8 Bicycle and Pedestrian Travel

Best Practices
Bicycling in Seattle

What are the policies and programs that promote safe bicycling travel?

Maximizing Bicycle Travel in Seattle's Center City

Every weekday in Seattle, between 4,000 and 8,000 residents commute to work using a bicycle as their primary mode of transportation.[1] Many more bicycle trips are made for recreational, shopping and other trips. Cyclists travel on neighborhood streets, unmarked arterials, and along the city's 25 miles of bicycle lanes and 40 miles of multi-use trails. Seattle has made a commitment to further develop and connect this network through the adoption of the 2007 Seattle Bicycle Master plan. The plan calls for the construction of 201 miles of bike facilities by 2009 and 455 miles by the year 2030. The City expects that the resulting increase in cycling will help achieve a goal for 20% of all trips by 2030 to be by non-motorized means.

Seattle's Challenges

Despite clear indicators that increased cycling creates more friendly public streets, is environmentally friendly, energy efficient and helps citizens stay healthy, bicycling in most US cities is difficult. Road design, traffic speeds, and intersections are often not consistent with the needs of bicycles, putting cyclists in situations where safety and comfort are impaired. Shifting travelers' modes to cycling requires significant investment in infrastructure, education, encouragement, and enforcement. In Seattle, cyclists face a number of obstacles that make commuting to work and undertaking local errands by bike particularly challenging.

- **Topography.** Seattle is made up of a number of ridges and bluffs which in some areas creates significant street grades. East – west streets connecting First Hill/Capitol Hill and downtown reach grades of approximately 17%.

1 City of Seattle Department of Transportation (1999)

Local bike organization offers coffee for wet morning commuters in Portland
Source: Jonathan Maus/BikePortland.org

A strong bike culture is common in the world's best cycling cities: Cycling in a city where rain or hills are prevalent has a tendency to cultivate a proud and cohesive bicycle culture. In San Francisco bike messengers are more immersed in cycle culture than their counterparts in the rest of the country[1] and bike related events are well attended with the Bike to Work Day attracting as many as 35,000 people cycling to work on that day. In Portland, neighborhood bike events are frequent and wet morning commuters on city streets and bridges are regularly offered free coffee and pastries by bike clubs

1 Pucher et al. (1999)

King County Bus Bike Racks

Seattle was the first major city to equip the city's entire bus fleet with bike racks. Recently, King County Metro has begun installing racks that hold three bikes.
Source: Nelson\Nygaard

Bike integration with transit systems is important for making cycling accessible to Seattleites of all abilities. Bike-transit integration allows commuters to avoid bad weather, a particularly steep leg of their journey, or to pass major barriers, such as tunnels or bridges where cycling is prohibited or particularly difficult. About a third of all transit buses in North America are equipped with bike racks. In 1994 King County was the first major transit provider to equip its entire bus fleet with bike racks. Further, Seattle cyclists are not required to obtain a permit nor pay an additional fare for use of the rack. As a result the Seattle bus system carries more than 60,000 bicyclists a month in the peak bicycling season. However, the demand for the limited cycle rack space on hilly urban bus routes often far exceeds capacity, keeping potential bikers away. King County Metro is upgrading bus bike racks to models that carry three bikes, providing more capacity for bikers on transit.

- **Precipitation.** On average Seattle receives 154 rainy days a year with annual rainfall of 36 inches.
- **Bus traffic.** Approximately 240 buses travel through Center City during the morning peak period. Buses can be problematic for cyclists due to their size, limiting their ability to see bikes, and their tendency to frequently traverse bike lanes for passenger pick up and drop offs. Further, due to frequent stops, buses and bicycles often travel at similar speeds which results in cyclists and buses repeatedly overtaking each other.
- **Physical barriers.** Seattle has several natural and man made obstacles that make getting from point A to point B challenging. Topography is severe in the downtown core and in several Seattle neighborhoods; steep slopes make some roadways impassible for the average cyclist. Freeway structures and railways reduce street connectivity and create challenges in route planning. The City's many water bodies also lengthen trip distances and introduce conflicts as all modes are funneled onto a small number of bridges.
- **Safety concerns.** Safety concerns are one of the top concerns made by those who wish to cycle more.

These climatic and topographical challenges are real, but experience in other cities suggests they can be overcome. This section poses some difficult questions about the future of cycling in Seattle and follow with real experiences from other cities.

Issue #1. What evidence is there that investing in cycling facilities will lead to more bicycling?

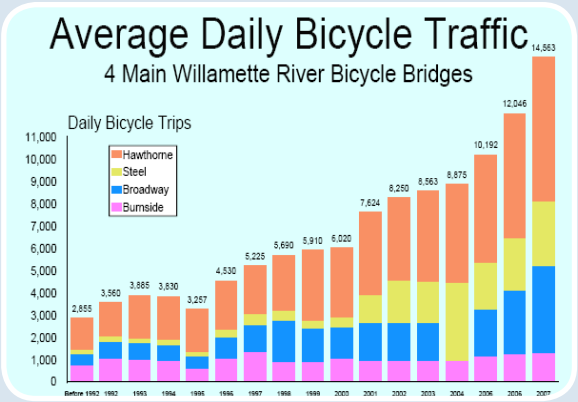
After spending an average of 15% of its transportation budget on building and maintaining its bicycle infrastructure, cycling in Boulder, Colorado has increased by over 100% in the past ten years. In San Francisco Journey to Work Data showed an increase of 108% in bicycle trips from 1990 to 2000. In 2000, San Francisco had the highest percentage of bike commuters among cities with a population of 500,000 or above in the United States. It is also one of the hilliest cities in the country.

In Portland, Oregon, city officials have noted double-digit increases in cycling for three years in a row. In some Portland neighborhoods bike commuting to the CBD is as high as 9%. Portland has installed over 260 miles of bicycle lanes, bicycle boulevards, and off-road trails resulting in a bicycle network increase of 240% since 1991. During the same period, the number of bicycle trips across Portland's four bicycle-friendly bridges increased by 410% (See Figure 1); meanwhile corresponding auto counts remained stable (0% growth). If this trend were to continue for the next 15 years, bicycles would represent nearly 40 percent of all trips traveling over Portland bridges by 2015.

While Portland has more moderate grades than Seattle, some of its most successful cycling neighborhoods are comparable in grade and distances separating them from downtown Portland. Urban neighborhood such as Fremont, Ballard, Lower Queen Anne or Wallingford are comparable in distance and elevation change from Seattle Center City as many of Portland's eastside neighborhoods are from the Portland CBD. Furthermore, as the population of the Center City increases demand for short, relatively flat circulation trips will increase. In Seattle, half of all automobile trips are less than five miles in length. Short journeys are opportune markets for cycling due to the inefficiency of driving for short, urban trips (i.e., congestion delay and time needed to find a place to park).

Other cities have also had success in increasing cycling through infrastructure investments. Figure 2 shows the relationship between bike commuters and the availability of bike lanes. Figure 3 shows the impact of policies encouraging cycling in West German cities.

Figure 1 Average Daily Bicycle Traffic



Source: City of Portland

Figure 2 Mode Split to Bicycle Network Miles

City	% Of Arterial Roads With Bike Lanes	% Of Commuters Who Bike
Boulder, CO	97%	21%
Davis, CA	95%	17%
Palo Alto, CA	13%	6%
Portland, OR	28%	5%
Madison, WI	About 37%	3%
San Francisco, CA	About 4%	2%
Chicago, IL	11%	1%

Figure 3 German Cycling Boom Engineered by Explicit Shifts in Transport Policy in 1970s

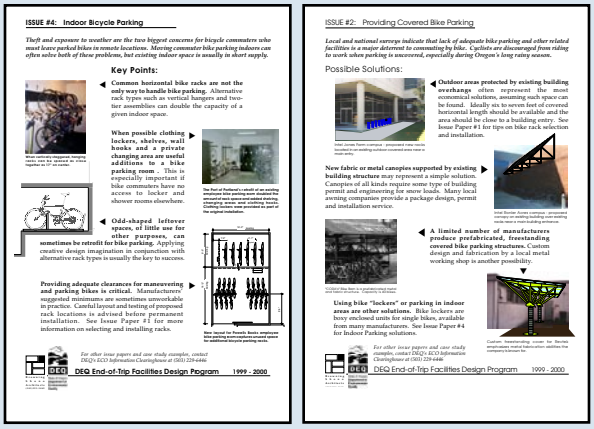
City	Time Period	Change in Bicycle Modal Split Share	Percentage Increase in Bicycle Share
Munich	1976 to 1994	6% to 13%	+117%
Nuremberg	1976 to 2001	4% to 9%	+125%
Cologne	1976 to 1993	6% to 12%	+100%
Freiburg	1976 to 1993	12% to 19%	+58%
Stuttgart	1976 to 2000	2% to 6%	+200%
Bremen	1976 to 1997	16% to 21%	+21%
Muenster	1976 to 2001	29% to 35%	+21%
Average for all urban areas in Western Germany	1972 to 2002	8% to 10%	+25%

Figure 4 Public-Private Bike Partnerships

City of Portland maintains a public/private partnership with local fitness clubs to provide clothes storage, shower facilities and secure bike parking.

Source: City of Portland

Figure 5 ODEQ End-of-the-Trip Design Guideline Series provide illustrated examples for employers looking to retrofit sheltered bike parking



Source: Rick Browning, Oregon Department of Environmental Quality

Issue #2. How do you convince people to bicycle in a city with 150 rainy days out of the year?

The best practice for encouraging bicycle commuting in the rain is to provide spaces where cyclists access facilities at the end of their commute to dry off, store clothes, and shower, and to access secure bike parking, protected from the weather. Using regulations or incentive programs, cities can play a part in mandating or encouraging the inclusion of these resources in all new office buildings.

As many cities are reducing auto parking requirements as part of smart growth strategies, attention should be paid to ensure that bicycle parking is not negatively impacted. As such, minimum bicycle parking requirements should be decoupled from auto parking requirements (i.e., one short-term bicycle space per 20 auto spaces) and replaced with minimums set to building uses or square footage (i.e., Elementary schools: one short-term space per ten students). Seattle has decoupled bike parking from auto parking requirements. In Portland, the city mandates minimum short-term and long-term bicycle parking requirements and also allows bicycle parking to substitute for a portion of automobile parking. Some cities, including Seattle and Vancouver, BC, have established minimum requirements for shower and change room facilities.

In Seattle, a number of employers already provide shower facilities and bike lockers on-site; in some cases these services are provided by private or non-profit organizations such as BikeStation. Located in Seattle's Pioneer Square and select California cities, BikeStation offers bike parking and related services for free during hours of operation. With a paid membership, cyclists have access to the secure facilities 24-hours a day.

Local and national studies show that a lack of adequate bike parking and other related services is a major deterrent to commuting by bike. While the provision of bike parking is mandated in most cities, covered parking is only recommended. Developing and distributing illustrated designs to developers and building managers is one way to facilitate the installation of well designed sheltered parking. (See Figure 5.)

Short days and rainy weather decrease visibility of cyclists and increase chances of accidents. Cities have limited influence in cyclist and driver behavior at night and in wet weather but some municipal programs have been established to increase awareness and education in this area. The City of Portland and community organizations initiated a public awareness campaign entitled *See & Be Seen: Light the Bike. See the Bike* to bring greater awareness to the dangers of cycling without proper lighting. The campaign is complimented by the local Community Cycling Center providing free lights to needy cyclists through its Get Lit! initiative (see Figure 6). In Amsterdam and Copenhagen, both cities have worked to train truck drivers to look out for bikers when they turn right at intersections and have changed mirrors on vehicles and at traffic corners to be positioned for better viewing of cyclists. The European Union has required that all trucks be retrofitted with blind-spot mirrors by 2009.

Issue #3. How does the city persuade people to bicycle in a city with significant hills?

Many hills can be avoided by designing bicycle routes to circumvent steep grades. However, residents may not be aware of these alternative routes. In San Francisco, the San Francisco Bike Map & Walking Guide shows existing bike routes, paths, and bike lanes, and indicates the grade of the street with different colors so the cyclist can avoid steep hills. In some hilly cities, switchback style urban bike routes are marked to provide more manageable climbs (see Figure 7).

In 1993 the City of Trondheim, Norway built and began operating the first, and still only, bicycle lift in the world. The Trampe bicycle lift travels at three to four miles per hour and lifts the mounted cyclist up the steep hill (a grade of one in five) by a pedal under the cyclist's right foot (see Figure 8).

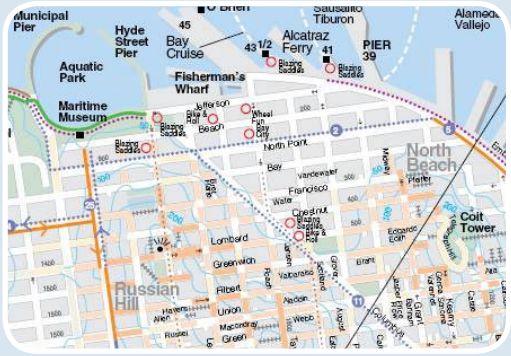
Other small design features such as bike gutters are extremely helpful for cyclists to maneuver their bikes up and down stairs. Bike gutters are gutter shaped ramps installed along the length of a stairwell that allows cyclists to wheel their bike up the stairs as an alternative to carrying it (see Figure 9, following page).

While ascending hills, cyclists' speeds are often slowed considerably. On very steep grades, slow

Figure 6 Bicycle Safety – See and Be Seen Campaign

The City of Portland's "See and Be Seen" campaign encourages greater awareness of the dangers of limited visibility during winter months.
Source: Jonathan Maus/BikePortland.org

Figure 7 San Francisco Bike Map



The San Francisco Bike Map helps cyclists to distinguish different hill grades by color coding the streets.
Design: reineckandreineck.com San Francisco

Figure 8 The Trampe Bicycle Lift in Trondheim, Norway

Despite the many hills in Trondheim, the city has the largest share of cycling in Norway. This is partly due to the significant financial investment over the past twenty years (approximately $4 million USD), the large number of university students, and the innovative Trampe bicycle lift installed in 1993.
Source: Trampe

Figure 9 Bike Gutter Along One of Portland, OR's City Stair Ramps

Source: Nelson\Nygaard

Figure 10 Climbing Lane in Seattle's E Union Street

Climbing lanes should allow for a greater buffer zone between parked cars and moving traffic for slower cyclists traveling up the hill.

Source: Nelson\Nygaard

speeds may result in the cyclist weaving slightly left to right in order to maintain consistent speed and balance. In order to provide the cyclists with a safe buffer zone, many cities advocate the installation of five foot wide "climbing lanes" for routes with grades steeper than four percent and roadway segments at least 300 feet in length. On the downhill segments shared-lane markings are installed to encourage cyclists to share the traveling lane in order to move away from parked cars. Seattle has recommended the installation of climbing lanes on a number of street segments in the city (see Figure 10).

Issue #4. What is needed to encourage timid cyclists to hit the roads?

Cities can greatly reduce safety fears by producing better facilities and programs – off-street paths, better crossing treatments, traffic calming, narrowing travel lanes, facility maintenance request programs, and education programs.

Perceptions of safety will improve as Seattle enhances and extends its bike network. Streetscape and road projects should be designed and evaluated against system-wide transportation goals that include pedestrian and bicycle master plans. With this vision, over two dozen cities across the U.S. have adopted "Complete Streets" ordinances which establish new principles for road design. These policies ensure that all new projects are designed for all users, guarantee that designs include street and sidewalk lighting, pedestrian and bicycle safety improvements, accommodation of public transit facilities, and provision of street trees. Seattle passed a Complete Streets law in April of 2007.

Improve intersections for cyclists: By far the largest number of auto-bicycle accidents occur at intersections. Cities can improve both the real and perceived safety of crossing with relatively simple intersection treatments.

The inclusion of bicycle detection devises can improve cyclists' experience at an intersection, discouraging red light running, and decreasing delays to bicyclists as well as motorists. Well placed loop detectors with pavement markings are currently the most reliable technology for bicycle detection. While standard auto loop detectors might detect bicyclists, the sensitivity needs to be ad-

justed so that bicyclists are identified and the detection loops must be placed in a location where the bicyclist's movements can be registered. To avoid cyclist confusion it is recommended that cities adhere to federal and state standards for pavement markings (see Figure 11). The city of Tucson, Arizona has employed the use of HAWK signals. These signals are activated by a cyclist pressing a button to trigger flashing red lights. Buttons such as these must be positioned within easy reach of a cyclist who is still mounted on their bike.

Colored bike lanes are another technique to increase awareness of cyclist movements in intersections. Portland, Oregon uses solid blue painted lanes at eleven high-traffic intersections to make the lanes more visible to motorists. In Germany colored lanes are used throughout the city at key spots such as intersections and turn zones where cars need to cross a bike lane. In Belgium all bike lanes are differentiated from the main traffic with the use of color.

Politicians in Portland, OR are advocating an increase in bike box construction as a safety measure in the wake of several cyclist fatalities at intersections. A bike box is an intersection treatment that moves back the line at which cars are supposed to stop at a traffic light by about five feet, creating a space for cyclists to queue in front of cars. This arrangement decreases the turning conflict which occurs when cars turn right into the cyclist's path. Bike boxes are used extensively in Europe and Canada with limited application in U.S. cities such as Portland and New York City (see Figure 12).

Generally cyclists are comfortable cycling in mixed traffic while vehicle speeds are below 25 miles per hour and traffic volumes do not exceed 4,000 per day. For this reason, bike boulevards, low-traffic streets that have been optimized for use by cyclists, are ideal routes for timid cyclists. Bike boulevards use a variety of traffic calming elements and signage to achieve a safe riding environment. Examples of bike boulevards exist in a few cities, including Berkeley, California; Palo Alto, California; San Luis Obispo, California; Portland, Oregon; Eugene, Oregon; and Vancouver, British Columbia (see Figure 13, following page).

Cities can reduce the demand for expensive separated facilities by reducing vehicle speeds along

Figure 11 Bicycle Loop Detector

A cyclist in Portland, OR positions herself over a bicycle loop detector installed near the Steel Bridge.
Source: Nelson\Nygaard

Figure 12 Bike Boxes

Bike boxes allow cyclists to move to the front of the travel lane in order to be more visible to cars and avoid turning conflicts. Politicians in Portland are advocating an increase in bike box construction as a safety measure in the wake of several cyclist fatalities at intersections.
(Above Top) Portland bike box (Source: Nelson\Nygaard)
(Above Bottom) Vancouver, British Columbia bike box. (Source: Nelson\Nygaard).

Figure 13 Bicycle Boulevard Traffic Calming

Bicycle Boulevard in Berkeley, California uses both chicanes and speed bumps to slow local traffic.
Source: Payton Chung

Figure 14 Barcelona Bicing.

Barcelona Bicing program provides residents an easy alternative to getting around.
Source: Wikipedia user Marcbel

bicycle routes. Many European cities limit vehicle speeds to 12 to 20 miles per hour on residential streets. Further there are safety benefits of enforced speed reductions. In the city of Graz, Austria, the speed limit was lowered to 18 miles per hour and road casualties were reduced by 25%. When speed limits were lowered in the UK from 30 to 20 miles per hour, policy makers found child pedestrian and cyclist accidents dropped by two-thirds.

The City of Trondheim, Norway provides 125 public bicycles for locals and visitors to rent in the city center. While not designed specifically to navigate the city's hills, the service does encourage residents who may normally avoid cycling to try navigating the city as a cyclist without any investment in equipment of their own. The bikes are equipped with a front shopping rack, thus eliciting the nickname "the city's shopping trolleys." Users insert an electronic subscription card to unlock the bike and bikes can be returned to any one of the ten city-bike stands. Similar bike-rental programs have flourished in Europe, most notably Paris, Lyon, and Rennes, France, as well as Barcelona, Sevilla and Cordoba, Spain. Vienna and London offer residents and tourists bike stands as well. In the U.S., trials of similar programs are being planned in Washington, D.C. and San Francisco; Portland, Oregon is vying for its own (see Figure 14).

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Best Practices
Promoting Pedestrian Travel

What are the policies and programs that promote safe pedestrian travel?

Pedestrian travel accounts for the majority of trips made in Seattle's Center City. While drivers typically make one trip in a vehicle to arrive and one to leave, people may make multiple trips on foot throughout the day, for many types of trips including lunch, errands, and shopping. The City of Seattle recognizes the importance of pedestrian travel to reducing congestion, improving the environment and improving public health. Seattle's City Council and Mayor have named pedestrian safety a priority issue, recognizing that safety is an essential requirement for increased walking.

Although physical safety is necessary to support walking, safety alone is not sufficient to attract and engage pedestrians. Fortunately, the Seattle Center City's walking environment is already relatively safe. Additionally, the rich mix of land uses in the Center City, combining housing, office, retail, and daily services, provides a wide variety of destinations within easy walking distance of each other. For this area of Seattle, then, the potential for pedestrian improvements goes beyond safety to include opportunities for creating and sustaining high quality, appealing, and lively walking environments.

Issue #1. Why promote walking in the Center City?

Living and working in the city without owning or driving a vehicle is becoming an increasingly viable option that depends on a supportive walking environment. Ongoing Center City housing construction and a focus on mixed-use development to absorb employment and residential growth provide the density of people and destinations that support multiple modes. Car-sharing programs, new transit service, and enhanced bike routes all offer alternatives to driving alone. Importantly, making walking routes enjoyable above and beyond ensuring safety is crucial to the success of

Road Diets in Seattle

Source: Dan Burden.

During a repaving project in 2004, this section of 12th Avenue underwent a road diet. The formerly four-lane street was repainted as two travel lanes plus a center turn lane and new bike lanes in both directions. Street trees, bus shelters, and curb cuts were added where missing, boltstering the attractiveness, comfort, and accessibility of the walking environment. A new pedestrian overlay zone requires that new buildings be brought up to the sidewalk edge, creating a sense of human-scale enclosure and calling for transparent building facades to envilven the sidewalk, interest passers-by, and create "eyes on the street." This photo shows one such new mixed-use, multi-story building with retail on the first floor and housing above.

"There comes a time when people listen to their hearts and feet, getting back to the fundamentals leading to the basic qualities of health, vitality, security and life. All good towns - the towns people are in love with - are based on walkability. Everything else comes second. Everything."
—Dan Burden

these alternatives. In order for Seattle residents to choose non-SOV modes, walking must be comfortable and appealing, whether to and from transit stops, at car-share locations, or between final destinations.

Enhancing the Center City walking environment is not only key to a successful multi-modal transportation plan, but also spurs tourism and economic development by drawing greater volumes of foot traffic through commercial districts. Building high quality pedestrian spaces also bolsters social equity by expanding access to Center City amenities and making this cost-free mode of transportation more pleasant and attractive to people of all incomes and ages. Also, promoting walking supports public health objectives by encouraging daily moderate physical activity for City Center residents, employees, and visitors. In line with climate protection and air quality goals, walking can replace short driving trips, reduce vehicle cold starts that create the greatest amount of pollution, and connect riders to high-capacity transit for longer trips.

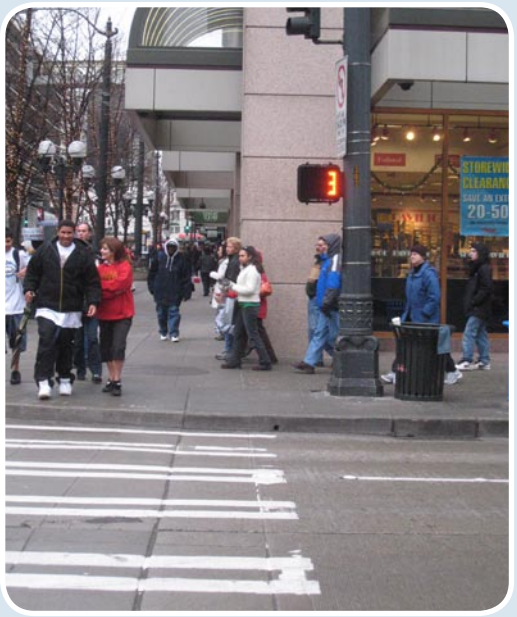
Issue #2. What elements in Seattle's Center City already support walking and pedestrian safety?

Vehicle speeds have the greatest impact on pedestrian safety. If a vehicle/pedestrian crash occurs, the risk of serious injury and death increases exponentially with speed. Street design - including lane width, lane number, and curb treatments - affect driving speeds more than posted limits. In the Center City, street design and operation and high vehicle volumes (including buses) help temper speed. Pedestrian safety elements widespread in the Center City, and especially in the downtown core, include:

- **Wide, well-maintained, and continuous sidewalks** that provide a complete network for travel by foot separated from vehicle traffic
- **Well-marked, signalized pedestrian crossings,** including new countdown timers at selected locations
- **Enforcement cameras** to monitor and discourage red light violations at targeted downtown intersections
- **On-street parking, planters, and street trees** that provide a buffer between the sidewalk and moving vehicles and naturally slow driving speeds (Figure 1).

Though the Center City offers a generally good pedestrian infrastructure, it is important to continually assess where spot improvements and maintenance are needed, and institute sidewalk repairs, crosswalk repainting, or additional crossing timers where warranted (Figure 2).

Figure 1



Well-marked crosswalks, countdown timers, and street trees promote pedestrian security.

Figure 2

Cracked, uneven sidewalks that collect puddles and run alongside fenced-off parking lots detract from pedestrian comfort, as well as safety.

Issue #3. What elements increase awareness of pedestrian-friendly zones?

Studies have shown that when pedestrians and drivers are aware of and attentive to each other's presence, the crash rate declines. Strategies that raise awareness of pedestrians and improve visibility for people driving and on foot may be considered for additional implementation in the Center City. These include:

- **Special or raised paving at crosswalks** assist in calming traffic and raise driver awareness that they are in a zone where pedestrians are expected to be crossing.
- **Pedestrian-only crossing phases** during signal cycles allow pedestrians to cross the intersection in any direction while all vehicles are stopped with a red light.
- **Leading pedestrian interval** gives pedestrians a few second head start to claim the right-of-way ahead of turning traffic.
- **Prohibiting right turns on red** prevents vehicles from turning into crossing pedestrians. Signal phases need to accommodate adequate time for through movement to reduce the urge to violate the no-turn-on-red (Figure 3).
- **Reducing intersection widths** improves visual contact between drivers and pedestrians and reduces crossing distances and the time needed to cross on foot.

"Curb bulbs" and "road diets" are two measures that affect crossing widths. "Curb bulbs" extend a section of the sidewalk into the road at an intersection. Curb bulbs are often placed at the end of an on-street parking lane. Pedestrians standing on the bulb can see and be seen by drivers before crossing. "Road diets" reduce the width or number of travel lanes, often by converting a 4-lane street into 2 travel lanes plus a center turn lane and bike lane (see sidebar: "Road Diets in Seattle," page 8B-1). This reduces crossing distances, vehicle speeds, and the number of travel lanes pedestrians must negotiate when crossing. Road diets may be more appropriate in more residential Center City neighborhoods, such as Capitol Hill and First Hill.

Over and above improving safety, each of these practices also conveys a message to both drivers and pedestrians that the Center City is intended to

Figure 3

A pedestrian-only phase in the signal at Pike Place Market allows pedestrians to cross in all directions while cars are stopped. Special brick pavement through the intersection provide a visual and tactile reminder of the crosswalk. Vehicles cannot turn right during a red light at this intersection, so pedestrians are free to cross with less threat of being hit by a turning car

Figure 4

Seattle's steep slopes make walking from west to east difficult. Escalators, elevators, and transit can assist with climbs.

Figure 5

A coffeeshop on the east-west pedestrian overpass from Colman Dock provides an amenity on an otherwise bleak walkway connecting the Ferry Terminal and waterfront to higher-elevation streets.
Source: N\N Archives

Figure 6

Building awnings are a welcome feature for pedestrians in rainy climates.
Source: N\N Archives

be visited on foot. Motorized traffic will be more aware and attentive to potential pedestrians, and people on foot feel more comfortable and invited to walk in an area offering multiple pedestrian-focused design elements.

Issue #4. How can the major pedestrian challenges in Seattle's Center City be addressed?

In addition to potential new programs and spot improvements and maintenance, certain broader issues affect specific routes, segments, and neighborhoods within the Center City.

East-west routes. East-west pedestrian routes provide crucial links between Center City activities, services, and residences. Most notably, steep slopes hinder easy walking from west to east from the waterfront, through downtown, and into Capitol Hill, First Hill, and Pike/Pine (Figure 4, previous page). Escalators and elevators are available inside many buildings in the downtown core, but their locations are not publicized, and access may be limited by security measures or outside of business hours. Aggressive strategies to build and promote escalators and elevators may be considered to help a wider range of residents and visitors navigate steep routes. Pedestrians may board buses to climb hills, free in the downtown "ride free zone." King County Metro publishes a "Downtown Seattle Accessible Map and Transit Guide" presenting wheelchair travel routes that avoid steps, offer elevators, or pass through buildings with lift assists and along streets with minimal slopes. Public information opportunities such as this map will help improve resident and visitor awareness of the most comfortable routes.

Waterfront connections. Many east-west routes connecting the waterfront to the rest of the Center City are poorly lit, unclearly marked, or appear to be unsafe. Intersection improvements, widened sidewalks, activating adjacent land uses, and attractive landscaping will help support walking on the waterfront routes. If pedestrian flow is distributed rather than concentrated at a few key points, such as the pedestrian overpass from Colman Dock, the web of pedestrian routes through the Center City will be more efficient (Figure 5).

Climate. Seattle's frequent rain means that people on foot often face cold, wet, and windy condi-

tions. Overhangs, awnings, and bus shelters can be encouraged or required through design guidelines and provide comfort and dignity to walking or waiting for transit (Figure 6). Such shelters from precipitation also offer shade during hot, sunny days. Spot improvements to sidewalk depressions and drainage issues will be helpful to remove puddles collecting in the walkway and at crosswalks.

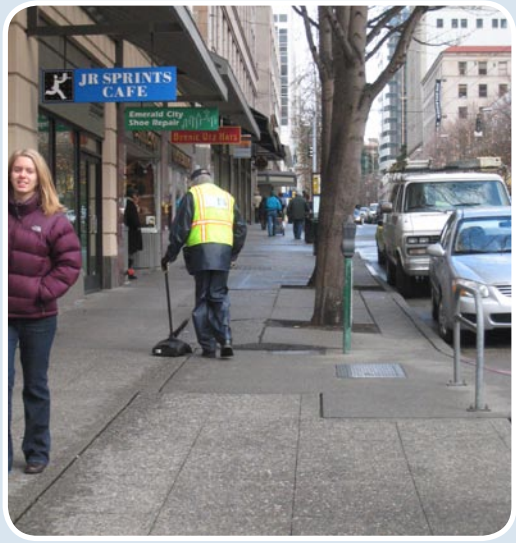
Highways and highway ramps. Although the Center City is proximate to many residential neighborhoods, natural and man-made barriers can prevent walking to reach the Center. Within the Center City, I-5 is a major mental and physical barrier to walking between the downtown core and the Capitol Hill, First Hill, and Pike/Pine neighborhoods to the east. In general, motorized vehicle speeds and volumes are the main danger and deterrent to walking behavior, as is the case where high-speed highway traffic enters the city street grid. Pedestrian crossings can be improved and emphasized at these ramps and existing I-5 crossings with signage, attention to enhanced crosswalk markings, emphasized lighting, and other elements that call out the presence of people on foot. Planters on I-5 crossings add pleasant greenery, separation from vehicle traffic, and a sense of human scale to sidewalks across this highway (Figure 7).

Personal security. In some areas of the Center City, loitering strangers, visually obscured spaces, and dark conditions may contribute to real and perceived insecurity that deters walking. The term "defensible space" describes designs that deter crime and increase security in public spaces. Such open designs provide visibility across an area and escape routes in case of threat. Land uses that are active 24-hours a day provide "eyes on the street", with unofficial visual surveillance from constant passers-by helping to improve security. Additional personal safety measures include providing appropriate lighting and making walls and barriers translucent and permeable to reduce hiding places and allow surveillance. Further, studies of the "broken window syndrome" have found that the presence of "quality of life" issues, such as litter, graffiti, and dilapidated buildings, can lead to the perception that no one is monitoring or caring for a place, which in turn may lead to increased insecurity and even crime. Seattle's Metropolitan

Figure 7

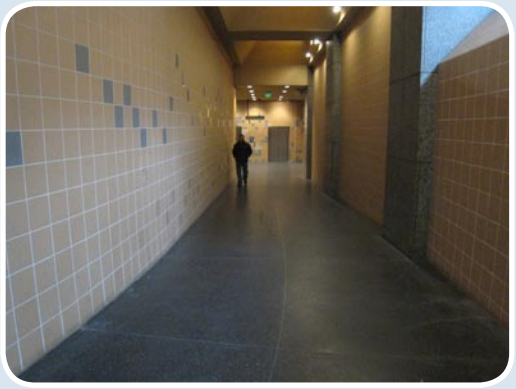
Crossings over I-5 need extra attention to make pedestrians visible to and comfortably separated from traffic.

Figure 8



The MID Ambassadors clean up litter, graffiti, and other signs of disorder to make downtown feel taken care of and secure for walking trips.

Figure 9



Long, opaque underground Transit Tunnel entrances may feel foreboding and closed off from surveillance and lacking possible means of escape if visitors feel uncomfortable.
Source: N\N Archives

Figure 10

Street trees, awnings, and a wide sidewalk create a pedestrian space scaled to the height of people on foot and in proportion to building bulk and street width. Transparent windows and first-floor building articulation break up imposing buildings into human-scale, inviting pedestrian streetscapes.
Source: N\N Archives

Improvement District ambassadors regularly keep downtown streets clean and offer directions, assistance, and an extra security presence for visitors (Figure 8).

In communities across the country, law enforcement, planners, and community members have partnered to implement Crime Prevention Through Environmental Design (CPTED) principles. CPTED approaches include creating natural surveillance, activating areas, and defining entrances and preferred uses of space. Such efforts work best when applied in combination. In Seattle's Center City, attention may be especially needed in potentially foreboding and closed-off areas, such as access hallways to transit, alleyways, stairwells, and parking lots (Figure 9).

Construction zones. Construction in the Center City disrupts sidewalks and intersections and brings large, heavy vehicles across sidewalks. Sufficient warning signage and convenient detour routes should be put in place for pedestrians, including covered, well-lit, temporary sidewalks where necessary. Contractor education may help minimize construction impacts on pedestrian mobility.

Issue #5. What built elements improve the quality of the pedestrian experience?

Beyond issues of accommodation, elements that create additional comfort, aesthetics, and amenities contribute to a pleasant pedestrian experience. If the pedestrian environment is unpleasant, people will tend to avoid walking. This can lead to the weakening of neighborhood shopping districts, the loss of locally-owned businesses, and increased traffic burdens. Poor pedestrian experience can also lead to increased transit ridership to travel short distances that people would otherwise walk, removing healthful physical activity from daily routines.

Seattle has established itself as one of the top cities in the U.S. for attracting the "creative class"—smart innovators who are attracted to a dynamic built environment. The Center City can build on its existing success and create lively zones by following best practices and Seattle Pedestrian Advisory Board recommendations for elements that promote healthy, dynamic, and enjoyable walking environments.

- **Active sidewalks and transparent buildings.**

Buildings and streetscapes that activate the environment, such as sidewalk cafes and parks, build community and stimulate the desire to walk to reach destinations. Transparent building facades with windows at street level create interest and also open up the pedestrian realm, so people are not forced to walk beside an imposing blank wall. Top pedestrian attractive land uses include pubs, grocery stores, and parks.

- **Human-scale sidewalks.** Sidewalk widths should be proportional to the height of buildings and roadway size. Where multi-story buildings and multi-lane roads are present, sidewalks must be wider in order to counteract the bulk of the buildings and create a pedestrian realm in proportion to the scale of the automobile travel lanes. First story building articulations between storefronts, tree canopies, and awnings and overhangs create a human-scale space for walking (Figure 10, previous page).
- **Visual interest and diversity.** Diverse environments attract people on foot. This includes diversity in land use and shop types, architecture styles, landscape designs, and people.
- **Attractive and distinctive sidewalk treatments.** Unique sidewalk surfaces are placemaking elements that add interest to the walking environment. Defined connections between buildings and the adjacent sidewalk direct foot traffic to entrances and extend the pedestrian realm from the sidewalk to the building.
- **Urban nature.** A tree canopy that provides shade and shelter and defines an "outdoor hallway" also helps achieve balance between pavement and planted areas. Grass strips, planters, and visible use of rainwater as a resource further reintegrate ecological functions into the urban realm and draw visitors.
- **Pedestrian furnishings such as seating and weather protection, water fountains and trash receptacles, and street trees and other green elements invite foot traffic.** These amenities create usable places for people to rest, to reflect, to have a sense of refuge, to meet and greet, and to see and be seen (Figure 12).
- **Wayfinding.** Street signs, maps, and unique area treatments such as historical displays and public art help pedestrians orient themselves and create interest and comfort. Streetscapes that are inherently easy to navigate invite travel by foot and make driver and pedestrian be-

Figure 11

Colorful pavement patterns create a gateway from the building entrance to the outside pedestrian realm.
Source: N\N Archives

Figure 12

Seating, plants, and active street-level windows are attractive to people on foot.
Source: N\N Archives

havior more predictable and thus, safer (Figure 13, following page).

- **Minimal auto-centric land uses and cuts across sidewalks.** Car-centric land uses, such as parking lots and garage entrances, introduce hazards and psychological barriers to people on foot. Driveways across the sidewalk should be minimized whenever possible. Vehicle driveways should not interrupt the sidewalk's grade and should be made of sidewalk material so it is clear to drivers that they are crossing a pedestrian zone. Entrances designed to require cars to make right angle turns help force traffic to slow down before entering. Where garage exits are present, visual contact and awareness between pedestrians and drivers should be supported through mirrors, pavement treatments, and noise signals.
- **Defined shortcuts and convenient crossings increase pedestrian route options and decrease walking distances.** The clean, decorated alleyway in Figure 14 is activated by adjacent land uses to create an inviting pedestrian zone. The signalized mid-block crossing in Figure 15 provides a shortcut in the middle of a long block.

Figure 13

Street names inlaid in the sidewalk and area maps in the downtown core create a sense of place and a wayfinding aid.

Figure 14

Figure 15

Issue #6. What items support a comfortable and safe walking environment for people of all ages and abilities?

"Universal design" concepts seek to ensure that the transportation network serves people of all abilities, ages, and demographics. Whether a pedestrian is an adult or a child, using a wheelchair or pushing a stroller, or traveling during times of low visibility, streets that work for children, the elderly, and people with special mobility needs serve everyone better. Americans with Disabilities Act (ADA) guidelines and requirements direct appropriate sidewalk and curb cut design and guide ramp placement at curbs and building entrances. Limiting curb cuts, leveling grades, and reducing cross-slopes makes sidewalks safer and more comfortable for all walkway users. Removing obstacles from the sidewalk, including litter, utility poles, or trash cans, creates a clear path of travel for everyone. This also includes regular monitoring and maintenance of cracks and warps. Adopting a more aggressive approach to undergrounding of utilities clears pathways and improves the aesthetic quality of streetscapes. As mentioned in regard to the steep slopes in Seattle, special attention should be made to provide publicly accessible lift-assist infrastructure. Ensuring the visibility and consistent placement of signage makes wayfinding systems more navigable and helpful for all people on foot and even drivers. Pedestrians of all abilities need adequate green lengths during signal cycles to allow time to cross. Importantly, when unique paving materials or raised crosswalks are used to provide a visual and tactile signal of the pedestrian environment, care must be given to ensure that any pavement treatments do not hinder movement for those using wheelchairs or canes. Attention to universal design principles throughout the Center City will promote and support pedestrian travel for all segments of the population.

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Photo Sources:

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