MAGNOLIA BRIDGE REPLACEMENT

Environmental Assessment

May 2015

Seattle Department of Transportation
Agreement No. T12-64

Washington State
Department of Transportation

U. S. Department of Transportation
Federal Highway Administration

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May 2015

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TABLE OF CONTENTS

COVER SHEET

FACT SHEET

ACRONYMS ..... **VII**

CHAPTER 1 EXECUTIVE SUMMARY **1-1**

1 Where is the Magnolia Bridge located? 1-1

2 What is the purpose of the Magnolia Bridge Replacement Project? 1-1

3 Why is the project needed and what would happen if the bridge were not replaced? 1-2

4 How was a Preferred Alternative selected? 1-3

5 What is the Preferred Alternative? 1-4

6 What would the new bridge look like? 1-4

7 When would construction begin and how long would it take? 1-6

8 How would construction be staged? 1-6

9 What are the project effects and mitigation? 1-8

10 Would the project have 'disproportionately high and adverse effects' on minority or low income environmental justice populations? 1-53

11 What measures are proposed to avoid or minimize effects to minority, low income and Limited English Proficiency populations? 1-54

CHAPTER 2 WHY DO WE NEED THIS PROJECT? **2-1**

1 What is the purpose of this project? 2-1

2 Why is the project needed and what would happen if the bridge were not replaced? 2-1

3 Why is this Environmental Assessment (EA) being prepared? 2-2

4 What will I find in this EA? 2-3

CHAPTER 3 HOW DID WE DEVELOP THE ALTERNATIVES? **3-1**

1 How were the alternatives developed? 3-1

2 How have the public and government agencies been involved? 3-2

3 What key concerns were raised? 3-6

4 How will we involve the public and government agencies in the future? 3-7

5 What alternatives were initially considered? 3-8

6 How was the Preferred Alternative selected? 3-13

7 How does the Preferred Alternative meet the project design goals, purpose and need? 3-21

CHAPTER 4 WHAT ARE THE MAIN ELEMENTS OF THE PROJECT? **4-1**

1 Where is the existing bridge and where would the new bridge be located? 4-1

2 What would the new bridge look like? 4-2

3 Would pedestrian and bicycle connections change? 4-3

4 What safety improvements would be included? 4-4

5 What would happen during construction? 4-5

6 What is the project construction schedule? 4-10

CHAPTER 5 HOW WOULD THE PROJECT AFFECT THE ENVIRONMENT? **5-1**

1 What are the existing conditions in the project area? 5-1
2 What information was prepared to evaluate the project? 5-2
3 How were project impacts evaluated? 5-3
CHAPTER 5.1 TRAFFIC AND TRANSPORTATION 5.1-1
1 How is the Magnolia community connected to the rest of Seattle? 5.1-1
2 How were the data for the project evaluated? 5.1-2
3 What is traffic like now on the bridge and surrounding area and what would happen in the future? 5.1-2
4 How would the project affect public transit? 5.1-4
5 How would the project affect pedestrians and bicyclists? 5.1-5
6 How would the project affect freight movements? 5.1-7
7 How would construction activities affect traffic? 5.1-8
8 What measures are proposed to avoid or minimize effects on traffic during construction? 5.1-9
CHAPTER 5.2 NOISE 5.2-1
1 How were noise levels evaluated for the Magnolia Bridge Replacement Project? 5.2-1
2 How noisy is the study area and what are the noise sources? 5.2-4
3 How would the completed project affect noise levels? 5.2-4
4 How would we minimize the effects of traffic noise? 5.2-5
5 How would project construction affect noise? 5.2-6
6 What measures are proposed to avoid or minimize noise effects? 5.2-6
CHAPTER 5.3 LAND USE PATTERNS 5.3-1
1 Why study land use patterns and project impacts? 5.3-1
2 How were land use patterns evaluated? 5.3-1
3 What are the study area boundaries? 5.3-2
4 What are the existing land uses in the study area? 5.3-2
5 What is the existing zoning in the study area? 5.3-5
6 What are future land uses and zoning in the study area? 5.3-8
7 What effects to land use were identified for the project? 5.3-8
8 What construction effects to land use were identified for the project? 5.3-11
9 Is the project consistent with planned land use and City zoning policies and regulations? 5.3-12
10 What measures are proposed to avoid or minimize effects on land use patterns? 5.3-13
CHAPTER 5.4 COMMUNITIES, NEIGHBORHOODS, AND BUSINESSES 5.4-1
1 Why study community, neighborhood, and business impacts? 5.4-1
2 What types of data were analyzed for the project? 5.4-1
3 What are the project study area boundaries? 5.4-2
4 What are the demographics of the study area? 5.4-4
5 What are the community and neighborhood conditions in the study area? 5.4-11
6 What are the current business and economic conditions in the study area? 5.4-15
7 What is the forecast for population and household growth? 5.4-17
8 What is the forecast for business and economic conditions in the study area? 5.4-18

9 How would the Preferred Alternative affect communities and neighborhoods? 5.4-18
10 How would communities, neighborhoods, and businesses be affected by construction activities?....5.4-22
11 Would the project have 'disproportionately high and adverse effects' on minority or low income environmental justice populations? 5.4-23
12 What measures are proposed to avoid or minimize effects to communities, neighborhoods and businesses? 5.4-25
CHAPTER 5.5 HISTORIC, CULTURAL AND ARCHAEOLOGICAL RESOURCES/SECTION 106 ....5.5-1
1 What are cultural resources? 5.5-1
2 How are impacts to cultural resources evaluated under Section 106? 5.5-2
3 What is the Magnolia Bridge Replacement Project Area of Potential Effects? 5.5-2
4 What historic resources are located within the Area of Potential Effects? 5.5-3
5 What archaeological resources are located within the Area of Potential Effects? 5.5-3
6 Would any cultural resources be affected by the project? 5.5-4
7 What measures are proposed to avoid or minimize effects to historic, cultural and archaeological resources? 5.5-6
CHAPTER 5.6 PARK, RECREATIONAL AND 4(F) RESOURCES 5.6-1
1 What is Section 4(f)? 5.6-1
2 What are Section 4(f) resources? 5.6-1
3 How are impacts to Section 4(f) resources evaluated? 5.6-2
4 Are there Section 4(f) resources in the project area? 5.6-2
5 Would local parks and recreational area Section 4(f) resources be affected by the project? 5.6-6
6 Would historical Section 4(f) resources be affected by the project? 5.6-8
7 How would Section 4(f) resources be affected during construction? 5.6-9
8 What measures are proposed to avoid or minimize effects to parks, recreational and Section 4(f) resources? 5.6-9
CHAPTER 5.7 PUBLIC SERVICES AND UTILITIES 5.7-1
1 Why are impacts to public services and utilities being considered? 5.7-1
2 What are the boundaries of the project study area? 5.7-2
3 How were public services and utilities identified and analyzed for the Magnolia Bridge Replacement Project? 5.7-2
4 What public services are located in the study area? 5.7-2
5 What utilities are located in the study area? 5.7-8
6 Would public services and utilities be affected by the project? 5.7-8
7 Would public services and utilities be affected by construction of the project? 5.7-9
8 What measures are proposed to avoid or minimize effects to public services and utilities? 5.7-10
CHAPTER 5.8 VISUAL QUALITY AND AESTHETICS 5.8-1
1 Why are we evaluating visual quality and aesthetics? 5.8-1
2 How were visual impacts evaluated? 5.8-1
3 What is the existing visible environment or visual character of the project? 5.8-2
4 What visual resources are located in the study area? 5.8-3
5 How would views from the bridge change as a result of the project? 5.8-5

6 How would views towards the bridge change as a result of the project? 5.8-6
7 What other visual impacts would result from the project? 5.8-9
8 What impacts would construction have on visual resources? 5.8-12
9 What measures are proposed to avoid or minimize effects to visual quality? 5.8-12
CHAPTER 5.9 AIR QUALITY 5.9-1
1 Is air quality a concern in the study area? 5.9-1
2 How was air quality evaluated for the project? 5.9-1
3 How would the project affect air quality? 5.9-2
4 How would construction activities affect air quality? 5.9-4
5 What measures are proposed to avoid or minimize effects to air quality? 5.9-6
CHAPTER 5.10 WATER RESOURCES 5.10-1
1 What is the project study area? 5.10-1
2 What water resources are found in the study area? 5.10-1
3 How are water resources regulated? 5.10-5
4 How were water quality impacts evaluated? 5.10-6
5 What are the project impacts to surface water resources? 5.10-7
6 How would construction activities affect water resources in the study area? 5.10-9
7 What measures are proposed to avoid or minimize effects to water resources? 5.10-10
CHAPTER 5.11 FISH, WILDLIFE, AND VEGETATION 5.11-1
1 Why are fish, wildlife, vegetation and habitat considered in an EA? 5.11-1
2 What are the study area boundaries? 5.11-2
3 How were fish, wildlife, vegetation and habitat identified in the study area? 5.11-2
4 What types of fish, wildlife, and vegetation were found? 5.11-3
5 What other habitat is found near the project? 5.11-9
6 How would fish, wildlife, vegetation and their habitat be affected by the project? 5.11-10
7 How would fish, wildlife, vegetation and their habitat be affected during construction? 5.11-11
8 What measures are proposed to avoid or minimize effects to fish, wildlife, and vegetation? 5.11-13
CHAPTER 5.12 FEDERALLY-LISTED SPECIES 5.12-1
1 Why study Federally-listed species? 5.12-1
2 What are the study area boundaries? 5.12-2
3 How were Federally-listed species lists obtained? 5.12-2
4 What Federally-listed species and critical habitat are in the project area? 5.12-3
5 How would Federally-listed species and critical habitat be affected by the project? 5.12-3
6 What is Essential Fish Habitat (EFH) and what species have EFH in Puget Sound? 5.12-4
7 How would EFH be affected by the project? 5.12-5
8 What measures are proposed to avoid or minimize effects to Federally-listed species, critical habitat, and EFH? 5.12-5
CHAPTER 5.13 GEOLOGY AND SOILS 5.13-1
1 Why study geology and soils? 5.13-1
2 What is the project study area? 5.13-2

3 What is the geology of the study area? 5.13-2
4 What soils are found in the study area? 5.13-3
5 How were geology and soils evaluated for the Magnolia Bridge Replacement Project? 5.13-4
6 What are the project impacts to geology and soils and measures to avoid or minimize these effects? 5.13-5
7 What are the construction impacts to geology and soils and measures to avoid or minimize these effects? 5.13-6
CHAPTER 5.14 HAZARDOUS MATERIALS 5.14-1
1 How were hazardous materials and wastes identified within the study area? 5.14-1
2 Are there any potentially contaminated sites in the study area? 5.14-2
3 Would the project affect any hazardous materials sites? 5.14-2
4 What measures are proposed to avoid or minimize effects from hazardous materials? 5.14-2
CHAPTER 6 CUMULATIVE EFFECTS 6-1
1 What are cumulative effects and why do we study them? 6-1
2 What are the temporal and geographic boundaries for this analysis? 6-3
3 What other projects are included in the cumulative effects analysis? 6-3
4 How would construction of the Magnolia Bridge contribute to cumulative effects? 6-5
5 What contribution to cumulative effects would result from the project? 6-7
6 What measures are proposed to minimize cumulative effects? 6-8
CHAPTER 7 MITIGATION 7-1
1 What measures would be taken to avoid or minimize construction effects? 7-1

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LIST OF EXHIBITS

Exhibit 1-1 Project Vicinity and Study Area 1-2
Exhibit 1-2 The Preferred Alternative Location 1-4
Exhibit 1-3 Existing Magnolia Bridge 1-5
Exhibit 1-4 Preferred Alternative 1-5
Exhibit 1-5 Construction Activities 1-7
Exhibit 1-6 Possible Detour – Creation of Temporary New Streets 1-10
Exhibit 1-7 Pedestrian and Bicycle Routes 1-14
Exhibit 1-8 Modeled Sensitive Receptors 2006 1-18
Exhibit 1-9 Modeled Sensitive Receptors (Park and Historic Properties 2014) 1-19
Exhibit 1-10 The Existing Bridge in relation to the Admiral's House 1-22
Exhibit 1-11 The Preferred Alternative in relation to the Admiral's House 1-22
Exhibit 1-12 Study Area Census Tracts (2010) 1-25
Exhibit 1-13 Lawton Elementary and Catherine Blaine School 1-28
Exhibit 1-14 Ursula Judkins Viewpoint, view to the east from the parking lot 1-33
Exhibit 1-15 Smith Cove Playfield (view to the north) 1-34
Exhibit 1-16 View from Existing Bridge at the West End 1-36
Exhibit 1-17 View from New Bridge from the West End 1-36
Exhibit 1-18 Surface Water Bodies Near Preferred Alternative 1-41
Exhibit 3-1 Project Open House 3-1
Exhibit 3-2 Bridge Alignment Criteria 3-2
Exhibit 3-3 Alternative A (Preferred Alternative) 3-9
Exhibit 3-4 Alternative D 3-10
Exhibit 3-5 Alternative H 3-11
Exhibit 3-6 Alternative C 3-12
Exhibit 3-7 Rehabilitation Alternative 3-13
Exhibit 3-8 Summary Comparison of Alternatives 3-15
Exhibit 4-1 The New Magnolia Bridge 4-2
Exhibit 4-2 Existing Magnolia Bridge 4-3
Exhibit 4-3 New Magnolia Bridge 4-3
Exhibit 4-4 Pedestrian and Bicycle Routes 4-5
Exhibit 4-5 Construction Activities 4-7
Exhibit 4-6 Possible Street Detours 4-9

Exhibit 4-7 Construction Schedule 4-10
Exhibit 5-1 Features Near the Existing Magnolia Bridge 5-4
Exhibit 5.1-1 Magnolia Access Arterials Daily Traffic Counts 5.1-3
Exhibit 5.1-2 Bus Stops Near Magnolia Bridge 5.1-4
Exhibit 5.1-3 Pedestrian & Bicycle Routes 5.1-6
Exhibit 5.2-1 FHWA Noise Abatement Criteria 5.2-2
Exhibit 5.2-2 Modeled Sensitive Receptors 5.2-3
Exhibit 5.2-3 Modeled Sensitive Receptors (Park and Historic Properties 2014) 5.2-4
Exhibit 5.2-4 Construction Equipment Noise Ranges 5.2-7
Exhibit 5.3-1 Existing Land Use 5.3-4
Exhibit 5.3-2 BINMIC Planning Area 5.3-5
Exhibit 5.3-3 Existing Zoning 5.3-7
Exhibit 5.4-1 Study Area Census Tracts (2010) 5.4-3
Exhibit 5.4-2 Median Household Income 5.4-5
Exhibit 5.4-3 Poverty Status 5.4-5
Exhibit 5.4-4 School Lunch Program (May 2013) 5.4-6
Exhibit 5.4-5 Age and Disability 5.4-7
Exhibit 5.4-6 Ethnic and Racial Composition 5.4-8
Exhibit 5.4-7 Race and Ethnicity in Schools 5.4-9
Exhibit 5.4-8 Linguistically Isolated Populations 5.4-10
Exhibit 5.4-9 Public School Students with Limited English Proficiency (October 2012) 5.4-10
Exhibit 5.4-10 Educational facilities within the Study Area 5.4-14
Exhibit 5.4-11 Employment by Sector in Interbay 5.4-15
Exhibit 5.4-12 Businesses and Structures near the Magnolia Bridge 5.4-16
Exhibit 5.4-13 Terminal 91 Employer Interviews 5.4-17
Exhibit 5.4-14 Right-of-Way Parcels 5.4-20
Exhibit 5.4-15 Property Acquisitions 5.4-21
Exhibit 5.5-1 Historic Resources in the Area of Potential Effects 5.5-5
Exhibit 5.5-2 Shoreline at Smith Cove - early 1930s 5.5-6
Exhibit 5.6-1 Parks, Recreation, and Section 4(f) Resources 5.6-5
Exhibit 5.7-1 Seattle Police Department West Precinct 5.7-3
Exhibit 5.7-2 Fire Stations in the Study Area 5.7-4

Exhibit 5.7-3 Public Facility Locations 5.7-5
Exhibit 5.7-4 Emergency Vehicle Routes 5.7-6
Exhibit 5.7-5 Magnolia Public Schools 5.7-7
Exhibit 5.7-6 Utility Providers in the Study Area 5.7-8
Exhibit 5.8-1 Viewpoints in the Magnolia Bridge Visual Quality Study Area 5.8-4
Exhibit 5.8-2 View from Existing Bridge from West End 5.8-5
Exhibit 5.8-3 View from Preferred Alternative from West End 5.8-6
Exhibit 5.8-4 View from Existing Bridge from Smith Cove Playfield 5.8-7
Exhibit 5.8-5 View of New Magnolia Bridge form Smith Cove Playfield 5.8-7
Exhibit 5.8-6 View from Existing Bridge from Elliott Bay Trail 5.8-8
Exhibit 5.8-7 View of New Magnolia Bridge form Elliott Bay Trail 5.8-8
Exhibit 5.8-8 View of the Admiral's House next to the existing Magnolia Bridge 5.8-9
Exhibit 5.8-9 View of the Admiral's House next to the preferred alternative 5.8-10
Exhibit 5.8-10 Shadow Effects of the new Magnolia Bridge 5.8-11
Exhibit 5.9-1 Intersections Modeled for Air Quality 5.9-2
Exhibit 5.9-2 One-Hour Average CO Concentrations 5.9-4
Exhibit 5.9-3 Eight-Hour Average CO Concentrations 5.9-4
Exhibit 5.10-1 Historic Smith Cove Estuary 5.10-2
Exhibit 5.10-2 Surface Water Bodies near Preferred Alternative 5.10-3
Exhibit 5.10-3 Existing Bridge Drains 5.10-4
Exhibit 5.10-4 Drained Surface Areas and Stormwater Peak Flow 5.10-9
Exhibit 5.11-1 Fish and Wildlife Habitat Areas 5.11-5
Exhibit 5.11-2 Smith Cove Tidelands 5.11-6
Exhibit 5.12-1 Effects Determination 5.12-4
Exhibit 5.13-1 Landslide and Loose Soil Areas 5.13-3
Exhibit 5.13-2 Geology Profile in the Study Area 5.13-4
Exhibit 5.14-1 Known or Potentially Contaminated Sites of Concern 5.14-3
Exhibit 5.14-2 Sites of Concern 5.14-4
Exhibit 6-1 Other Projects in the Study Area 6-2
Exhibit 7-1 Mitigation Commitments 7-2
List of Appendices R-1
List of Preparers R-2

References R-4

Magnolia Bridge Replacement

Seattle, Washington

Environmental Assessment:

Submitted pursuant to Section 42 USC 4332 (2) (c) and 23 CFR Part 771 by the City of Seattle Department of Transportation, U.S. Department of Transportation Federal Highway Administration, and the Washington State Department of Transportation.

Cooperating Agencies:

National Oceanic and Atmospheric Administration (NOAA) Fisheries and U.S. Fish and Wildlife Service

5/21/15
(Date of Approval)

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Seattle Department of Transportation

05/28/15
(Date of Approval)

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5.28.15
(Date of Approval)

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In compliance with the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA), this Environmental Assessment (EA) describes the environmental consequences of replacing the existing Magnolia Bridge structure, approaches, and related arterial connections.

Comments Due:

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Fact Sheet

Project Name: Magnolia Bridge Replacement

Project Description:
This project would replace the existing Magnolia Bridge structure, approaches, and related arterial connections with facilities that maintain convenient and reliable vehicular and non-motorized access between the Magnolia community and the rest of the City of Seattle.

Project Proponents:
City of Seattle Department of Transportation (SDOT)

SEPA Lead Agency:
City of Seattle Department of Transportation (SDOT)

Responsible SEPA Official:
Scott Kubly, Director, City of Seattle Department of Transportation (SDOT)

NEPA Lead Agency:
Federal Highway Administration (FHWA)

Date Document Issued:

Comment Period:

Comments and Contact Information:

Public Hearing Date and Locations:
A public hearing on this environmental assessment would be held on _____ at _____ from _____ PM to _____ PM

Document Cost and Availability:

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Permits and Approvals:

Federal
Archaeological Resources Protection Act (ARPA) Permit
Rivers and Harbors Act Section 9 - Bridge Permit - USACE
Clean Water Act (CWA) Section 404 Permit - Wetland/Streams
CWA Section 401 - Water Quality Certification
CWA Section 402 - National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit
Coastal Zone Management Act Consistency Determination
Dept. of Transportation Act Section 4(f)
Marine Mammal Protection Act Permits
National Environmental Policy Act (NEPA)
National Historic Preservation Act Section 106 Compliance
Rivers and Harbors Act Section 10 Permit
Endangered Species Act Section 7

State
Archaeological Lands Use Authorization
Aquatic Lands Use Authorization
Asbestos Removal
Hydraulic Project Approval (HPA)
Resource Conservation and Recovery Act (RCRA) Site ID Number
State Environmental Policy Act (SEPA)
Underground Storage Tank (UST) Notification
Water Rights Permit

Local
Shoreline Substantial Development Permit
Floodplain Development Permit
Noise variance

Subsequent Environmental Review:
City of Seattle will adopt the NEPA Environmental Assessment as a SEPA document per Chapter 25 of the Seattle Municipal Code.

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ACRONYMS

BINMIC	Ballard Interbay Northend Manufacturing and Industrial Center
WSDOT	Washington State Department of Transportation
EIS	Environmental Impact Statement
BNSF	Burlington Northern Santa Fe
EA	Environmental Assessment
SDOT	Seattle Department of Transportation
ASL	American Sign Language
NEPA	National Environmental Policy Act
SEPA	State Environmental Policy Act
FHWA	Federal Highway Administration
NOAA	National Oceanic and Atmospheric Administration
PSRC	Puget Sound Regional Council
NAC	Noise Abatement Criteria
dBA	A-weighted decibels
EPA	Environmental Protection Agency
TMP	Traffic Management Plan
USDOT	US Department of Transportation
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
WISHA	Washington Industrial Safety and Health Act
NAAQS	National Ambient Air Quality Standards
SIP	State Implementation Plan
PM10	Particulate matter less than 10 microns
CO	carbon monoxide
NOx	Nitrogen oxides
PSCAA	Puget Sound Clean Air Agency
USGS	U.S. Geological Survey
BMPs	Best Management Practices
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
Ecology	Washington Department of Ecology
WDNR	Washington Natural Resources
METRO	Municipality of Metropolitan Seattle
EFH	essential fish habitat
MSE	mechanically-stabilized earth
UST	Underground Storage Tank List
LUST	Leaking Underground Storage Tank List
CSCSL	Confirmed and Suspected Contaminated Sites List
WAICR	Washington Site Register of Independent Cleanup Reports
SPCC	Spill Prevention, Control, and Countermeasure

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Chapter 1 Executive Summary

1 Where is the Magnolia Bridge located?

The Magnolia Bridge is one of three bridges that connect the Magnolia neighborhood to the rest of the city. It lies between the Magnolia community on the west and the Queen Anne community on the east. The bridge connects to West Galer Street at the top of the Magnolia Bluff and to 15th Ave West and West Garfield Street at the foot of Queen Anne Hill. (See Exhibit 1-1).

View of the existing Magnolia Bridge

2 What is the purpose of the Magnolia Bridge Replacement Project?

The Magnolia Bridge provides an important link between the Magnolia community, home to approximately 20,000 people and the rest of Seattle. It is one of only three bridges in and out of Magnolia, all of which cross over the north/south BNSF railroad tracks (the other two being at West Dravus Street and West Emerson Street). The bridge provides the only road access to the land between the Port of Seattle Terminal 91, Smith Cove Park, and the Elliott Bay Marina.

The purpose of this project is to replace the existing bridge, its structures, approaches, and related street connections to maintain access between these places and the City of Seattle.

Nisqually Earthquake

February 28, 2001, Magnitude 6.8

The Magnolia Bridge concrete bracing was damaged. Braces were replaced with tubular steel bracing. The bridge was closed for four months.

3 Why is the project needed and what would happen if the bridge is not replaced?

The Magnolia Bridge is showing signs of its age. Much of the existing structure was built between 1929 and 1930, and has been in service since then. The concrete structure is showing signs of deterioration, with concrete cracking related to corrosion of the reinforcing steel. The bridge was forced to close for repairs in 1997 after a landslide damaged the piers at its west end, and again following damage that occurred during the 2001 Nisqually Earthquake.

Exhibit 1-1

Project Vicinity and Study Area

The project is needed because:

- Loss of the use of the bridge would increase traffic on both West Dravus Street and West Emerson Street resulting in 15 to 30 minute delays, similar to that seen during closure of the bridge after the 2001 Nisqually earthquake. Not only would general traffic be delayed, but emergency response would be delayed.
- The types of soils around the Magnolia Bridge are likely to liquefy during an earthquake event. If this were to happen, the existing foundations could slip sideways and the bridge could collapse.
- Due to the condition of the existing bridge, the cost to keep it in service for more than 10 years would approach the cost of replacing it.

Column bracing at west end of bridge

4 How was a Preferred Alternative selected?

Selecting a new configuration and location to replace the existing Magnolia Bridge was a lengthy process that took place from 2002 through 2006. It began with the development of 25 initial alignments. These alignments were screened on the basis of technical and environmental parameters then narrowed down to nine. These nine alignments were then submitted to the public for comment. Subsequently, the nine alignments were screened and narrowed to four alignments, which were then developed into four alternatives.

The four alternatives were evaluated for potential impacts in fourteen environmental discipline reports (Traffic and Transportation, Noise, Land Use, Community/Neighborhoods and Businesses, Historic, Cultural and Archaeological Resources, Parks and Recreational Resources, Social, Economic and Relocations, Public Services & Utilities, Visual Quality, Air Quality, Water Quality, Fish and Wildlife, Geology and Soils, Hazardous Materials) and finally a Preferred Alternative was selected.

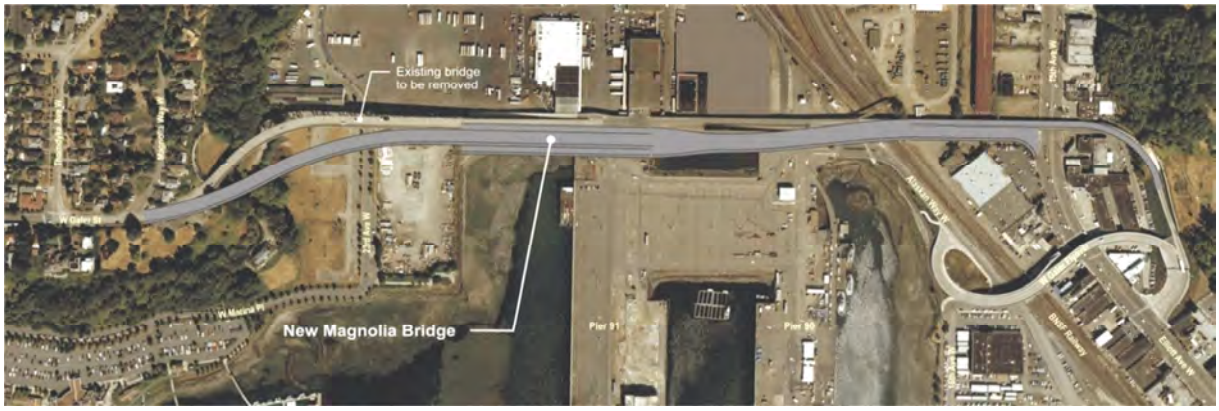
There was considerable public input in developing the alternatives, which then helped shape the selection of the preferred alternative. Approximately fifty public meetings were held. SDOT met with regulatory agencies and

businesses, and held regular meetings with a design advisory committee. At the end of the process, recommendations were made to City Council and the Mayor and a Preferred Alternative was recommended.

5 What is the Preferred Alternative?

In March 2006, SDOT recommended a Preferred Alternative to replace the existing Magnolia Bridge. The replacement bridge would lie immediately south of the existing bridge between the Magnolia Bluff and Pier 90, and very close to the same alignment as the existing bridge between Pier 90 and 15th Avenue West/Elliott Avenue West. Connections at the east and west ends of the bridge would be similar to the existing bridge. Exhibit 1-2 shows the location of the Preferred Alternative in relation to the existing bridge that would be removed.

Exhibit 1-2
The Preferred Alternative Location



6 What would the new bridge look like?

The look of the new bridge won't change much from the existing structure, although it would have fewer column supports, and longer distances between column supports. The new bridge deck would be wider than the existing bridge by about 15 feet. The outside lanes would be 16 feet wide to allow bicycle travel on the outside of the lane while the inside lanes would be 11 feet wide. A 10-foot sidewalk separated from the eastbound (downhill) lane by a concrete barrier would be included along the south side.

Unlike the existing bridge, the new bridge would have two ramps at 23rd Avenue West that would take traffic to and from the Port of Seattle Terminal 91 complex, Smith Cove Park and Elliott Bay Marina. The number of traffic lanes east of these ramps would not change. Exhibit 1-3 and Exhibit 1-4 compare the appearance of the existing bridge from a viewpoint on the west slope of Queen Anne Hill with a photo simulation of the Preferred Alternative.

Exhibit 1-3
Existing Magnolia Bridge

2002 photograph from 8th Avenue West.

Exhibit 1-4
Preferred Alternative

Photo simulation view from 8th Avenue West on Queen Anne Hill

7 When would construction begin and how long would it take?

The project is on hold until sufficient funding has been secured to complete the final design and construction. As of this writing, it is unclear when the funding will be secured. Construction of the Preferred Alternative would take approximately 39 months from beginning to end. It is estimated that during the first ½ of the project, traffic to and from Magnolia would be maintained on the existing bridge and completed portions of the new structure. During the final 14-20 months the bridge would be closed to traffic.

8 How would construction be staged?

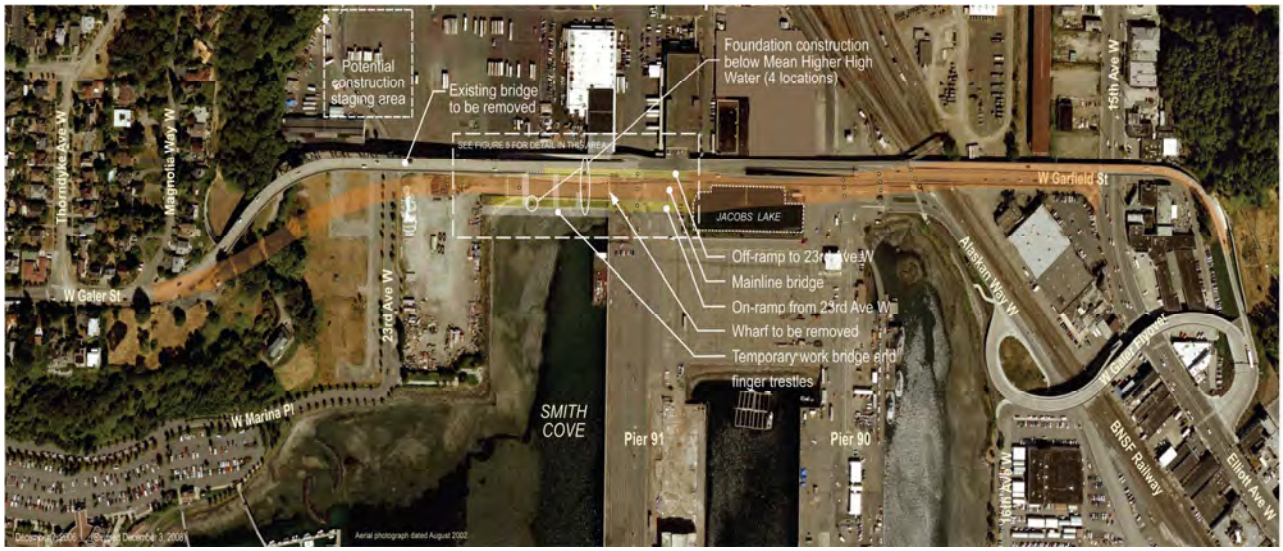
Construction sequencing of the Preferred Alternative was designed to maintain traffic on the existing structure for as long as possible. Sequencing would occur in three phases. Exhibit 1-5 shows some of the activities that would occur during construction.

- During the first phase of the project automobile traffic to and from Magnolia would be maintained on the existing bridge. However, pedestrian, and bicycle traffic and transit service would be removed and detoured. These detours would remain in place for the first two phases of construction.
    - Construction would begin at the west end by constructing the new Magnolia Bluff approaches.
    - Following this, the existing wharf at Jacobs Lake and the existing 23rd Street on-ramp would be demolished. This would make room for temporary work bridges needed to be able to access existing foundations and to construct new bridge spans over Jacob's Lake.
    - After this work is complete, the new 23rd Street on-ramp and mainline bridge would be built until the work conflicts with demolition of the east portion of the bridge.
    - Temporary detours would then be constructed to allow traffic to continue to move through the corridor during the next phase of the project.

- During the second phase of the project, all traffic would be detoured off the existing bridge.
    - Once traffic is switched to the detour routes, the rest of the existing bridge and the 23rd Street off-ramp would be demolished.
    - The new main-line bridge over railroad and 15th Avenue ramp would then be constructed.

- During the third phase of the project traffic would be moved onto the new structure
    - Cleanup and demolition of the rest of west end of the 'old' bridge would occur.
    - Finally, traffic would be switched to the new bridge. Ramp work would be completed.

Exhibit 1-5
Construction Activities



2002 photograph from 8th Avenue West.

9 What are the project effects and mitigation?

The Preferred Alternative would affect the built and natural environments both during and after construction. Mitigation measures however, would be provided to minimize the impacts that could not be avoided. The following are the key findings

of the environmental analyses. Impacts that would occur after completion (operation) of the bridge are described first, followed by a description of impacts that would occur during construction.

Traffic

Each of the three Magnolia community connections to the 15th Avenue West corridor carries about 30 to 35 percent of the average daily traffic of 60,000 vehicle trips. Eastbound traffic is heavier in the morning and westbound traffic is heavier in the afternoon. On a typical weekday, 1,700 vehicles cross the Magnolia Bridge in the afternoon peak traffic hour. With or without a new bridge, traffic models predict that there would be approximately 2,100 vehicles on the Magnolia Bridge during the afternoon peak hour in 2036 – the design year for the project.

What is a 'design' year?

The design year for a project is generally 20 years after the anticipated completion or opening of the project. The Magnolia Bridge Replacement Project used an opening date of 2016 as a basis to develop future traffic volumes. The design year for the project is 2036.

Because predicted traffic volumes for the Preferred Alternative would be nearly the same as the future traffic volumes for the existing bridge if it were not replaced, and because the Preferred Alternative would have basically the same alignment, the same number of traffic lanes and the same street connections as the existing bridge, the new bridge would have no impact on traffic after the project is completed.

The Preferred Alternative would restore the current mid-bridge bus stops, existing emergency service, school bus routes and existing pedestrian and bicycle connections. [1] The new bridge would have no impacts on these modes of transportation.

Construction Effects

The majority of the traffic and transportation effects would occur during demolition of the bridge structure and construction of the east portion of the new bridge during the 2nd and 3rd phases of construction. This would last from 14 to 20 months. During this time the bridge would be closed and traffic would be detoured through the corridor.

[1] Pedestrian connections would be upgraded to meet ADA requirements

Two types of detours are under consideration once traffic can no longer use the existing bridge: use of existing city streets; and creation of new surface streets though Terminal 91.

- Use of existing City Streets – east west traffic going to and from Magnolia would travel across the existing connections along West Dravus Street and West Emerson Place. North-south travel would be along 20th Avenue NW and Thorndyke Ave W (See Exhibit 1-6). Traffic to and from the marina and Terminal 91 would be detoured to 21st Avenue West and the Galer Street Flyover.
- Creation of New Streets – The City and the Port of Seattle(Port) have discussed the possibility of providing a surface road connection that would use the Galer Street Flyover and a detour road along the east side of Terminal 91 (next to the BNSF railroad) through Port of Seattle property (See Exhibit 1-6). This detour would connect Elliott Avenue W and Alaskan Way West with 21st Ave West and Thorndyke Ave West. The City and the Port have also discussed a surface detour on the west side of Terminal 91 at the base of Magnolia Bluff to connect 21st Avenue West with 23rd Avenue West and West Marina Place.

As project design proceeds, construction phasing and staging plans would be further developed, along with potential detour routes. The following describes the general effects of detours on elements of the built environment and important users of the corridor.

Exhibit 1-6

Possible Detour – Creation of Temporary New Streets

Magnolia Neighborhood - The existing Magnolia Bridge is the most direct route connecting the Magnolia neighborhood to the rest of Seattle. Travel times and distances for residents,

particularly in southern Magnolia, would increase during the time the detour is in place. The resulting higher traffic volumes on these routes are likely to create backups, particularly during commute peaks. Backups are also anticipated on other streets that would serve as temporary detours. Detour routes would increase the distance traveled by residences to and from Magnolia by approximately 1.7 miles and increase travel time by approximately eight minutes. Detour routes would also increase travel time to the maritime businesses located on the Port of Seattle's North Bay property, as the existing access to the terminal would be removed and re-routed. The re-route would be the same as the eastern portion of the traffic detour. In addition, existing transit service to these businesses would be eliminated during the full extent of construction.

Emergency Responders – Detoured emergency responders, who would otherwise use the Magnolia Bridge, are likely to find it necessary to take a less direct route to their destination and may encounter higher traffic volumes with traffic in and out of Magnolia constricted. The result would be slower response times, particularly in instances when police and fire/emergency vehicles would need to approach or leave the south end of Magnolia.

Schools – School buses would be impacted similarly to emergency responders and general traffic. School bus routes would change. It would take longer for school buses to make their way across the corridor.

Freight Movements - Truck movements in and out of Terminal 91 would continue to access the Terminal 91 East Gate at the north end of Alaskan Way West from Elliott Avenue West via the Galer Flyover as they do today. However, the Galer Flyover and Alaskan Way West may also be used as a detour route for access to a Terminal 91 surface route to 21st Avenue West and Thorndyke Avenue West. This would increase traffic and travel time in this area and slow freight movements in and out of Terminal 91.

Public Transit – During 11 months of construction, the Magnolia bus route would need to be detoured to West Dravus

Street. This would result in increased transit route distances and travel times, necessitating a change in bus schedules. The existing bus stop on the Magnolia Bridge serving North Bay businesses would be removed during construction.

Bicycles and Pedestrians – The existing Magnolia Bridge includes a sidewalk used by both pedestrians and bicyclists that connects the Magnolia neighborhood to 15th Avenue West/Elliott Avenue West. The sidewalk also connects to the 23rd Avenue West off-ramp. Here, pedestrians and bicyclists can link to North Bay/Terminal 91 or the multi-use Elliott Bay Trail that passes under the bridge (See Exhibit 1-7). The bridge also includes two stairways that provide pedestrian access to 15th Avenue West and pedestrian walkway that connects the trail as well as to the North Bay/Terminal 92 businesses [1]. During the first two phases of construction bicycle and pedestrian use of the bridge would both be eliminated. Bike and Pedestrian detours to and from Magnolia would be provided from Smith Cove Park via a detour along 21st Avenue West surface street. Access to North Bay/Terminal 91 would be via the Elliott Bay Trail at the intersection with the 21st Avenue West surface street on the east side of the Port property[2].

Rail Traffic - Bridge construction next to and over the operating BNSF Railway would require limited closures of the rail track. SDOT would work closely with BNSF and would comply with railroad operating restrictions to coordinate allowed work periods.

Environmental Justice Concerns – Detours along West Emerson would cause backups on roadways near Lawton Elementary School and detours along Thorndyke Avenue could have similar traffic impacts near Catherine Blaine School. This would increase travel time to and from school for children being transported by their parents or taking the school bus.

[1] Note: The existing Magnolia bicycle and pedestrian facilities (sidewalk and stairs) are not ADA accessible.

[2] Note: The Elliott Bay Trail portion of the pedestrian/bicycle detour is ADA compliant. The remainder of the detour would not be ADA compliant.

Because there is a high percent of minority students at these schools, the project could have temporary disproportionately high and adverse effects on minority populations.

Limited English Proficiency (LEP) populations will be identified and materials translated into other languages, as appropriate following City of Seattle Translation and Interpretation Policy (Executive Order 01-07)[3]. Translated materials would be disseminated as appropriate, in the study area as well as to businesses in the vicinity of the project that employ LEP workers would be provided with translated materials.

Mitigation Measures

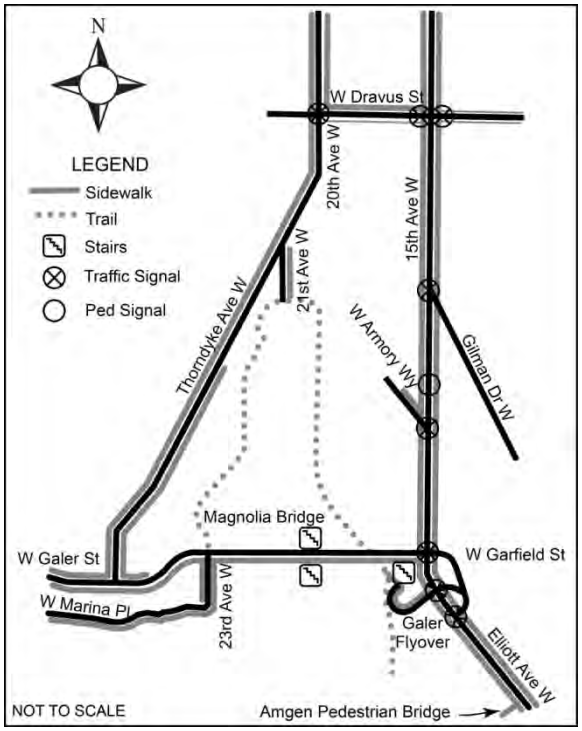
To minimize traffic impacts, the existing Magnolia Bridge would be kept open for as long as possible. Traffic would continue to use the existing bridge until it is demolished. This would allow existing traffic patterns to be maintained during about half of the 39-month construction period.

Several detours are being considered once traffic can no longer use the existing bridge. As project design proceeds, construction phasing and staging plans would be further developed, along with potential detour routes. All detour routes when determined will be clearly marked.

Traffic management plans (TMP) and construction management plans (CMP) approved by SDOT would be put in place prior to construction of the Preferred Alternative. The City would coordinate with the Port of Seattle and Terminal 91 businesses to maintain access throughout the construction period.

[3] Seattle's Translation and Interpretation Policy is part of the City's Title VI Plan and forms the policies the City uses to identify and provide outreach to LEP individuals. The policy aligns with Title VI requirements for LEP populations."

Exhibit 1-7
Pedestrian & Bicycle Routes



Traffic control measures would be put into place to address congestion on the detour routes. This may include use of police officers at key intersections along the detours. During construction pedestrian and bicycle traffic would be detoured under the bridge. Detours would be clearly marked.

During construction, Magnolia bus routes would be detoured to West Dravus Street in the north. Temporary transit service to the Terminal 91 complex during construction would be provided shuttle vehicles to bring transit passengers between 15th Avenue West bus stops and the complex. Notification of changes in bus service would be provided to area businesses and the general public several months prior to the change.

SDOT would work closely with the Port of Seattle, King County, emergency responders, local schools, local businesses, community groups, the media, agencies that serve the homeless, Seattle Parks and Recreation, the Bicycle Alliance, and the Seattle Department of Human Services to develop a

communication plan to be used during construction. The communication plan would include the development of an Inclusive Outreach and Public Engagement IOPE) Plan following the City of Seattle IOPE Guide.

Limited English Proficiency populations would be identified and materials translated into other languages following City of Seattle Translation and Interpretation Policy (Executive Order 01-07)[4]. Businesses in the vicinity of the project that employ LEP workers would be provided with translated materials as appropriate.

SDOT would work with Lawton Elementary School and Catherine Blaine School to identify LEP populations and translate materials in other languages for distribution by each school.

An evaluation to determine if homeless individuals reside in the vicinity of the bridge would be conducted. The plan would include strategies for disseminating information on construction activities, project schedule, road closures, traffic detours, bicycle and pedestrian detours, parks closures, and transit alternatives during construction.

Noise

Noise regulations and guidelines are the basis for evaluating potential noise effects. For state and federally funded projects, traffic noise effects occur when predicted hourly noise levels (designated by the symbol "$L_{eq}(h)$") approach or exceed a Noise Abatement Criteria (NAC) established by the Federal Highway Administration (FHWA), or substantially exceed existing noise levels.

FHWA's Traffic Noise Model was used to estimate traffic noise levels in the project area[5]. The model uses field measurements of current noise levels and current traffic volumes to estimate

[4] Seattle's Translation and Interpretation Policy is part of the City's Title VI Plan and forms the policies the City uses to identify and provide outreach to LEP individuals. The policy aligns with Title VI requirements for LEP populations."

[5] For residential and park property, a noise level of 66 dBA approaches the NAC and is considered an impact.

existing noise levels. The model then projects noise levels out to the design year which is 20 years after project construction.

The four principal sources of traffic noise in the existing condition are the Magnolia Bridge, the bridge approaches, West Galer Street, and Thorndyke Avenue West. Background noise sources include urban residential noise, industrial and rail yard noise, and aircraft flights. Noise levels were measured at 23 locations along the alignment and through the project area deemed to be "noise sensitive receptors". Noise levels were modeled at these locations through the 2036 design year (Shown in Exhibits 1-8 and 1-9).

Existing noise levels range from a low of 54 dBA near the Elliott Bay Marina to a high of 68 dBA at a residence on West Galer Street east of Thorndyke Avenue West. The majority of the measured noise levels fall below the NAC of 67 dBA for residences and other category activities.

The New Magnolia Bridge would not change the noise source — traffic coming to and from Magnolia Bluff along West Galer Street. The location of the roadway won't change substantially where it passes by Magnolia Bluff residences so the completed project would have the same noise levels as the "No Build" alternative for Magnolia Bluff residents. The projected increase in traffic through the design year would result in an increase in noise levels along West Galer Street of about 3 to 4 decibels over existing noise levels. This level of increase would be nearly undetectable, and would exceed the NAC of 67 dBA for residences.

The New Magnolia Bridge would be located on, over or adjacent to several park and historic properties. As located on Exhibit 1-8, the park properties are the Ursula Judkins Viewpoint (receptor #20), Smith Cove Playfield (receptor #20), and Centennial Park (receptor #23). The historic property is the "Admiral's House" (receptor #21), now privately owned. The Smith Cove Park waterfront site (receptor #19) is also shown. It is more than 500 feet from the new bridge location.

Noise levels in the western portion of Ursula Judkins Viewpoint nearest to West Galer Street are predicted to be 66 to

70 dBA in the design year with or without the project. These levels exceed the NAC for a park property. The project roadway matches existing West Galer Street west of the Magnolia Way West intersection. In the eastern portion of the park, noise levels are predicted to decrease with project and be below the NAC for park property. This is result of the new bridge approach wall which would have barrier and railing above roadway level.

Design year noise levels in the Smith Cove Playfield, Smith Cove Park waterfront site, the Admirals House property, and Centennial Park would be below impact levels with or without the project.

Noise barrier and buffer noise abatement measures were examined for the Preferred Alternative and found to be infeasible for the project. Noise barriers or buffers to reduce traffic noise levels in this area would not be feasible because breaks in the barrier would be required for property driveways.

Exhibit 1-8

Modeled Sensitive Receptors 2006

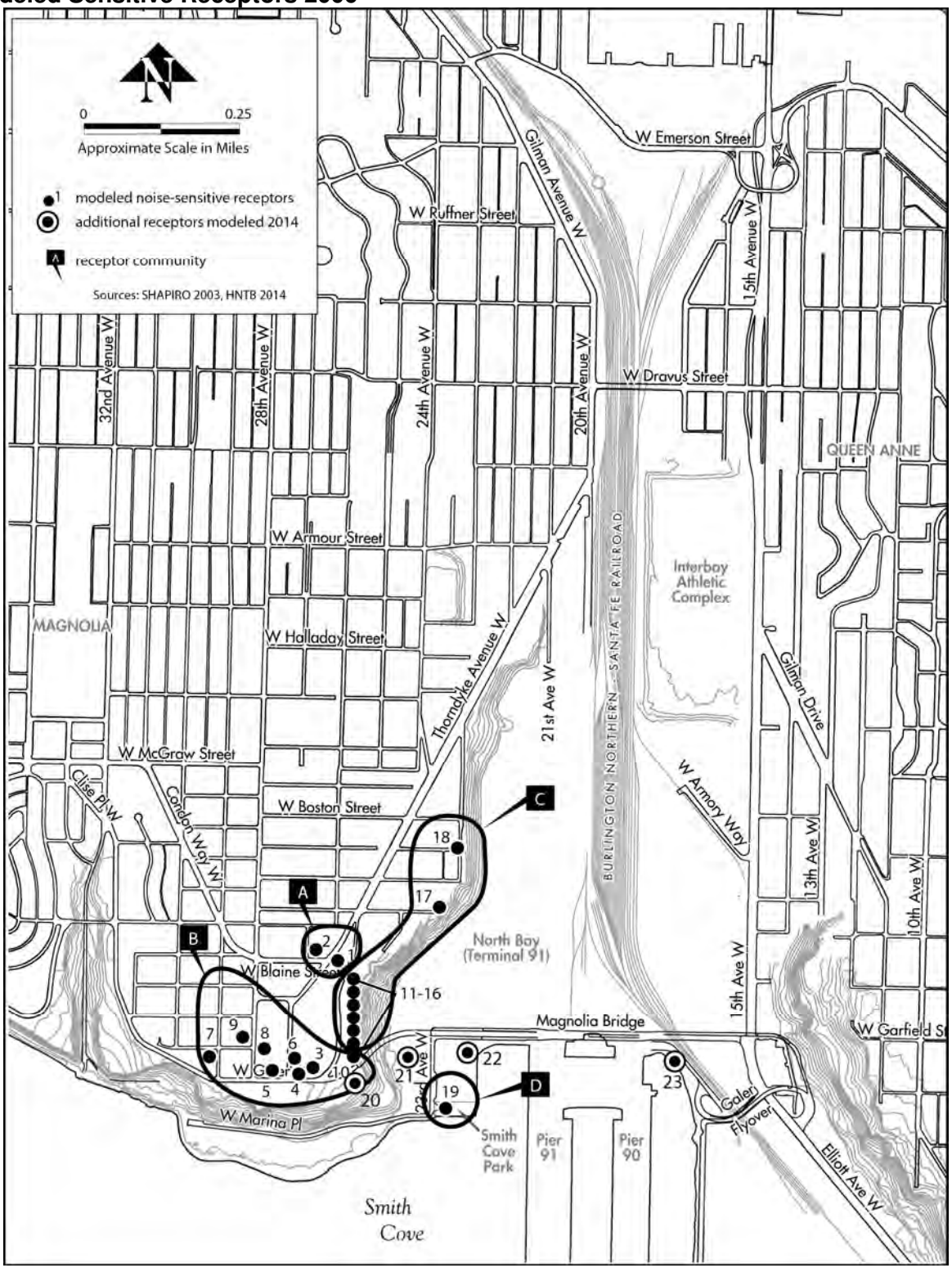
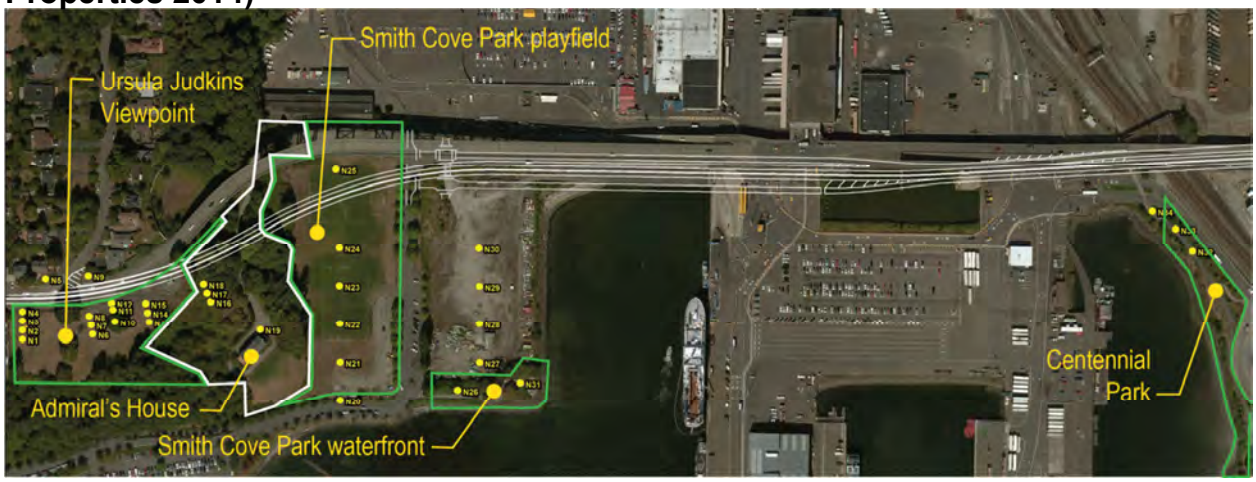


Exhibit 1-9
Modeled Sensitive Receptors (Park and Historic Properties 2014)



Construction Effects

Construction activities would generate temporary noise, and may affect nearby residents on the Magnolia Bluff, businesses, and park users. The most prevalent noise would be from stationary engines that power equipment. The loudest noises would be from impact equipment. Pile driving would be intermittently intrusive, but should not interfere with face-to-face or telephone conversations at distances greater than 500 feet from the construction area.

Mitigation Measures

Construction noise is subject to the City of Seattle Noise Ordinance and cannot exceed permissible levels without a variance from the City. To reduce construction noise, the following measures would be incorporated into construction plans and specifications:

- Limiting the noisiest construction activities, such as pile driving, to between 7 AM and 10 PM to reduce construction noise levels during sensitive nighttime hours;
- Outfitting construction equipment engines with adequate mufflers, intake silencers, and engine enclosures;

- Turning off construction equipment during prolonged periods of nonuse to eliminate noise;
- Requiring contractors to maintain all equipment and train their equipment operators in practices to reduce noise levels; and
- Locating stationary equipment away from receiving properties to decrease noise.

Land Use Patterns

The existing Magnolia Bridge connects the commercial corridor along 15th Avenue West/Elliott Avenue West with the Magnolia residential and commercial neighborhoods and provides vehicle and pedestrian access to the several land uses in the area including:

- The Port of Seattle Terminal 91 marine/industrial area, other waterfront businesses[6]
- Washington National Guard Amory
- Public park land
- The BNSF railroad

The majority of the existing corridor is zoned General Industrial (IG). A portion of the western end of the corridor, on the Magnolia Bluff, is zoned Residential Single Family. The eastern portion of the corridor along 15th Avenue West is zoned Industrial Commercial (IC) with a few areas zoned for low rise Multi-family. A portion of the project lies within the shoreline – designated as Urban Industrial. Each of these land use zones allows the development of transportation projects, including streets and bridges.

What is land use and zoning?

Land use refers to the manner in which portions of land or the structures on them are used (e.g., commercial, retail, residential, industrial). Land uses in the City of Seattle are established by land use goals and policies in Seattle's Comprehensive Plan.
Zoning regulates land use and development and helps implement the Comprehensive Plan. In Seattle, zoning is regulated under the Land Use Code.

Future Conditions

Future land use and zoning in the study area would not change substantially. The majority of land would remain industrial and retain industrial zoning. However, two new land uses in the project area may occur in the near future:

[6] Most of the project lies within the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC) area. BINMIC is designated in Seattle's Comprehensive Plan as a Manufacturing/Industrial Center.

- Development of Washington National Guard property and potential redevelopment to commercial/retail. No formal plans exist currently, but the City of Seattle may be looking at zoning changes and removal of the Armory from the BINMIC as part of the 2015 Comprehensive Plan updates.
- Sound Transit and the City are completing a transit study of possible transit improvements between downtown Seattle and Ballard. The study is examining the possibility of high capacity transit through BINMIC – which could results in a change in current land use from bus transit to light rail.

Access

The project would temporarily change the existing access to maritime business on Terminal 91 during construction. Currently, the existing Magnolia Bridge ramps provide automobile and small truck access directly from the bridge to the Port of Seattle's Terminal 91 Center Gate. This access point would be removed during demolition of the existing bridge and won't be replaced as part of the Preferred Alternative. Future access to Terminal 91 would be via the Galer Flyover and Alaskan Way West and through the East Gate. This is the current route for large trucks which are currently prohibited from using the Center Gate ramps.

Bicycle and Pedestrian facilities would be improved. The existing bridge includes a narrow shared sidewalk used by both pedestrians and bicyclists. The Preferred Alternative would separate these modes by providing a ten-foot wide sidewalk on the south side of the bridge and 16-foot wide lane that would accommodate safer bicycle travel on the roadway.

Relocations and Acquisitions

The new bridge would require relocations and acquisition of rights-of-way of a few properties.

Anthony's Seafood Distribution Center - Anthony's Seafood Distribution Center, a business that is part of the marine cluster operating in the project area, has direct access to the existing

bridge structure. Replacing the Magnolia Bridge would remove this direct connection and require the relocation of Anthony's Seafood Distribution Center or reconfiguration of the existing building. Representatives of Anthony's indicated that they prefer to relocate as close to their current location as possible.

Ursula Judkins Viewpoint - The Ursula Judkins Viewpoint, a park owned by the City of Seattle, lies along the western edge of the existing bridge. The Preferred Alternative would run through 0.18 acre of the parking lot.

FAA Communications Building - Within and adjacent to the Ursula Judkins parking lot (on park property) is a communications building owned by the Federal Aviation Administration (FAA). The building houses a transmitter used for guiding planes landing at Boeing Field. This facility would have to be decommissioned or relocated to allow construction of the Preferred Alternative. SDOT has begun discussions with FAA and will reach agreement with the FAA before FHWA makes a final NEPA decision.

Exhibit 1-10
The existing bridge in relation to the Admiral's

The Admiral's House - The Preferred Alternative would require a permanent easement over a portion of the Admiral's House property – a property listed on the National Register of Historic Places.

Smith Cove Playfield - The Preferred Alternative would cross over a portion of the Smith Cove Playfield on 23rd Avenue West south of the existing bridge location.

Smith Cove - Placement of four piers and footings in Smith Cove to support the mainline bridge and 23rd Street on-ramps would require property acquisition or easements from the Port of Seattle and the Washington State Department of Natural Resources.

Exhibit 1-11
The Preferred Alternative in relation to the Admiral's

Construction Effects

Construction impacts to the Admiral's House can be found in the Cultural, Historic and Archaeological Resources/Section 106 section.

Construction impacts to Smith Cove parks can be found in the

Parks, Recreation and 4(f) section.

Construction of the Preferred Alternative could cause temporary disruptions for industrial uses located on Port of Seattle property. Construction activities may divert or delay vehicular access to the waterfront and Piers 90 and 91 within Terminal 91.

Up to 16.2 acres of temporary right-of-way or easement would be required to construct the Preferred Alternative. This includes staging areas, the area that would be affected by demolishing the existing bridge, and the right-of-way that would be retained for the completed bridge.

In-water construction of temporary work bridges, the 23rd Street ramps, removal of the wooden wharf at Jacobs Lake and placement of several footings and bridge supports would occur within the City of Seattle Shoreline Environment.

Mitigation Measures

During construction access to the cluster of marine businesses as well as the cruise terminal at Terminal 91 would be changed. SDOT and the Port of Seattle are evaluating detours and alternative access points to accommodate these changes. The contractor would be required to maintain access to businesses throughout the construction period. Anthony's would be relocated or be provided alternate access to its existing location. If Anthony's is relocated, they would be compensated at fair market value and provided relocation assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970.

Mitigation for the Admiral's House property can be found in the subsequent Historic and Archaeological Resources/Section 106 section.

Mitigation for Smith Cove parks is discussed in the Parks, Recreation and 4(f) section.

SDOT would coordinate with FAA on the relocation of their communications structure once construction funding becomes available.

SDOT would follow mitigation measures prescribed in the Magnolia Bridge Replacement Project Biological Opinion (2008) and all updates made prior to construction. SDOT would also obtain required state and federal permits for in-water work as well as a City of Seattle Shoreline Substantial Development Permit to mitigate impacts to the Shoreline Environment.

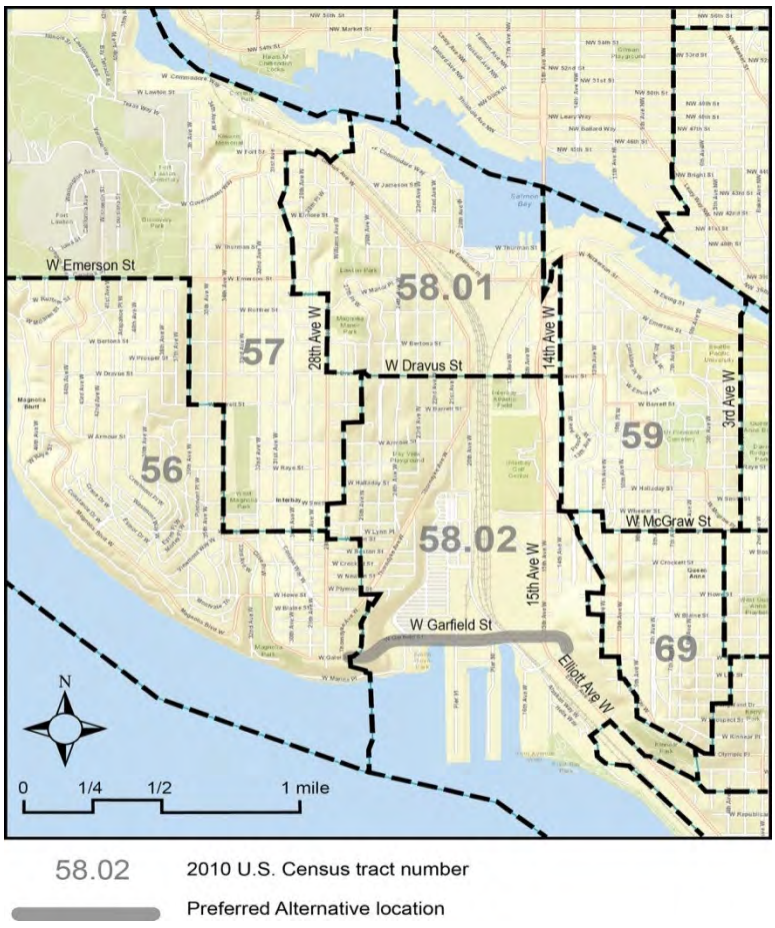
Community, Neighborhoods, and Businesses

The demographics of the project were determined within a study area emanating ½ mile in all directions from the existing bridge; it includes portions of six census tracts within the Magnolia, Interbay and Queen Anne neighborhoods (See Exhibit 1-12):

- Magnolia (56.00, 57.00)
- Interbay (58.01, 58.02)
- Queen Anne (59.00, 69.00)

Portions of Census Tracts 59 and 69 were included in the study area because they are within ½ mile of the existing bridge. However, no impacts are anticipated here because these census tracts are separated by the SW Queen Anne Greenbelt and have limited automobile access to and from 15th Avenue West. Information on these census tracts is not included in the following section.

Exhibit 1-12
Study Area Census Tracts (2010)



Low Income Populations

The income for the majority of residents within the study area (as measured by Median Household Income) was much higher than the federal poverty level for a family of four ranging from approximately $60,000 to $145,000. Populations with the lowest median household incomes reside in the Interbay neighborhoods – in the center portion of the study area - which include Census Tracts 58.01 and 58.02. Populations with the highest incomes reside in the Magnolia neighborhood which includes Census Tracts 56 and 57 and is located in the western portion of the study area.

While median household incomes throughout the study are above the 2014 poverty level, a number of people residing here live below the poverty level; a total of 558 individuals live below the poverty level within Census Tracts 58.01, 58.02. Census Tract 57.00, where the median household income is over $83,000 had the greatest percentage (9%) of individuals living under the poverty level in the study area.

Two schools are located within the study area: Lawton Elementary (Census Tract 58.01) and Catherine Blaine School (Census Tract 56). Exhibit 1-13 shows the location of these schools. The number of students receiving free or reduced lunches at these schools is approximately 15%.

Age and Disability

The Magnolia neighborhood has the highest percentage of individuals aged 65 or older in the study area. The highest percent of disabled individuals in the study area reside in Census Tracts 57 and 58.01.

Minority Populations

The racial composition in the study area is predominantly white (84%). Black or African Americans make up 2% of the population within the study area, Asian/Pacific Islander, 6% and Hispanic or Latinos 6%. Other race or two or more races make up 7%. Census Tract 58.02 had the highest percentage of minority residents within the study area at 24%. Minority Populations present in the highest percentages are Hispanic or Latino and Asian/Pacific Islanders. Census Tract 58.02 has approximately 21% minority populations – also consisting of Hispanic or Latino and Asian/Pacific Islanders. Race and Ethnicity of students attending Lawton Elementary and Catherine Blaine School is similar to that of the study area - with students of Hispanic or Latino and Asian/Pacific Islanders representing 7-8% of the student population.

Data from both the Census and from Seattle Public Schools indicated small percentages of linguistically isolated populations (LIP) and students with Limited English Proficiency (LEP) reside in the study area. LIP populations were the highest in Census Tract 58.02 at 6.5%. LEP students

were 0.5% of the population at Lawton Elementary and 2.3% of the population at Catherine Blaine School.

Also, within the study area, the average median household income is approximately $85,000[7]. The lowest median household income within the study area is nearly $60,000. This is quite a bit higher than the 2014 defined federal poverty level which is $24,000 for a family of four[8]. However, 531 individuals or 11.6% of the population within the study area were reported to be living below the poverty level. These individuals are located throughout the study area.

Individuals who reported speaking a language other than English[9] at home made up 1.4% of the total population within the study area (115 individuals). They include speakers of non-Spanish languages and Asian/Pacific Islander populations.

[7] Demographic information was gathered from the 2010 U.S. Census Summary File 1/ U.S. Census Bureau, American Community Survey 2011 5-year Estimate Tables S1101 and S1903.

[8] 2014, US Department of Health and Human Services, ASPE.hhs.gov

[9] Note: Limited English proficiency includes individuals age 5 or older that do not speak English or speak it less than less than well. Source: 2011 American Communities Survey 2006-2010 ACS 5-year estimates; Magnolia Bridge Replacement Social, Economic, and Relocation Discipline Report.

Exhibit 1-13

Lawton Elementary School and Catherine Blaine School

Businesses

There is a cluster of seven maritime businesses in very close proximity to the existing bridge: Trident Seafoods, Lineage City Ice Seattle (cold storage), Independent Packers (seafood processing), Anthony's, Holland America, Sleeping Giant, and Intercruises. Lineage City Ice lies at the heart of this cluster,

providing the other businesses with cold storage space and bringing business to the area. Trident Seafoods is the largest of the businesses and uses a large portion of Lineage City Ice's storage capacity. Two of these businesses would be directly affected by the project. Impacts to Anthony's and the Port of Seattle Pier 91are described in the Traffic and Land Use sections.

Interviews with the seven businesses in the area, and the Port of Seattle were conducted in 2004 and 2013. Employers on the Port of Seattle property interviewed in 2013 reported a large minority and LEP workforce.

Construction Effects

Impacts to communities, neighborhoods and businesses are described on pages in the preceding Traffic, Land Use and Parks and Recreation Section 4(f) sections.

Mitigation Measures

Mitigation measure for impacts to communities, neighborhoods and businesses are described in the Traffic, Land Use and Parks and Recreation Section 4(f) sections of this executive study.

Historic, Cultural, and Archaeological Resources/Section 106

There is one historic property in the project area, the Admiral's House. It was constructed in 1944 by the U.S. Navy to house the commanding admiral and his family, and serve as a center for official government entertaining (Sheridan 2013). It is listed on the National Register of Historic Places and is significant for its association with the U.S. Navy and its role in Seattle from World War II until the 1990s The Admiral's Residence is also significant for its embodiment of the Colonial revival architecture. The home was recently sold to a private party for use as a residence. A portion of the Preferred Alternative would lie over a small portion of the Admiral's House property (See Exhibit 1-11 and Exhibit 1-12).

No known archaeological resources have been identified in the vicinity of the project.

What is Section 106?

Section 106 of the National Historic Preservation Act requires federal agencies to account for their impacts on historic properties and cultural and resources. Regulations in 36 CFR 800 outline requirements for complying with Section 106 for projects receiving federal funding or requiring a federal permit.

Construction Effects

The FHWA has determined that construction of the Preferred Alternative would temporarily impact access to the Admiral's House and cause minor damage.

The extent of archaeological resources below the ground surface is unknown. However, due to the location of the project near the historic shoreline it is possible that archaeological finds may be encountered during construction.

Mitigation Measures

FHWA developed a Memorandum of Agreement (MOA) with U.S. Navy, the Washington State Department of Archaeology and Historic Preservation (DAHP) and City of Seattle requiring a pre-construction survey of the structural condition of the house, garage and access road, and a geotechnical investigation of the stability of the hillside on the property. Before construction may begin, repairs must be completed and storm windows installed to prevent dust and dirt from entering interior spaces and to reduce interior noise. If required, slope stability mitigation measures would be performed. Mitigation measures in the MOA would be adhered to. Additional mitigation measures are included in the MOA. In addition, the Admiral's House is now under private ownership. The MOA and its provisions were a condition of sale.

SDOT would obtain a permanent easement for use of the Admiral's House property for the bridge structure. Provisions related to bridge maintenance access requirements and the protection of the historic characteristics of the Admiral's House property would be included.

A temporary construction easement for work on and over the Admiral's House property would be obtained. This would include access requirements and the provisions for the protection of the historic characteristics of the Admiral's House property.

A Construction Monitoring Plan would be developed prior to the start of construction that would outline monitoring

protocols and identify areas of sensitivity for archaeological monitoring of select pre-construction and construction tasks. This would include an Inadvertent Discovery Plan (IDP). If significant archaeological resources are identified during construction, mitigation for potential impacts should be addressed following the protocols of the IDP. Should any prehistoric or historic cultural remains be discovered during the demolition or construction, all work in the area of the discovery shall cease and the IDP should be followed.

Parks, Recreation and 4(f)

There are nine parks and recreation facilities and two historic resources in the vicinity of the project that qualify as 4(f) resources. Ursula Judkins Viewpoint, Smith Cove Waterfront Park, Smith Cove Playfield, Smith Cove Open Water Park, Thorndyke Park and Magnolia Way West, Magnolia Park, Centennial Park, and the Magnolia and SW Queen Anne Greenbelts. The Ursula Judkins Viewpoint, Thorndyke Park and Magnolia Park while open to the public, function primarily as neighborhood parks –used by local residents. Smith Cove Park, Smith Cove Playfield and Centennial Parks all function as city-wide facilities. Automobile access and parking is available as is park access via the Elliott Bay Trail. The Magnolia and SW Queen Anne Greenbelts serve as city open space[10]. Three parks and one historic resource would be impacted by the Preferred Alternative:

What are 4(f) Resources?

Section 4(f) resources are important public parks, recreation areas, wildlife refuges or historic properties that are regulated under Section 4(f) of the U.S. Department of Transportation Act of 1966. The Act prohibits FHWA from approving projects that 'use' 4(f) resources.

- Ursula Judkins Viewpoint,
- Smith Cove Playfield
- Thordnyke Park and Magnolia Way West
- The Admiral's House

[10]There are no known homeless encampments within parks properties. However, homeless individuals have been seen under the bridge, under the Galer Flyover, and in wooded areas on the hill east of the bridge (Queen Greenbelt) in the past. Before construction, any homeless populations within the project area would be identified notified of the project, and vacated.

The following describes impacts to parks properties. Impacts to the Admiral's House are described in the Historic, Cultural Resources, and Archeological Resources section above.

Impacts to the Ursula Judkins Viewpoint and Smith Cove Playfield parks involve small acquisitions of park land for use as part of the transportation facility. During construction, impacts would involve closure of portions of Ursula Judkins Viewpoint and Smith Cove Park for a short period of time during construction. FHWA has determined that these impacts would be '*de minimis*' and would not affect the activities, features or attributes of these properties that qualify them as Section 4(f) resources. FHWA has also determined that the impacts to the Thorndyke Park and Magnolia Way West intersection would be temporary. Seattle Parks and Recreation (Parks) has concurred with these findings.

Ursula Judkins Viewpoint - The West Galer Street (western) approach of the Preferred Alternative would be realigned to meet current design standards for visibility around curves and barriers. It would also allow the existing bridge to remain open to traffic while the new bridge is built immediately to the south. This would require the acquisition of approximately 0.18 acre to be acquired from the 2.4-acre Ursula Judkins Viewpoint. This area is currently occupied by a portion (about 0.02 acre) of the Viewpoint public parking lot, a restricted site for FAA navigation equipment, and some inaccessible area on the hillside south of the existing Magnolia Bridge. The remaining portions of the Viewpoint would continue to provide views of the city and waterfront. The aesthetic attributes and related activities associated with the upper site would not be substantially impaired or diminished.

Exhibit 1-14
Ursula Judkins Viewpoint (view to the east from the parking lot)

Smith Cove Playfield – The existing Magnolia Bridge resides in 0.40 acres of rights-of-way of over and through the Smith Cove Playfield property. In its current location, due to the number and type of footings/columns, the bridge bisects the parcel. The area under the bridge is rights-of-way and unusable. Only the southern portion of the site is used for recreation as a playfield.

The Preferred Alternative would continue to bisect the Smith Cove Playfield property crossing over 0.59 acres of the Smith Cove playfield. See Figure 1-15.

The Preferred Alternative would not change access to the Smith Cove Playfield. Placement of proposed bridge footings is not anticipated to adversely affect existing or future access to planned park and recreation activities on this site.

Exhibit 1-15
Smith Cove Playfield (view to the north)

Construction Effects

Access to the lower site and use of the northern portion of the playfield would be impacted for approximately 16 months while the west portion of the bridge is being constructed. Large equipment would be required on the construction site for foundation, column and bridge span construction. The construction area would not be available for recreational use at that time.

For a period of approximately four months, construction activities would be ongoing within the northern one-third of the Smith Cove playfield site and within portions of the Ursula Judkins Viewpoint. During that period, the construction area would not be available for recreational use. In addition, noise, dust and visual effects from construction would make use of the remaining park land to the south less desirable for potential park users.

Near the end of the project construction period, existing bridge demolition would require about two months. This may require some of the area north of the new bridge for equipment access and to maintain a safe distance from the demolition. Temporary equipment marshaling or laydown areas for have not been determined at this time. In addition, noise, dust, and visual effects from construction would make use of the remaining parkland south of the construction area less desirable for potential park users.

Noise would be increased during: project staging, demolition of the old and construction of the new bridge structure; and demolition and construction of the new 23rd Avenue West ramps in the proximity of the Smith Cove Playfield.

Mitigation Measures

SDOT and Parks have entered into a Joint Development Agreement (JDA) for joint planning and development of the park property for transportation use by the Preferred Alternative and recreational uses. Land occupied by the existing bridge and not needed for the new bridge would be transferred to Parks and Recreation. Under the JDA SDOT would trade 0.40 acres of right-of-way currently occupied by the Magnolia Bridge for the 0.59 acres required for the Preferred Alternative. This would decrease the amount of park land required to construct the Preferred Alternative over the Smith Cove Playfield. In addition, removal of the piers, columns and bracing, of the existing bridge would free up land currently un-usable for park and recreation purposes.

Bridge demolition may have short-term noise and dust impacts on the adjacent Smith Cove Playfield site, the Ursula Judkins Viewpoint, and the Admiral's House property. The contract for bridge demolition would specify demolition procedures and noise and dust abatement measures to lessen and mitigate impacts.

Mitigation measures for the Admiral's House are described in the Historic, Cultural and Archaeological Resources/Section 106 section above.

Exhibit 1-16
View from Existing Bridge at the West End

Exhibit 1-17
View from New Bridge at the West End

Public Services and Utilities

The Preferred Alternative in its new configuration would result in permanent relocation of utility infrastructure:

- Telecommunications on the existing bridge would be permanently relocated.
- The large network of overhead and underground power lines, as well as street lighting at the eastern edge of the project would need to be moved.
- Power lines on the existing bridge serving the Terminal 91 south substation and feeding the King County Interbay pump station would be relocated.
- New stormwater infrastructure would be installed.

The Preferred Alternative would have the same number of travel lanes as the existing bridge, and both approaches would be built close to the existing alignment. Emergency access and travel times as well as school bus routes would be the same as the no build condition.

New stormwater facilities would be installed and stormwater quality entering Elliott Bay would be improved. Otherwise, public services would not be affected by the Preferred Alternative.

The Preferred Alternative would not create additional demand for utility service within the study area due to development, as no new development would result from this project.

Construction Impacts

Construction would result in temporary relocations of utility service connections to allow the construction of the bridge structure, ramps, foundations, and walkways.

Demolition of the existing bridge would result in the permanent demolition, abandonment, and/or relocation of affected electric power, telecommunications, and sanitary sewer utilities. Temporary service interruptions to utility services such as electric power, gas, and communications during the construction period would be unavoidable.

Damage to utility infrastructure near or adjacent to the bridge could occur from demolition of the bridge structure, utility settlement from dewatering and vibration.

Additional construction impacts of the Preferred Alternative on public services are described in the preceding Traffic and Land Use sections.

Mitigation Measures

The following mitigation measures are in addition to those described in previous sections.

Potential impacts on major utility infrastructure for the Preferred Alternative would be avoided through the careful placement of bridge foundations and careful execution of construction.

Vibration and settlement monitoring plans and a plan to maintain adequate utility clearances would be required of the contractor.

Whenever feasible, unavoidable utility outages that can have a substantial effect on customers would be scheduled during the least disruptive time period. Strategic bypass plans would be developed to ensure no interruptions to sewer or drainage services occur.

Mitigation for unavoidable, temporary disruptions of other utility services would aim first to minimize the duration of the interruptions to utility customers and service providers and second to provide for temporary or new connections in the best possible locations.

SDOT would work closely with Seattle City Light, Seattle Public Utilities, King County, and private utilities affected by the Preferred Alternative to ensure protection of these resources.

Visual Quality

The new bridge would have the same number of lanes as the existing bridge, but the lanes and the pedestrian/bicycle sidewalk would be wider than the existing lanes and sidewalk. There would be fewer structural supports under the new bridge

than under the existing bridge. The visual experience for viewers looking from the Preferred Alternative would be similar to those looking from the existing bridge. An example of this can be seen in Exhibits 1-3, 1-4, 1-15, 1-16 and 1-17. Examples of how views towards the Preferred Alternative would be similar to views towards existing bridge can be seen in Exhibit 1-11.

The Preferred Alternative would be closer to the Admiral's House than the existing bridge. Exhibits 1-10 and 1-11 show the small visual impact of the Preferred Alternative.

Construction Effects

Project construction would require some clearing of trees and vegetation mainly south of the existing bridge on the slope of Magnolia Bluff. The extent of the impact would depend on the type of structure and whether construction is done over temporary supports from below or by using overhead cranes.

Temporary impacts to views towards and from the bridge would be affected during construction as new temporary structures are constructed and the old bridge demolished.

Mitigation Measures

- Consider the use neutral paint colors to reduce the effect of bulk of the structure when seen from below.
- Include viewpoints along the pedestrian/bicycle walkway.
- Plant mature vegetation to reforest the slope and greenbelt areas to replace plants that have been removed.
- Schedule prompt replanting of cleared areas.

Air Quality

The study area currently meets the National Ambient Air Quality Standards (NAAQS) and all state and local ambient air quality standards for regulated air pollutants. The Washington Department of Ecology State Implementation Plan (SIP) designates the project area as an air quality maintenance area for carbon monoxide (CO). To be eligible for future federal

funds, the Preferred Alternative must demonstrate conformity with the SIP. Air quality modeling shows that CO concentrations at all intersections in the study area would decrease in the future and would meet all applicable ambient air quality standards in the 2010 and 2036 traffic forecast years. The project would be in conformity with the SIP.

Construction Effects

Delays during peak traffic periods would cause minor changes in localized air quality. Vehicle emissions during this time are not expected to exceed CO standards.

Dust and particulate matter would be generated from demolition, land clearing, ground excavation, cut and fill activities, and construction of surface roadways. Construction emissions would be greatest during the earthwork phase because most emissions are associated with the movement of dirt on the site. Emissions would vary from day to day, depending on the level of activity, type of construction activity, weather conditions (especially rain), soil conditions, wind speed, and amount of equipment in use. Large dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Mitigation Measures

Construction equipment would be properly maintained to reduce exhaust emissions from diesel and gasoline engines during construction. No adverse impacts are expected to occur, and no mitigation would be required.

Emissions would be reduced if only limited areas of the construction site are disturbed simultaneously. Project specifications would require that the amount of exposed area be kept to a minimum.

Construction equipment would be properly maintained to reduce exhaust emissions from diesel and gasoline engines during construction. No adverse impacts are expected to occur, and no mitigation would be required.

Water Quality

Several surface water bodies occur near the Magnolia Bridge: Smith Cove, the Smith Cove Waterway, Lake Jacobs (an industrial pond located south of the existing bridge on Terminal 91 between Piers 90 and 91) and Elliott Bay. These water bodies have been historically degraded and contaminated by development occurring over the last century. See Exhibit 1-18.

Exhibit 1-18
Surface Water Bodies near Preferred Alternative

Three relatively distinct groundwater flow systems occur near the existing Magnolia Bridge. The principal system is a shallow unconfined aquifer within the Interbay Channel, the lowland between Queen Anne and Magnolia hills that underlies most of the project. The other systems include upland aquifers within Queen Anne and Magnolia hills and a deep artesian aquifer located approximately 300 to 400 feet below sea level. The general groundwater flow in the Interbay shallow aquifer is to the south, toward Elliott Bay. Groundwater fluctuates between 5 and 12 feet and fluctuates in response to tidal changes.

Groundwater quality has been degraded by numerous industrial activities that have historically existed in the area. No domestic or municipal drinking water rights were identified. No public drinking water wells, sole source aquifers, wellhead protection

areas, or critical aquifer recharge areas exist within the Interbay Channel.

A contributor to water quality in the project area is stormwater runoff from the existing Magnolia Bridge which currently discharges untreated into Elliott Bay, or infiltrates into groundwater and an underlying aquifer. Stormwater from the existing bridge discharges to three outfalls to Elliott Bay and to a sanitary sewer in 15th Avenue West. Two of the outfalls are to Smith Cove Waterway east of Pier 90 and the third is to Smith Cove at the south street end of 23rd Avenue West. The runoff to the sanitary sewer is treated at the King County Metro West Point Wastewater Treatment Plant. There is no separation of runoff from the existing bridge and approaches which include both pollution generating impervious surfaces (PGIS) and runoff from sidewalks and other areas that do not generate pollution (non PGIS).

What is pollution-generating impervious surface (PGIS)?

PGIS is an impervious surface that is a source of pollutants in stormwater runoff. Study area PGIS includes roadways that receive direct rainfall or the run-on or blow-in of rainfall. Non-PGIS surfaces include sidewalks and pathways with no motor-vehicle traffic and that do not receive runoff from PGIS areas.

The Preferred Alternative would be wider that the existing bridge. It would have more impervious surface both PGIS and Non-PGIS than the existing bridge. Unlike the existing bridge, stormwater from the Preferred Alternative would be treated prior to being discharged. And it would only be discharged to two outfalls: the Smith Cove Waterway east of Pier 90 or Smith Cove at the 23rd Avenue West street end. This change would result in improved stormwater quality.

Construction Effects

- Demolition and construction could allow dust, debris, paint chips, epoxies, grit, and chemical contaminants to enter surface water and groundwater.
- Sediment (and potential contaminants) eroded from exposed earth (from clearing, grading, or stockpiling activities) may enter Elliott Bay from uncontrolled stormwater runoff.
- If the soils are contaminated and not properly controlled, surface water runoff may carry hazardous materials into Elliott Bay.

- Excavations for bridge footings and utility trenches may expose contaminated groundwater or release substances into groundwater.
- Project staging areas (where construction materials and/or equipment are stored) may acquire metals, sediment, oils, and grease, and the contaminants may be carried by surface runoff to Elliott Bay.
- Impacts to groundwater could include increases in total dissolved solids as a result of releasing muddy stormwater or contaminants into the shallow groundwater from spills or leaks due to improper hazardous material storage or handling. Ground construction for foundations and utilities has the potential to create paths for the movement of contaminated groundwater.
- Groundwater pumped for foundation and utility construction ("dewatering") could contain contaminants and could pull contamination from other areas as the groundwater is pumped. Land settlement could occur in areas where construction dewatering takes place and could impact built structures in the area.
- New utilities or stormwater pipes installation below the shallow groundwater table could create a pathway for the movement of existing groundwater contaminants to non-contaminated areas.

Mitigation Measures

Mitigation would be required as part of the environmental and permitting processes and would provide a net improvement to water quality relative to the existing condition. Stormwater and drainage design would follow the City of Seattle's Stormwater and Drainage Code. Stormwater runoff would be treated to remove pollution before discharging into Elliott Bay. The project would be required to provide "basic treatment" as defined by Washington State Department of Ecology Storm Water Management Manual and the Seattle Stormwater Code (SMC 22.800).

Maintenance BMPs, such as regular sweeping of the new bridge structures, and cleaning of the catch basin sumps would become part of the City's ongoing roadway maintenance program. Structural treatment BMP's will be required and would be confirmed during the permitting process.

The creation of migration pathways for existing groundwater contaminants along new utility or stormwater conveyance trenches may be mitigated in several ways. Where possible, future utility trenches would be sited to avoid areas where groundwater contamination has been identified.

The project would avoid and minimize impacts to water quality by following City, State and Federal permit conditions and requirements. Additional mitigation measures would include:

- Construction and demolition over and within open water areas would require methods such as the use of tarps, silt fencing, containment booms, safety nets or a barge to capture debris and other freed materials including paint chips.
- Impact pile driving would be minimized. Piles would be vibrated in and out as far as possible.
- Concrete would be cured seven days or more before contact with water to avoid leaching.
- Sampling for pH would be performed in the event there is an unauthorized discharge from concrete activities.
- A Spill Prevention, Control and Countermeasures Plan (SPCC Plan) would be prepared and used for the duration of the project. The SPCC Plan would identify potential spill sources, notification and reporting procedures, training procedures and spill prevention and countermeasures.
- Potential water quality impacts to groundwater would be mitigated by implementing effective stormwater, hazardous material, and spill response management practices

- Measures to mitigate the movement or discharge of contaminated groundwater would be determined during project final design and permitting.
- The potential for land settlement resulting from construction dewatering may be mitigated by utilizing watertight shoring systems to minimize dewatering or by re-injecting groundwater to prevent excessive lowering of the water table around the construction area.

Geology and Soils

The Magnolia Bridge extends across Interbay, a trough-like area created during the retreat of several glaciers. The soils are composed of several types of soils: weak glacial, beach and estuary deposits one laid on top of the other. These are all overlain by fill placed by humans since the late 1800s.

On either end of the bridge are two bluffs: Magnolia Bluff on the west and Queen Anne Hill on the east. These areas are made up of hard dense soils also laid down during the retreat of several glaciers. The bottom of the bluffs consists of landslide deposits and fill placed by humans. Historic shorelines run buried along the bluffs.

What is lateral spreading?

When underlying soils liquefy, the upper layer of soil may move horizontally downslope particularly near the base of a hill. This may displace foundations and structure supports, causing a structure such as a bridge to collapse.

The Magnolia Bridge is in an area prone to earthquakes. The geologic hazards that earthquakes can cause include soil liquefaction and ground motion. In addition, lateral spreading can occur strong enough to cause the bridge to fail. The hillsides are subject to landslides and erosion.

The western approach to the Preferred Alternative would require cutting into the existing slope. Slope cutting can weaken the slope and result in a future landslide.

Settlement of fill approaches can impact underlying and adjacent structures or utilities as well as walls or structures constructed on the fill. Downdrag caused by ground settlement can result in additional loads and potential damage to existing buried foundations and new deep foundations.

What is downdrag?

Downdrag happens when settling soils pull down on the outside surface of underground foundations.

Bridge footings for the Preferred Alignment would be placed in soils likely to liquefy during an earthquake. Bridge footings

could topple rendering portions of the new bridge unusable.

Construction Effects

Slope Stability and Landslides – Excavation on steep slopes and placing fill material over soft soil can cause slope instability.

Vibration – The installation of driven pile or drilled shaft foundations and some soil improvement methods can cause vibrations that would impact adjacent facilities.

Erosion – Erosion from areas with cuts, fills, excavations, and any soil improvement installation disturbance can cause increased sediment movement onto other areas of the project, into stormwater drains, and into Smith Cove.

Mitigation Measures

New deep foundations would be designed to accommodate the downdrag loads, or construction sequencing can be used so that the foundations are installed after most of the settlement has occurred. Existing foundations would be evaluated for the settlement-induced downdrag loads. Mitigation measures such as use of ground improvement would be considered.

Settlement impacts would be mitigated by several methods, including preloading, construction sequencing, ground improvement, or use of lightweight fill. Affected utilities may be relocated. Utility relocations would be determined in final design.

Temporary erosion and sediment control plans would be prepared in accordance with City of Seattle Drainage and Grading Code and Standard Specifications.

Soil improvement would be necessary along the majority of the Preferred Alternative alignment to depths as much as 55 feet below the existing ground surface to mitigate liquefaction and lateral spreading during a strong seismic event.

Low vibration pile driving equipment would be used to reduce vibration levels. Driving open-ended piles or pre-drilling a near-surface hole prior to pile driving can also reduce vibration levels. Low vibration drilled shaft equipment (such as an

oscillator) can also be used to reduce vibration levels. Soil improvement methods such as compaction grouting or cement deep soil mixing have lower vibration impacts than other methods.

Short-term soil stability would be improved by using staged construction and geotextiles. Monitoring the amount of soft soil compaction beneath a layer of fill would determine when additional fill can be added in stages. Lightweight fill material can be used in areas where staged construction is not feasible.

Hazardous Materials

Interbay is an historical industrial center occupied by the railroad, maritime industry and the Navy over a long period of time. Much of the contamination in Interbay has undergone cleanup, but because of these historic land uses, pockets of contaminated soils and groundwater are still present near the project.

Contaminated Soils and Groundwater – Contaminated soils and groundwater resulting from contaminants migrating off-site from existing properties or historic properties located in the vicinity of the alignment, may be encountered during construction of the Preferred Alternative.

Rights-of-Way – SDOT anticipates acquiring rights-of-way and/or easements on parcels that may be contaminated with hazardous materials that may require cleanup.

Lead Based Paint/Asbestos – The existing bridge likely has lead-based paint and asbestos-containing material. Lead-based paint can pose a health risk during demolition when lead particles can become airborne and be inhaled or ingested. Lead-painted metal may be recycled.

Buildings and structures to be demolished may contain lead-based paint and asbestos-containing building materials. These include a portion of the Terminal 91 Center Gate guard shack, and the Anthony's Seafood Distributing loading area connected to the existing bridge. Buildings would be surveyed prior to demolition to determine if any asbestos-containing building

material or lead-based paint would be affected by the demolition.

Construction Effects

Encountering unknown or undocumented hazardous waste in the project area is possible and could impact the construction schedule, project costs, and the health and safety of workers. With proper planning and training, contamination not previously identified but which could be encountered during construction can be recognized, isolated, and contained or remediated so as to minimize cost and schedule impact.

Construction activities could result in generation of hazardous wastes and introduction of those wastes to the environment. Fuel and hydraulic leaks and spills from construction machinery are possible.

Chemicals that could be released from uncured asphalts used for road surfacing can be toxic. Use of these and other construction materials presents some risk to the environment.

Construction impacts may arise if contaminated soil and/or groundwater is encountered during proposed construction activities (e.g., drill shafts for bridge foundations and associated excavation for pile caps). Contaminants that may be encountered include petroleum hydrocarbons, metals, PCBs, creosote, VOCs, SVOCs, and PAHs.

Earthwork associated with bridge support structures and/or dewatering activities may encounter contamination and/or modify contaminant migration pathways.

Vehicle accidents can result in spills of hazardous materials. Stormwater and water quality treatment facilities would be constructed to collect and retain pollutants from traffic operations.

Mitigation Measures

Site investigations would be performed in potentially contaminated areas where excavation is proposed to determine the location and extent of any contamination.

Site investigations would be performed prior to purchase to determine the location and extent of contamination.

Where feasible, the amount of contamination generated would be minimized by using driven piles instead of auger cast piles for bridge foundations.

Any contaminated soil or groundwater that is encountered would be analyzed to assess the regulatory classification of the soil/groundwater and the most cost-effective remediation strategy.

Construction planning would include the development of spill prevention, control, and countermeasure plans, erosion and sedimentation control plans, and plans for the handling and disposal of known and anticipated contaminants. These plans would prescribe procedures, including best management practices, to minimize these potential indirect impacts.

Fish, Wildlife, and Vegetation

Over 40 species of fish have been identified within the study area. Species that may be present along the shoreline include Puget Sound Chinook salmon, Puget Sound steelhead, Yelloweye rockfish and canary rockfish and bull trout. Dungeness crab may be located present west of the project area. Larger fish, including adult salmon, flatfish, and others, are more likely to occur in deeper water. The piles and pier structures of Terminal 91 are likely to support fish such as pile perch, rockfish, and cabezon. These fish would also be more common along the Elliott Bay Marina rubble breakwater, southwest of the proposed project.

Shoreline habitat near Smith Cove Park

Marine mammals commonly observed in Elliott Bay include California sea lions, harbor seals, and harbor porpoise. These animals would not be expected to use shallow nearshore habitats in the study area. The only known seal or sea lion haulout sites in Elliott Bay are the navigation buoys west of West Point, Alki Point, and Shilshole Bay Marina (Jeffries et al. 2000). WDFW (2003) reports that the nearshore areas from Smith Cove north are a concentration area for Dungeness crab.

Most terrestrial species near the project footprint are limited to the isolated forest fragments in the Magnolia and Queen Anne bluffs. Species that may be found here include the chorus frog, long-toed salamander, and northwestern garter snake.

Birds are the most commonly observed wildlife in the study area. Ravens and pigeons appear to be nesting and/or roosting in the undersides of the existing Magnolia Bridge. Starlings, black-capped chickadees, spotted towhee, robin, crow, pigeon, and song sparrow have been observed near the project alignment. Young Peregrine falcons have been observed on either side of the bridge. A nesting pair of Purple Martin resides in Centennial Park (WSDOF, 2014). Bald Eagle breeding areas are located ½ mile west of the bridge on the Magnolia Bridge (2013, WDFW). Great Blue Herons are known to be present in the area. Pileated woodpeckers may reside in the forested areas of the Magnolia Bluff – near the Ursula Judkins Viewpoint.

Effects from the Preferred Alternative include:

- Increased overwater coverage in the intertidal area west of Pier 91 by the ramp structure and new mainline bridge.
- Removal of the existing Jacobs Lake wood wharf would open this area to increased light penetration.
- Approximately 200 square feet of intertidal habitat would be removed with the installation of four bridge foundations.
- Loss of bird and small mammal habitat - through removal approximately 0.5 acre of forest at the west end of the new proposed bridge including removal two big-leaf maples in excess of 24 inches in diameter.
- Loss of breeding and foraging habitat for some special status species, including bats when the bridge is demolished.

Construction Effects

- Temporary loss of intertidal habitat with the installation of drilled shaft foundations, sheet pile cofferdams for construction of the foundations, falsework support bents, and temporary piles supporting the work bridge.
- Noise from pile driving in the Smith Cove intertidal and nearshore areas may disturb fish and Southern resident killer whales in the vicinity.
- Impacts to the intertidal zone described above would affect aquatic organisms. Pile driving could have serious, potentially lethal effects on fish in the immediate vicinity (i.e., within 50 feet) of the activity.
- Pulse noise and turbidity created by drop hammer pile driving could have deleterious effects on fish physiology. Any juvenile fish migrating along the shoreline during construction would likely move offshore to avoid disturbance. While this would limit the potential physiological effects of pile driving, the movement could expose juvenile fish to greater predation risk.

Mitigation Measures

- Containment booms would be deployed around the work area to contain any floatable debris or spills that may enter the water.
- Timing windows would be followed for in-water work – for species listed under the Endangered Species Act. The in-water work window for Elliott Bay is July 16 through February 14.
- A bubble curtain would be used to reduce underwater sound pressure levels when an impact hammer is used to drive or proof steel piles. The bubble curtain would completely surround the pile and be adequately weighted to keep the bubble ring resting on the sea floor. The pile shall be completely engulfed in bubbles over the full length of the water column at all times when the impact pile driver is in use. A 9 decibel

reduction in sound pressure levels is anticipated from use of the bubble curtain.

- Underwater noise during pile driving would be monitored according to accepted methods as described in WSDOT's Underwater Noise Monitoring Plan template.
- Monitoring within of 1.2 miles of the project site would occur for marine mammals during all vibratory and impact pile driving activities. If an orca or Steller sea lion is located, all pile driving activities would stop until the orcas or Steller sea lions have left the area.
- The last sheet pile to close the cofferdam would be driven at low tide to reduce the potential for fish entrapment. Any fish trapped would be removed following Washington State Department of Transportation Fish Removal Protocol and Standards.
- Heavy equipment would be checked daily for petroleum leaks and repairs made as necessary.
- The existing Magnolia Bridge would be visually surveyed prior to demolition to determine the extent of bat roosting habitat in this structure. If potential bat roosting habitat is identified by this survey, WSDOT and SDOT would collaborate to consider ways to mitigate for habitat loss by incorporating bat habitat into the new bridge design. Potential mitigation could include use of mounting brackets or expansion joints in the bridge design or placement of artificial bat roost sites.
- Some portion of the Smith Cove beach would be daylighted, if feasible.
- Native shoreline vegetation would be planted where conditions are appropriate.
- The project would include treatment of all stormwater coming from the bridge deck and is expected to result in a net reduction in pollutant concentrations for

pollutants of concern to salmonids and in the discharge of total suspended solids (which carry persistent organic pollutants).

- WDFW Priority Habitat and Species (PHS) management plans would be followed for PHS species: Great Blue Herons, peregrine Falcon, Pileated Woodpecker, Purple Martin and Dungeness Crab.

10 Would the project have 'disproportionately high and adverse effects' on minority or low income environmental justice populations?

During construction a number of temporary adverse impacts would occur throughout the study area. Some would have "disproportionately high and adverse effects" on minority or low-income populations. These are described below.

- **Travel time/distance –** construction detours would cause increased traffic and travel times throughout the corridor and affect all residents in the Magnolia and Interbay neighborhoods. Detours along West Emerson however, would cause backups on roadways near Lawton Elementary School and detours along Thorndyke Avenue could have similar traffic impacts near Catherine Blaine School. This would increase travel time to and from school for children being transported by their parents or taking the school bus. Because a high percent of minority students attend these schools, the project could have temporary disproportionately high and adverse effects on minority populations.
- **Transit** – Direct transit service on the bridge would be discontinued during construction. Transit routes currently stopping on the bridge and serving North Bay /Terminal 91 businesses would be detoured to West Dravus Street. This could prevent or delay transit dependent individuals (who may also be low-income individuals) from getting to work. The project could have temporary disproportionately high and adverse effects on low income populations.
- **Business Access** – Businesses located on Terminal 91 employ a high percentage of minorities. While English

proficiency is as a condition of employment for most of these businesses, for many of these employees English is a second language. The demographics of this employment pool include Chinese, Vietnamese, Spanish and East African populations. Many of these employees take the bus and access work via the bridge stairways. Removal of the stairway on the bridge would cause a loss in transit service and change access to these businesses. Limiting transit service and business access could have temporary disproportionately high and adverse effects on minority populations.

- **Business Relocation** – The project may require relocation or reconfiguration of the existing Anthony's Seafood Distributing building. This action could result in a loss of jobs or an increase in travel time for employees to a new location. Anthony's Seafood Distributing employs a large percentage of minority, low income and LEP workers, so relocation or reconfiguration of the building would potentially cause disproportionately high and adverse impacts on minority and low income and LEP employees.

11 What measures are proposed to avoid or minimize effects to minority, low income and Limited English Proficiency populations?

- A Traffic Management Plan (TMP) will be prepared by the Contractor. The TMP will include: information on street closures, detour routes and construction activity within the project area.
- Access to Northbay/Terminal 91 businesses will be maintained during construction.
- Owners of Anthony’s s would be compensated at fair market value without discrimination in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compensation would include relocation costs for Anthony’s Seafood Distributing if this business relocates.

- SDOT will develop an Inclusive Outreach and Public Engagement (IOPE) plan following the City of Seattle IOPE Guide[11]. This will include identifying the racial and ethnic composition of the project area, as well as low income, LEP, disabled and elderly populations that might be impacted by the project.
- Transit service to the Terminal 91 complex during construction would be maintained. This may be done by re-routing transit service or by providing shuttle vehicles to bring transit passengers between 15th Avenue West bus stops and the complex. This decision would be made prior to completion of final design.

[11] The IOPE Guide and Translation and Interpretation Policy are part of the City of Seattle Title VI Plan.

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Chapter 2 Introduction to the Project

This chapter describes the purpose and history of the Magnolia Bridge Replacement Project and why the project is needed.

Column bracing at west end of bridge

1 What is the purpose of this project?

The Magnolia Bridge provides an important link between the Magnolia community an area of northwest Seattle home to approximately 20,000 people and the rest of Seattle. It is one of three roads connecting Magnolia, along with West Dravus Street and West Emerson Street. The bridge provides the only public vehicular access to the land between the Port of Seattle Terminal 91, Smith Cove Park, and the Elliott Bay Marina. The purpose of this project is to replace the existing bridge, its structures, approaches, and related street connections to maintain access between these places and the City of Seattle.

2 Why is the project needed and what would happen if the bridge were not replaced?

The Magnolia Bridge is showing signs of its age. Much of the existing structure was built between 1929 and 1930, and has been in service since then. The concrete structure is showing signs of deterioration, with concrete cracking apparently related to corrosion of the reinforcing steel. The project is needed for the following reasons:

What is the "design" earthquake?

This is the earthquake that the new bridge would be designed to withstand, which will include ground motions anticipated to happen every 1,000 years .

- The Magnolia Bridge carries about one third of the daily traffic to and from Magnolia and also provides the only road access from the marina and public park property west of the Port of Seattle Terminal 91. It is the most direct route for much of south and west Magnolia to downtown Seattle and the regional freeway system. In addition, the bridge is an important route for emergency services.
- Loss of use of this bridge would increase traffic on both West Dravus Street and West Emerson Street resulting in 15 to 30 minute delays, similar to that seen during closure of the bridge after the 2001 Nisqually earthquake. Police, fire and ambulance response time would similarly be increased. The Magnolia Bridge is susceptible to severe damage and collapse from an earthquake that is less severe than a "design" earthquake. The types of soils around the Magnolia Bridge are likely to liquefy during an earthquake event. If this were to happen, the foundations would slip sideways and the bridge would collapse.

Column bracing at west end of bridge

The cost to keep the existing bridge in service for more than 10 years, the cost for repair, strengthening and preservation, continued maintenance and a full seismic retrofit would approach the cost of replacing the existing bridge.

Existing supports and deck repair

3 Why is this Environmental Assessment (EA) being prepared?

SDOT prepared this EA to comply with both and National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) requirements for major actions with probable environmental effects. The environmental analysis conducted as part of this EA – and the comments received in response to it – will help decision makers consider the potential environmental effects of the project before deciding how to proceed. The EA process provides the public, agencies, and

interested tribes an opportunity to review potential project effects and solicits constructive comments that could help SDOT engineers refine the project design. Public comments would be incorporated into a Finding of No Significant Impacts (FONSI). The EA process would conclude when a FONSI is issued by FHWA. At a later date, SDOT would adopt the FONSI to complete the SEPA process.

4 What will I find in this EA?

The Magnolia Bridge Replacement Project EA consists of seven chapters and fourteen Appendices.

- **Chapter 1 – Executive Summary**: summarizes the project's purpose, the studies completed, and project impacts and proposed measures to mitigate these impacts.
- **Chapter 2 – Introduction to the Project**: describes the project purpose and need, and why the EA is being prepared.
- **Chapter 3 – Developing the Alternatives**: describes how project alternatives were developed and evaluated leading to selection of a Preferred Alternative.
- **Chapter 4 – Project Description**: presents the elements of the Preferred Alternative, and the construction sequence and schedule.
- **Chapter 5 – Environmental Effects:** is an overview of project evaluation process. It is divided into 14 subchapters. Each subchapter describes the studies conducted, baseline conditions, project effects on these baseline conditions, and measures to avoid or minimize adverse effects of construction and operating the project. Detailed studies are included in Appendices A through T.
    - 5.1 – Traffic and Transportation
    - 5.2 - Noise
    - 5.3 – Land Use Patterns

  - 5.4 – Community, Neighborhoods and Businesses
  - 5.5 – Historic, Cultural and Archaeological resources/Section 106
  - 5.6 – Parks, Recreational and 4(f) Resources
  - 5.7 – Public Services and Utilities
  - 5.8 – Visual Quality and Aesthetics
  - 5.9 – Air Quality
  - 5.10 – Water Resources
  - 5.11 – Fish, Wildlife and Vegetation
  - 5.12 – Federally-Listed Species
  - 5.13 – Geology and Soils
  - 5.14 – Hazardous Materials
- **Chapter 6 – Cumulative Effects:** considers the incremental environmental effects of the project when added to other past, present and reasonably foreseeable future actions. The cumulative effects analysis includes other projects in the Preferred Alternative study area.
- **Chapter 7 – Mitigation:** contains the measures to avoid or minimize adverse effects of construction and operating the project.

Appendices

A Glossary

B Type, Size, and Location Study

C Cross Reference of NEPA Elements of the Environment and Environmental Assessment Sections

D Agency and Tribal Correspondence

E Air Quality Discipline Report

F Environmental Justice Discipline Report

G Geology and Soils Discipline Report

H Hazardous Materials Discipline Report

I Historic, Cultural, and Archaeological Resources Discipline Report

J Land Use Discipline Report

K Noise Discipline Report

L Section 4(f) Evaluation

M Public Services and Utilities Discipline Report

N Social, Economic, and Relocation Discipline Report

O Traffic & Transportation Discipline Report

P Visual Quality Discipline Report

Q Water Quality Discipline Report

R Wildlife, Fisheries, and Vegetation Discipline Report

S Rehabilitation Alternative Environmental Effects

T Biological Assessment

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Chapter 3 Developing the Alternatives

This chapter discusses how alternatives were identified, evaluated and screened to help select a preferred alternative. It also describes three build alternatives and the No Build Alternative that were considered in the early phases of the project.

Exhibit 3-1
Project Open House

1 How were the alternatives developed?

The process of generating initial design concepts began in 2002 when the project team gathered to brainstorm possible replacement structures and bridge alignments. From this meeting, the first open house, stakeholder interviews, and technical studies, SDOT developed twenty-five initial alignment concepts. The team completed a "fatal flaw" evaluation using a set of Bridge Alignment Criteria listed in Exhibit 3-2, and the twenty-five concepts were reduced to nine candidate alignments. The nine candidate alignments were further evaluated based on environmental, traffic, urban design, and cost criteria. After receiving comments from a design advisory group, public and community groups, agencies, the Port of Seattle Commission, the Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC) Action Committee, Terminal 91 businesses, the 15th Avenue West corridor businesses, the Seattle Design Commission, and the

Seattle City Council Transportation Committee; four alignments were recommended for environmental study: A, B, D, and H (See Exhibits 3-3 through 3-7).

Exhibit 3-2

Bridge Alignment Criteria

Vehicular Access to Magnolia – Provide equal or better access to Magnolia.

Vehicular Access to Interbay – Do not prohibit or interfere with access to and from the Interbay area.

Vehicular Access to Marina/Waterfront from Magnolia – Provide a workable access route to the marina/waterfront area from Magnolia.

Public Access to Waterfront – Do not interfere with or limit public access to the waterfront.

Olmsted Legacy or Critical Waterfront Parcels – No significant negative impact to the Olmsted Plan or important waterfront lands.

Traffic Flow on 15th Avenue West – Do not degrade traffic flow on 15th Avenue West.

Construction Impacts – Construction impacts should be acceptable to the community.

Hazardous Material – Avoid identified hazardous materials or contaminated areas.

Major Displacement/Relocation – No excessive displacement or relocation of businesses or residents.

Neighborhood Impacts – No significant negative impact on adjacent neighborhoods.

Bicycle & Pedestrian Connections – Maintain existing facilities and do not preclude future facilities.

Alternative Selection Process

25 initial concepts were developed and reviewed.

9 alignments, were left having survived a fatal flaws analysis

4 alternatives, A, D, C and the No Build were analyzed in 14 environmental discipline reports. The Rehab alternative was a later analyzed for potential impacts.

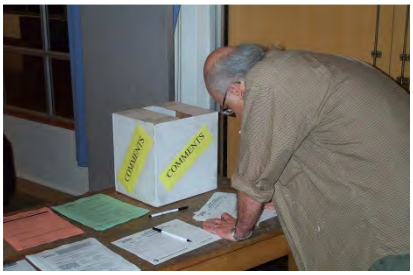
C, H and the Rehabilitation alternatives were eliminated based on results of the environmental analysis and public comment. Alternatives A and D had the least impact on the environment and the community.

Alternative A was selected as the Preferred Alternative.

2 How have the public and government agencies been involved?

SDOT has involved the public in the Magnolia Bridge Replacement Project through a wide range of activities including:

- Establishing and meeting regularly with a Design Advisory Group (DAG) consisting of representatives from community and business groups and public agencies.
- Inviting the public to participate in project scoping and alternatives development.
- Conducting extensive public outreach, holding public open houses, attending community meetings, producing newsletters, and maintaining an Internet website.



Comments were encouraged

- Conducting other outreach efforts such as presentations to and meetings with interested parties including the Magnolia Community Club, Magnolia Chamber of Commerce, Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC), Port of Seattle Commissioners, the Port's Neighborhood Advisory Committee, and the BNSF Railway.

Design Advisory Group (DAG)

The charge of the DAG was to provide guidance and feedback on the development of alternatives for replacement of the Magnolia Bridge. Members were project stakeholders or interested parties who could help inform bridge design and help identify potential project impacts. Members served as liaisons with the groups they represented. SDOT held 33 meetings with the DAG between 2002 and 2006.

Design Advisory Group

Queen Anne Chamber Of Commerce
Port Of Seattle
Queen Anne Community Council
Bicycle Alliance of America
Washington Department of Transportation (WSDOT)
Magnolia/Queen Anne District Council
Seattle Marine Business Coalition
Ballard Interbay Northend Manufacturing/Industrial Center
Uptown Alliance and Friends of Queen Anne
Magnolia Community Club
Seattle Popular Monorail Authority
Magnolia Chamber of Commerce
Seattle Design Commission

Project Scoping and Development

More than 90 people attended the Magnolia Bridge Replacement Project scoping meeting on May 22, 2003. People were invited to submit comments in a variety of forms during the public comment period. SDOT received public comments through:

- Comment forms at the scoping meeting
- Project website request for comments
- Email to Project Team members
- Letters
- Phone calls to Project Team members
- Scoping meeting transcripts

On the same day, SDOT met with agencies having jurisdiction over the project area to identify their concerns and take comments.

SDOT compiled all of the comments received from these scoping meetings as well as from open houses and neighborhood meetings and agency meetings. Concerns raised

A scoping meeting is designed to:

- Inform the public and agencies of proposed actions and alternatives;
- Serve as a forum to gather comments to help identify potential environmental impacts;
- Ensure that the environmental documents consider reasonable alternatives; and
- Help identify issues or concerns to promote a focus on items important to the local community and to agencies.

Presentation at Trident Seafoods in Terminal 91

during the scoping period were considered as initial alternatives were being designed.

Public Outreach

Since early 2002, SDOT has provided information about the Magnolia Bridge Replacement Project to the public—through neighborhood meetings, open house events, and visits to community facilities and businesses.

Project Team members conducted extensive outreach efforts to minority populations living and working in the Interbay area. They contacted local businesses to identify and locate special groups and learn about their transportation needs. Spanish, Vietnamese, and American Sign Language (ASL) interpreters were available at the November 20, 2003 open house and subsequent public meetings.

Other Outreach Efforts

To successfully evaluate a replacement for the Magnolia Bridge, the public and interested parties were provided information as the project evolved and were given opportunities to provide input. Interested groups were involved throughout the life of the project include:

- Magnolia and Queen Anne neighborhoods, and businesses
- Businesses along 15th Avenue West/Elliott Avenue West corridor
- Waterfront and Terminal 91 uplands businesses
- Users of the facility, including commuters and other frequent users
- Bicyclists and pedestrians
- Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC)
- BNSF Railway
- WSDOT and other agencies
- Local public transit agencies
- Design Advisory Group

Magnolia Bridge Replacement Project Outreach

Public Open Houses, Blaine School

October 9, 2002
December 5, 2002
November 20, 2003
October 26, 2004
November 29, 2005
September 13, 2006
October 16, 2007

Neighborhood Meetings

December 11, 2002
February 19, 2003
March 11 & 19, 2003
April 14, 2003
May 13, 2003
October 21, 2003
December 10, 2003

Community Meetings

2002	8
2003	8
2004	12
2005	8
Total	36

Agency & Public Scoping Meetings

May 22, 2003

Design Advisory Group Meetings

2002	4
2003	7
2004	5
2005	5
2006	6
2007	5
Total	33

- Seattle Design Commission
- Seattle City Council
- Seattle Port Commission

In 2013, SDOT re-engaged businesses potentially affected by the construction and operation of the Preferred Alternative. SDOT attended several public meetings and shared information on the project's status. SDOT updated the project website.

Government Agency and Tribal Involvement

- SDOT has been working closely with WSDOT and FHWA to meet all National Environmental Policy Act (NEPA) requirements and coordinate reviews of the discipline reports.
- SDOT has worked closely with the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service and the U.S. Fish and & Wildlife Service to assist WSDOT in completing Endangered Species Act consultation.
- SDOT has worked closely with the Department of Archaeology and Historic Preservation (DAHP), Seattle Department of Neighborhoods (DON), and with Indian Tribes on fisheries, cultural and archaeological resource issues.
- SDOT has worked closely with DAHP, DON and the Navy to ensure that measures are in place to protect the Colonel's House during project construction.
- The Project Team continues to meet with Port staff to coordinate on other Port projects.
- SDOT has coordinated project design with King County Transit Division on bus routing and project impacts and with the King County Wastewater Treatment Division on existing and proposed combined sewer overflow facilities.
- SDOT has coordinated with the Seattle Department of Planning and Development (DPD) to stay informed of proposed land use changes in Interbay and has provided population and employment forecasts.

How SDOT communicates with the public

Speaker's Bureau – Formal presentations by SDOT personnel to community organizations.

Newsletters – Newsletters are mailed to keep the public informed on project progress.

Website – The Magnolia Bridge Project website at: http://www.seattle.gov/transportation/magbridgereplace.htm was designed as a resource for the public, and has been updated regularly.

- The Seattle Department of Parks and Recreation and SDOT have entered into a Joint Development Agreement to jointly plan and develop the transportation and recreation uses of the Smith Cove Acquisition property. They are currently adding the recently acquired West Yard property to this process.
- SDOT and FHWA have coordinated with the Federal Aviation Administration (FAA) on an air navigation equipment site at the Magnolia Bridge west approach.
- Sound Transit and SDOT are evaluating potential high capacity rail transit corridors in the Magnolia Bridge vicinity.
- WSDOT contacted a number of Tribes regarding cultural resource issues. The Snoqualmie Tribe entered into consultation regarding site monitoring during construction.

3 What key concerns were raised?

Key concerns raised between 2002 and 2008 during the project's extensive outreach efforts include:

- Keep the bridge open during construction to maintain access to magnolia. Minimize to the extent possible other impacts associated with construction of the new facility.
- Minimize localized impacts on Magnolia residents and the community (e.g., noise, interruptions in traffic flow and patterns, residential and business displacements)
- Maintain aesthetic qualities of the area (e.g., scenic views from the bridge, bridge design)
- Minimize impacts to park resources and greenbelts.
- Create a safer facility in terms of seismic events and landslides (e.g., meet current seismic and safety standards)
- Create a facility that is capable of linking with present and future multi-modal transportation opportunities.

- Include the public in selection of the new bridge.

For more information on comments received during development of the project, see Appendix L, Section 4(f) Evaluation (Public Involvement) and the project website at http://www.seattle.gov/transportation/magbridgereplace.htm

4 How will we involve the public and government agencies in the future?

Additional activities to engage the public would be planned as the project moves forward and prior to a formal public hearing. They would include:

- Conducting public open houses, attending community meetings, producing newsletters, and updating and maintaining the project website.
- Providing translated newsletter and project information on the project website.
- Conducting presentations to and meeting with interested parties.
- Providing notice of a public hearing in local newspapers: The Seattle Times, The Daily Journal of Commerce, and The Queen Anne, Magnolia News, and local media outlets that provide news and information to Asian and Hispanic communities.
- Developing an Inclusive Outreach and Public Engagement (IOPE) Plan following the City of Seattle IOPE Guide which includes identifying the racial and ethnic composition of the project area and developing outreach strategies to include these populations. Limited English Proficiency populations would be identified and materials (e.g., meeting notices, mailings, Newsletters, project website) translated into other languages following City of Seattle Translation and Interpretation Policy (Executive Order 01-07). Strategies for including LEP individuals would be included in the IOPE Plan. SDOT will work with the Seattle Office of Civil Rights and Disability Rights Washington to develop strategies for identifying and

Design Advisory Group

Queen Anne Chamber Of Commerce
Port Of Seattle
Queen Anne Community Council
Bicycle Alliance of America
Washington Department of Transportation (WSDOT)
Magnolia/Queen Anne District Council
Seattle Marine Business Coalition
Ballard Interbay Northend Manufacturing/Industrial Center
Uptown Alliance and Friends of Queen Anne
Magnolia Community Club
Seattle Popular Monorail Authority
Magnolia Chamber of Commerce
Seattle Design Commission

reaching out to persons with disabilities within the project area. SDOT will ensure that public meetings, open houses and hearings are all ADA accessible, can accommodate wheelchairs, are ADA parking and can provide other accommodations upon request.

- Working with businesses in vicinity of the project to identify information needs of employees with limited English proficiency and providing them with translated materials (e.g., flyers, posters, e-mail).
- Working with community based organizations that engage underserved populations including the Washington Council of the Blind, United Blind of Seattle, Queen Anne Helpline, Society of St. Vincent de Paul, Creative Living Services, and United Indians of all Tribes Foundation, Elderhealth Northwest, and Northwest Center.
- Providing translators at public meetings.

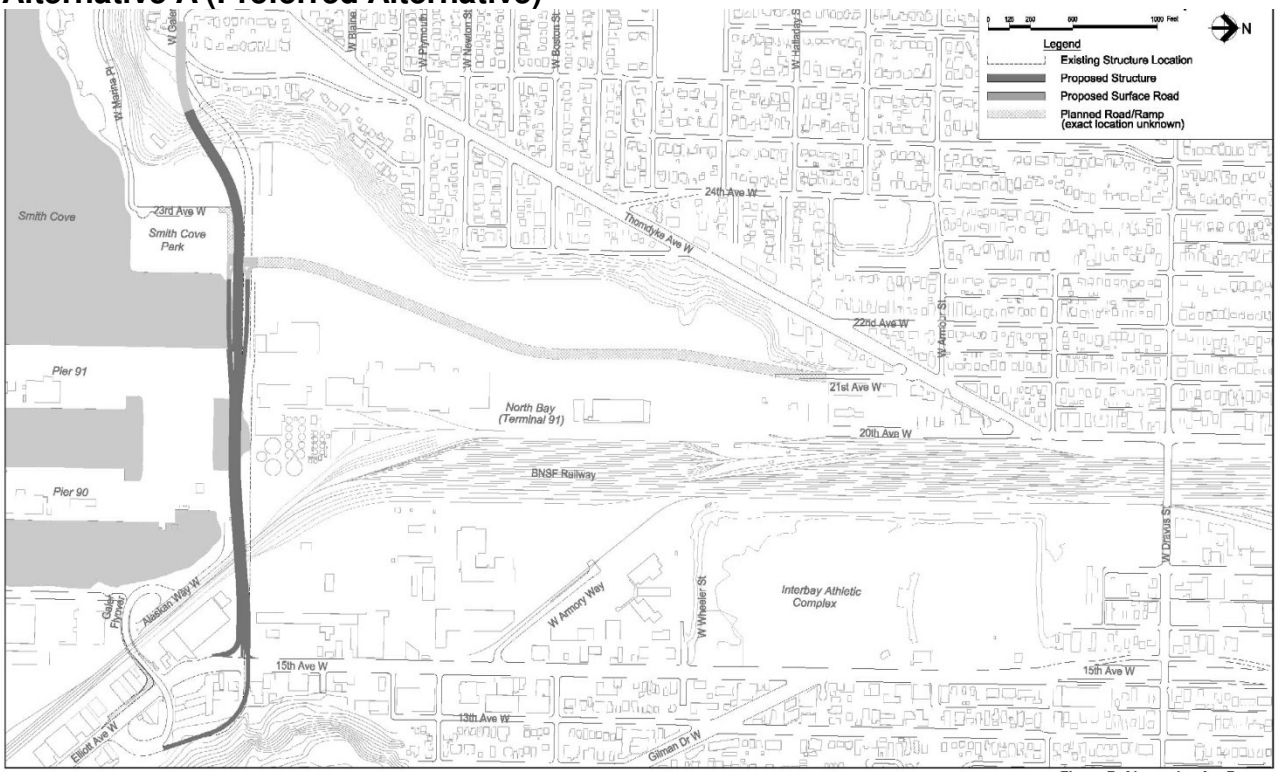
Government agencies and Tribes and stakeholders previously involved with the project would be re-engaged prior to publication of the EA via e-mail and one-on-one meetings. Invitations to comment on the EA and attend the public hearing would be provided.

5 What alternatives were initially considered?

Exhibit 3-3 through 3-7 show Alternative A, D, H, C, and the Rehab Alternative. The three alternatives analyzed in the initial draft environmental documents were Alternatives A, D, and H. In March 2004, the City removed Alternative H from consideration because a review of traffic operations found that this option would be unable to handle the future forecast traffic volumes. Alternative H was replaced with Alternative C, the next best alignments. In spring 2005, the City received feedback through the public involvement process that rehabilitating the existing bridge structure to current load and design standards should be evaluated. A Rehabilitation Alternative was developed that involved bringing the bridge up

to current load and design standards using the existing bridge structure to the maximum extent feasible.

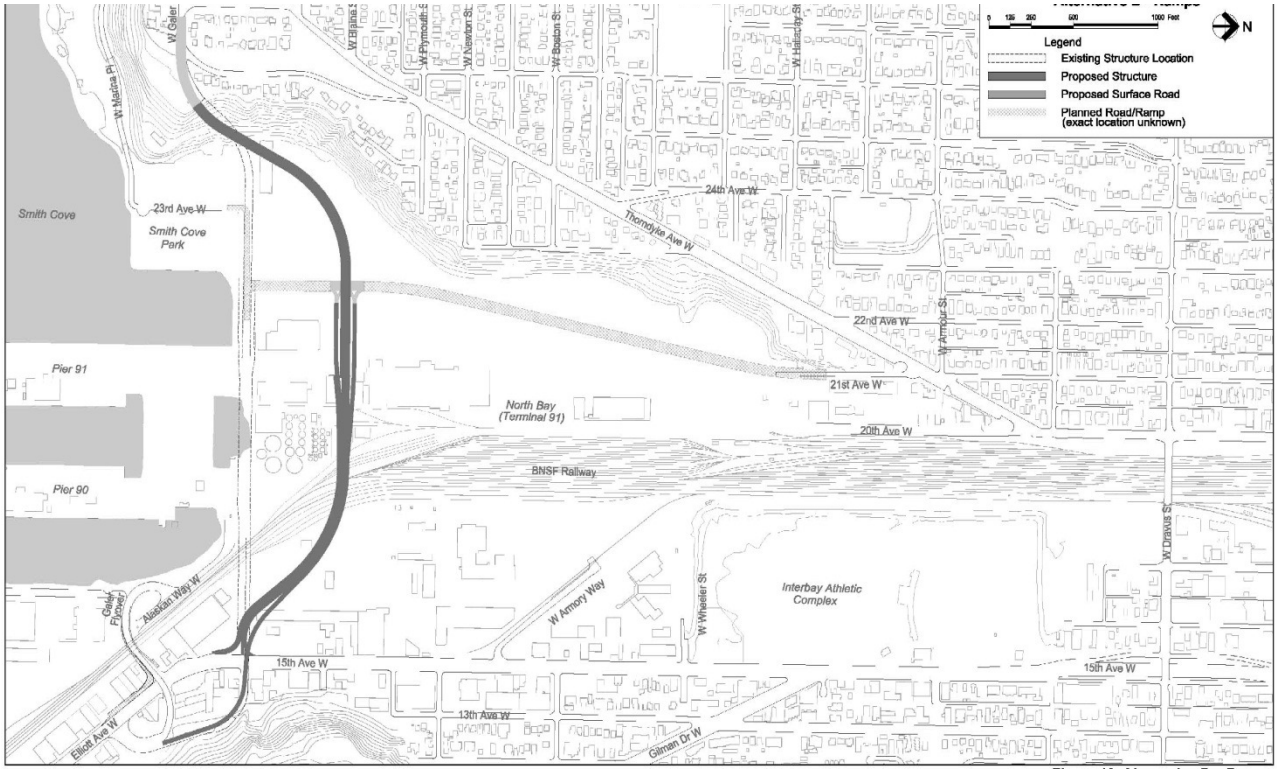
Exhibit 3-3
Alternative A (Preferred Alternative)



Alternative A (Preferred Alternative)

This alternative builds a new structure immediately south of the existing bridge. Construction would be staged to allow the existing bridge to be used as long as possible. Two ramps to 23rd Avenue West provide access to the waterfront and the Port of Seattle Terminal 91 and cruise terminal complex to and from the east. Connections at the east and west ends of the bridge are similar to the existing bridge.

Exhibit 3-4
Alternative D

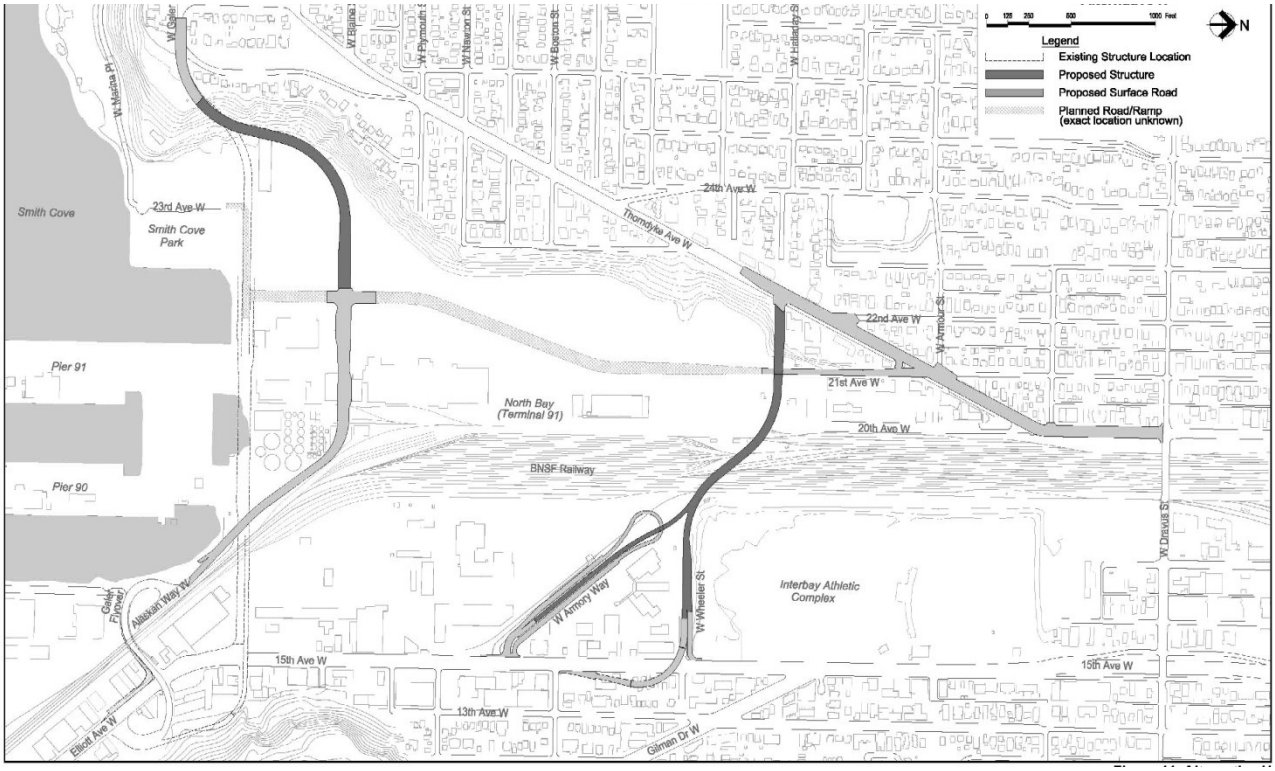


Alternative D

This alternative builds a new bridge in the shape of a long arc north of the existing bridge. Construction can be staged to allow the existing bridge to be used longer than Alternative A. Connections at the east and west ends of the bridge are similar to the existing bridge, and ramps provide access to and from the waterfront and the Terminal 91 complex.

Exhibit 3-5

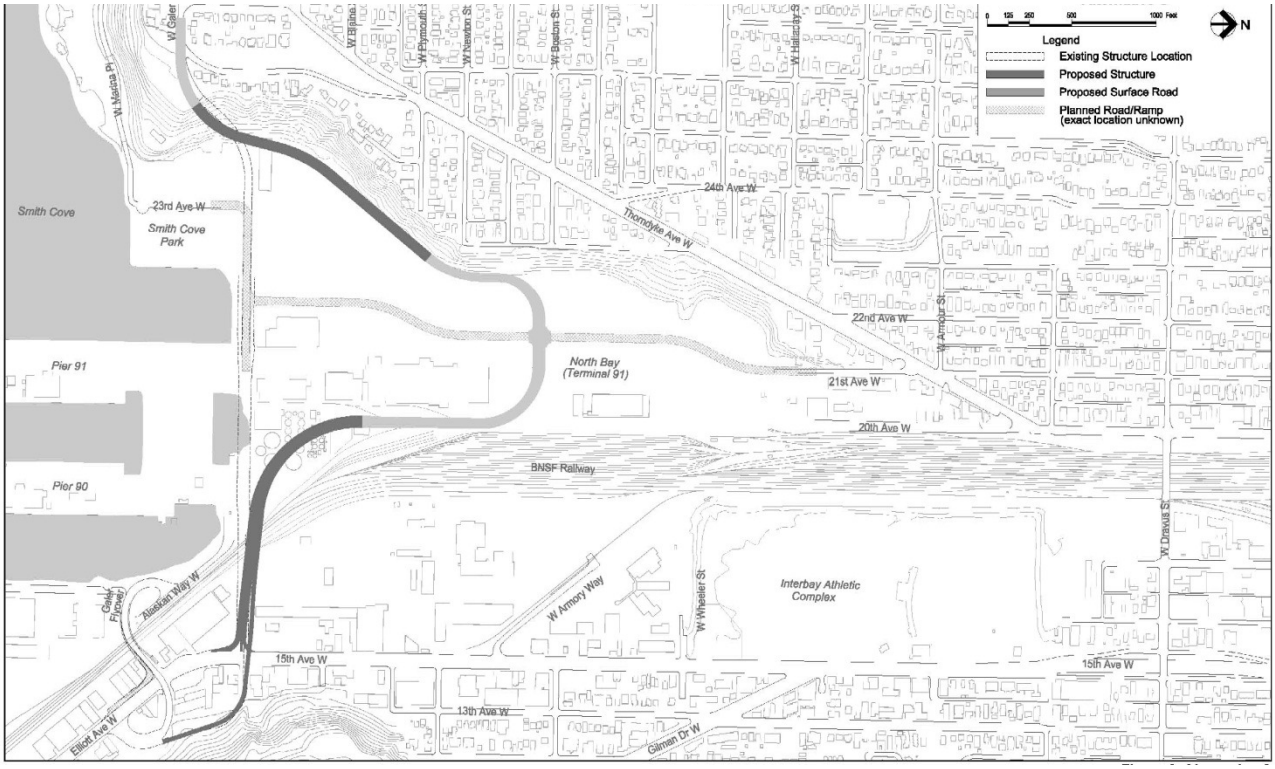
Alternative H – Removed from consideration



Alternative H

Alternative H was removed from consideration because there would be excess traffic congestion and delay at the Alaskan Way West and Galer Flyover intersection.

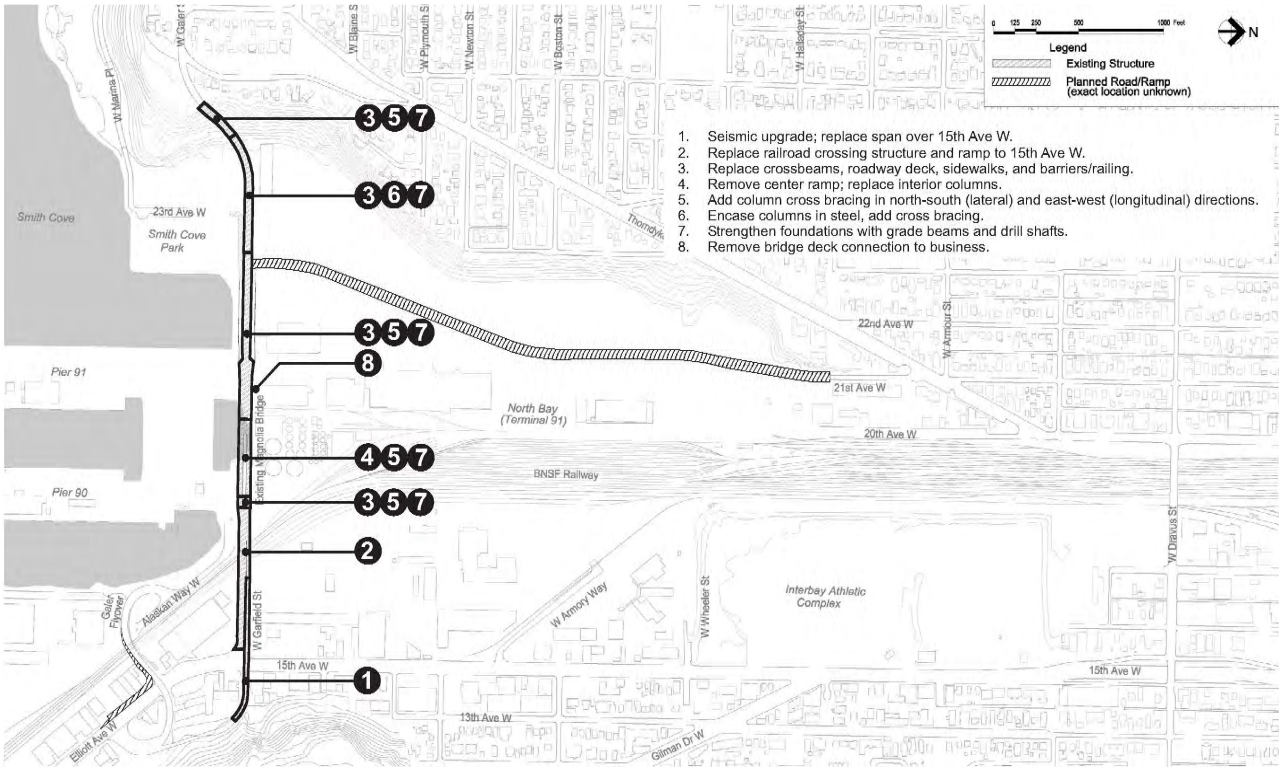
Exhibit 3-6
Alternative C



Alternative C – Added to replace Alternative H

This alternative constructs 2,200 feet of surface roadway within the Port of Seattle Terminal 91 property between two bridge structures. A bridge descends from Magnolia Bluff along the toe of the slope and reaches the surface while still next to the bluff. After turning south along the east side of Terminal 91, the road rises to cross the railroad tracks and connects to 15th Avenue West. Alternative C provides a unique surface/structure combination that is distinctly different from Alternatives A and D.

Exhibit 3-7
Rehabilitation Alternative



Rehabilitation Alternative

This alternative maintains the existing bridge alignment and replaces all of the bridge deck, sidewalk, and barriers in order to bring the bridge up to current design standards. The remaining columns and foundations between the railroad tracks and Magnolia Bluff are strengthened. The existing ramps to and from the waterfront remain, but the center ramps to Terminal 91 are removed.

6 How was the Preferred Alternative selected?

Between 2005 and 2006, SDOT continued to evaluate the remaining four alternatives to aid in the selection of a preferred alternative.

SDOT considered two versions of Alternatives A and D that provided vehicular access to the marina from the bridge, one including ramps and the other an elevated, signalized intersection. In early March 2005, SDOT decided to drop the

intersection options for both alternatives based on cost/benefit analyses and public opposition.

In 2005, the Rehabilitation Alternative was introduced, based on public comment. It involved bringing the bridge up to current load and design standards using the existing bridge structure to the extent possible. It was later eliminated due to cost.

Later that year, SDOT eliminated the Rehabilitation Alternative because it was not cost effective.

Left for evaluation in an environmental document was built Alternatives A, D and C. In late 2005, SDOT identified a bridge structure type following several public outreach events and consultations with the project's Design Advisory Group and the Seattle Design Commission. The new bridge would use concrete box girders supported by columns that flare out at the top.

In March 2006, SDOT recommended Alternative A as the preferred alternative to replace the Magnolia Bridge based on an evaluation of design and environmental criteria, and on how well it met the project's purpose and need. It was selected as the preferred alternative because it would:

- Respond to local transportation needs
- Be a strong alternative based on environmental and technical analysis
- Receive neighborhood, business, and governmental agency support, including that of the Port of Seattle
- Provide the least disruption to residents on Magnolia's eastern edge and businesses located under and next to the bridge
- Allow Interbay business owners greater certainty in planning for future expansion or development
- Cost less than other proposed alternatives

Exhibit 3-8 summarizes the results of environmental evaluation.

Exhibit 3-8
Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Construction Detour Time[13]	Second longest estimated detour time: 14-20 months (increases to 21-27 months if modified version is built in existing alignment).	Second shortest estimated detour time: 8-14 months.	Shortest estimated detour time: 6-12 months.	Longest estimated detour time: 21-27 months.
Added Travel Time after Construction	Same as No Build.	Would add 0.5 mile to route and up to 80 seconds additional travel time due to added distance and a signalized intersection.	Would add 0.1 mile to route and about ten seconds in additional travel time.	Same as No Build.
Public Opinion	Preferred by public, including Magnolia Bluff residents . Preferred by majority of Project Design Advisory Group (DAG). Ranked third by Seattle Design Commission..	Preferred by Seattle Design Commission. Mixed DAG support. General public opposes. Some Magnolia Bluff residents oppose.	Ranked second by public . Ranked second by Seattle Design Commission. Mixed DAG support Some Magnolia Bluff residents oppose.	General public opposes DAG opposes. Seattle Design commission opposes.
Local Business and Port Staff Opinion	Preferred by businesses and Port tenants. Port Staff supports, especially if there is a long delay to start of construction (similar to existing bridge which is a known quantity).	Major Port tenants oppose. General business community does not like Port Staff opposes -- interferes with future redevelopment.	Port Staff ranks second. Magnolia Village businesses like shorter detour time. Major Port tenants oppose. Potential to create redevelopment issues for Port if there is a long delay to start of construction.	Port tenants rank second General business community does not like Port Staff opposes.

[13] Construction would require an 8-minute detour across West Dravus Street, impacting traffic on 15th Avenue West.

Exhibit 3-8

Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Engineering & Design[14]	Simpler construction than Alternative D (straight bridge). Easier railroad crossing. Good driving characteristics. Creates waterfront viaduct (barrier). Limits future urban design opportunities. Construction over active park lands. Construction in water and in close proximity to existing bridge.	Did not meet project goals.	Opportunity to create "urban design" transition from structure to shoreline. Provides land use flexibility into the future (a "100-year facility"). Construction over only passive park lands. More complex construction than Alternative A (curved structure). More complex railroad crossing. Driving characteristics less favorable than straight bridge.	Design Team recommended building a new facility because the costs to rehabilitate the existing bridge were nearly the same as construction a new bridge. In addition, a rehab would only be good for 10 years whereas a new bridge would be designed for up to 70 years.

[14] ADA accessibility will be incorporated during the next phase of project design. The project will study accessible options to the stairs such as an accessible ramp, lift or elevator and identify the most viable option.

Exhibit 3-8

Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Residential and Business Displacement	One business impacted or relocated: Anthony's Seafood: Potential displacement - building access revision may avoid displacement or business would be relocated. Potential loss of tax revenue to Seattle if affected business moves out of city.	Three businesses Three businesses properties impacted or relocated: Trident Seafood: Building access and loading docks on the east side of the building would be reconfigured. The City would work with Trident to prevent disruption of business operations. Anthony's Seafood: Potential displacement - building access revision may avoid displacement or business would be relocated. Port of Seattle Warehouse (former Snider Petroleum): Building may need to be relocated. The building is vacant. Potential loss of business and tax revenue to Seattle if businesses move out of the City.	Three businesses properties impacted or relocated: Anthony's Seafood: Potential displacement - building access revision may avoid displacement or business would be relocated. City Ice: One building housing part of City Ice operations would be removed and relocated on-site. This could result in a short-term closure of the business. The City would work with City Ice to minimize disruption of business operations. Port of Seattle Warehouse (former Snider Petroleum): building may be relocated. The building is currently vacant. Potential loss of business and tax revenue effects if maritime cluster economy is impacted or if business moves out of the City	One business impacted/relocated: Anthony's Seafood: Potential displacement - building access revision may avoid displacement or business would be relocated . Potential loss of tax revenue to Seattle if affected business moves out of city.

Exhibit 3-8

Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Environmental Justice	Pier 91 businesses employ a high percentage of minority and LEP individuals. A number of these employees access work by transit. The project could have temporary disproportionately high and adverse effects on these populations during construction when existing bus service would be removed from the bridge. Other disproportionate impacts to these populations would be due to increased travel times to and from Pier 91 business during the 14-20 months of traffic detours. As of 2013, Anthony's employed 18 workers at this site. The company stated that a few of its workers were minority or LEP individuals but declined to disclose the percentage or number. Relocation of Anthony's could impact minority and LEP workers at this company[15].	The project would have the same temporary disproportionately high and adverse effects on Pier 91 minority and LEP employees as Alternative A. However, the impacts due to traffic detours would be of a shorter duration - 8-14 months. While Trident Seafood employs a high % of minority and LEP individuals the business would remain open during reconfiguration of the building. The impacts to Anthony's would be the same as Alternative A.	The project would have the same temporary disproportionately high and adverse effects on Pier 91 minority and LEP employees as Alternative A. However, the impacts due to traffic detours would be of a shorter duration – 6-12 months. Approximately ½ of City Ice Employees are minority or LEP individuals. Disruption of business operations could have a disproportionate impact on these workers. The impacts to Anthony's would be the same as Alternative A.	The project would have the same temporary disproportionately high and adverse effects on Pier 91 minority and LEP employees as Alternative A. However, the impacts due to traffic detours would be of a longer duration – 21-27 months. The impacts to Anthony's would be the same as Alternative A.

[15]The company also stated that it has a strong preference for remaining close to Lineage CityIce and would prefer to be relocated as close to its current location as possible.

Exhibit 3-8

Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Natural Environment	Project would add up to 1.2 acres of impervious surface to study area. About 3.2 acres would be in 200-foot shoreline area. About 0.1 acre of intertidal vegetation and habitat would be removed for four bridge piers Minor impacts to upper intertidal vegetation. 0.5 acre of forest removed.	Adds up to 0.2 acre of impervious surface. About 0.2 acre would be in 200-foot shoreline area. About 0.3 acre of forest and disturbed vegetation removed.	Out of shoreline area. Removes 0.3 acre of impervious surface About 0.3 acre of forest and disturbed vegetation removed.	Project would be similar to No Build. No change to impervious surface. About 2.7 acres would be in the 200-foot shoreline area. Minor impacts to upper intertidal vegetation . 0.3 acre or less of vegetation disturbance for foundation rehabilitation.
Geology, Soils, and Topography	Slope instability at cuts mitigated by retaining walls. Liquefaction and lateral spreading mitigated by ground improvement measures.	Same as Alternative A.	Same as Alternative A.	Liquefaction and lateral spreading mitigated by ground improvement measures. Mitigate groundwater impacts caused by ground improvement measures.
Land Use	Consistent with Seattle, Port and BINMIC policies. Would be constructed in Shoreline District (similar to existing bridge).	Consistent with Seattle, Port and BINMIC policies.	Consistent with Seattle, Port and BINMIC policies.	Consistent with Seattle, Port and BINMIC policies Some construction would be in Shoreline District
Recreation	Crosses 0.6 acre of active park area and 0.3 acre of passive park area.	Bridge would be built over about 0.3 acre of passive park land.	Bridge would be built over about 0.3 acre of passive park land.	Construction would be in existing right of way and easements adjacent to park land.

Exhibit 3-8

Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Visual Quality (View from bridge)	Views from the bridge would remain very similar to existing conditions .	Views from the bridge would be different than existing conditions, as much of the route would be further from the shoreline, obstructed by buildings, and at ground level.	Views from the bridge would be similar to existing conditions, though bridge users would be further from the shoreline.	Views from the bridge would remain very similar to existing conditions.
Visual Quality (View of bridge)	Slightly less visual impact than the existing bridge upon Magnolia Bluff residents. Cleaner appearance under the bridge compared to No Build. Some impact due to increased structure width compared to No Build. Some impact due to bridge directly over active park area compared to No Build which is adjacent to park land.	Somewhat reduced impact due to increased distance from park land compared to No Build. Cleaner appearance under the bridge compared to No Build.	Somewhat reduced impact due to increased distance from park land compared to No Build. Cleaner appearance under the bridge compared to No Build. Slightly more visual impact than the existing bridge upon Magnolia Bluff residents.	Similar to No Build, but removal of much of the under-bridge steel framing.
Services and Utilities	No change in demand for public services. No increase in distance for emergency response vehicles between 15th Avenue West and Magnolia. A special emergency response plan will be implemented during construction to mitigate any service impacts.	A special emergency response plan will be implemented during construction to mitigate any service impacts. Emergency vehicle response distance would increase by 0.5 mile between 15th Avenue West and Magnolia plus navigate an additional signalized intersection.	A special emergency response plan will be implemented during construction to mitigate any service impacts. Emergency vehicle response distance would increase by 0.1 mile (less than 10 sec additional travel time) between 15th Avenue West and Magnolia.	No change in demand for public services. No increase in distance for emergency response vehicles between 15th Avenue West and Magnolia. A special emergency response plan will be implemented during construction to mitigate any service impacts.

Exhibit 3-8
Summary Comparison of Alternatives

Criteria	Alternative A	Alternative C	Alternative D	Rehabilitation
Hazardous Materials	Potential contamination could be disturbed at excavation sites. Lead-based paint on steel portions of existing bridge to be demolished.	Potential contamination could be disturbed at excavation sites. There may be asbestos and lead-based paint in buildings to be demolished. Lead-based paint on steel portions of existing bridge to be demolished.	Same as Alternative C.	Same as Alternative A.

7 How does the Preferred Alternative meet the project design goals, purpose and need?

The New Magnolia Bridge would provide reliable access to Magnolia and maintain traffic mobility. Bicycle and pedestrian connections would be improved with a wider, more continuous sidewalk. The new bridge would maintain access to neighborhoods and businesses while supporting Terminal 91 redevelopment.

The new bridge would meet current seismic design criteria. It would remain standing following a design earthquake, continuing to provide a connection to the Magnolia community and not blocking traffic on the BNSF Railway and 15th Avenue West.

Project Design Goals

Provide reliable access

- Provide a seismically safe and reliable route to Magnolia.

Maintain or improve traffic mobility

- Provide additional access points into Magnolia.
- Maintain or improve traffic flow on the 15th Avenue West corridor.
- Improve waterfront access to and from Magnolia.
- Improve public access to the waterfront.
- Maintain or improve the level of bicycle and pedestrian connections within and beyond the project area Maintain neighborhoods and businesses
- Maintain Magnolia's aesthetic qualities and community feel.
- Provide a route that will support Magnolia Village businesses.
- Support redevelopment of vacant or underutilized Interbay properties.

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Chapter 4 Project Description

This chapter describes the main elements of the Magnolia Bridge Replacement Project. These include a preview of where the new bridge would be located, what it would look like, a description of how the new bridge would connect to existing bicycle facilities, what safety improvements would be included, and what would happen during construction.

1 Where is the existing bridge and where would the new bridge be located?

The Magnolia Bridge is located in northwest Seattle, in King county. It lies between the Magnolia community on the west and Queen Anne on the east. The bridge connects to West Galer Street at the top of the Magnolia Bluff and to 15th Avenue West and West Garfield Street at the foot of Queen Anne Hill. The bridge is one of three corridors connecting the Magnolia Neighborhood to the rest of the Seattle. The other two corridors are West Dravus Street and West Emerson Street. The site is 15 feet above sea level at the Port of Seattle's Terminal 91, rising to 140 feet at the Magnolia Bluff. The bridge crosses over the Port of Seattle Terminal 91 and Burlington Santa Fe (BNSF) railroad tracks.

In March 2006, SDOT recommended a Preferred Alternative to replace the existing Magnolia Bridge with a new structure immediately south of the existing bridge between the Magnolia Bluff and Pier 90. The Preferred Alternative would run on the same alignment as the existing bridge between Pier 90 and 15th Avenue West/Elliott Avenue West. Connections at the east and west ends of the bridge would be similar to the existing bridge. Exhibit 4-1 shows the location of the new bridge in relation to the existing bridge that would be removed.

Exhibit 4-1
The New Magnolia Bridge location

2 What would the new bridge look like?

The look of the new bridge won't change much although it would have fewer column supports, and longer distances between them. Exhibit 4-2 and Exhibit 4-3 compare the appearance of the existing bridge from a viewpoint on the west slope of Queen Anne Hill with a photo simulation of the New Magnolia Bridge. The new bridge deck would be wider than the existing bridge by about 15 feet. The outside lanes would be 16 feet wide to allow bicycle travel on the outside of the lane while the inside lanes would be 11 feet wide. A 10-foot sidewalk separated from the eastbound (downhill) lane by a concrete barrier would be included along the south side.

Exhibit 4-2
Existing Magnolia Bridge

2002 photograph from 8th Avenue West.

Exhibit 4-3
New Magnolia Bridge

Photo simulation view from 8th Avenue West on Queen Anne Hill

Unlike the existing bridge, the new bridge would have two ramps at 23rd Avenue West that would take traffic to and from the Port of Seattle Terminal 91 complex, Smith Cove Park and Elliott Bay Marina. The number of traffic lanes east of these ramps would not change.

3 Would pedestrian and bicycle connections change?

The existing Magnolia Bridge includes a sidewalk used by both pedestrians and bicyclists that connects the Magnolia neighborhood to 15th Avenue West/Elliott Avenue West (See

Exhibit 4.4). The sidewalk also connects to the 23rd Avenue West off-ramp. Here, pedestrians and bicyclists can link to North Bay/Terminal 91 or the multi-use Elliott Bay Trail that passes under the bridge. The bridge also includes stairways in several areas to allow access to the trail[16]. The western approach to the bridge connects with existing bike facilities via West Galer. From here, West Galer Street connects directly to Magnolia Blvd West which is a commonly used bike route to Discovery Park. The New Magnolia Bridge would replace the existing stairways and provide comparable access to the bridge for persons with disabilities. Options including ramps, lifts and elevators will be evaluated as the project design moves forward.

4 What safety improvements would be included?

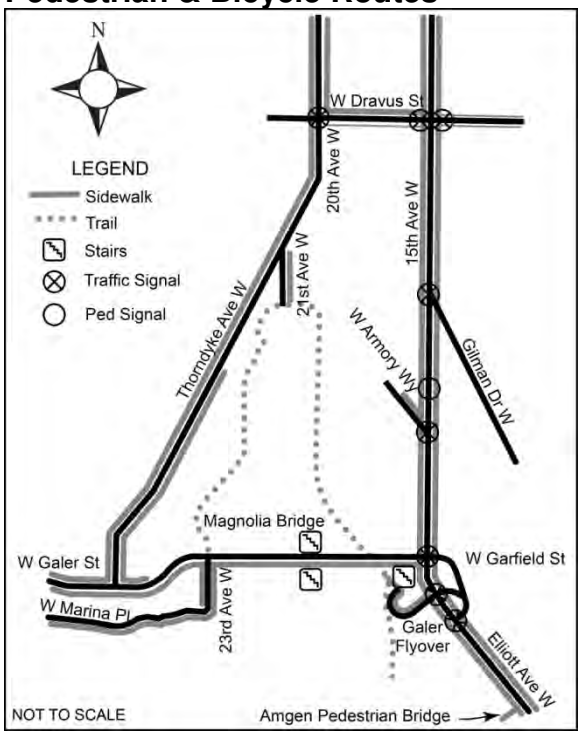
Wider lanes and ramps would improve vehicular safety. The existing bridge has an unsafe condition where eastbound vehicles make illegal 180-degree turns to and from the 23rd Avenue West ramps. The New Magnolia Bridge would include a center barrier or other design feature to eliminate this unsafe turn.

Two existing conditions that restrict driver visibility would be eliminated with the replacement bridge:

- Views of the existing road around the curves at the west end of the bridge that are partially blocked by traffic barriers along the roadway would be improved with wider lanes. This would allow barriers to be further apart and the road ahead would be more visible;

[16] Note: Current pedestrian and bicycle connections are not ADA compliant.

Exhibit 4-4
Pedestrian & Bicycle Routes



- The abrupt change in slope at the top of the two-way ramp from 15th Avenue West limits the visibility of objects in the roadway. Currently, drivers do not have enough time to avoid an object in front of them. The New Magnolia Bridge 15th Avenue West ramp would have a gentler slope that would provide improved visibility.

The new bridge would meet current seismic design criteria. It would remain standing following a design earthquake. Chapter 5.13 discusses past earthquakes and measures to minimize the effects of the design earthquake.

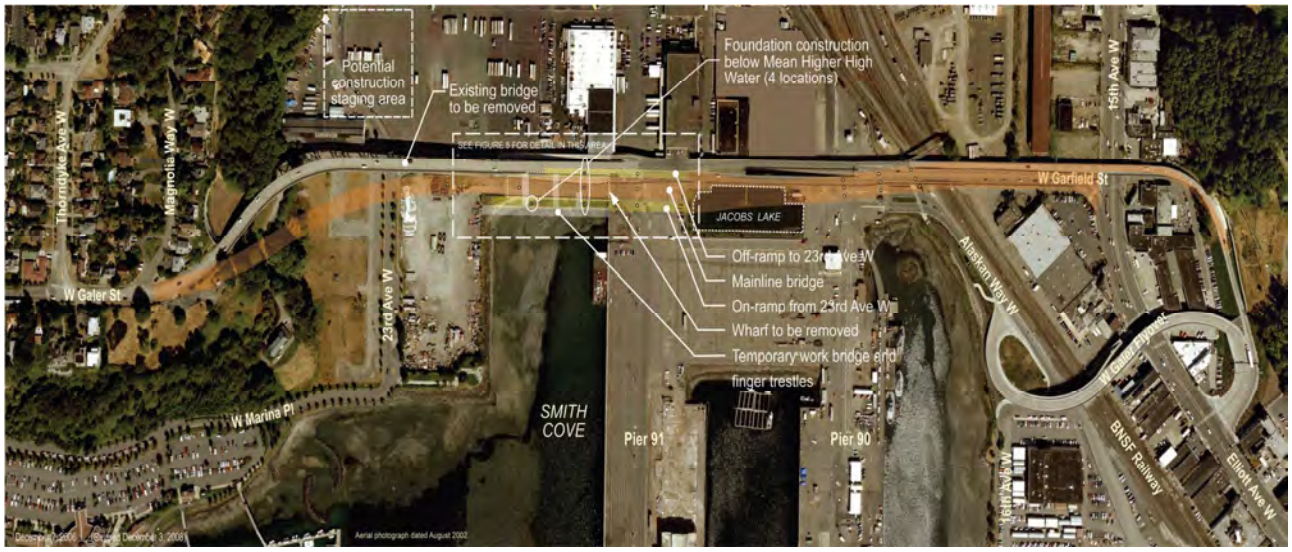
5 What would happen during construction?

Generally, construction of the new bridge would be completed as much as possible before the existing bridge is demolished. It is anticipated however, that bridge access would be closed for about one year for construction of the eastern section where

the replacement structures are on the existing alignment. The sequence of work is as follow and is shown in Exhibit 4.5.

- Initial Construction with traffic maintained on existing bridge:
    - Construct Magnolia Bluff approach – south of existing bridge
    - Demolish existing wharf at Smith Cove and existing 23rd Street on- ramp
    - Build temporary work bridges for access to foundations and construction of bridge spans over the water at Smith Cove and Jacob's lake
    - Construct 23rd Street on- ramp and mainline bridge until the construction conflicts with existing bridge
    - Construct a temporary detour
- Traffic Detoured
    - Switch traffic to temporary detour
    - Demolish the existing Mainline Bridge and 23rd Street off-ramp
    - Construct new mainline bridge over railroad and 15th Avenue ramp
    - Traffic on new structure during demolition and cleanup
    - Switch Traffic to new bridge
    - Construct 23rd Street off-amp and complete construction of 23rd Street on-ramp ramp.

Exhibit 4-5
Construction Activities



A possible construction staging area could be located north of Smith Cove Park on existing asphalt pavement (see Exhibit 4-5). This site has convenient street, rail, and marine access which would allow prefabricated bridge components and other construction materials to be brought in as needed. The ultimate location of construction staging areas would be determined when final design is completed and the construction schedule is known.

What is a construction staging area?

This is a space that is fenced off for storing the construction equipment, supplies, and materials that will be used to build the new bridge.

Traffic Detours

Three types of detours are being considered to handle traffic during bridge construction: use of existing city streets; new surface streets through Terminal 91; and temporary ramps to keep traffic in the existing corridor. All three types of detours are expected to be used. This decision would be made prior to completion of final design (See Exhibit 4-6).

1. *Use existing streets* - With the existing bridge closed to traffic, traffic to and from 15th Avenue West can use the remaining two connections to Magnolia: West Dravus Street and West Emerson Place. The West Dravus Street route would add approximately 1.7 miles to the

commute between the Magnolia Bluff and the intersection of Elliott Avenue West and the Galer Flyover. The additional time imposed by this detour would be about eight minutes per communing vehicle. But is expected to be greater in periods of heaviest traffic. Traffic would be managed at congested intersections through modification to traffic signal timing and using traffic control personnel

2. *Use new surface street detours* - SDOT and the Port of Seattle are looking into providing a surface road connection that would use the Galer Flyover and a detour road along the east side of Terminal 91 next to the BNSF Railway tracks. This detour would connect Elliott Avenue West and Alaskan Way West with 21st Avenue West and Thorndyke Avenue West. SDOT and the Port of Seattle are also discussing a surface detour on the west side of Terminal 91 at the base of Magnolia Bluff to connect 21st Avenue West with 23rd Avenue West and West Marina Place. A temporary traffic signal may be needed at the 21st Avenue West intersection with Thorndyke Avenue West.
3. *Maintain traffic in the existing bridge corridor* -The west section of the New Magnolia Bridge would be south of the existing bridge and would be built while the existing bridge remains open to traffic. Only the existing eastbound on-ramp from 23rd Avenue West would be closed and removed ruing this phase and 23rd Avenue Traffic would use a surface detour route to 21st Avenue West and West Thorndyke Street. Two options would be investigated for maintaining traffic in the existing corridor:

- Use the Galer Flyover, Alaskan Way West, and a new temporary ramp to the New Magnolia Bridge west of Pier 90 or a new temporary ram to the New Magnolia Bridge at Smith Cove.

- Use the Galer Flyover, Alaskan Way Wets, and a new temporary ramp to the New Magnolia Bridge at Smith Cove.

Bicycle Detours

The existing bridge would remain open to bicyclists during construction of the west portion of the new bridge. Construction of the eastern portion of the bridge would require removal of the existing bridge. Bicycle access to Magnolia from 15th Avenue West would remain available with the Galer Flyover and the Elliot Bay Trail to Thorndyke Avenue West.

Exhibit 4-6
Possible Street Detours

6 What is the project construction schedule?

The estimated construction duration is shown in Exhibit 4-7.

Exhibit 4-7
Construction Schedule

Construction Stage	Duration (months)
Mobilization of material and equipment	1
1 – Initial construction with traffic maintained on existing bridge	15
2 – Bridge closed to traffic to complete construction	14-20
3 – Traffic on new structure during demolition and cleanup	6
Total Construction Duration	39

Chapter 5 Environmental Effects

This chapter presents the potential effects of the project on people and the environment. Scientists, engineers, architects, economists and planners on the Project Team conducted 14 different studies documented in the discipline reports, see Appendices. The project team used this information to set a baseline and examine changes that might result during and after construction.

Magnolia Bridge (looking west)

1 What are the existing conditions in the project area?

The Magnolia Bridge spans the primarily industrial area between the Magnolia and Queen Anne neighborhoods. The bridge crosses over the Port of Seattle Terminal 91 and Burlington Northern Santa Fe (BNSF) railroad track facilities situated between Magnolia on the west and Queen Anne on the east. The bridge connects to West Galer Street at the top of the Magnolia Bluff and to 15th Avenue West and West Garfield Street at the foot of Queen Anne Hill.

On either end of the Bridge are two residential neighborhoods: Magnolia on the west and Queen Anne on the east. Both of these neighborhoods are primarily residential and buffered by a greenbelt. The Interbay neighborhood is the valley running between Magnolia and Queen Anne. The Interbay neighborhood is primarily industrial in nature.

What is a Discipline Report?

A discipline report focuses on a specific environmental topic such as geology, water quality, hazardous materials, or other built or natural resources. It presents an analysis of the environment with respect to that discipline, how the project may affect that environment, and offers recommendations on how to best avoid or minimize adverse effects to that environment.

Port of Seattle owned Piers 90 and 91 are located south of the existing structure. Pier 91 is a maritime center and houses the Smith Cove Cruise ship terminal. The BNSF Railway runs under a portion of the east end of the bridge.

The City of Seattle Parks Department owns several parcels near and under the west end of the bridge including the Ursula Judkins Viewpoint on the top of the Magnolia Bluff, which provides sweeping views of downtown Seattle.

Prior to the 1900, Interbay was an estuary. Between 1900 and 1930 much of the neighborhood was filled. The area was occupied by the Navy and heavy industrial uses. Soils in the area are contaminated.

Facilities, businesses and general features that would be directly impacted by the project are shown in Exhibit 5-1.

2 What information was prepared to evaluate the project?

The following discipline reports were prepared for the project.

- Air Quality (Appendix E)
- Environmental Justice (Appendix F)
- Geology and Soils (Appendix G)
- Hazardous Materials (Appendix H)
- Historic, Cultural, and Archeological (Appendix I)
- Land Use (Appendix J)
- Noise (Appendix K)
- Section 4(f) (Appendix L)
- Public Services and Utilities (Appendix M)
- Social, Economic and Relocation (Appendix N)
- Traffic and Transportation (Appendix O)
- Visual Quality (Appendix P)
- Water Quality (Appendix Q)

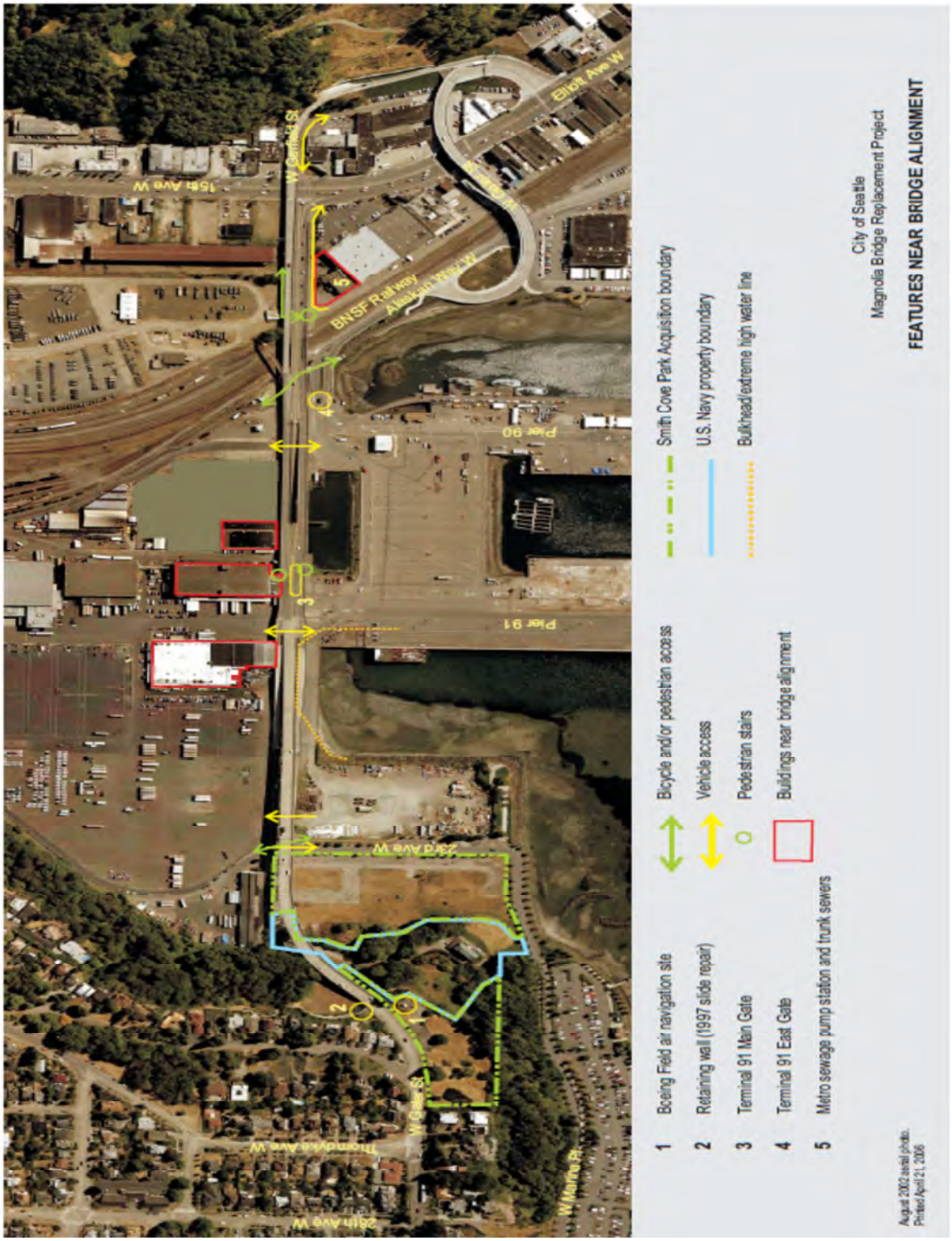
- Wildlife, Fisheries, and Vegetation (Appendix R)
- Rehabilitation Alternative Environmental Effects (Appendix S)
- Biological Assessment (Appendix T)

3 How were project impacts evaluated?

Project Team members evaluated impacts of the project for 14 areas of the environment and documented these issues in separate discipline reports. The results of these analyses are summarized in the following chapters.

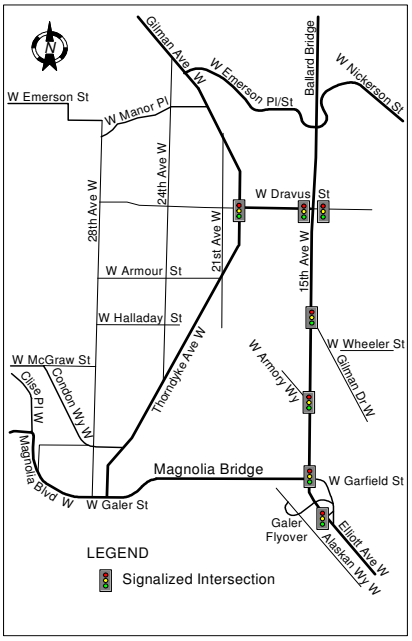
Exhibit 5-1

Features Near the Existing Magnolia Bridge



Chapter 5.1 Traffic and Transportation

This chapter describes transportation conditions in the Magnolia Bridge corridor between the 15th Avenue West/Elliott Avenue West and Magnolia Bluff. It summarizes transportation information for the bridge as it exists today and estimates for the new bridge. Detailed transportation information can be found in the Traffic and Transportation Discipline Report in Appendix O.



Magnolia Street Connections

1 How is the Magnolia community connected to the rest of Seattle?

There are three roadway connections from Magnolia, a community of over 20,000 residents, to the rest of Seattle. The Magnolia Bridge, West Dravus Street, and West Emerson Place/Street all run east-west and connect Thorndyke Avenue West, 20th Avenue West, and Gilman Avenue West on the east side of Magnolia with 15th Avenue West/Elliott Avenue West.

The 15th Avenue West/Elliott Avenue West roadway is the primary north-south street connecting the neighborhoods of Magnolia, Queen Anne, Ballard, and Loyal Heights to downtown Seattle. As the southernmost of the three connections, the Magnolia Bridge is the most direct route for

much of south and west Magnolia to downtown Seattle and the regional freeway system.

2 How were the data for the project evaluated?

Traffic forecasts were modeled from population and employment projections provided by the Puget Sound Regional Council (PSRC). The original forecasts were prepared in 2003 for a 2010 year of opening and a 2030 design year. The design year represents conditions 20 years after project construction. In 2013, the bridge design year for this analysis was moved to 2036 because 2016 had been assumed to be the earliest year for bridge construction. The 2030 forecasts were compared with 2036 travel demand conditions based on updated PSRC population and employment forecasts. This review determined that 2036 travel demand in the project study area would not be substantially different from the 2030 forecast conditions. The 2030 forecasts prepared in 2003 adequately represent 2036 conditions.

The City of Seattle provided land use data and employment projections that were consistent with the existing industrial land use zoning of the Port of Seattle property and commercial zoning along 15th Avenue West/Elliott Avenue West.

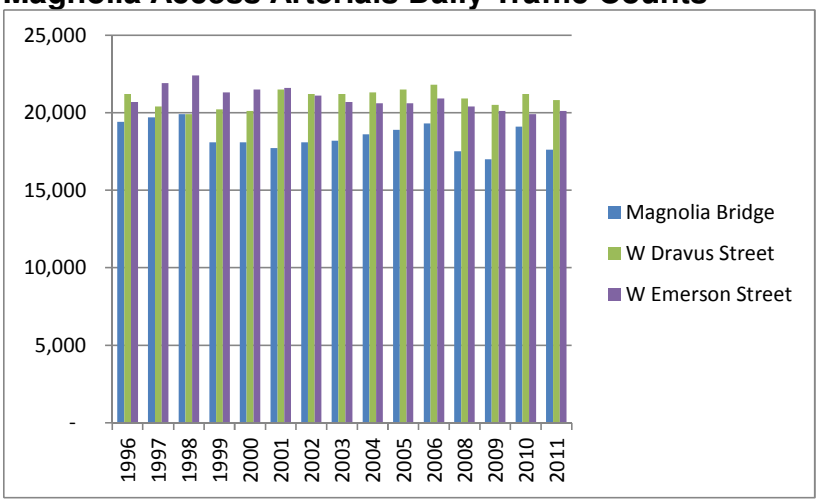
Signalized intersections were modeled with computer software based on analysis methods described in the *2000 Highway Capacity Manual.* The network of signalized and unsignalized intersections was modeled using software that analyzed lane changes and blocking problems related to close-spaced intersections.

3 What is traffic like now on the bridge and surrounding area and what would happen in the future?

Each of the three Magnolia community connections to the 15th Avenue West corridor carries about 30 to 35 percent of the average 60,000 daily vehicle trips. Exhibit 5.1-2 shows relatively little change in traffic on each of the three arterials over the 1996 through 2011 period of count data. Following the

commuting pattern between the Magnolia residential district and employment centers accessed by the 15th Avenue West corridor, eastbound traffic is heavier in the morning and westbound traffic is heavier in the afternoon. On a typical weekday, 1,700 vehicles cross the Magnolia Bridge in the afternoon peak traffic hour. With or without a new bridge, traffic models predict 2,100 vehicles would travel on the Magnolia Bridge (West Garfield Street) during the afternoon peak hour in 2030.

Exhibit 5.1-1
Magnolia Access Arterials Daily Traffic Counts



Note: Traffic is average annual weekday traffic (AAWDT).

Source: Seattle Department of Transportation Traffic Flow and Data Maps, 1996-2011. URL: http://www.seattle.gov/transportation/tfdmaps.htm

When evaluated in 2002-2003, all of the signalized intersections in the study area operated with no congestion with the exception of the intersection of Elliott Avenue West and the Galer Flyover. This intersection experienced congestion in the afternoon due to the high volume of northbound through traffic. In 2013, this intersection had lower afternoon traffic volume than in 2002-2003 and operated satisfactorily[17].

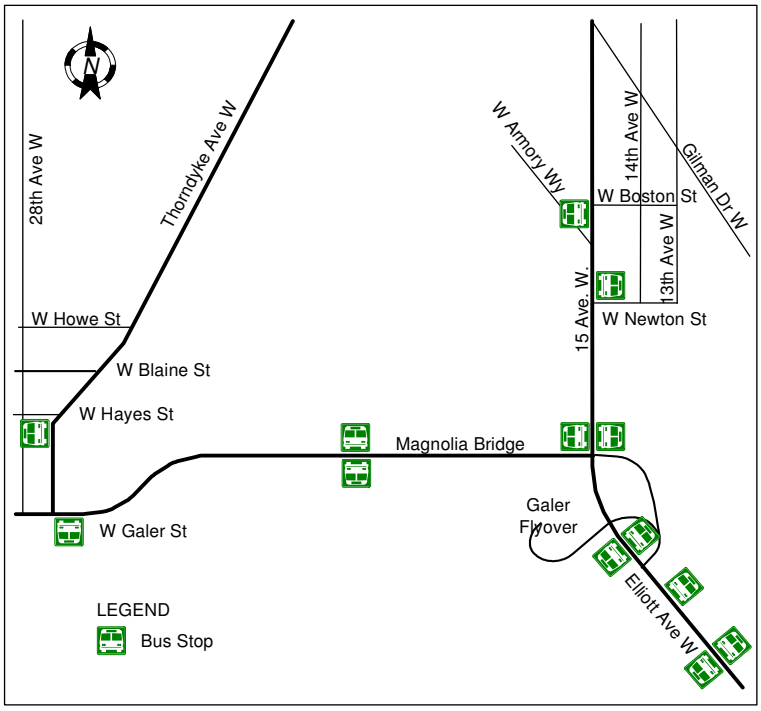
[17] Original modeling

4 How would the project affect public transit?

There are 13 bus stops near the Magnolia Bridge. Two of these stops are for bus routes #19, #24, and #33 are on the bridge structure. They serve Terminal 91 businesses including the Pier 91 cruise terminal. The Magnolia Bridge connection with 15th Avenue West/Elliott Avenue West is a transfer point offering connections to north-south bus routes Rapid Ride D line and #32.

The project would replace existing mid-bridge bus stops that currently serve Terminal 91 and provide access to 23rd Avenue West; SDOT would continue to work with King County Metro to retain current bus service across the bridge after construction of the Preferred Alternative.

Exhibit 5.1-2
Bus Stops Near the Magnolia Bridge



The Sounder Everett-Seattle commuter rail service runs through the study area on the BNSF Railway tracks. This is a weekday, peak period service between stations in Snohomish

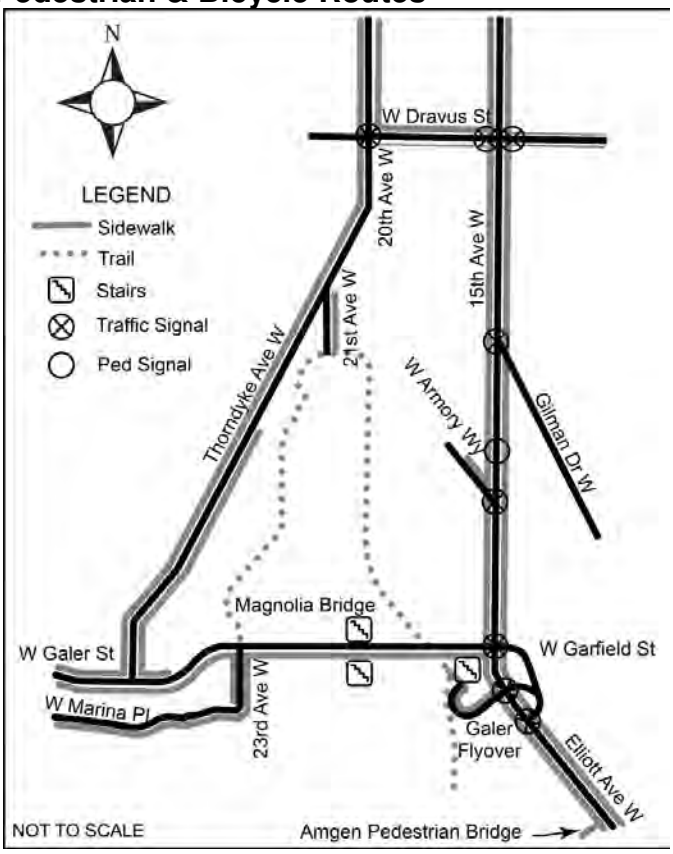
County and downtown Seattle. A station is not proposed in Magnolia Bridge vicinity.

Sound Transit and the City of Seattle are studying the 15th Avenue West/Elliott Avenue West corridor for potential rail high capacity transit service between Ballard and downtown. Study findings were presented to the Seattle City Council and Sound Transit Board for possible future action.

5 How would the project affect pedestrians and bicyclists?

Exhibit 5.1-3 shows study area pedestrian and bicycle routes, including the Elliott Bay Trail and Terminal 91 Bike Path (shown as "Trail" in the exhibit) that are part of Seattle's system of "urban bike/pedestrian" trails. The east bluff of Magnolia rises steeply from the North Bay/Terminal 91 complex. Because of the steep bridge grade, many pedestrians and bicyclists use other routes to access Magnolia from 15th Avenue West/Elliott Avenue West.

Exhibit 5.1-3
Pedestrian & Bicycle Routes



Currently, there are two stairways for pedestrians at the bus stops near the mid-point of the bridge. These stairways connect to a pedestrian undercrossing between the two bus stops (Note: the existing stairs are not ADA compliant). The bottom of the single stairway on the south side of the bridge is on the east side of the railroad tracks. A walkway leads to 15th Avenue West under the north side of the structure. A pedestrian bridge from Elliott Avenue West at West Prospect Street crosses the railroad and serves the Amgen Helix Campus and connects to the Elliott Bay Trail.

The Elliott Bay Trail is a multi-use trail connecting Interbay with Seattle. This trail is a major north-south, multi-use pedestrian/bicycle facility used by commuter bicyclists not only from Magnolia, but also from neighborhoods to the north via the Ballard Bridge and West Dravus Street. Many users

from Magnolia access the trail at 21st Avenue West. The Terminal 91 Bike Path is that portion of the Elliott Bay Trail that follows the perimeter of the Terminal 91 complex. The Terminal 91 Bike Path and 21st Avenue West to Thorndyke Avenue West offer a longer, but gentler grade route from the Elliott Bay Trail to south Magnolia.

Bicyclists use the Magnolia Bridge in both directions, although there are no separate bike lanes and the vehicle lanes are narrow. The steep grade makes this route difficult for many occasional bicyclists, particularly in the westbound, uphill direction. The Preferred Alternative would include a ten-foot-wide sidewalk on the south side of the new Magnolia Bridge and 16-foot-wide outside separate bike lanes. The sidewalk would maintain the same connections as the existing bridge to West Galer Street on Magnolia Bluff, 23rd Avenue West and the waterfront, and 15th Avenue West and would be designed to meet ADA requirements. A new pedestrian facility (such as elevators, lifts and ramps) that would provide bridge access for individuals with disabilities will be evaluated during the next stage of design.

6 How would the project affect freight movements?

Trucks accessing the Terminal 91 East Gate and the Terminal 36 grain elevators west of the railroad tracks use the Galer Flyover from Elliott Avenue West. Trucks destined to and from Magnolia use the Magnolia Bridge, West Dravus Street or Emerson Place West. Truck volumes on Magnolia Bridge are higher in the morning traffic hours and are forecast to increase from 20 to nearly 100 trucks per hour in 2030. Truck volumes on the Galer Flyover are forecast to increase from the current 30 trucks to a high of around 85 trucks per hour.

The project crosses the Burlington Northern Santa Fe (BNSF) Railway mainline and other BNSF tracks. Most of the average 80 train operations each day through the project area are freight-related. The project would replace an existing grade-separated crossing with another grade-separated crossing so there would be no effect on future railroad operations. SDOT is

working with BNSF to coordinate future project construction to assure train operations are not affected.

The project would not change the truck access to Terminal 91 or the Grain Terminal. The project would eliminate the existing Magnolia Bridge center ramps to the Terminal 91 Center Gate. Vertical clearance prevents large trucks from using this gate and its removal would not substantially affect the number of truck trips at the remaining two gates. SDOT is working with the Port on Terminal 91 access issues.

7 How would construction activities affect traffic?

By building much of the new bridge to the south of the existing bridge, existing traffic patterns would be maintained during about half of the 39-month construction period. Traffic would continue to use the existing bridge until it is removed to allow construction east of Pier 90 to 15th Avenue West. This construction phase of existing bridge closure is expected to last 14 to 20 months. During this closure, traffic to and from Magnolia would use the remaining two connections at West Dravus Street and West Emerson Place. Traffic may also use temporary surface street detours through Terminal 91, or a temporary ramp to the remaining west section of the existing bridge or the west section of the new bridge.

The eastbound on-ramp from 23rd Avenue West is expected to be removed early in the construction schedule because this ramp is located where the new replacement bridge would be built. Marina and other waterfront traffic that use this ramp may be detoured to a surface route along the base of Magnolia Bluff to 21st Avenue West and Thorndyke Avenue West at the north end of Terminal 91. The actual detours would be determined when final design is completed and construction is scheduled.

The mid-bridge bus stops serving Terminal 91 businesses with King County Metro transit routes #19, #24, and #33 would not be available when the existing bridge is removed. The new bridge would have mid-bridge bus stops.

Railroad

Construction cannot occur within 12 feet of the center of a track with a passing train. This limits adjacent work to time periods that are typically no more than about two hours long. Construction procedures would be developed during final design to allow construction within railroad operating restrictions.

8 What measures are proposed to avoid or minimize effects on traffic and transportation?

During construction

Traffic Detours

Three types of detours may be used to handle traffic during bridge construction: existing city streets; new surface streets through Terminal 91; and staged construction and temporary ramps to keep traffic in the existing corridor. The actual detours would be determined when final design is completed and construction is scheduled.

Use existing streets

With the existing bridge closed to traffic, traffic between Magnolia and 15th Avenue West can use the remaining two connections to Magnolia: West Dravus Street and West Emerson Place. The West Dravus Street route would add approximately 1.7 miles to the commute between the Magnolia Bluff and the intersection of Elliott Avenue West and the Galer Flyover. Vehicles traveling this route would encounter eight signalized intersections where the route across the existing bridge has only one. The additional travel time imposed by this detour would be about eight minutes per commuting vehicle, but is expected to be greater in periods of heaviest traffic. Traffic would be managed at congested intersections through modifications to traffic signal timing and using traffic control personnel.

Use new surface street detours

SDOT and the Port of Seattle have discussed providing a surface road connection that would use the Galer Flyover and a detour road along the east side of Terminal 91 next to the

BNSF railroad. This detour would connect Elliott Avenue West and Alaskan Way West with 21st Avenue West and Thorndyke Avenue West. SDOT and the Port of Seattle have discussed a surface detour on the west side of Terminal 91 at the base of Magnolia Bluff to connect 21st Avenue West with 23rd Avenue West and West Marina Place. This route would be needed early in the project for marina and other waterfront traffic when the eastbound on-ramp from 23rd Avenue West is removed. A temporary traffic signal may be needed at the 21st Avenue West intersection with Thorndyke Avenue West to handle the increased traffic during the detour period. The actual detours using new temporary surface streets will be determined during final design.

Maintain traffic in the existing bridge corridor

The west section of the New Magnolia Bridge would be south of the existing bridge and would be built while the existing bridge remains open to traffic. Only the existing eastbound on-ramp from 23rd Avenue West would be closed and removed during this phase and 23rd Avenue traffic would use a surface detour route to 21st Avenue West and West Thorndyke Street. Two options would be investigated during final design for maintaining traffic in the existing corridor when the existing bridge between 15th Avenue West and Pier 90 is demolished.

- Use the Galer Flyover, Alaskan Way West, and a new temporary ramp to the remaining bridge west of Pier 90.
- Demolish and replace the 15th Avenue West overpass and railroad crossing with a wider structure that would allow temporary two-way traffic while the ramp and railroad crossing to the south is replaced.

Freight Movements

Truck movements in and out of Terminal 91 would continue to use the Galer Flyover access from Elliott Avenue West and the Terminal 91 East Gate at the north end of Alaskan Way West. The Galer Flyover and Alaskan Way West may be used as a detour route for access to the Terminal 91 surface route to 21st Avenue West and Thorndyke Avenue West. The detour route

would be designed and operated to maintain truck access to Terminal 91 businesses.

Terminal 91 businesses require traffic circulation between Piers 90 and 91 south of the bridge and cold storage and processing operations north of the bridge. Traffic maintenance plans, developed in cooperation with the Port of Seattle Terminal 91 businesses, would maintain this access throughout the construction period.

Public Transit

Transit service to the Terminal 91 complex during construction would be maintained. This may be done by re-routing transit service or by providing shuttle vehicles to bring transit passengers between 15th Avenue West bus stops and the complex. This decision would be made prior to completion of final design.

Construction Parking

Parking for construction workers may be provided at Port properties adjacent to the project. City rights-of-way and easements may also be available for construction workforce parking. Additional enforcement of the residential parking permit restrictions on Magnolia Bluff near the west end of the bridge may necessary if construction-related parking is observed to occur in the neighborhood.

Traffic on the New Bridge

Traffic on the New Magnolia Bridge would be similar to the existing bridge. No specific measures to avoid or minimize effects on traffic and transportation are anticipated.

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Chapter 5.2 Noise

This chapter summarizes the results of the noise analysis completed for the project. Following the guidelines and standards for analyzing and mitigating highway noise established by the FHWA and the Washington State Department of Transportation, potential noise effects and mitigation measures were identified. Additional information on noise impacts can be found in the Noise Discipline Report in Appendix K.

Homes on West Galer Street

1 How were noise levels evaluated for the Magnolia Bridge Replacement Project?

Please refer to the Magnolia Bridge Replacement Noise Discipline Report in Appendix K (on CD) for a complete discussion of the noise analysis.

Noise regulations and guidelines are the basis for evaluating potential noise effects. For state and federally funded projects, traffic noise effects occur when predicted hourly noise levels (designated by the symbol "$L_{eq}(h)$") approach or exceed a Noise Abatement Criteria (NAC) established by the Federal Highway Administration (FHWA), or substantially exceed existing noise levels.

What are sensitive receptors?

Sensitive receptors represent all land use activity categories where the FHWA noise abatement criteria (Exhibit 5.2-1) specify exterior and interior noise levels. Land use activity categories include residences, recreation areas, hotels, schools, churches, libraries, and hospitals.

For residential and park property, a noise level of 66 dBA approaches the FHWA NAC and is considered an impact. FHWA's Traffic Noise Model was used to estimate traffic noise levels in the project area. The model uses field measurements of current noise levels and current traffic volumes to estimate existing noise levels. The model then projects noise levels out to the design year which is 20 years after project construction. Noise levels were measured at 23 locations adjacent to the project deemed to be “noise sensitive

receptors" (see Exhibit 5.2-2) and noise levels were modeled through the 2030 design year. Since the initial noise modeling was performed, the project design year was moved to 2036 because construction is assumed to not start earlier than 2016. The previous 2030 traffic forecasts have been compared with 2036 travel conditions based on updated regional population and employment forecasts. Slow growth in the last several years due to the 2007 to 2009 "Great Recession" and slow recovery has resulted in 2036 traffic forecasts on the Magnolia Bride study area not substantially different from previous 2030 forecasts. There would be no substantial difference between noise levels in the 2036 design year and the 2030 values were used in the noise analysis.

Additional noise modeling was done in 2014 at four park sites and one historic property site to determine if there were impacts to properties the properties describe in Chapter 5.6 as park, recreational and historic resources. Exhibit 5.2-3 shows the locations modeled in these five properties.

Exhibit 5.2-1
FHWA Noise Abatement Criteria

Activity Category	dBA Leq(h)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those quality is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not include din Categories A or B above.
D	No criteria	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FHWA 23 CFR Part 772

What is L_{eq}(h)?

The equivalent sound level is widely used to describe environmental noise. It is a measure of the average sound energy measured during an hour.

Exhibit 5.2-2
Modeled Sensitive Receptors

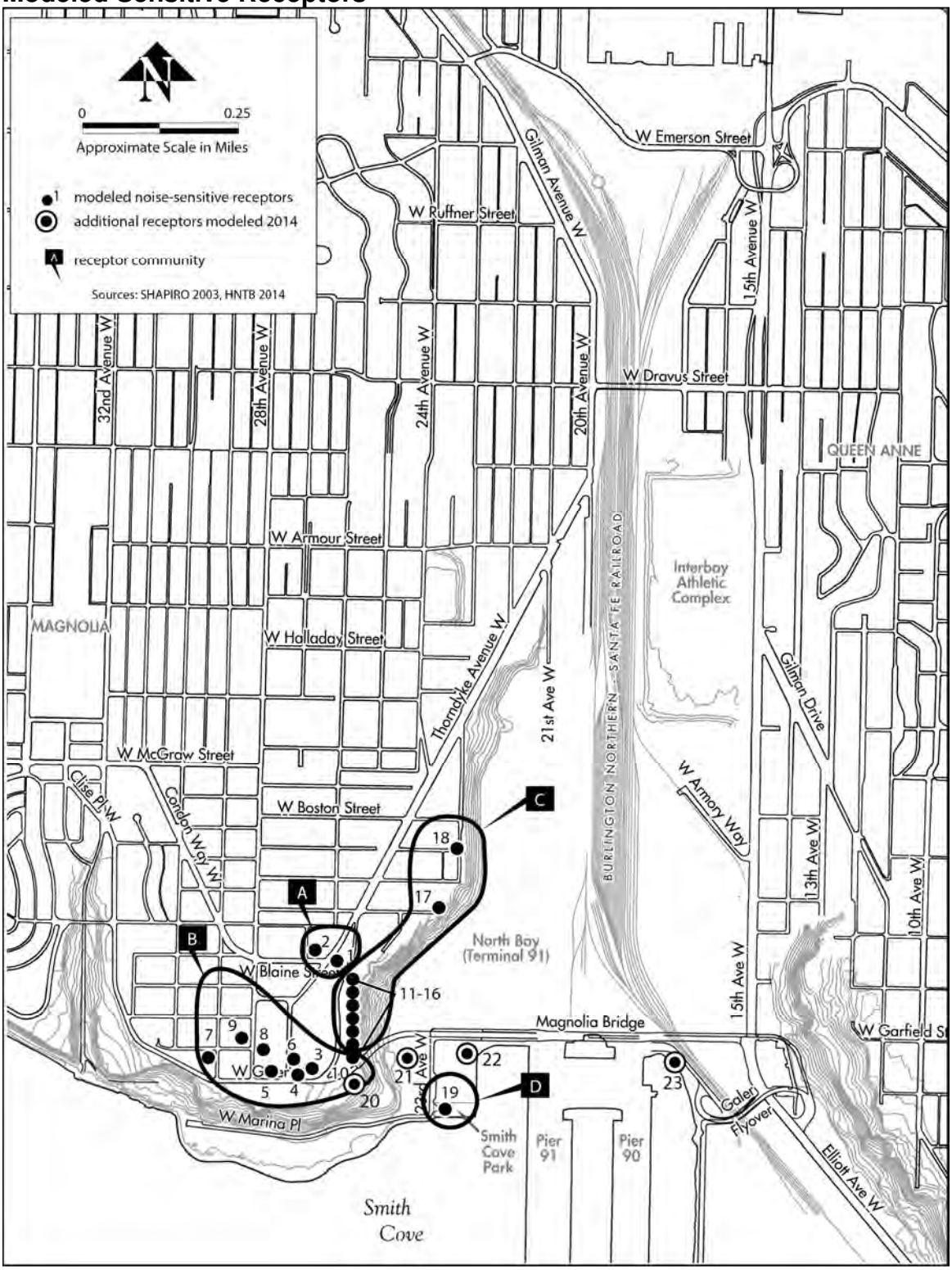
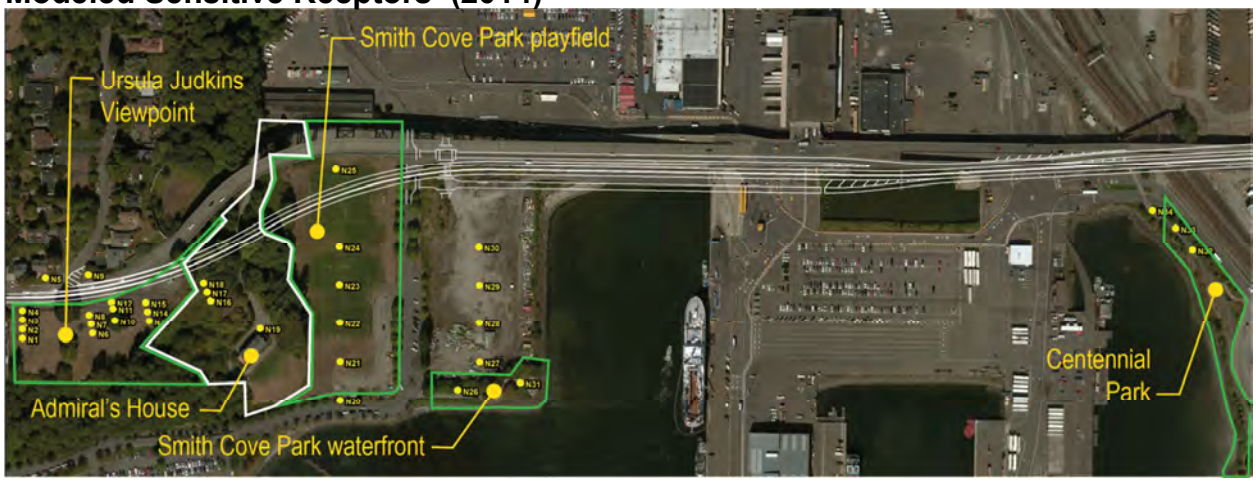


Exhibit 5.2-3
Modeled Sensitive Recptors (2014)



2 How noisy is the study area and what are the noise sources?

The four principal sources of traffic noise in the study area are: Magnolia Bridge, the bridge approaches, West Galer Street, and Thorndyke Avenue West. Background noise sources include urban residential noise, industrial and rail yard noise, and aircraft flights.

Existing noise levels range from a low of 54 dBA near the Elliott Bay Marina to a high of 68 dBA at a residence on West Galer Street east of Thorndyke Avenue West. The majority of the measured noise levels fall below the NAC of 67 dBA for residences and other category B activities.

How loud are the noises we hear every day?

Soft Whisper from 15 feet	30 dBA
Television from 10 feet	60 dBA
Freeway traffic from 50 feet	70 dBA
City bus from 50 feet	80 dBA
Jet airliner from 200 feet	120 dBA

3 How would the completed project affect noise levels?

The New Magnolia Bridge would not change the noise source — traffic coming to and from Magnolia Bluff along West Galer Street. The location of the roadway won't change substantially where it passes by Magnolia Bluff residences so the completed project would have the same noise levels as the No Build alternative for Magnolia Bluff residents. The projected increase in traffic through 2030 would result in noise levels along West Galer Street of 70 to 71 dBA, an increase of 3 to 4 decibels

over existing noise levels. This level of increase would be nearly undetectable, but would exceed the NAC of 67 dBA for residences.

The New Magnolia Bridge would be located on, over or adjacent to several park and historic properties. As located on Exhibit 5.2-2, the park properties are the Ursula Judkins Viewpoint (receptor #20), Smith Cove Playfield (receptor #20), and Centennial Park (receptor #23). The historic property is the "Admiral's House (receptor #21), now privately owned. The Smith Cove Park waterfront site (receptor #19) is also shown. It is more than 500 feet from the new bridge location.

Noise levels in the western portion of Ursula Judkins Viewpoint nearest to West Galer Street are predicted to be 66 to 70 dBA in the design year with or without the project. These levels exceed the NAC for a park property. The project roadway matches existing West Galer Street west of the Magnolia Way West intersection. In the eastern portion of the park, noise levels are predicted to decrease with project and be below the NAC for park property. This is result of the new bridge approach wall which would have barrier and railing above roadway level.

Design year noise levels in the Smith Cove Playfield, Smith Cove Park waterfront site, the Admirals House property, and Centennial Park would be below impact levels with or without the project.

4 How would we minimize the effects of traffic noise?

FHWA regulations (23 CFR 772) specify that when agencies planning a project identify noise effects, they must evaluate abatement (mitigation) measures to reduce the effects. Agencies must incorporate all noise abatement measures that they determine to be "reasonable and feasible," into the project design before FHWA will approve the project. Four noise abatement measures were considered: traffic management measures to reduce traffic and/or lower speeds; moving the roadway further away from homes; providing noise barriers

What is "reasonable and feasible?"

Feasibility deals primarily with engineering considerations (e.g., can a barrier be built given the topography of the location; can a substantial noise reduction be achieved given certain access, drainage, safety, or maintenance requirements; are other noise sources present in the area, etc.). Reasonableness is a more subjective criterion than feasibility. It implies that common sense and good judgment were applied in arriving at a decision. (USDOT 1995)

such as walls; and purchasing land for noise buffers or barriers.

All of the noise abatement measures were found to be infeasible for the project. Moving the project away from residences is not feasible while meeting the project's purpose and need. Noise barriers would not be effective because of frequent breaks in the wall for driveways. There is no undeveloped land to purchase for noise buffers or barriers. For more information on the criteria used to determine what noise abatement measures are "reasonable and feasible," please see the Noise Discipline Report (Appendix K).

5 How would project construction affect noise?

Construction activities would generate temporary noise, but would not constitute a noise impact. The most prevalent noise would be from stationary engines that power equipment. The loudest noises would be from impact equipment. Pile driving would be intermittently intrusive, but should not interfere with face-to-face or telephone conversations at distances greater than 500 feet from the construction area.

Construction noise is subject to City of Seattle Noise Ordinance and cannot exceed permissible levels without a variance from the City.

6 What measures are proposed to avoid or minimize noise effects?

During construction

To reduce construction noise at nearby receptors, the following measures would be incorporated into construction plans and specifications:

- Limiting the noisiest construction activities, such as pile driving, to between 7 AM and 10 PM to reduce construction noise levels during sensitive nighttime hours
- Outfitting construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise by 5 to 10 dBA (US EPA, 1971)

- Turning off construction equipment during prolonged periods of nonuse to eliminate noise
- Requiring contractors to maintain all equipment and train their equipment operators in practices to reduce noise levels
- Locating stationary equipment away from receiving properties to decrease noise
- Requiring contractors to use OSHA-approved ambient sound-sensing backup alarms that could reduce disturbances from backup alarms during quieter periods

Exhibit 5.2-4
Construction Equipment Noise Ranges

Equipment	Examples	dBA at 50 feet
Earth Moving	Compactors, loaders, backhoes, tractors, graders, pavers	73 – 96
Materials Handling	Concrete mixers and pumps, cranes, derricks	74 – 88
Stationary	Pumps, compressors, generators	69 – 87
Hauling	Trucks	83 – 94
Impact Equipment	Pile-drivers	95 – 106
Impact Tools	Jackhammers, rock drills, pneumatic wrenches	81 – 98

Source: Environmental Protection Agency (EPA), 1971

Traffic Noise

Noise abatement measures have been evaluated and found to be infeasible. See section “4” of this chapter.

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Chapter 5.3 Land Use Patterns

This chapter includes a description of current and future land use patterns near the Magnolia Bridge, a summary of potential project impacts, and a discussion of the project's consistency with applicable land use plans and development regulations. Please refer to the Magnolia Bridge Replacement Project Land Use Discipline Report in Appendix J for a complete analysis of land use patterns and project impacts.

Pier 90 and Pier 91

1 Why study land use patterns and project impacts?

Implementing regulations of NEPA (40 CFR 1502.16(c)) require environmental assessments (EA) to include a discussion of possible conflicts between the proposed project and applicable land uses plans, objectives, policies, controls and regulations. The goal of the analysis is to help decision makers understand the effect of the project on land use and development patterns. Part of the analysis includes an examination of relocations caused by changes in land use.

What is a land use?
Land use refers to the manner in which portions of land or the structures on them are used (e.g., commercial, retail, residential, industrial, etc). Land uses in the City of Seattle are established by land use goals and policies in Seattle's Comp Plan.

2 How were land use patterns evaluated?

To analyze land use patterns and consistency of the project with adopted plans, policies, and regulations, project staff reviewed numerous City planning documents, neighborhood plans and the City of Seattle's Comprehensive Plan, *Toward a Sustainable Seattle, A Plan for Managing Growth 1994-2014* (as amended), also known as the Comp Plan. They also reviewed Indian treaties and agreements. Information on existing and future land uses was gathered through field

investigations, analysis of City GIS information, discussions with the Seattle Department of Planning and Development, and review of the City's Future Land Use Map.

Relevant policies and regulations in each document were identified and compared to the Preferred Alternative to determine if it was consistent with these guidelines.

3 What are the study area boundaries?

The study area boundaries for the Magnolia Bridge Replacement Project include West Dravus Street on the north, 10th Avenue West on the east, the Elliott Bay waterfront on the south (from Terminal 86 to the extension of 32nd Avenue West), and 32nd Avenue West on the west.

4 What are the existing land uses in the study area?

Several types of land uses occur within the study area:

- **Residential** - single family residential neighborhoods are located to the east and west of the project site, on the upper portions of the Magnolia Bluff and Queen Anne Hill. Multi-family neighborhoods are located on the lower portions of both hills. Residential zoning is also present to the north.
- **Industrial/commercial** - Interbay is the lowland area between Magnolia and Queen Anne. It consists mostly of industrial land with a small mix of commercial and light industrial along Elliott Avenue.
- **Other land uses** – several additional types of land uses, not included on the Land Use Map, occur within the study area:
    - The Washington National Guard Armory is located to the west of this corridor
    - The BNSF railroad track and rail yard run through the middle of the industrial section
    - The Port of Seattle Terminal 91 is located south of the bridge. It supports several maritime uses.

- Several public parks are adjacent to the Magnolia Bridge and its approaches. A golf course and community garden are located along Thorndyke Avenue West and 15th Avenue West
- The Magnolia Bridge lies within the Seattle shoreline overlay district. Shoreline regulations govern development on upland and in-water work.
- The majority of the study area lies within the Ballard-Interbay Northend Manufacturing and Industrial Center (BINMIC - see Figure 5.3-2). BINMIC is designated in the Comp Plan as a Manufacturing/Industrial Center.

Exhibit 5.3-1

Existing Land Use

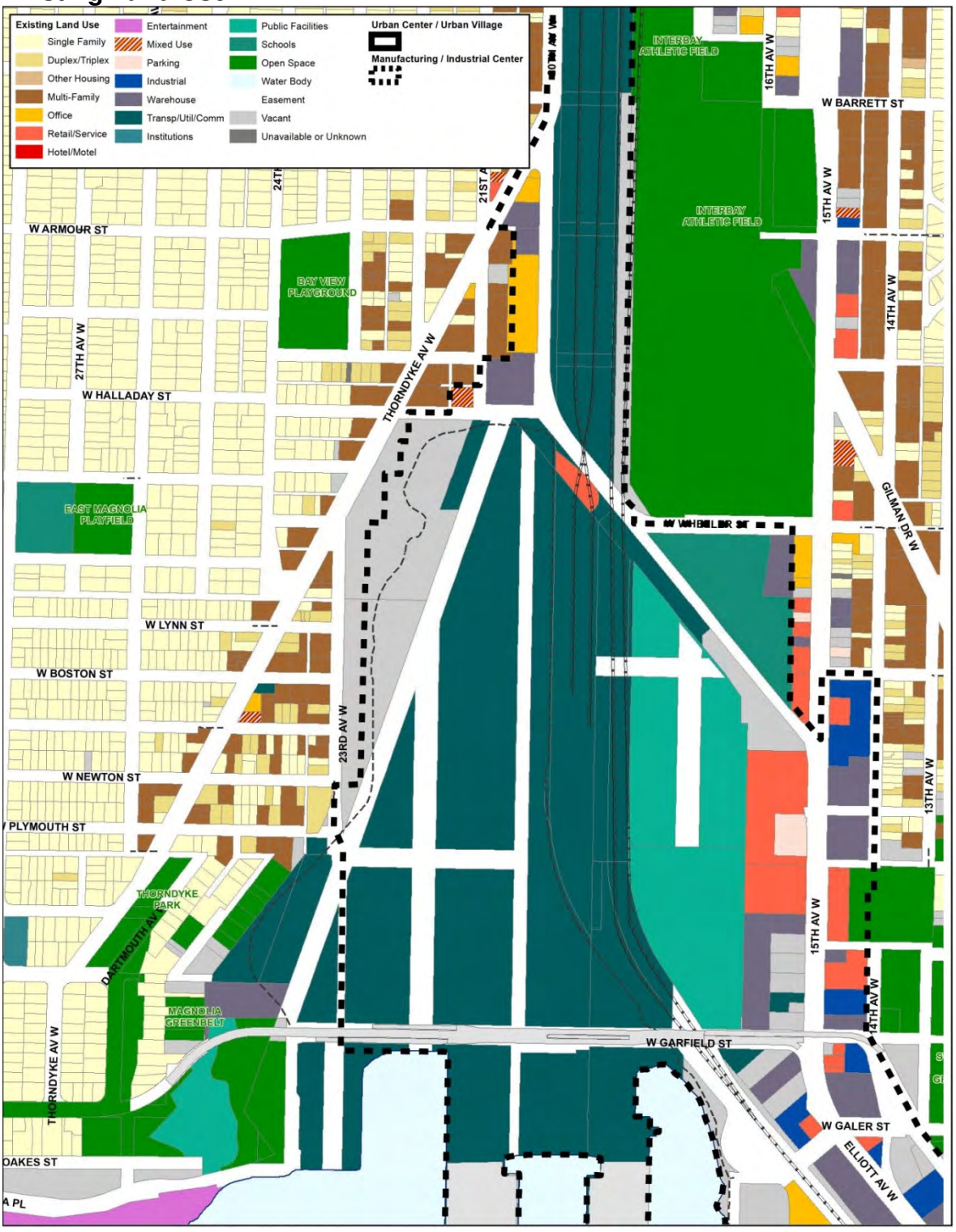
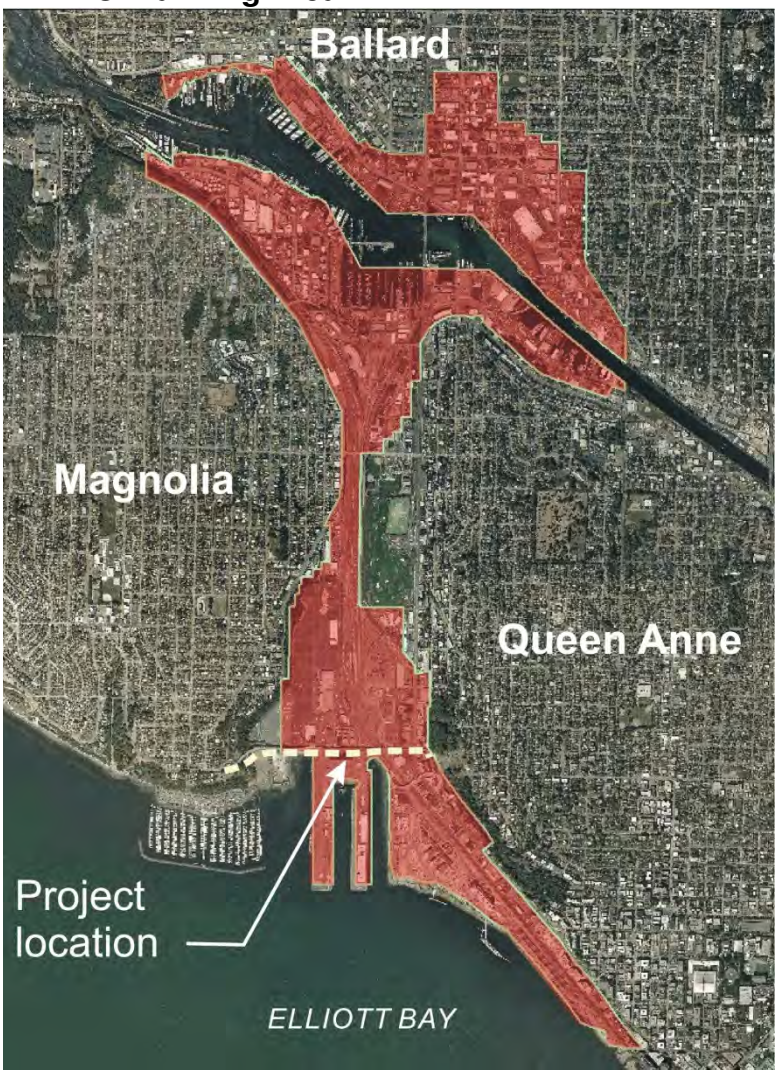


Exhibit 5.3-2
BINMIC Planning Area



5 What is the existing zoning in the study area?

The majority of the study area is zoned General Industrial (IG). The Port's Terminal 91, including properties south of the bridge along Elliott Avenue West, and BNSF Railway property are zoned General Industrial 1/45 (IG1), which allows industrial development in areas characterized as having access to waterways and rail. The National Guard Armory and properties located along 15th Avenue West, south of West Armory Way, are zoned General Industrial 2/45 (IG2), which is intended to allow a broader mix of activities. The uphill

What is zoning?
Zoning regulates land use and development. Zoning is regulated under Seattle's Municipal Code and provides a means to implement Seattle's Comp Plan.

portions of the study area include the Magnolia and Queen Anne neighborhoods which are zoned Residential Single Family 5000. Lower areas on both hills are zoned Lowrise 1, 2, or 3 which allows multifamily residential development with higher densities than Residential Single Family zoning.

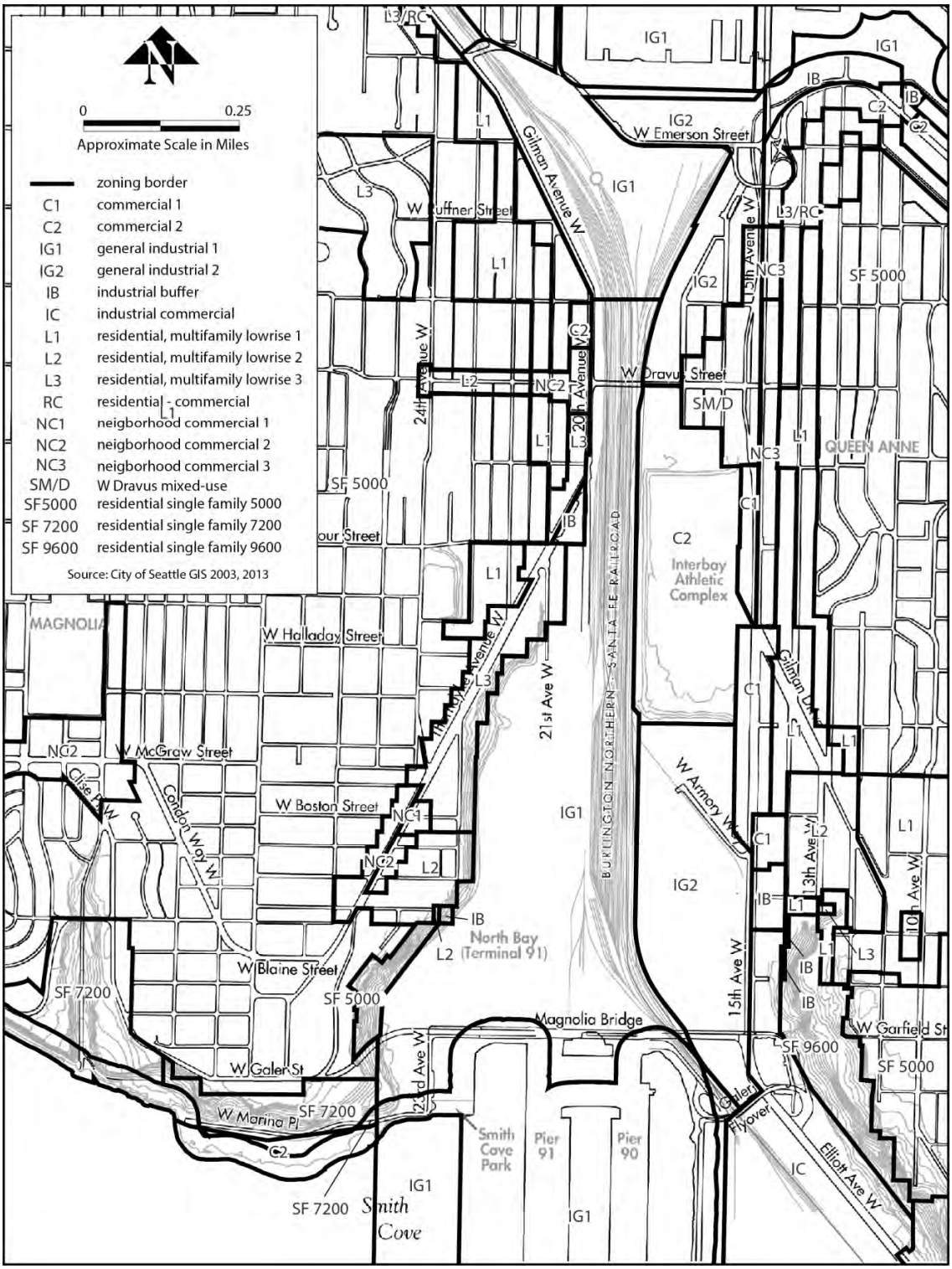
Some property fronting the eastern side of 15th Avenue West (south of West Armory Way) and fronting both sides of Elliott Way West (south of the existing bridge) is zoned Industrial Commercial. This zone is intended to promote development of businesses that incorporate a mix of industrial and commercial activities. Some areas to the east of 15th Avenue West are zoned Industrial Buffer (IB), which provides additional development regulations to limit impacts on neighboring non-industrial areas.

Parcels fronting 15th Avenue West north of West Armory Way are zoned Commercial 1 and Commercial 2, which indicate an auto-oriented, primarily retail/service commercial area that serves surrounding neighborhoods and the larger community or citywide clientele. A Neighborhood Commercial zone (NC-3), which allows less intensive commercial uses, is located along 15th Avenue West north of Gilman Drive West.

A portion of the Magnolia Bridge Replacement Project lies within the City of Seattle's Shoreline District (Shoreline), a zoning overlay which modifies allowed land uses, heights and development standards as appropriate for local shoreline conditions. Specifically, the project lies within the Urban Industrial (UI) Environment. Development standards in the UI are consistent with those in the IG zone. Zoning requirements for each zone would be coordinated as part of the Shoreline permitting process.

Exhibit 5.3-3

Existing Zoning



6 What are future land uses and zoning in the study area?

The City of Seattle would be updating the Comp Plan in 2015. Several minor zoning boundary adjustments are being considered in the northern section of the BINMIC from General Industrial (IG) to Commercial/Industrial (IC) and discussion of removal of several parcels east of 15th Avenue West near Dravus from the BINMIC has occurred. These proposed changes would be evaluated as part of the upcoming Comp Plan update. Several policies around the preservation of industrial lands are also being considered as part of this update.

In 2005, the Port of Seattle evaluated the development potential of Terminal 91. To accomplish this would require a zoning change from its current industrial designation. This was denied by City Council and is not part of the proposed Comp Plan update. It is unclear if the Port would revisit this in the future.

The Washington National Guard is looking into selling or developing the Armory property. While this too would require a change in zoning, no formal plans have been put forth at this time. Future development of the Armory would be evaluated as part of the Comp Plan update.

Sound Transit and the City completed a study of possible transit improvements between downtown Seattle and Ballard. The study is examined the possibility of high capacity transit through BINMIC – which could be a change in current land use from bus transit to light rail. Recommendations are formulated at this time.

7 What effects to land use were identified for the project?

Current Land Use and Zoning

Business Impacts

Anthony's Seafood Distribution would lose its direct access to the existing Magnolia Bridge. Alternate access would be provided or the business would be relocated. A decision will

be made in consultation with the business before the project moves into final design.

Property Acquisition/Relocation

The Magnolia Bridge east approach would be located over existing BNSF Railway tracks. Approval and easements from the railroad must be obtained.

Several City-owned park lands are adjacent to the existing Magnolia Bridge and its approaches. Due to the move of the project alignment south from the existing project, the western end of the bridge approaching West Galer Street would be constructed over City-owned park land (Ursula Judkins Viewpoint and Smith Cove Park). Also, construction of project elements on parkland located immediately south of the existing bridge is required to complete the project. SDOT and Seattle Parks and Recreation have signed a Joint Development Agreement to manage replacement of the Magnolia Bridge over the park property. The area under the bridge in that location (approximately 0.6 acre) would be used for public open space or non-organized recreation activities. See Chapter 5.6: Park, Recreation, and 4(f) Resources for more information and the Section 4(f) Evaluation in Appendix L.

The Federal Aviation Administration (FAA) houses a transmitter on the southeast corner of Ursula Judkins Park. This transmitter is used for guiding planes landing at Boeing Field. This facility would have to be decommissioned or relocated to allow construction of the Preferred Alternative. SDOT and FHWA have begun discussions with FAA and would continue these discussions before the project moves into final design.

Cultural Resources

The preferred alternative would require a permanent easement over a portion of the Admiral's House property due to the southward movement of the bridge alignment. The impacts of this change in alignment on the Admiral's House would be minimal. See chapters 5.5: Historic, Cultural, and Archaeological Resources, of this EA and the Historic, Cultural

and Archaeological Resources Discipline Report in Appendix I for more information on the impacts to the Admiral's House.

Shorelines

The existing shoreline west of the Magnolia Bridge is highly modified. It consists of armoring along most of its length with rip-rap or seawalls, and supports industrial use. Low-functioning intertidal habitat is present (Seattle Shoreline Characterization Report, 2009). In-water work includes placement of piers within Elliott Bay and loss of habitat.

Tribal Lands

A portion of the Preferred Alternative is located within the ceded territory and the "usual and accustomed areas" of the Suquamish Tribe, Tulalip Tribe, Muckleshoot Tribe, Yakama Indian Nation, the Duwamish Tribe (pending federal recognition), and the Kikiallus Indian Nation (not federally recognized). A small portion of the Preferred Alternative alignment would lie within Elliott Bay, which includes tribal fishing areas; however, no conflicts between the project alternatives and tribal interests have been identified to date. Discussions have occurred with the tribes through the Section 106 process.

Future Land Use and Zoning

The New Magnolia Bridge would use land that is mostly zoned and used for industrial purposes, as the majority of the project area lies within the BINMIC. Existing land use is shown in Exhibit 5.3-2. A small portion of Ursula Judkins Park, and a portion of the former U.S. Navy property at the western end of the project are zoned residential. The City of Seattle would need to obtain the right-of-way or an easement over Port of Seattle, Seattle Parks and Recreation, and private properties. The City would also need to work with the BNSF Railway to construct over a portion of the railroad tracks to the south of the existing bridge.

In March 2013, the City of Seattle parks department acquired the "West Yard" property for the Magnolia Combined Sewer Overflow project and as an addition to Smith Cove Park. This

property is located between west of Pier 91 between the existing Smith Cove Playfield, Smith Cove Park and the existing Magnolia Bridge. While this property is intended for future parks use, no immediate plans or funding are available.

The New Magnolia Bridge would be compatible with future land uses in the Port of Seattle Terminal 91. In February 2006, the Port of Seattle Commissioners endorsed the Preferred Alternative as the preferred location for the replacement of the existing bridge.

The project would have no effects on current or future zoning.

Future Development Patterns

By moving the bridge location slightly to the south, the Preferred Alternative would continue to form a physical and visual barrier between the shoreline (including the piers) and the uplands. Constructing the bridge in this location would not affect the ability to retain the types of industrial and recreational uses that are currently in the area or those proposed for this area.

8 What construction effects to land use were identified for the project?

Construction of the Preferred Alternative is estimated to take 39 months. The bridge would be closed to all traffic for a 14- to 20-month period within that time frame. While not substantial, a number of effects to land uses would occur:

Business Access

Construction of the Preferred Alternative could cause temporary disruptions for industrial uses located on Port of Seattle property. Construction activities may divert or delay vehicular access to the waterfront and Piers 90 and 91 within Terminal 91.

Up to 16.2 acres of temporary right-of-way or easement would be required to construct the Preferred Alternative. This includes staging areas, the area that would be affected by demolishing the existing bridge, and the right-of-way that would be retained for the new bridge.

Temporary Easements

The Port of Seattle Terminal 91 is located south of the bridge. SDOT and the Port of Seattle are looking into providing a surface road connection that would use the Galer Flyover and a detour road along the east side of Terminal 91 next to the BNSF Railway tracks. This detour would connect Elliott Avenue West and Alaskan Way West with 21st Avenue West and Thorndyke Avenue West. SDOT and the Port of Seattle are also discussing a surface detour on the west side of Terminal 91 at the base of Magnolia Bluff to connect 21st Avenue West with 23rd Avenue West and West Marina Place. Temporary easements would be required to work on Parks property and on the Admiral's House property.

9 Is the project consistent with planned land use and City zoning policies and regulations?

The Preferred Alternative is consistent with City of Seattle, Port of Seattle, and BINMIC planned land use, City zoning policies and regulations. The Preferred Alternative would not preclude use and redevelopment of the industrial areas adjacent to the bridge and thus would be consistent with the purpose of the IG1 zone and other policies for the Industrial Area. It is consistent with potential future IC zoning and other policies for the industrial/commercial area.

The Preferred Alternative is consistent with City shoreline policies and regulations. The new bridge would continue to provide City view corridors, and the widened pedestrian and bicycle path on the bridge structure would likely increase the number of non-vehicular users and thus the relative importance of these views. The Preferred Alternative would include in-water work. In-water work would meet City and federal shoreline policies and regulations.

10 What measures are proposed to avoid or minimize effects on land use patterns?

During construction

Construction of the New Magnolia Bridge would comply with City of Seattle land use and zoning regulations. Owners of displaced businesses would be compensated at fair market value and provided relocation assistance when purchases occur in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended.

Please refer to relevant discipline reports for this project for a description of mitigation measures related to other elements of the environment, including social and economic conditions, visual quality, transportation, water quality, air quality, and noise.

Construction in the shoreline and critical areas would meet the requirements of Shoreline and critical areas regulations found in Seattle Municipal Code (SMC) Section 24.60 and SMC Section 25.09.

A construction management plan would be prepared to manage construction traffic in the vicinity of the project. The plan would identify mitigation measures, including detours, to be implemented during the construction phases. The measures would include, in part, providing advanced notice to local businesses of construction activities and stipulating detour routes and parking locations.

To mitigate construction impacts to specific businesses and residences, a public involvement plan for construction activities would be prepared. This plan could include public notices and mailings to affected businesses and residences about the scope of construction work, likely impacts, and access issues.

After Construction

Right-of-way acquisition for the project would comply with City of Seattle land use and zoning regulations, where applicable. Please refer to relevant discipline reports for this

project for a description of mitigation measures related to other elements of the environment.

Owners of displaced businesses would be compensated at fair market value and provided relocation assistance when purchases occur in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended.

Indirect and Cumulative Impacts

The Magnolia Bridge replacement is one of several projects in the study area in the planning and evaluation phases of development. Planning is underway for locating a new high-capacity transit corridor and for redeveloping areas of underutilized land in the area. These projects may influence future transportation patterns, land use patterns, and economic potential.

Planned Development

Ballard to Downtown High Capacity Transit Planning Study

The Ballard to Downtown High Capacity Transit Planning Study was completed in 2014. It identified possible rail transit improvements between Ballard and downtown Seattle. Improvements include high capacity transit light rail alignments and station locations. Sound Transit and SDOT are partnering on this study. Initial corridor screening identified eight corridor alternatives. Four of these are located in the Magnolia Bridge study area.

The Preferred Alternative would retain the same intersection configuration on 15th Avenue West and Elliot Avenue West and would be compatible with the Downtown to Ballard high capacity transit alignment and station concepts in that corridor. The two high capacity transit alignment concepts that use the 20th Avenue West alignment in Terminal 91 were developed for compatibility with the existing Magnolia Bridge and would be compatible with the Preferred Alternative.

Terminal 91 Development Options Study

The Port of Seattle has studied development options for the 30 acres of upland Terminal 91 that is considered surplus to

marine and industrial use. Market conditions at the time of the 2010 real estate market analysis showed the current highest and best use was continued use for yard storage of equipment and vehicles. In the future, there may be a demand for more intensive uses allowed under the IG1 zoning. However, land uses and zoning would not change. There are no future plans for this development at this time.

Interbay 15th Avenue West Corridor

The 2013-2014 proposed amendments to the Comprehensive Plan include a land use change to the National Guard Armory site between Magnolia Bridge and West Armory Way east of the BNSF Railway. If approved, the land use would be changed from industrial to mixed-use commercial. This proposed change would not affect or be affected by the project.

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Chapter 5.4 Communities, Neighborhoods, and Businesses

This chapter describes current communities, neighborhoods, and businesses near the Magnolia Bridge project, summarizes potential impacts on these resources and examines equity effects. Please refer to the Magnolia Bridge Replacement Social, Economic, and Relocation; Land Use; and Environmental Justice discipline reports in appendices N, J, and F for complete discussions of the communities, neighborhoods, and businesses analyses.

1 Why study community, neighborhood, and business impacts?

The analysis of demographics of an area, neighborhood cohesion, equity effects and impacts to businesses is required to comply with Title VI of the Civil Rights Act of 1964, Executive Order 13166, and the National Environmental Policy Act (NEPA). In addition, Executive Order 12898 on environmental justice requires federal agencies to take appropriate steps to identify and address "disproportionate impacts" to minority and low-income populations. US DOT Order 5610.2(a) and FHWA Order 6640 23.A provide guidance on how to evaluate and address environmental justice in minority and low income populations.

2 What types of data were analyzed for the project?

2010 U.S. Census Bureau data and 2011 American Community Survey (ACS) reports were used to obtain information on the

age, household income, and the race and ethnicity of the population within the study area. These reports also provided housing information such as the numbers of owners and renters, and the types of housing available in the study area. Seattle Public School data was gathered to gain information on the demographics of students attending schools within the study area.

Economic information was compiled from a variety of sources including the Puget Sound Regional Council (PSRC), Washington State Employment Security Department, USA Business Directory Database and Dun & Bradstreet. Interviews with businesses in the Interbay area were conducted to determine long-term impacts on the local business community.

To better understand development patterns and community characteristics within the study area, project staff met with neighborhood and business groups, the Seattle Department of Parks and Recreation and the Seattle Department of Planning and Development between 2001 and 2014 (See Chapter 3 of this EA for additional information on public outreach).

3 What are the project study area boundaries?

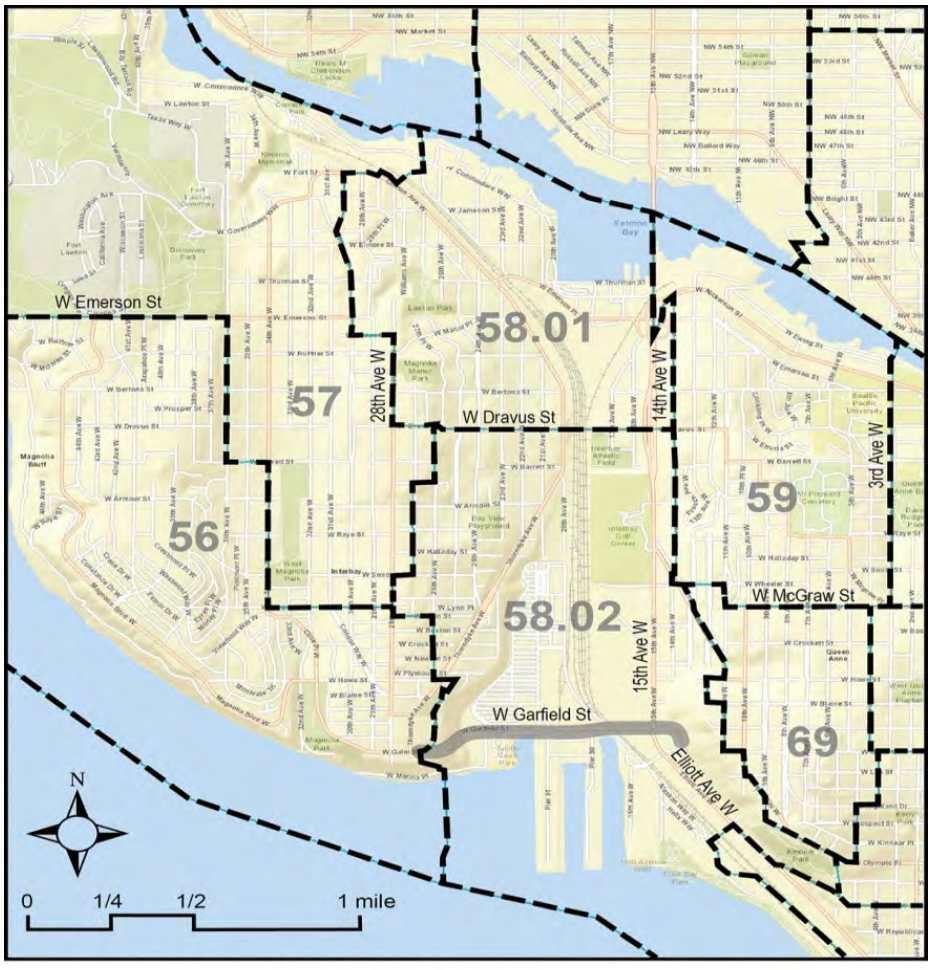
The study area for the Magnolia Bridge Replacement Project encompasses portions of six census tracts within the Magnolia, Interbay and Queen Anne neighborhoods:

- Magnolia (56.00, 57.00)
- Interbay (58.01, 58.02)
- Queen Anne (59.00, 69.00)

These census tracts are within ½ mile of the existing bridge, and represent areas where a portion of the Preferred Alternative would be constructed or where the project might have an impact. Exhibit 5.4-1 shows the six census tracts in the study area and their relationship to the Preferred Alternative location. As the Preferred Alternative was being developed, it became clear that the major impacts from the project would be localized in the Magnolia and Interbay neighborhoods. Higher

volumes of traffic and up to eight minute delays on detours along West Dravus Street, West Emerson Place, 21st Avenue West and Thorndyke Avenue West would occur. Traffic was anticipated to back up on side streets along these roadways as well. These impacts would not occur in the Queen Anne neighborhood located east of the Magnolia Bridge (Census Tracts 59 and 69) as this is separated by the SW Queen Anne Greenbelt and has limited automobile access to and from 15th Avenue West.

Exhibit 5.4-1
Study Area Census Tracts (2010)



What is a Census Tract?

Census tracts are small, relatively permanent statistical subdivisions of a county or city used by the U.S. Census Bureau to provide a stable set of geographic units for the presentation of statistical data.

4 What are the demographics of the study area?

Demographics are the statistical information or data of a population. Typical demographics used for understanding the population of an area include average age, income and education. The demographics or population characteristics examined in this study include median household income, poverty status, age and disability, ethnic and racial composition, and linguistic isolation. These are indicators commonly used to evaluate potential impacts that might occur from a transportation projects

Low Income Populations

Three measures were used to identify low income populations in the study area:

- Median household income
- Poverty status
- Schools on the Reduced Lunch Program[18]

The following provides a profile of low income populations residing in the study area.

Median Household Income

The median household income within the study area ranges from approximately $60,000 to $145,000. This is much higher than the federal poverty level for a family of four – which was $24,000 in 2014[19].

There are disparities in median household income within the study area. The Interbay neighborhood, where the bridge alignment lies, is comprised of Census Tracts 58.01 and 58.02. It has the lowest median incomes within the study area. The Magnolia neighborhood to the west (Census Tracts 56 and 57) has much higher median household incomes.

[18] Eligibility for "Free or Reduced-Price Meals" is income and family size dependent. In 2012, a student in a family of four was eligible for free lunches if the family had an annual income below $42,643. Source: Seattle Public Schools, 2013.

[19] Source: U.S. Department of Health and Human Services 2014 Poverty Guidelines.

Exhibit 5.4-2

Median Household Income

Area	Number of Households	Median Household Income	Average Household Size	Percentage of Family Households [1]	Percentage of Non-Family Households [2]
King County	790,070	$70,567	2.37	58.7%	41.3%
City of Seattle	282,480	$61,856	2.05	43.8%	56.2%
Census Tract 56.00	2,667	$145,221	2.37	72.1%	27.9%
Census Tract 57.00	2,892	$83,830	2.19	49.8%	50.2%
Census Tract 58.01	2,667	$61,966	1.97	44.4%	55.6%
Census Tract 58.02	2,513	$59,572	1.72	37.6%	62.4%
Census Tract 59.00	2,642	$80,625	2.20	49.4%	50.6%
Census Tract 69.00	2,061	$78,792	1.90	39.5%	60.5%
TOTAL Study Area	15,442	$85,001	2.05	48.8%	51.2%

Notes: [1] Family households include a householder and one or more other people living in the same household who are related to the householder by birth, marriage, or adoption.
[2] Non-family households include a householder living alone or with non-relatives only.

Source: 2011 American Communities Survey, 2011 5-year Estimate, Tables S1101 and S1903.

Poverty Status

While median household incomes throughout the study are above the 2014 poverty level, a number of people residing here live below the poverty level (See Exhibit 5.4-3). Within Census Tracts 58.01, 58.02 (those with the lowest median household income in the study), a total of 558 individuals (4.8% to 7.1%) live below the poverty level. Surprisingly Census Tract 57.00 where the median household income is over $83,000 had the greatest percent (9%) of individuals living under the poverty level in the study area.

Exhibit 5.4-3

Poverty Status

Area	Population for Poverty Status Determination [1]	Population Below Poverty Level	Percentage Below Poverty Level
King County	1,880,029	198,546	10.4%
City of Seattle	584,685	77,109	13.2%
Census Tract 56.00	6,320	283	4.5%
Census Tract 57.00	6,326	568	9.0%
Census Tract 58.01	5,216	250	4.8%
Census Tract 58.02	4,342	308	7.1%
Census Tract 59.00	5,814	606	10.4%
Census Tract 69.00	3,965	305	7.7%
TOTAL Study Area	31,983	2,320	5.7%

[1]The Census Bureau uses the federal government's official poverty definition, which involves comparing an individual's total family income with the poverty threshold appropriate for that individual's family size and composition. Poverty status is determined for all people except those who are institutionalized, in military group quarters, in college, or unrelated and under 15 years old.

[2]The population below the poverty line in this area is estimated as the households in the income groups below $24,000from the EJView ACS Summary Report.

Sources: U.S. Census Bureau, American Community Survey 2011 5-year table B17001.EJView ACS Summary Report, run August 27, 2013.

School Lunch Programs

Five public elementary schools lie within the study area:

- Lawton Elementary 4000 27th Ave W (Census Tract 58.01)
- Catherine Blaine School - 2550 34th Ave W (Census Tract 56)
- Coe Elementary 2424 7th Ave W (Census Tract 59)
- John Hay Elementary 201 Garfield St (Census Tract 59)
- Queen Anne 411 Boston St (Census Tract 69)

Associated with each school is a designated attendance area - a defined geographic boundary intended to serve the students who live within that geographic boundary. Students are assigned to a public school based on where the student lives.

Coe, John Hay and Queen Anne elementary schools lie within study area census tracts, but are over a mile from the Preferred Alternative located on Queen Anne Hill. They would not be impacted by the project. Lawton Elementary and Catherine Blaine School however, serve both the Interbay and Magnolia neighborhoods are in locations that would experience impacts from the Magnolia Bridge Replacement Project. The number of students receiving free or reduced lunches at Lawton and Catherine Blaine schools is described in Exhibit 5.4-4.

Exhibit 5.4-4

School Lunch Program (May 2013)

School (Grades)	School Enrollment	Number Receiving Free or Reduced- Price Lunches	Percent Receiving Free or Reduced- Price Lunches
Seattle Public Schools Total	50,618	21,065	41.6%
Study Area Schools			
Lawton Elementary (K-5) 58.01	433	63	14.7%
Catherine Blaine School (K-8) 56	616	81	13.1%

Age and Disability

The Magnolia neighborhood Census Tracts (56, 57 and 58.01) has the highest percentage of individuals aged 65 or older in the study area. The highest percent of disabled individuals in the study area reside in Census Tracts 57 and 58.01 (see Exhibit 5.4-5).

Exhibit 5.4-5

Age and Disability

Area	Population	Percentage Age 65 and Older	Percentage with Disability[1]
Local Jurisdiction			
King County	1,880,029	10.5%	16.1%
City of Seattle	584,375	13.2%	17.2%
Census Tract 56.00	6,320	18.3%	11.2%
Census Tract 57.00	6,326	14.1%	12.3%
Census Tract 58.01	5,216	12.2%	13.5%
Census Tract 58.02	4,342	10.4%	10.6%
Census Tract 59.00	5,814	7.5%	11.6%
Census Tract 69.00	3,845	10.5%	13.5%

Notes: [1] Percentage of civilian non-institutionalized population 5 years of age and older.
Source: U.S. Census 2010, SF1

Minority Populations

Two measures were used to identify minority populations in the study area: ethnic and racial composition data as reported in the 2010 Census and information reported by Seattle Public Schools[20]. Results are shown in Exhibits 5.4-6 and 5.4-7 and are described below.

Ethnic and Racial Composition

The Interbay neighborhood (Census Tracts 58.01 and 58.02) had the highest percentage of minority residents in the study area. Minority populations living here included: Asian/Pacific Islander, Hispanic/Latin and mixed race populations. Census

[20] Eligibility for "Free or Reduced-Price Meals" is income and family size dependent. In 2012, a student in a family of four was eligible for free lunches if the family had an annual income below $42,643. Source: Seattle Public Schools, 2013.

Tract 57.00 had the highest percent of Asian/Pacific Islanders in the study area.

Exhibit 5.4-6

Ethnic and Racial Composition

Area	Race (all categories)					Ethnicity	Race and Ethnicity
	White[1]	Black or African American	American Indian and Alaska Native	Asian/ Pacific Islander	Other race or two or more races	Hispanic or Latino (of any race)	Total minority[2]
King County	68.7%	6.2%	0.8%	15.4%	9.0%	8.9%	35.2%
City of Seattle	69.5%	7.9%	0.8%	14.2%	7.6%	6.6%	33.7%
Census Tract 56.00	90.5%	0.8%	0.1%	4.5%	4.0%	2.6%	11.5%
Census Tract 57.00	85.2%	1.5%	0.5%	**7.7%**	5.1%	3.6%	17.1%
Census Tract 58.01	83.1%	2.6%	0.9%	**7.1%**	6.3%	**5.9%**	20.6%
Census Tract 58.02	80.5%	3.7%	0.7%	**7.4%**	7.8%	**8.2%**	24.2%
Census Tract 59.00	85.9%	2.0%	0.6%	5.9%	5.6%	4.2%	16.5%
Census Tract 69.00	87.7%	1.1%	0.3%	5.0%	5.9%	3.8%	14.7%
Within one-half mile of project alternatives[3]							
	84%	2%	0%	6%	7%	6%	19%

Source: 2010 U.S. Census Summary File 1/ U.S. Census Bureau, American Community Survey 2011 5-year table B17001
1 Includes White/Hispanic
2 Does not include non-Hispanic White
3 Calculated by EJView (URL: http://epamap14.epa.gov/ejmap/entry.html). See Appendix A.

Race and Ethnicity in Seattle Public Schools

Asian/Pacific Islanders make up approximately 8% of the school population at both Lawton Elementary and Catherine Blaine School. Hispanic/Latinos made up 8% of the school population at Lawton Elementary and approximately 7% of the school population at Catherine Blaine School.

Exhibit 5.4-7

Race and Ethnicity in Schools

School (Grades)	School Enrollment (Pct. Area Resident)	American Indian	Asian/ Pacific Islander	Black/ African American	Hispanic/ Latino	White	Multi-Racial
District Total	50,648 (N/A)	1.0%	18.1%	17.7%	12.6%	44.0%	6.6%
Study Area Schools							
Lawton Elementary (K-5)	433 (N/A)	0.7%	7.6%	1.6%	8.3%	70.4%	11.3%
(58.01)	621 (76.0%)	0.8%	8.1%	2.3%	6.8%	71.5%	10.6%
Catherine Blaine School (K-8) 56							

Limited English Proficiency (LEP)

Two measures were used to determine the presence of individuals unable to communicate effectively in English in the study area: linguistic isolation population data from the 2010 Census and LEP information collected by the Seattle Public School District. Exhibits 5.4-8 and 5.4-9 show this information.

Linguistically isolated populations are scattered throughout the study area, the highest percentage residing in Census Tract 58.02. There are few LEP students attending neighborhood schools. Two students or 0.5% at Lawton Elementary School were identified as LEP individuals.

What is LEP?
LEP or Limited English Proficiency refers to persons who are unable to communicate effectively in English. Equal access to information for these populations is protected under Title VI of the Civil Rights Act

Exhibit 5.4-8

Linguistically Isolated Populations

Area	Population Age 5 and Older	Linguistically Isolated Population Age 5 and Older[1]	Percentage of Linguistically Isolated Population
Local Jurisdiction			
King County	1,789,600	195,963	11.0%
City of Seattle	571,982	56,222	9.8%
Study Area Census Tracts			
Census Tract 56.00	5,952	71	1.2%
Census Tract 57.00	5,982	168	2.8%
Census Tract 58.01	5,049	222	4.4%
Census Tract 58.02	4,454	291	6.5%
Census Tract 59.00	7,204	128	1.8%
Census Tract 69.00	3,665	51	1.4%
	32,306	931	2.9%
Total Study Area within one-half mile of project alternatives			
	8,086	289	3.6%

Note: [1] Linguistically isolated population includes individuals living in households in which no person age 14 or older speaks only English or speaks English as a second language very well.
Source: 2011 American Communities Survey, 2011 5-year Estimate, Table 16004

Exhibit 5.4-9

Public School Students with Limited English Proficiency (October 2012)

School (Grades)	School Enrollment	Pct. Area Resident	Number Classified as having LEP	Percent Classified as having LEP
Seattle Public Schools Total	49,864	Not available	5,961[1]	12.1%
Study Area Schools				
Lawton Elementary (K-5) Hay (58.01)	433	Not available	2	0.5%
Catherine Blaine School (K-8) (56.0)	621	76.0%	14	2.3%

1. Number of students in June 2012 assessed as Limited English Proficiency. Source: Seattle Public Schools, 2012.

5 What are the community and neighborhood conditions in the study area?

Community Cohesion and Linkages

The Magnolia neighborhood is located west of the existing Magnolia Bridge. It is well defined and functions similar to an island. It is primarily residential with a main shopping area called Magnolia Village located along West McGraw Street. This business district contains retail establishments, specialty stores, professional services, and restaurants. Other features of the neighborhood include Magnolia Park, Smith Cove Park, and a marina on the south side of Magnolia.

The Queen Anne neighborhood is immediately east of the bridge and like Magnolia is primarily residential with a main business district located along Queen Anne Avenue North near the middle of the neighborhood. Buffering the neighborhood from the project area is the Southwest Queen Anne Greenbelt.

The Interbay neighborhood lies between Magnolia and Queen Anne and includes a diverse mix of industrial, light industrial, and maritime businesses. The main landholder in the study area is the Port of Seattle.

The Magnolia Bridge is one of three bridges that provides a connection between the study area neighborhoods and the larger region, as well as between local neighborhoods.

Pedestrian, Transit and Bicycle Facilities

The Magnolia Bridge has pedestrian facilities connecting the Magnolia neighborhood to Smith Cove Park and Elliott Bay Marina as well as to 15th Avenue West/Elliott Avenue West. The Elliott Bay multi-use trail connects Magnolia with downtown Seattle through Myrtle Edwards Park. The trail passes under the Magnolia Bridge along the west side of the BNSF rail yard, but there are no direct connections to the bridge. Stairs from the bridge connect to bike routes and to Smith Cove Park below. There are no elevators. Three metro bus routes (#19, #24 and #33) run along the Magnolia Bridge, with two stops along the mid-span of the bridge. These routes serve Terminal 91 businesses.

Parks and Recreation

There are nine parks near the Preferred Alternative: Ursula Judkins Viewpoint, Smith Cove Waterfront Park, Smith Cove Playfield, Smith Cove Open Water Park, Thorndyke Park and Magnolia Way West, Magnolia Park, Centennial Park, the Magnolia and SW Queen Anne Greenbelts. The Ursula Judkins Viewpoint, Thorndyke Park and Magnolia Park while open to all Seattle residents, function primarily as neighborhood parks –used by local residents. Smith Cove Park, Smith Cove Playfield and Centennial Parks are all function as city-wide facilities. Automobile access and parking is available as is park access via the Elliott Bay Trail. The Magnolia and SW Queen Anne Greenbelts serve as city open space (See Chapter 5.6 Parks, Recreational and 4(f) Resources for additional information on parks and recreational facilities).

Religious Institutions

There are a total of 22 religious institutions located in the study area. For the purposes of this report, religious institutions are defined as places of worship, meditation, or gathering places for members. These institutions are mainly located in the Queen Anne and Magnolia neighborhoods and represent a variety of religious affiliations including Christian Science, Presbyterian, Methodist, Lutheran, Catholic, Baptist, and Jehovah's Witnesses. Members of the religious institutions may live in nearby residential areas or farther away from the place of worship or gathering. No cemeteries are associated with these religious institutions. The closest cemeteries to the Magnolia Bridge are the Mt. Pleasant Cemetery and Queen Anne Columbarium located on the top of Queen Anne Hill, and the Fort Lawton Cemetery and Kiwanis Memorial Park located in north Magnolia. These cemeteries, however, are well outside the project alternative footprints.

The closest religious institution relative to the Magnolia Bridge is City Team Ministries, a mission located at 904 Elliott Avenue West. The closest church is Saint Margaret's, a Catholic church located on 14th Avenue West at West Dravus Street in the north Interbay neighborhood.

Social Institutions

A variety of community and family services and organizations are in the study area; most of these facilities are located in the Queen Anne neighborhood where project impacts would not occur.

Social Service Organizations

- Guardianship Services (Private) - 200 1st Avenue West (Census Tract 69)
- Queen Anne Foodbank (Private) - 3 West Howe Street (Census Tract 69)
- Seattle Housing Authority (Public) - 190 Queen Anne Avenue N (Census Tract 69)
- National CASA (Court Appointed Special Advocates for Children) - 100 W Harrison Street (Census Tract 69)
- Seattle Children's Home (Social Service Organization/Mental Health Services) - 2142 10th Avenue W (Census Tract 69)

In addition, one fraternal organization, the Queen Anne Masonic Temple, is located in the Queen Anne neighborhood at the corner of 4th Avenue West and West Garfield Street.

Educational Facilities

There are a total of 24 public and private schools and day care facilities in the study area (See Exhibit 5.4-10). Seattle Public Schools operates eight public schools in the study area. Attendance boundaries vary depending on the type of school. For example, the school district enrolls children in a cluster of schools for elementary education based on the location of their residence[21]. The district allows citywide enrollment for middle and high schools. The Magnolia Bridge provides one of three access routes for school buses between the Magnolia neighborhood and the rest of the city.

[21] School district statistics have been gathered as a secondary source of minority population and income data.

Exhibit 5.4-10

Educational Facilities within the Study Area

School	Grades	Address	Neighborhood
Preschools			
	Pre-School-Kindergarten	1606 5th Ave W	Queen Anne (CT
	Pre-School-Kindergarten	3116 W Smith St	
	Pre-School-Kindergarten	2836 34th Ave W	Magnolia
			Magnolia
	Pre-School-Kindergarten	4625 34th Ave W	
	Pre-School-Kindergarten	3555 W McGraw St	Magnolia
			Magnolia
Seattle Public Schools			
Lawton Elementary	Kindergarten-5	4000 27th Ave W	Magnolia
John Hay Elementary	Kindergarten-5	201 W Garfield St	Queen Anne
Frantz H. Coe Elementary	Kindergarten-5	2424 7th Ave W	Queen Anne
Catherine Blaine School	Kindergarten-8	2550 34th Ave W	Magnolia
McClure Middle School	6-8	1915 1st Ave W	Queen Anne
The Center School	9-12	305 Harrison St	Queen Anne
Ballard High School	9-12	1418 NW 65th St	Ballard
Secondary Bilingual Orientation Center	6-12	411 Boston St	Queen Anne
Private Schools			
Matheia School	Kindergarten-5	414-A W Howe St	Queen Anne
Our Lady of Fatima	Kindergarten-8	3301 W Dravus St	Magnolia
Seattle Country Day School	Kindergarten-8	2619 Fourth Ave N	Queen Anne
St. Anne School	Kindergarten-8	101 W Lee St	Queen Anne

Child Care Services

Name	Licensed Capacity	Age Range	Address	Neighborhood
The Baby Bungalow	22	12 months-3 years	1617 1st Ave W	Queen Anne
Cosmopolitan Kids	33	1 month - 5 years	19 W McGraw St	Queen Anne
Hilltop Children's Center	80	2 years - 10 years	2400 8th Ave W	Queen Anne
Kidspace	85	3 months - 5 years	3837 13th Ave W	Queen Anne
North Queen Anne Day Care	112	1 year - 10 years	3200 3rd Ave W	Queen Anne
Northwest Center Child Development Program	103	1 month - 12 years	2919 1st Ave W	Queen Anne
Whizz Kids Academy Magnolia	43	1 year - 6 years	2450 33rd Ave W	Magnolia

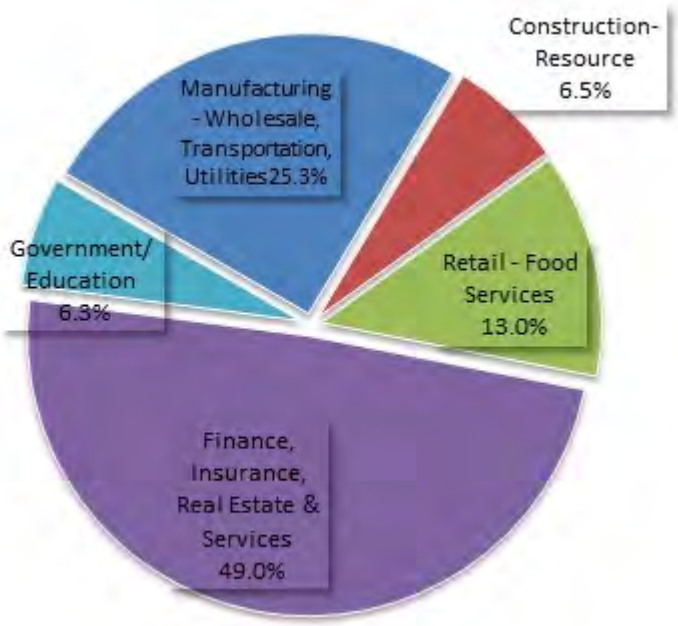
Source: See Social, Economic, and Relocation (Appendix N)

6 What are the current business and economic conditions in the study area?

Economic Conditions

According to the PSRC, more than 20,000 people were employed in the study area in 2010. Exhibit 5.4-11 shows a breakdown of Interbay employment by sector.

Exhibit 5.4-11
Employment by Sector in Interbay 2010



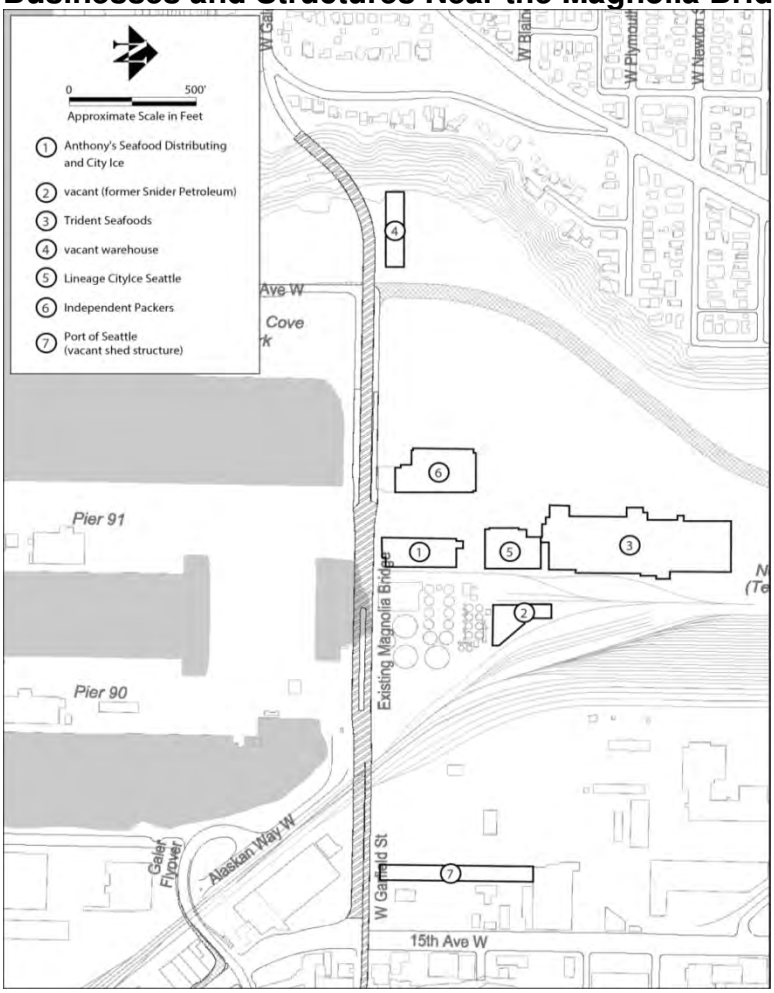
Business Conditions

There are seven maritime businesses within the study area that would be directly affected by the project, including the Port of Seattle. Exhibit 5.4-12 shows the location of some of these businesses. Additional businesses not shown are located on Piers 90 and 91 south of the bridge. These include the Pier 91 cruise terminal.

The cluster of maritime businesses on Terminal 91 within and adjacent to the project corridor includes Trident Seafoods, Lineage City Ice Seattle (cold storage), Independent Packers (seafood processing), and Anthony's Seafood Distributing.

Lineage City Ice lies at the heart of this cluster, providing the other businesses with cold storage space and bringing business to the area. Trident Seafoods is the largest of the businesses and uses a large portion of Lineage City Ice's storage capacity.

Exhibit 5.4-12
Businesses and Structures Near the Magnolia Bridge



Note: Two of the businesses (labeled #2 and #4) in the figure have recently moved. As of August 2013, the buildings were vacant.

Interviews were conducted with these businesses in 2004 and again in 2013[22]. These are listed in Exhibit 5.4-13.

Results indicated that these businesses are dependent on each other and that unobstructed access to the piers is crucial for their continued operations. In addition, employers indicated that workers in these marine businesses have a higher representation by minorities than is found in the region's population.

Exhibit 5.4-13
Terminal 91 Employer Interviews

Employer	Employees on site (% Minority)	Minority Languages Spoken	Transit Use
Anthony's	18 (Not provided)	Spanish, Nepalese	NA
Holland America	100 (Not provided)	English proficient	<10%
Independent Packers	130 (90%)	Spanish, Tagalog, Vietnamese	some use
Intercruises	160 (40%)	English proficiency required	10-20%
Lineage City Ice	45 (50%	Spanish, some LEP	10%
Trident Seafoods	>200 (86%)	Spanish, Tagalog, Vietnamese	25%

Note: Employment for Holland America and Intercruises is from May through September.

7 What is the forecast for population and household growth?

The Magnolia, Interbay, and Queen Anne neighborhoods are substantially built-out areas. Future population and housing growth is expected to occur as infill development consistent

[22] Four of the seven businesses interviewed in 2013 had been interviewed in 2004. These are Anthony's Seafood Distributing, Independent Packers, City Ice, and Trident Seafoods. Two of the six businesses interviewed in 2004 are no longer located in the project area: Snider Petroleum and Tsubota Family/Opus.

with existing zoning and City of Seattle Comprehensive Plan designations. Between 2015 and 2040, future growth in population and the number of households in the study area is expected to be less than ½% annually (Puget Sound Regional Council, Seattle, WA – 2013 Forecast Products Package: Land Use Baseline, Central Puget Sound Region). For additional information on population and household forecasts please refer to the Magnolia Bridge Replacement Project Land Use Discipline Report, Appendix J.

8 What is the forecast for business and economic conditions in the study area?

The Puget Sound Regional Council forecasts Interbay employment to grow at a 1.5% annual rate for the 2015 through 2040 thirty-year forecast period. This is slightly below the 1.6% annual rate for the City of Seattle and King County. The 2015 to 2040 forecast employment growth rates for Magnolia and Queen Anne are 1.3% and 0.8%, respectively.

9 How would the Preferred Alternative affect communities and neighborhoods?

Community Cohesion and Linkages

The completed project would not impact community cohesion or linkages. After construction, the new Magnolia would continue to serve as a connection between the Magnolia, Interbay, and Queen Anne neighborhoods, as well as a major transportation linkage between Magnolia and the rest of Seattle. No residential displacements would be made. Moving the bridge farther south would have no impact or slightly reduce noise to residential neighborhoods near the Magnolia Bridge.

Pedestrians, Bicycles, and Transit

The project would improve or maintain connections from the bridge to existing pedestrian and bicycle facilities. Sidewalks on the new bridge would be wider than the existing five-foot sidewalk and would enhance pedestrian movements. Unlike the current bridge, outside lanes would be provided for cyclists.

The existing bus stops would be replaced in the same place on the new bridge

The existing stairways would be replaced. In addition, ADA compliant structures such as ramps, elevators or lifts would be developed during the next stage of design to provide persons with disabilities access to the bridge that would be comparable to the stairways.

Parks and Recreation

The Preferred Alternative would require small amounts of land from the Ursula Judkins Viewpoint on Magnolia Bluff, and from the Smith Cove Playfield at the base of the bluff west of 23rd Avenue West, which currently provides limited views of the City. The completed project would have no impacts to views from the Ursula Judkins Viewpoint and would maintain pedestrian access and vehicle access to the park via West Galer Street. The Preferred Alternative would be located on an aerial easement over 0.59 acre of currently designated parkland at the lower Smith Cove Playfield site. The Preferred Alternative would relocate the bridge structure south of its existing location over the lower Smith Cove Playfield and would bisect the area proposed for turf activities. However, placement of proposed overhead bridge footings would not adversely affect existing or future access to planned park and recreation activities on this site. Drivers, cyclists, and pedestrians would still be able to directly access the site from 23rd Avenue West (See Chapter 5. 6 for additional information on parks and recreational facilities).

Educational Institutions

A number of educational facilities are located in the study area, including childcare facilities, preschools, and public and private schools. However, none of these are located close to the proposed roadway under the Preferred Alternative, so access to these facilities would not need to be modified. General travel patterns to and from these institutions would not change after construction of the Preferred Alternative has been completed.

Social Institutions

A number of social institutions are located in the study area. All of these are located outside the project footprint on Queen Anne. Direct access to these facilities would not need to be modified. Travel patterns to and from these facilities would not change during or after construction of the Preferred Alternative have been completed.

Right-of-Way and Easements

Construction of the New Magnolia Bridge would require the acquisition through purchase, easements, or trade of about 5.8 acres from five different owners, including Parks. This includes removal of access to Anthony's Fish House (See relocation section below). However, most of the project would be on Port of Seattle property. Exhibit 5.4-14 and Exhibit 5.4-14 show the acquisition areas.

Exhibit 5.4-14
Right-of-Way Parcels

Exhibit 5.4-15
Property Acquisitions

Parcel #	Current Owner	Acquisition Area (acres)
1	City of Seattle Parks- Ursula Judkins Viewpoint	0.18
2	Private	0.33
3	City of Seattle Parks – Smith Cove Playfield	0.59
4	City of Seattle Parks – West Yard	1.00
5	Port of Seattle	3.48
6	State of Washington	0.06
7	BNSF Railway	< 0.01
8	Port of Seattle	0.05
9	Port of Seattle	0.08
	Total	5.78

Relocations

Replacing the Magnolia Bridge would require the relocation of Anthony's Seafood Distributing This business has direct access to the existing bridge structure. However, Anthony's operates seven days a week for 362 days of the year. Therefore Anthony's would need to be relocated prior to bridge closure to maintain business. Representatives of Anthony's indicated that they prefer to relocate as close to their current location as possible. They did not indicate they would restructure their business or let go of employees at that time. If however, relocation of Anthony's resulted in a loss of jobs, a disproportionately high and adverse impact on minority and low income workers could occur.

Right-of-way acquisition would require removal of access to part of one non-residential structure in the study area (see Relocation below) – the FAA Communications building. It is unclear at this time if FAA would decommission this facility or request its relocation. SDOT and FAA are discussing the options. There are no employees located at this facility.

Business Access

The Preferred Alternative would eliminate the direct bridge access to the Terminal 91 Central Gate from the bridge ramps immediately west of the BNSF Railway crossing. SDOT and the Port of Seattle are discussing how to replace this access route.

10 How would communities, neighborhoods, and businesses be affected by construction activities?

Construction would take approximately 39 months to complete the LPA. During the first 15 months of construction automobile traffic would be maintained on the bridge. Bike, pedestrian, freight, and transit would not be allowed. For up to 32 months, buses would be detoured to West Dravus St. The existing bus stops on the bridge surface would be removed because they would no longer have access to the stairs that take pedestrians from the eastbound side to the westbound side. The existing bus stops on the bridge would cease to provide access to Piers 90 and 91 and North Bay/Terminal 91.

For approximately 17 months, the bridge would be closed to all traffic. Traffic to and from Magnolia would be detoured to West Dravus Street and West Emerson Street. Traffic between 15th Avenue West and Magnolia would detour to the remaining two connections at West Dravus and West Emerson Street. Construction detours may use surface street detour routes through Port of Seattle Terminal 91, and possibly temporary ramps to remaining sections of existing bridge or completed sections of the new bridge. Traffic to and from the marina and North Bay/Terminal 91 would be detoured to the 21st Avenue West surface street and the Galer Flyover. The detour route from the Magnolia Bluff across West Dravus Street to the intersection of Elliott Avenue West and the Galer Flyover would be approximately 1.7 miles longer than the route across the existing bridge.

For a period of approximately ten months, construction activities would be ongoing within the northern one-third of the Smith Cove Playfield. During that time, the construction area would not be available for recreational use. Existing bridge

demolition during the last two months of project construction would require the use of park property near the bridge for equipment access and a safety buffer. The northern portion of the park would be closed for recreational purposes.

For a period of about one year at the beginning of project construction, construction activities would be ongoing within a portion of the northern section of the Ursula Judkins Viewpoint. During that period, the construction area would not be available for recreational use. In addition, the parking lot would be used for construction staging and would be closed for approximately nine months.

A "disproportionately high and adverse effect" on a minority of low-income population is an adverse effect that:
-Is predominately borne by a minority and/or a low-income population or
-Will be suffered by the minority and/or low income population at an appreciably more severe magnitude than the adverse effect suffered by the rest of the population

11 Would the project have 'disproportionately high and adverse effects' on minority or low income environmental justice populations?

During construction a number of adverse impacts would occur throughout the study area. Some would have "disproportionately high and adverse effects" on minority or low-income populations. These are described below.

Increased Travel Time/Distance

Detours during construction of the Preferred Alternative would cause increased traffic and travel times throughout the corridor, especially along 20th Avenue Northwest, Thorndyke Avenue West, West Dravus Street, West Emerson Place, 21st Avenue West and the Galer Street Flyover due to traffic detours along these streets. Changes in travel time caused by detours would prevent or delay all residents within the Interbay and Magnolia neighborhoods from getting to work.

Detours along West Emerson would cause backups on roadways near Lawton Elementary School and detours along Thorndyke Avenue could have similar traffic impacts near Catherine Blaine School. This would increase travel time to and from school for children being transported by their parents or taking the school bus. Because there is a high percent of minority students at these schools the project could have temporary disproportionately high and adverse effects on minority populations. Emergency responders would follow

these detour routes. Even with the construction of an additional emergency route between 21st Ave West and Smith Cove (under consideration), emergency response time would increase by 3 additional minutes in each direction. Construction detours around and under the bridge proposed for accommodating bicycle and pedestrian traffic would result in increased travel time and distance for non-motorized travel.

Transit

Direct transit service on the bridge would be discontinued during construction. Transit routes currently stopping on the bridge and serving North Bay /Terminal 91 businesses would be detoured to West Dravus Street. This could prevent or delay transit dependent individuals (who may also be low-income individuals) from getting to work. The project could have temporary disproportionately high and adverse effects on low income populations.

Business Access

Businesses located on Terminal 91 employ a high percentage of minority and Limited English Proficiency (LEP) individuals – between 40% and 90%. While English proficiency is as a condition of employment for most of these businesses, for many of these employees English is a second language. The demographics of this employment pool include Chinese, Vietnamese, Hispanic and East African populations. Approximately 10-25% of employees take the bus and exit on bridge bus stops. They access work via the bridge stairways. The project could have temporary disproportionately high and adverse effects on these populations due to additional travel time and delays getting to work and loss of direct access to employment due to loss of transit service.

Potential disproportionate impacts on minority and low income populations could occur if Anthony's Seafood Distributing, which employs a large percentage of minority workers, would require relocation or reconfiguration of the existing building. Anthony's had 12 employees when interviewed in January 2004 and 18 employees when interviewed in August 2013.

About 75 percent of the employees in 2004 were racial or ethnic minorities. If relocation of Anthony's resulted in a loss of jobs, a disproportionately high and adverse impact on minority, LEP and low income workers could occur.

12 What measures are proposed to avoid or minimize effects to communities, neighborhoods and businesses?

During Construction

To reduce the effects of construction activities on neighborhoods and businesses, the following measures would be incorporated into construction plans and specifications.

- The contractor would be required to prepare and implement an SDOT-approved Traffic Management Plan (TMP). Detour routes would be provided and clearly marked with signs.
- The TMP would be implemented and coordinated with all emergency service organizations prior to any construction activity.
- The contractor would coordinate with utility providers prior to construction to identify conflicts and resolve the conflicts prior to or during construction.
- The contractor would be required to maintain access to businesses throughout the construction period. Anthony's Seafood Distributing would be relocated, or alternate access to its existing location would be provided, prior to loss of access to the existing Magnolia Bridge.

- Owners of Anthony's s would be compensated at fair market value without discrimination in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compensation would include relocation costs for Anthony's Seafood Distributing if this business relocates.
- SDOT and Parks would jointly develop a construction management plan. The plan would identify mitigation measures to be implemented during the construction phases to ensure public safety and continued circulation on the bicycle pathway around the Port of Seattle Terminal 91 property. Signs and detour routes would be posted on the bicycle pathway to direct cyclists and pedestrians during construction. Contract plans would identify the temporary access locations, provisions to keep construction site dirt off of area roadways, and requirements for site restoration. Public vehicle access would be maintained on 23rd Avenue West except for brief closures for overhead work or work in the roadway. At those times, detours would be made to maintain necessary access to Smith Cove Playfield, Smith Cove Waterfront Site and the Smith Cove Marina. See Chapter 5.6 and Appendix X for a discussion of impacts to park/ recreational resources and proposed measures to mitigate these impacts.
- SDOT will develop an Inclusive Outreach and Public Engagement (IOPE) plan following the City of Seattle IOPE Guide. This will include identifying the racial and ethnic composition of the project area, as well as low income, LEP, disabled and elderly populations that might be impacted by the project and developing outreach activities such as conducting public open houses, attending community meetings, producing newsletters, updating and maintaining a project website to provide information on the project schedule and construction activities.

After Construction

SDOT and Seattle Parks and Recreation entered into a Joint Development Agreement in 2007 for planning and development of the Preferred Alternative alignment bridge replacement and park facilities in the Smith Cove acquisition upper and lower sites. The joint planning effort is to ensure minimal impact upon park and transportation facilities, agree upon mitigation measures, and develop the best overall combination of public facilities at these locations.

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Chapter 5.5 Historic, Cultural and Archaeological Resources/Section 106

To complete the environmental review of a project, the project must demonstrate that it is in compliance with Section 106 of the National Historic Preservation Act (NHPA). This chapter summarizes the Section 106 evaluation that was completed for the project. The detailed analysis can be found in the Historic, Cultural and Archaeological Resources Discipline Report, Appendix I.

1 What are cultural resources?

The term "cultural resources" includes archaeological sites, Native American and traditional cultural places, historic buildings and structures, historic districts, and planned landscapes. The National Historic Preservation Act of 1966 was passed to recognize the importance of these resources to our national, regional, and local culture.

Section 106 of the National Historic Preservation Act requires federal agencies to account for the effects of their undertakings on historic properties and cultural resources and to afford the Advisory Council on Historic Preservation an opportunity to comment. FHWA and WSDOT also seek to ensure that each tribe has the opportunity to identify and address any concerns regarding identification and evaluation of cultural resources and potential effects of the undertaking upon such resources.

Archaeological resources are places where past peoples have left physical evidence of their occupation. Archaeological sites may include deposits of debris such as artifacts, food remains (shells and bones), or the ruins of dwellings or other structures.
Historic properties (per Section 106) include prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places; artifacts, records, and remains that are related to and located within these National Register properties.

2 How are impacts to cultural resources evaluated under Section 106?

- The first step in evaluating cultural resources is to develop an Area of Potential Effect (APE) then consult with the State Department of Archaeology and Historic Preservation (DAHP) to finalize the APE.
- Once an APE is established, information is gathered to decide if there are any cultural resources in the area.
- If cultural resources are found an evaluation (by a historic preservation professional and/or archaeologist) is conducted to determine how those cultural resources might be affected.
- If it is found that a project would have an adverse effect on a cultural resource, measures to avoid or reduce harm are developed.
- DAHP is consulted on these measures. Typically agreement is reached on the range of project impacts and ways to minimize them.

What is an APE?
An APE (Area of Potential Effects) is the geographic area within which an undertaking may directly or indirectly cause alterations to the character or use of historic properties.

3 What is the Magnolia Bridge Replacement Project Area of Potential Effect?

An APE was established in consultation with WSDOT, FHWA, interested tribes, DAHP, the City of Seattle Office of Historic Preservation, and other consulting parties[23]. The APE was determined to be 100 feet on each side of the Preferred Alternative footprint, the Admiral's House property, Piers 90 and 91 and the northernmost building on Pier 89 (see Exhibit 5.5-1).

[23] Tribes contacted included Federally recognized Tribes (Suquamish Tribe, Snoqualmie Tribe, Tulalip Tribes, Muckleshoot Tribe, Yakama Indian Nation), non-Federally recognized Tribes (Duwamish Tribal Organization, Kikiallus Indian Nation). Only the Snoqualmie Tribe consulted on the APE. The Tribe requested the APE be modified and that a paid Tribal Monitor be allowed to participate in archaeological monitoring during construction.

4 What historic resources are located within the Area of Potential Effect?

There are two historic properties in the Magnolia Bridge Replacement Project APE. One structure, the Admiral's House (labeled #3 on Exhibit 5.5-1), has been listed on the federal National Register of Historic Places (NRHP). One structure (labeled #9 on Exhibit 5.5-1), a warehouse formerly occupied by Snider Petroleum, is eligible for listing in the NRHP.

What is the National Register of Historic Places (NRHP)?

The National Register of Historic Places (NRHP) is the United States federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation.

The Admiral's House

The Admiral's House was constructed in 1944 by the U.S. Navy to house the commanding admiral and his family, and serve as a center for official government entertaining (Sheridan 2013). The Admiral's House is listed in the NRHP, and designated as a Seattle Landmark (April 2013). It is significant for its association with the U.S. Navy and its role in Seattle from World War II until the 1990s. The Admiral's Residence is also significant for its embodiment of the Colonial revival architecture.

What is a Seattle historic landmark?

In Seattle, a building, object, or structure may be eligible to be listed as a historic landmark if it is more than 25 years old and the Seattle Landmarks Preservation Board determines it is of historic significance. The Admiral's Residence was listed as a Seattle Landmark in 2013.

Warehouse, Port of Seattle

The warehouse building (#9 in Exhibit 5.5-1) was constructed in 1929 for the Texas Company Refinery. The warehouse provided support to the U.S. Navy during World War II and the Korean and Vietnam wars. In the 1970s, it was declared a surplus property and transferred to the Port of Seattle along with most of the Terminal 91 property. In 2005, the building was recommended as eligible for listing in the NRHP under Criterion A for its association with Seattle's history. Since that time, many of the buildings and storage tanks associated with the refinery have been demolished.

5 What archaeological resources are located within the Area of Potential Effect?

Cultural resources staff conducted field investigations in September 2003 to identify archaeological resources along each alternative alignment and to identify significant historic structures in the project area as part of the Section 106 analysis.

Subsurface archaeological investigation and testing was also completed in February and March 2006 at sites along the project alignment. No known archaeological sites were identified within the study area. (For additional information see 2006, *HRA, Archaeological Investigations for the Magnolia Bridge Replacement Project Seattle, Washington, See Appendix I*)

6 Would any cultural resources be affected by the project?

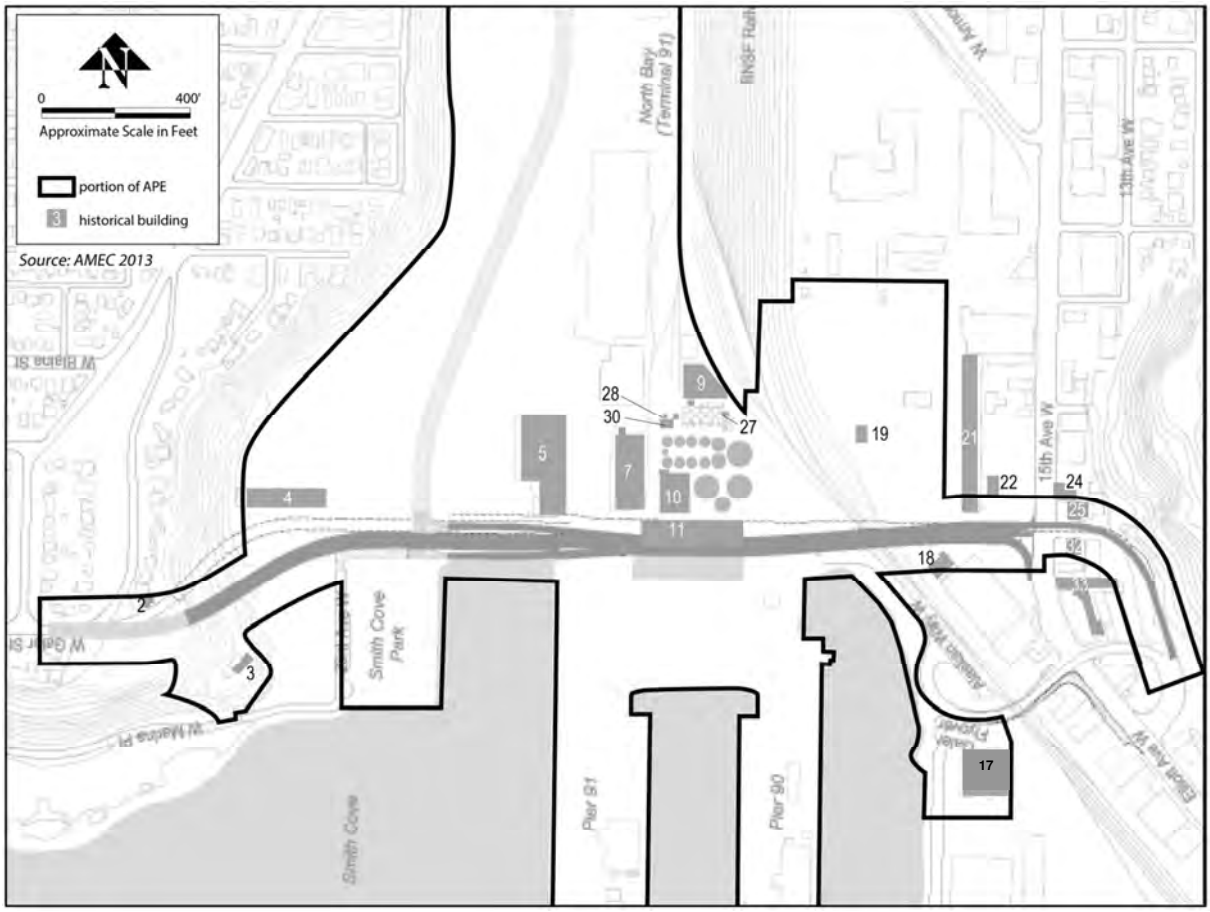
The FHWA has determined that the construction of the Preferred Alternative would modify the character-defining attributes of the Admiral's House and have an adverse effect. A Memorandum of Agreement documents this finding and sets out stipulations for protection of the property and mitigation of construction effects.

The extent of archaeological resources below the ground surface is unknown. None were discovered during the investigations described in Appendix I. However, due to the location of the project near the historic shoreline it is possible that archaeological finds may be encountered during construction.

Construction activities would be temporary and would not have substantial long-term access, aesthetic, air quality, noise, or water quality/quantity related effects on any Section 106 property.

Exhibit 5.5-1

Historic Resources in the APE



Note: Exhibit 5.5-1 includes a number of buildings that were evaluated in 2006. Since that time, these buildings have either been removed or determined not to be eligible for listing on the National Register of Historic Places.

Exhibit 5.5-2
Shoreline at Smith Cove - early 1930s

Looking southwest from Magnolia Bluff *Source: Museum of History & Industry, Seattle*

7 What measures are proposed to avoid or minimize effects to historic, cultural and archaeological resources?

During construction

A Memorandum of Agreement (MOA) was signed in 2011 between the Federal Highway Administration (FHWA), State Historic Preservation Office (SHPO), Washington Department of Transportation (WSDOT), City of Seattle, and the private owner to address the adverse effects on the property. It stipulates protocols that must be followed to mitigate the impacts of the Magnolia Bridge Project during and after construction.

To mitigate impacts to the Admiral's House, the FHWA has executed a Memorandum of Agreement (MOA). The MOA requires a pre-construction survey of the structural condition of the house, garage and access road, and a geotechnical investigation of the stability of the hillside on the property. Before construction may begin, repairs must be competed and storm windows installed to prevent dust and dirt from entering interior spaces and to reduce interior noise. If required, slope stability mitigation measures would be performed. Additional mitigation measures in the MOA can be found in Appendix B

of the Historic, Cultural and Archaeological Discipline Report (Appendix I).

No specific construction mitigation measures are identified for the warehouse structure (building #9) on the Terminal 91 property. The building is currently (Spring 2014) vacant. When final design continues and construction dates are known, specific measures may be proposed.

A Construction Monitoring Plan would be developed prior to the start of construction that would outline monitoring protocols and identify areas of sensitivity for archaeological monitoring of select pre-construction and construction tasks. The development of an Inadvertent Discovery Plan (IDP) is also recommended. If significant archaeological resources are identified during construction, mitigation for potential impacts should be addressed following the protocols of the IDP. Should any prehistoric or historic cultural remains be discovered during the demolition or construction, all work in the area of the discovery shall cease and the IDP should be followed.

Prior to, and during construction, training would be provided to all on-site construction personnel to assist in the identification of cultural resources and to help them understand measures to avoid and protect historic properties.

A Traffic Management Plan (TMP) would be prepared to manage construction traffic in the vicinity of the project. The plan would identify mitigation measures to be implemented during the construction phases to ensure protection of public safety. The Joint Development Agreement could require that replacement parkland be established and open to the public prior to the beginning of bridge construction.

Before construction, a MOA signed by the City of Seattle, WSDOT, DAHP, FHWA, and any affected tribes would be prepared, identifying mitigation measures that would be carried out if archaeological resources are discovered during construction. If archaeological sites discovered during

construction are determined to be eligible for the NRHP and preservation of the resource in place is warranted, the Section 4(f) process would be expedited and the resource review process, including consultation with other agencies, would be shortened, as appropriate.

After Construction

Right of way or an easement would be acquired for construction and operation of the New Magnolia Bridge across the NRHP-listed Admiral's House property. An easement would contain provisions related to bridge maintenance access requirements and the protection of the historic characteristics of the Admiral's House property. The easement would be acquired when construction dates are known.

Chapter 5.6 Parks, Recreational and 4(f) Resources

To complete the environmental review, the project must demonstrate that it is in compliance with Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966. This chapter summarizes the 4(f) evaluation that was completed for the project. The detailed analysis can be found in the Section 4(f) Evaluation in Appendix L.

Smith Cove Park waterfront site entry

1 What is Section 4(f)?

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 prohibits the Federal Highway Administration (FHWA) from approving transportation projects that use land from important public parks, recreation areas, wildlife refuges, or land containing historical sites of local, state, or federal significance unless (a) there is no feasible and prudent alternative, and (b) the project includes all possible planning to minimize harm to these resources (49 USC 303). If resources protected by Section 4(f) are involved in a project's planning, a determination whether there is a "use" of those resources is required.

What is "use" of a resource?

- "Use" of resources protected by Section 4(f) takes place when the following conditions are present:
- Resource land is permanently incorporated into the transportation project.
- There is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose as determined by the criteria in §774.13(d), which is a subsection of Section 4(f).
- There is a constructive use of a Section 4(f) property as determined by the criteria in §774.15 (another subsection of Section 4(f)).

Constructive use occurs when the transportation project does not incorporate land from a Section 4(f) resource, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the resources are substantially diminished.

2 What are Section 4(f) resources?

Section 4(f) resources are significant publicly owned parks and recreation areas and wildlife and waterfowl refuges. Parks and recreation areas must be open to the public to qualify, but wildlife and waterfowl refuges may restrict access to preserve

quality habitat. Historic sites of national, state or local significance that are on or eligible for inclusion on the National Register of Historic Places qualify as Section 4(f) properties regardless of ownership or public access.

3 How are impacts to Section 4(f) resources evaluated?

To evaluate potential effects on Section 4(f) resources, SDOT followed FHWA policy guidance and regulations in 23 CFR 774, which defines the regulatory requirements to comply with Section 4(f).

4 Are there Section 4(f) resources in the project area?

There are eleven properties in the vicinity of the project that qualify as 4(f) resources (see Exhibit 5.6-1). They are listed below and include nine parks and recreational facilities and two historic properties. The parks and recreational facilities are:

- Smith Cove Park waterfront site - a City owned park located on Elliott Bay near the west end of the existing Magnolia Bridge. This park has 1.1 acres of public waterfront access and a picnic area east of 23rd Avenue West near West Marina Place. On-street parking is available along 23rd Avenue West.
- Smith Cove Playfield - a 4.9 acre City owned park located west of 23rd Avenue West at the base of Magnolia Bluff. It includes a level turf area/play field area. It accommodates passive and non-organized park activities. On-street parking is available along 23rd Avenue West.
- Ursula Judkins Viewpoint - a 2.4 acre City owned park located on the south side of West Galer Street immediately west of the Magnolia Bridge. The upper, northwest portion of Ursula Judkins Viewpoint has the highest elevation in the project area and has a partial view of Elliott Bay. Trees and shrubs along the south

Ursula Judkins Viewpoint view to the east

border of the park property block open views to the south from much of the park area. From the east portion of the park, near the parking area, the view is open to the east toward Queen Anne Hill and the north area of downtown Seattle.

- Smith Cove Open Water Park - a 14.04-acre tideland area south of the Smith Cove Playfield and West Marina Place. These city-owned lands are approximately 440 feet wide and extend approximately 1,500 feet into Elliott Bay. They provide fish and wildlife habitat. There is little public access. No other facilities or amenities are associated with the tideland parcel.
- Centennial Park - an 11-acre linear park owned by the Port of Seattle located along the east side of the Smith Cove Waterway and along Elliott Bay in the vicinity of Terminal 86 Grain Facility. A bicycle/pedestrian facility, the Elliott Bay Trail, runs through the park and allows connections from the West Galer Flyover and the trail.
- Thorndyke Park and Magnolia Way West - a 1.4 acre City owned park located between Thorndyke Avenue West and Magnolia Way West, just north of the bridge. Thorndyke Park is a moderately used neighborhood park and does not contain any formal recreation facilities. Magnolia Way West owned by Parks runs from the northern edge of the park southward and connects with West Galer Street. It provides southern access to both Thorndyke Park and neighborhood south of the park. Magnolia Way West, West Galer Street and their intersection are part of the City of Seattle boulevard system.[24]

[24]A boulevard is defined by Parks as "a linear park, established by ordinance, usually an extension or expansion of a dedicated street(s) which continues to serve as a right-of-way in addition to being park land." Seattle Department of Parks and Recreation Non-Park Uses of Parks Lands Policy (City Council Resolution #29475, October 1996).

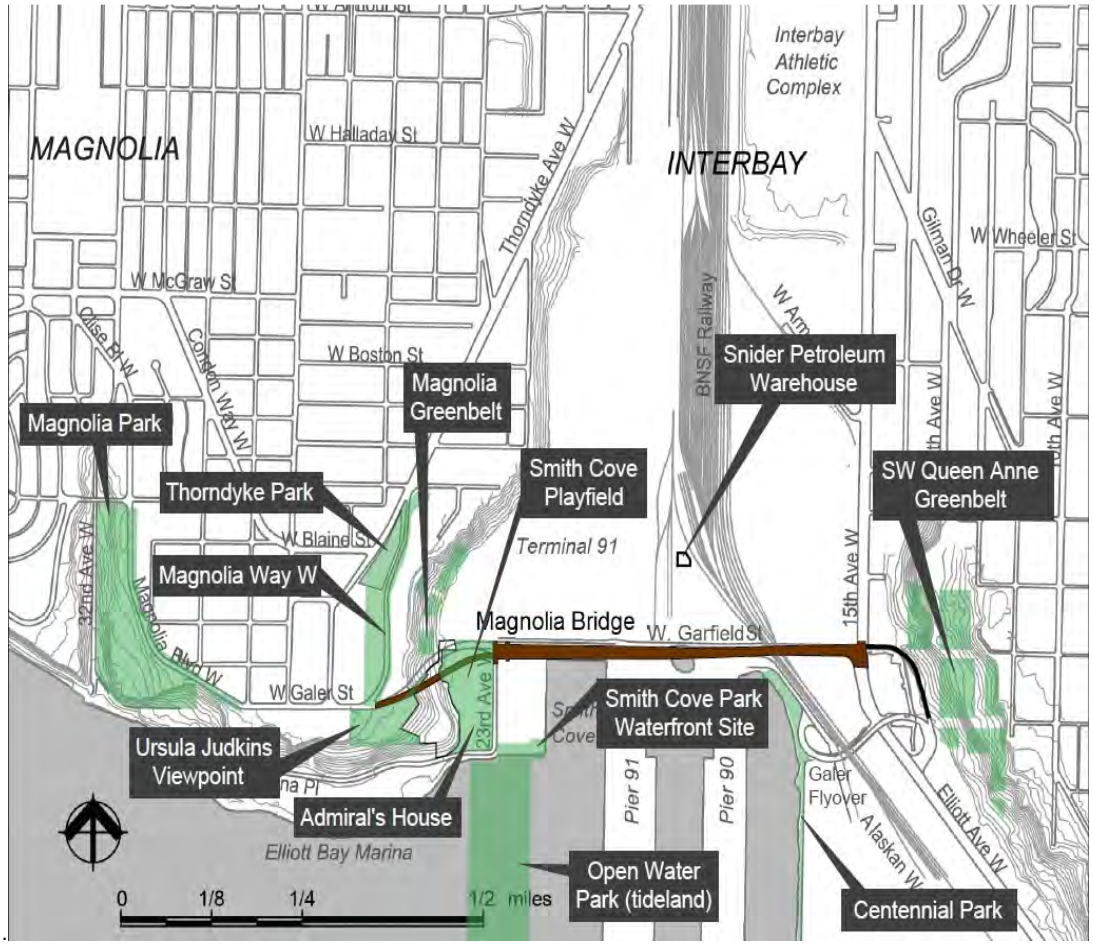
- The Magnolia Greenbelt[25] consists of 2.7 acres of Parks owned land along the eastern bluff of Magnolia between W Howe St & Dartmouth Ave W[26]. The greenbelt serves as public open space. However, there is no public access to or through the greenbelt
- Magnolia Park - a 12.1 acre park owned along the western bluff of Magnolia located at1461 magnolia Blvd West. It is approximately ½ mile west of the Magnolia Bridge, provides a magnificent view of Puget Sound, and includes picnic facilities, restrooms, paths, a play area and many beautiful trees. Access to the park is from Magnolia Blvd. A parking lot lies adjacent to the eastern boundary of the park.
- SW Queen Anne Greenbelt - a 35 acre greenbelt on Queen Anne Hill east of the Magnolia Bridge ramp. A bicycle/pedestrian trail runs through the greenbelt.

[25] Urban greenbelts are a part of the Parks, Recreation and Open Space Plan adopted in 1957. Greenbelts are defined as areas under public ownership or control or private ownership with some form of public interest or control left primarily in its natural state for a variety of purposes.

[26] The Magnolia Greenbelt consists of the 10 Parks owned parcels (3547900435, 3547900735, 3547900720,3547900705,35447900695, 3547900680, 3547900650, 2325039077, 2325039024, and 2325039027). Please see Appendix E for additional information.

Exhibit 5.6-1

Parks, Recreational, and Section 4(f) Resources



Admiral's House

The historic properties are,

- The Admiral's House, "13th Naval District" located along the bluff above Smith Cove and south of the Magnolia Bridge. This two-story building, built in 1944, is 8,500 square feet in size and is accessed via a gated private driveway that passes under the existing bridge. The property is 3.89 acres. The building and property are listed in the National Register of Historic Places (NRHP) and is a designated City of Seattle Landmark. The Admiral's House was sold to a private party in 2013.
- Building 9 is Port of Seattle warehouse building located about 465 feet north of the Magnolia Bridge and west of the BNSF Railway yard. The warehouse was built for the Texas Company ("Texaco") oil refinery in 1925 and has a building footprint of approximately 15,000 square feet. The building is considered eligible for listing in the NRHP.

See Chapter 5.5 and the Appendix I for more detail on historic, cultural and archaeological resources.

What are the differences between Section 106 described in Chapter 5.5 and 4(f) for historic properties?

Section 106 considers project effects to "historic properties." Section 4(f) considers whether there is a use of "historic properties."

Section 4(f) applies to the actual use or occupancy of a historic site, while Section 106 involves an assessment of adverse effects of an action on historic properties.

The Section 106 process is integral to the Section 4(f) process when historic sites are involved. The Section 4(f) process is not integral to the Section 106 process.

5 Would local parks and recreational area Section 4(f) resources be affected by the project?

The project would affect three local parks and recreational area Section 4(f) resources: Ursula Judkins Viewpoint, Smith Cove Playfield and the intersection of Thorndyke Park and Magnolia Way West.

The project would locate the new bridge and west approach on and over portions of the Ursula Judkins Viewpoint and Smith Cove Playfield. This would affect Ursula Judkins Viewpoint and the Smith Cove Playfield. However, the Seattle Department of Transportation and the Department of Parks and Recreation (Parks) have entered into a Joint Development Agreement for joint planning and development of the park property for transportation use by the Preferred Alternative and recreational uses. Land occupied by the existing bridge and not needed for the new bridge would be transferred to Parks. FHWA has determined that impacts to both the Ursula Judkins

Viewpoint and Smith Cove Playfield would be '*de minimis'* and would not affect the activities, features or attributes of these properties that qualify them as Section 4(f) resources. FHWA has also determined that the impacts to the intersection of Magnolia Way West and West Galer Street would constitute a '*temporary occupancy*' and would not impede access to Thorndyke Park or degrade other portions of the site that deem it a 4(f) resource. Seattle Parks has concurred with these findings. Impacts to these resources are described below.

Ursula Judkins Viewpoint

The West Galer Street approach to the new bridge would be realigned to meet current design standards for visibility around curves and barriers and to allow the existing bridge to remain open to traffic while the new bridge is built immediately to the south. This would require about 0.18 acre to be acquired from the 2.4-acre Ursula Judkins Viewpoint. This area is currently occupied by a portion (about 0.02 acre) of the Viewpoint public parking lot, a restricted site for aviation navigation equipment, and some inaccessible area on the hillside south of the existing Magnolia Bridge. The remaining portions of the Viewpoint would continue to provide views of the city and waterfront. The aesthetic attributes and related activities associated with the upper site would, therefore, not be substantially impaired or diminished.

The new bridge alignment would move southward 0.18 acres into the park. This would increase noise levels to a between 67-70 dBA about six feet into the park. This is the noise level considered an adverse impact on park land. However, this is only a slight increase from the existing condition of 66-69 dBA. The slight increase in the park area experiencing a 66 dBA or higher noise level would not substantially affect park users.

Smith Cove Playfield

The 4.9-acre Smith Cove Playfield site has access from 23rd Avenue West south of Magnolia Bridge. The Preferred Alternative would cross over the north portion of the property

with a single, 360-foot long span with two bridge columns just inside the park east and west fences. Because the piers, columns and bracing, of the existing bridge are closely spaced, the land under the bridge is not currently usable for park and recreation purposes and is fenced along the south side of the bridge columns. Removing the existing bridge would free up some of this land for park use by removing six sets of bridge columns and the low-level bracing on the park property. Because of its configuration, the new bridge would require an additional 0.19 acres of park land for right-of-way compared to the 0.40 acres the existing bridge occupies.

There would be no change in the area of the park exposed to noise levels of 66 dBA or more compared to the existing bridge. This is the noise level considered an adverse impact on park land.

Because the project would not create additional traffic capacity for access to Magnolia, no additional demand on park and recreation facilities would occur.

Thorndyke Park and Magnolia Way West (Intersection of Magnolia Way West/West Galer Street)

Public access to Thorndyke Park is currently along Magnolia Way West from West Galer Street in the south and Thorndyke Avenue West in the north. The intersection of Magnolia Way West/West Galer Street may be closed for a period of 1-2 months for reconstruction of the roadway.

6 Would historical Section 4(f) resources be affected by the project?

The FHWA has determined that the construction of the Preferred Alternative would modify the character-defining attributes of the Admiral's House and have an adverse effect. A Memorandum of Agreement documents this finding and sets out stipulations for protection of the property and mitigation of construction effects. See Chapter 5.1 and Appendix L for more information on the project's impacts to historical Section 4(f) resources.

7 How would Section 4(f) resources be affected during construction?

For a period of approximately four months, construction activities would be ongoing within the northern one-third of the Smith Cove playfield site and within portions of the Ursula Judkins Viewpoint. During that period, the construction area would not be available for recreational use. In addition, noise, dust, and visual effects from construction would make use of the remaining park land to the south less desirable for potential park users. This would require the area immediately south of the existing bridge which would be needed for equipment access and to maintain a safe distance from the demolition.

Construction would be required on and over portions of the Admiral's House property. The area along west boundary of the property would require temporary occupancy for construction equipment for installation of drilled shaft foundations and the abutment, and for falsework for some portion of the bridge superstructure. There would be some ground disturbance along the east property line for construction of a column foundation for the Preferred Alternative.

Bridge demolition may have short-term noise and dust impacts on the adjacent Smith Cove Playfield site, the Ursula Judkins Viewpoint, and the Admiral's House property. The contract for bridge demolition would specify demolition procedures and noise and dust abatement measures to lessen and mitigate impacts.

8 What measures are proposed to avoid or minimize effects to parks, recreational and Section 4(f) resources?

During construction

Parks

A construction management plan would be prepared to manage construction traffic in the vicinity of the project. The plan would identify mitigation measures to be implemented during the construction phases to ensure protection of public safety.

The Joint Development Agreement could require that replacement parkland be established and open to the public prior to the beginning of bridge construction.

Historical Sites

To mitigate impacts to the Admiral's House, the FHWA has executed a Memorandum of Agreement (MOA). The MOA requires a pre-construction survey of the structural condition of the house, garage and access road, and a geotechnical investigation of the stability of the hillside on the property. Before construction may being, repairs must be competed and storm windows installed to prevent dust and dirt from entering interior spaces and to reduce interior noise. If required, slope stability mitigation measures would be performed. Additional mitigation measures in the MOA, including landscaping restoration, are available in the Appendix I, Historic, Cultural and Archaeological Discipline Report. The Admiral's House was sold in 2013. The terms and conditions of the MOA were attached to the deed.

After Construction

Right of way or an easement would be acquired for construction and operation of the New Magnolia Bridge across the NRHP-listed Admiral's House property. An easement would contain provisions related to bridge maintenance access requirements and the protection of the historic characteristics of the Admiral's House property. The easement would be acquired when construction dates are known.

Chapter 5.7 Public Services and Utilities

This chapter summarizes information on local public service and utility providers in the project area, potential impacts of the project on these service providers and proposes mitigation measures. Additional information and analysis can be found in the Public Services and Utilities Discipline Report in Appendix O.

Fire Station 41 in Magnolia

1 Why are impacts to public services and utilities being considered?

Local governments, utility districts, and occasionally private companies provide public services and utilities to the residents within their service boundaries. Public services include fire and police protection and schools. Utilities include electricity, natural gas, water, wastewater and stormwater collection, and telecommunications. If a project has the potential to affect public services and utilities by increasing demand beyond the capability of service providers or by disrupting service, both the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA) require that public services and utilities be considered in an environmental analysis. Construction may require relocation or adjustment of utility lines or facilities, or may interfere temporarily with police, fire, and emergency.

Please refer to the Magnolia Bridge Replacement Public Services and Utilities & Traffic and Transportation Discipline Reports in Appendices M and O for a complete discussion of public services and utilities analysis.

2 What are the boundaries of the project study area?

For purposes of this analysis the study area includes the portion of the City of Seattle that encompasses the Magnolia, Interbay, and Queen Anne neighborhoods and focuses on the local police precincts, fire stations, schools and utilities that serve those areas.

3 How were public services and utilities identified and analyzed for the Magnolia Bridge Replacement Project?

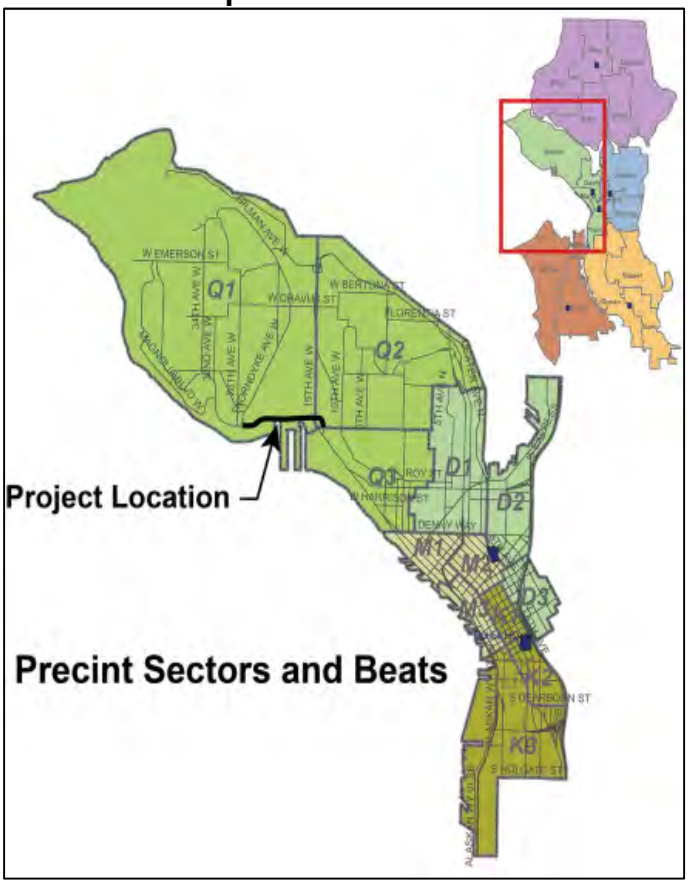
Public services were identified by field investigations, reviews of Internet web sites maintained by the service providers, and direct contacts and interviews with the service providers. These service providers were given descriptions of the project and asked to describe service issues and planned facility and service improvements. Utility plans and maps were reviewed and utility providers were contacted. The focus of the utility inventory was to identify the major utilities so they could be avoided, if possible, or relocated with minimal service interruptions.

4 What public services are located in the study area?

Police Services

The Seattle Police Department (SPD) provides public safety protection to businesses and residents within the City of Seattle.

Exhibit 5.7-1
Seattle Police Department West Precinct



Note: The West Precinct green area in Exhibit 5.7-1. It is divided into 4Ssectors – each a different shade of green. The northernmost green area is Queen Sector
Note: The Queen Sector includes Beats Q1, Q2 and Q3. A beat is an area patrolled by an individual officer.
Source: http://www.seattle.gov/police/images/map/West_Print.pdf

The SPD West Precinct (Exhibit 5.7-1) provides police protection in the study area, which includes the Magnolia, Interbay, and Queen Anne neighborhoods. The West Precinct runs 24-hour patrols and has a full range of emergency response and public safety services to prevent crime and enforce the law. The study area is part of the West Precinct's Queen Sector.

Each year the SPD publishes an annual report that summarizes activities of the Department. In 2012, Officers in the West Precinct responded to 39,547 calls for service in the Queen

Sector; of these, 71 violent crimes and 567 property crimes occurred in the Magnolia/Interbay area[27].

Fire and Emergency Medical Services

The Seattle Fire Department provides fire and emergency medical protection services in the City of Seattle. Four fire stations directly serve the Magnolia, Interbay, and Queen Anne neighborhoods. They are listed in Exhibit 5.7-2.

Exhibit 5.7-2
Fire Stations in the Study Area

Station	Neighborhood	Address	Fire Units
41	Magnolia	2416 34th Ave. W.	one engine company
20	Queen Anne	3205 13th Ave. W	one engine company
8	Queen Anne	110 Lee Street	one engine company; one ladder unit
18	Ballard	1521 NW Market St.	one engine company one ladder unit; one medic unit; one battalion chief

Note: Station 20 would relocate to 15th Avenue W and W Armour Street in 2014.

Harborview Medical Center, located in downtown Seattle, also services the study area with two medic units. The personnel at each of these facilities provide emergency and medical services within the study area. The location of these facilities is shown in Exhibit 5.7.3.

Emergency Response Routes

Emergency response routes have been established for the fire stations and Harbor View medic units serving residents and businesses within the study area. Exhibit 5.7-4 illustrates the location of these routes.

[27] Violent crimes include homicide, rape, robbery and aggravated assault. Property crimes include burglary, larceny and vehicle theft.

Exhibit 5.7-3

Public Facility Locations

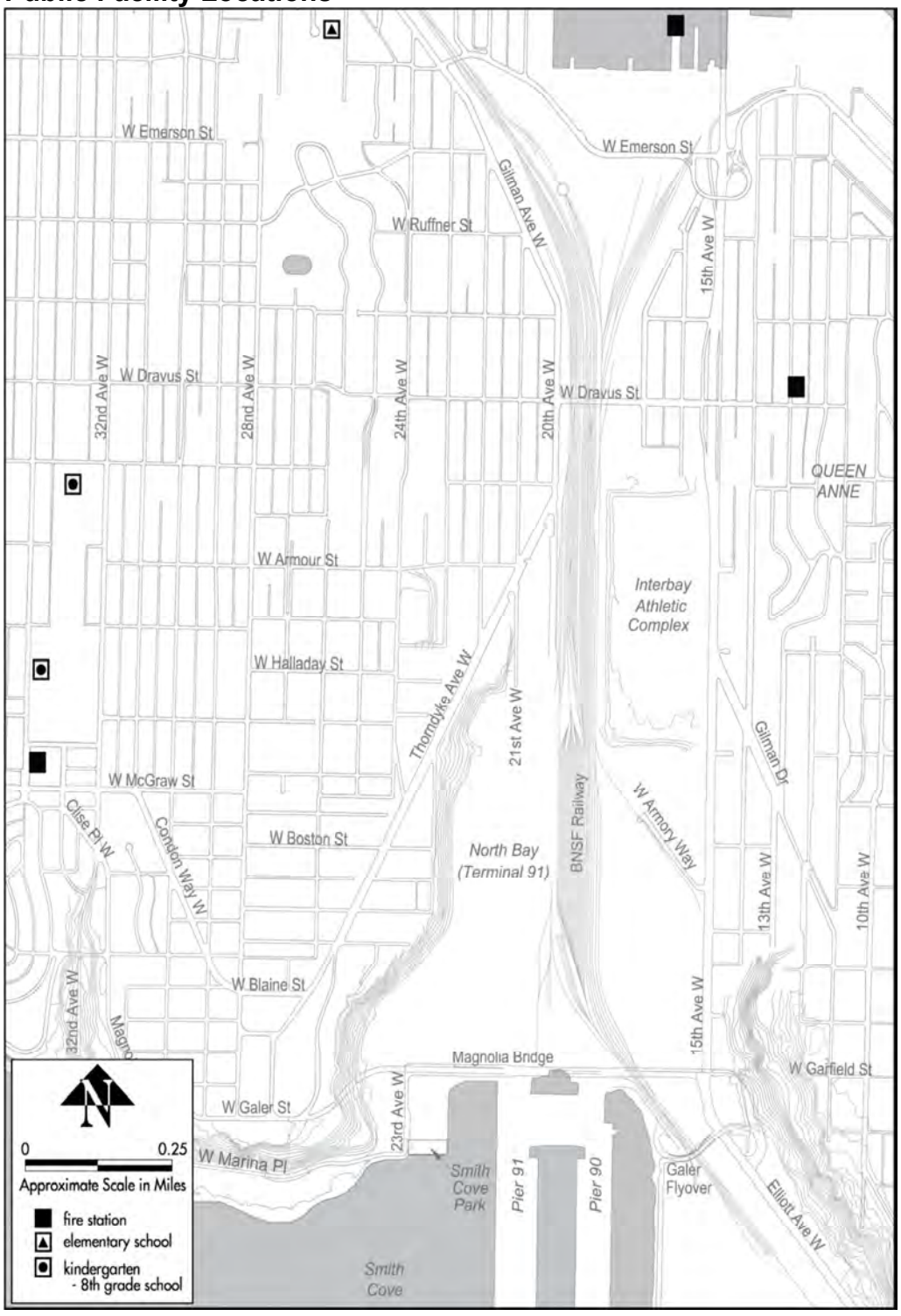


Exhibit 5.7-4

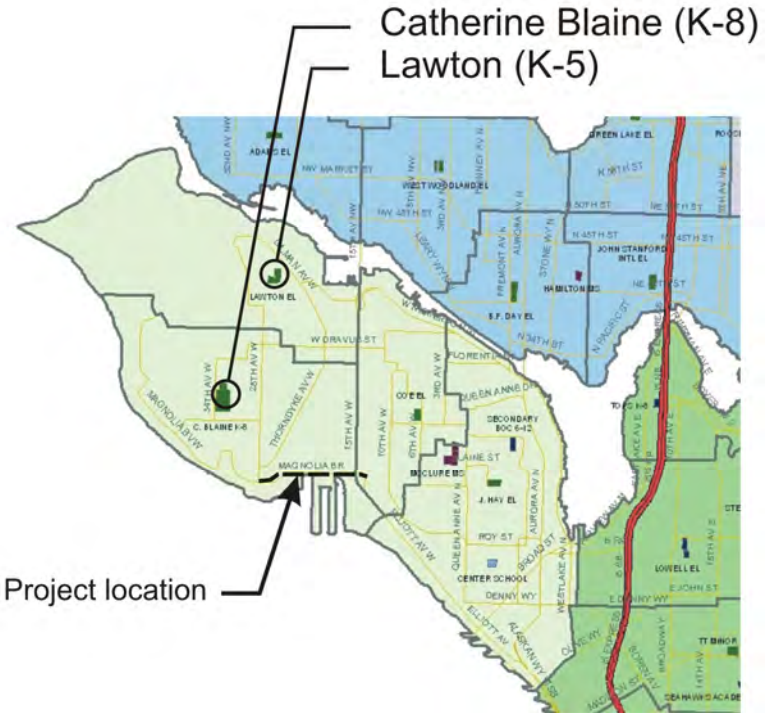
Emergency Vehicle Routes

Public Schools

The Seattle Public School District operates nine public schools in the study area. This school district enrolls children in a cluster of schools for elementary education based on the location of their residence. Exhibit 5.7-5 shows the two public schools in the Magnolia neighborhood. Catharine Blaine School serves children in kindergarten through 8th grade; Lawton Elementary serves kindergarten through 5th grade.

Two bus routes transport elementary school children through the study area. The Magnolia Bridge is lightly used for school bus service and West Dravus Street is also utilized.

Exhibit 5.7-5
Magnolia Public Schools



Transit

The Magnolia Bridge is used by King County Metro public transit routes #19, #24, and #33. These routes serve the Terminal 91 businesses including the Pier 91 cruise terminal. The Magnolia Bridge connection with 15th Avenue West/Elliott Avenue West is a transfer point offering connections to north-south bus routes Rapid Ride D line and #32.

The project would provide mid-bridge bus stops and would work with King County Metro to retain current bus routes. The mid-bridge bus stops would serve Terminal 91 and provide access to 23rd Avenue West. Transit service is more fully discussed in Chapter 5.1 – Traffic and Transportation the Traffic and Transportation Discipline Report in Appendix O).

5 What utilities are located in the study area?

The study area is served by both public and privately-owned utilities They include water, sanitary sewer and stormwater drainage, wastewater treatment, natural gas, electricity, telecommunications, and garbage and recycling services (See Exhibit 5.7-6). Port utility lines are interspersed throughout the Terminal 91 complex. Public utility main lines are generally located within existing street rights-of-way.

Exhibit 5.7-6
Utility Providers in the Study Area

Utility Provider	Service
Seattle Public Utilities	water sanitary sewer storm drains garbage and recycling
Seattle City Light	electricity
Puget Sound Energy	natural gas
King County	regional wastewater treatment
CenturyLink	telecommunications

More detail on individual utilities is provided in the Public Services and Utilities Discipline Report in Appendix M.

6 Would public services and utilities be affected by the project?

Public Services

The New Magnolia Bridge would not create additional traffic capacity for access to Magnolia and would not induce population or housing growth in the study area. The Preferred Alternative would provide similar access and maintain the same travel patterns as provided by the existing bridge. Emergency vehicle access and bus routes would not be affected. No additional demand for public services would occur. Emergency vehicle access and bus routes would not be affected. The completed project would not displace any public services.

Utilities

The Preferred Alternative while not creating additional demand for utility service within the study area due to development,

would impact utilities in the area. The bridge in its new configuration would result in permanent relocation of utility infrastructure; these relocation impacts are described below under "Construction Impacts" described below. To comply with the Seattle Stormwater and Drainage Code, changes stormwater would improve stormwater quality due to drainage improvements that would be installed as part of the project.

7 Would public services and utilities be affected by construction of the project?

Public Services

During project construction, the existing bridge and the access to southern Magnolia it provides would need to be closed for a period of time while the bridge connections are completed. The length of the closure is estimated at 14 to 20 months. During the bridge closure, increased traffic on West Dravus Street, West Emerson Place and detour routes to and from Magnolia would result in longer emergency response times and increased travel time for school buses using these routes. Additional information on detours during construction is provided in Chapter 5.1 – Traffic and Transportation and the Traffic and Transportation Discipline Report in Appendix O.

Construction impacts to fire protection and emergency medical services could include a slight increase in service calls for construction-related injuries. The Seattle Police Department could experience an increase in calls for service related to construction site theft or trespassing.

Construction employees are expected to be drawn from the Seattle area. Therefore, no school enrollment increases associated with families of construction employees would occur.

Utilities

The project would not cause permanent interruptions to any utility services. There would be no temporary interruptions to major utilities such as power distribution lines and trunk sewers.

Temporary service interruptions to utility services such as electric power, gas, and communications during the construction period would be unavoidable.

Telecommunications cables serving Magnolia are carried on the existing bridge. These would be relocated by the owner prior to bridge demolition to minimize disruptions.

Construction would result in temporary relocations of utility service connections to allow the construction of the bridge structure, ramps, foundations, and walkways. Demolition of the existing bridge would result in the permanent demolition, abandonment, and/or relocation of affected electric power, telecommunications, and sanitary sewer utilities.

Electrical service is the utility that would be most affected by construction of the Preferred Alternative. It would affect a large network of overhead and underground power lines, as well as street lighting at the eastern edge of the project. Power lines on the existing bridge serving the Terminal 91 south substation and feeding the King County Interbay pump station. These power lines could be relocated underground. In addition to the overhead lines, SCL has underground facilities near the existing Magnolia Bridge that may be affected by construction of the new bridge. These facilities would be located early in the design process and relocated and/or protected as required.

8 What measures are proposed to avoid or minimize effects to public services and utilities?

During Construction

A construction management plan would be prepared to manage construction traffic in the project vicinity. The plan would identify the mitigation measures to be implemented during the construction phases to ensure access by emergency service providers, school buses, and transit.

Construction site security would include on-site security surveillance and fencing to prevent public access.

Construction worker safety measures would be a part of the construction contracts and would be consistent with

Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) standards and regulations.

As project design proceeds, construction phasing and staging plans would be developed. These would allow two-way traffic to be maintained in the existing bridge corridor for as long as possible. Most of the New Magnolia Bridge west of Pier 90 would be built south of the existing bridge. This would allow the old bridge to remain open while this portion of the new bridge is built. From Pier 90 to 15th Avenue West, the new bridge would be built in the same location as the existing bridge. This would require partial or complete demolition of the existing bridge before construction of the new bridge can be completed. Detour routes would be used during construction of this section of the project. These would include temporary surface detour routes and may also include temporary ramps for access to the remaining section of the existing bridge or completed sections of the new bridge.

In addition to detour routes, traffic control personnel would be needed to direct traffic through congested areas. It is estimated that between two and four police traffic officers could be needed in the West Dravus Street corridor during the peak travel hours to relieve traffic congestion during project construction.

Potential impacts on major utility infrastructure, sanitary sewers, and drainage services would be avoided through the careful placement of bridge foundations and careful execution of construction. The following plans would be required to minimize impacts on existing utilities:

- a construction management plan,
- an erosion and sedimentation control plan,
- vibration and settlement monitoring plan, and
- a plan to maintain adequate clearances to utilities.

Whenever feasible, unavoidable utility outages that can have a substantial effect on customers would be scheduled during the least disruptive time period. Strategic bypass plans would be developed to ensure no interruptions to sewer or drainage services occur.

Mitigation for unavoidable, temporary disruptions of other utility services would aim first to minimize the duration of the interruptions to utility customers and service providers and second to provide for temporary or new connections in the best possible locations.

During Operation

Bridge and roadway maintenance activities may sometimes require temporary lane closures to provide work areas for maintenance vehicles and personnel. These activities are typically scheduled in advance and notification would be given to media and with signage identify the dates, time of day, and duration of lane closures. Two-way traffic would be maintained on the bridge in the remaining open lanes. Any maintenance or repair activity that would require more extensive lane closures, up to complete closure, would be coordinated with fire, police, and medical emergency service providers to maintain adequate service coverage to the Magnolia community.

Chapter 5.8 Visual Quality and Aesthetics

This chapter summarizes the results of the visual impacts analysis completed for the project. Following the guidelines and standards for analyzing visual impacts, potential effects of the Preferred Alternative were identified and mitigation measures developed. Additional information on the visual impacts analysis completed for the project can be found in the Visual Quality Discipline Report in Appendix P.

View of the existing Magnolia Bridge

1 Why are we evaluating visual quality and aesthetics?

Visual perception is an important component of environmental quality that can be affected by a project. The location, design, and maintenance of a transportation facility can both positively and negatively affect visual features of the landscape. A Visual Impacts Analysis is required for all transportation projects that change the roadside character, including a change in alignment. The alignment of the Magnolia Bridge Preferred Alternative would move south of the existing bridge.

What is the Magnolia Bridge visual quality study area?

The Magnolia Bridge project study area is from West Dravus Street to the north, 8th Avenue West on Queen Anne Hill to the east, Elliott Bay (including WSDOT ferry routes) to the south, and Thorndyke Avenue West and Magnolia Way West on Magnolia Bluff to the west.

2 How were visual impacts evaluated?

Federal, state and local regulations and FHWA guidelines are the basis for evaluating potential visual impacts. The Magnolia Bridge Visual Impacts Analysis includes an evaluation of the views towards the bridge, views from the bridge, visual quality, aesthetics, light, glare and shadow effects. Visual impacts were evaluated following a series of steps:

- Step 1: A study area was identified that encompassed

the existing Magnolia Bridge, its approaches and the surrounding area from which it could be seen outside the project area.

- Step 2 –Existing visual resources within the study area were identified then evaluated based on visual quality of the resource. Visual resources included viewpoints that represented different viewer groups; public parks, and 4(f) resources in the study area. Viewer groups were also identified: those using the highway who would have a view from the project and those viewing the highway (e.g., neighbors or park users) who would have a view of or toward the project.
- Step 3 –Potential impacts of the Preferred Alternative on the visual character and quality of the visual resources were examined. Impacts to viewers were also evaluated.
- Step 4 - Potential sources of light and from the bridge such as roadway lighting viewed from above the bridge alignments were identified and evaluated. Similarly, potential sources of shading from the bridge were examined.

3 What is the existing visible environment or visual character of the project?

The Magnolia Bridge is located in the valley between Queen Anne Hill on the east and Magnolia Bluff on the west in the City of Seattle. The bridge crosses North Bay (Terminal 91) either on elevated structures or surface roads.

Queen Anne hill is approximately 300' high as it faces the project area and is primarily residential in character buffered by a densely wooded greenbelt that extends along the southwest portion of the base of the hill. A mixture of multi-family and commercial structures lined the base of the hill on 15th Avenue West.

What is visual character?

Visual character is a description of the existing visible environment: land and water forms, vegetation, development, transportation and utilities

The Magnolia hill is approximately 150' high as it faces the

project area and is primarily residential in character. It too is buffered by a densely wooded greenbelt on the face of the bluff, extending the length of the project area.

The North Bay (Terminal 91) district is essentially level extending from Elliott Bay on the south to the Salmon Bay Waterway on the north, and from the 15th Avenue West/Elliott Avenue West corridor on the east to the Magnolia Hill bluff on the west. The North Bay area contains a mixture of manufacturing and industrial uses, and includes port and railroad operations. Structures are typically large, single or two story industrial and warehouse structures. The 15th Avenue West/Elliott Avenue West corridor is lined with low commercial structures with some multi-story residential buildings. There is little natural or ornamental landscaping present in the North Bay area.

4 What visual resources are located in the study area?

Visual resources within the study area include several public parks adjacent to or overlooking the project area and multi-use pedestrian/bicycle trails.

Also there are 10 viewpoints within the study area. The viewpoints include views from the bridge and views towards the project, above and below the bridge. These viewpoints were analyzed for potential impacts to visual quality. They include:

1. Galer Flyover, looking northwest
2. 16th Avenue West public Path/Bikeway, looking northwest
3. West Dravus Bridge, looking south
4. 21st Avenue West, Public path/Bikeway looking south
5. 8th Avenue West at West Lee Street, looking north
6. Smith Cove Park, looking north
7. From Magnolia Bridge, looking southeast
8. From Magnolia Bridge, looking northwest
9. From Magnolia Bridge, looking southwest

Viewpoint 7 – Top of Magnolia Hill

10. Bainbridge Island Ferry, looking north

Exhibit 5.8-1
Viewpoints in the Magnolia Bridge Visual Quality Study Area

How is visual quality determined?

The project team determined the visual quality of existing views using three criteria.

1) **Vividness** is the memorability of landscape components as they combine in striking and distinctive visual patterns.

2) **Intactness** is the visual integrity of the natural and human landscape and its freedom from encroaching elements.

3) **Unity** is the visual coherence and compositional harmony of the landscape considered as a whole (FHWA, 1988).

5 How would views from the bridge change as a result of the project?

The visual experience for users of the Preferred Alternative would be very similar to the existing bridge. The new bridge would have the same road connections at both the east and west ends and would be built immediately next to the existing bridge location west of Pier 90 and in the same location as the existing bridge east of the BNSR Railway crossing. The new bridge would match the existing bridge height at the east and west connections and be within a few feet of the height of the existing bridge at all other locations. The new bridge would have the same number of lanes as the existing bridge, but the lanes and the pedestrian/bicycle sidewalk would be wider than the existing lanes and sidewalk. This increase in roadway width would make the visual effect of the change in height less vivid when descending from Magnolia Bluff than on the existing narrower roadway (see Exhibits 5.8-2 and 5.8-3).

Exhibit 5.8-2
View from Existing Bridge at West End

Exhibit 5.8-3
View from Preferred Alternative at West End

6 How would views towards the bridge change as a result of the project?

The visual experience for viewers looking towards the Preferred Alternative would be similar to those looking towards the existing bridge. There would be fewer structural supports under the new bridge than under the existing bridge. Exhibits 5.8-4 and 5.8-5 are the view from Smith Cove Park west of 23rd Avenue West and looking to the north. Typical column spacing for the existing bridge is 30 to 40 feet east of Pier 91 and 40 to 60 feet west of Pier 91. Overhead steel framing has been added in bridge strengthening and repair projects as well as column-to-column cross bracing from the original construction and later strengthening and repair projects. Most of the new bridge would have column spacings of 160 feet or more resulting in many fewer columns than the existing bridge. Exhibit 5.8-5 shows the effect of fewer columns and the wider column spacing of the new bridge.

Exhibit 5.8-4
View of Existing Bridge from Smith Cove Playfield

Exhibit 5.8-5
View of New Magnolia Bridge from Smith Cove Playfield

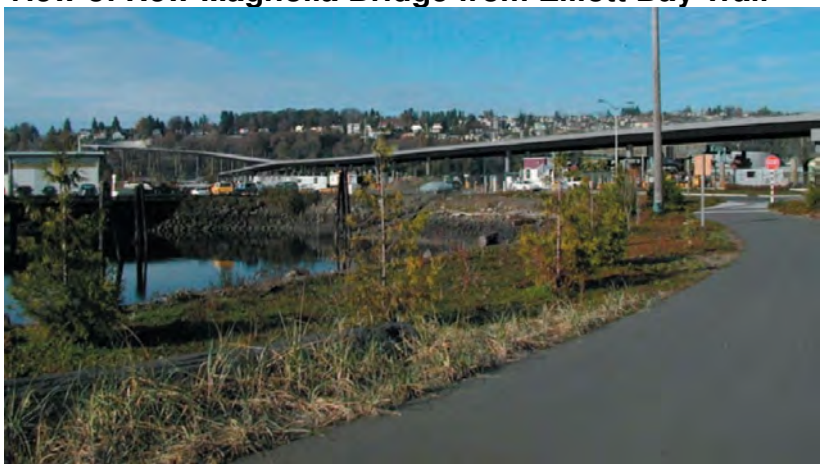
Exhibits 5.8-6 and 5.8-7 are the view toward the Magnolia Bridge from the Elliott Bay Trail near West Galer Street. The new bridge location would be close to the existing bridge location where it crosses the trail and railroad. There would be fewer structural supports under the new bridge so views under

the new bridge would be much less obstructed than under existing conditions.

The railroad crossing is the one section of the project where supporting structure above the roadway is being considered. This additional structure is needed because of clearance requirements over the railroad, roadway grade, and construction considerations next to an operating railroad track. The overhead structure, if selected, would be a substantial visual element at the east end of the project.

Exhibit 5.8-6
View of Existing Bridge from Elliott Bay Trail

Exhibit 5.8-7
View of New Magnolia Bridge from Elliott Bay Trail



7 What other visual impacts would result from the project?

Impacts to the Admiral's House

The new bridge would cross over the privately-owned Admiral's House historic property south of the existing bridge location, and about 200 feet away from the house. The house is oriented to the southeast with views of the Seattle waterfront. The new bridge is north of the house toward the hillside and screened by trees. Final landscaping design for the new bridge would consider screening plantings for views from the house north toward the bridge.

Exhibit 5.8-8
View of the Admiral's House – next to the existing Magnolia Bridge

Exhibit 5.8-9
View of the Admiral's House – next to the Preferred Alternative

Light and Glare

The New Magnolia Bridge would present three potential sources of light and glare from the new bridge: roadway lighting as viewed from above the roadway; roadway lighting viewed from below the bridge; and vehicle headlights viewed from above the roadway. The new bridge would be built very close to the existing bridge location. Vehicle headlights would continue to be seen from residences on Magnolia Bluff such as those along Magnolia Way West. Headlights would also be seen from Queen Anne Hill, but at a greater distance. Most of the area underneath the bridge is already illuminated for roadway, railroad, and industrial activities. West of 23rd Avenue West, the new bridge alignment would be south of the existing alignment. The roadway lighting for the new bridge would be closer and more visible to the southern and central portion of lower Smith Cove playfield and West Marina Place.

Shadows

Shadow effects of the New Magnolia Bridge would be similar to the existing bridge. Shadows would be cast under and to the north of the structure. The bridge would be about 15 feet wider than the existing structure because of wider travel lanes and a wider pedestrian/bicycle sidewalk. Support columns for the new bridge would cast shadows, but there would be a reduced effect due to fewer bridge columns and greatly reduced bracing and supporting framework under the roadway.

Public parks or trails that would be affected by shadows are the lower Smith Cove playfield, the Terminal 91/Elliott Bay Trail along the west side of the Port of Seattle Terminal 91 complex, and the Terminal 91/Elliott Bay Trail between Terminal 91 and the BNSF Railway. Shadows would be cast on the northern portion of lower Smith Cove Playfield in the early morning and late afternoon summer hours.

Exhibit 5.8-10

Shadow effects of the New Magnolia Bridge

8 What impacts would construction have on visual resources?

Project construction would require some clearing of trees and vegetation mainly south of the existing bridge on the slope of Magnolia Bluff. The extent of the impact would depend on the type of structure and whether construction is done over temporary supports from below or by using overhead cranes.

Temporary impacts to views towards and from the bridge would be affected during construction as new temporary structures are conducted and the old bridge demolished.

9 What measures are proposed to avoid or minimize effects to visual quality?

During construction

The clearing of vegetation would be mitigated by limiting the duration from the start of clearing to replanting and reforestation. This would be done by careful scheduling and promptly replanting with relatively mature plant stock.

During operation

- Neutral paint colors can be used to reduce the bulk effect of the structure when seen from public areas below.
- Viewpoints would be included along the pedestrian/bicycle walkway.
- Roadway lights would be shielded to minimize the direct views of the light sources from above or below the roadway.
- Mature vegetation would be planted to reforest the slope and greenbelt areas and screen vehicle headlights.

Chapter 5.9 Air Quality

This chapter discusses how the project would affect local and regional air quality, including criteria pollutants and mobile sources. Additional information on air quality can be found in the Air Quality Discipline Report in Appendix E.

Elliott Avenue West Intersection

Please refer to the Magnolia Bridge Replacement Air Quality Discipline Report in Appendix E (on CD) for a complete discussion of the air quality analysis.

1 Is air quality a concern in the study area?

The study area currently meets the National Ambient Air Quality Standards (NAAQS) and all state and local ambient air quality standards for regulated air pollutants. The Washington Department of Ecology State Implementation Plan (SIP) designates the project area as an air quality maintenance area for carbon monoxide (CO). In order to be eligible for future federal funds, the New Magnolia Bridge project must demonstrate conformity with the SIP for the maintenance area pollutants and the Clean Air Act.

2 How was air quality evaluated for the project?

Background data and conditions were researched in and around the study area to determine the level of regulated air pollutants. This research identified carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM_{10}) as pollutants that could affect air quality with this type of project.

To demonstrate conformity, qualitative analysis of PM_{10} impacts and quantitative modeling for CO were performed in late 2003. The CO modeling was done as "hot spot" analyses at the three worst-performing intersections in the study area: Alaskan Way West at the West Galer Flyover ("A" in Exhibit 5.9-1); West Dravus Street at 20th Avenue West (B); and West Dravus Street at the 15th Avenue West southbound ramps (C).

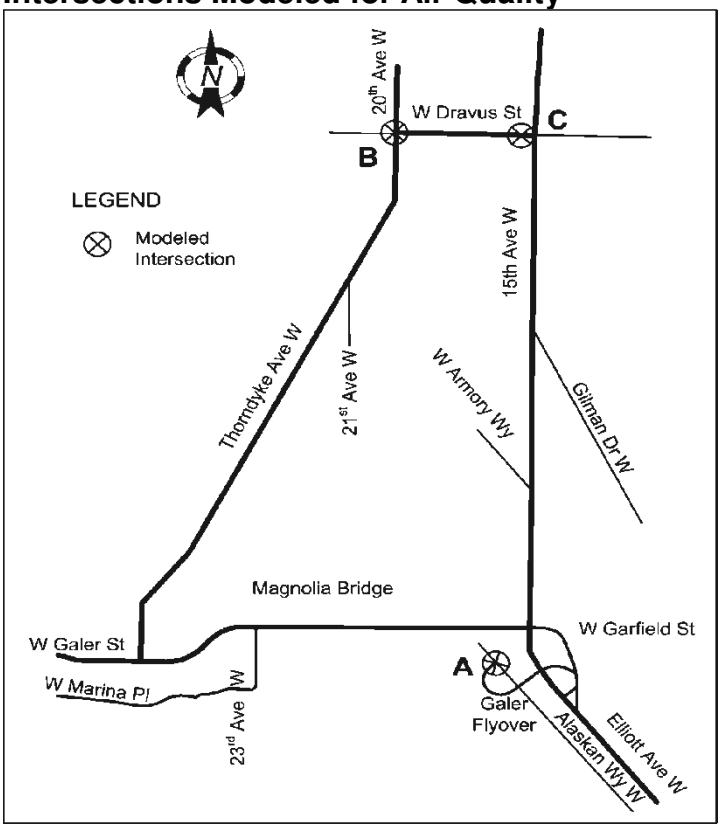
What is particulate matter?

Particulate matter is complex mixture of extremely small particles and liquid droplets consisting of number of components, including acids, organic chemicals, metals and soil or dust particles. EPA groups particle matter into two categories:

"inhalable coarse particles": particles that are larger than 2.5 micrometers and smaller than 10 micrometers in diameter and abbreviated as PM_{10}

"Fine particles": particles that are smaller than 2.5 micrometers in diameter and abbreviated as abbreviated as $PM_{2.5}$

Exhibit 5.9-1
Intersections Modeled for Air Quality



Two models were used for these analyses: CO emission rates were calculated using the model MOBILE5b; and ambient CO concentrations near the roadway were estimated using the model CAL3QHC.

What is the Clean Air Act?

The Clean Air Act of 1970, 42 USC 7401 et seq., was enacted to protect and enhance air quality and to assist state and local governments with air pollution prevention programs. Under the Clean Air Act Amendments of 1990, USDOT cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to Clean Air Act requirements.

3 How would the project affect air quality?

The air quality modeling was done in 2003 for the worst-performing intersections in terms of vehicle delay. There has

been no substantial change in traffic volumes and no change in traffic control at these intersections through 2013. The 2003 results are representative of current conditions.

Air quality modeling shows that CO concentrations at all intersections in the study area would decrease in the future and would meet all applicable ambient air quality standards in the 2010 and 2030 traffic forecast years, due to traffic volumes shown to have declined over the last few years and have stabilized to the current traffic volumes and better emissions control system in vehicles. The project design year is now 2036, but the previously prepared 2030 traffic forecasts have been determined to be representative of 2036 traffic conditions. Exhibit 5.9-2 and Exhibit 5-9.3 show the predicted CO concentrations at the three analyzed intersections.

Since the air quality modeling was done, new air quality models and emission factors have been adopted by FHWA and WSDOT. Traffic forecasts have not substantially changed and the evaluated intersections have the same number of lanes and traffic control. The earlier modeling results show maximum CO concentrations of less than 20 percent of the one-hour standard and less than 50 percent of the eight-hour standard. WSDOT has estimated new modeling would not show a violation and does not need to be carried out.

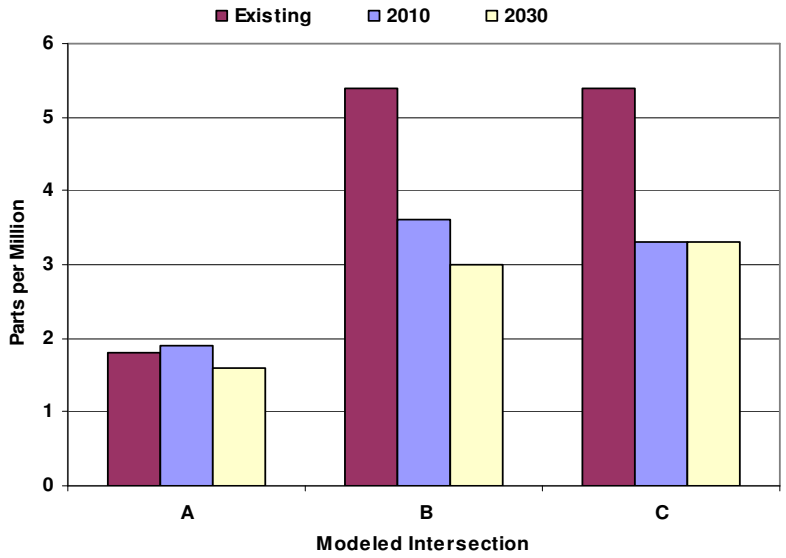
Ozone pollution results from the buildup and chemical interaction of multiple pollutants. Therefore, ozone compliance must be demonstrated by regional air quality planning agencies rather than on a project-by-project basis. The Puget Sound Clean Air Agency (PSCAA) documents the area's compliance with the ozone NAAQS and its plans to maintain that compliance in the ozone SIP. As of 2012, the Puget Sound region is in compliance with the national standard for ozone of 75 parts per billion.

What are air quality standards?

Under the federal Clean Air Act, the EPA has set National Ambient Air Quality Standards (NAAQS) that specify maximum concentrations for specific pollutants. Transportation projects must conform to the NAAQS by demonstrating that:

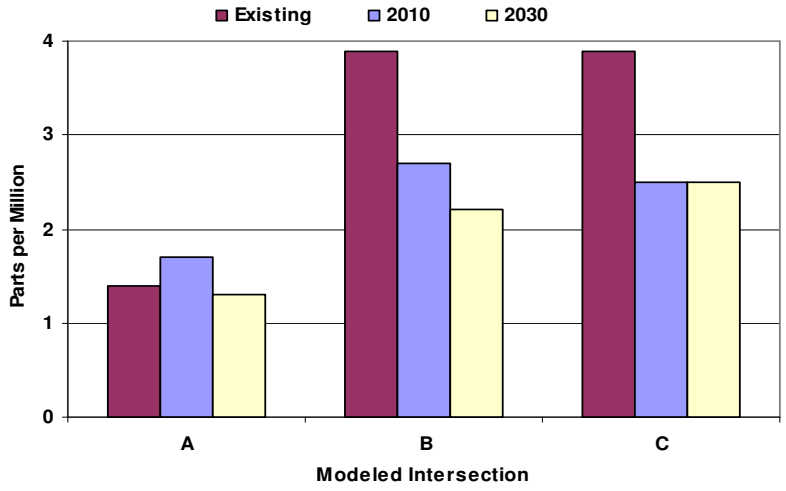
- the proposed project will not cause or contribute to any new violation of NAAQS;
- the project will not increase the frequency or severity of any existing violation of any NAAQS;
- the project will not delay timely attainment of the NAAQS within the region; and
- it will not increase a CO reading in the design year (2030) over the CO reading in the existing year.

Exhibit 5.9-2
One-Hour Average CO Concentrations



Note: Maximum NAAQS = 35 parts per million

Exhibit 5.9-3
Eight-Hour Average CO Concentrations



Note: Maximum NAAQS = 9 parts per million

4 How would construction activities affect air quality?

Construction activities would be scheduled to minimize delays during peak traffic periods, although closure of the Magnolia Bridge and the use of detour routes would be necessary for an

estimated 14 to 20 months of a 39-month construction period. Vehicle emissions during the bridge closure are not expected to exceed CO standards. Heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, PM_{10}, and NO_x in exhaust emissions. They would contribute a small amount of emissions compared with automobile traffic because construction traffic constitutes a small fraction of the total traffic in the area. If construction activity were to reduce the speed of other vehicles in the area, CO and exhaust emissions from traffic would increase slightly while those vehicles are delayed.

Construction emissions would be temporary and limited to the immediate area surrounding the construction site or along the queues on the detour routes. Some phases of construction, particularly during asphalt paving, would have short-term odors. Odors might be detectable to some people near the project site, but would be diluted as distance from the site increases. Any impact in the area would be limited to a short duration.

No asphalt mixing, cement mixing, or rock crushing would occur onsite. SDOT would ensure that any activity that emits air pollutants in the study area would have appropriate and valid permits.

Dust and particulate matter would be generated from demolition, land clearing, ground excavation, cut and fill activities, and construction of surface roadways. Construction emissions would be greatest during the earthwork phase because most emissions are associated with the movement of dirt on the site. Emissions would vary from day to day, depending on the level of activity, specific construction activities, weather conditions (especially rain), soil conditions, wind speed, and amount of equipment in use. Large dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

The quantity of generated particulate matter would be proportional to the area of the construction and level of activity. Based on field measurements of suspended dust during similar construction projects, emissions generation for this project construction would be 1.2 tons per exposed acre of activity per month.

5 What measures are proposed to avoid or minimize effects to air quality?

During construction

Construction equipment would be properly maintained to reduce exhaust emissions from diesel and gasoline engines during construction. No adverse impacts are expected to occur, and no mitigation would be required.

Cleared vegetation and waste material would not be burned. This material would be mulched or disposed of off-site.

Emissions would be reduced if only limited areas of the construction site are disturbed simultaneously. Project specifications would require that the amount of exposed area be kept to a minimum.

During operation

Bridge maintenance equipment would be properly maintained to reduce exhaust emissions from diesel and gasoline engines. No adverse impacts are expected to occur, and no mitigation would be required.

Chapter 5.10 Water Resources

This chapter examines the potential effects of the project on water resources, specifically surface water, groundwater and marine waters including sediment deposits from upland activities. More detailed and technical discussions of the information presented in this section can be found in the Water Quality Discipline Report in Appendix Q.

View of Dolphin Cove with the Magnolia Bridge

1 What is the project study area?

In this EA, the phrase *water resources* refer collectively to marine and freshwater surface water bodies (such as lakes and streams), stormwater, groundwater and sediments.

The study area contains the surface waters of Elliott Bay and its associated inlets, stormwater flows from the bridge and surface streets and bridge approaches, groundwater and sediments.

2 What water resources are found in the study area?

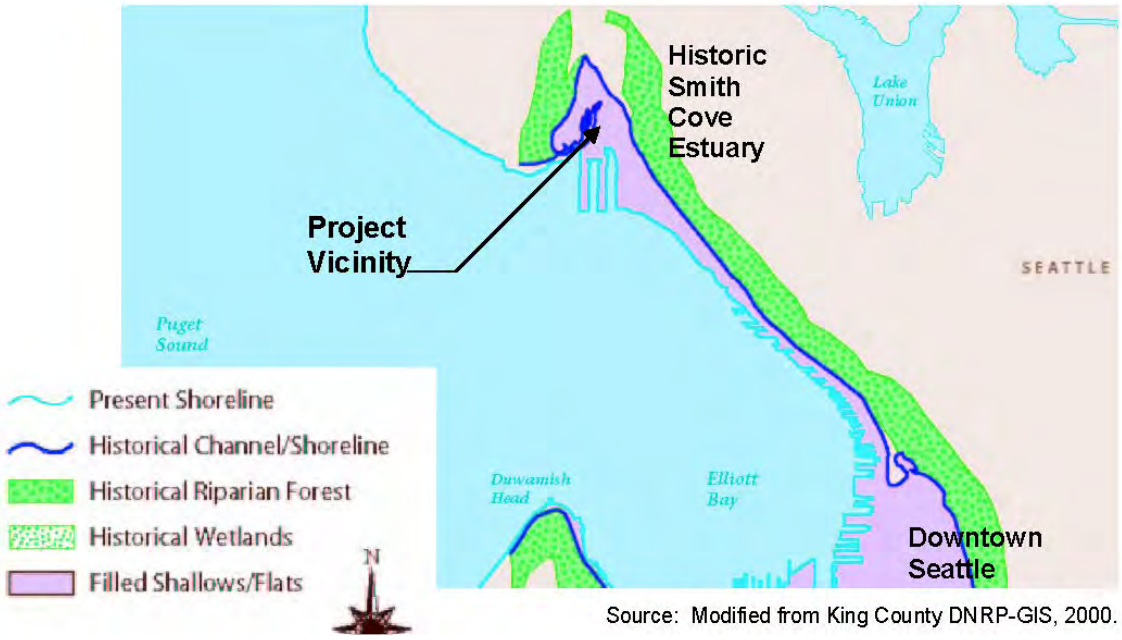
Surface Water

Surface water bodies within the study area include Elliott Bay, Smith Cove, the Smith Cove Waterway, Lake Jacobs (an industrial pond located south of the existing bridge on Terminal

91 between Piers 90 and 91), Elliott Bay, stormwater and sediments. These water bodies have been historically degraded and contaminated by development occurring over the last century.

Smith Cove was an estuary prior to being filled to form the Terminal 91 uplands. Urbanization has caused the loss of most of the estuarine habitat within Elliott Bay through shoreline modification and through the discharge of contaminants.

Exhibit 5.10-1
Historic Smith Cove Estuary



Source: Modified from King County DNRP-GIS, 2000.

Exhibit 5.10-2
Surface Water Bodies near Preferred Alternative

Sediments

Sediments near the Terminal 91 piers in Smith Cove are contaminated above state cleanup screening levels. The contaminants have historically been deposited during activities such as shipping and handling of various products (spillage), direct disposal, input of groundwater, stormwater runoff, through Combined Sewer Overflow (CSO) discharges, or from direct erosion of contaminated soils. Stormwater runoff produced from the existing Magnolia Bridge currently discharges untreated into Elliott Bay, or infiltrates into groundwater and an underlying aquifer.

Stormwater

Stormwater from the 6.77-acre surface area of the existing bridge is collected in drain inlets located on the deck surface of the bridge. The bridge downspouts take the water to surface pavements where the surface storm drains empty at three outfalls to Elliott Bay and to a combined sewer in 15th Avenue West (see Exhibit 5.10-3). The outfalls drain 5.63 acres (83 percent) of the bridge and the sewer drains 1.14 acres (17 percent) of the bridge. Two of the outfalls are to Smith Cove Waterway east of Pier 90 and the third is to Smith Cove at the south street end of 23rd Avenue West. There is no stormwater

What is pollution-generating impervious surface (PGIS) and non-pollution generating impervious surface (NPGIS)?

PGIS is an impervious surface that is a source of pollutants in stormwater runoff. Study area PGIS includes roadways that receive direct rainfall or the run-on or blow-in of rainfall.

Non-PGIS surfaces include sidewalks and pathways with no motor-vehicle traffic and that do not receive runoff from PGIS areas.

treatment of runoff to the three outfalls. The runoff to the combined sewer is treated at the King County Metro West Point Wastewater Treatment Plant. There is no separation of runoff from the bridge and approaches which are pollution generating impervious surfaces (PGIS) and runoff from sidewalks and other areas that do not generate pollution (non PGIS).

Exhibit 5.10-3
Existing Bridge Drains

Groundwater

There are three relatively distinct groundwater flow systems near the project. The principal system is a shallow unconfined aquifer within the Interbay Channel, the lowland between Queen Anne and Magnolia hills that underlies most of the project. The other systems include upland aquifers within Queen Anne and Magnolia hills and a deep artesian aquifer located approximately 300 to 400 feet below sea level.

The general groundwater flow in the shallow aquifer is to the south, toward Elliott Bay. Two groundwater observation wells installed near the existing bridge alignments in 2007 measured water levels fluctuating between 8 to 10 feet below ground surface in one well and between 6 and 12 feet in the other well. In addition, the shallow water table in the vicinity of Elliott Bay (Smith Cove) fluctuates in response to tidal stage changes.

Actual depths to the groundwater vary based on the ground surface elevation, season of the year, and tidal stage in Elliott Bay.

In the Interbay Channel, the groundwater quality of the shallow unconfined aquifer has generally been degraded by numerous industrial activities that have historically existed in the area. The Port of Seattle has a well and groundwater rights in Terminal 91 for environmental quality and fish propagation purposes. No domestic or municipal drinking water rights were identified. No public drinking water wells, sole source aquifers, wellhead protection areas, or critical aquifer recharge areas exist within the Interbay Channel.

3 How are water resources regulated?

Water resources are protected under federal, state, and local regulations. The Clean Water Act (33 USC 1251 et seq.) is the cornerstone of legislation protecting water resources in the United States (EPA 2004). The EPA is the primary federal agency responsible for implementing and enforcing the Clean Water Act, which was passed in 1972 in response to widespread public concern about controlling water pollution and protecting America's water bodies. In many cases, however, the EPA has delegated its authority and implementation duties to state agencies. In Washington, the EPA has authorized Ecology to regulate discharges to the state's water resources through the National Pollutant Discharge Elimination System (NPDES) permit program and the Pretreatment and General Permits programs, which regulate point and nonpoint source (surface water flow not discharged from particular facilities such as stormwater discharges). Ecology has adopted laws that regulate the concentrations of toxic substances allowed in stormwater and surface water bodies and has developed manuals detailing approved stormwater treatment and detention procedures.

Stormwater

In the City of Seattle the City's stormwater code (Seattle Municipal Code Titles 22.800 through 22.808) regulates the

treatment and discharge of stormwater. The existing code has been approved by Ecology as equivalent to or more stringent than the state's requirements. The code establishes the level of water quality treatment ("basic" or "enhanced") required for a project. It also identifies if, and where, detention of stormwater runoff is required. Stormwater discharges into Elliott Bay has been deemed exempt from flow control, however stormwater from the project must be treated under the existing code. The code also requires that detention facilities be installed when stormwater is directed to the combined sewer, but this project would redirect runoff currently directed to the combined sewer to existing stormwater outfalls. For more information on how stormwater is regulated see the Appendix Q Water Quality Discipline Report.

Groundwater

Ecology is also the primary agency regulating groundwater. Water quality standards have been established for groundwater and certain permits are required before it can be extracted, discharged to a surface water body or 'recharged' into the ground. The City of Seattle and King County also regulate groundwater discharges from temporary and permanent dewatering. Ecology also regulates the management of contaminated groundwater.

Sediment Quality

Ecology implements regulations to prevent contamination of sediments in water bodies through Chapter 173-204 of the Washington Administrative Code (WAC) Sediment Management Standards. These include standards designation, sediment testing procedures, sediment source control, and sediment cleanup processes and policies. Surface waters discharged to waters of the state cannot contain contaminants at levels expected to contaminate marine sediments.

What is water quality?

Water quality refers to the physical and chemical properties of water that affect its capability to support beneficial uses. Federal, state, and local agencies regulate surface water quality to maintain a variety of beneficial uses, including domestic water supply, irrigation, fish and shellfish rearing, recreation (such as swimming and sport fishing), commerce and navigation, and wildlife habitat.
Source: Chapter 173-201A WAC

4 How were water quality impacts evaluated?

Surface Water

The short-term construction impacts to surface water quality were estimated based on expected land disturbance during

construction, distance of the construction from the shoreline, and the amount of in-water work.

Long-term impacts on water quality were evaluated by both qualitative and quantitative methods. Data sources and content are discussed in detail in Appendix Q. The analysis focused on the estimated area of disturbance, proximity to existing shoreline, and amount of in-water work. Long-term water quality impacts were analyzed with regard to predicted quality (pollutant loading) of surface water runoff.

Groundwater

Groundwater resources were evaluated by reviewing data from water wells and borings. This information was obtained from the Port of Seattle, City of Seattle, engineering firms, U.S. Geological Survey (USGS), and from new borings made for this project. Groundwater quality information was also obtained from WSDOT, Port of Seattle, and other state and federal environmental databases.

Sediment Quality

Impacts to sediments were evaluated qualitatively. Numerous studies providing evidence of sediment contamination within Elliott Bay were examined (King County, 2001). NOAA and the State Department of Ecology studied sediment quality in Central Puget Sound in 2002. As part of the study, numerous sampling stations were established and monitored in Elliott Bay in 1998. Three nearshore stations (115, 180, and 178) were located near to or within Smith Cove and the Smith Cove Waterway. Toxic levels of contaminants were observed in the inner strata of Elliott Bay. In addition, chemical concentrations exceeded Sediment Quality Standards (SQS's) (per WAC 173-204), and exceeded Cleanup Screening Levels (CSL).

5 What are the project impacts to surface water resources?

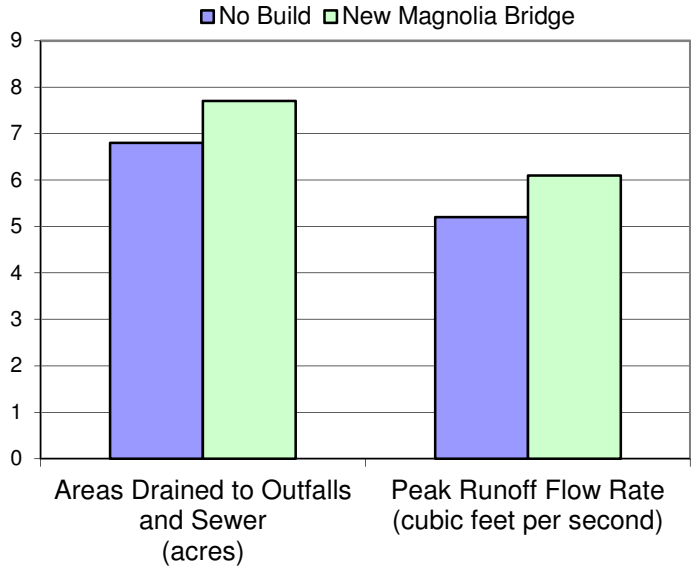
The long-term impacts to surface water quality are from stormwater-generated from traffic traveling on the new bridge. This is based is based on the amount of PGIS, rainfall (flow

rate), and the volume of traffic. The New Magnolia Bridge would have 7.43 acres of PGIS. This is about 2.2 acres more PGIS than the existing bridge. The new bridge would generate a peak runoff flow rate that is 0.9 cubic feet per second (cfs) higher than the rate of the existing bridge.

The stormwater would be discharged to two Seattle Public Utilities outfalls: one to Smith Cove Waterway east of Pier 90; and one to Smith Cove at the 23rd Avenue West street end. Computer modeling of these two outfalls show they have adequate capacity for bridge peak flows. The other existing bridge outfall, owned by the Port of Seattle, and the sanitary sewer connection would not be used by the new bridge.

If the Bridge is designed and built under the existing Stormwater Code the stormwater runoff from the new bridge would be treated to remove pollution before discharging into Elliott Bay. The project would be required to provide “basic treatment” as defined by Washington State Department of Ecology Storm Water Management Manual and the Seattle Stormwater Code (SMC 22.800). Treatment would include separation of oil from surface runoff at the high use intersections of 15th Avenue West at West Garfield Street and removal of at least 80 percent of the total suspended solids (TSS) from all roadway runoff. This would improve water quality from the existing condition. Seattle’s Stormwater Code names Elliott Bay as a “designated receiving water” with sufficient capacity to receive discharges of drainage water without flow control from a discharging site.

Exhibit 5.10-4
Drained Surface Areas and Stormwater Peak Flow



6 How would construction activities affect water resources in the study area?

- Demolition and construction could allow dust, debris, paint chips, epoxies, grit, and chemical contaminants to enter surface water and groundwater.
- Sediment (and potential contaminants) eroded from exposed earth (from clearing, grading, or stockpiling activities) may enter Elliott Bay from uncontrolled stormwater runoff.
- If the soils are contaminated and not properly controlled, surface water runoff may carry hazardous materials into Elliott Bay.
- Construction equipment, barges, or trucks may leak directly into or be carried by surface runoff to Elliott Bay.
- Excavations for bridge footings and utility trenches may expose contaminated groundwater or release substances into groundwater.

- Project staging areas (where construction materials and/or equipment are stored) may acquire metals, sediment, oils, and grease, and the contaminants may be carried by surface runoff to Elliott Bay.
- The project would require construction of new bridge foundations within the tideland and open water west of Pier 91. While marine sediments in Smith Cove are known to be contaminated, no specific contamination is known to exist where the foundations are being proposed. There is potential for increased turbidity, and suspension of contaminated sediments during installation of the bridge footings.

Groundwater

- Impacts to groundwater could include increases in total dissolved solids as a result of releasing muddy stormwater or contaminants into the shallow groundwater from spills or leaks due to improper hazardous material storage or handling.
- Groundwater pumped for foundation and utility construction ("dewatering") could contain contaminants and could pull contamination from other areas as the groundwater is pumped. Land settlement could occur in areas where construction dewatering takes place and could impact built structures in the area/.
- New utilities or stormwater pipes installation below the shallow groundwater table could create a pathway for the movement of existing groundwater contaminants to non-contaminated areas.

7 What measures are proposed to avoid or minimize effects to water resources?

During construction

The project would avoid and minimize impacts to water quality by following permit conditions and requirements. Additional mitigation measures would include:

- Construction and demolition over and within open water areas would require methods such as the use of tarps, silt fencing, containment booms, safety nets or a barge to capture debris and other freed materials including paint chips.
- The project would require several permits, and the development of a SWPPP and a 401 water quality certification.
- Construction equipment access to tideland and over-water work sites would be from temporary work bridges and trestles. The temporary piles to support these structures would be vibrated in as far as possible and impact pile driving would be minimized. Piles would be vibrated out.
- Concrete would be cured seven days or more before contact with water to avoid leaching.
- Sampling for pH would be performed to detect and respond to the potential for an unauthorized discharge from concrete activities.
- A Spill Plan (SPCC Plan) would be prepared and used for the duration of the project. The SPCC Plan would identify potential spill sources, spill prevention, spill response procedures, training procedures, spill containment, notification, clean-up and reporting procedures.

Groundwater

- Potential water quality impacts to groundwater would be mitigated by implementing effective BMPS for stormwater, hazardous material containment, and spill response management practices.
- Measures to mitigate the movement or discharge of contaminated groundwater would be determined during project final design and permitting. These may include the use of watertight shoring systems in excavations that extend below the water table. If the discharge of

contaminated water is unavoidable due to construction requirements, the discharge would be contained and treated on-site to meet relevant water quality criteria and discharged to the sanitary sewer using a King County Industrial Waste permit, or hauled by appropriate vehicles to a treatment facility before final disposal.

- The potential for land settlement resulting from construction dewatering may be mitigated by utilizing watertight shoring systems to minimize dewatering or by re-injecting groundwater to prevent excessive lowering of the water table around the construction area.

Sediments

Disturbance of potentially contaminated shoreline sediments would be avoided or minimized by the design and location of in-water pier footings within contaminated areas. Preliminary site investigations would be performed prior to excavation to determine the location and extent of any contamination. The contractor would comply with the HPA, 401 Certification and shoreline permit conditions.

During operation

All of the anticipated impacts to water quality would be mitigated as required by the permitting processes and would probably provide a net improvement to water quality relative to the existing conditions.

Surface Water

Potential increases in pollutant loading are required to be mitigated. Part of the mitigation would be the installation of Best Management Practices (BMPs) basic stormwater treatment. The proposed treatment of stormwater prior to discharge into Elliott Bay would result in a net-benefit to water quality, since more than 80 percent of bridge runoff is untreated today. Flow from the high-use 15th Avenue West and West Garfield Street intersection would have oil/water separation in addition to sediment removal.

What are best management practices?

Best management practices (BMPs) are actions or structures that reduce or prevent pollutants from entering stormwater and degrading water quality. There are many different types of BMPs. Some are treatment technologies, such as oil/water separators. Others are typical measures that can be implemented as part of a project, such as sweeping streets to eliminate debris. Some BMPs are permanent features of a project, others can be temporary measures used during construction.

Maintenance BMPs, such as regular sweeping of the new bridge structures, and cleaning of the catch basin sumps would become part of the City's ongoing roadway maintenance program.

Groundwater

The creation of migration pathways for existing groundwater contaminants along new utility or stormwater conveyance trenches may be mitigated in several ways. Where possible, future utility trenches should avoid areas where groundwater contamination has been identified (see the Hazardous Materials Discipline Report) or should not extend below the shallow groundwater table.

Constructing low permeability "dams" within the trench backfill to restrict horizontal groundwater movement can be used in areas where contamination exists to mitigate the potential for contaminant migration.

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Chapter 5.11 Fish, Wildlife, and Vegetation

This chapter describes the presence of wildlife, fish, plants and their habitat near the Magnolia Bridge and identifies the potential impacts of the project on these resources. Chapter 5.12 Federally-Listed Species addresses species and habitat listed under the Endangered Species Act (ESA), the Marine Mammal Protection Act and the Magnuson-Stevens Fishery Conservation and Management Act. Additional information can be found in the Wildlife, Fisheries and Vegetation Discipline Report in Appendix R and the Magnolia Bridge Replacement Project Biological Assessment (Appendix T).

Magnolia Bluff

1 Why are fish, wildlife, vegetation and habitat considered in an EA?

An ecosystem is a biological community along with the physical and chemical environment with which it interacts. Ecosystems are made up of living organisms, including humans, and the environment they inhabit. Various federal, state, and local regulations including the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA) require that the effects of a proposed project on ecosystem structure, function, and process be evaluated in environmental documents. This section of the EA presents a summary of the evaluation of three important biotic resources—fish, wildlife and their habitat (including vegetation) that are present in the study area. Please see the Wildlife, Fisheries and Vegetation Discipline Report in Appendix R for additional information.

2 What are the study area boundaries?

The study area is bounded on the north by West Emerson Street and the southern tip of Piers 90 and 91 on the south. The western boundary is Thorndyke Ave West and the eastern boundary is 15th Avenue West.

3 How were fish, wildlife, vegetation and habitat identified in the study area?

Studies conducted by public agencies were collected and reviewed. These agencies included the U.S. Environmental Protection Agency (EPA), U.S. Fish and Wildlife Service (USFWS), Washington State Department of Fish and Wildlife (WDFW), Washington State Department of Ecology (Ecology), Washington State Department of Natural Resources (WDNR), Washington State Department of Transportation (WSDOT), Port of Seattle, City of Seattle, the former Municipality of Metropolitan Seattle (METRO), and King County. Other sources included the Elliott Bay/Duwamish Restoration Panel, University of Washington, local environmental groups (e.g., the local chapter of the Audubon Society), and local water-dependent businesses. In addition, recent EISs and other studies of the marine systems conducted for private and public developments in the area were reviewed for useful information on plants and animals. Priority Habitats and Species (PHS) maps and lists of special status species were obtained from WDFW.

A reconnaissance-level survey of the terrestrial and intertidal areas was conducted in areas of potential habitat that may be affected by the project alternatives. Information collected included a classification of habitat types and a general assessment of wildlife use of the study area. No diving or other field sampling or surveys or species-specific surveys (such as for forage fish spawning habitat or for bald eagles) were conducted. A field survey was made in August 2003 of the upland and intertidal areas of Smith Cove within the projects potential impact area.

The ordinary high water line of the tidal zone was marked in May 2006. Habitat types were classified and an assessment of wildlife use in the project area was made. The field survey located potential wetlands in the study area.

4 What types of fish, wildlife, and vegetation were found?

Smith Cove

Fish

Over 40 species of fish have been identified as common to nearshore waters adjacent to the study area. A complete list of these species can be found in Appendices R and the Magnolia Bridge Biological Assessment.

Juvenile and adult salmon are known to migrate and rear along the shorelines of Elliott Bay (Kerwin and Nelson 2000), including the nearshore areas of the undeveloped portions of Smith Cove. Puget Sound Chinook salmon, Puget Sound steelhead, Yelloweye rockfish and canary rockfish and bull trout may all be present near the project. Larger fish, including adult salmon, flatfish, and others, are more likely to occur in deeper water. The piles and pier structures of Terminal 91 are likely to support fish such as pile perch, rockfish, and cabezon. These fish would also be more common along the Elliott Bay Marina rubble breakwater, southwest of the proposed project.

WDFW (2003) reports that the nearshore areas from Smith Cove north are a concentration area for Dungeness crab. However, it is unlikely that Dungeness crab use the upper intertidal zone of Smith Cove adjacent to the project because of the lack of macroalgae (e.g., *Zostera* and *Nereocystis*) and high level of human disturbance.

Wildlife Species

The study area provides limited habitat for wildlife species due to the high levels of human disturbance from extensive residential and industrial development in the Interbay area and surrounding communities. Most of the species in the area are limited to the isolated forest fragments in the study area for foraging, breeding, or cover habitat. Appendix R lists a number

of mammals that could be found in the project area including common opossum, coyote, deer mouse, muskrat, river otter, squirrels and domestic cats and dogs. The Magnolia Bridge supports roosting bats under the bridge.

Marine mammals that are commonly observed in Elliott Bay include California sea lions, harbor seals, and harbor porpoise. These animals would not be expected to use shallow nearshore habitats in the study area. The only known seal or sea lion haulout sites in Elliott Bay are the navigation buoys west of West Point, Alki Point, and Shilshole Bay Marina (Jeffries et al. 2000). Additional information on marine mammals can be found in Appendices R and the Magnolia Bridge Replacement Project Biological Assessment.

Reptiles and amphibians may be found in the study area. Pacific chorus frog, long-toed salamander, and northwestern garter snake could be found in the Magnolia and Queen Anne greenbelts.

Exhibit 5.11-1

Fish and Wildlife Habitat Areas

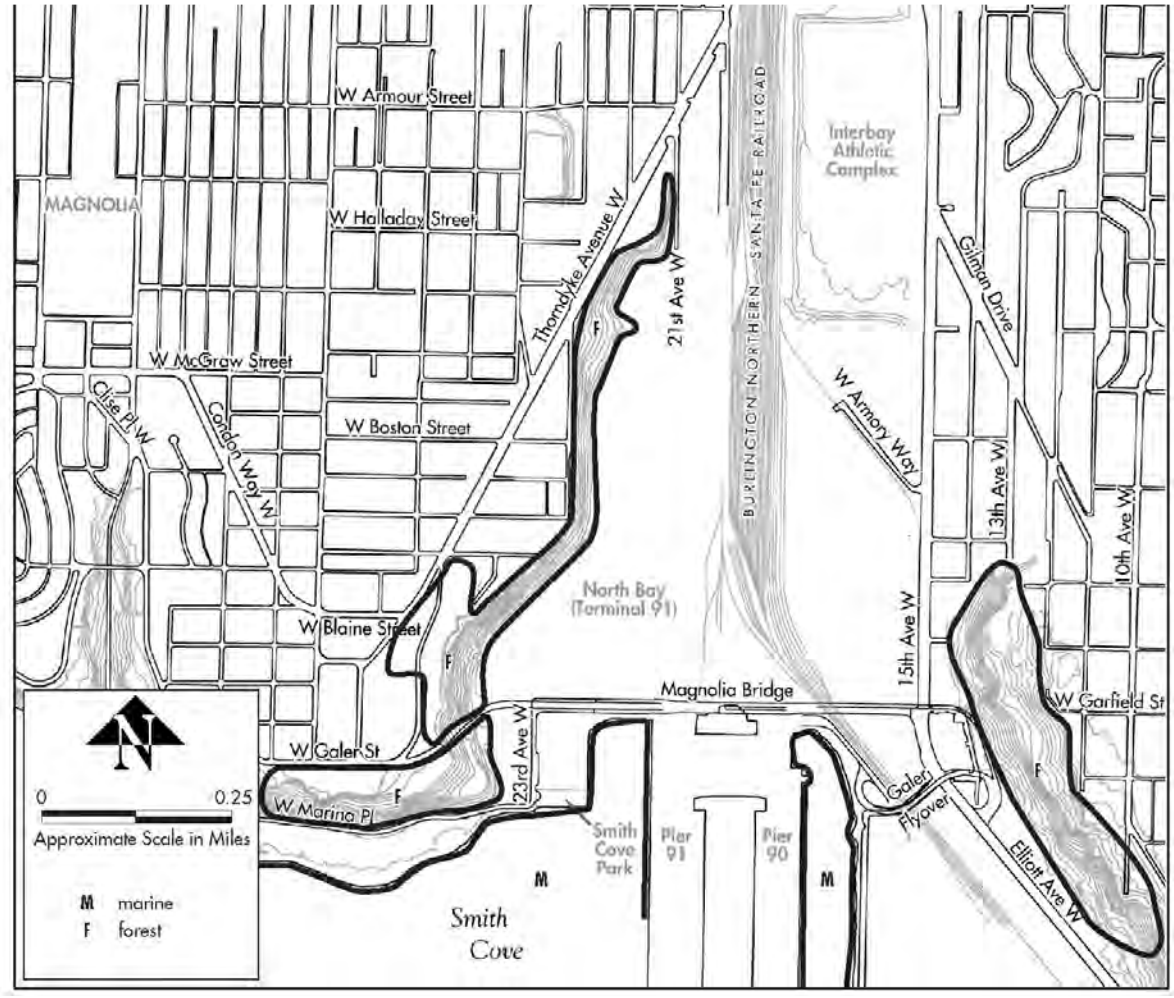
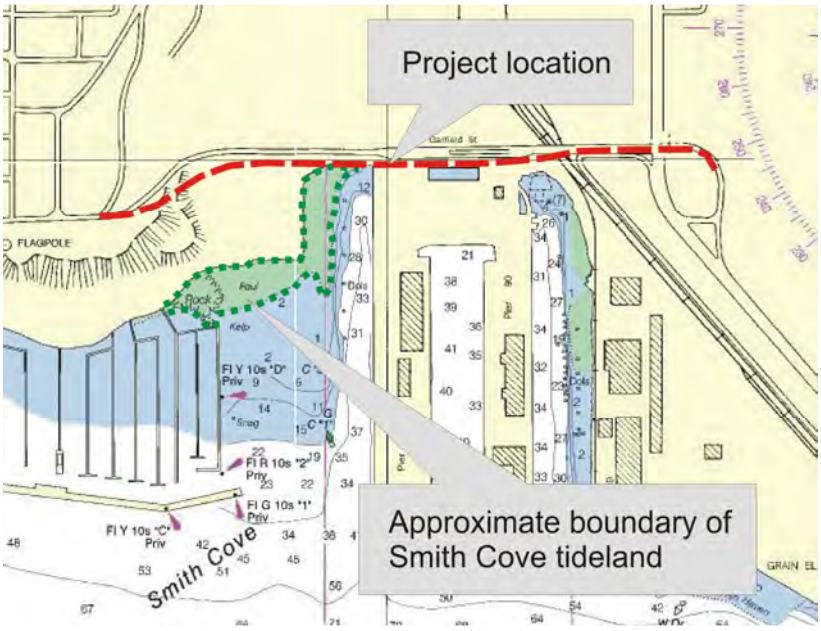


Exhibit 5.11-2
Smith Cove Tidelands



Birds

Birds are the most commonly observed wildlife in the study area. Ravens and pigeons appear to be nesting and/or roosting in the undersides of the existing Magnolia Bridge. The pigeons provide a source of food for peregrine falcons that nest on the West Seattle Bridge and the grain terminal (Falcon Research Group 2003). The eyrie at the grain terminal fledged four young (three females and one male) during the 2003 nesting season. These young falcons were observed soaring over the east side of the study area during the summer of 2003 (Falcon Research Group 2003). The west end of the bridge fledged four young (three females and one male) during the 2003 nesting season. These young falcons were observed soaring over the east side of the study area during the summer of 2003 (Falcon Research Group 2003). The nest at the West Seattle Bridge has not produced young. Both of these nest sites are constructed nest boxes. Appendix R provides a detailed list bird species that may occur in the study area. The most common birds in the study area include starlings, black-capped chickadees, spotted towhee, robin, crow, pigeon, and song

sparrow. These and other urban-adapted birds can find limited breeding sites in the terrestrial habitat in the study area and abundant forage in surrounding residential areas, where numerous homes provide bird feeding platforms. The isolated forest fragments in the study area could support breeding songbirds. There are large snags and some decadent trees that could provide nesting cavities for raptors, owls, woodpeckers, and other cavity-nesting species. No raptors or raptor nests were observed during the site visit.

Bald Eagle breeding areas are located ½ mile west of the bridge on the Magnolia Bridge (WDFW, 2013). Bald eagles may forage in the project area.

Vegetation

Historically, much of the Port's North Bay/Terminal 91 property in this area was intertidal mudflats and marshes. This area was filled beginning in the early 1900s through the early 1940s. Remnant hardwood forests remain on steep slopes on the east and west sides of the study area. Non-native invasive and weedy plants dominate along property fringes and on undeveloped parcels scattered throughout the study area. Ornamental and landscaped vegetation dominates residential properties surrounding the study area, as well as public properties such as Smith Cove Playfield and the Terminal 91 Trail. Some intertidal marine vegetation exists in the shallow, undredged fringes of Smith Cove (Exhibit 5.11-2).

Forest

The Magnolia and Queen Anne greenbelts support mature hardwood forests dominated by big-leaf maple (many over 21 inches in diameter), red alder, and black cottonwood. Douglas fir, western red cedar, and western hemlock are present but not as common. Shrubs and bushes including Himalayan blackberry, English ivy, Indian plum, willow, swordfern, holly and Oregon grape are also found in the greenbelts.

Ornamental/Landscaped Vegetation

Smith Cove Park and the Terminal 91 Bicycle Path are planted with a variety of native and non-native ornamental plants.

Small trees, shrubs, and herbaceous plants line the Terminal 91 Bicycle Path and the walking path in Smith Cove Park. Many of the plants found along the bike path are native wetland plants, including spirea, red-osier dogwood, soft rush, and red alder. Pin oak, Lombardy poplar, tulip poplar, and domesticated plum are also present. Lawn grasses are found in patches throughout the study area. The largest lawn area is on the former Naval Supply Depot property south of the western terminus of Magnolia Bridge.

Disturbed Vegetation

Throughout the study area, undeveloped, disturbed areas along roadside ditches, adjacent to the railroad tracks, and in other fringe areas are dominated by a combination of invasive and weedy species. These species include Himalayan blackberry, English ivy, evergreen blackberry, butterfly bush, tansy ragwort, honeysuckle, field bindweed, western water hemlock, Scot's broom, common vetch, Japanese knotweed, and introduced grasses.

Marine Vegetation

Smith Cove supports a narrow band of intertidal marine vegetation and scattered salt marsh plants in the upper intertidal zone. The intertidal plants observed during the site visit included sea lettuce, and rockweed. Scattered individuals of silver burweed, American dunegrass, and saltbush were observed among driftwood collected in the northwest corner of the cove between Smith Cove Park and the westernmost Terminal 91 pier. The *Elliott Bay Small Craft Harbor Final EIS* (Corps of Engineers 1987) reported sea lettuce and rockweed as the dominant plants in the upper midtidal zone, with the red alga more common in the lower portions. That report also noted that brown algae such dominated the lower intertidal zone.

Priority Habitats and Species (PHS)

PHS state-listed wildlife species that have been identified as occurring in the study area include osprey, peregrine falcon,

What are priority habitats and species (PHS)?

Priority species require protective measures for their survival due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations (e.g., heron colonies, bat colonies) considered vulnerable; and species of recreational, commercial, or tribal importance that are vulnerable. Priority species and habitats are protected by the State of Washington.

See Chapter 5.12 for additional information on Federally-protected species.

Purple Martin and Great Blue Heron. Marbled Murrelet may occur in the project area.

There is an active osprey nest at the north end of the study area in the Interbay Golf course and an active peregrine falcon eyrie in an artificial nest box at the Port of Seattle grain terminal southeast of the project site. Both of these habitats are ½ mile from the Magnolia Bridge. A Purple Martin breeding area has been identified on the eastern end of the study area in Centennial Park. Great Blue Herons occasionally forage in the intertidal areas of Smith Cove.

Chinook salmon, Coho salmon, Puget Sound Steelhead and Dungeness crab occur in the project area. Bull trout may occur in the project area. Steller sea lions, a threatened species occur in Elliot Bay but do not occur in vicinity of the project. The J pod of Southern resident killer whales migrates into Northern Puget Sound and generally remains throughout the winter but do not occur in vicinity of the project. More information on these species can be found in Chapter 5.12 ESA Listed Species, Appendix R and the Magnolia Bridge Biological Assessment

WDFW has identified the Queen Anne Greenbelt as a Biodiversity Area. This is an area within a city of urban growth boundary that has valuable fish or wildlife habitat and supports a diverse community of species.

WDFW has identified a portion of Smith Cove and as estuarine intertidal habitat. Intertidal areas consisting of rocky substrate, native vegetation (e.g., eelgrass, 2 macro-algae, emergent vegetation) are found here.

5 What other habitat is found near the project?

The area south of the bridge (and including in-water habitat) is highly modified with shoreline anchoring throughout. Terminals 90 and 91 are large industrial docks with boat slips for large vessels. The marina and terminals both include extensive overwater cover. Regular dredging and filling have substantially impacted intertidal and sub-tidal habitat availability and function.

Terminals 90 and 91 and their associated upland facilities are located on the site of the historical entrance to the Smith Cove embayment. Smith Cove historically extended far to the north into the Interbay area. Smith Cove has since been filled and an embayment is no longer present on the site. The shoreline east of Terminal 90 is also Port of Seattle property and supports industrial uses. A BNSF railroad track runs through the shoreline corridor of this reach but is not immediately on the shoreline.

A small mudflat area between the Elliott Bay Marina and Terminals 90 and 91 has been restored as mitigation for various Port of Seattle activities. There is some vegetation along a bluff that is separated from the shoreline by the Elliott Bay Marina and its parking facilities. The bluffs include a mix of deciduous and coniferous trees as well as shrubs. There is a very high percentage of impervious surfaces in this area (Seattle Department of Planning, 2012).

The greenbelts on either end of the Magnolia Bridge are isolated patches of habitat surrounded by urban development. The areas are steeply sloped and highly vegetated. Vegetation found in the greenbelts is described earlier in this chapter. There are no streams in the study area.

6 How would fish, wildlife, vegetation and their habitat be affected by the project?

The completed project would only have a few impacts to fish, wildlife, vegetation and their habitat. Most impacts would occur during construction. These include:

Aquatic Species

- The new eastbound on-ramp and mainline bridge would increase over water coverage of the intertidal area west of Pier 91 covered by structure, but removal of the existing low-level wood wharf would open this area to increased light penetration.

- Minor long-term impacts to upper intertidal vegetation at the north end of Smith Cove could occur due to increased shading from the proposed bridge structure.
- The quality of stormwater coming off the new bridge would be improved from treatment of roadway runoff. Current runoff is untreated.
- Approximately 200 square feet of intertidal habitat would be removed with the installation of four bridge foundations.

Terrestrial Species and Birds

- Loss of bird and small mammal habitat - through removal approximately 0.5 acre of forest at the west end of the new proposed bridge, just south of the existing western bridge terminus. This impact would include the removal of at least two large big-leaf maples in excess of 24 inches in diameter.
- Loss of breeding and foraging habitat for some special status species, including bats and pileated woodpeckers, when small amounts of forest are removed from the undeveloped slope above the Port property and removal of the mainline bridge.
- Birds are sensitive to noise. Noise disruptions during breeding could cause some species such as Great Blue Heron to abandon their nests.

7 How would fish, wildlife, vegetation and their habitat be affected during construction?

Construction activities that would impact fish, wildlife and vegetation include work that would be completed in the water as well as work in and adjacent to the Magnolia Bluff and Queen Anne Hill. The following summarizes construction impacts of the project. For additional information see Appendices R and the Magnolia Bridge Biological Assessment.

Aquatic Species

Construction of the Magnolia Bridge Preferred Alternative would take approximately 39 months. In-water construction would take place over approximately 36 weeks. The main in-

water activities that could affect fish and vegetation in the project area are:

- Removal of the existing wood wharf on the north side of Jacob's Lake
- Removal of the existing bridge on-ramp from 23rd Avenue West at the north end of Smith Cove and west of Pier 91
- Installation and removal of a temporary work bridge and finger trestles to enable construction of the new bridge while the existing bridge remains standing
- Installation and removal of falsework supports for the new mainline bridge
- Construction of foundations for new the 23rd Avenue West on-ramp and mainline bridge
- Construct new mainline bridge columns and superstructure
- Demolition of the existing mainline bridge and 23rd Avenue West off-ramp
- Construction new 23rd Avenue West on-ramp and new 23rd Avenue West off-ramp bridge superstructures
- Remove 23rd Avenue West on-ramp superstructure falsework supports and work bridge

Potential project effects on fish, marine mammals and intertidal habitat include:

- Temporary loss of intertidal habitat with the installation of drilled shaft foundations, sheet pile cofferdams for construction of the foundations, falsework support bents, and temporary piles supporting the work bridge.
- Installation and removal of temporary piles and structures would cause temporary noise impacts and increase localized turbidity. Noise from pile driving in the Smith Cove intertidal and nearshore areas may disturb fish and Southern resident killer whales in the vicinity.
- Impacts to the intertidal zone described above would affect aquatic organisms. Pile driving could have

serious, potentially lethal effects on fish in the immediate vicinity (i.e., within 50 feet) of the activity.

- Pulse noise and turbidity created by drop hammer pile driving could have substantial, deleterious effects on fish physiology. Any juvenile fish migrating along the shoreline during construction would likely move offshore to avoid disturbance. While this would limit the potential physiological effects of pile driving, the movement could expose juvenile fish to greater predation risk.
- Existing nearshore habitat would not be substantially affected during in-water construction because nearshore habitat are in the study area are degraded from past and ongoing disturbances and the presence of a pile supported access road at the head of Smith Cove.

Terrestrial Species and Birds

Besides loss of habitat, the noise and disturbance of construction equipment and activities would temporarily displace wildlife in the immediate vicinity. Noise from construction and demolition of the eastern approaches would affect wildlife and birds in the vicinity.

8 What measures are proposed to avoid or minimize effects to fish, wildlife, and vegetation?

During construction

Aquatic Species

A sheet pile cofferdam would be installed in the intertidal zone during pile driving activities. This dam would keep water out of the area where pile driving would occur. Any fish caught within the cofferdam would be trapped and released before pile driving would commence.

BMPs for construction would be implemented to minimize turbidity and water quality degradation during in-water activities. Forage fish are not known to spawn in the study area, so no construction impacts to these salmon prey species would be expected. Habitat for offshore fish species and those fish that inhabit the piers would remain unchanged.

Construction would not occur during critical juvenile salmon migration and rearing periods (summer to late fall). Consultation with Services to determine appropriate conservation measures would be completed prior to construction. In addition all relevant permit conditions including a Section 404 permit from the US Army Corps of Engineers and HPA from WSDFR would be followed.

If a killer whale is spotted during in-water work, impact pile driving would be halted until the whale has left the area. Adverse effects to Puget Sound salmon are temporary and their effect on Southern resident killer whales is discountable. A marine mammal protection plan would be developed. See Chapter 5.12 for additional mitigation for Federally-listed species.

WDFW Priority Habitat and Species (PHS) Management plans would be followed for PHS species: Great Blue Herons, Peregrine Falcon, Pileated Woodpecker, Purple Martin, and Dungeness Crab.

Removal of the wharf under the new eastbound on-ramp would open the intertidal area of Smith Cove beach up to daylight from the south. This would increase the intertidal and nearshore habitat productivity of areas formerly under the wharf. To improve the beach area, the existing ramp columns would be removed to below the surface. Native shoreline vegetation would be planted where conditions are appropriate.

Minor long-term impacts to upper intertidal vegetation at the north end of Smith Cove due to increased shading from the proposed bridge structure. Mitigation measures would be evaluated during 60% design and developed with WSDOT and permitting agencies with jurisdiction.

Stormwater coming off the new bridge would be similar in volume to existing conditions. Currently, stormwater generated by the existing bridge is proposed to be collected by a formal conveyance network including catch basins and then routed through a treatment facility such as an oil and water

separator prior to being discharged to an existing outfall. In the long term, the project would have a potential beneficial effect on all aquatic species using nearshore environment of Smith Cove.

Terrestrial Species and Birds

The existing Magnolia Bridge would be visually surveyed prior to demolition to determine the extent of bat roosting habitat in this structure. The forested habitat at the west end of the proposed bridge would also be visually surveyed prior to construction to determine the extent of bat roosting habitat and presence of other birds in this area. If potential bat roosting habitat is identified by these surveys, WSDOT and SDOT would collaborate to determine ways to mitigate habitat loss in the project area. Potential mitigation could include bridge design measures and use of artificial bat roost sites on the new bridge.

Best management practices for vegetation protection would be included in the construction contract plans and specifications. All substantial trees that would be removed would be identified in accordance with SMC 25.11 and, where feasible, these trees and their drip line would be protected. All disturbed natural areas would be replanted with native species.

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Chapter 5.12 Federally-Listed Species

This project has received federal funding from FHWA and may receive future funding from federal agencies; therefore, consultation under Section 7 of the Endangered Species Act (ESA) is required. This section also describes Essential Fish Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the 1996 Sustainable Fisheries Act (SFA).

Smith Cove

1 Why study Federally-listed species?

Section 7 of the Endangered Species Act (ESA) requires each federal agency to ensure the actions it carries out, authorizes, permits, or funds do not jeopardize the continued existence of any threatened or endangered species. Section 7 requires consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) which administer the ESA for certain types of projects. WSDOT initiated Section 7 consultation with the Services Section FHWA. This was done by preparation and submittal of a Biological Assessment (BA) and was completed in 2009. Consultation was completed with the issuance of a concurrence letter by the Services.

Please refer to the Magnolia Bridge Replacement Wildlife, Fisheries, and Vegetation Discipline Report in Appendix R and Biological Assessment for a complete discussion of the fish and aquatic resources analysis.

Section 7 requires re-initiation of consultation if project conditions changed. Since this consultation concluded, new species and critical habitat have been designated in the project action area. Consultation has been re-initiated for these new species and critical habitat. A new concurrence letter would be issued by the Services at the end of this consultation.

Other federal regulations require similar or additional analysis of impacts to listed species and consultation with the Services. These are Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) and the 1996 Sustainable Fisheries Act (SFA). Compliance with these regulations is also documented in the BA and consultation is completed along with Section 7 consultation.

2 What are the study area boundaries?

The study area boundaries or "action area" under Section 7 include areas that would be directly or indirectly affected by the project. An action area is usually larger than the footprint of the project because it considers the effects of interrelated and interdependent activities. For the Magnolia Bridge, the action area includes both 'in-water' and 'in-air' action areas due to noise impacts and the type of listed species that may occur in in vicinity of the project during construction. The in-water action is large. It extends approximately 12.3 miles. This is as far as underwater sound from pile-driving could travel. There is a possibility that killer whales may occur in this area during project construction. The in-air action area extends 800 feet north of the bridge and 1600 feet water-ward. This is the distance in-air noise generated from construction is expected to travel. Listed bird species may be present in this area during construction.

3 How were Federally-listed species lists obtained?

Species lists were obtained from the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). Based on a review of known populations

What are salmonids?

Salmonids are fish that are members of the family Salmonidae, which includes salmon, trout, char, and whitefish.

and habitat requirements, threatened and endangered plants do not occur in the action area.

Local, state and federal agencies as well as the indian tribes were contacted to obtain up-to-date information on salmonid and marine fish stocks that could be in the vicinity of the study area, their habitat needs, timing of occurrence, and issues important to the Muckleshoot and Suquamish Tribes. Salmonid use of Elliott Bay and the impacts from additional shading received particular emphasis in the impact analysis

4 What Federally-listed species and critical habitat are in the project area?

Listed terrestrial and marine species that may occur in the action area include Puget Sound Chinook salmon, Puget Sound steelhead, bull trout, Boccacio rockfish, Canary rockfish, Yelloweye rockfish, Steller sea lion, southern resident killer whale, and marbled murrelet.

5 How would Federally-listed species and critical habitat be affected by the project?

Potential effects to salmonids include short-term negative effects from noise and turbidity, long-term effects of removal of approximately 200 square feet of intertidal habitat where the bridge foundations would be replaced, and positive effects to water quality from stormwater treatment, removal of creosote-treated wood piles, and increased nearshore light penetration.

The total duration of in-water construction, including pile driving, pile removal, and drilled shaft construction, would be approximately 36 weeks. All in-water impact driving of steel piles for a temporary work bridge, trestles and supports is expected to take place within a one-month period, in November and/or December.

Construction of the temporary work bridge and finger trestles would have short-term (12 to 14 months) effects due to increased shade under the bridge. Due to increased construction activity and noise, listed salmonids would avoid the area.

Summary of Effect Determinations

Exhibit 5.12.1 summarizes the project effects determinations made for Federally-listed species and critical habitat. Consultation was concluded in 2009 for Chinook salmon and critical habitat, steelhead, bull trout and critical habitat, marbled murrelets, killer whales and critical habitat, and Steller sea lions. Consultation has been reinitiated and is ongoing for three species of rockfish and their proposed critical habitat, and proposed critical habitat for steelhead.

Exhibit 5.12-1
Effects Determinations

Species	Status	Effects Determination	Critical Habitat	Critical Habitat Effects Determination
Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*)	Threatened (Puget Sound Evolutionary Significant Unit [ESU])	May affect, not likely to adversely affect	Designated	May affect, not likely to adversely affect
Puget Sound steelhead (*Oncorhynchus mykiss)*	Threatened (Puget Sound Distinct Population Segment [DPS])	May affect, not likely to adversely affect	Proposed	In process
Bull trout (*Salvelinus confluentus*)	Threatened (Coastal-Puget Sound DPS)	May affect, not likely to adversely affect	Designated	May affect, not likely to adversely affect
Steller sea lion (*Eumetopias jubatus*)	Threatened	May affect, not likely to adversely affect	None designated in WA	N/A
Southern resident killer whale (*Orcinus orca*)	Endangered	May affect, not likely to adversely affect	Designated	May affect, not likely to adversely affect
Marbled Murrelet *(Brachyramphus marmoratus)*	Threatened	May affect, not likely to adversely affect	None in project area	N/A
Boccacio rockfish (*Sebastes paucispinis*)	Endangered	In process	Proposed	In process
Canary rockfish (*Sebastes pinniger*)	Threatened	In process	Proposed	In process
Yelloweye rockfish (*Sebastes riberrimus*)	Threatened	In process	Proposed	In process

N/A Not applicable

Sources: NMFS and USFWS concurrence letter, October 15, 2009; HNTB 2014.

6 What is Essential Fish Habitat (EFH) and what species have EFH in Puget Sound?

EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity” (50 CFR 600-905-930). The Biological Assessment (BA)

conducted for the Magnolia Bridge Replacement Project Preferred Alternative includes Essential Fish Habitat consultation (the BA is Appendix T). BA Table B-1 lists the approximately 50 commonly found species and life-history stages with designated EFH in Puget Sound and Elliott Bay. Most of these are groundfish such as flounder, sole and rockfish. There are three Pacific salmon species (Chinook, Coho, and Puget Sound pink) and four coastal pelagic species (anchovy, Pacific sardine, Pacific mackerel, and market squid).

7 How would EFH be affected by the project?

Potential effects on EFH would be the same as those on Federally-listed species. These include short-term negative effects from noise and turbidity, long-term effects of removal of approximately 200 square feet of intertidal habitat where the bridge foundations would be replaced, and positive effects to water quality from stormwater treatment, removal of creosote-treated wood piles, and increased nearshore light penetration.

Construction of the temporary work bridge and finger trestles would have short-term (12 to 14 months) effects due to increased shade under the bridge.

The consultation on EFH was concluded in 2009 with a finding that conservation measures to address ESA concerns are also adequate to avoid, minimize, or otherwise offset potential adverse effects to the EFH of the species listed in the BA.

8 What measures are proposed to avoid or minimize effects to Federally-listed species, critical habitat, and EFH?

During construction

Numerous avoidance, minimization, and conservation measures and best management practices have been included in the project design. The measures are identified in the October 2008 Biological Assessment and include:

- Containment booms would be deployed around the work area to contain any floatable debris or spills that may enter the water.

- Timing windows would be followed for in-water work. The in-water work window for Elliott Bay is July 16 through February 14.
- A bubble curtain would be used to reduce underwater sound pressure levels when an impact hammer is used to drive or proof steel piles. The bubble curtain would completely surround the pile and be adequately weighted to keep the bubble ring resting on the sea floor. The pile shall be completely engulfed in bubbles over the full length of the water column at all times when the impact pile driver is in use. A 9 decibel reduction in sound pressure levels is anticipated from use of the bubble curtain.
- Underwater noise during pile driving would be monitored according to accepted methods as described in WSDOT's Underwater Noise Monitoring Plan template.
- Monitoring within of 1.2 miles of the project site would occur for marine mammals during all vibratory and impact pile driving activities. If an orca or Steller sea lion is located, all pile driving activities would stop until the orcas or Steller sea lions have left the area (Appendix D of Biological Assessment).
- The last sheet pile to close the cofferdam would be driven at low tide to reduce the potential for fish entrapment. Any fish trapped would be removed following Washington State Department of Transportation Fish Removal Protocol and Standards.
- Heavy equipment would be checked daily for petroleum leaks and repairs made as necessary.

During operation

The project would include treatment of all stormwater and is expected to result in a net reduction in pollutant concentrations for pollutants of concern to salmonids and in the discharge of total suspended solids (which carry persistent organic pollutants). The overall project stormwater treatment greatly

reduces the overall pollutant concentrations from the project compared to pre-project conditions (see Chapter 5.10).

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Chapter 5.13 Geology and Soils

This chapter describes the existing geologic and soil conditions in the project area, potential effects from the project, and potential avoidance, minimization and mitigation measures. Additional information on geology and soils can be found in the Geology and Soils Discipline Report in Appendix G.

1 Why study geology and soils?

The geology and soils within a proposed project site are considered in an environmental document for three main reasons:

- They influence the type and size of foundation required for structures, which, in turn, affects the project footprint, noise level, and amount of ground disturbance created by construction equipment, and they determine the volume of excavation required.
- The composition, location relative to the water table, and density of soils that would be excavated determine the suitability of the soils for reuse as fill on the project. The suitability of soil for reuse affects truck traffic beyond the project boundaries and space available for placement of waste or excess fill.

- The presence of geologic hazards (such as active seismic vulnerability and the potential for liquefaction) increases the mitigation costs for the project. Unmitigated hazards may pose risks to the users of the facility, adjacent landowners, and the aquatic environment.

2 What is the project study area?

The study area for the project extends approximately from the southern edge of Piers 90 and 91 to West Dravus Street on the north. The eastern boundary of the study area is West 13th Street. The western boundary of the study area is West Galer Street and Thorndyke Avenue West.

3 What is the geology of the study area?

Geologic Setting

The New Magnolia Bridge would extend across Interbay, a north-trending topographic trough bounded by Magnolia Bluff on the west and Queen Anne Hill on the east. The bordering uplands are made up of very dense and hard soils laid down during the advance and retreat of several glaciers. The Interbay trough is made up of much weaker glacial, beach, and estuary deposits laid down since the last retreat of glacial ice approximately 13,500 years ago.

Please refer to the Magnolia Bridge Replacement Geology and Soils Discipline Report in Appendix G for a complete discussion of geology and soils analysis.

Since the late 1800s, the Interbay area (specifically Smith Cove) has been filled by humans with various materials. These weak soils in Interbay are underlain by more competent, glacial soils. The depth to these more competent soils varies considerably along and in the vicinity of the existing bridge and proposed New Magnolia Bridge.

Geologic Hazards

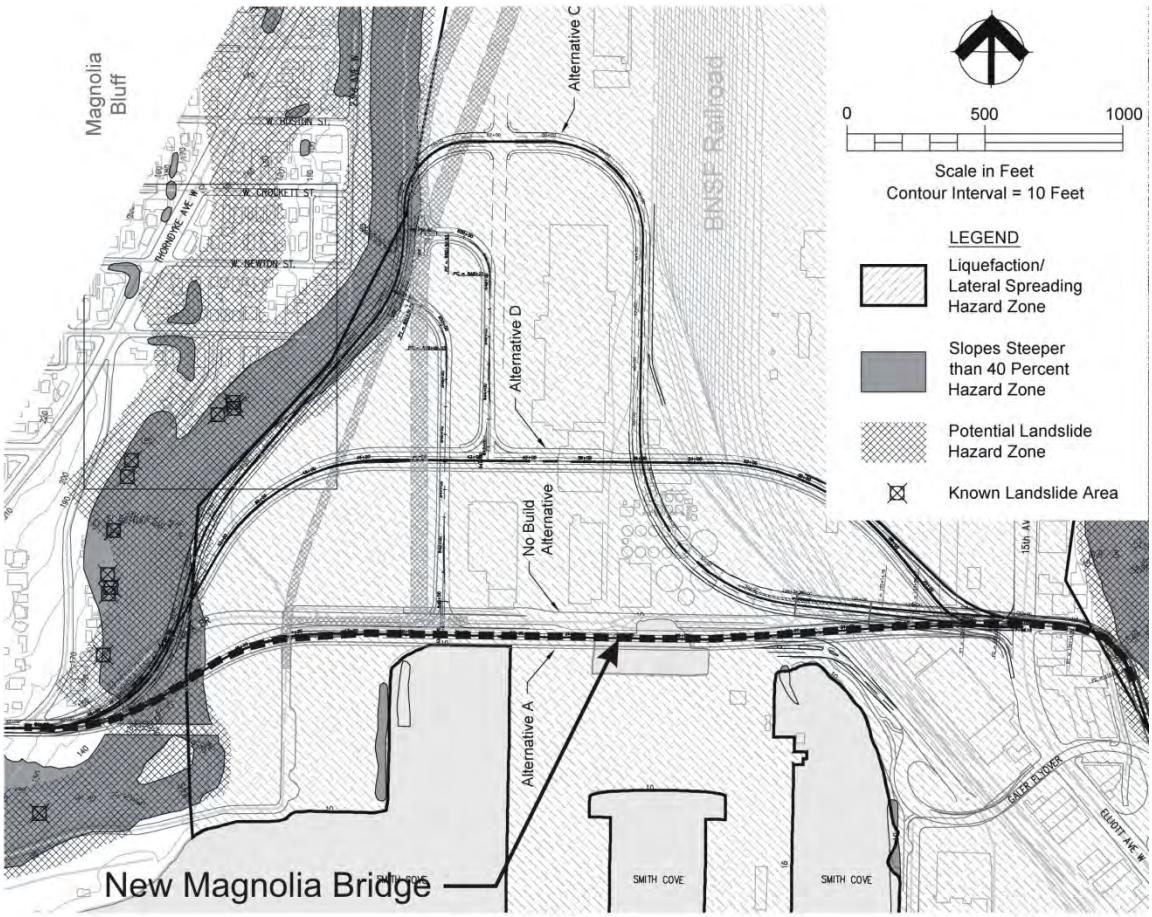
The project area has been subjected to numerous earthquakes of low to moderate intensity and occasionally to strong shocks during the brief 180-year written, historical record in the Pacific Northwest. The geologic hazards caused by earthquakes that may affect the project include strong ground motion, liquefaction (and its related effects including lateral spreading),

What is liquefaction?

Soils may liquefy during an earthquake when ground movements cause loose, saturated soils to lose strength, essentially becoming a heavy liquid and loosing ability to support structure foundations.

and landslides. Other non-earthquake-related hazards, such as landslides and erosion, could also occur. Exhibit 5.13-1 shows areas susceptible to landslides and soil liquefaction.

Exhibit 5.13-1
Landslide and Loose Soil Areas



Source: Draft Geology and Soils Discipline Report. Seattle Department of Transportation. February 2005. Figure 24.

4 What soils are found in the study area?

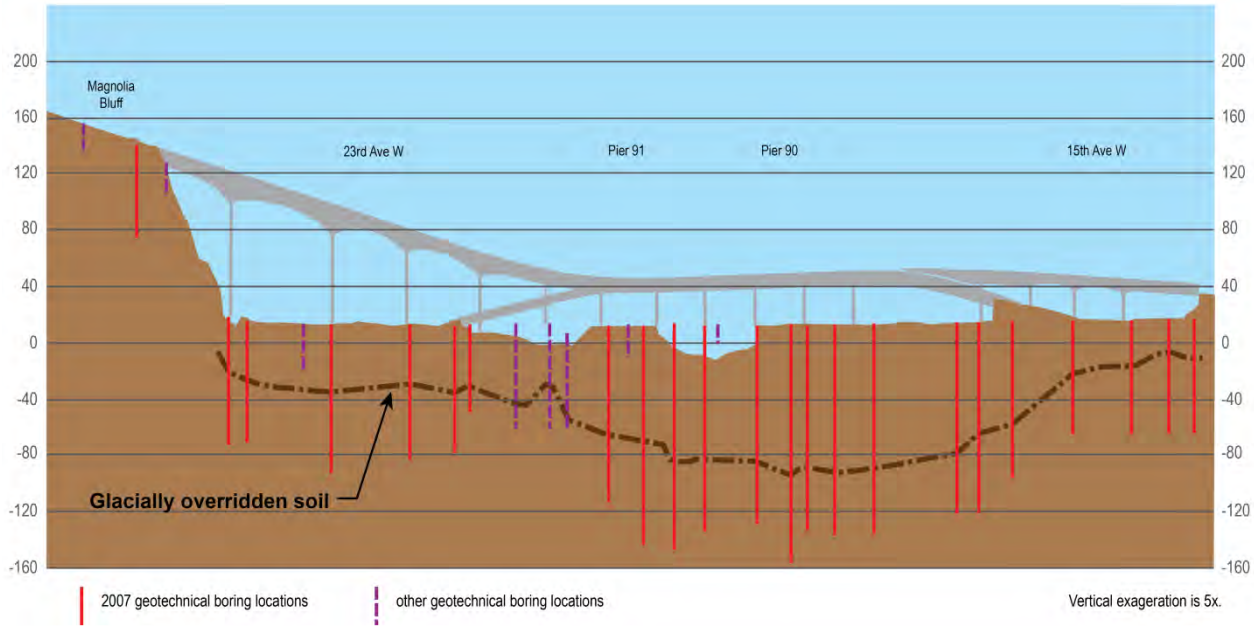
The upper layer of soil along the bridge alignment, typically within 4 to 25 feet of the surface, is fill material between the historic shorelines east of 15th Avenue West near the east end of West Garfield Street and the toe of the Magnolia Bluff slope near the west end of the existing bridge. Underneath this fill material are beach and estuary deposits, along with material from landslides, laid down since the retreat of glaciers about 13,500 years ago. There are much harder glacial soils below

What is lateral spreading?

When underlying soils liquefy, the upper layer of soil may move horizontally downslope—particularly near the base of a hill. This may displace foundations and structure supports, causing collapse.

these deposits. The depth from the surface to the hard glacial soils is typically 30 to 40 feet near the former shoreline to 100 feet or more from the BNSF Railway to Pier 91. shows a profile view of the geology along the New Magnolia Bridge alignment.

Exhibit 5.13-2
Geology Profile in the Study Area



Looking north with Magnolia Bluff on the left and 15th Avenue West on the right.
Source: Adapted from Shannon and Wilson, 2008.

5 How were geology and soils evaluated for the Magnolia Bridge Replacement Project?

Information about the study area geology and soils was obtained from available reports and studies, and a field survey of slope conditions. New subsurface explorations were performed by drilling and obtaining soil samples. Sources for existing reports and studies were the City of Seattle departments, the Seattle-area Geologic Mapping project office, and the Port of Seattle. Published geologic maps, other documents, and information on existing building foundations were also reviewed.

6 What are the impacts to geology and soils and measures to avoid or minimize these effects?

Slope Stability and Landslide Areas

Cuts into existing slopes can result in slope instability. Retaining walls would be used to support the cuts and the soil slopes behind the cuts. The wall designs would be based on subsurface information and standard design procedures.

What is a landslide?

A landslide is the sudden release of a mass of rock and earth down a slope.

Soft Soils and Settlement

Settlement of fill approaches can impact underlying and adjacent structures or utilities as well as walls or structures constructed on the fill. Settlement impacts can be mitigated by several methods, including preloading, use of mechanically-stabilized earth (MSE) walls, construction sequencing, ground improvement, or use of lightweight fill. Affected utilities may be relocated. Utility relocations would be determined in final design.

What are geotextiles?

Geotextiles are sheets made of woven or mesh synthetic fibers. When placed between layers of soil, these sheets aid in reinforcing and holding the soil together.

Downdrag caused by ground settlement can result in additional loads and potential damage to existing buried foundations and new deep foundations. New deep foundations can be designed to accommodate the downdrag loads, or construction sequencing can be used so that the foundations are installed after most of the settlement has occurred. Existing foundations would be evaluated for the settlement-induced downdrag loads. Mitigation measures such as use of ground improvement would be considered.

What is downdrag?

Downdrag happens when settling soils pull down on the outside surface of underground foundations.

Earthquake

A “design” earthquake could occur at any time during the life of the New Magnolia Bridge causing liquefaction, lateral spreading, and landslides. Geotechnical borings and engineering studies have been conducted during final design. These studies estimated the potential for liquefaction and lateral spreading and were used for structural design and recommendations for areas of soil improvement.

Soil improvement would be necessary along the majority of the Preferred Alternative alignment to depths as much as 55 feet

below the existing ground surface .This would mitigate liquefaction and lateral spreading that could result from the 1,000-year return period design level ground motions of the design earthquake.

7 What are the construction impacts to geology and soils and measures to avoid or minimize these effects?

Landslides

Placing fill material over soft soil can cause slope instability. Short-term soil stability would be improved by using staged construction and geotextiles. Monitoring the amount of soft soil compaction beneath a layer of fill would determine when additional fill can be added in stages. Lightweight fill material can be used in areas where staged construction is not feasible.

Noise and Vibration

The installation of driven pile or drilled shaft foundations and some soil improvement methods can cause vibrations that would impact adjacent facilities. Low vibration pile driving equipment can be used to reduce vibration levels. Driving open-ended piles or pre-drilling a near-surface hole prior to pile driving can also reduce vibration levels. Low vibration drilled shaft equipment (such as an oscillator) can also be used to reduce vibration levels. Soil improvement methods such as compaction grouting or cement deep soil mixing have lower vibration impacts than other methods. Construction noise is discussed in Chapter 5.2.

Erosion

Erosion from areas with cuts, fills, excavations, and any soil improvement installation disturbance can cause increased sediment movement onto other areas of the project, into stormwater drains, and into Smith Cove.

Temporary erosion and sediment control plans would be prepared in accordance with City of Seattle best management practices (BMPs). Cleared or graded areas can be covered with jute or other netting, mulch or hydroseeding. Parking and

staging areas for vehicles and equipment can be covered with a gravel work pad. Silt fences or straw bales would be placed around disturbed areas to filter sediment from surface water runoff. See Chapter 5.10 for a discussion of water quality.

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Chapter 5.14 Hazardous Materials

This chapter summarizes the results of the Hazardous Materials Discipline Report and soil groundwater and sediment characterization studies form nearby properties. Additional information on can be found in the Hazardous Materials Discipline Report in Appendix H.

1 How were hazardous materials and wastes identified within the study area?

Please refer to the Magnolia Bridge Replacement Hazardous Materials Discipline Report in Appendix H on (CD) for a complete discussion of the hazardous materials analysis.

Historic records for the project area were reviewed along with local, state, and federal environmental databases to identify former and current land uses that could result in contamination of soil and/or groundwater along the New Magnolia Bridge alignment. Initial review found approximately 600 identified sites in various databases or reports. Most of the properties were eliminated as potential concerns because they:

- had been cleaned up and/or contamination is unlikely to migrate toward the project area;
- were not listed on databases that indicate contamination is present; and/or
- were considered to be located at a sufficient distance from the project area so as not to pose a risk.

What are "substantially contaminated" properties?

"Substantially contaminated" properties typically refer to sites with large volumes of contaminated materials, a long history of industrial or commercial use, and sites with contaminants that are persistent, difficult, or expensive to manage.

A visual survey was made to identify any current uses in the project corridor likely to involve the use, treatment, storage, or disposal of hazardous materials and to verify the location of sites identified from the regulatory review. All observations were from public areas.

2 Are there any potentially contaminated sites in the study area?

Twenty-eight sites were considered to pose some risk to the project and were retained for further evaluation. These sites included metal manufacturers, junk and wrecking yards, auto repair shops, gasoline stations/bulk fuel distributors, print shops, laundries, bulk fuel terminals, railroads, and other industrial sites. Properties adjacent to the proposed project that store or have stored heating oil were also included. Nineteen of the 28 sites are on or adjacent to the New Magnolia Bridge alignment. Exhibit 5.14-1 shows the 28 site locations and Exhibit 5.14-2 describes the sites.

3 Would the project affect any hazardous materials sites?

The project would acquire right-of-way from or be near property that is substantially contaminated or reasonably predicted to be contaminated. Contaminated soil and groundwater may exist from previous activities on the acquired property and from the movement of contaminated groundwater from off-site properties. Project foundation construction and utility construction could encounter contaminated groundwater and soil.

What are "reasonably predictable" properties?

"Reasonably predictable" properties refer to sites with recognized environmental conditions based on existing data, or they can be predicted to have those conditions based on site observations, previous experience or by using best professional judgment. Common examples of reasonably predictable sites might include a dry cleaning business or a former gas station.

4 What measures are proposed to avoid or minimize effects from hazardous materials?

During construction

Known or Suspected Contamination within the Project Right-of-Way

SDOT anticipates acquiring rights-of-way and/or easements on parcels that may be contaminated with hazardous materials that are not considered reasonably predictable to remedy. Prior to acquiring contaminated parcels, site investigations would be conducted to determine the location and extent of contamination. Site cleanup would be completed prior to or during construction.

Exhibit 5.14-1

Known or Potentially Contaminated Sites of Concern Adjacent to the Project

Exhibit 5.14-2

Sites of Concern

Site No.	Site Name	Site Address	Proximity to Project	Site Concerns	Contamination	Risk Analysis
1-4	Single Family Residences	1502 Thorndyke Ave 2608 W Galer St 2600 W Galer St 1500 Magnolia Way	Adjacent to north	Residential heating oil	Potential soil and/or ground water	Low impact; No excavation or acquisition
5	City of Seattle (West Yard)	1450 23rd Ave W	Coincident, adjacent to south	History of industrial uses	Known soil and ground water	Moderate impact Partial acquisition, excavation
6	King County (West Yard)	1500 23rd Ave W	Adjacent to south	History of industrial uses	Known soil and ground water	Low impact; No excavation or acquisition
7	Port of Seattle Terminal 91	2001 W Garfield St Terminal 91 Tank Farm Lease Parcel	Coincident, adjacent to north and south	Heavy industrial use	Known soil and ground water	High impact; Partial acquisition, excavation
8	Port of Seattle Terminal 91	2001 W Garfield St Terminal 91 Short Fill Area	Coincident, adjacent to south	Heavy industrial use	Known sediment contamination	High impact; Partial acquisition, excavation
9	Burlington Northern Santa Fe Railway	2201 W Armory Way	Coincident, adjacent to north and south	Heavy industrial use	Potential soil and/or ground water	Moderate impact; Excavation, no acquisition
10	Burlington Northern Santa Fe Railway	2601 20th Ave W	Coincident, adjacent to north	Heavy industrial use	Known soil, potential ground water	Moderate impact; Excavation, partial acquisition
11	Metro Interbay Pump Station	1601 W Garfield St	Adjacent to south	Wastewater pump station	Potential	Moderate impact; No excavation or acquisition
12	Elliott Industrial Park/Samis Property	1523 Elliott Ave W 1541 Elliott Ave W	Adjacent to south	Former petroleum distribution, service station(s), auto wrecking and repair	Known soil and ground water	Moderate impact; No excavation or acquisition
13	Precision Motorworks	1501 Elliott Ave W	About 300 ft. to south	Former petroleum distribution, service station(s), battery store	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
14	Commercial property	1451 Elliott Ave W	About 400 ft. to south	Former petroleum distribution	Potential soil and/or ground water	Low impact; No excavation or acquisition

15	1448 Elliott Ave W	1448 Elliott Ave W	About Adjacent to south	Auto garage	Potential soil and/or ground water	Low impact; No excavation or acquisition
16	Builders Hardware Supply	1516 15th Ave W	Adjacent to southwest	Former service station and machine shop	Potential soil and/or ground water	Low impact; No excavation or acquisition
17	Bedrock Supply	1401 W Garfield St	Adjacent to south	Former service station, steel and iron works site	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
18	Lighthouse Uniforms	1532 15th Ave W 1415 W Garfield St	Adjacent to south	Former dry cleaners, UST	Potential soil and/or ground water	Substantially Contaminated
19	Vacant commercial property	1534 15th Ave W	Adjacent to south	Former service station	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
20	Vacant commercial property	No address	Adjacent to southwest	Former dry cleaners, steel manufacturer	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
21	SPCC (formerly Rudd Paint)	1602-1630 15th Ave W	Adjacent to north	Former paint manufacturer	Known, granted “No Further Action” status	Low impact; No excavation or acquisition
22	EZ Storage	1634 15th Ave W	About 400 ft. to north	Former “insect powder” manufacturer	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
23	Car Wash Enterprises	1800 15th Ave W	About 500 ft. to north	Current/former gas station	Known soil and ground water	Low impact; No excavation or acquisition
24	Part of former Tsubota Steel	1805 15th Ave W	About 500 ft. to north	Former heavy industrial, former dry cleaner	Potential soil and/or ground water	Low impact; No excavation or acquisition
25	Joseph Smith Estates / Triad Interbay LLC	1631-1801 15th Ave W	About 200 ft. to north	Former heavy industrial, former boat repair	Known soil and ground water	Low impact; No excavation or acquisition
26	Part of former Tsubota Steel	1601-1621 15th Ave W	About 50 ft. to north	Truck and bus maintenance garage - UST	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
27	Part of former Tsubota Steel	1601 15th Ave W	Adjacent to north	Former used car lot, and bus and truck maintenance	Potential soil and/or ground water	Moderate impact; No excavation or acquisition
28	Washington National Guard	1600 W Armory Way	Adjacent to north	Military staging and supply	Potential soil and/or ground water	Moderate impact; No excavation or acquisition

Source: Appendix H – Hazardous Materials Discipline Report, Table 1

The existing bridge likely has lead-based paint. Lead-based paint can pose a health risk during demolition when lead particles can become airborne and be inhaled or ingested. Lead-painted metal may be recycled.

Buildings and structures to be demolished may contain lead-based paint and asbestos-containing building materials. These include the FAA equipment shed near the bridge west approach, a portion of the Terminal 91 Center Gate guard shack, and the Anthony's Seafood Distributing loading area connected to the existing bridge. Buildings would be surveyed prior to demolition to determine if any asbestos-containing building material or lead-based paint would be affected by the demolition.

Known or Suspected Contamination Outside of the Project Right-of-Way

Contaminated soils and groundwater, resulting from contaminant migration from existing off-site properties or historic properties located in the vicinity of the alignment, may be encountered during construction of the New Magnolia Bridge. Site investigations would be performed in potentially contaminated areas where excavation is proposed to determine the location and extent of any contamination. Where feasible, the amount of contamination would be minimized by using driven piles instead of auger cast piles for bridge foundations. Any contaminated soil or groundwater that is encountered would be analyzed to assess the regulatory classification of the soil/groundwater and the most cost-effective remediation strategy developed. SDOT would ensure that the contractor disposes of all contaminated soil and water encountered during construction per applicable state and local laws so that risk to environment and personnel is minimized.

Contamination can be spread as a result of construction. For example, new groundwater migration pathways can be created during drilling activities or construction of underground utility corridors. Construction planning would include the development of spill prevention, control, and countermeasure

plans, erosion and sedimentation control plans, and plans for the handling and disposal of known and anticipated contaminants according to City of Seattle Standard Specifications for Road, Bridge, and Municipal Construction Sections 1-07.5 and 1-07.13 through 1-07.30)

Unknown Contamination

If contamination is discovered during construction, the contractor would suspend work in the vicinity of the area of concern and follow SDOT procedures set in Seattle Standard Specifications 1-07.30 for identifying and managing wastes. Appropriate sampling and disposal methods would be employed to minimize environmental risks.

Worker and Public Health and Safety

Individuals on the project construction site would be apprised of the possibility of encountering known or predicted contaminants and the locations of potentially contaminated areas. Site-specific health and safety training that describes monitoring requirements and the use of personal protective equipment would be necessary. Workers would be trained in recognizing potential contamination and reporting procedures. Contractors who are likely to encounter known or unknown contamination would be required to demonstrate their ability to identify these situations and respond quickly to avoid contaminant migration to public areas.

Hazardous Materials Spills During Construction

Spill Prevention, Control, and Countermeasure (SPCC) plans, erosion and sedimentation control plans, and plans for the handling and disposal of known and anticipated contamination would be developed following City of Seattle Standard Specifications that prescribe procedures and best management practices, for during construction.

The Spill Plan required for construction would address steps that would be taken to minimize impact of vehicle accidents that could result Vehicle accidents can result in spills of hazardous materials. The contractor would construct stormwater and wastewater and water quality treatment

facilities and soils handling facilities as needed to properly handle wastes during construction would be constructed to collect and retain pollutants from truck and automobile traffic. These facilities would decrease the potential for off-site migration of contaminants.

Hazardous Materials Spills on the New Bridge

Vehicle accidents could result in spills of hazardous materials. SDOT Safety office responds to roadway spills. SDOT crews cleanup the spills or engage a spill response contractor to minimize and respond to all roadway spills. The drainage on the bridge would be designed with to comply with stormwater code so that road pollutants would be mitigated to the extent feasible. Stormwater and water quality treatment facilities would be constructed to collect and retain pollutants from traffic on the bridge. These facilities would decrease the potential for off-site migration of contaminants. See Chapter 5.10 for additional information on water quality.

Chapter 6 Cumulative Effects

Cumulative effects are important to consider during the construction of and opening of a project. While they may be minor when viewed in the individual context of direct[28] and indirect[29] effects, they can add to the effects of other actions and eventually lead to a measurable environmental change.

1 What are cumulative effects and why do we study them?

Cumulative effects are the incremental effects of an action on the environment when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative effects can result from actions that are individually minor, but may be significant taken together over a period of time. Cumulative effects are evaluated in order to determine the overall impact on environmental resources from an accumulation of past, present, and reasonably foreseeable actions. Not all environmental resources affected by an action would have cumulative effects or would require cumulative effect analysis.

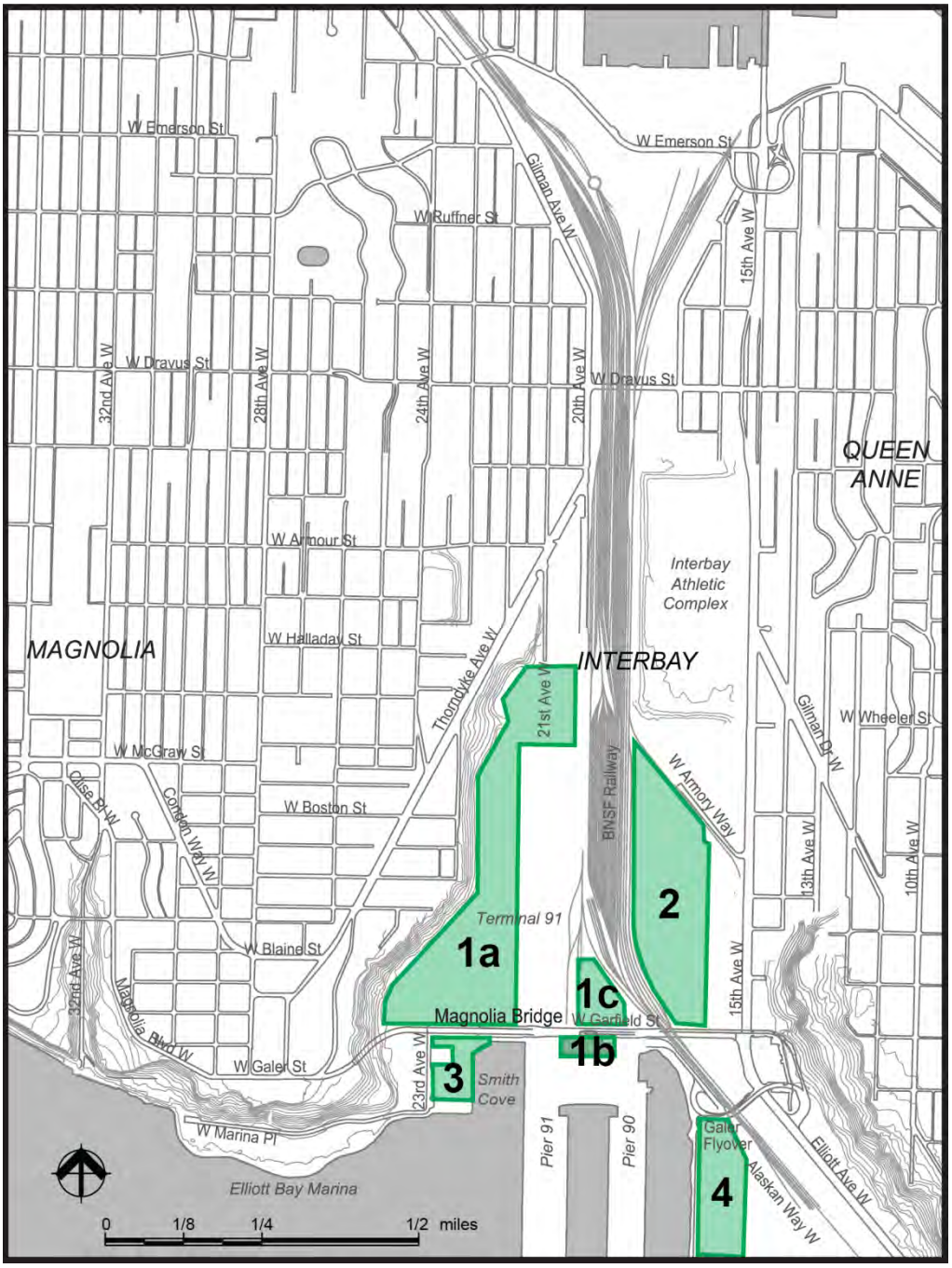
Please refer to all of the Magnolia Bridge Replacement discipline reports in Appendices E through S (on CD) for complete discussions of the cumulative impacts of each discipline.

[28] Effect caused by the proposed action and occurring at the same time and place.

[29] Effect caused by the proposed action that is later in time or farther removed in distance, but still reasonably foreseeable.

Exhibit 6-1

Other Projects in the Study Area



2 What are the temporal and geographic boundaries for this analysis?

The Preferred Alternative was evaluated for traffic operations in the year 2036. This year corresponds to approximately twenty years after construction was proposed to begin. It is near the mid-point of the regional land use and transportation planning model forecasts for 2030 and 2040. This 2036 analysis year is used for cumulative impacts related to employment and population changes. The geographic boundary for cumulative impact analysis corresponds to the study area depicted in Exhibit 6-1.

3 What other projects are included in the cumulative effects analysis?

Five studies and/or projects in vicinity to the project were included in the analysis of cumulative effects. They are described below and shown in Exhibit 6-1.

Terminal 91 Development Options Study

The Port of Seattle has studied development options for the 30 acres of upland Terminal 91 that is considered surplus to marine and industrial use. Market conditions at the time of the 2010 real estate market analysis showed the current highest and best use was continued use for yard storage of equipment and vehicles. In the future, there may be a demand for more intensive uses allowed under the IG1 zoning. Most of the surplus area is labeled “1a” in Exhibit 6-1. Two smaller areas labeled “1b” and “1c” may also be available for redevelopment. Area 1b is a 1.2-acres area of small of open water, Lake Jacobs, between the Piers 90 and 91 “Short Fill” and 91 and the existing bridge. This area would likely be filled when the existing bridge is removed. Area 1c is approximately four acres that was occupied by the tank farm removed in 2005.

The New Magnolia Bridge has been analyzed for the future development that is allowed on the Terminal 91 site under current industrial zoning and with non-industrial building heights limited to 45 feet.

Washington Army National Guard Armory Site

The 26 acre Armory Site is in current by State of Washington Army National Guard (Exhibit 6-1 label "2"). It is within the Ballard-Interbay-Northend Manufacturing and Industrial Center (BINMIC) planning area and has industrial (IG2) zoning. The site was reviewed in the Ballard to Interbay Land Use Corridor Study conducted in 2013 for potential future zoning change to allow mixed uses including manufacturing. No change was recommended for the 2014 comprehensive plan amendments.

West Yard Park Expansion

The Seattle Parks and Recreation acquired a 4.60 acre Terminal 91 West Yard property from the Port of Seattle in late 2013. The site includes the 1.12-acre waterfront park site at the south end of the property. The remainder of the property (Exhibit 6-1, label "3") would be land banked for future development of a waterfront park.

Amgen Helix Campus Expansion

Amgen is a biotech firm located in several buildings on a 40-acre site bounded by West Galer Street, Alaskan Way West and 16th Avenue West. Amgen currently has about 750 employees at the site. In 2006 the firm announced plans to add a total of 550,000 square feet of new office and lab space on the campus with the capacity to house up to 750 new employees. The project was later cancelled and as of December 2013 there are no pending expansion plans for the Helix Campus. The campus expansion area is labeled "4" on Exhibit 6-1.

Amgen traffic uses Alaskan Way West and the Galer Flyover for access to Elliott Avenue West. Traffic and air quality analyses for the New Magnolia Bridge have used employment and traffic forecasts for Amgen. Recent traffic count data for Amgen shows that vehicle trips generated by the campus are at a lower rate per employee than assumed in the traffic impact studies.

Port of Seattle Smith Cove Cruise Terminal at Pier 91

The Port of Seattle is relocated the cruise ship terminal from Terminal 30, south of downtown Seattle, to Terminal 91 where cruise ships use berths and a passenger terminal at the south end of Pier 91. Cruise passenger parking is located in surface lots in the upland area of Terminal 91, north of the existing Magnolia Bridge. The cruise terminal began operation in May 2009. The 2013 May 1 through September 30 season had 137 cruise ship calls at Terminal 91.

Because this facility is in operation, it is not shown on Exhibit 6-1 as a future project.

4 How would construction of the Magnolia Bridge contribute to cumulative effects?

If construction of the New Magnolia Bridge coincides with the construction of any of the other projects in the study area, their combined impacts could be a higher intensity over a longer period. Construction of the New Magnolia Bridge would not start any earlier than 2016 and would continue through 2019 or later.

The following specific considerations, by discipline, would need to be addressed.

Traffic and Transportation

Traffic analyses were conducted in 2004 for 2010 (opening) and 2030 (design) analysis years. Forecasts made at that time were based on employment levels assuming redevelopment within Terminal 91, the Armory site and other properties in the 15th Avenue West corridor, and full development of the Amgen Helix Campus. Employment growth in Terminal 91 was forecast at a 2.9 percent annual rate between 2010 and 2030. A 4.3 percent annual employment growth rate was forecast for the properties in the area between West Wheeler Street and West Prospect Street and between 15th Avenue West/Elliot Avenue West and Terminal 91.

With the Great Recession of 2007 to 2009, many development projects were put on hold or cancelled. A review of current

traffic forecast models indicates that the new 2036 project design year would not have substantially different traffic volumes than the 2030 forecasts made in 2004.

Existing traffic patterns would be maintained as long as possible during New Magnolia Bridge construction. We estimate that traffic detours would be needed for between 14 and 20 months when the east section of the bridge is built. Traffic detours assume that Amgen traffic would continue using the Galer Flyover along with Terminal 91 cruise terminal and truck traffic. Traffic forecasts and operations during the construction period would be revised as necessary to account for the status of these projects.

Cruise terminal traffic is oriented to weekend periods and would generally not coincide with peak weekday commuting periods. Information from the analyses prepared for the cruise terminal project and for monitoring of Terminal 91 traffic will be used for the New Magnolia Bridge traffic planning for the construction period.

Noise

Magnolia Bridge construction noise could have an effect on adjacent new Terminal 91 development if it is close to the bridge construction site. Buildings closest to Magnolia Bluff may be the most sensitive because they would be furthest from the noise-generating railroad operations and industrial activities and traffic. At the present time, any new buildings would be in an industrial land use zone and construction noise would be limited to Seattle noise ordinance sound levels for industrial receiving properties and an industrial generating source.

Communities, Neighborhoods, and Businesses

The Magnolia Chamber of Commerce represents many of the Magnolia Village businesses located in south central Magnolia. The Chamber of Commerce is concerned that the bridge closure during construction with detours that add travel time and distance would discourage non-residents from patronizing Magnolia businesses. The other projects could result in some

short-term increase in traffic congestion during construction, but not to the extent of the Magnolia Bridge construction.

Recreational and Cultural Resources

North Bay and Amgen have the potential to bring greater numbers of employees into the study area and the Interbay Neighborhood Association master plan proposal would increase residential density in the West Dravus Street corridor. This could incrementally increase the demand for local park and recreation facilities. The Elliott Bay/Terminal 91 Trail crosses the Magnolia Bridge corridor at two locations. These crossings would be maintained for public access during bridge construction.

The North Bay project and others in Interbay have the potential to encounter buried cultural artifacts during construction.

Air Quality

The North Bay site and the south end of the 15th Avenue West Development site coincide with or are next to portions of the Magnolia Bridge project. There may be cumulative air quality effects if adjacent sites are under construction at the same time. The total amount of exposed earth from multiple projects may need to be considered in preparing dust control plans to minimize exposure of area residents and workers to particulates.

5 What contribution to cumulative effects would result from the project?

Visual Quality

The New Magnolia Bridge would cross the north end of the Seattle Parks and Recreation West Yard property. The bridge is anticipated to be located in an easement on this property. Development of the West Yard site as a waterfront open space area would be done in conjunction with a joint development agreement between Parks and Recreation and the Seattle Department of Transportation. This agreement may consider park access and landscaping treatment adjacent to the park property.

New development in Terminal 91 would have a 45-foot height limit under the existing IG1 zoning. The new bridge would be at or close to the same height as the existing bridge. Bridge users would not have views to the south, towards the waterfront, blocked by new development, except for potentially in the area between Pier 90 and 91 if buildings are located in the area labeled "1b" on Exhibit 6-1. The new bridge roadway would be about 35 feet above the existing ground.

Water Resources

Area projects south of about West Dravus Street drain to Elliott Bay. Projects would generally not increase the amount of impervious surface and stormwater runoff. Projects would be required to meet current standards for water quality and treatment would improve the quality of runoff to Elliott Bay. The Magnolia Bridge project would not induce development that would not occur if the bridge were not replaced.

Wildlife, Fisheries and Vegetation

Terminal 91 development would increase traffic and human activity near habitat areas including the Magnolia Bluff green belt open space and the Smith Cove shoreline. This would further discourage even temporary or transient use of the area by fish and wildlife. Amgen development along Smith Cove Waterway would have a similar effect.

6 What measures are proposed to minimize cumulative effects?

Cumulative effects would be minimized through careful scheduling of construction with an emphasis on environmental controls. Best management practices would be utilized throughout the study area.

Traffic control plans would consider the effect of other projects construction and operations traffic on detour routes.

Project design would consider the location of adjacent development and its compatibility with bridge types, aesthetic treatments, lighting, and pedestrian access.

Chapter 7 Mitigation

This chapter summarizes measures to avoid and mitigate adverse effects during the construction and operation of the New Magnolia Bridge

1 What measures would be taken to avoid or minimize construction effects?

Mitigation measures are included at the end of each section in Chapter 5. Exhibit 7-1 summarizes these commitments.

Exhibit 7-1

Mitigation Commitments

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
3	Developing the Alternatives	Ensuring Inclusive Outreach and Public Engagement	Conducting public open houses, attending community meetings, producing newsletters, and updating and maintaining the project website. Provide translated newsletter and project information on the project website. Conducting presentations to and meeting with interested parties. Providing notice of a public hearing in local newspapers: The Seattle Times, The Daily Journal of Commerce, and The Queen Anne, Magnolia News, and local media outlets that provide news and information to Asian and Hispanic communities. Developing an Inclusive Outreach and Public Engagement (IOPE) Plan following the City of Seattle IOPE Guide which includes identifying the racial and ethnic composition of the project area and developing outreach strategies to include these populations. Limited English Proficiency populations would be identified and materials (e.g., meeting notices, mailings, newsletters, project website) translated into other languages following City of Seattle Translation and Interpretation Policy (Executive Order 01-07). Strategies for including LEP individuals would be included in the IOPE Plan. SDOT will work with the Seattle Office of Civil Rights and Disability Rights Washington to develop strategies for identifying and reaching out to	SDOT	Final Design & Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			persons with disabilities within the project area. SDOT will ensure that public meetings, open houses and hearings are all ADA accessible, can accommodate wheelchairs, and can provide other accommodations upon request. Working with businesses in vicinity of the project to identify information needs of employees with limited English proficiency and providing them with translated materials (e.g., flyers, posters, e-mail). Working with community based organizations that engage underserved populations including the Washington Council of the Blind, United Blind of Seattle, Queen Anne Helpline, Society of St. Vincent de Paul, Creative Living Services, United Indians of all Tribes Foundation, Elderhealth Northwest, and Northwest Center. Providing translators at public meetings.		
5.1	Traffic and Transportation	Traffic Detours	Three types of detours may be used to handle traffic during bridge construction: existing city streets; new surface streets through Terminal 91; and staged construction and temporary ramps to keep traffic in the existing corridor. The actual detours would be determined when final design is completed and construction is scheduled.	SDOT and Contractor	Construction
		Freight Movements	Truck movements in and out of Terminal 91 would continue to use the Galer Flyover access from Elliott Avenue West and the Terminal 91 East Gate at the	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			north end of Alaskan Way West. The Galer Flyover and Alaskan Way West may be used as a detour route for access to the Terminal 91 surface route to 21st Avenue West and Thorndyke Avenue West. The detour route would be designed and operated to maintain truck access to Terminal 91 businesses. Terminal 91 businesses require traffic circulation between Piers 90 and 91 south of the bridge and cold storage and processing operations north of the bridge. Traffic maintenance plans, developed in cooperation with the Port of Seattle Terminal 91 businesses, would maintain this access throughout the construction period.		
		Public Transit	Transit service to the Terminal 91 complex during construction would be maintained. This may be done by re-routing transit service or by providing shuttle vehicles to bring transit passengers between 15th Avenue West bus stops and the complex. This decision would be made prior to completion of final design.	SDOT and King County Metro	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
		Construction Parking	Parking for construction workers may be provided at Port properties adjacent to the project. City rights-of-way and easements may also be available for construction workforce parking. Additional enforcement of the residential parking permit restrictions on Magnolia Bluff near the west end of the bridge may necessary if construction-related parking is observed to occur in the neighborhood.	SDOT and Contractor	Construction
		Bicycles and Pedestrians	The existing stairways would be replaced. In addition, ADA complaint structures such as ramps, elevators or lifts will be developed during the next stage of design to provide access to the bridge comparable to the stairways.	SDOT	Final Design
5.2	Noise	Construction Noise	To reduce construction noise at nearby receptors, the following measures would be incorporated into construction plans and specifications: Limiting the noisiest construction activities, such as pile driving, to between 7 AM and 10 PM to reduce construction noise levels during sensitive nighttime hours Outfitting construction equipment engines with adequate mufflers, intake silencers, and engine enclosures to reduce their noise by 5 to 10 dBA (US EPA, 1971) Turning off construction equipment during prolonged periods of nonuse to eliminate noise Requiring contractors to maintain all equipment and	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			train their equipment operators in practices to reduce noise levels Locating stationary equipment away from receiving properties to decrease noise Requiring contractors to use OSHA-approved ambient sound-sensing backup alarms that could reduce disturbances from backup alarms during quieter periods		
5.3	Land Use Patterns		Construction in critical areas would need to meet the requirements of SMC Section 25.09. Before construction affecting property access begins, a construction management plan would be prepared to manage construction traffic in the vicinity of the project. This plan would include, in part, providing advanced notice to local businesses of construction activities and stipulating detour routes and parking locations. To mitigate construction impacts to specific businesses and residences under all alternatives, a public interaction plan for construction activities would be prepared. This plan could include public notices and mailings to affected businesses and nearby residences about the scope of construction work, likely impacts, and access issues.	SDOT and Contractor	Construction
5.4	Communities, Neighborhoods & Businesses	Communities & Neighborhoods	The contractor would be required to prepare and implement an SDOT approved Traffic Management Plan (TMP). Detour routes would be provided and	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			clearly marked with signs. The TMP would be implemented and coordinated with all emergency service organizations prior to any construction activity. The contractor would coordinate with utility providers prior to construction to identify conflicts and resolve the conflicts prior to or during construction.		
		Businesses	The contractor would be required to maintain access to businesses throughout the construction period. Anthony's Seafood Distributing would be relocated or alternate access to its existing location would be provided prior to loss of access from the existing Magnolia Bridge. Owners of displaced business properties would be compensated at fair market value without discrimination in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compensation would include relocation costs for Anthony's Seafood Distributing if this business relocates.	SDOT and Contractor	Construction
5.5	Cultural and Archaeological Resources	Admiral's House & Inadvertent Discoveries	An MOA for the Admiral's House has been signed by FHWA, DAHP, City of Seattle and the U.S. Navy. The MOA requires a pre-construction survey of the structural condition of the house, garage and access road, and a geotechnical investigation of the stability of the hillside on the property. Before	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			construction may begin, repairs must be competed and storm windows installed to prevent dust and dirt from entering interior spaces and to reduce interior noise. If required, slope stability mitigation measures would be performed. Additional mitigation measures in the MOA are available in Appendix B of the Historic, Cultural and Archaeological Discipline Report (EA Appendix I on CD). No specific construction mitigation measures are identified for the warehouse structure (building #9) on the Terminal 91 property. The building is currently (Spring 2014) vacant. When final design continues and construction dates are known, specific measures may be proposed. A Construction Monitoring Plan should be developed prior to the start of construction that would outline monitoring protocols and identify areas of sensitivity for archaeological monitoring of select pre-construction and construction tasks. The development of an Inadvertent Discovery Plan (IDP) is also recommended. If significant archaeological resources are identified during construction, mitigation for potential impacts should be addressed following the protocols of the IDP. Should any prehistoric or historic cultural remains be discovered during the demolition or		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			construction, all work in the area of the discovery shall cease and the IDP should be followed. Prior to, and during construction, training would be provided to all on-site construction personnel to assist in the identification of cultural resources and to help them understand measures to avoid and protect historic properties. A construction management plan would be prepared to manage construction traffic in the vicinity of the project. The plan would identify mitigation measures to be implemented during the construction phases to ensure protection of public safety. The Joint Development Agreement could require that replacement parkland be established and open to the public prior to the beginning of bridge construction. Before construction, a MOA signed by the City of Seattle, WSDOT, OAHP, FHWA, and any affected tribes would be prepared, identifying mitigation measures that would be carried out if archaeological resources are discovered during construction. If archaeological sites discovered during construction are determined to be eligible for the NRHP and preservation of the resource in place is warranted, the Section 4(f) process would be expedited and the resource review process, including consultation with other agencies, would		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			be shortened, as appropriate.		
5.6	Parks, Recreational & 4(f) Resources	Admiral's House	Right of way or an easement will be acquired for construction and operation of the New Magnolia Bridge across the NRHP-listed Admiral's House property. An easement would contain provisions related to bridge maintenance access requirements and the protection of the historic characteristics of the Admiral's House property. The easement would be acquired when construction dates are known.	SDOT and Parks	Final Design
		Ursula Judkins Viewpoint	A permanent easement of 0.18 acres from Parks would be required. SDOT and Parks would jointly develop a construction management plan. The plan would identify mitigation measures to be implemented during the construction phases to ensure public safety and continued circulation on the bicycle pathway around the Port of Seattle Terminal 91 property. Signs and detour routes would be posted on the bicycle pathway to direct cyclists and pedestrians during construction. Contract plans would identify the temporary access locations, provisions to keep construction site dirt off of area roadways, and requirements for site restoration. Public vehicle access would be maintained After construction, the parking lot will be striped to maximize parking spaces.	SDOT and Parks	Final Design
		Smith Cove	SDOT will compensate Parks for the use of the	SDOT and	Final Design

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
		Playfield	playfield with a transfer of the existing bridge rights-of-way to Parks after bridge demolition. SDOT and Parks would jointly develop a construction management plan. The plan would identify mitigation measures to be implemented during the construction phases to ensure public safety and continued circulation on the bicycle pathway around the Port of Seattle Terminal 91 property. Signs and detour routes would be posted on the bicycle pathway to direct cyclists and pedestrians during construction. Contract plans would identify the temporary access locations, provisions to keep construction site dirt off of area roadways, and requirements for site restoration. Public vehicle access would be maintained on 23rd Avenue West except for brief closures for overhead work or work in the roadway. At those times, detours would be made to maintain necessary access to Smith Cove Playfield, Smith Cove Waterfront Site and the Smith Cove Marina.	Parks	
5.7	Public Services & Utilities	General Mitigation Measures	A construction management plan would be prepared to manage construction traffic in the project vicinity. The plan would identify the mitigation measures to be implemented during the construction phases to ensure access by emergency service providers, school buses, and transit. Construction site security would include on-site	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			security surveillance and fencing to prevent public access. Construction worker safety measures would be a part of the construction contracts and would be consistent with Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) standards and regulations. As project design proceeds, construction phasing and staging plans would be developed. These would allow two-way traffic to be maintained in the existing bridge corridor for as long as possible. Most of the New Magnolia Bridge west of Pier 90 would be built south of the existing bridge. This would allow the old bridge to remain open while this portion of the new bridge is built. From Pier 90 to 15th Avenue West, the new bridge would be built in the same location as the existing bridge. This would require partial or complete demolition of the existing bridge before construction of the new bridge can be completed. Detour routes would be used during construction of this section of the project. These would include temporary surface detour routes and may also include temporary ramps for access to the remaining section of the existing bridge or completed sections of the new bridge.		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			In addition to detour routes, traffic control personnel would be needed to direct traffic through congested areas. It is estimated that between two and four police traffic officers could be needed in the West Dravus Street corridor during the peak travel hours to relieve traffic congestion during project construction. Potential impacts on major utility infrastructure, sanitary sewers, and drainage services would be avoided through the careful placement of bridge foundations and careful execution of construction. The following plans would be required to minimize impacts on existing utilities: a construction management plan, an erosion and sedimentation control plan, vibration and settlement monitoring, and a plan to maintain adequate clearances to utilities. Whenever feasible, unavoidable utility outages that can have a substantial effect on customers would be scheduled during the least disruptive time period. Strategic bypass plans would be developed to ensure no interruptions to sewer or drainage services occur. Mitigation for unavoidable, temporary disruptions of other utility services would aim first to minimize the duration of the interruptions to utility customers and service providers and second to		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			provide for temporary or new connections in the best possible locations.		
		FAA Facility	FHWA, Parks and SDOT will work with FAA on the decommissioning and possible relocation of the FAA facility currently occupying a small portion of the Ursula Judkins Viewpoint.	FAA/FHWA, WSDOT, SDOT and Parks	Final Design
5.8	Visual Quality	Vegetation Removal	Project construction would require some clearing of trees and vegetation mainly south of the existing bridge on the slope of Magnolia Bluff. There would be short-term visual impacts from construction equipment. The extent of the impact would depend on the type of structure and whether construction is done over temporary supports from below or by using overhead cranes. The clearing of vegetation would be mitigated by limiting the duration from the start of clearing to replanting and reforestation. This would be done by careful scheduling and promptly replanting with relatively mature plant stock. Neutral paint colors can be used to reduce the bulk effect of the structure when seen from public areas below Viewpoints will be included along the pedestrian/bicycle walkway. Roadway lights will be shielded to minimize the direct views of the light sources from above or below the roadway.	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			Mature vegetation can be planted to reforest the slope and greenbelt areas and screen vehicle headlights.		
5.9	Air Quality	Construction	Construction equipment would be properly maintained to reduce exhaust emissions from diesel and gasoline engines during construction. No adverse impacts are expected to occur, and no mitigation would be required. Cleared vegetation and waste material would not be burned. This material would be mulched or disposed of off-site. Emissions would be reduced if only limited areas of the construction site are disturbed simultaneously. Project specifications would require that the amount of exposed area be kept to a minimum.	SDOT and Contractor	Construction
5.10	Water Resources	Over-water Construction	Construction and demolition over and within open water areas would require methods such as the use of tarps, silt fencing, containment booms, safety nets or a barge to capture debris and other freed materials including paint chips. Construction equipment access to tideland and over-water work sites would be from temporary work bridges and trestles. The temporary piles to support these structures would be vibrated in as far as possible and impact pile driving would be minimized. Piles would be vibrated out. Concrete would be cured seven days or more before	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			contact with water to avoid leaching. Sampling for pH would be performed in the event there is an unauthorized discharge from concrete activities. A Spill Prevention, Control and Countermeasures Plan (SPCC Plan) would be prepared and used for the duration of the project. The SPCC Plan would identify potential spill sources, notification and reporting procedures, training procedures and spill prevention and countermeasures.		
		Groundwater	Potential water quality impacts to groundwater would be mitigated by implementing effective stormwater, hazardous material, and spill response management practices Measures to mitigate the movement or discharge of contaminated groundwater would be determined during project final design and permitting. These may include the use of watertight shoring systems in excavations that extend below the water table. If the discharge of contaminated water is unavoidable due to construction requirements, the discharge may be contained and treated on-site to meet relevant water quality criteria before final disposal. The potential for land settlement resulting from construction dewatering may be mitigated by utilizing watertight shoring systems to minimize dewatering or by re-injecting groundwater to	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			prevent excessive lowering of the water table around the construction area.		
		Sediments	Disturbance of potentially contaminated shoreline sediments would be avoided or minimized by the design and location of in-water pier footings within contaminated areas. The contractor would comply with the shoreline permit conditions.	SDOT and Contractor	Final Design and Construction
5.11	Fish, Wildlife & Vegetation	Fish	A sheet pile cofferdam would be installed in the intertidal zone during pile driving activities. This dam would keep water out of the area where pile driving would occur. Any fish caught within the cofferdam would be trapped and released before pile driving would commence. Additional mitigation measures listed in the Magnolia Bridge Biological Assessment Section 404 and HPA permits will also be implemented.	SDOT and Contractor	Construction
		Wildlife	The existing Magnolia Bridge would be visually surveyed prior to demolition to determine the extent of bat roosting habitat in this structure. The forested habitat at the west end of the proposed bridge would also be visually surveyed prior to construction to determine the extent of bat roosting habitat in this area. If potential bat roosting habitat is identified by these surveys, WSDOT and SDOT would collaborate to consider ways to mitigate for habitat loss in the project area. Potential mitigation	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			could include bridge design measures and use of artificial bat roost sites on the new bridge.		
		Vegetation & Habitat	Best management practices for vegetation protection would be included in the construction contract plans and specifications. All substantial trees that would be removed would be identified in accordance with SMC 25.11 and, where feasible, these trees and their drip line would be protected. All disturbed natural areas would be replanted with native species. Removal of the wharf under the new eastbound on-ramp would open the intertidal area of Smith Cove beach up to daylight from the south. This would increase the intertidal and nearshore habitat productivity of areas formerly under the wharf. To improve the beach area, the existing ramp columns would be removed to below the surface. Native shoreline vegetation would be planted where conditions are appropriate.	SDOT and Contractor	Construction
5.12	Federally Listed Species		Measures are identified in the Biological Assessment include: Containment booms would be deployed around the work area to contain any floatable debris or spills that may enter the water. Timing windows would be followed for in-water work. The in-water work window for Elliott Bay is July 16 through February 14.	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			A bubble curtain would be used to reduce underwater sound pressure levels when an impact hammer is used to drive or proof steel piles. The bubble curtain would completely surround the pile and be adequately weighted to keep the bubble ring resting on the sea floor. The pile shall be completely engulfed in bubbles over the full length of the water column at all times when the impact pile driver is in use. A 9 decibel reduction in sound pressure levels is anticipated from use of the bubble curtain. Underwater noise during pile driving would be monitored according to accepted methods as described in WSDOT's Underwater Noise Monitoring Plan template. Monitoring within of 1.2 miles of the project site would occur for marine mammals during all vibratory and impact pile driving activities. If an orca or Steller sea lion is located, all pile driving activities would stop until the orcas or Steller sea lions have left the area (Appendix D of Biological Assessment). The last sheet pile to close the cofferdam would be driven at low tide to reduce the potential for fish entrapment. Any fish trapped would be removed following Washington State Department of Transportation Fish Removal Protocol and Standards. Heavy equipment would be checked daily for		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			petroleum leaks and repairs made as necessary.		
5.13	Geology & Soils	Landslides	Placing fill material over soft soil can cause slope instability. Short-term soil stability would be improved by using staged construction and geotextiles. Monitoring the amount of soft soil compaction beneath a layer of fill would determine when additional fill can be added in stages. Lightweight fill material can be used in areas where staged construction is not feasible.	SDOT and Contractor	Construction
		Noise & Vibration	Low vibration pile driving equipment can be used to reduce vibration levels. Driving open-ended piles or pre-drilling a near-surface hole prior to pile driving can also reduce vibration levels. Low vibration drilled shaft equipment (such as an oscillator) can also be used to reduce vibration levels.	SDOT and Contractor	Construction
		Soil Erosion	Temporary erosion and sediment control plans would be prepared in accordance with City of Seattle best management practices (BMPs). Cleared or graded areas can be covered with jute or other netting, mulch or hydroseeding. Parking and staging areas for vehicles and equipment can be covered with a gravel work pad. Silt fences or straw bales would be placed around disturbed areas to filter sediment from surface water runoff.	SDOT and Contractor	Construction
5.14	Hazardous Materials		SDOT anticipates acquiring rights-of-way and/or easements on parcels that may be contaminated with hazardous materials that are not considered	SDOT and Contractor	Construction

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			reasonably predictable to remedy. If acquiring these parcels is necessary, site investigations can be performed prior to purchase to determine the location and extent of contamination. The existing bridge likely has lead-based paint. Lead-based paint can pose a health risk during demolition when lead particles can become airborne and be inhaled or ingested. Lead-painted metal may be recycled. Buildings and structures to be demolished may contain lead-based paint and asbestos-containing building materials. These include the FAA equipment shed near the bridge west approach, a portion of the Terminal 91 Center Gate guard shack, and the Anthony's Seafood Distributing loading area connected to the existing bridge. Buildings would be surveyed prior to demolition to determine if any asbestos-containing building material or lead-based paint would be affected by the demolition. Contaminated soils and groundwater, resulting from contaminant migration from existing off-site properties or historic properties located in the vicinity of the alignment, may be encountered during construction of the New Magnolia Bridge. Site investigations would be performed in potentially contaminated areas where excavation is proposed to determine the location and extent of		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			any contamination. Where feasible, the amount of contamination would be minimized by using driven piles instead of auger cast piles for bridge foundations. Any contaminated soil or groundwater that is encountered would be analyzed to assess the regulatory classification of the soil/groundwater and the most cost-effective remediation strategy. Contamination can be spread as a result of construction. For example, new groundwater migration pathways can be created during drilling activities or construction of underground utility corridors. Construction planning would include the development of spill prevention, control, and countermeasure plans, erosion and sedimentation control plans, and plans for the handling and disposal of known and anticipated contaminants. These plans would prescribe procedures, including best management practices, to minimize these potential indirect impacts. If SDOT acquires a contaminated property, SDOT would be liable for a site cleanup. SDOT, along with other parties such as past owners, would be liable for costs associated with the cleanup of a site and the cost to repair damages to natural resources. Individuals on the project construction site would be apprised of the possibility of encountering known or predicted contaminants and the locations		

#	Mitigation Category	Impact	Mitigation Commitment From Source Document	Responsible Branch	Phase to be Implemented
			of potentially contaminated areas. Site-specific health and safety training that describes monitoring requirements and the use of personal protective equipment would be necessary. Workers would be trained in recognizing potential contamination and reporting procedures. Contractors who are likely to encounter known or unknown contamination would be required to demonstrate their ability to identify these situations and respond quickly to avoid contaminant migration to public areas. Construction activities may generate hazardous wastes, which could be introduced to the environment. Spill Prevention, Control, and Countermeasure (SPCC) plans, erosion and sedimentation control plans, and plans for the handling and disposal of known and anticipated contamination would be developed that prescribe procedures, including best management practices, for use during construction. Vehicle accidents can result in spills of hazardous materials. Stormwater and water quality treatment facilities would be constructed to collect and retain pollutants from traffic operations. These facilities would decrease the potential for off-site migration of contaminants.		

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List of Appendices

Appendices B, and E through T are on CD.

A Glossary

B Type, Size, and Location Study

C Cross Reference of NEPA Elements of the Environment and Environmental Assessment Sections

D Agency and Tribal Correspondence

E Air Quality Discipline Report

F Environmental Justice Discipline Report

G Geology and Soils Discipline Report

H Hazardous Materials Discipline Report

I Historic, Cultural, and Archaeological Resources Discipline Report

J Land Use Discipline Report

K Noise Discipline Report

L Section 4(f) Evaluation

M Public Services and Utilities Discipline Report

N Social, Economic, and Relocation Discipline Report

O Traffic & Transportation Discipline Report

P Visual Quality Discipline Report

Q Water Quality Discipline Report

R Wildlife, Fisheries, and Vegetation Discipline Report

S Rehabilitation Alternative Environmental Effects

T Biological Assessment

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Appendix A Glossary

access	The ability to enter or approach a facility or to make use of a facility.
adverse effects	The totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to: ▪ bodily impairment, infirmity, illness or death ▪ air, noise, and water pollution and soil contamination ▪ destruction or disruption of human-made natural resources ▪ destruction or diminution of aesthetic values ▪ destruction or disruption of community cohesion or a community's economic vitality ▪ destruction or disruption of the availability of public an private facilities and services ▪ vibration ▪ adverse employment effects ▪ displacement of persons, businesses, farms, or nonprofit organizations ▪ Increased traffic congestion, isolation, exclusion or separation of minority or low-income individuals within a given community or from the broader community ▪ denial of, reduction in, or significant delay in the receipt of benefits of DOT programs, policies, or activities
air pollutant	Any substance in air that could, in high enough concentration, harm people, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of matter capable of being airborne. Matter may be in the form of solid particles, liquid droplets, gases, or a combination thereof. Generally, substances falls into two main groups: ▪ those emitted directly from identifiable sources ▪ those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without sunlight.
air quality standards	The level of pollutants prescribed by regulations that may not be exceeded during a given time in a defined area.
ambient	Surrounding atmosphere
aquifer	A water-bearing layer of permeable rock, sand, or gravel.
artesian aquifer	An aquifer where the water is under pressure.
area of potential effect	This is the area in which historic and cultural properties, if they are present, could be affected by the project either directly or indirectly.

arterial	A major street that primarily serves through traffic, but also provides access to abutting properties. Arterials are often divided into principal and minor classifications depending on the number of lanes, connections made, volume of traffic, nature of traffic, speeds, interruptions (access functions), and length.
basin	The area of land that drains to a specific body of water.
best management practices (BMPs)	BMPs are generally accepted techniques that, when used alone or in combination, prevent or reduce adverse effects of a project. Examples include erosion control measures and construction management to minimize traffic disruption.
capacity	The maximum sustained traffic flow of a transportation facility under prevailing traffic and roadway conditions in a specified direction.
carbon monoxide (CO)	A colorless, odorless, poisonous gas produced by incomplete combustion of fossil fuel.
CO	Carbon monoxide, a colorless, odorless, and poisonous gas generated by automobiles that reduces the oxygen-carrying capability of the blood.
Code of Federal Regulations (CFR)	The code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government. It is divided into 50 titles that represent broad areas subject to federal regulation. Each volume of the CFR is updated once each calendar year and is issued on a quarterly basis.
congestion	A condition characterized by unstable traffic flows that prohibit movement on a transportation facility at optimal legal speeds. Recurring congestion is caused by regularly occurring excess traffic volume compared with capacity. Nonrecurring congestion is caused by unusual or unpredictable events such as traffic accidents.
constructive use	A type of indirect use in which a transportation project's proximity impacts (as opposed to direct impacts) are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Examples include excessive noise level increases, diminished aesthetic features, ecological intrusions, and other indirect impacts to the resources' environment or utility.
cultural resources	Any historic (or prehistoric) district, site, building, structure, or object that is either listed or eligible for listing on the National register of Historic Places. Examples include items as artifacts, records, structures, and remains.
cumulative effect	Effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively noticeable actions taking place over a period of time.
delay	Increased travel time experienced by a person or a vehicle because of circumstances that impede the desirable movement of traffic.
direct effect	Effect caused by the proposed action and occurring at the same time and place.
discharge	Runoff leaving a new development or redevelopment via overland flow, built conveyance systems, or infiltration facilities.
displacement	The act of removing a business, residence or public facility fro its existing location. In the context of transportation improvements, displacement is generally the result of: ▪ Property acquisition for right-of-way expansion or ▪ Elimination of access to a property due to traffic revisions.

effect	Includes ecological effects (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health effects, whether direct, indirect, or cumulative. Effects may include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes the effect will be beneficial.
endangered species	Any species that is in danger of extinction throughout all or a substantial portion of its range.
equivalent sound level (L_{eq})	The equivalent sound level is widely used to describe environmental noise. It is a measure of the average sound energy during a specified period of time.
feasible and prudent	A term that is integral to the Section 4(f) process, feasible and prudent refers to the viability of an alternative that avoids the use of a Section 4(f) resource. The term "Feasible" refers to the constructability of a project—whether or not it can be built using current construction methods, technologies, and practices. The term "Prudent" refers to how reasonable the alternative is—in essence, whether or not it makes sense. Given a range of options, a transportation agency must select an avoidance alternative rather than adversely impact Section 4(f) resources if it is feasible and prudent. By contrast, an alternative may be rejected if it is not feasible and prudent. An alternative may be considered not feasible and prudent for any of the following reasons: ▪ Does not meet project purpose and need ▪ Excessive cost of construction ▪ Severe operational or safety problems ▪ Unacceptable impacts (social, economic or environmental) ▪ Serious community disruption ▪ A combination of any of the above
fill	Soil placed by humans, such as for roads or building foundations.
groundwater	Water that resides and/or flows through the openings in rock and soils below the visible surface of the ground.
habitat	The native environment or specific surroundings where a plant or animal naturally grows or lives. The surroundings include physical factors such as temperature, moisture, and light, together with biological factors such as the presence of food or predator organisms.
hazardous materials	Hazardous materials include any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a threat to human health or the environment.
impervious surface area	Area that is not permeable to infiltration of precipitation or runoff to groundwater (water will run off this type of surface, but not soak in). A high proportion of precipitation that falls onto impervious surfaces drains from the area as stormwater runoff. In contrast, vegetated areas are permeable, and a large proportion of precipitation that falls on vegetated areas is either intercepted by vegetation or infiltrates into the soil.
infiltration	The downward movement of water fro the surface to the subsoil.
intertidal	The shoreline zone above the low-tide mark.
listed species	Any species of fish, wildlife, or plant that has been determined to be endangered or threatened under Section 4 of the Endangered Species Act (ESA).
low-income	A person whose median household income is at or below the Department of Health and Human Services poverty guidelines.

mitigation	Defined in WAC 197-11-766 as: ▪ avoiding the impact altogether by not taking a certain action or parts of an action: ▪ minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts; ▪ rectifying the impact by repairing, rehabilitating, or restoring the affected environment; ▪ reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; ▪ compensating for the impact by replacing, enhancing or providing substitute resources or environments; and/or ▪ monitoring the impact and taking appropriate corrective measures
modeling	Use of statistics and mathematical equations to simulate and predict real events and processes.
National Ambient Air Quality Standards (NAAQS)	Standards established by the EPA for pollutant concentrations in outside air throughout the country.
National Register of Historic Places (NRHP)	The Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. Properties listed in the register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The National Park Service administers the National Register, which is part of the U.S. Department of the Interior.
noise abatement criteria (NAC)	Noise regulations and guidelines are the basis for evaluating potential noise effects. For state and federally funded highway projects, traffic noise effects occur when predicted noise levels approach or exceed the NAC established by the FHWA.
NOx	Nitrogen oxides, the result of nitrogen combining with oxygen in the atmosphere and a primary emission from combustion. A major component of smog.
outfall	Point of discharge for stormwater runoff; also the end of a culvert or pipe that discharges stormwater runoff.
ozone	Ozone is a natural form of oxygen that provides a protective layer shielding the earth from ultraviolet radiation. Ozone in the troposphere is produced through complex chemical reactions of NOx, hydrocarbons, and sunlight. Ozone is a chemical oxidant and major component of smog. It can seriously impair the respiratory system and is one of the most widespread of all the Clean Air Act pollutants with standards set by the EPA.
particulate	A very small solid, suspended in air or water, which can very widely in size, shape, density, and electrical change.
peak hour	The hour in the morning and in the afternoon when the maximum demand occurs on a given transportation facility or corridor
peak period	The period of the day during which the maximum amount of travel occurs. It may be specified as the morning (AM), or the afternoon or evening (PM) peak.
public services	Public services include fire and police protection, schools, parks and recreational facilities, places of worship, and cemeteries.

publicly owned	Property that is owned and/or operated by a public entity. If a governmental body has a proprietary interest in the land (such as fee ownership, drainage easements or wetland easements), it can be considered publicly owned. Land subject to a public easement in perpetuity can also be considered to be publicly owned land for the purpose for which the easement exists.
Puget Sound Regional Council (PSRC)	The Metropolitan Planning Organization (MPO) and Regional Transportation Planning Organization (RTPO) for the Central Puget Sound region, which comprises Snohomish, King, Pierce, and Kitsap counties. The MPO and RTPO is the legally mandated forum for cooperative transportation decision-making in a metropolitan planning area.
right-of-way	Land purchased prior to the construction of new highway improvements along with land for retaining walls and other project features.
runoff	Rainwater or snowmelt that directly leaves an area as surface drainage.
salmonid	Fish that are members of the family Salmonidae, which includes salmon, trout, char, and whitefish.
secondary effect	Effect caused by the proposed action that is later in time or farther removed in distance, but still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.
Section 106	Under Section 106 of the National Historic Preservation Act of 1966, as amended, federal agencies must identify and evaluate cultural resources and consider how an undertaking they fund, license, permit, or assist affect historic properties eligible for inclusion in the National Register of Historic Places. The federal agencies must afford the State Historic Preservation Officer and the Advisory Council on Historic Preservation the opportunity to comment on these undertakings.
Section 4(f)	Section 4(f) of the Department of Transportation Act of 1966 prohibits FHWA from approving the use of land from a significant publicly owned park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless a determination is made that: ▪ There is no feasible and prudent alternative to the use of land from the property; and ▪ The proposed action includes all possible planning to minimize harm to the property resulting from such use.
smog	Dust, smoke, or chemical fumes that pollute the air and make hazy, unhealthy conditions. Automobile, truck, bus, and other vehicle exhausts and particulates are usually trapped close to the ground, obscuring visibility and contributing to a number of respiratory problems.
spill prevention control and countermeasures (SPCC) plan	An SPCC plan is implemented to minimize effects to soil, surface water, and groundwater. The SPCC plan addresses procedures, equipment, and materials used in the event of a spill of contaminated soil, petroleum products, contaminated water or other hazardous substances.
stormwater	The portion of precipitation that does not naturally percolate into the ground or evaporate, but flows overland into pipes and other features of a drainage system into a defined body of water or treatment facility.
study area	The area specifically identified for analysis. Study areas very among individual resources as scientific convention and practice dictate.
threatened species	Any species that is likely to become endangered within the foreseeable future throughout all or a substantial portion of its range.
upland vegetation	Vegetation associated with dry areas away from water or wetlands; vegetation that is not located within the area influences by a body of water.

use	Generally, “use” occurs with a DOT-approved project or program ▪ When land from a Section 4(f) site is acquired for a transportation project, ▪ When there is an occupancy of land that is adverse in terms of the statue’s preservationist purposes, or ▪ When the proximity impact of the transportation project on the Section 4(f) site, without acquisition of land, are so great that the purposes for which the Section 4(f) site exists are substantially impaired.
utilities	Utilities include electricity, natural gas, water, wastewater and stormwater collection, and telecommunications.
vehicle	Any car, truck, van, motorcycle, or bus designed to carry passengers or goods.
vibration	An oscillatory motion, which can be described in terms of displacement, velocity, or acceleration.
view	Aspects of the environment that a viewer can see from the study area and what the viewer can see of the project from nearby surroundings.
water table	The upper limit of the layer of ground that is saturated with water.
wetland	Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.

Appendix C Cross Reference of NEPA Elements of the Environment and Environmental Assessment Sections

NEPA Element of the Environment	Location in the Environmental Assessment	Appendix
Soils and Geology	Chapter 5.13 Geology And Soils	G
Air Quality	Chapter 5.9 Air Quality	E
Water Quality	Chapter 5.10 Water Resources	Q
Surface Water	Chapter 5.10 Water Resources	Q
Floodplains	Chapter 5.10 Water Resources	Q
Groundwater	Chapter 5.10 Water Resources	Q
Wildlife, Fish, and Vegetation	Chapter 5.11 Wildlife and Vegetation Chapter 5.12 Fish and Aquatic Resources	R and T
Wetlands	Chapter 5.10 Water Resources	Q
Energy	Not applicable	
Noise	Chapter 5.2 Noise	K
Hazardous Materials	Chapter 5.14 Hazardous Materials	H
Land Use, Land Use Plans, and Growth Management	Chapter 5.3 Land Use Patterns Chapter 5.4 Communities, Neighborhoods and Businesses	J F and N
Coastal Areas and Shorelines	Chapter 5.10 Water Resources	Q
Wild and Scenic Rivers	Not applicable	
Agricultural and Farmlands	Not applicable	
Parks, Recreation and Section 4(f)	Chapter 5.6 Parks, Recreational and Section 4(f) Resources	I and L
Historic, Cultural, and Archaeological Resources (Section 106)	Chapter 5.5 Historic, Cultural and Archaeological Resources/Section 106	I
Social and Economic Conditions	Chapter 5.4 Communities, Neighborhoods and Businesses	N
Environmental Justice	Chapter 5.4 Communities, Neighborhoods and Businesses	F
Visual Impacts, Light, and Glare	Chapter 5.8 Visual Quality	P
Transportation	Chapter 5.1 Traffic and Transportation	O
Public Services and Utilities	Chapter 5.7 Public Services and Utilities	M
Cumulative Impacts	Chapter 6 Cumulative Effects	E – T
Mitigation	Chapter 7 Mitigation	e-t

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Appendix D

Agency and Tribal Coordination

Scoping/Public Outreach

The following Federal and state resource agencies, tribes and local agencies participated in the project scoping process due to their special expertise or legal jurisdiction were invited to participate in the scoping and public outreach process.

Federal Agencies

U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish & Wildlife Service
NOAA Fisheries
Federal Transit Administration
Federal Highway Administration (Lead Agency)
U.S. Navy
Federal Aviation Administration (FAA)

Tribes

Muckleshoot Tribe
Suquamish Tribe
Duwamish Tribe
Puyallup Indian
The Yakama Tribe
United Indians of All Tribes Foundation

Washington State Agencies

Department of Archaeology and Historic Preservation (DAHP)
Department of Natural Resources
Department of Ecology
Washington Department of Fish & Wildlife (WDFA)
Interagency Committee for Outdoor Recreation
Parks and Recreation Commission
State Patrol
Puget Sound Water Quality Team

Regional Agencies

Northwest Indian Fisheries Commission
King County Transportation Planning
Puget Sound Clean Air Agency
Puget Sound Regional Council
Port of Seattle
King County Metro
Sound Transit

City of Seattle Departments

Seattle Fire Department (SFD)
Seattle Police Department (SPD)
Department of Planning and Development (DPD)
Department of Neighborhoods (DON)
Planning Commission
Department of Parks & Recreation (Parks)
Seattle City Light (SCL)
Seattle Public Utilities (SPU)

State and Local Government

The Washington State Legislature
Mayor, City of Seattle
Seattle City Council

Endangered Species Act Consultation

The following agencies participated in Endangered Species Act consultation for the Magnolia Bridge Replacement Project.

WSDOT/FHWA
NOAA Fisheries
U.S. Fish and Wildlife
USACE

Emergency Detours/Reroutes

The following agencies participated in the development of emergency detours and rerouting for the Magnolia Bridge Replacement Project.

Port of Seattle
Seattle Fire Department
Seattle Police Department
Seattle Emergency Management
King County Metro
U.S. Homeland Security

Section 106

SDOT, WSDOT and FHWA have coordinated closely with DAHP, the U.S. Navy, and the City's Office of Historic Preservation identifying potential impacts to The Admiral's House and proposed mitigation measures throughout the Section 106 process. Correspondences with DAHP are listed below and can be found in Appendices I and L (Historic, Cultural, and Archaeological Resources Discipline Report and Section 4(f) Evaluation).

1. June 20, 2001	Magnolia Bridge NRHP Eligibility – From Gregory Griffith, OAHP (now DAHP)
2. September 23, 2003	Magnolia Bridge NRHP Eligibility – Affirmation – From Gregory Griffith (OAHP)
3. March 25, 2008	NRHP Eligibility of Properties in the project area. Letter from Trent deBoer, WSDOT

4. January 6, 2004	APE Determination Request – From Shapiro for SDOT
5. January 21, 2004	APE Concurrence – from OAHP
6. March 31, 2008	Submission of Historical, Cultural and Archaeological Resources Report to OAHP from Trent deBoer, WSDOT
7. May 2, 2008	Response to May 2, 2008 Letter from DAHP, Navy Property
8. June 16, 2008	Adverse effect determination: The Admiral's House
9. August 6, 2014	Updated consultation NRHP Eligibility of Properties in the project area. Letter from Trent deBoer, WSDOT
10. November 24, 2014	DAHP Concurrence: Two historic properties in project area eligible for listing on the NRHP. Section 106 complete.

A Memorandum of Agreement (MOA) has been signed by FHWA, the U.S. Navy, the Washington State Historic Preservation Officer (SHPO), WSDOT, the City of Seattle, and Pacific Northwest Communities for mitigation of adverse effects of construction of the new Magnolia Bridge over the Admiral's House property. The Admiral's House property was sold to a private owner in 2013 after the property was listed on the National Register of Historic Places (NRHP). The property has historic preservation and easement covenants which prohibit changes to the historically significant features ("Features of Significance") without approval of the City of Seattle's Landmark Preservation Board or the City's Historic Preservation Officer. Correspondence and agreements can be found in Appendices I and L (Historic, Cultural, and Archaeological Resources Discipline Report and Section 4(f) Evaluation).

WSDOT requested comments or information on cultural and archaeological resources within the APE from the Suquamish, Tulalip, and Muckleshoot Tribes, Duwamish Tribal Organization, and the Yakama and Kikiallus Indian Nations. WSDOT received a response from one tribe, the Snoqualmie Tribe. A copy of this correspondence can be found in Appendix I.