

Conceptual Project: Thornton Creek Trunk Replacement and Realignment

Capacity Needs Addressed

Thornton Creek Trunk

Project Identified in 2007 CSI Plan Update

Yes

Location

Sewer Agency: Seattle Public Utilities

Jurisdiction: City of Seattle

Planning Area: Northwest Lake Washington

Existing Facilities and Capacity Needs

Conveyance Facility	Upstream Manhole	Downstream Manhole	Length (ft)	Diameter (in)	Year Built	Capacity (mgd)	2060 20-yr Peak Flow (mgd)	2060 20-yr Peak Flow Exceeded (mgd)	Year Exceeded	2010 Level of Service (yr)
WW*THORNTON.NWW10-01(6)	NWW10-01	WO7-04	866	42	1965	54.58	81.85	27.27	2010	10.7
WW*THORNTON.WO7-04(4)	WO7-04	WO7-08	1,151	48	1965	33.60	81.85	48.25	2010	1.1
WW*THORNTON.WO7-08(1)	WO7-08	WO7-08A	340	48	1965	74.35	81.85	7.5	2043	> 20
WW*THORNTON.WO7-08A(2)	WO7-08A	WO7-11	744	42	1965	32.6	81.85	49.25	2010	1.0
WW*THORNTON.WO7-11(3)	WO7-11	WO7-14	1,425	42	1965	61.06	81.85	20.79	2012	> 20
WW*THORNTON.WO7-15(8)	WO7-15	WO7-23	1,225	48	1965	44.65	91.42	46.77	2010	2.1

Project Description

Components and Construction Methods

The Thornton Creek Trunk conceptual project addresses the capacity needs shown in the table above.

Thornton Creek Trunk begins at the confluence of the North Lake City and West Lake City trunks and ends at the Matthews Beach Pump Station. Capacity needs have been identified for the entire trunk.

The conceptual project includes diversion of flows from the North Lake City Trunk to the Thornton Creek Trunk through a new pipeline. The diversion includes 2,250 feet of 54-inch-diameter pipe. The upstream end of the new pipe connects to the North Lake City Trunk at NE 110th Street; the downstream end connects to the Thornton Creek Trunk in the athletic field north of NE 105th Street. The Thornton Creek Trunk will be replaced downstream from the point where the North Lake City Trunk diversion connects to the Thornton Creek Trunk. The existing 640-foot pipe segment from the North Lake City Trunk diversion location (manhole NWW10-02) to the current connection with the Thornton Creek Trunk will be taken out of service and abandoned in place.

Diversion of the inflows from the North Lake City Trunk at the upper portion of the existing Thornton Creek Trunk is proposed in order to avoid work in Meadowbrook Park. By diverting the flows, the upper portion of the existing Thornton Creek Trunk through Meadowbrook Park will have adequate conveyance capacity for the projected 2060 peak 20-year flows from the West Lake City Trunk. A new easement of approximately 960 lineal feet through a Seattle Public Schools property will be required.

Conveyance Facility	Segment (manholes)	Project Element	Construction Methodology	Diameter (in)	Length (ft)	Design Capacity (mgd)
North Lake City diversion	NWW10-02 to W07-06	North Lake City diversion	Trench-cut	54	2,250	71.7
		Easement through school property	N/A	N/A	N/A	N/A
WW*THORNTON.W07-04(4)	W07-06 to W07-08	Pipe replacement	Trench-cut	60	521	103
WW*THORNTON.W07-08(1)	W07-08 to W07-08A	Pipe replacement	Trench-cut	60	340	103
WW*THORNTON.W07-08A(2)	W07-08A to W07-11	Pipe replacement	Trench-cut	60	744	103
WW*THORNTON.W07-11(3)	W07-11 to W07-14	Pipe replacement	Trench-cut	60	1,425	103
WW*THORNTON.W07-15(8)	W07-15 to W07-23	Pipe replacement	Trench-cut	72	1,225	114
		City of Seattle street use fee	N/A	N/A	N/A	N/A

Upstream and Downstream Projects

Upstream Projects: North Lake City Trunk Replacement, Realignment, and Rehabilitation

Downstream Projects: None

Concepts Evaluated

- **Storage.** Storage was evaluated as an alternative to conveyance replacement. The estimated required storage volume is in excess of 20 MG. Storage was not evaluated further because it would be difficult to find a site with adequate space for such a large storage facility in the urban project area and costs to construct the facility would be high compared to replacement and diversion. In addition, the pipe will likely need to be replaced in the near future because of its age (built in 1965) and while inspection information from 2012 rated the condition of the existing trunk as structurally sound, it did show signs of corrosion sedimentation, root intrusion, and infiltration.
- **Paralleling.** The Thornton Creek Trunk was constructed in 1965 (over 50 years old). Inspection information from 2012 rated the condition of the existing trunk as structurally sound yet showing signs of corrosion sedimentation, root intrusion, and infiltration. Paralleling was not considered further for a conceptual project because of age and condition.

Estimated Project Costs

Estimated project costs for the Thornton Creek Trunk Replacement and Realignment Project are shown in the table below. Cost estimating methodologies are as follows:

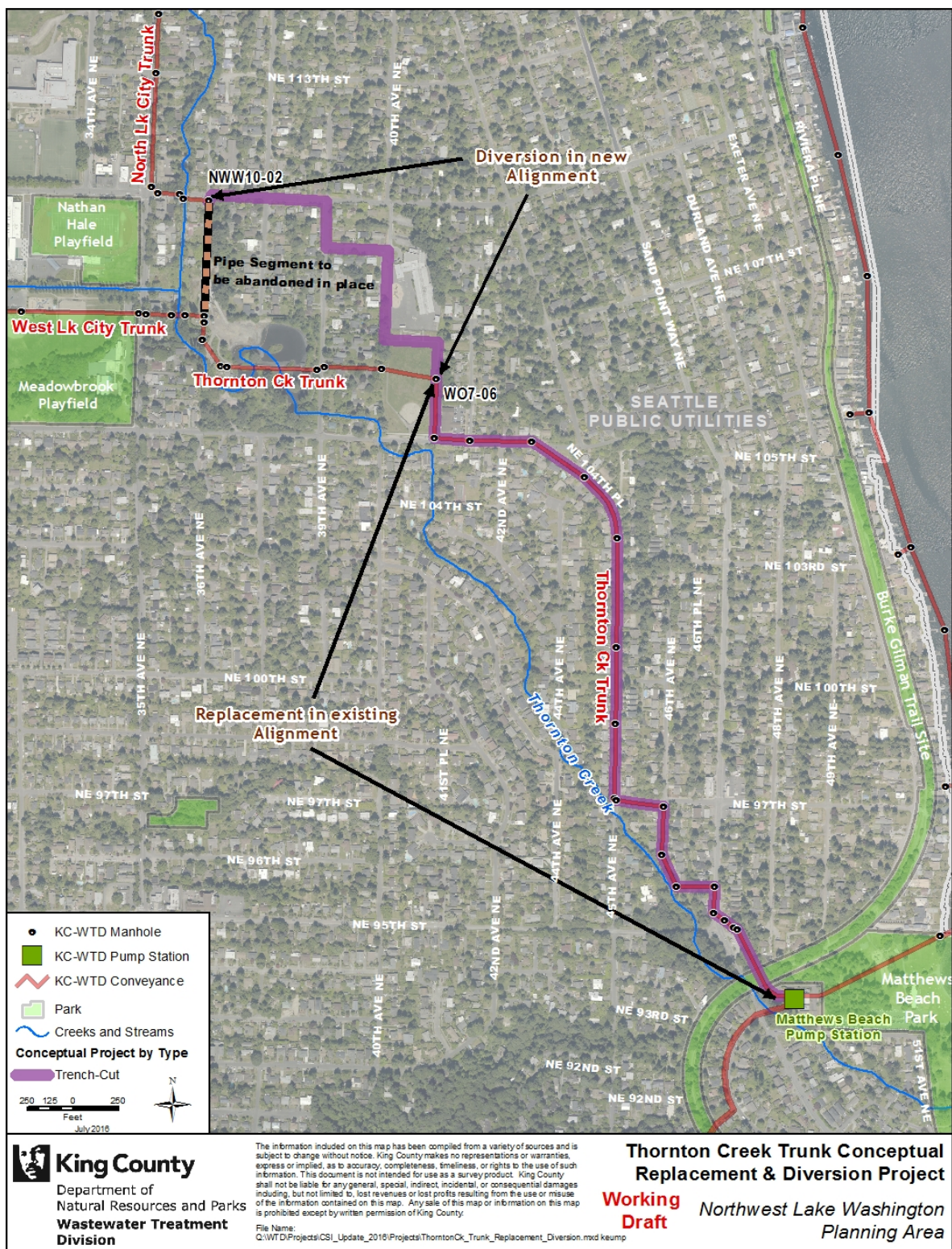
- The construction cost was estimated with Tabula conveyance system cost estimating software. Tabula is a parametric construction cost estimation tool used for conceptual or feasibility studies for projects at the 0 to 2 percent design level. Additional information on Tabula can be found at <http://www.kingcounty.gov/services/environment/wastewater/csi/tabula.aspx>.

- Dimensions for project components were rounded up for the Tabula estimates. For example, costs to replace a pipe reach of 4,756 feet would be estimated for a length of \$4,800 feet.
- Allied costs (including design allowance, change order allowance, engineering, permitting, WTD staffing) were estimated based on a percentage of project construction costs in WTD's project management database, PRISM. These allied cost percentages are based on a statistical analysis of different types and sizes of WTD's historical project costs over time.
- Overall project contingency (30 percent), construction cost allowances for indeterminate items (25 percent), and construction change order allowances (10 percent) are added in accordance with WTD estimating guidelines appropriate to this class of estimate.
- The estimate is an early AACE International Class 5 cost estimate based on 0–2 percent project design. Class 5 estimates are considered to have an accuracy range of -50 percent to +100 percent (AACE RP No. 18R-97, Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries: http://www.aacei.org/toc/toc_18R-97.pdf).

**DRAFT Conceptual Projects to Meet Identified Capacity Needs
Northwest Lake Washington Planning Area**

Conceptual Estimate - AACEI Class 5					
Project Name:	Thornton Creek Trunk Replacement and Realignment			Date:	7/7/2016
Location:	Northwest Lake Washington Planning Area - from the confluence of North Lake City and West Lake City trunks to the Thornton Creek Trunk			Estimator:	Eric Trimble (VMS) Douglas Leo (VMS)
Description:	The Thornton Creek Trunk will be replaced from the point where the North City Trunk diversion connects to the Thornton Creek Trunk - project includes diversion of flows from the North Lake City Trunk to the Thornton Creek Trunk through a new pipeline			Version:	1
DIRECT: SUBTOTAL CONSTRUCTION COSTS					
Item No.	Item Description	Quantity	Units	Unit Cost	Item Cost
1	NLC Diversion - 54-in Diversion Pipeline (NWW10-02 to W07-06)	2,250	LF	\$ 1,514	\$ 3,406,168
2	60-in Trench-Cut Replacement Pipeline - W07-06 to W07-08	521	LF	\$ 1,501	\$ 782,181
3	60-in Trench-Cut Replacement Pipeline - W07-08 to W07-08A	340	LF	\$ 1,422	\$ 483,411
4	60-in Trench-Cut Replacement Pipeline - W07-08A to W07-11	744	LF	\$ 1,701	\$ 1,265,890
5	60-in Trench-Cut Replacement Pipeline - W07-11 to W07-14	1,425	LF	\$ 1,688	\$ 2,405,032
6	72-in Trench-Cut Replacement Pipeline - W07-15 to W07-23	1,225	LF	\$ 2,256	\$ 2,763,326
7					\$ -
8					\$ -
9					\$ -
10					\$ -
11					\$ -
12					\$ -
13					\$ -
14					\$ -
15					\$ -
16					\$ -
17					\$ -
18					\$ -
19					\$ -
20					\$ -
Subtotal Construction Costs					\$ 11,110,000
DIRECT: SUBTOTAL ADDITIONAL CONSTRUCTION COSTS					
Street Use Permit					\$ 300,000
Mitigation Construction Contracts					\$ -
Allowance for Indeterminates (Design Allowance)					\$ 2,777,500
Subtotal Construction Bid Opening Amount					\$ 14,187,500
Owner Furnished Equipment					\$ 250,000
Outside Agency Construction					\$ 500,000
Construction Contract/OFE Change Order Allowance					\$ 1,493,750
Subtotal KC Contribution to Construction					\$ 16,431,250
Sales Tax					\$ 1,577,400
DIRECT: SUBTOTAL OTHER CAPITAL CHARGES					
KC/WTD Direct Implementation					\$ -
Misc. Capital Costs					\$ 46,008
TOTAL DIRECT CONSTRUCTION COSTS					\$ 18,050,000
INDIRECT: NON-CONSTRUCTION COSTS					
Engineering Services					\$ 3,614,875
Planning & Management Services					\$ 1,478,813
Permitting & Other Agency Support					\$ 205,391
Right-of-Way					\$ 422,200
Misc. Service & Materials					\$ 542,231
Non-WTD Support					\$ 254,684
WTD Staff Labor					\$ 1,884,089
Subtotal Non-Construction Costs					\$ 8,402,283
Project Contingency					\$ 7,937,082
Initiatives					\$ 205,391
TOTAL INDIRECT NON-CONSTRUCTION COSTS					\$ 16,540,000
TOTAL PROJECT COST					\$ 34,600,000

Conveyance System Improvement Program Update



Outline for CSI Program Update Report

Short summary	1-2 pages
Purpose, Scope, and Assumptions	1-2 pages
Background	3-5 pages
RWSP policies and definition of 20-year standard	
Service area and systems	
Previous CSI planning and related programs	
Summary of 2007 update (number of projects and total cost)	
Developments and changes since 2007 update	
Identified Projects	10-15 pages (with tables and figures)
Processes used to identify needs and projects	
Process used to prioritize projects	
Level of service	
Facility condition	
Local agency input	
Coincident benefits	
Tables listing capacity driven projects	
Equity and Social Justice and projects	
Next Steps	1-2 pages
Appendices	
2015 Regional Needs Assessment	
2017 Conceptual Projects to Address Identified Capacity Needs	