

Technical Report South Lake Union Streetcar Project

Stormwater

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The City of Seattle Department of Transportation

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Table of Contents

CHAPTER 1	SUMMARY	1-1
CHAPTER 2	INTRODUCTION.....	2-1
CHAPTER 3	PROJECT DESCRIPTION	3-1
CHAPTER 4	REGULATORY CONTEXT	4-1
	4.1 SMC 22.800 City of Seattle Drainage Code Requirements.....	4-1
	4.2 CWA 303d Listed Waters Requirements	4-1
	4.3 National Pollutant Discharge Elimination System Requirements	4-2
CHAPTER 5	AFFECTED ENVIRONMENT	5-1
	5.1 Drainage System Overview.....	5-1
	5.3 Surface Water and Drainage System.....	5-1
CHAPTER 6	IMPACT ANALYSIS	6-1
	6.1 Impervious Pavement Revisions.....	6-1
	6.2 Stormwater Detention	6-1
	6.3 Direct Discharge to Lake Union.....	6-1
CHAPTER 7	CONSTRUCTION	7-1
	7.1 Stormwater Pollution Prevention Plan and TESC Measures.....	7-1
	7.2 Spill Prevention, Control and Countermeasure Plan.....	7-2
	7.3 Other Measures	7-2
CHAPTER 8	REFERENCES.....	8-1

List of Figures

Figure 3-1: Project Area	3-2
Figure 5-1: Location of King County Trunk Sewer Connections and the Lake Union Outfall ..	5-2
Figure 5-2: Conveyance Piping: South Area	5-3
Figure 5-3: Conveyance Piping: North Area	5-4

Chapter 1

Summary

The City of Seattle, in cooperation with the Federal Transit Administration (FTA), proposes to construct a new streetcar line in the South Lake Union area of Seattle. This line would provide additional transit connections to downtown Seattle and would serve an area undergoing rapid and widespread redevelopment. The proposed South Lake Union Streetcar Project would begin near the intersection of Olive Way and 5th Avenue in downtown Seattle. It would extend north through the Denny Triangle and South Lake Union neighborhoods and terminate near the intersection of Fairview Avenue North and Ward Street near the Fred Hutchinson Cancer Research Center. The streetcar line would connect these important destinations with the regional transit hub at Westlake Center, which would be a major connection point for light rail, buses and monorail. The length of the proposed streetcar line would be approximately 1.3 miles in each direction (2.6 track miles total).

Stormwater detention for the proposed project would be provided where required under City of Seattle Ordinance 22.800. No substantial changes to the existing combined conveyance system are anticipated. Storm drain inlets and catch basins would be relocated as required, to accommodate proposed streetcar stations. As the project progresses through preliminary engineering, some minor changes may be necessary to avoid any potential physical or operational conflicts between existing combined conveyance system facilities and the proposed streetcar project.

Chapter 2

Introduction

This report's objective is to evaluate potential environmental impacts to the existing combined stormwater system and drainage in the project area arising from the construction as well as the operation of the proposed Seattle Streetcar project. The report reviews stormwater regulations, the existing stormwater facilities in the project area, and the proposed stormwater facilities for the streetcar project.

This report is organized into eight chapters. Chapters following the report summary (Chapter 1) and this introduction (Chapter 2) include:

- Chapter 3: Project Description
- Chapter 4: Regulatory Context
- Chapter 5: Affected Environment
- Chapter 6: Impact Analysis
- Chapter 7: Construction
- Chapter 8: References

Chapter 3

Project Description

The City of Seattle, in cooperation with the U.S Department of Transportation Federal Transit Administration (FTA), proposes to construct a new streetcar line to serve the downtown, Denny Triangle and South Lake Union areas of Seattle. This line would provide local transit service, connect to the regional transit system, accommodate economic development, and contribute to neighborhood vitality. The project elements and construction are discussed in detail in the *South Lake Union Streetcar Project Description Memo* (Parsons Brinckerhoff, March 2005).

The proposed South Lake Union Streetcar would begin in the vicinity of the intersection of Westlake Avenue and Olive Way/5th Avenue in downtown Seattle (see Figure 3-1). It would extend north through the Denny Triangle and South Lake Union neighborhoods and terminate in the vicinity of Fairview Avenue N. and Ward Street near the Fred Hutchinson Cancer Research Center. The line would connect these neighborhoods and destinations with the regional transit hub at Westlake Center, which will be a major connection point for light rail, buses and monorail. The length of the proposed streetcar line is approximately 1.3 miles in each direction (2.6 track miles total) and the tracks and stops would be constructed entirely within existing right-of-way.

The streetcar would share the street with automobile traffic. Initially, the streetcar is expected to operate for 15 hours per day (roughly 6 AM to 9 PM), with fifteen minutes between cars. Ultimately, the system is expected to operate for 18 hours per day (roughly 5 AM to 11 PM), with ten minutes between cars.

As shown in Figure 3-1, streetcar stops would typically be side-platform corner-curb bulbs located within the parking lane at the far side of an intersection. Two stops would be center platform configurations: one within Fairview Avenue N. at the Fred Hutchinson campus and one in the railbank north of Valley Street adjacent to South Lake Union Park.

Bi-directional, low-floor, single-car, articulated streetcars are proposed. They are typically 66 feet long, 11.5 feet high, and 8 feet wide and run on standard gauge tracks. The streetcar would be powered by an overhead electrical system similar to those used by streetcars in cities such as Tacoma, Washington and Portland, Oregon.

A maintenance facility at the southwest corner of Fairview Avenue N. and Valley Street is also planned as part of this project. The maintenance facility building would be approximately 100 x 70 feet. Two additional yard storage tracks would also be provided. Daily vehicle maintenance and inspections and minor repairs would be completed at the facility.

In the typical construction method for the streetcar track system, the top 12 to 18 inches of pavement would be removed and replaced with rail-embedded reinforced concrete slabs within a trench approximately eight feet wide. This project would also involve upgrading the stormwater detention system, relocation of utilities, and installation of traction power substations.

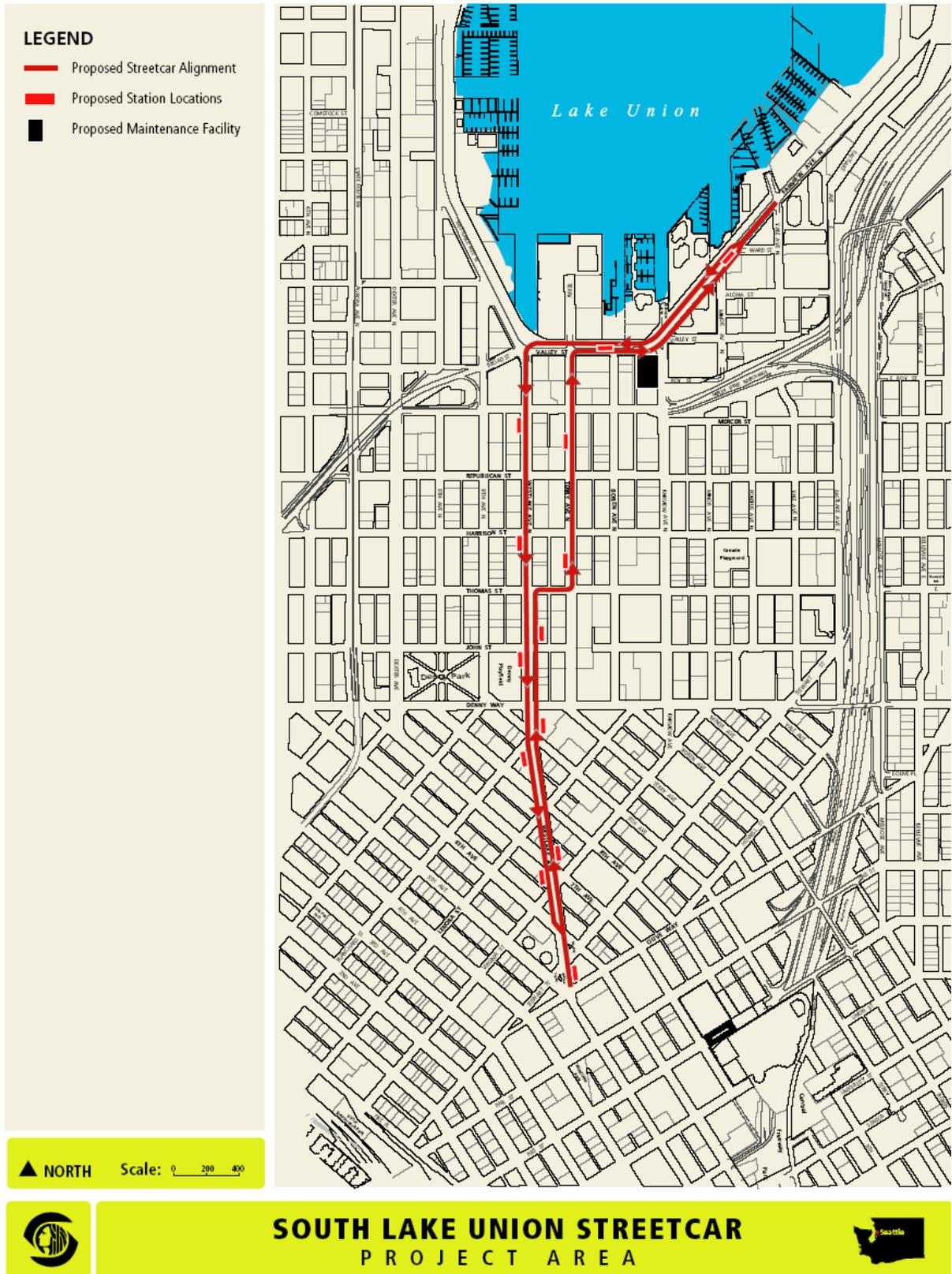


Figure 3-1: Project Area

Chapter 4

Regulatory Context

Current local, state, and federal regulations will determine how stormwater issues related to both construction and operation of the proposed streetcar line will be treated. These regulations are summarized in this chapter.

4.1 SMC 22.800 City of Seattle Drainage Code Requirements

Stormwater drainage within the City of Seattle is governed by Seattle Municipal Code (SMC) Chapters 22.800 through 22.808, also known as the *Stormwater, Grading and Drainage Control Code*. In particular, Section 22.802.015 of the SMC requires that,

The peak drainage water discharge rate from the portion of the site being developed shall not exceed 0.2 cubic feet per second per acre under 25-year, 24-hour design storm conditions or 0.15 cubic feet per second per acre under 2-year, 24-hour design storm conditions unless the site discharges water directly to a designated receiving water or to a public storm drain which the Director of SPU determines has sufficient capacity to carry existing and anticipated loads from the point of connection to a designated receiving water body. Projects with more than 2,000 square feet of new and replaced impervious surface shall be required to install and maintain a flow control facility, in accordance with rules promulgated by the Director that is sized for the volume of runoff routed through the facility. Approved exceptions and flow control methods may be prescribed in rules promulgated by the Director.

In addition, the SMC 22.802.015 sets action thresholds for water quality treatment for any new development or redevelopment project, as follows:

1. 5,000 square feet or more *new*, or one acre of accumulative *new and replaced*.
2. One acre of accumulative *new and replaced* vegetative cover or exposed soil subject to the use of pesticides and fertilizers (including lawns, golf courses, landscaped areas, parks and sports fields) unless a landscape management plan is submitted and approved by the Director.

4.2 CWA 303d Listed Waters Requirements

Section 303(d) of the federal Clean Water Act requires states to develop a list of polluted water bodies every two years. For each polluted water body, the law requires states to develop Total Maximum Daily Loads (TMDLs). A TMDL is the amount of pollutant loading that can occur in a given water body (river, marine water, wetland, stream, or lake) and still meet water quality standards. TMDLs are implemented through permits to point-source dischargers and through non-regulatory programs for non-point-source discharges.

Currently, no TMDL limits exist for discharges to Lake Union. However, pollution-level monitoring and testing in Lake Union have shown elevated Category 5 levels for lead, aldrin, fecal coliform, and ammonia-N are above Clean Water Act requirements. Category 5 waters are those water bodies where at least one characteristic or designated use is impaired, as evidenced by failure to attain the applicable water quality standard for one or more pollutants.

The Washington State Department of Ecology (Ecology) plans to submit these findings to the U.S. Environmental Protection Agency (EPA) in the spring of 2005. As a result, Lake Union may be listed in the future as a polluted water body.

4.3 National Pollutant Discharge Elimination System Requirements

The construction of the project would require an NPDES construction stormwater general permit because the construction activities related to the installation of the rail tracks and platforms, the underground concrete pipe detention facilities, and the maintenance facility would disturb more than one acre of land and could result in potential discharge (indirectly) to Lake Union.

Chapter 5

Affected Environment

This section describes the existing drainage issues pertinent to the proposed South Lake Union Streetcar Project. These issues include the following: an overview of the drainage system as well as a brief description of specific elements of the system in the project area.

5.1 Drainage System Overview

The existing drainage system between Olive Way and Fairview Place North consists of inlet and catch basin catchment structures discharging into the City's combined storm and sanitary sewer system. The combined sewer system flows into King County trunk sewer lines located at Westlake Avenue and 7th Avenue; Westlake Avenue North and Republican Street; and Terry Avenue North and Republican Street. These flows are then directed to the recently completed Mercer Street Tunnel, which was constructed as a part of the Denny/Lake Union Combined Sewer Overflow (CSO) control project. From here, combined sewage is discharged either, to Puget Sound after treatment at the West Point Treatment Plant, or to Elliott Bay after localized treatment through the Mercer Tunnel and Elliott West CSO Control Facility.

North of Fairview Place North, however, drainage is separated from the sanitary sewer system. Stormwater flows drain from this area into Lake Union via a storm outfall at Minor Avenue North. Figure 5-1 is a general map that shows the location of the Minor Avenue North outfall and the pipe storm connections with the King County trunk sewer.

5.3 Surface Water and Drainage System

The project area is characterized by a complex network of underground sewer and stormwater conveyance piping. Figure 5-1 shows the location of the one stormwater outfall that exists in the project area. It is 72 inches in diameter. The combined sewer system lines south of Fairview Place North are shown in Figure 5-2 and Figure 5-3.



Figure 5-1: Location of King County Trunk Sewer Connections and the Lake Union Outfall

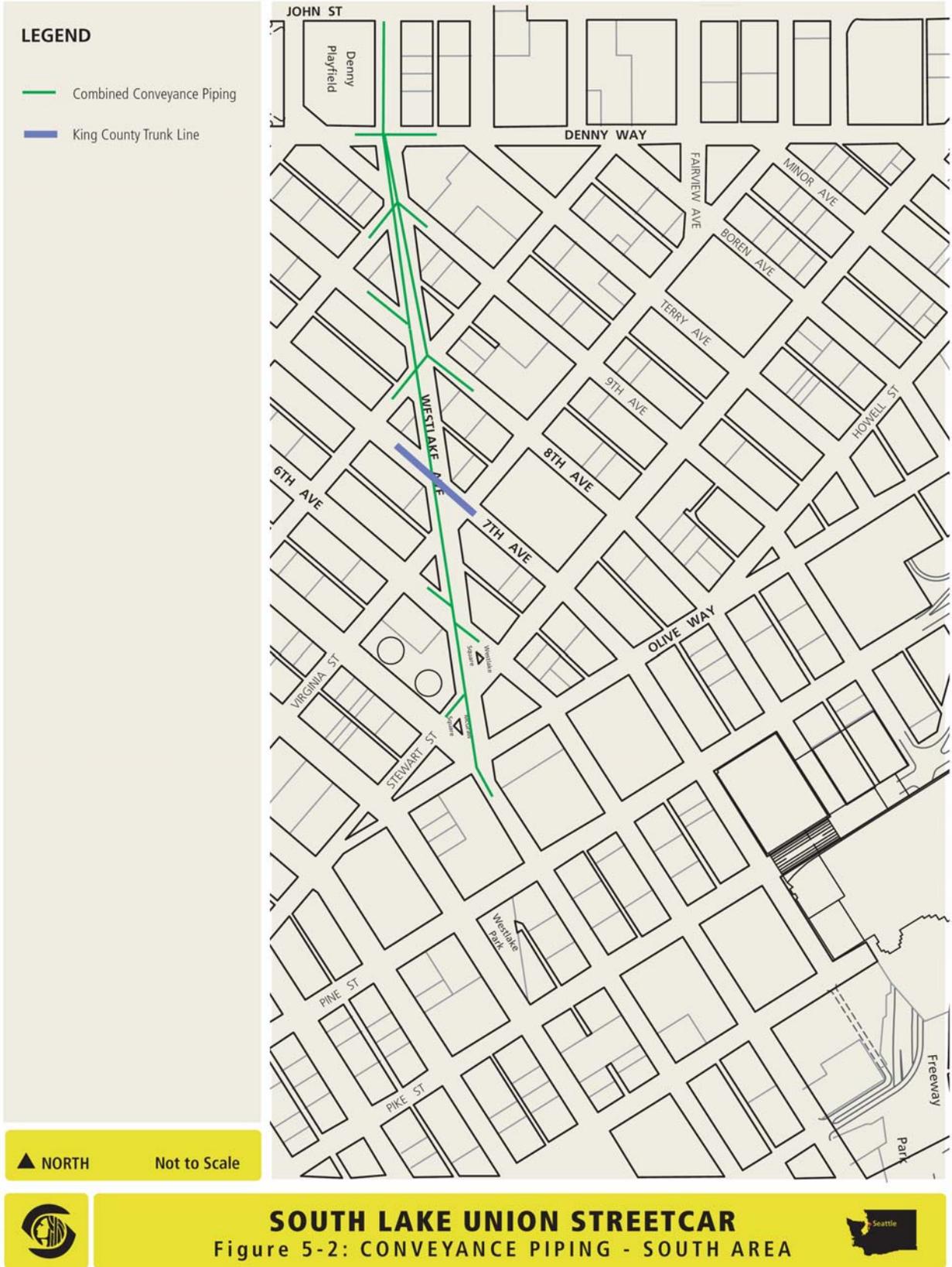


Figure 5-2: Conveyance Piping: South Area

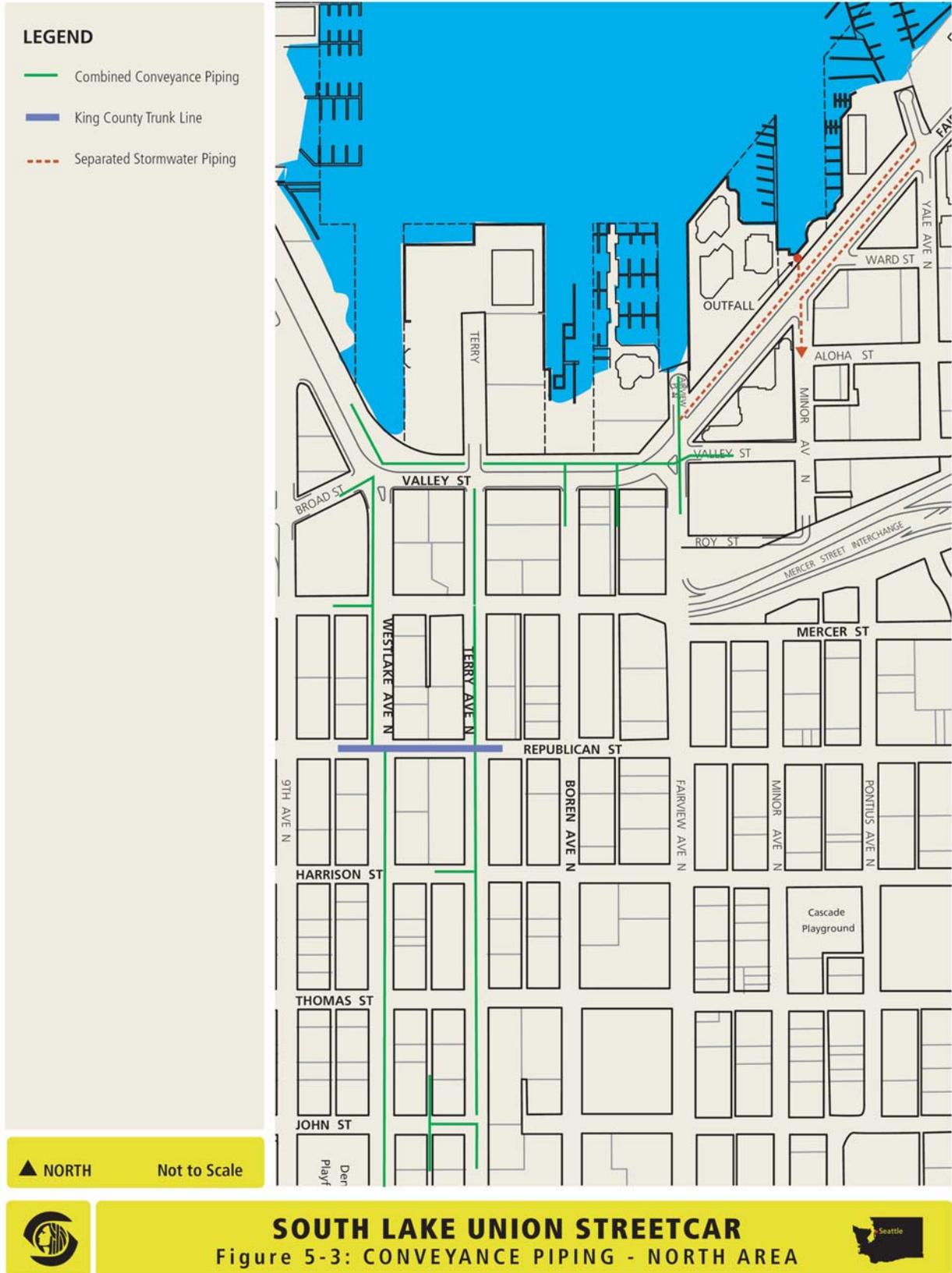


Figure 5-3: Conveyance Piping: North Area

Chapter 6

Impact Analysis

The proposed project would cross five combined-sewer sub-basins and one stormwater sub-basin draining into Lake Union.

6.1 Impervious Surface Revisions

The construction of the proposed streetcar project facilities would not create new impervious pavement. The rail tracks and station platforms would be installed within existing right-of-way or adjacent sidewalks of existing paved roadways. The new track located north of Valley Street is proposed to use ballasted track between the rail ties. Track constructed on ballast and ties is considered a pervious non-pollution generating surface (PNPGS).

The proposed maintenance facility site is currently an impervious site, which includes two buildings and a parking area. A very minor amount of impervious surface increase (less than 5,000 square feet) is anticipated to result from construction of pedestrian boarding stations and a subsequent loss of sidewalk strip landscaping.

6.2 Stormwater Detention

The South Lake Union Streetcar Project would involve constructing stormwater detention facilities to meet the requirements of City of Seattle Municipal Code 22.800 (also known as the *Stormwater, Grading, and Drainage Control Code*). Up to 5 pipe storm drain detention facilities will be constructed within roadway right-of-way. Construction of the stormwater detention facilities would include excavations of up to 15 feet in depth and generally require closure of two traffic lanes during their construction. One or more stormwater vaults will provide detention for the streetcar maintenance facility. Where required, peak discharge flows for 2- or 25-year storm events (as directed by the City) would match the City of Seattle's maximum release rates for discharging into the combined sewer system.

6.3 Direct Discharge to Lake Union

In the portion of the project area north of Fairview Place North, drainage is separated from the sanitary sewer system. Stormwater drains from this area into Lake Union via a storm outfall at Minor Avenue North. Within this area, there would be no increase in impervious area, and no impact to water quality.

Chapter 7

Construction

Construction activities can potentially cause temporary impacts to water quality. To minimize the potential for impacts, construction mitigation typically required for roadway pavement removal and roadway utility trenching will be required for the proposed South Lake Union Streetcar Project. All local, state, and federal permits required for this work will be obtained prior to commencement of work.

7.1 Stormwater Pollution Prevention Plan and TESC Measures

In preparation for the construction activities, a stormwater pollution prevention (SWPPP) plan will be prepared consistent with the Seattle Municipal Code 22.800, and the City of Seattle *Standard Plans and Specifications for Municipal Construction, whichever is more stringent*. The SWPPP plan will be required as a part of the NPDES Baseline General Permit.

The stormwater pollution prevention plan will incorporate Temporary Erosion and Sediment Control (TESC) measures. These will be required to minimize sediment runoff during construction. The TESC measures will avoid or minimize the occurrence that excavated soils and construction materials are deposited on streets or in conveyance piping, and will help prevent turbid water from entering Lake Union.

The plan also will describe the temporary Best Management Plans (BMPs) selected for water quality treatment during project construction. A BMP is a physical, structural, and/or managerial practice that prevents or reduces water pollution. The following BMPs will be included:

- Staging of construction equipment shall not occur in any sensitive or critical area.
- The contractor will be required to follow the City of Seattle Standard Specification for Road, Bridge, and Municipal Construction (section 1-07.5, Prevention of Environmental Pollution and Preservation of Public Natural Resources). In addition, the contractor will follow the Regional Road Maintenance Endangered Species Act Program Guidelines for maintenance category Road Way Surface (1.24-1.27) and outcome categories to Reduce Potential for Soil from Becoming Water or Airborne (page 2.18), Filter/Perimeter Protection (page 2.19), and Reducing Water Velocity/Erosive Force (page 2.21).
- The contractor shall provide inlet protection in accordance with city requirements.
- Catch basin filters will be used in catch basins located downgradient of each of the project sites to prevent sediments and construction-related pollutants from entering the storm drainage system during construction.
- Periodic maintenance and replacement of filters will be required.

- Trucked stockpiles will be covered with impervious barriers for protection from rain.
- Based on field conditions during construction, additional temporary BMPs may also be required.

7.2 Spill Prevention, Control and Countermeasure Plan

In addition to the TESC and BMP measures as part of the Stormwater Pollution Prevention Plan, a Spill Prevention, Control and Countermeasures (SPCC) Plan will be prepared and implemented. This plan will be prepared following the American Society for Testing and Materials (ASTM) E1527-00, *Standard Practice for Environmental Site Assessments*, the Ecology 2001 *Stormwater Management Manual for Western Washington*, and the SMC 22.800. The SPCC Plan's goals is to control pollutants on construction sites that have the potential to harm human health or the environment. The plan would specifically address the comprehensive control of pollutants that include, but are not limited to the following:

- Management of fuels, oils, solvents, and chemicals used in operations and maintenance;
- Solid waste decomposition products determined by the City of Seattle and the Department of Ecology to present a hazard; and
- Maintenance and management of contaminated soils and water encountered or generated on the construction site.

See the *South Lake Union Streetcar Project, Phase I Environmental Site Assessment* technical report for additional information and mitigation measures on this issue.

7.3 Other Measures

Further investigation is warranted prior to final project design and/or the start of project construction. The use of television camera inspection techniques is recommended.

Chapter 8

References

City of Seattle, *Drainage Facility Maps*

City of Seattle, Seattle Municipal Code Title 22.800, *Stormwater, Grading and Drainage Control Code*. Volume 1: Source Control Technical Requirements Manual, Volume 2: Construction Stormwater Control Technical Requirements Manual, Volume 3: Flow Control Technical Requirements Manual, and Volume 4: Stormwater Treatment Technical Requirements Manual. Seattle, Washington.

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