging at-grade crossings in bridge area: None

Bike/ped accommodations immediately adjacent to bridge:
- Accessway leading to NW 112th Ave. (curb ramps provided where accessway meets street)
- Shared use path leading to George Foege Park

Accessway connecting the bridge with NW 112th Ave. provides curb ramps for easy bicyclist transitions to/from the street

Surrounding bike/ped network:
- Shared use paths in George Foege Park
- Accessway connecting with residential area east of bridge
- Bicycle lanes and sidewalks on Cedar Hills Blvd.
- Limited sidewalk network on nearby residential streets
- Surrounding low-volume streets with limited connectivity

Bicycle lanes and sidewalks on Cedar Hills Blvd.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: More out-of-direction travel for users traveling to/from the north (no direct access provisions); minimal out-of-direction travel to/from south, east, west
- Pedestrian: More out-of-direction travel for users traveling to/from the north (no direct access provisions); minimal out-of-direction travel to/ from the south, east, west

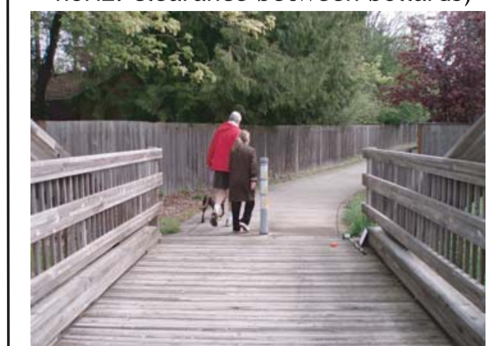
Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: Minimal out-of-direction travel (bridge is at roughly the same elevation as George Foege Park and nearby neighborhood, therefore requiring no circuitous access ramps)
- Pedestrian: Minimal out-of-direction travel (bridge is at roughly the same elevation as George Foege Park and nearby neighborhood, therefore requiring no stairs or circuitous access ramps)

Wayfinding or other signage/ pavement markings: Signage on NW Cedar Hills Blvd. directing pedestrians/bicyclists to bridge

Wayfinding signage on NW Cedar Hills Blvd.

Design Elements

Bridge access provisions:
- Shared use path on west side
- Neighborhood accessway on east side
- Bollards provided at bridge ends and on neighborhood accessway at NW 112th Ave.
  - Center bollard at bridge ends (5' horizontal clearance on each side of bollards)
  - Twin bollards on accessway (2' 10" horiz. clearance on outer ends, 4' 6" horiz. clearance between bollards)



Bollards placed at the bridge's center provide sufficient clearance for passing bicyclists, wheelchairs and other users

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path/ accessway system
- Shared use path/accessway width: ~10'

Fence/wall/railing heights:
- Shared use path/accessway: No immediate fences, walls or railings
- Bridge: 38.5" middle railing, 54" upper railing

Railings on bridge structure

Lighting: Ambient street lighting only

Bridge structure length (excluding access ramps): ~148'

Bridge structure vertical clearance: varies

Minimum bridge structure width: ~10'

Bridge cross-section includes a 10' curb-to-curb width, plus 3.5" of "shy distance" on each side

Surface conditions:
- Bridge: Wood surface in good condition; minor expansion joint "lips" at both ends of bridge
- Access ramps: Pavement in good condition
- No drainage grates on bridge or paths

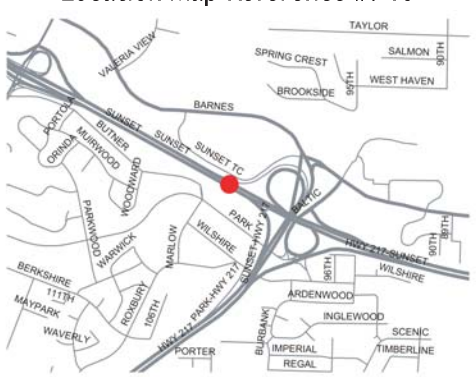
Horizontal/vertical obstructions: Low-hanging vegetation on east accessway

Minor vegetation encroachment on east accessway

U.S. 26 at Sunset Transit Center

Location: Beaverton, OR

Location Map Reference #: 10



Crosses over: U.S. 26; MAX light rail

Source: Google Earth

Year built: 1998

Owned by: TriMet

Nearby destinations:
- Cedar Hills neighborhood
- Sunset Transit Center and MAX Station
- Cedar Park Middle School
- Cedar Hills commercial district

Sunset Transit Center

Misc. observations: Security gates and cameras present on bridge

Location Elements

Nearest alternative formalized crossing(s):
- U.S. 26 at SW Baltic Ave., grade-separated crossing, ~1,130' east of bridge
- U.S. 26 at SW Cedar Hills Blvd., grade-separated crossing, ~3,450' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Barriers and fencing

Bike/ped accommodations immediately adjacent to bridge:
- Sidewalk gaps being filled on SW Butner Rd. near south access ramp
- Mid-block pedestrian crossing being installed on SW Butner Road near south access ramp

Mid-block pedestrian crossing under construction on SW Butner Road adjacent to bridge's south access ramp

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Bicycle lanes on SW Marlow Ave.

Sidewalk under construction on SW Butner Rd.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge lies on a relatively direct route between the transit center and areas to the south); short informal path connecting south access ramp with SW Butner Rd. may indicate some perceived out-of-direction travel
- Pedestrian: Minimal out-of-direction travel (bridge lies on a relatively direct route between the transit center and areas to the south); short informal path connecting south access ramp with SW Butner Rd. may indicate some perceived out-of-direction travel

Informal path connecting south access ramp with SW Butner Rd.

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~23'
- Bicycle: Lack of access ramp on north side (stairs/elevator only) may be equated with perception of out-of-direction travel
- Pedestrian: Minimal out-of-direction travel

Wayfinding or other signage/ pavement markings: Wayfinding signage on south side directing pedestrians/bicyclists to the bridge and transit center

Design Elements

Bridge access provisions:
- Linear access ramp on south side; stairways provided for alternative routing
- Stairway with landings and "bike gutters" on north side
- Elevator on north side

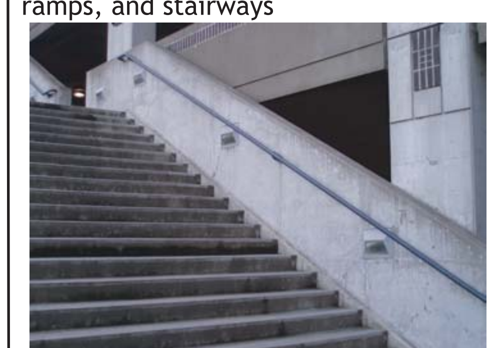
Stairway at bridge's north end

Elevator connecting the bridge with Sunset Transit Center below

Access ramp length/width:
- South access ramp: ~490'/~10'

Fence/wall/railing heights:
- South access ramp: ~37" lower railing, ~42" upper railing
- North stairway: ~35" railing, 42" wall
- Bridge: ~35" railings

Lighting: Provided on bridge, access ramps, and stairways



Lighting on north stairway

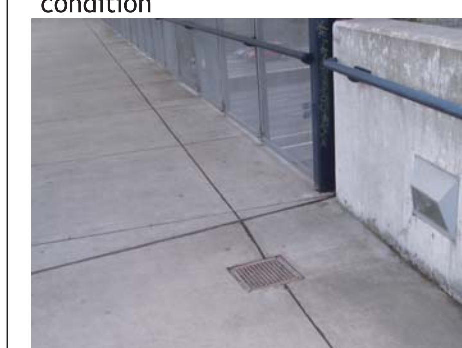
Bridge structure length (excluding access ramps): ~290'

Bridge structure vertical clearance: ~8' (at north end); ~11' (at south end)

Minimum bridge structure width: ~11' 1"

Bridge cross-section includes an 11' 1" rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition; small drainage grates at north end
- Access ramps: Pavement in good condition



Drainage grate at bridge's north end

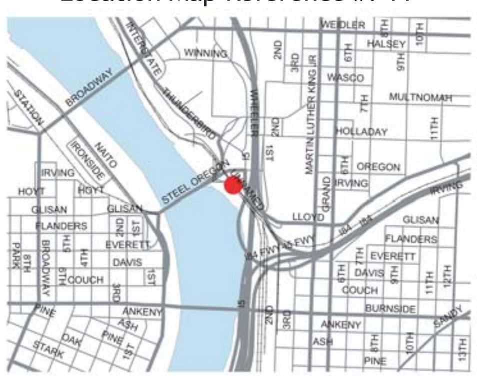
Horizontal/vertical obstructions: None

Eastbank Esplanade - Rose Quarter Connector

Location: Portland, OR

Location Map Reference #: 11

Crosses over: Union Pacific Railroad



Source: Google Earth

Year built: 2001

Owned by: City of Portland

Nearby destinations:
- Lloyd District
- Rose Quarter
- Rose Quarter Transit Center and MAX Station
- Convention Center
- Eastbank Esplanade
- Steel Bridge

Eastbank Esplanade

Misc. observations: Heavy commuting and recreational use; bridge also serves as a destination with its various viewing areas

Location Elements

Nearest alternative formalized crossing(s):
- Steel Bridge, grade-separated crossing over railroad, ~250' north of bridge
- E. Burnside St., grade-separated crossing over railroad, ~2000' south of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing

Bike/ped accommodations immediately adjacent to bridge:
- Bicycle "scrambler signal" at NE Interstate Ave. at Oregon St.
- Curb ramps present at nearby intersections
- Sidewalks on NE Lloyd Blvd.
- Eastbank Esplanade

Bicyclists waiting at "scrambler signal" near bridge's east end

Surrounding bike/ped network:
- Eastbank Esplanade
- Steel Bridge Bikeway/Walkway
- Sidewalks and bicycle lanes on NE Lloyd Blvd. and NE Interstate Ave.

Steel Bridge Bikeway/Walkway

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical bicycle route between Esplanade and surrounding NE Portland destinations)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between Esplanade and surrounding NE Portland destinations)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~25'
- Bicycle:
  - East end: Minimal out-of-direction travel (bridge is at roughly the same elevation as nearby street, therefore requiring no circuitous access ramps)
  - West end: Some out-of-direction travel created by switchback ramp (some bicyclists were observed using adjacent stairways; "bike gutter" not provided on stairways to provide alternative routing); however, wide ramps allow faster travel speeds
- Pedestrian:
  - East end: Minimal out-of-direction travel (bridge is at roughly the same elevation as nearby street, therefore requiring no circuitous access ramps; stairway provided to reduce travel distance
  - West end: Multiple stairways provided to facilitate direct travel between bridge and Esplanade

Wide access ramps enabling faster bicycle travel off-set their circuitous layout

Wayfinding or other signage/ pavement markings: Wayfinding signage; regulatory signage directing bicyclists to yield to pedestrians

Design Elements

Bridge access provisions:
- Switchback ramp with level landings on west end (number of switchbacks depends on direction of travel)
- Multiple stairways with landings on west end
- Circular access ramp on east end
- Stairway on east end

Stairway with landing on bridge's west end

Access ramp length/width:
- East ramp: ~109'/ ~15'
- West ramp: ~595'/ ~14'

Fence/wall/railing heights:
- West ramps/stairways: 36" railings, 42" barrier
- East ramp/stairways: 36" railings, 42" barrier (no railings on east ramp)
- Bridge: 36" railings, 42" barrier

Lighting: Provided on bridge structure and access ramps

Lighting on west access ramp

Bridge structure length (excluding access ramps): ~187'

Bridge structure vertical clearance: ~10' 3"

Minimum bridge structure width: ~14'

Bridge cross-section includes a 14' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition; drainage grates and manhole covers on west ramp are flush with pavement

Drainage grates and manhole covers are flush with the pavement

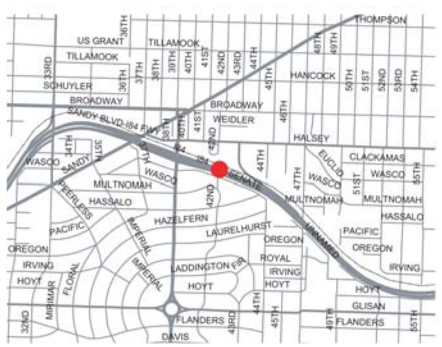
Horizontal/vertical obstructions: Minor vegetation encroachment on west access ramp

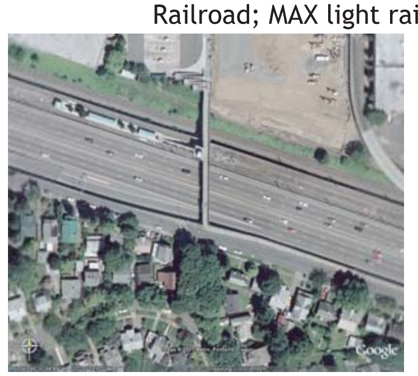
Interstate 84 at Hollywood Transit Center

Location: Portland, OR

Location Map Reference #: 12

Crosses over: I-84, Union Pacific Railroad; MAX light rail





Source: Google Earth

Year built: 1985

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Laurelhurst neighborhood
- Hollywood neighborhood
- Laurelhurst Elem. School
- Hollywood Library
- Hollywood Transit Center and MAX Station
- Commercial businesses on NE Sandy Blvd.

Hollywood Transit Center

Misc. observations: Heavy commuting use

Location Elements

Nearest alternative formalized crossing(s):
- I-84 at NE 39th Ave., ~700' west of bridge
- I-84 at NE 47th Ave., ~1,600' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing and sound walls

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps lacking at some nearby intersections
- Audible pedestrian signal on NE 42nd Ave. at Halsey St.
- Difficult bicycle movements at NE 42nd/Halsey intersection (conflicts with buses leaving transit center)
- No transition ramp to bicycle lane immediately north of bridge
- "Cycletrack" north of bridge (bikes use sidewalk)

Bicycle lane without transition ramp from sidewalk/cycletrack (north side of bridge)

Surrounding bike/ped network:
- Bicycle lanes on NE 42nd Ave.
- "40s Bikeway"
- Sidewalks on most nearby streets
- Low-volume residential streets
- Well-connected street grid

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical bicycle route
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between major walking destinations)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle:
  - North end: Excessive out-of-direction travel on north access ramp (7 switchbacks); "bike gutter" provided on adjacent stairways to provide alternative routing
  - South end: Depends on direction of travel (out-of-direction travel required for bicyclists continuing on 40s bikeway); "bike gutter provided on adjacent stairway to provide alternative routing
- Pedestrian:
  - North end: Stairways provided as an alternative to switchback ramps
  - South end: Stairways provided as an alternative to ramp

Narrow access ramp with multiple switchbacks complicates bicycle access on the bridge's north end

Wayfinding or other signage/ pavement markings:
- Wayfinding signage directing bicyclists to nearby destinations
- Signage identifying ADA access routes
- "Bicycle boulevard" markings denoting bridge as part of the 40s Bikeway

Design Elements

Bridge access provisions:
- Switchback ramp with level landings on north end (7 switchbacks)
- Stairways with landings and "bike gutter" on north end
- Stairway with landings to MAX station
- Elevator to MAX station
- Linear ramp with landings on south end
- Stairway with landings and "bike gutter" on south end

Stairway with "bike gutter" on bridge's south end

Elevator providing access between bridge and MAX station below

Access ramp length/width:
- North ramp: ~280'/ ~5'
- South ramp: ~210'/ ~9'

Fence/wall/railing heights:
- North ramp/stairway: 32" railings
- South ramp/stairways: 32" railings, 48" wall
- Bridge: 32" railings, 108" fence

Lighting: Provided on bridge structure and access ramps

Bridge structure length (excluding access ramps): ~268'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~11' 6"

Bridge cross-section includes an 11' 6" width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in good condition

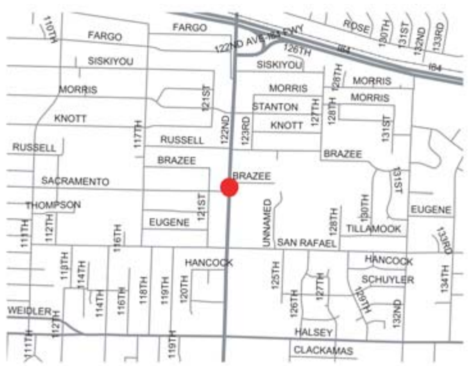
The bridge and access ramps benefit from relatively good pavement conditions

Horizontal/vertical obstructions: None

NE 122nd Avenue at Sacramento Street

Location: Portland, OR

Location Map Reference #: 13



Crosses over: NE 122nd Ave.

Source: Google Earth

Year built: 1966
(center span replaced: 1993)

Owned by: City of Portland

Nearby destinations:
- Parkrose Heights neighborhood
- Russell neighborhood
- Sacramento Elem. School
- Russell Elem. School
- Portland Christian High School
- John Luby Park
- Knott Park
- Merrifield Park
- TriMet bus stops

Parkrose Heights neighborhood

Misc. observations: High vehicle speeds on NE 122nd Ave.

Location Elements

Nearest alternative formalized crossing(s):
- NE 122nd Ave. at Sacramento St., unsignalized at-grade crossing, ~65' south of bridge
- NE 122nd Ave. at Brazee St., unsignalized at-grade crossing, ~65' north of bridge

Elements precluding/discouraging at-grade crossings in bridge area: None

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided at adjacent intersections
- Sidewalks on surrounding streets

Curb ramps are present at adjacent intersections

Surrounding bike/ped network:
- Bicycle lanes and sidewalks on NE 122nd Ave.
- Low-volume residential streets
- Sidewalks on most streets
- Limited street system connectivity

Bicycle lanes and sidewalks on NE 122nd Ave.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge is not located on a logical east-west bicycle route (streets to the south provide better connectivity)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between several schools)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~18'
- Bicycle: Out-of-direction travel required for bicyclists traveling on NE 122nd Ave. (stairs are oriented in opposite direction of adjacent bicycle lanes), however less out-of-direction travel required for east-west bicyclists; "bike gutters" provided on stairways
- Pedestrian: Stairway orientation creates out-of-direction travel for southbound pedestrians on west side of NE 122nd Ave., and for northbound pedestrians on east side of NE 122nd Ave.; less out-of-direction travel required for east-west pedestrians

At each bridge end, stairways are oriented in one direction of travel only, which may not be useful to pedestrians wishing to travel in the opposite direction

Wayfinding or other signage/ pavement markings: Nearby wayfinding signage oriented toward motorists

Design Elements

Bridge access provisions:
- Stairways with level landings and "bike gutters"
- No access ramps for bicyclists or mobility-impaired users

Stairway with landings and "bike gutter"

Stairway total length/width:
- West stairway: ~31'/~5'
- East stairway: ~31'/~5'

Fence/wall/railing heights:
- Stairways: ~42" railings
- Bridge: ~42" railings

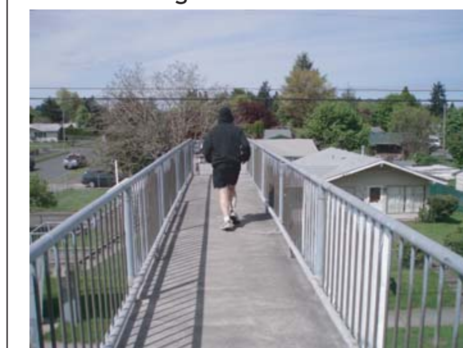
Railing style on stairways and bridge

Lighting: Ambient street lighting on west side of NE 122nd Ave. only

Bridge structure length (excluding access ramps): ~80'

Bridge structure vertical clearance: N/A (uncovered)

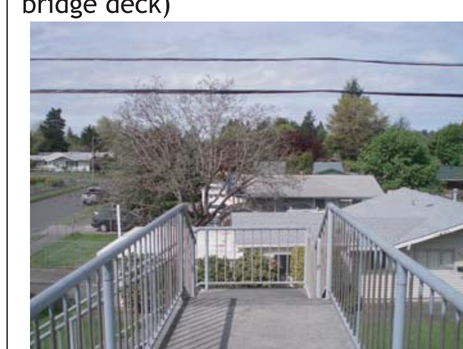
Minimum bridge structure width: ~5' 2"



Bridge cross-section includes a 5' 2" rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition
- Stairways: Pavement in good condition
- No drainage grates on bridge or stairs

Horizontal/vertical obstructions: Low hanging electrical wires over east and west bridge ends (~6' 8" above bridge deck)



Low-hanging electrical wires above bridge

SW Spring Street

Location: Portland, OR

Location Map Reference #: 14

Crosses over: Gully near Ainsworth School

Year built: 1938 (replaced: 1961)

Owned by: City of Portland

Nearby destinations:
- Southwest Hills neighborhood
- Ainsworth Elem. School
- Ainsworth Greenspace

Ainsworth Elem. School

Misc. observations: Heavy use by children traveling to/from Ainsworth Elem School

Location Elements

Nearest alternative formalized crossing(s):
- SW Elm St. (~270' north of bridge) provides the closest alternate route around the gully

Elements precluding/discouraging at-grade crossings in bridge area:
- Steep topography of gully
- Private properties

Bike/ped accommodations immediately adjacent to bridge:
- Presence of parked vehicles and lack of curb ramps complicate travel at bridge's west end for all users
- Sidewalks on SW Spring St.

Difficult transition between bridge's west end and surrounding sidewalk and street system

Surrounding bike/ped network:
- Sidewalks on SW Spring St. and SW St. Helens. Ct.
- Low-volume residential streets
- Limited street system connectivity

Sidewalks on SW St. Helens Ct.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge is located on a logical bicycle route for Ainsworth students traveling to nearby neighborhoods, but long distance bicyclists may not be attracted to the bridge's location (not located on logical longer-distance routes)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between Ainsworth Elem. School and surrounding neighborhoods)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: None
- Bicycle: No out-of-direction travel (bridge is at same elevation as surrounding streets, therefore requiring no circuitous access ramps)
- Pedestrian: No out-of-direction travel (bridge is at same elevation as surrounding streets, therefore requiring no stairs or circuitous ramps)

Bridge and surrounding streets are at roughly the same elevation, therefore requiring no stairways or circuitous access ramps

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- Linear access ramp (west end)
- SW Spring St. cul-de-sac (east end)

West access ramp

Access ramp length/width:
- West ramp: ~36'/~4' 4"
- No east ramp

Fence/wall/railing heights:
- Access ramp: No fences, walls, railings
- Bridge: ~36" railings

Railing style on bridge

Lighting: Provided on bridge and west access ramp

Light pole on bridge structure

Bridge structure length (excluding access ramps): ~195'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width:
- 3' 9" (curb-to-curb)
- 4' 6" (rail-to-rail)

Extruded curbs reduce the bridge's usable width

Surface conditions:
- Bridge: Pavement in good condition
- West access ramp: Pavement in good condition
- SW Spring St. cul-de-sac: Rough pavement conditions; water ponding near bridge entrance
- No drainage grates on bridge or ramps

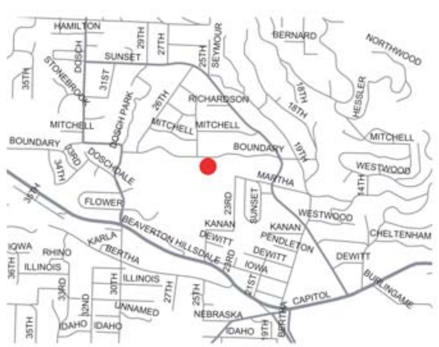
Horizontal/vertical obstructions: Encroaching tree branches at bridge's west end

Encroaching vegetation on sidewalk near bridge's west end

Trillium Creek

Location: Portland, OR

Location Map Reference #: 15



Crosses over: Trillium Creek

Year built: 1953
(portions replaced: 1990)

Owned by: City of Portland

Nearby destinations:
- Hillsdale neighborhood
- Robert Gray Middle School
- Hillsdale Park

Robert Gray Middle School

Misc. observations: Bridge is fairly isolated; graffiti present on bridge; vegetation (e.g., leaves) collecting on overhead fence; moss growing on inner walls of bridge

Location Elements

Nearest alternative formalized crossing(s):
- SW Sunset Blvd. (~1,200' east of bridge) provides the closest alternate route around Trillium Cr.

Elements precluding/discouraging at-grade crossings in bridge area:
- Topography of gully
- Private properties

Bike/ped accommodations immediately adjacent to bridge:
- Fragmented pedestrian paths leading to Robert Gray Middle School, Hillsdale Park and SW Boundary St.

Pedestrian path connecting the bridge with Hillsdale Park and Robert Gray Middle School

Surrounding bike/ped network:
- Bridge is part of "SW Trail #6"
- Bicycle lanes on SW Beaverton-Hillsdale Hwy.
- Low-volume residential streets
- Sidewalks on some streets
- Limited street system connectivity

Sidewalks lacking on SW Boundary St. north of the bridge

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Although the bridge provides a key connection across Trillium Cr., its isolation and location away from higher-use bicycle corridors may not attract bicyclists
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between Robert Gray Middle School and neighborhoods to the north); several informal walking paths approach the bridge from the south,indicating a lack of formalized pedestrian facilities on popular walking routes

Informal walking path between the bridge and Hillsdale Park

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: No out-of-direction travel (bridge and surrounding paths/ streets are at roughly the same elevation, therefore requiring no circuitous access ramps)
- Pedestrian: Minimal out-of-direction travel (bridge and surrounding paths are at roughly the same elevation, therefore requiring no stairs or circuitous access ramps)

Wayfinding or other signage/ pavement markings: Sign at north end of bridge indicating its status as part of the SW Trails system

Design Elements

Bridge access provisions: Pedestrian paths on both approaches

Pedestrian path on the bridge's north end

Access ramp length/width:
- Length: N/A (bridge is part of a continuous pedestrian path)
- Width: ~5'

Fence/wall/railing heights:
- Paths: No fences, walls, railings
- Bridge: ~33" railings

Railing style on bridge

Lighting: Provided on bridge structure

Lighting on bridge structure

Bridge structure length
(excluding access ramps): ~204'

Bridge structure vertical clearance: ~8' 4"

Minimum bridge structure width: ~5' 6"

The bridge includes a relatively narrow height and width

Surface conditions:
- Bridge: Water ponding on bridge deck
- Access ramps: Pavement in poor condition (cracking, heaving, weeds growing between pavement cracks, manhole covers and drainage grates not flush with pavement)

Poor pavement conditions on north path

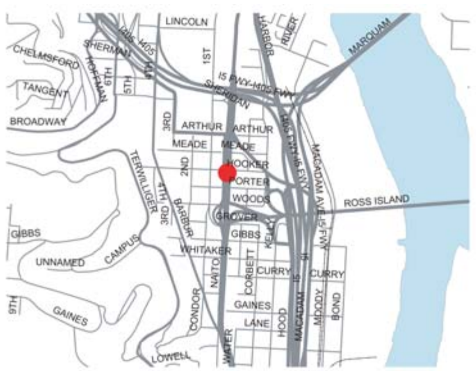
Horizontal/vertical obstructions:
Railings at bridge ends (designed to discourage bicycling on the bridge) create major "pinch points" for all users

Railings obstructing travel on the bridge

SW Hooker Street at Naito Parkway

Location: Portland, OR

Location Map Reference #: 16



Crosses over: SW Naito Pkwy.

Source: Google Earth

Year built: 1957 (replaced: 1981)

Owned by: City of Portland

Nearby destinations:
- Corbett/Terwilliger/ Lair Hill neighborhood
- Lair Hill Park
- Lair Hill Art Center
- National College of Natural Medicine
- TriMet bus stops

Corbett-Terwilliger-Lair Hill neighborhood

Misc. observations: Heavy commuting use; heavy traffic volumes on SW Naito Pkwy. cause bridge to vibrate and bounce

Location Elements

Nearest alternative formalized crossing(s): SW Naito Pkwy. at Arthur St., grade-separated crossing, ~530' north of bridge (conflicts between motorized and non-motorized traffic)

Elements precluding/discouraging at-grade crossings in bridge area: None

Bike/ped accommodations immediately adjacent to bridge:
- Sidewalks on SW Hooker St.
- Curb ramps at nearby intersections
- Curb ramps lacking where access ramps meet the street

The absence of a curb ramp creates difficult transitions between SW Hooker St. and the bridge's west access ramp

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Well-connected street system

Sidewalks on SW Corbett Ave.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is on a logical east-west bicycle travel route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route connecting destinations within close proximity of each other)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: Linear ramps reduce out-of-direction travel; some out-of-direction travel for users accessing TriMet bus stops directly below the bridge
- Pedestrian: Pedestrians wishing to access TriMet bus stops directly below the bridge may view the access ramps as requiring out-of-direction travel; stairways not provided to reduce travel distance

The linear ramps provide direct access between the bridge and points farther east and west, but require additional travel for users accessing TriMet bus stops directly under the bridge

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- Linear ramps
- Ramps are somewhat steep and may pose difficulties for wheelchairs or other mobility-impaired users
- No level landings

The east access ramp is fairly steep and lacks level landings

Access ramp length/width:
- West ramp: ~81'/ ~10'
- East ramp: ~158'/ ~10'

Fence/wall/railing heights:
- Access ramps: ~54" railings
- Bridge: No railings

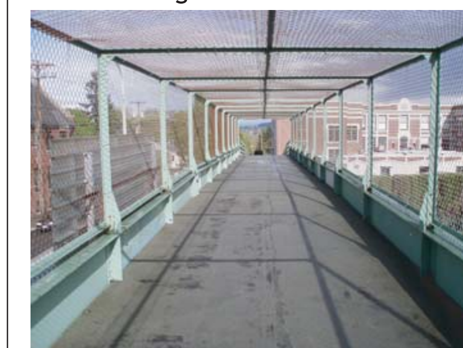
Railings are absent from the bridge structure

Lighting: Ambient street lighting only

Bridge structure length (excluding access ramps): ~140'

Bridge structure vertical clearance: ~8'

Minimum bridge structure width: ~10'



Although the bridge provides a 10' 6" curb-to-curb width, the extruded steel beams reduce the usable width to about 10'

Surface conditions:
- Bridge: Pavement in generally good condition; water ponding on bridge structure
- Access ramps: Pavement in good condition
- No drainage grates on bridge or ramps

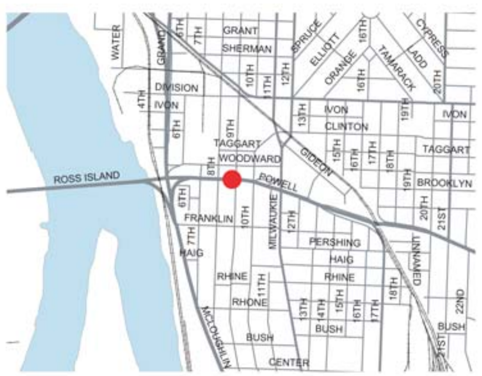
Water ponding on bridge surface

Horizontal/vertical obstructions: None

SE Powell Boulevard at 9th Avenue

Location: Portland, OR

Location Map Reference #: 17



Crosses over: SE Powell Blvd.

Source: Google Earth

Year built: 1985

Owned by: City of Portland

Nearby destinations:
- Brooklyn neighborhood
- Hosford-Abernethy neighborhood
- Industrial area to the north
- Commercial businesses on SE Powell Blvd.
- TriMet bus stops

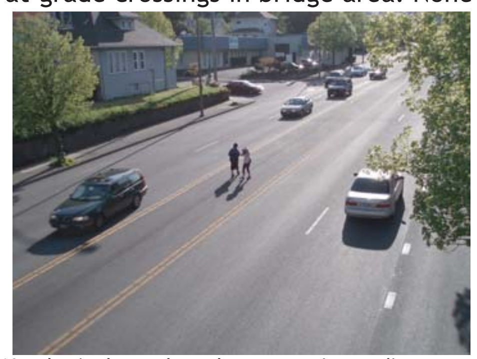
SE Powell Blvd.

Misc. observations: Litter, gravel and other debris on bridge and access ramps; heavy traffic volumes and high vehicle speeds on SE Powell Blvd.

Location Elements

Nearest alternative formalized crossing(s):
- SE Powell Blvd., at 9th Ave., unsignalized at-grade crossing (no crosswalks), located immediately east of bridge
- SE Powell Blvd. at SE Milwaukie Ave., signalized at-grade crossing, ~730' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: None



No physical or other elements exist to discourage risky at-grade crossings of SE Powell Blvd.

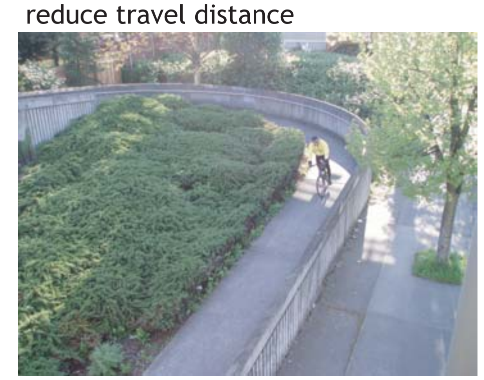
Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided at adjacent intersections
- Sidewalks on SE Powell Blvd. and on SE 9th Ave.

Curb ramps provided where bridge access ramps meet the surrounding street system

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Low-volume residential streets
- Well-connected street grid

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route); northbound bicyclists on 9th Ave. must briefly ride on the sidewalk (against traffic) to access the bridge
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route connecting nearby destinations)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~16'
- Bicycle: "Spiral" ramps minimize travel distance to overcome vertical rise, and permit slow but continuous bicycle movement
- Pedestrian: "Spiral" ramps minimize travel distance to overcome vertical rise; pedestrians wishing to access TriMet bus stops directly below the bridge may view the ramps as requiring out-of-direction travel (some at-grade crossing behaviors observed); stairways not provided to reduce travel distance



"Spiral" access ramp on bridge's south side

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- "Spiral" ramps
- No level landings
- No bollards where access ramps meet streets
- Ramp slope becomes especially steep where ramps meet the bridge

Access ramp length/width:
- South ramp: ~175'/~6' 4"
- North ramp: ~175'/~6' 4"

Although the bridge and access ramp width provides enough lateral clearance for one bicyclist, it may be difficult for multiple oncoming bicyclists to pass each other

Fence/wall/railing heights:
- Access ramps: ~37" railings (railings on one side only), 48" walls
- Bridge: ~33" railings (railings on one side only), 44" walls

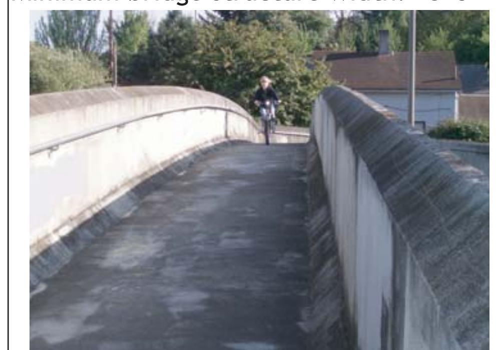
Railings are provided on one side of the bridge and access ramps

Lighting: Ambient street lighting only

Bridge structure length (excluding access ramps): ~94'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~5' 6"



Extruded curbs reduce the bridge's usable width

Surface conditions:
- Bridge: Pavement in good condition
- Access ramps: Pavement in relatively good condition; large "lip" on north and south access ramps; drainage grates placed adjacent to access ramps

"Lip" on north access ramp could pose difficulties for "wheel users"

Drainage grate placed outside the bicycle/pedestrian travelway

Horizontal/vertical obstructions: None

SE Brooklyn Street at Union Pacific Railroad

Location: Portland, OR

Location Map Reference #: 18

Crosses over: Union Pacific Railroad

Source: Google Earth

Year built: 1976

Owned by: City of Portland

Nearby destinations:
- Hosford-Abernethy neighborhood
- Clinton Community Garden
- Industrial area to the south
- Commercial businesses on SE Powell Blvd.

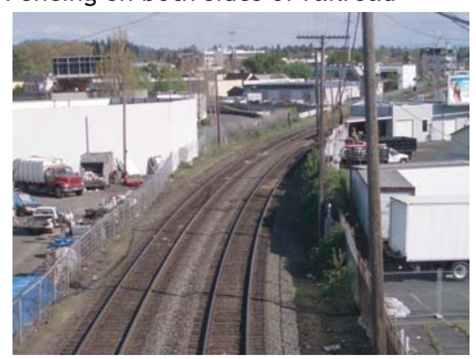
Hosford-Abernethy neighborhood

Misc. observations: Graffiti and glass present on bridge; electrical wires resting on overhead fence

Location Elements

Nearest alternative formalized crossing(s):
- SE Powell Blvd. at UPRR, grade-separated crossing, ~620' east of bridge
- SE 12th Ave. at UPRR, at-grade crossing, ~1,170' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on both sides of railroad



Fencing on both sides of the railroad preclude at-grade crossings

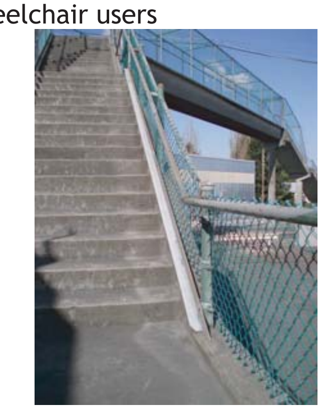
Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps lacking where bridge stairways meet the street system
- Sidewalks on surrounding streets

Curb ramps lacking where stairways meet surrounding sidewalks

Surrounding bike/ped network:
- SE Clinton St. "Bicycle Boulevard"
- Low-volume residential streets
- Sidewalks on most streets
- Pedestrian "half signal" on SE Powell Blvd. at 13th Pl.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge is not located on a logical north-south bicycle route (streets to the east and west provide more-convenient railroad crossings)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route, and is further enhanced through a nearby pedestrian "half signal" on SE Powell Blvd.)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~25'
- Bicycle: Bicyclists may equate the lack of access ramps (stairs only) with out-of-direction travel; "bike gutters" provided on stairways for bicyclists who chose to use the bridge
- Pedestrian: Minimal out-of-direction travel (stairs are oriented along the desired travel route); lack of access ramps renders bridge unusable for wheelchair users



"Bike gutter" on west stairway

Wayfinding or other signage/pavement markings: None

Design Elements

Bridge access provisions:
- Stairways with level landings and "bike gutters"
- No access ramps for bicyclists or mobility-impaired users

Stairway with landings

Stairway total length/width:
- West stairway: ~59'/~6'
- East stairway: ~59'/~6'

Stairways and landings are approximately 6' wide

Fence/wall/railing heights:
- Stairways: ~34" railings
- Bridge: ~34" railings

Railing style on stairways and bridge

Lighting: Ambient street lighting only

Bridge structure length (excluding access ramps): ~75'

Bridge structure vertical clearance: 8' 6"

Minimum bridge structure width: ~5' 7"

Bridge cross-section includes a 5' 7" rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition; expansion joint gaps at east and west bridge ends
- Stairways: Pavement in good condition

Expansion joint gap at east end of bridge structure

Horizontal/vertical obstructions: Sinking overhead fence on bridge structure

Sinking overhead fence on bridge structure

SE Lafayette Street at Union Pacific Railroad

Location: Portland, OR

Location Map Reference #: 19

Crosses over: Union Pacific Railroad

Source: Google Earth

Year built: 1943

Owned by: Union Pacific Railroad

Nearby destinations:
- Brooklyn neighborhood
- Brooklyn Elem. School
- Winterhaven Middle School
- Cleveland High School
- Brooklyn School Park
- Powell Park
- Brooklyn Railyard
- Industrial areas to the east and west

Brooklyn Railyard

Misc. observations: Graffiti present on bridge; slippery wood surface on bridge and stairs; weight of pedestrians causes wood surface to bounce

Location Elements

Nearest alternative formalized crossing(s):
- SE Powell Blvd. at UPRR, grade-separated crossing, ~1,270' north of bridge
- SE Holgate Blvd. at UPRR, grade-separated crossing, ~2,250' south of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on east side of railroad (pedestrians observed crossing at-grade through hole cut in fence)

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramp in poor condition where west stairway meets the street
- Curb ramps in good condition where east stairway meets the street
- Sidewalks on surrounding streets

Curb ramp in poor condition at bottom of west stairway

Sidewalk and curb ramp in good condition near east stairway

Surrounding bike/ped network:
- Low-volume residential streets
- Sidewalks on most streets

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge is located on a logical east-west bicycle route (nearest alternative crossings are difficult for bicyclists)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical east-west walking route between nearby residential areas and schools)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~25'
- Bicycle: Bicyclists may equate the lack of access ramps (stairs only) with out-of-direction travel; "bike gutter" not provided on stairways
- Pedestrian: Minimal out-of-direction travel (stairs are oriented along the desired travel route); lack of access ramps renders bridge unusable for wheelchair users

West stairway

Wayfinding or other signage/pavement markings: "No Trespassing" signs at bridge's west end (to discourage at-grade crossings)

"No Trespassing" sign at bridge's west end

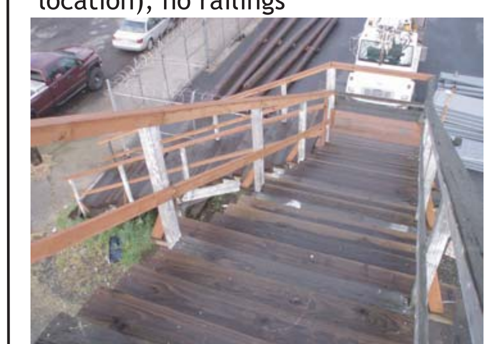
Design Elements

Bridge access provisions:
- Wooden stairways with landings
- No access ramps for bicyclists or mobility-impaired users

Wooden stairway with landings

Stairway total length/width:
- West stairway: 6' wide, length data not available
- East stairway: 6' wide, length data not available

Fence/wall/railing heights:
- Stairways: ~42" railings
- Bridge: ~69-79" fence (depending on location); no railings



Railing style on stairways

Railings not provided on bridge structure

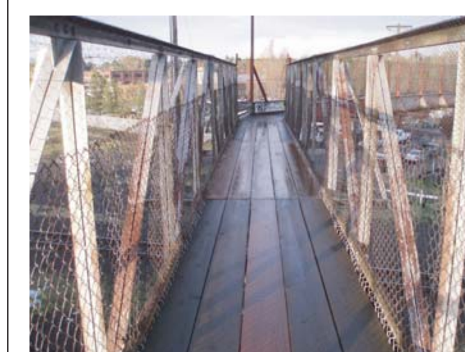
Lighting: Ambient street and railroad lighting only

Bridge structure length (excluding access ramps): ~128'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~5' 9" - 6' 4" (depending on location)

An alignment shift midway across the bridge creates two segments with differing widths



The bridge's eastern end has a 5' 9" width

Surface conditions:
- Bridge: Wooden surface generally in good condition (slippery when wet; some water ponding)
- Stairways: Wooden surface generally in good condition (slippery when wet; some water ponding)

Horizontal/vertical obstructions: Portions of cyclone fence on bridge extend into the pedestrian travelway

Interstate 205 at SE Main Street

Location: Portland, OR

Location Map Reference #: 20

Crosses over: I-205, future MAX light rail, SE 96th Ave.

Source: Google Earth

Year built: 1978

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Montavilla neighborhood
- Hazelwood neighborhood
- Clark Elem. School
- Portland Adventist Academy
- Portland Adventist Medical Center
- Berrydale Park
- Berrydale Community Garden

Montavilla neighborhood

Misc. observations: Potential direct connection with future MAX station below bridge

Location Elements

Nearest alternative formalized crossing(s):
- I-205 at SE Washington St., grade-separated crossing, ~1,500' north of bridge
- I-205 at SE Market St., grade-separated crossing, ~1,250' south of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on both sides of I-205

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided where access ramps meet the street system
- Marked pedestrian crossing where east access ramp meets SE 96th Ave.
- Sidewalks on SE 96th Ave. and SE Main St.
- I-205 Path

Sidewalks and marked pedestrian crossing where east access ramp meets SE 96th Ave.

Surrounding bike/ped network:
- I-205 Path
- Sidewalks on most nearby streets
- Bicycle lanes on SE 96th Ave.
- Low-volume residential streets

I-205 Path

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical east-west bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical walking route between nearby educational facilities and residential areas)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Some out-of-direction travel required at both bridge ends; long circuitous access ramp on east end (informal paths present to reduce travel distance); informal paths on west end have been paved
- Pedestrian: Some out-of-direction travel required at both bridge ends; long circuitous access ramp on east end (informal paths present to reduce travel distance); informal paths on west end have been paved

Informal paths connecting with east access ramp

Wayfinding or other signage/pavement markings:
- Wayfinding signage directing I-205 Path users to bridge and SE 96th Ave.
- Faded pavement markings separating bi-directional traffic on access ramps

Design Elements

Bridge access provisions:
- Circuitous access ramps
- Previously informal paths that have been paved (west end)
- No stairways

West access ramp

Access ramp length/width:
- West ramp: ~224'/~10'
- East ramp: ~357'/~10'

Fence/wall/railing heights:
- West ramp: No fences, walls, railings
- East ramp: ~49" railings
- Bridge: ~9' 4" fence, ~49" railings

Fence and railing on bridge structure

Lighting: Provided on bridge and access ramps

Bridge structure length (excluding access ramps): ~575'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~10'

Bridge cross-section includes a 10' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition; expansion joint gaps at bridge ends (creates issues for "wheel" users)
- Shared use paths: Pavement in generally good condition (minor cracking)
- No drainage grates on bridge or access ramps

Expansion joint gap at bridge's west end

Horizontal/vertical obstructions: None

SE Powell Boulevard at Interstate 205

Location: Portland, OR

Location Map Reference #: 21

Crosses over: SE Powell Blvd.

Source: Google Earth

Year built: 2003

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Lents neighborhood
- Powellhurst-Gilbert neighborhood
- Marshall High School
- PCC-Southeast
- Ed Benedict Park
- Kelly Butte Natural Area
- Commercial businesses on SE Powell Blvd.

SE Powell Blvd.

Misc. observations: Potential connection with future nearby MAX station

Location Elements

Nearest alternative formalized crossing(s):
- SE Powell Blvd. at I-205 NB ramps, signalized at-grade crossing, ~500' east of bridge
- SE Powell Blvd at 92nd Ave., signalized at-grade crossing, ~500' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Signage prohibiting at-grade pedestrian crossings below bridge

Bike/ped accommodations immediately adjacent to bridge:
- I-205 Path
- Sidewalks present where access ramps meet SE Powell Blvd.

Sidewalk on SE Powell Blvd.

Surrounding bike/ped network:
- I-205 Path
- Sidewalks on most nearby streets
- Bicycle lanes on SE Powell Blvd. (east of I-205)
- Bicycle lanes on SE 92nd Ave.
- Low-volume residential streets

I-205 Path

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Some out-of-direction travel required at both bridge ends; excessive out-of-direction travel for users traveling between the bridge and south side of SE Powell Blvd.
- Pedestrian: Some out-of-direction travel required at both bridge ends; excessive out-of-direction travel for users traveling between the bridge and south side of SE Powell Blvd.; stairways not provided for alternative routing

Wayfinding or other signage/ pavement markings:
- Wayfinding signage directing users to/ from I-205 path, SE Powell Blvd., and other destinations
- "Bicyclists Yield to Pedestrians" signs on access ramps
- Pavement markings separating bi-directional traffic on bridge and access ramps
- "SLOW" pavement markings on north access ramp

Wayfinding signage on I-205 Path near bridge

Design Elements

Bridge access provisions:
- Circuitous access ramps (landings provided on north ramp)
- No stairways

North access ramp

Access ramp length/width:
- North ramp: ~385'/~14'
- South ramp: ~570'/~10'

Fence/wall/railing heights:
- North ramp: No fences, walls, railings
- South ramp: No fences, walls, railings
- Bridge: ~95" fence, ~42" railings (railing is ~12" long and serves as a bicycle "handlebar guard")

Bridge railing also serves as a bicycle "handlebar guard"

Lighting: Provided on bridge and access ramps

Bridge structure length (excluding access ramps): ~216'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~14'

Bridge cross-section includes a 14' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition; minor expansion joint gaps at bridge ends (creates issues for "wheel" users)
- Access ramps: Pavement in good condition
- No drainage grates on bridge or access ramps

Minor expansion joint gap at bridge's west end

Horizontal/vertical obstructions: None

SE Division Street at 136th Avenue

Location: Portland, OR

Location Map Reference #: 22

Crosses over: SE Division St.

Source: Google Earth

Year built: 1966

Owned by: City of Portland

Nearby destinations:
- Hazelwood neighborhood
- Powellhurst-Gilbert neighborhood
- Lincoln Park Elem. School
- David Douglas High School
- Lincoln Park
- TriMet bus stops
- Commercial businesses on SE Division St.

SE Division St.

Misc. observations: High vehicle speeds on SE Division St.

Location Elements

Nearest alternative formalized crossing(s):
- SE Division St. at 136th Ave., signalized at-grade crossing, ~120' west of bridge
- SE Division St. at 137th Ave., unsignalized at-grade crossing, ~110' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: None

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps provided at adjacent intersections
- Fragmented sidewalks on SE Division St.

Curb ramps are present at adjacent intersections

Surrounding bike/ped network:
- Bicycle lanes and fragmented sidewalks on SE Division St.
- Low-volume residential streets
- Sidewalks on most streets
- Limited street system connectivity

Sidewalk gap on SE Division St. immediately east of the bridge

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Bridge may be used by cyclists traveling between SE 136th and 139th avenues, however cyclists traveling between SE 136th and 135th avenues likely would use signalized intersection immediately west of bridge
- Pedestrian: Bridge is located along a logical walking route for pedestrians traveling between nearby schools and residential areas southeast of the bridge

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: ~16'
- Bicycle: Bicyclists may equate lack of access ramps (stairs only) with out-of-direction travel; "bike gutters" provided on stairways
- Pedestrian: Stairways' perpendicular orientation with SE Division St. may minimize perception of out-of-travel, however some pedestrians may chose to cross at-grade (shorter travel distance)

Stairway oriented perpendicular to SE Division St.

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions:
- Stairways with level landings and "bike gutters"
- No access ramps for bicyclists or mobility-impaired users

Stairway with landings and "bike gutter"

Stairway total length/width:
- North stairway: ~35'/~5' 11"
- South stairway: ~35'/~5' 11"

Fence/wall/railing heights:
- Stairways: ~42" railings
- Bridge: ~42" railings

Railing style on stairways and bridge

Lighting: Ambient street lighting on north side of SE Division St. only

Bridge structure length (excluding access ramps): ~83'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~5' 11"

Bridge cross-section includes a 5' 11" rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition
- Stairways: Pavement in good condition
- No drainage grates on bridge or stairs

Horizontal/vertical obstructions: Low-hanging electrical wires over north and south bridge ends (~6' 8" above bridge deck)

Low-hanging electrical wires above bridge

Interstate 5 at Barbur Transit Center

Location: Portland, OR

Location Map Reference #: 23

Crosses over: Interstate 5

Source: Google Earth

Year built: 1976

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Crestwood neighborhood
- Multnomah neighborhood
- West Portland Park neighborhood
- Jackson Middle School
- Woods Memorial Park
- Barbur Transit Center

Barbur Transit Center

Misc. observations: Heavy traffic volumes on I-5 cause bridge to vibrate and bounce; artwork on north access ramp adds aesthetic value

Location Elements

Nearest alternative formalized crossing(s):
- I-5 at Capitol Hwy., grade-separated crossing, ~1,120' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area:
Fencing on both sides of I-5

Bike/ped accommodations immediately adjacent to bridge:
- Sidewalk leading to Barbur Transit Center
- No sidewalks where south access ramp meets the street system

Sidewalk connecting north access ramp with Barbur Transit Center

Surrounding bike/ped network:
- Bridge is part of "SW Trail #5"
- Sidewalks and bicycle lanes on SW Barbur Blvd.
- Sidewalks missing on streets south of bridge
- Low-volume residential streets

Most streets immediately south of the bridge lack sidewalks

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge lies on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge lies on a logical north-south walking route between the transit center and residential areas to the south)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data not available
- Bicycle: Some out-of-direction travel required to overcome elevation difference, however the linear access ramps facilitate continuous bicycle travel
- Pedestrian: Some out-of-direction travel required to overcome elevation difference; stairway provided on north access ramp to provide alternative routing

Wayfinding or other signage/pavement markings: Wayfinding signage identifying bridge as part of "SW Trail #5"

Wayfinding signage identifying the bridge as part of "SW Trail #5"

Design Elements

Bridge access provisions:
- Linear access ramps on north and south sides
- Stairway with landings on north side ("bike gutter" not provided)

North access ramp

Stairway at bridge's north end

Access ramp length/width:
- North ramp: ~255'/~10'
- South ramp: ~390'/~10'

Fence/wall/railing heights:
- Access ramps: 40" railings
- Stairway: 44" railings
- Bridge: ~40" railings

Lighting: Provided on bridge and access ramps

Lighting on south access ramp

Bridge structure length (excluding access ramps): ~155'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~11'

Bridge cross-section includes an 11' rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition; drainage grates at south end; expansion joint gaps at north and south ends
- Access ramps: Pavement in generally good condition; vegetation growing between pavement joints in some locations

Horizontal/vertical obstructions:
- Vegetation encroaching on bridge structure
- Vegetation encroaching on south access ramp

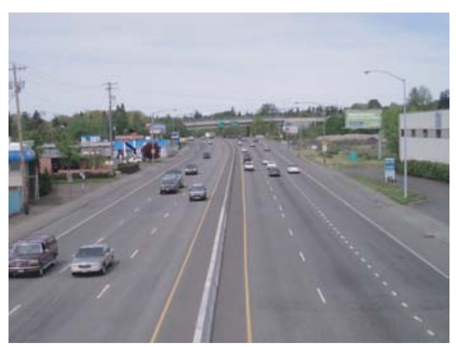
Vegetation encroaching on bridge structure

Springwater Trail at SE McLoughlin Boulevard

Location: Portland, OR

Location Map Reference #: 24

Crosses over: SE McLoughlin Blvd.



Year built: 2006

Owned by: City of Portland

Nearby destinations:
- Ardenwald neighborhood
- Sellwood-Moreland neighborhood
- Johnson Creek Park
- Tideman Johnson Park
- Roswell Pond Open Space
- McLoughlin Industrial Area
- TriMet bus stop

Sellwood-Moreland neighborhood

Misc. observations: Architectural elements add aesthetic value to the bridge

Location Elements

Nearest alternative formalized crossing(s):
- SE McLoughlin Blvd. at Ochoco St., signalized at-grade crossing, ~530' south of bridge
- SE McLoughlin Blvd. at Tacoma St., grade-separated crossing, ~1,550' north of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Concrete center divider on SE McLoughlin Blvd.

Bike/ped accommodations immediately adjacent to bridge:
- Springwater Trail
- Sidewalks present on SE Ochoco St., and where access ramp meets McLoughlin Blvd.

Sidewalk on SE McLoughlin Blvd.

Surrounding bike/ped network:
- Springwater Trail
- Sidewalks on most nearby streets
- Accessway connecting with residential area west of bridge
- Low-volume residential streets

Springwater Trail

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical east-west bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical east-west walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Minimal out-of-direction travel for east-west users (bridge and Springwater Trail are at roughly the same elevation, thereby requiring no circuitous access ramps); some out-of-direction travel between bridge and east side of SE McLoughlin Blvd. (via access ramp); bridge not accessible from west side of SE McLoughlin Blvd.
- Pedestrian: Minimal out-of-direction travel for east-west users (bridge and Springwater Trail are at roughly the same elevation, thereby requiring no circuitous access ramps); some out-of-direction travel between bridge and east side of SE McLoughlin Blvd. (via access ramp); bridge not accessible from west side of SE McLoughlin Blvd.; stairways not provided for alternative routing

Access ramp connecting bridge with SE McLoughlin Blvd.

Wayfinding or other signage/ pavement markings:
- Wayfinding signage directing users to/ from Springwater Trail and other destinations
- "Bicycle boulevard" markings on accessway leading to/from SE 19th Ave.

Design Elements

Bridge access provisions:
- Circuitous access ramp with switchback on bridge's east end (landings not provided)
- No stairways
- Bridge is part of a continuous shared use path

Switchback on east access ramp

Access ramp length/width:
- East ramp: ~465'/~7'

Fence/wall/railing heights:
- East ramp: No fences, walls, railings
- Bridge: ~42" railings

Railing style on bridge structure

Lighting: Ambient street lighting only

Bridge structure length (excluding access ramps): ~300'

Bridge structure vertical clearance: varies

Minimum bridge structure width: ~12'

Bridge cross-section includes a 12' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition; minor expansion joint gaps at bridge ends (creates issues for "wheel" users); drainage grates placed outside the bridge's curb-to-curb width
- Access ramps: Pavement in good condition

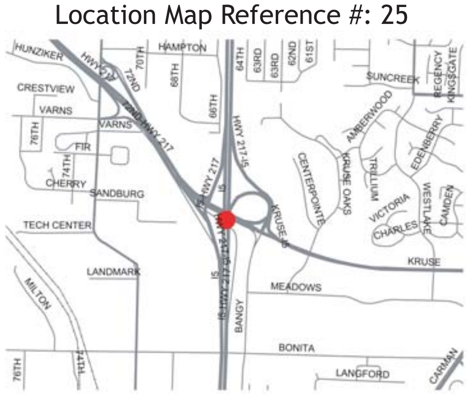
Drainage grates placed outside the bicycle/ pedestrian travelway

Horizontal/vertical obstructions: None

Interstate 5/Oregon 217 Interchange

Location: Tigard, OR

Location Map Reference #: 25



Crosses over: Interstate 5

Source: Google Earth

Year built: 2001

Owned by: Oregon Dept. of Transportation

Nearby destinations:
- Centerpointe Open Space
- Kimberly Woods Open Space
- Kruse Oaks Open Space
- Business parks and commercial areas along SW Kruse Way and Bangy Rd.

Interstate 5

Misc. observations: Excessive noise generated by two adjacent freeways; high vehicle speeds and volumes on nearby streets

Location Elements

Nearest alternative formalized crossing(s):
- I-5 at SW Bonita Rd., grade-separated crossing, ~2,000' south of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing and barriers on both sides of I-5

Bike/ped accommodations immediately adjacent to bridge:
- Shared use path along Kruse Way and I-5
- Sidewalks and curb ramps provided at adjacent intersections

Pedestrian infrastructure present on SW Kruse Way at Bangy Rd., immediately east of the bridge

Surrounding bike/ped network:
- Shared use paths along SW Kruse Way and I-5
- Sidewalks on most nearby streets
- Bicycle lanes on SW Bangy Rd.

Bicycle lanes and sidewalks on SW Bangy Rd.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical east-west bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical east-west walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and adjacent paths: Data unavailable
- Bicycle: No out-of-direction travel (bridge and surrounding streets/paths are at roughly the same elevation, thereby requiring no circuitous access ramps)
- Pedestrian: No out-of-direction travel (bridge and surrounding streets/paths are at roughly the same elevation, thereby requiring no stairways or circuitous access ramps)

Bridge and path are at roughly the same elevation, eliminating the need for stairways or circuitous access ramps

Wayfinding or other signage/ pavement markings: None

Design Elements

Bridge access provisions: Bridge is part of a continuous shared use path network

Shared use path leading to the bridge

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path)
- Shared use path width: ~10'
- Center bollard at intersection west of bridge (5' horiz. clearance on each side of bollard)

Center bollard present where shared use path meets intersection west of the bridge

Fence/wall/railing heights:
- Shared use paths: No fences, walls, railings
- Bridge: ~44" railings

Railing style on bridge structure

Lighting: Ambient freeway lighting only

Bridge structure length (excluding access ramps): ~251'

Bridge structure vertical clearance: ~10' 6"

Minimum bridge structure width: ~14' 6"

Bridge cross-section includes a 14' rail-to-rail width

Surface conditions:
- Bridge: Pavement in good condition; large pavement "lip" at bridge's east end (creates issues for "wheel" users)
- Access ramps: Pavement in good condition
- No drainage grates on bridge or access ramps

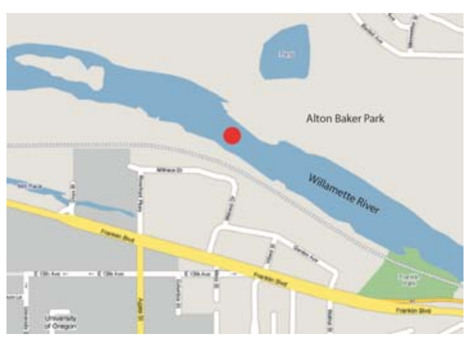
Pavement "lip" at bridge's east end

Horizontal/vertical obstructions: Minor vegetation encroachment on on bridge's east end

Autzen Bridge

Location: Eugene, OR

Location Map Reference #: 26



Source: Google Maps

Crosses over: Willamette River

Source: Google Earth

Year built: 1970

Owned by: City of Eugene

Nearby destinations:
- University of Oregon
- University of Oregon Riverfront Field
- Autzen Stadium
- Alton Baker Park
- Whilamut Natural Area
- Franklin Park
- North Bank Trail
- South Bank Trail

South Bank Trail and Riverfront Field

Misc. observations: Viewing areas with benches make the bridge a destination

Location Elements

Nearest alternative formalized crossing(s):
- Knickerbocker Bridge, ~3,500' east of bridge
- DeFazio Bridge, ~5,500 west of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Willamette River

Bike/ped accommodations immediately adjacent to bridge:
- Shared use paths at both bridge ends
- Raised crosswalk with pavement texturing immediately south of bridge

Raised crosswalk with pavement texturing on Millrace Dr. immediately south of the bridge

Surrounding bike/ped network:
- North Bank Trail
- South Bank Trail
- Trail to Autzen Stadium
- Sidewalks on most nearby streets

North Bank Trail

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and adjacent paths: Data unavailable
- Bicycle: Minimal out-of-direction travel (bridge and surrounding paths are at roughly the same elevation, thereby requiring no circuitous access ramps); however some informal paths exist near both bridge ends
- Pedestrian: Minimal out-of-direction travel (bridge and surrounding paths are at roughly the same elevation, thereby requiring no stairways or circuitous access ramps); however some informal paths exist near both bridge ends

Informal path at bridge's north end

Wayfinding or other signage/ pavement markings:
- Wayfinding signage at north and south bridge ends
- Pavement markings on North and South Bank trails serving as mileage markers

Design Elements

Bridge access provisions: Bridge is part of a continuous shared use path network

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path)
- Shared use path width: ~12'

Fence/wall/railing heights:
- Shared use paths: No fences, walls, railings
- Bridge: ~20" walls, ~44" railings

Railing style on bridge structure

Lighting:
- Provided on bridge and shared use paths
- Several damaged/broken lights on bridge walls

Overhead lighting on bridge

Bridge structure length (excluding access ramps): ~670'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~12'

Bridge cross-section includes a 12' width (railings and walls are flush with one another)

Surface conditions:
- Bridge: Pavement in generally good condition; expansion joint gaps at both bridge ends; manhole covers on bridge deck might be difficult for some "wheel" users
- Shared use paths: Pavement in generally good condition

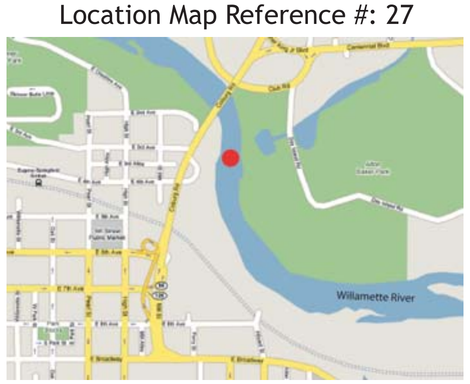
Manhole cover on bridge deck

Horizontal/vertical obstructions: None

DeFazio Bridge

Location: Eugene, OR

Location Map Reference #: 27



Source: Google Maps

Crosses over: Willamette River

Source: Google Earth

Year built: 1999

Owned by: City of Eugene

Nearby destinations:
- University of Oregon
- Alton Baker Park
- Skinner Butte Park
- Hult Center for the Performing Arts
- North Bank Trail
- South Bank Trail
- Plazas north and south of the bridge

Alton Baker Park

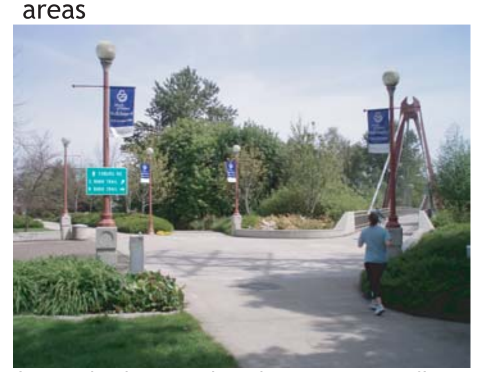
Misc. observations: Architectural elements add aesthetic value to the bridge; Viewing areas make the bridge a destination

Location Elements

Nearest alternative formalized crossing(s):
- Ferry Street Bridge, ~300' west of bridge
- Autzen Bridge, ~5,500' east of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Willamette River

Bike/ped accommodations immediately adjacent to bridge:
- Shared use paths at both bridge ends
- Sidewalks on Ferry St.
- Plazas serving as a path confluence areas



Plaza at bridge's south end serves as a confluence for multiple paths and sidewalks

Surrounding bike/ped network:
- North Bank Trail
- South Bank Trail
- Trails in Alton Baker Park
- Sidewalks on Ferry St.

North Bank Trail

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Depends on direction of travel; minimal out-of-direction travel for users on Ferry St. corridor (bridge and street are at roughly the same elevation, thereby requiring no circuitous access ramps); some out-of-direction travel between bridge and North/South Bank trails (via access ramps)
- Pedestrian: Depends on direction of travel; minimal out-of-direction travel for users on Ferry St. corridor (bridge and street are at roughly the same elevation, thereby requiring no circuitous access ramps); some out-of-direction travel between bridge and North/South Bank trails (via access ramps); stairways provided at bridge's north end to provide alternative routing; stairways not provided at bridge's south end

Wayfinding or other signage/pavement markings:
- Wayfinding signage at north and south bridge ends
- Pavement markings on North and South Bank trails serving as mileage markers

Wayfinding signage near bridge's south end

Design Elements

Bridge access provisions:
- Linear and curvilinear access ramps
- Stairway on bridge's north end (no landings or "bike gutter")

North access ramp

Access ramp length/width:
- North ramp: ~75'/~15' 6"
- North stairway: ~6' 6" wide

Fence/wall/railing heights:
- North ramp: ~43" lower railings, ~55" upper railings
- North stairway: ~43" railings
- Bridge: ~43" lower railings, ~55" upper railings

Railing style on bridge structure and north access ramp

Lighting: Provided on bridge, access ramps and surrounding paths

Lighting on bridge structure

Bridge structure length (excluding access ramps): ~613'

Bridge structure vertical clearance: varies

Minimum bridge structure width: ~14'

Bridge cross-section includes a 14' width (curbs and railings are flush with one another)

Surface conditions:
- Bridge: Pavement in good condition; minor expansion joint gaps at bridge ends (creates issues for "wheel" users); small drainage grates placed at bridge edges
- Access ramps: Pavement in good condition

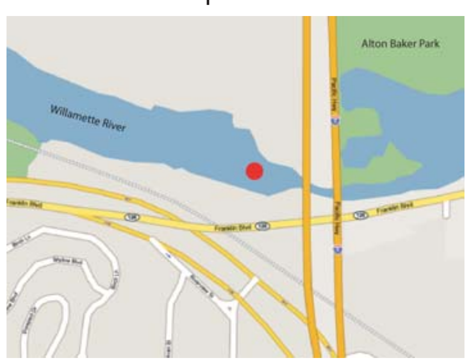
Expansion joint gap at bridge's south end

Horizontal/vertical obstructions: None

Knickerbocker Bridge

Location: Eugene, OR

Location Map Reference #: 28



Source: Google Maps

Crosses over: Willamette River

Source: Google Earth

Year built: 1979

Owned by: City of Eugene

Nearby destinations:
- University of Oregon
- Alton Baker Park
- Whilamut Natural Area
- Franklin Park
- North Bank Trail
- South Bank Trail

Alton Baker Park

Misc. observations: Viewing areas with benches make the bridge a destination

Location Elements

Nearest alternative formalized crossing(s): Autzen Bridge, ~3,500' west of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Willamette River

Bike/ped accommodations immediately adjacent to bridge: Shared use paths at both bridge ends

Shared use paths provide direct access to the bridge

Surrounding bike/ped network:
- North Bank Trail
- South Bank Trail
- Jogging trails in Alton Baker Park

South Bank Trail

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical north-south bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical north-south walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and adjacent paths: Data unavailable
- Bicycle: Minimal out-of-direction travel (bridge and surrounding paths are at roughly the same elevation, thereby requiring no circuitous access ramps); however some informal paths exist near the bridge's north end
- Pedestrian: Minimal out-of-direction travel (bridge and surrounding paths are at roughly the same elevation, thereby requiring no stairways or circuitous access ramps); however some informal paths exist near the bridge's north end

Informal path at bridge's north end

Wayfinding or other signage/ pavement markings:
- Wayfinding signage at north and south bridge ends
- Pavement markings on North and South Bank trails serving as mileage markers

Design Elements

Bridge access provisions: Bridge is part of a continuous shared use path network (north access path is somewhat steep, which could complicate travel for wheelchair users)

The north access path includes a short but steep grade, which can pose difficulties for wheelchairs and other users

Access ramp length/width:
- No specific lengths (bridge is part of a continuous shared use path)
- Shared use path width: ~10'

Fence/wall/railing heights:
- Shared use paths: No fences, walls, railings
- Bridge: ~43" railings

Railing style on bridge structure

Lighting: One light provided on bridge's south end

Bridge structure length (excluding access ramps): ~525'

Bridge structure vertical clearance: N/A (uncovered)

Minimum bridge structure width: ~13'

Bridge cross-section includes a 13' rail-to-rail width

Surface conditions:
- Bridge: Pavement in generally good condition; large pavement "lips" at both bridge ends; manhole covers on bridge deck might be difficult for some "wheel" users
- Shared use paths: Rough pavement conditions on north access path

Pavement "lip" at bridge's north end

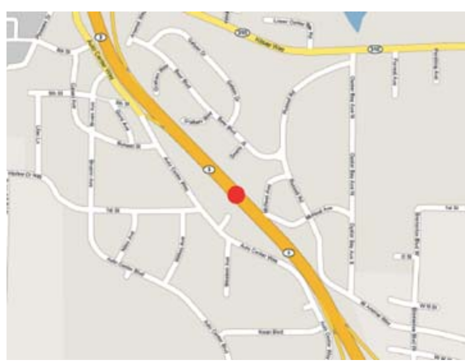
Rough pavement conditions on north access path

Horizontal/vertical obstructions: None

Searle Street Bridge

Location: Bremerton, WA

Location Map Reference #: 29



Source: Google Maps

Crosses over: SR 3

Source: Google Earth

Year built: 1974

Owned by: Washington State Dept. of Transportation

Nearby destinations:
- Westpark neighborhood
- Commercial businesses on Auto Center Way

Westpark Neighborhood

Misc. observations: Graffiti and glass present on bridge structure

Location Elements

Nearest alternative formalized crossing(s):
- SR 3 at Kitsap Way, grade-separated crossing, ~1,500' north of bridge
- SR 3 at W Loxie Eagans Blvd, grade-separated crossing, ~2,800' south of bridge

Elements precluding/discouraging at-grade crossings in bridge area: Fencing on both sides of SR 3

Bike/ped accommodations immediately adjacent to bridge:
- Curb ramps lacking where access paths meet the street system
- Sidewalks present on Searle St. and Baer Blvd.

Curb ramps lacking where access paths meet surrounding streets

Surrounding bike/ped network:
- Sidewalks on most nearby streets
- Low-volume residential streets

Sidewalk on Searle St.

Degree of out-of-direction travel to reach bridge area (real or perceived):
- Bicycle: Minimal out-of-direction travel (bridge is located on a logical east-west bicycle route)
- Pedestrian: Minimal out-of-direction travel (bridge is located on a logical east-west walking route)

Degree of out-of-direction travel to overcome any vertical rise to reach the bridge:
- Vertical rise between bridge and base of access ramps: Data unavailable
- Bicycle: Minimal out-of-direction travel (bridge and surrounding streets/paths are at roughly the same elevation); lack of curb ramps complicates bicycle transitions to/from access paths
- Pedestrian: Minimal out-of-direction travel (bridge and surrounding streets/paths are at roughly the same elevation); out-of-direction travel required for mobility-impaired users to access curb ramps

The lack of curb ramps complicates bridge access for some users

Wayfinding or other signage/pavement markings: Wayfinding signage directing users to bridge from adjacent neighborhoods

Wayfinding signage west of bridge

Design Elements

Bridge access provisions: Access path on bridge's east end

East access path

Access path length/width:
- East path: No specific length (part of a continuous path; ~4' 6" width

East access path is about 4' 6" wide

Fence/wall/railing heights:
- East path: No fences, walls, railings
- Bridge: ~44" railings

Lighting: Provided on bridge and surrounding streets

Bridge structure length (excluding access ramps): ~233'

Bridge structure vertical clearance: ~7' 6"

Minimum bridge structure width: ~7' 6"

Bridge cross-section includes a 7' 6" rail-to-rail width and a 7' 6" vertical clearance

Surface conditions:
- Bridge: Pavement in good condition; large pavement "lips" at bridge ends
- Access ramps: Major cracking on Searle St. sidewalk; major cracking/heaving on east access path
- No drainage grates on bridge or access ramps

Pavement cracking/heaving on east access path

Horizontal/vertical obstructions: Guard rail and encroaching vegetation on west approach create a "pinch point"

References

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

American Association of State Highway and Transportation Officials. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004.

City of Vancouver, Washington. Survey of 217 Portland metropolitan area bicyclists, 2006.

Institute of Transportation Engineers. *Improving the Pedestrian Environment through Innovative Transportation Design*. Publication No. IR-118, 2005.

Oregon Department of Transportation. *Oregon Bicycle and Pedestrian Plan*, 1995.

U.S. Department of Transportation. *Rails-with-Trails: Lessons Learned*, 2002.

U.S. Department of Transportation. *BIKESAFE Case Study #35: Grade-Separated Crossing Treatments*. Report accessed from the Pedestrian and Bicycle Information Center website: www.bicyclinginfo.org.

Washington State Department of Transportation. *Design Manual*, 2006.

Washington State Department of Transportation. *Pedestrian Facilities Guidebook*, 1997.