SECTION 2: CURRENT CONDITIONS

GENERAL

Figure 4 This bridge over I-405 at NE 100th Street helps tie neighborhoods together

From the perspective of a cyclist or walker, Kirkland is a relatively easy place in which to travel. Although Interstate 405 forms a barrier to mobility as it cuts the City from north to south, there are three bridges spanning I-405 that are exclusively for cyclists and walkers. At the other six street crossings, walkers and cyclists are adjacent to relatively high volume, high speed general purpose traffic (Map 2). The Eastside Rail Corridor also bisects the City from north to south but holds the potential of being an outstanding off-road trail for bicycling and walking uses. With the exception of I-405 and a handful of other multilane arterials, Kirkland's transportation system consists of two and three-lane streets with speed limits of 35 MPH or less. Kirkland's hills (Map 3) provide a challenge to walkers and cyclists. Facilities for disabled pedestrians are increasing in number but many places need improvements in order to comply with current standards remain.

Because there are only a few multilane high speed arterials, bicycling is relatively easy and pleasant on the vast majority of Kirkland's streets. However, there are still some key links that only heartiest of cyclists use.

The shore of Lake Washington, downtown Kirkland, and the former highway bridge across Juanita Bay are all examples of wonderful places to walk in Kirkland. Most local streets are welcoming to pedestrians, but there are still a number of locations where traffic volumes and or speeds are moderate to high and where sidewalk is missing, narrow or uncomfortably close to traffic. Sometimes crossing streets is difficult because of rude drivers or because of the need for better lighting or other measures.

PEDESTRIANS

CROSSWALKS

Figure 5 Countdown signal heads show the time remaining to safely cross the street

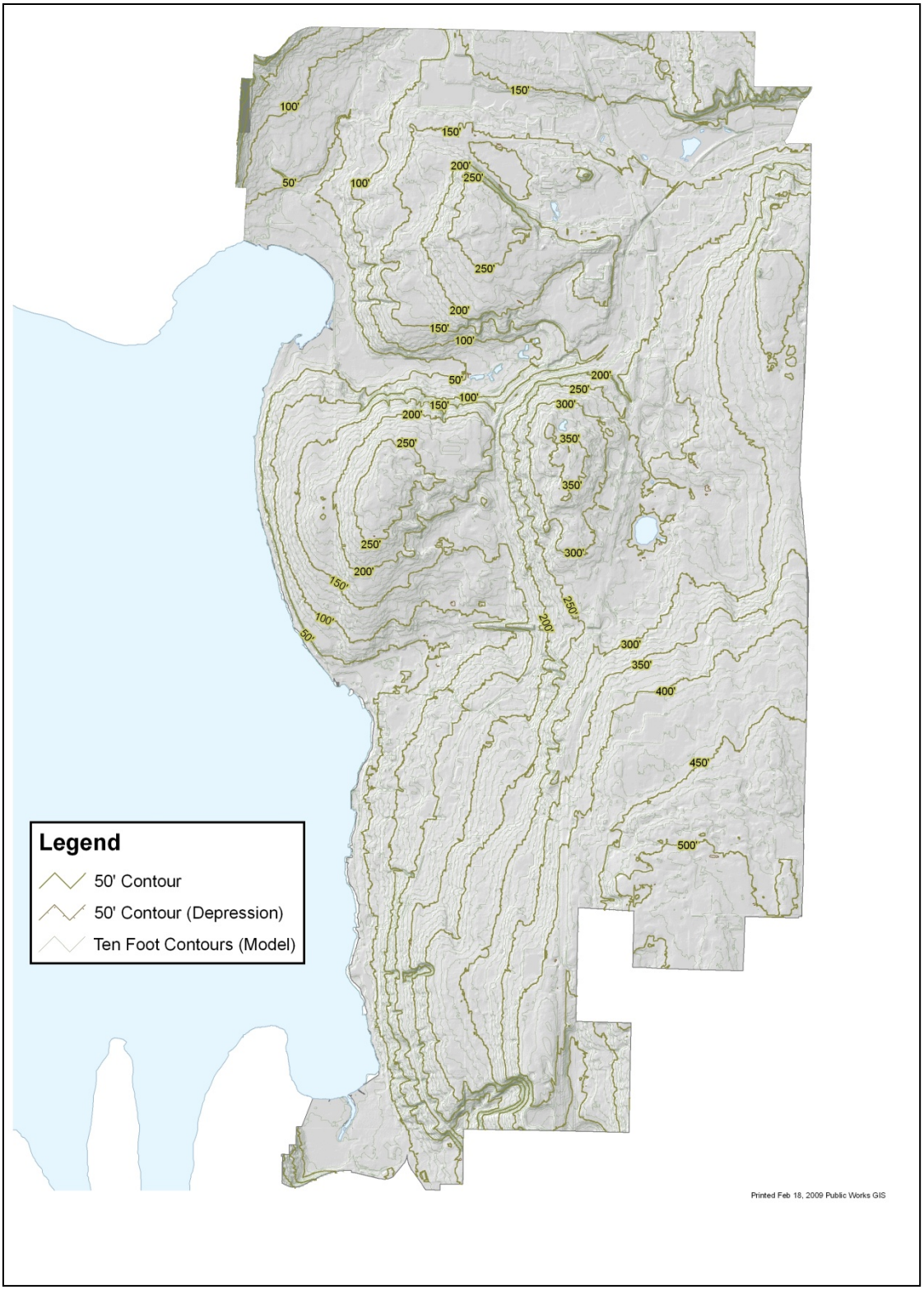
Traffic Signals

All traffic signals in the City of Kirkland have crosswalks and pedestrian signals. Countdown pedestrian signal heads are replacing standard heads and are being installed on new projects. Pushbuttons that give visual and audible feedback are replacing those that do not.

Pedestrian signals that make an audible tone during the "walk" phase are installed at about 10% of traffic signals. City of Kirkland policy is to install such signals wherever they are requested. Historically these have been requested by people with serious vision impairment. "Walk" and "Don't walk" intervals are being changed to meet new standards that call for longer flashing "Don't walk" intervals. These changes are a result of new data on walking speeds of pedestrians that show speeds assumed in the past were too high.

Map 2 Annual daily traffic volumes 2005

Map 3 Kirkland's topography provides a challenge to cyclists and pedestrians.



In-Pavement lights

In-pavement flashing lights were first installed in the City of Kirkland at two crosswalks in 1995. Because of their popularity and effectiveness, the number of installations has grown to 30 locations (see Map 4). Unfortunately, maintaining in-pavement lights has proven to be difficult (see page 47). With proper installation, newer model in-pavement lights are reasonably durable.

Pedestrian Flags

Pedestrian flags are now used in large and small cities across the country but they started in Kirkland in 1997. This program was suggested to City staff by a citizen who had seen a similar program in Japan. Like in-pavement lights, the number of pedestrian flag locations has grown from only a few locations to over 70 (see Map 4). In the downtown area, City staff maintains the flags. In other areas of the city, flag locations are maintained by volunteers. City staff ensure that the volunteers have the necessary flags and the volunteers then make sure that the holders are filled with flags. Recent research[4] shows that pedestrian flags are an effective at increasing pedestrian safety at crosswalks, especially when considered in the context of other possible treatments.

In 2007, work began to examine and redesign Kirkland's pedestrian flag program. Funded by a grant from the WSDOT, the aim of the work was to increase usage of pedestrian flags . A 67% increase was seen in flag usage as a result of the changes.

Advance stop bars at crosswalks

Usually, stop bars (pavement markings that indicate where drivers should stop as they approach an intersection or crosswalk) have been placed about 4' before crosswalks. Advance stop bars are placed about 40' before crosswalks. Advanced stop bars are placed at uncontrolled crosswalks on multi-lane streets. By encouraging motorists to stop farther from the crosswalk, sight

Take it to Make it

These examples illustrate how the pedestrian flag program has been changed to overcome barriers to usage.

Barrier: **Flags not available;** existing holder is only capable of holding 8 flags. Strategy: **Redesign holder;** use bucket style holders which hold up to 20 flags.

Barrier: **Pedestrians feel safe without flags.** Strategy: **Place messaging on bucket**, develop **slogan** which conveys need to use flags.

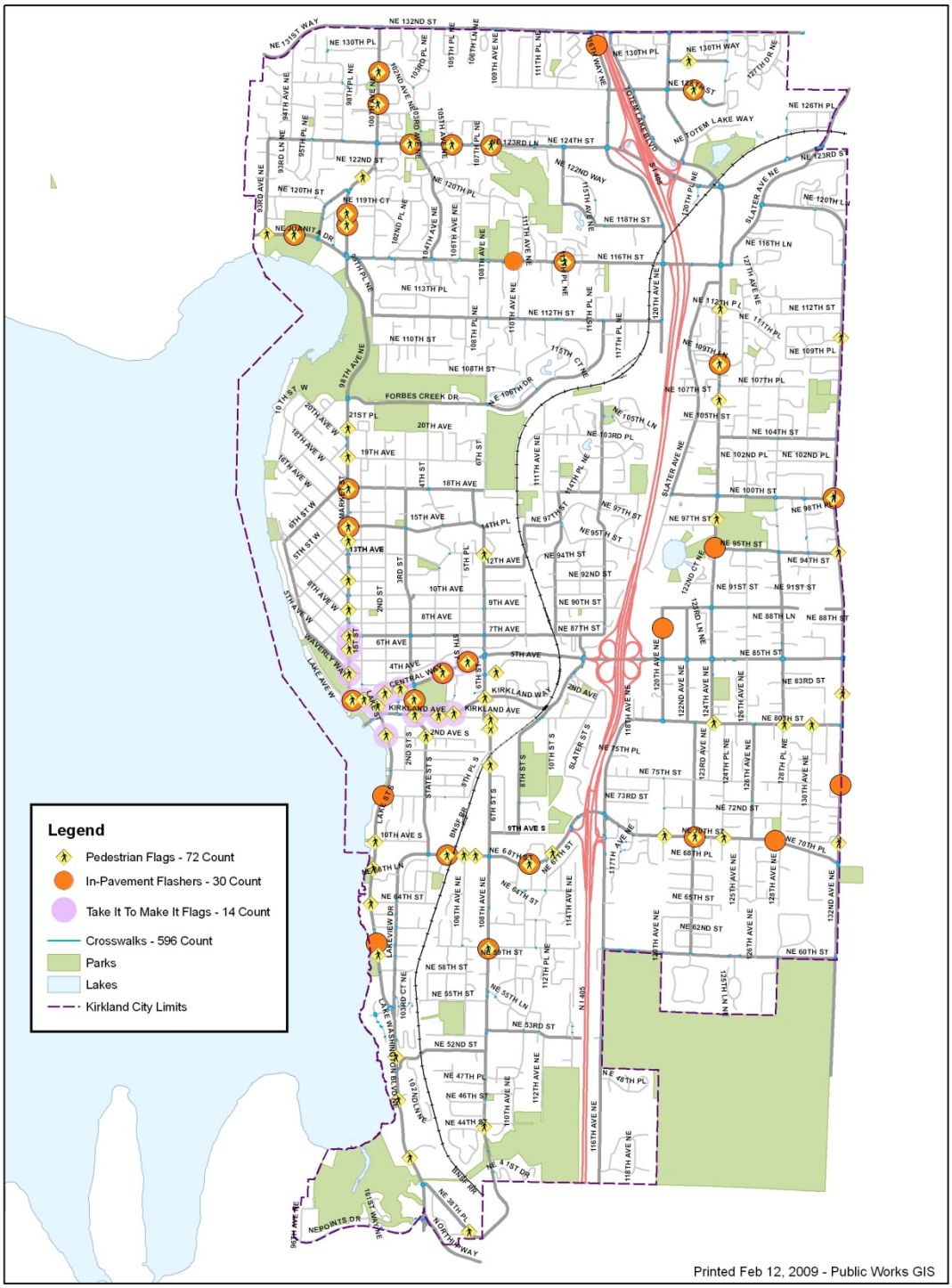
Take It to Make It

Barrier: **Pedestrians don't know what flags are for.**
Strategy: **Redesign flag** from orange to yellow to make use clear and to match standard warning sign.

Barrier: **Flags are not a norm**; people feel odd using them.
Strategy: Promote use by **partnering with merchants** and **other means** such as distributing coasters to bars and restaurants.

[4] TCRP report 112/NCHRP report 562 Improving Pedestrian Safety at Unsignalized Crossings, Transportation Research Board, 2006.

Map 4 Locations of pedestrians flags and locations of in-pavement lights



distance for vehicles in adjacent lanes is increased, reducing the chance of a double threat crash. Double threat crashes occur when one lane of traffic stops for a pedestrian, the pedestrian begins to cross the street but traffic in the other lane, unseen by the pedestrian, does not yield. In 2003, the City of Kirkland received a grant from the Washington Traffic Safety Commission to study the effectiveness of advance stop bars at uncontrolled crosswalks. Four locations were studied; a "test" pedestrian crossed the street and the number of vehicles failing to yield was measured both before and after advance stop bars were installed. The number of motorists failing to yield was reduced by about 20% with the bars and accompanying signs.

LIGHTING EVALUATION

Adequate lighting is a critical part of providing a safe crossing for pedestrians. In 2007, a review of lighting at each uncontrolled crosswalk on Kirkland's arterial streets was undertaken. A transportation consulting firm was hired to evaluate each crosswalk during hours of darkness and evaluate the adequacy of lighting on a 1-10 scale for each approach using the criteria in Table 1.

Table 1 Evaluation criteria for 2007 lighting survey

Ranking	Description
10	Good lighting uniformity and visibility of pedestrians off roadway, Good geometrics, Clear pedestrian and roadway channelization, No blocking foliage/buildings/ fences/cars/walls
9	
8	Above average lighting conditions, Buildings or vegetation present but does not create a blockage of pedestrians
7	
6	Average lighting conditions, Some blockage from vegetation/parking, Average roadway lighting illumination/uniformity
5	
4	Some missing channelization and signing, Lacking sidewalk continuity, Lighting illuminance/uniformity could use some improvement
3	
2	Inability to see pedestrians, Excessive glare or absence of light, Vegetation/parked vehicles blocking view of pedestrians and/or signage
1	

Of 92 crosswalks evaluated, the consultant recommended that crosswalks ranked at 3 and below be given highest priority for improvement. There are 24 crosswalks that have at least one approach rated 3 or below. At the other end of the spectrum, 13 crosswalks have both ratings at 8 or above.

Staff examined the poorest rated crosswalks and made immediate improvements such as trimming trees and other obstacles that blocked light from the crosswalk. At other locations it was relatively easy to install additional lighting. There was no easy remedy at some locations and those have become candidates for funding through the Capital Improvement Program and pedestrian safety grants and form the basis for Objective G5.3

SAFETY EVALUATION OF UNCONTROLLED CROSSWALKS

In 2003, the Transportation Commission oversaw an evaluation of uncontrolled crosswalks in Kirkland. A ranking system was used to give each crosswalk a ranking based on the volume, speed of traffic and the number of lanes to be crossed. This ranking system was developed for the Federal Highway Administration[5] and divides crosswalks into three categories:

[5] Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Federal Highway Administration, FHWA HRT-04-100.

N = A marked crosswalk alone is not adequate for the location
P = A marked crosswalk alone is possibly an adequate treatment
C = The crosswalk is a candidate for a marked crosswalk alone.

Over 120 crosswalks in Kirkland were evaluated. The Commission gave special attention to those crosswalks that had an "N" ranking along with those that had more than three crashes in the past 10 years and at least one crash in the past five years.

WALKWAYS

The maps and other information about walkways in this Plan are based on a 2004 inventory. This information is reported by street segment. Segments are pieces of street between two intersecting streets.

Most existing walkways are 5' wide concrete sidewalk. In areas so designated in the Comprehensive Plan or Zoning Code, sidewalks are wider and in a few places they are more narrow. There are also sections of asphalt path that are separate from the roadway and a small amount of gravel pathways.

The charts and tables in the following pages indicate the extent to which Kirkland's walkway network is complete. Information is broken down by both the two general categories–those with complete walkway on at least one side of a segment and those with neither side complete—and by six detailed categories of completion. Additionally, the information is sorted by street functional classification. Functional classification is important because it is a good predictor of auto volume. Although principal arterials make up a small fraction of the miles of streets, they carry most of the auto volume. Local streets make up more than half of the street miles but they each carry relatively little auto volume. The other street classifications fall somewhere in between these two extremes. Pedestrians need sidewalks most on higher volume streets. Functional classifications are shown in Map 5.

Street Functional Classification

There are four functional classes:

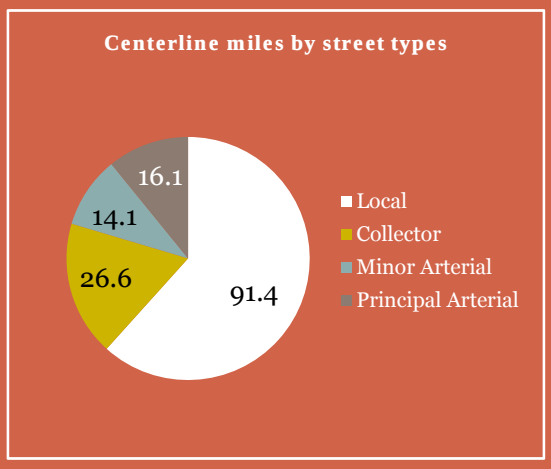
- principal arterial
- minor arterial
- collector
- local streets

Principal arterials connect to regional locations. NE 116th Street is an example of a principal arterial.

Minor arterials provide connections between principal arterials and serve as key circulation routes. 108th Avenue NE is an example of a minor arterial.

Collectors distribute traffic from arterials to local streets. NE 80th Street is a collector street

Local access streets give access to individual properties and connect to collectors.



As noted in Table 2, about 60% of streets in Kirkland have walkways on at least one side. All new development projects, including single family homes, must construct sidewalks where it is

Table 2 Miles of walkway by functional classification and type of completion

General condition	Specific condition: presence by side of street	Local Street		Collector		Minor Arterial		Principal arterial		TOTAL	
		Miles	%	Miles	%	Miles	%	Miles	%	Miles	%
Walkway not complete either side	no walkway	31.7	34.7	3.1	11.5	1.0	6.8	0.9	5.5	36.7	24.7
	some/none	12.2	13.4	2.2	8.3	0.8	5.9	0.4	2.2	15.6	10.5
	some/some	6.8	7.5	2.2	8.4	0.6	4.1	0.7	4.5	10.4	7.0
	Sub total No side complete	**50.8**	**55.6**	**7.5**	**28.2**	**2.4**	**16.8**	**2.0**	**12.2**	**62.6**	**42.2**
Walkway complete on one or both sides	complete/none	15.1	16.5	6.9	26.0	1.5	10.8	1.9	11.5	25.4	17.1
	complete/some	7.0	7.7	5.8	21.7	1.8	12.9	0.8	4.9	15.4	10.4
	complete/complete	18.5	20.3	6.4	24.1	8.4	59.5	11.7	71.4	45.0	30.3
	Sub total one side complete	**40.6**	**44.4**	**19.1**	**71.8**	**11.7**	**83.2**	**14.4**	**87.8**	**85.8**	**57.8**
TOTAL		**91.4**	**100**	**26.6**	**100**	**14.1**	**100**	**16.4**	**100**	**148.4**	148.4

missing along the public street frontage of their property. The major exception is for dead-end streets of less than 300 feet in length. Sidewalks are not required on these short cul-de-sacs.

Because of their maintenance costs, gravel paths are usually interim treatments. In some other areas, pedestrians share wide paved shoulders with cyclists. The former highway bridge at Juanita Bay is the city's longest section of formal shared use facility.

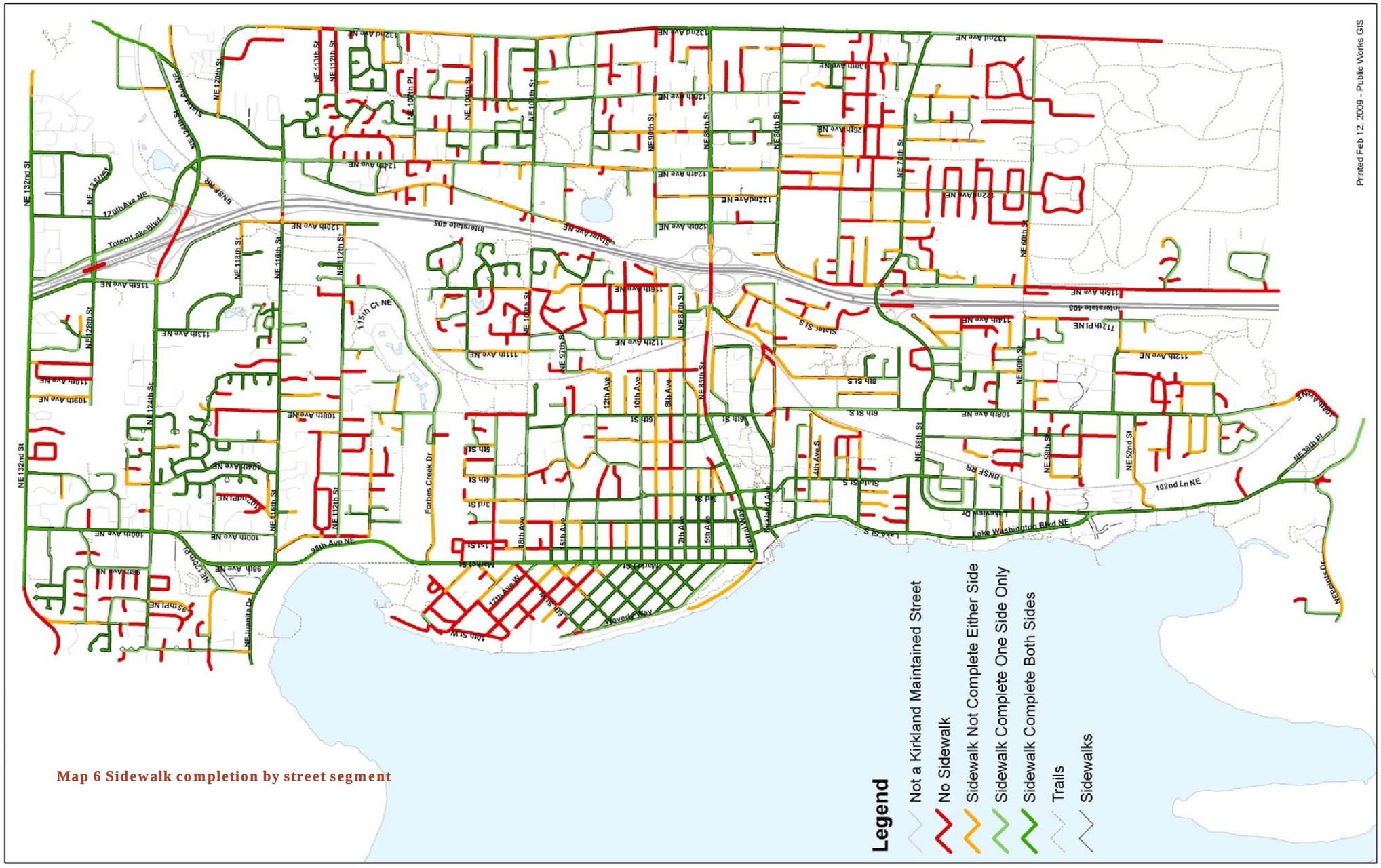
There are six different categories of walkway completion. They are listed below from most complete to least complete:

1. Walkways are complete on both sides of a segment.
2. Walkways are complete on one side of a segment and the other side has some walkway present but it is not complete.
3. Walkways are complete on one side, but there is no walkway on the other side of the segment.

Street Segments

Street segments used in the analysis of sidewalk completion are pieces of street between intersections. Examples of street segments in a portion of the Norkirk neighborhood are shown in brackets on the map below. There are about 2000 segments in Kirkland.

Map 5 Street functional classification



Map 6 Sidewalk completion by street segment

4. There is some walkway on both sides of a segment, but neither side is complete.
5. There is some walkway on one side of a segment, but no walkway on the other.
6. There is no walkway on either side of the segment.

These six categories can be collapsed into two general categories:

- Walkways are complete at least on one side.
- Walkways are not complete on either side.

In this analysis, even when adjacent segments have sidewalk complete on one side, it doesn't mean that sidewalks are continuous along the two adjacent segments. For example, it could be that the sidewalks are complete on the north side of the first segment and the south side of the adjoining segment. Both segments would be reported as "sidewalk complete on one side" but a walker would have to cross the street to use both pieces of sidewalk. This is rarely the case however. On most streets, sidewalks are completed along one side. Map 6 shows sidewalk presence and indicates several categories of sidewalk completion.

Table 3 provides an estimate of the sidewalk remaining to be completed by street type, and a cost estimate based on a typical 2008 construction cost of $300/lin. ft. for sidewalk. Sidewalk construction costs can vary depending on the physical conditions of the location such as slopes and whether or not drainage is required. In addition to the construction cost, the cost of design and an 10% contingency is also included. The purpose of these estimates is to give a planning level range of the cost of completing various portions of the network. When actual projects are being considered for construction a much more detailed analysis will be completed.

Completion of additional sidewalks is covered under goal G3. Objective G3.1 calls for completion of walkway on both sides of all segments on principal and minor arterials.

Goal G6 describes completion of an ADA Transition Plan (see page 101). Meeting this goal will require analysis and inventory of existing facilities and a plan to make all areas accessible and compliant with the ADA.

Figure 6 Miles of walkway needed to complete network, by street type

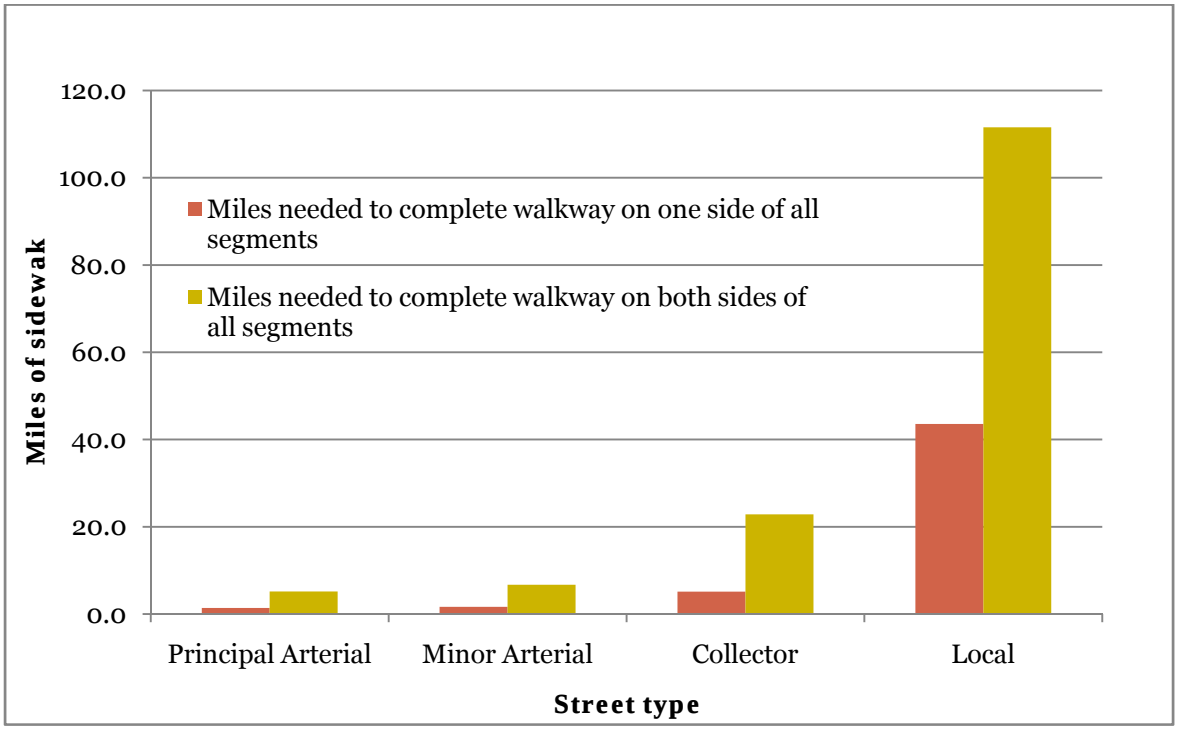


Table 3 Miles of sidewalk needed to complete sidewalk network and associated costs

Street type	Needed to complete one side of all segments		Needed to complete both sides of all segments	
	Length (mi)	Cost ($M)	Length (mi)	Cost ($M)
Principal Arterial	1.4	3.2	5.2	11.9
Minor Arterial	1.7	3.8	6.7	15.4
Collector	5.1	11.8	22.8	52.2
Local	43.6	100.1	111.5	256.2
Total	**51.7**	**118.9**	**146.3**	**335.9**

Cost estimate based on typical 2008 cost of $300/lin. ft for construction plus 35% of construction cost for project design plus 10% of construction cost as contingency. Estimate only, actual costs will vary.

Figure 7 Walkway completion by type of roadway

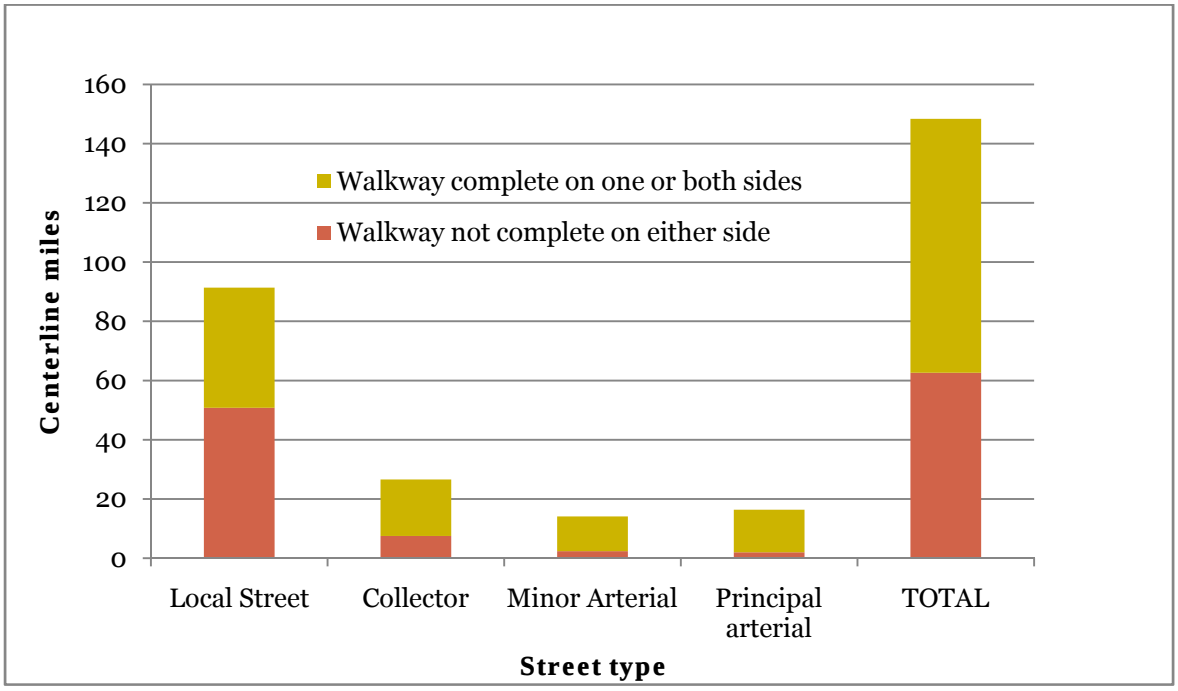


Figure 8 Detailed walkway completion by centerline miles of street type

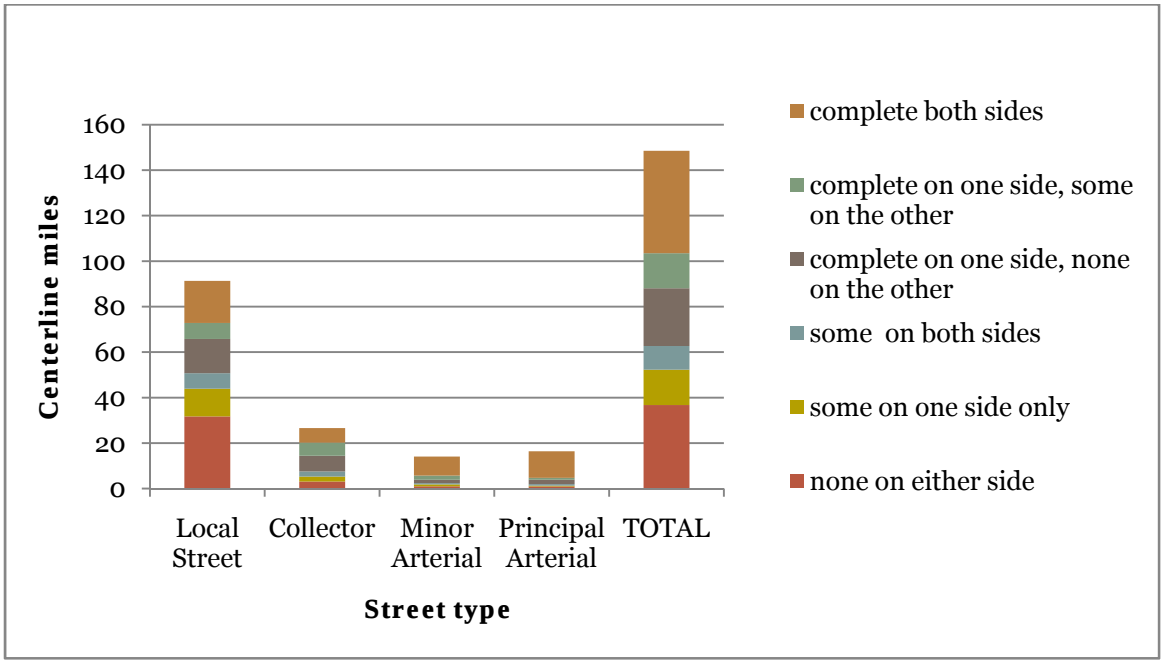
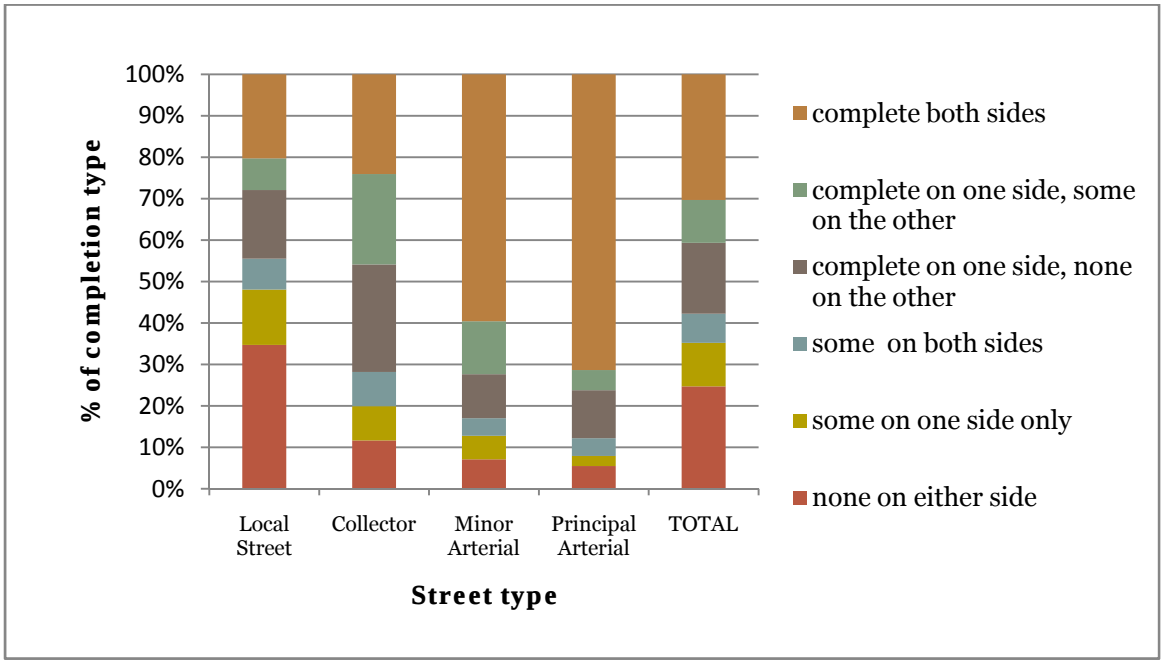


Figure 9 Walkway completion as a percentage of street classification



BARRIERS

Figure 10 Railroad bridge at Kirkland Way. This low and narrow bridge is difficult for cyclists, walkers and tall vehicles.

I-405 presents a major barrier to walkers, but it is a lesser barrier than it once was. The cloverleaf interchange at NE 85th Street, built in the 1960's has no accommodations for pedestrians. The rebuilt interchange at NE 116th Street, the first phase of which was built in 2006, and which is planned for completion in 2010, will incorporate generous facilities for allowing walkers to safely cross under I-405. Modern design for pedestrian facilities are also illustrated in the direct access ramp at 128th Street. The three pedestrian bridges across I-405 corridor also help to mitigate the barrier that I-405 presents to pedestrian travel. A large concrete bridge carries the Eastside Rail Corridor over Kirkland Way near Railroad Avenue. This structure was built in the early 20th century and is a barrier to easy passage for walkers and cyclists because of its narrow portal. The structure also limits sight distance somewhat from nearby intersections. Although steps are being taken to remove them, there are many features around Kirkland that are barriers to those who have difficulty walking. The ADA Transition Plan identified in Goal G6 (see page 101) addresses these barriers.

CYCLING

INTERSECTIONS

Often, bicycle lanes end as they approach signalized intersections. This is usually because extra auto lanes are present at the signal and roadway space is not allocated to bicycles. There are some locations where restriping could eliminate or minimize these discontinuities across intersections. On the other hand, some experts believe that striping bicycle lanes through intersections, causing cyclists to pass on the right of cars, make cyclists susceptible to "right hook" crashes where right turning cars strike cyclists in bicycle lanes.

Cyclists feel that it is difficult to activate traffic signals. Most traffic signals in Kirkland use inductive loops buried in the pavement to detect vehicles and bicycles. When the traffic signal senses the presence of a vehicle, it responds with the appropriate signal display. The problem comes when cyclists don't know where to stop in order to be sensed by the signal. The City of Kirkland does not currently mark loops so that cyclists know where to stop at traffic signals. This topic is addressed more fully on Page 104.

Detection at traffic signals

Most of the signals in Kirkland use loops of wire buried in the pavement to detect the presence of vehicles. An electrical current is passed through the wire creating a circuit. When a vehicle passes over the wire, the properties of the circuit are changed, that change is detected by the traffic signal controller and the signal indications are changed.

The most sensitive parts of the loops are at their edges, and when loops are visible, it's fairly easy to position a bicycle in a way that activates the signal. Unfortunately, most cyclists aren't aware of this and even if they are, sometimes loops are under the top layer of pavement and can't be seen.

Another type of detection involves video cameras. They detect vehicles based on changes in pixels of a video image of the lanes approaching the signal. The City of Kirkland has a handful of intersections that use video detection.

Video detection is considered easier for cyclists, but during times of darkness it can also be problematic.

ON-STREET BIKE LANES

As shown in Map 8, current on street bicycle facilities in the City of Kirkland provide reasonable coverage on the main north-south corridors with fewer complete east-west corridors. Almost all bike lanes are at least 5' in width. Most miles of any city's street inventory are local streets with low car volumes traveling at relatively low speeds and therefore do not need bicycle lanes. This is true of Kirkland as well. A proposed bicycle network and improvements are discussed in Section 6.

Pavement condition is important to cyclists for both safety and comfort. Pavement Condition Index (PCI) is measured on a scale between 1 and 100 called PCI. Kirkland's current overall PCI is 65. Arterials are 55, with collectors at 69. Due to differences in measuring, it is difficult to directly compare Kirkland's pavement condition index with that of other nearby cities, but qualitatively speaking, they are similar.

SIGNING AND WAYFINDING

Although some signs exist, Kirkland does not have a standard application of bike lane signs. Proposed changes to the standards for highway and street signing eliminate requirements for signs that indicate the presence of on street bike lanes. Kirkland does not currently have bicycle-specific wayfinding (directional) signs. Like most of the communities on the Lake Washington Loop route, Kirkland has not signed this regional bike route.

BARRIERS

A major regional barrier to bicycle travel is the prohibition of bicycles on the floating bridge portion of State Route 520. Construction of such facilities has always been a part of the bridge replacement program, but replacement is not scheduled until at least 2016.

The discussion of I-405 as a barrier to pedestrian travel on Page 30 is also applicable to bicycle travel. Newer facilities; NE 128th Street, NE 116th Street (when completed), and NE 100th Street all have good bicycling facilities while the older interchanges at NE 70th Street, NE 85th Street and NE 124th Street have poor or no facilities for cyclists. This is a function of the standards that were in use when the facilities were constructed. As borne out by the survey of cyclists, the most difficult streets to bike on Kirkland are Central Way between 6th Street and 132nd Avenue NE, NE 124th Street between 100th Avenue NE and 132nd Avenue NE and, to a lesser degree, 100th Avenue between NE 116th Street and NE 132nd Street. The last of these was noted on the Cascade Bicycle Club's *Left by the Side of the Road*[6] project as a key regional missing link because of the connections it makes to other regional facilities.

PARKING

Section 105.32 of the Kirkland Zoning Code requires all new development except single family and duplex developments with six or more parking stalls to have bicycle parking. Bicycle parking must be in a well lit, visible, sheltered area within 50 feet of the building entrances. One bicycle parking stall shall be provided for each 12 automobile parking stalls, but this can be modified based on the nature of the project. Kirkland does not currently have standards for the design of racks. Objective 8.2 (page 11) calls for improvements in the way bicycle parking is codified.

Map 7 Bicycle racks in downtown Kirkland. Black triangles show locations of racks, circles are 300' in radius.

[6] *Left by the Side of the Road: Puget Sound Regional Bicycle Network Study Assessment and Recommendation*, 2006, Cascade Bicycle Club.

Map 7 shows the existing public racks in downtown Kirkland as black triangles. The grey buffers of 300' are intended to indicate the area of coverage assuming that the maximum distance a user would walk and correspond to a walk of about two minutes. Although some areas are covered by multiple racks, other areas are not covered at all. The eastern part of downtown is better covered than is the western part. This corresponds to the newer development and public facilities that have been developed there. Objective G8.3 calls for additional bicycle parking facilities to be added both in downtown and in other parts of the City zoned for commercial land use.

Map 8 Existing on street bicycle lanes

CRASHES

CRASH DATA MANAGEMENT

The City of Kirkland maintains separate databases for crashes involving pedestrians and those involving cyclists. The software that supports these databases is called PBCAT[7]. It was developed by the University of North Carolina Highway Safety Research Center for the Federal Highway Administration and is distributed for free.

Detailed information for each reported[8] crash is included in the database, such as information about the people involved, the weather, lighting and surface conditions, injury severity and directions of travel. Contributing causes are also included. Each crash location is coded so that it can be tracked in the City's Geographic Information System. PBCAT allows crashes to be typed by the action of each vehicle, pedestrian or bicycle involved. This makes it possible to sort and analyze crashes by a set of standardized crash types. For example; bicycle going straight in bicycle lane/vehicle turning right at intersection. Appendix B contains a gallery of descriptive charts based on crash data from 1996-2007.

Pedestrian crash facts 1997-2007

37% of pedestrian crashes happen during the months of November, December and January.

About one-fourth of all crashes happen when pavement is wet and about one third happen after dark.

A little more than a quarter of pedestrian crashes happen during the PM drive time; between 4:00 and 7:00.

97% of crashes involving pedestrians result in some injury and 33% of them are incapacitating injuries. That rate increases to 50% incapacitation for those over 55.

Males and females are equally likely to be involved in pedestrian crashes.

Non-intersection crashes account for 29% of all crashes (17% at mid-block locations and 12% at driveways).

66% of all crashes involve a pedestrian at a crosswalk.

The pedestrian was using a crosswalk in 80% of the crashes that occur at intersections and in 58% of midblock crashes.

At unsignalized intersections, 50% of the crashes involve driver's failure to yield as the main contributing factor.

PEDESTRIAN CRASHES

Figure 13 shows that the annual number of pedestrian crashes has remained relatively steady over the past 11 years. This is despite increases in the number of people walking. Crashes over the most recent five years are shown on Map 9. It is difficult to draw specific conclusions about why the number of crashes per unit of exposure has decreased. It is probably due to a number of factors including engineering, education and enforcement efforts. It is also likely that as the number of pedestrians increases drivers become more aware of them. Years like 2003 where there are a very small number of crashes or like 2002 where there are a particularly large number of crashes are not attributable to any particular factor. They are seen as normal fluctuation around the average.

Figures 11 and 12 show that almost ¾ of pedestrian crashes happen at intersections. Of those that happen at signalized intersections, turning vehicles are involved with 68% of them. At unsignalized intersections, half the crashes involve vehicles that did not yield.

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[7]PBCAT is an acronym for Pedestrian and Bicycle Crash Analysis Tool http://www.walkinginfo.org/facts/pbcat/index.cfm
[8] Reported crashes are those for which a police report is completed. Police reports are completed when a collision results in $700 or more in property damage or an injury.

Because there is little documentation about the amount of pedestrian activity in other cities, it is difficult to compare Kirkland's crash experience with that of other cities. Goals G2 and G5 include strategies to address crashes at intersections and to measure pedestrian volume so that accident rates can be computed.

Figure 11 Pedestrian crashes at signalized intersections by vehicle action 1997-2007 The green segment of the left circle represents crashes at signalized intersections.

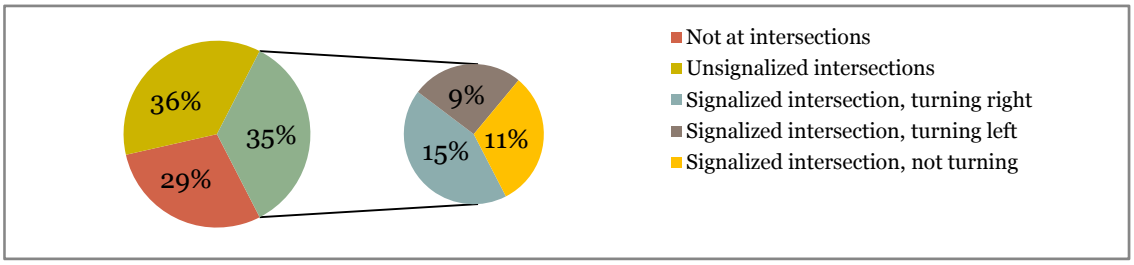


Figure 12 Pedestrian crashes at unsignalized intersections by vehicle action 1997-2007. The gold segment of the left circle represents crashes at unsignalized intersections

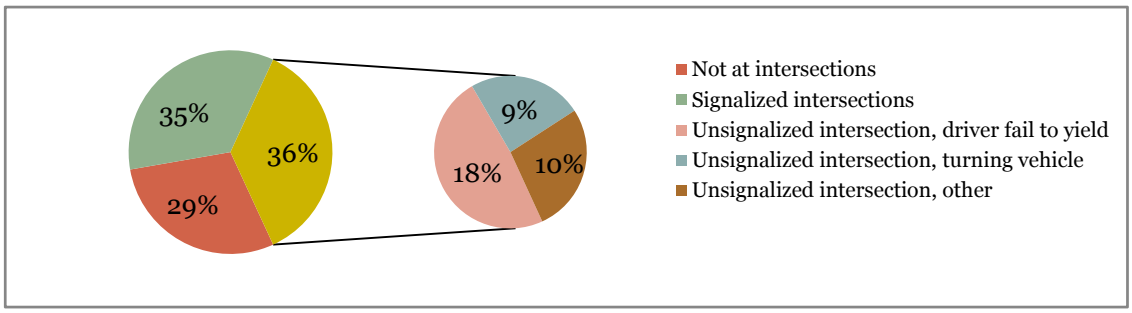
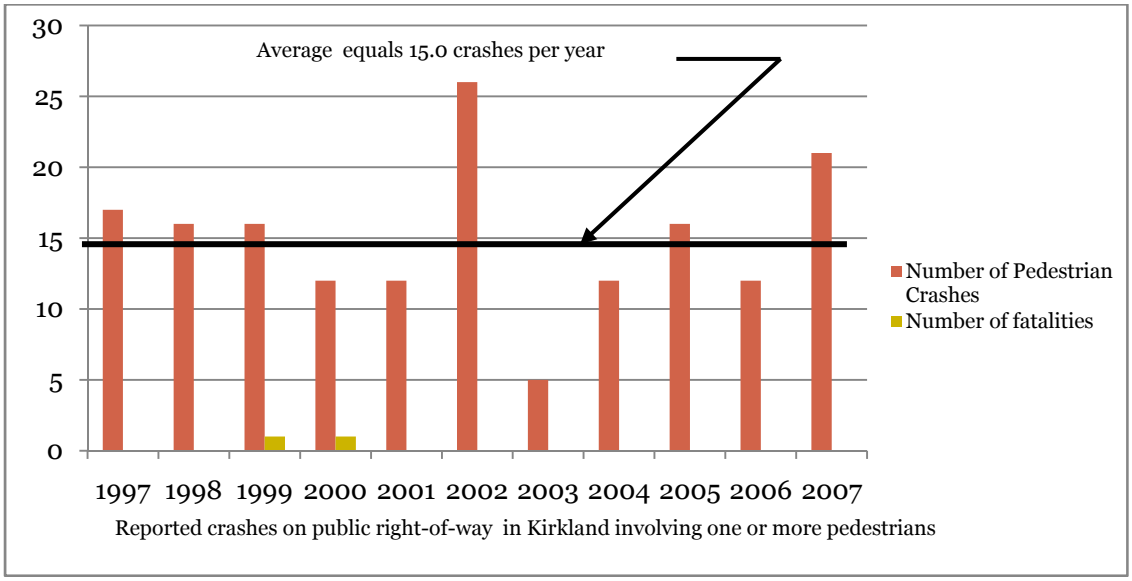
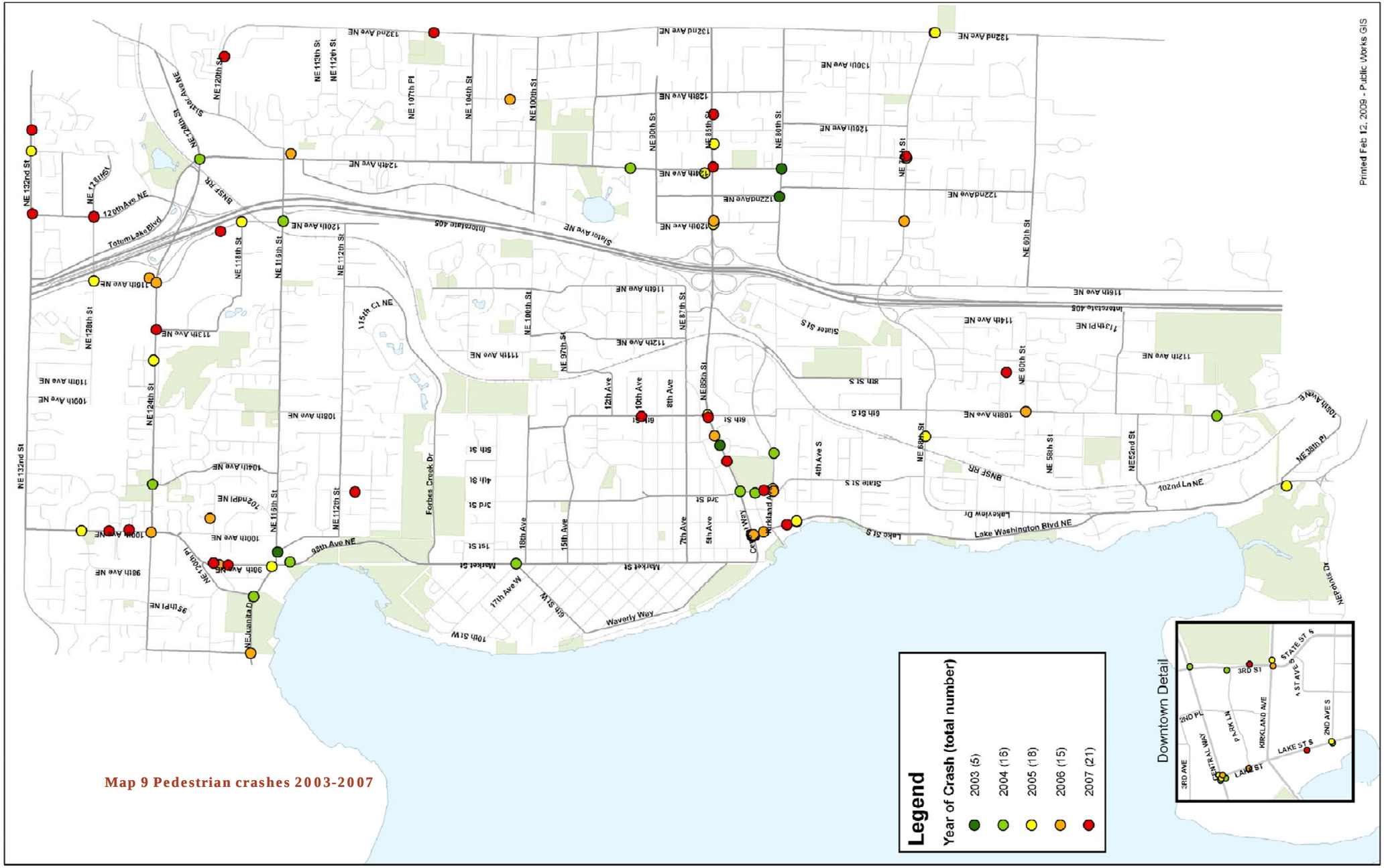
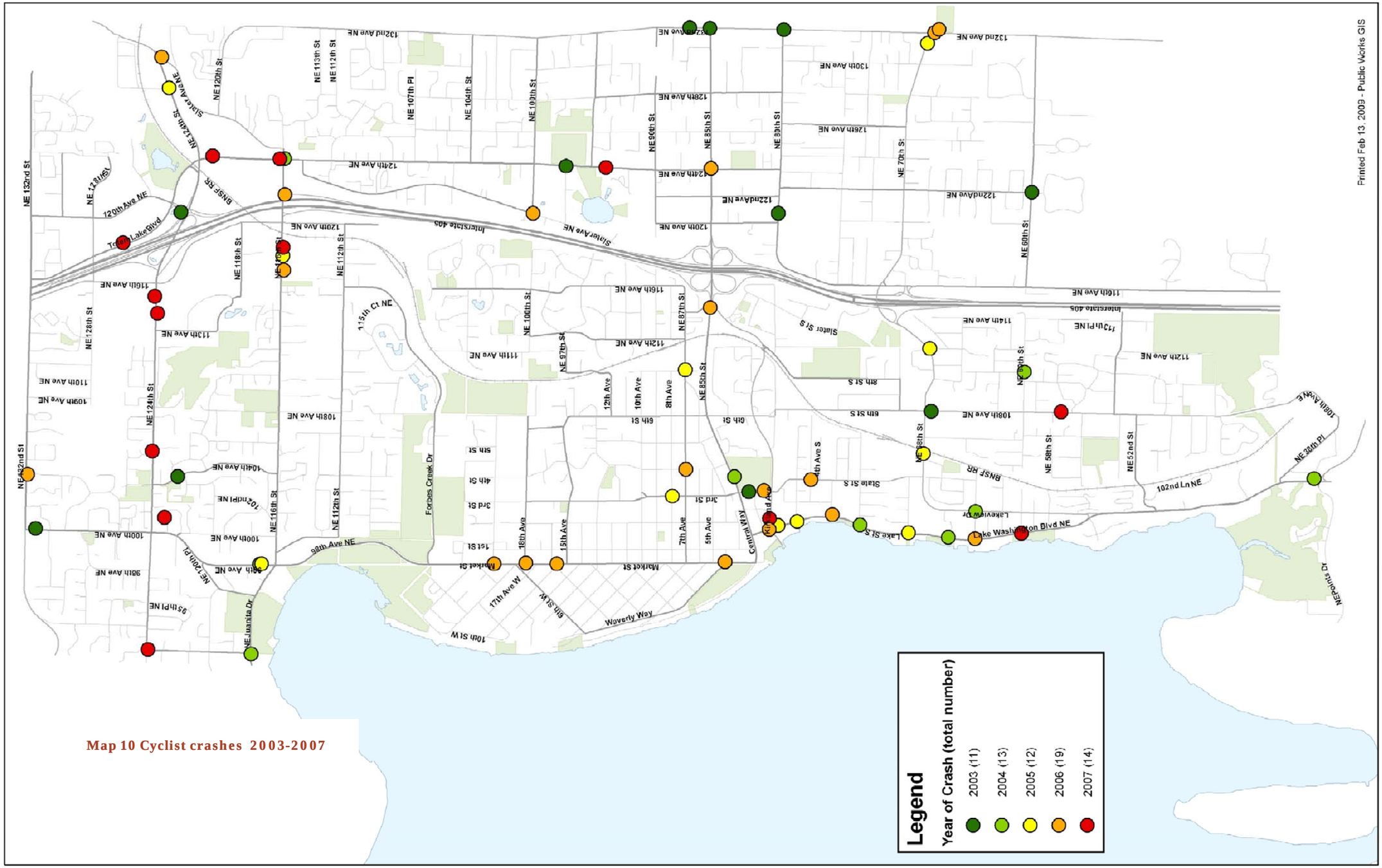


Figure 13 Annual number of pedestrian crashes fatal and non-fatal 1997-2007





Map 9 Pedestrian crashes 2003-2007



Map 10 Cyclist crashes 2003-2007

CYCLIST CRASHES

Figure 14 shows the annual number of bicycle crashes has remained relatively steady over the past 11 years. Map 10 shows locations of crashes from the period 2003-2007. Although each of the past six years has been at or above average, the number of crashes is so small that it is hard to call it a trend. Most years are within three crashes of the average, with the two outlier years averaging to almost exactly the 11 year average. Reliable estimates of the rate at which cycling miles are increasing or decreasing are not available; therefore, the rate of cycling crashes is unknown. It is unlikely that the number of miles cycled is decreasing; indicating the number of crashes per mile cycled is probably decreasing.

Bicycle crash facts 1997-2007

59% of bicycle crashes happen during the five months from May to September.

About three-fourth of all bicycle crashes happen on dry pavement during daylight .

Almost half of bicycle crashes happen during the PM drive time; between 4:00 and 7:00.

Just over half the crashes involve motorists that failed to yield.

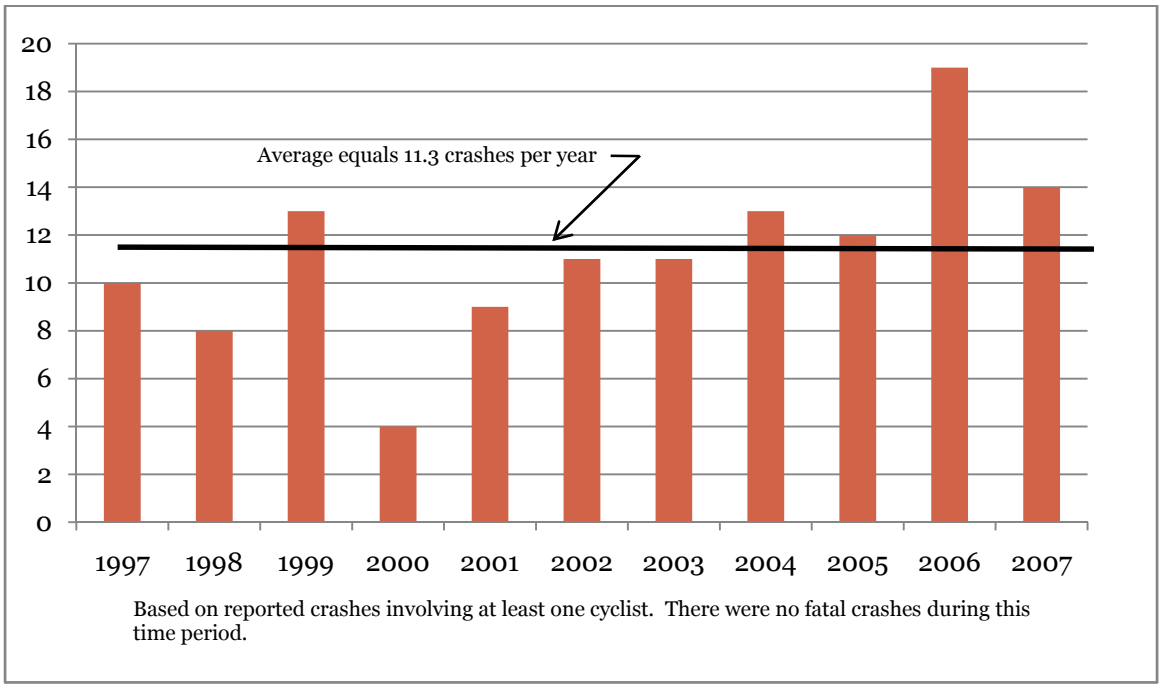
84% of crashes involving bicycles result in some injury and 18% of them are incapacitating injuries.

Males are more than four times more likely (81% to 19%) than females to be involved in pedestrian crashes.

Cyclists were using a crosswalk/sidewalk in 43% of all bike crashes, a bike lane in 31% and was in the travel lane in 26% of all crashes.

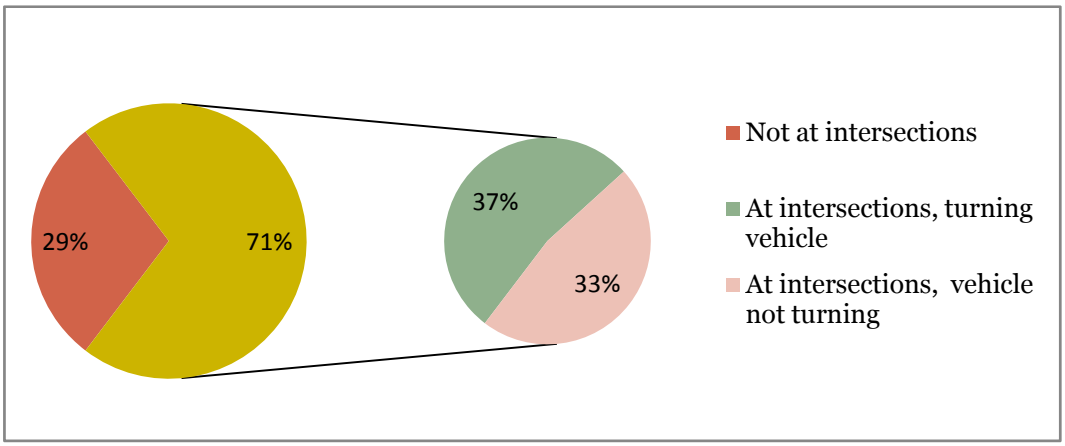
Like crashes involving pedestrians, about ¾ of crashes involving cyclists happen at intersections. At intersections, crashes are almost evenly split between those that involve turning vehicles and those that do not (see Figure 15).

Figure 14 Annual number of cyclist crashes 1997-2007



Based on reported crashes involving at least one cyclist. There were no fatal crashes during this time period.

Figure 15 Crashes involving cyclists at intersections, by vehicle action 1996-2007. The gold section of the left circle represents crashes at intersections.



TRANSIT

Transit is closely associated with cycling and walking. Transit helps pedestrians and cyclists expand the range of their trip making by allowing passage over and along barriers like freeways. For those who have difficulty walking longer distances or who don't have access to a car, transit is particularly important way of providing mobility. Every transit trip begins and ends with either a walking or cycling component. It is outside the scope of this plan to comment on the amount of transit service which Kirkland receives, but this plan does take specific steps to support transit service that is provided. Transit is an important consideration in the ranking of sidewalk construction projects as described in Section 5 and is considered when locations for bicycle parking are being analyzed (see page 114).

Both transit agencies that serve Kirkland - Sound Transit and King County Metro - have bicycle racks on every coach in their fleets. Most racks hold two bicycles, but racks that hold three bicycles are under development. Transit operates mainly on principal and minor arterials, but also on a few high volume collector streets. Sidewalk exists on both sides of most of these streets (see Figure 8, page 29).

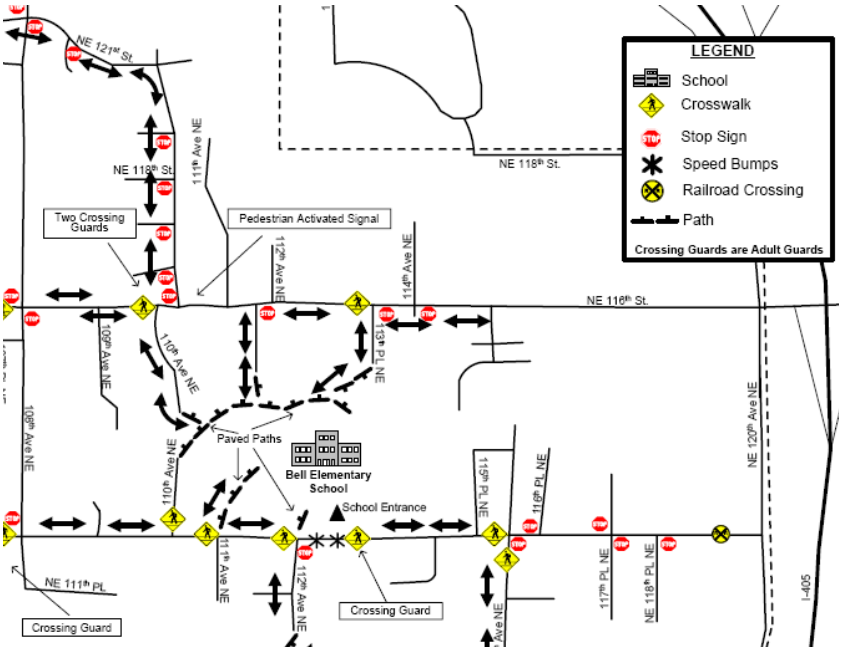
Of the approximately 322 bus stops in Kirkland, about 9% have shelters and about 88% are accessible for handicapped lifts. King County Metro runs a bicycle locker program that includes facilities at the Kingsgate and South Kirkland Park & Rides, as well as the transit center in downtown Kirkland. Bicycle racks are also available at South Kirkland Park & Ride and the downtown transit center.

SCHOOL WALK ROUTES

Kirkland has seven public elementary schools[9] within its borders that have school walk routes (SWR). The Lake Washington School District is responsible for producing a safe school walk route map for each school. Each map describes in detail the preferred walk routes within approximately a mile of each school. Map 11 is a sample of such a map. The District considers the presence of sidewalk when it determines the routes. For example, if there is sidewalk on only one side of a street, that side is designated as the walk route. If there is sidewalk on both sides of a

[9] Community School is an elementary school in Kirkland. Because it is a choice school it does not have a designated school walk route.

Map 11 A portion of the A.G. Bell Elementary School Walk Route



street, then both sides are designated as the walk route. Note that because the School District prepares the school walk routes, and because they only produce them for public elementary schools, the term "school walk routes" as used in this document is synonymous with the term "public elementary school walk routes". The Lake Washington School District is also responsible for funding and locating school crossing guards. The School district does not operate school buses for high school students. Students receive passes to use Metro Transit instead.

Kirkland has just over 30 miles of school walk routes (see Map 12). The majority of SWR are on local and collector streets. There is about one mile on principal arterials and about five miles on minor arterials. Almost 80% of the routes have walkways on at least one side. Table 4 describes walk route completion by roadway classification. Goal G4 addresses increasing the number of children who walk to school.

In response to a funding opportunity, in October of 2000, the City Council created a School Walk Route Committee including residents, parents, representatives from the School District and others. In May of 2002, after numerous meetings, discussions, open houses and interaction with the various schools, the City Council approved their recommendations. These recommendations included:

- Build $1 M worth of "priority" SWR projects as identified by each school
- Rank other identified SWR's using the CIP Project Evaluation Criteria
- Explore possibility of a Sidewalk Bond ballot measure to provide funding for sidewalks
- "Call" concomitant agreements that would fund sidewalks through private funding. (see Page 56 for more information about concomitant agreements.)

Priority SWR projects were completed at all seven elementary schools by the Fall of 2002, and other routes continue to be evaluated for funding. After further study, a sidewalk bond measure was not pursued and the concomitant process was modified. Including the priority improvements that were undertaken in 2002, approximately $2.2 M has been invested in improvements along school walk routes over the last few years. Between the time that the inventory of school walk routes that was done in preparation for the School Walk Route Advisory Committee in 2001 and today, significant progress was made in completing the walk routes around schools as shown in Figure 16. As a result of concerted efforts to improve school walk routes, the number of routes that have sidewalk on at least one side of the street has increased to a minimum of 80%.

Table 5 summarizes the number of miles of sidewalk left to complete the school walk route system. It also shows the estimated cost to complete the system. Some segments on school walk routes are on short dead-end streets and other locations where sidewalk is either not desired or not necessary. This means that achieving "100%" completion of sidewalks on school walk route system is not possible.

Table 4 Centerline miles of school walk routes by street type and walkway completion type

General condition	Specific condition: presence of walkway by side of street	Local Street	Collector	Minor Arterial	Principal Arterial	Total
Walkway not complete either side	None on either side	2.2	0.6	0.0	0.0	2.8
	Some on one side only	0.8	1.3	0.5	0.0	2.5
	Some on both sides	0.7	0.4	0.0	0.0	1.1
	Subtotal neither side complete	3.7	2.3	0.5	0.0	6.5
Walkway complete on one or both sides	Complete on one side, none on the other	1.9	3.8	0.5	0.0	6.2
	Complete on one side, some on the other	2.1	3.6	0.2	0.0	5.9
	Complete both sides	3.3	3.6	3.9	1.0	11.8
	Subtotal at least one side complete	7.2	11.0	4.6	1.0	23.9
TOTAL		11.0	13.3	5.1	1.0	30.4

Map 12 School walk routes

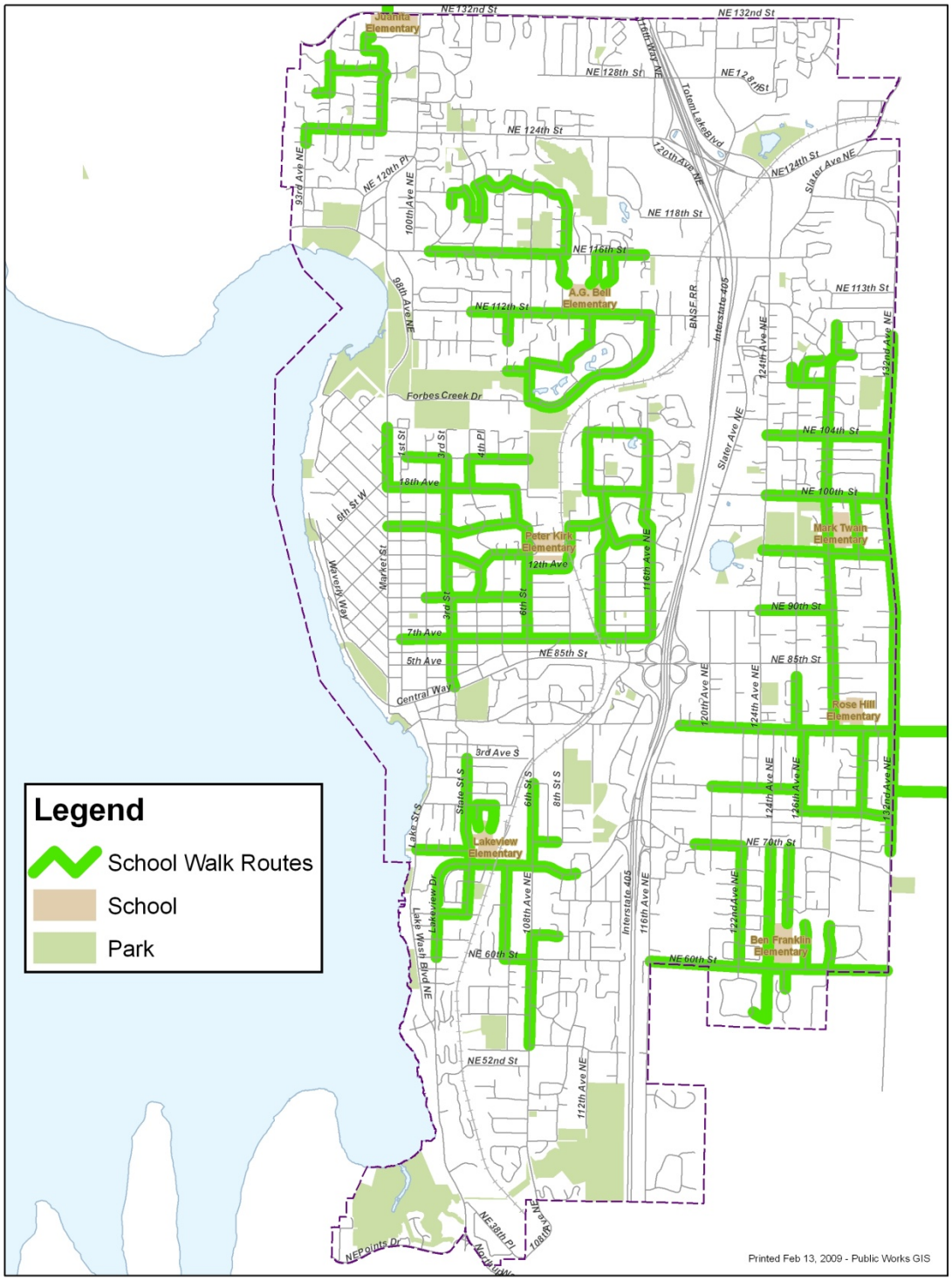


Figure 16 Inventory of school walk route completion by school. Funded projects reflected in projected columns.

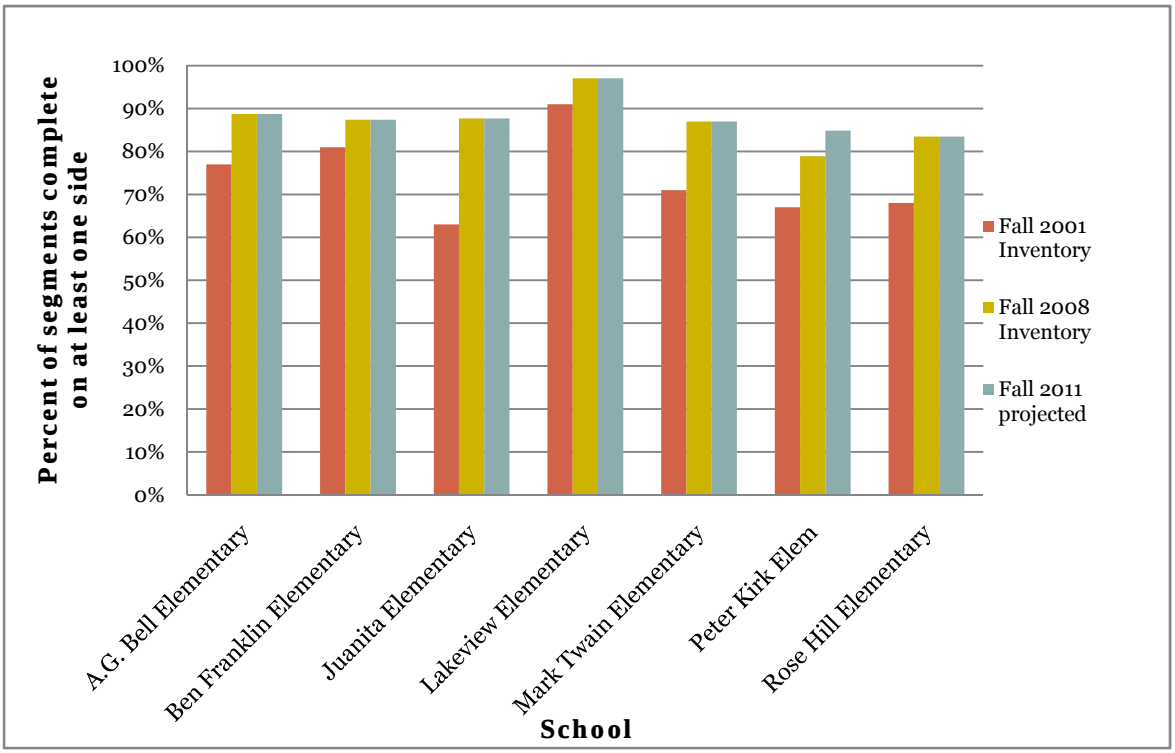


Figure 17 School walk route completion by street type

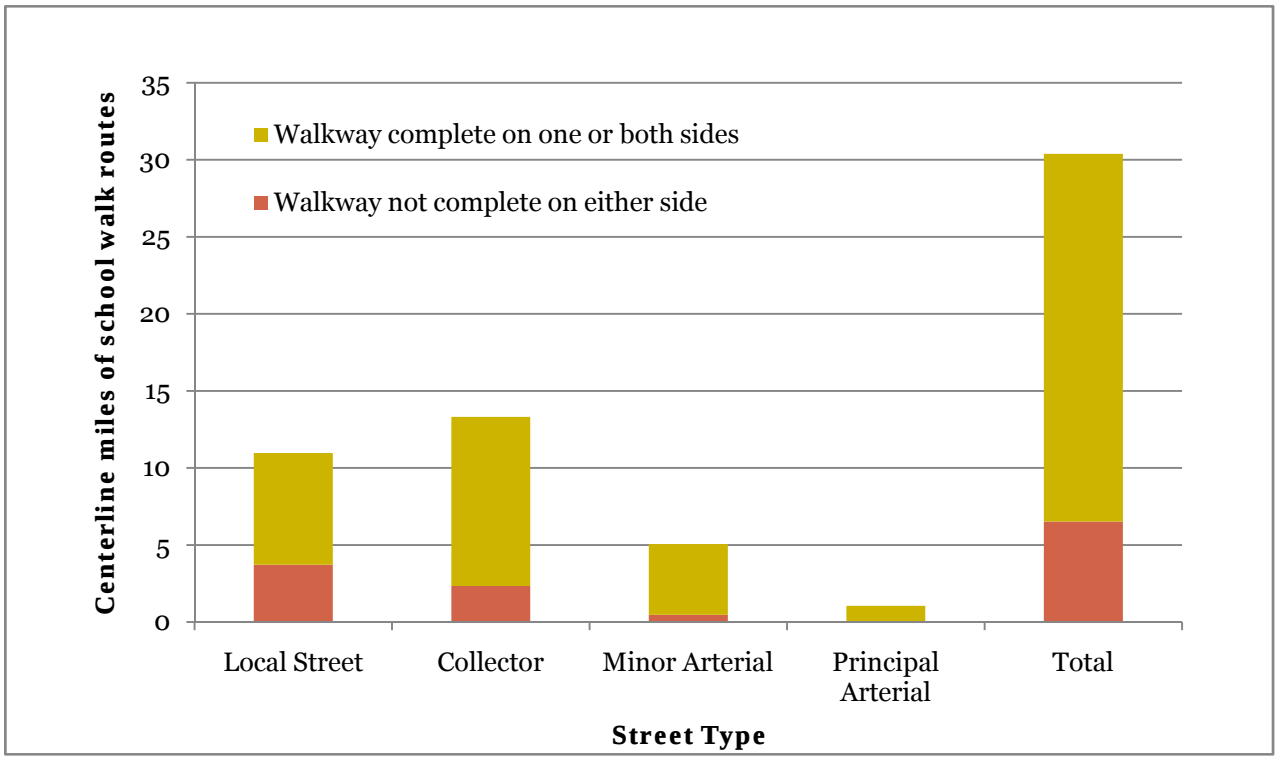


Figure 18 Detailed completion of school walk routes

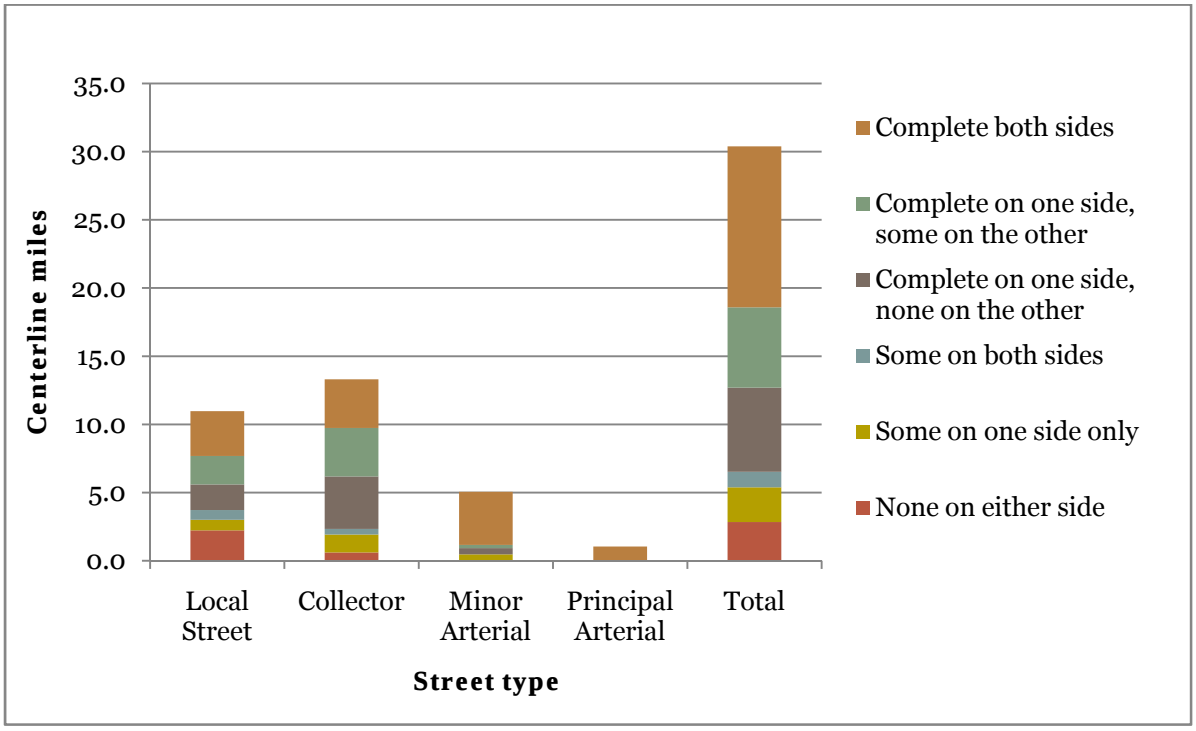


Figure 19 Detailed completion of school walk routes by street type; percentage

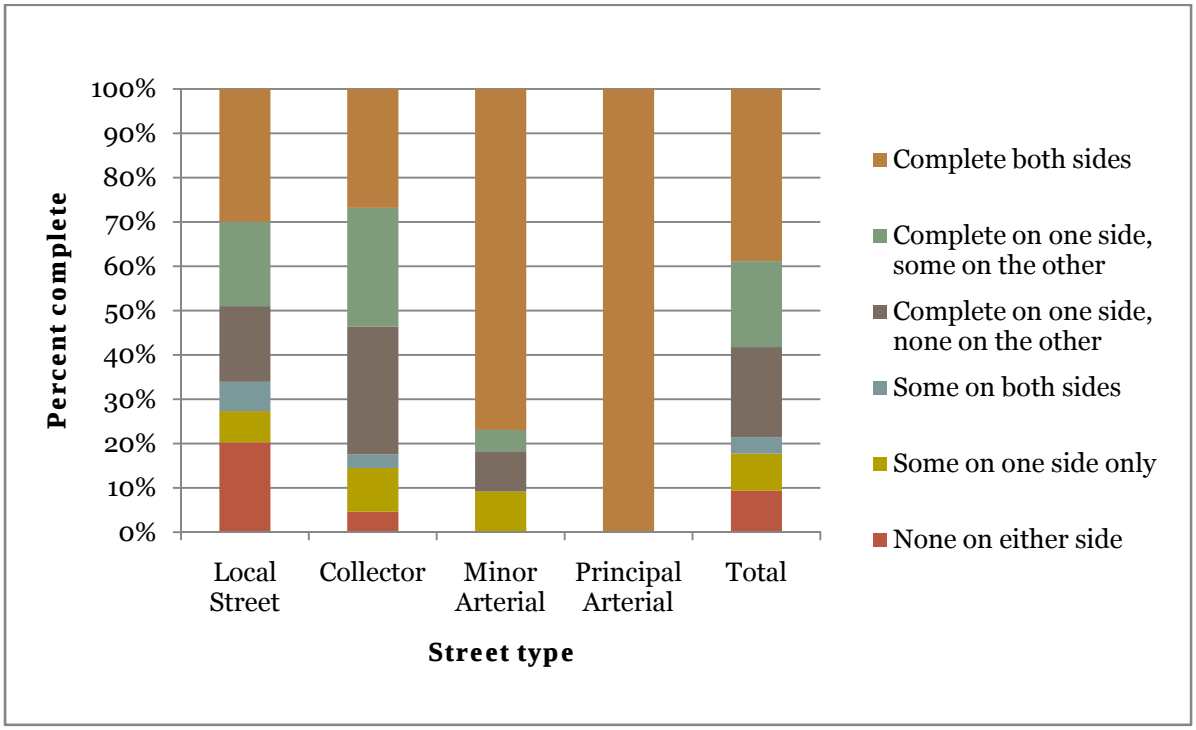


Table 5 Completion costs of school walk routes

Street type	Needed to complete one side of all segments		Needed to complete both sides of all segments	
	Length (mi)	Cost ($M)	Length (mi)	Cost ($M)
Principal Arterial	0.0	0.0	0.0	0.0
Minor Arterial	0.2	0.4	1.3	2.9
Collector	1.6	3.6	10.1	23.3
Local	3.2	7.4	10.0	22.9
Total	**5.0**	**11.3**	**21.4**	**49.0**

Cost estimate based on typical 2008 cost of $300/lin. ft for construction plus 35% of construction cost for project design plus 10% of construction cost as contingency. Estimate only, actual costs will vary.

MAINTENANCE

PEDESTRIAN FACILITIES

According to the Kirkland Municipal Code, sidewalk maintenance is the responsibility of the adjacent property owner. Nevertheless, the Public Works Department has several programs to address sidewalk maintenance.

Concrete sidewalks are constructed by forming separate panels of sidewalk each about 10' long. When the sidewalk is new, all the panels are at the same level, creating a smooth walkway. Tripping hazards are caused when these sidewalk panels shift relative to each other by ½" or more. An inventory of all the walkways in Kirkland was conducted in 2004. This survey indentified a number of offsets which have been corrected. When new problems are reported to the City several methods are used to remove the offset. The most common treatment is to grind a portion of the higher panel, but sometimes the entire lower panel is raised or material is placed on top of the lower panel to bring it up to the level of the higher panel.

Tree roots pushing on sidewalk panels is the cause of most of the offsets in the sidewalk system. Improper installation or damage by heavy vehicles can also cause offsets but this is rare. City policy is to protect the trees versus the sidewalk; in other words, trees are not removed because their roots are damaging sidewalks. There are several strategies that are used to accomplish this. Rubber sidewalk has been used as a pilot project; the rubber sidewalk is able to flex and maintain a smooth surface even when roots push on it. Asphalt is more

What does the Kirkland Municipal Code say?

Although the City has several programs that help property owners maintain sidewalk, the law holds adjacent property owners responsible for the cost of sidewalk maintenance. Here are the applicable section of the KMC:

19.20.020 Abutting property owner to maintain sidewalk in safe condition.

It shall be the responsibility of the owner of property abutting upon a public sidewalk to maintain the sidewalk at all times in a safe condition, free of any and all obstructions or defects, including but not limited to ice and snow. (Ord. 2654 § 1 (part), 1982)

19.20.030 Expense of maintenance and repair to be borne by abutting property and owner thereof.

The burden and expense of maintaining sidewalks along the side of any street or other public place shall devolve upon and be borne by the owner of the property directly abutting thereon. The abutting property owner shall also be responsible for performing and paying for sidewalk repairs to the extent the need for repairs is caused by the actions or omissions of the abutting property owner. (Ord. 4123 § 1, 2008: Ord. 2654 § 1 (part), 1982)

flexible than concrete and can also be used in areas where tree roots are damaging standard sidewalk. Simply moving the sidewalk so that it avoids trees is also sometimes possible.

Figure 20 Installation of rubber sidewalk panels on 103rd Avenue NE

In some cases, sidewalk panels themselves crack or otherwise deteriorate. In these cases, asphalt sections are sometimes used as an interim replacement for the damaged concrete. Concrete is restored as a component of the pavement maintenance program when the street pavement is overlaid. Currently, the Capital Improvement Program also includes $200,000 per year to make repairs to sidewalks.

Although they have a lower initial cost, the shorter life and therefore higher maintenance cost of asphalt paths give them a higher lifecycle cost than concrete sidewalks. Gravel paths have an even greater maintenance cost and are used only as a short term solution; typically where concrete or asphalt is to be installed soon or where special users such as horses need a softer surface.

The most common sidewalk maintenance complaints are about obstructions in the walkway. This is usually landscaping, brush, or tree branches that reach across the sidewalk. Because it is the responsibility of the adjacent property owners to maintain a clear sidewalk when the city receives a complaint that sidewalk is obstructed several steps go into resolution of the complaint. First the complaint is checked to see if it is a safety hazard that warrants immediate action. If it is, City staff removes the obstruction. If it is not an immediate hazard, a letter describing the problem is sent to the adjacent property owner. The letter explains that the property owner has two to three weeks to remove the obstruction. If the work is not done, a second letter is sent reminding the resident of their responsibility, setting a shorter time line, and stating that if not done, it will be removed by the City. About 75% of the complaints are taken care of by property owners within the allotted time. Goal G6 identifies treatments for reducing obstructions on sidewalks.

Waste and recycling containers are another common sidewalk obstruction. When specific blocking problems are reported, letters are sent by the City to the offending property owners. Mail boxes and parked cars can also be obstructions. The Public Works Department can often work with neighbors to change parking restrictions to eliminate parking blockages. Mailbox relocation can only be done with the approval of the Post Office. Relocation can be difficult because the Post Office has regulations that prohibit box relocation in some cases; for example to the other side of a street.

There are about 180 pathways and small connectors that are the maintenance responsibility of the City. These are the kind of facilities that make connections between cul-de-sacs for example. These are maintained semi annually or on a complaint basis depending on the amount of staff available.

Maintenance of in-pavement lights at crosswalks has proven problematic. Equipment from some manufacturers has not been durable and sometimes parts are not readily available. Sometimes, installations fail and cannot be put back in service without total replacement. Various substitute solutions can be put in place when this type of failure occurs, depending on the situation. These include overhead pushbutton-activated flashing lights. Figure 21 shows one such solution.

BICYCLE FACILITIES

Keeping bicycle lanes free of obstructions and free of debris is a major maintenance concern of cyclists and the City of Kirkland. On average, every street in the city is swept 11 times a year. The downtown area is swept 100 times a year. Downtown sweeping frequency increases in the summer when activity is highest and in the autumn when leaf debris can clog storm drains.

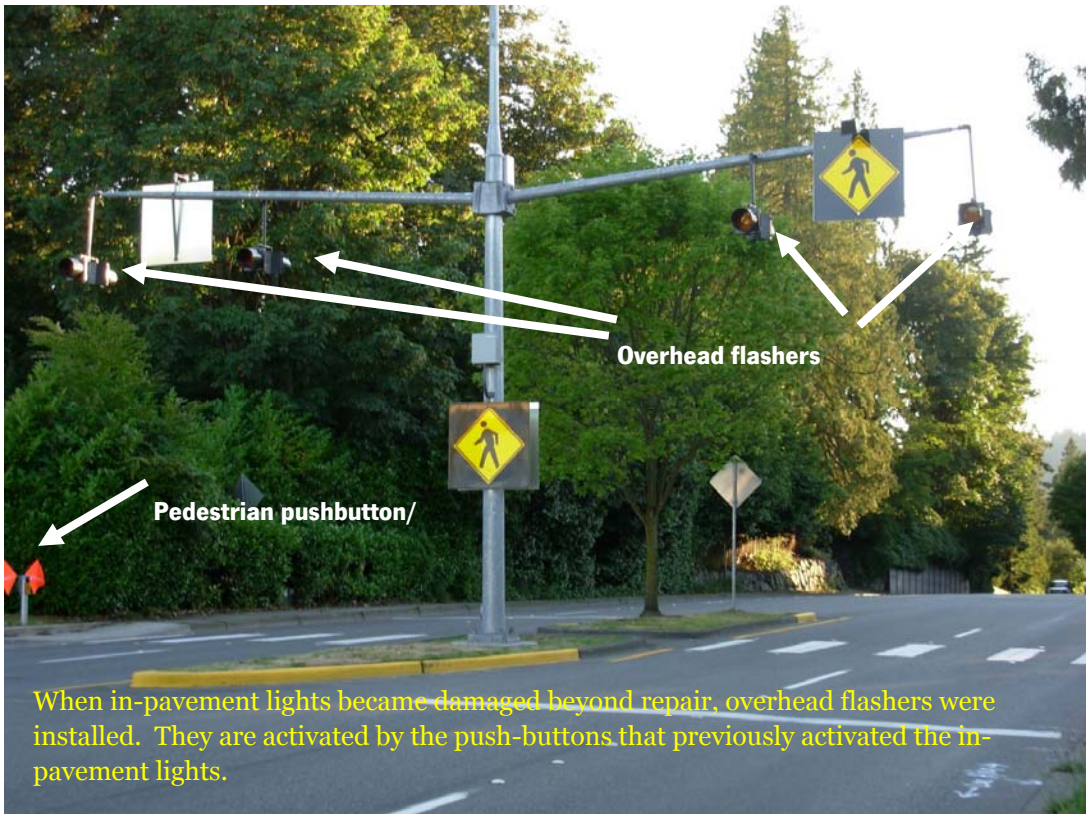
Although there is no special program to specifically sweep bicycle lanes, there is an active program that responds to specific complaints. Spot sweeping is performed on bicycle lanes whenever a focused complaint is received. Many requests of this type are handled each year.

Being detected at traffic signals is also a major concern for cyclists. Traffic signals in Kirkland should be able to detect bicycles. City technicians can respond and work with cyclists at any location where a problem is reported.

During periods of snow and ice, sand is sometimes used as a means of improving traction for cars and trucks. After the weather event, the leftover sand sometimes presents an obstruction in the area of the street where bicycles typically travel. Chemical deicers are being examined as an alternative to sand in part to help with this problem.

Small bumps and holes in the pavement that car traffic doesn't notice can still be a problem for cyclists. As with sweeping and traffic signal detection, pavement irregularities are also handled as they are reported.

Figure 21 Overhead flashers at a former site of in-pavement lights, NE 124th Street at 105th Avenue in Juanita



When in-pavement lights became damaged beyond repair, overhead flashers were installed. They are activated by the push-buttons that previously activated the in-pavement lights.