



# CITY OF KIRKLAND

Department of Public Works

123 Fifth Avenue, Kirkland, WA 98033 425.587.3800

www.kirklandwa.gov

Council Meeting: 04/17/2012

Agenda: Unfinished Business

Item #: 10. b.

## MEMORANDUM

**To:** Kurt Triplett, City Manager

**From:** Dave Snider, P.E., Capital Projects Manager  
Ray Steiger, P.E., Public Works Director

**Date:** April 10, 2012

**Subject:** TOTEM LAKE FLOOD CONTROL MEASURES –UPDATE/FUNDING APPROVAL

### RECOMMENDATION:

It is recommended that City Council receives an update on measures taken over the fall and winter months to alleviate flooding in the vicinity of Totem Lake. It is also recommended that City Council approve funds for replacement of a series of twin 42-inch culverts that serve as outlets to Totem Lake.

These actions are part of the 2012 City Work Program Item *"Implementing Totem Lake Action Plan regulatory changes, Phase II flooding projects and NE 120<sup>th</sup> Street construction to revitalize the Totem Lake Business District to further the goal of **Economic Development.**"*

### BACKGROUND DISCUSSION:

At their regular meeting on November 3, 2011, City Council received information on summer 2011 activities related to the Totem Lake Flood control measures (Attachment A). That update described the work completed in 2011 and identified the ongoing plan to provide emergency pumping as a means to minimize possible occurrences of Totem Lake flooding through the 2011-2012 winter/wet season. Totem Lake pumping began in November, 2011.

The on-going pumping operations have been successful, and prior to Sunday, April 8<sup>th</sup>, 2012, there were no lane closures on Totem Lake Boulevard since March, 2011, despite a number of relatively significant rainfall events. The following table compares the outcomes of various storms over the last 30-month period:

Date	Rainfall (inches)	Totem Lake Blvd	Notes
<i>Prior to measures</i>			
October 17, 2009	2.06	Road closed	2-day storm
December 11-12, 2010	4.72	Road closed	3-day storm ("Pineapple Express")
January 13, 2011	1.62	South curb lane closed	2-day storm /1-in. rain/several of snow)
March 14, 2011	1.81	North curb lane closed	3-day storm
<i>After measures</i>			
November 21-24, 2011	3.40	No closure	4-day rain storm
January. 20-22, 2012	1.66	No closure	3-day rain storm / 4-6 in. of snow
March 9-15, 2012	3.39	No closure	7-day rain storm
April 8, 2012	NA	Southbound lane closure	Sink-hole developed

**TABLE 1.** Storm related closures of Totem Lake Boulevard before and after flood control measures

On April 8<sup>th</sup>, the southbound center turn lane of Totem Lake Boulevard developed what was reported by Kirkland Police as a "pot hole" (Attachment B). City staff responding to the scene discovered what had developed into a 2-3 foot diameter sinkhole in the road immediately above two large diameter storm drains; the roadway has continued to give way and efforts to shore the cavity and cover the hole have been put in place temporarily. As of this memo, staff had steel plates on the center turn lane of Totem Lake Boulevard and is working with a local contractor to assist in dewatering of the pipes to determine the level of failure. Information will be relayed to City Council at their April 17<sup>th</sup> meeting along with a likely funding request for storm drain and pipe replacement.

In addition to successfully providing flood control this winter, the emergency pumping operation at Totem Lake has also provided an opportunity for closer inspection of the existing corrugated metal pipe (CMP) drainage system that outlets from Totem Lake. Specifically, there is a series of twin (side by side) 42-inch CMP culverts that convey water from Totem Lake along the northern/eastern edge of Totem Lake Boulevard, under 120<sup>th</sup> Avenue NE, and then under Totem Lake Boulevard. From there, water is conveyed under I-405 and to the west as Juanita Creek. These twin culverts are approximately 60-years old and are at the end of their anticipated design life. Until this year, inspection of these culverts had not been possible due to depth of the pipes and the high water level in the drainage system. The removal of sediments and vegetation last summer, combined with the on-going pumping activities, has reduced the water level to allow maintenance staff to visually inspect the condition of the twin pipes. Additionally, due to the failure on April 8<sup>th</sup>, staff has been able to observe three significant conditions:

120<sup>th</sup> Ave NE culverts --

1. The southern culvert crossing 120<sup>th</sup> Ave NE is severely clogged with sediment;
2. The northern culvert crossing 120<sup>th</sup> Ave NE is partially crushed and is the cause of a sink hole on the Chevron property near the intersection of Totem Lake Boulevard and 120<sup>th</sup> Ave NE; and
3. Sections of each of the culverts show signs of significant deterioration.

The combination of these conditions is cause for taking immediate action to replace the existing culverts. At this time, the culverts are operating at a capacity that is less than half of their original design flow capacity, and their replacement will restore the flow capacity and improve overall drainage out of Totem Lake. In addition to the drainage improvements, replacement will eliminate the potential collapse of 120<sup>th</sup> Avenue NE or Totem Lake Boulevard were the culverts to fail due to further structural degradation.

Staff requests City Council's authorization to fund this project in order to immediately begin the design and necessary permitting efforts for the replacement of the twin culverts. This is the primary project that was contemplated as the "*Phase II flooding projects*" in the Work Program. The funding needed for the engineering and permitting costs is estimated to be \$390,000 and is available from the 2011 Annual Storm Drain Replacement Program (Attachment C & D). It is anticipated that design will be completed in 2012. Permitting through agencies that include the Washington State Departments of Fish and Wildlife, Ecology, and Transportation, the Army Corps of Engineers, the King Conservation District and the City will be completed by late spring 2013, and construction will follow immediately thereafter. Funding for the construction phase is currently being identified in the 2013-2018 Capital Improvement Program with a total project cost of approximately \$1.5M (CSD-0075).

Given City Council approval, design and permitting will be completed in time to bid the Project for construction during the fish work window of July through September, 2013. Until construction, staff will continue to address sediment, vegetation, and beaver dam removal throughout the Totem Lake drainage system concurrent with ongoing pumping operations. Emergency pumping permits have been secured through 2014.



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**MEMORANDUM**

**To:** Kurt Triplett, City Manager

**From:** Noel Hupprich, P.E., Senior Project Engineer  
Ray Steiger, P.E., Public Works Director

**Date:** November 3, 2011

**Subject:** TOTEM LAKE FLOOD CONTROL MEASURES – PROJECT UPDATE

**RECOMMENDATION:**

It is recommended that City Council receive this update on the Totem Lake Flood Control Measures Project (CSD-0059)

**BACKGROUND DISCUSSION:**

It was their regular meeting on July 19, 2011, that City Council received an earlier update on the Totem Lake Flood Control Measures Project. That update described analysis and design work completed by staff and the City's consultant, CH2MHill, Bellevue, WA, together with recommendations for maintenance work that would reduce the frequency and severity of flooding in the Totem Lake area. The analysis included a detailed survey of the Totem Lake drainage system and located "stream barriers" where accumulation of sediment, invasive vegetation and beaver dams are impacting the flow of water out of Totem Lake. The recommended maintenance work involved removal of accumulated sediment and vegetation at three locations, and the removal of one active beaver dam (Attachment A).

The original Project budget for 2011 was \$117,000 and estimates to perform the recommended work exceeded that amount. At their regular meeting of August 2, 2011, City Council authorized the use of an additional \$218,000 from the Surface Water Reserve Fund to complete the work, bringing the total available funding for 2011 to \$335,000. Permitting conditions required that the sediment and vegetation removal be completed by August 31, 2011; this was accomplished by an expedited permitting review process, cooperation from private property owners and from WSDOT, along with the City's ability to contract with the King County Rivers Team through an existing interlocal agreement. The sediment and vegetation removal work began in mid August and was complete by the end of August; the beaver dam removal was permitted separately and City crews completed that work in early September.

The following photos show the before (May, 2011) and the after (September, 2011) conditions at the three sediment and vegetation removal locations, including the beaver dam:

**1 - Totem Lake Outlet**



May, 2011



September, 2011

**2 - Settling Basin**



May, 2011



September, 2011

**3 - Drainage Channel East Side of I-405**

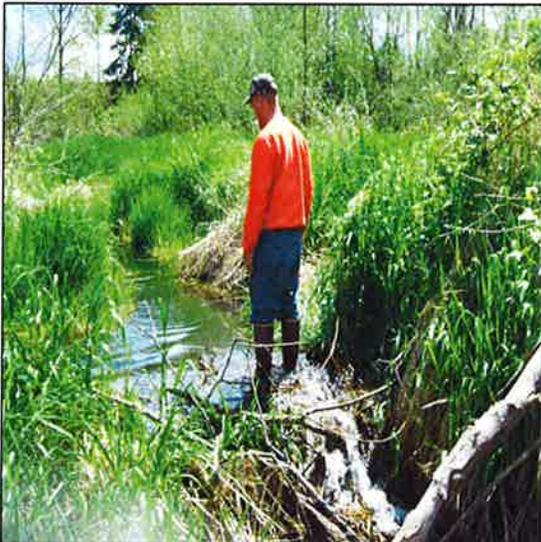


May, 2011



September, 2011

**4 - Beaver Dam West of 116<sup>th</sup> Ave NE**



May, 2011



September, 2011

The City's consultant, CH2MHill, conducted a new survey and collected water surface elevations after the maintenance work was finished. The results of that survey showed a decrease in the water surface elevation of three feet within the drainage system, between Totem Lake and the east side of I-405. The drop in water surface elevation exposed culverts within the system that had been submerged for over ten years, providing City crews an opportunity to inspect and repair one culvert known to be damaged, but previously submerged and inaccessible.

The work completed this year focused on "stream barriers" located between I-405 and Totem Lake. These activities allowed for the identification of other barriers not previously evident, particularly the area of drainage channel from the west side of I-405 to 116<sup>th</sup> Ave NE. The initial survey of the drainage channel found the area to be built up with sediment and vegetation; now that the drainage channel upstream has been cleaned out, it is clear that sediment and vegetation removal in the area between I-405 and 116<sup>th</sup> Ave NE will further improve flows out of Totem Lake. City staff and the design consultant will be working together to develop a plan for 2012 work to address further maintenance needs in this area.

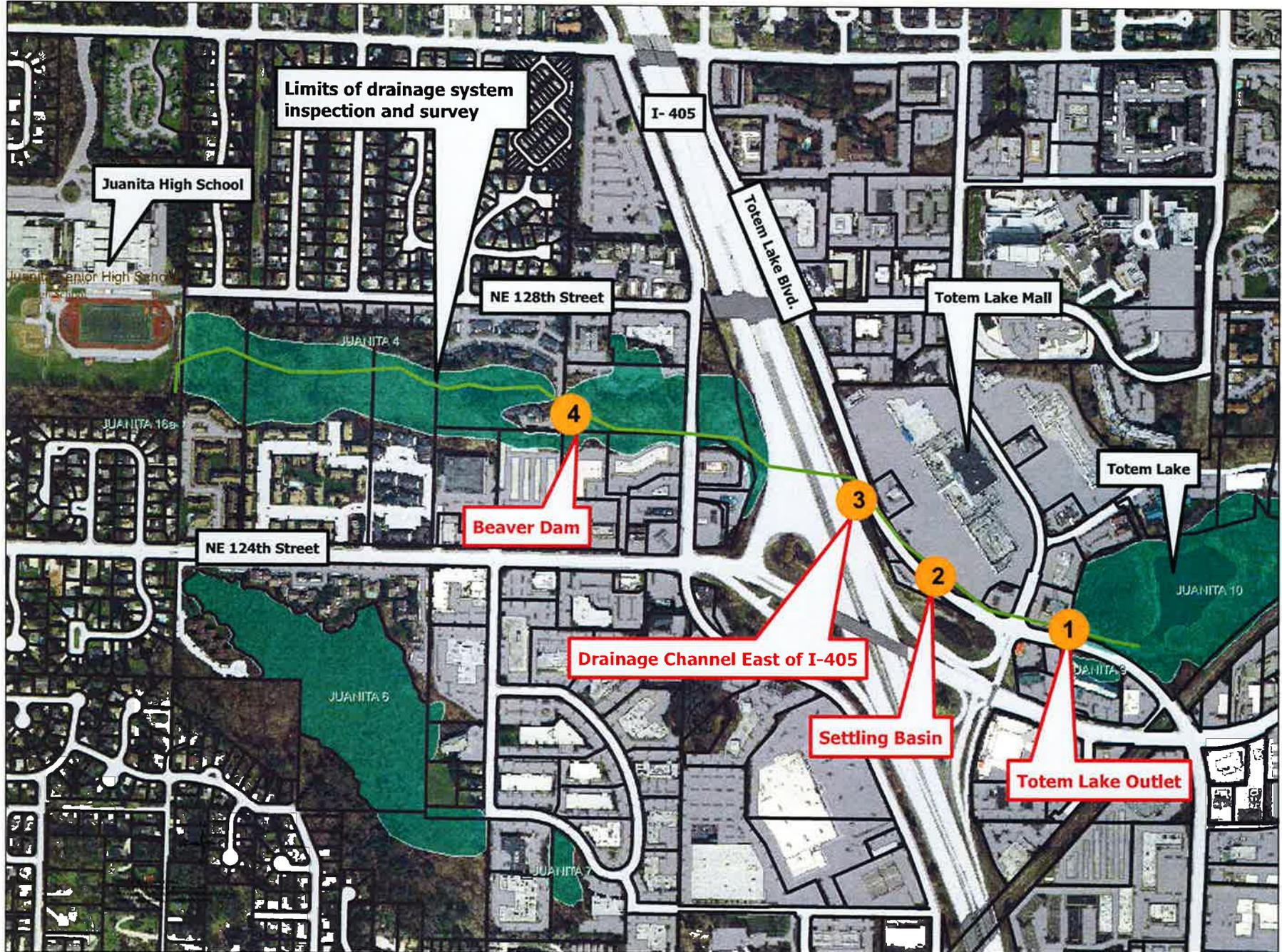
To immediately address the stream barriers on the west side of I-405 during this year's wet season (November through April), staff is currently working on a hydraulic pumping plan to move water around the sediment and vegetation "hump" that exists between I-405 and 116<sup>th</sup> Ave NE. The strategy for pumping during the wet season is to begin this activity in advance of significant storm events, or when the lake level rises above a determined elevation. The intent is to maintain storage capacity in the Lake to allow for an increase in volume during large storm events. The City's consultant is currently working on the analysis to define a water level that will trigger pumping.

The pumping plan will draw water from culverts beneath I-405 and divert it around the sediment and vegetation between I-405 and 116<sup>th</sup> Ave NE. The discharge water will be moved downstream where the drainage channel gradient is steeper and water does not typically back up (Attachment B). City maintenance crews are securing all material and equipment needed for the pumping system. The system will be comprised of a rigid intake pipe and a flexible hose discharge line. A large capacity pump will be brought to the site as needed; however, the intake and discharge lines will be left in place to allow for quick and easy set up.

City staff and the consultant have met with representatives from Department of Ecology, the Army Corps of Engineers, and the Washington Department of Fish and Wildlife (WDFW) to secure all necessary environmental permits. Staff has applied for a general Hydraulic Project Approval (HPA) from WDFW and the pumping plan is presently going through a standard SEPA determination process. All formal permits are expected to be received and the pumping system will be in place by the end of November. In the mean time, WDFW has approved temporary emergency pumping through its emergency HPA process, which is based on verbal authorization in the event that flooding is eminent.

Last winter, staff sent out flood preparedness letters to business and property owners who have been affected by flooding in the Totem Lake area. This year staff has prepared a follow up letter to provide an update on the flood control efforts completed to date and to continue to encourage individual preparedness (Attachment C). The letter describes the work the City is doing to reduce the frequency and severity of flooding, and offers flood awareness advice with web based links for additional information.

Attachments: (3)



### Totem Lake Flood Control Pumping Plan



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No warranty is made by the City of Totem for the accuracy  
of these materials, including the model.

November 16, 2011

[Name]  
[Address]

RE: Totem Lake Flood Preparedness

Dear [Property Owner],

The City would like to update you on flood control efforts around Totem Lake. We have made significant progress towards reducing the severity and duration of seasonal flooding. Further work to minimize flooding is planned, which will provide a greater level of protection. In the meantime, we hope for the best, prepare for the worst and encourage you to also be prepared. Along with specifics of how the City has been working on this critical area, we have included our seasonal reminders of steps that individuals can take to minimize potential property impacts due to heavy rains or snow events.

This summer the City completed the first steps in a multi-year process to address flood control in the area near Totem Lake. The work included a detailed survey of 5000 feet of conveyance channel downstream of Totem Lake, water surface level monitoring, and coordination with regulatory agencies. The survey identified several areas along the drainage channel where sediment and vegetation are impacting the outflow of Totem Lake. In August the City partnered with WSDOT and King County to remove built up sediment and vegetation along the conveyance channel between Totem Lake and the east side of I-405. This work increased the conveyance capacity of the drainage channel and lowered the level of the Lake by approximately three feet which will allow for greater storage of runoff from winter rains.

The work completed this year has improved flood control in the area; however, more work is necessary. Currently, the City is completing an emergency pumping plan that will be in place shortly to further reduce the risk of flooding, and Phase II of the multi-year project (scheduled for next construction season) will include the removal of the remaining sediment and vegetation in the conveyance system from I-405 downstream and to the west along the Totem Lake conveyance channel.

In the meantime, the City is continuing to maintain its monitoring of critical drainage structures. When wet weather is anticipated, City Crews are dispatched to ensure that the structures are clean and ready to function as they were designed. In addition, a traffic detour plan has been developed for use if the intersection of Totem Lake Boulevard and 120<sup>th</sup> Ave NE becomes inundated. With some planning now on your part, your business can continue uninterrupted through the winter rains.

Winter in the Pacific Northwest, especially in a second-in-a-row La Nina year as has been predicted, can mean large amounts of rainfall. The attached map shows areas that may be at risk of flooding when the level of Totem Lake rises in response to rainfall. Your business is located in one of these areas, and we want to assist you in locating sources of information on how to prepare for flooding and how to minimize your risk of damage from it. Because of its urban nature, Totem Lake can rise quickly depending on rainfall patterns (4 feet in about 8 hours during a large storm according to recent modeling), so it is important to be prepared before a rain event starts.

## **Flood Preparedness**

### Make Plans:

- Do you have flood insurance? If not, consider purchasing flood insurance. The majority of businesses around the lake are outside the FEMA 100-year flood plain (which is used by the National Flood Insurance Program to set flood insurance premiums), so insurance costs should be relatively low. See [www.floodsmart.gov](http://www.floodsmart.gov) for details.
- Identify areas of your property that may flood. Make a plan to move valuable items, equipment and materials out of range of floodwaters permanently or, if that is not possible, temporarily during an event (i.e. identify alternative storage locations).
- Teach employees how and when to safely turn off gas, electricity, and water lines.
- Stock sandbags and plan for sandbag placement.

### During a Flood:

- Watch the weather.
  - Monitor Seattle Rain Watch ([www.atmos.washington.edu/SPU/](http://www.atmos.washington.edu/SPU/)) to get a feel for how much rain has fallen and how much is coming. Totem Lake usually rises the most in response to large storm events (3 inches or more over a 24 hour period).
  - Look at the level of Totem Lake. Totem Lake Boulevard near the intersection of 120<sup>th</sup> Avenue NE is usually one of the first spots to be impacted by heavy rains, and may indicate that floodwaters are rising toward your property.
- Mark flood elevations on building and take pictures. This will help in filing flood insurance claims, and will assist engineers with modeling conditions and designing flood reduction projects.
- Follow detour routes and do not drive through floodwaters. If your car stalls in a flooded area, abandon it as soon as possible and walk to safety from the direction you came.

### After a Flood:

- When re-entering your place of business, be cautious of potential gas leaks, electrical shorts, and live wires.
- Follow procedures for safe cleanup of household items, food, water supply, and property. For more information, go to [www.kingcounty.gov/health/preparedness](http://www.kingcounty.gov/health/preparedness).
- Contact the City of Kirkland Building Department at (425) 587-3600 regarding any questions on repairs that normally require a building permit such as foundation repairs, drywall and insulation replacement.

Further information and resources on flood preparedness is available at [www.govlink.org/storm/floods.asp](http://www.govlink.org/storm/floods.asp).

If you would like further information about Totem Lake or about flood preparedness, please contact Jenny Gaus, Environmental Services Supervisor, at (425) 587-3850 or [jgaus@ci.kirkland.wa.us](mailto:jgaus@ci.kirkland.wa.us). Thank you for your efforts to protect yourselves through this winter and beyond.

Sincerely,  
City of Kirkland

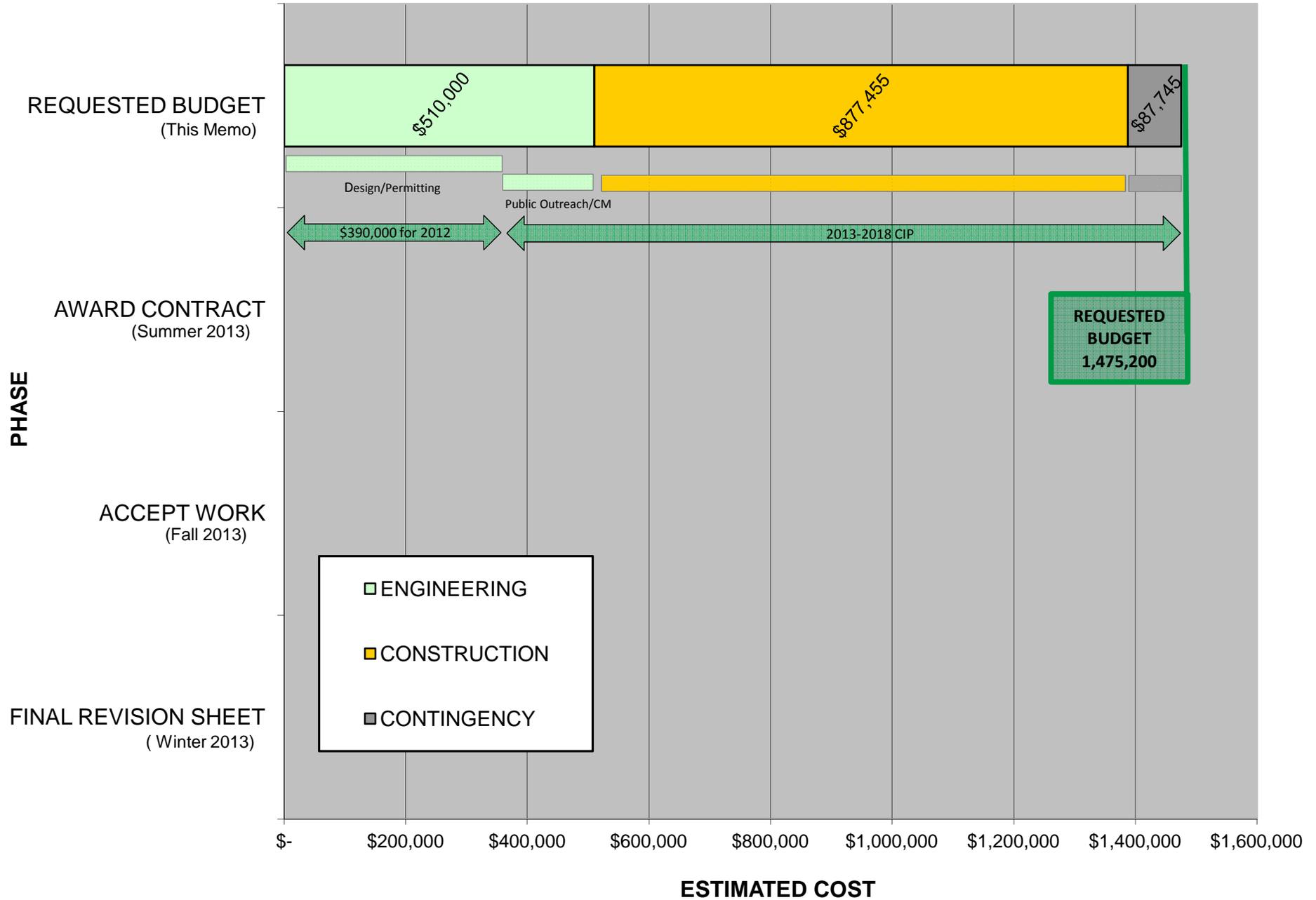
Ellen Miller-Wolfe  
Economic Development Manager

Jenny Gaus, PE, CSM  
Environmental Services Supervisor



# Totem Lake Twin 42-inch Culvert Replacement (CSD-0075)

## Project Budget Report



**FISCAL NOTE**

CITY OF KIRKLAND

Source of Request							
Ray Steiger, Public Work Director							
Description of Request							
Request for funding of \$390,000 for a new project to replace culverts in Totem Lake as part of flood control efforts (CSD 0075). This project is funded as a candidate from the Annual Storm Drain Replacement program (CSD 9999). Total project costs for CSD 0075 are estimated to be \$1,475,200. The balance will be funded in the upcoming 2013-18 CIP for completion in 2013.							
Legality/City Policy Basis							
Fiscal Impact							
The <b>Annual Storm Drain Replacement Program</b> project is an approved 2011-16 CIP project with a total 2011-12 budget of \$922,600 funded by utility rates. There is sufficient balance in this project to fund this request.							
Recommended Funding Source(s)							
<b>Reserve</b>	Description	2012 Est End Balance	Prior Auth. 2011-12 Uses	Prior Auth. 2011-12 Additions	Amount This Request	Revised 2012 End Balance	2012 Target
<b>Revenue/Exp Savings</b>							
<b>Other Source</b>	Annual Storm Drain Replacement Project balance. Estimated revised ending 2012 project balance is \$532,600 after funding this request for \$390,000.						
Other Information							
Prepared By		Neil Kruse, Senior Financial Analyst			Date		April 3, 2012