



CITY OF KIRKLAND
Department of Public Works
123 Fifth Avenue, Kirkland, WA 98033 425.587.3800
www.ci.kirkland.wa.us

MEMORANDUM

To: David Ramsay, City Manager

From: Ray Steiger, P.E., Capital Projects Manager, Public Works
Paul Stewart, Deputy Director, Planning and Community Development

Date: July 26, 2007

Subject: TREES AND SIDEWALKS

RECOMMENDATION:

It is recommended that the City Council hold a study session to discuss the issue of trees and sidewalks.

BACKGROUND AND DISCUSSION:

The City has an extensive inventory of street trees. Variety of species, ages, growing patterns, location and health provide distinctive character to the City and yet can also present issues that are inconsistent with the objectives of the community. The planning, management, protection, and care of the tree inventory falls into many categories of responsible staff, organizations, codes and policies. Trees are vital to a healthy environment, cleaning air and water, and providing character and variety to urban environments. When done correctly, they are also an economic benefit to businesses. The following is an excerpt from our Design Guidelines for Pedestrian Oriented Business Districts and supports the notion that tree-lined streets are part of the reason people visit these parts of town:

Streets are the conduits of life in a community. The repetition of trees bordering streets can unify a community's landscape. Trees add color, texture, and form to an otherwise harsh and discordant urban environment. A strong street tree planting scheme can establish community identity and provide a respite from the weather and the built environment. Large, deciduous trees planted in rows on each side of the street can bring visual continuity to Kirkland particularly on major entry arterials. Smaller trees should be planted in confined areas. Street trees will not obscure businesses from the street if the appropriate trees are selected and maintained. Branches can frame ground floor businesses, allowing bus and truck movement while enhancing the pedestrian environment. Trees should be of adequate size to create an immediate impact and have a good chance of survival. Species with invasive root systems or those that are prone to disease, intolerant of pollution, or short-lived should be avoided.

Kirkland currently has approximately 12,000 public trees in its inventory that contribute to the urban tree canopy. Some trees are on our publicly owned land, parks and facilities, and many are in the public right of way (Attachment A). Responsibility for these trees falls to City Staff (Planning, Parks, and Public Works), private citizens (adjacent property owners and businesses), and others (Puget Sound Energy specifically). The City has multiple codes developed for tree selection in new developments (Chapter 95 and 110 of the Kirkland Zoning Code), tree removal policies (Chapter 19 of the Kirkland Municipal Code), and various maintenance schedules and operating practices. The Comprehensive Plan identifies the goal of increasing the tree canopy from 32 percent (2003) to 40 percent. The community as a whole is clearly behind

the development of an ever improving urban forest. There remain, however, challenges that result from the competition for limited space in which the trees are planted.

Kirkland currently has approximately 200 miles of paths and sidewalks. Similar to the high community value assigned to a healthy urban forest, excellent pedestrian facilities and opportunities to safely walk are also highly valued. And again, like our tree inventory, the responsibility for sidewalks is also shared among a diverse group: the development community, the City Capital Improvement program, City maintenance personnel, and adjacent property and business owners. In 2006, after looking at the magnitude of the maintenance of the existing sidewalk infrastructure, the City Council allocated \$200,000 annually to specifically begin to address repair of sidewalks throughout the City. A complete inventory of the City sidewalk system in 2004 identified a vast array of sidewalk defects from cracks and "offsets" (both vertical and/or horizontal separation) to vegetation impacts, patches or obstacles (Attachment B). Damage to the sidewalks can be attributed to a number of reasons: poor original construction methods (i.e. lack of sub-base material), too much loading (typical at intersection corners from heavy equipment or garbage trucks), weather damage such as water freezing and thawing or erosion of sub-base material, and others. The number one issue, however is adjacent tree roots that grow into or under the sidewalk. Unfortunately, the conflict between trees and sidewalks is not confined to one area of the community; it is City-wide and is not diminishing.

This issue, trees vs. sidewalks can be broken into two distinct discussions:

1. New public improvements (being built now and in the future), and
2. Existing conditions (trees and sidewalks that are out there now)

For the most part, discussion one is well underway. The refining of tree selection, placement, and maintenance are being more closely scrutinized by City Staff. Involvement of plan review specifically focused on trees and their integration into the project will alleviate most issues in the future. Commonly a key component of tree conflicts is the wrong tree for the wrong location. With a more proactive review of project trees pre-construction, construction, and post-construction many situations can be avoided. Work still remains through the need to have a more complete vision for the community via an urban forest management plan and processes specifically focused on tree review through the development process.

Dealing with existing conditions is currently the discussion which brings the most challenge. Kirkland, like other Cities, employs a number of methods to address the conflict between tree (roots) and sidewalks. Trees are addressed on a case by case basis and typically involve the City's field arborist, maintenance personnel, or a property owner and may result in one or more of the following approaches:

- Grinding of (sidewalk) panels
- Removal of panels
- Root pruning
- Tree pruning
- Replacement of panels using:
 - asphalt
 - rubber panels (for report please see Attachment C)
 - meandered sidewalk
- Tree review (criteria to use):
 - can the sidewalk be "reworked" as above?
 - is the tree diseased or dying?
 - is there infrastructure damage being caused?
 - Is it the wrong tree for the situation?
 - Where is it (community values)?
 - Can a substitute be planted in place

More often than not, the existing trees will be left and other measures to repair the sidewalk are used.

An example of a recent repair process was during the 2007 sidewalk maintenance project. With that project, approximately 250 feet of sidewalk adjacent to City Hall (along Second Street) was identified as needing repair (Attachment D). During the development of the project, which had a number of roots impacting the sidewalks, the concrete panels and curb and gutter, were removed. At that time, the tree root systems were exposed and under the guidance of an arborist, in this case, an arborist hired by the City, they were pruned and treated. After the damaging roots were removed, the concrete curb, gutter, and sidewalk were replaced with new concrete. In this case, no trees were removed. In total, this portion of the 2007 contract cost approximately \$42,000 or roughly \$170 per foot of sidewalk repaired. If this process were utilized throughout the City on similarly damaged panels, the estimated cost would be in the \$40 - \$50 million range and would not account for the cost of tree removal/replacement.

What are others doing that we aren't?

The issue is being experienced by other cities universally. A recent article in the Seattle Times reported on the shock of adjacent property owners when they discovered that *they* were responsible for the broken sidewalks in front of their home. In a survey of its citizens, one of the lowest rated areas of service for Seattle was "sidewalks, walkways, and crosswalks". Recent approval of their "Bridging the gap" tax levy is now dedicated to addressing their sidewalks, but even with that funding, there are vast amounts of work to be done by the City. In the same article Edmonds has "adjacent property responsible" codes similar to Kirkland, however they do fund and perform maintenance of their 14 miles of sidewalks. Bellevue funds and maintains their 300 miles. The City of Redmond dedicates approximately 5-10 percent of their annual \$1 million sidewalk budget to maintenance of its 220 miles of sidewalks.

Other approaches:

- Above ground planters like used in Victoria; recognize however that it may be limited in its application and still require irrigation and maintenance;
- Olympia has a nursery and the City has taken on the trees in the right of way. Downtown Olympia has a "no removal" policy on trees;
- Some cities use surface water funds to help with the tree program – it has been shown that tree filtering and canopy help to keep environment cool and runoff detained;
- How does Low Impact Development figure into the solutions? Staff is currently working with SVR Inc, and will be receiving a report in late August on possible pervious sidewalk/structural soil desing for tree planting locations;
- Issaquah's (field crew) tree team handles their trees;
- In Redmond trees and roots are looked at case by case. They have three arborists on staff. If the tree is the wrong pick as a street tree, they usually recommend removal. If the tree is worth saving, they have been obtaining easements where they can and are providing a larger tree pit/planter area. If no space is available they will prune according to direction from an arborist.
- The University of Washington has a significant outreach program for their Quad Cherry Trees. Trees are purchased by donors, planted and allowed to grow to significance before existing trees are removed. This is part of an approximate 10-15 year vision for replanting trees in place of diseased trees.
- Old trees that are harvested are sold as premium wood to various bidders

Staff will present these and other discussion points at the upcoming study session with the objective of continuing to refine policy and goals for the urban tree canopy concurrent with identifying approaches to addressing the impact of the root system on the sidewalks and walk ways.

Next Steps

We believe resolutions to the conflict of maintaining a tree canopy and promoting a safe walking environment will be long-term and will require both a strategic approach as well as the flexibility for case-by-case responses. Listed below are the elements that should be included in the discussion of this issue.

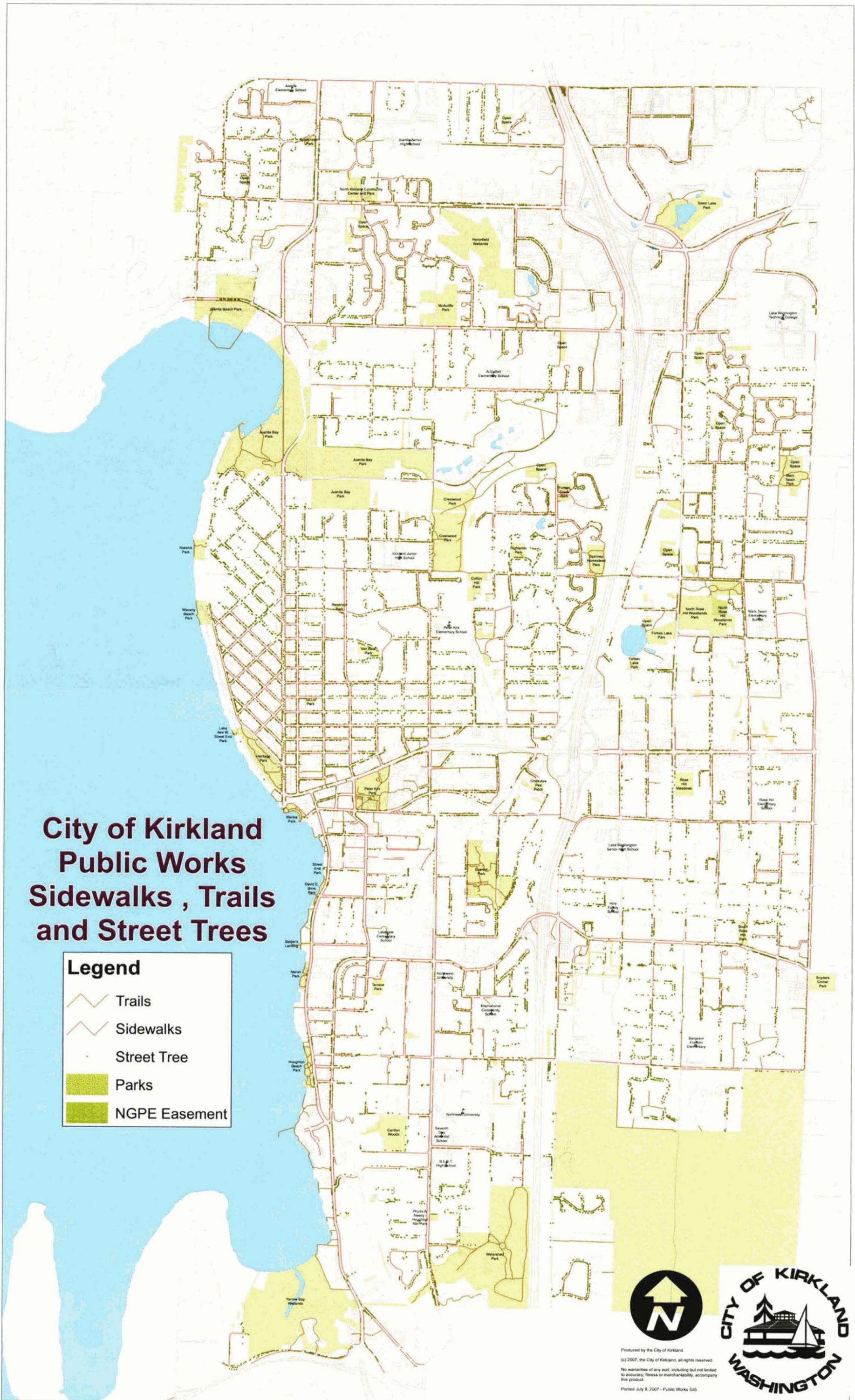
- The proposed Capital Improvement budget for 2008-2013 contains a project titled 'Park Lane Pedestrian Corridor Enhancements'. This project will look at opportunities and design standards relative to sidewalk improvements from Lake Street to Peter Kirk Park. There is \$60k proposed for this work in 2008. The information from this study will help frame the operational and cost issues.
- We have utilized a Pilot Program of Rubber Sidewalks and it is currently too early to determine if this is a feasible long-term solution. Also, currently the cost of the Rubber Sidewalk exceeds the cost of standard concrete panels. Yet, we believe this could be an element in our strategic look at solutions.
- Staff has met with residents and businesses on Kirkland Way to look at the existing conditions and consider potential solutions. There are no easy answers here, similar to Park Lane, 132nd Ave NE in Rose Hill and other locations. Staff has considered different options at these locations, but is not currently recommending them due to space considerations, cost or other limitations.
- We are looking for Council direction on the broader policy issues relative to sidewalks and trees, and we will utilize that direction in our approach to the capital project noted above, as well as in other opportunities and challenges in this area.

Attachments (4)

City of Kirkland Public Works Sidewalks, Trails and Street Trees

Legend

-  Trails
-  Sidewalks
-  Street Tree
-  Parks
-  NGPE Easement

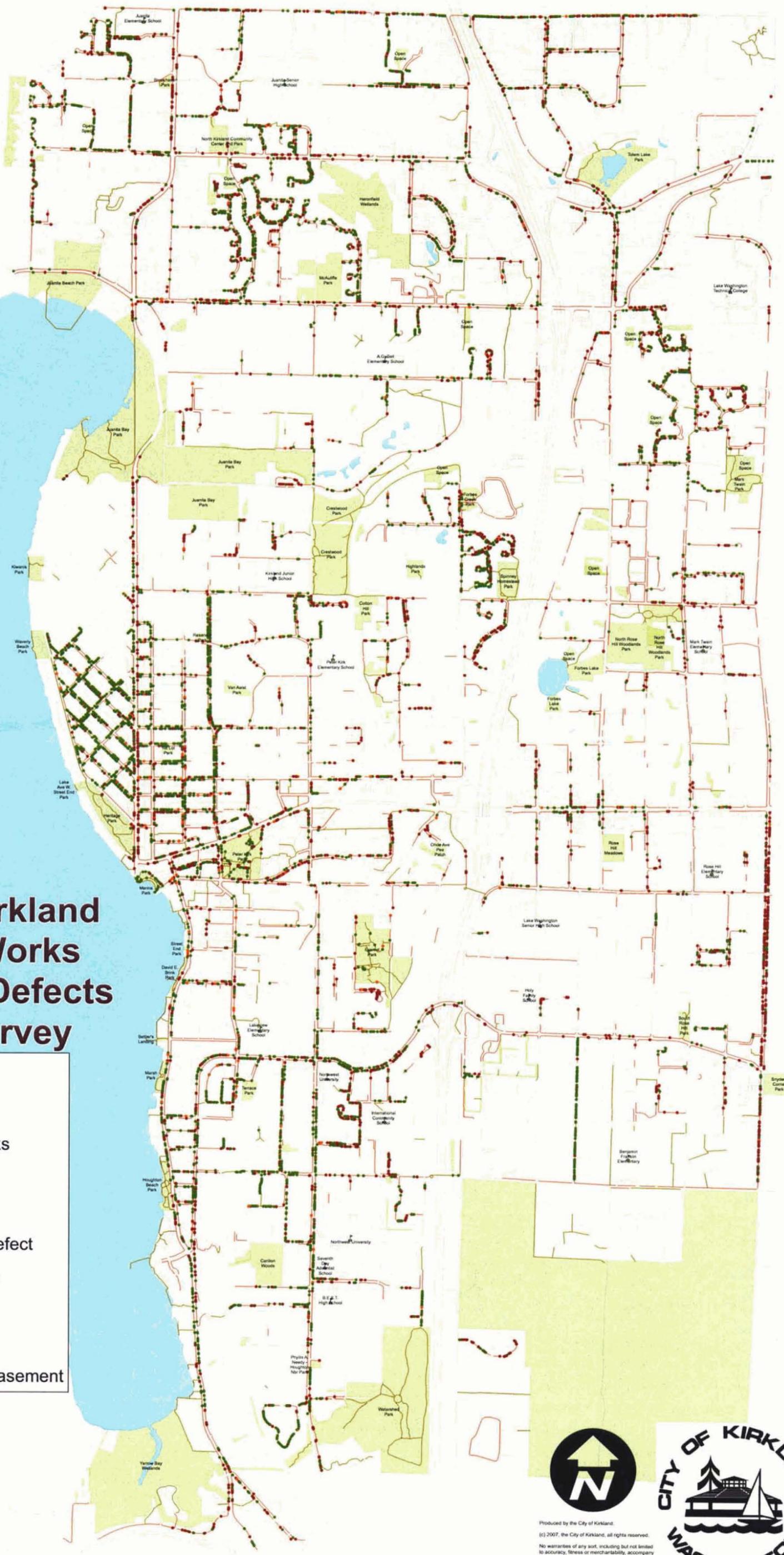


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City of Kirkland Public Works Sidewalk Defects 2004 Survey

Legend

-  Trails
-  Sidewalks
- Defect Type**
-  Crack
-  Mixed Defect
-  Obstacle
-  Offset
-  Parks
-  NGPE Easement



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Printed July 11, 2007 - Public Works GIS



CITY OF KIRKLAND

Department of Public Works

123 Fifth Avenue, Kirkland, WA 98033 425.587.3000

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MEMORANDUM

To: David Ramsay, City Manager

From: Daryl Grigsby, Public Works Director
Ray Steiger, P.E., Capital Projects Manager

Date: August 3, 2007

Subject: RUBBER SIDEWALKS INSTALLATION AND FOLLOW-UP

In February 2007, Council was presented with a Reading File Memo that discussed a City pilot project involving the installation of rubber sidewalks. In March, Council awarded a contract to Taggart Construction, Bothell, WA, and rubber sidewalk panels were installed in areas of the Lakeview Neighborhood during the month of April. With this memo we wish to update Council on the current status of the pilot project by providing an overview on final cost differences between the rubber sidewalk and conventional concrete sidewalk, an outline for monitoring the new installations and a recommendation for future rubber sidewalk installations within the City.

CONSTRUCTION

Kirkland's rubber sidewalk pilot project consisted of installing rubber sidewalk panels in five locations (approximately 420 square feet) on 103rd Ave NE and 102nd Ave NE as part of the 2006 Sidewalk Maintenance Project. Please see Attachment C-1 for installation locations including before and after photos of each.

The installation of the rubber sidewalk was fairly easy with construction starting with the removal of the broken concrete sidewalk panels and then exposing the root systems of the existing mature street trees. The City's Arborist, Mark Padgett, and the contractor worked closely together to ensure the exposed roots were handled appropriately and not damaged in any way. Mark exposed the root systems using an air spade (a tool that removes soil and exposes the root system through the use of compressed air) and provided guidance on how to work around the roots without damaging the trees.



Roots exposed under the old sidewalk panels.

After the roots were exposed, "structural soil" was placed around the existing root structure. Structural soil, or CU-Soil, is a soil mixture that was developed and patented by Cornell University and consists of larger aggregate in a matrix of clay topsoil and a hydrogel copolymer (which keeps the topsoil and larger aggregate from separating). Structural Soil has been shown to be beneficial for root structures as the larger aggregate provides adequate pore space and strength to support the loads from sidewalks and driveways while the topsoil promotes healthy root system development for the tree. A layer of geotextile fabric and a fine-grained crushed rock leveling course was then placed on top of the structural soil layer. The leveling course allowed the contractor to achieve a compact and level surface for placement of the

rubber sidewalk panels. The final step of installation consisted of connecting the rubber sidewalk panels to each other with fiberglass dowels and then securing the side panels in-place with a continuous aluminum edge restraint strip.

The sides of the rubber panels were not always square and the pre-drilled dowel holes did not always line up perfectly. According to the Rubbersidewalks, Inc. representative the reason is because they are manufactured from recycled tires, however, they are currently working on improving the dowel connection system through tighter controls during the manufacturing process for the panels. The City's contractor often had to change out panels in order to get a better fit and he hoped that future installations will be made easier through such improvements.



Compaction of fine crushed rock that serves as a base for the rubber sidewalk panels.

During and after the installation we learned of several other agencies that are thinking about or are planning on installing rubber sidewalk in the near future. For our project we jointly purchased the rubber sidewalk materials with the City of Bellevue in order to save on shipping costs. At this time, Bellevue staff is waiting until Fall, 2007 to do their installation and they have expressed appreciation to us for our comments and insights gained through our construction experience. During the construction phase we were also contacted by staff members from the Cities of Portland, Bellingham and Redmond who are all very interested in receiving our feedback as they make plans to visit Kirkland's installations.

COSTS

Based on bids received from the 2006 Sidewalk Maintenance Project, the cost of installing rubber sidewalk was over twice the cost of constructing conventional concrete sidewalk. Attachment C-2 shows a comparison of the unit prices for constructing both rubber and concrete sidewalks based on the low bid received for the Project.



Installation of rubber sidewalk panels



Rubbersidewalks Inc. promotes the product life of the rubber sidewalk panels, when located adjacent to trees, as being 20+ years. However, the first rubber sidewalk installation was constructed nine years ago (1998) which is only half of the predicted product life span so only time will tell whether a potential reduction in maintenance costs will outweigh the

known additional costs for the construction of the rubber sidewalks.

From past Kirkland maintenance experiences, for the past ten years the City's street crews have typically responded to the Lakeview Neighborhood area an average of twice a year to grind down or patch the specific sidewalk location that have now been replaced with rubber sidewalks.

MONITORING

Public Works staff will visit the rubber sidewalk installation sites on a quarterly basis to observe the performance of the rubber sidewalk panels. Staff will photograph the sites in order to have historical documentation of the condition of the sidewalks. We will also monitor each location for the general condition of the panels looking for any shifting or lifting, as well as recording all maintenance activities, if required.

Staff last visited the Lakeview Neighborhood site on June 26th, 2007. During the site visit we spoke with two property owners who live near the rubber sidewalk installations and both property owners provided positive feedback on the new installations, both being pleased with the final product. One resident even commented on how nice the feel of the rubber sidewalk is underfoot compared to traditional concrete sidewalks. A few of the sites had some grass growing up between the edges of the sidewalk panels but each location appeared to be performing as expected with no bulging or lifting of the panels being observed.

OUTLOOK

There appears to be many benefits in installing rubber sidewalks in locations where tree roots have damaged conventional sidewalks and where tree retention is desired. Those benefits need to be weighed against the additional cost of rubber sidewalk and the unknown long-term performance and maintenance requirements. The following table contains a list of pros and cons associated with rubber sidewalk installations:

<u>PROS</u>	<u>CONS</u>
+ Uses recycled materials – diverts tires from landfills	– Company is based in California – is not local and shipping costs add to the final costs
+ Increases water infiltration to roots	– Materials and installation costs are currently twice as expensive as conventional sidewalks
+ Pavers are flexible & will bend versus breaking – reducing tripping hazards	– Irregularities in panels need to be improved by manufacturer to ease installation.
+ Maintenance required less often in areas where trees exist	– Maintenance schedule (if/when required) unknown
+ Sidewalk replacement required less often in areas where trees exist	– Long-term performance unknown
+ Positive feedback from residents	

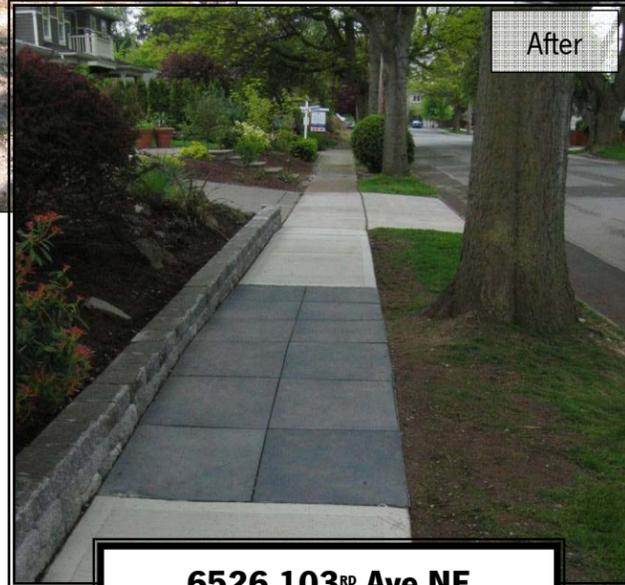
Staff will continue to monitor the existing rubber sidewalk installations while also exploring other solutions for repairing sidewalks damaged by tree growth. If, however, another opportunity presents itself, staff does recommend expanding the pilot program to include a different City location with trees of a different species than those along 103rd Ave NE and 102nd Ave NE. Engineering staff can work with the City's staff arborist and the street maintenance department to determine an appropriate candidate for a future installation.



Completed rubber sidewalk installation

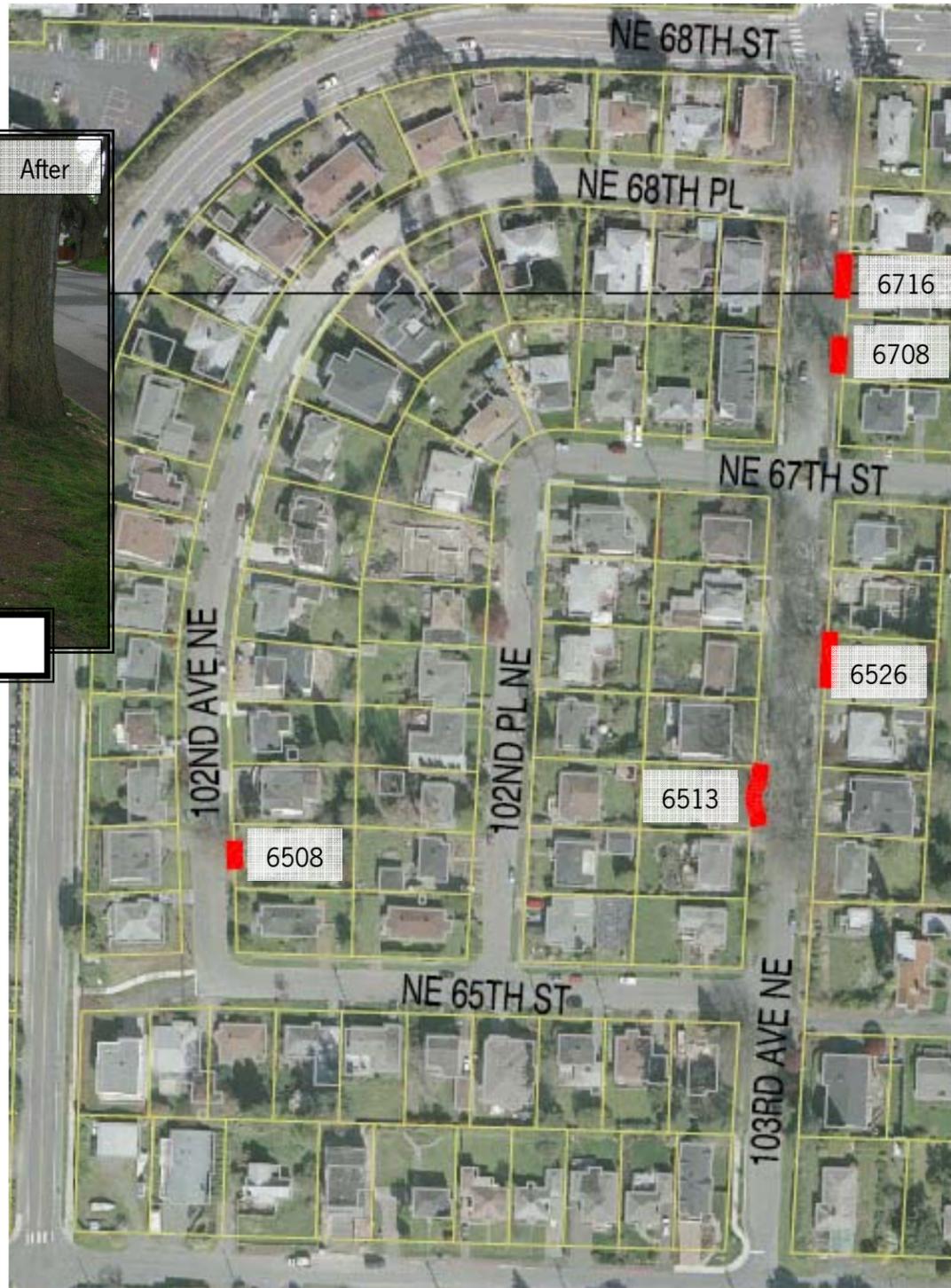


Before



After

6526 103RD Ave NE



Before



After

6716 & 6708 103RD Ave NE



Before



After

6508 102RD Ave NE



Before



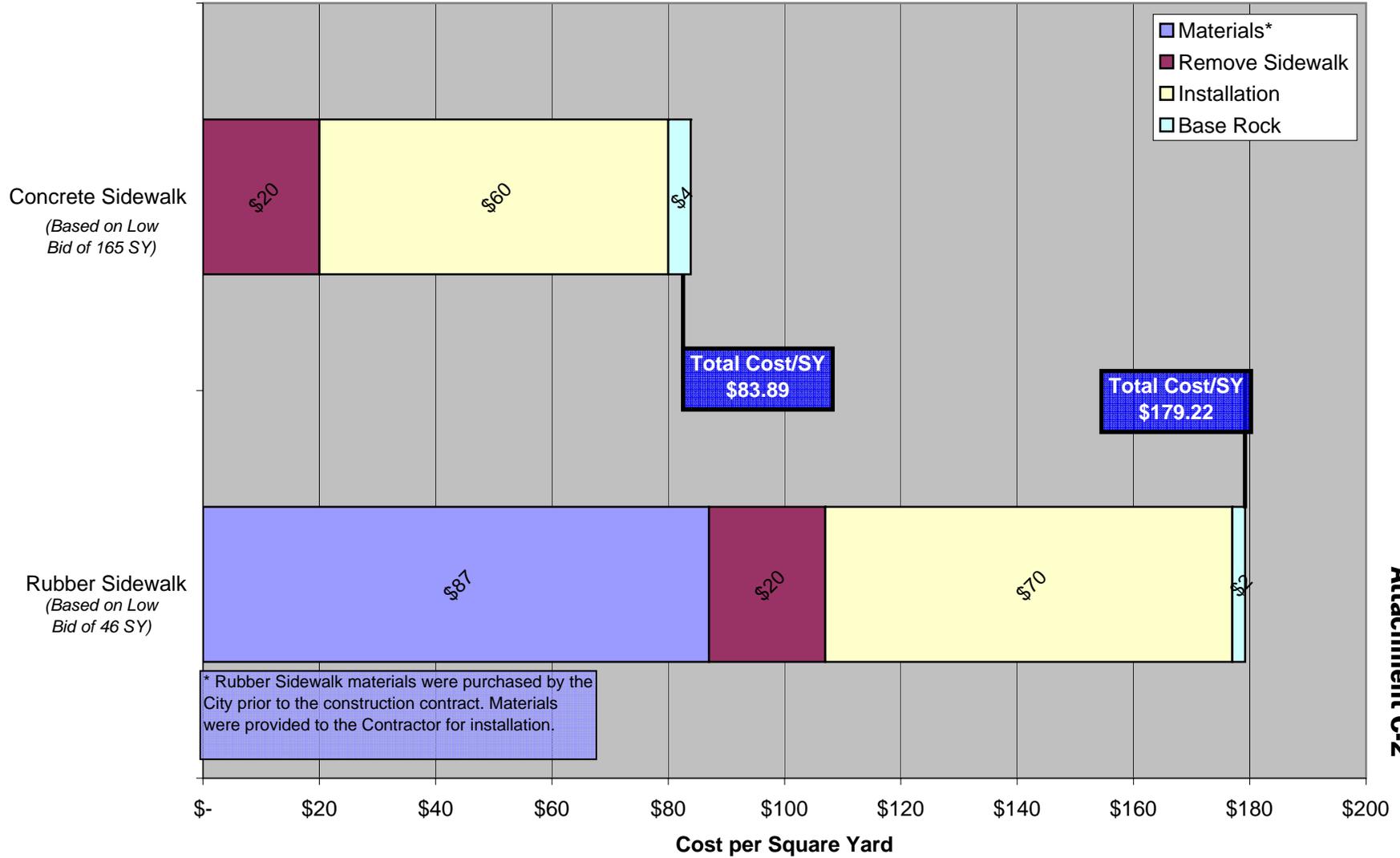
After

6513 103RD Ave NE



City of Kirkland
2006 SIDEWALK MAINTENANCE PROJECT
RUBBER SIDEWALK INSTALLATIONS

Rubber Sidewalk vs. Concrete Sidewalk (2006 Sidewalk Maintenance Project)



Legend

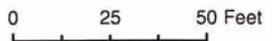
Sidewalk Defects

Crack >1.5" or Offset >1.5"

- ▲ Crack
- Mixed Defect
- Offset
- ★ Obstacle
- Street
- ROW



1 inch equals 50 feet



City of Kirkland - Department of Public Works

Sidewalk Defects Near City Hall

Note: Sidewalk Defects noted are based on a survey performed in 2004.