A Tale of Portland Bridges

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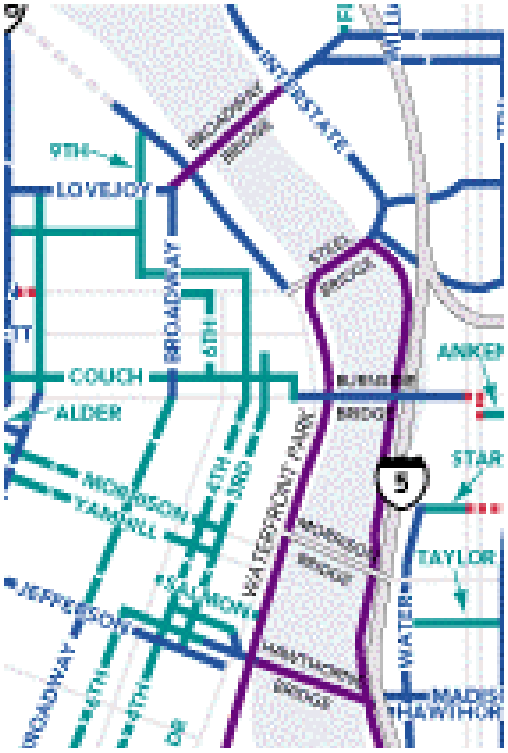
Background

There are 10 bridges spanning Portland's Willamette River, which cuts through the heart of Portland and provides social, economic, and recreational benefits. The Willamette River bridges connect the City's east and west sides—on the west side is Portland's vibrant and economically critical downtown, on the east side are light industries, emerging business districts, and pedestrian and bicycle-friendly neighborhoods. The bridges simply are critical for mobility (See Map, Figure 1.) They include five local bridges providing downtown access (Hawthorne, Morrison, Burnside, Steel, and Burnside), three other local bridges (Ross Island, Sellwood, and St. Johns), and two limited access freeways (Fremont and Marquam.) Multnomah County is responsible for five of the bridges, the Oregon Department of Transportation (ODOT) for four, and the Union Pacific Railroad for one. The City of Portland is responsible for signing, striping, and access to all bridges.

Eight bridges (all but the limited access freeways) provide some level of pedestrian and bicycle access (see Table 1.) In the early 1990s, a year-long partial closure of the Hawthorne Bridge galvanized cycle advocates to press for access during the closure. At the same time, the City embarked upon a major program to engage cyclists and potential cyclists in a dialogue about ways to increase cycling as a means of transportation. Overwhelmingly, improvements to the bridges' approaches and spans were seen as the highest priority because of the poor bicycle and pedestrian conditions.



At the time, the eight non-freeway bridges were a major barrier for pedestrian and bicycle travel. Bicyclists and pedestrians shared narrow sidewalks, and all bridges had access problems, such as:

- Cyclists having to cross motor vehicle ramps with no markings or yield control.
- Lack of bikeway facilities on approaching congested streets and structures.

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– Conflicts between bicyclists and pedestrians on narrow sidewalks and other points.

On two bridges (Sellwood and Steel), the sidewalks were so narrow that bicyclists were supposed to walk their bikes (which, of course, they rarely did) through conflict areas. On several of the bridges, bicyclists could theoretically use auto travel lanes. On one downtown bridge (Burnside) this required sharing the relatively narrow 10' wide outside travel lanes on a six-lane span. On three other downtown bridges, sharing the travel lanes was (and still is) a dangerous undertaking given the narrow lane widths, traffic volume and speeds, and sight distance. On three non-downtown bridges, sharing lanes meant bicycling on slippery grating (not a good option in rainy Portland.)

These problems translated to low bicycle and pedestrian use. Surveys of cyclists found the number one problem cited was bridge facility quality and access. In response, Multnomah County, ODOT, and the City of Portland collaborated on an ISTEA-funded study called the Willamette River Bridges Access Project (WRBAP). Consultants CH2MHill identified over $15 million in potential bicycle, pedestrian, and ADA improvements. The City and County subsequently implemented many of these via grants from ODOT, ISTEA, and through routine City of Portland, Multnomah County, and ODOT bridge and approach maintenance work.

Measures Implemented

Over $12 million worth of improvements have been implemented, primarily on four of the downtown bridges: Hawthorne, Burnside, Steel, and Broadway. Preliminary design for improvements on the fifth downtown bridge—Morrison—is underway as of Fall 2002. Limited improvements were suggested for the Sellwood, St. Johns, and Ross Island bridges; no major improvements have resulted. The measures implemented on the four main bridges are shown in the photos below and described for each bridge in Table 1.

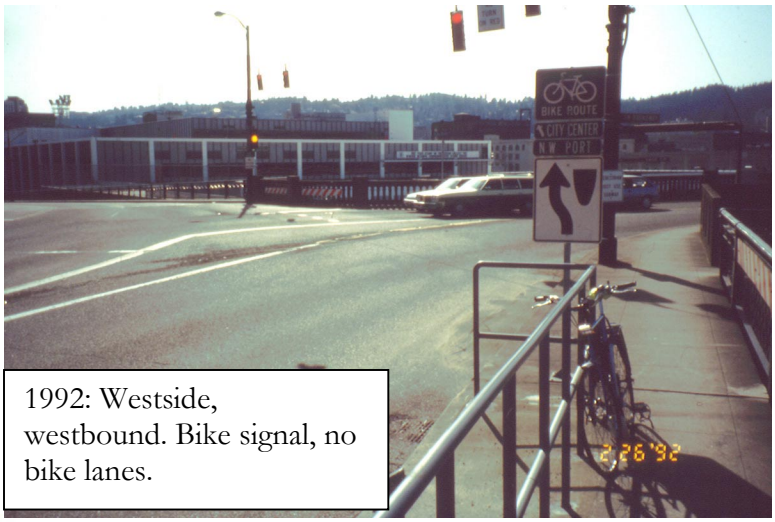
The measures include:

- Improvements to off-street facilities (widening sidewalks on Hawthorne, sidewalk in-fill in approach areas, replacement of slippery sidewalk surface on both Hawthorne and Broadway, addition of shared use path on Steel).
- Striping bike lanes, signing (on the bridge span on Burnside, and on most approaches and access streets).
- Focus on safety at conflict areas (closure of on-ramp from Naito to Hawthorne Bridge, reconstruction of conflict areas on approaches to Hawthorne and Broadway, blue bike lane implementation in conflict zones on approaches to Broadway and Hawthorne).
- Redesigning sidewalk ramps to meet ADA (all bridges).

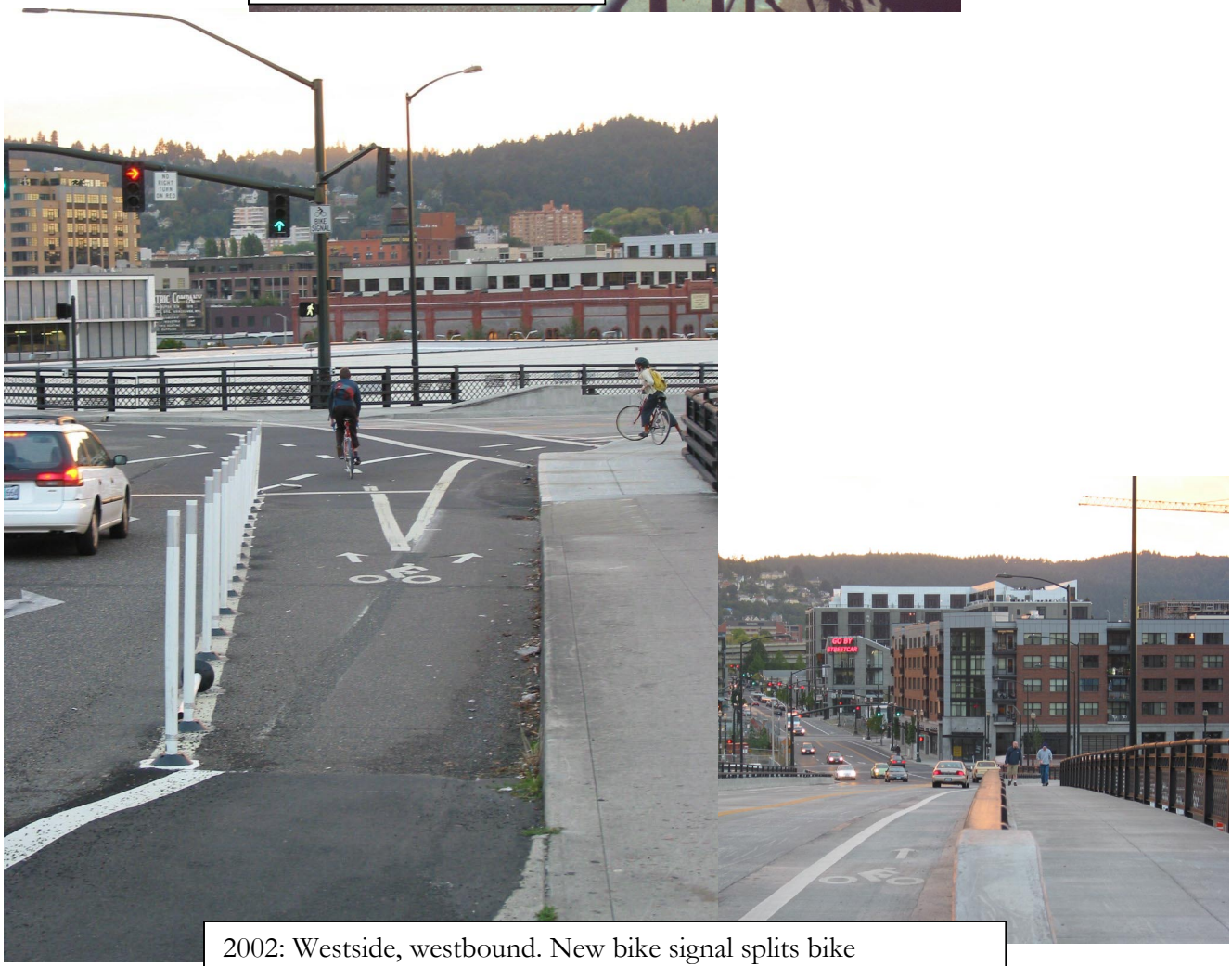
It should be noted that many of the improvements were made in conjunction with other bridge upgrade or reconstruction projects, thus costs for specific bike/pedestrian improvements are not always available. Also note that the City used blue pavement areas in bike/motor vehicle conflict areas on the approaches from the eastside for two bridges (Broadway and Hawthorne). Blue bike lanes as a safety technique are discussed in the City of Portland publication, "Blue Bike Lanes for Cycling Safety" (City of Portland, 1997).

Photo Gallery: Portland Bridges with Significant Changes

Broadway Bridge

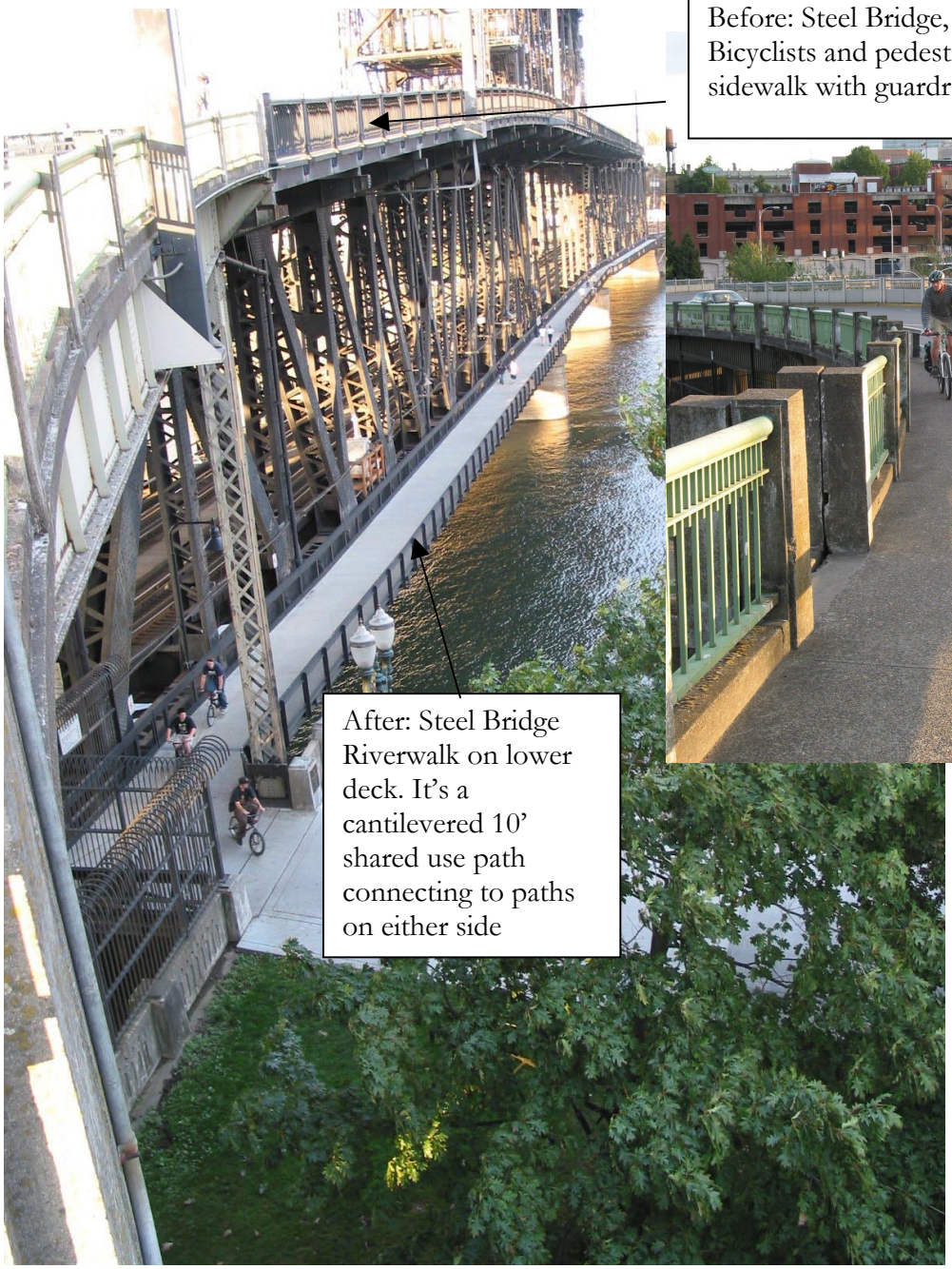


1992: Westside, westbound. Bike signal, no bike lanes.



2002: Westside, westbound. New bike signal splits bike movements. Bike lanes on approaches and connecting streets.

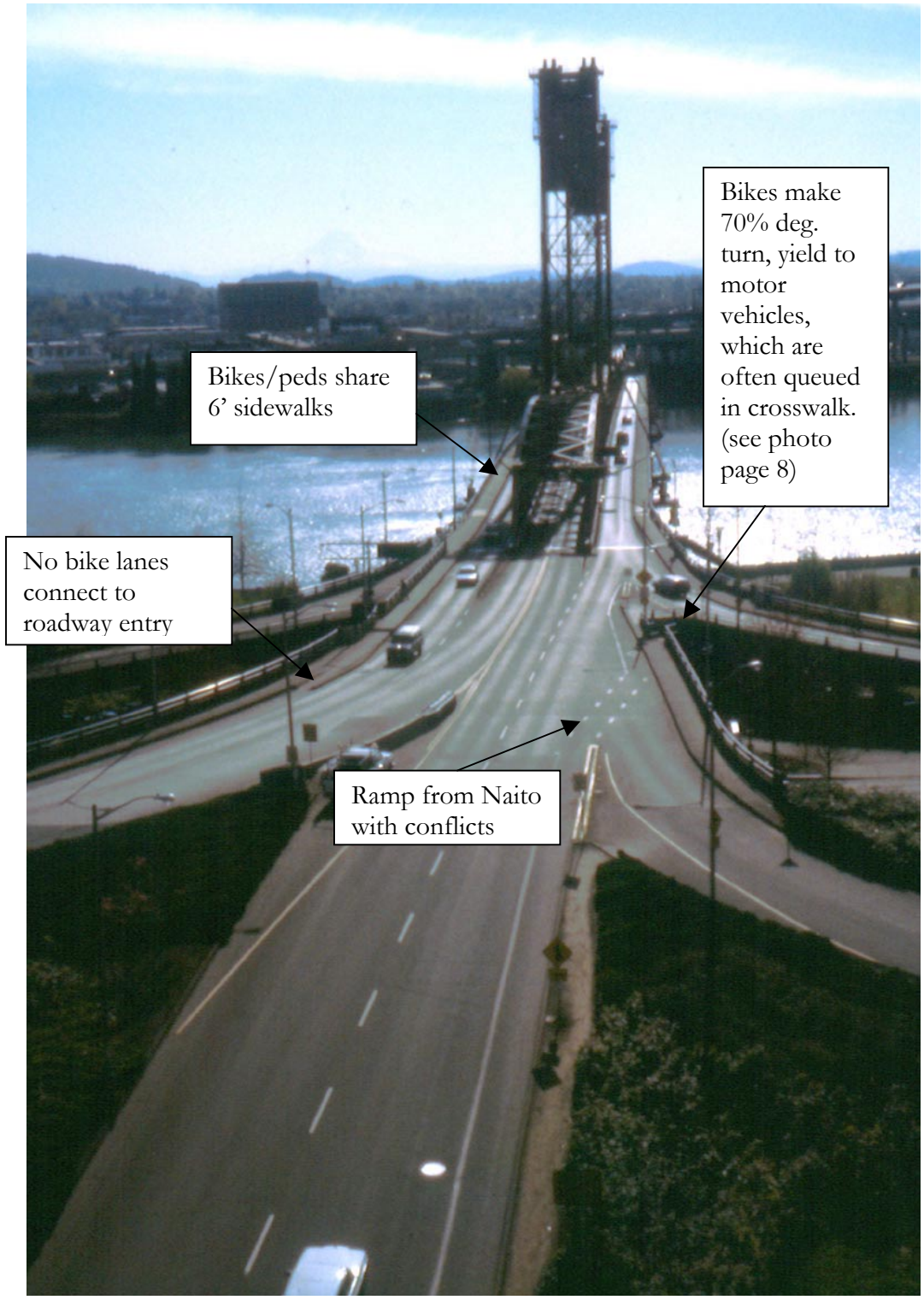
Steel Bridge



Before: Steel Bridge, upper deck. Bicyclists and pedestrians sharing one 5' sidewalk with guardrail.

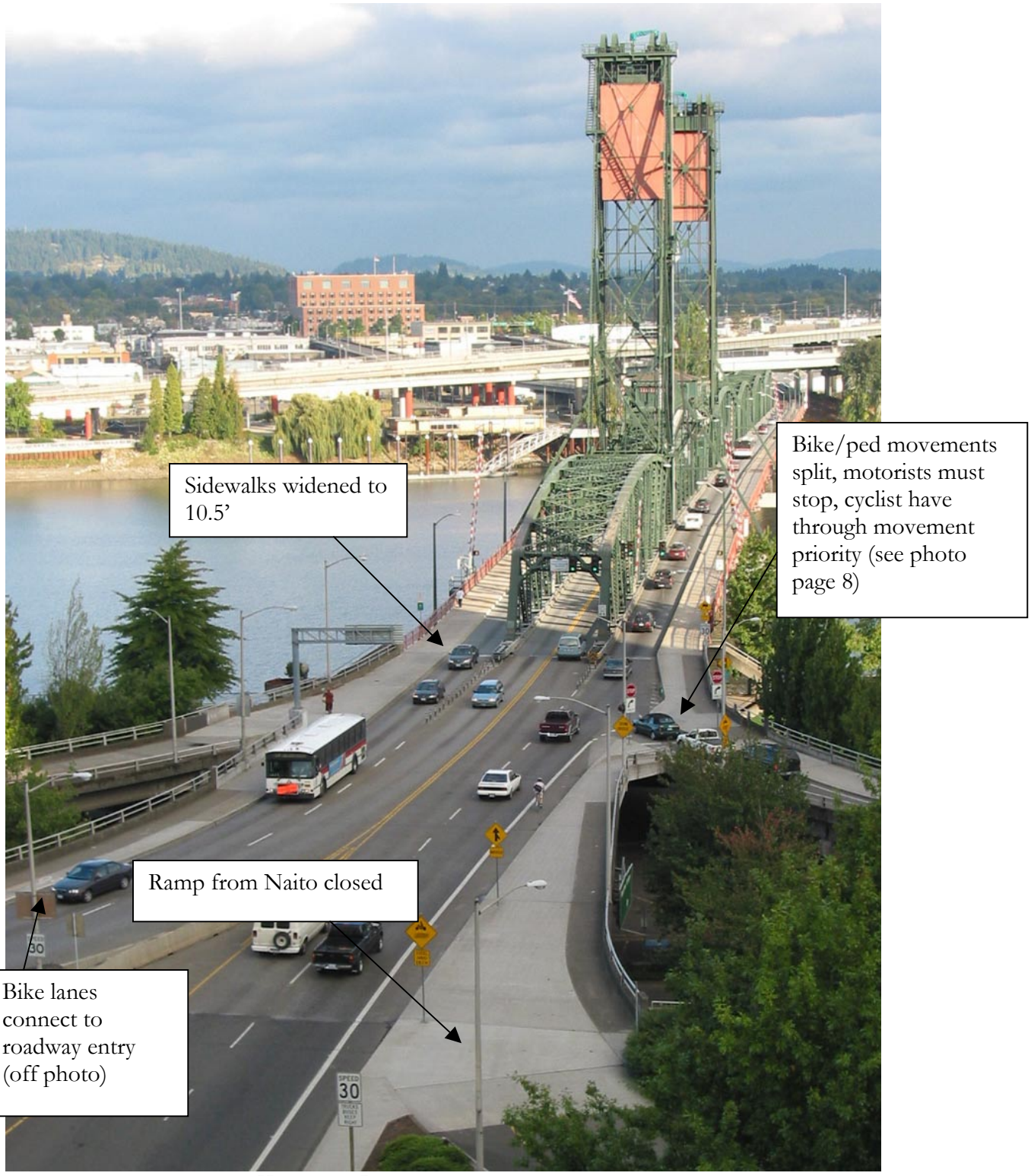
After: Steel Bridge Riverwalk on lower deck. It's a cantilevered 10' shared use path connecting to paths on either side

Hawthorne Bridge: Before



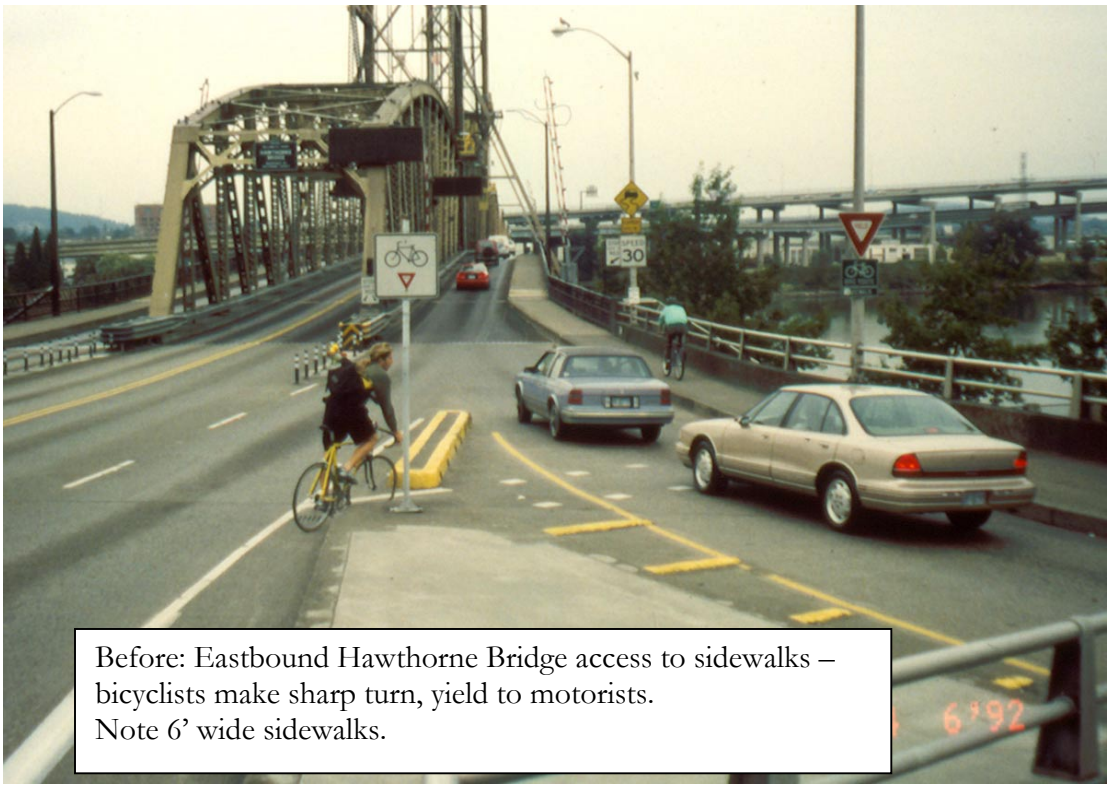
Hawthorne Bridge westside, eastbound, before improvements made.

Hawthorne Bridge: After

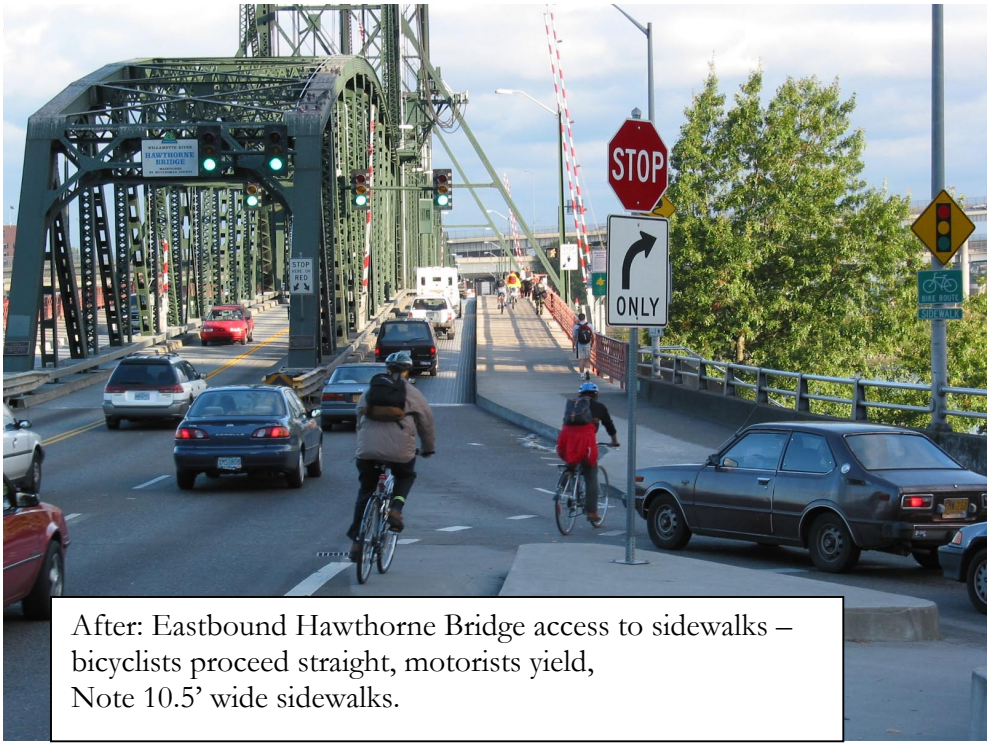


Hawthorne Bridge westside, eastbound, after improvements made.

Hawthorne Bridge: Before and After

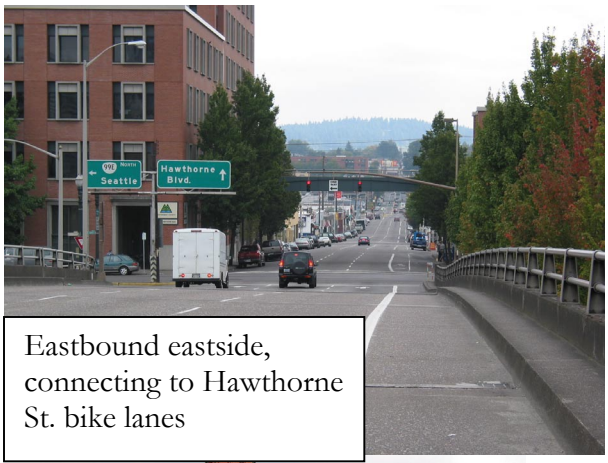


Before: Eastbound Hawthorne Bridge access to sidewalks – bicyclists make sharp turn, yield to motorists.
Note 6' wide sidewalks.

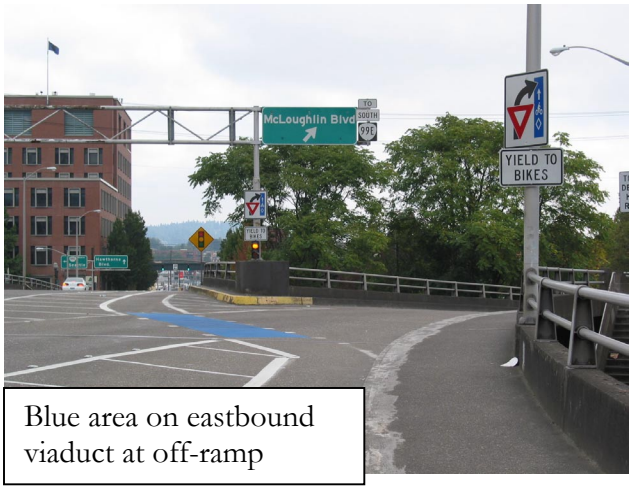


After: Eastbound Hawthorne Bridge access to sidewalks – bicyclists proceed straight, motorists yield,
Note 10.5' wide sidewalks.

Hawthorne Bridge: After



Eastbound eastside, connecting to Hawthorne St. bike lanes



Blue area on eastbound viaduct at off-ramp

Eastbound, westside

Westbound, eastside

Hawthorne: Bike lanes added on all approaches. Bike lanes added to all connecting streets: SW Main, SW Madison, SE Hawthorne, SE Madison. Blue bike area used at areas where motorists cross bicycle lane.

Table 1: Bridge countermeasures, costs, funding sources

Bridge	Owner[2]	Status Before	Measures Implemented	Cost	Funding Source
Hawthorne*	Multnomah County	Cyclists and pedestrians sharing six-foot wide sidewalks. No bike lanes and minimal sidewalks on approaches. Bicyclists shared roadway or used sidewalks to access. Problematic interaction between cyclists and motor vehicles in several areas.	Sidewalks widened to 10-feet on each side. Bike lanes striped on all approaches. Sidewalk in-fill on approaches. Curb ramps rebuilt to meet ADA. Eastbound approach, Westside: 1st ramp from Naito Parkway closed, eliminating conflict area. Second ramp reconfigured to force motorists to stop and give cyclists and pedestrians priority, separate bike and pedestrian crossing areas. Blue bike lanes introduced in conflict zones on east side.	Sidewalk widening: $1.2 million Other changes: $200,000	ODOT Bike/Ped Grants, TEA-21 STP funding
Burnside*	Multnomah County	Bikes and pedestrians on 10' wide sidewalks. Bike access via surface street without bike lanes.	Deck restriped with bike lanes by removing one travel lane in non-peak direction	$20,000	Local transportation funding
Steel*	*Upper Deck:* Multnomah County. *Lower Deck:* Union Pacific Railroad	Bikes and pedestrians sharing approx 5-foot sidewalk on south side, upper deck. Some cyclists on roadway.	New 12' bike/ped path added to lower deck, along with new shared use path (Eastbank Esplanade) and bike lanes on eastside	$10 million	ISTEA & TEA-21 Enhancements, local tax increment financing

[2] On all bridges, approaches, signing, and striping controlled by City of Portland

Bridge	Owner[2]	Status Before	Measures Implemented	Cost	Funding Source
			approaches. "Bikes on roadway" signing on upper deck.		
Broadway*	Multnomah County	Bikes and peds on 10' wide sidewalks with slippery surface. No bike lanes on connecting surface streets. Approaches with numerous ill-defined conflict areas.	Sidewalk surface replaced (sidewalk width same). Bike lanes added to all connecting surface streets and ramps. Conflict areas on approaches modified and defined (by blue bike areas in two cases).	$300,000	Multnomah County & Portland transportation funding
Sellwood	Multnomah County	Bikes and peds on 4' wide sidewalk on one side. Very constrained. Access from eastside via surface street without bike lanes. Access from Westside via shared use path.	None. Bridge to be rebuilt within 20-years		
St. Johns	ODOT	Bikes and peds on narrow 4' sidewalks. Access horrible via major highway.	None. ODOT studying restriping potential.		
Ross Island	ODOT	Bikes and peds on 4' wide sidewalk on one side. Very constrained. Access from Westside near impossible. Access from eastside via crowded surface streets without bike lanes.	Bridge rebuilt, but bikes & pedestrians still share narrow sidewalk. No improvements made.		
Morrison*	Multnomah County	Bikes and peds on narrow sidewalks. Very	Preliminary design study underway as of Fall 2002	$250,000	TEA-21

Bridge	Owner[2]	Status Before	Measures Implemented	Cost	Funding Source
		constrained. Dangerous conflict areas at highway ramps.			

* Connects eastside to downtown Portland.

Figure 2: Bridge Bicycle Traffic

on four main Willamette River bridges

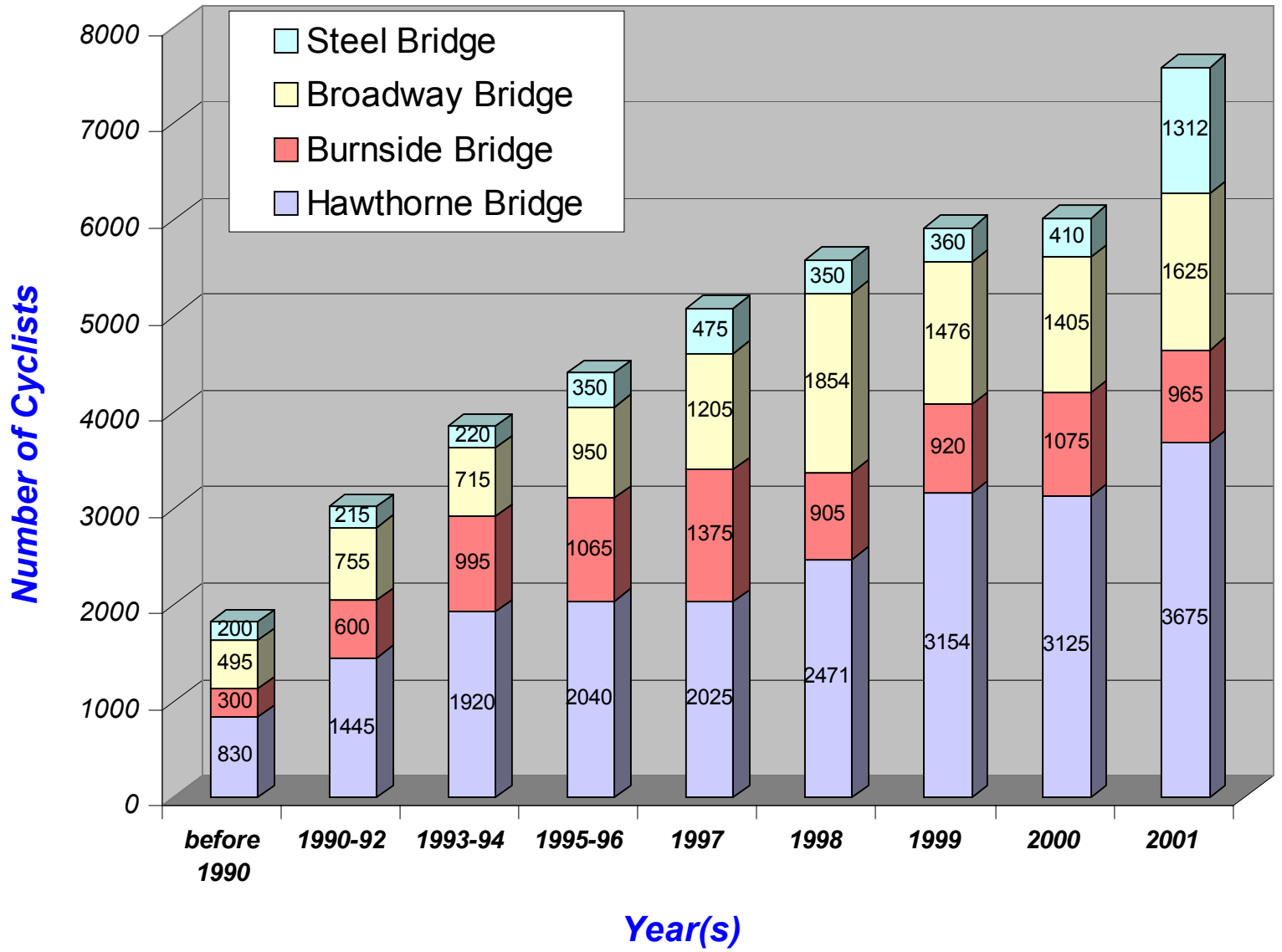


Table 2: Bridge Bicycle Traffic

	before 1990	1990-92	1993-94	1995-96	1997	1998	1999	2000	2001	2002
Hawthorne Bridge	830	1445	1920	2040	2025	2471	3154	3125	3675	
Burnside Bridge	300	600	995	1065	1375	905	920	1075	965	
Broadway Bridge	495	755	715	950	1205	1854	1476	1405	1625	
Steel Bridge		215	220	350	475	350	360	410	1312	
Totals	1825	3015	3850	4405	5080	5580	5910	6015	7577	
Ross Island Bridge*				100			90			
Morrison Bridge*					100		100			
Sellwood*					260		315			

Notes: counts are either from 24-hour hose counts, or from extrapolated 4 to 6 PM manual counts (estimated at 20% of total daily bicycle volume based on 24-hour video and manual verification). Where more than one count is available in a given year, counts are averaged. All counts taken in the summer months, on good weather weekdays.

* No significant bike/ped improvements made

Burnside Br counts pre-1993 are estimates based on 7-9am counts

Burnside Bridge is restriped with bike lanes on-street.

Hawthorne Br. 1998 count was conducted on the Morrison Br. Detour, as the Hawthorne was closed

Hawthorne Bridge reopens with widened sidewalks and access improvements

Broadway Bridge sidewalks resurfaced, eastside approaches improved, westbound bike lanes added to Lovejoy Ramp

Broadway Br. 1999 count conducted during Lovejoy ramp demolition

Lovejoy Ramp not yet open

Steel Bridge Riverwalk opens

Evaluation and Results

The City of Portland collected bicycle counts on the bridges over time, as shown in Figure 2 and Table 2. These counts are based on the daily peak two-hour period, and thus primarily reflect commute trips. The counts show an enormous increase over time in bicycle use on the four main bridges, while in comparison, counts for the bridges without bicycle access improvements remain extremely low. Recreational trips have increased enormously as well. Joggers and cyclists frequently use the Hawthorne and Steel bridges and their connecting paths as a downtown exercise loop during the day and on weekends.

A clear link can be made between the increased bike use and improved facilities on the four bridges discussed. On the Hawthorne, Burnside, and Broadway bridges alone, bike use went up 78% in the 1990s, compared with a 14% increase in the population and an 8% increase in motor vehicle use on these bridges. The following results should be noted:

- On the Burnside Bridge, bike use tripled from 300 daily cyclists to approximately 1000 once the improvements were made.
- On the Hawthorne Bridge, many improvements were made over a multi-year period. The most significant jump in use occurred in 1999, after the sidewalks were widened, from about 2400 cyclists to over 3100—a 32% increase in one year.
- On the Broadway Bridge, a 54% increase in cycling occurred the year after the major improvements were made.
- On the Steel Bridge, bike use went up 220% after the Steel Bridge Riverwalk and Eastbank Esplanade opened in May 2001.

Conclusions

Extremely successful, this decade-long effort has been a major factor in Portland's increasing bicycle use because of the crucial links these bridges provide into downtown. It has also been positive for pedestrians and people with disabilities, for several reasons:

- Bike and pedestrian conflicts have either have been largely eliminated through the installation of on-street bike lanes or reduced through the provision of more or alternative space.
- All curb ramps have been upgraded to meet ADA standards.
- Missing sidewalk connections have been installed.
- Pedestrian-motorist conflict areas with motorists at approaches improved.

The most dramatic and expensive improvements have had the most significant impact. Relatively low cost improvements like the blue bike markings in conflict zones, bike lanes on certain approaches, and signage were not as significant factors in increasing bike use as the major cost items like providing a new shared use path, widening the sidewalk, and replacing sidewalk surfaces and approaches. For example, bike use on the Burnside Bridge tripled when bike lanes were installed in 1993 (cost of $20,000), but has remained flat since that time at less than 1000 daily cyclists. In comparison, bike use on the Hawthorne Bridge

tripled to over 3000 daily cyclists due to the much-improved sidewalks and access improvements (cost of more than $1.3 million). Similar increases were seen on the Broadway Bridge (cost of $300,000) and Steel Bridge (cost of more than $10 million).

A key to the heavy and increasing concentration of bicyclists on the Hawthorne, Steel and Broadway Bridges, as opposed to the Burnside and other bridges, is fact that on these three bridges' spans, bicyclists are off-street on either wide sidewalks or a shared use path, with bike lanes on the approaches. In addition, the City added bicycle lanes to all streets connecting to the Hawthorne, Steel and Broadway Bridges, overcoming major hurdle in getting people to the bridges. In contrast, on the Burnside Bridge, cyclists operate in striped bicycle lanes adjacent to traffic, which is uncomfortable for some cyclists. And, there are no connecting bike lanes on the approaches or connecting streets.

Costs and funding

The total cost of bridge improvements to date is over $12 million, funded through a variety of sources. See Table 1 above.