SOUTH PARK BRIDGE PROJECT

Draft Environmental Impact Statement and Section 4(f) Evaluation

Appendix Volume II

September 2005

U.S. Department of Transportation
Federal Highway Administration

Washington State
Department of Transportation

King County
Department of Transportation

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Appendix K. Transportation Technical Report

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South Park Bridge Project

Transportation Technical Report

Prepared for the

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April 2004

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Technical Report
South Park Bridge Project

Transportation

April 2004

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Chapter 1 Executive Summary

King County has proposed several design alternatives for the historic South Park Bridge based on a directive to replace or rehabilitate the aging facility. As a requirement of this evaluation, a comprehensive traffic analysis was performed to assess the impacts of the various bridge alternatives on local traffic circulation and regional traffic flow. This report summarizes existing and future traffic conditions related to the design alternatives, the contents of which will be used to satisfy specific requirements for King County's environmental review process and ultimately lead to a preliminary design. This work will also serve as a precursor for determining a preliminary preferred bridge alternative by screening the future traffic implications of the alternatives. The design alternatives under consideration include two new fixed-span bridge structures, a new bascule structure, and a rehabilitated facility. Removal of the bridge is also under consideration. As discussed throughout this report, a total of five bridge alternatives are included in the environmental assessment. These alternatives are listed below.

- No Action Alternative
- Rehabilitation Alternative
- Bascule Bridge Alternative
- Mid-Level Fixed-Span Bridge Alternative
- High-Level Fixed-Span Bridge Alternative

For the purposes of the transportation study, the alternatives were aggregated into "grouped" scenarios in order to avoid duplication of analysis efforts for very similar or identical design and traffic conditions. These scenarios are listed and described in detail in Chapter 4 (Methodology) of this report (see Table 1). Two future horizon years, 2009 and 2027, were evaluated to capture the impacts of the bridge alternatives on short-term opening-year traffic conditions and long-range traffic conditions, respectively. The combination of the two analysis horizon years and the design alternatives yielded a total of eight evaluation scenarios to be analyzed. With respect to specific locations for analysis, twelve intersections were identified and selected. These are listed in the Affected Environment section (see Chapter 5).

Evaluation of traffic conditions was divided into three basic tasks. The first task involved the development of existing intersection turning movement volumes through the use of manual traffic counts and volume post-processing and balancing. Next, future peak hour volumes for the bridge design and traffic scenarios were established via the King County EMME/2 travel demand forecasting model and future land use and arterial network assumptions incorporated. The third task consisted of an area-wide level of service analysis for each of the eight scenarios to determine the future degree of congestion at twelve targeted intersections and access points within the study area.

Analysis results for the year 2009 traffic scenarios show increased delays and congestion for the majority of intersections examined. Background growth (annualized) for the study intersections and arterials ranged from 5 percent to 20 percent with commensurate delay increases system-wide. Specific locations impacted most from the general growth

in traffic volumes include the key gateway intersections of the study area: 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road. These gateways also serve as major entry points into the downtown and industrial areas of Seattle. Shifts in traffic patterns for the No-Bridge Scenario (due to complete removal of the bridge link) were noticeable for year 2009 conditions and showed higher overall congestion levels than for other scenarios with a bridge crossing maintained. With the bridge link removed, traffic flow was concentrated to major arterials and highways (i.e., East Marginal Way S.) and gateway intersections, thereby increasing both traffic volumes and congestion levels at these locations. Due to the moderate traffic volumes near the South Park Bridge for all scenarios, delays for intersections along 14th Avenue S. remain low during the peak traffic periods.

For year 2027 traffic conditions, background growth is expected to be significant due to the cumulative effect of total growth over the long-range horizon period. Year 2027 traffic forecasts indicate growth estimates of 10 to 50 percent for most links in the study area. As such, significant pockets of congestion would likely develop for each scenario, particularly at the high-traffic gateway intersections. Results for both the Four-Lane Bridge Scenario (assumes one of several four-lane bridge alternatives) and No-Bridge Scenario (bridge link removed) show several critical intersection movements with significant delays and generally higher congestion levels with the bridge removed. This would be expected due to the high background traffic levels on the street system for both scenarios and the shift in trips due to removal of the bridge link.

Despite system-wide background growth in traffic for future scenarios, improvement measures related to the local transportation network and sub-area traffic operations would be minimal. The various bridge configurations and cross-sections that maintain a link across the Duwamish Waterway (with the exception of the High-Level Fixed-Span Bridge Alternative) would not require extensive measures to ensure reasonable levels of congestion for the local South Park community. This is primarily due to the moderate traffic levels approaching the bridge on either 14th Avenue S. or 16th Avenue S. In fact, as shown in the level of service (LOS) and delay calculations for future conditions, low congestion levels are expected along the 14th Avenue S. corridor for all scenarios. However, analysis results for critical gateway intersections such as 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road indicate high delays and congestion levels for the majority of the scenarios examined. For these locations, improvements related to major freeway and bridge widening or grade-separation of heavily traveled corridor crossings may be needed to offset long-term traffic growth and impacts for the south Seattle industrial areas. However, due to the regional nature of these gateway intersections, development of suitable improvements measures at these locations would not be within the scope of this analysis/project. Improvement projects at this regional level would be made using long-range Capital Improvement Program (CIP) evaluation criteria and policy-based decisions.

Chapter 2 Introduction

Chapter 2 is an introduction to the technical analysis contained in this discipline report. This chapter describes existing conditions, the history of the project, the purpose and need for the project, and the five project alternatives being considered for environmental review. In addition, this chapter summarizes project coordination conducted to date with agencies, local governments, the community advisory group, and members of the public.

2.1 Description of Existing Conditions

This first section describes existing conditions pertinent to the proposed South Park Bridge Project. The project area is defined. The existing bridge and its current condition are described. The local roadway network in the South Park community is described. Non-vehicular transportation in the community is also summarized.

2.1.1 The Project Area

The South Park community is about four miles south of downtown Seattle (see Figure 1). The community lies south of the Duwamish Waterway, the man-made channel portion of the Duwamish River as it enters Elliott Bay. Though originally incorporated as its own city in 1905, much of the area was annexed by the City of Seattle in 1907.[1] The project area lies south of the industrial Georgetown area of Seattle and the King County International Airport (known as Boeing Field). It encompasses the roadway corridor defined by 16th Avenue S. between East Marginal Way S. and the South Park Bridge and 14th Avenue S. between the bridge and S. Trenton Street. Residents and business owners in the project area generally identify with the City of Seattle.

The project area, however, is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits of both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Trenton Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company's Plant 2 dominates the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land uses front on 14th Avenue S. and along the south bank upstream of the South Park Bridge. Single-family residences, however, generally characterize the area off of this main transportation artery.

[1] City of Seattle, *South Park Residential Urban Village Plan*, 1998.

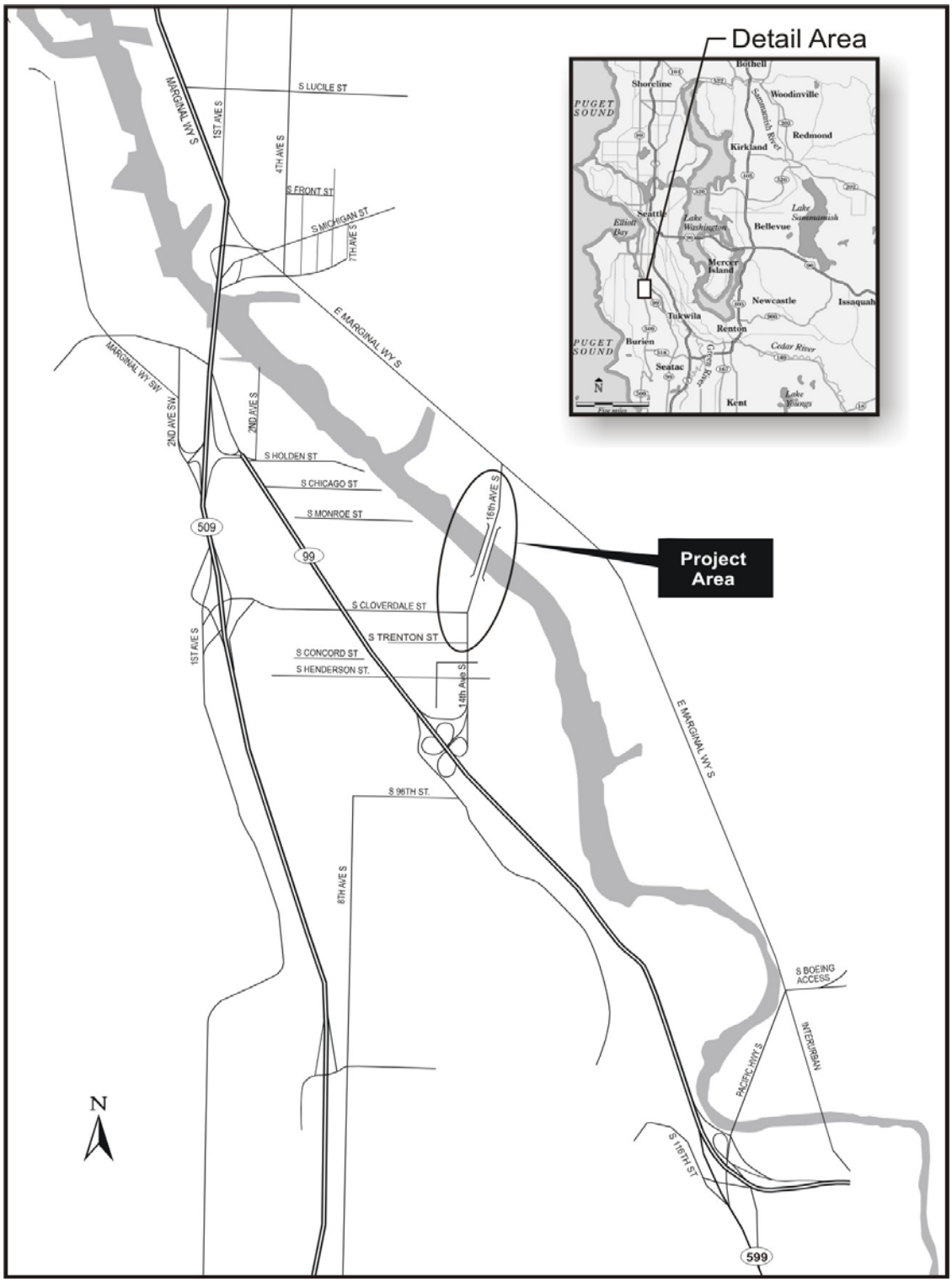

Figure 1
Project Area and Vicinity

2.1.2 The Existing South Park Bridge

The South Park Bridge was constructed in 1929-1931 (see Figure 2). The existing structure consists of a Scherzer rolling-lift double-leaf bascule movable span. Because it is the only operational example of a Scherzer rolling-lift bascule bridge in Washington, the bridge is listed on the National Historic Register.[2]

Each side is flanked by two truss approach spans and twelve concrete slab approach spans. The overall length of the bridge is approximately 1,045 feet abutment-to-abutment and approximately 1,340 feet in entirety to the grade match points. The double-leaf bascule movable span has a center-to-center distance between the front bearing points of approximately 190 feet. The roadway consists of four 9.5-foot lanes. The pavement is 38 feet with 6-foot sidewalks on both sides. Reinforced concrete piers founded on timber piling support the bascule span. Two large in-water piers support the counterweights, track supports, and racks for the rolling lift. The attached towers house the operating machinery, electrical equipment, and operator control room.

The South Park Bridge spans the Duwamish Waterway, which is used for industrial, commercial, and recreational purposes. The bridge is near the upstream limit of heavy industrial uses along the Duwamish Waterway, but it is within the section of the navigation channel maintained by the U.S. Army Corps of Engineers. The existing maximum vertical clearance of the bridge when closed is approximately 34 feet at Mean High Water (MHW). Bridge openings occur approximately three times per day on average to accommodate waterway traffic, although on some days the bridge does not open at all. The existing navigable horizontal clearances is approximately 118 feet at the water level (fender-to-fender), but narrows to 92 feet approximately 114 feet above the water between the open bascule leaves. The depth of the navigation channel is approximately 15 feet at Mean Lower Low-Water (MLLW).

2.1.3 Bridge Condition

In spite of substantial on-going maintenance and repairs, the South Park Bridge has suffered considerable deterioration over the past 70 years. In particular, the bascule piers are cracked and unstable resulting in the misalignment of the movable spans. Consequently, the center lock and glide tracks require on-going modifications and adjustments to allow the bridge to operate properly. Long-term, the stability of the entire bridge is at risk due to the original shallow placement of the supporting piles, which has resulted in movement of the bridge piers over the decades. The condition of the bridge worsened significantly following the Nisqually Earthquake in February 2001, and it remains vulnerable to future seismic events. A 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on Federal Highway Administration criteria).[3] This was among the lowest ratings given any bridge structure in the State of Washington in 2002.

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[2] King County Landmarks and Heritage Commission. *Findings and Fact Decision—14th Avenue South Bridge*, decision made December 19, 1996 and filed January 2, 1997.

[3] King County, *Bridge Inspection Report*, August 1, 2002.

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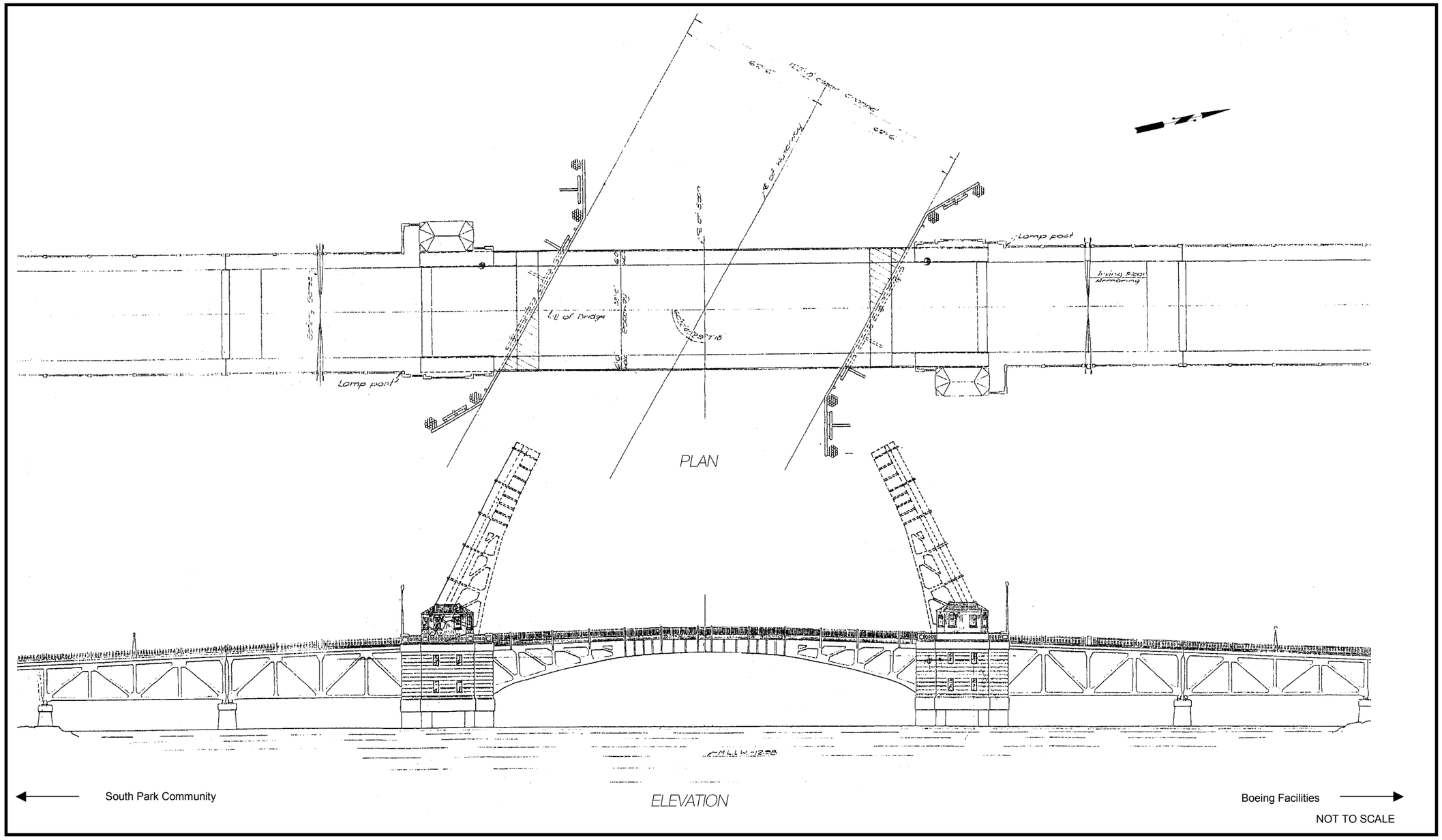

Figure 2
Existing South Park Bridge

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2.1.4 Roadway Network

The bridge presently accommodates an average daily traffic volume of approximately 20,000 vehicles per day, based on 2001 City of Seattle traffic counts. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For South Park community residents, the bridge is the primary direct means of access to the north, downtown Seattle, and I-5.

The existing roadway network surrounding the South Park Bridge consists of a variety of roadway types. They range from local two-lane streets to major limited-access highways. Regional traffic movement in the South Park area is concentrated to three nearby north-south corridors including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Features such as the Duwamish Waterway and large-scale facilities such as Boeing Field and the Boeing Plant 2 create barriers within the road network and limit opportunities for access to and from the major regional routes.

2.1.5 Freight, Transit, and Pedestrians

Freight movement in peripheral areas of the South Park community is significant due to the high concentration of industrial and manufacturing uses in the general area. Major truck traffic is primarily directed along East Marginal Way S. and SR-99. The South Park Bridge and S. Cloverdale Street are also designated truck routes for oversized vehicles. Trucks use S. Cloverdale Street to access the City of Seattle South Recycling and Disposal Station located at 8105 Fifth~~th~~ Avenue S. as well as SR-509 and SR-99 located on the western edge of the South Park community. With respect to rail movements, the only train crossing in the study area exists immediately south of the intersection of East Marginal Way S. and 16th Avenue S.

Bus routes serving the South Park community are primarily located along major north-south corridors, including East Marginal Way S., 14th and 16th Avenues S., and S. Cloverdale Street. Six major King County Metro bus routes serve the area. Routes 60 and 130 cross the South Park Bridge and four of the six bus routes travel along S. Cloverdale Street.

Pedestrians and bicyclists are commonly seen in the South Park area, especially near the community's center near the intersection of 14th Avenue S. and S. Cloverdale Street. Mid-day pedestrian volumes are higher than the morning or evening commute periods due to shopping, transit use, and lunch-related walking trips.

2.2 History of Project

Since 1931, the moveable bridge has crossed the Duwamish Waterway in the South Park community of the City of Seattle. The following sections contain an overview of the studies preceding the start of the current environmental review effort, a summary of two key documents that framed the initial development of project alternatives, and ongoing reports documenting the changing condition of the bridge.

2.2.1 Overview of Studies

In recent history, over 20 engineering studies have been prepared on the South Park Bridge. Starting in 1987, when the bridge was 56-years-old, King County contracted for the preparation of a general engineering investigation report to assess the condition of the bridge. In 1991 and 1993, additional studies were completed including a geotechnical study, foundation design report, and a life-cycle cost analysis. This information led King County to undertake a series of studies in 1994 addressing liquefaction risks as well as the condition of the concrete, substructures, approach span joints and loading rating. In addition, a study was conducted to evaluate potential replacement alternatives for the bridge and another study investigated community issues related to the bridge. Since 1994, King County has recognized that the bridge required either rehabilitation or replacement and has continued to investigate the condition and vulnerabilities of the bridge in an effort to evaluate these options.

2.2.2 Summary of Key Engineering Reports

Two key engineering studies were conducted that helped to frame the current pursuit to evaluate potential alternatives to rehabilitate or replace the South Park Bridge. A 1994 Sverdrup study evaluated potential design options and a 1999 Entranco study researched and presented the likely steps required to conduct the necessary environmental review of the project alternatives and to complete necessary permitting. These studies are summarized below.

2.2.2.1 Sverdrup Study

In November 1994, Sverdrup Civil, Inc. completed a report titled *14th/16th Avenue South Park Bridge Rehabilitation/Replacement—Design Report* for the King County Department of Public Works. The objective of that report was to evaluate alternative alignments and bridge types, impacts of the alternatives studied and to present to King County results, findings, conclusions, and recommendations of a preferred replacement bridge for the existing South Park Bridge.

The 1994 design report studied five alternatives: rehabilitation of the existing bridge; two fixed-span bridge replacements (a 100-foot vertical clearance bridge and a 60-foot vertical clearance bridge); a new moveable bridge (double-leaf bascule bridge); and bridge closure (permanent closure and demolition of the existing bridge). Other alternatives that had been evaluated but were not carried forward, according to this report were: locating the replacement bridge immediately east (upstream) of the existing

alignment; matching the existing alignment; and locating the northbound and southbound lanes on separate structures. These three alternatives were not considered feasible and thus were not studied further.

The 1994 design report concluded that the 60-foot vertical clearance fixed-span bridge design could be used to replace the existing South Park Bridge, with consideration of mitigation of impacts to some users.

2.2.2.2 Entranco Study

In July 1999, Entranco completed the *16th Avenue S. Bridge Replacement Project: Environmental Review Report* for the King County Department of Transportation. The objective of this report was to present to King County a summary of environmental review and permitting activities that would likely be required for replacing the bridge.

The report identified the proposed project as a replacement of the existing bridge, including improvements to the approach road—14th Avenue S. to the south and 16th Avenue S. to the north of the Duwamish Waterway. The project limits were identified as East Marginal Way S. on the north and S. Cloverdale Street on the south. The report asserted three build alternatives should be selected for evaluation in the EIS, including alternatives with differing alignments and bridge types. It was further noted that three alternatives would be the least number needed to provide a reasonable range of alternatives under National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations.

Entranco outlined the various tasks that would be required under the WSDOT Environmental Procedures Manual and Federal Highway Administration (FHWA) guidelines. The report identified these tasks to include the following: the development of bridge alternatives, screening, and selection of alternatives for analysis in the EIS; preliminary engineering design, including an update to the1994 rehabilitation/replacement report; survey and mapping work; hydraulic and geotechnical studies, and conceptual-level design documentation. The report concluded that the alternatives proposed, including rehabilitation of the existing bridge, had not been designed in enough detail to make a decision regarding a preferred alternative. Related to the environmental review process, the report recommended the public involvement program include coordination with an Interdisciplinary Team (IDT) of agency representatives and a community advisory committee. The report also listed 17 specific environmental discipline reports that would likely be required for the preparation of the EIS.

The findings and recommendations presented in the Entranco report formed the basis from which King County staff developed the current contracted scope of work for environmental review. The scope includes engineering, environmental review, agency coordination, and public involvement tasks.

2.2.3 Continuing Deterioration

Since 1999, King County has continued to move forward to develop alternatives for rehabilitating or replacing the existing South Park Bridge. Bridge conditions have worsened since the engineering studies were conducted in the mid-1990s. In February 2001, the Puget Sound Nisqually Earthquake caused significant and widespread damage to the bridge. Over $740,000 was required to repair the bridge in order to keep it operational.[4] The King County 2001 bridge inspection report recorded a rating of 8.0 out

[4] Tim Lane, King County Department of Transportation, Telephone Conversation, September 23, 2002.

of a total possible score of 100 (based on FHWA criteria).[5] The following year, this rating decreased to 6.0.[6]

2.3 Purpose and Need of Project

As a required element of the EIS, a Purpose and Need Statement was developed for the South Park Bridge Project to clarify the underlying basis for the proposed action. The development of the initial draft Purpose and Need Statement involved review and comment by a number of parties including King County staff and the Project Advisory Committee (PAC) that includes agencies with jurisdiction over the proposed project. The draft Purpose and Need Statement was also revised based on comments received at several public involvement events. In April 2002, King County forwarded the draft Purpose and Need Statement to the Federal Highways Administration (FHWA) for review and approval. The text of the FHWA-approved version of the Propose and Need Statement is presented in the following sub-sections, although minor revisions and footnotes have been included for clarification.

2.3.1 Function and Role of the South Park Bridge

The King County Department of Transportation (KCDOT) is proposing the rehabilitation or replacement of the South Park Bridge located in King County, Washington. Since 1931 the moveable-span bridge has carried traffic along the 14th Avenue South and 16th Avenue South corridor across the Duwamish Waterway. On a typical workday, a mix of approximately 20,000 cars, trucks and buses use the bridge to access employment centers in downtown Seattle and the Duwamish industrial area. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For residents of the community of South Park, the bridge is the only immediate means of access to and from destinations east of the community. The moveable structure spans the navigation channel of the Duwamish Waterway. When open, large-size industrial and recreational vessels have access to upriver destinations. The South Park Bridge is also a major route for heavy truck traffic traveling to and from large industrial manufacturers including the Boeing Company.

2.3.2 Purpose of Proposed Project

The purpose of the proposed action is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge. The proposed action must also maintain the vital transportation linkage for cars, trucks, buses, bicyclists and pedestrians across the Duwamish Waterway.

2.3.3 Need for the Proposed Project

In spite of substantial ongoing maintenance and repairs, the South Park Bridge has suffered substantial deterioration over the past 70 years. Existing problems with the

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[5] King County, *Bridge Inspection Report,* August 21, 2001.

[6] King County, *Bridge Inspection Report,* August 1, 2002.

bridge worsened significantly following the Nisqually Earthquake in February 2001 and the bridge remains vulnerable to future seismic events. A recent 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on FHWA criteria).[7] This is among the lowest ratings given any bridge structure in the State of Washington.

The bridge could be closed as a consequence of excessive structural deterioration or failure of the moveable-span operations (particularly in the event of another seismic event). Closure of the bridge would have a significant impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area— including SR-99, SR-509, First Avenue S. and East Marginal Way S. Improvements are required in the near future to protect public safety and to maintain a transportation corridor that is critical to the local and regional economy.

2.3.3.1 Seismic Vulnerability

The February 28, 2001 Nisqually earthquake (magnitude 6.8, located 35 miles from Seattle and deep below the surface) caused significant damage to the South Park Bridge. Since the earthquake, operation of the moveable span has been less reliable, requiring the bridge to be closed for repairs intermittently for several days. The continuing periodic closure of the bridge for repairs has heightened the awareness of the need for rehabilitation or replacement of the existing bridge.

2.3.3.2 Roadway Design Deficiencies

The South Park Bridge does not meet current roadway design standards and has many design deficiencies. For example, the overall bridge width including lane widths, shoulders and sidewalks should be 64 feet according to current design standards. The existing bridge width is currently only 52 feet (measured outside-to-outside).

2.3.3.3 Transportation Issues

An average of 20,000 daily vehicle trips cross the Duwamish Waterway on the South Park Bridge. It is a significant link between the east and west side of the Duwamish Waterway, both locally and regionally. The South Park Bridge is also a route for heavy and oversize truck traffic. According to previous studies, closure of the bridge would have a significant noticeable impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area—including the Highway 99 and East Marginal Way S. corridors.

2.3.4 Key Issues

2.3.4.1 Community Impacts

The existing South Park Bridge is a highly valued feature of the South Park community. There is widespread concern in the community that changes to the bridge could have a

[7] The original text of the FHWA-approved Purpose and Need Statement cited the condition rating of 8.0 from the 2001 King County Bridge Inspection Report. The current cited condition rating of 6.0 is from the King County *Bridge Inspection Report* dated August 1, 2002.

significant adverse impact on the community and the emerging economic vitality of the South Park business district centered along 14th Avenue South. The *South Park Residential Urban Village Plan of 1998* (the neighborhood plan) identified one of its primary objectives as "finding a solution for the South Park Bridge that is sensitive to the needs of the community."

The South Park community is also ethnically diverse. Approximately 30 percent of the populations' primary language is not English. These factors require greater emphasis on the consideration of environmental justice[8] in order to ensure that the potential adverse effects from the proposed project do not have a disproportionate impact on lower-income or minority populations.

2.3.4.2 Aquatic Habitat Protection

The Duwamish Waterway is an important route for juvenile and adult salmon migrating between the upper Green River, Elliott Bay and the Pacific Ocean. However, much of the waterway in the vicinity of the South Park Bridge currently provides poor habitat for chinook salmon (listed as threatened under the Endangered Species Act) and other marine organisms. The armored shoreline along the waterway in the project area provides minimal habitat for young chinook salmon during their critical rearing period. Recovery plans now underway for threatened and endangered salmon will address potential means of enhancing habitat favorable to the survival and growth of young salmon from the Duwamish River/Green River system. Restoration of the shoreline in the vicinity of the project would address immediate and long-term needs for habitat improvement along the Duwamish Waterway.[9]

2.3.4.3 Duwamish Waterway Navigation

The Duwamish Waterway is used for industrial, commercial and recreational purposes. The South Park Bridge is near the upstream limit of heavy industrial uses along the waterway, but it is within the section of the waterway maintained by the U.S. Army Corps of Engineers as a navigation channel. A number of local businesses, as well as the U.S. Coast Guard, have emphasized to King County that any engineering solutions for the South Park Bridge must maintain navigational access upstream of the existing bridge.

2.4 Description of Alternatives

This section describes the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives (Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives). The first section explains the transportation engineering criteria and standards used to design the Rehabilitation Alternative and the three

[8] Environmental justice concerns the need to avoid disproportionate, significant adverse impact on minority and/or low-income communities.

[9] This section highlights the importance of addressing aquatic habitat values in the project area, as well as the implications for species currently listed under the ESA; however, it is not intended as a complete characterization of the factors that need to be considered in this regard.

replacement bridge alternatives. The second section describes the horizontal and vertical profile of the bridge alternatives, navigation channel clearances, and impacts to the local road network. The last section describes construction activities associated with each of the five alternatives for the South Park Bridge Project.

2.4.1 Design Criteria

Except for the No Action Alternative, construction of any of the project alternatives would incorporate current transportation engineering design criteria for the cross-section, alignment, design speed, maximum grade, and transition segment. The road cross-section design is a key design element that would change for any of the build alternatives (see Figure 3). The existing bridge cross-section incorporates four 9.5-foot travel lanes, raised curbs on both sides of the pavement, and a 6-foot sidewalk on either side of the roadway. The outside-to-outside dimension of the existing bridge is 52 feet. These lane widths are non-standard and would be changed for the Rehabilitation Alternative and for the three replacement bridge alternatives. For the Rehabilitation Alternative, the pavement would remain approximately the same width as it is currently, but would be reconfigured for three standard lanes. There would be two 12-foot lanes on the outside and one 11-foot lane in the middle of the roadway. Traffic would use one 12-foot lane for northbound travel and the other two lanes for southbound travel. The 6-foot sidewalk on either side of the roadway would be enlarged to approximately 7.5 feet. In contrast, each of the replacement bridge alternatives would be designed with four standard 11-foot lanes, traffic barriers or a painted median down the center, a traffic barrier on each side of the pavement, and a single combined 13-foot pedestrian/bike path on the west (downstream) side of the bridge. The width of the cross-section for the new replacement bridge alternatives including the exterior barriers would total approximately 68 feet (outside-to-outside of the bridge structure).

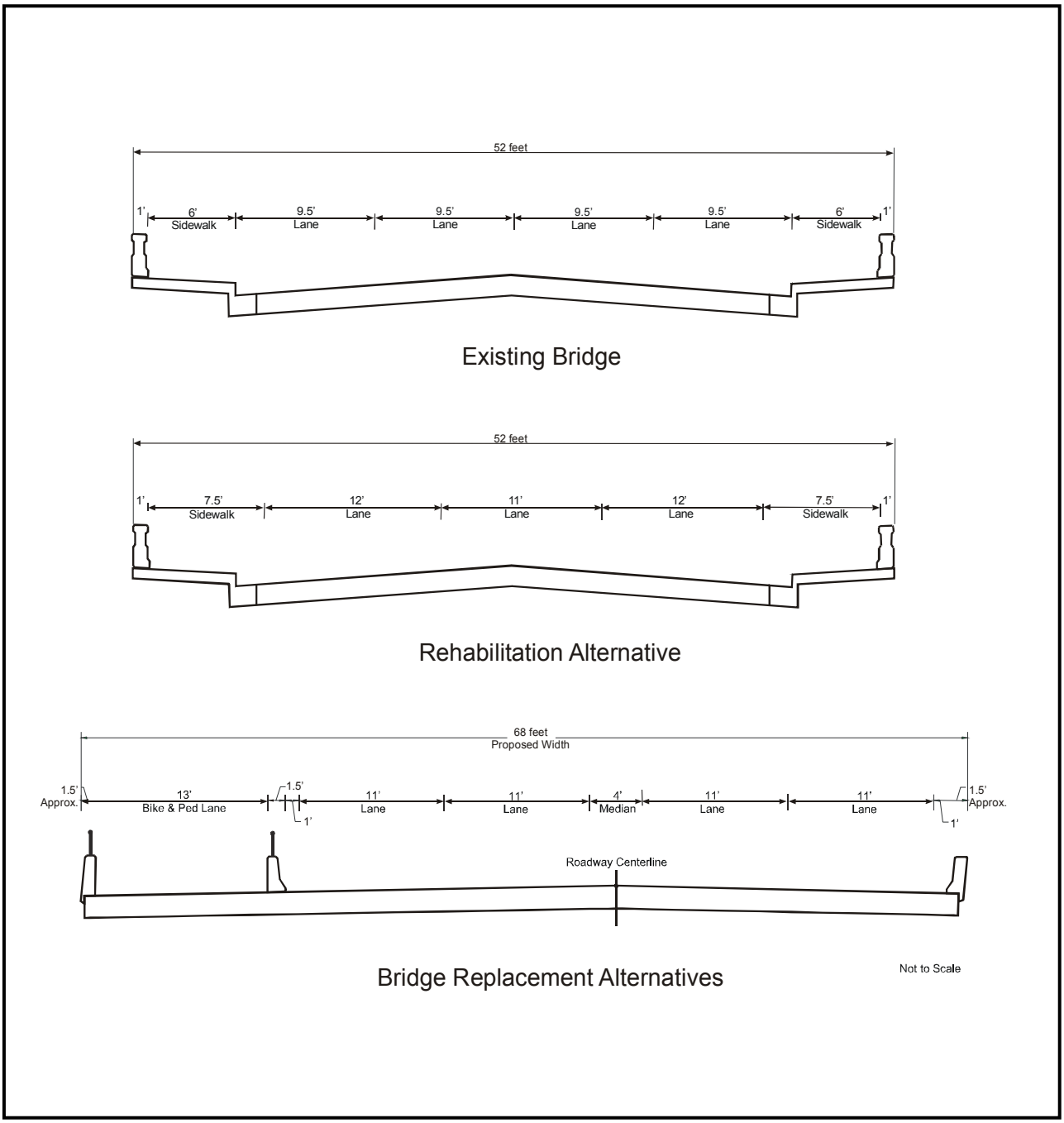

Figure 3
Existing and Proposed
Bridge Cross-Section Designs

An initial range of potential bridge alternatives and alignments was considered based on earlier studies,[10] current input from stakeholders, and the project team. During the course of this initial alternatives development process, it was determined that there were no practical alternative alignments for a replacement bridge other than to parallel the existing bridge. It was determined that replacement bridge alternatives should be aligned to the west (downstream) of the existing bridge in order to minimize impacts to existing land uses. Conceptual engineering for the replacement bridge alternatives set the alignment for these bridges at approximately 80 feet to the west of the centerline of the existing bridge (i.e., as close to the existing structure as practicable without compromising constructability). The initial alignment of the new roadway was the same as the existing road alignment on the south side of the waterway. The existing roadway is quite narrow. Matching the centerline of the new bridge alternatives to the existing would require acquisition of both land and buildings on both sides of 14th Avenue S. To minimize these impacts, the alignment of the new transition segment was shifted slightly to the east of the existing road alignment because there are fewer parcels and buildings located on the east side of the road compared to the west. In addition, more of the buildings located on the east side are set back from the existing sidewalk than on the west side. In this way, the proposed alignment for the replacement alternatives has been developed to avoid or minimize potential land use and relocation impacts.

Other design factors affecting impacts to adjacent properties include the new bridge's design speed and maximum grade. King County road standards call for a 35 mph design speed and a maximum of 8 percent grade. Initially, these standards were incorporated into each of the alternatives. Implementation of an 8 percent maximum grade for the High-Level Fixed-Span Bridge Alternative, however, would have resulted in a very long bridge (project terminus to terminus). For example, the north terminus would have extended across East Marginal Way S. and into Boeing Field. To reduce impacts to land use, the maximum grade for the High-Level Fixed-Span Bridge Alternative would need to slightly exceed 8 percent. In this manner, the north side of the bridge would terminate south of East Marginal Way S. This grade change reduced the overall length of the bridge on both south and north ends of the bridge by several hundred feet for the High-Level Fixed-Span Bridge Alternative.

Community impacts would also be affected depending on the design of the transition segment. This is the segment of the roadway that merges the differing widths of the new roadway and the existing narrow roadway. Typically, transition segments begin at the point the grade of the bridge matches the grade of the existing roadway and extends beyond some distance. The actual rate at which the width of the roadway is reduced is defined by transportation engineering design standards. To minimize impacts to land uses along 14th Avenue S., King County proposes to start the transition segment from the abutment for all alternatives. This means that by the time the bridge matches the grade of the existing roadway, the width of the new bridge is nearly the same width as the existing road. As a result, the total length of the roadway is reduced potentially several hundred

[10] Entranco, Inc., *Environmental Review Report: 16th Avenue S. Bridge Replacement*, July 1999.

feet in length. In addition, the width of the transition segment for the Mid-Level Fixed-Span Bridge Alternative is further reduced by having the single combined 13-foot pedestrian/bike path split off from the main bridge structure at approximately S. Orr Street and descended to ground level in a zigzag fashion. This design modification further reduced the overall impact of the Mid-Level Fixed-Span Bridge Alternative.

Together, the design criteria discussed in this section would allow for the construction of a replacement bridge that provides increased safety for vehicles, bicyclists, and pedestrians.

2.4.2 The Alternatives

A total of five alternatives were selected for evaluation in the environmental review process including: the No Action Alternative, the Rehabilitation Alternative, the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative, and the High-Level Fixed-Span Bridge Alternative. These alternatives were selected from an initial group of nine preliminary project alternatives.[11] The alternatives proposed for evaluation in the environmental review process were selected because they had fewer potential impacts than the other preliminary alternatives. Based on comparison ratings for seven evaluation criteria (regional mobility, local access, navigation, community impacts, aquatic habitat, construction impacts, and estimated project costs), the following preliminary alternatives were dropped from further consideration: a low-level fixed-span bridge, a movable swing bridge, a vertical lift movable bridge, and a tunnel option. The following sections describe each of the proposed project alternatives to be considered in the environmental review process based on conceptual civil and structural engineering.[12] [13]

2.4.2.1 No Action Alternative

The No Action Alternative assumes that the existing bridge structure's poor condition would require it to be closed at some time in the future. Deterioration due to use could allow the bridge to continue to operate for the foreseeable future, but at some time in the future, the bridge would need to be closed. As such, for purposes of environmental review, it is assumed the existing bridge would be closed permanently sometime before 2027.

However, the bridge could be closed for other reasons than simply deteriorated condition. Another earthquake could cause an unexpected emergency closure of the bridge at any time. The on-going movement of the bridge foundations could eventually cause the moveable spans to become misaligned to the extent that repairs would be infeasible. Or, the cost of maintaining the bridge could become more than King County is willing to expend. Under any of these circumstances, the bridge would be closed.

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[11] Parsons Brinckerhoff. *South Park Bridge Project: Summary Technical Memo - Alternatives Development and Screening*, September 6, 2002.

[12] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

[13] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

When closed, no vehicular, bicycle, or pedestrian traffic would be allowed to use the bridge. As a navigable waterway, the U.S. Coast Guard regulates bridges that span waterways such as the Duwamish Waterway. If the bridge were no longer operating, the U.S. Coast Guard regulations would require demolition and removal of the bridge. With no structures remaining, there would be no potential navigation obstructions in the Duwamish Waterway.

Under this alternative, there would be no change in the local street network except 14th and 16th Avenue S. would be dead-ended on both the south and north shores of the Duwamish Waterway. Figure 4 shows the existing local street network and Figure 5 shows the local street network following the removal of the existing bridge in the No Action Alternative. As the road does not currently provide direct access to the adjacent Boeing Company properties, the exact location of the road closure on the north side would need to be negotiated with Boeing as well as the owner of the railroad tracks immediately south of East Marginal Way S. In addition, the site of the removed bridge would be restored.

2.4.2.2 Rehabilitation Alternative

For the Rehabilitation Alternative, much of the existing bridge structure would need to be replaced. The existing steel trusses of the approach spans and the bascule leaves would be refurbished and reused. The mechanical and electrical operating systems would be refurbished and/or replaced. Studies have confirmed the existing bridge piers are gradually shifting because the foundation pilings were not originally driven to a sufficient depth. Although the initial goal was to rehabilitate the existing piers, the design team's structural analyses determined that the existing bascule piers and truss approach span piers must be replaced in order to ensure the long-term (approximately 75 years) integrity of the bridge. If the bascule piers were reconstructed, the longevity of the Rehabilitation Alternative would be similar to the expected minimum life of a new bridge structure.

For the Rehabilitation Alternative, the new bascule piers are proposed to be approximately the same size, location, and historic character as the existing piers (see Figure 6). To construct the new bascule piers, the bascule leaves and steel approach spans would need to be removed. The steel truss elements of the bridge structure would be taken to another site for repair, refurbishment, and/or painting before they are re-installed following the construction of the new piers. The concrete shafts or pilings supporting the foundations of the new piers would extend below the existing pilings to a depth beneath the riverbed where stable soils exist. The removal of the steel truss spans would also allow for replacement of the steel approach piers. The concrete approach spans and bridge abutments would be replaced and the bridge deck would be reconstructed. Like the existing bridge, there would be piers both on land and in the water. The first on-land piers would be only an estimated 20 feet from the top of the south embankment and the closest in-water piers would be approximately 20 feet from the top of the embankment. The piers

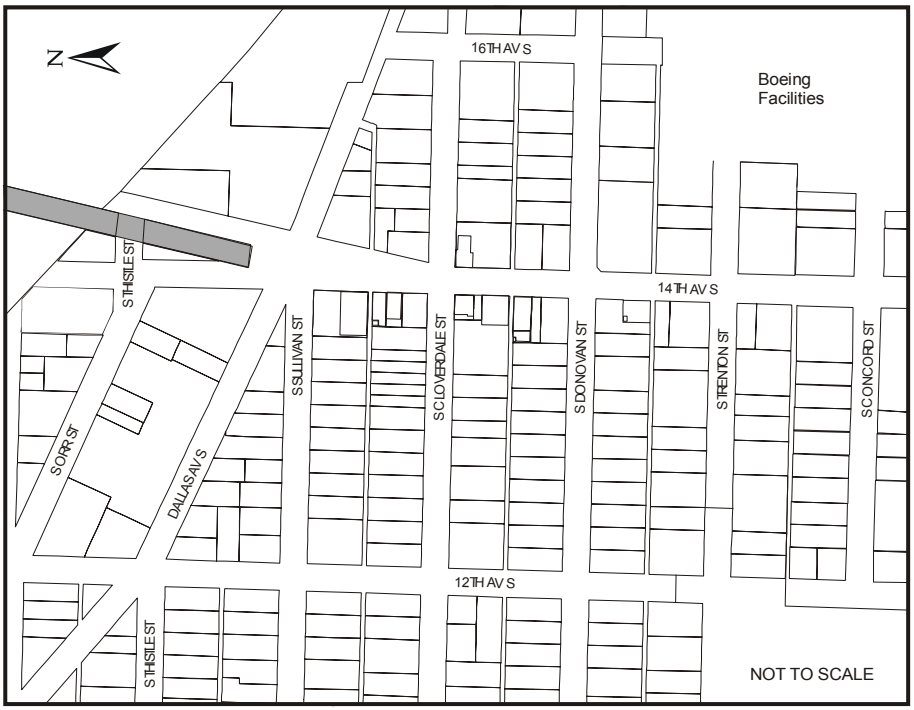

Figure 4
Existing Conditions Street Network

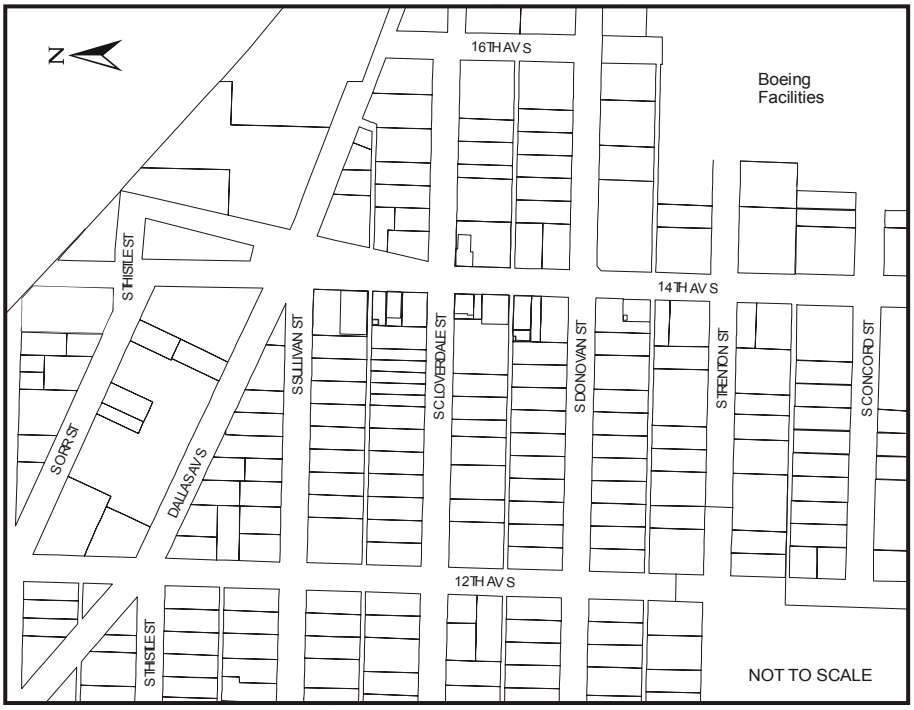

Figure 5
No Action Alternative Street Network

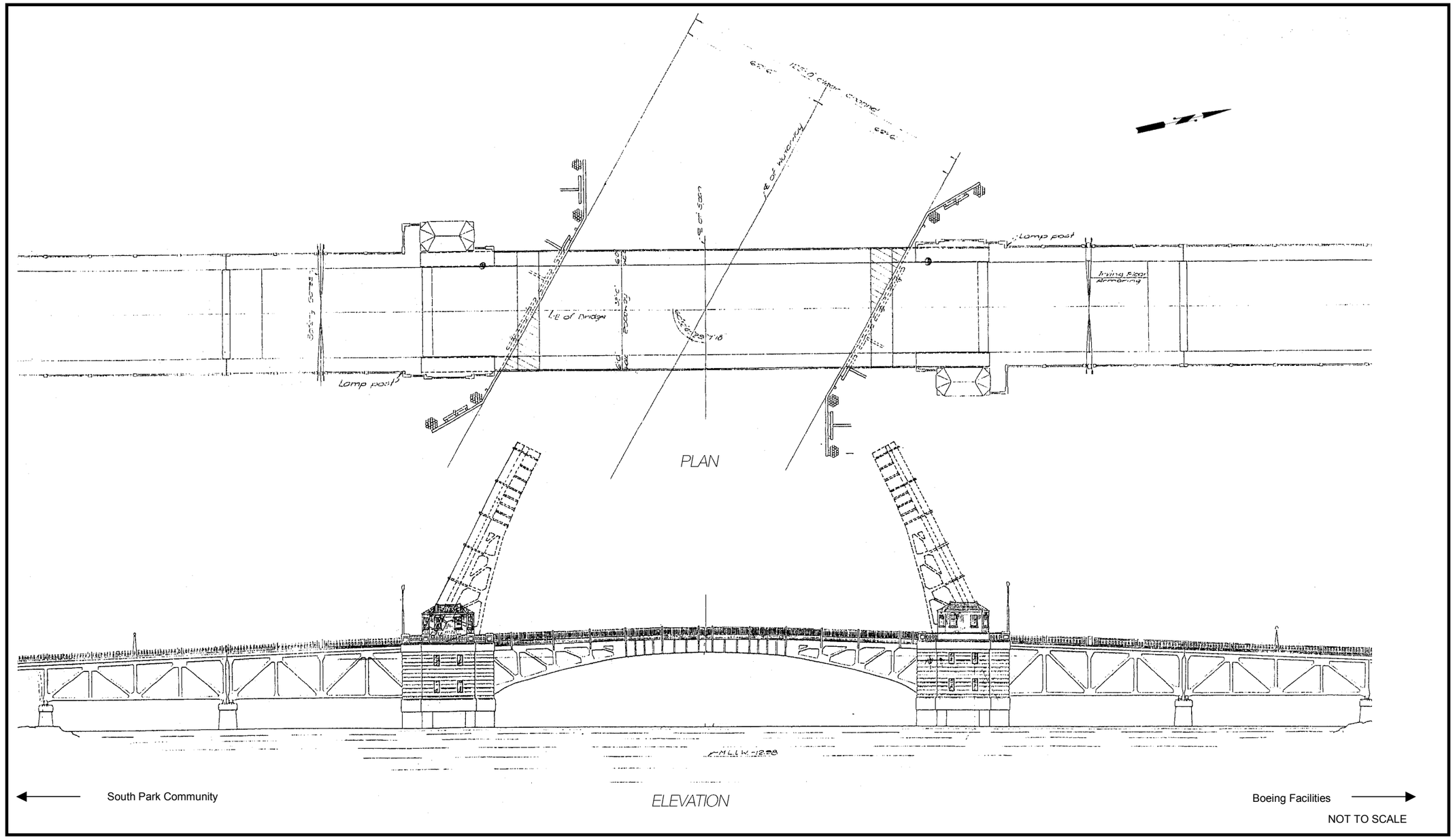

Figure 6
Rehabilitation Alternative

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on the north shoreline would extend through the existing Boeing dock. The conceptual engineering analysis also determined that the mechanical and electrical systems should be replaced. Any required construction activities, including replacement of the bridge railings, bridge tender towers, and lamp posts, would be done in a manner that preserves the historic character of the existing bridge to the greatest extent possible.

To meet current roadway design standards, the new bridge deck would remain approximately the same as the existing, but the pavement would be striped to accommodate three standard traffic lanes. Bicycle and pedestrian traffic would continue to be able to use the bridge via a 7.5-foot pedestrian path on each side of the bridge.

Following construction, the existing 118-foot navigable channel width would be preserved so existing waterway users would be able to continue to use the navigation channel to travel upriver of the South Park Bridge. The extended closure of the bridge during construction, however, would have a significant temporary impact on access to the South Park community.

Following construction, there would be only slight changes in the local street network. Figure 7 shows the local street network in the South Park community following construction activities for the rehabilitation of the existing bridge. The Figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. (For comparison, Figure 8 shows the local street network following the construction of the Bascule Bridge Alternative.) To improve vehicular safety, S. Sullivan Street would intersect Dallas Avenue S., which would become the main cross street intersection with 14th Avenue S. The 16th Avenue S. (immediately east of the bridge) intersection with Dallas Avenue S. as well as 14th Avenue S. may also need to be reconfigured. Access to points north via the South Park Bridge would be maintained.

2.4.2.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the construction of a new movable bridge immediately downriver of the existing bridge (see Figure 9). The bridge mechanism could be a Scherzer rolling lift type (no longer a common design for new movable bridges) or another type. The bridge length would be approximately 935 feet from abutment-to-abutment, not including roadway approaches. Road improvements would extend from a point just north of S. Cloverdale Street on the south side of the waterway and north to a point opposite the northeast corner of Boeing Building 2-15. The interior walls of the bridge abutments would be approximately 200 feet from the top of the embankment, or approximately 50 feet closer to the shore than the existing bridge. With fewer piers than the existing bridge, the first on-land piers of this alternative would be approximately 55 feet from the top of the south embankment at the shortest distance and the closest in-water piers would be approximately 65 feet away. On the north shoreline, the closest in-water piers would be approximately 95 feet from the top of the embankment and the closest on-land piers would be approximately 30 feet away. Unlike

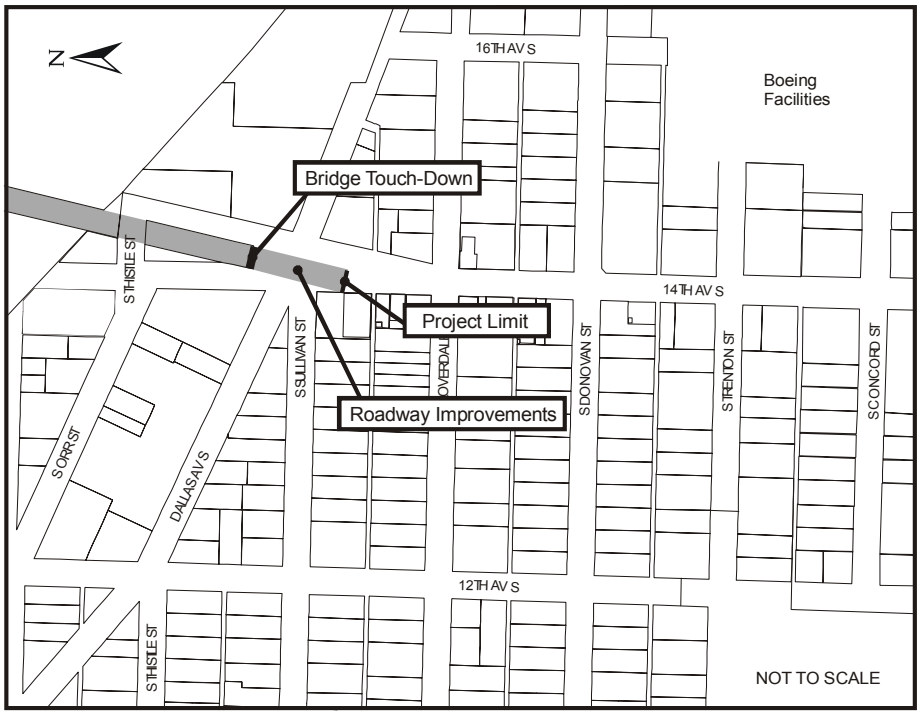


Figure 7
Rehabilitation Alternative Street Network

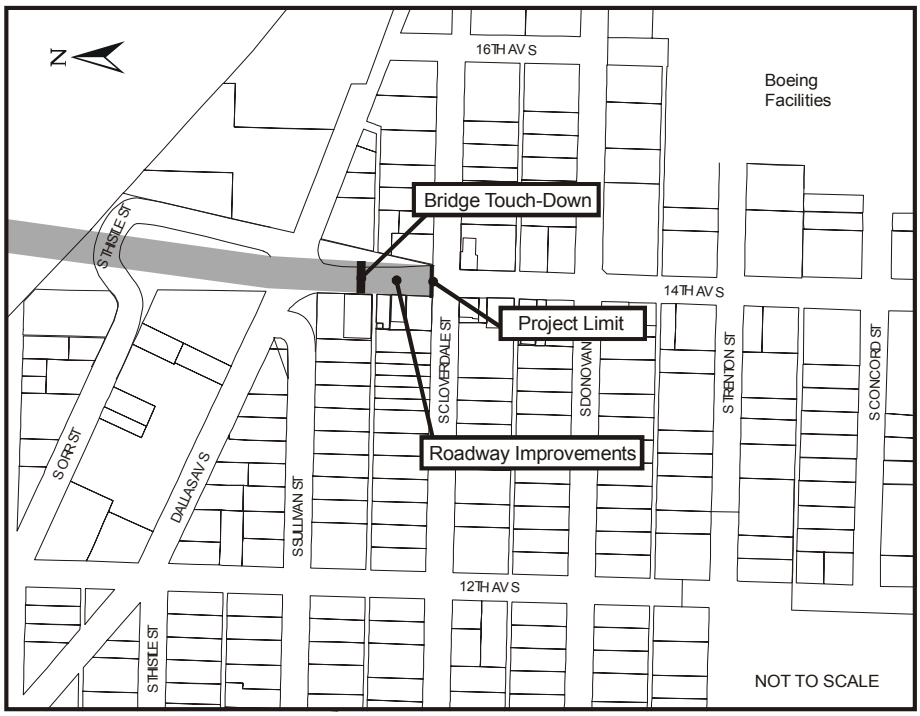
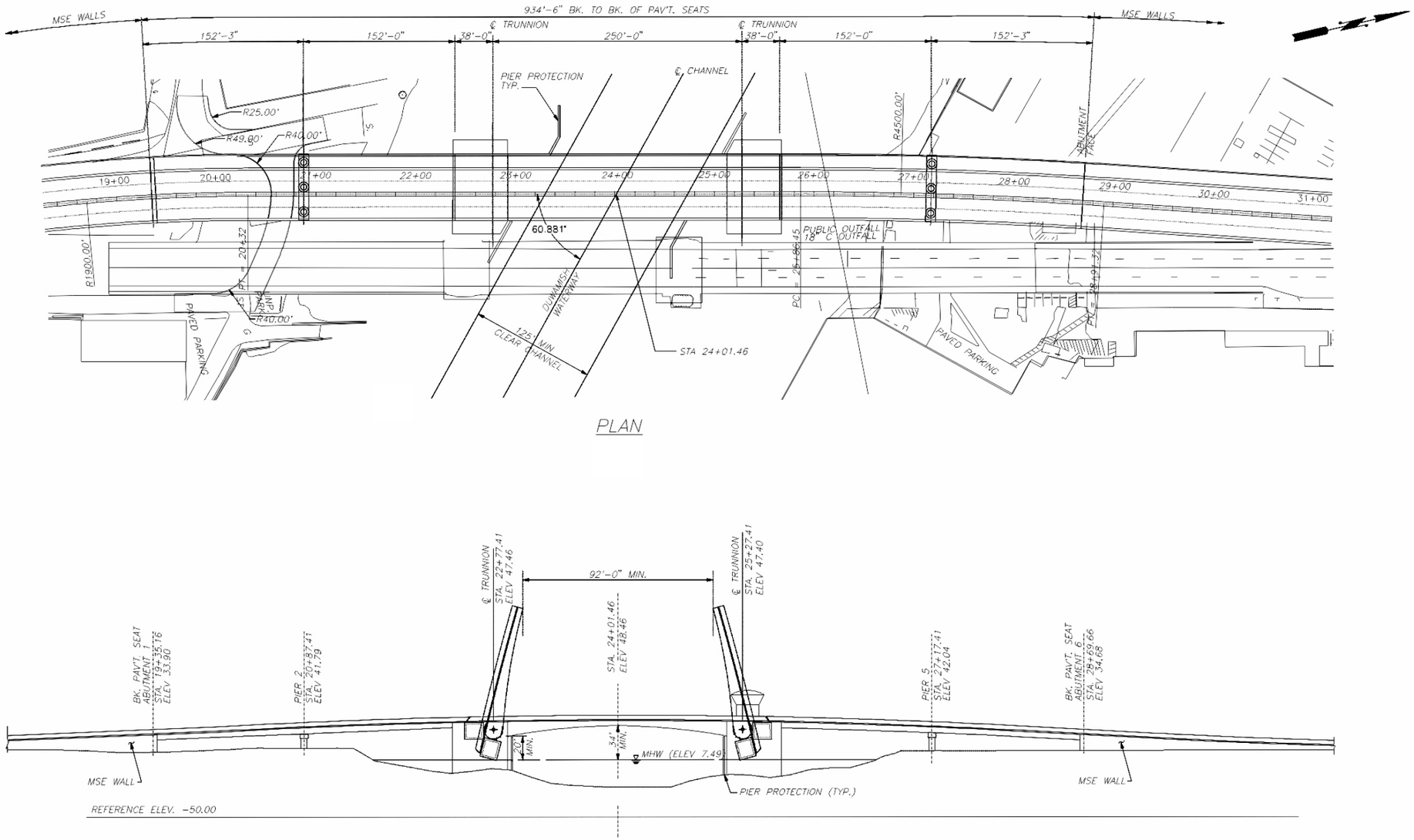


Figure 8
Bascule Bridge Alternative Street Network



PLAN

ELEVATION

Figure 9
Bascule Bridge Alternative

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the existing bridge's grated bascule leaves, the bridge deck of the bascule leaves would be solid surface to improve vehicle traction and to control stormwater runoff.

Similar to the existing bascule bridge, this bridge profile would be approximately 34 feet above the Duwamish Waterway when in the closed position. The mid-section span would be comprised of two movable leaves that could be raised to open the bridge. The navigation channel would be approximately 125 feet in width (slightly greater than the existing 118-foot-wide channel). This two-leaf bascule bridge would not impose limitations to the height of waterway users passing the bridge, because the new bridge would be approximately 125 feet between the tips of the raised spans.

Following construction, there would be some change in the local street network (see Figure 8). S. Sullivan Street would be permanently closed or reconfigured to improve traffic safety and vehicular and truck turning movements from the new bascule bridge to Dallas Avenue S. S. Sullivan Street would no longer have direct access to 14th Avenue S. and the bridge. The intersection of 16th Avenue S. (immediately east of the bridge) and Dallas Avenue S. may also need to be reconfigured. To ensure adequate vertical clearance for vehicles, S. Thistle Street would need to be slightly realigned further to the north and closer to the Duwamish Waterway. This figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. Access to points north via the South Park Bridge would be maintained. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the construction of a non-movable bridge (see Figure 10). The bridge length would be approximately 1,660 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 550 feet from the top of the Duwamish Waterway embankment, or 300 feet further setback than the existing bridge. The closest on-land piers would be approximately 85 feet from the south embankment and the closest in-water piers would be approximately 100 feet away. On the north side, the closest in-water piers would be approximately 130 feet from the top of the embankment and the closest on-land piers would be approximately 65 feet away. Road improvements would extend slightly north of S. Donovan Street and north to a point approximately 320 feet south of East Marginal Way S.

The mid-point of the bridge profile across the Duwamish Waterway would be approximately 65 feet above MHW of the Duwamish Waterway. The horizontal clearance would be approximately 125 feet, or slightly greater than the existing clearance. The vertical clearance, however, would restrict use of some waterway traffic, including some tugs and barges. Most vessels that currently pass the existing bridge would continue to be able to use the navigation channel. As described earlier in the discussion of the design considerations, the width of the new mid-level bridge is reduced when the bike-pedestrian path is separated from the elevated approach roadway near the south side abutment. This design feature reduces land use and relocation impacts.

Following construction, there would be changes in the local street network (see Figure 11). (For comparison, Figure 12 shows the local street network following the construction of the High-Level Fixed-Span Bridge Alternative.) The location of the south abutment and its vertical clearance would require modification of Dallas Avenue S. and S. Sullivan Street. S. Sullivan Street would likely be merged into Dallas Avenue S. just west of the new structure and a new roadway would be constructed under the new bridge. The alignment of this roadway would be slightly to the north to ensure it would have a minimum allowable vertical clearance. Neither street would have direct access to the new South Park Bridge. Figure 11 also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on the both sides of 14th Avenue S. for the majority of the distance between S. Sullivan Street and S. Cloverdale Street. Traffic would be able to access the bridge at S. Cloverdale Street, which would be raised a maximum of approximately 5 feet at the intersection to meet the descending grade of the bridge. This change in the intersection would allow traffic on S. Cloverdale Street to continue to have direct access to 14th Avenue S. though a retaining wall would also need to be constructed around the four corners of the intersection of S. Cloverdale Street and 14th Avenue S. due to the grade change. S. Orr Street would be closed due to the location of the support structures for the proposed separated pedestrian/bike path, which would allow bicyclists and pedestrians to descend from the bridge level to the street level. In addition, S. Thistle Street would be closed as it would no longer be able to connect to S. Orr Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative is a non-movable bridge (see Figure 13). The bridge length would be approximately 2,332 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 900 feet from the top of the Duwamish Waterway embankment, or 650 feet further set back than the existing bridge. The on-land and in-water piers of this alternative are approximately in the same location as proposed for the Mid-Level Fixed-Span Bridge Alternative. Road improvements would extend from S. Trenton Street and continue north to East Marginal Way S. This alternative would require minor modification of the 16th Avenue S. East Marginal Way S. intersection and of the existing railroad track crossing immediately south of this intersection.

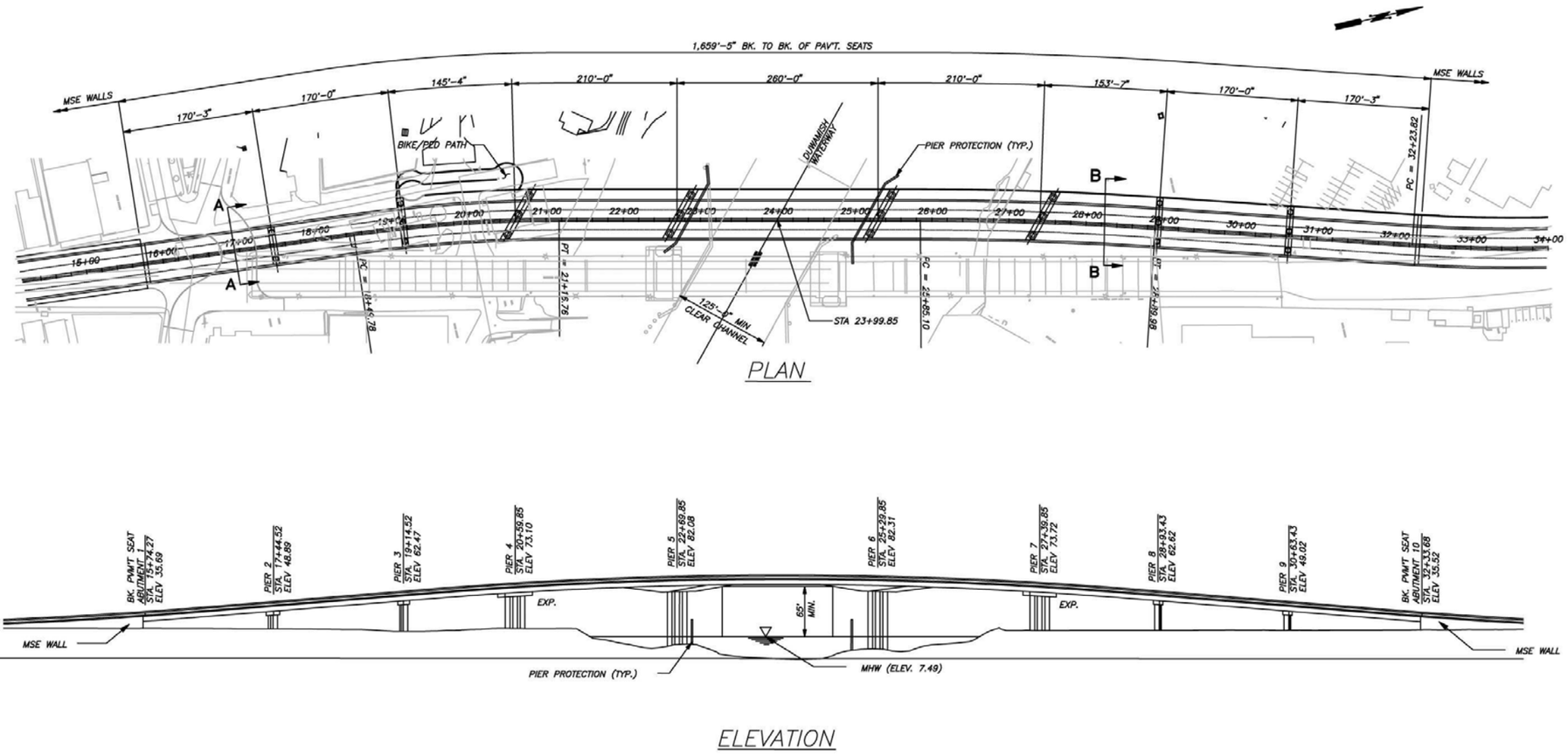

Figure 10
Mid-Level Fixed-Span
Bridge Alternative

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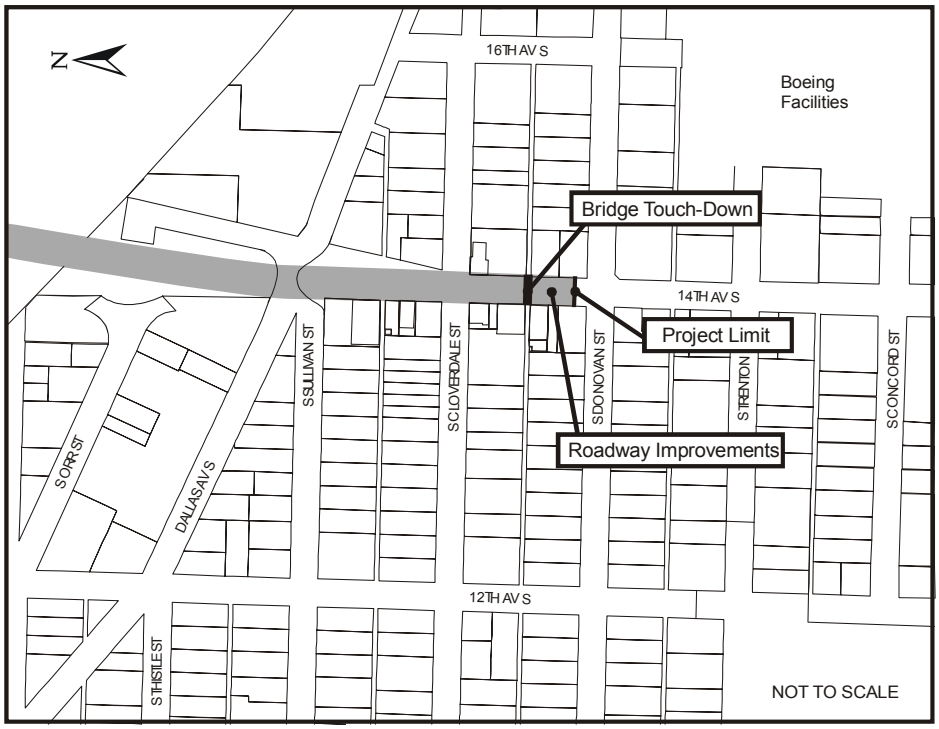

Figure 11
Mid-Level Fixed-Span Bridge Alternative Street Network

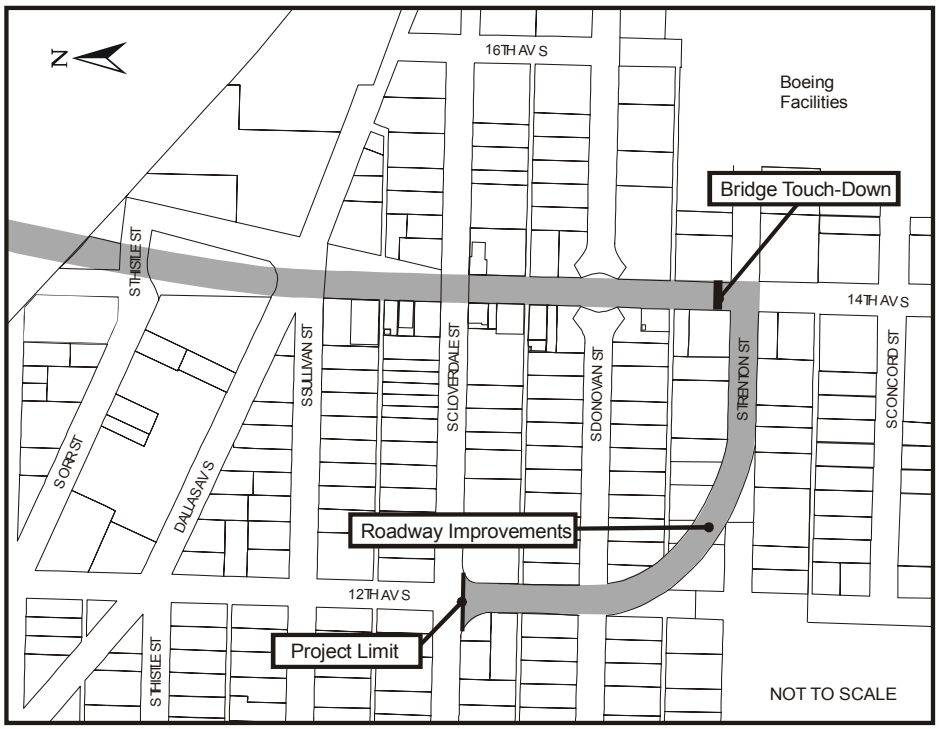

Figure 12
High-Level Fixed-Span Bridge Alternative Street Network

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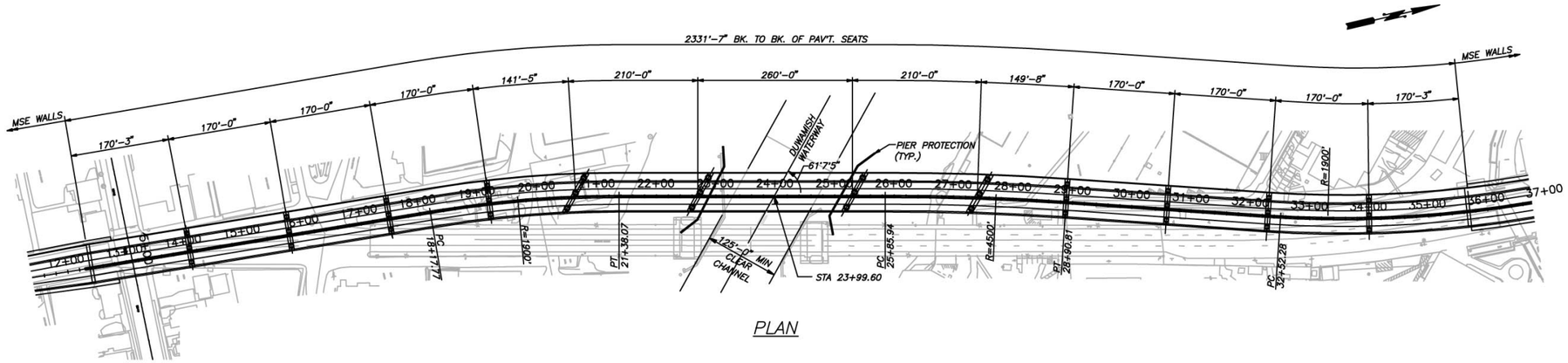

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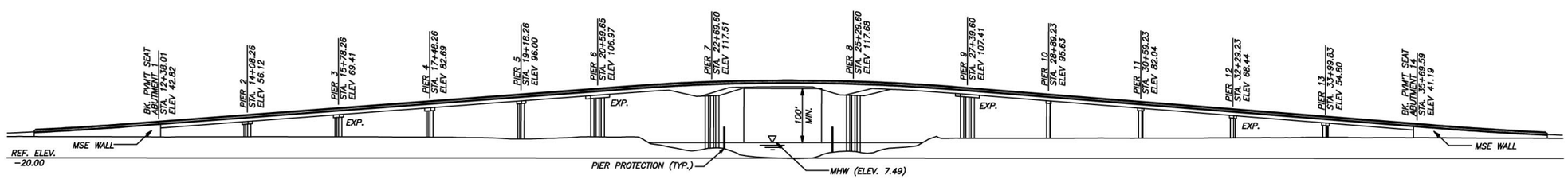

ELEVATION

South Park Community

Boeing Facilities

NOT TO SCALE

Figure 13
High-Level Fixed-Span Bridge Alternative

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The bridge design would allow for approximately 100 feet of vertical clearance above the MHW of the Duwamish Waterway as requested by the U.S. Coast Guard. The horizontal waterway clearance for the navigation channel would be approximately 125 feet, which is slightly greater than the existing 118-foot clearance (fender-to-fender). The bridge's vertical clearance would not be expected to limit the height of boats and barges currently passing the bridge. However, vessels larger than those currently using the navigation channel might not be able to pass the bridge in the future.

Following construction, there would be numerous changes in the local street network as shown in Figure 12. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. The bridge south abutment would require Dallas Avenue S., S. Sullivan Street, and S. Cloverdale Street to be converted to underpasses under the new South Park Bridge. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on both sides of 14th Avenue S. for the majority of the two-block distance between S. Cloverdale Street and S. Trenton Street. S. Donovan Street would be closed at 14th Avenue S. due to obstruction from the bridge abutment and a vehicle turn-around would be constructed on either side of the abutment on S. Donovan Street. To allow traffic to access the new South Park Bridge, a new principle arterial roadway would need to be constructed between S. Trenton Street and 12th Avenue S. and road improvements would be required on 12th Avenue S. north to S. Cloverdale Street. This new route would allow traffic, trucks, and buses to continue to access the new South Park Bridge from S. Cloverdale Street via 12th Avenue S. and S. Trenton Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.3 Construction Durations and Activities

Construction of a rehabilitation or replacement bridge for the existing South Park Bridge is planned to take approximately two to three years, including the demolition and removal of the existing bridge. Construction is anticipated to start within the next several years and opening of the rehabilitation or a replacement bridge is currently anticipated to occur by 2009. The actual time required for construction activities vary for each of the alternatives. Construction activities associated with the No Action Alternative involves only demolition of the existing bridge and restoration of the site. The construction period for this alternative would be the shortest of all alternatives, approximately 8 months. The other alternatives would additionally require rehabilitation or construction of a new replacement bridge. Anticipated construction durations (demolition of existing and construction of new) would be approximately 32 months for the Rehabilitation Alternative, 33 months for the Bascule Bridge Alternative, 20 months for the Mid-Level Fixed-Span Bridge Alternative, and 24 months for the High-Level Fixed-Span Bridge Alternative.[14]

[14] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

From a construction perspective, the five project alternatives include three different types of construction activities. The No Action Alternative assumes the existing bridge condition would eventually require closure and removal of the bridge structures. Construction activities would focus on demolishing the existing bridge and restoring the project area. The Rehabilitation Alternative would require bridge closure for approximately 30 months for rehabilitation or replacement of various elements of the existing bridge. The Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives would all result in constructing a replacement bridge approximately 80 feet downstream of the existing bridge. For these three alternatives, the new bridge would be constructed while the existing bridge continues to be operational. When the new bridge is connected to the existing road, there would be short-term temporary bridge closures. These closures could be limited to weekends or could extend for approximately one month, depending on the alternative. Once the new bridge is completed, traffic would be rerouted to the new bridge and then the existing bridge structure would be demolished in a similar fashion as described for the No Action Alternative.

Rehabilitation of the existing bridge would require closure of the existing bridge for approximately 30 months, although efforts would be made to minimize the closure period as much as possible. Reconstruction activities would begin as soon as possible after completion of design engineering and acquisition of construction permits. Traffic would be given advance notice to take alternate routes prior to closure of the existing bridge. The construction of a temporary dock and a construction staging area would be required on both banks of the waterway (see Figure 14). Construction of the new bascule piers would likely be the first major construction activity. This would entail removing the existing pier protection fenders, installing temporary supports for the bridge superstructure, removing the bascule leaves as well as the steel truss spans, installing cofferdams around the existing steel truss approach piers and bascule piers, and demolishing the existing piers.

The bascule leaves and steel truss approach spans would be removed from the construction site for refurbishment. Construction of the new piers would involve drilling shafts through the existing timber piles, constructing the pile cap, dewatering the construction area inside the cofferdam, constructing the upper portions of the pier, removing the cofferdam, and finally reconstructing the upper portions of the bascule pier and bridge towers. Workers would reconstruct the concrete approach spans and replace the abutments. Workers would also reconstruct the bridge deck and replace the mechanical and electrical systems used to operate the bridge. Replacement of the piers, bridge tender towers, bridge railings, and lamp posts would be done in a manner that would preserve the historic character of these features of the existing bridge.

Major construction activities and sequencing would be similar for the Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives. The construction duration and the impact area for each of these three alternatives, however, would clearly differ. Following completion of design engineering, acquisition of construction permits, purchase of needed property, and relocation of residents and businesses, construction

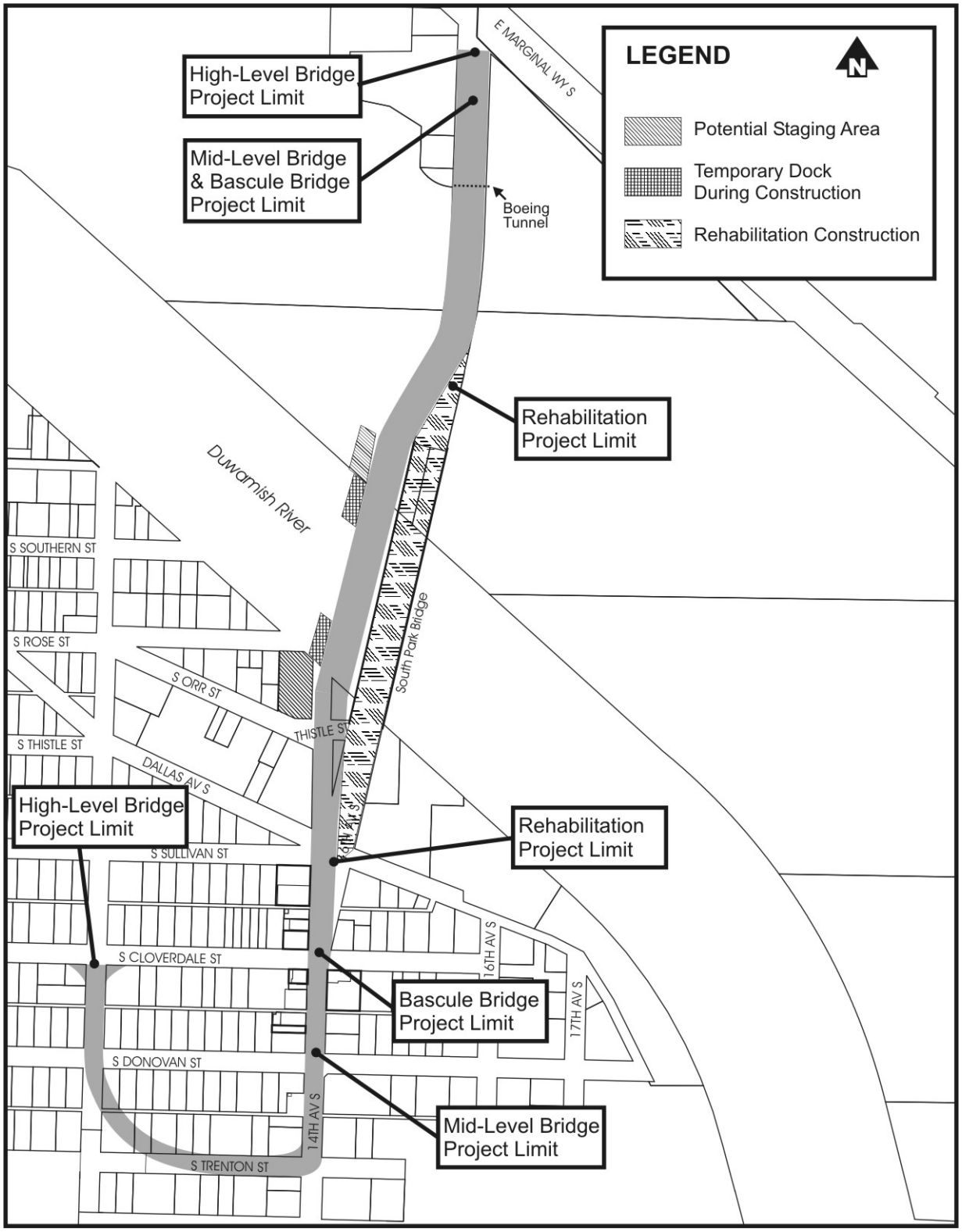

Figure 14
Proposed Construction Staging Areas

activities would begin. The first activities would include establishing the construction staging areas and constructing temporary docks with pilings on both sides of the waterway (see Figure 14).

Buildings affected by the construction activities would be demolished and utilities would be either temporarily or permanently relocated. To minimize traffic impacts, construction activities would begin with the construction of the in-water piers. Construction activities would progress landward from the central portion of each bridge alternative. Both in-water and on-land construction would begin with construction of the sub-structures (piers and abutment) and would be followed by placement of the superstructure (beams, deck, rails). On-land construction of the piers, abutment, retaining walls, and transition segments at either end of the bridge would likely require temporary closure of adjacent or nearby roads and rerouting of local traffic. If possible, these temporary closures would be limited to weekend and/or night times to minimize impacts to the community. Construction activities on the north and south portions of the new bridge structures could also occur either separately or concurrently. The last of the construction activities would be the construction of the new curb and gutter of the at-grade roadway, and paving the roadway to match the existing width of 14th Avenue S. Figure 14 shows the project limits, or start and end points, of construction activities for each of the project build alternatives.

For the rehabilitation and new bridge alternatives, new girders and other oversized materials would most likely be delivered to the project site by barge. Large cranes located on the barges or temporary docks would off-load the materials and place them in the nearby construction staging area. Removal of the existing bridge pier foundations and construction of the new bascule and steel truss piers would all require the use of cofferdams to isolate the construction activities. Construction of the new approach-span piers would use drilled shafts, which would likely incorporate the use of temporary casings to isolate the construction activities. This in-water work would be performed by equipment operated from the temporary docks or from barges.

Demolition of the existing bridge would involve disassembly and removal of the existing bascule leaves, superstructure, bridge piers, protection fenders, and abutment. Cranes would use the existing bridge structure and approaches as much as possible to remove the various elements of the bridge. Barges would likely be used to remove oversized materials. At this time, this demolition work is not planned to require construction of temporary docks or the acquisition or temporary use of property on the banks of the Duwamish Waterway for a staging area. Removal of the abutment foundations, however, would likely require temporary short-term closure of adjacent and/or nearby streets. During this time, local traffic would be temporarily rerouted from the immediate area.

Following the completion of the construction activities associated with any of the project alternatives, disturbed areas would be restored. Conceptual site restoration plans would be developed for each alternative based on additional consultation with resource agencies and other stakeholders.

2.4.4 Cost Estimates for the Alternatives

Cost estimates for each of the proposed project alternatives have been prepared by the project engineers (see Table 1).[15] The cost estimate for each project alternative, including the No Action alternative, is broken down into the following components: 1) plans, specifications, and estimates (PS&E), 2) right-of-way costs, and 3) construction and construction-related costs. The total cost estimates are provided in 2003 dollars as well as estimated costs escalated for 2008, the anticipated mid-point of the project construction period. These cost estimates were calculated based on the conceptual engineering plans that were prepared for each of the alternatives.[16]

Clearly, the No Action Alternative is the least expensive as the existing bridge would not be rehabilitated nor would a new replacement bridge be constructed. The cost to remove the existing bridge structure would be approximately $7,000,000 (2003 dollars). The estimated costs to either rehabilitate or replace the existing bridge structure range between approximately $62 million to $77 million in 2003 dollars. The least costly of the build alternatives is the proposed Mid-Level Fixed-Span Alternative, which is estimated to cost approximately $61,523,000 to design and construct. The Rehabilitation Alternative is estimated to cost approximately $63,930,000 and the High-Level Fixed-Span Alternative is estimated to cost approximately $70,460,000. The most costly of the build alternatives is the Bascule Bridge Alternative, which is estimated to cost $77,334,000. The escalated 2008 dollar estimates to design and construction the project alternatives are also shown in the table.

Table 1. Cost Estimates of the Project Alternatives

Alternative	PS&E	Right-of-Way	Construction	Total (2003 dollars)	Total (2008 dollars)
No Action	$ 250,000	$ 0	$ 6,750,000	$ 7,000,000	$ 9 M
Rehabilitation	$ 6,843,000	$ 754,000	$56,333,000	$63,930,000	$ 74 M
Bascule Bridge	$ 8,253,000	$ 3,655,000	$ 65,426,000	$ 77,334,000	$ 90 M
Mid-Level Fixed-Span Bridge	$ 4,235,000	$ 6,377,000	$ 50,911,000	$61,523,000	$ 71 M
High-Level Fixed-Span Bridge	$ 5,261,000	$ 15,310,000	$ 49,889,000	$ 70,460,000	$ 82 M

Source: Parsons Brinckerhoff, November 2003.

[15] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

[16] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

2.5 Project Coordination

Coordination to date for the South Park Bridge Project has involved members of the public, a special community advisory group, and representatives of government agencies. Formal scoping was initiated through publication of the NEPA Notice of Intent and the SEPA Determination of Significance and Scoping Notice on February 7, 2002 and February 14, 2002, respectively. Separate scoping meetings were conducted in the South Park community for relevant agencies and members of the public. Both meetings were held on February 28, 2002. Written and verbal comments received through the scoping process were reviewed by King County and used in the development of the project alternatives and topics for environmental impact assessment.

A public involvement plan for the proposed South Park Bridge Project was developed during the initial stages of project planning. The Project Advisory Committee (PAC) and the Community Advisory Group (CAG) reviewed this document and provided comments to King County. The first public involvement efforts began prior to the formal scoping period. A public workshop was held in the South Park community on January 17, 2002. At this meeting, the nine preliminary project alternatives were presented. A second public workshop was held on June 19, 2002. At this meeting, the five proposed project alternatives were presented. Members of the public were encouraged to provide comments at both of these meetings. To facilitate participation and input from Hispanic persons living in the community, a bilingual translator attended all meetings. In addition, handouts and newsletters for the project were published in English and Spanish, and public notices were published in "Siete Dias", a local Spanish-speaking newspaper. Future opportunities for public involvement are also planned, including a public hearing and workshop following publication of the Draft Environmental Impact Statement in 2004.

Establishing a CAG was a significant component of the public involvement plan. A total of 17 individuals were chosen to participate in the CAG to represent community stakeholder interests and public concerns. The CAG meets periodically to be briefed on the progress of the project and to provide input to the South Park Bridge project team. Again, a bilingual English-Spanish translator attends the meeting to facilitate communication with Spanish-speaking individuals on the CAG. To date, CAG meetings have been held on April 10, May 21, June 4, June 11, and October 29 of 2002 and on January 7 and November 18, 2003. Additional CAG meetings are planned for the future.

As part of the environmental review process, King County periodically meets with the Project Advisory Committee (PAC) to give a status report of the project, answer questions, and to solicit comments. This committee is comprised of members of various agencies that have potential jurisdiction over the proposed South Park Bridge Project. The committee is the Interdisciplinary Team (IDT) required under NEPA implementation guidelines and provides technical support to King County staff. To date, the PAC has met on January 10, February 20, May 9, May 23, and October 10 of 2002. Coordination with the PAC is planned at critical future steps in the environmental review process.

A non-scientific survey was also conducted of South Park businesses located on 14th Avenue S. during the late spring of 2003.[17] The goal of the survey was to help assess potential impacts to businesses, especially minority-owned and –operated (employees) businesses. The survey respondents were also asked to identify their particular concerns about the proposed rehabilitation or replacement of the existing South Park Bridge. A total of 18 businesses were successfully surveyed. Spanish and Vietnamese translators were provided, as needed, to assist business representatives understand and respond to the questions. In addition, the data was used to assess the potential effects displaced businesses and jobs would have on the South Park community. The analysis of the survey findings are discussed in detail in the Economic, Social, and Relocation technical reports supporting the analysis in the EIS.

As key issues have arisen during development of the project alternatives and in assessing potential environmental impacts, special meetings have also been held with key stakeholders and organizations in the South Park community, as well as with other government agencies and jurisdictions with an interest in the project. For example, on December 3, 2002, King County met with owners of property along 14th Avenue S, and information booths were set up at the Sea Mar Community Health Center-sponsored annual Fiesta Patrias on September 14, 2002 and at a family night event held at the Concord Elementary School on September 27 and November 22 of 2002. Periodic coordination meetings have also been held with representatives of the City of Seattle and the City of Tukwila, and other government agencies. These coordination activities will continue to occur on an on-going basis as the EIS is prepared and finally adopted.

[17] Parsons Brinckerhoff. *South Park Bridge Project: Survey of 14th Avenue South Businesses*, August 22, 2003.

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Chapter 3 Studies and Coordination

The South Park Bridge is located in an area that is home to various jurisdictions. The bridge structure and approaches lie in three jurisdictions: King County, the City of Tukwila, and the City of Seattle. Additional jurisdictions that influence or are affected by the bridge include the Washington State Department of Transportation (WSDOT) and the Puget Sound Regional Council (PSRC). This transportation study was closely coordinated with King County transportation planning staff, in conjunction with representatives from each affected jurisdiction or agency. This was initiated to ensure that the most current traffic and land use data is incorporated into the analysis. Background data was gathered from a number of sources and shared among agencies to allow for comparison of data and consistency. Where applicable, field-collected data was compared to existing data from each agency.

Despite its critical role in the south Seattle transportation system, few studies of the South Park Bridge have been conducted in the past ten years with respect to traffic impacts and congestion management. Two traffic studies, one by Sverdrup (*16th Avenue South Bridge Rehabilitation/Replacement Design Report*, November 1994) and one by Entranco (*16th Avenue S. Bridge Replacement Project: Environmental Review Report*, June 1999) have been used as reference material for this study. Information specifically regarding the alternatives that were previously examined and the levels of background traffic growth assumed was studied.

Travel-demand forecasts for this study were taken from the current King County travel model (based on the EMME/2 software platform). The forecasts are represented by a calibrated and approved 1998 baseline model run and a long-range 2020 model run. Land use assumptions within these models have been developed using detailed estimates from King County and neighboring jurisdictions. Transportation improvement projects from adjacent areas are also included in the overall study to reflect future changes in the roadway network. Extrapolated traffic forecasts (year 2027 conditions) were also compared to PSRC long-range 2030 forecasts (and land use assumptions) for consistency.

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Chapter 4 Methodology

This chapter summarizes the approach and the various techniques and tools used to develop traffic-volume forecasts and perform operational analysis of existing and future traffic conditions for the South Park Bridge study area. The various types of data collected are reviewed and the methodologies used to gather this information are described. The study approach and data collection procedures are discussed first, followed by an overview of the traffic forecasting process and analysis sequence.

4.1 Study Approach

This transportation study followed a conventional planning analysis approach which included data collection, alternatives analysis, detailed investigation of existing roadway and traffic conditions, forecasts of future trip generation and distribution patterns, analysis of future conditions, and an assessment of alternatives. The first element, data collection, involved determining the data needed to conduct a thorough evaluation of the corridor and acquiring this critical information. A preliminary alternatives analysis was simultaneously performed to identify initial bridge alternatives and to eliminate, early in the process, unreasonable alternatives based on factors such as environmental impacts, construction costs, and operational weaknesses.

Following these tasks, existing roadway and traffic conditions were examined through the use of computer simulation techniques, field observations, and data analysis. Future trip generation, traffic volumes, and trip distribution patterns were then determined through demand forecast modeling procedures. This modeling process was developed through a joint collaborative effort of various agencies to determine appropriate land-use forecasts and roadway network assumptions for future-year (2009 and 2027) conditions.

Using the forecasted volumes and distribution patterns generated by the bridge alternatives, future traffic conditions were investigated through further technical analysis. Refinements to the traffic volumes and network assumptions were made throughout this study as the project alternatives and traffic data were updated during the study process.

The project alternatives under consideration include two new fixed-span structures, a new movable structure, and a rehabilitated facility. Removal of the bridge was also evaluated. For traffic analysis purposes, the alternatives are aggregated into four sets of scenarios based on similar traffic characteristics and design elements. A total of eight scenarios were developed reflecting the two horizon years—2009 and 2027. These scenarios are listed in Table 2 for the five bridge alternatives (No Action, Rehabilitation, Bascule Bridge, Mid-Level Fixed-Span Bridge, and High-Level Fixed-Span Bridge). As shown in this table, the year 2009 No Action Alternative under “Four Lane” (assuming the bridge remains open) would be similar to the 2009 Bascule Bridge and Mid-Level Fixed-Span Bridge alternatives. For year 2027 conditions, the Bascule Bridge and Mid-Level Fixed-Span Bridge alternatives would be similar. The year 2009 Rehabilitated Bridge Three-Lane Scenario would incorporate two southbound lanes and one northbound lane across the structure. This Three-Lane Scenario was evaluated based on potential short-

term cost savings compared to the Four-Lane Scenario and by direction from King County Traffic Engineering staff. Nonetheless, a four-lane cross-section is considered the preferred design for the Rehabilitated Bridge Alternative due to the long-range (over 50 years) traffic capacity needs of the 14th Avenue S. corridor and the desire to maintain the operational characteristics of the bridge in the short-term. The High-Level Fixed-Span Bridge Alternative reflects a south-end touch down point for the bridge deck at 14th Avenue S./S. Trenton Street versus 14th Avenue S./S. Cloverdale Street.

Table 2. Traffic Analysis Scenarios

Alternative	Corresponding Scenario by Year		
	Existing	2009 Opening Year	2027 Long-Range
No Action	Existing	No-Bridge Four-Lane	No Bridge Bridge Closed
Rehabilitation	N/A	Three-Lane	Three-Lane
Bascule Bridge	N/A	Four-Lane	Four-Lane
Mid-Level Fixed-Span Bridge	N/A	Four-Lane	Four-Lane
High-Level Fixed-Span Bridge	N/A	Four-Lane	Four-Lane

4.2 Data Collection

To provide a comprehensive investigation of operational conditions on and around the South Park Bridge, various types of data, in addition to turning movement count information and lane geometry data, were needed. Due to the regional nature of this study and its focus on overall corridor operations, data and information related to accidents, pedestrians, heavy-vehicles, etc., were either collected in the field or provided by an external source. The specific study area considered for this traffic analysis was selected based on the anticipated level of impact of the various bridge alternatives on major intersections and critical roadways in the Duwamish Waterway area, particularly those facilities that are deemed key surrogate routes to the South Park Bridge (i.e., SR-99, SR-509, East Marginal Way S., etc). Specific data items collected for this study are described below.

4.2.1 Intersection Turning Movements

Manual turning movement counts were conducted by Traffic Data Gathering, Inc (TDG) for morning and evening peak traffic periods. Counts were taken from January 23 to January 31, 2002, for the twelve signalized and stop-control intersections within the defined study area. A summary of the specific intersection count locations and volumes is described in the Existing Conditions section (see Chapter 5). Morning (AM) peak-period counts were taken from 7 to 9 AM and evening (PM) counts were taken from 4 to 6 PM. These specific peak periods were targeted for data collection to identify worst-case conditions for operational analysis of the corridor and to subsequently develop appropriate mitigation strategies for these worst-case conditions. The highest-volume hour within the two-hour peak periods varied somewhat by intersection. However, for the majority of intersections examined, the morning peak hour occurred from 7 to 8 AM

and the evening peak hour typically occurred from 4:00 to 5:00 PM. Data for these specific peak hours was used as the basis for node-to-node volume balancing which, in turn, provided input data for detailed intersection analysis, signal progression evaluation, and simulation of the corridor. Heavy vehicle and bus volumes were included in all turning-movement counts.

4.2.2 Roadway Geometry Data

Roadway information related to lane configurations, shoulders, turn pockets, grades, lane drops, parking stalls, etc., was originally provided via paint-line sketches from the City of Seattle, King County, and the City of Tukwila. Verification of this roadway information was made through various independent field visits by Parsons Brinckerhoff staff in March, April, and May of 2002. Four afternoon and two morning field observations were made.

4.2.3 Signal Timing and Phasing Data

Signal-timing data for all signalized intersections were provided by the various participating jurisdictions. To ensure that this data was consistent with current signal data, field verifications were made during four site visits from March to May of 2002.

4.2.4 Pedestrian Crossing Volumes

Pedestrian volumes were included in the manual field counts conducted by TDG. These volumes were negligible for the majority of intersections evaluated in the study area.

4.2.5 Accidents

The City of Seattle accident database provided accident data for various intersections of interest. Accidents were given by annual totals for years 1996 to 2000 and represent all reported vehicle-to-vehicle and vehicle-to-object collisions.

4.3 Travel Demand Forecasting

4.3.1 Overview

Traffic analysis of the study area intersections and roadway facilities for the future conditions (2009 and 2027) requires estimates for traffic growth on these facilities. The South Park Bridge study team relied on travel-demand forecasts to derive the relevant growth rates for input into the traffic analysis. The King County Travel Model was used to produce travel-demand forecasts for year 2009 and 2027 conditions. This model, developed by King County Department of Transportation (KCDOT) staff, was used due to its suitability for producing appropriate travel forecasts for the area.

KCDOT staff provided the study team with the model databases for base-year 1998 conditions and future 2020 conditions. The motivation for using the King County Model, the details of the review undertaken to determine the applicability of the model assumptions, and the methodology used to produce the 2009 and 2027 travel forecasts from the 1998 and 2020 models are described in the following sections.

4.3.2 Suitability of the King County Travel Model

The King County Travel Model is executed on the EMME/2 platform, a common and widely used travel-demand forecasting and planning software package. Documentation provided by the KCDOT staff indicates that the model has been developed using well-known and sophisticated techniques and has followed nationally accepted standards. The model relies on the traditional four-step process (trip generation, trip distribution, mode choice, and traffic assignment) used by almost all travel models in the U.S. The KCDOT model also depends on the PSRC model for several key model inputs such as trip generation trip rates, mode-split factors, and time-of-day factors. These features of the King County Model and the other methods used in the model are indicative of the credibility and reliability of the forecasts produced.

The King County Model includes approximately 1,300 zones (a zone represents an origin or destination of travel activity) and encompasses the entire Puget Sound region. The model has a detailed zone structure with 1,172 zones for just the King County area. The number of zones allocated to King County in the King County Model is significantly higher than the PSRC model, which has an estimated 450 zones for the same area. More zones and, consequently, smaller zone sizes add to the accuracy and precision of the King County model's travel forecasts. The more refined zone system in this model supports the inclusion of minor arterials and collector roadways as well as major arterials and freeways in the model networks. These enhancements ensure the appropriateness of the model forecasts, not only for planning-level applications, but also for sub-area level traffic impacts analysis.

The model for this study includes 17 zones (bounded by SR-509 to the west, I-5 to the east, S. Lucile Street to the north and S. 128th Street to the south) and includes network representations of major roadway facilities like SR-509, SR-99, I-5, East Marginal Way S., Boeing Access Road, Airport Way S., Des Moines Memorial Drive, 1st Avenue S., and 14th/16th Avenue S. Relevant facilities such as S. Michigan Street, S. Cloverdale Street, 8th Avenue S., and Ellis Avenue S. were also included in the model databases given by KCDOT staff. Since these roadways sufficiently cover the facilities for which forecasts and traffic analyses were required, it was determined that the zone detail and network representation of the facilities in the model were adequate for the purposes of this study. Hence, refinements to the zone structure within the model or any addition of roadway facilities were not deemed necessary.

4.3.3 Land Use Assumptions

The land-use data underlying the 1998 King County model was developed from the year 1998 King County Assessor's permit data using ArcView/GIS software to translate parcel data to model zonal data. KCDOT staff have documented that this data was verified through comparisons to PSRC 1998 census block data. Differences were found to be within 2 percent. The land use data underlying the 2020 King County model was developed by combining 1998 to 2020 PSRC land-use growth data with 1998 King County model land use data. The resulting year 2020 data was checked and adjusted to conform to the growth estimated from the King County Concurrency program and to local data from cities and other jurisdictions within King County. These data "checks" indicate that the land use data underlying the King County model are based on reasonable

assumptions. Because the South Park Bridge study team did not possess additional information that could have supplemented the existing land use assumptions in the King County model, no changes were made to these assumptions.

4.3.4 Network Assumptions

The 1998 base-year network was developed from the 1998 PSRC model network. Road improvement projects listed in the King County CIP and PSRC's Metropolitan Transportation Plan (MTP) are expected to add significant roadway capacity and were included in development of the 2020 network. The study team extensively reviewed the list of projects included in the 2020 model and identified the following applicable study area projects needed for future 2009 and 2027 conditions.

- **Des Moines Memorial Drive**—Roadway improvements include conversion of a four-lane roadway to a three-lane roadway with a center turn lane from S. 96th Street to S. 112th Street. This project was specifically included in the 2009 model networks.

- **SR-509 Extension**—Roadway improvements include extension of SR-509 from its current terminus at S. 188th Street to I-5. The roadway will be a four-lane divided freeway with new ramps to and from the north at S. 200th Street and new ramps to and from the south at 24th Avenue S./28th Avenue S. This project and the Des Moines Memorial Drive project were included in the 2027 model networks. The King County 2020 model includes the SR-509 extension as four lanes and an HOV lane and Des Moines Memorial Drive as two lanes plus left-turn lane. This is the same as in the PSRC 2020 model.

4.3.5 Model Calibration

The King County model documentation includes a discussion of screenline validation efforts for average weekday daily traffic (AWDT) and PM peak-hour traffic. The only screenline location (for validating the King County model) near the study area is screenline #609 (S.W. Lake Washington). The King County model documentation indicates that this screenline performs well, with the ratio of model estimated volumes to observed volumes at 1.07 for daily and 1.06 for the PM peak hour. Since this screenline is some distance from the study area, a comparative analysis of the 1998 AM and PM peak-hour model estimated volumes versus observed volumes for key study area facilities was prepared. The results of this screenline-level comparison are shown in Table 3.

As shown in Table 3, apart from S. Cloverdale Street and 14th Avenue S., the model estimates volumes are within 20 percent of the observed peak-hour traffic volumes. On the South Park Bridge, the model is within 2 percent and 9 percent of the observed traffic for AM peak and PM peak hour, respectively. Overall, the model shows volumes that compare reasonably well with observed traffic patterns. This indicates that the model is adequately calibrated for the purpose of producing travel forecasts in the study area.

With regard to existing 2002 traffic count comparisons, travel demand forecasts for the 1998 baseline year were calibrated by county staff and have been made the forecasting "standard" for determining future traffic levels within King County jurisdiction (as

discussed above). These volumes are provided on a link-level basis and are not easily compared to turning movement counts. As such, detailed comparisons between 1998 calibrated forecasts and 2002 existing counts were not deemed necessary.

4.3.6 Forecasting Methodology

The King County Travel Model performs all four steps of the traditional forecasting process: trip generation, trip distribution, mode choice, and trip assignment. A basic interpolation method was used to prepare 2009 and 2027 forecasts since a full 2009 or 2027 King County model run that includes development of land use data, trip generation, trip distribution and mode choice analysis and trip assignment would be beyond the scope of this analysis.

Table 3. Comparison of 1998 AM and PM Peak Hour Observed and Model Estimated Volumes

Facility Description	AM Peak Hour			PM Peak Hour		
	Observed	Estimated	Est./Obs.	Observed	Estimated	Est./Obs.
South Park Bridge	1,610	1,575	0.98	2,030	2,210	1.09
SR-99 (s/o Boeing Access Road)	1,810	2,165	1.20	2,110	2,425	1.15
1st Avenue S. (s/o S. Cloverdale Street)	1,960	2,270	1.16	2,300	2,655	1.15
SR-509 (s/o S. Cloverdale Street)	4,800	4,820	1.00	5,200	5,760	1.10
14th Avenue S. (n/o S. Trenton Street)	1,365	1,005	0.74	1,425	1,405	0.99
S. Cloverdale Street (w/o 14th Avenue S.)	744	900	1.21	1,304	1,030	1.27
E. Marginal Way S. (n/o Boeing Access Road)	1,590	1,530	0.96	2,095	2,200	1.05

The forecasting analysis for South Park Bridge study required use of only the trip assignment feature of the demand model. The results of the trip generation, trip distribution, and mode choice analysis were implied in the trip tables used to prepare the 2009 and 2027 models. To simplify the model forecasting process, the trip distribution stage was not evaluated. It was assumed that in the event of a bridge closure or any other model alternative, the regional trip distribution pattern (longer trips through the system such as downtown Seattle to/from Des Moines) would not change significantly due to the availability of zone-to-zone alternatives such as I-5, SR-99 and SR-509.

Following mode-choice analysis and prior to trip assignment, the King County model generates and prepares AM, PM, and off-peak vehicle trip tables that are ready for the assignment stage. Year 2009 vehicle trip tables (AM and PM peak period) were developed through linear interpolation between 1998 and 2020 AM peak- and PM peak-period vehicle trip tables. Year 2009 AM peak and PM peak vehicle trips were assigned to the year 2009 networks to produce traffic volumes for the study area. Link-level

growth factors (AM and PM) for all study area arterials were determined using the ratio of 2009 link volumes to 1998 link volumes. These growth factors were then used in the traffic analysis for the 2009 traffic operations/simulation model.

Year 2027 vehicle trip tables (AM and PM peak period) were developed through extrapolating from 2020 AM peak- and PM peak-period vehicle trip tables. Zone-to-zone growth rates between 1998 and 2020 model vehicle trips were used to extrapolate 2027 conditions. Year 2027 AM and PM peak vehicle trips were assigned to the various year 2027 networks to produce traffic volumes for the study area. Link-level growth factors (AM and PM) on all the study area links were then found by the ratio of 2027 link volumes to 1998 link volumes. These growth factors were subsequently used in the 2027 traffic operations/simulation model.

Because the PSRC model does not include sufficient zone detail or network detail in the study area (including several roadway facilities for which link-level forecasts and growth rates were needed), use of the PSRC model is not appropriate for producing year 2027 growth forecasts. The use of King County model forecasts (versus PSRC model forecasts) for 2027 conditions is a reasonable approach based on the following factors:

- Consistency with traffic projections made for the mid-range 2009 scenarios
- Appropriate level of zone and network detail in the King County model
- PSRC growth assumptions indirectly implied in the current King County models

4.3.7 Select Link Analysis on South Park Bridge

To better understand the travel patterns produced by the King County model, a select link analysis of the South Park Bridge for the 1998 PM peak-period conditions (three hours) was performed. The model output shows that approximately 6,500 trips use 14th Avenue S. and 16th Avenue S. (and the South Park Bridge) during the PM peak period. Zone-to-zone trips produced from the select link analysis were aggregated and summarized into a district-to-district format. The results of this exercise are shown in Table 4.

The select link analysis shows that during the PM peak, the South Seattle District (District #8) comprising areas within the City of Seattle south of the West Seattle Freeway, including Boeing Field, is the origin for roughly 40 percent of total trips. Most of the trips are destined to areas south of the bridge. The Burien/Tukwila/Renton District accounted for 27 percent and the Shorewood/Boulevard Park District accounted for 16 percent of the trips.

This data indicates that the majority of trips using the bridge are work-related. They originate at employment centers such as Boeing with destinations that are typically residential areas such as Burien, Tukwila, or Shorewood. In the event of a bridge closure, trips to and from the areas mentioned would be most affected. The select link analysis also shows that only a small percentage of the trips are either originated from or destined to northern areas like Downtown Seattle and North Seattle.

4.3.8 *Analysis of Traffic Impacts to Airport Way*

A comparison of the model volumes for the 2027 No-Bridge Scenario and the 2027 Four-Lane Scenario shows that Airport Way S. experiences a moderate increase in traffic (less than 25 percent) when the bridge link is removed. The impact of the bridge closure on Airport Way S. appears most significant at the intersection of Airport Way S. and Boeing Access Road and declines considerably to the north (near S. Norfolk Street). However, model results indicate little to no change in overall traffic demands on Airport Way S. along Boeing Field due to the hypothetical bridge closure.

Table 4. 1998 PM Peak Period (Three Hours) Trips on the South Park Bridge

ORIGIN \ DESTINATION		Pierce County 1	Kent/Fed Way/Auburn 2	Burien/Tukwila/Renton 3	East King County 4	Shorewood/Blvd. Park 5	South Park 6	West Seattle 7	South Seattle / Boeing 8	Downtown Seattle 9	North Seattle 10	Snohomish County 11	Kitsap County 12	External 13	Origin Totals	Origin Shares
Pierce County	1	–	–	–	–	–	–	–	100	–	–	–	–	–	100	2%
Kent/Fed Way/Auburn	2	–	–	5	–	–	–	–	270	–	–	–	–	–	275	4%
Burien/Tukwila/Renton	3	6	22	369	–	295	139	397	317	–	–	–	11	1	1,557	24%
East King County	4	25	21	37	–	57	30	–	3	–	–	–	1	3	177	3%
Shorewood/Blvd. Park	5	–	0	184	0	–	–	–	105	36	0	–	–	0	325	5%
South Park	6	–	2	162	7	–	–	–	246	39	1	1	0	0	458	7%
West Seattle	7	–	2	243	1	–	–	–	83	20	–	–	–	0	349	5%
South Seattle / Boeing	8	250	639	611	23	464	249	350	–	–	–	–	13	25	2,623	40%
Downtown Seattle	9	45	49	144	–	181	128	3	–	–	–	–	2	6	559	9%
North Seattle	10	7	5	16	–	14	10	–	–	–	–	–	0	1	53	1%
Snohomish County	11	0	0	4	–	3	3	–	0	–	–	–	0	0	10	0%
Kitsap County	12	–	0	8	0	0	0	–	3	0	–	–	–	–	11	0%
External	13	–	0	0	–	0	1	–	8	–	–	–	–	–	9	0%
Destination Totals		334	740	1,782	32	1,014	560	750	1,134	95	1	1	27	36	6,506	100%
Destination Shares		5%	11%	27%	0%	16%	9%	12%	17%	1%	0%	0%	0%	1%	100%	

4.4 Operational Analysis

Analysis of roadway and intersection operational performance was performed through use of the Synchro analysis program. Synchro 5.0 (build version 321) represents the most recent update at the time of analysis and was used for all technical analysis tasks. Synchro is a commonly used macroscopic analysis tool developed by Trafficware Inc. (Berkeley, CA). It evaluates intersection delays and congestion based on procedures similar to those given in the 2000 Highway Capacity Manual (Chapters 16 and 17). Basic inputs used for Synchro relate primarily to traffic data, including traffic volumes, lane geometry (number of lanes, lane widths, turn-lane storage, etc), signal timing data, pedestrian and bicycle volumes, bus and heavy vehicle traffic levels, and a variety of other data items. Analysis results and performance measures that are provided by the Synchro package include delays, travel time, level of service, queues, and various other measures. These results are typically used to determine how changes in roadway geometry or volumes would impact traffic circulation and roadway congestion at the intersection-level.

The Synchro package also includes a microscopic simulation/animation module known as SimTraffic that is typically used for signal progression analysis and queue spillback evaluation. This module is best applied when signals are incorporated into a network system or "grid" in which some level of signal synchronization is employed. However, due to the spacing and location of the various intersections examined for this study, macroscopic analysis (i.e., use of Synchro only) was deemed an appropriate analysis approach for the purposes of the scenario-to-scenario comparisons.

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Chapter 5 Affected Environment

5.1 Existing Conditions

5.1.1 Roadway Network

The existing roadway network surrounding the South Park Bridge consists of a variety of arterial types. Roadways range from local two-lane streets to major limited-access highway backbones. Regional traffic movement in the South Park area is concentrated in three north-south corridors, including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Natural features, such as the Duwamish Waterway, and large-scale land uses, such as Boeing Field, create barriers within the network and limit opportunities for access to and from the major regional routes. Characteristics of the primary roadway facilities vary with respect to lane number, width, grades, and posted speeds. These differences are based on specific functional needs within the roadway network and corridor capacity requirements. Key roadways surrounding the South Park Bridge include SR-99, SR-509, East Marginal Way S., 14th/16th Avenue S., and Boeing Access Road. These roadways are described below and are shown in Figure 15 (vicinity map). Intersection geometry with respect to the number and function of approach lanes at key intersections is shown in Figure 16 (lane geometry map).

- SR-99 is a limited-access state facility and principal arterial. This roadway varies from four lanes to six lanes and provides South Park Bridge access to and from the south. The posted speed limit is 40 mph, lane widths are 12 feet, and grades are modest.

- SR-509 is a limited-access state highway that merges with SR-99 near East Marginal Way S. Three lanes are generally provided in each direction with access ramps at designated points along the corridor. Lane widths are 12 feet and the speed limit is 40 to 55 mph. Grades are modest and the roadway surface consists of asphalt. This facility is used as a major commercial truck route.

- East Marginal Way S. is a principal arterial with two to three lanes in each direction. This roadway provides bridge access to and from the north and access to activities related to various Boeing manufacturing facilities. Lane widths along the segment between 1st Avenue S. and Boeing Access Road range from 10 to 14 feet and the speed limit is generally 35 mph. Grades are modest and turn lanes are provided at major cross streets such as 16th Avenue S., S. Michigan Street, and Boeing Access Road.

- 14th/16th Avenue S. is a four-lane north-south major arterial connecting the key north-south corridors of East Marginal Way S. (to the north) and SR-99 (to the south). The South Park Bridge follows this 14th/16th Avenue S. alignment and provides one of a few opportunities to cross the Duwamish Waterway.

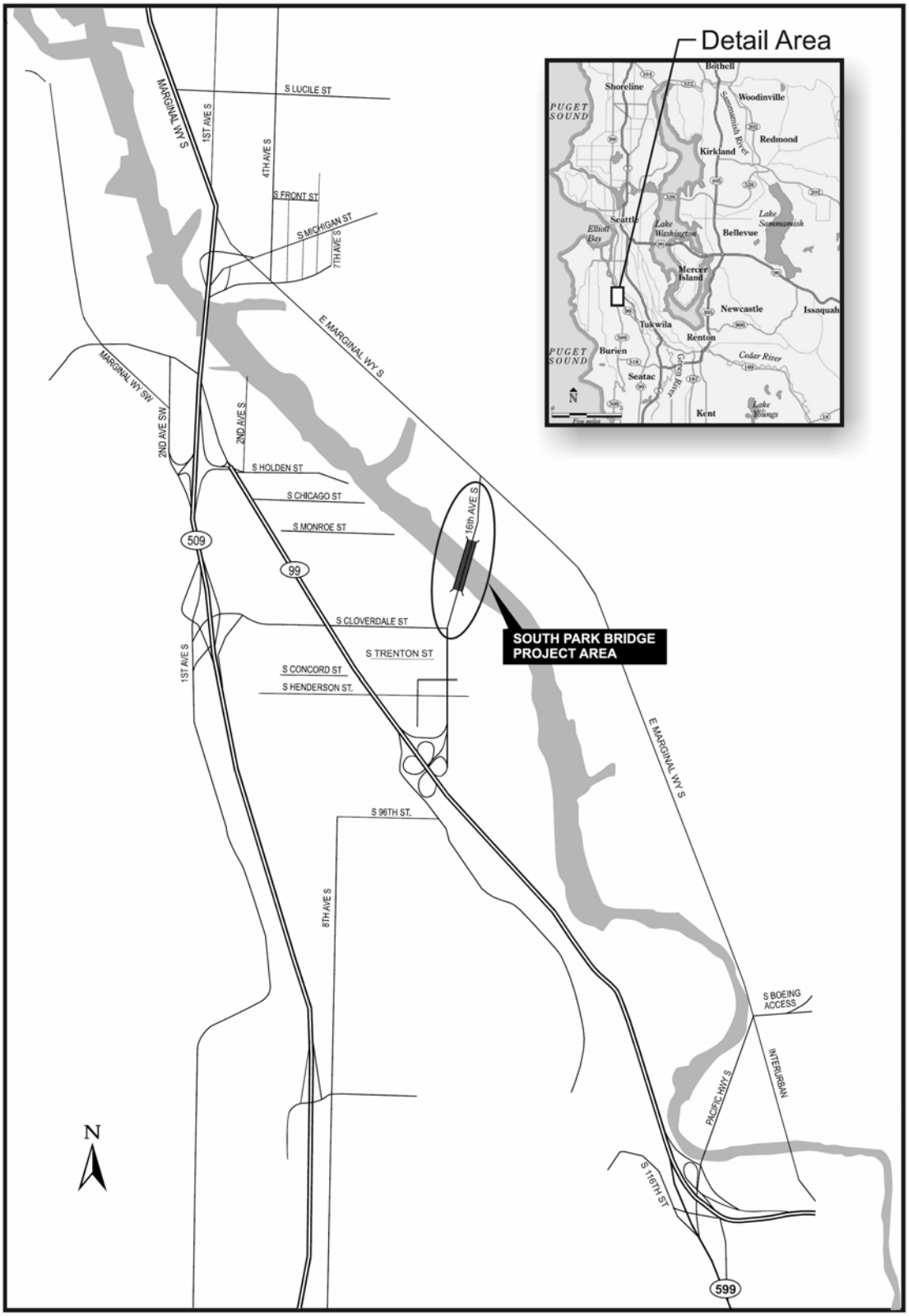

Figure 15
Vicinity Map

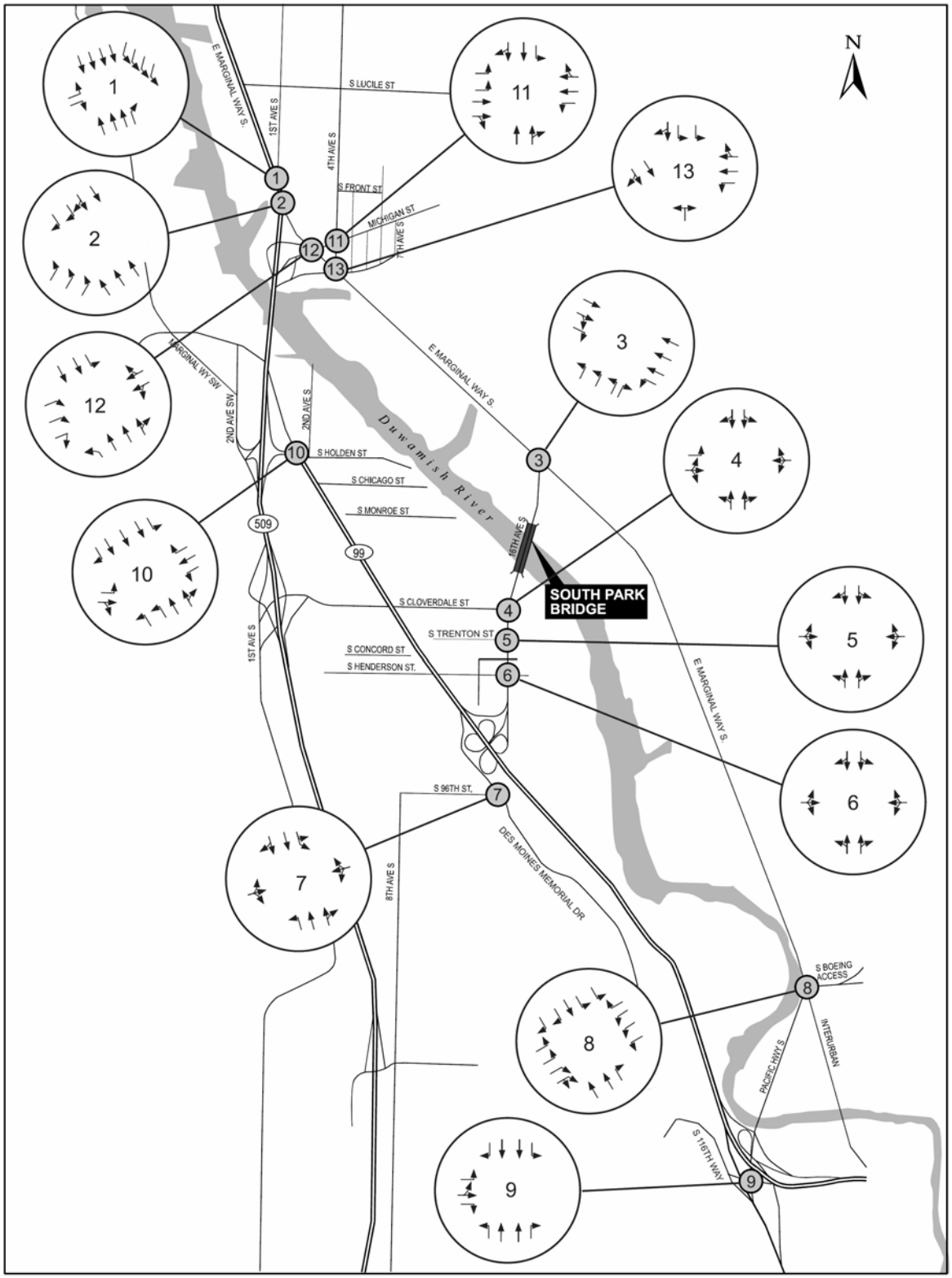

Figure 16
Existing Lane Geometry

This roadway also serves as the principal route through the South Park community, allowing access to several businesses on 14th Avenue S between SR-99 and S. Cloverdale Street. Lane widths, not including the bridge section, are 12 to 14 feet and the speed limit is 35 mph. Lanes on the bridge deck are relatively narrow at approximately 9.5 feet each. Grades are modest with the exception of the bridge crossing approaches.

- Boeing Access Road is a major east-west arterial that lies southeast of the South Park Bridge. This roadway provides access between East Marginal Way S., SR-99, and the I-5 corridor. It consists of two to three lanes in each direction. No speed limit is given for the segment west of I-5 and lane widths are generally 11 to 12 feet. Grades are moderate and the roadway surface consists of asphalt. At the Boeing Access Road/East Marginal Way S. intersection, dual westbound turn lanes are provided along with right-turn channelization for a free westbound to northbound movement.

- S. Cloverdale Street is a designated principal east-west arterial that lies just south of the South Park Bridge. This roadway serves as a major truck route through the area and connects SR-509 and SR-99 to 14th Avenue S. One lane of travel is provided in each direction between SR-99 and 14th Avenue S., and turn lanes are provided at major intersections. Parking and sidewalks are provided on both sides of the arterial west of 14th Avenue S. Grades along S. Cloverdale Street are modest and surfacing consists of asphalt and concrete. The posted speed limit is 30 mph between SR-99 and 14th Avenue S.

- Airport Way S. is a north-south freeway "frontage" road that is designated as a principal arterial. This facility is used primarily as a commercial route for industrial/warehouse uses (high truck volumes) and as a secondary by-pass for commuters. Two lanes are provided in each direction with left-turn channelization at major intersections. Grades are modest, pavement surfacing is conventional asphalt, and lanes are 11 to 12 feet wide.

5.1.2 Peak Hour Volumes

Peak-hour intersection volumes for existing conditions were taken directly from manual turning-movement field counts. Morning peak-period counts were conducted from 7 to 9 AM and PM peak counts were conducted from 4 to 6 PM. The highest peak-hour volume occurred from 7:15 to 8:15 AM during the morning commute period (see Figure 17) and from 4 to 5 PM for the evening period (see Figure 18) based on the 15-minute traffic data. Included in this data are heavy vehicle volumes at the targeted intersections and pedestrian volumes by movement. Where possible, this volume data was compared to historical traffic counts from the City of Seattle. For some areas, refinements to these volumes were needed to ensure reasonable balancing between adjacent intersections (outbound to inbound volume matching), especially for closely spaced intersections such as those along 14th Avenue S. Note that only the turning -movement volumes that impact signal operations are shown in the figures. These are consistent with the volumes entered into the traffic simulation model and which form the basis for the intersection level of service calculations. Volumes that do not affect intersection operations such, as those

accommodated by a free-flowing right-turn lane, are not shown in these figures. Critical intersections targeted for this evaluation (and their corresponding node numbers) include:

- East Marginal Way S. & 1st Avenue S. (1 and 2)
- East Marginal Way S. & S. Michigan Street (12)
- East Marginal Way S. & 4th Avenue S. (13)
- S. Michigan Street & 4th Avenue S. (11)
- SR-99 & S. Holden Street (10)
- East Marginal Way S. & 16th Avenue S. (3)
- 16th Avenue S. & S. Cloverdale Street (4)
- 14th Avenue S. & S. Trenton Street (5)
- 14th Avenue S. & S. Henderson Street (6)
- S. 96th Street & Des Moines Memorial Drive (7)
- East Marginal Way S. & Boeing Access Road (8)
- SR-99 & S. 116th Street (9)

5.1.3 Level of Service

Operational analysis of AM and PM existing peak-hour conditions was performed for each of the thirteen signalized intersections using the Synchro analysis package, adhering to the analysis guidelines given in the *2000 Highway Capacity Manual (HCM)*. Capacity analysis, as it is commonly referred to, is used to determine LOS for various transportation facilities such as intersections, freeways, and arterials. Table 5 shows standardized LOS criteria for signalized intersections. LOS analysis results are shown in Table 6 and in Figures 17 and 18. They indicate low to moderately high delays overall. Table 7 summarizes existing AM and PM peak hour queues for key intersection approaches and movements.

Table 5. Level of Service Criteria

LOS	Signalized Delay (seconds/vehicle)	Traffic Flow Characteristics
A	≤ 10	Low delays, virtually free flow, unimpeded
B	> 10 and ≤ 20	Stable flow with minor delays, less freedom to maneuver through the intersection
C	> 20 and ≤ 35	Stable flow with some delays, less freedom to maneuver through the intersection
D	> 35 and ≤ 55	Long delays and high density, but stable flow and operations
E	> 55 and ≤ 80	Operating conditions at or near capacity
F	> 80	Forced operation, breakdown conditions

Source: 2000 Highway Capacity Manual (see Chapters 16 & 17).

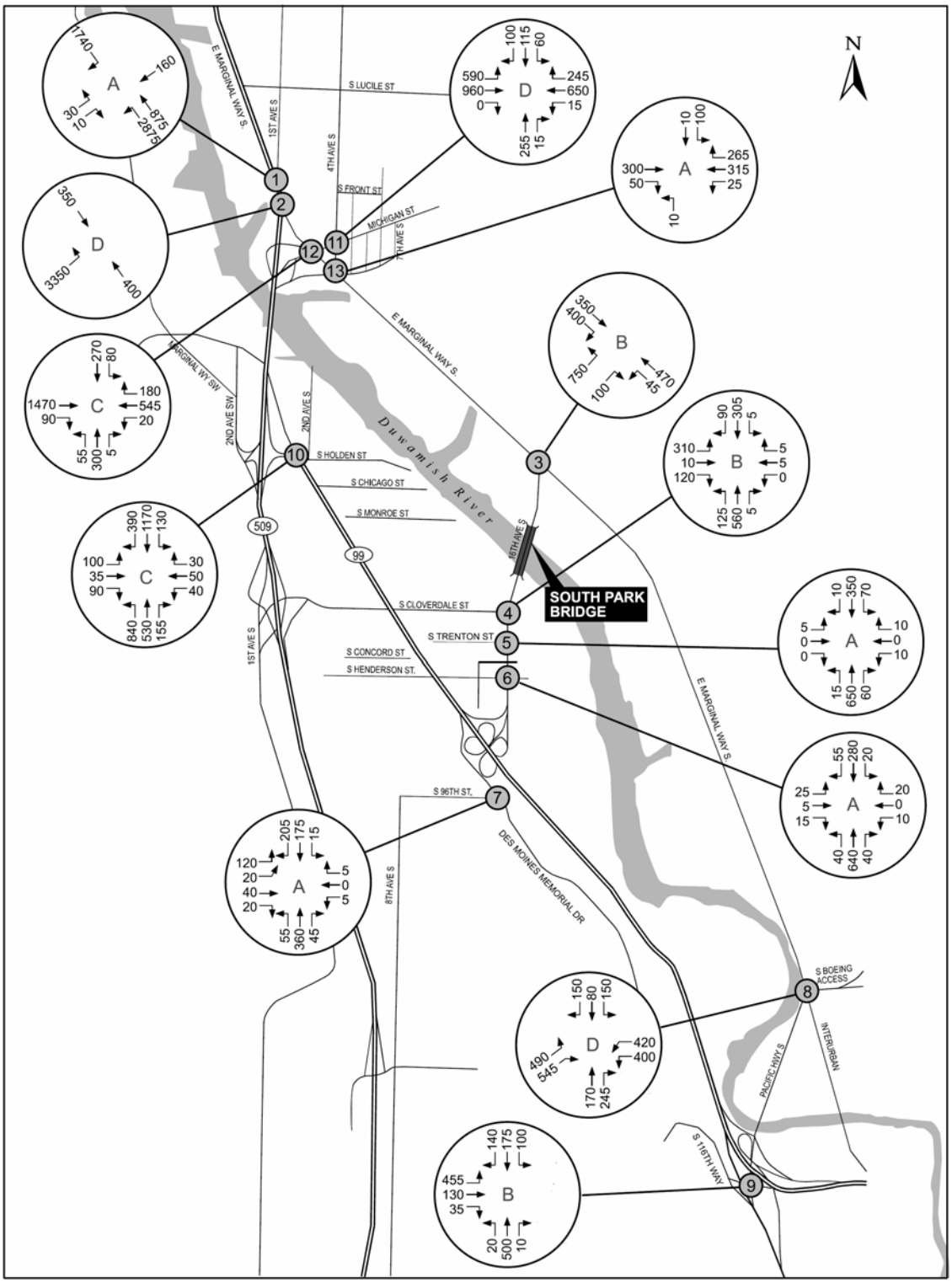

Figure 17
Existing AM Peak Hour Volumes and Level of Service

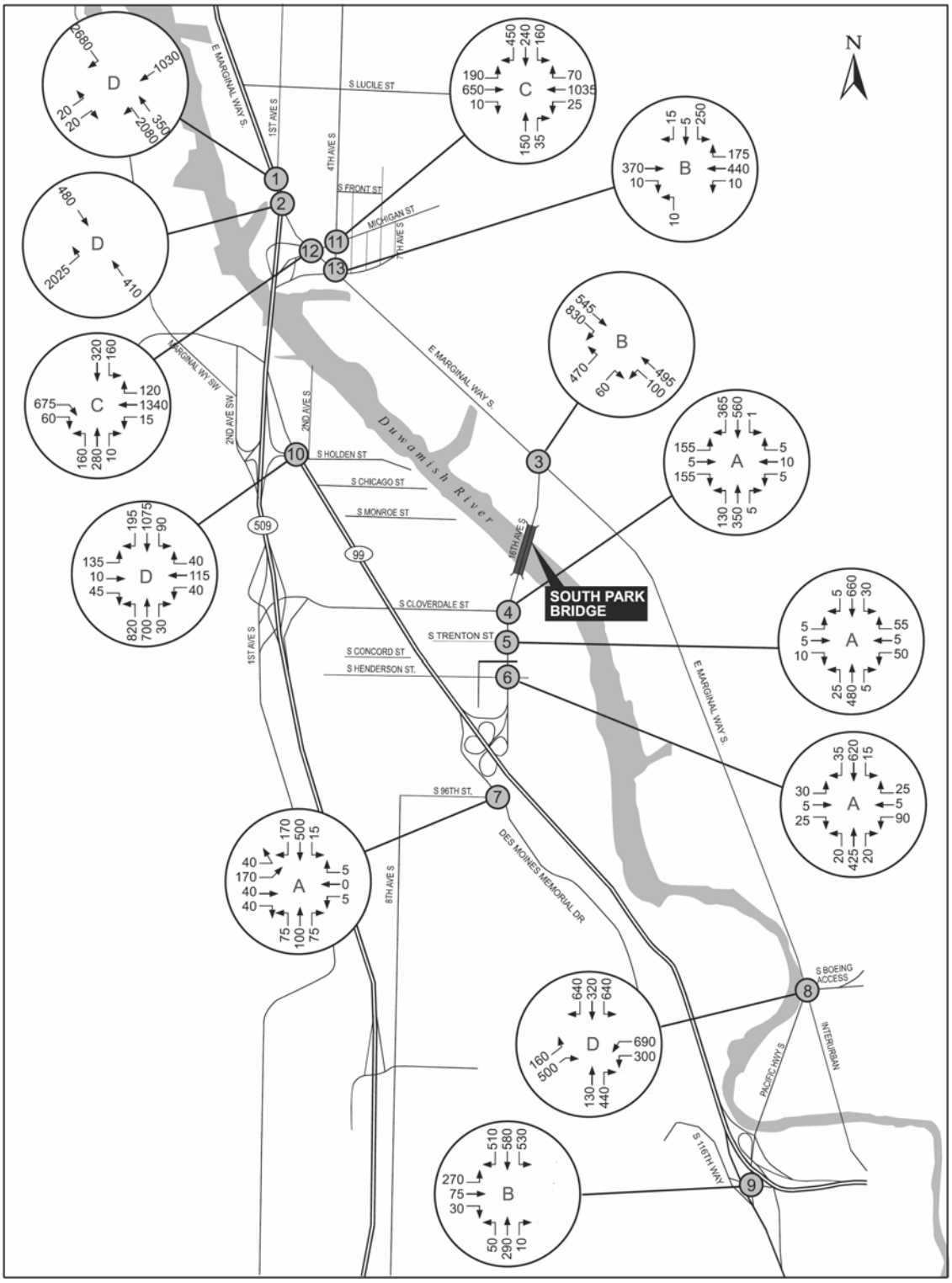

Figure 18
Existing PM Peak Hour Volumes and Level of Service

Table 6: Existing Peak Hour Level of Service

#	Intersection	AM Peak Hour					PM Peak Hour				
		Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay		
		Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS
1	1st Avenue S & E Marginal	5.4	A	SBT	119.2	F	38.7	D	SBT	61.7	E
2	1st Ave S. (bridge) & E Marginal	39.8	D	NWR	115.9	F	36.0	D	NBT	37.1	D
3	16th Ave S & E Marginal	18.5	B	NBL	33.7	C	16.3	B	NBL	45.3	D
4	14th Ave S & S. Cloverdale St	13.2	B	EBL	32.1	C	9.9	A	EBL	38.8	D
5	14th Ave S & S. Trenton St	1.1	A	EBT	37.8	D	4.9	A	WBT	25.4	C
6	14th Ave S & S. Henderson St	2.7	A	EBT	28.1	C	8.7	A	WBT	34.5	C
7	S 96th St & Des Moines Mem	6.6	A	NWL	9.0	A	9.3	A	NWL	10.8	B
8	E Marginal & Boeing Acc Rd	36.4	D	SBT	48.5	D	42.7	D	NER	58.9	E
9	S 116th St & SR-99	17.5	B	NBL	28.2	C	16.5	B	NBL	37.1	D
10	S. Holden St & SR-99	31.8	C	WBL	57.9	E	36.6	D	WBL	54.7	D
11	S. Michigan St & 4th Ave S	35.5	D	EBL	103.7	F	33.3	C	EBL	174.8	F
12	E Marginal & Michigan	28.9	C	NWL	45.0	D	31.1	C	SEL	99.0	F
13	E Marginal & 4th Ave S	5.7	A	NBL	42.9	D	12.3	B	NBL	53.1	D

Note: Delays given in seconds per vehicle

As shown in Table 6, three intersections currently operate at LOS D during the AM peak hour and four at LOS D during the PM peak hour. Higher congestion locations include 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road. Some congestion is expected at these intersections because they carry the greatest amount of traffic during critical peak periods and serve as "gateways" into the South Park area. Key turning movements in the S. Michigan Street/4th Avenue S./East Marginal Way S. triangle also show moderate to high levels of congestion during both peak hours.

Delays for intersections approaching the South Park Bridge along 14th /16th Avenue S. are generally low, with most delays for these locations at LOS A or LOS B. Analysis results for the remaining intersections show modest delays with low congestion levels.

Vehicle queues are summarized in the table in Appendix A. This table shows the current length of queues for specific approaches based on the simulation results and also reports the available storage lengths for vehicles waiting in a queue. These queue analysis results indicate only modest vehicle stacking for most intersection approaches. Key intersection approaches include the 1st Avenue S./East Marginal Way S. southeast approach, 1st Avenue S. (bridge)/East Marginal Way S. northbound through movement, and some movements at East Marginal Way S./Boeing Access Road. Results for these movements show some queuing activity, though little to no spillback to adjacent intersections appears to occur (based on the estimated storage lengths). Queues for southbound left-turn movements at S. 116th Street/SR-99/SR-599 are also noticeable for the PM peak hour when compared to the storage length for these left turns. Nonetheless, sufficient vehicle storage is generally provided to accommodate current traffic loads during the AM and PM peak hour periods.

5.1.4 Accident History

King County and the City of Seattle provided existing accident and collision data for the targeted study intersections. A summary of these accidents by year and accident type is provided in Table 7.

Table 7. Accident History

#	Intersection	1997	1998	1999	2000	2001	Total	Rear End	Side Swipe	Angle	Other	Injury	Fatalities
1	1st Ave S & E. Marginal	5	8	7	3	9	32	4	11	13	4	*	*
3	16th Ave S & E. Marginal	1	3	1	4	4	13	0	5	6	2	*	*
4	14th Ave S & S. Cloverdale St	9	1	6	3	4	23	2	4	15	2	*	*
5	14th Ave S & S. Trenton St	2	2	4	4	2	14	1	1	7	5	*	*
6	14th Ave S & S. Henderson St	4	7	5	2	5	23	1	1	20	1	*	*
7	S. 96th St. & Des Moines Mem	3	4	3	1	*	17	2	1	12	2	10	0
8	E. Marginal & Boeing Acc Rd	18	24	18	13	10	83	39	28	7	9	5	0
9	S. 116th St. & SR-99	8	9	14	17	*	60	10	1	24	25	28	0
10	S. Holden St. & SR-99	4	3	11	12	*	38	10	8	10	10	16	0
11	S. Michigan & 4th Ave S.	4	0	4	5	7	20	2	5	11	2	*	*
12	E. Marginal & S. Michigan St	11	4	7	5	2	29	0	4	25	0	*	*
13	E. Marginal Way & 4th Ave. S.	3	0	3	1	4	11	1	3	5	2	*	*

Notes: No accident information is available for intersection 2, the bridge. A star (*) indicates that no data was available for the time period examined.

5.1.5 Non-motorized Traffic

Pedestrian and bicyclist volumes near the South Park community are generally low. Turning-movement traffic counts for both the AM and PM peak periods revealed few non-motorized trips through the targeted intersections. Based on field notes, fewer than ten pedestrians and bicyclists were observed at each location during the two-hour peak-period counts. Mid-day pedestrian volumes may be higher than during the AM or PM peak periods due to lunch-related walking trips. This is especially true in the South Park business district on 14th Avenue S. With respect to bicycle access, the City of Seattle Bicycling Guide Map shows 14th/16th Avenue S. as a "commonly-used" arterial by bicyclists, though no designated bicycle lane is provided south of East Marginal Way S. Dallas Avenue S. is also a recommended bikeway that ties into the Duwamish Waterway bike facility. The Duwamish Waterway bike facility runs along SR-99, connects to S. Henderson Street and 8th Avenue S., and ultimately ties into the 1st Avenue S. Bridge bike route system.

5.1.6 Transit Service

Transit routes serving the South Park community are primarily located along major north-south corridors such as East Marginal Way S. and 14th/16th Avenue S. Major King County Metro bus routes serving the area include Route 60 (Broadway-White Center), Routes 130 and 132 (Seattle-Des Moines), Route 154 (Auburn-Boeing), Route 173 (Seattle-Federal Way), and Route 174 (Seattle-Sea-Tac-Federal Way).

Figure 19 illustrates the key bus stop locations in South Park. The time durations between arriving buses, known as "headways," vary noticeably depending on the time of day. During the morning and evening commuter periods, headways for the major routes serving the South Park community (Routes 60, 130, and 132) are typically between 10 and 30 minutes. Off-peak headways range from 20 to 60 minutes depending on the route. Specific headways for Routes 130 and 132 along S. Cloverdale Street are roughly 20 minutes during the morning and evening commute periods.

5.1.7 Freight Movement and Demand

Freight movements in peripheral areas of the South Park community are noticeable due to the high concentration of industrial and manufacturing uses in the general area. Major heavy-vehicle travel paths are primarily directed along East Marginal Way S. and SR-99 according to the City of Seattle Comprehensive Plan. S. Cloverdale Street is also used by trucks to access SR-509 and SR-99 from 14th Avenue S. This is the preferred route through the community. With respect to rail movements, the only freight-related crossing applicable to this study exists near the intersection of East Marginal Way S. and 16th Avenue S. Field observations during peak commute-traffic periods indicated no train movements crossing the 16th Avenue S. approach. However, various off-peak site visits revealed some short-duration crossing activity with delays to traffic of less than three minutes. Trains generally consisted of only four to six cars.

5.1.8 Parking

Parking in the affected area near the South Park Bridge mainly consists of on-street parallel parking along 14th Avenue S. (south of the bridge) to serve local businesses in the South Park commercial core. Based on field notes, approximately 40 to 50 parallel parking spaces are provided between S. Cloverdale Street and S. Director Street. No-parking restrictions are enforced for the east side of 14th Avenue S. between 7 and 9 AM and between 4 and 6 PM. For the west side of the roadway, restrictions are enforced between 3 and 6 PM only. The curb lanes on 14th Avenue S. are generally 11 feet to 12 feet, providing a minimum of 11 feet for parking during non-restricted hours of the day. During peak-hour traffic counts, only a moderate number of parallel parking movements (roughly 14-20) were observed along 14th Avenue S. within permissive parking segments.

One-hour parking limits are imposed on the west side of the street (southbound) during permissive periods. On-street parking areas are also provided on side streets such as S. Cloverdale Street and S. Trenton Street. These spaces serve commercial and retail businesses on 14th Avenue S. as well as residential and service uses on 14th Avenue S. side streets.

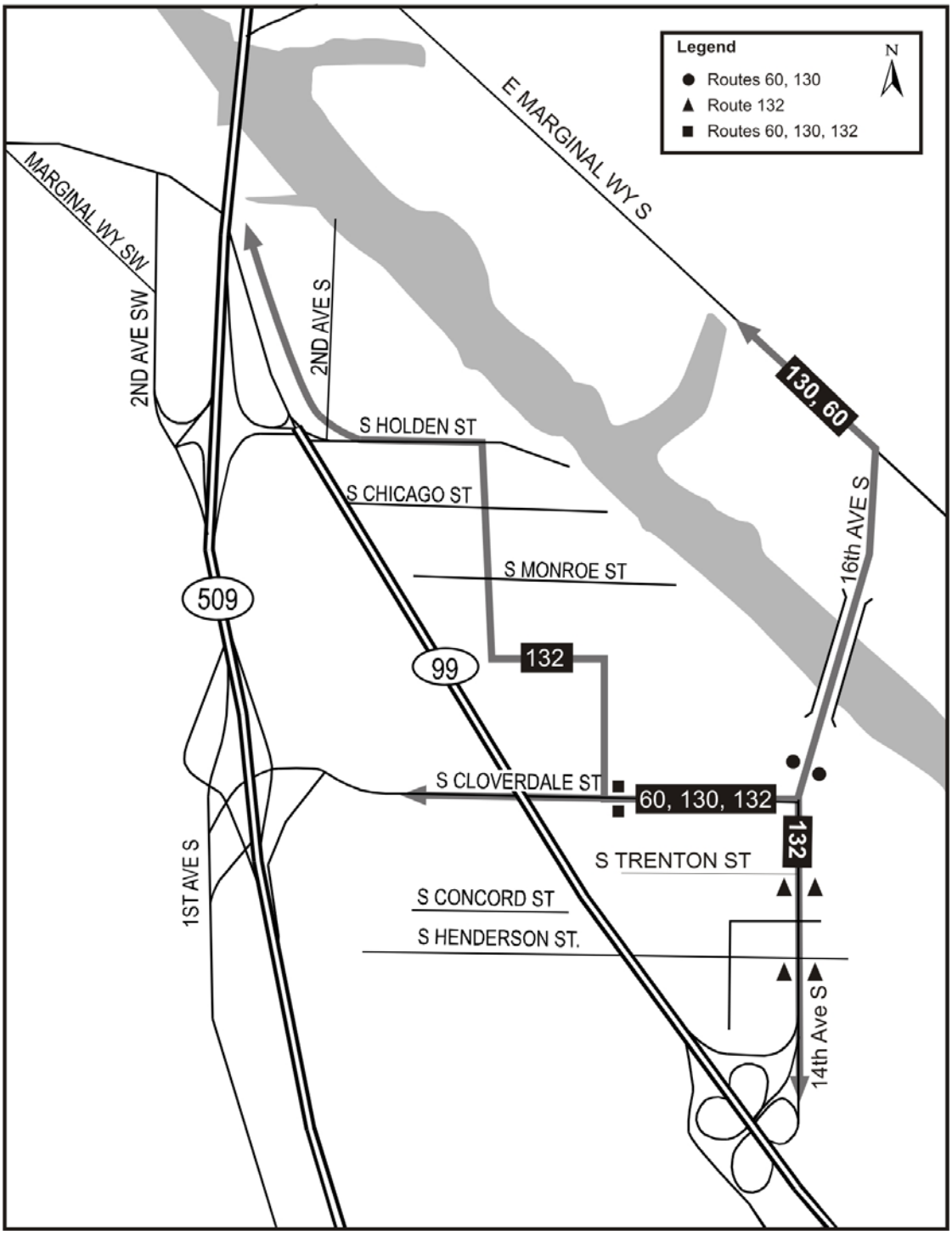

Figure 19
Bus Stop Locations

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Chapter 6 Impacts

6.1 Future Opening-Year (2009) Conditions

6.1.1 Roadway Network

The roadway system assumed for the opening year scenarios incorporates the same basic street elements as those given in the Existing Scenario, except for the South Park Bridge lane configuration and a minor roadway narrowing along Des Moines Memorial Drive. For the Four-Lane Scenario, the only network change involves narrowing Des Moines Memorial Drive from S. 96th Street to S. 112th Street from four lanes to three lanes (two lanes and a two-way left-turn lane). The High-Level Fixed-Span Bridge Scenario (refer to Section 6.2 and Figure 27) incorporates a south-end bridge touchdown point at S. Trenton Street, but is otherwise similar to the No Action and Mid-Level Fixed-Span Scenarios. The Rehabilitation Three-Lane Scenario includes the Des Moines Memorial Drive modification, but involves conversion of the existing four-lane bridge cross-section to a three-lane section (two southbound lanes and one northbound lane). The No-Bridge Scenario removes the existing 14th./16th Avenue S. bridge link and assumes that waterway crossings are made at neighboring corridors. The assumed lane geometry for the No-Bridge Scenario is given in Figure 20. Improvements related to the SR-509 extension and Alaskan Way Viaduct are not included in the year 2009 scenario networks due to uncertainties surrounding these particular large-scale regional projects.

6.1.2 Peak Hour Volumes

Future intersection volumes for each of the three year-of-opening scenarios were derived from travel-demand forecasts given by the King County regional forecasting model (see Section 4.3). This model is based on the EMME/2 software platform and incorporates various land use, employment, roadway network, and population characteristics to determine future traffic flow distribution patterns and peak-period volumes. King County has developed a base-year forecasting model (calibrated to 1998 traffic conditions) and an approved long-range 2020 forecast model. Year 2009–2027 traffic volumes are summarized in Figures 21–26. As with the existing volume figures, only the turning-movement volumes that impact signal operations are shown in the figures (consistent with the volumes entered into the traffic simulation model).

Background traffic growth rates reflected in the year 2009 Four-Lane Scenario were derived from the established 1998 baseline and 2020 long-range forecasts using a conventional straight-line interpolation process. Actual turning-movement volumes (i.e., those used for analysis) for this scenario were developed by applying the background growth rate to existing traffic volumes collected specifically for this study. Volumes for the High-Level Fixed-Span Bridge Scenario were derived from an individual model run and reflect a south-end bridge touchdown point at S. Trenton Street (versus S. Cloverdale Street), as well as redistribution of S. Cloverdale Street-bound traffic to S. Trenton Street and 12th Avenue S.

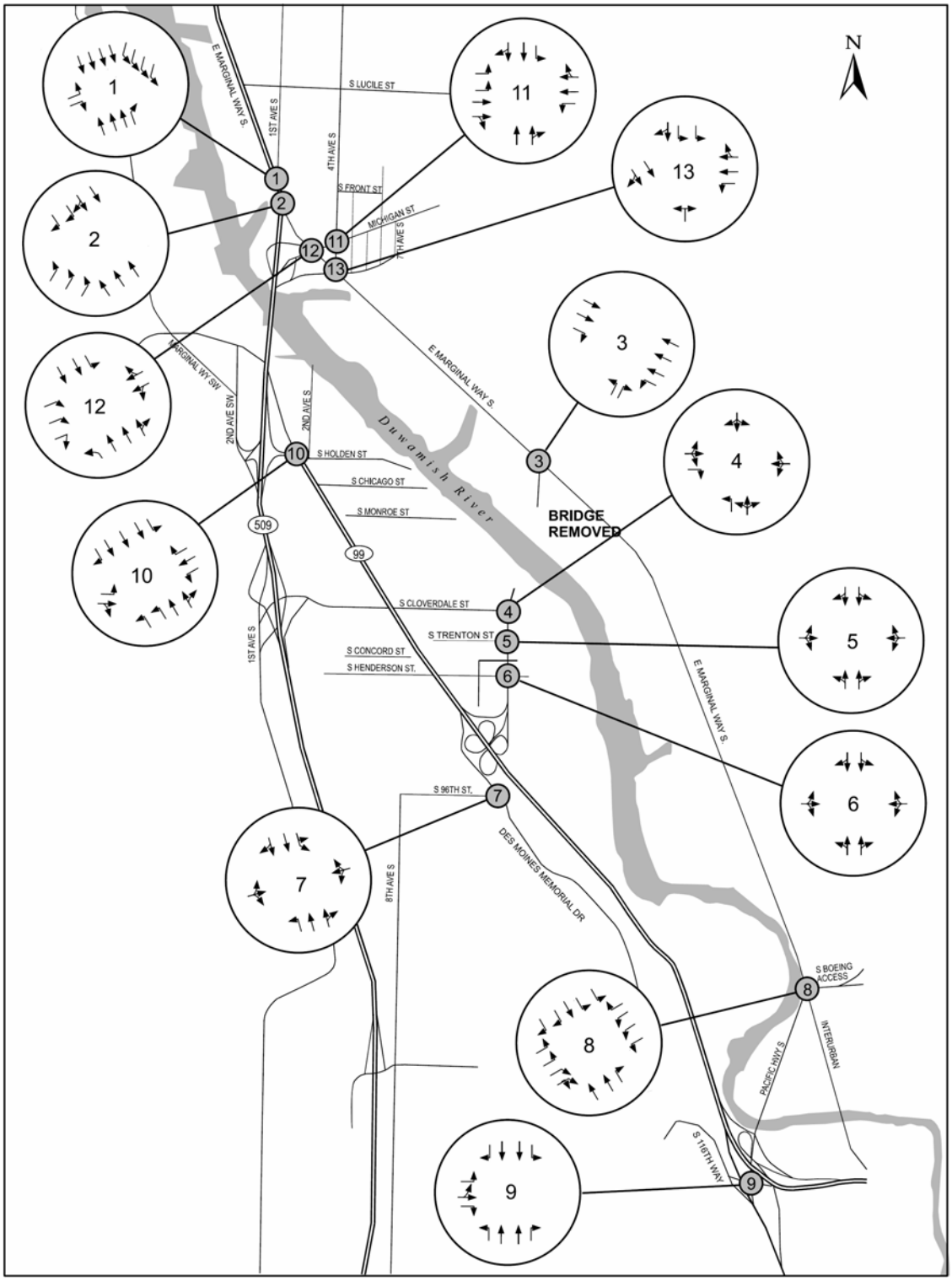

Figure 20
Future No-Bridge Scenario Lane Geometry

Traffic volumes for the Rehabilitation scenarios reflect the same basic land use, employment, and household elements as for the No-Action scenarios, but with the four-lane to three-lane conversion incorporated. Volumes for the No-Bridge Scenario were developed by modeling a scenario without the bridge link in the network and redistributing traffic to parallel or alternative routes in the system (i.e., East Marginal Way S., SR-99, Airport Way S., etc.). The effects of this rerouting were most noticeable for East Marginal Way S. at Boeing Access Road and 1st Avenue S. Based on the forecasts, redistribution to parallel arterials such as Airport Way S. and SR-99 would be minor.

6.1.3 Level of Service

LOS calculations for future mid-range 2009 traffic conditions were performed for the several scenarios to determine future congestion levels in the study area. Results are summarized in Table 8 and in Figures 21–26. As shown in Table 8, the scenarios are aggregated by lane configuration. For example, the "Four-Lane Bridge" heading in Table 8 reflects the No Action, Bascule Bridge, Rehabilitation, and Mid-Level Fixed-Span Bridge alternatives. The "Three-Lane Bridge" heading refers to the secondary three-lane Rehabilitation Alternative. "No-Bridge" falls under the No Action Alternative.

For the future 2009, signal phasing and timing data were revised and optimized for each scenario. This approach was deemed suitable to allow the traffic system (i.e., signals) to adapt to changes in travel patterns. As shown in Table 8, average delays for the targeted intersections vary noticeably depending on the location and/or scenario in question. Specific locations with high levels of congestion and long delays include 1st Avenue S./East Marginal Way S., 1st Avenue S. Bridge/East Marginal Way S., East Marginal Way S./Boeing Access Road, S. Holden Street/SR-99, S. Michigan Street/4th Avenue S., and S. Michigan Street/East Marginal Way S. These higher congestion levels generally apply to all three year-of-opening scenarios. Analysis results for these specific intersections indicate delays in the LOS D to LOS F range, with some delays exceeding 100 seconds per vehicle.

An intersection-level analysis was performed for the High-Level Fixed-Span Scenario with respect to impacts at the 14th Avenue S./S. Trenton Street intersection. Results of this intersection analysis are summarized in Appendix B. Traffic forecasts for the High-Level Fixed-Span Scenario indicate that traffic using S. Cloverdale Street would generally shift to S. Trenton Street as a result of the bridge touchdown point being moved toward S. Trenton Street. S. Trenton Street (and 12th Avenue S.) would thus become the primary access route to and from SR-99 instead of S. Cloverdale Street. As such, impacts to traffic circulation and overall operations would occur primarily at 14th Avenue S./S. Trenton Street in the High-Level Fixed-Span Scenario, with traffic volumes similar to those at 14th Avenue S./S. Cloverdale Street in the Four-Lane Scenario. The end result of this volume shift from S. Cloverdale Street to S. Trenton Street would be similar levels of congestion for 14th Avenue S./S. Trenton Street (in the High-Level Fixed-Span Scenario) as for 14th Avenue S./S. Cloverdale Street (in the Four-Lane Scenario). Localized impacts on S. Cloverdale Street and S. Alaska Street may occur with respect to bridge access, but no major congestion issues would arise.

Table 8. Future 2009 Peak Hour Level of Service—AM & PM Peak Hour

AM PEAK HOUR																
		Four-Lane Bridge					Three-Lane Bridge					No Bridge				
		Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay		
#	Intersection	Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS
1	1st Ave S & E Marginal Way S	5.8	A	SBT	119.1	F	6.0	A	SBT	119.1	F	6.7	A	SBT	119.0	F
2	1st Ave (Bridge) & E Marginal Way S	59.3	E	NWR	133.7	F	60.7	E	NWR	141.3	F	88.1	F	NWR	156.7	F
3	16th Ave S & E Marginal Way S	16.8	B	NBL	30.8	C	14.6	B	NBL	35.7	D	3.9	A	NBL	42.6	D
4	14th Ave S & S Cloverdale St	14.0	B	EBL	31.5	C	12.7	B	EBL	32.8	C	7.4	A	WBT	39.3	D
5	14th Ave S & S Trenton St	1.1	A	EBT	37.8	D	1.1	A	EBT	37.8	D	1.2	A	EBT	37.8	D
6	14th Ave S & S Henderson St	3.1	A	EBT	27,8	C	2.9	A	EBT	27.8	C	2.6	A	EBT	26.1	C
7	S 96th St & Des Moines Mem Dr	7.7	A	NWL	11.9	B	6.8	A	NWL	10.2	B	6.5	A	NWL	9.6	A
8	E Marginal Way S & Boeing Access Rd	42.2	D	SBT	72.6	E	42.5	D	SBT	73.8	E	44.1	D	SBT	75.6	E
9	S 116th St & SR-99	19.6	B	NBL	35.6	D	19.4	B	NBL	35.0	D	19.6	B	NBL	35.7	D
10	S Holden St & SR-99	35.8	D	EBL	90.5	F	35.9	D	EBL	90.5	F	37.0	D	EBL	93.8	F
11	S Michigan Way & 4th Ave S	27.5	C	SBL	66.2	E	28.5	C	SBL	79.0	E	30.6	C	SBL	89.8	F
12	E Marginal Way S & S Michigan Ave	47.6	D	NER	75.8	E	59.9	E	NER	99.1	F	95.2	F	NER	167.8	F
13	E Marginal Way S & 4th Ave S	8.6	A	NBL	42.9	D	9.0	A	NBL	42.9	D	10.5	B	NBL	42.9	D

Note: Delays given in seconds per vehicle

Table 8. Future 2009 Peak Hour Level of Service—AM & PM Peak Hour (continued)

PM PEAK HOUR																
		Four-Lane Bridge					Three-Lane Bridge					No Bridge				
		Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay		
#	Intersection	Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS
1	1st Ave S & E Marginal Way S	45.7	D	SBT	113.9	F	51.9	D	SBT	110.7	F	50.5	D	SBT	116.3	F
2	1st Ave (Bridge) & E Marginal Way S	33.9	C	NWR	39.1	D	33.3	C	NWR	40.8	D	33.8	C	NWR	45.1	D
3	16th Ave S & E Marginal Way S	15.8	B	NBL	35.7	D	22.4	C	NWL	53.3	D	5.2	A	NBL	51.4	D
4	14th Ave S & S Cloverdale St	11.4	B	EBL	39.0	D	16.4	B	NBL	89.6	F	10.9	B	WBT	35.5	D
5	14th Ave S & S Trenton St	4.5	A	EBT	25.7	C	4.6	A	EBT	25.2	C	3.3	A	EBT	28.5	C
6	14th Ave S & S Henderson St	7.7	A	WBT	34.4	C	7.4	A	WBT	34.6	C	6.0	A	WBT	31.9	C
7	S 96th St & Des Moines Mem Dr	10.5	B	NWL	12.7	B	10.1	B	NWL	12.1	B	7.9	A	NWL	9.4	A
8	E Marginal Way S & Boeing Access Rd	57.6	E	NER	87.2	F	58.7	E	NER	90.7	F	62.5	E	SBL	91.4	F
9	S 116th St & SR-99	18.6	B	NBL	43.2	D	18.4	B	NBL	41.7	D	19.0	B	NBL	46.3	D
10	S Holden St & SR-99	39.4	D	EBL	82.0	F	40.0	D	EBL	100.6	F	45.1	D	EBL	100.1	F
11	S Michigan Way & 4th Ave S	29.7	C	EBL	74.5	E	30.0	C	EBL	75.2	E	29.5	C	EBL	74.2	E
12	E Marginal Way S & S Michigan Ave	24.0	C	NWL	58.6	E	24.2	C	NWL	55.5	E	67.5	E	NWL	133.3	F
13	E Marginal Way S & 4th Ave S	10.8	B	NBL	53.1	D	11.9	B	NBL	53.1	D	10.5	B	NBL	53.1	D

Note: Delays given in seconds per vehicle

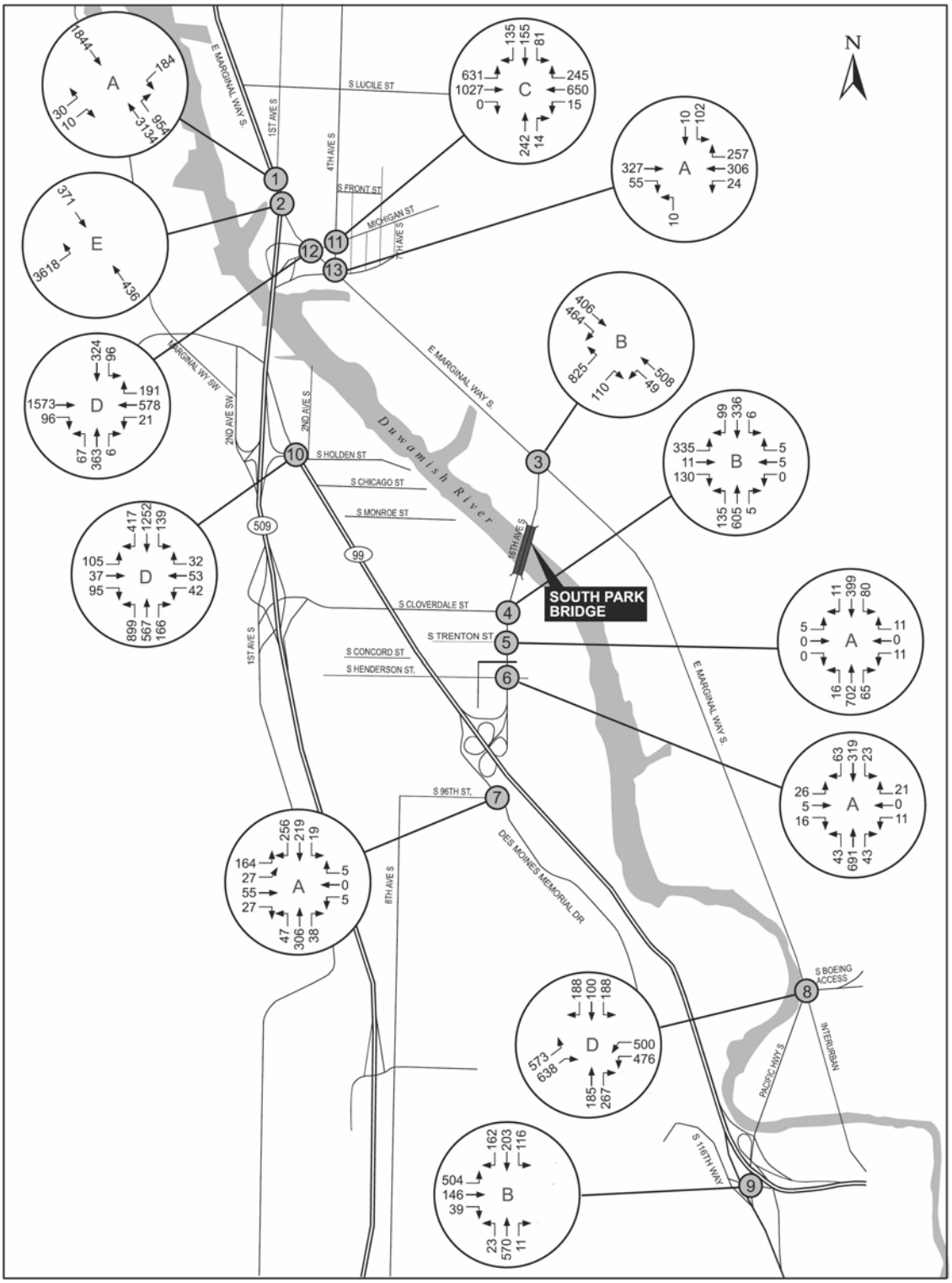

Figure 21
Future 2009 Four-Lane Scenario AM Peak Hour Volumes and LOS

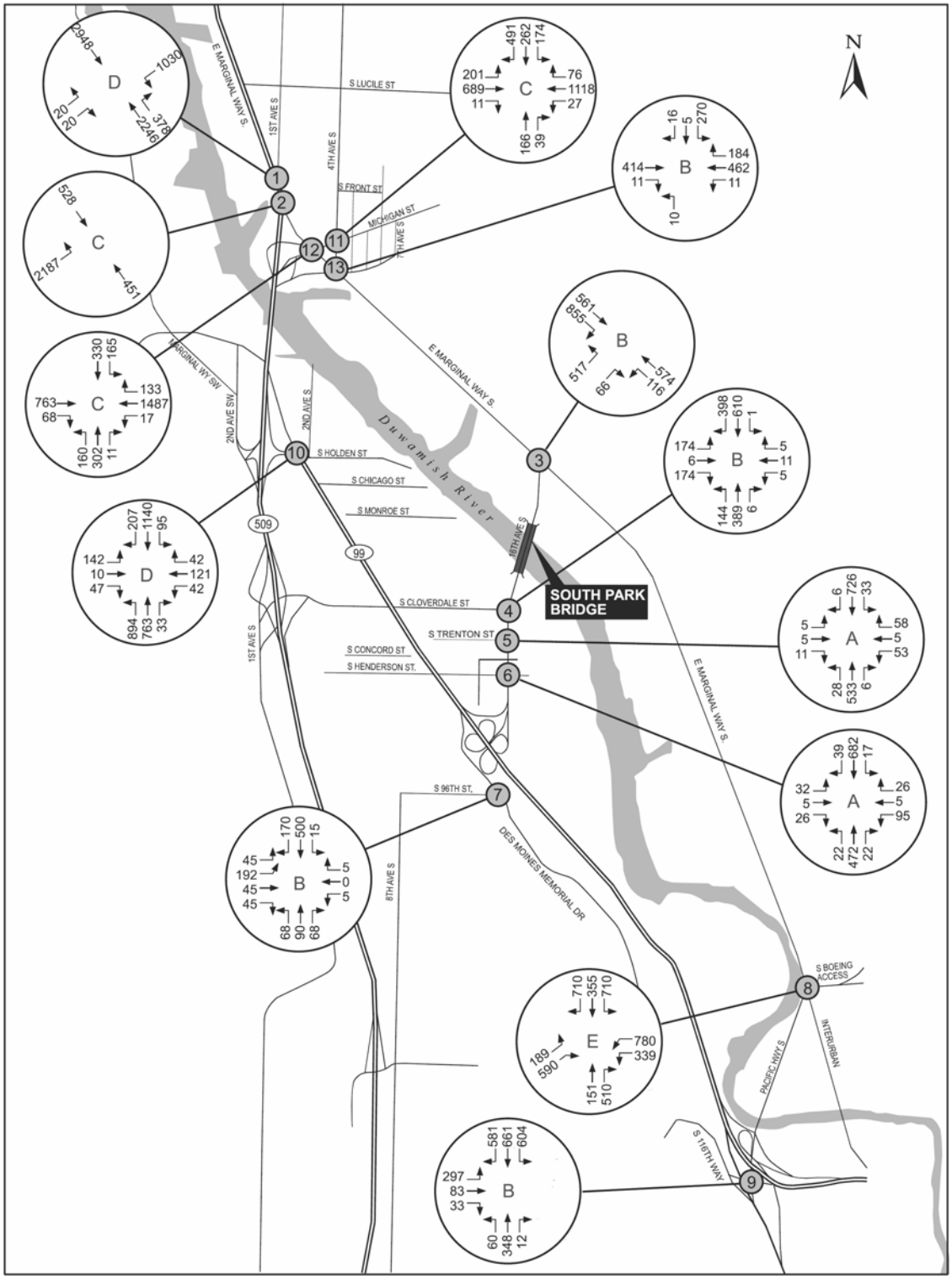

Figure 22
Future 2009 Four-Lane Scenario PM Peak Hour Volumes and LOS

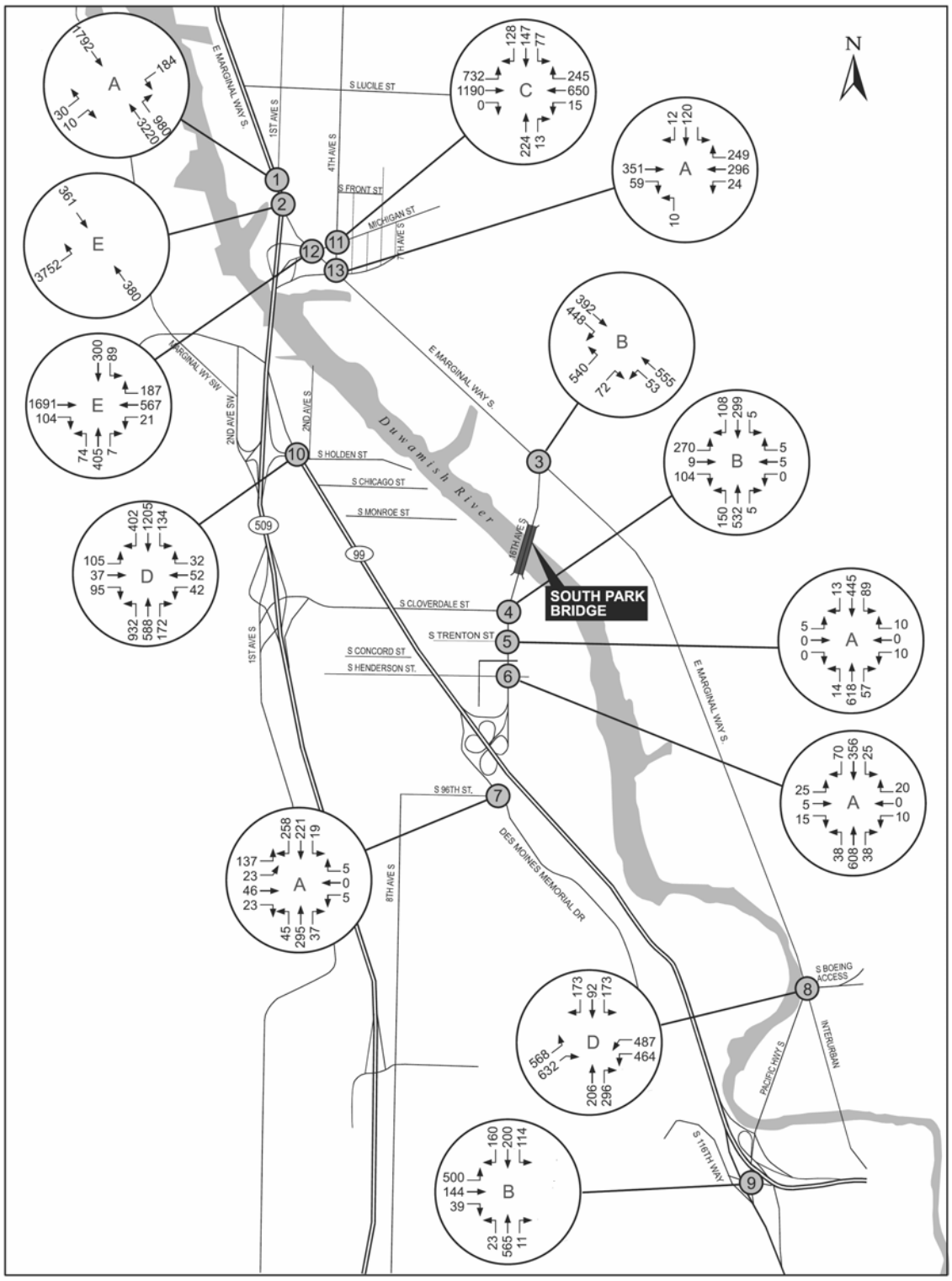

Figure 23
Future 2009 Three-Lane Scenario AM Peak Hour Volumes and LOS

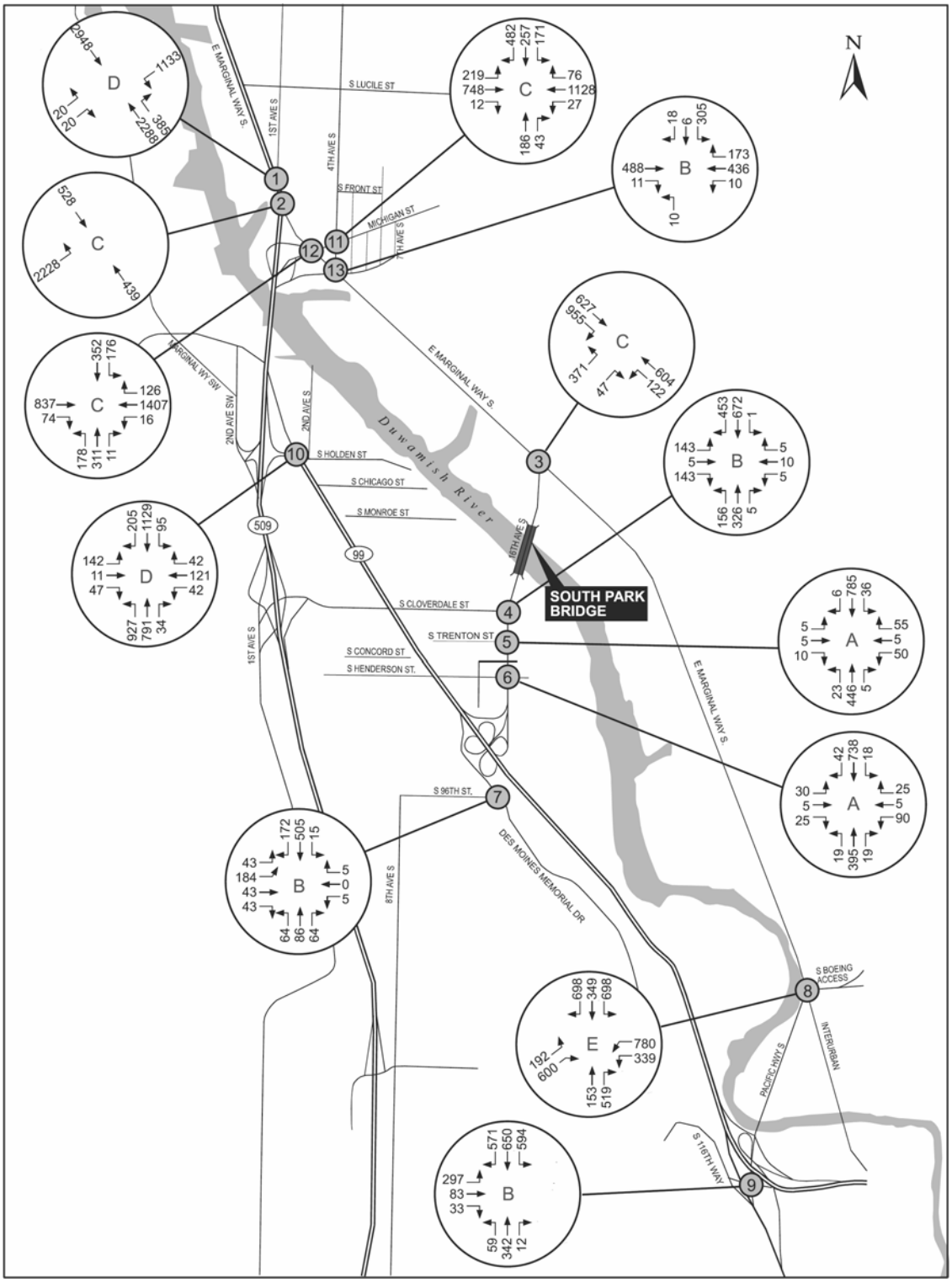

Figure 24
Future 2009 Three-Lane Scenario PM Peak Hour Volumes and LOS

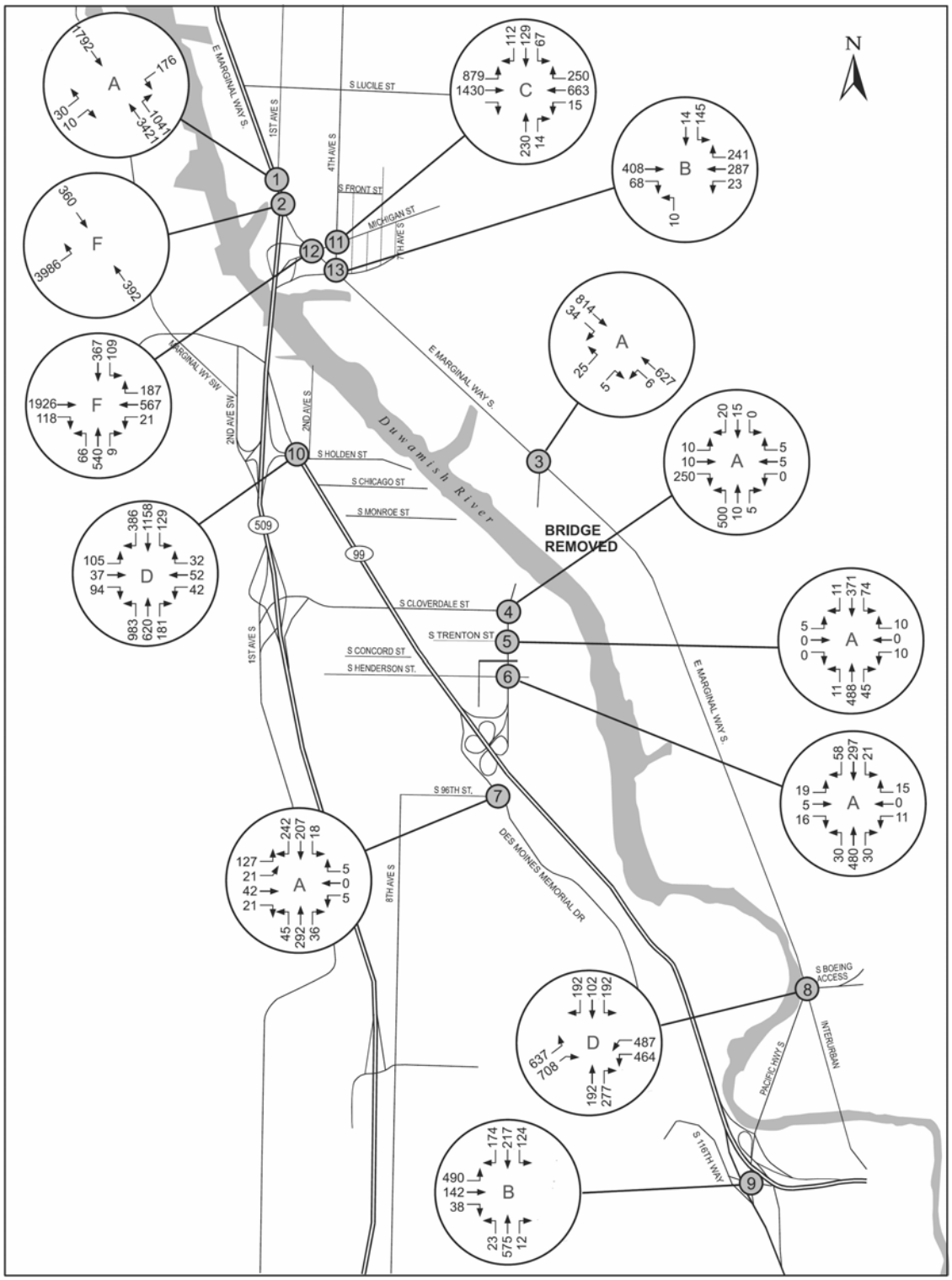

Figure 25
Future 2009 No-Bridge Scenario AM Peak Hour Volumes and LOS

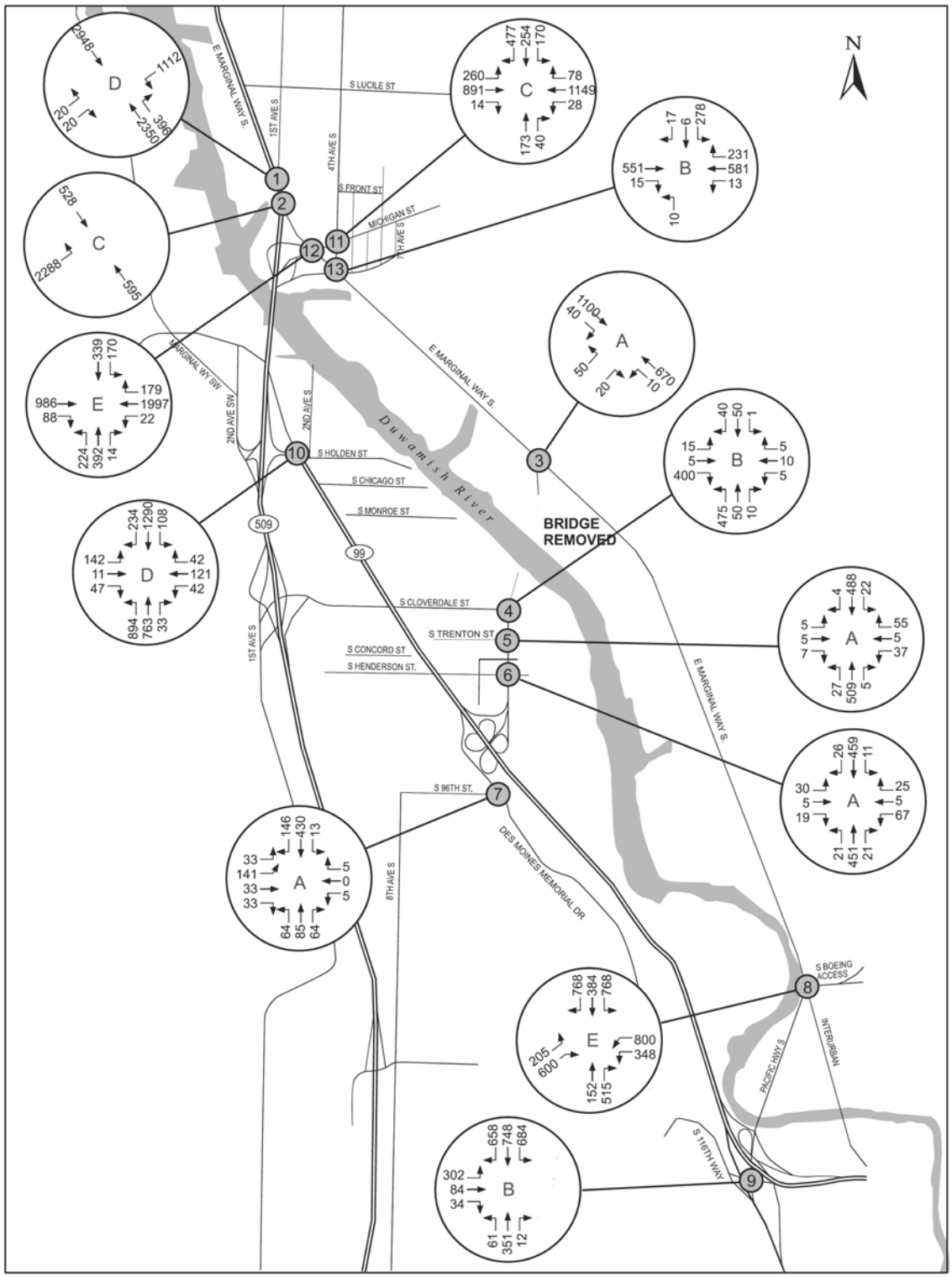

Figure 26
Future 2009 No-Bridge Scenario PM Peak Hour Volumes and LOS

Queue analysis results for the various 2009 scenarios are given in the Appendix A. These results show the 95th percentile queues for each approach and movement as well as the corresponding physical storage lengths.

6.1.4 Non-motorized Traffic

The impacts of the year 2009 scenarios on non-motorized traffic in the South Park community depend somewhat on whether or not the bridge facility is closed. For the Four-Lane Scenario where the current four-lane cross-section is maintained, no impacts to existing pedestrian and bicyclist activity would occur. Future increases in non-motorized volumes would result from natural background growth and/or any redevelopment efforts over the next few years. For the Rehabilitation Three-Lane Scenario, wider shoulders and sidewalks would be provided on the bridge deck due to reconfiguration of the cross-section from four to three lanes. This change could improve non-motorized safety by reducing bridge-related traffic friction. A separate bike lane, however, is not proposed at this time.

If the bridge is closed and removed as described in the No-Bridge Scenario, all non-motorized traffic using the bridge would be eliminated. However, overall pedestrian and bicyclist patterns outside of the bridge-crossing area would not change significantly. Based on field data and site observations, most non-motorized trips in the area occur near the 14th Avenue S. corridor between S. Cloverdale Street and S. Henderson Street and are generally not dependent on the bridge. For the High-Level Fixed-Span Scenario, access to and from the bridge on the south-end could be provided at S. Cloverdale Street via stairs to offset the impacts of the vertical realignment. This is not proposed at this time. However, disabled access would likely only be possible at the touchdown point at the 14th Avenue S./S. Trenton Street intersection.

6.1.5 Transit Service

Impacts to transit service in the Four-Lane Scenario and Rehabilitation Three-Lane Scenario would be negligible since no rerouting of service would be required. By the 2009 mid-range horizon, transit-service levels would likely increase system-wide, based on documented King County Metro service plans. For the No-Bridge Scenario, transit service for specific routes would be eliminated due to removal of the bridge link. Affected bus routes would include Routes 60 and 130. Alternative routing paths would be developed (similar to those in place during emergencies) to ensure that existing transit users in the area are not abandoned. Bus routes for the High-Level Fixed-Span Scenario (including Route 132) would also be affected due to the elimination of bridge access to and from 14th Avenue S. via S. Cloverdale Street. Such bus routes would likely be rerouted onto 12th Avenue S. and S. Trenton Street to access the bridge.

Rerouting plans similar to those for the No-Bridge Scenario would likely be implemented due to the anticipated design and geometric characteristics of S. Trenton Street and 12th Avenue S. Both S. Trenton Street and 12th Avenue S. would be redesigned and upgraded to Minor Arterial (City of Seattle) standards in order to handle large commercial-type vehicle weight/sizes and turning movement requirements.

6.1.6 Freight Movement

Freight mobility would not likely be impacted for the scenarios that maintain a crossing over the waterway (bridge in place) since current routing patterns could continue. However, for the No-Bridge Scenario, removal of the bridge link would require truck rerouting for access to and from destinations on either side of the waterway. This rerouting would most likely be captured at the north and south gateway intersections of 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road, respectively. This is reflected in the analysis. For the High-Level Fixed-Span Scenario, access between S. Cloverdale Street and the bridge would be eliminated due to the relocated bridge touchdown point at S. Trenton Street. However, both S. Trenton Street and 12th Avenue S. would be redesigned, widened, and upgraded to handle large vehicle movements. The S. Trenton Street/12th Avenue S. bypass route would thus become the primary connector between S. Cloverdale Street and the bridge for all vehicles.

6.1.7 Parking

Parking impacts, particularly related to 14th Avenue S. in the South Park community, would likely be modest during peak-hour periods due to the absence of any major geometric or capacity changes to 14th Avenue S., with the exception of the High-Level Fixed-Span Bridge Alternative. Lane configurations on 14th Avenue S. for the alternatives do not change despite major design differences in the bridge structure. The current four-lane configuration is retained.

As discussed in Chapter 5 (Affected Environment), parking restrictions are currently in place during morning and evening commute periods to ensure that reasonable throughput capacity is provided on 14th Avenue S. These restrictions would be retained to provide adequate levels of throughput capacity and to minimize parking friction during peak traffic periods. Moderate impacts would occur in the High-Level Fixed-Span Scenario due to reconfiguration of the touchdown point to S. Trenton Street (from S. Cloverdale Street). Approximately 20 to 25 parking spaces would be eliminated in this scenario along 14th Avenue S. as a result of the touchdown point relocation. However, some businesses would also be removed due to potential right-of-way requirements and acquisitions, so parking demand may be somewhat reduced. Nonetheless, in comparison to existing conditions, a net loss in parking supply would be likely.

6.2 Year 2027 Long-Range Conditions

6.2.1 Roadway Network

Arterials included in the year 2027 scenarios are similar to those given for the corresponding year 2009 scenarios. Two sets of long-range analysis scenarios were examined for 2027 conditions. The first set of scenarios fall under the previously mentioned four-lane design and represents the Bascule Bridge and Mid-Level Fixed-Span Bridge alternatives that assume four lanes across the bridge structure (two in each direction). The High-Level Fixed-Span Scenario, which relocates the south-end touchdown point from 14th Avenue S./S. Cloverdale Street to 14th Avenue S./S. Trenton Street, is also implied in the Four-Lane Scenario due to its similarities with the other four-lane configurations. Geometric assumptions for the High-Level Fixed-Span

Scenario are given in Figure 27. This scenario is discussed qualitatively in the following sections. The second scenario is the No-Bridge Scenario, which assumes complete removal of the bridge. Long-range regional improvements related to the SR-509 extension were included in the year 2027 roadway network, but Alaskan Way Viaduct improvements were not.

The Three-Lane Scenario, that would assume two southbound lanes and one northbound lane across the bridge, was not included in this long-range analysis based on the anticipated similarities to the four-lane configuration north and south of the bridge. The lane alignment for the northbound approach to the bridge in the 2027 three-lane scenario would allow for a two-lane to one-lane taper north of S. Cloverdale Street. This would effectively maintain the same intersection geometry as the four-lane scenarios and merge the two northbound receiving lanes into one lane just south of the bridge and sufficiently north of the S. Cloverdale Street intersection. As such, the operational characteristics of the S. Cloverdale Street/14th Avenue S. intersection would be similar to those of the Four-Lane Scenario despite the same levels of northbound traffic along 14th Avenue S.

6.2.2 Peak Hour Volumes

Future 2027 intersection volumes for each of the scenarios were derived from travel-demand forecasts given by the King County regional forecasting model. As described previously, this model is based on the EMME/2 software platform and incorporates various land use, employment, roadway network, and population characteristics to determine future trip distribution patterns and peak-period traffic volumes. Growth rates reflecting the year 2027 Four-Lane Scenario were derived from the established 1998 baseline and 2020 long-range forecasts using a straight-line extrapolation process. Overall traffic growth from 1998 to 2020 was annualized (year-to-year growth) and extrapolated out to the 2027 horizon.

Detailed turning-movement volumes for the 2027 Four-Lane Scenario were subsequently developed by applying these annualized growth rates to existing peak-hour traffic volumes. A similar process was employed for the 2027 High-Level Fixed-Span Scenario but with the S. Cloverdale Street connection to 14th Avenue S. removed and relocated to S. Trenton Street (recall that S. Trenton Street represents the new southern touchdown point for the bridge).

Derivation of traffic volumes for the No-Bridge Scenario reflects the same basic process used for the Four-Lane Scenario but with the bridge link removed from the network in the travel demand forecasts. This scenario incorporates an area-wide redistribution of north-south traffic flow (normally taking the South Park Bridge route) to parallel or alternative routes in the system, including East Marginal Way S., SR-99, and S. Airport Way. As with the 2009 traffic rerouting patterns, impacts to East Marginal Way S. at Boeing Access Road and 1st Avenue S. are most noticeable (based on link volume estimates). Traffic redistribution to SR-99 and S. Airport Way would be minor in comparison. Peak-hour volumes for year 2027 conditions are shown in Figures 28–31. As with the Existing and 2009 volume figures, only the turning-movement volumes that impact signal operations are shown in the figures (consistent with the volumes entered into the traffic simulation model).

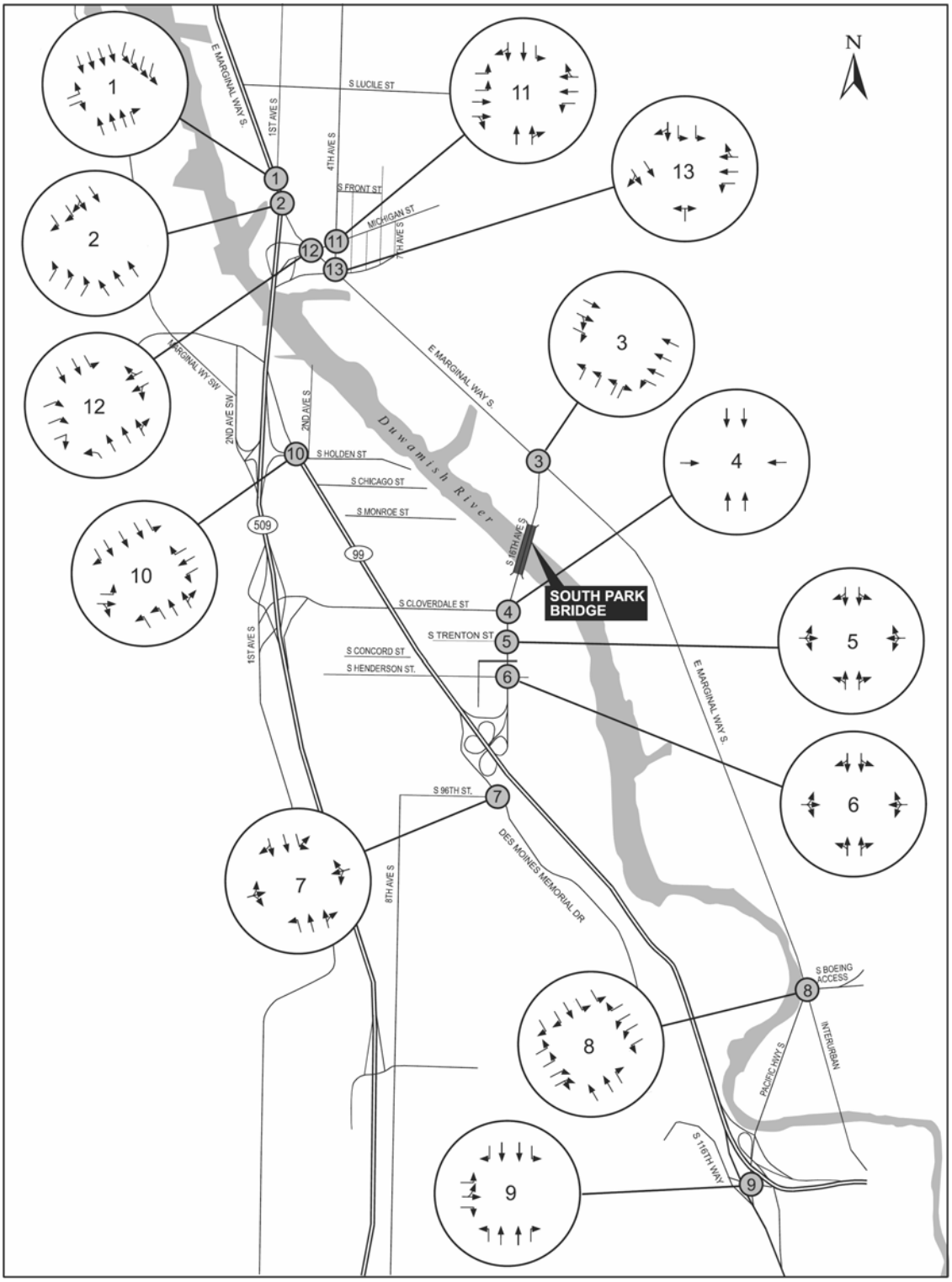

Figure 27
High-Level Fixed-Span Scenario Lane Geometry Assumptions

6.2.3 Level of Service

LOS calculations for future 2027 traffic conditions were performed for the aggregated Four-Lane Scenario and for the No-Bridge Scenario. Both AM and PM peak-hour traffic conditions were evaluated for a total of four scenarios. The High-Level Fixed-Span Scenario was evaluated with respect to impacts at the 14th Avenue S./S. Trenton Street intersection. Results of this evaluation are summarized in Appendix B. LOS calculations were again made using the Synchro 5.0 (build version 321) analysis tool described previously. LOS and delay results, combined with peak hour turning movement volumes, are shown in Figures 28–31 and are summarized in Table 9.

As with the 2009 analysis scenarios, signal phasing and timing data were optimized for each scenario to ensure that the traffic system could adapt to anticipated changes in travel patterns. This was deemed appropriate to avoid underestimating the ability of the signals to accommodate increases in traffic volume. As shown in Table 9, analysis results for the Four-Lane Scenario indicate high levels of congestion at the gateway intersections.

Queue analysis results for the 2027 scenarios are given in Appendix A. These results show the 95th percentile queues for each approach and movement, as well as the corresponding physical storage lengths.

As shown in Appendix A, 95th-percentile queues have been tabulated for the existing, 2009, and 2027 projections by scenario for both AM and PM peak hours. These queues are reported for all approaches at the 13 study intersections and were obtained from the Synchro analysis results. The current physical storage length is also included in Appendix A for comparison purposes.

The results of the AM peak analysis indicate long queues for 3 out of the 13 intersections. They include the northbound right-turn movement at S. Michigan Street and East Marginal Way S. (Intersection #12) where the 95th-percentile queue length exceeds the given capacity (i.e., queue spillback). Spillback is also expected for the northbound through movement at SR-99/East Marginal Way S. (Intersection #2) and the eastbound left turn at S. 116th Way/SR-99 (Intersection #9).

Queue length results for the PM peak hour analysis indicate additional areas of spillback beyond those described for the AM peak hour. Specific movements and approaches that show severe levels of spillback include the southeast right turn at East Marginal Way S./1st Avenue S. (Intersection #1), the northbound right turn at Boeing Access Road/East Marginal Way S. (Intersection #8), and the southbound left turn at S. 116th Way and SR-99 (Intersection #9). These movements also would experience significant delays. Remaining movements and approaches generally show modest to moderate levels of queuing, with most queue lengths contained within the physical storage capacities provided.

Higher-delay intersections of interest include 1st Avenue S./East Marginal Way S., East Marginal Way S./Boeing Access Road, S. Michigan Street/4th Avenue S., and East Marginal Way S./S. Michigan Street intersections. Delays for these intersections would be expected to fall into the LOS E or LOS F range with average delays of more than 60 seconds per vehicle. This is because of the above described queuing delays. Results of the No-Bridge Scenario

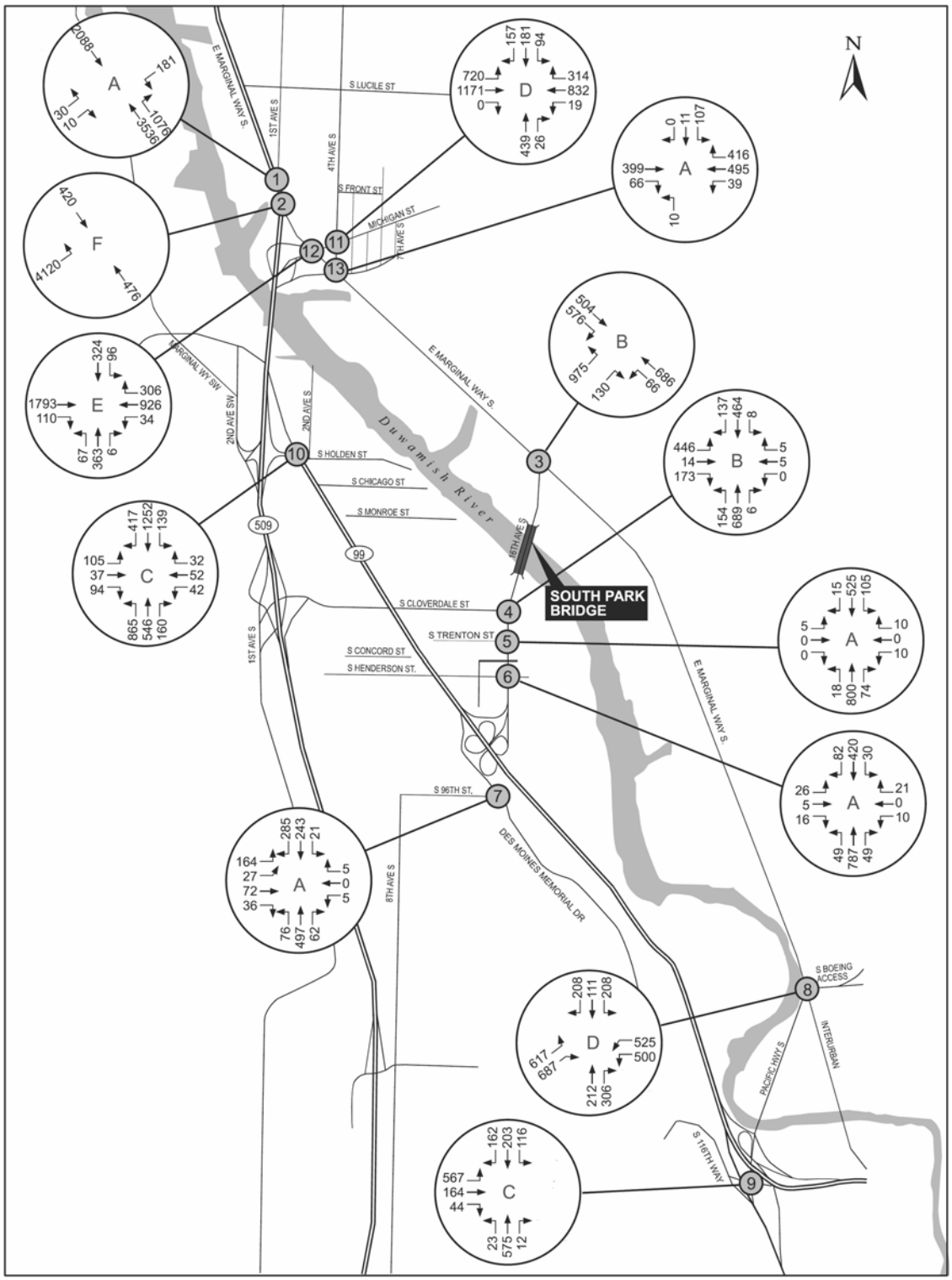

Figure 28
Future 2027 Four-Lane Scenario AM Peak Hour Volumes and LOS

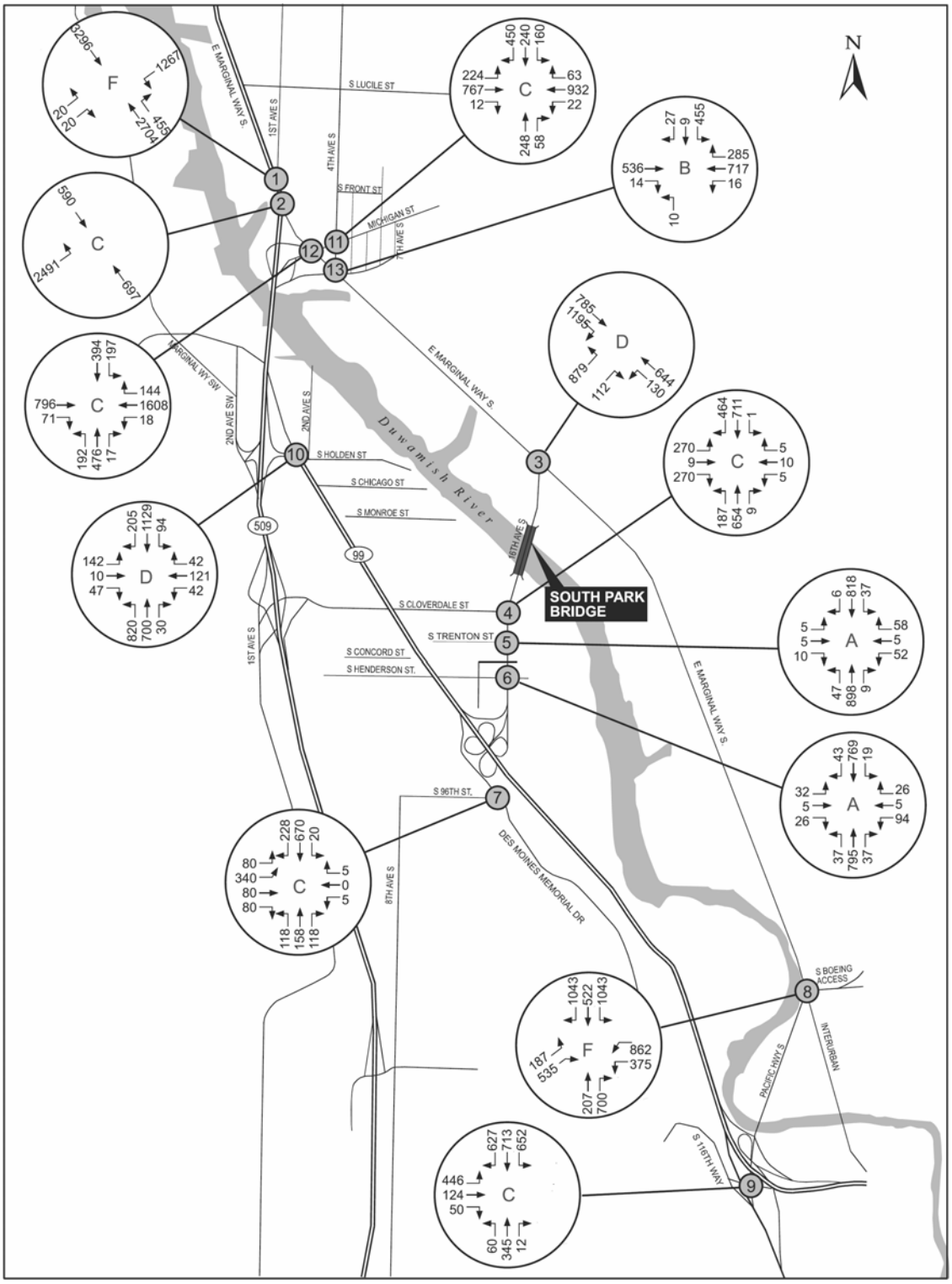

Figure 29
Future 2027 Four-Lane Scenario PM Peak Hour Volumes and LOS

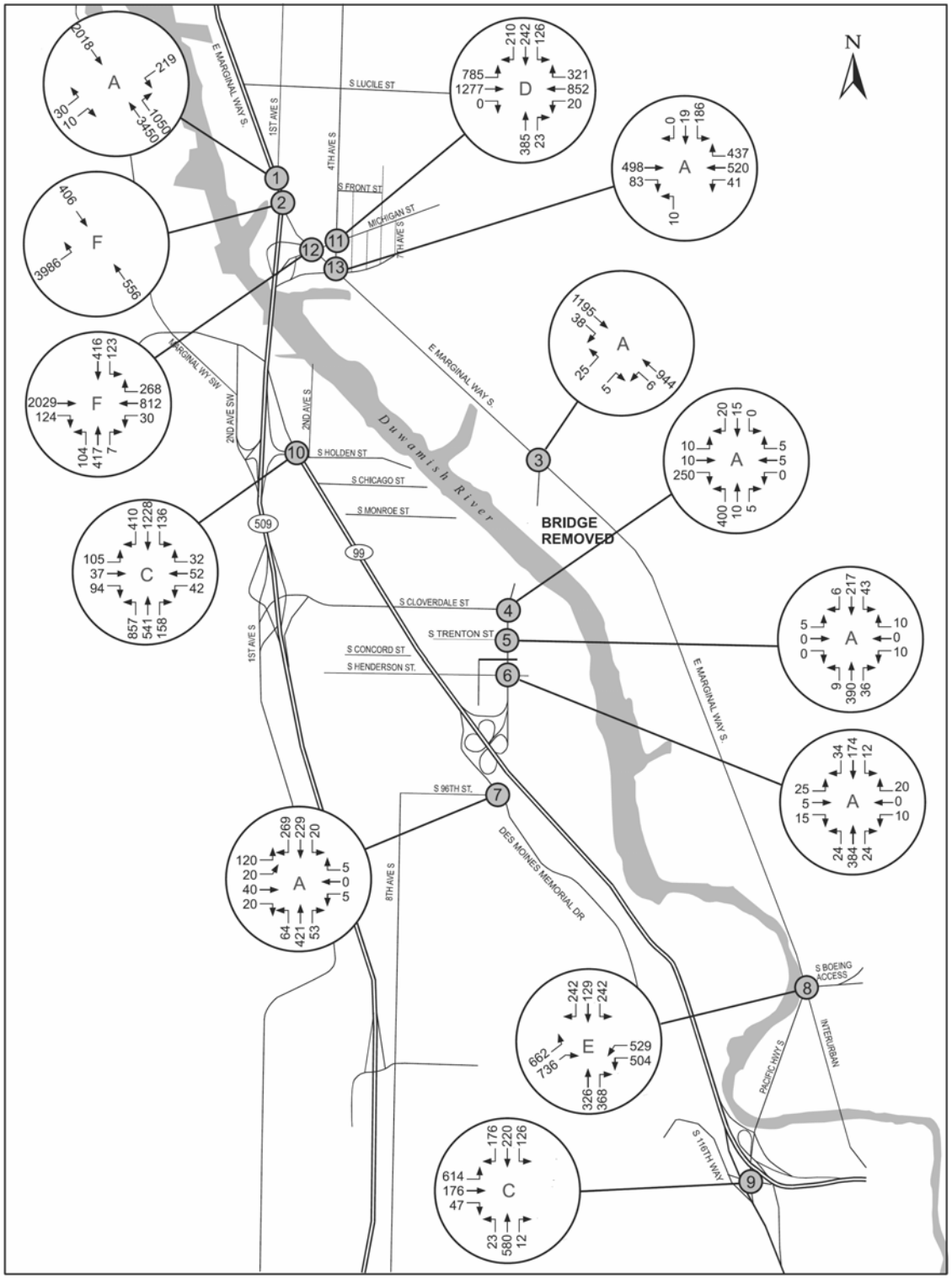

Figure 30
Future 2027 No-Bridge Scenario AM Peak Hour Volumes and LOS

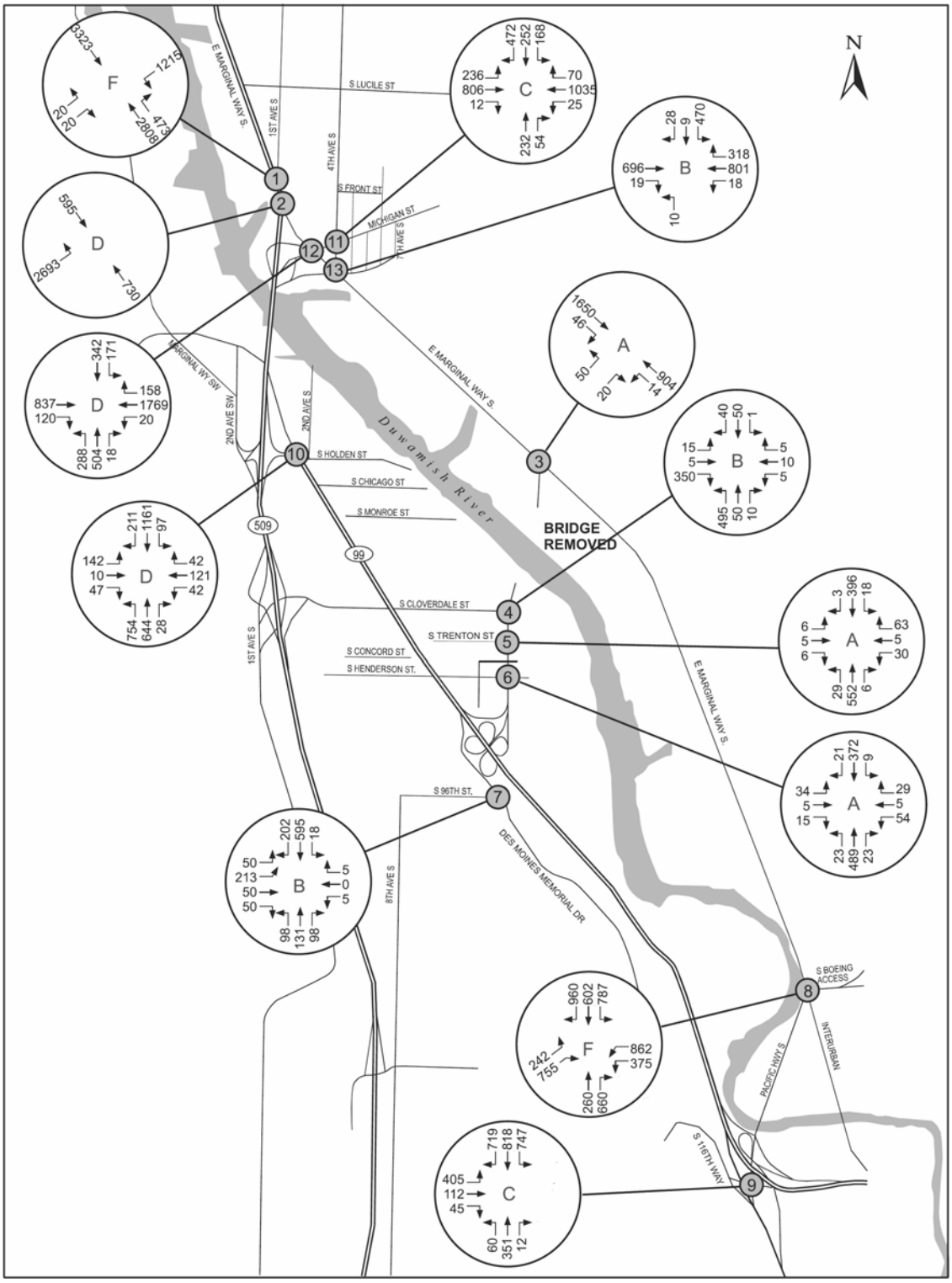

Figure 31
Future 2027 No-Bridge Scenario PM Peak Hour Volumes and LOS

show similar results to the Four-Lane Scenario but with slightly greater congestion levels. Critical gateway intersections in the No-Bridge Scenario (with the bridge link completely removed) are likely to operate at either LOS E or F.

The analysis results for future 2027 conditions indicate that background traffic growth could play a major role in defining future levels of congestion for the primary study area intersections. Traffic volumes for the Four-Lane Scenario would be significant at key intersections such as 1st Avenue S./East Marginal Way S. and East Marginal Way S./S. Michigan Street. Due to these high baseline traffic volumes, changes in traffic patterns and subsequent shifts in volumes resulting from the bridge closure in the No-Bridge Scenario would have moderate impacts on overall intersection performance. This is reflected in the delay results shown in Table 9. This does not necessarily imply that closing the bridge would have no effect on traffic delays or congestion.

In fact, at the local level, shifts in traffic patterns could increase congestion levels significantly depending on the specific sub-area of interest. This especially applies to communities and businesses near the bridge such as the South Park community and Boeing manufacturing divisions. What the delay results do indicate is that high levels of congestion would occur in the long-term future with or without the bridge link in place and congestion is more dependent on background growth due to limited capacity in the transportation system. Also, with the bridge link removed, delays for several key intersection movements could increase noticeably.

As with the year 2009 LOS analysis, intersection-level analysis was not performed for the High-Level Fixed-Span Scenario. This was again due to the expected similarities between the High-Level Fixed-Span Scenario and the general Four-Lane Scenario. Year 2027 traffic forecasts for the High-Level Fixed-Span Scenario indicate that traffic using S. Cloverdale Street would generally shift to S. Trenton Street as a result of the bridge touchdown point being moved south. S. Trenton Street, along with 12th Avenue S., would thus become the primary access route to and from SR-99 instead of S. Cloverdale Street. Similar levels of congestion would result at 14th Avenue S./S. Trenton Street (for the High-Level Fixed-Span Scenario) as for 14th Avenue S./S. Cloverdale Street (for the Four-Lane Scenario).

6.2.4 Non-Motorized Traffic

Similar to the 2009 scenarios, impacts of the various year 2027 design alternatives on non-motorized traffic depend somewhat on whether or not the bridge facility is demolished and which bridge configuration is assumed. For the Four-Lane Scenario, the current bridge is replaced or rehabilitated with a similar facility, steeper grades would make it more difficult for pedestrians and bicyclists to use the bridge.

Some increase in peak-period non-motorized traffic volumes is expected due to background growth and higher land use densities. For the Mid-Level Fixed-Span Bridge Alternative (a Four-Lane Scenario), access for pedestrians to and from the bridge would be provided via a new pedestrian/bike “peel-off” ramp located near S. Orr Street. In the case where the bridge is closed and removed under the No-Bridge Scenario, non-motorized traffic would be eliminated. Overall pedestrian and bicyclist travel patterns

Table 9. Future 2027 Peak Hour Level of Service

AM PEAK HOUR

#	Intersection	Four-Lane Bridge					No Bridge				
		Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay		
		Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS
1	1st Ave S & E Marginal Way	7.3	A	SBT	119.4	F	7.6	A	SBT	118.2	F
2	1st Ave (Bridge) & E Marginal	120.9	F	NWR	165.3	F	122.8	F	NWR	162.2	F
3	16th Ave S & E Marginal Way	16.1	B	NBL	26.4	C	3.8	A	NBL	42.4	D
4	14th Ave S & Cloverdale St	18.1	B	EBL	35.2	D	7.5	A	WBT	39.3	D
5	14th Ave S & Trenton St	1.1	A	EBT	37.8	D	1.5	A	EBT	37.8	D
6	14th Ave S & Henderson St	2.8	A	EBT	27.8	C	3.8	A	EBT	27.8	C
7	S 96th St & Des Moines Mem Dr	9.4	A	NWL	13.7	B	6.6	A	NWL	9.5	A
8	E Marginal & Boeing Access Rd	47.6	D	SBT	83.1	F	63.7	E	SBT	129.3	F
9	S 116th St & SR-99	20.9	C	NBL	38.8	D	22.1	C	NBL	42.4	D
10	Holden St & SR-99	34.2	C	EBL	93.4	F	33.3	C	EBL	88.6	F
11	Michigan Way & 4th Ave S	43.9	D	SBL	114.8	F	47.2	D	SBL	142.4	F
12	E Marginal Way & Michigan Ave	64.2	E	NER	118.1	F	100.2	F	NER	187.3	F
13	E Marginal Way & 4th Ave S	6.8	A	NBL	42.9	D	9.0	A	NBL	42.9	D

PM PEAK HOUR

#	Intersection	Four-Lane Bridge					No Bridge				
		Intersection Average		Movement with Longest Delay			Intersection Average		Movement with Longest Delay		
		Delay	LOS	Mov't	Delay	LOS	Delay	LOS	Mov't	Delay	LOS
1	1st Ave S & E Marginal Way	83.7	F	SBT	143.0	F	81.9	F	SBT	138.9	F
2	1st Ave (Bridge) & E Marginal	34.8	C	NWR	51.8	D	36.2	D	NWR	56.9	E
3	16th Ave S & E Marginal Way	47.0	D	NWL	111.2	F	6.0	A	NBL	51.2	D
4	14th Ave S & Cloverdale St	22.4	C	EBT	55.2	E	11.2	B	WBT	35.5	D
5	14th Ave S & Trenton St	3.6	A	EBT	25.3	C	3.2	A	EBT	29.9	C
6	14th Ave S & Henderson St	7.5	A	WBT	34.4	C	5.7	A	EBT	31.1	C
7	S 96th St & Des Moines Mem Dr	30.2	C	NWL	67.9	E	12.8	B	NWL	16.2	B
8	E Marginal & Boeing Access Rd	111.8	F	SBL	167.7	F	115.1	F	SBT	197.7	F
9	S 116th St & SR-99	23.0	C	NBL	49.4	D	23.5	C	NBL	50.8	D
10	Holden St & SR-99	36.7	D	EBL	69.2	E	35.1	D	EBL	68.4	E
11	Michigan Way & 4th Ave S	28.1	C	EBL	68.1	E	28.7	C	EBL	71.0	E
12	E Marginal Way & Michigan Ave	32.3	C	SEL	78.0	E	54.5	D	NWL	113.0	F
13	E Marginal Way & 4th Ave S	19.4	B	NBL	53.0	D	17.7	B	NBL	53.0	D

Note: Delays given in seconds per vehicle

would not change dramatically even with this link removed based on the low number of non-motorizeds currently using the bridge and future land use patterns (expected to remain industrial). However, users that depend on the bridge to cross the waterway, such as those in the South Park community, would be forced to use less convenient alternative routes such as 1st Avenue S and/or SR-99, which may not be feasible for pedestrians.

6.2.5 Transit Service

Long-range impacts to transit service for the Four-Lane Scenario would be negligible since no rerouting of service would be required. Transit service levels by 2027 will increase system-wide based on long-range King County Metro service plans, but not far beyond short-range 2009 levels due to the incorporation of new LINK Light-Rail Transit (LRT) service. For the No-Bridge Scenario, transit service for the existing Routes 60 and 130 would be eliminated due to removal of the bridge link from the network. However, new or modified routes and service levels could be implemented to ensure that transit service is maintained in the South Park area.

Impacts to transit service for the High-Level Fixed-Span Scenario may be similar to those for the No-Bridge Scenario for Routes 60, 130, and 132 based on the location of the bridge touchdown point (shifts from north of S. Cloverdale Street to north of S. Trenton Street). Large vehicles would be rerouted to S. Trenton Street and 12th Avenue S. as a substitute connector between S Cloverdale Street and the bridge.

6.2.6 Freight Movement

Freight mobility and accessibility would not be significantly affected for the Four-Lane Scenario since a crossing over the waterway would be maintained. However, for the No-Bridge Scenario, removal of the bridge link would require some truck rerouting for access to and from destinations on either side of the existing bridge. Impacts of this rerouting would be reflected at the north and south gateway intersections of 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road intersections. The traffic analysis results for the 2027 No-Bridge Scenario incorporate these rerouting patterns and subsequent changes in traffic volumes in terms of additional delays and vehicle travel times. Freight access would be affected somewhat for the High-Level Fixed-Span Scenario due to the modified touchdown point at S. Trenton Street (versus S. Cloverdale Street) and slight increases in travel time due to the substitute route comprised of S Trenton Street and 12th Avenue S. In addition, the steeper grades associated with the High-Level Fixed-Span Bridge Alternative would affect climbing speeds (especially for trucks) at the north and south bridge approaches.

6.2.7 Parking

Parking impacts for the year 2027 bridge scenarios, specifically along 14th Avenue S. in the South Park community, would likely be modest during peak-hour periods due to the absence of any major geometric or capacity changes to 14th Avenue S. in future analysis scenarios. Lane configurations on 14th Avenue S. for the various alternatives do not change despite major design differences in the bridge structure. Current parking restrictions would be retained to provide adequate levels of throughput capacity and to minimize parking friction during peak traffic periods. Some impacts would occur in the

High-Level Fixed-Span Scenario due to the reconfiguration of the touchdown point to 14th Avenue S./S. Trenton Street (from 14th Avenue S./S. Cloverdale Street). Approximately 20 to 25 parking spaces would be eliminated in the High-Level Fixed-Span Scenario along 14th Avenue S along with removal of several businesses.

Due to system-wide background growth in traffic levels resulting from higher-density land uses and regional population and employment increases, congestion and vehicle delay at the key study intersections would likely increase in the short-term (year 2009) and long-range (year 2027) future. For roadways near the South Park Bridge approaches, however, mitigation measures related to the transportation network and traffic operations would be minimal. The various bridge configurations and cross-sections that maintain a link across the Duwamish Waterway (with the exception of the High-Level Fixed-Span Bridge Alternative) would not require extensive measures to ensure reasonable levels of congestion for the local South Park community. This is primarily due to the moderate traffic levels approaching the bridge on either 14th Avenue S. or 16th Avenue S. In fact, as shown in the LOS and delay calculations for future conditions, low congestion levels are expected along the 14th Avenue S. corridor for all traffic scenarios.

Analysis results for critical gateway intersections, such as 1st Avenue S./East Marginal Way S. and East Marginal Way S./Boeing Access Road, indicate high delays and congestion levels for the majority of the scenarios examined, including the No-Action sScenario. For these locations, improvement measures such as those related to major freeway and bridge widening or grade-separation of heavily traveled corridor crossings may be needed to offset long-term traffic growth and impacts for the south Seattle industrial areas. However, due to the regional nature of these gateway intersections, and the fact that these impacts are not directly related to the bridge alternatives, development of suitable mitigation measures would be beyond the scope of this analysis. Improvements at the more comprehensive regional level are best made using long-range CIP evaluation techniques and policy-based decisions.

As discussed previously, the High-Level Fixed-Span Bridge Alternative would vertically realign the bridge deck and relocate the south-end touchdown point from 14th Avenue S./S. Cloverdale Street to 14th Avenue S./S. Trenton Street. One critical impact of this design would be the elimination of traffic access directly to and from 14th Avenue S. via S. Cloverdale Street. Rerouting of this traffic to 12th Avenue S. and S. Trenton Street was included in the High-Level Fixed-Span Scenario to maintain access to and from 14th Avenue S. To minimize the impacts of the High-Level Fixed-Span Bridge Alternative, a left-turn pocket should be provided for the northbound approach at the 14th Avenue S./S. Trenton Street intersection. This improvement would minimize the effects of northbound to westbound left-turn queues (turns from 14th Avenue S. to S. Trenton Street).

For the bridge designs that fall under the Four-Lane and Three-Lane scenarios, several localized measures could be implemented to improve the overall operational efficiency and mobility characteristics of the street system near the South Park Bridge. These would apply to both short-term and long-range traffic conditions. The following measures are recommended.

Signal Optimization and Coordination

Signal phasing and timing characteristics for intersections located and evaluated in the study area should be optimized in order to accommodate future changes in traffic volumes, trip distribution patterns, and roadway modifications. Although this would not necessarily be considered direct mitigation for impacts of the bridge alternatives, it would be considered good practice to facilitate effective future operations. This may include simulation and analysis of future traffic operations using appropriate analysis software as well as manual retiming of the signal system. Future horizon-year traffic counts and heavy vehicle data collection would be required to undertake this effort. Implementation of signal coordination or interconnection (coordinated with the Seattle Department of Transportation), especially along linear corridors such as 14th Avenue S., is also recommended to maximize the progression of traffic streams within and through the South Park community. Coordination of multiple signals would ensure higher throughput capacity as well as lower congestion levels for the affected roadway segment. Signal coordination would involve determination of appropriate signal cycle lengths, offset data, and actuation characteristics for each signal in the "linked" system.

Turn Lanes at 14th Avenue S./S. Cloverdale Street

To minimize future traffic friction near the South Park Bridge due to vehicle turning movements, northbound and southbound turn pockets (provided within the existing right-of-way) are recommended at the intersection of 14th Avenue S./S. Cloverdale Street, specifically for the various bridge alternatives that maintain a touchdown point north of S. Cloverdale Street. This mitigation would only apply to the 2027 Four-Lane Scenario (reflecting the Bascule Bridge and Mid-Level Fixed-Span Bridge Alternatives) since peak hour traffic volumes for the various 2009 scenarios would not warrant any channelization changes. As discussed in previous sections of this report, the amount of conflicting traffic (due to higher turning movement volumes) at the 14th Avenue S./S. Cloverdale Street intersection is expected to increase noticeably by the 2027 horizon year. As such, the current permissive phasing patterns and approach capacities for northbound and southbound traffic streams may not be adequate.

A designated turn lane, as recommended, would allow storage for turning vehicles and would also provide opportunities to add protected signal phasing exclusively for left turning vehicles. This left-turn lane could likely be provided within the existing 14th Avenue S. right-of-way without the need for property acquisition.

The effectiveness of the proposed left-turn lane mitigation was evaluated through analysis of the 2027 Four-Lane Scenario AM & PM peak hour forecasts. For these 2027 scenarios, a 100-foot left-turn pocket (storage for approximately four or more vehicles) was added to the northbound approach at the 14th Avenue S./S. Cloverdale Street intersection, and the signal timing and phasing was modified to accommodate a protected and permissive phase sequence. The results of this evaluation are summarized in the table on the following page.

As shown in the table, some increases in delay could occur for specific movements impacted by the following: (1) the proposed northbound left turn lane and (2) changes to the signal phasing sequence. With the protected leading phase for northbound left turns,

the southbound through movement is most noticeably affected due to the direct reduction in capacity. Delays for this movement increase significantly, especially for the PM peak hour (from 7.2 seconds per vehicle to 21.7 seconds per vehicle). However, results for the remaining intersection movements (those shown and not shown in the table) indicate reductions in delay as well as improvements in overall intersection congestion for both the AM and PM peak hour scenarios.

Table 10. Summary of Mitigation Analysis Results
(14th Avenue S./S. Cloverdale Street Northbound Left-Turn Lane)

Movement	2027 Four-Lane w/out Mitigation				2027 Four-Lane with Mitigation			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Northbound Left Turn	Shared	---	Shared	---	11.9	B	21.7	C
Northbound Through	15.3	B	22.9	C	10.8	B	4.8	A
Eastbound Left Turn	35.2	D	51.8	D	35.2	D	46.7	D
Southbound Through	8.4	A	7.2	A	13.1	B	21.7	C
Overall	18.1	B	22.4	C	17.7	B	18.2	B

Turn Lanes at 14th Avenue S./S. Trenton Street

As described for the High-Level Fixed-Span Bridge Alternative, the touchdown point for the bridge would be relocated to just north of the 14th Avenue S./S. Trenton Street intersection. As such, S. Trenton Street and 12th Avenue S. would become the primary access route for S. Cloverdale Street-bound traffic. The result of this access revision would be a significant increase in turning movements on 14th Avenue S. at S. Trenton (especially northbound turns). This shift in traffic would likely require designated left-turn storage lanes on 14th Avenue S. at S. Trenton Street. These turn lanes would serve to reduce 14th Avenue S. and allow separation of left-turn movements from the heavy north-south traffic on 14th Avenue S. As with the turn lanes recommended for the 14th Avenue S./S. Cloverdale Street intersection, some roadway widening (within the existing right-of-way) would likely be needed on 14th Avenue S. near S. Trenton Street to allow for lane re-striping changes and turn pocket tapers. Turn lanes at S. Trenton Street would preclude any needed widening of 14th Avenue S. at S. Cloverdale Street.

Analysis results for the High-Level Fixed-Span Bridge Alternative are provided in Appendix B. These delay and level-of-service results assume the proposed left-turn channelization described above and includes left-turn pockets for each of the 14th Avenue S./S. Trenton Street intersection approaches.

Parking Restrictions During Peak Hour Periods

Current parking restrictions along 14th Avenue S. prohibit parking on the east side of the roadway (northbound direction) during the morning peak period between 7 and 9 AM and during the evening peak period between 3 and 6 PM. For the west side of 14th Avenue S. (southbound direction), parking is only prohibited during the evening peak period. To maintain reasonable long-term capacity along 14th Avenue S. during all

critical traffic periods of the day, a restriction on southbound parking during the morning 7 to 9 AM peak period is recommended. Based on traffic forecasts for the South Park area, volume increases for both directions along 14th Avenue S. are anticipated. As such, a single southbound lane would not likely be adequate for the additional traffic demands that would occur by the mid-term 2009 and long-range 2027 horizon years.

Such parking restrictions would limit on-street parking to off-peak hours for the roadway segments identified. This loss of parking would likely be modest in comparison to the total parking space inventory on side streets and in the South Park area as a whole. The primary impact to parking would be from the design of the High-Level Fixed-Span Bridge Alternative, which is assumed to require several property parcels as a result of the relocated touchdown point.

Analysis results for the various 2009 and 2027 scenarios assume that the above parking restrictions are in place during the critical AM and PM peak-hour periods. As such, a four-lane cross section, with two travel lanes in each direction, is provided in the future (AM and PM peak hours) on 14th Avenue S.

Chapter 8 References

City of Seattle (Seattle Transportation), 2000. *Highway Capacity Manual,* Seattle, Washington.

City of Seattle (Seattle Transportation), 1997-2002. *Signal Timing Database*, Seattle, Washington.

City of Tukwila, 1997-2002. *Accident Report (East Marginal Way and Boeing Access Road),* Tukwila, Washington.

Entranco Inc, 1999. *Environmental Review Report: 16th Avenue South Bridge Replacement*, Bellevue, Washington, July 1999.

Sverdrup Corporation, 1994. *14th/16th Avenue South Bridge Rehabilitation/ Design Report for the King County Department of Transportation.* Bellevue, Washington, November 1994.

Transportation Research Board (National Research Council), 1997-2002. *Five-Year Historical Accident Database*.

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Appendix A Summary of Intersection Queues

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Appendix A Summary Of Intersection Queues

The following tables show the 95th-percentile queue lengths for existing, Year 2009, and Year 2027 conditions for key study area intersection approaches. The 95th-percentile queue represents the maximum distance from the stop bar to the back of the queue under the 95th percentile traffic volumes. Also shown are the current physical capacity storage lengths for each approach and an indication of whether the projected queues will exceed the storage capacity of a particular approach lane. See the footnotes below for further table explanatory notes.

AM Peak Hour 95th-Percentile Queue

#	Intersection	Movement	Existing	2009 Four-Lane	2009 Three-Lane	2009 No-Bridge	2027 Four-Lane	2027 No-Bridge	Storage (est. ft.)
1	East Marginal Way S & 1st Ave S	EB LT2	105	105	105	105	106	104	128
		EB RT	0	0	0	0	0	0	128
		NB LT	149	m192	m333	m495	m400	m341	310
		NB TH	m136	m164	m173	m256	m209	m181	310
		SB TH	113	128	128	122	127	148	900
		SE RT	221	248	234	235	302	328	952
2	1st Ave S (bridge) & East Marginal Way S	NB TH	1694	#2560	#2667	#2968	#3219	#3123	>2000
		SB LT	401	419	#444	#456	#514	457	538
		NW RT	#420	#481	#434	#465	#558	#637	945
3	16th Ave S & East Marginal Way S	NB LT	203	193	145	43	192	42	>1000
		NB RT	40	35	35	11	31	11	200
		SE TH	185	173	144	180	218	268	>1000
		SE RT	69	74	91	30	70	39	>1000
		NW LT	24	34	26	3	53	3	>1000
		NW TH	58	83	67	31	144	51	>1000
4	S Cloverdale St & 14th Ave S	EB LT	197	211	176	70	#323	71	532
		EB TH	147	174	142	18	#285	18	532
		WB TH	18	20	18	22	21	22	509
		NB LT			102	162		129	
		NB TH	187	222	314	163	#265	129	622
		SB TH	102	110	88	47	150	47	>1000
5	S Trenton St & 14th Ave S	EB TH	13	15	13	13	15	13	527
		WB TH	29	29	29	29	29	29	514
		NB TH	51	57	48	36	68	27	626
		SB TH	24	28	35	35	39	19	622
6	S Henderson St & 14th Ave S	EB TH	50	52	50	44	52	50	521
		WB TH	33	33	33	32	33	33	520
		NB TH	63	74	62	44	91	35	>1000
		SB TH	39	34	33	27	33	16	626
7	S 96th St & Des Moines Memorial	EB TH	74	108	89	75	164	84	694
		WB TH	7	7	8	7	10	9	738
		SE LT	12	17	15	14	22	14	100
		SE TH	40	60	53	47	77	51	>1000
		NW LT	30	34	29	27	62	37	150
		NW TH	69	75	63	58	146	84	>1000

AM Peak Hour 95th-Percentile Queue (continued)

#	Intersection	Movement	Existing	2009 Four-Lane	2009 Three-Lane	2009 No-Bridge	2027 Four-Lane	2027 No-Bridge	Storage (est. ft.)
8	S Boeing Access Rd & East Marginal Way S	WB LT2	#559	#622	#606	#662	#722	#755	>1000
		WB LT	221	259	255	264	280	289	>1000
		NB TH	109	142	154	147	160	234	>1000
		NB RT	109	#193	#240	#220	#283	#482	50
		SB LT	100	#158	#148	#165	#186	#238	>1000
		SB TH	120	#204	#193	#208	#235	#292	>1000
		SB RT	42	75	68	71	80	88	>1000
		NE LT	272	340	340	369	367	402	>1000
		NE RT	#390	#482	#484	#534	#534	#609	>1000
9	S 116th Way & SR-99	EB LT	196	284	277	280	336	377	125
		EB TH	207	297	292	293	355	400	>1000
		EB RT	21	25	25	25	29	31	125
		NB LT	29	42	42	42	45	48	150
		NB TH	161	241	235	244	264	287	>1000
		NB RT	14	17	17	17	18	20	50
		SB LT	85	133	129	139	142	161	250
		SB TH	52	75	73	78	81	92	>1000
		SB RT	35	41	40	42	43	46	250
10	S. Holder St & SR-99	EB LT	#161	#205	#205	#205	#205	#205	276
		EB TH	87	99	99	99	99	99	>1000
		WB LT	#83	#88	#88	#88	#88	#88	75
		WB TH	79	83	83	83	83	83	367
		WB RT	31	31	31	31	31	31	75
		NB LT	#471	#519	#539	#565	#497	#490	250
		NB TH	243	268	276	297	255	247	>1000
		SB LT	171	177	174	167	177	176	200
		SB TH	#439	#474	#455	#447	#463	#447	>1000
		SB RT	196	239	226	218	230	218	200
11	S. Michigan St & 4th Ave S	EB LT	m#267	m220	m240	m250	m221	m200	240
		EB TH	m133	m103	m132	m148	m88	m88	400
		WB LT	31	32	32	33	37	37	175
		WB TH	357	#382	#420	#446	#575	#608	620
		NB TH	130	127	118	122	#273	#225	527
		SB LT	84	#140	#140	#130	#175	#227	150
		SB TH	58	80	77	71	93	122	547
12	S Michigan St & East Marginal Way S	WB TH	75	103	m83	m64	m187	m136	400
		SE LT	102	112	105	124	112	138	200
		SE TH	128	147	139	166	147	189	945
		NW LT	#86	90	98	89	89	#157	300
		NW TH	102	123	136	#196	121	138	538
		NE RT	#788	#928	#1023	#1220	#1111	#1303	200
		NE RT2	27	33	35	43	39	46	200

AM Peak Hour 95th-Percentile Queue (continued)

#	Intersection	Movement	Existing	2009 Four-Lane	2009 Three-Lane	2009 No-Bridge	2027 Four-Lane	2027 No-Bridge	Storage (est. ft.)
13	4th Ave S & East Marginal Way S	NB LT	24	24	24	24	24	24	152
		SB LT	56	55	64	75	59	103	150
		SB TH	27	m19	m25	m32	m20	m26	527
		SE TH	54	176	184	214	137	165	538
		NW LT	13	13	13	13	19	22	125
		NW TH	55	56	54	52	124	141	739

~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile, queue is metered by upstream signal.
>	Greater than.

NB	Northbound	**SB**	Southbound	**EB**	Eastbound	**WB**	Westbound
SE	Southeast	**NW**	Northwest	**NE**	Northeast		
LT	Left turn	**RT**	Right turn	**TH**	Through		

PM Peak Hour 95th-Percentile Queue

#	Intersection	Movement	Existing	2009 Four-Lane	2009 Three-Lane	2009 No-Bridge	2027 Four-Lane	2027 No-Bridge	Storage (est. ft.)
1	East Marginal Way S & 1st Ave S	EB LT2	45	51	50	51	50	50	128
		EB RT	43	48	48	48	49	50	128
		NB LT	268	274	312	315	538	579	310
		NB TH	146	110	125	126	m193	m198	310
		SB TH	370	#481	#520	#516	#604	#579	900
		SE RT	#1511	#1590	#1621	#1610	#1958	#1973	952
2	1st Ave S (bridge) & East Marginal Way S	NB TH	698	738	715	762	910	1055	>2000
		SB LT	m253	m257	m266	m265	m285	m293	538
		NW RT	207	240	241	336	406	437	945
3	16th Ave S & East Marginal Way S	NB LT	161	104	68	81	179	80	>1000
		NB RT	38	23	18	26	29	26	200
		SE TH	328	356	#432	303	#623	486	>1000
		SE RT	115	145	#709	46	#1007	60	>1000
		NW LT	41	105	#159	4	#208	5	>1000
		NW TH	57	152	172	43	176	62	>1000
4	S Cloverdale St & 14th Ave S	EB LT	160	167	145	71	#275	67	532
		EB TH	69	89	82	30	#352	29	532
		WB TH	33	35	33	33	35	33	509
		NB LT			#266	225		229	
		NB TH	183	215	216	231	#430	235	622
		SB TH	217	236	251	86	281	86	>1000
5	S Trenton St & 14th Ave S	EB TH	26	29	27	26	29	27	527
		WB TH	96	96	90	77	99	73	514
		NB TH	98	30	28	31	34	35	626
		SB TH	71	141	162	41	m139	30	622
6	S Henderson St & 14th Ave S	EB TH	56	58	57	57	58	62	521
		WB TH	124	130	124	100	130	87	520
		NB TH	72	83	65	62	170	63	>1000
		SB TH	191	121	123	48	139	33	626
7	S 96th St & Des Moines Memorial	EB TH	144	171	161	98	#625	299	694
		WB TH	9	10	10	9	14	15	738
		SE LT	13	14	14	10	22	19	100
		SE TH	131	154	149	95	306	237	>1000
		NW LT	51	54	51	38	#194	105	150
		NW TH	38	40	36	28	87	67	>1000
8	S Boeing Access Rd & East Marginal Way S	WB LT2	#420	#492	#492	#526	#646	#679	>1000
		WB LT	#484	#556	#556	#590	#718	#751	>1000
		NB TH	97	114	115	116	142	180	>1000
		NB RT	204	#382	#390	#423	#860	#845	50
		SB LT	#450	#543	#540	#588	#871	#588	>1000
		SB TH	#483	#580	#576	#625	#911	#1107	>1000
		SB RT	189	232	227	253	357	286	>1000
		NE LT	107	123	125	132	128	155	>1000
		NE RT	#406	#514	#527	#527	#569	#728	>1000

PM Peak Hour 95th-Percentile Queue (continued)

#	Intersection	Movement	Existing	2009 Four-Lane	2009 Three-Lane	2009 No-Bridge	2027 Four-Lane	2027 No-Bridge	Storage (est. ft.)
9	S 116th Way & SR-99	EB LT	203	235	231	244	#343	#347	125
		EB TH	212	247	244	256	#378	#368	>1000
		EB RT	27	29	28	30	41	40	125
		NB LT	79	96	92	96	96	96	150
		NB TH	161	200	196	203	202	#219	>1000
		NB RT	19	23	23	23	23	23	50
		SB LT	464	531	508	619	639	#804	250
		SB TH	170	177	178	196	216	235	>1000
		SB RT	49	45	46	45	52	49	250
10	S Holden St & SR-99	EB LT	#198	#247	#259	#259	#236	#236	276
		EB TH	44	47	48	48	47	47	>1000
		WB LT	72	74	74	74	74	74	75
		WB TH	155	162	162	162	162	162	367
		WB RT	34	35	35	35	35	35	75
		NB LT	#451	#521	#539	#531	#473	#433	250
		NB TH	265	291	299	301	265	248	>1000
		SB LT	#140	137	136	148	136	137	200
		SB TH	#422	#433	#426	#509	#404	400	>1000
		SB RT	78	82	80	102	77	76	200
11	S Michigan St & 4th Ave S	EB LT	m#176	m#142	m#152	m#176	m141	m0	240
		EB TH	m111	109	110	m128	m162	136	400
		WB LT	51	55	56	56	48	52	175
		WB TH	474	551	560	577	444	513	620
		NB TH	107	126	140	124	174	163	527
		SB LT	196	#242	#245	#252	205	#229	150
		SB TH	276	325	315	310	256	286	547
12	S Michigan St & East Marginal Way S	WB TH	#766	298	295	#1273	#923	#1104	400
		SE LT	#282	#247	#248	#289	#313	#260	200
		SE TH	171	194	#217	#216	#259	#218	945
		NW LT	#235	#247	#262	#390	#314	#462	300
		NW TH	99	127	132	158	191	197	538
		NE RT	264	250	301	353	266	308	200
		NE RT2	21	18	20	19	18	25	200
13	4th Ave S & East Marginal Way S	NB LT	28	28	28	28	28	28	152
		SB LT	147	m128	151	m144	247	259	150
		SB TH	m0	m14	m16	m17	m32	m32	527
		SE TH	147	222	243	249	m264	289	538
		NW LT	7	7	7	8	13	13	125
		NW TH	86	93	87	125	236	266	739

~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m Volume for 95th percentile, queue is metered by upstream signal.
> Greater than

NB	Northbound	**SB**	Southbound	**EB**	Eastbound	**WB**	Westbound
SE	Southeast	**NW**	Northwest	**NE**	Northeast		
LT	Left turn	**RT**	Right turn	**TH**	Through		

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Appendix B *High-Level Fixed-Span Bridge Supplemental Analysis*

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To: Tim Lane, Fay Schafi

From: Anthony Lo, Madhavi Sanakkayala

Date: April 16, 2004

Subject: South Park Bridge – High-Level Fixed-Span Bridge Supplemental Analysis

This memo provides a brief summary of the impacts of the high-level bridge configuration on the 14th Avenue S. corridor, particularly with respect to the 14th Avenue S./S. Trenton Street intersection. As discussed in the transportation discipline report, the high-level bridge scenario assumes a south-end touchdown point for the bridge just north of the 14th Avenue S./S. Trenton Street intersection due to the vertical geometry of the high-level bridge. One consequence of this alignment is the removal of vehicular access between S. Cloverdale Street and 14th Avenue S. (the intersection of 14th Avenue S./S. Cloverdale Street would become grade-separated).

Access between S. Cloverdale Street and 14th Avenue S. in the high-level bridge scenario would be provided via an alternative route using 12th Avenue S and S. Trenton Street. Any impacts at 14th Avenue S./S. Trenton Street are assumed to result from the shift in traffic movements from 14th Avenue S./S. Cloverdale Street. Analysis results, reflecting the use of Synchro 5.0, are provided for the single intersection of 14th Avenue S./S. Trenton Street. Intersections south of this location, such as 14th Ave S./S. Henderson Street, are not expected to change in terms of traffic volumes or lane geometry. These intersections are assumed to operate similarly to the original conditions presented for the 2009 & 2027 four-lane bridge scenarios. Hence, analysis results are not presented here for the intersections of 14th Avenue S./S. Cloverdale Street (since it is not an intersection in this scenario) and 14th Ave S./S. Henderson Street (since conditions will not change). Only the intersection expected to be uniquely impacted by this option, 14th Avenue S./S. Trenton Street Ave S, was evaluated for a year-of-opening 2009 horizon and a long-range 2027 horizon.

Assumptions

Several assumptions were made as part of this level of service analysis with respect to signal phasing/timing and lane geometry. These are highlighted below.

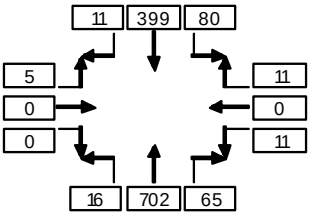
- Left turn pockets were included for all approaches (left turn pockets on 14th Avenue S could be accommodated within the existing right-of-way)
- South-end bridge touchdown point just north of S. Trenton Street
- Year 2027 EB approach consisted of a left lane + left/through/right lane
- Signals cycle lengths were optimized at 90 seconds for all scenarios
- Signal phasing and timing were also optimized for all scenarios
- Year 2009 signal phasing utilized leading or lagging left turns for all approaches
- Year 2027 signal phasing utilized split phases for EB & WB movements

Traffic Volumes

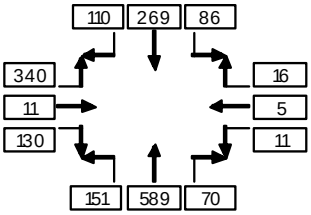
Intersection turning movement volumes for the 2009 & 2027 High-Level Bridge scenarios were based on the data given for the corresponding four-lane scenarios as described in the discipline report. Changes to the 14th Avenue S./S Trenton Street peak hour volumes were made to reflect the shift in traffic from 14th Avenue S./S. Cloverdale Street. For example, northbound left turns from 14th Avenue S. to S. Cloverdale Street were shifted to the northbound left turn movement at 14th Avenue S./S. Trenton Street (and the same shift for reverse movements). Original and modified traffic volumes for 14th Avenue S./S. Trenton Street are shown in the diagrams below.

Year 2009 Scenario Traffic Volumes - AM Peak Hour

Original Four-Lane Scenario

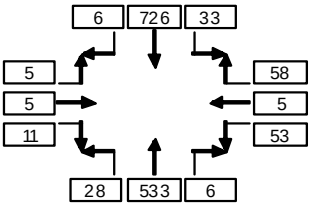


High-Level Bridge Scenario

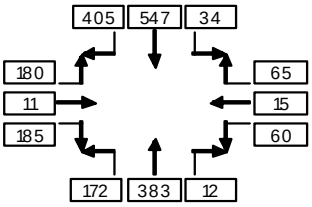


Year 2009 Scenario Traffic Volumes - PM Peak Hour

Original Four-Lane Scenario

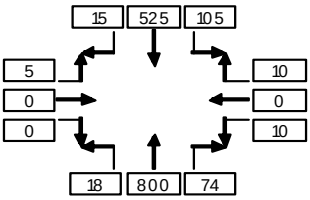


High-Level Bridge Scenario

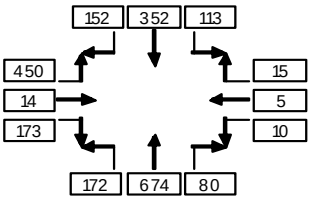


Year 2027 Scenario Traffic Volumes - AM Peak Hour

Original Four-Lane Scenario

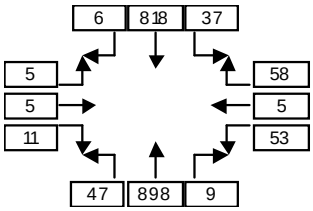


High-Level Bridge Scenario

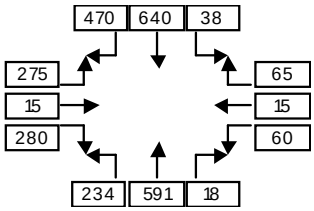


Year 2027 Scenario Traffic Volumes - PM Peak Hour

Original Four-Lane Scenario



High-Level Bridge Scenario



Analysis Results

The results of the Synchro analysis for the 2009 & 2027 High-Level Bridge scenarios are summarized in the table below. Included in this table are movement delays for the AM & PM peak hour periods, overall average intersection delay, and corresponding levels of service.

Intersection Delays and LOS
14th Avenue S. & S. Trenton Street

Turning Movement	2009		2027	
	AM	PM	AM	PM
Northbound Left Turn	47.9 D	36.9 D	77.5 E	102.1 F
Northbound Through/Right	15.0 B	14.9 B	19.9 B	14.7 B
Southbound Left Turn	49.7 D	40.7 D	47.7 D	40.8 D
Southbound Through/Right	15.2 B	22.2 C	18.1 B	30.5 C
Eastbound Left Turn	31.8 C	22.5 C	56.2 E	45.9 D
Eastbound Through/Right	5.0 A	5.7 A	42.3 D	19.8 B
Westbound Left Turn	41.8 D	40.5 D	37.8 D	36.5 C
Westbound Through/Right	21.1 C	10.2 B	21.6 C	12.6 B
Overall Intersection	22.1 C	20.9 C	33.9 C	32.8 C

Conclusions

Based on the analysis results and assumptions, overall delays for the 14th Avenue S./S. Trenton Street intersection would be moderate for the future 2009 and 2027 High-Level Bridge scenarios. The shift in traffic movements from the 14th Avenue S./S. Cloverdale Street intersection (which becomes grade-separated) would occur due to the bridge touchdown point just north of S. Trenton Street in the High-Level bridge scenario. As shown in the volume figures, approximately 500 to 900 new peak hour trips would use the alternative detour route provided by 12th Avenue S. and S. Trenton Street (to connect to/from 14th Avenue S.). The delays and LOS presented in the table indicate that specific higher-volume movements such as the northbound and eastbound left turns could approach saturation levels (LOS E or F) by 2027. However, overall level of service even for the critical 2027 AM peak hour scenario would be LOS C.

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Appendix L. Relocations Technical Report

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South Park Bridge Project

Relocations Technical Report

Prepared for the

King County
Department of Transportation
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Seattle, Washington 98104

Prepared by

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February 2004

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Technical Report
South Park Bridge Project

Relocations

February 2004

Prepared for:
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Chapter 1 Executive Summary

The proposed action would result in property acquisitions and potential business and residential building displacements under each of the build alternatives. The proposed project objective is to address deterioration and seismic vulnerability of the bridge due to the age of the structure. The bridge is needed to maintain an important transportation link across the Duwamish River. While potential relocations associated with the proposed improvements may affect property owners, restoring the structural integrity of the bridge and maintaining its ability to transport vehicles and goods in the area would be beneficial to the local neighborhood and commerce. These benefits are expected to be of value to the larger community and are expected to be greater than potential relocations associated with the proposed alternatives.

The No Action Alternative would not result in property acquisitions or displacements. The Rehabilitation Alternative would require the acquisition of up to three parcels on the south side of the existing bridge. These parcels include residential and commercial uses. The Rehabilitation Alternative would also include closure of the existing bridge over a 32-month period, which may lead to additional indirect business relocations that would not occur under the other build alternatives. This alternative would result in displacing three businesses on these parcels. It is not known whether these businesses are minority owned. One residential displacement would also occur.

The Bascule Bridge Alternative would require acquisition of up to five parcels south of the existing bridge, between Dallas Avenue S. and the Duwamish Waterway. A variety of land uses occur on these parcels, including residential, retail, and commercial uses. Partial acquisition of two parcels north of the bridge, on the west side of 16th Avenue S., would also occur under all build alternatives. Both of these parcels contain industrial uses. One of the five displaced businesses would be minority-owned and a total of at least 12 employees were identified at the affected businesses. Some parcels contain both residential and commercial uses. One residential displacement would occur.

The Mid-Level Fixed-Span Bridge Alternative would require acquisition of up to twelve parcels south of the existing bridge on both sides of 14th Avenue S. north of S. Cloverdale Street. Land uses on these parcels include residential, retail, and commercial uses. Partial acquisition of the two parcels on 16th Avenue S. north of the bridge would also occur. Five of the twelve displaced businesses would be minority-owned and a total of at least 57 employees were identified at the affected businesses. Some parcels contain both residential and commercial uses. Under this alternative, two residential displacements would occur.

The High-Level Fixed-Span Bridge Alternative would require full acquisition of up to thirty-three parcels, as well as partial acquisition of three additional parcels south of the existing bridge. Land uses on these parcels include residential, retail, and commercial uses. Additionally, the High-Level Fixed-Span Bridge Alternative would also require partial acquisition of the two parcels on 16th Avenue S. on the north side of the existing

bridge. This alternative requires full acquisition of up to six parcels on, or near, 12th Avenue S. to provide revised access to the new bridge via S. Trenton Street. This access revision also would require partial acquisition of three parcels in the same area. Each of the parcels affected by the proposed revisions to 12th Avenue S. currently includes single-family residential uses. Fourteen of the twenty-eight displaced businesses would be minority-owned and at least 90 employees were identified at the affected businesses. Some parcels include both residential and commercial uses. Under this alternative, nine residential displacements would occur.

Table 3 in Chapter 6 of this report provides a detailed list of potential property acquisitions under each of the build alternatives. Figure 1 provides a map of affected parcel locations. Property acquisitions and relocations would be compensated for at fair market value and in accordance with state and federal regulations, including the Uniform Relocation and Real Property Policies Act of 1970, as amended. Although replacement homes would not be plentiful in the immediate South Park neighborhood, relatively affordable homes would be available in the larger south Seattle area. Similarly, replacement business property is limited in the South Park neighborhood and more plentiful in the Greater Duwamish and South Seattle areas. Vacancy rates for most residential and commercial properties have increased during the recent economic slowdown, providing a supply of rental properties.

Detailed costs for potential mitigation measures for each of the alternatives have not been determined; however, it is likely that the greatest direct relocation costs would be associated with the High-Level Fixed-Span Bridge Alternative. Table 1 summarizes the number of affected parcels in the South Park neighborhood (south of the existing bridge) and total acquisition area for each of the alternatives. When secondary, or indirect, impacts are considered, long-term closure of the bridge could also result in a high number of potential business displacements, if unfavorable economic conditions result. Although no mitigation is proposed for such displacements under the relocations analysis, more detailed consideration of these impacts is presented in the *Economics Technical Report* for this project.

Table 1. Summary Table of Affected Parcels in the South Park Neighborhood

Alternative	Number of Affected Parcels	Total Area of Affected Parcels
No Action	0	0
Rehabilitation	3	0.67 acres
Bascule Bridge	5	1.39 acres
Mid-Level Fixed-Span Bridge	12	2.32 acres
High-Level Fixed-Span Bridge	36	6.41 acres

Note: Table includes total number of parcels potentially affected by full, or partial property acquisitions. Total area affected is the total size of each parcel combined, and is presented for comparison purposes only. This table does not reflect actual right-of-way area to be acquired. Partial acquisition of two parcels north of the bridge would also occur, however, these parcels are not included above, pending negotiations with the Boeing Company.

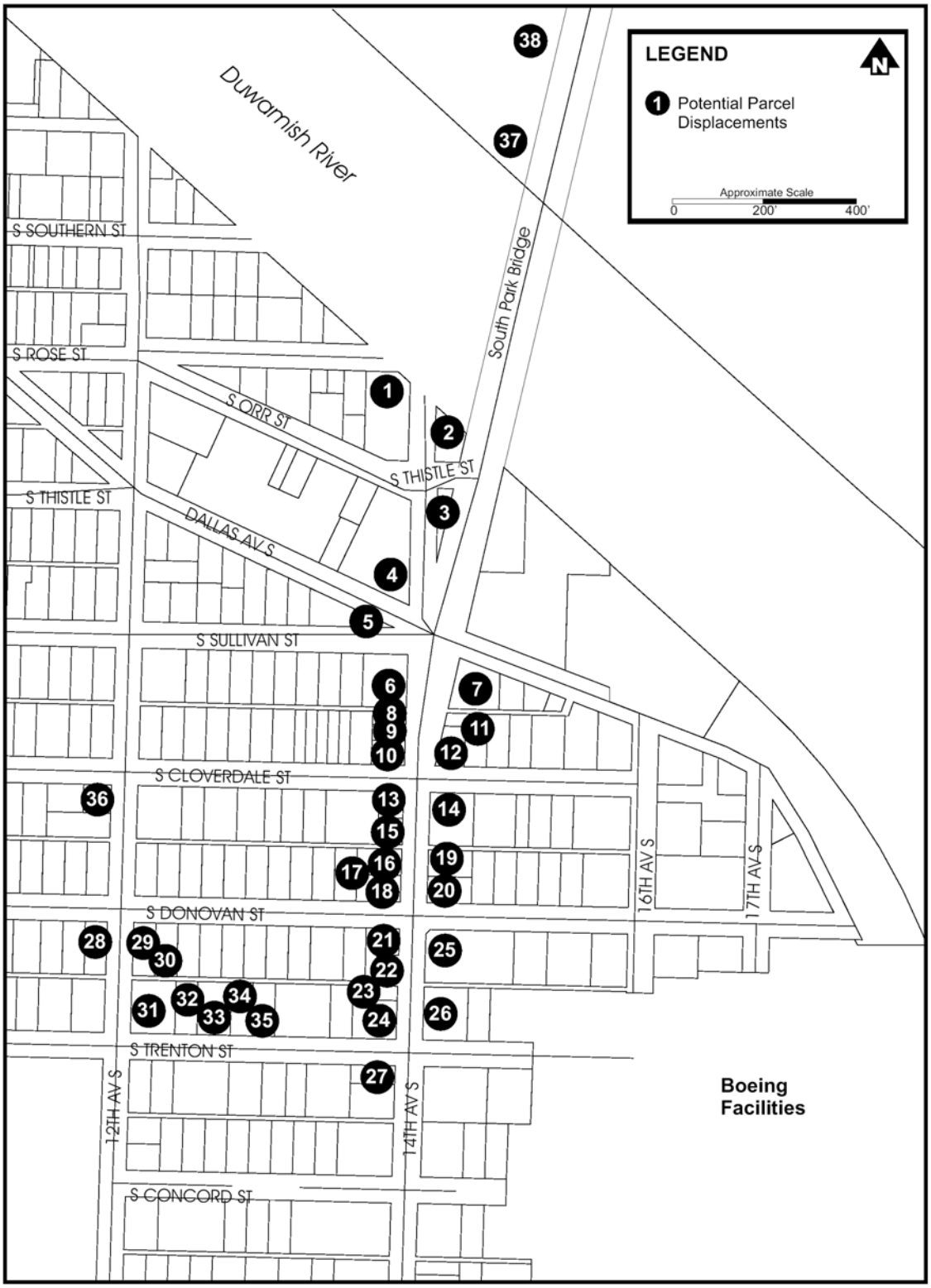

Figure 1
Affected Parcel Locations

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Chapter 2 Introduction

Chapter 2 is an introduction to the technical analysis contained in this discipline report. This chapter describes existing conditions, the history of the project, the purpose and need for the project, and the five project alternatives being considered for environmental review. In addition, this chapter summarizes project coordination conducted to date with agencies, local governments, the community advisory group, and members of the public.

2.1 Description of Existing Conditions

This first section describes existing conditions pertinent to the proposed South Park Bridge Project. The project area is defined. The existing bridge and its current condition are described. The local roadway network in the South Park community is described. Non-vehicular transportation in the community is also summarized.

2.1.1 The Project Area

The South Park community is about four miles south of downtown Seattle (see Figure 2). The community lies south of the Duwamish Waterway, the man-made channel portion of the Duwamish River as it enters Elliott Bay. Though originally incorporated as its own city in 1905, much of the area was annexed by the City of Seattle in 1907.[1] The project area lies south of the industrial Georgetown area of Seattle and the King County International Airport (known as Boeing Field). It encompasses the roadway corridor defined by 16th Avenue S. between East Marginal Way S. and the South Park Bridge and 14th Avenue S. between the bridge and S. Trenton Street. Residents and business owners in the project area generally identify with the City of Seattle.

The project area, however, is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits of both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Trenton Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company's Plant 2 dominates the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land uses front on 14th Avenue S. and along the south bank upstream of the South Park Bridge. Single-family residences, however, generally characterize the area off of this main transportation artery.

[1] City of Seattle, *South Park Residential Urban Village Plan*, 1998.

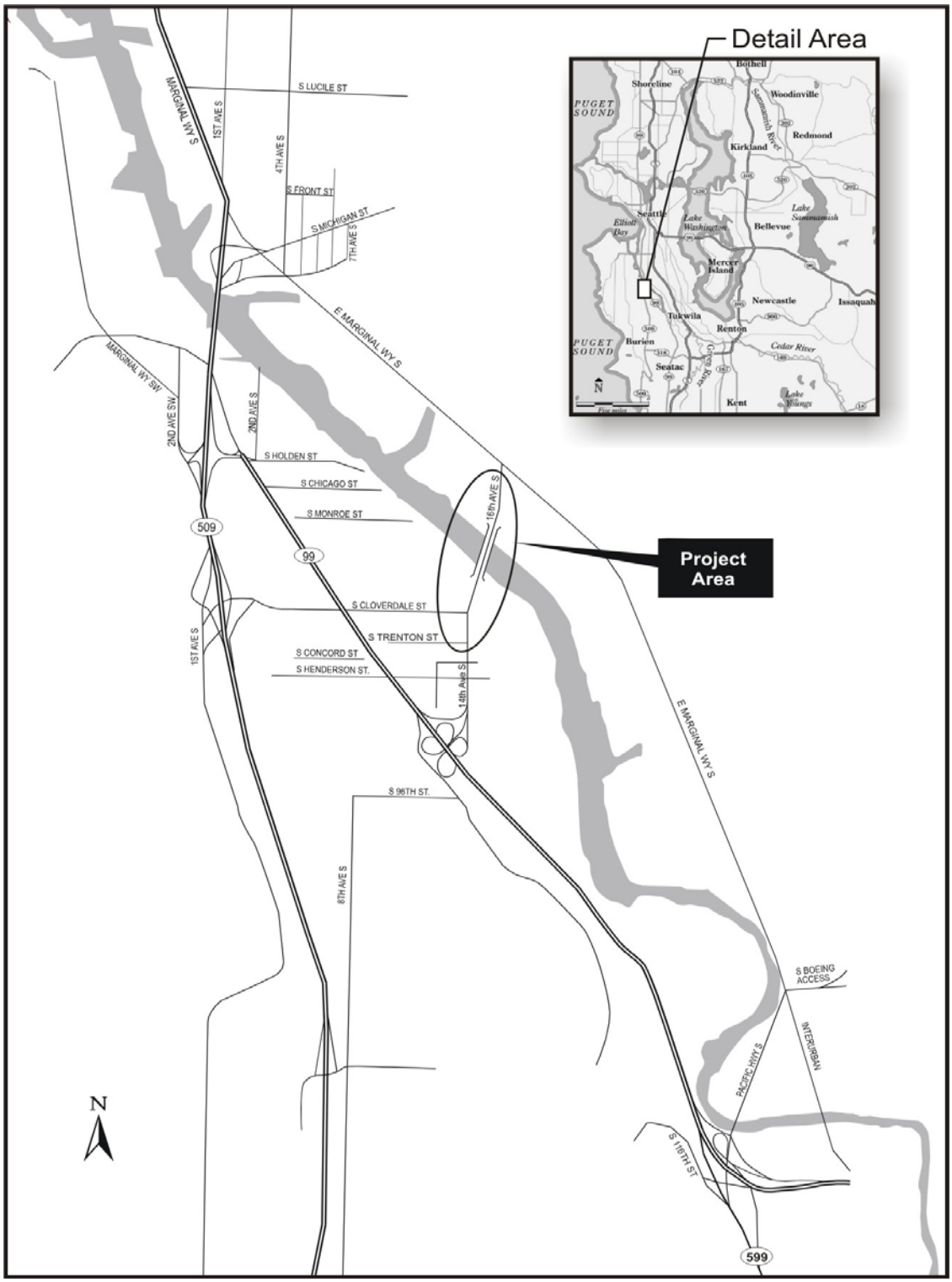

Figure 2
Project Area and Vicinity

2.1.2 The Existing South Park Bridge

The South Park Bridge was constructed in 1929-1931 (see Figure 3). The existing structure consists of a Scherzer rolling-lift double-leaf bascule movable span. Because it is the only operational example of a Scherzer rolling-lift bascule bridge in Washington, the bridge is listed on the National Historic Register.[2]

Each side is flanked by two truss approach spans and twelve concrete slab approach spans. The overall length of the bridge is approximately 1,045 feet abutment-to-abutment and approximately 1,340 feet in entirety to the grade match points. The double-leaf bascule movable span has a center-to-center distance between the front bearing points of approximately 190 feet. The roadway consists of four 9.5-foot lanes. The pavement is 38 feet with 6-foot sidewalks on both sides. Reinforced concrete piers founded on timber piling support the bascule span. Two large in-water piers support the counterweights, track supports, and racks for the rolling lift. The attached towers house the operating machinery, electrical equipment, and operator control room.

The South Park Bridge spans the Duwamish Waterway, which is used for industrial, commercial, and recreational purposes. The bridge is near the upstream limit of heavy industrial uses along the Duwamish Waterway, but it is within the section of the navigation channel maintained by the U.S. Army Corps of Engineers. The existing maximum vertical clearance of the bridge when closed is approximately 34 feet at Mean High Water (MHW). Bridge openings occur approximately three times per day on average to accommodate waterway traffic, although on some days the bridge does not open at all. The existing navigable horizontal clearances is approximately 118 feet at the water level (fender-to-fender), but narrows to 92 feet approximately 114 feet above the water between the open bascule leaves. The depth of the navigation channel is approximately 15 feet at Mean Lower Low-Water (MLLW).

2.1.3 Bridge Condition

In spite of substantial on-going maintenance and repairs, the South Park Bridge has suffered considerable deterioration over the past 70 years. In particular, the bascule piers are cracked and unstable resulting in the misalignment of the movable spans. Consequently, the center lock and glide tracks require on-going modifications and adjustments to allow the bridge to operate properly. Long-term, the stability of the entire bridge is at risk due to the original shallow placement of the supporting piles, which has resulted in movement of the bridge piers over the decades. The condition of the bridge worsened significantly following the Nisqually Earthquake in February 2001, and it remains vulnerable to future seismic events. A 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100

[2] King County Landmarks and Heritage Commission. *Findings and Fact Decision – 14th Avenue South Bridge*, decision made December 19, 1996 and filed January 2, 1997.

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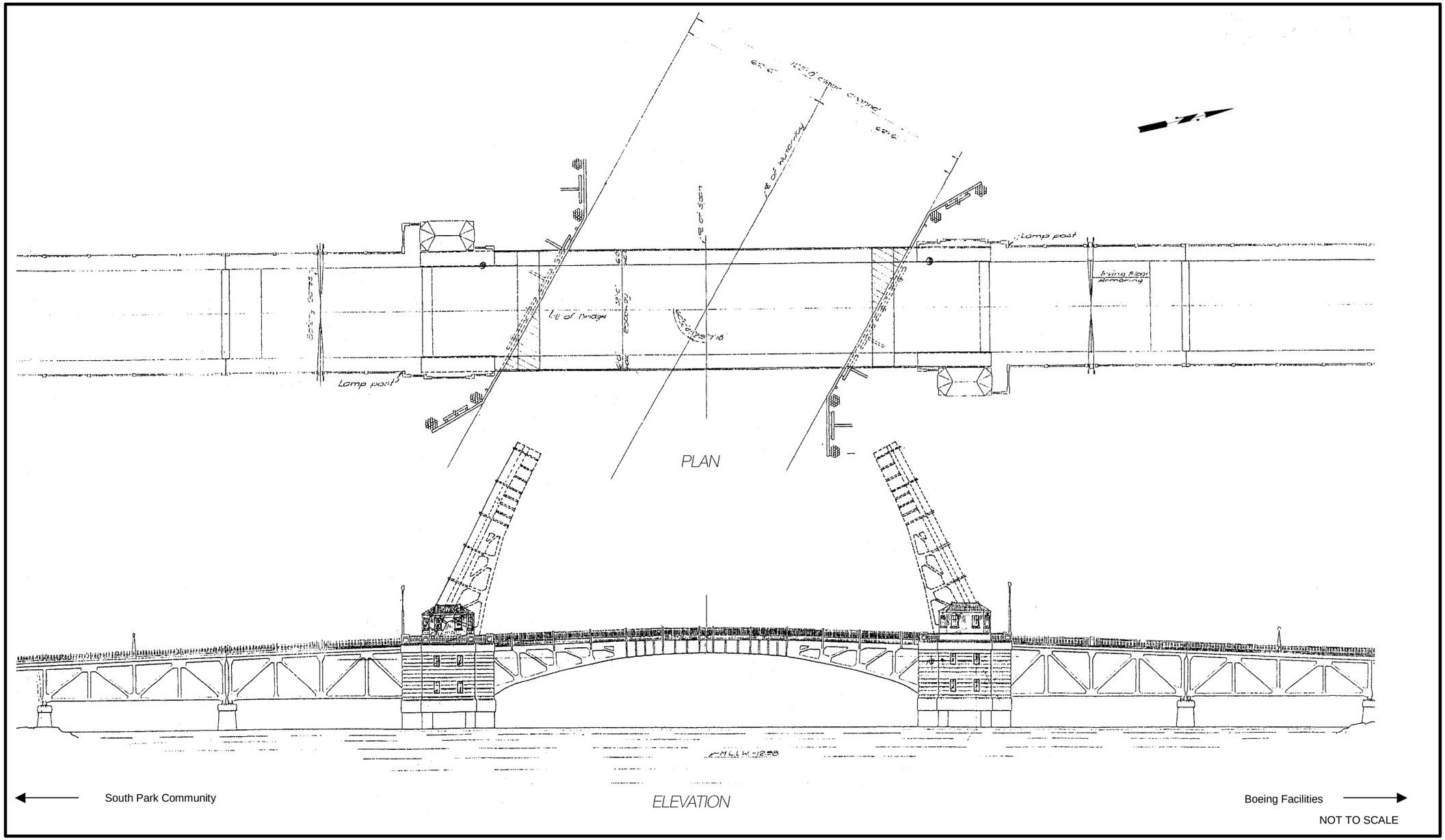

Figure 3
Existing South Park Bridge

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(based on Federal Highway Administration criteria).[3] This was among the lowest ratings given any bridge structure in the State of Washington in 2002.

2.1.4 Roadway Network

The bridge presently accommodates an average daily traffic volume of approximately 20,000 vehicles per day, based on 2001 City of Seattle traffic counts. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For South Park community residents, the bridge is the primary direct means of access to the north, downtown Seattle, and I-5.

The existing roadway network surrounding the South Park Bridge consists of a variety of roadway types. They range from local two-lane streets to major limited-access highways. Regional traffic movement in the South Park area is concentrated to three nearby north-south corridors including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Features such as the Duwamish Waterway and large-scale facilities such as Boeing Field and the Boeing Plant 2 create barriers within the road network and limit opportunities for access to and from the major regional routes.

2.1.5 Freight, Transit, and Pedestrians

Freight movement in peripheral areas of the South Park community is significant due to the high concentration of industrial and manufacturing uses in the general area. Major truck traffic is primarily directed along East Marginal Way S. and SR-99. The South Park Bridge and S. Cloverdale Street are also designated truck routes for oversized vehicles. Trucks use S. Cloverdale Street to access the City of Seattle South Recycling and Disposal Station located at 8105 Fifth Avenue S. as well as SR-509 and SR-99 located on the western edge of the South Park community. With respect to rail movements, the only train crossing in the study area exists immediately south of the intersection of East Marginal Way S. and 16th Avenue S.

Bus routes serving the South Park community are primarily located along major north-south corridors, including East Marginal Way S., 14th and 16th Avenues S., and S. Cloverdale Street. Six major King County Metro bus routes serve the area. Routes 60 and 130 cross the South Park Bridge and four of the six bus routes travel along S. Cloverdale Street.

Pedestrians and bicyclists are commonly seen in the South Park area, especially near the community's center near the intersection of 14th Avenue S. and S. Cloverdale Street. Mid-day pedestrian volumes are higher than the morning or evening commute periods due to shopping, transit use, and lunch-related walking trips.

---

[3] King County, *Bridge Inspection Report*, August 1, 2002.

2.2 History of Project

Since 1931, the moveable bridge has crossed the Duwamish Waterway in the South Park community of the City of Seattle. The following sections contain an overview of the studies preceding the start of the current environmental review effort, a summary of two key documents that framed the initial development of project alternatives, and ongoing reports documenting the changing condition of the bridge.

2.2.1 Overview of Studies

In recent history, over 20 engineering studies have been prepared on the South Park Bridge. Starting in 1987, when the bridge was 56-years-old, King County contracted for the preparation of a general engineering investigation report to assess the condition of the bridge. In 1991 and 1993, additional studies were completed including a geotechnical study, foundation design report, and a life-cycle cost analysis. This information led King County to undertake a series of studies in 1994 addressing liquefaction risks as well as the condition of the concrete, substructures, approach span joints and loading rating. In addition, a study was conducted to evaluate potential replacement alternatives for the bridge and another study investigated community issues related to the bridge. Since 1994, King County has recognized that the bridge required either rehabilitation or replacement and has continued to investigate the condition and vulnerabilities of the bridge in an effort to evaluate these options.

2.2.2 Summary of Key Engineering Reports

Two key engineering studies were conducted that helped to frame the current pursuit to evaluate potential alternatives to rehabilitate or replace the South Park Bridge. A 1994 Sverdrup study evaluated potential design options and a 1999 Entranco study researched and presented the likely steps required to conduct the necessary environmental review of the project alternatives and to complete necessary permitting. These studies are summarized below.

2.2.2.1 Sverdrup Study

In November 1994, Sverdrup Civil, Inc. completed a report titled *14th/16th Avenue South Park Bridge Rehabilitation/Replacement – Design Report* for the King County Department of Public Works. The objective of that report was to evaluate alternative alignments and bridge types, impacts of the alternatives studied and to present to King County results, findings, conclusions, and recommendations of a preferred replacement bridge for the existing South Park Bridge.

The 1994 design report studied five alternatives: rehabilitation of the existing bridge; two fixed-span bridge replacements (a 100-foot vertical clearance bridge and a 60-foot vertical clearance bridge); a new moveable bridge (double-leaf bascule bridge); and bridge closure (permanent closure and demolition of the existing bridge). Other alternatives that had been evaluated but were not carried forward, according to this report were: locating the replacement bridge immediately east (upstream) of the existing

alignment; matching the existing alignment; and locating the northbound and southbound lanes on separate structures. These three alternatives were not considered feasible and thus were not studied further.

The 1994 design report concluded that the 60-foot vertical clearance fixed-span bridge design could be used to replace the existing South Park Bridge, with consideration of mitigation of impacts to some users.

2.2.2.2 Entranco Study

In July 1999, Entranco completed the *16th Avenue S. Bridge Replacement Project: Environmental Review Report* for the King County Department of Transportation. The objective of this report was to present to King County a summary of environmental review and permitting activities that would likely be required for replacing the bridge.

The report identified the proposed project as a replacement of the existing bridge, including improvements to the approach road – 14th Avenue S. to the south and 16th Avenue S. to the north of the Duwamish Waterway. The project limits were identified as East Marginal Way S. on the north and S. Cloverdale Street on the south. The report asserted three build alternatives should be selected for evaluation in the EIS, including alternatives with differing alignments and bridge types. It was further noted that three alternatives would be the least number needed to provide a reasonable range of alternatives under National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations.

Entranco outlined the various tasks that would be required under the WSDOT Environmental Procedures Manual and Federal Highway Administration (FHWA) guidelines. The report identified these tasks to include the following: the development of bridge alternatives, screening, and selection of alternatives for analysis in the EIS; preliminary engineering design, including an update to the1994 rehabilitation/replacement report; survey and mapping work; hydraulic and geotechnical studies, and conceptual-level design documentation. The report concluded that the alternatives proposed, including rehabilitation of the existing bridge, had not been designed in enough detail to make a decision regarding a preferred alternative. Related to the environmental review process, the report recommended the public involvement program include coordination with an Interdisciplinary Team (IDT) of agency representatives and a community advisory committee. The report also listed 17 specific environmental discipline reports that would likely be required for the preparation of the EIS.

The findings and recommendations presented in the Entranco report formed the basis from which King County staff developed the current contracted scope of work for environmental review. The scope includes engineering, environmental review, agency coordination, and public involvement tasks.

2.2.3 Continuing Deterioration

Since 1999, King County has continued to move forward to develop alternatives for rehabilitating or replacing the existing South Park Bridge. Bridge conditions have worsened since the engineering studies were conducted in the mid-1990s. In February 2001, the Puget Sound Nisqually Earthquake caused significant and widespread damage to the bridge. Over $740,000 was required to repair the bridge in order to keep it operational.[4] The King County 2001 bridge inspection report recorded a rating of 8.0 out of a total possible score of 100 (based on FHWA criteria).[5] The following year, this rating decreased to 6.0.[6]

2.3 Purpose and Need of Project

As a required element of the EIS, a Purpose and Need Statement was developed for the South Park Bridge Project to clarify the underlying basis for the proposed action. The development of the initial draft Purpose and Need Statement involved review and comment by a number of parties including King County staff and the Project Advisory Committee (PAC) that includes agencies with jurisdiction over the proposed project. The draft Purpose and Need Statement was also revised based on comments received at several public involvement events. In April 2002, King County forwarded the draft Purpose and Need Statement to the Federal Highways Administration (FHWA) for review and approval. The text of the FHWA-approved version of the Propose and Need Statement is presented in the following sub-sections, although minor revisions and footnotes have been included for clarification.

2.3.1 Function and Role of the South Park Bridge

The King County Department of Transportation (KCDOT) is proposing the rehabilitation or replacement of the South Park Bridge located in King County, Washington. Since 1931 the moveable span bridge has carried traffic along the 14th Avenue South and 16th Avenue South corridor across the Duwamish Waterway. On a typical workday, a mix of approximately 20,000 cars, trucks and buses use the bridge to access employment centers in downtown Seattle and the Duwamish industrial area. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For residents of the community of South Park, the bridge is the only immediate means of access to and from destinations east of the community. The moveable structure spans the navigation channel of the Duwamish Waterway. When open, large-size industrial and recreational vessels have access to upriver destinations. The South Park Bridge is also a major route for heavy truck traffic traveling to and from large industrial manufacturers including the Boeing Company.

---

[4] Tim Lane, King County Department of Transportation, Telephone Conversation, September 23, 2002.

[5] King County, *Bridge Inspection Report*, August 21, 2001.

[6] King County, *Bridge Inspection Report*, August 1, 2002.

2.3.2 Purpose of Proposed Project

The purpose of the proposed action is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge. The proposed action must also maintain the vital transportation linkage for cars, trucks, buses, bicyclists and pedestrians across the Duwamish Waterway.

2.3.3 Need for the Proposed Project

In spite of substantial ongoing maintenance and repairs, the South Park Bridge has suffered substantial deterioration over the past 70 years. Existing problems with the bridge worsened significantly following the Nisqually Earthquake in February 2001 and the bridge remains vulnerable to future seismic events. A recent 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on FHWA criteria).[7] This is among the lowest ratings given any bridge structure in the State of Washington.

The bridge could be closed as a consequence of excessive structural deterioration or failure of the moveable span operations (particularly in the event of another seismic event). Closure of the bridge would have a significant impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area-- including SR-99, SR-509, First Avenue S. and East Marginal Way S. Improvements are required in the near future to protect public safety and to maintain a transportation corridor that is critical to the local and regional economy.

2.3.3.1 Seismic Vulnerability

The February 28, 2001 Nisqually earthquake (magnitude 6.8, located 35 miles from Seattle and deep below the surface) caused significant damage to the South Park Bridge. Since the earthquake, operation of the moveable span has been less reliable, requiring the bridge to be closed for repairs intermittently for several days. The continuing periodic closure of the bridge for repairs has heightened the awareness of the need for rehabilitation or replacement of the existing bridge.

2.3.3.2 Roadway Design Deficiencies

The South Park Bridge does not meet current roadway design standards and has many design deficiencies. For example, the overall bridge width including lane widths, shoulders and sidewalks should be 64 feet according to current design standards. The existing bridge width is currently only 52 feet (measured outside-to-outside).

2.3.3.3 Transportation Issues

An average of 20,000 daily vehicle trips cross the Duwamish Waterway on the South Park Bridge. It is a significant link between the east and west side of the Duwamish, both locally and regionally. The South Park Bridge is also a route for heavy and oversize truck

[7] The original text of the FHWA-approved Purpose and Need Statement cited the condition rating of 8.0 from the 2001 King County Bridge Inspection Report. The current cited condition rating of 6.0 is from the King County *Bridge Inspection Report* dated August 1, 2002.

traffic. According to previous studies, closure of the bridge would have a significant noticeable impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area – including the Highway 99 and East Marginal Way S. corridors.

2.3.4 Key Issues

2.3.4.1 Community Impacts

The existing South Park Bridge is a highly valued feature of the South Park community. There is widespread concern in the community that changes to the bridge could have a significant adverse impact on the community and the emerging economic vitality of the South Park business district centered along 14th Avenue South. The *South Park Residential Urban Village Plan of 1998* (the neighborhood plan) identified one of its primary objectives as "finding a solution for the South Park Bridge that is sensitive to the needs of the community."

The South Park community is also ethnically diverse. Approximately 30 percent of the populations' primary language is not English. These factors require greater emphasis on the consideration of environmental justice[8] in order to ensure that the potential adverse effects from the proposed project do not have a disproportionate impact on lower-income or minority populations.

2.3.4.2 Aquatic Habitat Protection

The Duwamish Waterway is an important route for juvenile and adult salmon migrating between the upper Green River, Elliott Bay and the Pacific Ocean. However, much of the waterway in the vicinity of the South Park Bridge currently provides poor habitat for chinook salmon (listed as threatened under the Endangered Species Act) and other marine organisms. The armored shoreline along the waterway in the project area provides minimal habitat for young chinook salmon during their critical rearing period. Recovery plans now underway for threatened and endangered salmon will address potential means of enhancing habitat favorable to the survival and growth of young salmon from the Duwamish/Green River system. Restoration of the shoreline in the vicinity of the project would address immediate and long-term needs for habitat improvement along the Duwamish Waterway.[9]

2.3.4.3 Duwamish Waterway Navigation

The Duwamish Waterway is used for industrial, commercial and recreational purposes. The South Park Bridge is near the upstream limit of heavy industrial uses along the waterway, but it is within the section of the waterway maintained by the U.S. Army

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[8] Environmental justice concerns the need to avoid disproportionate, significant adverse impact on minority and/or low-income communities.

[9] This section highlights the importance of addressing aquatic habitat values in the project area, as well as the implications for species currently listed under the ESA; however, it is not intended as a complete characterization of the factors that need to be considered in this regard.

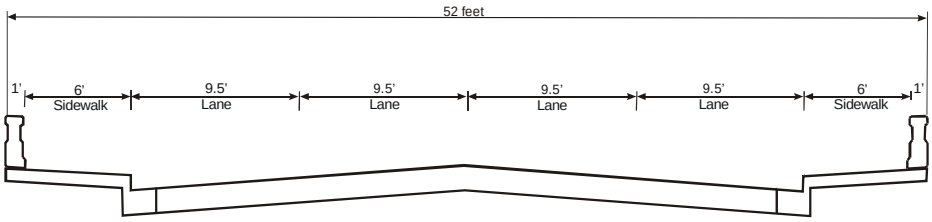
Corps of Engineers as a navigation channel. A number of local businesses, as well as the U.S. Coast Guard, have emphasized to King County that any engineering solutions for the South Park Bridge must maintain navigational access upstream of the existing bridge.

2.4 Description of Alternatives

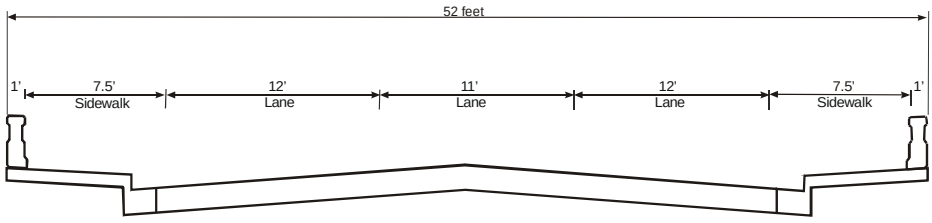
This section describes the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives (Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives). The first section explains the transportation engineering criteria and standards used to design the Rehabilitation Alternative and the three replacement bridge alternatives. The second section describes the horizontal and vertical profile of the bridge alternatives, navigation channel clearances, and impacts to the local road network. The last section describes construction activities associated with each of the five alternatives for the South Park Bridge Project.

2.4.1 Design Criteria

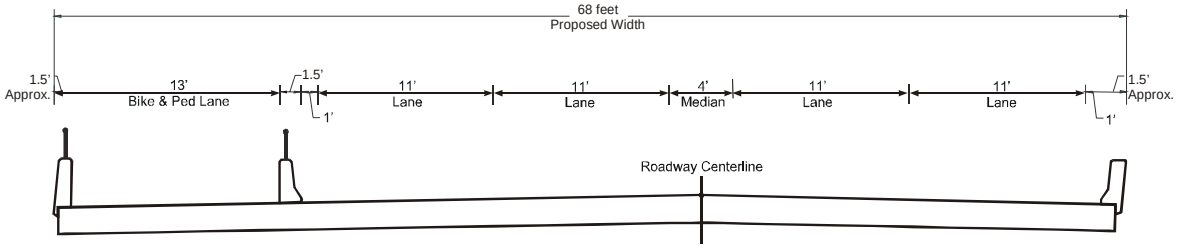
Except for the No Action Alternative, construction of any of the project alternatives would incorporate current transportation engineering design criteria for the cross-section, alignment, design speed, maximum grade, and transition segment. The road cross-section design is a key design element that would change for any of the build alternatives (see Figure 4). The existing bridge cross-section incorporates four 9.5-foot travel lanes, raised curbs on both sides of the pavement, and a 6-foot sidewalk on either side of the roadway. The outside-to-outside dimension of the existing bridge is 52 feet. These lane widths are non-standard and would be changed for the Rehabilitation Alternative and for the three replacement bridge alternatives. For the Rehabilitation Alternative, the pavement would remain approximately the same width as it is currently, but would be reconfigured for three standard lanes. There would be two 12-foot lanes on the outside and one 11-foot lane in the middle of the roadway. Traffic would use one 12-foot lane for northbound travel and the other two lanes for southbound travel. The 6-foot sidewalk on either side of the roadway would be enlarged to approximately 7.5 feet. In contrast, each of the replacement bridge alternatives would be designed with four standard 11-foot lanes, traffic barriers or a painted median down the center, a traffic barrier on each side of the pavement, and a single combined 13-foot pedestrian/bike path on the west (downstream) side of the bridge. The width of the cross-section for the new replacement bridge alternatives including the exterior barriers would total approximately 68 feet (outside-to-outside of the bridge structure).



Existing Bridge



Rehabilitation Alternative



Bridge Replacement Alternatives

Not to Scale

Figure 4
Existing and Proposed
Bridge Cross-Section Designs

An initial range of potential bridge alternatives and alignments was considered based on earlier studies,[10] current input from stakeholders, and the project team. During the course of this initial alternatives development process, it was determined that there were no practical alternative alignments for a replacement bridge other than to parallel the existing bridge. It was determined that replacement bridge alternatives should be aligned to the west (downstream) of the existing bridge in order to minimize impacts to existing land uses. Conceptual engineering for the replacement bridge alternatives set the alignment for these bridges at approximately 80 feet to the west of the centerline of the existing bridge (i.e., as close to the existing structure as practicable without compromising constructability). The initial alignment of the new roadway was the same as the existing road alignment on the south side of the waterway. The existing roadway is quite narrow. Matching the centerline of the new bridge alternatives to the existing would require acquisition of both land and buildings on both sides of 14th Avenue S. To minimize these impacts, the alignment of the new transition segment was shifted slightly to the east of the existing road alignment because there are fewer parcels and buildings located on the east side of the road compared to the west. In addition, more of the buildings located on the east side are set back from the existing sidewalk than on the west side. In this way, the proposed alignment for the replacement alternatives has been developed to avoid or minimize potential land use and relocation impacts.

Other design factors affecting impacts to adjacent properties include the new bridge's design speed and maximum grade. King County road standards call for a 35 mph design speed and a maximum of 8 percent grade. Initially, these standards were incorporated into each of the alternatives. Implementation of an 8 percent maximum grade for the High-Level Fixed-Span Bridge Alternative, however, would have resulted in a very long bridge (project terminus to terminus). For example, the north terminus would have extended across East Marginal Way S. and into Boeing Field. To reduce impacts to land use, the maximum grade for the High-Level Fixed-Span Bridge Alternative would need to slightly exceed 8 percent. In this manner, the north side of the bridge would terminate south of East Marginal Way S. This grade change reduced the overall length of the bridge on both south and north ends of the bridge by several hundred feet for the High-Level Fixed-Span Alternative.

Community impacts would also be affected depending on the design of the transition segment. This is the segment of the roadway that merges the differing widths of the new roadway and the existing narrow roadway. Typically, transition segments begin at the point the grade of the bridge matches the grade of the existing roadway and extends beyond some distance. The actual rate at which the width of the roadway is reduced is defined by transportation engineering design standards. To minimize impacts to land uses along 14th Avenue S., King County proposes to start the transition segment from the abutment for all alternatives. This means that by the time the bridge matches the grade of the existing roadway, the width of the new bridge is nearly the same width as the existing road. As a result, the total length of the roadway is reduced potentially several hundred

[10] Entranco, Inc., *Environmental Review Report: 16th Avenue S. Bridge Replacement*, July 1999.

feet in length. In addition, the width of the transition segment for the Mid-Level Fixed-Span Alternative is further reduced by having the single combined 13-foot pedestrian/bike path split off from the main bridge structure at approximately S. Orr Street and descended to ground level in a zigzag fashion. This design modification further reduced the overall impact of the Mid-Level Fixed-Span Alternative.

Together, the design criteria discussed in this section would allow for the construction of a replacement bridge that provides increased safety for vehicles, bicyclists, and pedestrians.

2.4.2 The Alternatives

A total of five alternatives were selected for evaluation in the environmental review process including: the No Action Alternative, the Rehabilitation Alternative, the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative, and the High-Level Fixed-Span Bridge Alternative. These alternatives were selected from an initial group of nine preliminary project alternatives.[11] The alternatives proposed for evaluation in the environmental review process were selected because they had fewer potential impacts than the other preliminary alternatives. Based on comparison ratings for seven evaluation criteria (regional mobility, local access, navigation, community impacts, aquatic habitat, construction impacts, and estimated project costs), the following preliminary alternatives were dropped from further consideration: a low-level fixed-span bridge, a movable swing bridge, a vertical lift movable bridge, and a tunnel option. The following sections describe each of the proposed project alternatives to be considered in the environmental review process based on conceptual civil and structural engineering.[12] [13]

2.4.2.1 No Action Alternative

The No Action Alternative assumes that the existing bridge structure's poor condition would require it to be closed at some time in the future. Deterioration due to use could allow the bridge to continue to operate for the foreseeable future, but at some time in the future, the bridge would need to be closed. As such, for purposes of environmental review, it is assumed the existing bridge would be closed permanently sometime before 2027.

However, the bridge could be closed for other reasons than simply deteriorated condition. Another earthquake could cause an unexpected emergency closure of the bridge at any time. The on-going movement of the bridge foundations could eventually cause the moveable spans to become misaligned to the extent that repairs would be infeasible. Or,

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[11] Parsons Brinckerhoff. *South Park Bridge Project: Summary Technical Memo - Alternatives Development and Screening*, September 6, 2002.

[12] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

[13] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

the cost of maintaining the bridge could become more than King County is willing to expend. Under any of these circumstances, the bridge would be closed.

When closed, no vehicular, bicycle, or pedestrian traffic would be allowed to use the bridge. As a navigable waterway, the U.S. Coast Guard regulates bridges that span waterways such as the Duwamish Waterway. If the bridge were no longer operating, the U.S. Coast Guard regulations would require demolition and removal of the bridge. With no structures remaining, there would be no potential navigation obstructions in the Duwamish Waterway.

Under this alternative, there would be no change in the local street network except 14th and 16th Avenue S. would be dead-ended on both the south and north shores of the Duwamish Waterway. Figure 5 shows the existing local street network and Figure 6 shows the local street network following the removal of the existing bridge in the No Action Alternative. As the road does not currently provide direct access to the adjacent Boeing Company properties, the exact location of the road closure on the north side would need to be negotiated with Boeing as well as the owner of the railroad tracks immediately south of East Marginal Way S. In addition, the site of the removed bridge would be restored.

2.4.2.2 Rehabilitation Alternative

For the Rehabilitation Alternative, much of the existing bridge structure would need to be replaced. The existing steel trusses of the approach spans and the bascule leaves would be refurbished and reused. The mechanical and electrical operating systems would be refurbished and/or replaced. Studies have confirmed the existing bridge piers are gradually shifting because the foundation pilings were not originally driven to a sufficient depth. Although the initial goal was to rehabilitate the existing piers, the design team's structural analyses determined that the existing bascule piers and truss approach span piers must be replaced in order to ensure the long-term (approximately 75 years) integrity of the bridge. If the bascule piers were reconstructed, the longevity of the Rehabilitation Alternative would be similar to the expected minimum life of a new bridge structure.

For the Rehabilitation Alternative, the new bascule piers are proposed to be approximately the same size, location, and historic character as the existing piers (see Figure 7). To construct the new bascule piers, the bascule leaves and steel approach spans would need to be removed. The steel truss elements of the bridge structure would be taken to another site for repair, refurbishment, and/or painting before they are re-installed following the construction of the new piers. The concrete shafts or pilings supporting the foundations of the new piers would extend below the existing pilings to a depth beneath the riverbed where stable soils exist. The removal of the steel truss spans would also allow for replacement of the steel approach piers. The concrete approach spans and bridge abutments would be replaced and the bridge deck would be reconstructed. Like the existing bridge, there would be piers both on land and in the water. The first on-land piers would be only an estimated 20 feet from the top of the south embankment and the closest in-water piers would be approximately 20 feet from the top of the embankment. The piers on the north shoreline would extend through the

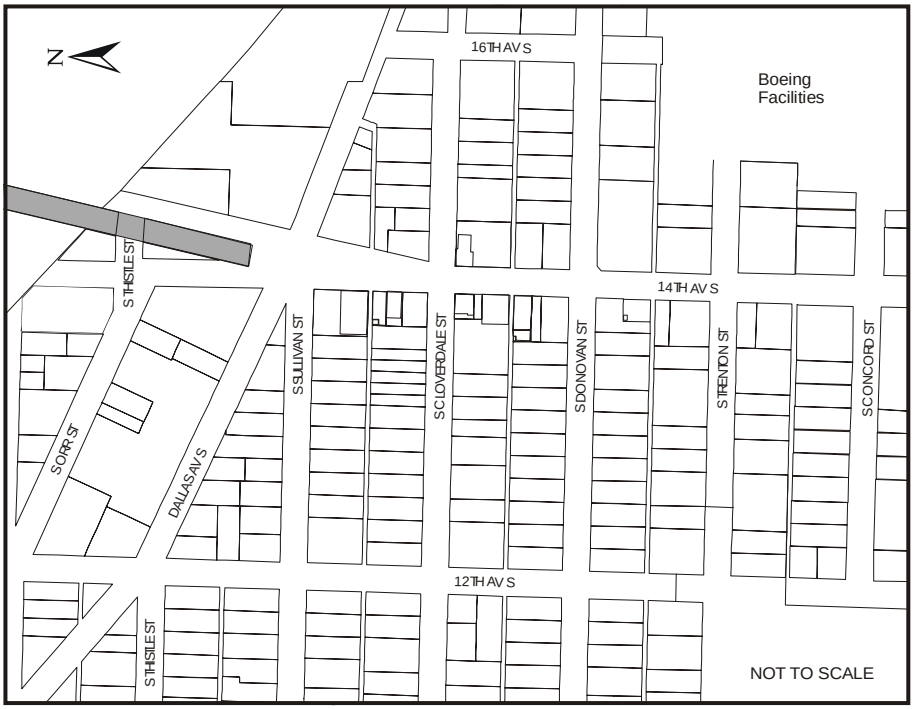

Figure 5
Existing Conditions Street Network

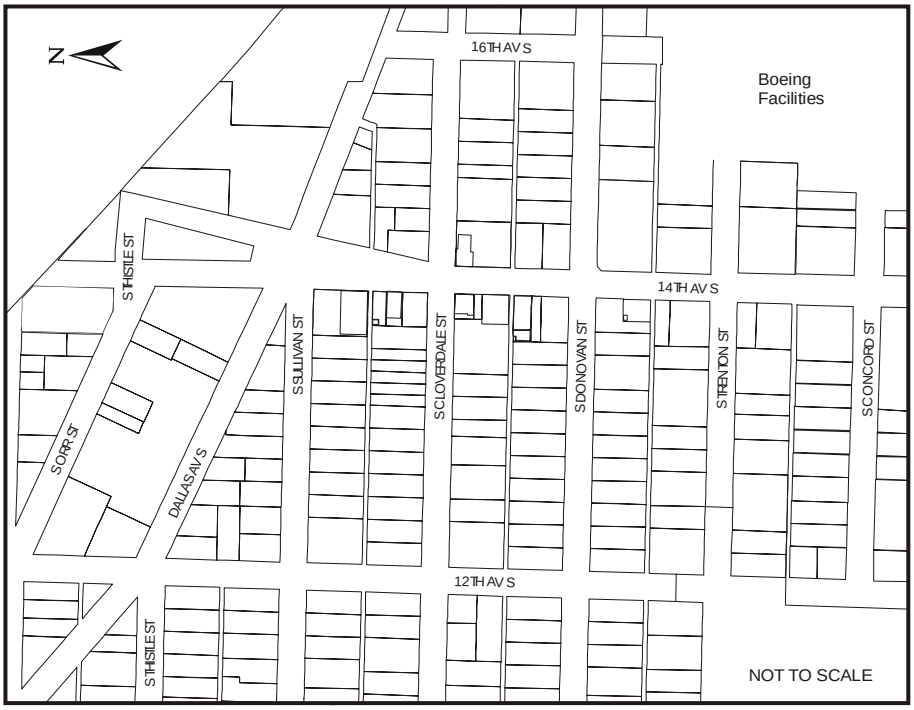

Figure 6
No Action Alternative Street Network

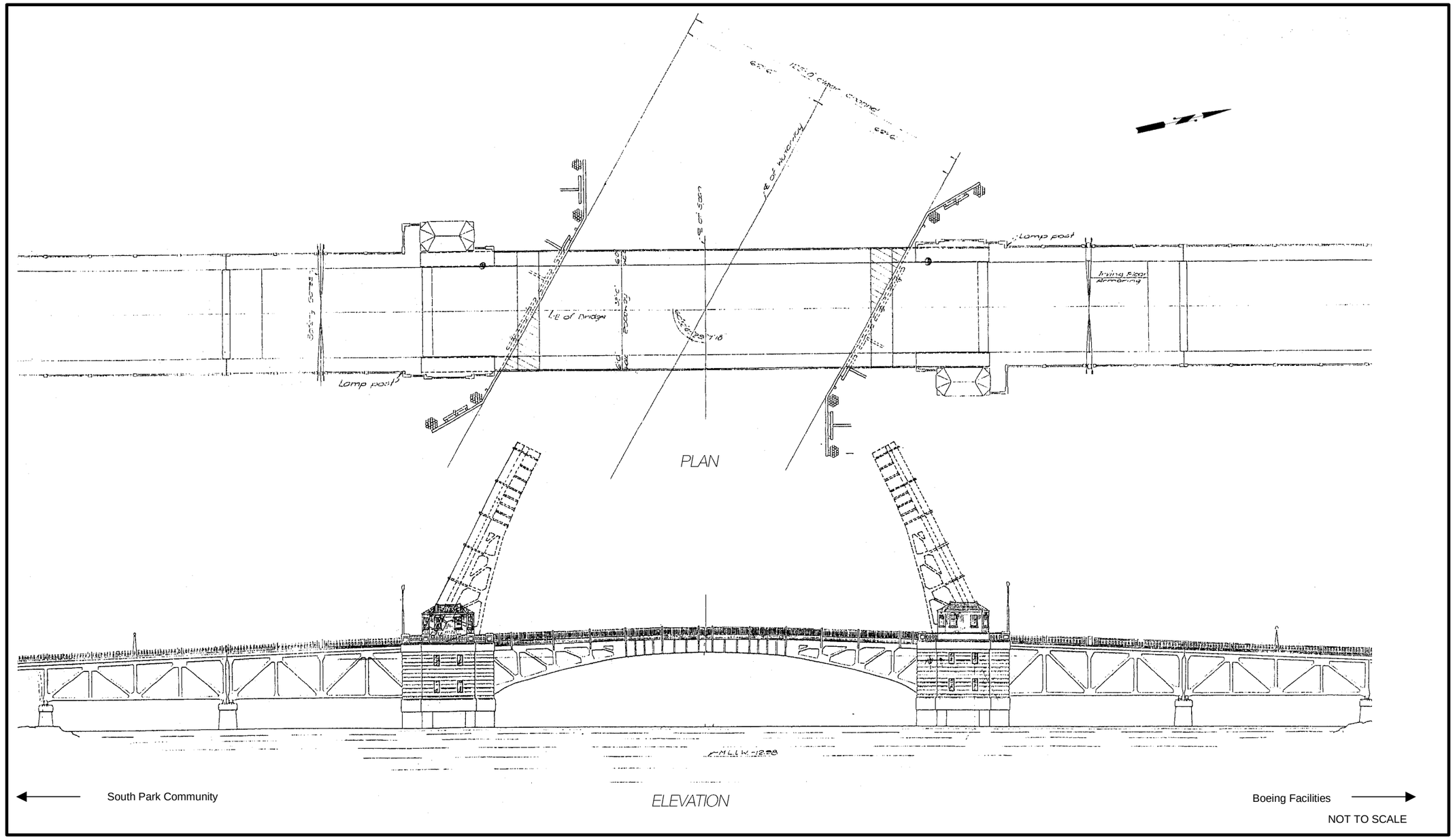

Figure 7
Rehabilitation Alternative

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existing Boeing dock. The conceptual engineering analysis also determined that the mechanical and electrical systems should be replaced. Any required construction activities, including replacement of the bridge railings, bridge tender towers, and lamp posts, would be done in a manner that preserves the historic character of the existing bridge to the greatest extent possible.

To meet current roadway design standards, the new bridge deck would remain approximately the same as the existing, but the pavement would be striped to accommodate three standard traffic lanes. Bicycle and pedestrian traffic would continue to be able to use the bridge via a 7.5-foot pedestrian path on each side of the bridge.

Following construction, the existing 118-foot navigable channel width would be preserved so existing waterway users would be able to continue to use the navigation channel to travel upriver of the South Park Bridge. The extended closure of the bridge during construction, however, would have a significant temporary impact on access to the South Park community.

Following construction, there would be only slight changes in the local street network. Figure 8 shows the local street network in the South Park community following construction activities for the rehabilitation of the existing bridge. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. (For comparison, Figure 9 shows the local street network following the construction of the Bascule Bridge Alternative.) To improve vehicular safety, S. Sullivan Street would intersect Dallas Avenue S., which would become the main cross street intersection with 14th Avenue S. The 16th Avenue S. (immediately east of the bridge) intersection with Dallas Avenue S. as well as 14th Avenue S. may also need to be reconfigured. Access to points north via the South Park Bridge would be maintained.

2.4.2.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the construction of a new movable bridge immediately downriver of the existing bridge (see Figure 10). The bridge mechanism could be a Scherzer rolling lift type (no longer a common design for new movable bridges) or another type. The bridge length would be approximately 935 feet from abutment-to-abutment, not including roadway approaches. Road improvements would extend from a point just north of S. Cloverdale Street on the south side of the waterway and north to a point opposite the northeast corner of Boeing Building 2-15. The interior walls of the bridge abutments would be approximately 200 feet from the top of the embankment, or approximately 50 feet closer to the shore than the existing bridge. With fewer piers than the existing bridge, the first on-land piers of this alternative would be approximately 55 feet from the top of the south embankment at the shortest distance and the closest in-water piers would be approximately 65 feet away. On the north shoreline, the closest in-water piers would be approximately 95 feet from the top of the embankment and the closest on-land piers would be approximately 30 feet away. Unlike

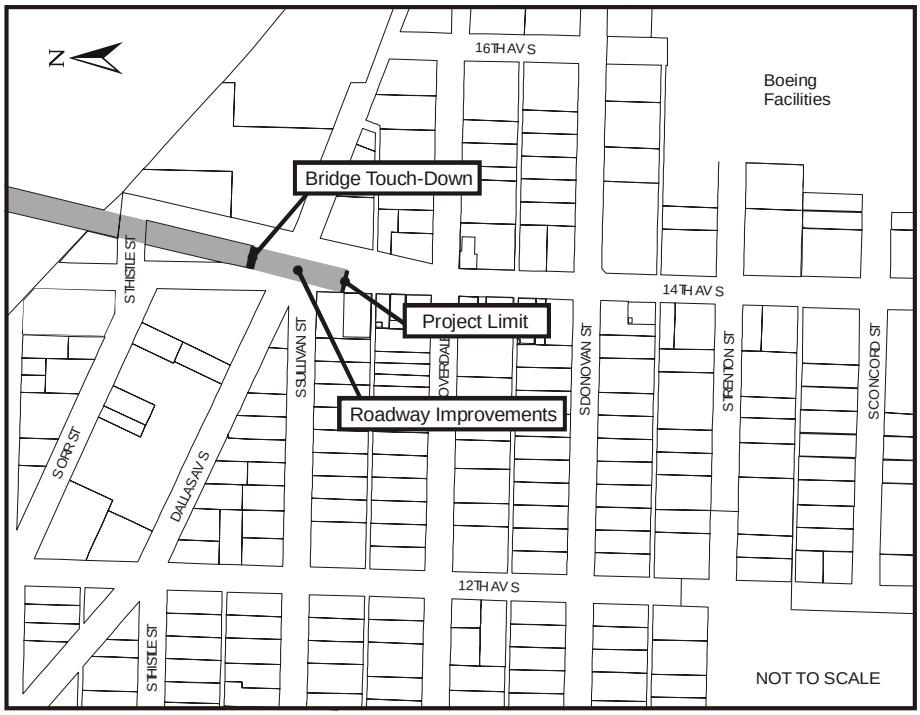

Figure 8
Rehabilitation Alternative Street Network

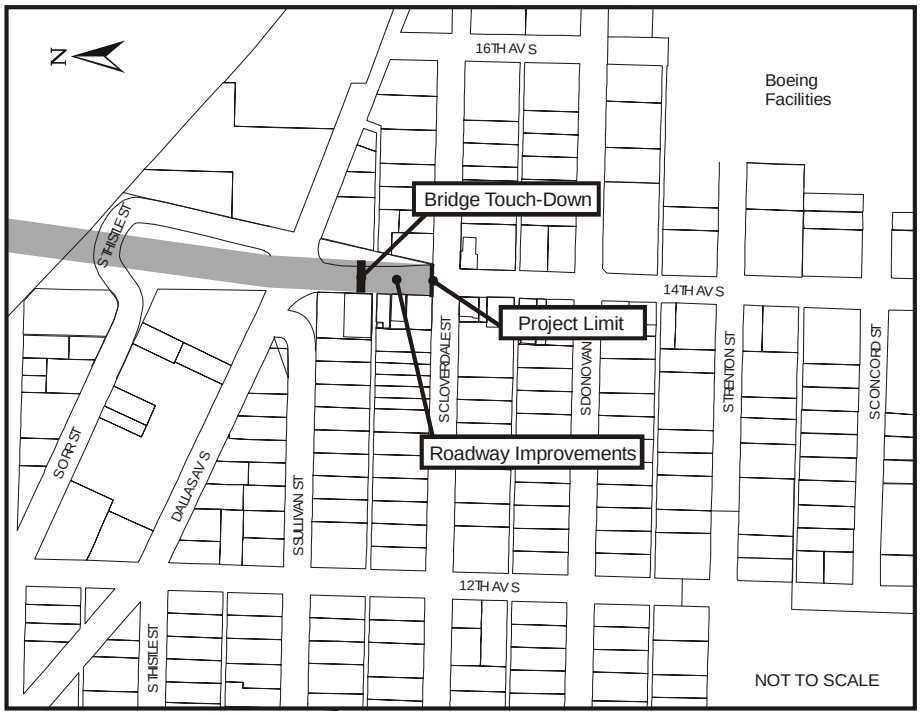

Figure 9
Bascule Bridge Alternative Street Network

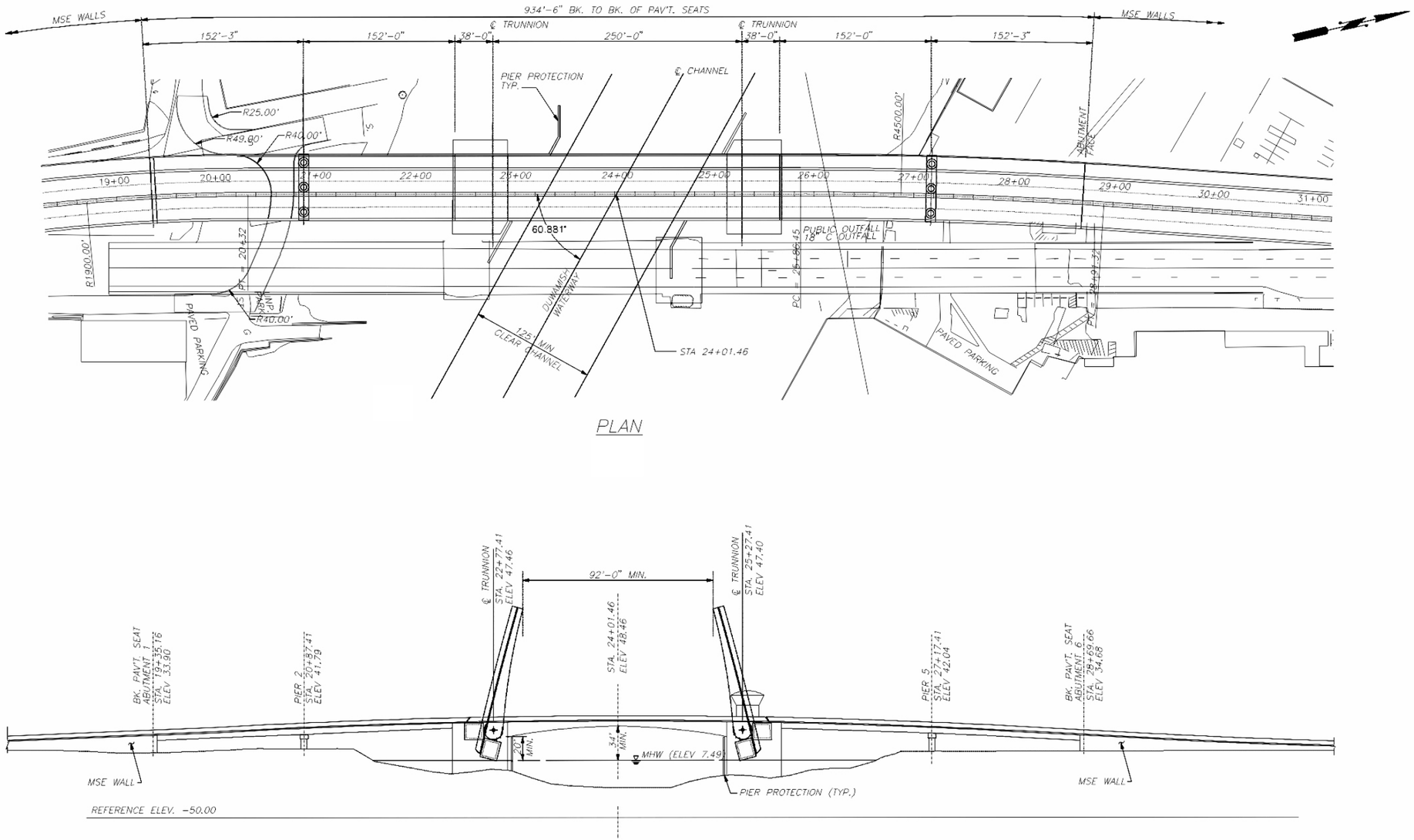

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Figure 10
Bascule Bridge Alternative

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the existing bridge's grated bascule leaves, the bridge deck of the bascule leaves would be solid surface to improve vehicle traction and to control stormwater runoff.

Similar to the existing bascule bridge, this bridge profile would be approximately 34 feet above the Duwamish Waterway when in the closed position. The mid-section span would be comprised of two movable leaves that could be raised to open the bridge. The navigation channel would be approximately 125 feet in width (slightly greater than the existing 118-foot-wide channel). This two-leaf bascule bridge would not impose limitations to the height of waterway users passing the bridge, because the new bridge would be approximately 125 feet between the tips of the raised spans.

Following construction, there would be some change in the local street network (see Figure 9). S. Sullivan Street would be permanently closed or reconfigured to improve traffic safety and vehicular and truck turning movements from the new bascule bridge to Dallas Avenue S. S. Sullivan Street would no longer have direct access to 14th Avenue S. and the bridge. The intersection of 16th Avenue S. (immediately east of the bridge) and Dallas Avenue S. may also need to be reconfigured. To ensure adequate vertical clearance for vehicles, S. Thistle Street would need to be slightly realigned further to the north and closer to the Duwamish Waterway. This figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. Access to points north via the South Park Bridge would be maintained. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the construction of a non-movable bridge (see Figure 11). The bridge length would be approximately 1,660 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 550 feet from the top of the Duwamish Waterway embankment, or 300 feet further setback than the existing bridge. The closest on-land piers would be approximately 85 feet from the south embankment and the closest in-water piers would be approximately 100 feet away. On the north side, the closest in-water piers would be approximately 130 feet from the top of the embankment and the closest on-land piers would be approximately 65 feet away. Road improvements would extend slightly north of S. Donovan Street and north to a point approximately 320 feet south of East Marginal Way S.

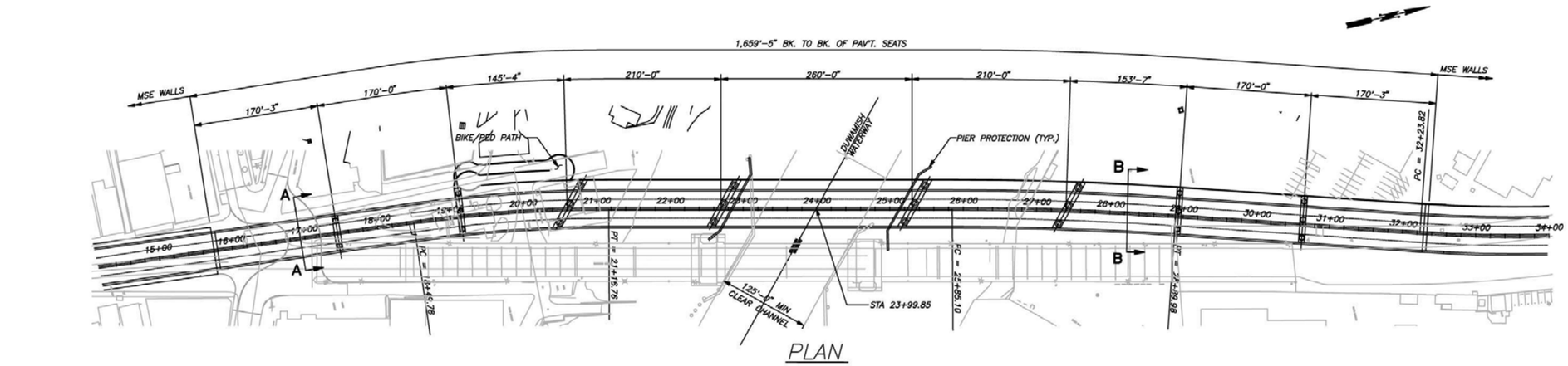
The mid-point of the bridge profile across the Duwamish Waterway would be approximately 65 feet above MHW of the Duwamish Waterway. The horizontal clearance would be approximately 125 feet, or slightly greater than the existing clearance. The vertical clearance, however, would restrict use of some waterway traffic, including some tugs and barges. Most vessels that currently pass the existing bridge would continue to be able to use the navigation channel. As described earlier in the discussion of the design considerations, the width of the new mid-level bridge is reduced

when the bike-pedestrian path is separated from the elevated approach roadway near the south side abutment. This design feature reduces land use and relocation impacts.

Following construction, there would be changes in the local street network (see Figure 12). (For comparison, Figure 13 shows the local street network following the construction of the High-Level Fixed-Span Bridge Alternative.) The location of the south abutment and its vertical clearance would require modification of Dallas Avenue S. and S. Sullivan Street. S. Sullivan Street would likely be merged into Dallas Avenue S. just west of the new structure and a new roadway would be constructed under the new bridge. The alignment of this roadway would be slightly to the north to ensure it would have a minimum allowable vertical clearance. Neither street would have direct access to the new South Park Bridge. Figure 12 also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on the both sides of 14th Avenue S. for the majority of the distance between S. Sullivan Street and S. Cloverdale Street. Traffic would be able to access the bridge at S. Cloverdale Street, which would be raised a maximum of approximately 5 feet at the intersection to meet the descending grade of the bridge. This change in the intersection would allow traffic on S. Cloverdale Street to continue to have direct access to 14th Avenue S. though a retaining wall would also need to be constructed around the four corners of the intersection of S. Cloverdale Street and 14th Avenue S. due to the grade change. S. Orr Street would be closed due to the location of the support structures for the proposed separated pedestrian/bike path, which would allow bicyclists and pedestrians to descend from the bridge level to the street level. In addition, S. Thistle Street would be closed as it would no longer be able to connect to S. Orr Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative is a non-movable bridge (see Figure 14). The bridge length would be approximately 2,332 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 900 feet from the top of the Duwamish Waterway embankment, or 650 feet further set back than the existing bridge. The on-land and in-water piers of this alternative are approximately in the same location as proposed for the Mid-Level Fixed-Span Bridge Alternative. Road improvements would extend from S. Trenton Street and continue north to East Marginal Way S. This alternative would require minor modification of the 16th Avenue S. East Marginal Way S. intersection and of the existing railroad track crossing immediately south of this intersection.



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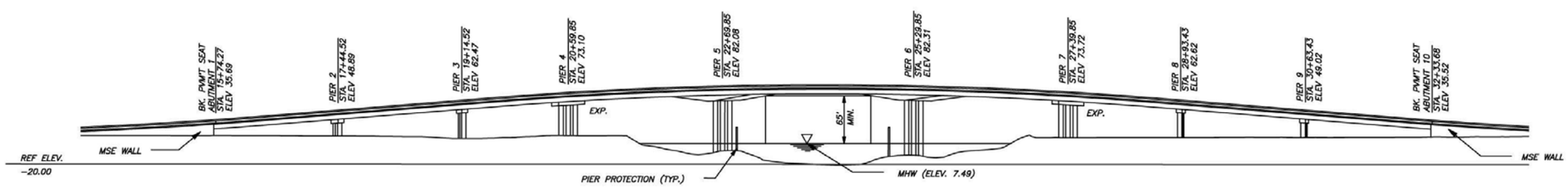

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Figure 11
Mid-Level Fixed-Span Bridge Alternative

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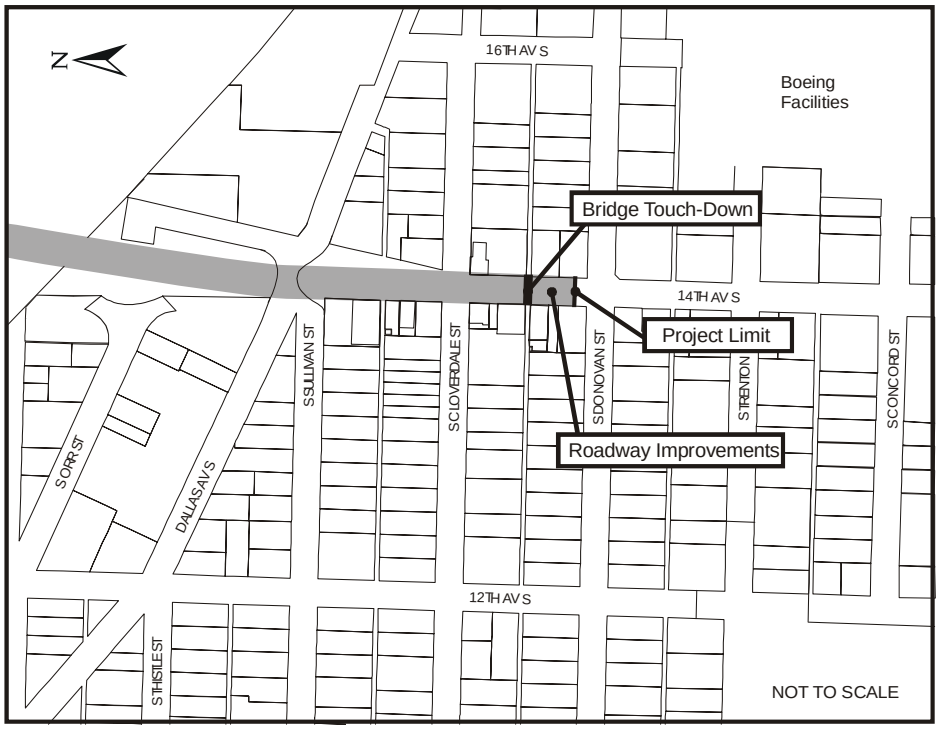

Figure 12
Mid-Level Fixed-Span Bridge Alternative Street Network

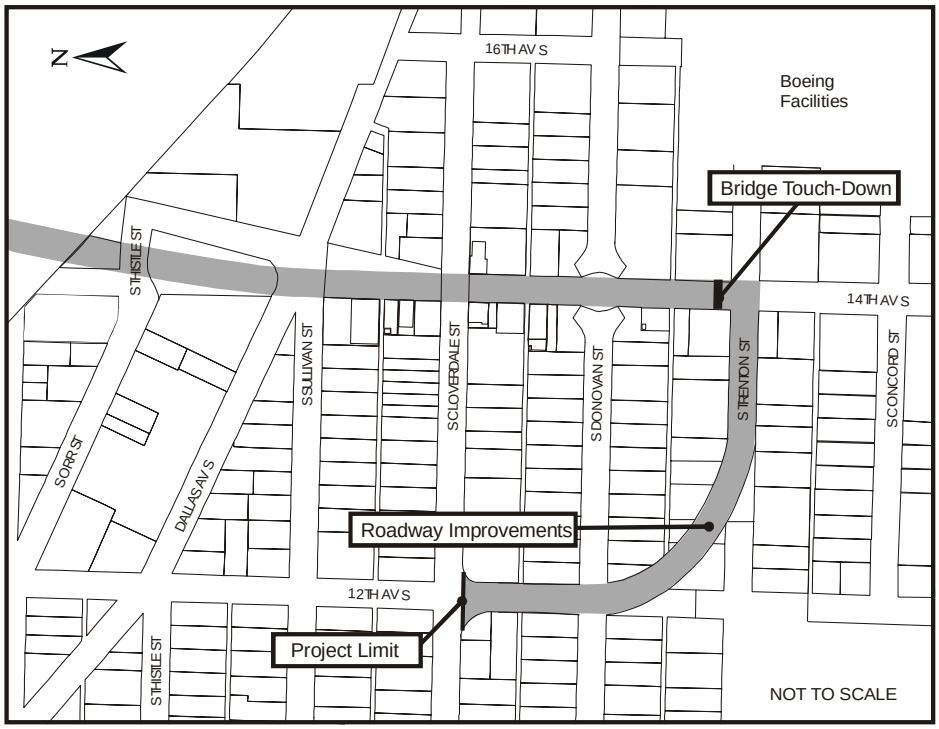

Figure 13
High-Level Fixed-Span Bridge Alternative Street Network

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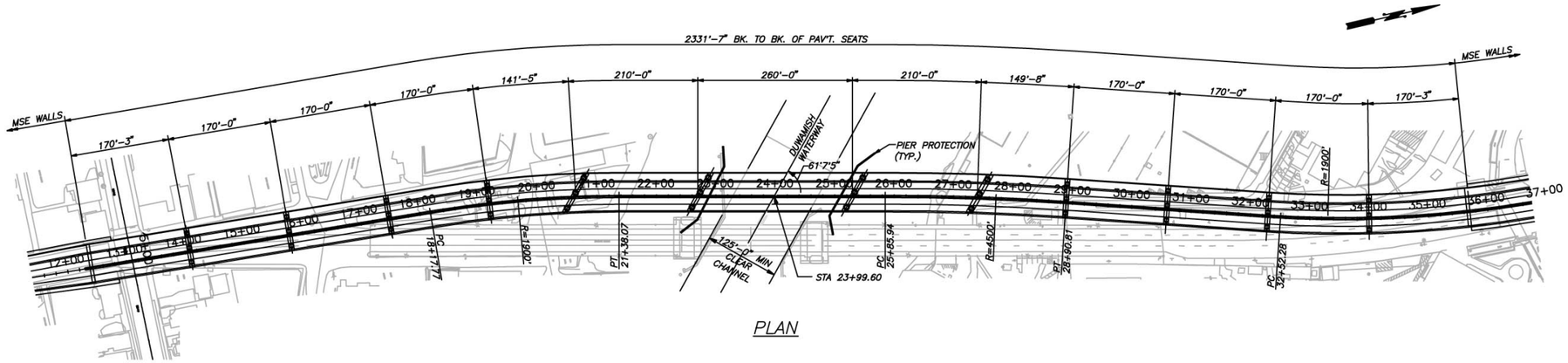

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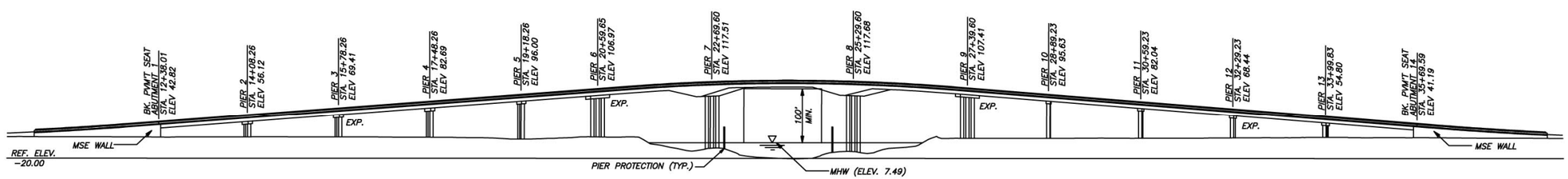

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Figure 14
High-Level Fixed-Span Bridge Alternative

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The bridge design would allow for approximately 100 feet of vertical clearance above the MHW of the Duwamish Waterway as requested by the U.S. Coast Guard. The horizontal waterway clearance for the navigation channel would be approximately 125 feet, which is slightly greater than the existing 118-foot clearance (fender-to-fender). The bridge's vertical clearance would not be expected to limit the height of boats and barges currently passing the bridge. However, vessels larger than those currently using the navigation channel might not be able to pass the bridge in the future.

Following construction, there would be numerous changes in the local street network as shown in Figure 13. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. The bridge south abutment would require Dallas Avenue S., S. Sullivan Street, and S. Cloverdale Street to be converted to underpasses under the new South Park Bridge. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on both sides of 14th Avenue S. for the majority of the two-block distance between S. Cloverdale Street and S. Trenton Street. S. Donovan Street would be closed at 14th Avenue S. due to obstruction from the bridge abutment and a vehicle turn-around would be constructed on either side of the abutment on S. Donovan Street. To allow traffic to access the new South Park Bridge, a new principle arterial roadway would need to be constructed between S. Trenton Street and 12th Avenue S. and road improvements would be required on 12th Avenue S. north to S. Cloverdale Street. This new route would allow traffic, trucks, and buses to continue to access the new South Park Bridge from S. Cloverdale Street via 12th Avenue S. and S. Trenton Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.3 Construction Durations and Activities

Construction of a rehabilitation or replacement bridge for the existing South Park Bridge is planned to take approximately two to three years, including the demolition and removal of the existing bridge. Construction is anticipated to start within the next several years and opening of the rehabilitation or a replacement bridge is currently anticipated to occur by 2009. The actual time required for construction activities vary for each of the alternatives. Construction activities associated with the No Action Alternative involves only demolition of the existing bridge and restoration of the site. The construction period for this alternative would be the shortest of all alternatives, approximately 8 months. The other alternatives would additionally require rehabilitation or construction of a new replacement bridge. Anticipated construction durations (demolition of existing and construction of new) would be approximately 32 months for the Rehabilitation Alternative, 33 months for the Bascule Bridge Alternative, 20 months for the Mid-Level Fixed-Span Bridge Alternative, and 24 months for the High-Level Fixed-Span Bridge Alternative.[14]

[14] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

From a construction perspective, the five project alternatives include three different types of construction activities. The No Action Alternative assumes the existing bridge condition would eventually require closure and removal of the bridge structures. Construction activities would focus on demolishing the existing bridge and restoring the project area. The Rehabilitation Alternative would require bridge closure for approximately 30 months for rehabilitation or replacement of various elements of the existing bridge. The Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives would all result in constructing a replacement bridge approximately 80 feet downstream of the existing bridge. For these three alternatives, the new bridge would be constructed while the existing bridge continues to be operational. When the new bridge is connected to the existing road, there would be short-term temporary bridge closures. These closures could be limited to weekends or could extend for approximately one month, depending on the alternative. Once the new bridge is completed, traffic would be rerouted to the new bridge and then the existing bridge structure would be demolished in a similar fashion as described for the No Action Alternative.

Rehabilitation of the existing bridge would require closure of the existing bridge for approximately 30 months, although efforts would be made to minimize the closure period as much as possible. Reconstruction activities would begin as soon as possible after completion of design engineering and acquisition of construction permits. Traffic would be given advance notice to take alternate routes prior to closure of the existing bridge. The construction of a temporary dock and a construction staging area would be required on both banks of the waterway (see Figure 15). Construction of the new bascule piers would likely be the first major construction activity. This would entail removing the existing pier protection fenders, installing temporary supports for the bridge superstructure, removing the bascule leaves as well as the steel truss spans, installing cofferdams around the existing steel truss approach piers and bascule piers, and demolishing the existing piers.

The bascule leaves and steel truss approach spans would be removed from the construction site for refurbishment. Construction of the new piers would involve drilling shafts through the existing timber piles, constructing the pile cap, dewatering the construction area inside the cofferdam, constructing the upper portions of the pier, removing the cofferdam, and finally reconstructing the upper portions of the bascule pier and bridge towers. Workers would reconstruct the concrete approach spans and replace the abutments. Workers would also reconstruct the bridge deck and replace the mechanical and electrical systems used to operate the bridge. Replacement of the piers, bridge tender towers, bridge railings, and lamp posts would be done in a manner that would preserve the historic character of these features of the existing bridge.

Major construction activities and sequencing would be similar for the Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives. The construction duration and the impact area for each of these three alternatives, however, would clearly differ. Following completion of design engineering, acquisition of construction permits, purchase of needed property, and relocation of residents and businesses, construction

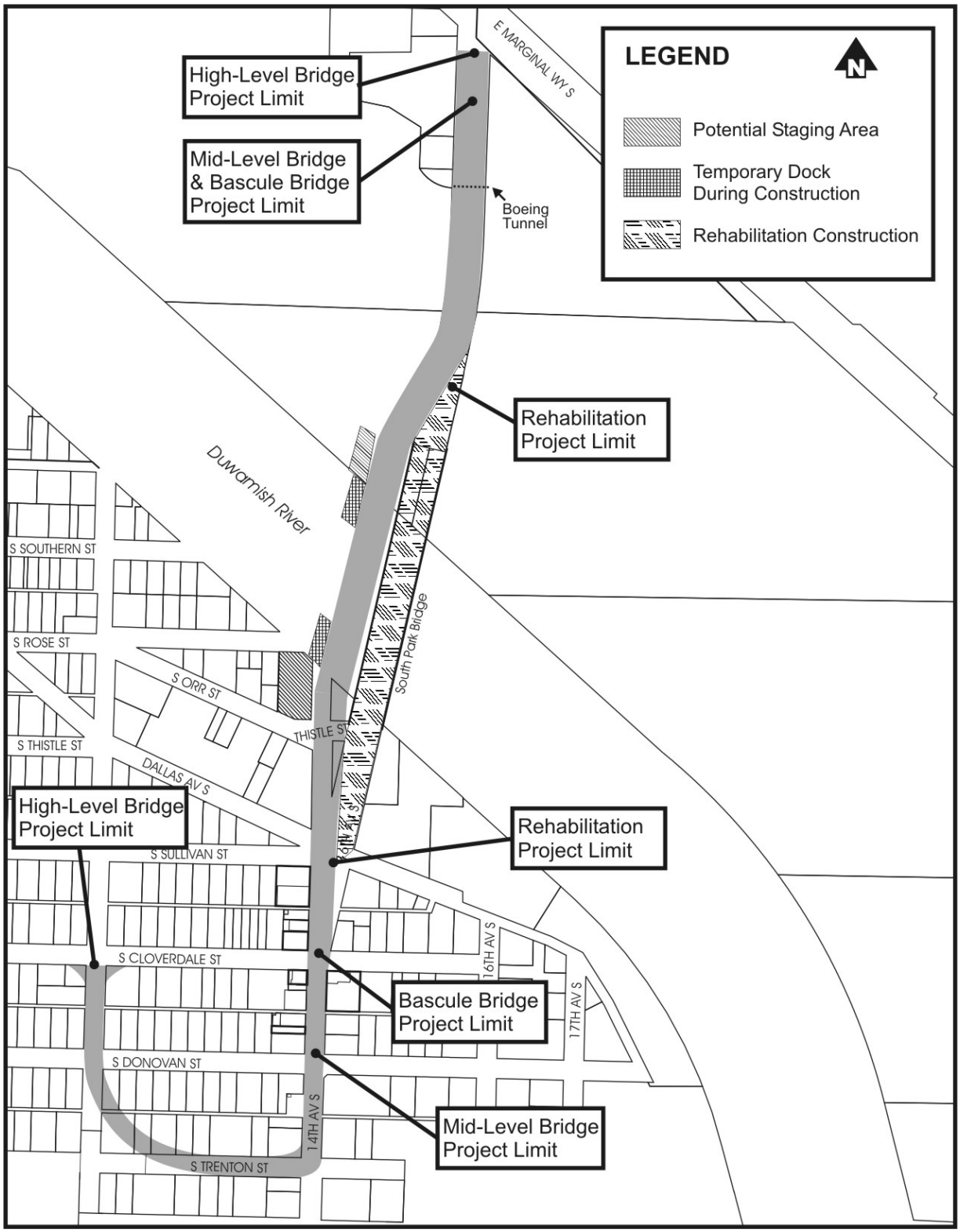

Figure 15
Proposed Construction Staging Areas

activities would begin. The first activities would include establishing the construction staging areas and constructing temporary docks with pilings on both sides of the waterway (see Figure 15).

Buildings affected by the construction activities would be demolished and utilities would be either temporarily or permanently relocated. To minimize traffic impacts, construction activities would begin with the construction of the in-water piers. Construction activities would progress landward from the central portion of each bridge alternative. Both in-water and on-land construction would begin with construction of the sub-structures (piers and abutment) and would be followed by placement of the superstructure (beams, deck, rails). On-land construction of the piers, abutment, retaining walls, and transition segments at either end of the bridge would likely require temporary closure of adjacent or nearby roads and rerouting of local traffic. If possible, these temporary closures would be limited to weekend and/or night times to minimize impacts to the community. Construction activities on the north and south portions of the new bridge structures could also occur either separately or concurrently. The last of the construction activities would be the construction of the new curb and gutter of the at-grade roadway, and paving the roadway to match the existing width of 14th Avenue S. Figure 15 shows the project limits, or start and end points, of construction activities for each of the project build alternatives.

For the rehabilitation and new bridge alternatives, new girders and other oversized materials would most likely be delivered to the project site by barge. Large cranes located on the barges or temporary docks would off-load the materials and place them in the nearby construction staging area. Removal of the existing bridge pier foundations and construction of the new bascule and steel truss piers would all require the use of cofferdams to isolate the construction activities. Construction of the new approach-span piers would use drilled shafts, which would likely incorporate the use of temporary casings to isolate the construction activities. This in-water work would be performed by equipment operated from the temporary docks or from barges.

Demolition of the existing bridge would involve disassembly and removal of the existing bascule leaves, superstructure, bridge piers, protection fenders, and abutment. Cranes would use the existing bridge structure and approaches as much as possible to remove the various elements of the bridge. Barges would likely be used to remove oversized materials. At this time, this demolition work is not planned to require construction of temporary docks or the acquisition or temporary use of property on the banks of the Duwamish Waterway for a staging area. Removal of the abutment foundations, however, would likely require temporary short-term closure of adjacent and/or nearby streets. During this time, local traffic would be temporarily rerouted from the immediate area.

Following the completion of the construction activities associated with any of the project alternatives, disturbed areas would be restored. Conceptual site restoration plans would be developed for each alternative based on additional consultation with resource agencies and other stakeholders.

2.4.4 Cost Estimates for the Alternatives

Cost estimates for each of the proposed project alternatives have been prepared by the project engineers (see Table 2).[15] The cost estimate for each project alternative, including the No Action alternative, is broken down into the following components: 1) plans, specifications, and estimates (PS&E), 2) right-of-way costs, and 3) construction and construction-related costs. The total cost estimates are provided in 2003 dollars as well as estimated costs escalated for 2008, the anticipated mid-point of the project construction period. These cost estimates were calculated based on the conceptual engineering plans that were prepared for each of the alternatives.[16]

Clearly, the No Action Alternative is the least expensive as the existing bridge would not be rehabilitated nor would a new replacement bridge be constructed. The cost to remove the existing bridge structure would be approximately $7,000,000 (2003 dollars). The estimated costs to either rehabilitate or replace the existing bridge structure range between approximately $62 million to $77 million in 2003 dollars. The least costly of the build alternatives is the proposed Mid-Level Fixed-Span Alternative, which is estimated to cost approximately $61,523,000 to design and construct. The Rehabilitation Alternative is estimated to cost approximately $63,930,000 and the High-Level Fixed-Span Alternative is estimated to cost approximately $70,460,000. The most costly of the build alternatives is the Bascule Bridge Alternative, which is estimated to cost $77,334,000. The escalated 2008 dollar estimates to design and construction the project alternatives are also shown in the table.

Table 2. Cost Estimates of the Project Alternatives

	PS&E	Right-of-Way	Construction	Total (2003 dollars)	Total (2008 dollars)
No Action	$ 250,000	$ 0	$ 6,750,000	$ 7,000,000	$ 9 M
Rehabilitation	$ 6,843,000	$ 754,000	$56,333,000	$63,930,000	$ 74 M
Bascule	$ 8,253,000	$ 3,655,000	$ 65,426,000	$ 77,334,000	$ 90 M
Mid-Level Fixed-Span	$ 4,235,000	$ 6,377,000	$ 50,911,000	$61,523,000	$ 71 M
High-Level Fixed-Span	$ 5,261,000	$ 15,310,000	$ 49,889,000	$ 70,460,000	$ 82 M

Source: Parsons Brinckerhoff, November 2003.

[15] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

[16] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

2.5 Project Coordination

Coordination to date for the South Park Bridge Project has involved members of the public, a special community advisory group, and representatives of government agencies. Formal scoping was initiated through publication of the NEPA Notice of Intent and the SEPA Determination of Significance and Scoping Notice on February 7, 2002 and February 14, 2002, respectively. Separate scoping meetings were conducted in the South Park community for relevant agencies and members of the public. Both meetings were held on February 28, 2002. Written and verbal comments received through the scoping process were reviewed by King County and used in the development of the project alternatives and topics for environmental impact assessment.

A public involvement plan for the proposed South Park Bridge Project was developed during the initial stages of project planning. The Project Advisory Committee (PAC) and the Community Advisory Group (CAG) reviewed this document and provided comments to King County. The first public involvement efforts began prior to the formal scoping period. A public workshop was held in the South Park community on January 17, 2002. At this meeting, the nine preliminary project alternatives were presented. A second public workshop was held on June 19, 2002. At this meeting, the five proposed project alternatives were presented. Members of the public were encouraged to provide comments at both of these meetings. To facilitate participation and input from Hispanic persons living in the community, a bilingual translator attended all meetings. In addition, handouts and newsletters for the project were published in English and Spanish, and public notices were published in “Siete Dias”, a local Spanish-speaking newspaper. Future opportunities for public involvement are also planned, including a public hearing and workshop following publication of the Draft Environmental Impact Statement in 2004.

Establishing a CAG was a significant component of the public involvement plan. A total of 17 individuals were chosen to participate in the CAG to represent community stakeholder interests and public concerns. The CAG meets periodically to be briefed on the progress of the project and to provide input to the South Park Bridge project team. Again, a bilingual English-Spanish translator attends the meeting to facilitate communication with Spanish-speaking individuals on the CAG. To date, CAG meetings have been held on April 10, May 21, June 4, June 11, and October 29 of 2002 and on January 7 and November 18, 2003. Additional CAG meetings are planned for the future.

As part of the environmental review process, King County periodically meets with the Project Advisory Committee (PAC) to give a status report of the project, answer questions, and to solicit comments. This committee is comprised of members of various agencies that have potential jurisdiction over the proposed South Park Bridge Project. The committee is the Interdisciplinary Team (IDT) required under NEPA implementation guidelines and provides technical support to King County staff. To date, the PAC has met on January 10, February 20, May 9, May 23, and October 10 of 2002. Coordination with the PAC is planned at critical future steps in the environmental review process.

A non-scientific survey was also conducted of South Park businesses located on 14th Avenue S. during the late spring of 2003.[17] The goal of the survey was to help assess potential impacts to businesses, especially minority-owned and –operated (employees) businesses. The survey respondents were also asked to identify their particular concerns about the proposed rehabilitation or replacement of the existing South Park Bridge. A total of 18 businesses were successfully surveyed. Spanish and Vietnamese translators were provided, as needed, to assist business representatives understand and respond to the questions. In addition, the data was used to assess the potential effects displaced businesses and jobs would have on the South Park community. The analysis of the survey findings are discussed in detail in the Economic, Social, and Relocation technical reports supporting the analysis in the EIS.

As key issues have arisen during development of the project alternatives and in assessing potential environmental impacts, special meetings have also been held with key stakeholders and organizations in the South Park community, as well as with other government agencies and jurisdictions with an interest in the project. For example, on December 3, 2002, King County met with owners of property along 14th Avenue S, and information booths were set up at the Sea-Mar Community Health Center-sponsored annual Fiesta Patrias on September 14, 2002 and at a family night event held at the Concord Elementary School on September 27 and November 22 of 2002. Periodic coordination meetings have also been held with representatives of the City of Seattle and the City of Tukwila, and other government agencies. These coordination activities will continue to occur on an on-going basis as the EIS is prepared and finally adopted.

[17] Parsons Brinckerhoff. *South Park Bridge Project: Survey of 14th Avenue South Businesses*, August 22, 2003.

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Land use maps, photographs of the project area, assessor's records, and field visits helped determine and confirm locations of buildings and other structures in the project area. The Seattle Department of Neighborhoods website provided background information on neighborhood characteristics. This information was reviewed to obtain baseline conditions against which to compare the proposed project build alternatives.

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Baseline data documenting the locations of existing businesses, residences, and other structures were reviewed and compared to alignment drawings of the proposed alternatives. Assessor's records were used to determine parcel sizes and, where appropriate, CAD drawings provided calculations of areas to be acquired from individual parcels under the different project alternatives. Zoning and comprehensive plan documents were consulted to determine designations for existing land uses and/or future development in the project area. Guidance was also provided by the WSDOT Environmental Procedures Manual and the Uniform Relocation Act of 1970.

Analysis included review of potential impacts on parcels, buildings, and access. Access impacts included loss of direct access to a building and loss of access associated with proposed street closures. The proposed project's construction footprint was superimposed on a map showing existing parcel lines and building envelopes to determine where construction efforts would require portions of adjacent parcels or structures on the lots. A partial acquisition of property would occur where a portion of land would be needed, leaving the majority of the parcel and buildings intact. A full acquisition would occur where all or most of the property would be needed to accommodate the proposed project improvements.

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The proposed improvements to the South Park Bridge and approaching roadways would require right-of-way acquisition which may include whole or partial takes from adjacent parcels, including potential building displacements. The existing roadway right-of-way on 14th Avenue S. accommodates four travel lanes, two in each direction, and shoulders on both sides of the roadway. The existing travel lanes are 9 to 10 feet wide, and the existing shoulders are generally 4 feet wide. According to current design standards, the overall roadway width of the new project should be approximately 16 feet wider than the existing width, which may result in the need for additional right-of-way acquisition along the project route for transitioning the new to the old.

Current adjacent land uses are industrial from the north side of the bridge to East Marginal Way S. Land uses immediately adjacent to the existing roadway vary in the area south of the bridge, with a mixture of commercial, retail, and industrial uses. Residential uses are prevalent to the east and west beyond the businesses that front 14th Avenue S. Many of the businesses located south of the bridge are very close to the existing sidewalk and have access on 14th Avenue S. On-street parking is also present along the road in places. Members of the community indicate that business activity along the roadway has increased recently. In January 2002, the Seattle Post Intelligencer newspaper indicated that the South Park business district "is enjoying a revival" and again in July stated that "After hard times, South Park is on the upswing with a new hair salon, espresso stand, money-transfer store and a restaurant opening in the past year (Seattle PI, 2002). That same article indicated that the future of the bridge "will shape the fate of South Park's business district."

Property characteristics provide a context for potential issues related to relocation and displacement concerns. Housing growth in the neighborhood has not been high. There were 59 new housing units added to the South Park neighborhood between 1994 and 2001, which represents approximately 17% of the neighborhood's twenty-year growth target (City of Seattle, 2002). A review of assessor's records for single family residences in the project area indicates that the average assessed value of homes is approximately $125,000 (King County, 2002). According to Windermere Real Estate Company, the median house in the Georgetown/South Park area is 77 years old with 1,056 square feet, and is, therefore, "older and smaller than many Seattle-area homes (Seattle PI, 2002)." The vacancy rate for industrial land in the south Seattle area was 5.49% in 2001 and the amount of occupied space declined by 31,015 square feet in the first quarter of 2002 (Trammel Crow, 2002). Additional information on land uses and economic conditions in the South Park neighborhood is provided in the South Park Bridge Project *Land Use Technical Report* and *Economics Technical Report*.

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Chapter 6 Impacts

6.1 Direct Impacts

Direct impacts would result where the new roadway approaches and improvements would require acquisition of property from parcels adjacent to the existing roadway right-of-way. As explained in Chapter 4, a partial acquisition of property would occur where a portion of land would be needed, leaving the majority of the parcel intact. A full acquisition would occur where all, or most, of the property would be needed to accommodate the proposed project improvements. In situations where access to existing properties would be eliminated by the proposed improvements, it was assumed that the entire parcel would be acquired by the project proponent. Although the proposed project design attempted to retain the proposed improvements within the existing roadway right-of-way, it was not always possible to do so, necessitating potential property acquisitions as discussed below.

6.1.1 No Action Alternative

No new construction would occur and the existing bridge would be demolished. No building displacement or property acquisitions would be needed for this alternative.

6.1.2 Rehabilitation Alternative

The existing bridge would be rehabilitated in place under this alternative, and therefore the potential relocation of buildings and parcel acquisitions would be limited. One parcel needed for a construction staging area and two parcels immediately adjacent to the existing bridge would be acquired. Two residences and a taxi service building are currently located on these parcels and would be displaced.

6.1.3 Bascule Bridge Alternative

Under the Bascule Bridge Alternative, it would be necessary to acquire parcels and/or buildings in the project area. Parcel acquisition and potential buildings displacements or relocations would result from the actual physical footprint of the new roadway, as well as from the loss of access to 14th Avenue S. due to reconfiguration of existing streets. South Park business owners have indicated a preference for their present location along 14th Avenue S. because of the neighborhood affordability, convenience of transportation, and their own ties to the community. More information on affected businesses and the community is provided in the South Park Bridge Project *Social Elements Technical Report* and *Economics Technical Report*.

Existing buildings on 14th Avenue S. north of Dallas Avenue S. would be displaced by the new roadway approaches and abutments. Table 3 identifies parcel acquisitions for the alternatives. Table 3 identifies property takes by their potential cause of impact. Locations of the parcels are shown on Figure 16 with numbers on the map corresponding to the “Map No.” column in Tables 3 and 4.

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Table 3. Potential Parcel Acquisitions

Map No.	Parcel No.	Current Use	Parcel Size (square feet)	Zoning	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge	Assessed Value
1.	0895	Residential (1 bldg. = 1 SF & boat storage) 1239 S. Rose Street	19,500 sq.ft.	RB Regional Business	No take	Full	Full	Full	Full	$195,000
2.	0860	Retail (1 bldg. = 1 repair & sales business) 1400 S. Thistle Street	6,400 sq.ft.	RB-Regional Business	No take	Full	Full	Full	Full	$99,900
3.	0080	Residential (1 bldg. = 1 SF dwelling & home-occupation real estate business) 1403 S. Thistle Street	3,325 sq.ft.	RB-Regional Business	No take	Full	Full	Full	Full	$97,000
4.	1045	Tavern (1 bldg. = 1 tavern business & boat storage) 8456 Dallas Ave S.	29,700 sq.ft.	RB-Regional Business	No take	No take	Full	Full	Full	$381,100
5.	7340	Restaurant (1 bldg. = 1 restaurant business) 8457 Dallas Ave S.	1,800 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No Take	Full	Full	Full	$54,700
6.	7550	Retail (1 bldg. = 1 convenience store & parking lot) 8507 14th Avenue S.	12,000 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$383,900
7.	8688	Restaurant/Retail (1 bldg. = 1 restaurant, 1 retail store, & 1 dry cleaners) 8500 14th Avenue S.	10,500 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$573,100
8.	7567	Restaurant/Retail/ Residential (1 bldg. = 1 restaurant, 1 video store, & 1 apt. upstairs) 8515 14th Avenue S.	2,250 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$140,200

Map No.	Parcel No.	Current Use	Parcel Size (square feet)	Zoning	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge	Assessed Value
9.	7566	Restaurant (1 bldg. = 1 restaurant) 8517 14th Avenue S.	2,625 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$164,000
10.	7565	Vacant Bldg. (1 bldg. = 1 tavern & 1 apt. past uses) 8525 14th Avenue S.	4,125 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$186,100
11.	8711	Travel Service (1 bldg. = 1 travel agency business) 8514 14th Avenue S.	3,545 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$72,200
12.	8714	Retail (2 bldgs. = 1 hair dresser, 1 repair & sales business, & 1 coffee stand) 8520 14th Avenue S.	5,400 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	Full	Full	$118,500
13.	7821	Retail/Residential (1 bldg. = 1 grocery store, 1 bakery in store, & 2 apts. upstairs) 8601 14th Avenue S.	2,310 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$109,900
14.	8654	Restaurant (1 bldg. = 1 restaurant) 8600 14th Avenue S.	12,000 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$224,600
15.	7810	Vacant Bldg. (1 bldg. = 1 restaurant, 1 retail, & 1 video store all closed) 8611 14th Avenue S.	17,705 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$654,400
16.	7841	VacantBuilding (1 bldg. = no past use apparent) 8615 14th Avenue S.	3,878 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$127,900

Map No.	Parcel No.	Current Use	Parcel Size (square feet)	Zoning	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge	Assessed Value
17.	7840	Tavern (1 bldg. = 1 tavern) 8617 14th Avenue S.	2,122 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$79,000
18.	7842	Retail (1 bldg. = 1 sewing business) 8621 14th Avenue S.	6,000 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$84,000
19.	8686	Residential (1 bldg. = 4 apts.) 8616 14th Avenue S.	6,000 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$154,000
20.	8683	Vacant Building (1 bldg. = no past use apparent) 8620 14th Avenue S.	6,000 sq.ft.	NC3-40 Neighbor-hood Commercial	No take	No take	No take	No take	Full	$59,500
21.	8095	Health Clinic (1 bldg. = dental clinic) 8701 14th Avenue S.	6,000 sq.ft.	C2-40 Commercial	No take	No take	No take	No take	Full	$186,300
22.	8096	Restaurant (1 bldg. = 1 restaurant) 8709 14th Avenue S.	3,000 sq.ft.	C2-40 Commercial	No take	No take	No take	No take	Full	$252,200
23.	8110	Parking Lot (no building on-site) 8721 14th Avenue S.	3,000 sq.ft.	C2-40 Commercial	No take	No take	No take	No take	Full	$24,000
24.	8115	Wholesale (1 bldg. = 1 wholesale distribution business) 8721 14th Avenue S.	9,000 sq.ft.	C2-40 Commercial	No take	No take	No take	No take	Full	$301,500
25.	8629	Wholesale (1 bldg. = 1 wholesale distribution business) 8700 14th Avenue S.	23,950 sq.ft.	C2-65 Commercial	No take	No take	No take	No take	Full	$658,800
26.	8649	Health Clinic (1 bldg. = 1 medical/ dental clinic & pharmacy) 8720 14th Avenue S.	12,000 sq.ft.	C2-65 Commercial	No take	No take	No take	No take	Full	$791,000

Map No.	Parcel No.	Current Use	Parcel Size (square feet)	Zoning	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge	Assessed Value
27.	8351	Health Clinic (1 bldg. = 1 medical/ dental clinic) 8801 14th Avenue S.	4,200 sq.ft.	C2-40 Commercial	No take	No take	No take	No take	Full	$303,000
28.	5935	Residential (1 bldg. = 1 SF dwelling) 1057 S. Donovan Street	6,000 sq.ft.	L3 Lowrise 3 Multifamily Residential	No take	No take	No take	No take	Partial	$42,000
29.	7985	Residential (1 bldg. = 1 SF dwelling) 1203 S. Donovan Street	6,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Full	$155,000
30.	7995	Residential (1 bldg. = 1 SF dwelling) 1207 S. Donovan Street	6,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Partial	$42,000
31.	8230	Residential (1 bldg. = 1 SF dwelling) 8718 12th Avenue. S.	12,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Full	$138,000
32.	8220	Residential (1 bldg. = 1 SF dwelling) 1210 S. Trenton Street	6,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Full	$149,000
33.	8205	Residential (1 bldg. = 1 SF dwelling) 1220 S. Trenton Street	9,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Full	$166,000
34.	8195	Residential (1 bldg. = 1 SF dwelling) 1226 S. Trenton Street	6,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Full	$152,000
35.	8185	Residential (1 bldg.=1 SF dwelling) 1230 S. Trenton Street	6,000 sq.ft.	SF-5000 Single Family Residential	No take	No take	No take	No take	Partial	$42,000

Map No.	Parcel No.	Current Use	Parcel Size (square feet)	Zoning	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge	Assessed Value
36.	6176	Residential (1 bldg.=1 MF dwelling - duplex) 8605 12th Avenue S.	4,000 sq.ft.	L2 Lowrise 2 Multifamily Residential	No take	No take	No take	No take	Full	$148,000
37.	0005(a)	Boeing Co. Plant 2 (large parcel, several buildings, parking lot)	1,158,109 sq.ft.	IG1 U/85 General Industrial	No take	No take	Partial	Partial	Partial	$6,071,000
38.	0005(b)	Boeing Co. Plant 2 (large parcel, several buildings, parking lot)	264,400 sq.ft.	MIC/H Manufac-turing Industrial Center-Heavy Industrial	No take	No take	Partial	Partial	Partial	$1,200,000

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Table 4. South Park Affected Parcels by Potential Cause of Impact for the Build Alternatives

Map No.	Parcel	Use and Location	Reason for Property Acquisition
Rehabilitation Alternative			
1.	0895	Residential, 1239 S. Rose Street	Roadway alignment / construction
2.	0860	Retail, 1400 S. Thistle Street	Roadway alignment / construction
3.	0080	Residential, 1403 S. Thistle Street	Roadway alignment / construction
Bascule Bridge Alternative			
1.	0895	Residential, 1239 Rose Street	Roadway alignment / construction
2.	0860	Retail, 1400 S. Thistle Street	Roadway alignment / construction
3.	0080	SF Residential, 1403 S. Thistle	Roadway alignment / construction
4.	1045	Tavern, 8456 Dallas Avenue S.	Change in access
5.	7340	Restaurant, 8457 Dallas Avenue S.	Roadway alignment / construction
Mid-Level Fixed-Span Bridge Alternative			
1.	0895	Residential, 1239 S. Rose Street	Roadway alignment / construction
2.	0860	Retail, 1400 S. Thistle Street	Roadway alignment / construction
3.	0080	SF Residential, 1403 S. Thistle Street	Roadway alignment / construction
4.	1045	Tavern, 8456 Dallas Avenue S.	Change in access
5.	7340	Restaurant, 8457 Dallas Avenue S.	Roadway alignment / construction
6.	7550	Retail, 8507 14th Avenue S.	Change in access
7.	8688	Restaurant/Retail, 8500 14th Avenue S.	Change in access
8.	7567	Restaurant/Retail/Residential, 8515 14th Avenue S.	Change in access
9.	7566	Restaurant, 8517 14th Avenue S.	Change in access
10.	7565	Vacant Building, 8525 14th Avenue S.	Change in access
11.	8711	Travel Service, 8514 14th Avenue S.	Change in access
12.	8714	Retail, 8520 14th Avenue S.	Change in access

Table 4. South Park Affected Parcels by Potential Cause of Impact for the Build Alternatives (continued)

High-Level Fixed-Span Bridge Alternative			
Map No.	**Parcel**	**Use and Location**	**Reason for Property Acquisition**
1.	0895	Residential, 1239 S. Rose Street	Roadway alignment / construction
2.	0860	Retail, 1400 S. Thistle Street	Roadway alignment / construction
3.	0080	SF Residential, 1403 S. Thistle Street	Roadway alignment / construction
4.	1045	Tavern, 8456 Dallas Avenue S.	Change in access
5.	7340	Restaurant, 8457 Dallas Avenue S.	Roadway alignment / construction
6.	7550	Retail, 8507 14th Avenue S.	Change in access
7.	8688	Restaurant/Retail, 8500 14th Avenue S.	Change in access
8.	7567	Restaurant/Retail/Residential, 8515 14th Avenue S.	Change in access
9.	7566	Restaurant, 8517 14th Avenue S.	Change in access
10.	7565	Vacant Building, 8525 14th Avenue S.	Change in access
11.	8711	Travel Service, 8514 14th Avenue S.	Change in access
12.	8714	Retail, 8520 14th Avenue S.	Change in access
13.	7821	Residential, 8601 14th Avenue S.	Roadway alignment / construction
14.	8654	Restaurant, 8600 14th Avenue S.	Roadway alignment / construction
15.	7810	Vacant Building, 8611 14th Avenue S.	Roadway alignment / construction
16.	7841	Vacant Building, 8615 14th Avenue S.	Roadway alignment / construction
17.	7840	Tavern, 8617 14th Avenue S.	Roadway alignment / construction
18.	7842	Retail, 8621 14th Avenue S.	Roadway alignment / construction
19.	8686	MF Residential, 8616 14th Avenue S.	Roadway alignment / construction
20.	8683	Vacant Building, 8620 14th Avenue S.	Roadway alignment / construction
21.	8095	Dental Center, 8701 14th Avenue S.	Roadway alignment / construction
22.	8096	Restaurant, 8709 14th Avenue S.	Roadway alignment / construction
23.	8110	Parking Lot, 8721 14th Avenue S.	Roadway alignment / construction
24.	8115	Wholesale, 8721 14th Avenue S.	Roadway alignment / construction
25.	8629	Wholesale, 8700 14th Avenue S.	Roadway alignment / construction

Table 4. South Park Affected Parcels by Potential Cause of Impact for the Build Alternatives (continued)

26.	8649	Medical/Dental Clinic and Pharmacy, 8720 14th Avenue S.	Roadway alignment / construction
27.	8351	Medical/Dental, 8801 14th Avenue S.	Roadway alignment / construction
28.	5935	Residential, 1057 S. Donovan Street	Roadway alignment / construction
29.	7985	Residential, 1203 S. Donovan Street	Roadway alignment / construction
30.	7995	Residential, 1207 S. Donovan Street	Roadway alignment / construction
31.	8230	Residential, 8718 12th Avenue. S.	Roadway alignment / construction
32.	8220	Residential, 1210 S. Trenton Street	Roadway alignment / construction
33.	8205	Residential, 1220 S. Trenton Street	Roadway alignment / construction
34.	8195	Residential, 1226 S. Trenton Street	Roadway alignment / construction
35.	8185	Residential, 1230 S. Trenton Street	Roadway alignment / construction
36.	6176	Residential, 8605 12th Avenue S.	Roadway alignment / construction
Note: A portion of the two Boeing Company parcels (Map Nos. 37 and 38) would be needed for roadway construction under each of the build alternatives.			

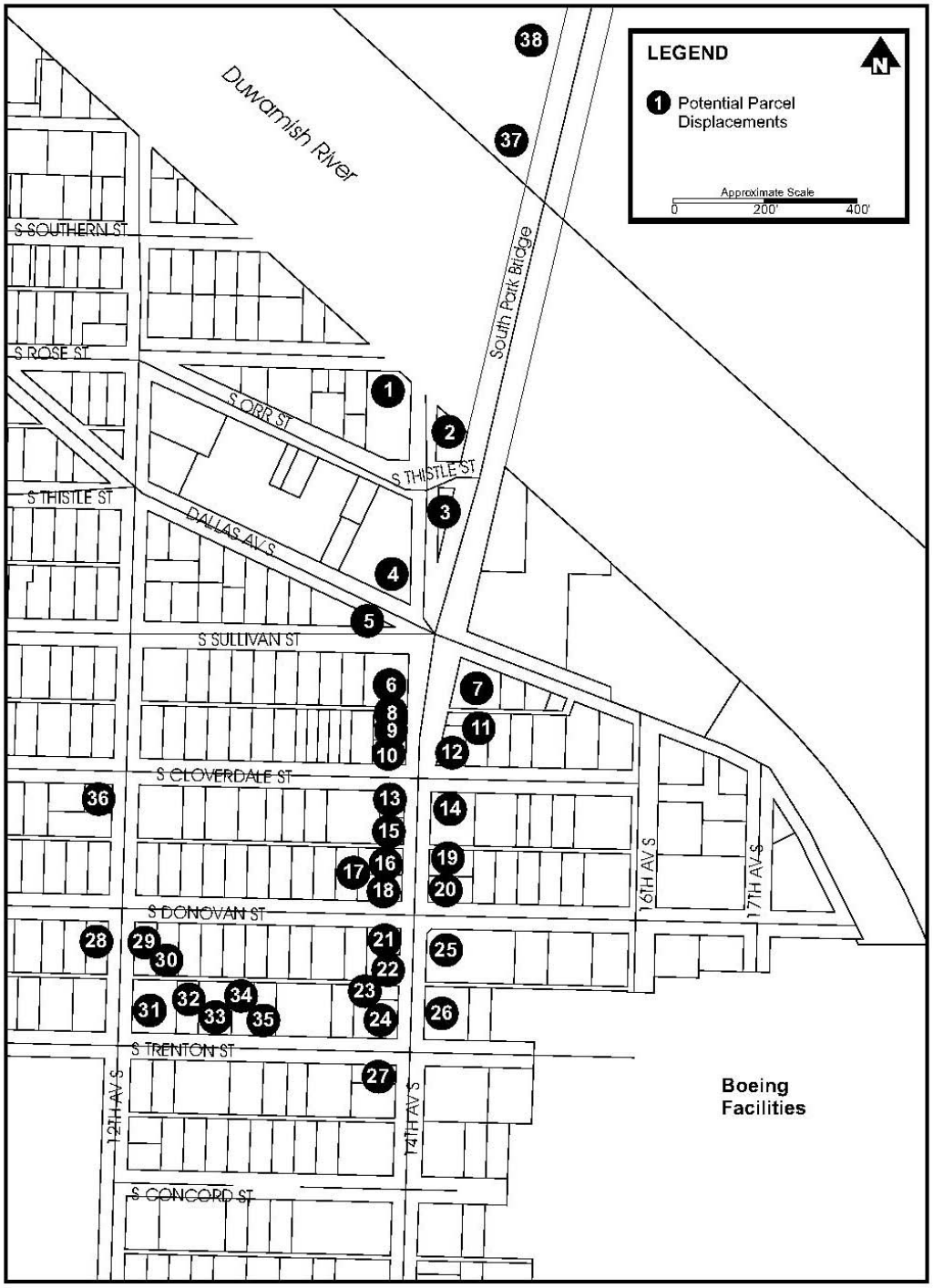

Figure 16
Parcel Location Map

As indicated in Table 4 of the *Social Elements Technical Report*, the South Park community is racially diverse with minorities comprising more than half of the local population. These technical reports also indicate that 13 percent of households in the community were at or below poverty levels in 1999 and that 9 percent of the community population in 2000 was over 64 years old. Transit use within the community was identified at between 13 to 16 percent. The number of households that are transit-dependent was approximately 14 percent, which is less than the City of Seattle as a whole.

Two residences and a taxi service building (see Figure 16, parcels 1, 2, and 3) west of the existing bridge would be displaced under all build alternatives. Additionally, the County Line Tavern and a small restaurant would be displaced on Dallas Avenue S. (see Figure 16, parcels 4 and 5). In a few instances, one parcel may have more than one use located there. Income levels were not identified for individual owners of the affected properties; however, the technical reports did identify one of the displaced buildings as "potentially" minority-owned. This was determined through the use of assessor's records information listing property owners by name. Where obvious Hispanic or Asian last names were listed, it was assumed that the property is in minority ownership; however, door-to-door surveys were not conducted to confirm this data. Specific property-level information regarding disabilities, age, size of family, English language proficiency, transit-dependency, or length of occupancy characteristics was not obtained because it would require detailed individual surveys with each potentially-affected property owner.

Because a large percentage of the community residents are minorities, it is likely that residential properties are minority-owned and/or renter-occupied. Because the percentage of households at or below the poverty level is relatively low, although household median income levels are substantially lower than city-wide statistics, it is not as likely that individuals displaced would have incomes below federal poverty guideline levels.

Information about businesses affected by the proposed project is presented in Chapter 5 of both the *Social Elements Technical Report* and *Economics Technical Report.* A separate report providing results of a local community business survey also provides detailed analysis about businesses that would potentially be affected by the proposed project. This information indicates that at least 12 employees would be affected by the proposed business displacements under the Bascule Bridge Alternative, and all of these employees are racial minorities.

North of the existing bridge under all build alternatives, including the Bascule Bridge Alternative, a portion of two Boeing Company parcels (see Figure 16, parcels 37 and 38) would need to be acquired. Both parcels that would be affected are on the west side of 14th Avenue S., one within the City of Tukwila and one within the City of Seattle. Approximately 29,174 square feet of the first parcel and approximately 2,430 square feet of the second parcel would be acquired for roadway right-of-way. The proposed alternative would encroach upon, but not affect, buildings on both of these parcels. Some existing parking spaces on these parcels would be permanently displaced by the roadway. The potential extent of these impacts is subject to change, pending the outcome of on-going negotiations between lead agency staff and The Boeing Company.

6.1.4 Mid-Level Fixed-Span Bridge Alternative

This alternative would result in more displacements south of the current bridge than would occur under the Bascule Bridge Alternative. Because the proposed roadway abutments would extend further south, both depriving existing access to, and eliminating existing access along, 14th Avenue S., additional parcels and buildings would need to be acquired. In addition to the acquisitions that would occur under the Bascule Bridge Alternative, the following buildings along both sides of 14th Avenue S. would likely be displaced by the Mid-Level Fixed-Span Bridge Alternative: Western Union convenience store, Muy Macho Restaurant, Jalisco Restaurant, Murdocks Tavern, Taxi Service building, Buena Vista Travel, check cashing store, Salon Expo, dry cleaners, and Pattaya Thai Restaurant (see Figure 16, parcels 6-12).

According to the data provided in the *Social Elements Technical Report* and *Economics Technical Report*, under this alternative business displacements would affect at least 57 employees, many of whom are racial minorities. These reports also indicate that 5 of the 12 displaced buildings contain minority-owned businesses. In a few instances, one parcel may have more than one use located there. Individual property data for residential displacements was not obtained; however, Chapter 5 of these technical reports does contain racial, income, and other data on the community as a whole. As with the Bascule Bridge Alternative, this data indicates that some residential displacements may be minority-owned and/or renter-occupied.

6.1.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative would affect the greatest number of parcels in the project area due to the length of the approaches and abutments needed for this option. In addition, a connector road would be constructed from S. Trenton Street to 12th Avenue S. Impacts to 14th Avenue S. would occur as far south as S. Trenton Street, and improvements and road closures under this alternative would affect existing buildings on both sides of the roadway. Up to 35 buildings would be displaced along 14th Avenue S. under this alternative (see Figure 16, parcels 13-27).

The following buildings on 14th Avenue S. would be displaced in addition to those identified under the Mid-Level Fixed-Span Bridge Alternative: Mexi-Mart and apartments, Kellys Tavern, retail sewing shop, South Park Medical Dental Clinic, R.L. Cook Wholesale, a vacant building north of S. Donovan Street, a four-plex apartment building, and Napolis Pizzeria Restaurant.

According to data in the *Social Elements Technical Report* and *Economics Technical Report*, 14 of the 28 displaced businesses would be minority-owned under this alternative. In a few instances, one parcel may have more than one use located there. At least 90 employees would be affected by these potential business displacements, and a significant portion of these employees are racial minorities. As with other alternatives, racial, income and other data was not obtained for residential displacements; however, community characteristics presented in these technical reports indicate that some of the displaced residences are likely to be minority-owned and/or renter occupied.

This alternative would also require connecting an existing portion of 12th Avenue S. to S. Trenton Street. This change is needed to provide access to the new bridge because direct access from Dallas Avenue S., S. Sullivan Street, S. Cloverdale Street, and S. Donovan Street would no longer be possible under this alternative. The new roadway would result in displacements for the High-Level Fixed-Span Bridge Alternative that would not occur under any of the other build alternatives (see Figure 16, parcels 28-36).

The reconfiguration of the southwest corner of the intersection at S. Cloverdale Street and 12th Avenue S. would result in the potential displacement of a single-family duplex residence. As 12th Avenue S. is realigned to meet with S. Trenton Street, the new roadway alignment would result in the potential displacement of up to four single-family residences, one on the southeast corner of S. Donovan Street and three residences at the west end of S. Trenton Street. Partial acquisition of one parcel on S. Donovan Street and two parcels on S. Trenton Street would also occur under this alternative. Where partial acquisitions are required, reconfiguration of existing driveways providing access to the parcels from S. Trenton Street may also be needed.

6.2 Construction Impacts

6.2.1 No Action Alternative

Construction activities would not occur; however, demolition of the existing bridge may affect adjacent parcels. The staging area used for construction of the proposed build alternatives would not be required. No potential displacements or relocations are expected to occur as a direct result of demolition; however, secondary impacts may occur as discussed in Section 6.3 below.

6.2.2 Rehabilitation Alternative

Construction staging would displace two residences, a taxi service building, and a warehouse building on the south side of the Duwamish Waterway north of S. Orr Street. Adjacent parcels may experience traffic congestion and noise and dust intrusions from construction activities. No additional displacements or relocations are expected to result from this alternative. Because this alternative would require closure of the bridge for approximately 32 months while rehabilitation takes place, additional indirect displacements may occur, as indicated in the secondary impacts section below.

6.2.3 Bascule Bridge Alternative

Construction staging would result in the removal of the same buildings on the south side of the waterway as are identified for the Rehabilitation Alternative above. During construction, portions of both of The Boeing Company parcels north of the bridge also may be used for construction staging. A larger portion of the southerly parcel would be used as a construction staging area, and much of the parking there would be temporarily displaced. Far fewer parking spaces would be affected on the second parcel; however, construction staging would displace more spaces than would be lost once the roadway is completed.

6.2.4 Mid-Level Fixed-Span Bridge Alternative

During construction, this alternative would likely require additional staging areas beyond those identified for the Rehabilitation and Bascule Bridge alternatives. Because these staging areas would be located on parcels already affected by the roadway design under this alternative, they would not result in the need for additional building displacements or parcel acquisitions.

6.2.5 High-Level Fixed-Span Bridge Alternative

Construction impacts under this alternative would be larger than those of the Mid-Level Fixed-Span Bridge Alternative south of the bridge because of the greater area affected. Additionally, this alternative would affect the same parcels north of the bridge that are affected by the other build alternatives.

6.3 Secondary and Cumulative Impacts

Generally, secondary impacts are impacts that result from a proposed action, while cumulative impacts are combined effects of a project's actions with those of other projects in the study area.

6.3.1 Secondary Impacts

Overall, the proposed build alternatives are not expected to result in substantial relocation impacts in the project area. The No Action Alternative requires closure of the bridge, which may have longer-term impacts on local businesses and residents. It is possible that some residents and businesses may choose to relocate to other areas to replace transportation conveniences that would be lost with permanent bridge closure. If closure of the bridge results in decisions to relocate, then the No Action Alternative would effectively have been the cause of such relocations.

The Rehabilitation Alternative may also result in similar secondary relocations because of the length of time (approximately 32 months) the bridge would be closed for repairs. It is possible that some local businesses could suffer from adverse economic conditions during this period. If these impacts are severe enough to result in business closures and subsequent relocations, these secondary displacements would be attributable to implementation of the Rehabilitation Alternative.

Historically, the South Park community has struggled to establish itself as a viable business and residential entity. Potential displacements under any of the build alternatives may have a secondary impact contributing to the overall reduction in the long-term vitality of the neighborhood. This impact would likely be greatest under the High-Level Fixed-Span Bridge Alternative where numerous direct displacements would occur. The Rehabilitation Alternative, however, could potentially have similar impacts if many businesses close or relocate during the expected repair period.

It is possible that displaced buildings, under any of the build alternatives, would be replaced after construction has concluded, in which case this impact would be largely temporary. In fact, some displacements could lead to new opportunities for development

along 14th Avenue S., where old buildings on parcels acquired for the bridge replacement project may be demolished. Such redevelopment would largely depend on new access and other improvements. Where new development occurs, it could be a catalyst for community revitalization.

Conversely, if displaced buildings are not re-developed and business and residential uses decline, the project alternatives would have added to difficulties the community has historically faced in developing an attractive business and residential environment. These impacts would be greatest under the High-Level Fixed-Span Bridge Alternative where the most potential displacements would take place.

6.3.2 Cumulative Impacts

Potential displacements associated with the bridge and roadway improvements would add to other disruptive impacts resulting from proposed actions nearby. No specific relocation needs have been identified for the proposed riverfront improvements project. Similarly, no relocations have been identified for on-going dredging and planned sediment capping activities within the waterway. The potential improvements that may be associated with grant money for 14th Avenue S. businesses have not been identified. Business improvement opportunities may be diminished by displacements associated with the build alternatives, especially in the near term. This may result in additional turnover because remaining businesses may experience reduced opportunities for revitalization, and the general business climate of the neighborhood would not be improving.

Over the longer term, changes associated with the South Park Bridge build alternatives, in combination with grant funds for 14th Avenue S. business improvements, may present additional opportunities for new development. If grant money could be used to replace access for some displaced buildings, or to improve pedestrian access, and/or provide parking where displacements have occurred, fewer overall relocations may occur, and more stability for existing businesses may be provided.

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The proposed project would be designed to minimize the number of parcel acquisitions and relocations needed under the project alternatives. Where parcel acquisitions cannot be avoided, compensation would be provided at fair market value in compliance with the Uniform Relocation and Real Property Policies Act of 1970, as amended (Revised Code of Washington, Chapter 8.26). These regulations provide for relocation services for all property owners without discrimination. Relocation assistance would be provided for all residences and businesses, including help in locating suitable replacement housing and business sites. Under state and federal laws, no individual is required to move unless comparable replacement property is available within that person's financial capabilities.

7.1 Regulatory Framework

Comparable replacement housing must be decent, safe, and sanitary; and it should be functionally similar to the present dwelling. Decent, safe, and sanitary housing means that a dwelling must meet all of the minimum requirements established by state regulations, and it must conform to applicable housing and occupancy codes. Replacement dwellings should have the following attributes:

- Must be adequate in size to accommodate the displaced persons
- Must have a similar number of rooms and living space
- Must be located in an area not subject to unreasonable adverse environmental conditions
- Generally, can not be less desirable than the present dwelling with respect to public utilities and commercial and public facilities
- Must be located on a site that is of a suitable size for the dwelling unit with normal site improvements
- Must be currently available to the affected property owner and within his/her financial means
- Should provide reasonable access to the displaced person's place of employment

If replacement housing is not available within a resident's financial ability to afford, alternative solutions, generally referred to as "housing of last resort," may be used. They could include:

- Purchase of housing for displaced individuals and the subsequent renting or selling of the house to those individuals at a price within their financial capabilities

- Renovation of existing housing
- Provision of financing for homeowner-occupants with low incomes and/or poor credit histories who have occupied their homes for at least 180 days
- Entering into partnerships with public or private agencies that provide housing for low-income individuals

Relocation assistance would be available to both residents and business owners. Relocation services would be provided by qualified personnel employed by King County and may include the following assistance:

- Determination of any special needs and requirements
- Explanation of relocation benefits
- Individual assistance
- Provision of transportation, if necessary
- Assurance of the availability of comparable property in advance of displacement
- Provision of referral to comparable properties
- Provision of the amount of the maximum replacement housing entitlement in writing 90 days (or more) before the required vacate date
- Inspection of houses for decent, safe, and sanitary conditions
- Information on other federal, state, and local programs offering assistance to displacees
- Provision of counseling to minimize hardships associated with relocations

King County would work closely with affected business owners to minimize the level of disruption that may be caused by the need to relocate. The County would make every effort to assist business owners in finding a suitable replacement site, giving special attention to local opportunities within the South Park area. Where businesses must relocate, the County would seek to ensure that moves are made in a timely manner that would reduce overall expenses, inconveniences, and the amount of time a business must be closed during the move. The County does not, however, have programs available for potential displaced property owners beyond the measures provided by the Uniform Relocations Act.

7.2 Availability of Replacement Property

As indicated in the discussion of affected environment (see Chapter 5), the average value of homes in the South Park area is relatively low compared to the average price of a home in the greater Seattle area. Multiple listings for the Seattle area were reviewed in March 2003. They generally indicated that, while single-family homes were available in the South Park area, there were few homes for sale at the time. As such, it may be difficult for displaced persons to find replacement homes within the same community. Available listings do suggest, however, that there would be a greater chance of finding replacement housing at relatively affordable prices ($200,000 or less) in the larger South Seattle area.

The potential availability of commercial (office, retail, and industrial) property within the immediate South Park area is even more limited. Listings for commercial property in the South Park area identified only two properties (both for industrial/warehouse uses) available in March/April 2003. More opportunities were listed within the Greater Duwamish area. Overall vacancies for retail and office space are on the rise, due to increases in supply and reduced demand as economic conditions have declined in the Seattle area. In general, the South Seattle real estate market reflects the current economic slowdown which has resulted in reduced industrial construction and negative absorption rates. Moreover, both retail and office space vacancies had increased from the final quarter of 2002. A slow recovery is predicted, which may influence the availability of existing commercial space (CB Richard Ellis, 2002; EDC, 2002; and Insignia Kidder Mathews, 2002). As the local economy improves, new construction may also be expected to increase the supply of commercial and industrial space in the region.

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Chapter 8 References

CB Richard Ellis, 2002. Fourth Quarter Market Index Briefs for Industrial, Retail, and Office Markets in the Puget Sound Region, Seattle, Washington.

Economic Development Council (EDC) of Seattle and King County, 2002. *Office, Industrial, and Retail Market Summaries (4th Quarter 2002).* At EDC website (www.edc-sea.org.)

Insignia Kidder Mathews, 2003. Available South Seattle Properties (retail, office, and industrial listings). Seattle, Washington,. April 2003,

King County, 2002a. King County Assessor's Records, Real Property Characteristics and Assessor's Maps, Seattle, Washington.

King County, 2002b. King County Department of Transportation, Road Services Division, Public Scoping Meeting Transcript, South Park Bridge Project, February 28, 2002. Seattle, Washington.

Seattle, 2002. *Maps Online: Zoning and Parcel Information*. Seattle Department of Construction and Land Use, Seattle, Washington.

Seattle, 2002. *Table of Net Housing Unit Growth in Urban Centers and Villages*. Seattle Strategic Planning Office, Seattle, Washington.

Seattle Post Intelligencer, 2002. "A Bridge Too Far Gone Badly Needs Rebuilding," January 17, 2002. Seattle, Washington.

Seattle Post Intelligencer, 2002. "City's Attention Turns To Keeping Its Little Mainstreets Healthy," July 22, 2002. Seattle, Washington.

Trammel Crow, 2002. *Market Scope: Puget Sound Region*, Trammel Crow Company, Seattle, Washington.

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Appendix M. Land Use Technical Report

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South Park Bridge Project

Land Use Technical Report

Prepared for the

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February 2004

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Technical Report
South Park Bridge Project

Land Use

February 2004

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Chapter 1 Executive Summary

1.1 Project and Study Objectives

The purpose of the South Park Bridge Project is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge, while maintaining a vital transportation link for cars, trucks, buses, bicyclists, and pedestrians across the Duwamish Waterway.

This land use study evaluates the benefits and adverse impacts on land uses associated with the construction and the long-term use of the five alternatives proposed for the South Park Bridge. The alternatives selected for comprehensive evaluation in the environmental review process include: No Action, Rehabilitation, Bascule Bridge, Mid-Level Fixed-Span Bridge, and High-Level Fixed-Span Bridge alternatives.

1.2 Existing Land Use, Plans, and Policies

Existing land uses are consistent with local zoning which includes Industrial and Manufacturing Industrial zones north of the bridge and General Industrial, Neighborhood Commercial, Multi-Family, Industrial, and Regional Business zones on the south. Zoning is controlled by three jurisdictions in the project area: Seattle, Tukwila, and King County. Land use patterns beyond the immediate project area include similar uses with residential uses south of the Duwamish Waterway and more commercial uses to the north. A combination of residential and commercial uses is found immediately adjacent to the waterway.

A number of plans and policies apply to the project area. The Growth Management Act and Puget Sound Regional Council transportation plans provide broad goals for coordinating land use and transportation facilities. The Seattle and King County comprehensive plans, neighborhood plans, and zoning codes provide additional direction at the local level. The proposed build alternatives would be consistent with regional and local plans and policies that call for improvements to transportation facilities as well as enhanced travel conditions for the movement of goods and services, commute traffic, and general vehicle trips. These alternatives would also provide some, but not complete, agreement with plans and policies linking transportation and land use provisions, as well as plans designating the neighborhood as an urban residential village. Some changes in land uses that could result from the build alternatives would not agree with policies in these plans that are intended to preserve residential and commercial land uses in the local neighborhood. The No Action Alternative would not be consistent with these plans because removal of the existing bridge would diminish local travel opportunities. Where build alternatives result in the displacement of businesses, they would not meet goals and policies intended to provide residential and business opportunities within local urban areas.

1.3 Impacts to Land Uses

Potential land use impacts would range from relatively minor to more extensive depending on the project alternative considered. Future land uses under the No Action Alternative may make it more difficult to achieve the planned urban residential village approach for the neighborhood, especially regarding the long-term viability of remaining businesses after bridge closure. The No Action Alternative would not directly change existing land uses; however, some businesses may not survive if the bridge is closed, as proposed under this option.

The proposed build alternatives would result in altering existing land uses in the project area by removing residences and businesses in the neighborhood commercial zone and converting land to roadway use under the build alternatives. The Rehabilitation Alternative would not affect existing land uses greatly because it would occur largely within the existing right-of-way. The footprint of this alternative would end to the south of S. Sullivan Street and would not affect a large part of the southern project area. The Rehabilitation Alternative would affect uses immediately adjacent to the bridge and waterway. Three parcels would be affected on the south and two parcels on the north. Overall, land use displacements would be minimal. This alternative would displace up to 3 buildings.

The Bascule Bridge Alternative would affect the smallest area of existing uses south of the bridge compared to the other replacement bridge alternatives. Although some residential and business losses may occur, this alternative would have fewer impacts than the other bridge replacement alternatives. Under this alternative, the southern project limits would extend to near S. Cloverdale Street. This alternative would result in displacing up to 5 buildings. It would affect 2 parcels north of the waterway and 5 parcels south of the waterway. Because of the small number of parcels affected, this alternative is not expected to affect adjacent land uses greatly.

The Mid-Level Fixed-Span Bridge Alternative would result in potential land use changes between S. Donovan Street and the south end of the bridge. Business and residential displacements would occur. The impacts of these displacements are described in more detail in the Relocations Technical Report for this project. This alternative would displace up to 12 buildings. It would affect 2 parcels north of the waterway and 12 parcels south of the waterway. Vacated parcels may create opportunities for redevelopment and the number of displaced buildings could lead to different uses in the future.

The High-Level Fixed-Span Bridge Alternative would affect the largest area south of the bridge, resulting in potential land use changes on 14th Avenue S. between S. Trenton Street and the south end of the bridge. This alternative also extends along S. Trenton Street and 12th Avenue S. The alternative would result in the potential displacement of up to 35 buildings. It would affect 2 parcels north of the waterway and 36 parcels south of the waterway, including 7 residences along S. Trenton Street and 12th Avenue S. These local residential streets would be improved to provide new access to 14th Avenue S. Because this alternative would affect the largest area among the bridge replacement

alternatives, it would provide a greater opportunity for new land uses in the future. Table 1 below summarizes land use impacts of the build alternatives.

Table 1. Summary of Impacts of Build Alternatives

Alternative	Parcels Affected	Area Affected	Affects on Land Uses
Rehabilitation	5	0.67 acres	Minor displacements, few land use changes expected
Bascule Bridge	7	1.39 acres	Minor displacements, few land use changes expected
Mid-Level Fixed-Span Bridge	14	2.32 acres	Moderate displacements, some opportunity for new land uses
High-Level Fixed-Span Bridge	38	6.41 acres	Substantial displacements, greater opportunity for new land uses

1.4 Construction Impacts

No immediate impacts related to construction would occur. Future demolition of the existing bridge would result in noise and dust emission increases and vehicle congestion associated with equipment and vehicles operating in the area. The build alternatives would result in varying degrees of congestion, air, and noise impacts on the project area. These impacts would be fairly moderate for the Rehabilitation and Bascule Bridge alternatives. Both Mid-Level Fixed-Span Bridge and High-Level Fixed-Span Bridge alternatives would result in greater construction impacts to the local community, with the High-Level Fixed-Span Bridge Alternative potentially resulting in substantial impacts over a greater area than expected for the other build alternatives.

1.5 Secondary and Cumulative Impacts

Closure of the existing bridge under the No Action Alternative would likely influence future land uses. Some business changes may result and, without the bridge, this alternative may lead to more residential uses in the area.

As a secondary impact, the build alternatives would result in varying opportunities for additional development. The Rehabilitation and Bascule Bridge alternatives would have relatively limited secondary impacts because the area affected under these alternatives would not be great. The Mid-Level Fixed-Span Bridge Alternative could have moderate opportunities for redevelopment depending on the final number of building displacements and how access is provided after construction. The High-Level Fixed-Span Bridge Alternative would have the greatest potential for future redevelopment and changes in the project area because it would alter most of the existing uses along 14th Avenue S.

Cumulative impacts would be relatively the same, although the High-Level Fixed Span Bridge Alternative would have the greatest combined impact because of the larger area affected.

1.6 Mitigation

Potential mitigation measures for land use impacts would be similar under each of the build alternatives. Acquisition of businesses and residences would occur in compliance with existing regulations, and property owners would be compensated at fair market value under the provisions of the Uniform Relocation and Real Property Policies Act of 1970, as amended (Revised Code of Washington, Chapter 8.26). The Relocations Technical Report for this project provides more information on relocation policies and services.

Property owners who would not be displaced should be provided advance notice of potential access or utility disruptions in the project area as a result of construction activities. The project proponent should work with local businesses and residents to minimize disruptions to these land uses during proposed project construction (the Economics Technical Report for this project provides additional information on mitigation for business impacts).

The local jurisdictions should work with the community to determine appropriate redevelopment land uses for parcels acquired for the proposed street and bridge improvements. Future development should be sensitive to community needs and desires, including continuing the viability of the existing business area along 14th Avenue S., provisions for replacement businesses, new access areas, street landscaping, bus shelters or pullouts, and other measures that would create an attractive and accessible environment for retail, service, and residential uses. Potential uses along the riverfront should consider future public recreation and shoreline access opportunities.

The cost effectiveness of implementing individual mitigation efforts under each build alternative has not been determined. Where fewer impacts would occur, however, it would likely be more cost effective to provide mitigation measures than where more impacts and, therefore greater mitigation measures, might be needed.

Chapter 2 Introduction

Chapter 2 is an introduction to the technical analysis contained in this discipline report. This chapter describes existing conditions, the history of the project, the purpose and need for the project, and the five project alternatives being considered for environmental review. In addition, this chapter summarizes project coordination conducted to date with agencies, local governments, the community advisory group, and members of the public.

2.1 Description of Existing Conditions

This first section describes existing conditions pertinent to the proposed South Park Bridge Project. The project area is defined. The existing bridge and its current condition are described. The local roadway network in the South Park community is described. Non-vehicular transportation in the community is also summarized.

2.1.1 The Project Area

The South Park community is about four miles south of downtown Seattle (see Figure 1). The community lies south of the Duwamish Waterway, the man-made channel portion of the Duwamish River as it enters Elliott Bay. Though originally incorporated as its own city in 1905, much of the area was annexed by the City of Seattle in 1907.[1] The project area lies south of the industrial Georgetown area of Seattle and the King County International Airport (known as Boeing Field). It encompasses the roadway corridor defined by 16th Avenue S. between East Marginal Way S. and the South Park Bridge and 14th Avenue S. between the bridge and S. Trenton Street. Residents and business owners in the project area generally identify with the City of Seattle.

The project area, however, is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits of both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Trenton Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company's Plant 2 dominates the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land uses front on 14th Avenue S. and along the south bank upstream of the South Park Bridge. Single-family residences, however, generally characterize the area off of this main transportation artery.

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[1] City of Seattle, *South Park Residential Urban Village Plan*, 1998.

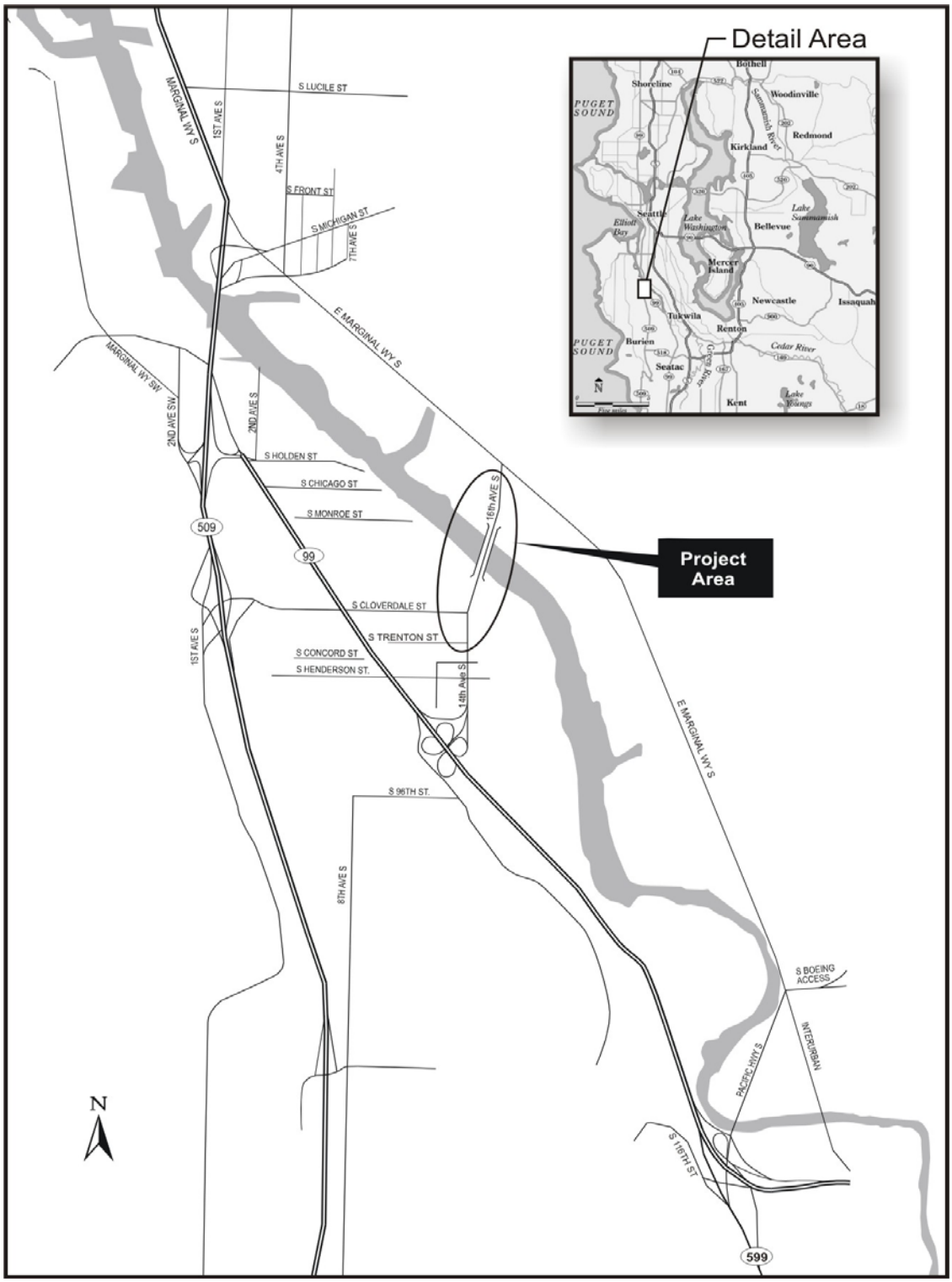

Figure 1
Project Area and Vicinity

2.1.2 The Existing South Park Bridge

The South Park Bridge was constructed in 1929-1931 (see Figure 2). The existing structure consists of a Scherzer rolling-lift double-leaf bascule movable span. Because it is the only operational example of a Scherzer rolling-lift bascule bridge in Washington, the bridge is listed on the National Historic Register.[2]

Each side is flanked by two truss approach spans and twelve concrete slab approach spans. The overall length of the bridge is approximately 1,045 feet abutment-to-abutment and approximately 1,340 feet in entirety to the grade match points. The double-leaf bascule movable span has a center-to-center distance between the front bearing points of approximately 190 feet. The roadway consists of four 9.5-foot lanes. The pavement is 38 feet with 6-foot sidewalks on both sides. Reinforced concrete piers founded on timber piling support the bascule span. Two large in-water piers support the counterweights, track supports, and racks for the rolling lift. The attached towers house the operating machinery, electrical equipment, and operator control room.

The South Park Bridge spans the Duwamish Waterway, which is used for industrial, commercial, and recreational purposes. The bridge is near the upstream limit of heavy industrial uses along the Duwamish Waterway, but it is within the section of the navigation channel maintained by the U.S. Army Corps of Engineers. The existing maximum vertical clearance of the bridge when closed is approximately 34 feet at Mean High Water (MHW). Bridge openings occur approximately three times per day on average to accommodate waterway traffic, although on some days the bridge does not open at all. The existing navigable horizontal clearances is approximately 118 feet at the water level (fender-to-fender), but narrows to 92 feet approximately 114 feet above the water between the open bascule leaves. The depth of the navigation channel is approximately 15 feet at Mean Lower Low-Water (MLLW).

2.1.3 Bridge Condition

In spite of substantial on-going maintenance and repairs, the South Park Bridge has suffered considerable deterioration over the past 70 years. In particular, the bascule piers are cracked and unstable resulting in the misalignment of the movable spans. Consequently, the center lock and glide tracks require on-going modifications and adjustments to allow the bridge to operate properly. Long-term, the stability of the entire bridge is at risk due to the original shallow placement of the supporting piles, which has resulted in movement of the bridge piers over the decades. The condition of the bridge worsened significantly following the Nisqually Earthquake in February 2001, and it remains vulnerable to future seismic events. A 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100

[2] King County Landmarks and Heritage Commission. *Findings and Fact Decision – 14th Avenue South Bridge*, decision made December 19, 1996 and filed January 2, 1997.

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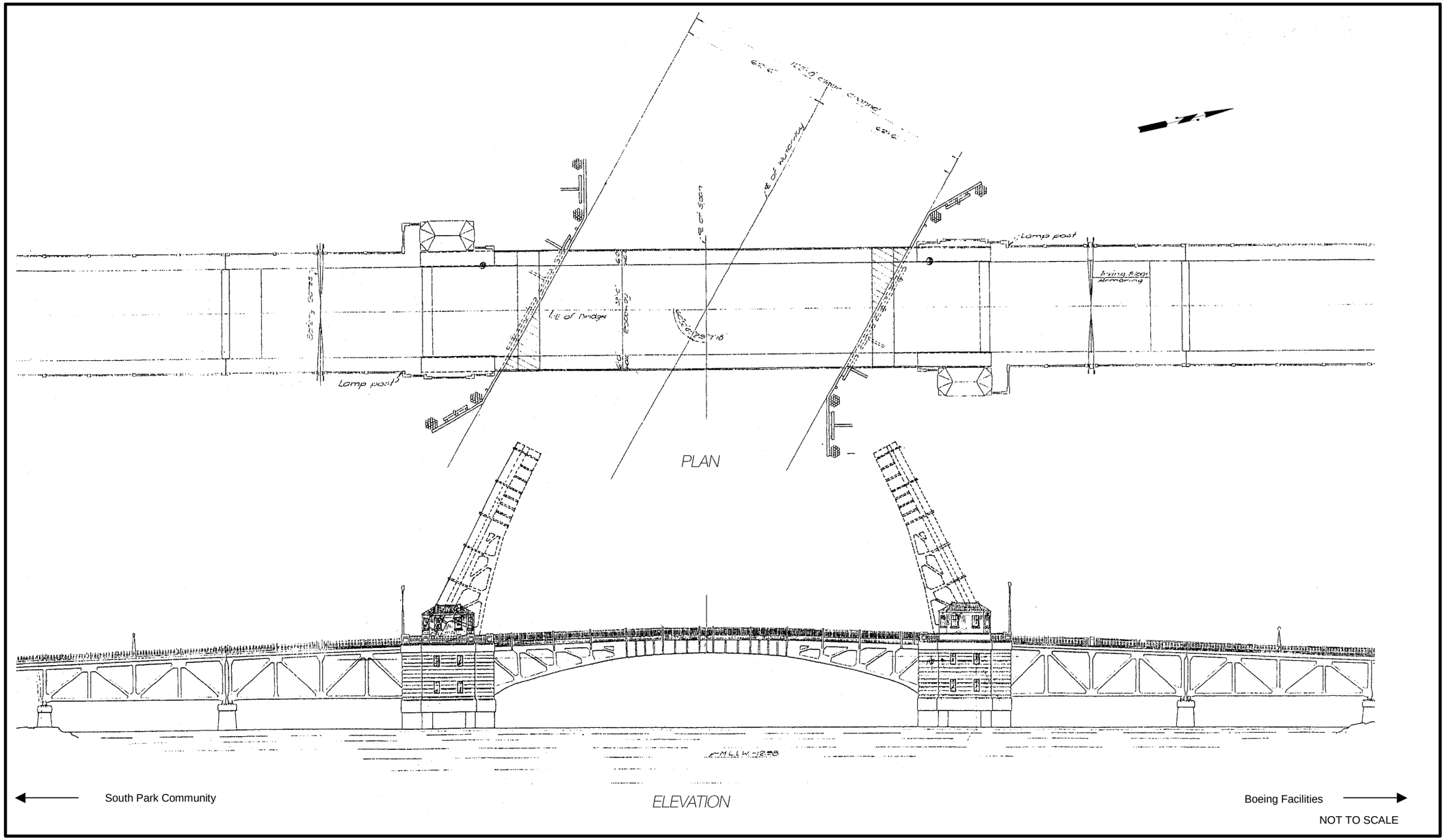

Figure 2
Existing South Park Bridge

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(based on Federal Highway Administration criteria).[3] This was among the lowest ratings given any bridge structure in the State of Washington in 2002.

2.1.4 Roadway Network

The bridge presently accommodates an average daily traffic volume of approximately 20,000 vehicles per day, based on 2001 City of Seattle traffic counts. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For South Park community residents, the bridge is the primary direct means of access to the north, downtown Seattle, and I-5.

The existing roadway network surrounding the South Park Bridge consists of a variety of roadway types. They range from local two-lane streets to major limited-access highways. Regional traffic movement in the South Park area is concentrated to three nearby north-south corridors including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Features such as the Duwamish Waterway and large-scale facilities such as Boeing Field and the Boeing Plant 2 create barriers within the road network and limit opportunities for access to and from the major regional routes.

2.1.5 Freight, Transit, and Pedestrians

Freight movement in peripheral areas of the South Park community is significant due to the high concentration of industrial and manufacturing uses in the general area. Major truck traffic is primarily directed along East Marginal Way S. and SR-99. The South Park Bridge and S. Cloverdale Street are also designated truck routes for oversized vehicles. Trucks use S. Cloverdale Street to access the City of Seattle South Recycling and Disposal Station located at 8105 Fifth Avenue S. as well as SR-509 and SR-99 located on the western edge of the South Park community. With respect to rail movements, the only train crossing in the study area exists immediately south of the intersection of East Marginal Way S. and 16th Avenue S.

Bus routes serving the South Park community are primarily located along major north-south corridors, including East Marginal Way S., 14th and 16th Avenues S., and S. Cloverdale Street. Six major King County Metro bus routes serve the area. Routes 60 and 130 cross the South Park Bridge and four of the six bus routes travel along S. Cloverdale Street.

Pedestrians and bicyclists are commonly seen in the South Park area, especially near the community's center near the intersection of 14th Avenue S. and S. Cloverdale Street. Mid-day pedestrian volumes are higher than the morning or evening commute periods due to shopping, transit use, and lunch-related walking trips.

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[3] King County, *Bridge Inspection Report*, August 1, 2002.

2.2 History of Project

Since 1931, the moveable bridge has crossed the Duwamish Waterway in the South Park community of the City of Seattle. The following sections contain an overview of the studies preceding the start of the current environmental review effort, a summary of two key documents that framed the initial development of project alternatives, and ongoing reports documenting the changing condition of the bridge.

2.2.1 Overview of Studies

In recent history, over 20 engineering studies have been prepared on the South Park Bridge. Starting in 1987, when the bridge was 56-years-old, King County contracted for the preparation of a general engineering investigation report to assess the condition of the bridge. In 1991 and 1993, additional studies were completed including a geotechnical study, foundation design report, and a life-cycle cost analysis. This information led King County to undertake a series of studies in 1994 addressing liquefaction risks as well as the condition of the concrete, substructures, approach span joints and loading rating. In addition, a study was conducted to evaluate potential replacement alternatives for the bridge and another study investigated community issues related to the bridge. Since 1994, King County has recognized that the bridge required either rehabilitation or replacement and has continued to investigate the condition and vulnerabilities of the bridge in an effort to evaluate these options.

2.2.2 Summary of Key Engineering Reports

Two key engineering studies were conducted that helped to frame the current pursuit to evaluate potential alternatives to rehabilitate or replace the South Park Bridge. A 1994 Sverdrup study evaluated potential design options and a 1999 Entranco study researched and presented the likely steps required to conduct the necessary environmental review of the project alternatives and to complete necessary permitting. These studies are summarized below.

2.2.2.1 Sverdrup Study

In November 1994, Sverdrup Civil, Inc. completed a report titled *14th/16th Avenue South Park Bridge Rehabilitation/Replacement – Design Report* for the King County Department of Public Works. The objective of that report was to evaluate alternative alignments and bridge types, impacts of the alternatives studied and to present to King County results, findings, conclusions, and recommendations of a preferred replacement bridge for the existing South Park Bridge.

The 1994 design report studied five alternatives: rehabilitation of the existing bridge; two fixed-span bridge replacements (a 100-foot vertical clearance bridge and a 60-foot vertical clearance bridge); a new moveable bridge (double-leaf bascule bridge); and bridge closure (permanent closure and demolition of the existing bridge). Other alternatives that had been evaluated but were not carried forward, according to this report were: locating the replacement bridge immediately east (upstream) of the existing

alignment; matching the existing alignment; and locating the northbound and southbound lanes on separate structures. These three alternatives were not considered feasible and thus were not studied further.

The 1994 design report concluded that the 60-foot vertical clearance fixed-span bridge design could be used to replace the existing South Park Bridge, with consideration of mitigation of impacts to some users.

2.2.2.2 Entranco Study

In July 1999, Entranco completed the *16th Avenue S. Bridge Replacement Project: Environmental Review Report* for the King County Department of Transportation. The objective of this report was to present to King County a summary of environmental review and permitting activities that would likely be required for replacing the bridge.

The report identified the proposed project as a replacement of the existing bridge, including improvements to the approach road – 14th Avenue S. to the south and 16th Avenue S. to the north of the Duwamish Waterway. The project limits were identified as East Marginal Way S. on the north and S. Cloverdale Street on the south. The report asserted three build alternatives should be selected for evaluation in the EIS, including alternatives with differing alignments and bridge types. It was further noted that three alternatives would be the least number needed to provide a reasonable range of alternatives under National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations.

Entranco outlined the various tasks that would be required under the WSDOT Environmental Procedures Manual and Federal Highway Administration (FHWA) guidelines. The report identified these tasks to include the following: the development of bridge alternatives, screening, and selection of alternatives for analysis in the EIS; preliminary engineering design, including an update to the1994 rehabilitation/replacement report; survey and mapping work; hydraulic and geotechnical studies, and conceptual-level design documentation. The report concluded that the alternatives proposed, including rehabilitation of the existing bridge, had not been designed in enough detail to make a decision regarding a preferred alternative. Related to the environmental review process, the report recommended the public involvement program include coordination with an Interdisciplinary Team (IDT) of agency representatives and a community advisory committee. The report also listed 17 specific environmental discipline reports that would likely be required for the preparation of the EIS.

The findings and recommendations presented in the Entranco report formed the basis from which King County staff developed the current contracted scope of work for environmental review. The scope includes engineering, environmental review, agency coordination, and public involvement tasks.

2.2.3 Continuing Deterioration

Since 1999, King County has continued to move forward to develop alternatives for rehabilitating or replacing the existing South Park Bridge. Bridge conditions have worsened since the engineering studies were conducted in the mid-1990s. In February 2001, the Puget Sound Nisqually Earthquake caused significant and widespread damage to the bridge. Over $740,000 was required to repair the bridge in order to keep it operational.[4] The King County 2001 bridge inspection report recorded a rating of 8.0 out of a total possible score of 100 (based on FHWA criteria).[5] The following year, this rating decreased to 6.0.[6]

2.3 Purpose and Need of Project

As a required element of the EIS, a Purpose and Need Statement was developed for the South Park Bridge Project to clarify the underlying basis for the proposed action. The development of the initial draft Purpose and Need Statement involved review and comment by a number of parties including King County staff and the Project Advisory Committee (PAC) that includes agencies with jurisdiction over the proposed project. The draft Purpose and Need Statement was also revised based on comments received at several public involvement events. In April 2002, King County forwarded the draft Purpose and Need Statement to the Federal Highways Administration (FHWA) for review and approval. The text of the FHWA-approved version of the Propose and Need Statement is presented in the following sub-sections, although minor revisions and footnotes have been included for clarification.

2.3.1 Function and Role of the South Park Bridge

The King County Department of Transportation (KCDOT) is proposing the rehabilitation or replacement of the South Park Bridge located in King County, Washington. Since 1931 the moveable span bridge has carried traffic along the 14th Avenue South and 16th Avenue South corridor across the Duwamish Waterway. On a typical workday, a mix of approximately 20,000 cars, trucks and buses use the bridge to access employment centers in downtown Seattle and the Duwamish industrial area. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For residents of the community of South Park, the bridge is the only immediate means of access to and from destinations east of the community. The moveable structure spans the navigation channel of the Duwamish Waterway. When open, large-size industrial and recreational vessels have access to upriver destinations. The South Park Bridge is also a major route for heavy truck traffic traveling to and from large industrial manufacturers including the Boeing Company.

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[4] Time Lane, King County Department of Transportation, Telephone Conversation, September 23, 2002.

[5] King County, *Bridge Inspection Report*, August 21, 2001.

[6] King County, *Bridge Inspection Report*, August 1, 2002.

2.3.2 Purpose of Proposed Project

The purpose of the proposed action is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge. The proposed action must also maintain the vital transportation linkage for cars, trucks, buses, bicyclists and pedestrians across the Duwamish Waterway.

2.3.3 Need for the Proposed Project

In spite of substantial ongoing maintenance and repairs, the South Park Bridge has suffered substantial deterioration over the past 70 years. Existing problems with the bridge worsened significantly following the Nisqually Earthquake in February 2001 and the bridge remains vulnerable to future seismic events. A recent 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on FHWA criteria).[7] This is among the lowest ratings given any bridge structure in the State of Washington.

The bridge could be closed as a consequence of excessive structural deterioration or failure of the moveable span operations (particularly in the event of another seismic event). Closure of the bridge would have a significant impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area-- including SR-99, SR-509, First Avenue S. and East Marginal Way S. Improvements are required in the near future to protect public safety and to maintain a transportation corridor that is critical to the local and regional economy.

2.3.3.1 Seismic Vulnerability

The February 28, 2001 Nisqually earthquake (magnitude 6.8, located 35 miles from Seattle and deep below the surface) caused significant damage to the South Park Bridge. Since the earthquake, operation of the moveable span has been less reliable, requiring the bridge to be closed for repairs intermittently for several days. The continuing periodic closure of the bridge for repairs has heightened the awareness of the need for rehabilitation or replacement of the existing bridge.

2.3.3.2 Roadway Design Deficiencies

The South Park Bridge does not meet current roadway design standards and has many design deficiencies. For example, the overall bridge width including lane widths, shoulders and sidewalks should be 64 feet according to current design standards. The existing bridge width is currently only 52 feet (measured outside-to-outside).

2.3.3.3 Transportation Issues

An average of 20,000 daily vehicle trips cross the Duwamish Waterway on the South Park Bridge. It is a significant link between the east and west side of the Duwamish, both locally and regionally. The South Park Bridge is also a route for heavy and oversize truck

[7] The original text of the FHWA-approved Purpose and Need Statement cited the condition rating of 8.0 from the 2001 King County Bridge Inspection Report. The current cited condition rating of 6.0 is from the King County *Bridge Inspection Report* dated August 1, 2002.

traffic. According to previous studies, closure of the bridge would have a significant noticeable impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area – including the Highway 99 and East Marginal Way S. corridors.

2.3.4 Key Issues

2.3.4.1 Community Impacts

The existing South Park Bridge is a highly valued feature of the South Park community. There is widespread concern in the community that changes to the bridge could have a significant adverse impact on the community and the emerging economic vitality of the South Park business district centered along 14th Avenue South. The *South Park Residential Urban Village Plan of 1998* (the neighborhood plan) identified one of its primary objectives as "finding a solution for the South Park Bridge that is sensitive to the needs of the community."

The South Park community is also ethnically diverse. Approximately 30 percent of the populations' primary language is not English. These factors require greater emphasis on the consideration of environmental justice[8] in order to ensure that the potential adverse effects from the proposed project do not have a disproportionate impact on lower-income or minority populations.

2.3.4.2 Aquatic Habitat Protection

The Duwamish Waterway is an important route for juvenile and adult salmon migrating between the upper Green River, Elliott Bay and the Pacific Ocean. However, much of the waterway in the vicinity of the South Park Bridge currently provides poor habitat for chinook salmon (listed as threatened under the Endangered Species Act) and other marine organisms. The armored shoreline along the waterway in the project area provides minimal habitat for young chinook salmon during their critical rearing period. Recovery plans now underway for threatened and endangered salmon will address potential means of enhancing habitat favorable to the survival and growth of young salmon from the Duwamish/Green River system. Restoration of the shoreline in the vicinity of the project would address immediate and long-term needs for habitat improvement along the Duwamish Waterway.[9]

2.3.4.3 Duwamish Waterway Navigation

The Duwamish Waterway is used for industrial, commercial and recreational purposes. The South Park Bridge is near the upstream limit of heavy industrial uses along the waterway, but it is within the section of the waterway maintained by the U.S. Army

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[8] Environmental justice concerns the need to avoid disproportionate, significant adverse impact on minority and/or low-income communities.

[9] This section highlights the importance of addressing aquatic habitat values in the project area, as well as the implications for species currently listed under the ESA; however, it is not intended as a complete characterization of the factors that need to be considered in this regard.

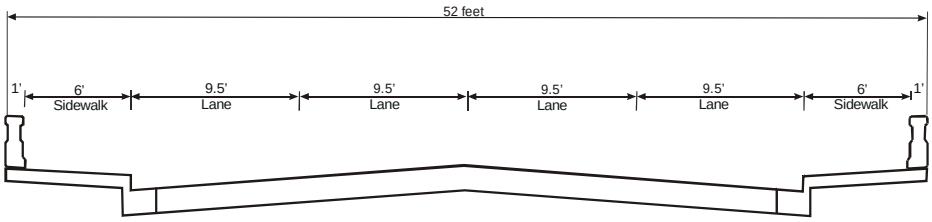
Corps of Engineers as a navigation channel. A number of local businesses, as well as the U.S. Coast Guard, have emphasized to King County that any engineering solutions for the South Park Bridge must maintain navigational access upstream of the existing bridge.

2.4 Description of Alternatives

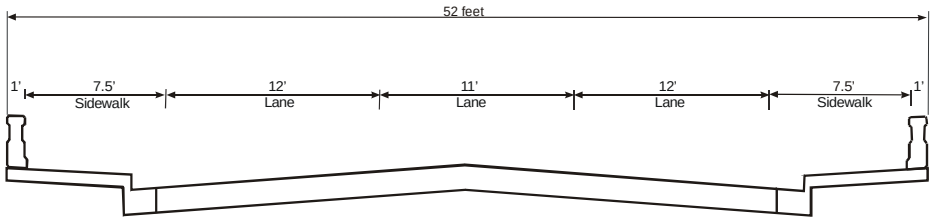
This section describes the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives (Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives). The first section explains the transportation engineering criteria and standards used to design the Rehabilitation Alternative and the three replacement bridge alternatives. The second section describes the horizontal and vertical profile of the bridge alternatives, navigation channel clearances, and impacts to the local road network. The last section describes construction activities associated with each of the five alternatives for the South Park Bridge Project.

2.4.1 Design Criteria

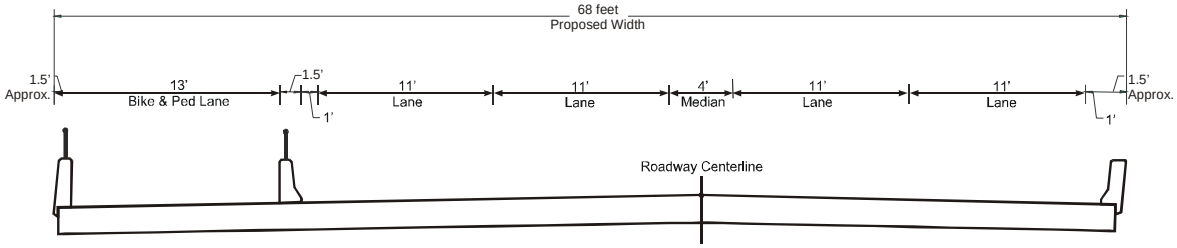
Except for the No Action Alternative, construction of any of the project alternatives would incorporate current transportation engineering design criteria for the cross-section, alignment, design speed, maximum grade, and transition segment. The road cross-section design is a key design element that would change for any of the build alternatives (see Figure 3). The existing bridge cross-section incorporates four 9.5-foot travel lanes, raised curbs on both sides of the pavement, and a 6-foot sidewalk on either side of the roadway. The outside-to-outside dimension of the existing bridge is 52 feet. These lane widths are non-standard and would be changed for the Rehabilitation Alternative and for the three replacement bridge alternatives. For the Rehabilitation Alternative, the pavement would remain approximately the same width as it is currently, but would be reconfigured for three standard lanes. There would be two 12-foot lanes on the outside and one 11-foot lane in the middle of the roadway. Traffic would use one 12-foot lane for northbound travel and the other two lanes for southbound travel. The 6-foot sidewalk on either side of the roadway would be enlarged to approximately 7.5 feet. In contrast, each of the replacement bridge alternatives would be designed with four standard 11-foot lanes, traffic barriers or a painted median down the center, a traffic barrier on each side of the pavement, and a single combined 13-foot pedestrian/bike path on the west (downstream) side of the bridge. The width of the cross-section for the new replacement bridge alternatives including the exterior barriers would total approximately 68 feet (outside-to-outside of the bridge structure).



Existing Bridge



Rehabilitation Alternative



Bridge Replacement Alternatives

Not to Scale

Figure 3
Existing and Proposed
Bridge Cross-Section Designs

An initial range of potential bridge alternatives and alignments was considered based on earlier studies,[10] current input from stakeholders, and the project team. During the course of this initial alternatives development process, it was determined that there were no practical alternative alignments for a replacement bridge other than to parallel the existing bridge. It was determined that replacement bridge alternatives should be aligned to the west (downstream) of the existing bridge in order to minimize impacts to existing land uses. Conceptual engineering for the replacement bridge alternatives set the alignment for these bridges at approximately 80 feet to the west of the centerline of the existing bridge (i.e., as close to the existing structure as practicable without compromising constructability). The initial alignment of the new roadway was the same as the existing road alignment on the south side of the waterway. The existing roadway is quite narrow. Matching the centerline of the new bridge alternatives to the existing would require acquisition of both land and buildings on both sides of 14th Avenue S. To minimize these impacts, the alignment of the new transition segment was shifted slightly to the east of the existing road alignment because there are fewer parcels and buildings located on the east side of the road compared to the west. In addition, more of the buildings located on the east side are set back from the existing sidewalk than on the west side. In this way, the proposed alignment for the replacement alternatives has been developed to avoid or minimize potential land use and relocation impacts.

Other design factors affecting impacts to adjacent properties include the new bridge's design speed and maximum grade. King County road standards call for a 35 mph design speed and a maximum of 8 percent grade. Initially, these standards were incorporated into each of the alternatives. Implementation of an 8 percent maximum grade for the High-Level Fixed-Span Bridge Alternative, however, would have resulted in a very long bridge (project terminus to terminus). For example, the north terminus would have extended across East Marginal Way S. and into Boeing Field. To reduce impacts to land use, the maximum grade for the High-Level Fixed-Span Bridge Alternative would need to slightly exceed 8 percent. In this manner, the north side of the bridge would terminate south of East Marginal Way S. This grade change reduced the overall length of the bridge on both south and north ends of the bridge by several hundred feet for the High-Level Fixed-Span Alternative.

Community impacts would also be affected depending on the design of the transition segment. This is the segment of the roadway that merges the differing widths of the new roadway and the existing narrow roadway. Typically, transition segments begin at the point the grade of the bridge matches the grade of the existing roadway and extends beyond some distance. The actual rate at which the width of the roadway is reduced is defined by transportation engineering design standards. To minimize impacts to land uses along 14th Avenue S., King County proposes to start the transition segment from the abutment for all alternatives. This means that by the time the bridge matches the grade of the existing roadway, the width of the new bridge is nearly the same width as the existing road. As a result, the total length of the roadway is reduced potentially several hundred

[10] Entranco, Inc., *Environmental Review Report: 16th Avenue S. Bridge Replacement*, July 1999.

feet in length. In addition, the width of the transition segment for the Mid-Level Fixed-Span Alternative is further reduced by having the single combined 13-foot pedestrian/bike path split off from the main bridge structure at approximately S. Orr Street and descended to ground level in a zigzag fashion. This design modification further reduced the overall impact of the Mid-Level Fixed-Span Alternative.

Together, the design criteria discussed in this section would allow for the construction of a replacement bridge that provides increased safety for vehicles, bicyclists, and pedestrians.

2.4.2 The Alternatives

A total of five alternatives were selected for evaluation in the environmental review process including: the No Action Alternative, the Rehabilitation Alternative, the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative, and the High-Level Fixed-Span Bridge Alternative. These alternatives were selected from an initial group of nine preliminary project alternatives.[11] The alternatives proposed for evaluation in the environmental review process were selected because they had fewer potential impacts than the other preliminary alternatives. Based on comparison ratings for seven evaluation criteria (regional mobility, local access, navigation, community impacts, aquatic habitat, construction impacts, and estimated project costs), the following preliminary alternatives were dropped from further consideration: a low-level fixed-span bridge, a movable swing bridge, a vertical lift movable bridge, and a tunnel option. The following sections describe each of the proposed project alternatives to be considered in the environmental review process based on conceptual civil and structural engineering.[12, 13]

2.4.2.1 No Action Alternative

The No Action Alternative assumes that the existing bridge structure's poor condition would require it to be closed at some time in the future. Deterioration due to use could allow the bridge to continue to operate for the foreseeable future, but at some time in the future, the bridge would need to be closed. As such, for purposes of environmental review, it is assumed the existing bridge would be closed permanently sometime before 2027.

However, the bridge could be closed for other reasons than simply deteriorated condition. Another earthquake could cause an unexpected emergency closure of the bridge at any time. The on-going movement of the bridge foundations could eventually cause the moveable spans to become misaligned to the extent that repairs would be infeasible. Or,

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[11] Parsons Brinckerhoff. *South Park Bridge Project: Summary Technical Memo - Alternatives Development and Screening*, September 6, 2002.

[12] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

[13] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

the cost of maintaining the bridge could become more than King County is willing to expend. Under any of these circumstances, the bridge would be closed.

When closed, no vehicular, bicycle, or pedestrian traffic would be allowed to use the bridge. As a navigable waterway, the U.S. Coast Guard regulates bridges that span waterways such as the Duwamish Waterway. If the bridge were no longer operating, the U.S. Coast Guard regulations would require demolition and removal of the bridge. With no structures remaining, there would be no potential navigation obstructions in the Duwamish Waterway.

Under this alternative, there would be no change in the local street network except 14th and 16th Avenue S. would be dead-ended on both the south and north shores of the Duwamish Waterway. Figure 4 shows the existing local street network and Figure 5 shows the local street network following the removal of the existing bridge in the No Action Alternative. As the road does not currently provide direct access to the adjacent Boeing Company properties, the exact location of the road closure on the north side would need to be negotiated with Boeing as well as the owner of the railroad tracks immediately south of East Marginal Way S. In addition, the site of the removed bridge would be restored.

2.4.2.2 Rehabilitation Alternative

For the Rehabilitation Alternative, much of the existing bridge structure would need to be replaced. The existing steel trusses of the approach spans and the bascule leaves would be refurbished and reused. The mechanical and electrical operating systems would be refurbished and/or replaced. Studies have confirmed the existing bridge piers are gradually shifting because the foundation pilings were not originally driven to a sufficient depth. Although the initial goal was to rehabilitate the existing piers, the design team's structural analyses determined that the existing bascule piers and truss approach span piers must be replaced in order to ensure the long-term (approximately 75 years) integrity of the bridge. If the bascule piers were reconstructed, the longevity of the Rehabilitation Alternative would be similar to the expected minimum life of a new bridge structure.

For the Rehabilitation Alternative, the new bascule piers are proposed to be approximately the same size, location, and historic character as the existing piers (see Figure 6). To construct the new bascule piers, the bascule leaves and steel approach spans would need to be removed. The steel truss elements of the bridge structure would be taken to another site for repair, refurbishment, and/or painting before they are re-installed following the construction of the new piers. The concrete shafts or pilings supporting the foundations of the new piers would extend below the existing pilings to a depth beneath the riverbed where stable soils exist. The removal of the steel truss spans would also allow for replacement of the steel approach piers. The concrete approach spans and bridge abutments would be replaced and the bridge deck would be reconstructed. Like the existing bridge, there would be piers both on land and in the water. The first on-land piers would be only an estimated 20 feet from the top of the south embankment and the closest in-water piers would be approximately 20 feet from the top of the embankment. The piers on the north shoreline would extend through the

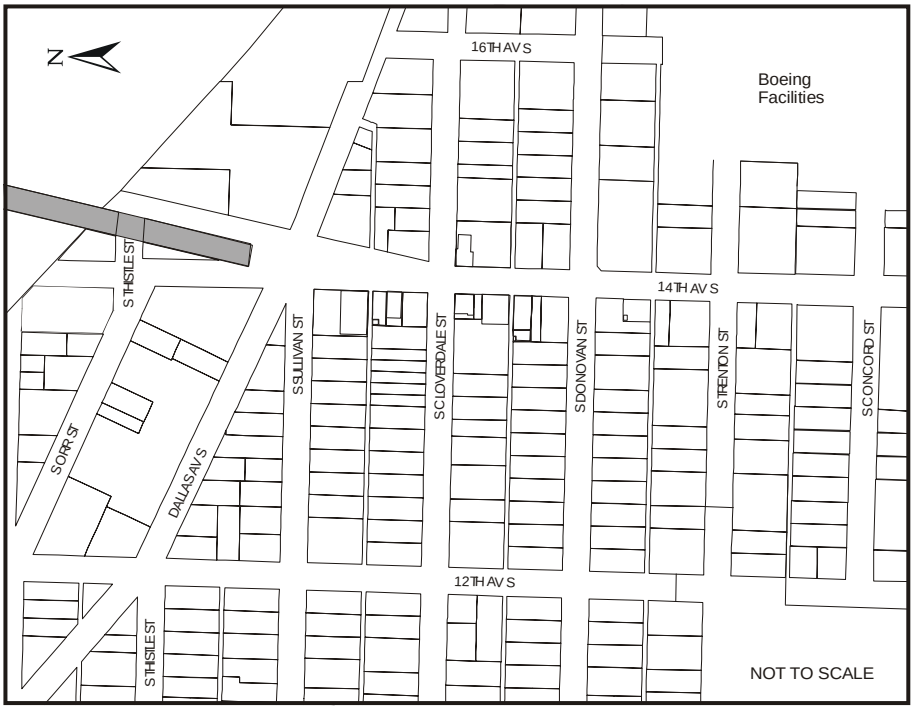

Figure 4
Existing Conditions Street Network

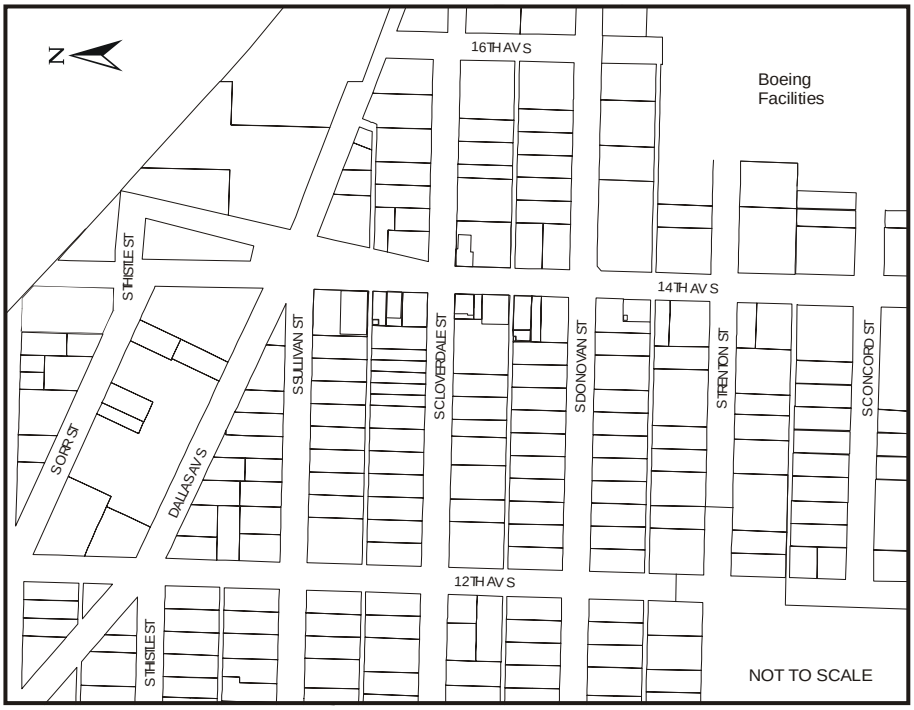

Figure 5
No Action Alternative Street Network

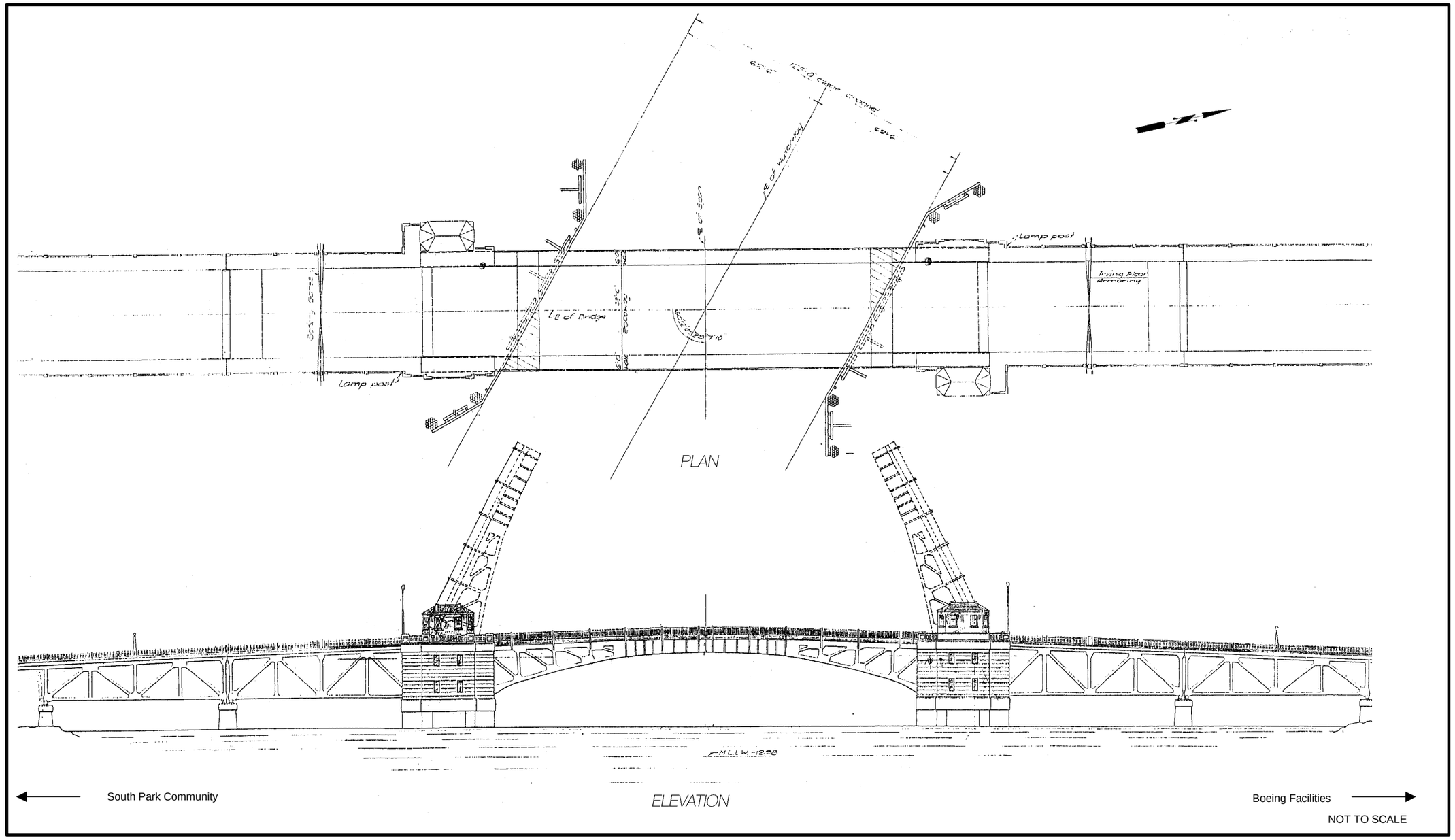

Figure 6
Rehabilitation Alternative

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existing Boeing dock. The conceptual engineering analysis also determined that the mechanical and electrical systems should be replaced. Any required construction activities, including replacement of the bridge railings, bridge tender towers, and lamp posts, would be done in a manner that preserves the historic character of the existing bridge to the greatest extent possible.

To meet current roadway design standards, the new bridge deck would remain approximately the same as the existing, but the pavement would be striped to accommodate three standard traffic lanes. Bicycle and pedestrian traffic would continue to be able to use the bridge via a 7.5-foot pedestrian path on each side of the bridge.

Following construction, the existing 118-foot navigable channel width would be preserved so existing waterway users would be able to continue to use the navigation channel to travel upriver of the South Park Bridge. The extended closure of the bridge during construction, however, would have a significant temporary impact on access to the South Park community.

Following construction, there would be only slight changes in the local street network. Figure 7 shows the local street network in the South Park community following construction activities for the rehabilitation of the existing bridge. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. (For comparison, Figure 8 shows the local street network following the construction of the Bascule Bridge Alternative.) To improve vehicular safety, S. Sullivan Street would intersect Dallas Avenue S., which would become the main cross street intersection with 14th Avenue S. The 16th Avenue S. (immediately east of the bridge) intersection with Dallas Avenue S. as well as 14th Avenue S. may also need to be reconfigured. Access to points north via the South Park Bridge would be maintained.

2.4.2.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the construction of a new movable bridge immediately downriver of the existing bridge (see Figure 9). The bridge mechanism could be a Scherzer rolling lift type (no longer a common design for new movable bridges) or another type. The bridge length would be approximately 935 feet from abutment-to-abutment, not including roadway approaches. Road improvements would extend from a point just north of S. Cloverdale Street on the south side of the waterway and north to a point opposite the northeast corner of Boeing Building 2-15. The interior walls of the bridge abutments would be approximately 200 feet from the top of the embankment, or approximately 50 feet closer to the shore than the existing bridge. With fewer piers than the existing bridge, the first on-land piers of this alternative would be approximately 55 feet from the top of the south embankment at the shortest distance and the closest in-water piers would be approximately 65 feet away. On the north shoreline, the closest in-water piers would be approximately 95 feet from the top of the embankment and the closest on-land piers would be approximately 30 feet away. Unlike

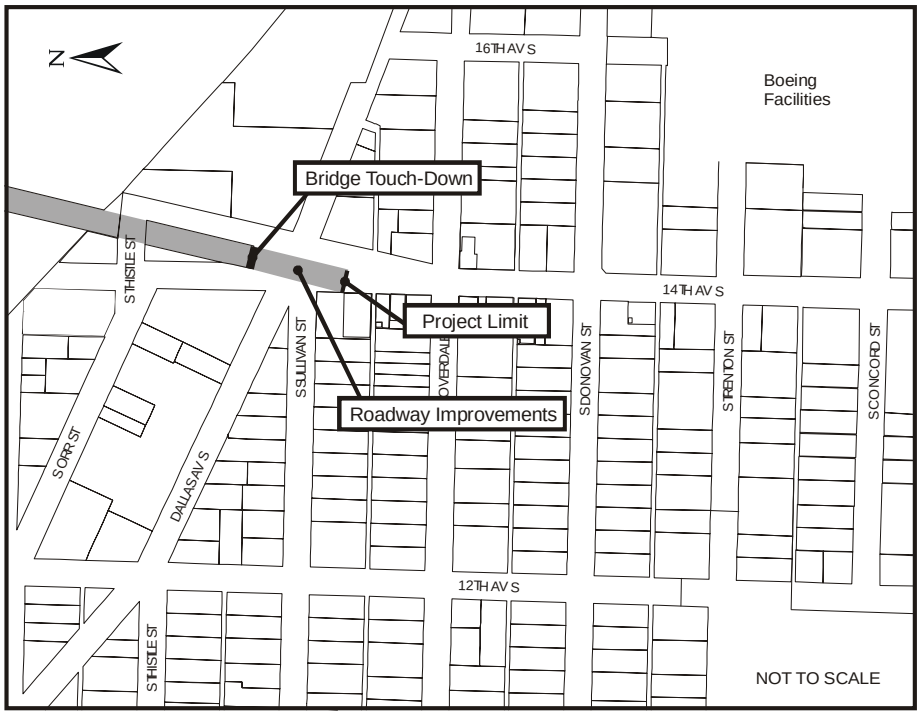

Figure 7
Rehabilitation Alternative Street Network

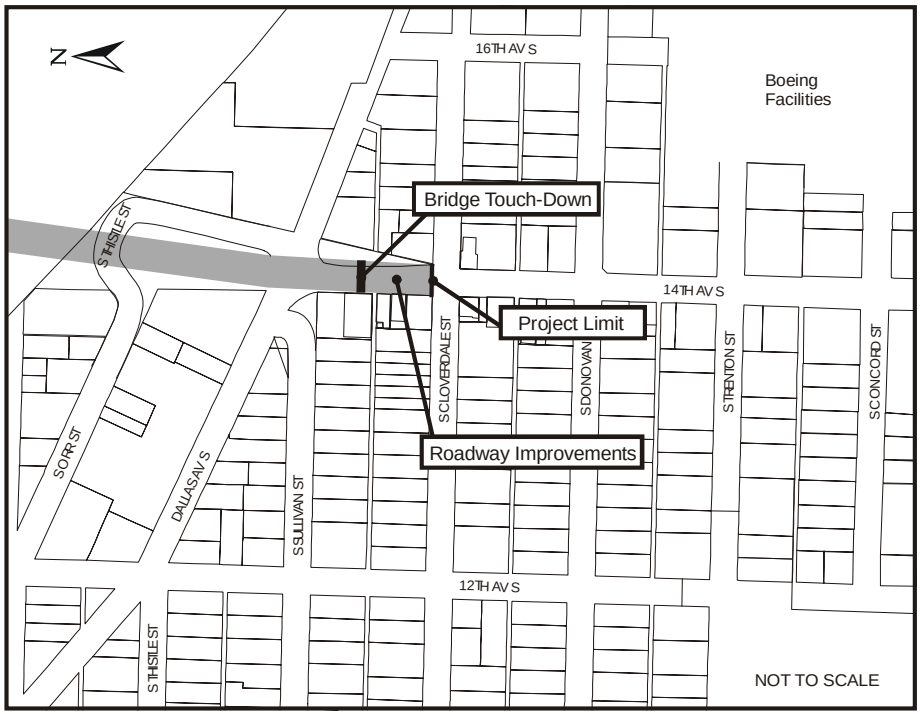

Figure 8
Bascule Bridge Alternative Street Network

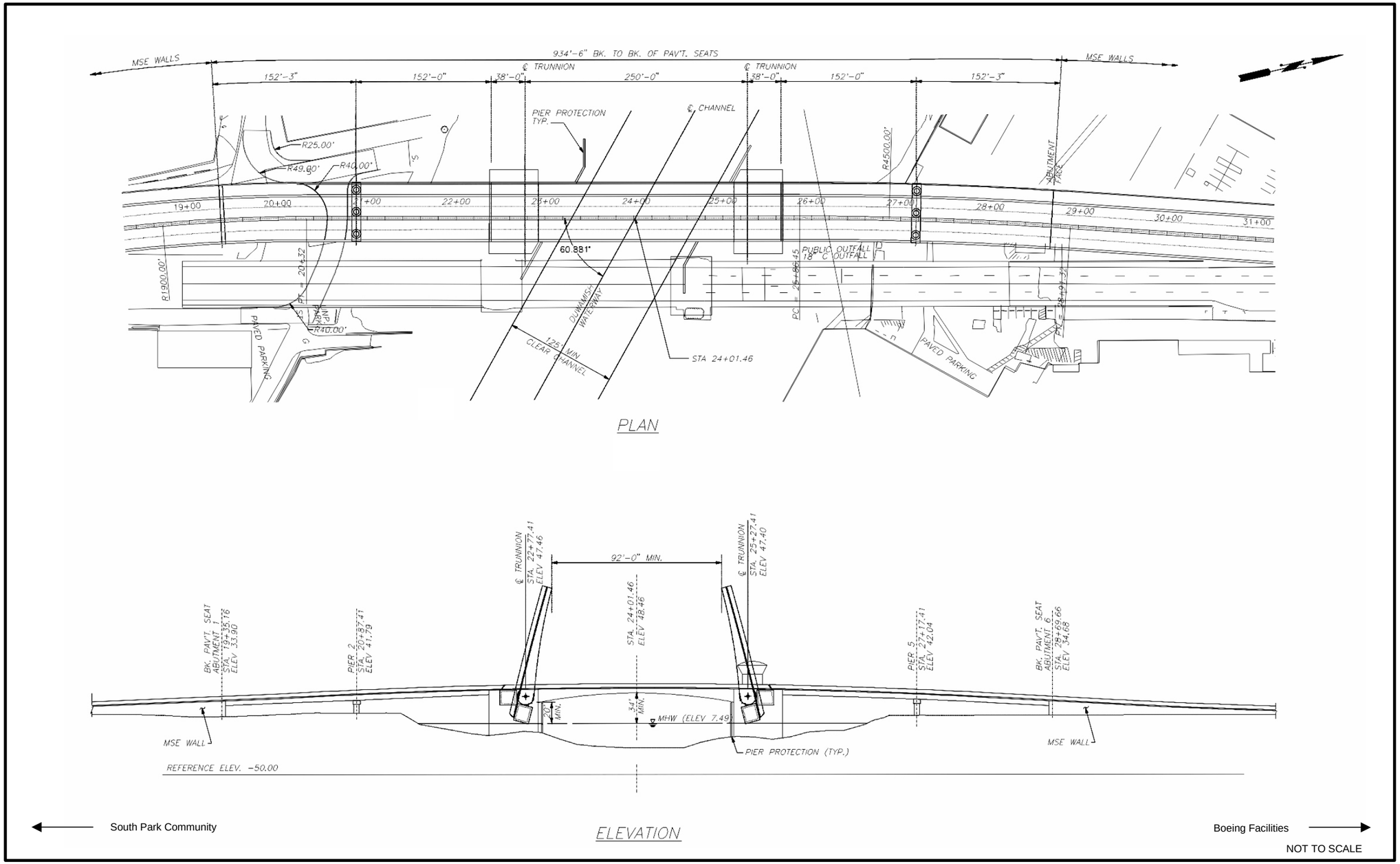

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Figure 9
Bascule Bridge Alternative

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the existing bridge's grated bascule leaves, the bridge deck of the bascule leaves would be solid surface to improve vehicle traction and to control stormwater runoff.

Similar to the existing bascule bridge, this bridge profile would be approximately 34 feet above the Duwamish Waterway when in the closed position. The mid-section span would be comprised of two movable leaves that could be raised to open the bridge. The navigation channel would be approximately 125 feet in width (slightly greater than the existing 118-foot-wide channel). This two-leaf bascule bridge would not impose limitations to the height of waterway users passing the bridge, because the new bridge would be approximately 125 feet between the tips of the raised spans.

Following construction, there would be some change in the local street network (see Figure 8). S. Sullivan Street would be permanently closed or reconfigured to improve traffic safety and vehicular and truck turning movements from the new bascule bridge to Dallas Avenue S. S. Sullivan Street would no longer have direct access to 14th Avenue S. and the bridge. The intersection of 16th Avenue S. (immediately east of the bridge) and Dallas Avenue S. may also need to be reconfigured. To ensure adequate vertical clearance for vehicles, S. Thistle Street would need to be slightly realigned further to the north and closer to the Duwamish Waterway. This figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. Access to points north via the South Park Bridge would be maintained. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the construction of a non-movable bridge (see Figure 10). The bridge length would be approximately 1,660 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 550 feet from the top of the Duwamish Waterway embankment, or 300 feet further setback than the existing bridge. The closest on-land piers would be approximately 85 feet from the south embankment and the closest in-water piers would be approximately 100 feet away. On the north side, the closest in-water piers would be approximately 130 feet from the top of the embankment and the closest on-land piers would be approximately 65 feet away. Road improvements would extend slightly north of S. Donovan Street and north to a point approximately 320 feet south of East Marginal Way S.

The mid-point of the bridge profile across the Duwamish Waterway would be approximately 65 feet above MHW of the Duwamish Waterway. The horizontal clearance would be approximately 125 feet, or slightly greater than the existing clearance. The vertical clearance, however, would restrict use of some waterway traffic, including some tugs and barges. Most vessels that currently pass the existing bridge would continue to be able to use the navigation channel. As described earlier in the discussion of the design considerations, the width of the new mid-level bridge is reduced

when the bike-pedestrian path is separated from the elevated approach roadway near the south side abutment. This design feature reduces land use and relocation impacts.

Following construction, there would be changes in the local street network (see Figure 11). (For comparison, Figure 12 shows the local street network following the construction of the High-Level Fixed-Span Bridge Alternative.) The location of the south abutment and its vertical clearance would require modification of Dallas Avenue S. and S. Sullivan Street. S. Sullivan Street would likely be merged into Dallas Avenue S. just west of the new structure and a new roadway would be constructed under the new bridge. The alignment of this roadway would be slightly to the north to ensure it would have a minimum allowable vertical clearance. Neither street would have direct access to the new South Park Bridge. Figure 11 also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on the both sides of 14th Avenue S. for the majority of the distance between S. Sullivan Street and S. Cloverdale Street. Traffic would be able to access the bridge at S. Cloverdale Street, which would be raised a maximum of approximately 5 feet at the intersection to meet the descending grade of the bridge. This change in the intersection would allow traffic on S. Cloverdale Street to continue to have direct access to 14th Avenue S. though a retaining wall would also need to be constructed around the four corners of the intersection of S. Cloverdale Street and 14th Avenue S. due to the grade change. S. Orr Street would be closed due to the location of the support structures for the proposed separated pedestrian/bike path, which would allow bicyclists and pedestrians to descend from the bridge level to the street level. In addition, S. Thistle Street would be closed as it would no longer be able to connect to S. Orr Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative is a non-movable bridge (see Figure 13). The bridge length would be approximately 2,332 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 900 feet from the top of the Duwamish Waterway embankment, or 650 feet further set back than the existing bridge. The on-land and in-water piers of this alternative are approximately in the same location as proposed for the Mid-Level Fixed-Span Bridge Alternative. Road improvements would extend from S. Trenton Street and continue north to East Marginal Way S. This alternative would require minor modification of the 16th Avenue S. East Marginal Way S. intersection and of the existing railroad track crossing immediately south of this intersection.

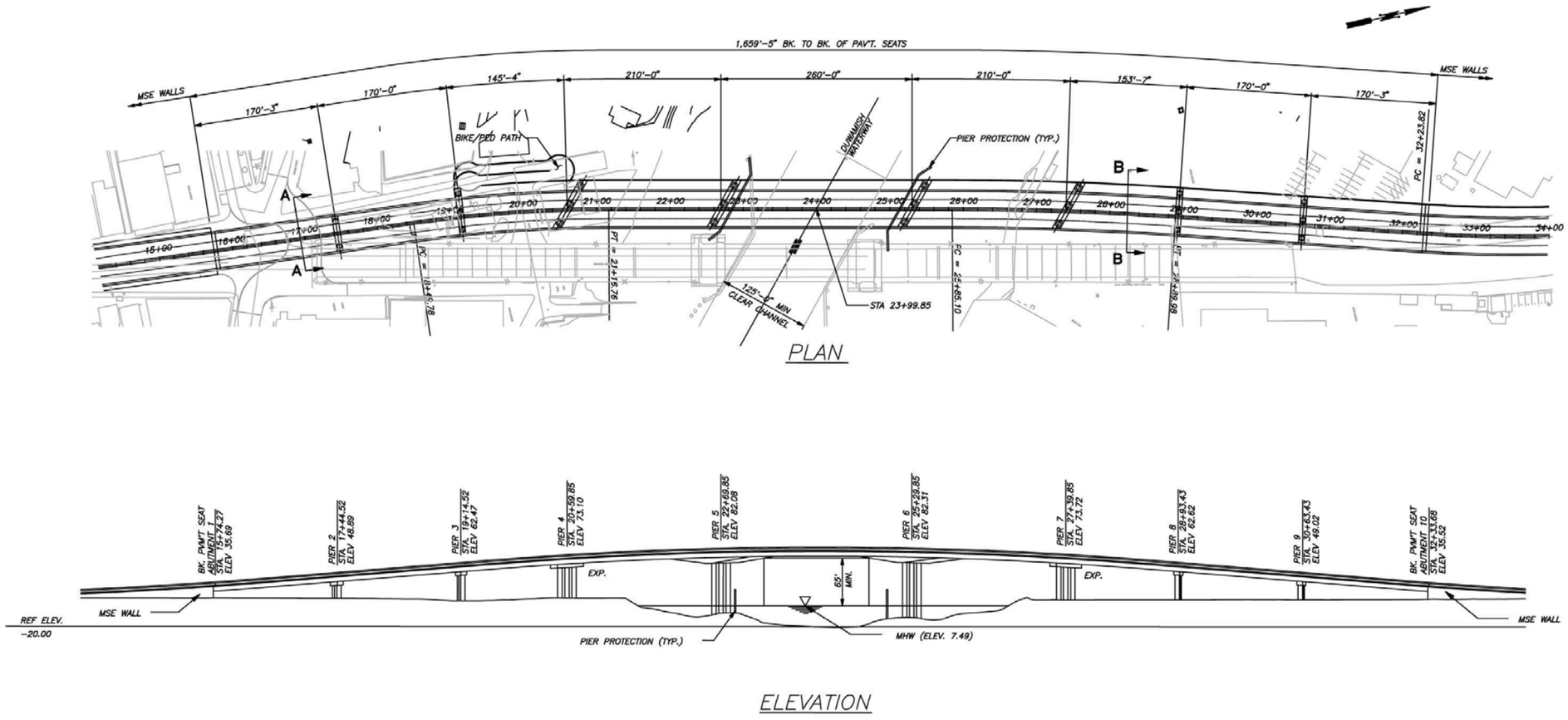

Figure 10
Mid-Level Fixed-Span
Bridge Alternative

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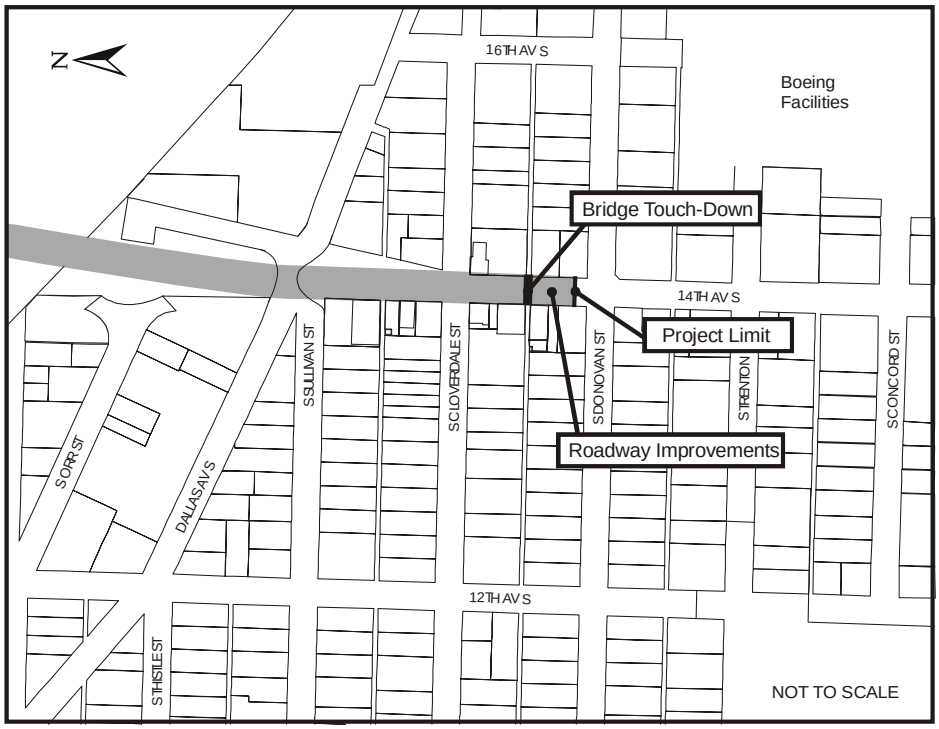

Figure 11
Mid-Level Fixed-Span Bridge Alternative Street Network

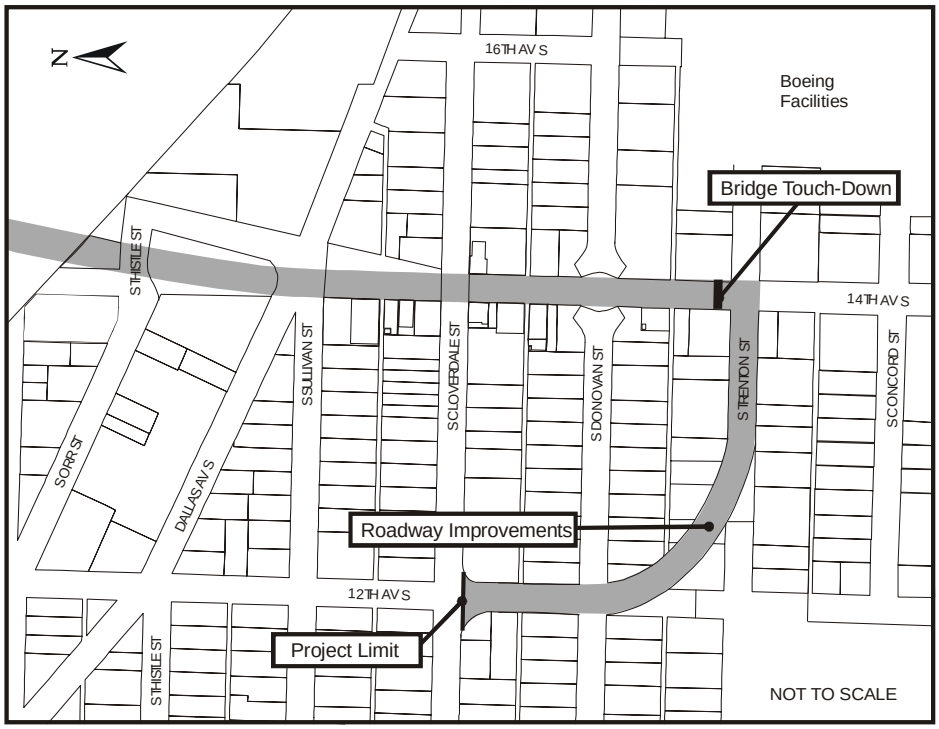

Figure 12
High-Level Fixed-Span Bridge Alternative Street Network

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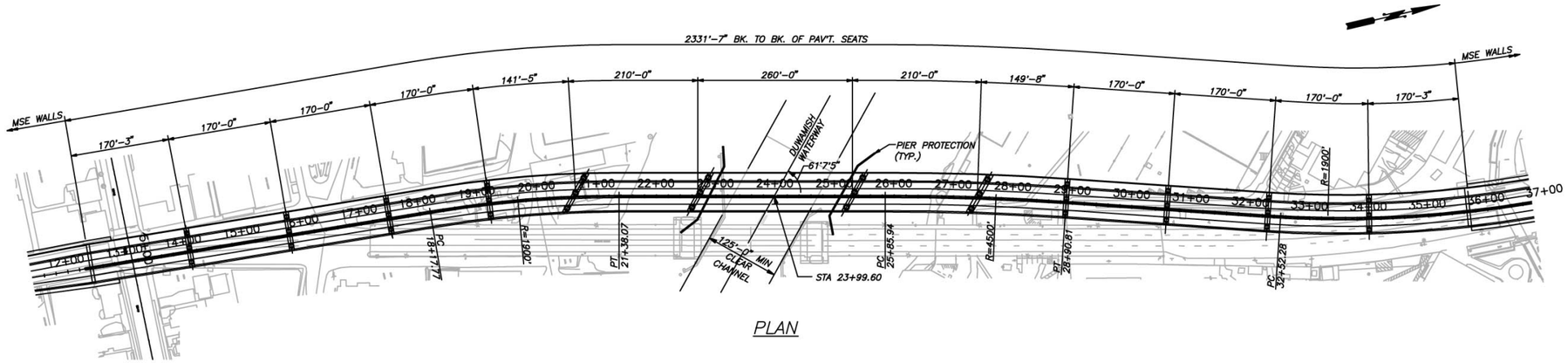

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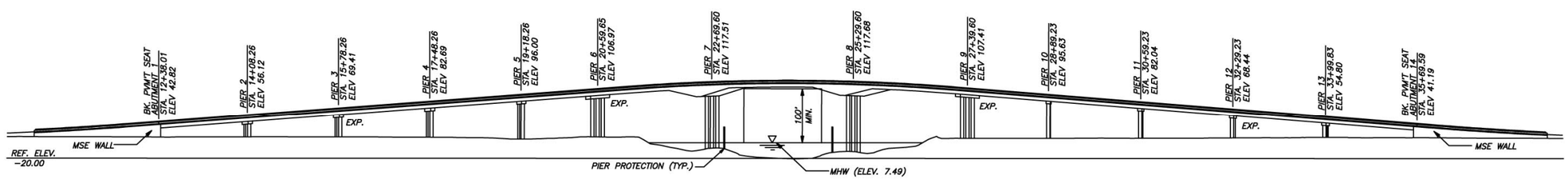

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Figure 13
High-Level Fixed-Span Bridge Alternative

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The bridge design would allow for approximately 100 feet of vertical clearance above the MHW of the Duwamish Waterway as requested by the U.S. Coast Guard. The horizontal waterway clearance for the navigation channel would be approximately 125 feet, which is slightly greater than the existing 118-foot clearance (fender-to-fender). The bridge's vertical clearance would not be expected to limit the height of boats and barges currently passing the bridge. However, vessels larger than those currently using the navigation channel might not be able to pass the bridge in the future.

Following construction, there would be numerous changes in the local street network as shown in Figure 12. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. The bridge south abutment would require Dallas Avenue S., S. Sullivan Street, and S. Cloverdale Street to be converted to underpasses under the new South Park Bridge. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on both sides of 14th Avenue S. for the majority of the two-block distance between S. Cloverdale Street and S. Trenton Street. S. Donovan Street would be closed at 14th Avenue S. due to obstruction from the bridge abutment and a vehicle turn-around would be constructed on either side of the abutment on S. Donovan Street. To allow traffic to access the new South Park Bridge, a new principle arterial roadway would need to be constructed between S. Trenton Street and 12th Avenue S. and road improvements would be required on 12th Avenue S. north to S. Cloverdale Street. This new route would allow traffic, trucks, and buses to continue to access the new South Park Bridge from S. Cloverdale Street via 12th Avenue S. and S. Trenton Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.3 Construction Durations and Activities

Construction of a rehabilitation or replacement bridge for the existing South Park Bridge is planned to take approximately two to three years, including the demolition and removal of the existing bridge. Construction is anticipated to start within the next several years and opening of the rehabilitation or a replacement bridge is currently anticipated to occur by 2009. The actual time required for construction activities vary for each of the alternatives. Construction activities associated with the No Action Alternative involves only demolition of the existing bridge and restoration of the site. The construction period for this alternative would be the shortest of all alternatives, approximately 8 months. The other alternatives would additionally require rehabilitation or construction of a new replacement bridge. Anticipated construction durations (demolition of existing and construction of new) would be approximately 32 months for the Rehabilitation Alternative, 33 months for the Bascule Bridge Alternative, 20 months for the Mid-Level Fixed-Span Bridge Alternative, and 24 months for the High-Level Fixed-Span Bridge Alternative.[14]

[14] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

From a construction perspective, the five project alternatives include three different types of construction activities. The No Action Alternative assumes the existing bridge condition would eventually require closure and removal of the bridge structures. Construction activities would focus on demolishing the existing bridge and restoring the project area. The Rehabilitation Alternative would require bridge closure for approximately 30 months for rehabilitation or replacement of various elements of the existing bridge. The Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives would all result in constructing a replacement bridge approximately 80 feet downstream of the existing bridge. For these three alternatives, the new bridge would be constructed while the existing bridge continues to be operational. When the new bridge is connected to the existing road, there would be short-term temporary bridge closures. These closures could be limited to weekends or could extend for approximately one month, depending on the alternative. Once the new bridge is completed, traffic would be rerouted to the new bridge and then the existing bridge structure would be demolished in a similar fashion as described for the No Action Alternative.

Rehabilitation of the existing bridge would require closure of the existing bridge for approximately 30 months, although efforts would be made to minimize the closure period as much as possible. Reconstruction activities would begin as soon as possible after completion of design engineering and acquisition of construction permits. Traffic would be given advance notice to take alternate routes prior to closure of the existing bridge. The construction of a temporary dock and a construction staging area would be required on both banks of the waterway (see Figure 14). Construction of the new bascule piers would likely be the first major construction activity. This would entail removing the existing pier protection fenders, installing temporary supports for the bridge superstructure, removing the bascule leaves as well as the steel truss spans, installing cofferdams around the existing steel truss approach piers and bascule piers, and demolishing the existing piers.

The bascule leaves and steel truss approach spans would be removed from the construction site for refurbishment. Construction of the new piers would involve drilling shafts through the existing timber piles, constructing the pile cap, dewatering the construction area inside the cofferdam, constructing the upper portions of the pier, removing the cofferdam, and finally reconstructing the upper portions of the bascule pier and bridge towers. Workers would reconstruct the concrete approach spans and replace the abutments. Workers would also reconstruct the bridge deck and replace the mechanical and electrical systems used to operate the bridge. Replacement of the piers, bridge tender towers, bridge railings, and lamp posts would be done in a manner that would preserve the historic character of these features of the existing bridge.

Major construction activities and sequencing would be similar for the Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives. The construction duration and the impact area for each of these three alternatives, however, would clearly differ. Following completion of design engineering, acquisition of construction permits, purchase of needed property, and relocation of residents and businesses, construction

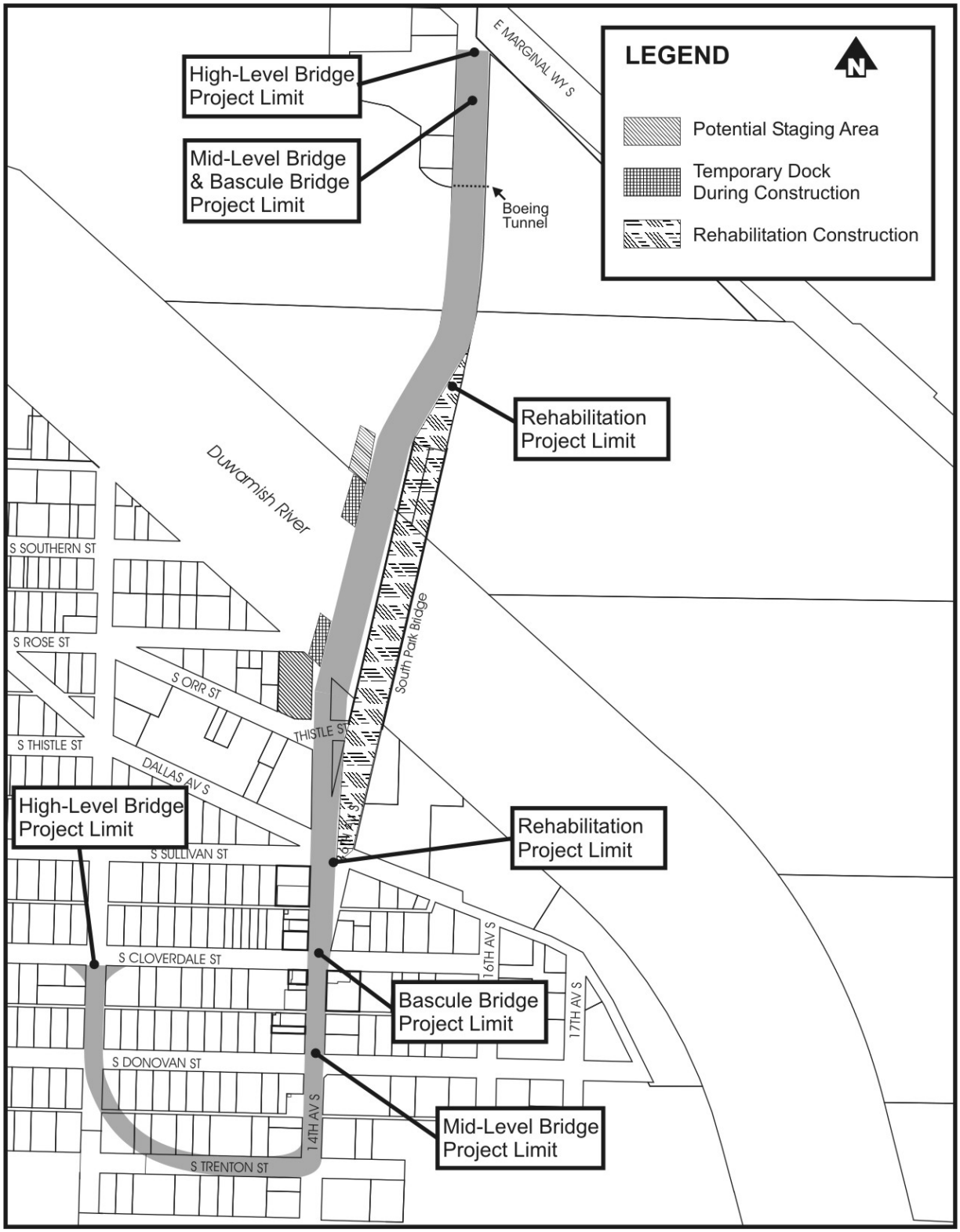

Figure 14
Proposed Construction Staging Areas

activities would begin. The first activities would include establishing the construction staging areas and constructing temporary docks with pilings on both sides of the waterway (see Figure 14).

Buildings affected by the construction activities would be demolished and utilities would be either temporarily or permanently relocated. To minimize traffic impacts, construction activities would begin with the construction of the in-water piers. Construction activities would progress landward from the central portion of each bridge alternative. Both in-water and on-land construction would begin with construction of the sub-structures (piers and abutment) and would be followed by placement of the superstructure (beams, deck, rails). On-land construction of the piers, abutment, retaining walls, and transition segments at either end of the bridge would likely require temporary closure of adjacent or nearby roads and rerouting of local traffic. If possible, these temporary closures would be limited to weekend and/or night times to minimize impacts to the community. Construction activities on the north and south portions of the new bridge structures could also occur either separately or concurrently. The last of the construction activities would be the construction of the new curb and gutter of the at-grade roadway, and paving the roadway to match the existing width of 14th Avenue S. Figure 14 shows the project limits, or start and end points, of construction activities for each of the project build alternatives.

For the rehabilitation and new bridge alternatives, new girders and other oversized materials would most likely be delivered to the project site by barge. Large cranes located on the barges or temporary docks would off-load the materials and place them in the nearby construction staging area. Removal of the existing bridge pier foundations and construction of the new bascule and steel truss piers would all require the use of cofferdams to isolate the construction activities. Construction of the new approach-span piers would use drilled shafts, which would likely incorporate the use of temporary casings to isolate the construction activities. This in-water work would be performed by equipment operated from the temporary docks or from barges.

Demolition of the existing bridge would involve disassembly and removal of the existing bascule leaves, superstructure, bridge piers, protection fenders, and abutment. Cranes would use the existing bridge structure and approaches as much as possible to remove the various elements of the bridge. Barges would likely be used to remove oversized materials. At this time, this demolition work is not planned to require construction of temporary docks or the acquisition or temporary use of property on the banks of the Duwamish Waterway for a staging area. Removal of the abutment foundations, however, would likely require temporary short-term closure of adjacent and/or nearby streets. During this time, local traffic would be temporarily rerouted from the immediate area.

Following the completion of the construction activities associated with any of the project alternatives, disturbed areas would be restored. Conceptual site restoration plans would be developed for each alternative based on additional consultation with resource agencies and other stakeholders.

2.4.4 Cost Estimates for the Alternatives

Cost estimates for each of the proposed project alternatives have been prepared by the project engineers (see Table 2).[15] The cost estimate for each project alternative, including the No Action alternative, is broken down into the following components: 1) plans, specifications, and estimates (PS&E), 2) right-of-way costs, and 3) construction and construction-related costs. The total cost estimates are provided in 2003 dollars as well as estimated costs escalated for 2008, the anticipated mid-point of the project construction period. These cost estimates were calculated based on the conceptual engineering plans that were prepared for each of the alternatives.[16]

Clearly, the No Action Alternative is the least expensive as the existing bridge would not be rehabilitated nor would a new replacement bridge be constructed. The cost to remove the existing bridge structure would be approximately $7,000,000 (2003 dollars). The estimated costs to either rehabilitate or replace the existing bridge structure range between approximately $62 million to $77 million in 2003 dollars. The least costly of the build alternatives is the proposed Mid-Level Fixed-Span Alternative, which is estimated to cost approximately $61,523,000 to design and construct. The Rehabilitation Alternative is estimated to cost approximately $63,930,000 and the High-Level Fixed-Span Alternative is estimated to cost approximately $70,460,000. The most costly of the build alternatives is the Bascule Bridge Alternative, which is estimated to cost $77,334,000. The escalated 2008 dollar estimates to design and construction the project alternatives are also shown in the table.

Table 2. Cost Estimates of the Project Alternatives

	PS&E	Right-of-Way	Construction	Total (2003 dollars)	Total (2008 dollars)
No Action	$ 250,000	$ 0	$ 6,750,000	$ 7,000,000	$ 9 M
Rehabilitation	$ 6,843,000	$ 754,000	$56,333,000	$63,930,000	$ 74 M
Bascule	$ 8,253,000	$ 3,655,000	$ 65,426,000	$ 77,334,000	$ 90 M
Mid-Level Fixed-Span	$ 4,235,000	$ 6,377,000	$ 50,911,000	$61,523,000	$ 71 M
High-Level Fixed-Span	$ 5,261,000	$ 15,310,000	$ 49,889,000	$ 70,460,000	$ 82 M

Source: Parsons Brinckerhoff, November 2003.

[15] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

[16] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

2.5 Project Coordination

Coordination to date for the South Park Bridge Project has involved members of the public, a special community advisory group, and representatives of government agencies. Formal scoping was initiated through publication of the NEPA Notice of Intent and the SEPA Determination of Significance and Scoping Notice on February 7, 2002 and February 14, 2002, respectively. Separate scoping meetings were conducted in the South Park community for relevant agencies and members of the public. Both meetings were held on February 28, 2002. Written and verbal comments received through the scoping process were reviewed by King County and used in the development of the project alternatives and topics for environmental impact assessment.

A public involvement plan for the proposed South Park Bridge Project was developed during the initial stages of project planning. The Project Advisory Committee (PAC) and the Community Advisory Group (CAG) reviewed this document and provided comments to King County. The first public involvement efforts began prior to the formal scoping period. A public workshop was held in the South Park community on January 17, 2002. At this meeting, the nine preliminary project alternatives were presented. A second public workshop was held on June 19, 2002. At this meeting, the five proposed project alternatives were presented. Members of the public were encouraged to provide comments at both of these meetings. To facilitate participation and input from Hispanic persons living in the community, a bilingual translator attended all meetings. In addition, handouts and newsletters for the project were published in English and Spanish, and public notices were published in “Siete Dias”, a local Spanish-speaking newspaper. Future opportunities for public involvement are also planned, including a public hearing and workshop following publication of the Draft Environmental Impact Statement in 2004.

Establishing a CAG was a significant component of the public involvement plan. A total of 17 individuals were chosen to participate in the CAG to represent community stakeholder interests and public concerns. The CAG meets periodically to be briefed on the progress of the project and to provide input to the South Park Bridge project team. Again, a bilingual English-Spanish translator attends the meeting to facilitate communication with Spanish-speaking individuals on the CAG. To date, CAG meetings have been held on April 10, May 21, June 4, June 11, and October 29 of 2002 and on January 7 and November 18, 2003. Additional CAG meetings are planned for the future.

As part of the environmental review process, King County periodically meets with the Project Advisory Committee (PAC) to give a status report of the project, answer questions, and to solicit comments. This committee is comprised of members of various agencies that have potential jurisdiction over the proposed South Park Bridge Project. The committee is the Interdisciplinary Team (IDT) required under NEPA implementation guidelines and provides technical support to King County staff. To date, the PAC has met on January 10, February 20, May 9, May 23, and October 10 of 2002. Coordination with the PAC is planned at critical future steps in the environmental review process.

A non-scientific survey was also conducted of South Park businesses located on 14th Avenue S. during the late spring of 2003.[17] The goal of the survey was to help assess potential impacts to businesses, especially minority-owned and –operated (employees) businesses. The survey respondents were also asked to identify their particular concerns about the proposed rehabilitation or replacement of the existing South Park Bridge. A total of 18 businesses were successfully surveyed. Spanish and Vietnamese translators were provided, as needed, to assist business representatives understand and respond to the questions. In addition, the data was used to assess the potential effects displaced businesses and jobs would have on the South Park community. The analysis of the survey findings are discussed in detail in the Economic, Social, and Relocation technical reports supporting the analysis in the EIS.

As key issues have arisen during development of the project alternatives and in assessing potential environmental impacts, special meetings have also been held with key stakeholders and organizations in the South Park community, as well as with other government agencies and jurisdictions with an interest in the project. For example, on December 3, 2002, King County met with owners of property along 14th Avenue S, and information booths were set up at the Sea Mar Community Health Center-sponsored annual Fiesta Patrias on September 14, 2002 and at a family night event held at the Concord Elementary School on September 27 and November 22 of 2002. Periodic coordination meetings have also been held with representatives of the City of Seattle and the City of Tukwila, and other government agencies. These coordination activities will continue to occur on an on-going basis as the EIS is prepared and finally adopted.

[17] Parsons Brinckerhoff. *South Park Bridge Project: Survey of 14th Avenue South Businesses*, August 22, 2003.

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Sources of information for this report include local comprehensive plans and policies, zoning codes, and environmental documents relevant to the project study area. Aerial photographs, maps, and GIS data were also used to analyze existing conditions and evaluate potential impacts that could result from the proposed project facilities. Impacts considered included potential changes in land uses caused by displaced residential and commercial properties and the project's relationship to land use goals and policies for the South Park area. The existing bridge's role in connecting the community and the potential impact of increasing the roadway's footprint along 14th Avenue S. was also reviewed. Coordination also occurred between the City of Seattle and the Boeing Company.

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Plans, policies, and maps from Tukwila, Seattle, and King County were reviewed to determine existing land uses in the study area. The Growth Management Act was reviewed for additional input on land use plans. Field visits were conducted and study area photographs were taken to confirm existing uses. The study area was defined by the northern and southern project limits of the proposed roadway approaches on each side of the bridge. Limits on the west were extended to include proposed changes along 12th Avenue S. between S. Cloverdale and S. Trenton streets. Potential land use impacts associated with the various build alternatives were determined by comparing conceptual alignment drawings of the proposed project facilities against maps, photos, and field data. Local comprehensive plans from the jurisdictions noted above, as well as neighborhood plans, zoning codes, and shoreline master programs, were reviewed to evaluate the project's relationship to existing regulations and policies. The WSDOT Environmental Procedures Manual provided direction on land use concerns consistent with FHWA guidance for environmental document preparation.

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Chapter 5 Affected Environment

5.1 Project Area

The South Park Bridge and 16th Avenue S. are located in a mixed-use neighborhood divided among three jurisdictions: unincorporated King County and the cities of Seattle and Tukwila. The project area extends from S. Concord Street in the south to East Marginal Way S. on the north. S. Trenton Street west of 14th Avenue S. and 12th Avenue S. north to S. Cloverdale Street also lie within the project corridor. Beginning in the southern project area, 14th Avenue S. becomes 16th Avenue S. north of Dallas Avenue S. where it continues across the Duwamish River and connects to East Marginal Way S.

The southern project area between S. Concord Street and Dallas Avenue S. is located within the City of Seattle. North of Dallas Avenue S., extending to the midstream point of the Duwamish River; the roadway and the bridge are located within unincorporated King County. The bridge at midstream in the Duwamish River, and 16th Avenue S. extending approximately 500 feet north from the northern shore, are located in the City of Tukwila. Beyond this point, 16th Avenue S. again enters Seattle city limits for a distance of approximately 750 feet until it intersects at East Marginal Way S., the northern limit of the project study area.

5.2 Existing Land Uses

Land uses in the project area vary among retail, commercial, light industrial, community services, and residential. In the south, on the west side of 14th Avenue S., uses include a grocery store, gas station, community health center, wholesale warehouse, restaurant, dentist office, parking lot, retail store, restaurants, tavern, parking, and marine stores. On the east side of 14th Avenue S., uses include an auto repair shop, retail store, community health center, wholesale parts warehouse, apartment building, commercial office, salon, travel office, restaurant, tire store, rental store, and marine supplies store. A large marina is located along the waterway's south shore, just east of the bridge. On the north side of the South Park Bridge, from the shore to East Marginal Way S., land uses on both sides of 16th Avenue S. include facilities and parking areas for the Boeing Company.

Mixed-single and multi-family residences are located, both to the east and west, behind the businesses and other uses found along 14th Avenue S. In some locations, other commercial, industrial, and retail uses are mixed among these residential areas, and particularly to the east, a large Boeing parking lot intrudes on the residential area between S. Concord Street and S. Donovan Street.

South Park is a small neighborhood extending roughly between S. Elmgrove Street and S. Cambridge Street on the north and south, respectively, and SR 509 and 16th Avenue S. on the west and east, respectively. Much of the area is residential with commercial, industrial, and retail uses mixed within the area. There are approximately 1,000 housing units in the neighborhood, the majority of which are older single-family homes. The area

along 14th Avenue S. comprises the primary business district in the South Park neighborhood. This area currently experiences a high volume of traffic and a shortage of parking that may have an impact on business activity there. In addition, field visits and site photos indicate that some businesses are more modest in appearance than others and exhibit a generally poor appearance when compared to adjacent or nearby structures where the external care of the building is more apparent. Redevelopment in the area has been hindered by the poor quality of infrastructure and facilities and soil contamination from past land uses on localized properties (City of Seattle, 1998).

The South Park Bridge has been characterized as a "critical arterial link across the Duwamish Waterway," "the main north-south arterial connection" to the South Park business center, and "a significant historic landmark" in the community (City of Seattle, 1998 and 1999; King County, 1994). Recent comments received at the public scoping meeting for proposed improvements to the bridge currently being considered have verified these views and the importance of the bridge to the community (King County, 2002).

The Duwamish Waterway, over which the bridge passes, is of equal importance to the community. The waterway is important as an industrial corridor and as a natural stream. In its former role, the waterway serves as an important connection to industrial and commercial land uses along the corridor and is a link to the Seattle harborfront area. In the latter role, the area is currently involved in an extensive cleanup program to remove waterway contaminated sediments and to restore important natural habitat for local fish species, including salmon.

Land uses along the waterway have been converted from farming and agricultural activities in the past to residential, industrial, and commercial development today. As the waterway became more urbanized, much of the shoreline was bulkheaded and the former estuarine and riparian habitat was lost (King County, 2000a). A six-mile portion of the lower waterway was listed as a federal Superfund site in 2001 and is currently being studied for cleanup. The portion of the waterway adjacent to the South Park neighborhood is within the proposed cleanup area (EPA/Ecology, 2002). The Economics Technical Report provides additional information on upstream land uses related to the importance of the Duwamish Waterway to the local community.

5.3 Zoning

Zones within the overall project area reflect the mix of existing land uses that are found along the 14th Avenue S. corridor near the bridge. As indicated above, the project area includes three jurisdictions, and project area zoning is designated by two cities and one county in the project area. The zones described below are identified for each of these jurisdictions.

5.3.1 City of Seattle Zones

C1: Commercial 1 and C2: Commercial 2

These General Commercial zones are intended to accommodate the broadest range of commercial activities, particularly those that would be highly dependent on automobile access and, therefore, incompatible with pedestrian-oriented residential and mixed-use environments. The C2 zone allows larger businesses, as well as light manufacturing and warehouse uses, which provide greater employment opportunities than the C1 zone.

NC3: Neighborhood Commercial

The neighborhood commercial zones are generally intended to be pedestrian-oriented areas, compatible with their surrounding neighborhoods and serving these areas, as well as larger community or citywide clientele, with a wide range of business and support services. The NC3 zone is a mixed-use designation intended to facilitate goals for urban centers and villages within the City. Generally, street-level retail and service uses are promoted with residential uses provided above. Size limits on commercial uses are limited in these zones to help assure that the overall bulk and scale is compatible with the character and function of the commercial area and to control traffic impacts while promoting compatible land use and transportation patterns. Similarly, housing in these zones is intended to be in close proximity to convenience shopping services and employment opportunities and to provide a built-in clientele within mixed use developments. Within these zones, there are additional limits on density, parking, signs, loading facilities, noise, light and glare, height, and landscaping—all intended to be compatible with urban village concepts.

IG1: General Industrial 1 and IG2: General Industrial 2

These zones are intended to promote a wide variety of industrial activities and related support uses most suited to industrial activity, while also providing an adequate separation from residential and pedestrian-oriented commercial areas. The purpose of the IG1 zone is to protect marine- and rail-related industrial areas from an inappropriate level of unrelated retail and commercial uses, by limiting these uses to a density and size limit lower than that allowed for industrial uses. The IG2 zone also has specified size limits, but is intended to allow a broader range of uses where the industrial function of an area is less established, and where additional commercial activity would improve employment opportunities and the physical condition of an area, without conflicting with industrial activity.

IB: Industrial Buffer

This zone is intended to provide an appropriate transition between industrial areas and adjacent residential zones, or commercial zones having a residential orientation and/or a pedestrian character. It is expected to allow the widest possible range of manufacturing uses and related industrial and commercial activities, while ensuring compatibility with the activity and physical character of abutting, less intensive zones.

SF 5000: Single-Family Residential

Single-family zones are intended to preserve and maintain the physical character of single-family residential areas in a way that encourages rehabilitation and provides

housing opportunities throughout the City. The SF5000 zone specifies a minimum lot size of 5,000 square feet.

L2RC: Residential Multi-Family

Generally, multi-family classifications specify the types of housing permitted in the different multi-family areas. The Lowrise 2 (L2) zone is intended to encourage a variety of multi-family housing types with less emphasis on ground-related units, while remaining at a scale compatible with single-family structures.

5.3.2 King County Zones (South Side of Bridge)

R-4: Residential, four dwelling units per acre

This is an urban residential zone primarily allowing for single, detached dwelling units in locations appropriate for urban densities.

RB: Regional Business

The regional business zone is intended to provide for the broadest mix of comparison retail, wholesale, service, and recreational/cultural uses with compatible storage and fabrication uses, serving regional market areas and offering significant employment opportunities. The zone encourages compact development supportive of transit and pedestrian travel, allows for outdoor sales and storage, regional shopping areas, and limited fabrication uses; it is intended to concentrate large-scale commercial and office uses to facilitate the efficient provision of public facilities and services.

I: Industrial

The industrial zone is intended to provide for the location and grouping of industrial enterprises and activities involving manufacturing, assembly, fabrication, processing, bulk handling and storage, research facilities, warehousing, and heavy trucking. This zone is also intended to protect the industrial land base for industrial economic development and employment opportunities by allowing for a wide range of industrial and manufacturing uses; establishing appropriate development standards and public review procedures for industrial activities with the greatest potential for adverse impacts; and limiting residential, institutional, commercial, office, and other non-industrial uses to those necessary for the convenience of industrial activities.

5.3.3 City of Tukwila Zones

The portion of the roadway lying within the jurisdiction of the City of Tukwila is zoned MIC/H: Manufacturing Industrial Center/Heavy Industrial. This zoning designation is intended to provide a major employment area containing heavy or bulk manufacturing and industrial uses, distributive and light manufacturing and industrial uses, and other uses that support those industries. Uses within this district are also intended to enhance the redevelopment of the Duwamish Corridor.

5.4 Zones and Comprehensive Plan Designations

The variety of zones described above includes areas immediately adjacent to the project route and zones located nearby. A zoning map is provided in Figure 15. Existing land uses in the project area have developed in keeping with permitted uses in these designations and are consistent with the various comprehensive plans for each jurisdiction. Comprehensive plan goals and policies for the project area reflect the intent to continue to allow a mix of uses locally, but also reflect the intent to protect important industrially zoned land from being converted to other uses. All three jurisdictions note the intent to maintain the industrial base along the Duwamish River corridor. A map of the broad, comprehensive plan designations is provided in Figure 16.

5.5 Land Use Plans and Policies

Land use in the project area is directed by a variety of state and local plans and policies. These plans and policies are identified below.

Washington State Growth Management Act (1990)

The Growth Management Act (GMA) requires state and local governments to manage statewide growth by identifying Urban Growth Areas (UGA), preparing comprehensive plans, capital improvement programs, and development regulations (RCW 36.70A). The GMA also specifies that transportation projects be identified and constructed concurrent with future development projects.

Puget Sound Regional Council Vision 2020 and *Destination 2030*

The *Vision 2020* plan includes policies and guidelines for implementation of local comprehensive plans and development regulations in the Central Puget Sound region, including King County. The plan identifies long range growth and transportation strategies to fulfill the vision of economically diverse and environmentally healthy comminutes. By integrating land use and transportation planning, the plan provides a framework for allowing regional growth while maintaining open space, resource lands, and an efficient transportation system with travel mode options. *Destination 2030* is guided by the growth management framework provided by the *Vision 2020* plan, and contains guidance to help implement the regional growth management and transportation strategy.

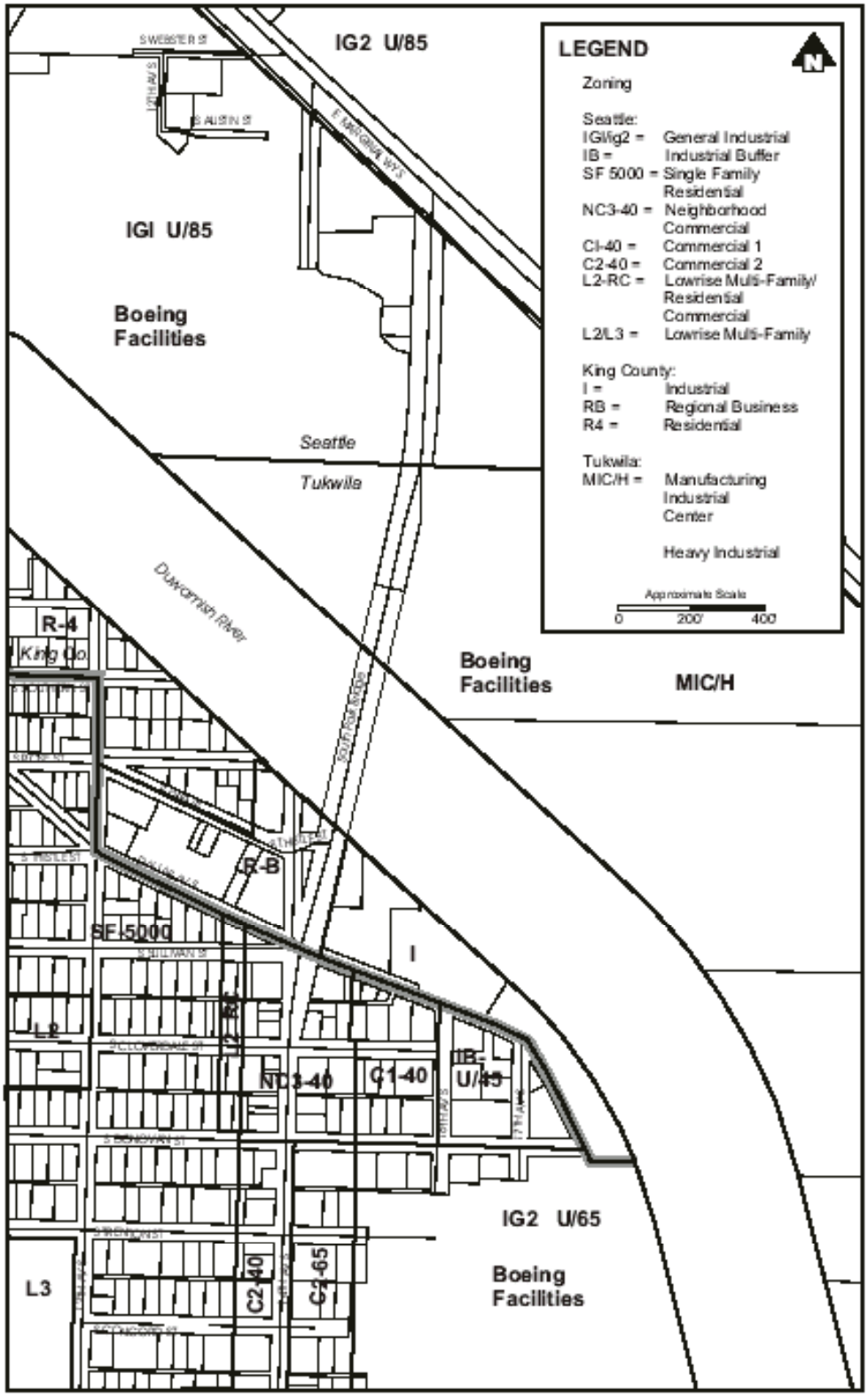

Figure 15
Zoning Map

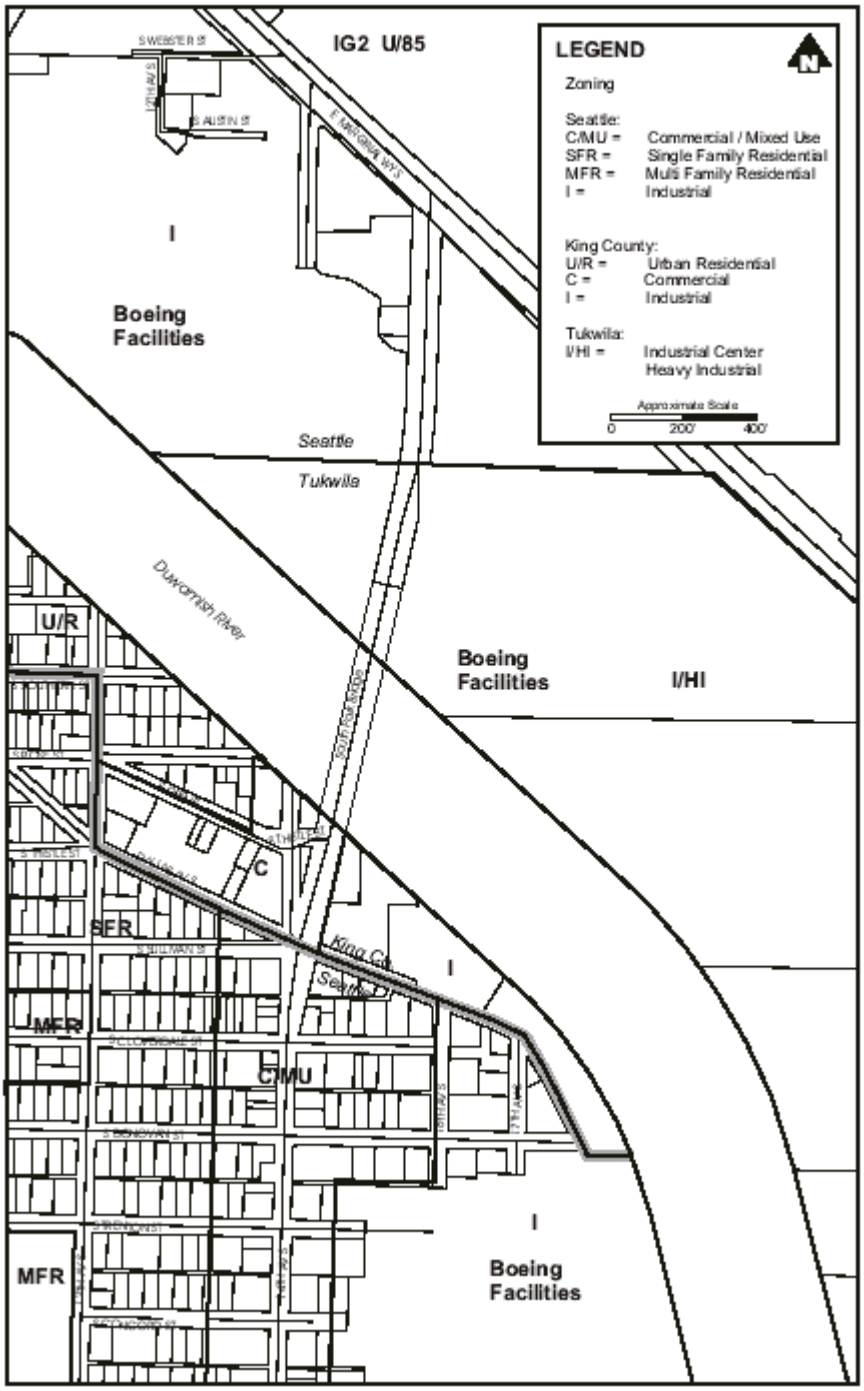

Figure 16
Comprehensive Plan Map

King County Comprehensive Plan (2000)

The King County Comprehensive Plan establishes a growth management strategy for King County over a 20-year period, in compliance with the planning goals of the state GMA. The policies address broad areas, such as urban and rural land use, economic development, housing, transportation, the natural environment, and open space. The Plan establishes a boundary for the County's UGA that directs growth and development away from rural areas and areas where services are not available, thereby containing urban sprawl and protecting open space while making the most efficient use of transportation and utilities. The County Comprehensive Plan identifies the unincorporated project area as an urban center, and within the urban center as a neighborhood business center. The Plan's land use map identifies the area from the southern shore of the Duwamish River to about mid-way to Dallas Avenue S. as Industrial and the area from the mid-point to Dallas Avenue S. as commercial.

King County Zoning Code: Title 21A (2001)

The King County Zoning Code implements the *Comprehensive Plan* through the provision of regulations and development standards to support the Plan's goals and policies. The Zoning Code specifies building and construction activity for unincorporated King County and includes zoning classifications, permitted use, allowable densities, and development standards. It also includes the County's shoreline management regulations for shoreline environments.

Seattle Land Use Code (2002)

The Land Use Code provides zoning and development regulations for the City. These regulations set forth procedures for the use of land within the City. In addition to general use or activity requirements, these provisions include specified height and size restrictions, as well as setback, parking, landscaping, and view requirements. The Land Use Code also includes special overlay districts that identify other development requirements in addition to those noted for individual zones.

Seattle Comprehensive Plan (2001)

Seattle's Comprehensive Plan provides goals and policies to guide growth and development in the City. The Plan is a 20-year policy plan and, consistent with GMA requirements, includes land use, transportation, housing, capital facilities, utilities, economic development, neighborhood planning, and environmental elements.

Also within the Plan are framework policies that present Seattle's core values which provide direction and priorities for the Plan. Four basic core values are defined: community, environmental stewardship, economic opportunity and security, and social equity. The Plan presents an urban village strategy which is intended to achieve goals that are shaped by the core values. The urban village strategy includes land use goals combined with transportation and housing goals that are intended to provide for affordable housing and facility improvements that serve higher density neighborhoods within the City. Under the Plan, neighborhoods have prepared separate planning

documents that provide specific policies related to individual neighborhood areas, as identified below.

South Park Residential Urban Village Plan (1998)
The South Park neighborhood plan describes a vision for the future of this area and identifies near-term and long-term key activities that represent goals and policies for improving the quality of life in the area. The plan also identifies future objectives for six planning elements, including land use, transportation, housing, capital facilities, economic development; and human development. As expressed by the plan's vision statement, the overall intent is to provide direction that would allow the South Park neighborhood to be "a great place to live and work," for a diverse population, in a community that accommodates both residential and business interests. This plan was prepared by the South Park Planning Committee comprised of residents and business persons within the community. The plan was reviewed by the Seattle Neighborhood Planning Office, and portions of the plan were formally adopted in *Seattle's Comprehensive Plan* as goals and policies for the neighborhood urban village.

Greater Duwamish Manufacturing and Industrial Center Plan (1999)
The Greater Duwamish plan identifies goals and policies intended to ensure the viability and expansion of manufacturing and industrial activity in the Duwamish area. The primary objectives of the plan are to restrict incompatible or competing land uses within the center; encourage manufacturing and industrial job retention and growth; establish a target of 10,860 new family wage industrial jobs; retain and improve access to, and transportation within, the manufacturing and industrial center; and to retain existing businesses and encourage new manufacturing and industrial development in the center. The plan is organized around recommendations for six main elements: jobs and economic development, land use, transportation, utilities, environmental issues, and public safety. It should be noted that the City did not adopt in its entirety all goals and polices within the plan, but the plan does provide additional guidance for the area.

Tukwila Comprehensive Plan (1995)
The Tukwila *Comprehensive Land Use Plan* provides goals and policies intended to guide the City's development over the next twenty years in accordance with the GMA. The overall intent is to provide the City's residents with guidelines for a safe, livable, economically viable community. The Plan identifies four major objectives for the future:

- Improve and sustain residential neighborhood quality and livability.
- Redevelop and reinvigorate the Pacific Highway corridor.
- Redevelop and reinvigorate the industrial uses along East Marginal Way S.
- Develop a thriving Urban Center as a true regional concentration of employment, housing, shopping, and recreational opportunities.

The Plan's goals and policies are organized around five GMA elements: housing utilities, transportation, capital facilities, shoreline, and land use (which includes five separate elements). It also includes five optional elements under GMA: community image, economic development, natural environment, annexation, and roles and responsibilities.

Tukwila Zoning Code, Title 18 (2001)

Similar to the other project area jurisdictions, the Tukwila Zoning Code provides zoning classifications and development regulations for the City. This includes regulations for the manufacturing and industrial zone in the project area. As with the other local codes, regulations for shoreline and environmentally critical areas are also provided in the zoning code.

Tukwila and King County Shoreline Management Programs

The project area lies within the urban environment designation under both the King County and Tukwila shoreline master program regulations. Generally, the shoreline programs specify development regulations for land within 200 feet of designated shorelines of the state as defined by the Washington State Shoreline Management Act (SMA) of 1971. The City and County regulations are modeled after the state SMA and govern development and use of local shoreline areas.

Goals and policies within the shoreline master program are intended to protect natural shoreline areas and the wildlife and aquatic lifeforms these areas support. As such, the shoreline master programs are intended to plan for appropriate land uses along natural shorelines, including potential alterations to the shoreline from development that might include residential, port, recreational, industrial, and commercial uses. Potential development within shoreline areas is subject to review and approval through the shoreline substantial development permit process. King County regulations define the purpose of the urban shoreline designation as follows:

> "…to ensure optimum utilization of shorelines of the state within urbanized areas by permitting intensive use and by managing development so that it enhances and maintains the shorelines of the state for a multiplicity of urban uses. The urban environment is designed to reflect a policy of increasing utilization and efficiency of urban areas, to promote a more intense level of use through redevelopment of areas now under-utilized and to encourage multiple use of the shorelines of the state if the major use is water dependent or water related while at the same time safeguarding the quality of the environment *(King County Code 25.16.010)*."

The Tukwila shoreline regulations specify that uses within the shoreline designation must meet the underlying zoning of the area. Tukwila further defines three management environment designations within shorelines depending on the distance from mean ordinary high water mark: river, low-impact, and high-impact environments. Specific shoreline regulations apply within each of these management designations, which generally allow more intensive uses farther from the mean high water mark.

5.6 Consistency with Plans and Policies

Washington Growth Management Act

King County, Seattle, and Tukwila have prepared comprehensive plans consistent with direction under the GMA. The GMA includes policies guiding land use and transportation that are relevant to the proposed project. The project area is within the designated urban growth area of the local jurisdictions it traverses. The GMA directs dense urban land uses to be located within the Urban Growth Boundary (UGB), including infrastructure intended to support high-density development. The proposed project build alternatives, including rehabilitation, would comply with GMA guidance specifying that urban development be supported by roadways that meet urban traffic levels and that also provide for transit and non-motorized needs. The No Action Alternative would not generally meet these goals as it would degrade the existing mobility within the neighborhood and deprive the area of the local access now provided by the bridge. These changes would not generally support higher density, urbanized land uses in the project area.

PSRC Vision 2020* and *Destination 2030

Both of these regional plans seek to coordinate land use and transportation goals in the greater Puget Sound region. The proposed project build alternatives would provide transportation connections within the South Park neighborhood and the surrounding area and would, therefore, be consistent with goals supporting enhanced travel opportunities regionally. The No Action Alternative would not support transportation goals because it would eliminate existing access to the neighborhood and areas north and south of the bridge. Land uses dependent on access and mobility provided by the bridge would be lost and localized residential and economic impacts would be greater than under the build alternatives.

King County Comprehensive Plan

The area closest to the southern side of the bridge is within unincorporated King County. The County's jurisdiction extends from the south side of the Duwamish Waterway to approximately Dallas Avenue S. where existing business and residential uses occur. The *King County Comprehensive Plan* and the accompanying Countywide Planning Policies include goals for urban areas that provide safe, healthy, diverse communities and that include affordable housing and employment opportunities. The business and residential uses in the unincorporated South Park area are consistent with this goal, and the build alternatives have varying degrees of impact on maintaining this objective.

The Mid-Level Fixed-Span Bridge and High-Level Fixed-Span Bridge alternatives have greater possibilities of disrupting the existing community than the other build alternatives, both during construction and in the long term, because they would affect the largest part of the community. The Bascule Bridge Alternative would better meet this goal through diminishing potential impacts on existing properties south of the bridge. The No Action Alternative would not be consistent with promoting safe, healthy communities because without the bridge, existing residential and business opportunities are likely to diminish.

Transportation goals of providing appropriate infrastructure to serve urban areas would be met by all of the build alternatives, in that proposed improvements would enhance travel connections for vehicles using the bridge, including transit, as well as bicyclists and pedestrians. The No Action Alternative would not meet this goal because mobility would be impeded, and transportation choices diminished, by the loss of this local and regional connection in the project area.

Seattle Comprehensive Plan

Seattle's Comprehensive Plan contains broad goals for the City and its neighborhoods, including general goals for the South Park neighborhood. These goals pertain to land use, transportation, capital facilities, utilities, environment, economic development, and cultural resources. While the general neighborhood goals were taken from the South Park neighborhood plan, the city did not adopt that plan in its entirety. Within the comprehensive plan, the City has defined a strategy for directing future growth to mixed use neighborhoods, which are designated as urban villages. The urban village designations are intended to guide function, character, intensity, type, and degree of growth in each neighborhood area.

Individual neighborhoods have been assigned different urban village categories. The South Park neighborhood has been designated as a Residential Urban Village. This designation is intended to "promote urban villages that function primarily as compact residential neighborhoods providing opportunities for a wide range of housing types and a mix of activities that support the residential population." Each residential urban village has been assigned population growth targets over the 20-year life of the Plan. Residential urban villages are intended to receive a significant share of the City's expected residential growth during this time, and Plan goals and policies indicate the intent to direct future residential growth to these areas. The growth target for the South Park residential urban village is 350 households over the next 20 years.

The South Park Planning Committee, comprised of local residents and interested community supporters, developed additional goals for the South Park area as presented within the *South Park Residential Urban Village Plan.* General goals include creating a great place to live and work; promoting collaboration with residents, businesses, and organizations in future planning; and encouraging cooperation among jurisdictions within the neighborhood. Land use goals include maintaining existing residential character, as well as preserving industrial and residential land. Transportation goals include creating a pleasant and safe transportation network and promoting a safe, active pedestrian environment. The South Park plan also contains general goals for the provision of public facilities, planning for, and minimizing impacts associated with new utilities. The inclusion of quality environmental practices and support for local environmental protection efforts is also noted in the plan.

The No Action Alternative would leave the existing neighborhood streets as they now are, with the notable exception of closing the bridge to future traffic and demolishing the structure. This alternative would not result in the immediate disruptions of the South Park neighborhood associated with the build alternatives. Therefore, in the short term, the neighborhood would continue to function as is currently expected under existing Plan

goals and policies. Over a longer period of time, however, the closure of the bridge would be expected to affect local land uses, especially businesses which now depend on the transportation connections the bridge now provides. To the extent that local businesses might be harmed by adverse economic conditions caused by bridge closure, this alternative would not support goals and policies intended to promote continued economic development in the neighborhood. It is likely that residential development would also be affected as commute trips currently facilitated by the bridge would be disrupted and may cause residents to seek more convenient locations in which to live. Therefore, the loss of connection to the larger regional transportation network that would occur if the bridge were to be closed would not generally be consistent with future goals intended to promote a residential urban village within the South Park neighborhood.

Each of the build alternatives would affect the local neighborhood and result in different levels of disruptions to existing land uses. Most of the affected land uses are currently retail and commercial uses, although some residential units would be affected. Where residential units are displaced, the proposed build alternatives would not be consistent with goals intended to direct new residential growth to the neighborhood. The potential loss of commercial properties would also be inconsistent with the intent to promote a pedestrian-oriented urban village approach within the neighborhood. The greatest disruption would result from the High-Level Fixed-Span Bridge Alternative; and that alternative may make it more difficult to achieve urban village goals than would other build alternatives with fewer land use displacements.

These impacts would be felt especially in the near-term, when right-of-way would be acquired and existing land uses would be converted to roadway use. Over the long term, however, the proposed build alternatives would be expected to improve living and working conditions in the area by enhancing the existing street system. The build alternatives would provide new connections and roadway improvements that would result in updating the existing South Park Bridge and street approaches.

The City's Plan recognizes that land use and transportation system improvements should be coordinated, complementary and promote the urban village strategy. At the same time, however, the city also recognizes that automobile access to local areas will continue to be important in achieving growth within urban villages. Because the proposed build alternatives would maintain the bridge and the connections it provides, it is expected that over time, these alternatives would provide the opportunity for new growth and development to occur within the South Park neighborhood. This growth would be guided by Plan goals and polices. Public involvement has been included in the design and environmental review process for proposed bridge alternatives and opportunities for additional public comments on the project will be provided. These comments may provide additional direction for meeting long-term goals and policies for the neighborhood.

South Park Residential Urban Village Plan

This plan includes goals for improving the 14th Avenue S. business area where the southern portion of the proposed project would be located. Key objectives in the plan include:

- Improve pedestrian safety, traffic circulation, and the visual character along 14th Avenue S. and the South Park Bridge.

- Provide and maintain pedestrian crosswalk striping at all intersections along 14th Avenue S.

- Reconfigure the S. Sullivan Street/Dallas Avenue S./14th Avenue S. intersection to improve traffic circulation and on-street parking on 14th Avenue S. and the 16th Avenue S. Bridge.

The proposed project build alternatives would generally be consistent with these goals by replacing the existing bridge with a new structure and providing for improvements to approach roads on each side of the bridge. The project would include sidewalks on the bridge and wider travel lanes which would be expected to improve traffic circulation and pedestrian use. Under the build alternatives, local intersection improvements are also expected to be made with the bridge replacement.

This plan also includes a specific goal to encourage annexation of the unincorporated portion of the community and to include this area within the urban village boundary. Specific to this objective is a key goal to maintain the South Park Bridge in the future. This goal states the desire to:

> "Work towards consensus on the future of the 16th Avenue bridge and select an alternative for upgrading the structure that benefits the 14th Avenue S. Business Area, the South Park Residential Urban Village and surrounding communities. Ensure that the bridge meets 14th Avenue S. where it currently does."

Only the build alternatives would support the goal of preserving the South Park Bridge in its present location. Because this plan anticipates that preservation of the bridge would be significant to the future of the residential urban village, the build alternatives would better support annexation of the area (the No Action Alternative) than would closure of the bridge.

Greater Duwamish Manufacturing and Industrial Center Plan

The focus of this plan is on maintaining the viability and expansion of the industrial and manufacturing uses in the Greater Duwamish area. The plan includes several goals and policies for the South Park area. These policies include maintaining industrial uses in the South Park area and providing improved sewer and drainage connections for South Park. The proposed project would not address these goals directly, although the improved roadway system under the build alternatives would better serve existing and future land uses, including industrial uses, in the area. The No Action Alternative may threaten some existing uses that are dependent on the bridge and transportation connections associated with it that would be lost if the bridge were not replaced.

A key policy under the Greater Duwamish plan transportation goals regarding improved mobility and access does address the proposed project. Policy T1.5 calls for maintaining "the South Park Bridge as a critical arterial link across the Duwamish Waterway and

between the South Park neighborhood and regional transportation corridors." It also calls for maintaining the bridge's ability to accommodate marine traffic. Elsewhere within the Plan, "preserving and/or replacing the South Park Bridge" is listed as one of the top ten capital investment priorities for the Duwamish Manufacturing and Industrial Center area. The build alternatives for the proposed project would be consistent with these goals and policies. The No Action Alternative would not meet these goals.

The plan also recommends specific improvements of the Dallas Avenue S. and 14th Avenue S. intersection to allow for better truck mobility and circulation. Similarly, improvements to enhance capacity and operation of the 16th Avenue S. and East Marginal Way S. intersection are recommended "in conjunction with the South Park Bridge preservation." The proposed project build alternatives would provide for local intersection improvements which would include potential changes to the intersection with Dallas Avenue S.. The proposed project would not include changes to the East Marginal Way S. intersection.

Tukwila Comprehensive Plan

Only a small portion of the project area on the north side of the bridge is within the City of Tukwila. This area is designated as industrial and consists of Boeing Company properties. The Tukwila *Comprehensive Land Use Plan* addresses general land use and transportation goals and also contains specific goals for the manufacturing/industrial center. Tukwila's general transportation goals are to provide a safe and efficient transportation system within the City. They also call for providing improved transit and pedestrian/bicycle facilities as part of the street network design. The proposed project would include improvements to the bridge and supporting roadways to make the bridge safe and improve travel conditions along the roadway. Sidewalks would be provided on both sides of the improved roadway, and across the bridge.

Although the Plan acknowledges problems with congestion in the industrial area, the Plan does not include specific goals for reducing congestion other than noting the need to work with other agencies to address transportation problems. The proposed project build alternatives would be consistent with the general goal of cooperation to improve transportation in the industrial zone. The City also has a goal of protecting the industrial land resource and providing support for industrial activities there. The proposed project would improve commercial access for trucks and other vehicles that use the bridge to reach industrial and manufacturing uses within the City's jurisdiction.

The Plan also notes the desire for protection of the Duwamish River shoreline within the industrial zone. The City has a special shoreline designation, Manufacturing/Industrial Center Environment, for the shoreline in the project area. The Plan includes goals for redevelopment and commercial/industrial uses there, as well as enhancement of access to the river, and protection and restoration of the natural riverbank characteristics. The proposed project would include mitigation measures intended to prevent negative impacts to the river and shoreline during construction and operation of the reconstructed bridge and roadway.

The No Action Alternative would fail to meet Plan goals because the restricted access that would result from closure of the bridge would be detrimental to commercial transportation to and from the area. Without the bridge, traffic would need to be rerouted, which would add to travel times for pick-up and delivery of essential parts and products. Delays in shipping and receiving could threaten the long-term viability of businesses that rely upon convenient access for successful operations.

Tukwila and *King County Shoreline Programs*

The proposed build alternatives would be consistent with the more intense uses associated with the urban shoreline designation. Future uses of the shoreline area that may follow construction of the new bridge would have to be consistent with water-dependent or water-related uses defined by the shoreline regulations. The No Action Alternative would not introduce a new structure to the shoreline area and would result in the removal of the existing bridge from the shoreline environment. Removal of the existing bridge would return the shoreline to more natural conditions; however, it could potentially increase access to the waterway from adjacent uplands and lead to future development of the shoreline area. Future development would be subject to shoreline regulations for the urban environment as indicated above.

Chapter 6 Impacts

6.1 Direct Impacts

6.1.1 No Action Alternative

Land uses north and south of the waterway would be affected under the No Action Alternative. The residential and business core of the South Park community is located south of the waterway, and the Boeing Company is the primary property owner of land on the north side of the waterway. Under this alternative, it is assumed that the South Park Bridge would not be replaced and, because of its deteriorating condition, would need to be closed to future use and demolished. The potential closing of the bridge could have the greatest affect on local land uses under this alternative. The bridge currently links industrial uses on the north with residential and business uses along 14th Avenue S., on the south side of the bridge.

Without the bridge, some businesses on the south may no longer remain along 14th Avenue S., and truck traffic now using the bridge would be rerouted. This may affect deliveries and other commercial access to Boeing and other commercial/industrial properties. Residential land uses to the south may experience some turnover, as residents dependent on convenient access to the north may choose to leave the area. The bridge provides immediate access to communities east of South Park, including Beacon Hill, North Rainier, Holly Park, and Rainier Beach. With closure of the bridge, the convenience of this access would be lost, and it is likely that the neighborhood would become more self-contained. This result may lead to a greater mix of residential and neighborhood retail uses in the community consistent with existing zoning, along with more localized commercial and industrial uses that are not dependent on bridge travel.

6.1.2 Rehabilitation Alternative

This alternative would affect adjacent land uses only slightly because it would occur largely within the existing right-of-way. Potential displacements for construction staging and the new approaches would be limited and are not expected to affect adjacent land uses greatly. Existing land uses are expected to continue after construction is completed; however, the roadway would be reduced to three lanes under this alternative. Additional detail on potential business and residential displacements, as well as economic impacts associated with the proposed project, may be found in the Relocations, Social Elements, and Economics technical reports prepared for this project.

6.1.3 Bascule Bridge Alternative

Under the Bascule Bridge Alternative, existing land uses would be disrupted by bridge replacement and street improvements in the project area. This alternative would have few direct impacts on adjacent land uses since the roadway approaches and abutments would be shorter in length and affect fewer parcels than under other build alternatives.

The South Park community would be less affected by land-use disturbances than under the other build alternatives. On the south side of the bridge, parcels north of S. Sullivan Street would be affected by the proposed improvements. This alternative would result in displacing up to five businesses on 14th Avenue S. for roadway right-of-way or as a result of lost access. All of these parcels currently are located within the portion of the project area in unincorporated King County. Land adjacent to 14th Avenue S. in this area is zoned RB (Regional Business) and I (Industrial), and future redevelopment of acquired parcels may occur consistent with these zoning designations.

Existing land uses on the north side of the bridge would be only slightly affected by the proposed project. The roadway alignment would be shifted to the west of the existing alignment which would require acquisition of additional land from two parcels currently owned by the Boeing Company. Presently this would affect parking areas on these parcels but would not displace buildings. The proposed project would require approximately 29,174 square feet of land from the first parcel on the northwest side of the bridge, in the City of Tukwila. It would also require approximately 2,430 square feet from an adjacent parcel on the north which lies within the City of Seattle. These two acquisitions combined would result in the conversion of approximately 31,604 square feet (0.72 acres) of existing industrially zoned land to roadway right-of-way. The extent of these impacts has not been confirmed pending the outcome of on-going discussions between the Boeing Company and lead agency staff.

6.1.4 Mid-Level Fixed-Span Bridge Alternative

Roadway approaches would be increased and a greater number of adjacent land uses would be affected by this alternative than would occur under the Bascule Bridge and Rehabilitation alternatives. Fourteen parcels could be affected by right-of-way acquisitions under this alternative, including the two Boeing Company parcels (see Relocations Technical Report). Land uses on both sides of 14th Avenue S. would be affected north of S. Donovan Street and the southern end of the bridge. Existing businesses there would be directly displaced by the new roadway alignment, or the access to these buildings would be lost as a result of roadway structures and area street closures. Up to 12 buildings would be affected in the South Park neighborhood, south of the existing bridge. Parcels between S. Sullivan Street and the south end of the existing bridge are located in King County and are the same as those affected by the Bascule Bridge Alternative. Parcels between S. Sullivan Street and S. Cloverdale Street are within the City of Seattle and are zoned NC3-40 (Neighborhood Commercial). After construction, redevelopment of some vacated parcels may occur consistent with these designations where new access can be provided.

6.1.5 High-Level Fixed-Span Bridge Alternative

Under this alternative, many of the land uses on the south side of the bridge along 14th Avenue S., north of S. Trenton Street, would likely be closed or relocated as access to 14th Avenue S. would be restricted by local street closures, bridge abutments, and retaining walls. Except for the small area noted within King County, all of these uses would occur in Seattle. New uses, consistent with the NC3 and C2 (Commercial) zoning designations for this area, could replace the existing business uses, although it is not

likely that the same number of businesses would be provided due to potential access constraints. As many as 35 buildings would be displaced under this alternative. These displacements would result in the disruption of most of the South Park business corridor along 14th Avenue S.

In addition to the land use changes along 14th Avenue S., this alternative would also require changes to 12th Avenue S. between S. Cloverdale Street and S. Trenton Street. The need to extend and connect S. Trenton Street to accommodate bus and truck traffic would result in the displacement of up to six residences near 12th Avenue S. and S. Trenton Street. It would also result in the loss of one house on the southwest corner of S. Cloverdale Street and 12th Avenue S. Although not all of these residences would be displaced, the proposed roadway configuration of 12th Avenue S. and S. Trenton Street would largely preclude future residential use of the affected parcels, either as a result of using most of the parcel area for the improved roadway or by preventing future access to the remaining portions of those parcels. While this would slightly reduce residential land uses in this neighborhood, it would not result in significant land use changes since the majority of the remaining residential uses would be retained.

Property north of the bridge would experience nearly the same loss of industrial land as indicated for the other build alternatives. This small decrease in industrial property would not significantly affect adjacent industrial land uses and would result in improved access to properties adjacent to the new roadway. Table 3 provides a comparison of potential impacts by the number of parcels affected, total parcel sizes, and zoning under each of the build alternatives.

Table 3. Comparison of Parcel Impacts

Alternative	Number of Affected Parcels	Total Area of Affected Parcels	Land Use Zones Affected
Rehabilitation	5	29,225 square feet (0.67 acres)	Regional Business, Residential
Bascule Bridge	7	60,725 square feet (1.39 acres)	Regional Business, Industrial, Residential
Mid-Level Fixed-Span Bridge	14	101,170 square feet (2.32 acres)	Regional Business, Industrial, Residential, Neighborhood Commercial
High-Level Fixed-Span Bridge	38	279,335 square feet (6.41 acres)	Regional Business, Industrial, Residential, Neighborhood Commercial, Commercial

Notes:

Each of the build alternatives would affect two large parcels north of the Duwamish Waterway owned by the Boeing Company.

Amounts shown are total parcel sizes, not total right-of-way to be acquired.

Source: King County and Seattle Comprehensive Plans; King County/Seattle Assessor's Records

6.2 Construction Impacts

6.2.1 No Action Alternative

No new construction would occur; however, the old bridge would be demolished after closure. Demolition impacts would be similar to those associated with construction in that traffic congestion due to movement of equipment and workers would temporarily affect local land uses and residents. Increases in noise and dust from demolition activities may also be experienced by nearby land uses.

6.2.2 Rehabilitation Alternative

During construction, some businesses and residents may experience travel disruptions caused by construction equipment and activities. Construction noise and fugitive dust may affect nearby businesses and residential areas. Construction impacts would likely be concentrated near the bridge and adjacent upland areas, where rehabilitation efforts would occur.

6.2.3 Bascule Bridge Alternative

Impacts would be similar to those of the Rehabilitation Alternative. The duration of potential impacts could be longer, as well, in order to accommodate construction of the new facilities. A greater number of adjacent land uses may experience impacts under this alternative because the approaches would extend further north and south of the bridge, resulting in a longer impact area. Adjacent residences and businesses as far south as S. Cloverdale Street may be affected.

6.2.4 Mid-Level Fixed-Span Bridge Alternative

Impacts would be similar to those of the other build alternatives. Adjacent land uses as far south as S. Donovan Street may be affected.

6.2.5 High-Level Fixed-Span Bridge Alternative

Impacts would be similar to those of the other build alternatives. This alternative could result in the greatest disturbance to adjacent land uses because it would extend the furthest south. Adjacent land uses as far south as S. Trenton Street may be affected. Moreover, residents on S. Trenton Street (west of 14th Avenue S.) and on 12th Avenue S. north to S. Cloverdale Street would also be affected by construction activities.

6.3 Secondary and Cumulative Impacts

The proposed project is not likely to result in substantial secondary and cumulative impacts on land use. Generally, secondary impacts are impacts that result from a proposed action, while cumulative impacts are combined effects of a project's actions with that of other projects in the study area.

6.3.1 Secondary Impacts

Although some existing businesses and homes would be displaced by the build alternatives, in most cases these are limited in area, and some level of redevelopment

could take place after the new bridge and roadway approaches are completed. The High-Level Fixed-Span Bridge Alternative would result in the greatest level of potential secondary impacts because it would affect a larger area of the community than the other build alternatives. The extent and type of redevelopment resulting from the build alternatives would depend, in part, on the need to provide new access for lots where the proposed improvements would prevent access from 14th Avenue S. Some existing businesses may be able to remain, if other nearby buildings are displaced and new driveways, and/or parking areas, are provided that would allow access to the remaining structures. Redevelopment may also provide the opportunity for new housing, which may include either single-family residences or multi-family uses. The new bridge and improved approaches under the build alternatives may also attract additional interest in the area for residential or business use. As new drivers use the roadway, some opportunities for secondary growth related to familiarity with the community may occur.

Secondary impacts on the community resulting from the No Action Alternative would be related primarily to closure of the South Park Bridge. Without the access and regional connections the bridge now provides, it is possible that opportunities for future redevelopment would be limited as fewer vehicles access and use the area. Future development may be more likely to be restricted to residential uses as the community's attraction to businesses may be diminished by the lack of more immediate regional travel connections.

6.3.2 Cumulative Impacts

The proposed project may also contribute to disruptions to land uses due to other adjacent projects in the area. The city has obtained grant money for business improvements along 14th Avenue S., and a proposed riverfront project approximately two miles west of the South Park Bridge area is planned. These projects, in combination with the proposed build alternatives, may generate additional interest in efforts to revitalize area businesses and residences. As improvements occur within the South Park community, potential redevelopment opportunities may increase with renewed interest in the area. Along with these projects, on-going dredging in the Duwamish Waterway by King County and capping of sediments there by the Boeing Company may, in combination with the South Park Bridge Project, contribute to traffic congestion, noise, and/or dust affecting surrounding properties during construction activities.

The No Action Alternative would not result in cumulative impacts associated with other improvements in and around the community. Closure and demolition of the South Park Bridge may diminish improvements to the general community provided by the projects noted above, as regional access would be decreased.

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The proposed project has been designed to minimize impacts on adjacent properties to the extent possible. All of the alternatives, including No Action, would affect existing land uses.

7.1 Build Alternatives

Acquisition of businesses and residences would occur in compliance with existing regulations, and property owners would be compensated at fair market value under the provisions of the Uniform Relocation and Real Property Policies Act of 1970, as amended (Revised Code of Washington, Chapter 8.26). The Relocations Technical Report for this project provides more information on relocation policies and services.

Property owners who would not be displaced should be provided advance notice of potential access or utility disruptions in the project area as a result of construction activities. The project proponent should work with local businesses and residents to minimize disruptions to these land uses during proposed project construction. The Economics Technical Report for this project provides additional information on mitigation for business impacts.

The local jurisdictions should work with the community to determine appropriate land uses for parcels acquired for the proposed street and bridge improvements. Future development should be sensitive to community needs and desires, including continuing the viability of the existing business area along 14th Avenue S., provisions for replacement businesses, new access areas, street landscaping, bus shelters or pullouts, and other measures intended to create an attractive and accessible environment for retail, service, and residential uses. Potential uses along the riverfront should consider future public recreation and shoreline access opportunities.

7.2 No Action Alternative

Mitigation measures are not proposed. Future plans for the South Park neighborhood could be prepared to develop land use measures for potential community changes associated with closure of the South Park Bridge. Such measures should be consistent with the urban residential village goals for the neighborhood identified in local comprehensive plans.

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Duwamish Coalition, 1995. *The Duwamish Industrial Area: An Economic Profile*, Duwamish Coalition, King County Office of Regional Policy and Planning, February 1995, Seattle, Washington.

EPA/Ecology, 2002. *Lower Duwamish Waterway Site Community Involvement Plan*, U.S. Environmental Protection Agency and Washington Department of Ecology, October 2002, Olympia, Washington.

King County, 2002. King County Department of Transportation, Road Services Division, Public Scoping Meeting Transcript, South Park Bridge Project, February 28, 2002, Seattle, Washington.

King County, 2001. *King County Zoning Code*, (*Title 21A*), King County Department of Development and Environmental Services, Renton, Washington.

King County, 2000a. *Habitat Limiting Factors and Reconnaissance Assessment Report: Green/Duwamish and Central Puget Sound Watersheds*, Volume I, King County Department of Water and Land Resources, December 2000, Seattle, Washington.

King County, 2000b. *King County Comprehensive Plan*, King County Department of Development and Environmental Services, Renton, Washington.

Puget Sound Regional Council, *Destination 2030*, PSRC, 2001, Seattle, Washington

Puget Sound Regional Council, *Vision 2020 (1995 Update)*, PSRC, May 25, 1995, Seattle, Washington

Seattle, City of; 2002. *Seattle Land Use Code* (Seattle Municipal Code, Title 23), Seattle, Washington.

Seattle, City of; 2001. *Seattle's Comprehensive Plan*, Office of Strategic Planning, Seattle, Washington.

Seattle, City of; 1999. *Greater Duwamish Manufacturing and Industrial Center Plan*, Seattle Neighborhood Planning Office, Seattle, Washington.

Seattle, City of; 1998. *South Park Residential Urban Village Plan*, Seattle Neighborhood Planning Office, Seattle, Washington.

Tukwila, City of; 2001. *Tukwila Zoning Code*, (Tukwila Municipal Code, Title 18), Tukwila, Washington.

Tukwila, City of; 1995. *Comprehensive Land Use Plan*, Tukwila Community Development Department, Tukwila, Washington.

Tukwila, City of; 1992. *Duwamish Corridor Redevelopment Proposal, Draft Environmental Impact Statement*, Tukwila Department of Community Development, Tukwila, Washington.

Washington, State of; 1990. *Growth Management Act*, (Revised Code of Washington 36.70A, as amended), Office of Community Development, Olympia, Washington.

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Memorandum

To: Tim Lane, Trinh Truong, Jim Sussex

From: M. Reinfeld

Date: August 12, 2005

Subject: South Park Bridge Project - Trends in Property Values

King County proposes to rehabilitate or replace the historic South Park Bridge, located in Seattle's industrial area south of downtown. The South Park community is predominantly residential, with a mixture of neighborhood retail and services along 14th Avenue S. The Boeing Company training facility is located in the southeast corner of the commercial district. In addition, much of the area between 12th Avenue S. and 17th Avenue S. north of Dallas Avenue S. is comprised of light industrial uses. For more information on the social and economic composition of the South Park community, see the *Social Elements Technical Report* (Feb 2004).

This memo summarizes trends in property values in the South Park community and compares them to regional trends.

Methodology

To identify properties in the South Park Community, we used the King County Parcel Viewer and iMap System. Within the study area defined by census tract 112, we selected approximately 10 percent of properties in each land use category (single-family residential, commercial and industrial) at random. Relying on King County's eReal Property System, we obtained total assessed values from 2000 and 2005 for the selected properties. In addition, we researched regional property sales price information available through the Northwest Multiple Listing Service and the United States Census Bureau.

Results

For a summary of the study results, see Table 1.

Residential

Based on a review of the sampled residential properties, most residential properties in the South Park area are between .15 and .25 acres (9,000 – 11,500 square feet). Because property sizes are similar, the median assessed value is a good measure of property values in South Park. In 2000, the median assessed value of the sampled residential properties in South Park was $95,000. By 2005, the median assessed value had risen to $152,000, an increase of 60 percent.

We recognize that a direct comparison between home sales prices and total assessed values is not necessarily appropriate. Unfortunately, information on home sales prices is not available for small neighborhoods such as South Park. Trends in assessed values,

however, tend to follow trends in sales prices. A comparison between these two trends, therefore, is relevant. The median home sale prices in King County increased 42 percent during the study timeframe, from $236,900 in 2000 to $335,950 in 2005. In the City of Seattle, the median home sale price rose 43 percent between 2000 and 2005, from $259,600 to $372,000.

In both King County and the City of Seattle, the average annual compound change of sales prices was 7 percent from 2000 to 2005. In contrast, the average annual compound rate of property values in South Park was 10 percent during the same time period.

Commercial and Industrial

There is substantial variation in property sizes and total assessed values of commercial and industrial properties in South Park. For instance, between 2000 and 2005, commercial property values ranged from $24,000 to over $1,000,000. On average, the total assessed value of sampled commercial properties rose 61 percent from 2000 to 2005, or 9 percent compounded annually. During the timeframe evaluated, industrial property values increased 67 percent, or an average compounded increase of 8 percent per year.

Table 1. Summary of Property Values and Trends in South Park

Land Use	Number of Parcels Sampled	Average % Change (2000 – 2005)	Average Annual Compound % Change (2000-2005)
Residential	73	70%	10%
Commercial	24	61%	9%
Industrial	11	67%	8%
Summary	108	64%	9%

Conclusion

South Park is a predominantly residential community. Residential properties in the community are increasing by 10 percent compounded per year. In contrast, residential property values in both King County and the City of Seattle are growing only 7 percent annually. The higher rate of change of property values in South Park is likely due to the high demand for housing in the community.

cc: E. Handeland, B. Minden, Project Files

Appendix N. Economics Technical Report

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South Park Bridge Project

Economics Technical Report

Prepared for the

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February 2004

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Technical Report
South Park Bridge Project

Economics

February 2004

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Chapter 1 Executive Summary

King County proposes to rehabilitate or replace the South Park Bridge. The purpose of the project is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the bridge. In addition, several key issues need to be addressed, which include community impacts, aquatic habitat protection, and Duwamish Waterway navigation. Current business activities and future economic development in South Park is integrally linked to the extent that the community and navigation along the Duwamish Waterway is affected by the proposed project.

Five alternatives are being considered: No Action, Rehabilitation, Bascule Bridge, Mid-Level Fixed-Span Bridge, and High-Level Fixed-Span Bridge. This Economics Technical Report describes the existing economic conditions of the South Park community (local area) and of the Greater Duwamish area and King County (regional area). Impacts to the local and regional economies, including marine users and marine-dependent businesses, were evaluated. These impacts were differentiated as construction-related, operation-related, and secondary and cumulative.

1.1 Affected Environment

South Park is about four miles south of downtown Seattle. Access into South Park from the Puget Sound Region is available via multiple modes of transportation, transit, and navigation, including several Metro bus routes. The local economy is comprised of highway-related, marine-related, and health care businesses. The South Park business district consists roughly of six blocks along both sides of 14th Avenue S. from S. Henderson Street to S. Orr Street near the south approach of the South Park Bridge. Businesses within this district include restaurants, taverns, marine retail and industrial facilities, other retail and warehouse, and medical and dental clinics. Several vacant buildings and residential units are interspersed with these businesses. Substantial proportions of South Park businesses are owned, operated, or serve clients that belong to minority populations.

1.2 Construction and Operational Impacts

The impacts associated with each alternative are detailed in Table 1 at the end of this section. These impacts are categorized by those that would occur during construction activities and those that would occur over the long-term operation of the replacement bridge. Long-term impacts are primarily associated with property acquisition and changes in the transportation network, marine vessel navigation, and regional travel patterns.

The need to acquire full or partial parcels of property is directly linked to impacts on South Park businesses, especially those located within the South Park business district. Table 1 lists the number potential property acquisitions as well as the number of operating businesses, vacant buildings, residential structures, and parking lots that would be affected by each of the alternatives. In addition, the assessed real property value of all parcels that would be fully acquired is totaled by alternative.

When businesses are displaced, the associated jobs are also displaced. These jobs would change in location if businesses were relocated or would be lost if businesses were permanently closed. Table 1 shows the estimated number of permanent jobs that would be affected by each alternative. With construction activities, temporary jobs would be created. These jobs are characterized as direct (jobs in the construction highway industry), indirect (jobs in industries that supply materials for highway construction), and induced (jobs in industries that benefit from the spending and investments made by the direct and indirect jobs).

The differentiating long-term impacts to the local and regional economy that would be expected to result by alternative are summarized below.

No Action Alternative

- Cross-river roadway connection would be lost
- South Park business district activities, Greater Duwamish region business activities, and associated jobs would decrease
- Regional transportation costs could increase without this connection
- Property values in South Park could decrease without this connection

Rehabilitation Alternative

- No changes to marine-related traffic and businesses
- Minimal changes in location of permanent jobs, property values, and regional business activities
- Long-term residual impacts on local businesses, particularly if some business would need to relocate or terminate business activities in the wake of not remaining viable during a 32-month construction period

Bascule Bridge Alternative

- No changes to marine-related traffic and businesses
- Minimal changes in location of permanent jobs, property values, and regional business activities

Mid-Level Fixed-Span Bridge Alternative

- Loss of one-third of the 14th Avenue S. business district businesses (15 businesses) and associated jobs and tax revenues
- Few impacts to most marine-related traffic and businesses—However, one business, Delta Marine Industries, could be severely impacted. It would not be able to conduct some of its current services of constructing and providing maintenance to luxury yachts. And, the derricks needed to launch these yachts would not be able to pass under the new bridge due to vertical constraints.

- Substantial changes in location of permanent jobs
- Minimal changes to remaining business property values, tax revenues, and regional business activities

High-Level Fixed-Span Bridge Alternative

- Severe displacement of two-thirds of the 14th Avenue S. business district businesses (28 businesses) and associated jobs and tax revenues
- Substantial changes to long-term traffic patterns due to local street network alterations
- Few impacts to marine-related traffic and businesses
- Substantial changes in location of permanent jobs
- Minimal changes to remaining business property values and tax revenues
- Possible increase in transportation costs for regional businesses if regional freight traffic seeks other routes to avoid the 8 percent grade on the new bridge.

1.3 Secondary Impacts

Secondary impacts from the No Action Alternative would be severe. The eventual closure of the South Park Bridge and loss of a cross-river connection would decrease local South Park business viability as well as increased transportation costs for Greater Duwamish regional businesses.

For the Rehabilitation Alternative, secondary impacts could include eventual loss of businesses, jobs, and associated tax revenues for businesses that sustained economic losses during construction that could not be relocated once the bridge reopened.

Few adverse secondary impacts would be anticipated for the Bascule Bridge Alternative.

The loss of businesses displaced for the Mid-Level Fixed-Span and High-Level Fixed-Span bridge alternatives could lead to additional losses in local South Park businesses that were not originally displaced. This would especially be the case in the High-Level Fixed-Span Bridge Alternative. In addition, one business (Delta Marine Industries) would lose the ability to conduct some of its future business activities at its current location, which is upstream of the bridge, under the Mid-Level Fixed-Span Bridge Alternative. This is due to new vertical constraints that would be incompatible with some of the yachts that are constructed and maintained at Delta Marine Industries as well as the access for derricks that are required to launch the yachts. And, over time, the High-Level Fixed-Span Bridge Alternative may limit the future size of some yachts that Delta Marine Industries may want to construct, which is again related to vertical constraints of the new bridge.

1.4 Cumulative Impacts

The implementation of any of the alternatives would not be expected to contribute adverse cumulative impacts. The South Park Bridge project would likely contribute to the objectives in the larger-scale Duwamish River clean-up project without causing adverse effects since it would also involve cleaning up contaminated properties affected by the project. Overall, the combined clean-up efforts would likely increase property values. In addition, the South Park Bridge would not contribute to any adverse cumulative impacts in association with the Duwamish Riverfront redevelopment project.

No other road or highway projects are known at this time that would conflict or cause adverse cumulative impacts when implementing any of the alternatives being evaluated in the South Park Bridge project.

1.5 Mitigation Measures

To reduce the construction and operation-related impacts, mitigation measures are recommended. The mitigation measures proposed are general in nature. Specific mitigation measures will need to be determined as part of final design and prior to the start of construction. These measures should be based on the expected cost effectiveness, specific needs of individual businesses, and resiliency of individual businesses to endure the impacts associated with each alternative.

General mitigation measures include scheduling construction activities to minimize impacts created during business hours or high-sales periods, providing information about construction to businesses, maintaining access to and visibility of open businesses, providing for lost parking, and complying with the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

The cost of relocation mitigation would likely be tied to the number of businesses that would need to be relocated and the assessed value of property acquired. Relative comparisons of property values (see Table 1) indicate that relocation mitigation associated with the Mid-Level Fixed-Span Bridge Alternative is much higher than either the Rehabilitation or the Bascule Bridge alternatives. The High-Level Fixed-Span Bridge Alternative would incur the highest cost for property acquisition and relocation.

A caveat regarding mitigation for right-of-way acquisition, displacement, and relocation of businesses is that most of the business owners surveyed indicated that they would not be able to remain viable upon relocation (Parsons Brinckerhoff, 2003). Many members of the project Community Advisory Group (CAG) agree that substantial business displacements could not be mitigated, such as needed under the Mid-Level Fixed-Span Bridge and High-Level Fixed-Span Bridge alternatives. Moreover, many business owners and managers believe that the loss of businesses in the South Park community, especially businesses that provide services to a predominantly Hispanic clientele, would adversely resonate through South Park as well as the larger Hispanic community in the Seattle metropolitan area.

Table 1. Comparison of Economic Impacts by Alternative

	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
CONSTRUCTION					
Construction Duration	8 Months	32 Months	30 Months	20 Months	24 Months
Construction Activity Impacts	• All cross-river roadway traffic prohibited • Decrease in traffic that supports business activities • Noise and vibration during business hours • Temporary delays for marine traffic • Increase in construction expenditures, temporary construction jobs, and associated tax revenues.	• Long duration of bridge closure that prohibits all cross-river roadway traffic • Decrease in traffic that supports business activities • Noise and vibration during business hours • Temporary delays for marine traffic • Increase in construction expenditures, temporary construction jobs, and associated tax revenues • Temporary street closures.	• Short-term bridge closures that prohibit all cross-river roadway traffic • Decrease in traffic that supports business activities • Noise and vibration during business hours • Temporary delays for marine traffic • Increase in construction expenditures, temporary construction jobs, and associated tax revenues • Temporary street closures.	• Short-term bridge closures that prohibit all cross-river roadway traffic • Decrease in traffic that supports business activities • Noise and vibration during business hours • Temporary delays for marine traffic • Increase in construction expenditures, temporary construction jobs, and associated tax revenues • Temporary street closures.	• Short-term bridge closures that prohibit all cross-river roadway traffic • Decrease in traffic that supports business activities • Noise and vibration during business hours • Temporary delays for marine traffic • Increase in construction expenditures, temporary construction jobs, and associated tax revenues • Temporary street closures.
Temporary Jobs Created During Construction	284	2,372	2,754	2,143	2,100
Direct	53	445	517	402	394
Indirect	133	1,110	1,289	1,003	983
Induced	98	817	949	738	723

Table 1. Comparison of Economic Impacts by Alternative (continued)

	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
OPERATION					
Full Parcel Acquisitions	0	3	5	12	33
Business displacements	0	3	5	15	28
Vacant building displacements	0	0	0	1	5
Residential displacements	0	1	1	2	9
Parking lot displacements	0	0	0	0	1
Assessed real property value	$0	$391,900	$827,700	$2,465,700	$7,383,800
Partial Parcel Acquisitions	0	0	2	2	5
Businesses affected	0	0	1	1	1
Residences affected	0	0	0	0	3
Parking lots affected	0	0	1	1	1
Permanent Jobs Displaced	0	15	25	75	140
Transportation Network Changes					
South Park Bridge	• Permanently closed	• Permanently open in same location	• Permanently open; replacement bridge immediately downriver; existing bridge demolished	• Permanently open; replacement bridge immediately downriver; existing bridge demolished	• Permanently open; replacement bridge immediately downriver; existing bridge demolished

Table 1. Comparison of Economic Impacts by Alternative (continued)

	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Transportation Network Changes (cont.)					
14th Avenue S.	• Dead-end at Duwamish Waterway	• Improved intersection with S. Sullivan St. and Dallas Ave S.	• Reconfigured intersection with Dallas Ave S. • No direct access to S. Sullivan St.	• No direct access to S. Sullivan St. and Dallas Ave. S. • Retaining walls for most of distance between S. Sullivan St. and S. Cloverdale St. • Retaining walls at intersection with S. Cloverdale St. • Raised intersection (5 feet) at S. Cloverdale St.	• No direct access to S. Sullivan St., Dallas Ave. S., S. Cloverdale St., and S. Donovan St. • Retaining walls for most of distance between S. Cloverdale St. and S. Trenton St.
16th Avenue S.	• Dead-end at Duwamish Waterway	• No change	• Reconfigured intersection with Dallas Ave S.	• Reconfigured intersection with Dallas Ave S.	• Reconfigured intersection with Dallas Ave S.
S. Orr Street	• No change	• No change	• No change	• Closed for pedestrian/bike path	• No change
S. Thistle Street	• No change	• No change	• Slightly realigned	• Closed	• Slightly realigned
Dallas Avenue S.	• No change	• Improved intersection with S. Sullivan St. and 14th Ave S.	• Reconfigured intersection with 16th Ave S.	• Merge into S. Sullivan St. and cross under new bridge. • No access to 14th Ave S. and bridge.	• Merge into S. Sullivan St. and cross under new bridge. • No access to 14th Ave S. and bridge.

Table 1. Comparison of Economic Impacts by Alternative (continued)

	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Transportation Network Changes (cont.)					
S. Sullivan Street	• No change	• Improved intersection with Dallas Ave S. and 14th Ave S.	• Permanently closed or reconfigured with Dallas Ave S. • No direct access to 14th Ave S. and bridge.	• Merge into Dallas Ave S. and cross under new bridge. • No access to 14th Ave S. and bridge.	• Merge into Dallas Ave S. and cross under new bridge. • No access to 14th Ave S. and bridge.
S. Cloverdale Street	• No change	• No change	• No change	• Raised intersection (5 feet) at 14th Ave S.	• Convert to underpass under new bridge.
S. Donovan Street	• No change	• No change	• No change	• No change	• No direct access to 14th Ave S., with turn-a-rounds constructed at abutments.
New principle arterial	• Not required	• Not required	• Not required	• Not required	• New road to connect S. Trenton St. and 12th Ave S.
Long-Term Impacts on Marine Business	• No change	• No change	• No change	• New bridge vertical clearance would be 65 feet above MHW • Vessels requiring more clearance would be prohibited	• New bridge vertical clearance would be 100 feet above MHW • Vessels requiring more clearance would be prohibited

Table 1. Comparison of Economic Impacts by Alternative (continued)

	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Long-Term Effects on the Regional Economy	• Closure of the bridge would require freight and passenger vehicles to detour to other bridges. • South Park would likely experience less thru-traffic. • Industries needing to detour freight, could experience increased operating expenses.	• Minimal impacts since no detours would be required.	• Minimal impacts since no detours would be required.	• Although economic impacts to South Park would be substantial, changes to the regional economy would be minimal.	• Economic impacts to South Park would be severe, and regional economies also could be adversely affected. • Increased freight and passenger vehicle travel time and operating costs would increase due to the new principle arterial connection from 12th Ave S. to S. Trenton St.

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Chapter 2 Introduction

Chapter 2 is an introduction to the technical analysis contained in this discipline report. This chapter describes existing conditions, the history of the project, the purpose and need for the project, and the five project alternatives being considered for environmental review. In addition, this chapter summarizes project coordination conducted to date with agencies, local governments, the community advisory group, and members of the public.

2.1 Description of Existing Conditions

This first section describes existing conditions pertinent to the proposed South Park Bridge Project. The project area is defined. The existing bridge and its current condition are described. The local roadway network in the South Park community is described. Non-vehicular transportation in the community is also summarized.

2.1.1 The Project Area

The South Park community is about four miles south of downtown Seattle (see Figure 1). The community lies south of the Duwamish Waterway, the man-made channel portion of the Duwamish River as it enters Elliott Bay. Though originally incorporated as its own city in 1905, much of the area was annexed by the City of Seattle in 1907.[1] The project area lies south of the industrial Georgetown area of Seattle and the King County International Airport (known as Boeing Field). It encompasses the roadway corridor defined by 16th Avenue S. between East Marginal Way S. and the South Park Bridge and 14th Avenue S. between the bridge and S. Trenton Street. Residents and business owners in the project area generally identify with the City of Seattle.

The project area, however, is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits of both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Trenton Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company's Plant 2 dominates the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land uses front on 14th Avenue S. and along the south bank upstream of the South Park Bridge. Single-family residences, however, generally characterize the area off of this main transportation artery.

[1] City of Seattle, *South Park Residential Urban Village Plan*, 1998.

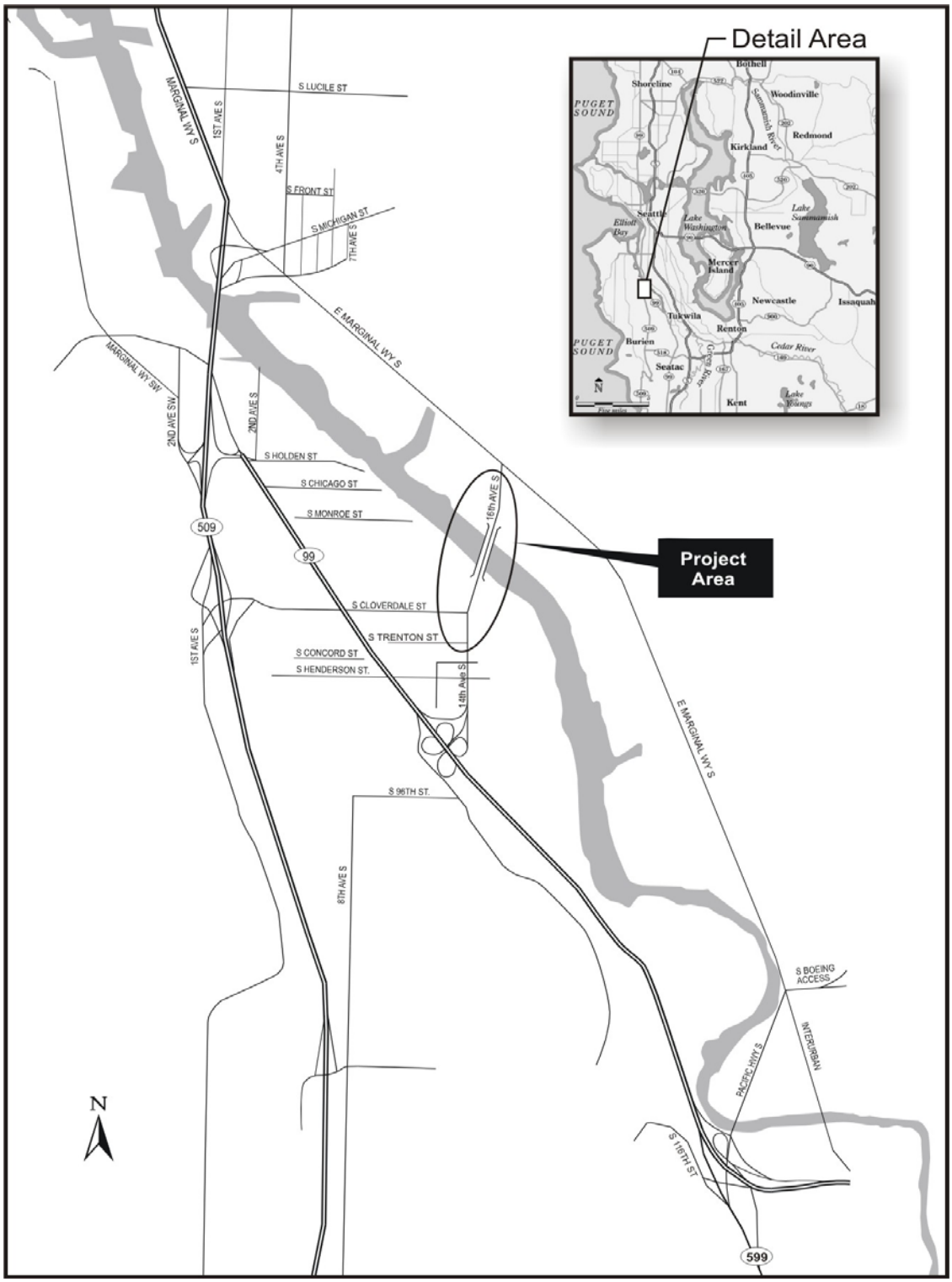

Figure 1
Project Area and Vicinity

2.1.2 The Existing South Park Bridge

The South Park Bridge was constructed in 1929-1931 (see Figure 2). The existing structure consists of a Scherzer rolling-lift double-leaf bascule movable span. Because it is the only operational example of a Scherzer rolling-lift bascule bridge in Washington, the bridge is listed on the National Historic Register.[2]

Each side is flanked by two truss approach spans and twelve concrete slab approach spans. The overall length of the bridge is approximately 1,045 feet abutment-to-abutment and approximately 1,340 feet in entirety to the grade match points. The double-leaf bascule movable span has a center-to-center distance between the front bearing points of approximately 190 feet. The roadway consists of four 9.5-foot lanes. The pavement is 38 feet with 6-foot sidewalks on both sides. Reinforced concrete piers founded on timber piling support the bascule span. Two large in-water piers support the counterweights, track supports, and racks for the rolling lift. The attached towers house the operating machinery, electrical equipment, and operator control room.

The South Park Bridge spans the Duwamish Waterway, which is used for industrial, commercial, and recreational purposes. The bridge is near the upstream limit of heavy industrial uses along the Duwamish Waterway, but it is within the section of the navigation channel maintained by the U.S. Army Corps of Engineers. The existing maximum vertical clearance of the bridge when closed is approximately 34 feet at Mean High Water (MHW). Bridge openings occur approximately three times per day on average to accommodate waterway traffic, although on some days the bridge does not open at all. The existing navigable horizontal clearances is approximately 118 feet at the water level (fender-to-fender), but narrows to 92 feet approximately 114 feet above the water between the open bascule leaves. The depth of the navigation channel is approximately 15 feet at Mean Lower Low-Water (MLLW).

2.1.3 Bridge Condition

In spite of substantial on-going maintenance and repairs, the South Park Bridge has suffered considerable deterioration over the past 70 years. In particular, the bascule piers are cracked and unstable resulting in the misalignment of the movable spans. Consequently, the center lock and glide tracks require on-going modifications and adjustments to allow the bridge to operate properly. Long-term, the stability of the entire bridge is at risk due to the original shallow placement of the supporting piles, which has resulted in movement of the bridge piers over the decades. The condition of the bridge worsened significantly following the Nisqually Earthquake in February 2001, and it remains vulnerable to future seismic events. A 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on Federal Highway Administration criteria).[3] This was among the lowest ratings given any bridge structure in the State of Washington in 2002.

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[2] King County Landmarks and Heritage Commission. *Findings and Fact Decision – 14th Avenue South Bridge*, decision made December 19, 1996 and filed January 2, 1997.

[3] King County, *Bridge Inspection Report*, August 1, 2002.

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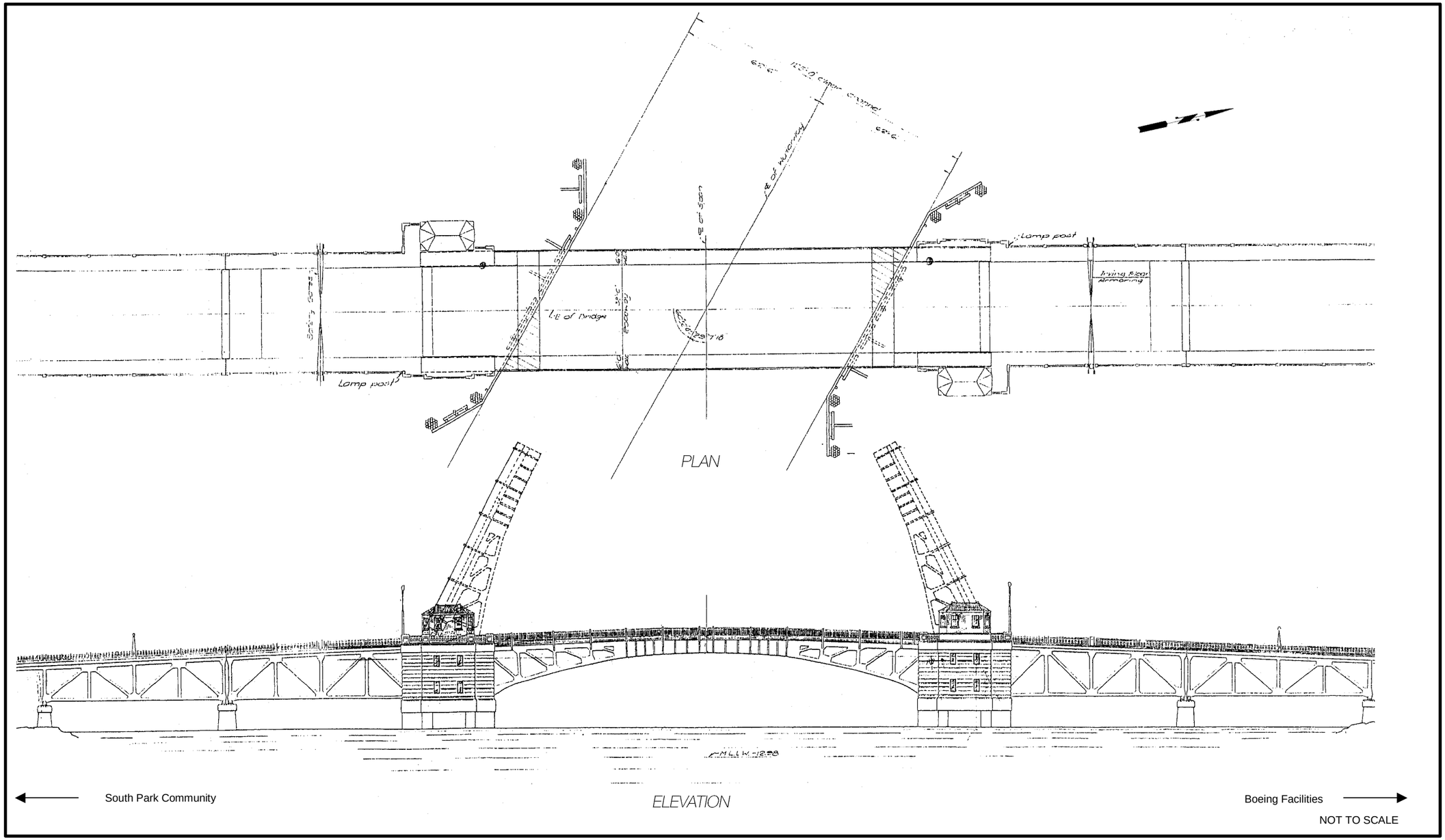

Figure 2
Existing South Park Bridge

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2.1.4 Roadway Network

The bridge presently accommodates an average daily traffic volume of approximately 20,000 vehicles per day, based on 2001 City of Seattle traffic counts. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For South Park community residents, the bridge is the primary direct means of access to the north, downtown Seattle, and I-5.

The existing roadway network surrounding the South Park Bridge consists of a variety of roadway types. They range from local two-lane streets to major limited-access highways. Regional traffic movement in the South Park area is concentrated to three nearby north-south corridors including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Features such as the Duwamish Waterway and large-scale facilities such as Boeing Field and the Boeing Plant 2 create barriers within the road network and limit opportunities for access to and from the major regional routes.

2.1.5 Freight, Transit, and Pedestrians

Freight movement in peripheral areas of the South Park community is significant due to the high concentration of industrial and manufacturing uses in the general area. Major truck traffic is primarily directed along East Marginal Way S. and SR-99. The South Park Bridge and S. Cloverdale Street are also designated truck routes for oversized vehicles. Trucks use S. Cloverdale Street to access the City of Seattle South Recycling and Disposal Station located at 8105 Fifth Avenue S. as well as SR-509 and SR-99 located on the western edge of the South Park community. With respect to rail movements, the only train crossing in the study area exists immediately south of the intersection of East Marginal Way S. and 16th Avenue S.

Bus routes serving the South Park community are primarily located along major north-south corridors, including East Marginal Way S., 14th and 16th Avenues S., and S. Cloverdale Street. Six major King County Metro bus routes serve the area. Routes 60 and 130 cross the South Park Bridge and four of the six bus routes travel along S. Cloverdale Street.

Pedestrians and bicyclists are commonly seen in the South Park area, especially near the community's center near the intersection of 14th Avenue S. and S. Cloverdale Street. Mid-day pedestrian volumes are higher than the morning or evening commute periods due to shopping, transit use, and lunch-related walking trips.

2.2 History of Project

Since 1931, the moveable bridge has crossed the Duwamish Waterway in the South Park community of the City of Seattle. The following sections contain an overview of the studies preceding the start of the current environmental review effort, a summary of two key documents that framed the initial development of project alternatives, and ongoing reports documenting the changing condition of the bridge.

2.2.1 Overview of Studies

In recent history, over 20 engineering studies have been prepared on the South Park Bridge. Starting in 1987, when the bridge was 56-years-old, King County contracted for the preparation of a general engineering investigation report to assess the condition of the bridge. In 1991 and 1993, additional studies were completed including a geotechnical study, foundation design report, and a life-cycle cost analysis. This information led King County to undertake a series of studies in 1994 addressing liquefaction risks as well as the condition of the concrete, substructures, approach span joints and loading rating. In addition, a study was conducted to evaluate potential replacement alternatives for the bridge and another study investigated community issues related to the bridge. Since 1994, King County has recognized that the bridge required either rehabilitation or replacement and has continued to investigate the condition and vulnerabilities of the bridge in an effort to evaluate these options.

2.2.2 Summary of Key Engineering Reports

Two key engineering studies were conducted that helped to frame the current pursuit to evaluate potential alternatives to rehabilitate or replace the South Park Bridge. A 1994 Sverdrup study evaluated potential design options and a 1999 Entranco study researched and presented the likely steps required to conduct the necessary environmental review of the project alternatives and to complete necessary permitting. These studies are summarized below.

2.2.2.1 Sverdrup Study

In November 1994, Sverdrup Civil, Inc. completed a report titled *14th/16th Avenue South Park Bridge Rehabilitation/Replacement – Design Report* for the King County Department of Public Works. The objective of that report was to evaluate alternative alignments and bridge types, impacts of the alternatives studied and to present to King County results, findings, conclusions, and recommendations of a preferred replacement bridge for the existing South Park Bridge.

The 1994 design report studied five alternatives: rehabilitation of the existing bridge; two fixed-span bridge replacements (a 100-foot vertical clearance bridge and a 60-foot vertical clearance bridge); a new moveable bridge (double-leaf bascule bridge); and bridge closure (permanent closure and demolition of the existing bridge). Other alternatives that had been evaluated but were not carried forward, according to this report were: locating the replacement bridge immediately east (upstream) of the existing

alignment; matching the existing alignment; and locating the northbound and southbound lanes on separate structures. These three alternatives were not considered feasible and thus were not studied further.

The 1994 design report concluded that the 60-foot vertical clearance fixed-span bridge design could be used to replace the existing South Park Bridge, with consideration of mitigation of impacts to some users.

2.2.2.2 Entranco Study

In July 1999, Entranco completed the *16th Avenue S. Bridge Replacement Project: Environmental Review Report* for the King County Department of Transportation. The objective of this report was to present to King County a summary of environmental review and permitting activities that would likely be required for replacing the bridge.

The report identified the proposed project as a replacement of the existing bridge, including improvements to the approach road – 14th Avenue S. to the south and 16th Avenue S. to the north of the Duwamish Waterway. The project limits were identified as East Marginal Way S. on the north and S. Cloverdale Street on the south. The report asserted three build alternatives should be selected for evaluation in the EIS, including alternatives with differing alignments and bridge types. It was further noted that three alternatives would be the least number needed to provide a reasonable range of alternatives under National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations.

Entranco outlined the various tasks that would be required under the WSDOT Environmental Procedures Manual and Federal Highway Administration (FHWA) guidelines. The report identified these tasks to include the following: the development of bridge alternatives, screening, and selection of alternatives for analysis in the EIS; preliminary engineering design, including an update to the1994 rehabilitation/replacement report; survey and mapping work; hydraulic and geotechnical studies, and conceptual-level design documentation. The report concluded that the alternatives proposed, including rehabilitation of the existing bridge, had not been designed in enough detail to make a decision regarding a preferred alternative. Related to the environmental review process, the report recommended the public involvement program include coordination with an Interdisciplinary Team (IDT) of agency representatives and a community advisory committee. The report also listed 17 specific environmental discipline reports that would likely be required for the preparation of the EIS.

The findings and recommendations presented in the Entranco report formed the basis from which King County staff developed the current contracted scope of work for environmental review. The scope includes engineering, environmental review, agency coordination, and public involvement tasks.

2.2.3 Continuing Deterioration

Since 1999, King County has continued to move forward to develop alternatives for rehabilitating or replacing the existing South Park Bridge. Bridge conditions have worsened since the engineering studies were conducted in the mid-1990s. In February 2001, the Puget Sound Nisqually Earthquake caused significant and widespread damage to the bridge. Over $740,000 was required to repair the bridge in order to keep it operational.[4] The King County 2001 bridge inspection report recorded a rating of 8.0 out

[4] Tim Lane, King County Department of Transportation, Telephone Conversation, September 23, 2002.

of a total possible score of 100 (based on FHWA criteria).[5] The following year, this rating decreased to 6.0.[6]

2.3 Purpose and Need of Project

As a required element of the EIS, a Purpose and Need Statement was developed for the South Park Bridge Project to clarify the underlying basis for the proposed action. The development of the initial draft Purpose and Need Statement involved review and comment by a number of parties including King County staff and the Project Advisory Committee (PAC) that includes agencies with jurisdiction over the proposed project. The draft Purpose and Need Statement was also revised based on comments received at several public involvement events. In April 2002, King County forwarded the draft Purpose and Need Statement to the Federal Highways Administration (FHWA) for review and approval. The text of the FHWA-approved version of the Propose and Need Statement is presented in the following sub-sections, although minor revisions and footnotes have been included for clarification.

2.3.1 Function and Role of the South Park Bridge

The King County Department of Transportation (KCDOT) is proposing the rehabilitation or replacement of the South Park Bridge located in King County, Washington. Since 1931 the moveable span bridge has carried traffic along the 14th Avenue South and 16th Avenue South corridor across the Duwamish Waterway. On a typical workday, a mix of approximately 20,000 cars, trucks and buses use the bridge to access employment centers in downtown Seattle and the Duwamish industrial area. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For residents of the community of South Park, the bridge is the only immediate means of access to and from destinations east of the community. The moveable structure spans the navigation channel of the Duwamish Waterway. When open, large-size industrial and recreational vessels have access to upriver destinations. The South Park Bridge is also a major route for heavy truck traffic traveling to and from large industrial manufacturers including the Boeing Company.

2.3.2 Purpose of Proposed Project

The purpose of the proposed action is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge. The proposed action must also maintain the vital transportation linkage for cars, trucks, buses, bicyclists and pedestrians across the Duwamish Waterway.

2.3.3 Need for the Proposed Project

In spite of substantial ongoing maintenance and repairs, the South Park Bridge has suffered substantial deterioration over the past 70 years. Existing problems with the bridge worsened significantly following the Nisqually Earthquake in February 2001 and

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[5] King County, *Bridge Inspection Report,* August 21, 2001.

[6] King County, *Bridge Inspection Report,* August 1, 2002.

the bridge remains vulnerable to future seismic events. A recent 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on FHWA criteria).[7] This is among the lowest ratings given any bridge structure in the State of Washington.

The bridge could be closed as a consequence of excessive structural deterioration or failure of the moveable span operations (particularly in the event of another seismic event). Closure of the bridge would have a significant impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area-- including SR-99, SR-509, First Avenue S. and East Marginal Way S. Improvements are required in the near future to protect public safety and to maintain a transportation corridor that is critical to the local and regional economy.

2.3.3.1 Seismic Vulnerability

The February 28, 2001 Nisqually earthquake (magnitude 6.8, located 35 miles from Seattle and deep below the surface) caused significant damage to the South Park Bridge. Since the earthquake, operation of the moveable span has been less reliable, requiring the bridge to be closed for repairs intermittently for several days. The continuing periodic closure of the bridge for repairs has heightened the awareness of the need for rehabilitation or replacement of the existing bridge.

2.3.3.2 Roadway Design Deficiencies

The South Park Bridge does not meet current roadway design standards and has many design deficiencies. For example, the overall bridge width including lane widths, shoulders and sidewalks should be 64 feet according to current design standards. The existing bridge width is currently only 52 feet (measured outside-to-outside).

2.3.3.3 Transportation Issues

An average of 20,000 daily vehicle trips cross the Duwamish Waterway on the South Park Bridge. It is a significant link between the east and west side of the Duwamish, both locally and regionally. The South Park Bridge is also a route for heavy and oversize truck traffic. According to previous studies, closure of the bridge would have a significant noticeable impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area – including the Highway 99 and East Marginal Way S. corridors.

2.3.4 Key Issues

2.3.4.1 Community Impacts

The existing South Park Bridge is a highly valued feature of the South Park community. There is widespread concern in the community that changes to the bridge could have a significant adverse impact on the community and the emerging economic vitality of the South Park business district centered along 14th Avenue South. The *South Park*

[7] The original text of the FHWA-approved Purpose and Need Statement cited the condition rating of 8.0 from the 2001 King County Bridge Inspection Report. The current cited condition rating of 6.0 is from the King County *Bridge Inspection Report* dated August 1, 2002.

Residential Urban Village Plan of 1998 (the neighborhood plan) identified one of its primary objectives as "finding a solution for the South Park Bridge that is sensitive to the needs of the community."

The South Park community is also ethnically diverse. Approximately 30 percent of the populations' primary language is not English. These factors require greater emphasis on the consideration of environmental justice[8] in order to ensure that the potential adverse effects from the proposed project do not have a disproportionate impact on lower-income or minority populations.

2.3.4.2 Aquatic Habitat Protection

The Duwamish Waterway is an important route for juvenile and adult salmon migrating between the upper Green River, Elliott Bay and the Pacific Ocean. However, much of the waterway in the vicinity of the South Park Bridge currently provides poor habitat for chinook salmon (listed as threatened under the Endangered Species Act) and other marine organisms. The armored shoreline along the waterway in the project area provides minimal habitat for young chinook salmon during their critical rearing period. Recovery plans now underway for threatened and endangered salmon will address potential means of enhancing habitat favorable to the survival and growth of young salmon from the Duwamish/Green River system. Restoration of the shoreline in the vicinity of the project would address immediate and long-term needs for habitat improvement along the Duwamish Waterway.[9]

2.3.4.3 Duwamish Waterway Navigation

The Duwamish Waterway is used for industrial, commercial and recreational purposes. The South Park Bridge is near the upstream limit of heavy industrial uses along the waterway, but it is within the section of the waterway maintained by the U.S. Army Corps of Engineers as a navigation channel. A number of local businesses, as well as the U.S. Coast Guard, have emphasized to King County that any engineering solutions for the South Park Bridge must maintain navigational access upstream of the existing bridge.

2.4 Description of Alternatives

This section describes the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives (Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives). The first section explains the transportation engineering criteria and standards used to design the Rehabilitation Alternative and the three replacement bridge alternatives. The second section describes the horizontal and vertical profile of the bridge alternatives, navigation channel clearances, and impacts to the local

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[8] Environmental justice concerns the need to avoid disproportionate, significant adverse impact on minority and/or low-income communities.

[9] This section highlights the importance of addressing aquatic habitat values in the project area, as well as the implications for species currently listed under the ESA; however, it is not intended as a complete characterization of the factors that need to be considered in this regard.

road network. The last section describes construction activities associated with each of the five alternatives for the South Park Bridge Project.

2.4.1 Design Criteria

Except for the No Action Alternative, construction of any of the project alternatives would incorporate current transportation engineering design criteria for the cross-section, alignment, design speed, maximum grade, and transition segment. The road cross-section design is a key design element that would change for any of the build alternatives (see Figure 3). The existing bridge cross-section incorporates four 9.5-foot travel lanes, raised curbs on both sides of the pavement, and a 6-foot sidewalk on either side of the roadway. The outside-to-outside dimension of the existing bridge is 52 feet. These lane widths are non-standard and would be changed for the Rehabilitation Alternative and for the three replacement bridge alternatives. For the Rehabilitation Alternative, the pavement would remain approximately the same width as it is currently, but would be reconfigured for three standard lanes. There would be two 12-foot lanes on the outside and one 11-foot lane in the middle of the roadway. Traffic would use one 12-foot lane for northbound travel and the other two lanes for southbound travel. The 6-foot sidewalk on either side of the roadway would be enlarged to approximately 7.5 feet. In contrast, each of the replacement bridge alternatives would be designed with four standard 11-foot lanes, traffic barriers or a painted median down the center, a traffic barrier on each side of the pavement, and a single combined 13-foot pedestrian/bike path on the west (downstream) side of the bridge. The width of the cross-section for the new replacement bridge alternatives including the exterior barriers would total approximately 68 feet (outside-to-outside of the bridge structure).

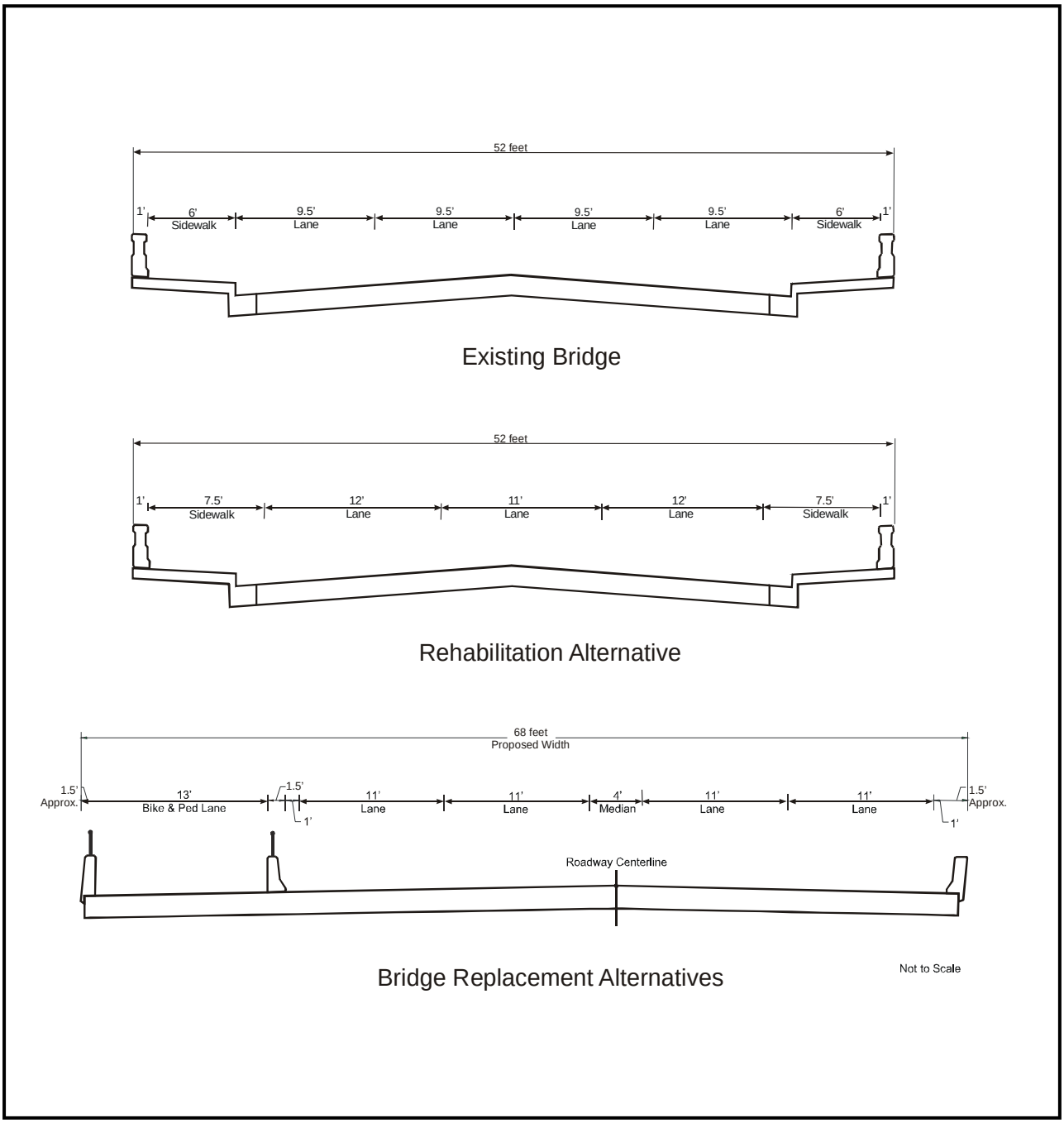

Figure 3
Existing and Proposed
Bridge Cross-Section Designs

An initial range of potential bridge alternatives and alignments was considered based on earlier studies,[10] current input from stakeholders, and the project team. During the course of this initial alternatives development process, it was determined that there were no practical alternative alignments for a replacement bridge other than to parallel the existing bridge. It was determined that replacement bridge alternatives should be aligned to the west (downstream) of the existing bridge in order to minimize impacts to existing land uses. Conceptual engineering for the replacement bridge alternatives set the alignment for these bridges at approximately 80 feet to the west of the centerline of the existing bridge (i.e., as close to the existing structure as practicable without compromising constructability). The initial alignment of the new roadway was the same as the existing road alignment on the south side of the waterway. The existing roadway is quite narrow. Matching the centerline of the new bridge alternatives to the existing would require acquisition of both land and buildings on both sides of 14th Avenue S. To minimize these impacts, the alignment of the new transition segment was shifted slightly to the east of the existing road alignment because there are fewer parcels and buildings located on the east side of the road compared to the west. In addition, more of the buildings located on the east side are set back from the existing sidewalk than on the west side. In this way, the proposed alignment for the replacement alternatives has been developed to avoid or minimize potential land use and relocation impacts.

Other design factors affecting impacts to adjacent properties include the new bridge's design speed and maximum grade. King County road standards call for a 35 mph design speed and a maximum of 8 percent grade. Initially, these standards were incorporated into each of the alternatives. Implementation of an 8 percent maximum grade for the High-Level Fixed-Span Bridge Alternative, however, would have resulted in a very long bridge (project terminus to terminus). For example, the north terminus would have extended across East Marginal Way S. and into Boeing Field. To reduce impacts to land use, the maximum grade for the High-Level Fixed-Span Bridge Alternative would need to slightly exceed 8 percent. In this manner, the north side of the bridge would terminate south of East Marginal Way S. This grade change reduced the overall length of the bridge on both south and north ends of the bridge by several hundred feet for the High-Level Fixed-Span Alternative.

Community impacts would also be affected depending on the design of the transition segment. This is the segment of the roadway that merges the differing widths of the new roadway and the existing narrow roadway. Typically, transition segments begin at the point the grade of the bridge matches the grade of the existing roadway and extends beyond some distance. The actual rate at which the width of the roadway is reduced is defined by transportation engineering design standards. To minimize impacts to land uses along 14th Avenue S., King County proposes to start the transition segment from the abutment for all alternatives. This means that by the time the bridge matches the grade of the existing roadway, the width of the new bridge is nearly the same width as the existing road. As a result, the total length of the roadway is reduced potentially several hundred

[10] Entranco, Inc., *Environmental Review Report: 16th Avenue S. Bridge Replacement*, July 1999.

feet in length. In addition, the width of the transition segment for the Mid-Level Fixed-Span Alternative is further reduced by having the single combined 13-foot pedestrian/bike path split off from the main bridge structure at approximately S. Orr Street and descended to ground level in a zigzag fashion. This design modification further reduced the overall impact of the Mid-Level Fixed-Span Alternative.

Together, the design criteria discussed in this section would allow for the construction of a replacement bridge that provides increased safety for vehicles, bicyclists, and pedestrians.

2.4.2 The Alternatives

A total of five alternatives were selected for evaluation in the environmental review process including: the No Action Alternative, the Rehabilitation Alternative, the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative, and the High-Level Fixed-Span Bridge Alternative. These alternatives were selected from an initial group of nine preliminary project alternatives.[11] The alternatives proposed for evaluation in the environmental review process were selected because they had fewer potential impacts than the other preliminary alternatives. Based on comparison ratings for seven evaluation criteria (regional mobility, local access, navigation, community impacts, aquatic habitat, construction impacts, and estimated project costs), the following preliminary alternatives were dropped from further consideration: a low-level fixed-span bridge, a movable swing bridge, a vertical lift movable bridge, and a tunnel option. The following sections describe each of the proposed project alternatives to be considered in the environmental review process based on conceptual civil and structural engineering.[12] [13]

2.4.2.1 No Action Alternative

The No Action Alternative assumes that the existing bridge structure's poor condition would require it to be closed at some time in the future. Deterioration due to use could allow the bridge to continue to operate for the foreseeable future, but at some time in the future, the bridge would need to be closed. As such, for purposes of environmental review, it is assumed the existing bridge would be closed permanently sometime before 2027.

However, the bridge could be closed for other reasons than simply deteriorated condition. Another earthquake could cause an unexpected emergency closure of the bridge at any time. The on-going movement of the bridge foundations could eventually cause the moveable spans to become misaligned to the extent that repairs would be infeasible. Or, the cost of maintaining the bridge could become more than King County is willing to expend. Under any of these circumstances, the bridge would be closed.

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[11] Parsons Brinckerhoff. *South Park Bridge Project: Summary Technical Memo - Alternatives Development and Screening*, September 6, 2002.

[12] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

[13] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

When closed, no vehicular, bicycle, or pedestrian traffic would be allowed to use the bridge. As a navigable waterway, the U.S. Coast Guard regulates bridges that span waterways such as the Duwamish Waterway. If the bridge were no longer operating, the U.S. Coast Guard regulations would require demolition and removal of the bridge. With no structures remaining, there would be no potential navigation obstructions in the Duwamish Waterway.

Under this alternative, there would be no change in the local street network except 14th and 16th Avenue S. would be dead-ended on both the south and north shores of the Duwamish Waterway. Figure 4 shows the existing local street network and Figure 5 shows the local street network following the removal of the existing bridge in the No Action Alternative. As the road does not currently provide direct access to the adjacent Boeing Company properties, the exact location of the road closure on the north side would need to be negotiated with Boeing as well as the owner of the railroad tracks immediately south of East Marginal Way S. In addition, the site of the removed bridge would be restored.

2.4.2.2 Rehabilitation Alternative

For the Rehabilitation Alternative, much of the existing bridge structure would need to be replaced. The existing steel trusses of the approach spans and the bascule leaves would be refurbished and reused. The mechanical and electrical operating systems would be refurbished and/or replaced. Studies have confirmed the existing bridge piers are gradually shifting because the foundation pilings were not originally driven to a sufficient depth. Although the initial goal was to rehabilitate the existing piers, the design team's structural analyses determined that the existing bascule piers and truss approach span piers must be replaced in order to ensure the long-term (approximately 75 years) integrity of the bridge. If the bascule piers were reconstructed, the longevity of the Rehabilitation Alternative would be similar to the expected minimum life of a new bridge structure.

For the Rehabilitation Alternative, the new bascule piers are proposed to be approximately the same size, location, and historic character as the existing piers (see Figure 6). To construct the new bascule piers, the bascule leaves and steel approach spans would need to be removed. The steel truss elements of the bridge structure would be taken to another site for repair, refurbishment, and/or painting before they are re-installed following the construction of the new piers. The concrete shafts or pilings supporting the foundations of the new piers would extend below the existing pilings to a depth beneath the riverbed where stable soils exist. The removal of the steel truss spans would also allow for replacement of the steel approach piers. The concrete approach spans and bridge abutments would be replaced and the bridge deck would be reconstructed. Like the existing bridge, there would be piers both on land and in the water. The first on-land piers would be only an estimated 20 feet from the top of the south embankment and the closest in-water piers would be approximately 20 feet from the top of the embankment. The piers on the north shoreline would extend through the existing Boeing dock. The conceptual engineering analysis also determined that the mechanical and electrical systems should be replaced. Any required construction activities, including replacement of the bridge railings, bridge tender towers, and lamp posts, would be done in a manner that preserves the historic character of the existing bridge to the greatest extent possible.

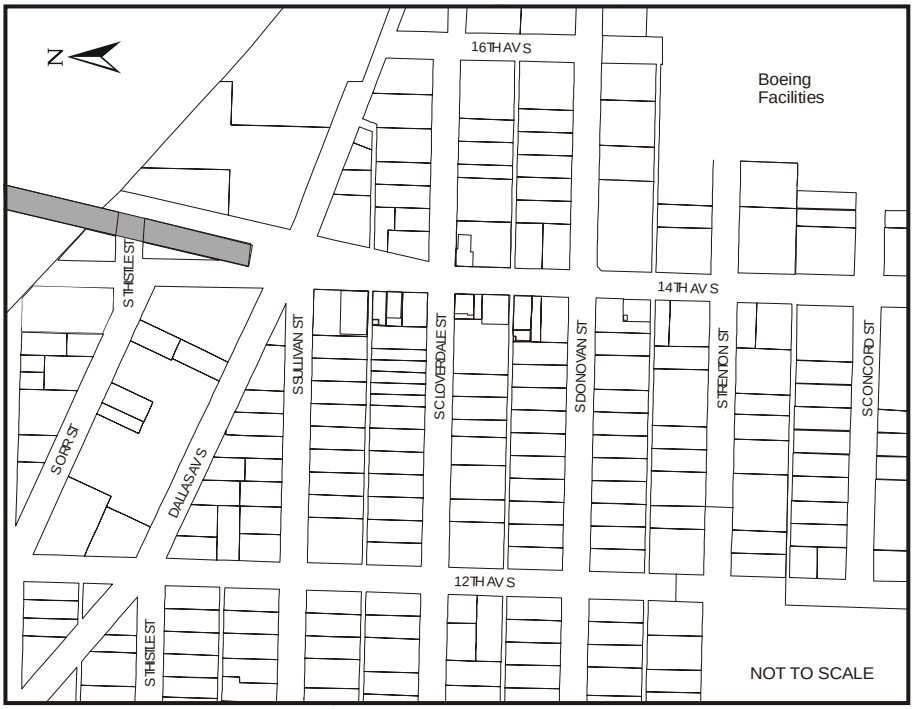

Figure 4
Existing Conditions Street Network

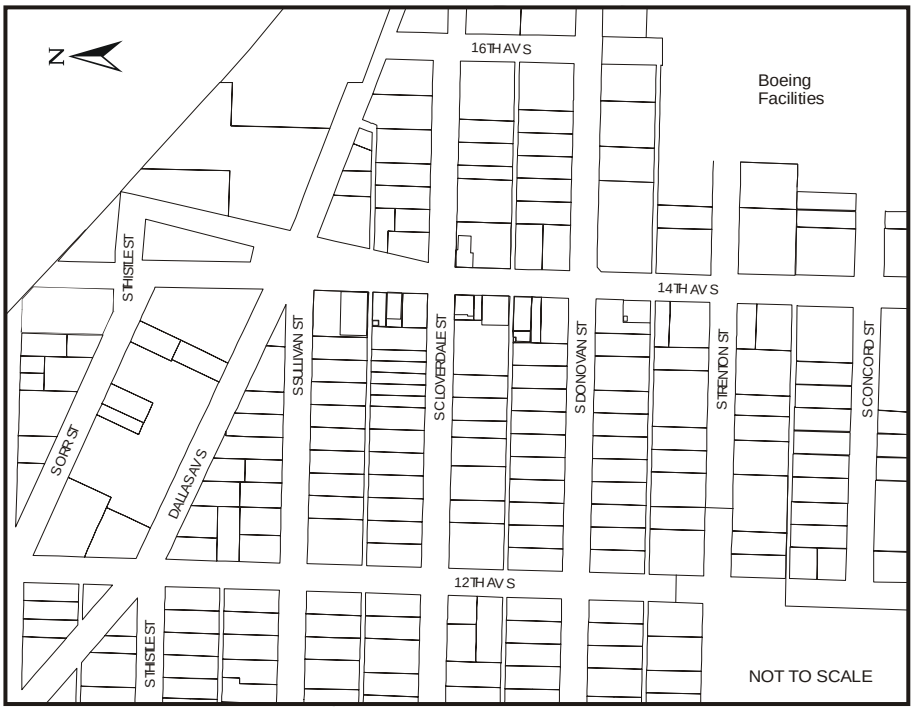

Figure 5
No Action Alternative Street Network

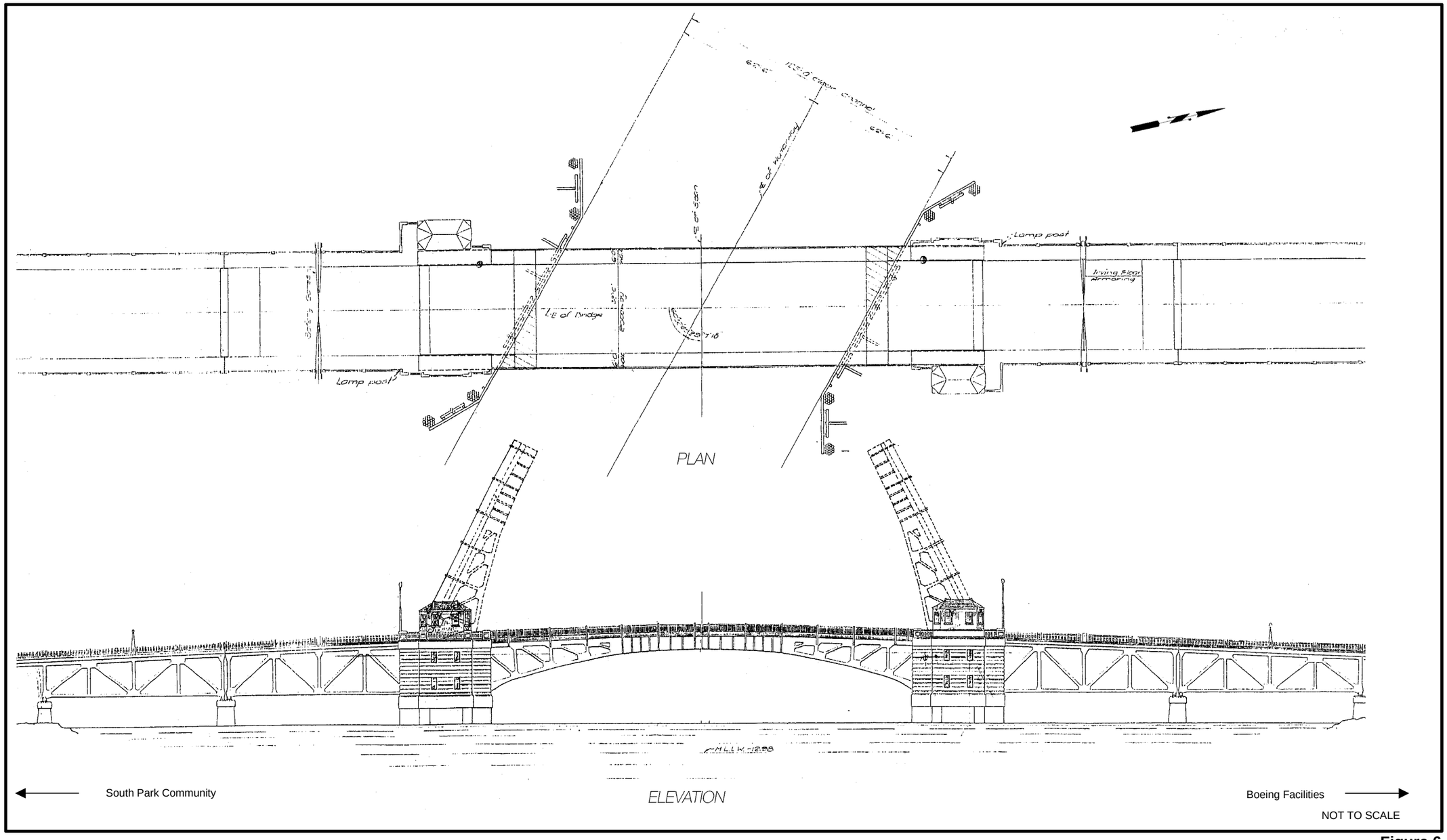

Figure 6
Rehabilitation Alternative

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To meet current roadway design standards, the new bridge deck would remain approximately the same as the existing, but the pavement would be striped to accommodate three standard traffic lanes. Bicycle and pedestrian traffic would continue to be able to use the bridge via a 7.5-foot pedestrian path on each side of the bridge.

Following construction, the existing 118-foot navigable channel width would be preserved so existing waterway users would be able to continue to use the navigation channel to travel upriver of the South Park Bridge. The extended closure of the bridge during construction, however, would have a significant temporary impact on access to the South Park community.

Following construction, there would be only slight changes in the local street network. Figure 7 shows the local street network in the South Park community following construction activities for the rehabilitation of the existing bridge. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. (For comparison, Figure 8 shows the local street network following the construction of the Bascule Bridge Alternative.) To improve vehicular safety, S. Sullivan Street would intersect Dallas Avenue S., which would become the main cross street intersection with 14th Avenue S. The 16th Avenue S. (immediately east of the bridge) intersection with Dallas Avenue S. as well as 14th Avenue S. may also need to be reconfigured. Access to points north via the South Park Bridge would be maintained.

2.4.2.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the construction of a new movable bridge immediately downriver of the existing bridge (see Figure 9). The bridge mechanism could be a Scherzer rolling lift type (no longer a common design for new movable bridges) or another type. The bridge length would be approximately 935 feet from abutment-to-abutment, not including roadway approaches. Road improvements would extend from a point just north of S. Cloverdale Street on the south side of the waterway and north to a point opposite the northeast corner of Boeing Building 2-15. The interior walls of the bridge abutments would be approximately 200 feet from the top of the embankment, or approximately 50 feet closer to the shore than the existing bridge. With fewer piers than the existing bridge, the first on-land piers of this alternative would be approximately 55 feet from the top of the south embankment at the shortest distance and the closest in-water piers would be approximately 65 feet away. On the north shoreline, the closest in-water piers would be approximately 95 feet from the top of the embankment and the closest on-land piers would be approximately 30 feet away. Unlike the existing bridge's grated bascule leaves, the bridge deck of the bascule leaves would be solid surface to improve vehicle traction and to control stormwater runoff.

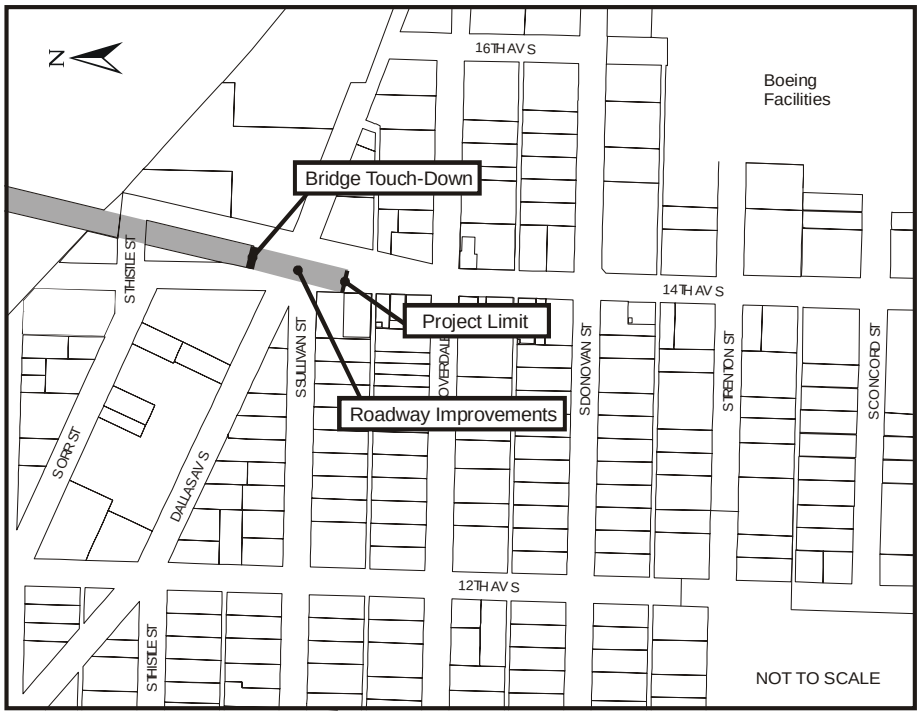

Figure 7
Rehabilitation Alternative Street Network

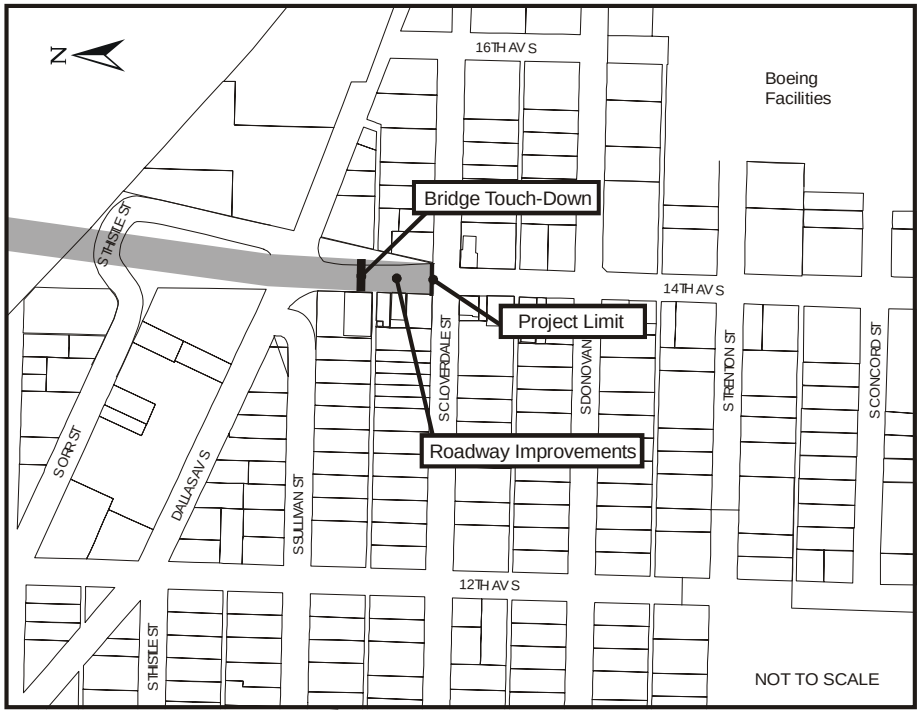

Figure 8
Bascule Bridge Alternative Street Network

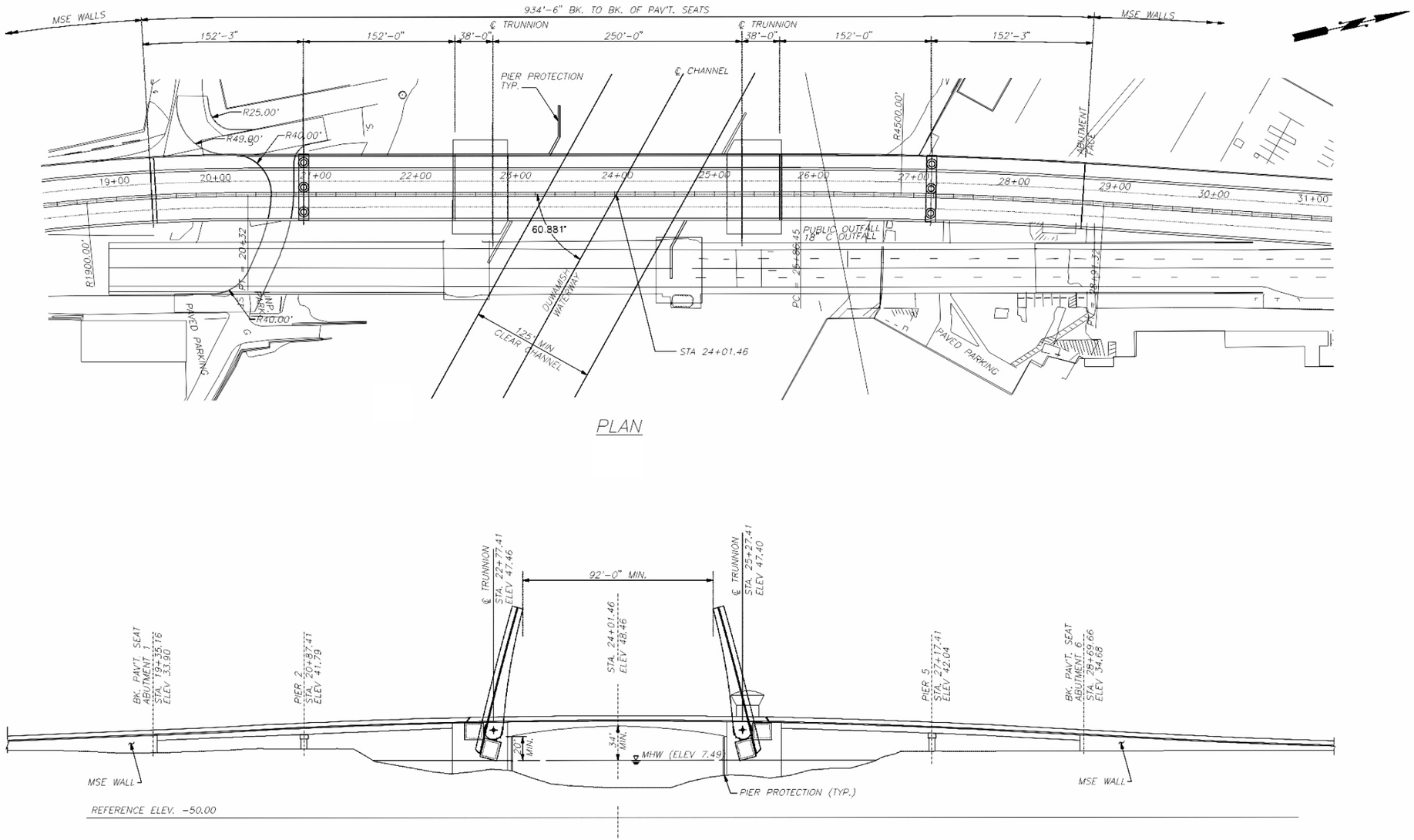

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Figure 9
Bascule Bridge Alternative

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Similar to the existing bascule bridge, this bridge profile would be approximately 34 feet above the Duwamish Waterway when in the closed position. The mid-section span would be comprised of two movable leaves that could be raised to open the bridge. The navigation channel would be approximately 125 feet in width (slightly greater than the existing 118-foot-wide channel). This two-leaf bascule bridge would not impose limitations to the height of waterway users passing the bridge, because the new bridge would be approximately 125 feet between the tips of the raised spans.

Following construction, there would be some change in the local street network (see Figure 8). S. Sullivan Street would be permanently closed or reconfigured to improve traffic safety and vehicular and truck turning movements from the new bascule bridge to Dallas Avenue S. S. Sullivan Street would no longer have direct access to 14th Avenue S. and the bridge. The intersection of 16th Avenue S. (immediately east of the bridge) and Dallas Avenue S. may also need to be reconfigured. To ensure adequate vertical clearance for vehicles, S. Thistle Street would need to be slightly realigned further to the north and closer to the Duwamish Waterway. This figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. Access to points north via the South Park Bridge would be maintained. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the construction of a non-movable bridge (see Figure 10). The bridge length would be approximately 1,660 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 550 feet from the top of the Duwamish Waterway embankment, or 300 feet further setback than the existing bridge. The closest on-land piers would be approximately 85 feet from the south embankment and the closest in-water piers would be approximately 100 feet away. On the north side, the closest in-water piers would be approximately 130 feet from the top of the embankment and the closest on-land piers would be approximately 65 feet away. Road improvements would extend slightly north of S. Donovan Street and north to a point approximately 320 feet south of East Marginal Way S.

The mid-point of the bridge profile across the Duwamish Waterway would be approximately 65 feet above MHW of the Duwamish Waterway. The horizontal clearance would be approximately 125 feet, or slightly greater than the existing clearance. The vertical clearance, however, would restrict use of some waterway traffic, including some tugs and barges. Most vessels that currently pass the existing bridge would continue to be able to use the navigation channel. As described earlier in the discussion of the design considerations, the width of the new mid-level bridge is reduced when the bike-pedestrian path is separated from the elevated approach roadway near the south side abutment. This design feature reduces land use and relocation impacts.

Following construction, there would be changes in the local street network (see Figure 11). (For comparison, Figure 12 shows the local street network following the construction

of the High-Level Fixed-Span Bridge Alternative.) The location of the south abutment and its vertical clearance would require modification of Dallas Avenue S. and S. Sullivan Street. S. Sullivan Street would likely be merged into Dallas Avenue S. just west of the new structure and a new roadway would be constructed under the new bridge. The alignment of this roadway would be slightly to the north to ensure it would have a minimum allowable vertical clearance. Neither street would have direct access to the new South Park Bridge. Figure 11 also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on the both sides of 14th Avenue S. for the majority of the distance between S. Sullivan Street and S. Cloverdale Street. Traffic would be able to access the bridge at S. Cloverdale Street, which would be raised a maximum of approximately 5 feet at the intersection to meet the descending grade of the bridge. This change in the intersection would allow traffic on S. Cloverdale Street to continue to have direct access to 14th Avenue S. though a retaining wall would also need to be constructed around the four corners of the intersection of S. Cloverdale Street and 14th Avenue S. due to the grade change. S. Orr Street would be closed due to the location of the support structures for the proposed separated pedestrian/bike path, which would allow bicyclists and pedestrians to descend from the bridge level to the street level. In addition, S. Thistle Street would be closed as it would no longer be able to connect to S. Orr Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative is a non-movable bridge (see Figure 13). The bridge length would be approximately 2,332 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 900 feet from the top of the Duwamish Waterway embankment, or 650 feet further set back than the existing bridge. The on-land and in-water piers of this alternative are approximately in the same location as proposed for the Mid-Level Fixed-Span Bridge Alternative. Road improvements would extend from S. Trenton Street and continue north to East Marginal Way S. This alternative would require minor modification of the 16th Avenue S. East Marginal Way S. intersection and of the existing railroad track crossing immediately south of this intersection.

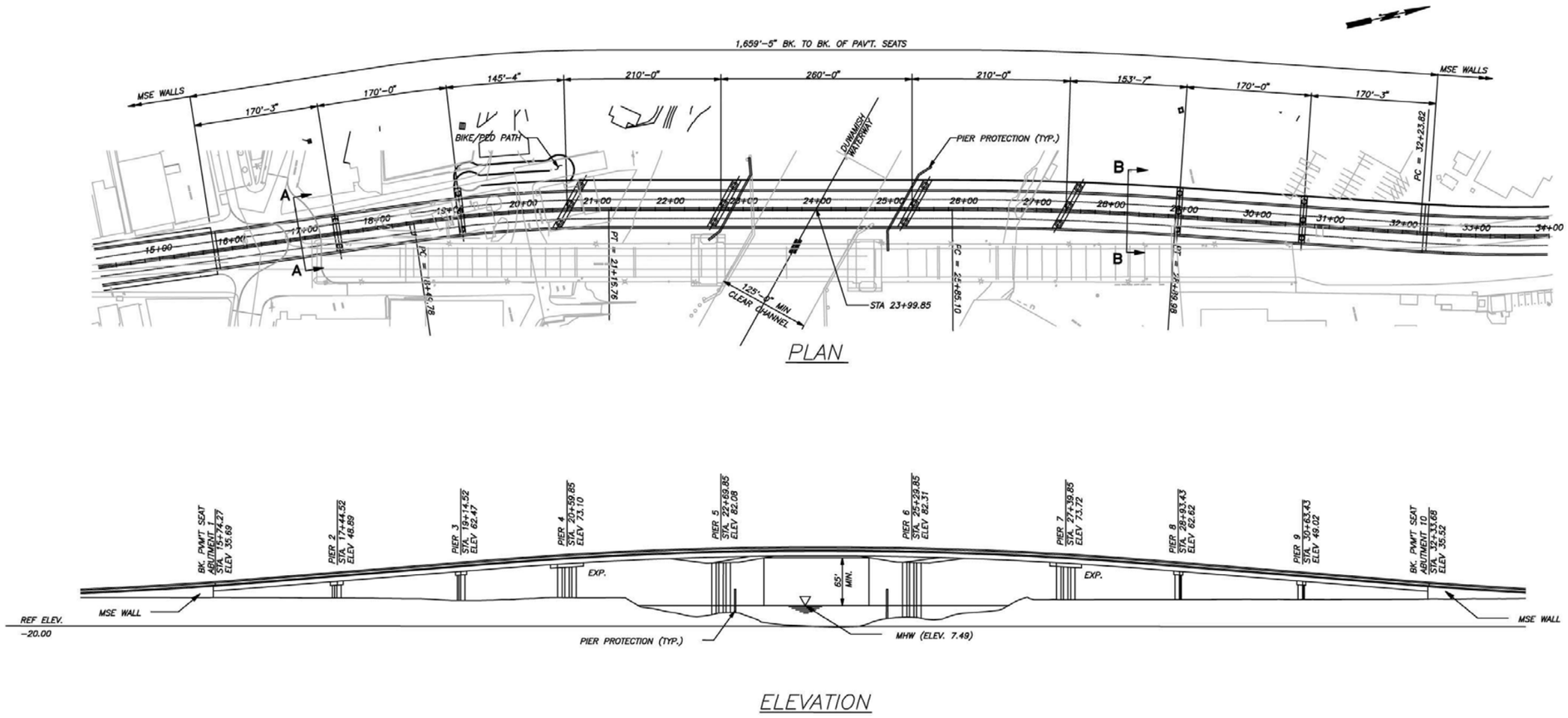

Figure 10
Mid-Level Fixed-Span
Bridge Alternative

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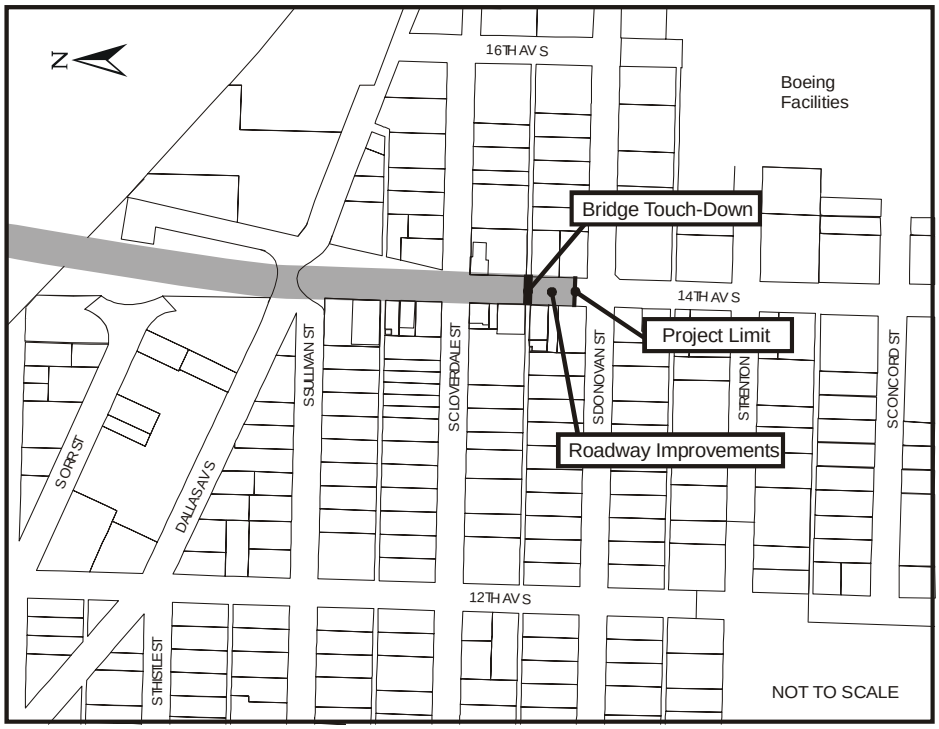

Figure 11
Mid-Level Fixed-Span Bridge Alternative Street Network

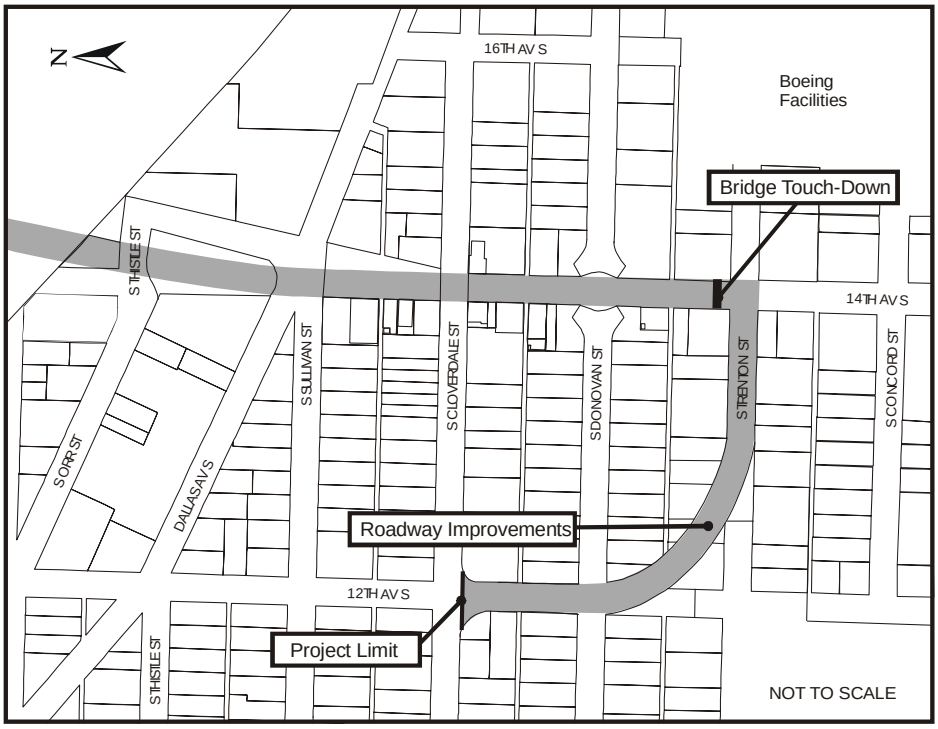

Figure 12
High-Level Fixed-Span Bridge Alternative Street Network

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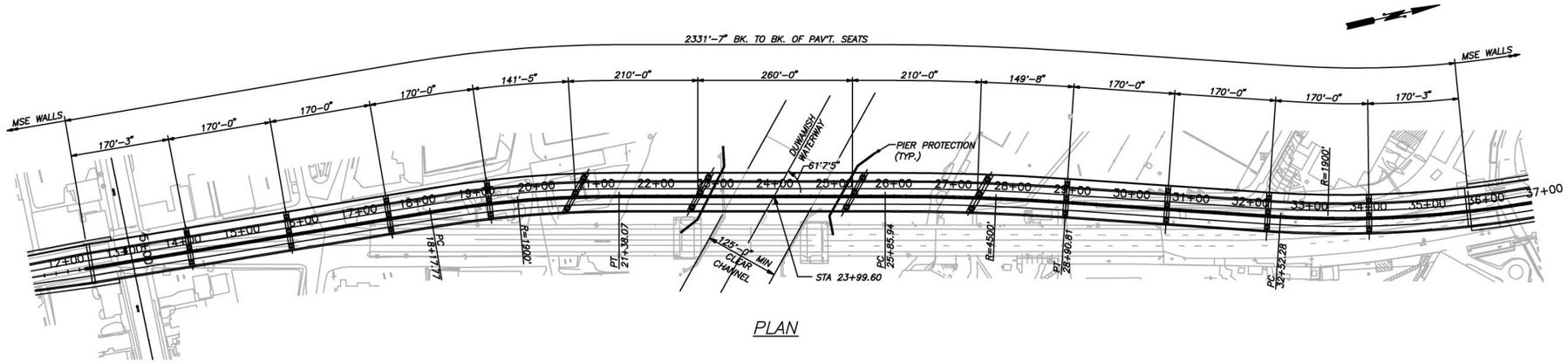

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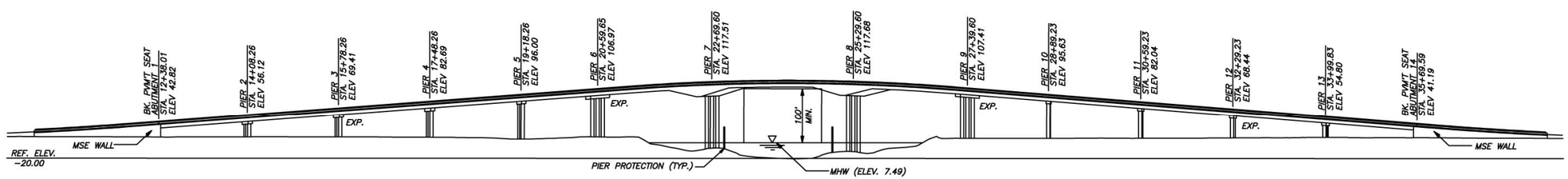

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Figure 13
High-Level Fixed-Span Bridge Alternative

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The bridge design would allow for approximately 100 feet of vertical clearance above the MHW of the Duwamish Waterway as requested by the U.S. Coast Guard. The horizontal waterway clearance for the navigation channel would be approximately 125 feet, which is slightly greater than the existing 118-foot clearance (fender-to-fender). The bridge's vertical clearance would not be expected to limit the height of boats and barges currently passing the bridge. However, vessels larger than those currently using the navigation channel might not be able to pass the bridge in the future.

Following construction, there would be numerous changes in the local street network as shown in Figure 12. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. The bridge south abutment would require Dallas Avenue S., S. Sullivan Street, and S. Cloverdale Street to be converted to underpasses under the new South Park Bridge. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on both sides of 14th Avenue S. for the majority of the two-block distance between S. Cloverdale Street and S. Trenton Street. S. Donovan Street would be closed at 14th Avenue S. due to obstruction from the bridge abutment and a vehicle turn-around would be constructed on either side of the abutment on S. Donovan Street. To allow traffic to access the new South Park Bridge, a new principle arterial roadway would need to be constructed between S. Trenton Street and 12th Avenue S. and road improvements would be required on 12th Avenue S. north to S. Cloverdale Street. This new route would allow traffic, trucks, and buses to continue to access the new South Park Bridge from S. Cloverdale Street via 12th Avenue S. and S. Trenton Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.3 Construction Durations and Activities

Construction of a rehabilitation or replacement bridge for the existing South Park Bridge is planned to take approximately two to three years, including the demolition and removal of the existing bridge. Construction is anticipated to start within the next several years and opening of the rehabilitation or a replacement bridge is currently anticipated to occur by 2009. The actual time required for construction activities vary for each of the alternatives. Construction activities associated with the No Action Alternative involves only demolition of the existing bridge and restoration of the site. The construction period for this alternative would be the shortest of all alternatives, approximately 8 months. The other alternatives would additionally require rehabilitation or construction of a new replacement bridge. Anticipated construction durations (demolition of existing and construction of new) would be approximately 32 months for the Rehabilitation Alternative, 33 months for the Bascule Bridge Alternative, 20 months for the Mid-Level Fixed-Span Bridge Alternative, and 24 months for the High-Level Fixed-Span Bridge Alternative.[14]

[14] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

From a construction perspective, the five project alternatives include three different types of construction activities. The No Action Alternative assumes the existing bridge condition would eventually require closure and removal of the bridge structures. Construction activities would focus on demolishing the existing bridge and restoring the project area. The Rehabilitation Alternative would require bridge closure for approximately 30 months for rehabilitation or replacement of various elements of the existing bridge. The Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives would all result in constructing a replacement bridge approximately 80 feet downstream of the existing bridge. For these three alternatives, the new bridge would be constructed while the existing bridge continues to be operational. When the new bridge is connected to the existing road, there would be short-term temporary bridge closures. These closures could be limited to weekends or could extend for approximately one month, depending on the alternative. Once the new bridge is completed, traffic would be rerouted to the new bridge and then the existing bridge structure would be demolished in a similar fashion as described for the No Action Alternative.

Rehabilitation of the existing bridge would require closure of the existing bridge for approximately 30 months, although efforts would be made to minimize the closure period as much as possible. Reconstruction activities would begin as soon as possible after completion of design engineering and acquisition of construction permits. Traffic would be given advance notice to take alternate routes prior to closure of the existing bridge. The construction of a temporary dock and a construction staging area would be required on both banks of the waterway (see Figure 14). Construction of the new bascule piers would likely be the first major construction activity. This would entail removing the existing pier protection fenders, installing temporary supports for the bridge superstructure, removing the bascule leaves as well as the steel truss spans, installing cofferdams around the existing steel truss approach piers and bascule piers, and demolishing the existing piers.

The bascule leaves and steel truss approach spans would be removed from the construction site for refurbishment. Construction of the new piers would involve drilling shafts through the existing timber piles, constructing the pile cap, dewatering the construction area inside the cofferdam, constructing the upper portions of the pier, removing the cofferdam, and finally reconstructing the upper portions of the bascule pier and bridge towers. Workers would reconstruct the concrete approach spans and replace the abutments. Workers would also reconstruct the bridge deck and replace the mechanical and electrical systems used to operate the bridge. Replacement of the piers, bridge tender towers, bridge railings, and lamp posts would be done in a manner that would preserve the historic character of these features of the existing bridge.

Major construction activities and sequencing would be similar for the Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives. The construction duration and the impact area for each of these three alternatives, however, would clearly differ. Following completion of design engineering, acquisition of construction permits, purchase of needed property, and relocation of residents and businesses, construction activities would begin. The first activities would include establishing the construction staging areas and constructing temporary docks with pilings on both sides of the waterway (see Figure 14).

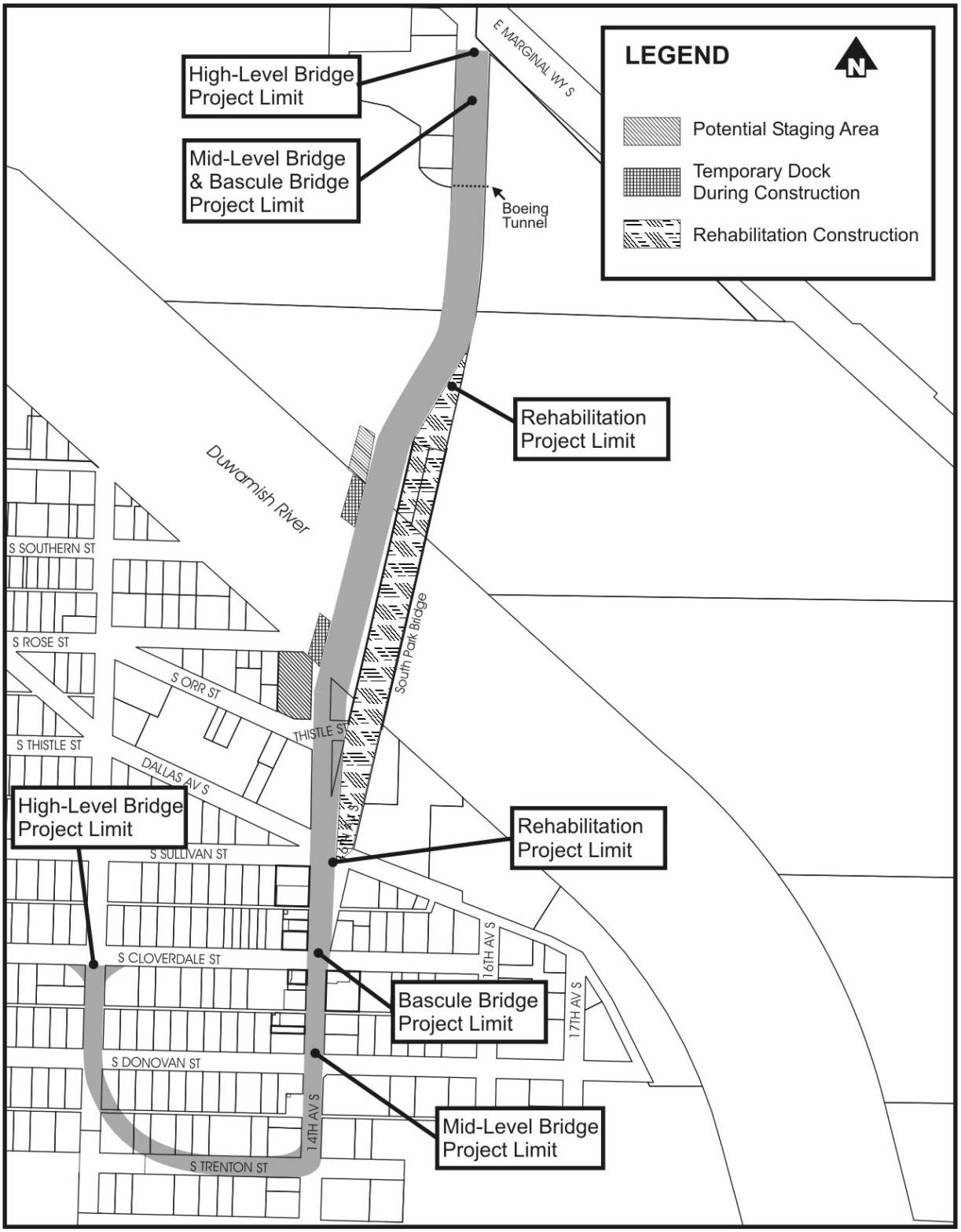

Figure 14
Proposed Construction Staging Areas

Buildings affected by the construction activities would be demolished and utilities would be either temporarily or permanently relocated. To minimize traffic impacts, construction activities would begin with the construction of the in-water piers. Construction activities would progress landward from the central portion of each bridge alternative. Both in-water and on-land construction would begin with construction of the sub-structures (piers and abutment) and would be followed by placement of the superstructure (beams, deck, rails). On-land construction of the piers, abutment, retaining walls, and transition segments at either end of the bridge would likely require temporary closure of adjacent or nearby roads and rerouting of local traffic. If possible, these temporary closures would be limited to weekend and/or night times to minimize impacts to the community. Construction activities on the north and south portions of the new bridge structures could also occur either separately or concurrently. The last of the construction activities would be the construction of the new curb and gutter of the at-grade roadway, and paving the roadway to match the existing width of 14th Avenue S. Figure 14 shows the project limits, or start and end points, of construction activities for each of the project build alternatives.

For the rehabilitation and new bridge alternatives, new girders and other oversized materials would most likely be delivered to the project site by barge. Large cranes located on the barges or temporary docks would off-load the materials and place them in the nearby construction staging area. Removal of the existing bridge pier foundations and construction of the new bascule and steel truss piers would all require the use of cofferdams to isolate the construction activities. Construction of the new approach-span piers would use drilled shafts, which would likely incorporate the use of temporary casings to isolate the construction activities. This in-water work would be performed by equipment operated from the temporary docks or from barges.

Demolition of the existing bridge would involve disassembly and removal of the existing bascule leaves, superstructure, bridge piers, protection fenders, and abutment. Cranes would use the existing bridge structure and approaches as much as possible to remove the various elements of the bridge. Barges would likely be used to remove oversized materials. At this time, this demolition work is not planned to require construction of temporary docks or the acquisition or temporary use of property on the banks of the Duwamish Waterway for a staging area. Removal of the abutment foundations, however, would likely require temporary short-term closure of adjacent and/or nearby streets. During this time, local traffic would be temporarily rerouted from the immediate area.

Following the completion of the construction activities associated with any of the project alternatives, disturbed areas would be restored. Conceptual site restoration plans would be developed for each alternative based on additional consultation with resource agencies and other stakeholders.

2.4.4 Cost Estimates for the Alternatives

Cost estimates for each of the proposed project alternatives have been prepared by the project engineers (see Table 2).[15] The cost estimate for each project alternative, including

[15] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

the No Action alternative, is broken down into the following components: 1) plans, specifications, and estimates (PS&E), 2) right-of-way costs, and 3) construction and construction-related costs. The total cost estimates are provided in 2003 dollars as well as estimated costs escalated for 2008, the anticipated mid-point of the project construction period. These cost estimates were calculated based on the conceptual engineering plans that were prepared for each of the alternatives.[16]

Clearly, the No Action Alternative is the least expensive as the existing bridge would not be rehabilitated nor would a new replacement bridge be constructed. The cost to remove the existing bridge structure would be approximately $7,000,000 (2003 dollars). The estimated costs to either rehabilitate or replace the existing bridge structure range between approximately $62 million to $77 million in 2003 dollars. The least costly of the build alternatives is the proposed Mid-Level Fixed-Span Alternative, which is estimated to cost approximately $61,523,000 to design and construct. The Rehabilitation Alternative is estimated to cost approximately $63,930,000 and the High-Level Fixed-Span Alternative is estimated to cost approximately $70,460,000. The most costly of the build alternatives is the Bascule Bridge Alternative, which is estimated to cost $77,334,000. The escalated 2008 dollar estimates to design and construction the project alternatives are also shown in the table.

Table 2. Cost Estimates of the Project Alternatives

	PS&E	Right-of-Way	Construction	Total (2003 dollars)	Total (2008 dollars)
No Action	$ 250,000	$ 0	$ 6,750,000	$ 7,000,000	$ 9 M
Rehabilitation	$ 6,843,000	$ 754,000	$56,333,000	$63,930,000	$ 74 M
Bascule	$ 8,253,000	$ 3,655,000	$ 65,426,000	$ 77,334,000	$ 90 M
Mid-Level Fixed-Span	$ 4,235,000	$ 6,377,000	$ 50,911,000	$61,523,000	$ 71 M
High-Level Fixed-Span	$ 5,261,000	$ 15,310,000	$ 49,889,000	$ 70,460,000	$ 82 M

Source: Parsons Brinckerhoff, November 2003.

2.5 Project Coordination

Coordination to date for the South Park Bridge Project has involved members of the public, a special community advisory group, and representatives of government agencies. Formal scoping was initiated through publication of the NEPA Notice of Intent and the SEPA Determination of Significance and Scoping Notice on February 7, 2002 and February 14, 2002, respectively. Separate scoping meetings were conducted in the South

[16] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

Park community for relevant agencies and members of the public. Both meetings were held on February 28, 2002. Written and verbal comments received through the scoping process were reviewed by King County and used in the development of the project alternatives and topics for environmental impact assessment.

A public involvement plan for the proposed South Park Bridge Project was developed during the initial stages of project planning. The Project Advisory Committee (PAC) and the Community Advisory Group (CAG) reviewed this document and provided comments to King County. The first public involvement efforts began prior to the formal scoping period. A public workshop was held in the South Park community on January 17, 2002. At this meeting, the nine preliminary project alternatives were presented. A second public workshop was held on June 19, 2002. At this meeting, the five proposed project alternatives were presented. Members of the public were encouraged to provide comments at both of these meetings. To facilitate participation and input from Hispanic persons living in the community, a bilingual translator attended all meetings. In addition, handouts and newsletters for the project were published in English and Spanish, and public notices were published in "Siete Dias", a local Spanish-speaking newspaper. Future opportunities for public involvement are also planned, including a public hearing and workshop following publication of the Draft Environmental Impact Statement in 2004.

Establishing a CAG was a significant component of the public involvement plan. A total of 17 individuals were chosen to participate in the CAG to represent community stakeholder interests and public concerns. The CAG meets periodically to be briefed on the progress of the project and to provide input to the South Park Bridge project team. Again, a bilingual English-Spanish translator attends the meeting to facilitate communication with Spanish-speaking individuals on the CAG. To date, CAG meetings have been held on April 10, May 21, June 4, June 11, and October 29 of 2002 and on January 7 and November 18, 2003. Additional CAG meetings are planned for the future.

As part of the environmental review process, King County periodically meets with the Project Advisory Committee (PAC) to give a status report of the project, answer questions, and to solicit comments. This committee is comprised of members of various agencies that have potential jurisdiction over the proposed South Park Bridge Project. The committee is the Interdisciplinary Team (IDT) required under NEPA implementation guidelines and provides technical support to King County staff. To date, the PAC has met on January 10, February 20, May 9, May 23, and October 10 of 2002. Coordination with the PAC is planned at critical future steps in the environmental review process.

A non-scientific survey was also conducted of South Park businesses located on 14th Avenue S. during the late spring of 2003.[17] The goal of the survey was to help assess potential impacts to businesses, especially minority-owned and –operated (employees) businesses. The survey respondents were also asked to identify their particular concerns

[17] Parsons Brinckerhoff. *South Park Bridge Project: Survey of 14th Avenue South Businesses*, August 22, 2003.

about the proposed rehabilitation or replacement of the existing South Park Bridge. A total of 18 businesses were successfully surveyed. Spanish and Vietnamese translators were provided, as needed, to assist business representatives understand and respond to the questions. In addition, the data was used to assess the potential effects displaced businesses and jobs would have on the South Park community. The analysis of the survey findings are discussed in detail in the Economic, Social, and Relocation technical reports supporting the analysis in the EIS.

As key issues have arisen during development of the project alternatives and in assessing potential environmental impacts, special meetings have also been held with key stakeholders and organizations in the South Park community, as well as with other government agencies and jurisdictions with an interest in the project. For example, on December 3, 2002, King County met with owners of property along 14th Avenue S, and information booths were set up at the Sea-Mar Community Health Center-sponsored annual Fiesta Patrias on September 14, 2002 and at a family night event held at the Concord Elementary School on September 27 and November 22 of 2002. Periodic coordination meetings have also been held with representatives of the City of Seattle and the City of Tukwila, and other government agencies. These coordination activities will continue to occur on an on-going basis as the EIS is prepared and finally adopted.

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Existing planning documents and published reports relevant to existing and proposed economic conditions were reviewed, including adopted comprehensive plans for King County, the City of Tukwila, and the City of Seattle as well as the *14th/16th Avenue South Bridge Economic Impact Analysis* (BST Associates, 1995), *South Park Residential Urban Village 1998 Plan* (South Park Planning Committee, 1998), and *Greater Duwamish Manufacturing and Industrial Center Plan* (Greater Duwamish Planning Committee, 1999). In addition, planning officials from local municipalities and business representatives were contacted regarding current and projected development and economic activity in the project area.

As discussed in the previous chapter, coordination with the public and government agencies has occurred throughout the project. Input received at public involvement activities, including scoping meetings, public workshops, CAG meetings, PAC meetings, and government coordination has been incorporated into this report, as applicable.

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Chapter 4 Methodology

The analysis of economic impacts follows guidelines put forth by FHWA National Environmental Policy Act (NEPA) guidelines; FHWA Technical Advisory T6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*; National Highway Cooperative Research Report-122 *Summary and Evaluation of Economic Consequences of Highway Improvements;* and WSDOT Environmental Procedures Manual.

Data was collected from a variety of federal, state, and local sources, including the U.S. Bureau of the Census; U.S. Bureau of Economic Analysis; Washington State Offices of Financial Management and Trade and Economic Development; Washington State Department of Revenue; Washington State Employment Security Department, Labor Market and Economic Analysis Branch; Puget Sound Regional Council; King County Assessor's Office; City of Seattle Office of Economic Development, Departments of Licensing, Strategic Planning, and Design, Construction and Land Use; Port of Seattle; and Metro Transit.

Two surveys were conducted to collect data from local businesses. One survey was conducted with local marine facilities located along the Duwamish River and with marine tugboat operators who serve these local facilities. (Results are provided in Appendices A and B.) This data was collected to update some information presented in the *14th/16th Avenue South Bridge Economic Impact Analysis* (BST Associates, 1995). Another survey was conducted with local businesses in the South Park business district (Parsons Brinckerhoff, 2003). Data in this survey focused on the type, ownership, and patronage of 14th Avenue S. businesses. A detailed description of the methods used to develop and conduct this survey as well as the results is provided in Appendix C.

Impacts to the local and regional economies, including water users and water-dependent businesses, were also evaluated. Impacts were differentiated as construction-related, operation-related, and secondary and cumulative. General mitigation measures were recommended for construction-related and operation-related impacts.

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Chapter 5 Affected Environment

This section describes existing regional and local economies for the project study area in terms of industry and employment sectors, earnings and income, and sources of tax revenues. Some aspects of the affected environment are reported for the broader geographical area.

5.1 Overall Economic Climate

The greater Seattle area hosts a large and diverse economy. To support this diverse economy, King County transportation infrastructure includes two transcontinental railroads, extensive nationwide trucking capacity, three interstate highways, a ferry system, a world-class port, and an international airport (EDC, 2002). Local transit and transportation systems enable the shipment of goods and services within the Puget Sound Region as well as to other parts of the state, Pacific Northwest, and parts of Canada.

The City of Seattle's top five revenue-producing companies include The Boeing Company (Boeing), Costco, Microsoft, Weyerhaeuser, and Washington Mutual (City of Seattle, 2002). Several of Boeing's facilities are located within and near the project study area. Boeing's South Park Site (training facilities) is bounded by 14th Avenue S. to the west, S. Donovan Street to the north, S. Henderson Street to the south, and the Duwamish Waterway to the east. Boeing's Plant 2 is also located north of the Duwamish Waterway with 16th Avenue S. passing through Boeing property to connect with East Marginal Way S. The King County International Airport (Boeing Field) is located east of East Marginal Way S. Additional nearby Boeing facilities are south of the project area, including the Thompson Site, Development Center, Riverfront Technical Park, Customer Services Center, and East Marginal Way Corporate Park.

The residential area in South Park has been designated a residential urban village in the City of Seattle's Comprehensive Plan. This residential area is surrounded by the Duwamish Manufacturing and Industrial Center (also a designated center in the City of Seattle's Comprehensive Plan). To a large extent, South Park is a residential community, mostly single- and detached-family units that are surrounded by heavy industrial uses, freeways, and a navigable waterway (South Park Planning Committee, 1998).

South Park is about four miles south of downtown Seattle. Access into South Park from the Puget Sound region is available via multiple modes of transportation, transit and navigation, including several Metro bus routes. A light rail transit project (Sound Transit) is proposed to connect the cities of Seattle, Tukwila, and SeaTac but would not pass through South Park.

5.2 Business Sectors and Activity

5.2.1 Regional Manufacturing and Industrial Businesses

The Greater Duwamish area, which surrounds South Park, supports regional manufacturing and industrial business. The industrial setting is described in the *Economic*

Development Report prepared as part of the *South Park Residential Urban Village 1998 Plan* (South Park Planning Committee, 1998):

> "The South Seattle/Green River industrial area has been consistently ranked among the strongest in the US during even the real estate doldrums of the past seven years. Access to the Port of Seattle (and the Pacific Rim trade), two major transcontinental railroads, and an international (Canada to Mexico) freeway, the Boeing (King County) and SeaTac airports are noteworthy of this area. Numerous manufacturing, warehouse, distributing, resource process, assembly and storage facilities dominate the area which is one of the few areas of the West Coast with this combination of transportation and industry." (p. 7-8)

5.2.2 South Park Business Community

An excerpt from the *Economic Development Report* prepared as part of the *South Park Residential Urban Village 1998 Plan* (South Park Planning Committee, 1998) describes the local economic setting:

> "The economic character of the greater South Park is decidedly industrial… Boeing, the major private-sector manufacturing employer in Washington dominated the area with its headquarters, testing and major production plants east of the South Park Residential Urban Village across the Duwamish River. The river gives the area a special character that few industrial areas have. The river not only is a means of industrial transportation, but there are several marinas and boat repair and storage yards. This area also has a small concentration of retail service businesses and is an access point for recreational boaters and fisherpeople.
>
> The area provides a major entry to the Boeing complex and the east portion of the Duwamish industrial area. It is a major north-south entrance to both the Seattle-port industrial area and the downtown [Seattle] area." (p.7)[18]

The South Park business district consists roughly of six blocks along both sides of 14th Avenue S. from S. Henderson Street to S. Orr Street. This area also comprises the south approach to the South Park Bridge. Businesses within this district include restaurants, taverns, marine retail and industrial facilities, other retail and warehouse, grocery stores, personal services, and health clinics. Several vacant buildings and residential units are interspersed among these businesses.

Table 3 summarizes key findings of a survey conducted with owners and managers of businesses located in the South Park business district (Parsons Brinckerhoff, 2003). Local businesses generally fall into three categories:

[18] Since the time of the *South Park Residential Urban Village 1998 Plan*, The Boeing Company has relocated its headquarters to another state.

- Businesses that provide services to The Boeing Company or other local businesses

- Businesses that provide services to South Park residents

- Light industrial businesses that have located in South Park because there is access to multiple modes of transportation and affordable real estate costs

The average length of time that businesses have been located at their current South Park locations is 13 years. The minimum is one year and the maximum is 43 years. Just over half of the business properties are owned rather than leased.

The Sea Mar Community Health Center is the largest employer in South Park with 400 full-time employees. The presence of this health center in South Park draws a large Hispanic population to the area, both in terms of residence and travel to South Park for services.

The racial and ethnic composition of local business employees and owners reflects the diversity of the South Park community. Of the 20 businesses surveyed, 11 businesses have a workforce completely comprised of minorities; 5 businesses have a workforce completely comprised of non-minorities; and the remaining 4 businesses have a mix of minority and non-minority employees (Parsons Brinckerhoff, 2003). Detailed discussion on the composition of minority populations in the study area is provided in the *Social Elements Technical Report*.

In terms of employee commuting patterns, owners or managers say that the majority of their employees drive to work and live in neighborhoods outside of South Park. These neighborhoods include White Center, Burien, Bothell, Kent, and Beacon Hill.

Most owners or managers estimate that most of their customers make a special trip to visit their businesses as opposed to stopping while they pass through South Park. All businesses have off-street parking, which is either owned or rented. Over half of the businesses surveyed suggest that most of their customers come from the South Park area. The restaurants, in particular, have many local customers and considerable patronage from Boeing employees. Just over half of the surveyed businesses indicate that a majority of their patrons belong to a minority population.

Table 3. Key Findings from the Local Business Survey

QUESTIONS (Total surveys = 20)			
Years located at current address?	Average	Min	Max
	13	1	43
Property owned (vs. leased)?		Owned	Leased
		11	9
Businesses with apartments attached?		Apartments	None
		4	16
	Average	Min	Max
Full-time employees	25	1	400
Part -time employees	4	0	50
Percentage of Employees		Totals	Percentage
White/Caucasian		128	23%
African American/Black		45	8%
Asian/Hawaiian/Pacific Islanders		67	12%
American Indian/Native Alaskan/Eskimo/Aleut		6	1%
Latino/Hispanic		309	54%
Mixed or Other		14	2%
Number of Businesses Comprised Completely of :			Businesses
White/Caucasian employees			5
African American/Black employees			1
Asian/Hawaiian/Pacific Islander Employees			3
American Indian/Native Alaskan/Eskimo/Aleut employees			0
Latino/Hispanic employees			6
Mixed or other			5
		Yes	No
Owner considers self to be of a racial minority		13	5
Businesses with majority of employees living in South Park		4	16
Businesses with majority of employees driving to work		17	2
Businesses with most customers from the South Park Area		11	8
Businesses with most customers making a special trip		15	4
Businesses with significant share of customers dropping by		3	15
Number of businesses where majority of customers drive to the business		17	2
Number of businesses where majority of customers walk to the business		3	16
Businesses with off-street parking		20	0
Business owners consider majority of customers minority		10	9
Business operated from a different location		6	13
Business owner has considered moving business		2	17

Note: Sums may not total 20 (total number of questionnaires completed) due to non-responses on some questions.
Source: Parsons Brinckerhoff, 2003.

Local business owners and operators who participated in the survey, as well as public meeting attendees, have repeatedly expressed concern about potential short- and long-term impacts on South Park businesses that would result from taking no action, rehabilitating, or replacing the South Park Bridge. Specific concerns identified include preserving a cross-river transportation facility, maintaining through-traffic during construction, and avoiding as much property acquisition and business relocation as possible.

5.2.3 Local Duwamish Waterway Businesses and Vessel Traffic

In addition to the retail and commercial business district, South Park business activities also include mixed light industrial and manufacturing along the Duwamish Waterway. Most of this activity is located along the south shore and east of the South Park Bridge.

From the *Greater Duwamish Manufacturing and Industrial Center Plan* (Greater Duwamish Planning Committee, 1999), the importance of Duwamish Waterway business is summarized:

> "The Duwamish Waterway is an important transportation corridor with regional and national significance. Domestic and international traffic via the waterway amounts to approximately 7.2 million tons, valued at approximately $7.5 billion (value does not include container terminals operated by the Port of Seattle). The Duwamish Waterway serves as the lifeline to Southeast and Western Alaska.
>
> In addition, most of the products bound for Alaska originate in the Seattle area, which increases the economic significance of the waterway to the City of Seattle and King County. The Duwamish Waterway is also an extremely important source of bulk raw materials for the region's construction industry (especially cement, limestone, gypsum and other building materials)." (p. 27)

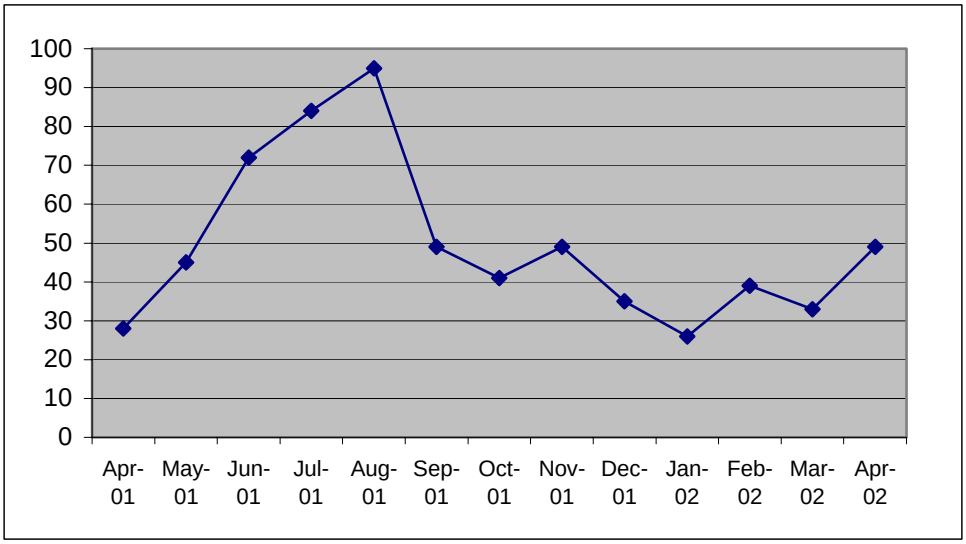
Table 4 lists current Duwamish Waterway businesses in the South Park vicinity and the types of business activities associated.

During the period of April 1, 2001, to April 30, 2002, the number of bridge openings for marine vessel passage ranged from 26 to 95 per month according to King County Daily Bridge Logs (see Figure 15). The frequency of bridge lifts has decreased in comparison to 1989-93 data presented in the *14th/16th Avenue South Bridge Economic Impact Analysis* (BST Associates, 1995). For example, the number of bridge openings ranged from 75 to 200 per month in 1989 and 1990; 45 to 160 openings per month in 1991; 55 to 145 openings per month in 1992; and 40 to 120 openings per month in 1993. A number of these reported bridge openings, however, were likely associated with repairs and test openings, especially considering the Nisqually earthquake occurred in February 2001.

Table 4. Local Businesses Using the Duwamish Waterway

Name of Business or Property Owner	Location	Type of Services (2002)	Change in Services since 1995
The Boeing Company	East shore of Duwamish R.; upstream of South Park Bridge	6 loading platforms (not in use)	No change
Delta Marine Industries	West shore of Duwamish R.; upstream of South Park Bridge	Luxury yacht construction and maintenance	No change
Duwamish Yacht Club	West shore of Duwamish R.; upstream of South Park Bridge	112 slips for recreational boats (power and sail)	Increase of 6 slips
Monsanto Wharf	East shore of Duwamish R.; upstream of South Park Bridge	Slip 6 (not in use)	No change
Muckleshoot Indian Tribe	West shore of Duwamish R. at turning basin; upstream of South Park Bridge	No marine services	Previously, this site was owned by Kenco Marine and had moorage for barges and other large vessels. All pilings have been removed.
South Park Marina	West shore of Duwamish R.; upstream of South Park Bridge	Moorage for 150 recreational boats	None
Crowley Marine Services	Provides services to facilities on the Duwamish R., but located elsewhere	No towboat service in last year to Duwamish R.	(Not reported in 1995)
Foss Maritime Company	Provides services to facilities on the Duwamish R., but located elsewhere	No towboat service in last year to Duwamish R.	(Not reported in 1995)
Manson Construction Company	Provides services to facilities on the Duwamish R., but located elsewhere	Several trips per year to haul derricks to Delta Marine to launch yachts.	No change
Western Tugboat	Provides services to facilities on the Duwamish R., but located elsewhere	Approx. 6 tugboat hauls per year to upstream facilities; hauls barges for dredging activities.	(Not reported in 1995)
Island Tug & Barge	Provides services to facilities on the Duwamish R., but located elsewhere	Approx. 75 tugboat hauls per year to upstream facilities; hauls barges and derricks.	(Not reported in 1995)

Sources: Crow, 2002; Jones, 2002; Crowley, 2002; Langjahr, 2002; Llanos, 2002; Manson, 2002; Schrewsbury, 2002; and Ellefsen, 2002.



Source: King County Daily Bridge Log, April 1, 2001-April 30, 2002.

Figure 15
South Park Bridge Openings by Month for All Vessels (April 2001–April 2002)

5.3 Employment

5.3.1 Employment by Industry

To characterize the employment of local residents, the proportion of jobs held in each industry sector is examined. Three geographic units are described in this section: South Park, which is defined as census tract 112; the study area, which is defined as census tracts 109, 112, 263, and 264; and the City of Seattle. Figures 16 and 17 depict the locations of census tract boundaries that are used in this technical report to define South Park and the study area (for additional detail, see the *Social Elements Technical Report*).

Seattle is a significant component of the state's economy. Based on 2000 census data, 22 percent of Seattle residents are employed in education/health/social service industries (see Table 5). Other major employment sectors for Seattle residents are professional/scientific/management/administrative/waste management services (16 percent), retail trade (11 percent), and arts/entertainment/recreation/accommodation/food services (10 percent). In comparison, the largest sector of employment for residents living in the study area and South Park is manufacturing (19 and 22 percent, respectively). This is due in large part to the presence of Boeing facilities in the vicinity.

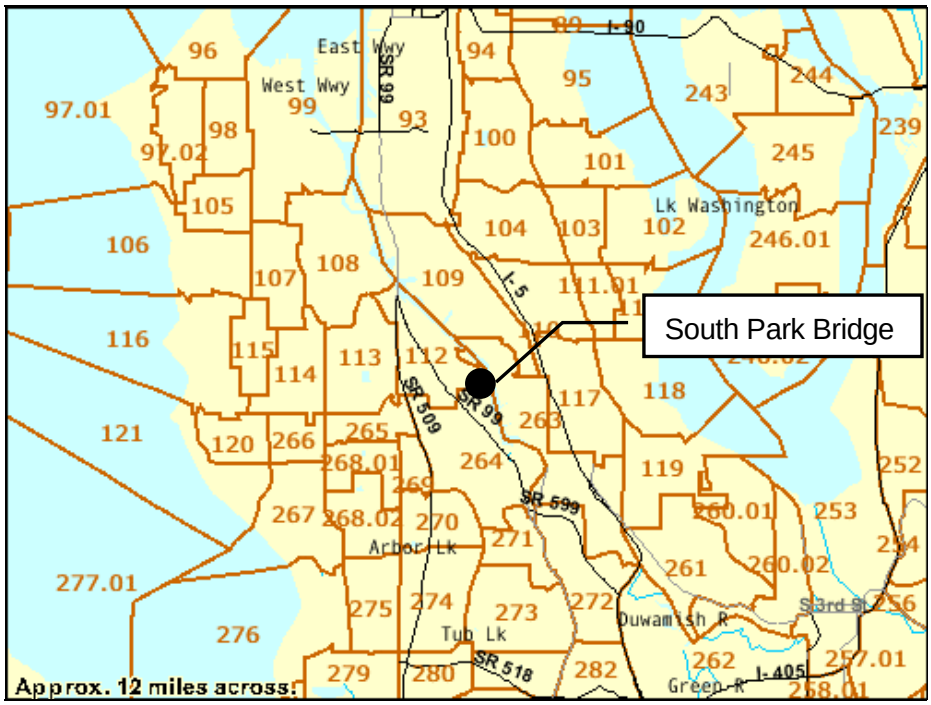


Figure 16
Vicinity Map of Census Tract Boundaries

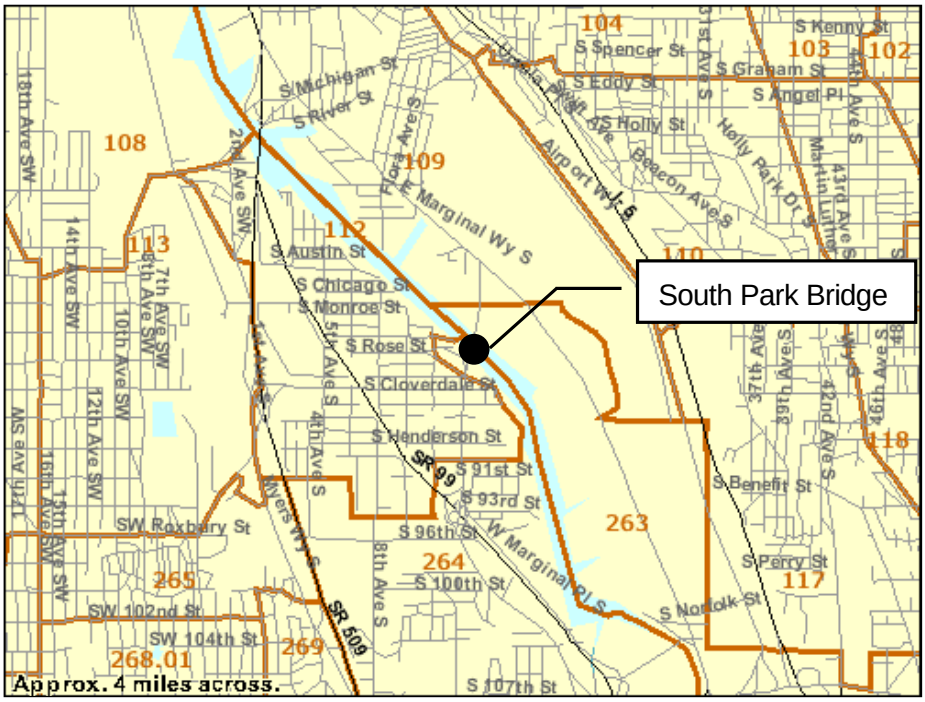


Figure 17
South Park Census Tract Boundaries

Note: South Park is defined as census tract 112. The study area is defined as census tracts 109, 112, 263 and 264.

Table 5. Employment by Industry (number/percent of jobs)

Industry	South Park	Study Area	Seattle
Total Population Employed (16 years and older)	**1,576**	**5,761**	**321,524**
Agriculture; forestry; fishing and hunting; and mining	12 0.8%	30 0.5%	1,103 0.3%
Construction	167 10.6%	478 8.3%	12,892 4.0%
Manufacturing	352 22.3%	1,079 18.7%	26,753 8.3%
Wholesale trade	59 3.7%	273 4.7%	10,471 3.3%
Retail trade	127 8.1%	602 10.4%	35,645 11.1%
Transportation and warehousing; and utilities	100 6.3%	480 8.3%	13,492 4.2%
Information	26 1.6%	190 3.3%	19,175 6.0%
Finance; insurance; real estate and rental and leasing	55 3.5%	299 5.2%	22,171 6.9%
Professional; scientific; management; administrative; and waste management services	214 13.6%	624 10.8%	51,813 16.1%
Educational; health and social services	163 10.3%	656 11.4%	69,507 21.6%
Arts; entertainment; recreation; accommodation and food services	248 15.7%	676 11.7%	31,762 9.9%
Other services (except public administration)	33 2.1%	226 3.9%	15,538 4.8%
Public administration	20 1.3%	148 2.6%	11,202 3.5%

Source: U.S. Census 2000.
Note: South Park is defined as census tract 112. The study area is defined as census tracts 109, 112, 263, and 264.

The area north of South Park also reports a high proportion of jobs in manufacturing and industrial sectors. As stated in the *Greater Duwamish Manufacturing and Industrial Center Plan* (Greater Duwamish Planning Committee, 1999), there were approximately 60,700 people employed in the Duwamish industrial area in the late 1990s. Two-thirds of these jobs were in the heavy and light industrial categories. The next largest sectors were services, retail trade, and construction, which represented approximately 30 percent of the total jobs. There were also approximately 1,989 employees of government and education agencies, 600 sole proprietors, and 150 employees engaged in agricultural services and/or mining.

Employment forecasts project a continued reliance on manufacturing jobs in the study area; however, this trend is steadily decreasing (Puget Sound Regional Council, 2001). The proportion of service and retail trade sectors is projected to increase over the next several decades (Puget Sound Regional Council, 2002b).

Employment at local South Park businesses is primarily in the retail trade and food services sectors. These types of businesses employ on average of five full-time employees (Parsons Brinckerhoff, 2003). Sea Mar Community Health Center employs approximately 400 full-time employees (Parsons Brinckerhoff, 2003).

5.3.2 Unemployment

Unemployment rates within King County have historically been lower than the statewide average rate (see Table 6). In 1999, unemployment varied from 3.4 to 4.6 for the census tracts located within the project area (US Census Bureau, 2000), and this was higher than King County averages for the same period. In April 2000, the unemployment rate (not seasonally adjusted) in South Park was 6.9 percent; similarly, the Study Area had a 5.8-percent unemployment rate and the City of Seattle had a 5.1-percent unemployment rate (U.S. Census, 2000).

Table 6. Unemployment Rates (average annual percent)

Area	1995	1996	1997	1998	1999	2000	2001
Washington State	6.4	6.5	4.8	4.8	4.7	5.2	6.4
King County	5.2	4.9	3.3	3.0	3.2	3.6	5.1

Source: Washington State Employment Security Department, Labor Market and Economic Analysis Branch, April 1, 2002.

5.2.3 Travel to Work

Table 7 shows the proportion of people who work in or outside the same place (city or town) that they live. Since South Park is incorporated within the City of Seattle, it can be concluded that two-thirds of South Park residents work in Seattle and one-third commute elsewhere. The study area includes residents who live within either Seattle or Tukwila; thus, it is understandable that many residents in the study area commute to adjacent cities. The South Park Bridge most likely provides one means for commuters to travel between Seattle and Tukwila in this vicinity.

Table 7. Place of Work (percent)

Place of Work	South Park	Study Area	Seattle
Total	**1,532**	**5,577**	**316,493**
Worked in place of residence	66.2%	30.7%	73.8%
Worked outside place of residence	33.8%	69.3%	26.2%

Note: South Park is defined as census tract 112. The study area is defined as census tracts 109, 112, 263, and 264.

Source: U.S. Census 2000.

The predominant mode of travel to work is by car, truck, or van (see Table 8). However, a higher proportion of South Park residents use public transportation (16 percent) or walk (5 percent) to work compared to residents within the study area (12 and 3 percent, respectively). In addition, an estimated 14 percent of South Park households are transit-dependent.

Table 8. Means of Transportation (percent)

Means of Transportation	South Park	Study Area	Seattle
Total	**1,532**	**5,577**	**316,493**
Car, truck or van	75.1%	80.6%	67.7%
Public transportation	16.1%	12.3%	17.6%
Motorcycle	0.7%	0.4%	0.3%
Bicycle	1.4%	1.0%	1.9%
Walked	5.4%	3.4%	7.4%
Other means	0.8%	0.6%	0.5%
Worked at home	0.7%	1.8%	4.6%

Note: South Park is defined as census tract 112. The study area is defined as census tracts 109, 112, 263, and 264.
Source: U.S. Census 2000.

5.4 Local Economy

5.4.1 Earnings and Income

The Census 2000 data reported the South Park community had a substantially lower median household income ($30,917) than both the study area and City of Seattle (see Table 9). Likewise, per capita income averaged $15,828, which was substantially lower than the study and Seattle averages.

Although South Park has similar proportions of households with earnings, wage and salary incomes, and self-employment incomes, residents rely more heavily on Supplemental Social Security and public assistance. The proportion of South Park households deriving retirement income is substantially less than study area and Seattle averages.

For a more detailed discussion on demographics and environmental justice issues for the local South Park community, please refer to the *Social Elements Technical Report*.

Table 9. Earnings and Income by Household (percent, 1999)

Area/Industry Sector	South Park	Study Area	Seattle
Number of Households	**1,228**	**4,647**	**258,635**
With earnings	84.3%	84.4%	82.6%
With wage or salary income	82.2%	82.5%	79.6%
With self-employment income	12.2%	8.7%	14.3%
With interest, dividends, or rental income	14.7%	27.1%	46.8%
With Social Security income	16.7%	17.5%	19.6%
With Supplement Social Security income	8.2%	5.6%	3.6%
With public assistance income	9.2%	5.1%	3.0%
With retirement income	8.1%	12.7%	13.2%
With other types of income	15.7%	15.9%	10.5%
Median household income ($)	**30,917**	**37,117**	**45,736**
Per capita income ($)	**15,828**	**18,386**	**30,306**

Notes: South Park is defined as census tract 112. The study area is defined as census tracts 109, 112, 263, and 264. Median household income for the study area is estimated for composite census tracts.
Source: U.S. Census, 2000.

5.4.2 Government Revenues

The State of Washington and King County rely on a variety of taxes to fund state and local government programs. These taxes include a combined state and local sales and use tax, a business and occupation tax, public utility tax, property tax, several other excise taxes, real estate tax, and estate taxes. Table 10 summarizes state and county revenues.

Table 10. State and County Revenues (dollars, 2000)

Revenues	Washington State	King County
Property Taxes	1,016,746,877	352,501,286
Retail Sales & Use	618,041,126	368,704,881
All Other Taxes	178,534,572	45,165,192
Licenses & Permits	51,046,418	13,506,370
Intergovernmental Revenue	1,338,290,593	433,410,434
Charges for Services	1,221,680,445	69,240,589
Fines & Forfeits	47,264,558	7,482,131
Misc. Revenues	564,413,478	205,760,842
Other Financing	272,468,747	132,671,564
Total Revenues	5,308,486,814	2,251,603,289

Note: Data may not add due to rounding.
Source: Washington State Office of Financial Management, 2002.

5.4.2.1 Sales and Use Tax

A combined state and local retail sales tax is collected on the selling price of tangible personal property. A use tax is assessed on the market value of using tangible personal property and services for which the sales tax has not been paid. The retail sales and use tax applies to most items purchased by consumers but does not apply to food items or prescription drugs. For the calendar year 2000, the City of Seattle had $13.6 billion in taxable retail sales. Utility services and most personal services (e.g., medical, dental, legal, barber) and real estate are not subject to these taxes. However, construction services and building materials are subject to the retail sales tax.

The amount of the retail sales and use tax varies by locality. The state tax base is 6.5 percent, but each locality can assess additional tax. Combined state and local tax rates for the study area is 8.8 percent (City of Seattle, City of Tukwila, and Unincorporated King County), including the Regional Transit Authority tax.

5.4.2.2 B&O Tax Revenues

Most businesses operating in the state are subject to the business and operation (B&O) tax. However, power, water, and gas companies and carriers by air, water, rail, and motor are taxable under the public utility tax. The B&O tax is typically assessed on the gross income or proceeds of sales or the value for privilege of doing business. Contractors doing construction work for federal agencies are classified as government contractors for B&O tax purposes. Contractors are subject to the B&O taxes. Typically, the measure of tax is the gross contract price (WAC 458-20-17001).

5.4.2.3 Property Tax Revenues

Real and personal property is subject to property tax in Washington. Real property includes land and any improvements, such as buildings, attached to the land. The primary characteristic of personal property is mobility. Examples of personal property are machinery, equipment, supplies, and furniture. Personal property tax typically applies to personal property used when conducting business.

The property tax is a combined state and local tax. The state property tax rate is $3.15 per $1,000 of assessed property value (Washington State Department of Revenue, 2002). Local tax rates vary depending on regular and special levies. The King County average for local property tax rates is $11.91 per $1,000 assessed value; the state average is $12.96 per $1,000 assessed value (Washington State Department of Revenue, 2002).

The county assessor collects property taxes for property located within an incorporated or unincorporated area. The property tax rate is dependent on the assessed value of the property, the taxing district(s) within which the property is located (various tax districts occur within a county), and the presence of voter-approved levies or bonds. Thus, different tax rates occur within a county.

5.4.2.4 Other Taxes and User Fees

Various other taxes are assessed at the state levels, which include excise tax on hotels and motels, event and entertainment admission, food and beverages, fuels, cigarettes, tobacco products, liquor, timber, rental cars, and others. Other local excise taxes include

municipal business taxes and licenses. The sale of most real property is subject to a real estate tax that is paid by the seller. Other taxes levied by the state or local municipalities include an estate and transfer tax, vehicle licensing fee, and watercraft excise tax. No personal income tax is levied in the state of Washington.

5.5 Property Values

Real property in South Park is assessed a value by the King County Assessor. Washington State law (RCW 84.52) requires assessors to appraise property at 100 percent of its true and fair market value in money, according to the highest and best use of the property (Washington State Department of Revenue, 2003). Property value is used to determine property tax. It is also used as one factor in determining the worth of the property if it is to be sold. Property values for properties directly affected by the project are generally discussed in Chapter 6 and more specifically in the *Relocation Technical Report*.

Potential economic impacts associated with the project are identified for each alternative. This chapter provides a discussion of impacts associated with construction activities, impacts associated with the operation of the alternative, and secondary and cumulative impacts.

The need to acquire full or partial parcels of property is directly linked to impacts on South Park businesses, especially those located within the South Park business district. Table 11 summarizes the number of potential property acquisitions as well as the number of operating businesses, vacant buildings, residential structures, and parking lots that would be affected by each of the alternatives. In addition, the assessed real property value of all parcels that would be fully acquired is totaled by alternative. Please note that some parcels contain more than one business or contain both a residence and a business. Residences may be single- or multi-family dwellings. Partial property acquisitions typically reduce the size of the parcel but would not require modifications to existing structures. Detailed discussion on property acquisitions is provided in the *Relocation Technical Report*.

Table 11. Property Acquisitions and Displacements by Alternative

	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Full parcel acquisitions	**0**	**3**	**5**	**12**	**33**
Business displacements	0	3	5	15	28
Vacant building displacements	0	0	0	1	5
Residential displacements	0	1	1	2	9
Parking lot displacements	0	0	0	0	1
Assessed real property value	$0	$391,900	$827,700	$2,465,700	$7,383,800
Partial parcel acquisitions	**0**	**0**	**2**	**2**	**5**
Businesses affected	0	0	1	1	1
Residences affected	0	0	0	0	3
Parking lots affected	0	0	1	1	1

The following discussions on construction and operation impacts refers, in part, to the parcels that would need to be acquired as a result of implementing each alternative, with particular emphasis on businesses that would be displaced.

6.1 Construction Activity Impacts

6.1.1 No Action Alternative

Construction activities associated with the No Action Alternative include the demolition and removal of the existing bridge. These activities would likely involve a temporary increased level of noise and vibration levels during business operation hours.

Marine traffic would continue regular navigation along the Duwamish Waterway. Delays to navigation would occur when in-water demolition equipment was in the navigation channel. This type of occurrence may be frequent since a substantial amount of the construction for this alternative would occur in-water. As a result, marine-related businesses would experience delays to their typical business activities.

Construction expenditures and temporary jobs created during construction would have a beneficial economic effect on South Park and the Greater Duwamish region (see Table 12 and the discussion in Section 6.3). In addition, additional tax revenues (e.g., sales and use, B&O, and miscellaneous excise taxes) would be generated. Expenditures could include food, fuel, temporary lodging, sundries, equipment, and construction materials.

6.1.2 Rehabilitation Alternative

During construction, the South Park Bridge would be closed for an extended period of approximately 32 months. During this time, it would be expected that all passenger and freight traffic traveling within the South Park business district would be limited to local travel since 14th Avenue S. essentially would become a dead end road. All through-traffic would use bypass routes. According to local businesses that were surveyed, nearly 20 percent of businesses rely on customers who are passing through the community compared to customers who make a special trip (Parsons Brinckerhoff, 2003). It is assumed that many of these customers would be lost during construction. The South Park business activities that rely on through-traffic would severely decrease during the construction period. This impact on business activities could adversely affect the number of jobs, especially with such a high proportion of jobs in the manufacturing sector that rely on direct and efficient transportation routes to support the industry. In addition, B&O tax, retail sales and use tax, and other applicable excise tax revenues that are generated from these businesses would decrease during the construction period.

In addition to changes in traffic patterns that affect business accessibility, construction activities may also increase the noise and vibration levels during business operation hours. Reduced visibility of businesses, decreased parking, or difficult access to operating businesses would be expected under this alternative.

Marine traffic would continue regular navigation along the Duwamish Waterway. Delays to navigation would occur if in-water construction equipment were temporarily in the navigation channel. This type of occurrence may be frequent since a substantial amount of the construction for this alternative would occur in-water. Therefore, marine-related businesses would experience delays to their typical business activities.

Construction expenditures and temporary jobs created during construction would have a beneficial economic effect on South Park and the Greater Duwamish region (see Table 12

and the discussion in Section 6.3). In addition, additional tax revenues (e.g., sales and use, B&O, and miscellaneous excise taxes) would be generated. Expenditures could include food, fuel, temporary lodging, sundries, equipment, and construction materials.

6.1.3 Bascule Bridge Alternative

During the approximate 33-month construction period, the South Park Bridge would remain open to all traffic until the new bridge was open. A few short-term bridge closures may occur, which would have minimal impact on business activities. All non-displaced businesses in the South Park business district could remain in operation. In addition, temporary street closures would also occur throughout the construction as roadway and intersection improvements are made. These closures would be of short duration and would have temporary impacts on local business activities.

Traffic that is rerouted around intersection improvements during construction may reduce business activities associated with the non-displaced businesses. In addition, other construction activities may diminish business activities with increased noise and vibration levels during business operation hours. Similarly, there may be adverse impacts on business activities that would be attributed to reduced visibility of businesses, decreased on-street parking, or difficult access to operating businesses. Some passenger or freight traffic using 14th Avenue S. may choose to use other north-south corridors to avoid construction activities.

Marine traffic would continue regular navigation along the Duwamish Waterway. Delays to navigation would occur if in-water construction equipment were temporarily in the navigation channel. This type of occurrence may be frequent since a substantial amount of the construction for this alternative would occur in-water. Therefore, marine-related businesses would experience delays to their typical business activities.

Construction expenditures and temporary jobs created during construction would have a beneficial economic effect on South Park and the Greater Duwamish region (see Table 12 and the discussion in Section 6.3). In addition, additional tax revenues (e.g., sales and use, B&O, and miscellaneous excise taxes) would be generated. Expenditures could include food, fuel, temporary lodging, sundries, equipment, and construction materials.

6.1.4 Mid-Level Fixed-Span Bridge Alternative

During the approximate 20-month construction period, the South Park Bridge would remain open to all traffic until the new bridge was open. All non-displaced businesses in the South Park business district could remain in operation. It is important to note that although the construction period is substantially shorter for this alternative compared to the Rehabilitation and Bascule Bridge alternatives, there would be 15 businesses displaced. (See Section 6.2.4 for further discussion on long-term impacts of these displacements.) Thus, the long-term adverse impacts are quite substantial compared to the benefits associated with a shorter construction period.

Traffic that is rerouted around the roadway and intersection improvements during construction may reduce business activities associated with the non-displaced businesses. A few short-term closures may occur, which would have minimal impact on business

activities (permanent road closures are addressed in Section 6.2.4 as part of operational impacts). In addition, various street closures may also occur as intersection improvements are made. These closures would be of short duration and would have temporary impacts on local business activities. The construction activities associated with the S. Cloverdale Street and 14th Avenue S. intersection reconstruction could reduce accessibility to businesses to the south. This is because S. Cloverdale Street is a major regional connector to SR-99 and SR-509.

In addition, construction activities may diminish business activities with increased noise and vibration levels during business operation hours. Similarly, there may be adverse impacts on business activities that would be attributed to reduced visibility, decreased parking, or difficult access to non-displaced businesses. Some passenger or freight traffic using 14th Avenue S. may choose to use other north-south corridors to avoid the construction activities.

Marine traffic would continue regular navigation along the Duwamish Waterway. Delays to navigation would occur if in-water construction equipment were temporarily in the navigation channel. Therefore, marine-related businesses would experience delays to their typical business activities. In addition, the vertical clearance for the mid-level bridge during construction would be constrained as the mid-level bridge is constructed. This constraint would limit the passage of vessels that require more than 65 feet MHW clearance.

Construction expenditures and temporary jobs created during construction would have a beneficial economic effect on South Park and the Greater Duwamish region (see Table 12 and discussion in Section 6.3). In addition, additional tax revenues (e.g., sales and use, B&O, and miscellaneous excise taxes) would be generated. Expenditures could include food, fuel, temporary lodging, sundries, equipment, and construction materials.

6.1.5 High-Level Fixed-Span Bridge Alternative

During the 24-month construction period, the South Park Bridge would remain open to all traffic until the new bridge was open. All non-displaced businesses in the South Park business district could remain in operation. It is important to note that although the construction period is substantially shorter for this alternative compared to the Rehabilitation and Bascule Bridge alternatives, there would be severe impacts to the South Park business district. This severity is due to the extent of displacement under this alternative; few businesses would remain in the South Park business district. (See Section 6.2.5 for further discussion on long-term impacts of these displacements once construction was complete.)

The rerouted traffic from changes to S. Orr Street, S. Thistle Street, Dallas Avenue S., S. Sullivan Street, and S. Donovan Street may reduce business activities at non-displaced businesses. Various street closures may also occur as roadway and intersection improvements are made. These closures would be of short duration and would have temporary impacts on local business activities. (Permanent road closures are addressed in Section 6.2.5 as part of operational impacts.) Construction activities associated with the S. Cloverdale Street and S. Trenton Street intersections with 14th Avenue S. as well as

improvements to 12th Street S. would also reduce accessibility to non-displaced businesses to the south. This is because S. Cloverdale Street is a major regional connector to SR-99 and SR-509, and S. Trenton Street and 12th Avenue S. would become the new arterial between S. Cloverdale Street and 14th Avenue S.

In addition, construction activities may diminish business activities at the remaining businesses, such as increased noise and vibration levels during business operation hours. Similarly, there may be adverse impacts on business activities that would be attributed to reduced visibility, decreased parking, or difficult access to non-displaced businesses. Some passenger or freight traffic using 14th Avenue S. may choose to use other north-south corridors to avoid construction activities. Impacts related to construction revisions of traffic could be severe.

Marine traffic would continue regular navigation along the Duwamish Waterway. Delays to navigation would occur if in-water construction equipment were temporarily in the navigation channel. Therefore, marine-related businesses would experience delays to their typical business activities.

Construction expenditures and temporary jobs created during construction would have a beneficial effect on the Greater Duwamish region and South Park, although limited due to extensive business displacements (see Table 12 and the discussion in Section 6.3). The limiting factor is that few businesses would remain in operation in the South Park business district after right-of-way is acquired and businesses on those acquired parcels are displaced.

Additional tax revenues (e.g., sales and use, B&O, and miscellaneous excise taxes) would be generated from construction expenditures. These expenditures could include food, fuel, temporary lodging, sundries, equipment, and construction materials.

6.2 Operational Impacts

Operational impacts are defined as those impacts that would be permanent and associated with long-term operation and maintenance. The need to displace local businesses is a key factor in overall impacts associated with each alternative. Table 12 identifies the number and type of businesses that would be displaced.

Table 12. Number and Type of Displaced Businesses by Alternative

Displacements	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
No. of Businesses	**0**	**3**	**5**	**15**	**28**
Type of Businesses					
Restaurant/Tavern/Grocer	0	0	2	7	10
Marina facility	0	0	0	0	0
Marine maintenance	0	1	1	1	1
Retail/Commercial	0	2	2	7	10
Industrial	0	0	0	0	2
Health Service	0	0	0	0	3
Other	0	0	0	0	2

Note: Types of businesses were identified based on visual inspection and survey response (Parsons Brinckerhoff, 2003).

Almost all businesses surveyed were opposed to relocation, because they believed their business would not remain viable after relocation (Parsons Brinckerhoff, 2003). Only the Sea Mar Community Health Center thought it could withstand relocation. This is likely due to its size.

6.2.1 No Action Alternative

6.2.1.1 Effects on Business Activity in South Park

No change to general business activity would occur until the existing South Park Bridge was closed. In response to this closure, traffic patterns would be severely altered, and local business activity within the South Park business district would be adversely affected. All cross-bridge traffic and related business activity would cease. According to local businesses that were surveyed, nearly 80 percent of businesses rely on customers who make a special trip to their business (Parsons Brinckerhoff, 2003). It would be assumed that many of these customers would continue to make a special trip to these businesses after bridge closure, unless the time, cost, or mode of travel (particularly public transit) made the trip too difficult. The remaining 20 percent of businesses that rely on customers who pass by would lose this customer base.

Marine-based businesses would not be affected until the closure of the bridge; however, it is unknown how these marine-based businesses would be affected by changes to vehicular traffic patterns.

6.2.1.2 Change in the Locations of Permanent Jobs

If South Park businesses were unable to remain viable after the closing of the South Park Bridge, local permanent jobs would be lost or displaced. These jobs would primarily be in the retail trade, transportation/warehousing/utilities, and arts/entertainment/ accommodation/food service sectors. However, some jobs would be retained for maintaining the bridge until it was closed.

Bypass routes would emerge to compensate for the loss of this bridge, which would deter traffic from traveling through South Park and surrounding areas as well. Many of the businesses in the Greater Duwamish area utilize the South Park Bridge for the movement of goods. A closure of this bridge could increase transportation costs for businesses in the region and, in effect, could reduce the number of permanent jobs.

6.2.1.3 Effects on Property Value Trends and Local Tax Revenues

A bypass route resulting from the South Park Bridge closure could have a mixed effect on property values in the South Park community. Less traffic would pass through the South Park business district to support business activities, which could adversely affect businesses but could also improve the residential qualities of neighborhoods. The ripple effects from reduced revenues generated by B&O taxes, retail sales and use taxes, and other applicable excise taxes would also be adverse if businesses activities slowed down.

6.2.1.4 Effects on the Region

Similar to effects on local and regional permanent jobs, adverse effects to regional economies could also be expected due to a bypass route. A bypass route could increase the costs and time to move freight, which could in turn increase operating expenses for regional industrial and manufacturing businesses. Commuters using the South Park Bridge to access Boeing would also be permanently detoured to other Duwamish Waterway crossings.

6.2.2 Rehabilitation Alternative

6.2.2.1 Effects on Business Activity in South Park

No permanent, adverse effects to local business activities would be expected under this alternative and its associated operation and maintenance activities. Some minor or location-specific changes, however, would occur.

Business Displacements

This alternative would require acquisition of three parcels on the south shore of the Duwamish River. Three businesses would be displaced as a result of acquiring these parcels: South Park Marina (maintenance facility only), Clear Channel, and South Park Realty.

Transportation and Business Patterns Changes

Changes in travel times for the shipment of goods to and from local businesses would not be expected to change as a result of this alternative. Similarly, business activity patterns within South Park would be minimally affected since the alignment of the bridge would not change under this alternative. If traffic were to increase due to the bridge improvements, then business activities may improve as well. No changes in local street networks would occur; thus, no corresponding impacts on business activities would likely result.

Marine Businesses

Marine-based business activities would remain the same under this alternative (Crow, 2002; Ellefsen, 2002; Schrewsbury, 2002; Jones, 2002). The horizontal and vertical clearances would remain similar to the existing bridge. Bridge openings would still be

required for the same types of vessels that currently cannot pass under the South Park Bridge.

6.2.2.2 Change in the Locations of Permanent Jobs

Approximately 15 permanent jobs would be lost or relocated for the employees working at the three displaced businesses. These jobs would primarily be in the retail trade and transportation/warehousing/utilities sectors. The location of these jobs would change if the businesses were relocated, especially if relocation moved these jobs outside of South Park. Or, these jobs would be lost if the business were discontinued.

The number of permanent jobs associated with the operation and maintenance of the bridge would remain similar to the current condition since this alternative continues the need for 24-hour staffing for bridge lifts.

6.2.2.3 Effects on Property Value Trends and Local Tax Revenues

Property values for businesses in the South Park business district may increase with a rehabilitated bridge due to spurred reinvestment in the business district. Several property owners have waited for a final decision on the South Park Bridge rehabilitation or replacement before initiating reinvestment in their property (Hayes, 2002). No adverse changes in parking options, visibility of local businesses, or access to businesses, which can contribute to changes in property value, would be expected under this alternative.

Revenue generated by B&O taxes, retail sales and use tax, or other applicable excise taxes would be expected to remain similar to the current tax revenues being generated. Property tax revenues would no longer be collected for the three parcels acquired as a result of this alternative.

6.2.2.4 Effects on the Region

As economic impacts to the local South Park business district would be minimal, changes to the regional businesses and economy would also be minimal as a result of this alternative. Regional traffic patterns would remain similar to current conditions. And, no large employers or service providers in the region would be displaced or disrupted.

6.2.3 Bascule Bridge Alternative

6.2.3.1 Effects on Business Activity in South Park

Business Displacements

This alternative would require full acquisition of five parcels and partial acquisition of two parcels. Five businesses would be displaced as a result of these acquisitions: South Park Marina (maintenance facility only), Clear Channel, South Park Realty, Country Line Tavern, and South Park Pho Teriyaki. Reductions to the capacity of Boeing's Plant 2 parking lot would also occur.

Transportation and Business Patterns Changes

Changes in travel times for the shipment of goods would remain similar to current travel times. No changes to the local roadway networks would occur under this alternative that would change travel times. Safety improvements to the bridge, in terms of standard lane

widths, would have a negligible effect on travel times. Further detail on transportation networks for opening year and long-range (year 2027) traffic impacts are discussed in the *Transportation Technical Report*.

Business patterns within South Park would be affected. Since the new bascule bridge would be aligned immediately downstream of the existing bridge, activities associated with the displaced businesses would shift to other businesses serving similar activities or to the new locations of any businesses that relocated within the local area. Other business activities associated with non-displaced businesses along 14th Avenue S. are expected to remain the same or be improved. Improved business activities could be generated from increased traffic resulting from the improved transportation infrastructure.

Several intersections would be reconstructed and several streets (S. Thistle Street, S. Sullivan Street, and Dallas Avenue S.) would be reconfigured. These changes would likely have a minimal long-term effect on business activities.

Marine Businesses

Marine-based business activities, except those associated with the displaced businesses, would be expected to remain the same. A new bascule bridge would not hinder, either by horizontal or vertical constraints, current waterway navigation activities (Crow, 2002; Ellefsen, 2002; Schrewsbury, 2002; Jones, 2002).

6.2.3.2 Change in the Locations of Permanent Jobs

Approximately 25 permanent jobs would be lost or relocated for the employees working at the five displaced businesses. These jobs would primarily be in the retail trade, transportation/warehousing/utilities, and arts/entertainment/accommodation/food service sectors. The location of these jobs would change if the businesses were relocated, especially if relocation moved these jobs outside of South Park. Or, these jobs would be lost if the business were discontinued.

No changes to existing permanent jobs in non-displaced businesses in the South Park business district would be anticipated since traffic routes would not likely change and adversely affect local business activities. The number of permanent jobs associated with the operation and maintenance of the bridge would remain similar to the current condition since this alternative also requires 24-hour staffing for bridge lifts.

6.2.3.3 Effects on Property Value Trends and Local Tax Revenues

The acquisition of property, both business and residential, would have minimal impact on property tax revenues collected by King County. Changes to property values along 14th Avenue S. in the South Park business district for non-displaced businesses and residences would not be expected to be adverse. Indeed, property values for these businesses may increase with a new bridge due to subsequent reinvestment in the business district. Several property owners have waited for a final decision on the South Park Bridge rehabilitation or replacement before initiating reinvestment in their property (Hayes, 2002).

Revenue generated by B&O taxes from displaced businesses may be lost if these businesses do not relocate. Similarly, any retail sales and use tax or other applicable excise tax revenues generated by these businesses may be similarly affected.

Many local businesses currently rely on on-street parking, which may not be available to the same extent on 14th Avenue S. with improvements associated with this alternative. This change in parking options may affect commercial sales potential. Visibility of local businesses is not expected to be substantially altered.

6.2.3.4 Effects on the Region

Although economic impacts to the local South Park business district would be moderate, changes to the regional businesses and economy would not be adversely affected as a result of this alternative. Regional traffic patterns would remain similar to current conditions. And, no large employers or service providers in the region would be displaced or disrupted.

6.2.4 Mid-Level Fixed-Span Bridge Alternative

6.2.4.1 Effects on Business Activity in South Park

Business Displacements

This alternative would require full acquisition of 12 parcels and partial acquisition of 2 parcels. Fifteen businesses would be displaced as a result of these acquisitions: South Park Marina (maintenance facility only), Clear Channel, South Park Realty, Country Line Tavern, South Park Pho Teriyaki, unnamed convenience store, Pattaya Thai, unnamed currency exchange, unnamed dry cleaners, Muy Macho, Jalisco, Buena Vista Travel, Salon Expo, unnamed coffee stand, and Herb's Taxi. The extent of these displacements is substantial. Approximately, two blocks of the six-block business district along both sides of 14th Avenue S. would be displaced. Reductions to the capacity of Boeing's Plant 2 parking lot would also occur.

Transportation and Business Patterns Changes

Changes in travel times for the shipment of goods would remain similar to current travel times. Although a few changes to the local roadway networks and safety improvements to the bridge (increased lane widths) would occur under this alternative, these changes would have a negligible effect on travel times. The periodic delays for bridge openings would not occur with the alternative as compared to the No Action, Rehabilitation, and Bascule Bridge alternatives. Further details on transportation networks for opening year and long-range (year 2027) traffic impacts are discussed in the *Transportation Technical Report*.

Business activity patterns within South Park would be substantially affected. Activities associated with the displaced businesses would likely shift to other businesses serving similar activities or may move to the new locations of any businesses that relocated. Other business activities associated with remaining businesses along 14th Avenue S. would be expected to remain the same or be improved. Improved business activities could be generated from increased traffic resulting from the improved transportation infrastructure.

Several intersections would be reconstructed. S. Orr and S. Thistle streets would be closed near the bridge. These closures would have minor adverse impacts on remaining South Park businesses. Businesses that previously used this road network to cross under the bridge would need to shift one block south. Dallas Avenue S. and S. Sullivan Street would be merged and would no longer have access to 14th Avenue S. Since many businesses in this immediate vicinity would be displaced, the changes to access and visibility would only affect on-going business activities. These remaining businesses may experience minor changes in access and visibility, which could affect their business activities. These effects are not expected to be substantial.

Marine Businesses

The vertical clearance would be reduced to approximately 65 feet above MHW. Marine-based business activities that rely on vessels or equipment that require more vertical clearance would be severely impacted. One business in particular, Delta Marine Industries, would not be able to conduct some of their current services. Delta Marine Industries constructs and provides maintenance services on luxury yachts. Some of their yachts would not be able to clear the mid-level bridge, even with the removal of any removable masts. In addition, launching these yachts from land to water requires using large derricks (cranes built on barges). The derricks are supplied from vendors in the Puget Sound Region, typically from Manson Construction Company. These derricks must be able to travel up and down the Duwamish River, which requires passing under the South Park Bridge. The derricks need approximately 90 feet of vertical clearance. Thus, the mid-level bridge would prohibit the passage of derricks and some of the luxury yachts constructed and serviced upstream of the bridge. The horizontal clearance would increase slightly; therefore, the width of vessels would not be constrained beyond current limitations.

Other marine businesses along the Duwamish River use barges and tugboats. Most of these vessels would be able to perform their current services under this alternative (Ellefsen, 2002; Schrewsbury, 2002). The U.S. Army Corps of Engineers conducts dredging of the Duwamish River Turning Basin #3, which is upstream of the bridge. Only contractors who have equipment that would pass under the mid-level bridge would be able to perform this dredging for the Corps. Thus, some equipment providers may be precluded if their equipment is unable to pass under the new bridge (BST Associates, 1995). In addition, sailboats moored at the South Park Marina would also be able to vertically clear a mid-level bridge (Crow, 2002). A few 70-foot sailboats would need to sail during low tides to clear the bridge (Crow, 2002).

6.2.4.2 Change in the Locations of Permanent Jobs

Approximately 75 permanent jobs would be affected for the employees working at the 15 displaced businesses. These jobs would primarily be in the retail trade, transportation/ warehousing/utilities, and arts/entertainment/accommodation/food service sectors. The extent of this effect depends on whether the business is relocated, which would likely result in retaining permanent jobs, or whether the business is discontinued, which results in a loss of permanent jobs. The location of these jobs would change if the businesses were relocated. If permanent jobs were relocated outside of South Park, then local jobs

would be lost for this community and gained elsewhere. Other permanent jobs lost as a result of this alternative would be the bridge tenders for the existing bascule bridge.

No changes to existing permanent jobs in remaining businesses in the South Park business district would be anticipated to occur as a result of changes in traffic routes. All passenger, transit, and freight traffic will continue to have direct access from 14th Avenue S. to S. Cloverdale Street.

6.2.4.3 Effects on Property Value Trends and Local Tax Revenues

The acquisition of property, both business and residential, would have minimal impact on property tax revenues collected by King County. However, property values along 14th Avenue S. in the South Park business district for remaining businesses and residences would not be expected to be adverse. Indeed, property values for these businesses may increase with a new bridge due to subsequent reinvestment in the business district and improved streetscape amenities (e.g., trees, bus shelters, bus pull-out plaza, park). Several property owners have waited for a final decision on the South Park Bridge rehabilitation or replacement before initiating reinvestment in their property (Hayes, 2002).

Revenue generated by B&O taxes from displaced businesses would be lost if these businesses do not relocate. Similarly, any retail sales and use tax or other applicable excise tax generated by these businesses would also be lost.

Most businesses currently rely on on-street parking, which may not be available to the same extent on 14th Avenue S. with improvements associated with this alternative. This change in parking options may affect commercial sales potential for the non-displaced businesses. Visibility of these businesses would not be substantially altered.

6.2.4.4 Effects on the Region

Although economic impacts to the local South Park business district would be substantial, changes to the regional businesses and economy would not be adversely affected as a result of this alternative. Regional traffic patterns would remain similar to current conditions. And, no large employers or service providers in the region would be displaced or disrupted.

6.2.5 High-Level Fixed-Span Bridge Alternative

6.2.5.1 Effects on Business Activity in South Park

Business Displacements

This alternative would require full acquisition of 33 parcels and partial acquisition of 5 parcels. Twenty-eight businesses, five vacant buildings, nine residential dwellings, and one parking lot would be displaced as a result of these acquisitions. Businesses that would be displaced include: South Park Marina (maintenance facility only), Clear Channel, South Park Realty, Country Line Tavern, South Park Pho Teriyaki, unnamed convenience store, Pattaya Thai, unnamed currency exchange, unnamed dry cleaners, Muy Macho, Jalisco, Buena Vista Travel, Salon Expo, unnamed coffee stand, Herb's Taxi, Mexi Mart, unnamed video store, El Molino Rojo, Napoli Pizza, El Vagre Restaurant, Kelly's Tavern, Bias Sewing, Juan Colorado, Swayne, RL Cook, and Sea

Mar Community Health Center (facilities at 8701, 8720, and 8801 14th Avenue S.). The extent of these displacements is severe. Over four blocks of the six-block business district along both sides of 14th Avenue S. would be displaced.

Transportation and Business Patterns Changes

The travel times and distances for shipping goods through South Park would likely be lengthened. This would be due to changes in the local street network and vertical grade of the new bridge. Traffic speed would be slowed, especially for freight traffic, due to the slightly higher than 8-percent grade. This grade may cause some freight traffic to reroute to other highways, which could adversely affect some business activities in South Park.

A severe impact for traffic connecting to and from SR-509 and SR-99 would be the change in direct access to S. Cloverdale Street from 14th Avenue S. Passenger and freight traffic traveling south across the bridge would be routed from 14th Avenue S. to S. Trenton Street, to 12th Avenue S., and onto S. Cloverdale Street in order to connect with major highways such as SR-509 and SR-99. This reroute would increase the travel distance and time.

Business patterns within South Park would be severely affected. Activities associated with the displaced businesses would shift to other businesses serving similar activities or to the new locations of any businesses that relocated. Other business activities associated with remaining businesses along 14th Avenue S. are expected to remain the same. However, this alternative displaces approximately four blocks of businesses within the six-block business district. So, very few businesses would remain in their current locations and the business district character would be severely altered.

Most intersections in the South Park business district would be modified: S. Orr and S. Thistle streets would be slightly modified; Dallas Avenue S., S. Sullivan Street, S. Cloverdale Street, and S. Donovan Street would no longer have access to 14th Avenue S; and the S. Trenton Street at 14th Avenue S. would be reconstructed. These changes may have a substantial effect on business activities for remaining businesses. Even though this pertains only to a few businesses, since most businesses in the South Park business district would be displaced, the impacts would contribute further adverse impacts to a severely altered business district.

Marine Businesses

Current marine-based business activities would minimally be impacted under this alternative. Large yachts constructed or serviced at Delta Marine Industries would need to have the masts removed before motoring under the high-level bridge. The derricks that enable launching of these yachts would be able to clear the vertical constraints of the high-level bridge. All barges, tugboats, and sailboats would similarly be able to clear this bridge (Crow, 2002; Ellefsen, 2002; Schrewsbury, 2002).

6.2.5.2 Change in the Locations of Permanent Jobs

Approximately 140 permanent jobs would be affected for the employees working at the 28 displaced businesses. The extent of this effect depends on whether the business is relocated, which would likely retain permanent jobs, or whether the business is

discontinued, which would result in a loss of permanent jobs. The location of these jobs would change if the businesses were relocated. If permanent jobs are relocated outside of South Park, then local jobs are lost for this community and gained elsewhere. Other permanent jobs lost as a result of this alternative would be the bridge tenders for the existing bascule bridge.

Traffic routes, both vehicular and freight, would be expected to change as a result of this alternative due to the S. Trenton Street/12th Avenue S. reroute to connect 14th Avenue S. to S. Cloverdale Street. Therefore, changes to existing permanent jobs in non-displaced businesses in the South Park business district may occur.

6.2.5.3 Effects on Property Value Trends and Local Tax Revenues

The acquisition of property, both business and residential, would have minimal impact on property tax revenues collected by King County. Changes in property values along 14th Avenue S. in the South Park business district for remaining businesses and residences would not be expected to be adverse. Indeed, property values for these businesses may increase with a new bridge due to subsequent reinvestment in the business district and improved streetscape amenities (e.g., trees, bus shelters, bus pull-out plaza, park). Several property owners have waited for a final decision on the South Park Bridge rehabilitation or replacement before initiating reinvestment in their property (Hayes, 2002). However, this pertains only to a few businesses since most businesses in the South Park business district would be displaced.

Revenue generated by B&O taxes from displaced businesses may be lost if these businesses do not relocate. Similarly, any retail sales and use tax or other applicable excise tax revenues may be lost.

Most businesses currently rely on on-street parking, which may not be available to the same extent on 14th Avenue S. with improvements associated with this alternative. This change in parking options may affect commercial sales potential. Visibility of non-displaced businesses is not expected to be substantially altered. Again, this pertains only to a few businesses since most businesses in the South Park business district would be displaced.

6.2.5.4 Effects on the Region

In addition to severe economic impacts to the local South Park business district, changes to the regional businesses and economy may also be affected as a result of this alternative. Primarily this is due to the S. Trenton Street/12th Avenue S. reroute to connect 14th Avenue S. to S. Cloverdale Street, which would increase the travel distance and time to connect with major highways such as SR-509 and SR-99.

One large employer, Sea Mar Community Health Center, would be affected by this alternative. It is a community-based organization that provides health and human services to communities in the Seattle metropolitan area and specializes in service to Hispanics and low-income persons. Of its 19 sites in the state, the non-profit organization's headquarters and its Seattle medical and dental clinic are located in South Park. This alternative would displace three buildings that are part of the Sea Mar Community Health

Center in South Park. The displacement and relocation of these facilities would require patients to adapt to the new location of facilities or to change service providers. (Please refer to the *Social Elements Technical Report* for a discussion on impacts to minority populations.)

6.3 Estimated New Jobs from Construction

Based on research conducted by the FWHA, transportation infrastructure contributes to the creation of new jobs (Keane, 1996). These jobs are characterized as direct (jobs in the construction highway industry), indirect (jobs in industries that supply materials for highway construction), and induced (jobs in industries that benefit from the spending and investments made by the direct and indirect jobs).

Conceptual construction costs were used to estimate the number of jobs that would be created from implementing the No Action, Rehabilitation, Bascule Bridge, Mid-Level Fixed-Span Bridge, and High-Level Fixed-Span Bridge alternatives (see Table 13). The construction costs associated with the No Action Alternative would be for demolition and removal of the existing bridge when it would become inoperable.

Table 13. Number of Estimated Jobs Created by Alternative

Type of Job	No Action	Rehabili-tation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Estimated Construction Cost (2003)	**$6,750,000**	**$56,333,000**	**$65,426,000**	**$50,911,000**	**$49,889,000**
Direct	53	445	517	402	394
Indirect	133	1,110	1,289	1,003	983
Induced	98	817	949	738	723

Source for estimate: Keane, 1996.

6.4 Secondary and Cumulative Impacts

6.4.1 Secondary Impacts

6.4.1.1 No Action Alternative

Adverse secondary impacts would occur if the No Action Alternative were chosen. Eventually the existing South Park Bridge would no longer be maintained or operated. The U.S. Coast Guard regulations would require demolition and removal of the non-operable bridge. The demolition of the bridge would prohibit cross-river traffic on 14th/16th Avenue S. Current roadway traffic would need to be rerouted, thus all business activities that depend on this traffic would be adversely affected. These effects would include decreased customer base, higher transportation costs, less convenient access to South Park, more vacant buildings, loss of jobs, decreases in tax revenues and property values, and diminishing economic viability for local South Park businesses. This impact on economic activities could adversely affect the number of jobs across the Duwamish

region, especially with such a high proportion of jobs in the manufacturing sector that rely on direct and efficient transportation routes to support the respective industries.

6.4.1.2 Rehabilitation Alternative

Adverse secondary impacts could occur if the Rehabilitation Alternative is chosen. This is due to local South Park businesses sustaining potentially significant financial losses during construction, particularly the 20 percent of the businesses that rely on the patronage of through traffic. Depending on the severity of these losses, businesses may be unable to survive the 32 months of construction. As a result, business patterns would change if fewer businesses were open after construction is completed. One factor that could impede the resiliency of business activities is whether traffic patterns used before construction would be reestablished after construction. If traffic does not return to South Park, then business activities would slow. In addition, changes in the location of permanent jobs associated with existing businesses could occur if businesses are unable to remain in business during the construction activities.

6.4.1.3 Bascule Bridge Alternative

Few, if any adverse secondary economic impacts would occur with the implementation of the Bascule Bridge Alternative. This is due to very limited direct disturbance to local South Park and regional business activities, which in turn would not adversely affect other businesses either locally or in the region over the long-term.

6.4.1.4 Mid-Level Fixed-Span and High-Level Fixed-Span Bridge Alternatives

If the Mid-Level Fixed-Span Bridge Alternative or High-Level Fixed-Span Bridge Alternative is chosen, secondary impacts on the local South Park businesses would be adverse. The displacements of businesses for the construction of a new fixed-span bridge could lead to losses of additional businesses over time. The High-Level Fixed-Span Bridge Alternative would have a higher potential of triggering this loss since the character of the business district would be substantially impacted by the displacement of two-thirds of the current business district. The Mid-Level Fixed-Span Bridge Alternative would initially displace one-third of the business district, and secondary impacts could affect part or all of the remaining businesses.

It may be possible in the future to redevelop some of the parcels that would be acquired for the project. If only part of the parcel was needed for new right-of-way, the remaining area could support new or modified development. It may be necessary to provide alternative access or possibly redefine parcel boundaries to support various developments. It is unknown at this time how much of each parcel would remain and exactly what types of development could occur. However, there would likely be potential opportunities for new development to occur on the remaining areas of some of the parcels affected by the Mid-Level Fixed-Span and High-Level Fixed-Span bridge alternatives.

The Mid-Level Fixed-Span Bridge Alternative would limit the types of marine facilities and vessels upstream of the bridge, primarily due to vertical clearance constraints. This limitation placed on upstream businesses could result in subsequent business displacements and the loss of permanent jobs over time. The High-Level Fixed-Span Bridge Alternative may limit future yachts that could be constructed at Delta Marine

Industries. The current vertical constraint on downstream bridges is 140 feet (at high water) at the West Seattle Freeway Bridge. Although the High-Level Fixed-Span Bridge Alternative is conducive to business needs at Delta Marine Industries, future business could be limited (Jones, 2002).

6.4.2 Cumulative Impacts

The implementation of any of the alternatives would not be expected to contribute to adverse cumulative impacts to the economy. An on-going, large scale clean up of contaminated properties along the Duwamish River as well as the river itself is underway. The South Park Bridge project would likely contribute to the objectives in this larger-scale Duwamish River project without causing adverse effects since it would also involve cleaning up contaminated properties affected by the project. Overall, the combined clean up efforts would likely increase property values.

Improvements are also planned for the Duwamish Riverfront area that is downstream from all alternatives considered in the South Park Bridge project. These improvements will aim to restore the riverfront's natural and recreational resources. The South Park Bridge would not contribute to any adverse cumulative impacts in association with the Duwamish Riverfront project.

No other road or highway projects are known at this time that would conflict or cause adverse cumulative impacts to the economy when implementing any of the alternatives being evaluated in the South Park Bridge project.

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Chapter 7 Mitigation

The mitigation measures proposed below are general in nature. Specific mitigation measures will need to be determined as part of final design and prior to construction. These measures should be based on the expected cost effectiveness, specific needs of individual businesses, and resiliency of individual businesses to endure the impacts associated with each alternative.

7.1 Mitigation for Construction Impacts

Potential mitigation to reduce adverse economic effects during construction activities include:

- Coordinate with U.S. Coast Guard and King County for navigation passage through the in-water construction activities to mitigate for construction delays. And, provide public notices to marine users.
- Minimize the extent and number of businesses, jobs, and access impacted during construction.
- Coordinate the timing of temporary bridge closures to minimize impacts to business activities, especially those related to seasonal or high-sales periods, to the extent practicable.
- Minimize the duration of modified or lost access to businesses.
- Provide signage, lighting, or other information to indicate that businesses are open.
- Provide public information (e.g., press releases, newsletters) on construction activities and on-going business activities.
- Maintain access for pedestrians, bicyclists, passenger vehicles, and trucks during business hours and during important business seasons.
- Provide advance notice if utilities would be disrupted, and schedule major utility shut-offs during non-business hours.
- Adhere rigorously to scheduling so that business merchants can plan sales and other retail events around the construction.
- Phase construction in each block to allow vehicular and pedestrian access to individual businesses.
- Implement dust and vibration mitigation during business hours.
- Minimize impacts and provide public information during scheduled community events (e.g., Fiesta Patrias) or holiday seasons that local businesses depend on for high sales.

7.2 Mitigation for Operational Impacts

Potential mitigation to reduce permanent adverse economic effects include:

- Minimize the extent and number of business, jobs, and access that would be permanently impacted.
- Compensate for right-of-way acquisition, displacement and relocation of businesses, and loss of property value per the Uniform Relocation Assistance and Real Property Acquisition Policies Act.
- Consider temporary relocation of displaced businesses during construction and permanent return to a place in the South Park Community after construction.
- Provide off-street parking opportunities to mitigate for lost on-street parking.

A caveat regarding mitigation for right-of-way acquisition, displacement and relocation of businesses is that most of the businesses surveyed indicated that they would not be able to remain viable upon relocation (Parsons Brinckerhoff, 2003). Many members of the project CAG agree that substantial business displacements could not be mitigated, such as needed under the Mid-Level Fixed-Span and High-Level Fixed-Span bridge alternatives. Moreover, many business owners and managers believe that the loss of businesses in the South Park community, especially businesses that provide services to a predominantly Hispanic clientele, would adversely resonate through South Park as well as the larger Hispanic community in the Seattle metropolitan area.

Chapter 8 References

BST Associates. *14th/16th Avenue South Bridge Economic Impact Analysis*. Prepared for King County Department of Public Works. Seattle, Washington, March 1995.

City of Seattle. *Seattle Datasheets: Economy, Industry & Business, Tourism, International Commerce and Transportation*. April 2002. http://www.cityofseattle.net/oir/datasheet.

City of Seattle. *Seattle's Comprehensive Plan.* A plan for managing growth 1994-2014 as amended 2000.

City of Tukwila. *Draft Environmental Impact Statement for the Duwamish Corridor Redevelopment Proposal. M*ay 1992.

Crow, Guy. South Park Marina. Telephone conversation, 25 September 2002.

Crowley Marine Services. Tim (unknown last name) at dispatch. Telephone conversation, 19 September 2002.

Economic Development Council of Seattle and King County (EDC). *Research and Data: Economic Base, International Trade, The City of Seattle, Office Market, and Transportation*. April 2002. http://www.edc-sea.org/research_data.

Ellefsen, Frank. Island Tug and Barge. Telephone conversation, 20 September 2002.

Fernandes Associates. *16th Avenue South Bridge Alternatives: Community Issues*. Prepared for King County Department of Public Works. Seattle, Washington, July 1994.

Federal Highway Administration (FHWA). *National Environmental Policy Act (NEPA) Guidelines, 23 CFR 771*.

FHWA. *Guidance for Preparing and Processing Environmental and Section 4G Documents.* Technical Advisory T6640.8A. 1987.

Greater Duwamish Planning Committee. *Greater Duwamish Manufacturing and Industrial Center Plan.* Seattle, Washington, 1999.

Hayes, Jennifer Davis. Personal interview. 29 August 2002.

Jones, Igor. Delta Marine Industries. Telephone conversation, 25 September 2002.

Keane, Thomas F. "The Economic Importance of the National Highway System." Public Roads On-Line. Spring 1996. U.S. Department of Transportation, Federal Highway Administration, Research, Development, and Technology Turner-Fairbank Highway Research Center. 3 October 2002. http://www.tfhrc.gov/pubrds/spring96/p96sp16.htm

Langjahr, Joe. Foss Maritime Company. Telephone conversation, 19 September 2002.

Llanos, Annette. Duwamish Yacht Club. Telephone conversation, 2 October 2002.

Manson Construction Company. Telephone conversation, September 2002.

Metro Transit. *Metro Transit at a Glance*. April 2002. http://www.transit.metrokc.gov/programs_info.

National Highway Cooperative Research. *Summary and Evaluation of Economic Consequences of Highway Improvements Report 122.*

Parsons Brinckerhoff. 2003. *Survey of 14th Avenue South Businesses*. Prepared for King County. August 23, 2003.

Puget Sound Region Council, 2002a. *Puget Sound Milestones: Population, employment and housing, 1995-2000*. Seattle, Washington, August 2002.

Puget Sound Regional Council, 2002b. 2001 Population and Employment Forecasts, Central Puget Sound Region. August 2002. http://www.psrc.org/datapubs/forecasts_2001.htm.

Schrewsbury, Rick. Western Tugboat. Telephone conversation, 19 September 2002.

South Park Planning Committee. *South Park Residential Urban Village 1998 Plan*, Seattle, Washington, 1998.

U.S. Census Bureau. *Census 2000 Data*. September 10-17, 2002. http://factfinder.census.gov.

U.S. Department of Commerce, Bureau of Economic Analysis. *Regional Accounts Data, Local Area Personal Income.* April 2002. http://www.bea.doc.gov/bea/regional/reis.

Washington State Department of Transportation (WSDOT). *Environmental Procedures Manual.* September 2003.

Washington State Department of Revenue. 2003. *Homeowners Guide to Property Taxes.* February 2003.

Washington State Department of Revenue, 2002a. *Local Sales and Use Tax Rates, Tax Rates Effective July 1, 2002*. July 2002. http://www.dor.wa.gov.

Washington State Department of Revenue, 2002b. *Tax Statistics 2001*. April 2002. http://www.dor.wa.gov/docs/reports/2001/Tax_Statistics_2001.

Washington State Employment Security Department, Labor Market and Economic Analysis Branch 2002. Resident civilian labor force for Washington State and countries. April 1, 2002

Washington State Employment Security Department, Labor Market and Economic Analysis Branch. King *County: Size of firm distribution for all ownerships, including multiple establishments, first quarter 2001*. April 2002. http://www.wa.gov.esd.lmea.labrmrkt/size/kingsiz.htm.

Washington State Office of Financial Management. *State of Washington 2001 Data Book*. April 2002. http://www.ofm.wa.gov/databook/index.htm.

Appendix A. Interview Data with Tugboat Providers

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Interview Data with Tugboat Providers

Island Tug & Barge—Frank Ellison, September 20, 2002

He operates a tugboat service that makes trips upstream of the South Park Bridge approximately 1-2 times a week. He hauls barges (in the90-foot-wide wide range) to storage facilities and large cranes to Delta Marine. His tugs have shallower drafts that other tugboat services, and he prefers to go at high tides so he can have more water to float in. When hauling barges, he can frequently pass under the South Park Bridge without needing it opened. When hauling cranes, he needs the bridge opened; cranes are a minimum of 80 feet high and can be as wide as 100'. The cranes are attached to their own barges, thus no smaller options are available to transport the crane. He said the horizontal clearance is tight already and any further reduction would severely impact barge travel. He also indicated that future needs would likely need to have larger dimensions, not smaller. “Things just keep getting bigger.” When asked about fixed-span option, he said it would have to be pretty high to accommodate the 80-foot cranes that Delta needs. He also mentioned the bend in the waterway, which requires extra width to pass through the South Park Bridge while turning around the bend.

Foss—Joe Langjahr , September 19, 2002

He said that Foss vessels have not gone up that far on the Duwamish in a long time, so long he could not remember when. He referred me to Manson, and said whatever works for them would work for any future needs of Foss. He also referred me to Western Tugboat.

Western Tugboat—Rick Schrewsbury, September 19, 2002

He said that his company hauls barges upriver of the South Park Bridge about six times per year for the dredging activities and to help Delta Marine launch yachts. Basically his largest tugs are 32 feet wide and 35 feet high (with the masts down). The barges that are hauled are 85 feet wide and 15 feet high and 80 feet high when hauling cranes. He referred to the vertical constraints of the existing power line that crosses the Duwamish River upstream of the bridge. He prefers 100-foot horizontal clearance to maneuver the barges under the bridge. His tugs are not the limiting factors, it is the size of his cargo, that requires these clearances. He referred me to Island Tug & Barge.

Crowley—Tim at Dispatch, September 19, 2002

They have not had any traffic in the last three years that has traveled as far up the Duwamish Waterway as the South Park Bridge. All of their activity on this river has been downstream of the bridge. Changes to the bridge would not affect Crowley.

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Appendix B
Interview Data with Duwamish River Marine Facilities

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Interview Data with Duwamish River Marine Facilities

Business Name and Address	1995 Data	Current Use	Vertical/ Horizontal Clearance Requirement	Perceived Impact of Rehabilitation	Perceived Impact of New Bascule	Perceived Impact of New Mid-Level Fixed-Span	Perceived Impact of New High-Level Fixed-Span
The Boeing Company Richard White (206) 655-3640	6 loading platforms Not currently in use	[Still trying to contact]					
Delta Marine Industries 1608 S. 96th Street Igor Jones, President (206) 763-2383 9/25/2002	Permanent floats to repair and outfit yachts Uses floating derricks to launch yachts	Same as 1995 data	Derricks must be able to meet vertical clearance. Yachts need to vertical clearance, some larger boats need to have masts removed before clearing West Seattle Fwy (140 ft) Horizontal clearance of South Park Bridge should not be narrowed in order to allow yachts to motor thru.	As long as waterway remains navigable during construction, should not be any impact. Roadway closure would not affect business activities.	As long as waterway remains navigable during construction, should not be any impact.	Mid-level fixed-span bridge would severely impact business. Yachts and derricks could not fit within vertical constraints. Yachts can't leave at MLW; need deeper water to sail.	DMI business could survive with 100 ft vertical clearance. Larger yachts would need masts taken off before motoring under bridge. DMI prefers to have no vertical constraints to accommodate future yacht designs.

Business Name and Address	1995 Data	Current Use	Vertical/ Horizontal Clearance Requirement	Perceived Impact of Rehabilitation	Perceived Impact of New Bascule	Perceived Impact of New Mid-Level Fixed-Span	Perceived Impact of New High-Level Fixed-Span
Duwamish Yacht Club 1801 S. 93rd Street (206) 767-9330 Annette Llanos Marina Manager 10/2/2002	106 slips for recreational boats (power and sail)	112 slips	Most tenant boats can clear the West Spokane Street Bridge without opening (55 ft). Tallest sailboats have a mast of 58 ft.	None	None	All power boats would be able to clear. Most sailboats would be able clear vertical constraint. A few may need to avoid sailing under bridge at high tide (about 20 percent of the time).	None
Monsanto Wharf Rhone-Poulenc 9/25/2002	Slip 6 Not currently in use	Same as 1995 data (confirmed by Guy Crow at South Park Marina 9/25)	N/A	N/A	N/A	N/A	N/A
Muckleshoot Indian Tribe 10054 West Marginal Way S. 10/2/2002	Moorage for barges and other large barges. Owned by Kenco Marine.	No current marine uses. Pilings have been removed. (Confirmed by Annette Llanos at Duwamish Yacht Club 10/02)	N/A	N/A	N/A	N/A	N/A

Business Name and Address	1995 Data	Current Use	Vertical/ Horizontal Clearance Requirement	Perceived Impact of Rehabilitation	Perceived Impact of New Bascule	Perceived Impact of New Mid-Level Fixed-Span	Perceived Impact of New High-Level Fixed-Span
South Park Marina 8604 Dallas Avenue S. Seattle WA 98108 Guy Crow (206) 762-3880 9/25/2002	150 boat moorage	Same as 1995 data	Most current tenants have boats that can sail under South Park Bridge without bridge lifts.	No impact to ability to sail boats. However, roadway closures would cause current tenants to use detours to drive to the marina where their sailboat is moored. Future tenants may choose other marinas that offer more convenience in terms of access (i.e., no detours that increase the distance from home to marina). As multi-business owner in South Park, he is very concerned about unsafe and deteriorating condition of the South Park Bridge. Closure of the South Park Bridge during construction would also have severe impacts on land-based businesses since all cross-river traffic would be rerouted.	No impacts expected on marina business. He also owns a tire store and restaurant along 14th Avenue S., which may be impacted from limited access and property takes.	A 60-65 foot bridge would not affect most tenants. A few may have slightly taller boats (70 ft) that could sail under bridge at low tides. His restaurant and tire business would be severely affected by property takes and changes in access.	No impacts expected on marina business. His restaurant and tire business would be severely affected by property takes and changes in access.

Sources: Crow, 2002; Jones, 2002; Llanos, 2002.

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Appendix C. Survey of 14th Avenue South Businesses

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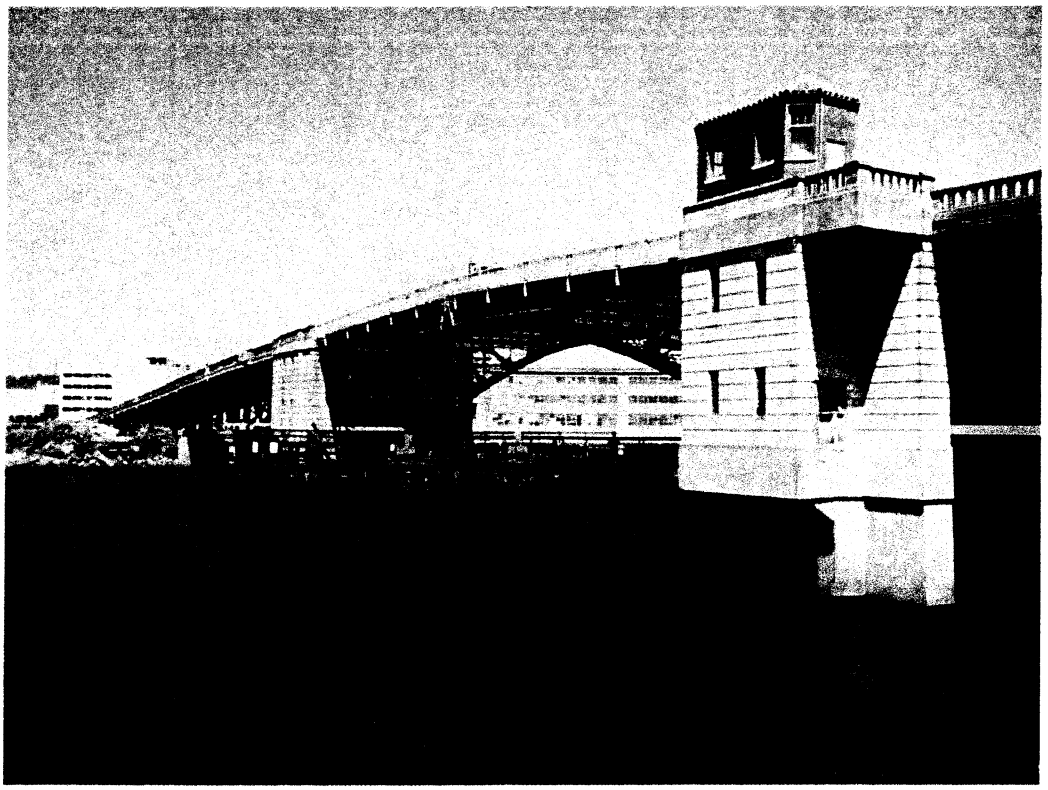
South Park Bridge Project

Survey of 14th Avenue South Businesses



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August 22, 2003

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South Park Bridge Project

Survey of 14th Avenue South Businesses

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Executive Summary

King County is proposing rehabilitation or replacement of the South Park Bridge. As part of the analysis, a survey was conducted to evaluate potential impacts of the bridge project to businesses and to persons of racial and/or ethnic minorities. A copy of the survey can be found in Appendix 1. The survey interviews were conducted with business owners and managers in the potential impact area on 14th Avenue S. from the Duwamish Waterway south to S. Trenton Street.

The data from the successfully collected surveys of businesses on 14th Avenue S. clearly show that South Park is a very diverse community. A high proportion of persons of racial and/or ethnic minorities own local businesses, shop at these businesses, and work for these businesses. When considering the potential commercial parcel acquisition for the project alternatives, it appears that persons of minority populations could be slightly more affected than non-minority persons (see Appendix 2). But this conclusion is based on a non-statistical sample survey of the businesses. Many of the business owners or managers feel their business would not survive relocation. Moreover, the data collected by the survey indicates the loss of businesses in the South Park community, especially the Latino businesses, would resonate through the South Park community as well as the larger Latino community. Based on anecdotal comments recorded following the interviews, it appears business owners and managers are most concerned about the High-Level Fixed-Span Bridge Alternative as few comments were recorded concerning any of the other project alternatives.

1.0 Background

King County is proposing rehabilitation or replacement of the South Park Bridge, and is preparing an Environmental Impact Statement (EIS) on the proposed bridge alternatives. The bridge is located approximately four miles south of downtown Seattle. It runs north-south across the Duwamish Waterway east of SR-509. The ends of the bridge are located in different local government jurisdictions - the City of Tukwila (north side) and King County (south side). The residential and community commercial district to the south of the bridge is the South Park community, which is within the City of Seattle city limits. Please see Figure 1 for a map of the project vicinity.

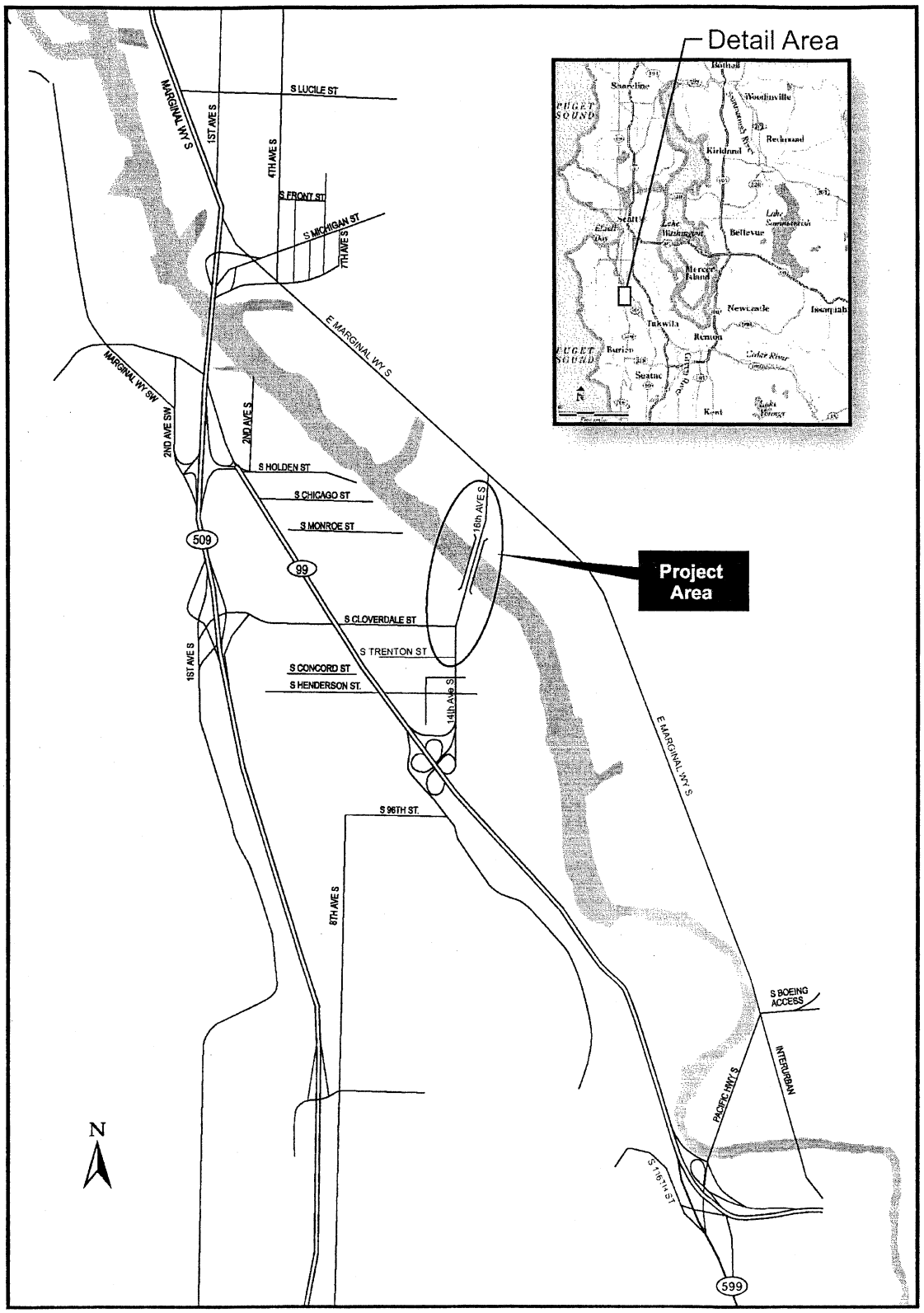

Figure 1
Project Vicinity Map

Five alternatives were selected for evaluation in the EIS. These alternatives include No Action, Rehabilitation of the existing bridge, a new Bascule Bridge, a new Mid-Level Fixed-Span Bridge, and a new High-Level Fixed-Span Bridge. Draft environmental technical reports were prepared and submitted for agency review in late fall of 2002. The comments received on the Relocation, Economics, and Social Elements technical reports expressed concerns regarding businesses that would be impacted along 14th Avenue S. In addition, 2000 census data reported the primary language spoken at home in approximately 30 percent of the South Park households was not English, and 47 percent of South Park residents were non-white. As such, potential impacts to minority populations were identified as an issue that required additional study. Specific questions were raised about how many businesses are minority owned or operated, how many business owners perceive direct and indirect project impacts on their businesses, and how business owners would perceive relocation. The project's effect on minority customers and residents of the South Park community was also of interest.

To help answer these questions and further evaluate the proposed project alternatives, King County requested that Parsons Brinckerhoff (PB) conduct a survey of businesses on 14th Avenue S. between S. Trenton Street and the Duwamish River. PB's South Park Bridge Project Team developed the survey questionnaire to gain insight into the interaction between the South Park community and local businesses. The goal of the survey was to answer the following questions:

- How many businesses in the area that would be potentially impacted by the South Park Bridge Project are minority-owned or minority-operated?
- Would the adverse impacts of the bridge alternatives affect minority-owned or minority-operated businesses disproportionately?
- What are business owners' concerns?
- Could the businesses affected by the project alternatives successfully relocate?
- What effect would potentially displaced businesses and jobs have on the residents of the community?

2.0 Approach and Methodology

Study Area

A list of the businesses to be surveyed was initially compiled based on the area directly impacted by the project alternatives. This area included all businesses fronting on 14th Avenue S. between the Duwamish Waterway and the south side of the intersection of S. Trenton Street and 14th Avenue S. As such, these businesses are located on properties either crossed or adjacent to the longest alignment of the project alternatives to be evaluated in the EIS. Other businesses in South Park could also be affected, but were not included in the survey. The names and addresses of potentially affected businesses along 14th Avenue S. were collected during a field visit. Figure 2 is a map of the potentially affected businesses within the survey area.

Questionnaire

The Project Team created a draft questionnaire with the intent of keeping interviews durations between 15 and 20 minutes. Most of the questions had yes/no or multiple-choice answers. After several Parsons Brinckerhoff and King County revisions, the draft questionnaire was forwarded to Charlie Cunniff of the Environmental Coalition of South Seattle (ECOSS) for review. In addition, key members of the community were alerted to the upcoming survey. These people included: Eugene Wasserman, Executive Director of the Neighborhood Business Council; Ron Cook, President of the South Park Business Association; Jennifer Davis-Hayes, Chair of the South Neighborhood Association. Feedback was generally positive and all agreed on the need for the survey. Comments were incorporated into the questionnaire. A copy of the final survey questionnaire is included in Appendix 1.

The questionnaire focused on the following subject areas: the business, the owners, the employees, and the customers. Questions were designed to gain an understanding of how the businesses function and how they fit into the South Park community. The questions addressed the following topics:

- Name and title of interview respondent
- Name and address of business
- Type of business

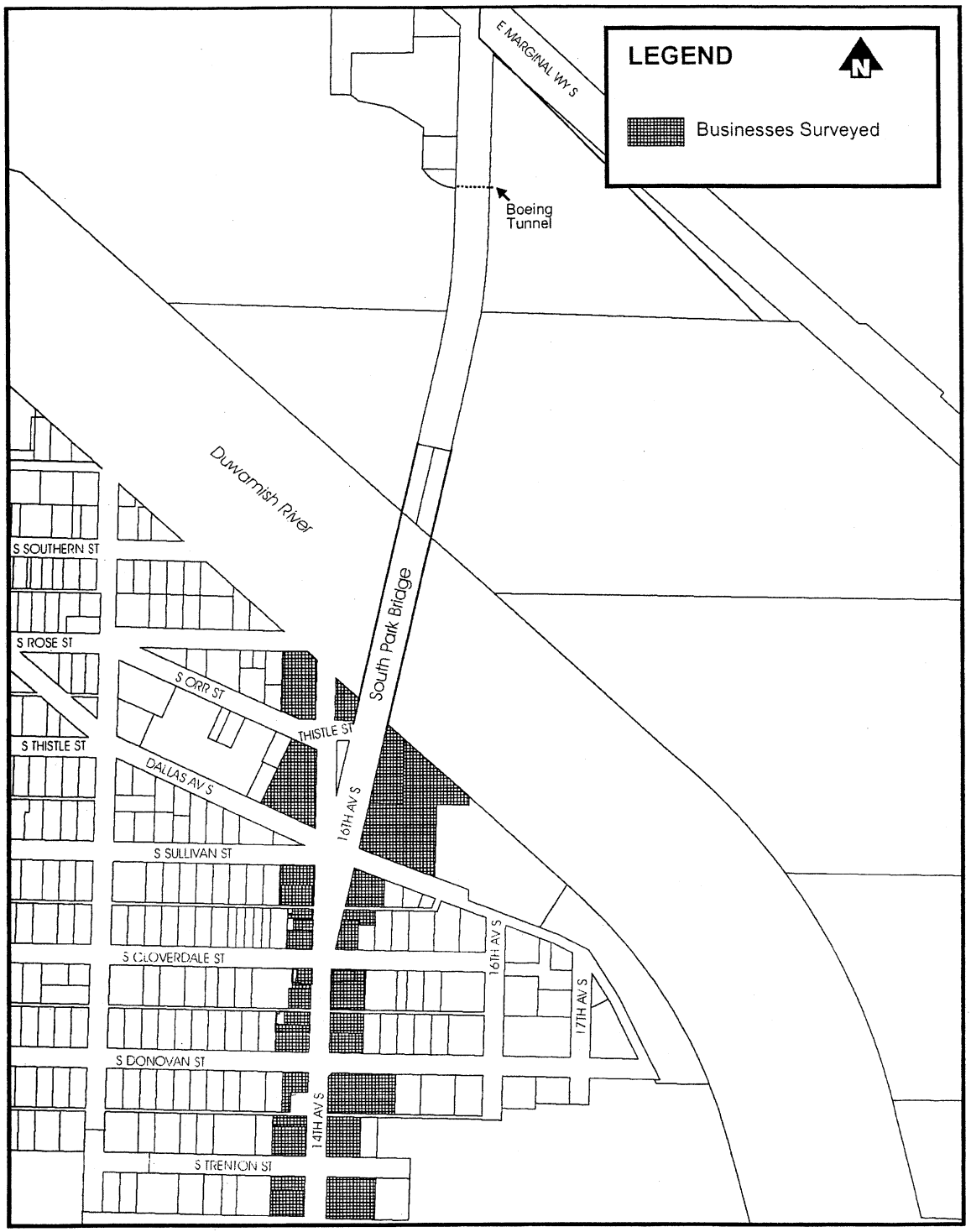

Figure 2

Potentially Affected Businesses in Survey Area

- Why the business is located in the South Park area
- How long the business has operated from its current location
- Whether the business is owned, operated and/or used by minorities
- Where the employees and customers live
- Whether the business owner has ever considered relocation
- What concerns the business owner or manager has about the potential impacts of the South Park Bridge Project.

Interviews

The Project Team decided that Celia Schorr of the Index Group and Charlie Cunniff of ECOSS would administer the survey and conduct the interviews. Ms. Schorr is the project public involvement specialist and has been involved in past public meetings and presentations in the South Park community. She coordinates with the Community Advisory Group (CAG) and has met many local business owners. Mr. Cunniff is the director of ECOSS and a member of the CAG. Through both of these roles, he knows most of the business people in South Park.

Because a number of businesses are owned by minorities and/or persons of Hispanic heritage, translators were also identified to help the team in the field. At the beginning of each interview, the business owner or manager was asked if a translator would help in the interview process. If a translator was requested, the interview was rescheduled for a different time that was convenient for both the business owner and the translator. In total, a translator was only requested on two different occasions and both requests were for a Vietnamese translator.

The interviews were conducted in person with business owners or managers and occurred during May and June of 2003. In most cases the interview was conducted verbally with Mr. Cunniff asking the questions and Ms. Schorr taking notes. In two cases where the owner or manager was not available, the questionnaire was left for them to fill out and return. On two other occasions, the interview was conducted, but the business owner or manager requested additional time to complete the survey and mail it back. As such, the survey data are limited to the opinions of the business owners and managers interviewed. Generally, the interviews were well received.

Owners and managers of the businesses were glad to have a forum in which to voice their concerns and ask questions regarding the proposed project.

3.0 Results

Of the 28 businesses located in the study area, 18 were successfully surveyed. Two additional businesses located adjacent to the study area were also surveyed. The responses to the survey questionnaires are used as a sample set. Table 1 summarizes the key findings. The text below also reviews other information obtained by the survey.

The responses indicate most business owners work at the site, and most of the businesses are small businesses. The types of businesses include health clinics, restaurants, taverns, grocery stores, boating supply, personal services, and industrial parts supply. The reasons the businesses are located in South Park generally fall into three categories:

- The business supports The Boeing Company and other businesses in the area
- The business supports the South Park community and its residents
- The light industrial business is located in South Park because there is access to multiple modes of transportation and affordable real estate prices.

The average length of time that businesses have been located at their current South Park location is 13 years. The minimum is one year, and the maximum is 43 years. Just over half of the properties are owned rather than leased.

Owners and managers stated there are many different reasons for locating businesses in South Park. One of the most common answers to this question was the cost of real estate (seven responses). Some claimed it was the only location where they could afford to buy or rent property. Another common reason for the location was the surrounding community (nine responses). These businesses are located in South Park because they have clients at the Boeing Company, either by being a subcontractor or supporting Boeing employees with services such as restaurants. The Sea Mar Community Health Center was also stated as a reason to locate in South Park because it draws a large Hispanic population to the area. Sea Mar Community Health Center is a community-based organization that provides comprehensive health and human services to the community, specializing in service to Hispanics. South Park was also noted for

Table1

Business Survey Key Findings

QUESTIONS (Total Surveys: 20)

		Average	Min	Max
Years located at current address?		13	1	43
			Owned	Leased
Property owned (vs. leased)?			11	9
			Apartments	None
Businesses with apartments attached?			4	16
	Sea Mar	Average*	Min*	Max*
Full-time employees	400	5	1	14
Part-time employees	50	2	0	9
			*excludes Sea Mar	
Percentage of employees:			Total	Percentage
White/Caucasian			128	23%
African American/Black			45	8%
Asian/Hawaiian/Pacific Islander			67	12%
American Indian/Native Alaskan/Eskimo/Aleut			6	1%
Mixed or Other			14	2%
Percentage of employees:				
Latino/Hispanic			309	54%
Number of businesses comprised completely of:				Businesses
White/Caucasian Employees				5
African American/Black Employees				1
Asian/Hawaiian/Pacific Islander Employees				3
American Indian/Native Alaskan/Eskimo/ Aleut Employees				0
Mixed or Other Employees				5
Latino/Hispanic Employees				6
			Yes	No
Owner considers self to be of a racial minority			13	5
Businesses with majority of employees living in South Park			4	16
Businesses with majority of employees driving to work			17	2
Businesses with most customers from the South Park Area			11	8
Businesses with most customers making a special trip			15	4
Businesses with significant share of customers dropping by			3	15
Number of businesses where a majority of customers drive to the business			17	2
Number of businesses where a majority of customers walk to the business			3	16
Businesses with off-street parking			20	0
Business owners consider majority of customers minority			10	9
Business previously operated from different location			6	13
Business owner has considered moving business			2	17

NOTE: Sums may not total 20 (total number of questionnaires completed) due to non-responses.

its accessibility to many modes of transportation, including highway, rail, and air (four responses). The Sea Mar Community Health Center is the largest employer in the South Park commercial district that was included in the survey. The Center has 400 full-time employees working in four different buildings. However, most of the businesses in the South Park community are small businesses that employ an average of five full-time employees and have a single location. The smallest business is one-person owned and operated, and the largest business other than Sea Mar Community Health Center has 14 employees. Forty-five percent of these businesses employ part-time employees.

The racial and ethnic composition of the business employees and owners interviewed reflects the diversity of the South Park community. Of all of the employees working for the businesses that were surveyed, only 23 percent are White or Caucasian. The respondents reported 54 percent of the employees were Latino or Hispanic, but did not report a separate racial group for these individuals. The remaining employees are from one or more racial groups.

Of the 20 businesses surveyed, 15 interview respondents said that all of their employees would consider themselves a person of a racial or ethnic minority. Six of these businesses have only Latino or Hispanic employees. Five of these businesses employ persons of mixed racial groups. Three respondents reported that all of their employees are of Asian, Hawaiian, or Pacific Islander racial groups. And one respondent said all of their employees are African American or Black. Five of the 20 total businesses surveyed employ persons who would not consider themselves a minority – White or Caucasian employees. In summary, the workforce of 75 percent of the businesses is completely comprised of minorities or persons of Latino or Hispanic heritage.

The survey also inquired about employee and customer travel patterns. Ninety percent of the owners or managers surveyed said that the majority of their employees drive to work and live in neighborhoods outside of South Park. These neighborhoods include White Center, Burien, Bothell, Kent, and Beacon Hill. Eighty percent of the respondents estimated that a significant share of their customers make a special trip to visit their businesses. Only a few businesses, however, provided any estimate of what percentage they considered to be a significant share of their customers. Ninety percent of the business owners or managers surveyed claimed that most of their customers drove to their business. All businesses had off-street parking, either owned or rented. Approximately 55

percent of the businesses surveyed suggested that most of their patrons come from the South Park community. The survey, however, did not ask the business owner or manager if they could estimate the percentage of their customers who come from other communities. Based on responses to another question, the business owners or manager also appear to perceive the residents of South Park make a special trip to their business. The restaurants, in particular, have many local customers as well as considerable patronage from The Boeing Company employees. Just over half of the surveyed businesses have a majority of their patrons who would consider themselves a minority. Two-thirds of the businesses have always operated from their current location, and only two have considered moving to another location.

4.0 Comments and Questions from Businesses

This section presents comments and questions about the South park Bridge Project from business owners and managers. The comments and questions listed below are grouped by topic. They are not quotes, but rather summaries that encapsulate each comment made during the survey interview. They are not listed in any particular order of importance.

Preference for an Alternative

- *If something other than the current bridge is built, it will affect my business and I will probably go out of business. It is already a tough time for many businesses.*
- *I would like to repair the current bridge and would not like to see the high-rise bridge built.*
- *If the higher bridge span is built, this business along with many others will be forced out of South Park.*
- *The high-rise bridge option would impact my total operation and diminish the value of my property and my business.*
- *As long as truck/trailer accessibility is maintained to my buildings, my business could survive - even through construction.*
- *I am concerned about the high-level bridge and the impacts on property and access to businesses.*
- *I prefer not to have a large bridge.*
- *I would prefer either fixing the present bridge or constructing another drawbridge, because these alternatives would be better for the community.*

Concerns/Questions on Potential Acquisition and Construction

- *I need my business to have easy access, visibility and parking during construction and after completion of the project.*
- *I just bought the business and hope that this project will not force me out of business.*
- *The costs of moving my business are incalculable due to the effect on personnel, loss of revenue, and irreplaceable location that provides access to all of my customers and suppliers. These costs are over and above any actual costs of physically relocating a business like mine and do not take into consideration the loss of value of my property.*
- *Is there a buy-out in case of the high-rise bridge?*
- *I am concerned about access and congestion during construction.*
- *Relocating Sea Mar medical, dental and health-related services would be a serious upheaval for us. However, in its 25-year history, Sea Mar has had an uncanny ability to overcome other serious challenges and has survived just fine.*

Other Comments

- *Make South Park safer for businesses, residents and the people that visit South Park.*
- *How long will the process take? When will a decision be made? The time spent waiting for a decision has a direct impact on the future plans for my building and business.*
- *We need something good for this area, a little town of American and Mexican people living together.*
- *Future success depends on bridge closures, detours, re-routing of bus routes, construction noises and impact on foot-traffic.*

The comments received from interview respondents did not include concerns about the need for a bridge. The comments reflect apprehension regarding construction and possible relocation. Most business representatives opposed the idea of relocating, and several stated that many businesses would not survive construction of the High-Level Fixed-Span Bridge Alternative (which would require relocating most of the businesses along 14th Avenue S.). None of the comments proposed a preferred alternative, but a number of comments addressed concerns regarding the High-Level Fixed-Span Bridge Alternative due to perceived impacts on local businesses.

5.0 Conclusions

Based on the survey data collected, answers to the questions framing the survey goals are discussed below:

How many businesses in the area potentially impacted by the South Park Bridge Project are minority-owned and/or operated?

From the set of businesses surveyed, it is apparent that approximately 72 percent of businesses are minority-owned. Of the total number of people employed at surveyed businesses (part-time and full-time), approximately 75 percent of the employees would consider themselves a racial and/or ethnic minority. These statistics, unfortunately, are based on a survey of only a portion of the total number of businesses that could be affected. Therefore, these descriptive statistics may not actually reflect the ownership characteristics of all businesses that could be affected by the project alternatives. The data, however, is clear that a significant portion of the businesses is likely to be minority-owned. For the Rehabilitation and Bascule Bridge alternatives, however, only three and five businesses, respectively, would be affected and chances that a significant share of these businesses would be minority-owned is uncertain due to the very small number of properties affected.

Would the adverse impacts of the bridge alternatives affect minority-owned and -operated businesses disproportionately?

The survey data suggests that if the High-Level Fixed-Span Bridge Alternative were built, minorities would be slightly more impacted (see Appendix 2). This is due to the high proportion of minority-owned businesses and minority-employed persons that are predicted to be directly affected by this alternative based on the survey data. Moreover, these particular businesses make up the core of the South Park business district. For the other alternatives, the number of businesses that would potentially be impacted is many fewer, 16 or fewer businesses compared to 28 businesses under the High-Level Fixed-span Bridge Alternative.

What are the business owners' concerns?

Business owners' and managers' concerns address both construction and operation concerns. Prior to construction, the business owners were concerned about potential inadequacy of compensation when properties are acquired. They pointed out that the purchase of their property and reimbursement of the physical relocation of their business would not necessarily cover all costs associated with moving the business. Regarding potential construction impacts, the business owners and managers would like assurances that visibility, access, and parking for their business would be maintained during construction. They are also concerned that congestion associated with

construction activities could deter customers from making purchases. Impacts such as these the business owners felt could contribute to forcing businesses to close. Depending on which project alternative is selected, the business owners also expressed concern that the long-term value of their property and business could diminish. Another comment expressed frustration in the perceived long duration of the decision-making process, which would affect future plans for their business.

Could the businesses affected by the project alternatives successfully relocate?

Most owners have no interest in relocating their business. A total of seven respondents reported they had operated their business from another location, but 12 said they had never operated a business except for in the South Park community. Only two of 18 of the respondents said they have contemplated relocating to another community. A wide variety of reasons were provided as to why these business owners or managers thought they might consider moving in the future. Most respondents did not provide an answer to the question in the survey that asked if the owner or manager thought his or her current employees would still work for the business should it relocation from South Park. Other business owners and managers commented that they expected that they would go out of business if they were relocated, though the largest employer interviewed, Sea Mar Community Health Center, thought they could withstand a relocation.

What effect would potentially displaced businesses and jobs have on community residents?

Although a small proportion of the community's residents work at the local businesses, the commercial district is seen as a vital place for community residents to interact. It provides retail and business and personal services that the community relies on. The commercial district also includes a number of Latino businesses, including the several Latino restaurants and a grocery store. These businesses support the Latino identity of the entire Latino/Hispanic community. By eliminating some of these Latino businesses, the impacts would likely resonate throughout the community. As one survey respondent said: "we need something good for this area, a little town of American and Mexican people living together."

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APPENDIX 1

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SOUTH PARK BRIDGE PROJECT

Business Owner Questionnaire

FILL OUT IN ADVANCE OF SURVEY:

BUSINESS:_____

APPROXIMATE ADDRESS:_____

TODAY'S DATE:_____

DATES OF 2 ADDITIONAL ATTEMPTS: 1) _____2) _____

==========

INTRODUCTIONS (Charlie and Celia)

As part of the introductions, ask –
Would you prefer that we provide a Spanish translator?

YES_____

NO _____

If so, when would be a more convenient time for us to come back with a translator (in the next several days)?

Make an appointment…

_____

_____

_____

_____

==========

THE BUSINESS

What is your name and title *(i.e. owner, president, manager)*?

Name:_____

Title:_____

What is the full name of the business?

Business:_____

What is your business address and telephone number?

Address:_____

Telephone: _____

How long has your business been located at this address?

Years: _____

Do you own the property or do you lease (*check one*)?

Own:_____

Lease:_____

Are apartments located upstairs (*check one*)? If so, do you know many?

Yes_____ Number_____

No_____

What type of business is this *(check one)*?

Other Describe: _____

_____

_____

Why did you choose to locate your business in South Park *(check one)*?

Location is near highways _____

Cost of real estate _____

Businesses in South Park_____

Residents of South Park _____

Area commercial and industrial businesses _____

Other reason:_____

WORKERS

What types of workers does your company employ, i.e. cashier, cook, clerk, receptionist etc.?

Describe: _____

_____

Approximately how many full-time and part-time employees do you currently have working for the company at this location on 14th Avenue S.?

Full-Time _____

Part-Time _____

Please estimate how many of your employees or what percentage of your employees would consider themselves to be a racial minority or have ethnic background (*all that apply*)?

Number or Percent

White / Caucasian _____

African American / Black _____

Asian / Hawaiian / Pacific Islander _____

Am. Indian / Native Alaskan / Eskimo / Aleut _____

Latino or Hispanic _____

Mixed or Other_____

***FOR OWNERS* - Do you consider yourself to be a person of a racial minority or of ethnic background (*all that apply*)?**

Racial Minority (*describe same as above*) _____

Latino or Hispanic _____

Do you believe the majority of your employees live in: *(check one)*

South Park neighborhood_____

Nearby Seattle neighborhoods_____

Other areas or cities _____

How do the majority of your employees get to work (check one)?

Walk_____

Bus_____

Car or truck_____

CUSTOMER INFORMATION

Would you guess most of your customers are from the South Park area (check one)?

Yes _____

No _____

In which of the other communities do you think they are located in (*all that apply*):

Georgetown _____

West Seattle _____

Other parts of Seattle _____

Burien-Tukwila-Renton _____

Other areas _____

Would you say a significant share of your customers make a special trip to do business with your company and/or other businesses or shops in the South Park community (*check one*)?

YES _____ If yes, could you estimate the percentage or proportion? _____

NO _____

Would you say a significant share of your customers might just be passing through the South Park commercial district and decide to stop and patronize your business (check one)?

YES _____ If yes, could you estimate the percentage or proportion? _____

NO _____

How do the majority of your customers get to your business (check one)?

Walk _____

Bus _____

Car or Truck _____

Does your business have its own parking lot (*check one*)?

YES _____ Do you think you need more off-street parking? _____

NO _____

Do you think the majority your customers would consider themselves to be a person of a racial minority and/or of ethnic background?

YES _____

NO _____

RELOCATION

Have you ever operated your business from a different location (check one)?

YES _____ If yes, which neighborhood or city? _____

NO _____

Have you ever considered moving your business to another location in South Park or elsewhere?

YES _____ If yes, where?_____

NO _____

Why (*check one*)?

Where you, the owner, live _____

Cost of real estate _____

Lack of available space _____

Location of your suppliers _____

Location of your customers _____

Other reason _____

If you ever moved your business, do you believe the majority of your employees would continue to work for you?

YES _____

NO _____ If no, why?_____

Assuming your preferred alternative for the South Park Bridge Project is selected, what is your most significant concern that would lead to the future success of your business?

_____

_____

_____

_____

==========

This is the end of the survey. Do you have additional questions or comments about the South Park Bridge Project or this survey? What are they?

_____

_____

_____

_____

_____

Mention they can call Patrick Duhon, Community Relations Planner at (206) 263-3424. Distribute Patrick's business card.

Would you like Patrick Duhon to call you back to discuss your questions or concerns?

YES _____

NO _____

Thank you very much for your time. **Goodbye.**

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APPENDIX 2

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Evaluation of Businesses Potentially Affected by Property Acquisition

During the analysis of the data collected in the survey, the surveyed businesses were cross-referenced to properties that potentially would be acquired. The 20 businesses surveyed includes 18 businesses on the potential acquisition list. In two cases, two of the businesses surveyed occupy one property. In two other cases, a business surveyed owned two parcels of property on the potential acquisition list. Of the 18 surveyed businesses, many are minority-owned or primarily serve minority or ethnic customers. The results by project alternative are presented below in the table. Please note that none of the businesses potentially acquired for the Rehabilitation Alternative were surveyed and only about half of the businesses potentially affected by the other project alternatives were surveyed. Considering the survey was not designed to interview a statistical sample of businesses, there is uncertainty that conclusions made based on the data collected in the survey may not be representative of the entire set of businesses that could be affected. But from the information obtained, it is clear that a significant share of the businesses that could be affected by acquisition are likely to be minority-owned businesses for each of the alternatives.

Table 1

Businesses Potentially Affected by Property Acquisition

	Alternatives				
	No Action	Rehabili-tation	Bascule	Mid-Level Fixed	High-Level Fixed
Total Number of Businesses	0	3	5	16	28
Number of Businesses Surveyed	0	0	2	10	18
Surveyed Minority-Owned Businesses	0	0	2	9	11
Surveyed Businesses where Majority of Customers are Minority	0	0	1	7	8

***NOTE: Due to the small number of surveys and small number of properties, it is inappropriate to extrapolate from the survey data set to the total proportion of businesses.

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South Park Bridge Project

Survey of 14th Avenue South Businesses
Supplemental Analysis

Prepared for the

King County
Department of Transportation
201 South Jackson Street
Seattle, Washington 98104

Prepared by

Parsons Brinckerhoff, Inc.
999 Third Avenue, Suite 2200
Seattle, Washington 98104

July 2005

South Park Bridge Project

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July 2005

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Executive Summary

King County is proposing to rehabilitate or replace the South Park Bridge. As part of the environmental impact analysis, a survey was conducted to evaluate potential effects of the bridge project on businesses particularly in regard to persons of racial or ethnic population groups. The survey interviews were conducted with business owners and managers in the potential impact area on 14th Avenue S. from the Duwamish Waterway south to S. Director Street. The initial survey effort was conducted in the spring of 2003. The need for additional survey information led to a supplemental survey effort for the same study area in December 2004.

The combined survey results illustrate the diversity of the South Park community. A high proportion of business owners, their employees, and customers are members of racial or ethnic minority groups. It is likely, therefore, that commercial parcel acquisition for the bridge rehabilitation or replacement alternatives would affect minority populations more than non-minority populations (see Table 2). Many of the survey respondents indicated that their business could not survive relocation. A loss of businesses in South Park, especially Hispanic businesses, would resonate throughout both the South Park community and the larger Hispanic community. Based on anecdotal comments recorded following the interviews, business owners are most concerned about potential effects of the High-Level Fixed-Span Bridge Alternative. Few comments were recorded concerning any other project alternative.

1.0 Background

King County is proposing to rehabilitate or replace the South Park Bridge and is preparing an Environmental Impact Statement (EIS) on the proposed bridge alternatives. The bridge is located approximately four miles south of downtown Seattle (see Figure 1). The potential effect of the project alternatives on minority and low-income populations was identified as an issue that required additional study.

In 2003, King County requested that Parsons Brinckerhoff (PB) conduct a survey of businesses on 14th Avenue S. between Duwamish Waterway and S. Director Street. This is the extent of the community's commercial district. PB's South Park Bridge Project Team developed the survey questionnaire and conducted the initial survey effort in the spring of 2003. The results of

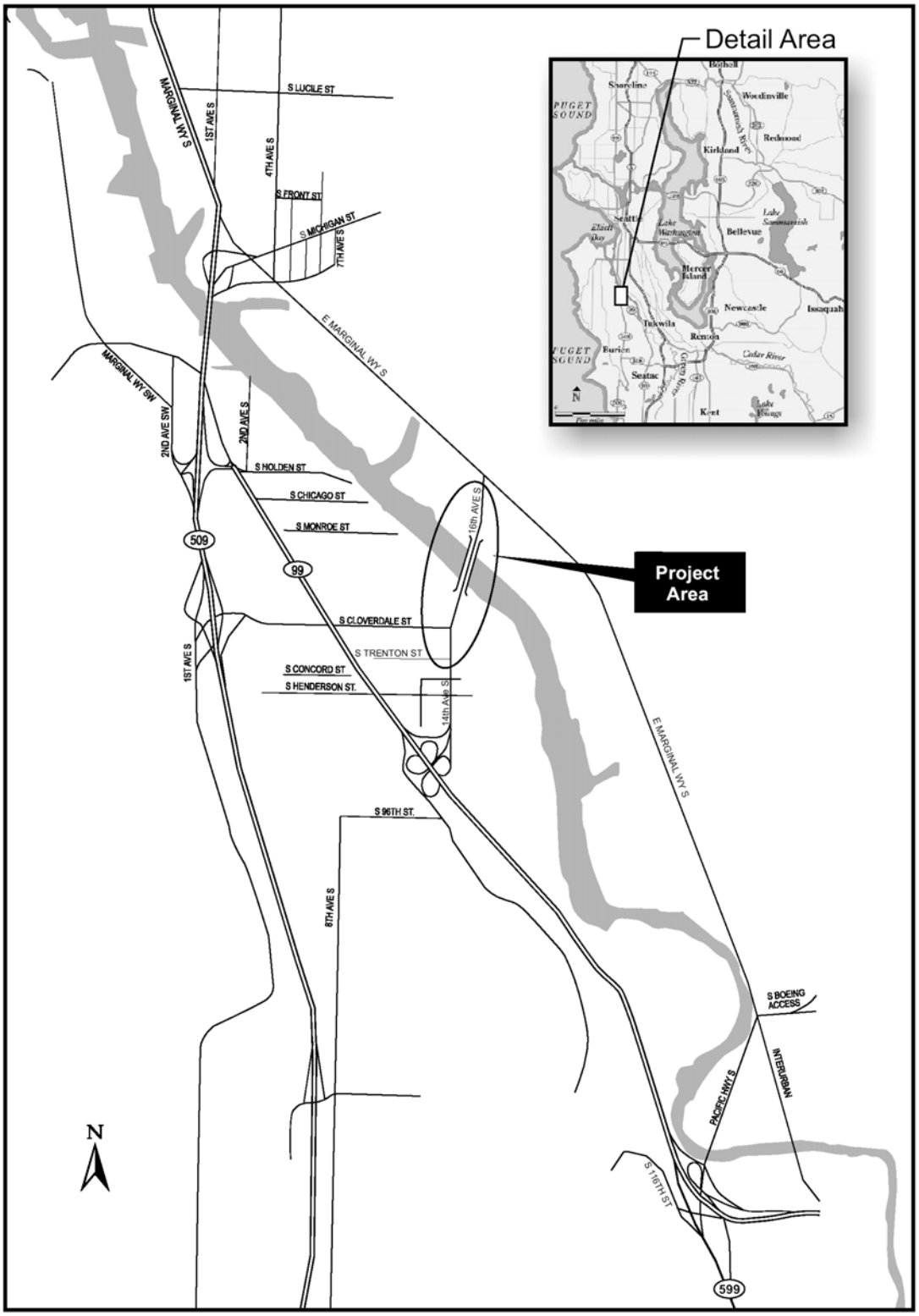

Figure 1. Project Vicinity Map

the survey were compiled in an August 2003 technical memo (Parsons Brinkerhoff 2003). This information was referenced in a draft version of the Preliminary Draft EIS that was subsequently reviewed by staff from WSDOT and FHWA. Because the information was limited to 18 completed survey responses (approximately half of the businesses in the study area), it was recommended that King County conduct a supplemental survey of the remaining businesses in the study area. The additional data would strengthen the analysis of economic impacts and environmental justice issues presented in the Draft EIS. Consequently, a follow-up survey effort was undertaken in December 2004 to fill data gaps from the initial survey results. This report describes the supplemental survey process and presents the cumulative results and conclusions from the combined survey efforts.

2.0 Approach and Methodology

Study Area

The Project Team compiled a list of businesses to be included in the supplemental survey based on the area directly impacted by the project alternatives. This area included all businesses along 14th Avenue S. between the Duwamish Waterway and S. Director Street. As such, these businesses are located on properties either crossed or adjacent to the longest alignment of the project alternatives to be evaluated in the EIS. Other businesses in South Park could also be affected but were not included in the survey because they would not be affected as directly. Figure 2 illustrates potentially affected businesses along 14th Avenue S.

Questionnaire

For the supplemental survey effort, the Project Team used the same questionnaire that was used in the spring of 2003. The goal of the survey was to answer the following questions:

- How many businesses in the area that would be potentially impacted by the South Park Bridge Project are minority-owned or -operated?
- What is the race/ethnicity of the employees working at the businesses?
- Would any adverse project impacts affect minority-owned or -operated businesses disproportionately?

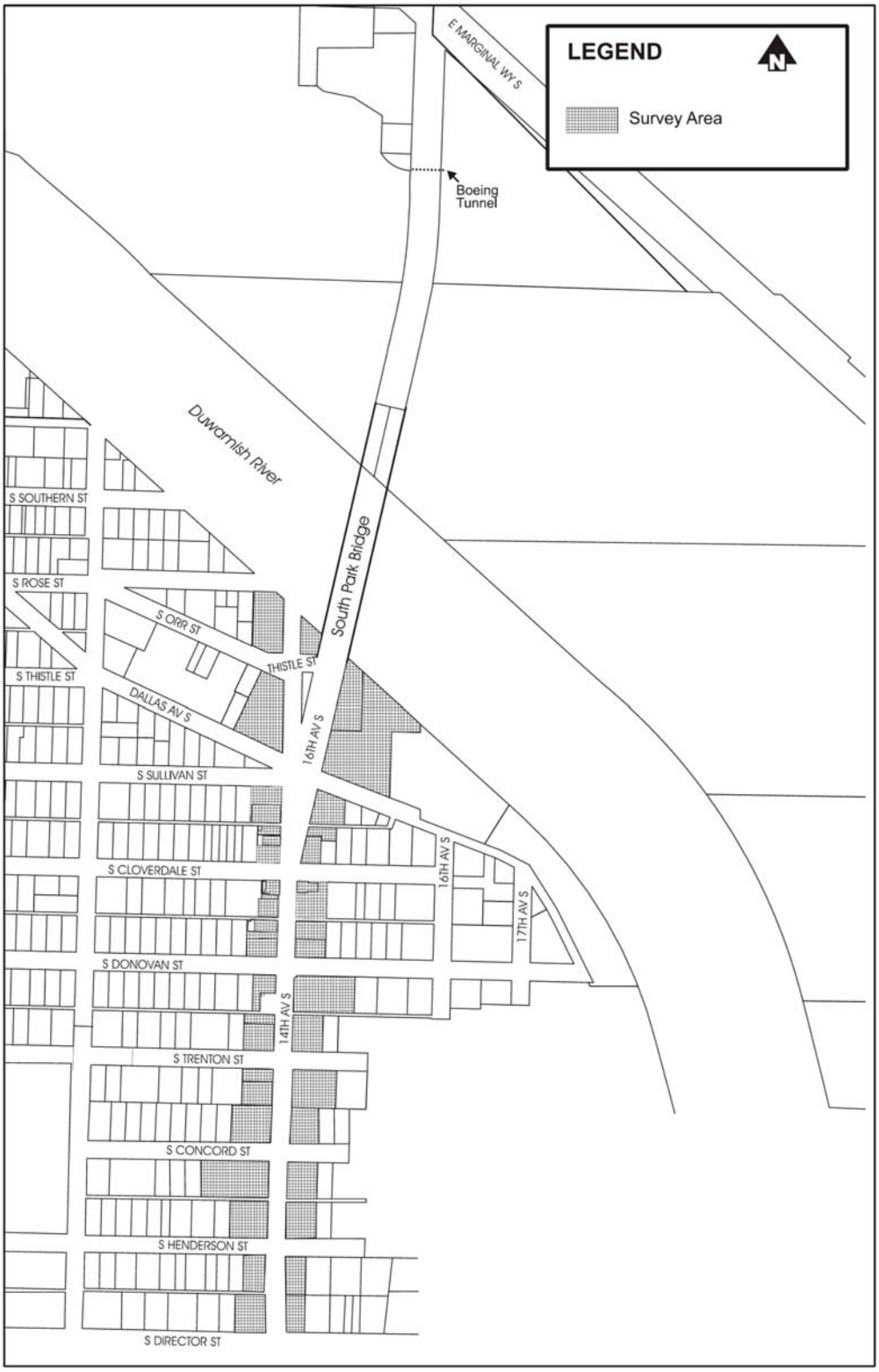

Figure 2. Potentially Affected Businesses in Survey Area

- Could the businesses affected by the project alternatives successfully relocate?
- Would relocating businesses and jobs have an adverse effect on South Park residents?

The questionnaire focused on four subject areas: the business, the owners, the employees, and the customers. Questions were designed to gain an understanding of how the businesses function and their role in the South Park community. The questions addressed the following topics:

- Type of business;
- Whether the business is owned, operated, and/or used by members of minority groups;
- Reasons for locating the business in South Park;
- Length of time business has operated from its current location;
- Where employees and customers live;
- Whether the business owner has ever considered relocation; and
- General concerns of business owners or managers about the South Park Bridge Project.

Interviews

In December 2004, King County staff interviewed owners or managers of the remaining businesses in the study area. Translation assistance was available upon request, but none of the interviewees in the supplemental survey requested assistance.

3.0 Cumulative Survey Results

Of the 38 businesses located in the study area, 35 were successfully surveyed during the initial and supplemental survey efforts. Table 1 summarizes the key findings from the two survey efforts.

Table 1. Business Survey Key Findings

QUESTIONS (Total Surveys: 35)

	Average	Min	Max
Years located at current address	11	1 week	56
		Owned	Leased
Property owned vs. leased		17	18
		Total	Percentage
Number of businesses with apartments attached		5	14%
	Average*	Min*	Max*
Full-time employees	3	1	13
Part-time employees	2	0	15
		Total	Percentage
Owner is member of racial/ethnic minority		21	60%
Race/ethnicity of employees:			
Hispanic		320	52%
White/Caucasian		150	24%
African American/Black		45	7%
Asian/Hawaiian/Pacific Islander		76	12%
American Indian/Native Alaskan/Eskimo/Aleut		6	1%
Mixed or Other		22	4%
Businesses comprised completely of:		# Businesses	Percentage
Hispanic employees		9	26%
White/Caucasian employees		9	26%
African American/Black employees		0	0
Asian/Hawaiian/Pacific Islander employees		3	9%
American Indian/Native Alaskan/Eskimo/Aleut employees		0	0
Mixed or Other employees			0
Businesses where:		Total	Percentage
majority of employees live in South Park		9	26%
majority of employees drive to work		24	69%
majority of customers live in South Park		17	49%
'significant share' of customers make a special trip to visit business		29	83%
majority of customers just 'drop by'		10	29%
majority of customers drive to the business		28	35%
majority of customers walk to the business		3	9%
off-street parking is offered		30	86%
majority of customers are racial/ethnic minority		22	63%
business previously operated from different location		12	34%
business owner has considered relocating		3	9%

*Excludes Sea Mar Community Health Center, which employs 400 full-time and 50 part-time employees.
NOTE: Sums may not total 35 (total number of questionnaires completed) due to non-responses.

Owners and managers indicated a variety of reasons to locate businesses in South Park. Two-thirds of the businesses have always operated from their current site, and only three have considered moving to another location. Reasons for locating in South Park generally fall into three categories:

- Businesses that provide services to The Boeing Company and other local industrial businesses;
- Businesses that cater to the specific needs of the South Park residents and the Hispanic population in the Seattle metropolitan area; and
- Businesses that seek to take advantage of the access to multiple modes of transportation and affordable real estate prices.

The most common reason given for choosing to locate in South Park was the surrounding community (nine responses). Several businesses are subcontractors to Boeing, while others support Boeing employees with services, such as restaurants. The Sea Mar Community Health Center was also stated as a reason to locate in South Park. Sea Mar Community Health Center is a community-based organization that provides health and human services to the community, specializing in services to Hispanic and low-income persons. Thus, several specialty businesses, such as Mexican restaurants and translation services, locate in South Park to take advantage of the steady flow of Hispanic patrons.

Seven business owners stated that reasonable real estate prices drew them to the South Park area. Several owners claimed it was the only location where they could afford to buy or rent property. In addition, South Park was noted for its accessibility to many modes of transportation, including highway, rail, and air (four responses).

Most of the businesses in the South Park community are small businesses that employ an average of three full-time employees and have only one store location. Eighty-six percent of the businesses surveyed employ fewer than 10 workers. The Sea Mar Community Health Center, however, has 400 full-time employees and four separate buildings in South Park. Excluding Sea Mar, the smallest business is one-person owned and operated and the largest business has 13 full-time employees. Forty-five percent of these businesses employ part-time employees.

The racial and ethnic composition of the business employees and owners interviewed reflects the diversity of the South Park community. Including Sea Mar Community Health Center, the businesses surveyed employ 619 people. Of these, 150 (24 percent) are White or Caucasian, 320 (52 percent) are Hispanic, and the remaining 149 employees (24 percent) are from African American, Asian, Native, and other racial and ethnic minority populations. Two-thirds of business owners estimated that most of their customers would consider themselves part of a minority population, as well.

The survey also inquired about employee and customer travel patterns. Seventy-four percent of surveyed respondents stated that the majority of their employees live in neighborhoods outside of South Park, including White Center, Burien, Bothell, Kent, and Beacon Hill. In addition, 69 percent of employers indicated that the majority of their employees drive to work. Approximately half of the business owners surveyed believed that the majority of their customers are from the South Park area. Eighty-three percent, however, also claimed that a significant share of their customer base makes a special trip to visit their business. Ninety percent of the respondents claimed that the majority of customers drive to their business. All of the businesses surveyed offer off-street parking.

4.0 Comments and Questions from Businesses

During the interviews, respondents were given the opportunity to ask questions about and provide comments on the South Park Bridge Project. The following statements are not quotes, but rather summaries of the various comments made over the course of all 35 interviews.

Preference for an Alternative

- *I would like to repair the current bridge. If the high-rise bridge built, it will affect my business and I will probably go out of business. It is already a tough time for many businesses.*

- *The high-rise bridge option would impact my total operation and diminish the value of my property and my business.*

- *I am concerned about the high-level bridge and the impacts on property and access to businesses.*

Potential Acquisition and Construction

- *I need my business to have easy access, visibility and parking during construction and after completion of the project. I am also concerned about congestion during construction.*

- *As long as truck/trailer accessibility is maintained to my buildings, my business could survive— even through construction.*

- *Moving my business would affect personnel, access to customers and suppliers, and ultimately cause a loss of revenue. These costs are over and above any actual costs of physically relocating a business.*

- *Is there a buy-out in case of the high-rise bridge?*

- *Relocating Sea Mar medical, dental and health-related services would be a serious upheaval for us. However, in its 25-year history, Sea Mar has had an ability to overcome other serious challenges and has survived.*

Other Comments

- *Make South Park safer for businesses, residents and the people who visit South Park.*

- *How long will the process take? When will a decision be made? The time spent waiting for a decision has a direct impact on the future plans for my building and business.*

- *My future success depends on bridge closures, detours, re-routing of bus routes, construction noises and impact on foot-traffic.*

The comments received from interview respondents did not include concerns about the need for a bridge. The comments reflect apprehension regarding construction and possible relocation. Most business representatives opposed the idea of relocating, and several stated that their business would not survive. In addition, many respondents expressed concerns about the High-Level Fixed-Span Bridge Alternative because it would require relocating most of the businesses along 14th Avenue S.

5.0 Conclusions

Based on the survey results, the questions framing the survey goals are discussed below:

How many businesses in the area potentially impacted by the South Park Bridge Project are minority-owned and/or operated?

Sixty percent of businesses are owned and/or operated by members of racial or ethnic minority groups. Approximately 75 percent of people employed at businesses in the study area would consider themselves a racial and/or ethnic minority.

Would the adverse impacts of the bridge alternatives affect minority-owned and -operated businesses disproportionately?

During the analysis, the surveyed businesses were cross-referenced to properties that would be potentially acquired. The High-Level Fixed-Span Bridge Alternative would have the most severe impact on the South Park area, with 24 businesses on the potential acquisition list.[1] Given the high proportion of businesses owned and operated by members of minority groups, this alternative would have a substantial effect on minorities. Due to the considerable share of minorities employed in the South Park business district, however, any project alternative will affect minority populations. Table 2 illustrates the number of properties affected by each project alternative and the percentage of affected properties owned, operated, or supported by members of minority populations.

[1] In four cases, at least two businesses occupied one property. Additionally, two businesses surveyed owned two parcels of property on the potential acquisition list.

Table 2. Proportional Effects of Project Alternatives on Minority Populations

Project Alternatives	# of Businesses Affected	Minority Owned/Operated	Majority of Employees are Minority	Significant Share of Customers are Minority
No Action	0	0	0	0
Rehabilitation	2	0	50%	100%
Bascule	4	100%	60%	75%
Mid-Level Fixed-Span	19	53%	77%	63%
High-Level Fixed-Span	24	63%	58%	63%

Note: Although 35 businesses in the study area were surveyed, not all businesses are on the potential property acquisition list.

What are the business owners' concerns?

Survey respondents' concerns addressed potential relocation and project construction and operation. Business owners worried that compensation for their property and the relocation of their business would not necessarily cover all costs associated with moving the business. Regarding potential construction impacts, the business owners requested assurances that visibility, access, and parking for their business would be maintained during construction. They also expressed concern that congestion associated with construction activities could deter customers from visiting businesses. Consequences such as these, the business owners felt, could contribute to forcing businesses to close. Survey respondents also expressed concern about long-term property values.

Could the businesses affected by the project alternatives successfully relocate?

Most owners have no interest in relocating their business. Several respondents commented that they expected that they would go out of business if they were relocated. Sea Mar Community Health Center, however, thought it could withstand relocation.

What effect would potentially displaced businesses and jobs have on community residents?

While only a small proportion of community residents work at local businesses, the commercial district is a vital place for community residents to interact. It provides retail, business, and personal services that, while limited, the community relies on. The commercial district also

houses a number of Hispanic businesses, including several restaurants and a convenience grocery store. Because South Park is a major hub of Hispanic activity, eliminating some of these businesses would likely resonate throughout the Hispanic community. As one survey respondent said: “We need something good for this area, a little town of American and Mexican people living together.”

REFERENCES

Parsons Brinckerhoff, 2005. *Survey of 14th Avenue South Businesses, South Park Bridge Project.* Prepared for King County Department of Transportation. August 23, 2003.

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Appendix O. Social Elements Technical Report

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South Park Bridge Project

Social Elements Technical Report

Prepared for the

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February 2004

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Technical Report
South Park Bridge Project

Social Elements

February 2004

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Chapter 1 Executive Summary

King County proposes to rehabilitate or replace the historic South Park Bridge. This 70-year-old bridge is located in Seattle's industrial area south of downtown. The two-leaf bascule bridge spans the Duwamish Waterway at approximately 16th Avenue S. Along this navigable segment of the Duwamish Waterway, there are only two other bridges and both are over one mile away. The north bridge approach is adjacent to the Boeing Plant 2 complex south of East Marginal Way S. and the south bridge approach terminates in the community commercial business district of South Park. The purpose of the project is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the bridge. Rehabilitation or replacement of the existing bridge would maintain a vital transportation linkage for cars, trucks, buses, bicyclists, and pedestrians across the Duwamish Waterway.

Preliminary engineering to support the EIS identified a total of nine potential alternatives for rehabilitation or replacement of the bridge. A total of five of these alternatives were selected for environmental analysis. These alternatives include the following: No Action Alternative, Rehabilitation Alternative, Bascule Bridge Alternative, Mid-Level Fixed-Span Bridge Alternative, and High-Level Fixed-Span Bridge Alternative. The No Action Alternative assumes the bridge would not be rehabilitated or replaced, but due to the poor condition of the bridge, it would eventually be closed and demolished at some time in the future. The Rehabilitation Alternative proposes to reconstruct and/or refurbish the existing bridge, reconfigure the roadway from four to three travel lanes, and slightly widen the existing sidewalks. The Bascule Bridge Alternative proposes to construct a new two-leaf bascule bridge immediately west (downstream) of the existing bridge and connect this new bridge to roadways leading to the existing bridge approaches. The two fixed-span bridge alternatives are similar in that they are aligned immediately downstream of the existing bridge. The fixed-span alternatives, however, limit the vertical clearance over the Duwamish navigation channel. The Mid-Level Fixed-Span Bridge Alternative would have a vertical clearance of approximately 65 feet, and the High-Level Fixed-Span Bridge Alternative would be approximately 100 feet.

The *Social Elements Technical Report* provides background information for the project study area on the following topics: the community character, population, demographics, household characteristics, housing, income, community and social services, public services, recreation, pedestrian bicycle facilities, and transit services. In addition, current factors affecting community cohesion and environmental justice concerns are discussed. The following sections summarize the existing social environment in the community, the construction and operational impacts of each of the different alternatives, the secondary and cumulative impacts, and recommended mitigation measures.

1.1 Affected Environment

The South Park community is a somewhat isolated community in Seattle. The community is bounded by two highways, the Duwamish Waterway, and industrial land uses. Access

into and out of the community is limited; yet, residents are able to find most common retail and personal services within the South Park community commercial district. In addition, there are community and social services, a medical and dental clinic, a fire station, an elementary school, a community center, and several parks located in South Park. These amenities and isolation help to create strong cohesion for this self-contained community.

Existing land uses in the South Park community are mixed. The area is predominantly residential with both single-family and multi-family dwellings. Land uses on either side of 14th Avenue S., between the Duwamish Waterway south to approximately S. Henderson Street, is a mixture of neighborhood retail and service businesses. These businesses typically extend only one parcel off of 14th Avenue S. along the seven- to eight-block commercial district. To the east of the southern portion of this commercial district, there is a very large training facility complex owned by The Boeing Company (Boeing). In addition, much of the area between 12th Avenue S. and 17th Avenue S. north of Dallas Avenue S. is comprised of light industrial uses. Several of these businesses support the commercial, industrial, as well as recreational use of the Duwamish Waterway.

Recent statistics published about the South Park community indicate that the community residents are both racially and ethnically diverse. A large percentage of the residents are of Hispanic heritage, and many young families reside in the community. The City of Seattle, however, has also identified the community as economically distressed, in part due to low median household incomes and a relatively higher proportion of households requiring public assistance compared to Seattle households.

1.2 Construction and Operation Impacts

The analysis of potential significant impacts addressed a total of seven social elements of the environment. These elements include the following: population and housing; community and social services; public services; recreation; pedestrian, bicycle, and transit; community cohesion; and compliance with federal policies on environmental justice. The potential impacts on social elements of the community differ quite substantially for each of the proposed project alternatives. The following identify the primary construction and operation impacts for each of the alternatives. Table 1 provides additional, more-detailed information and compares the alternatives side-by-side.

Table 1. Potential Social Element Impacts by Alternative

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Population and Housing	• No dwellings acquired • No displacement of persons • No long-term change to population or housing	• Acquire 2 single-family dwellings • Displace 5 persons (est.) • No long-term change to population or housing	• Acquire 2 single-family dwellings • Displace 5 persons (est.) • No long-term change to population or housing	• Acquire 2 single-family, 1+ apartment dwellings • Displace 8 persons (est.) • No long-term change to population or housing	• Acquire 10 single-family, 6 multifamily, 3+ apartment dwellings • Displace 48 persons (est.) • No long-term change to population or housing
Community and Social Services	• No acquisition of community or social services • Short-term temporary demolition period detours or delays • Permanent detours and delays following removal of bridge • No long-term change in local street network	• No acquisition of community or social services • Approximately 32 months of construction period detours and delays • Bridge access to community maintained • No long-term change in local street network	• No acquisition of community or social services • Minor short-term temporary construction period detours and delays • Bridge access to community maintained • Minor reconfiguration of local street network	• No acquisition of community or social services • Minor short-term temporary construction period detours and delays • Bridge access to community maintained • Minor reconfiguration of local street network, plus permanent closure of S. Thistle St.	• Acquisition of two buildings housing Sea Mar Community Health Clinic services, which serves primarily minorities, Hispanic, and low-income persons • Multiple short-term temporary construction period detours and delays • Bridge access to community maintained • Substantial reconfiguration of local street network, plus closure of S. Donovan St., plus construction of the new S. Trenton St./12th Avenue S. connector road

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Public Services	• No acquisition of public service properties • Short-term temporary demolition period detours and delays • Fire, police, and emergency response not affected • Major incidence response involving adjacent neighborhood services could be affected • No change in bus access to elementary school as routes do not use the existing bridge	• No acquisition of public service properties • Approximately 32 months of construction period detours and delays • Fire, police, and emergency response not affected • Major incidence response involving adjacent neighborhood services would not be affected • No change in bus access to elementary school	• No acquisition of public service properties • Minor short-term temporary construction period detours and delays • Fire, police, and emergency response not affected • Major incidence response involving adjacent neighborhood services would not be affected • No change in bus access to elementary school	• No acquisition of public service properties • Minor short-term temporary construction period detours and delays • Fire, police, and emergency response could be affected due to closure of S. Orr Street and S. Thistle Street • Major incidence response involving neighborhood services would not likely be affected • No change in bus access to elementary school	• No acquisition of public service properties • Multiple short-term temporary construction period detours and delays • Fire, police, and emergency response would be affected by bridge design and alignment, closure of S. Donovan St., and the new S. Trenton St./12th Avenue S. connector road • Major incidence response involving neighborhood services would be permanently affected by reroutes • No change in bus access to elementary school

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Recreation	• No acquisition of recreation facilities • Minor detours during demolition • Temporary demolition impacts to South Park Marina and recreational navigation • No navigation obstructions following removal of the bridge • No long-term change in access to recreation facilities, potential expansion of waterfront trail	• No acquisition of recreation facilities • Detours for duration of 32-month construction period • Ongoing construction impacts to South Park Marina and recreational navigation • Navigation channel and vertical clearance same as existing • No long-term change in access to recreation facilities, potential expansion of waterfront trail	• No acquisition of recreation facilities • Minor detours during construction • Temporary construction impacts to South Park Marina and recreational navigation • Navigation channel slightly wider and vertical clearance same as existing • No long-term change in access to recreation facilities, potential expansion of waterfront trail	• No acquisition of recreation facilities • Minor detours during construction • Temporary construction impacts to South Park Marina and recreational navigation • Navigation channel slightly wider and vertical clearance limited to approx. 65 ft. • Very minor change in access to recreation facilities, potential expansion of waterfront trail	• No acquisition of recreation facilities • Ongoing minor detours during construction • Temporary construction impacts to South Park Marina and recreational navigation • Navigation channel slightly wider and vertical clearance limited to approx. 100 ft. • More significant change in access to recreation facilities, potential substantial expansion of waterfront trail

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Pedestrian, Bicycle, and Transit	• Minor detours and delays during removal of the existing bridge • No long-term access across the Duwamish, permanent detours and delays following removal of the bridge • No change to ped/bike access in South Park	• Minor detours and delays during construction, except no access across Duwamish during entire 32-month construction period • Continued access across the Duwamish following construction with minor ped/bike safety improvements • Very liminted change in ped/bike access in South Park, but some safety improvements	• Minor detours and delays during construction • Continued access across the Duwamish following construction, with improved safety • No change to ped/bike access in South Park, but some improvement to ped/bike safety on the bridge and in South Park	• Minor detours and delays during construction • Continued ped/bike access and improved safety across the Duwamish following construction • Only very minor changes to ped/bike access in South Park, but substantial improvements to ped/bike safety in South Park	• Ongoing temporary detours and delays during construction • Continued access across the Duwamish following construction, with improved safety • Length, grade, and height of bridge may discourage ped/bike use, though improved safety in the design of the bridge facility • Substantial change to ped/bike access in South Park and substantial improvements to ped/bike safety in South Park

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Community Cohesion	• Construction activities associated with bridge removal potentially could affect community cohesion • Long-term removal of the bridge potentially could affect community cohesion due demolition of historic bridge – a community symbol and permanent detours • Increased isolation could potentially provide minor improvements to community cohesion	• Closure of bridge during the 32-month construction periodcould disrupt community cohesion • No change in community cohesion following construction, existing bridge restored as desired by community businesses and residents	• Construction activities would not affect community cohesion • Little change in community cohesion following construction of new bascule bridge, but demolition of historic bridge – a community symbol	• Construction activities would not likely affect community cohesion • Some change in community cohesion following construction, but demolition of historic bridge – a community symbol • Displacement of a portion of the commercial district could jeopardize the future stability of the commercial district and would cause residents to shop elsewhere, which would decrease ties with South Park and adversely affect community cohesion	• Ongoing construction activities in the commercial district and adjacent residential areas would disrupt community cohesion • New bridge would be a physical and visual barrier in the community, separating residential areas • Displacement of almost two-thirds of the commercial district would substantially and adversely affect the commercial district – heart of the community • Community cohesion of South Park would be significantly impacted

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Environmental Justice	• No acquisition of properties • No environmental justice impacts due to acquisition • Removal of the bridge would adversely affect minority/Hispanic businesses and minority/Hispanic and low-income residents in the South Park community • Some long-term mitigation measures would likely be needed to comply with federal policies and laws on Environmental Justice	• Acquisition of 3 properties in South Park • Impact to minority, Hispanic, and low-income property owners and residents is possible • During construction, rehabilitation of the bridge is assumed to adversely affect minority/Hispanic businesses, their minority, ethnic, and low-income workers, and minority, ethnic and/or low-income residents potentially displaced from the South Park community • Some short-term mitigation measures would most likely be needed to comply with federal policies and laws on Environmental Justice	• Acquisition of 5 properties in South Park • Direct impacts to minority, Hispanic, and low-income property owners and residents is possible • Direct impacts to minority, ethnic, commercial property owners and minority, ethnic, and low-income displaced workers could be disproportional based on available information • Some long-term mitigation measures may be needed to comply with federal policies and laws on Environmental Justice	• Acquisition of 12 properties in South Park • Direct impacts to minority, Hispanic, and low-income property owners and residents is likely • Direct impacts to minority/Hispanic commercial property owners and minority and low-income displaced workers could be disproportional based on available information • Displacement of a major proportion of the businesses in the commercial district appears to be disproportionately born by minority/Hispanic persons based on available information • Long-term instability of the commercial district could adversely affect minority and low-income residents and visitors to South Park	• Acquisition of 36 properties in South Park • Direct impacts to minority, Hispanic, and low-income property owners and residents is very likely • Direct impacts to minority commercial property owners and minority and low-income displaced workers would likely be disproportional based on available information • Significant displacement of almost two-thirds of the businesses in the commercial district appears to be disproportionately born by minority/ Hispanic persons based on available information • Long-term instability of the commercial district could adversely affect minority and low-income residents and visitors to South Park

Social Elements	No Action	Rehabilitation	Bascule Bridge	Mid-Level Fixed-Span Bridge	High-Level Fixed-Span Bridge
Environmental Justice (cont.)				• Substantial long-term mitigation measures would need to be implemented in order to comply with federal policies and laws on Environmental Justice	• The displacement of two buildings housing medical and social services of the Sea Mar Community Health Clinic would affect minority, Hispanic, and low-income persons in South Park as well as those residing in Seattle and other areas of King County • The extent of the adverse impacts of this alternative extends beyond the immediate project corridor. Even if substantial mitigation measures were developed and implemented, this alternative may still not comply with federal policies and laws on Environmental Justice

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1.2.1 No Action Alternative

- No dwellings would be acquired; no displacement of persons.
- Short-term temporary construction period detours and delays would affect access to community, social, and public services.
- Permanent detours and delays would affect access to community, social, and public services due to removal of the existing bridge; but noise, air quality, and congestion along 14th Avenue S. would decrease.
- Temporary construction impacts would occur to the South Park Marina and recreational navigation; but no long-term navigation obstructions would exist following removal of the bridge.
- There would be no change to pedestrian and bike access within South Park following construction; but removal of the bridge would permanently prevent pedestrian, bike, or transit crossing of the Duwamish Waterway.
- Community cohesion would potentially be affected with the removal of the bridge due to permanent detours and increased isolation. Transportation access and travel time would increase for both shoppers and Sea Mar Community Health Center patients who reside outside of the South Park community, which could affect the long-term stability of the commercial district.
- There would be no direct impacts to minority, ethnic, or low-income persons; but removal of the bridge would adversely affect the minority and Hispanic residents and businesses in this economically distressed community.

1.2.2 Rehabilitation Alternative

- The County would acquire two single-family dwellings and displace an estimated five persons of unknown race, ethnic, or income status.
- Closure of the bridge during rehabilitation for approximately 32 months would require detours and delays for community/social and public services for the entire construction period.
- The historic bridge structure across the Duwamish Waterway would be preserved to continue to mark a gateway into the South Park community.
- There would be disruptions to the South Park Marina and recreational navigation on the Duwamish Waterway for the 32-month duration of the construction period, but no long-term changes in channel width or vertical clearance.
- There would be no change to pedestrian, bike, or transit access within South Park following construction;and pedestrian, bike, or transit crossing of the Duwamish Waterway would be preserved and some improvements to safety.
- There is no change in community cohesion anticipated due to rehabilitation of the historic bridge.

- Three properties would be acquired and it is presumed the impacts may affect minority, ethnic, and/or low-income persons.

1.2.3 Bascule Bridge Alternative

- The County would acquire two single-family dwellings and displace an estimated five persons of unknown race, ethnic, or income status.
- Short-term temporary detours and delays would affect community/social and public services during construction.
- There would be minor reconfiguration of local street network, but a bascule-type bridge across the Duwamish Waterway would be maintained for the long-term future to facilitate access to community/social and public services in both South Park and to and from adjacent neighborhoods and downtown Seattle.
- Temporary short-term disruptions would occur to the South Park Marina and recreational navigation on the Duwamish Waterway during the construction period, but there would be a slightly wider channel and continued unlimited vertical navigation clearance following the construction period.
- There would be no change to pedestrian, bike, and transit access within South Park following construction; and pedestrian, bike, or transit crossing of the Duwamish Waterway would be preserved and safety improved.
- There would be little change in community cohesion due to demolition of historic bridge–a community symbol.
- Five properties would be acquired and it is presumed the impacts may affect minority, ethnic, and/or low-income persons.

1.2.4 Mid-Level Fixed-Span Bridge Alternative

- The County would acquire two single-family dwellings plus a minimum of one apartment over a commercial business, which would displace an estimated eight persons of unknown race, ethnic, or income status.
- Short-term temporary detours and delays would affect community/social and public services during construction.
- Minor reconfiguration of local street network plus closure of S. Thistle Street would occur; but a bridge across the Duwamish Waterway would be maintained for the long-term future to facilitate access to community/social and public services in both South Park and to and from adjacent neighborhoods.
- Temporary short-term disruptions would occur to the South Park Marina and recreational navigation on the Duwamish Waterway during the construction period. A slightly wider channel would be constructed, but the vertical navigation clearance would be limited to 65 feet following the construction period.

- There would be a inor change to pedestrian, bike, and transit access within South Park following construction; but pedestrian, bike (including bike ramp), or transit crossing of the Duwamish Waterway would be preserved and safety improved.
- Some change in community cohesion is anticipated due to demolition of the historic bridge, replacement with a fixed-span bridge, and impacts to the commercial district, which could affect the long-term stability of the shopping district.
- A total of 12 South Park properties would be acquired and could cause disproportionate effects on minority, ethnic, and low-income persons, including residents and workers. This could affect the stability of the commercial district, which could affect the minority, ethnic, and economically distressed community.

1.2.5 High-Level Fixed-Span Bridge Alternative

- The County would acquire ten single-family, six multi-family, and a minimum of three apartments over a commercial business in South Park. This would displace an estimated 48 persons, many of whom would likely be minority, Hispanic, and potentially low-income persons.
- The County would acquire two buildings of the Sea Mar Community Health Clinic, which provides medical and social services to minority, Hispanic, and low-income persons in the South Park community and the Seattle metropolitan area.
- Multiple short-term temporary detours and delays would affect community/social and public services during construction.
- Reconfiguration of the local street network would include closure of S. Donovan Street and construction of a new connector road from S. Trenton Street to 12th Avenue S. Bridge traffic would be permanently rerouted through a residential neighborhood and would alter access to some community/social and public services in South Park and to and from adjacent neighborhoods and downtown Seattle.
- Temporary short-term disruptions would occur to the South Park Marina and recreational navigation on the Duwamish Waterway during the construction period. A slightly wider channel would be constructed, but the vertical navigation clearance would be limited to 100 feet following the construction period.
- Pedestrian and bike access within South Park would be improved following construction. Transit service would be rerouted and bus stops would be relocated. Pedestrian, bike, and transit crossing of the Duwamish Waterway would be improved, though bridge length and grade could discourage pedestrian and bike use.
- Significant adverse impacts to community cohesion are anticipated due to demolition of the historic bridge and replacement with a fixed-span bridge. There

would be significant displacement of businesses in the commercial district, which would likely cause residents to shop outside of the community.

- A total of 36 properties would be acquired, including two Sea Mar Community Health Center buildings. It is determined that the impacts would likely cause a high and adverse disproportionate impact on minority and ethnic persons, including residents and workers. This would likely affect the stability of the commercial district thus impacting the entire minority, ethnic, and economically distressed community as well as minority, ethnic, and low-income persons in the Seattle metropolitan area.

A comparison of the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives point out that the increasing length of the alternatives appears to be related to the cumulative severity of the adverse social impacts of each alternative, with the exception of the No Action Alternative. Generally, the longer the bridge alternative, the greater the impacts to population and housing, community and social services, public services, pedestrian and bicycle trails, transit, community cohesion, and environmental justice. The No Action Alternative is an exception because the removal of the bridge actually causes potentially substantial hardship to the community as traffic into and out of the community is permanently rerouted, which would increase travel time, especially to Georgetown and downtown Seattle. Potential improvements to noise and air quality and decreased traffic congestion on 14th Avenue S. would likely increase pedestrian and bicycle traffic in South Park. But, substantial barriers to the movement of people from outside South Park to shop and obtain medical/dental care would likely affect the commercial core and heart of the South Park community.

As such, the overall impact rating of the alternatives would rate the Rehabilitation and Bascule Bridge alternatives similarly as low impact. The Mid-Level Fixed-Span Bridge Alternative would be modest impact. The No Action Alternative would be substantial impact. And the High-Level Fixed-Span Bridge Alternative would be severe impact based on the social elements of the environment evaluated in this report.

1.3 Secondary and Cumulative Impacts

The proposed project would have both secondary and cumulative impacts. Secondary impacts are primarily related to the extent of changes in the community, particularly the community's commercial district. Extensive changes could cause long-term instability in the remaining businesses, which could alter residents' shopping patterns and disrupt existing community cohesion. Substantial changes in the commercial district could also dissuade visitors from shopping in the community. Such secondary impacts would be expected to be minor for the Rehabilitation, Bascule Bridge, and Mid-Level Fixed-Span Bridge alternatives. The removal of the bridge for the No Action Alternative would likely cause a moderate level of secondary impacts. In contrast, the secondary impacts of the High-Level Fixed-Span Bridge Alternative would be most severe considering approximately two-thirds of the properties comprising the existing commercial district would be acquired and the businesses displaced. Changes to the commercial district

could both increase and decrease the attractiveness of the community as a place for families.

Cumulative impacts would also occur. Construction of an engineered cap over contaminated sediments in the Duwamish Waterway and proposed restoration of fisheries habitat in the South Park segment of the Duwamish Waterway is proposed to occur within approximately the same time period as construction is proposed for the South Park Bridge Project. Depending on the project alternative, the impacts to social elements of the environment could be cumulatively beneficial or potentially harmful to the community and its businesses and residents.

1.4 Recommended Mitigation

A number of mitigation measures are recommended to avoid, reduce, or minimize potential adverse environmental impacts to social elements of the environment. They are presented for each of the major issues: population and housing; community and social services; public services; recreation; pedestrian, bicycle, and transit; community cohesion; and environmental justice. The key mitigation measures include:

- The project team should coordinate with representatives of the community to develop alternative-specific plans to restore the project construction area to enhance and strengthen cohesion in the community, the business district, and the nearby residential neighborhoods.
- The project team should coordinate with public service providers, including fire, police, emergency response, and transit, to develop a plan to ensure that continued high levels of service could be implemented following the construction of each of the project alternatives.
- Construction activities should be planned in sequences through careful coordination with the community and local government agencies and utilities to minimize impacts on community and social services, public services, recreation, pedestrian and bicycle trails, transit service, property owners, business owners, and residents. Special care should be taken to avoid impacts to community-sponsored special events, e.g. Fiesta Patrias.
- The project team should coordinate with representatives of the community businesses, community and social service providers, and residents to determine the best methods and languages (e.g. Spanish, Vietnamese, etc.) to be used to communicate with the community prior to and during the construction activities.
- Construction activities and the schedule of planned construction activities, including detours and road closures, should be communicated prior to construction and on an ongoing basis during the construction period to the entire South Park community—community and social service providers, fire, police, emergency response, schools, recreation and senior citizen centers, property owners, business owners, and residents.

- Following the completion of the construction activities, the project team should consider hosting a community event to announce the completion of the construction activities and the opening of the rehabilitated bridge or a replacement bridge.

By alternative, the extent of needed mitigation to avoid, reduce, or minimize adverse impacts to social elements of the environment is closely correlated to the length of the bridge alternative. The longer bridge alternatives would require more property acquisition, more residential and commercial displacement and relocation, a larger area disturbed by construction activities, a longer duration for construction activities, as well as a larger area in the community permanently changed by the bridge structure. The more extensive the social impacts, the more extensive mitigation would be required to try to make the community whole again following construction. As such, the cost of project mitigation would be expected to be low for the No Action Alternative, modest for the Rehabilitation and Bascule Bridge alternatives, moderate for the Mid-Level Fixed-Span Bridge Alternative, and highest for the High-Level Fixed-Span Bridge Alternative.

Chapter 2 Introduction

Chapter 2 is an introduction to the technical analysis contained in this discipline report. This chapter describes existing conditions, the history of the project, the purpose and need for the project, and the five project alternatives being considered for environmental review. In addition, this chapter summarizes project coordination conducted to date with agencies, local governments, the community advisory group, and members of the public.

2.1 Description of Existing Conditions

This first section describes existing conditions pertinent to the proposed South Park Bridge Project. The project area is defined. The existing bridge and its current condition are described. The local roadway network in the South Park community is described. Non-vehicular transportation in the community is also summarized.

2.1.1 The Project Area

The South Park community is about four miles south of downtown Seattle (see Figure 1). The community lies south of the Duwamish Waterway, the man-made channel portion of the Duwamish River as it enters Elliott Bay. Though originally incorporated as its own city in 1905, much of the area was annexed by the City of Seattle in 1907.[1] The project area lies south of the industrial Georgetown area of Seattle and the King County International Airport (known as Boeing Field). It encompasses the roadway corridor defined by 16th Avenue S. between East Marginal Way S. and the South Park Bridge and 14th Avenue S. between the bridge and S. Trenton Street. Residents and business owners in the project area generally identify with the City of Seattle.

The project area, however, is governed by three local government jurisdictions. The area north of the Duwamish Waterway (between East Marginal Way S. and the waterway) lies within the city limits of both the City of Seattle (northern portion) and the City of Tukwila (southern portion). The area south of the Duwamish Waterway (between the waterway and S. Trenton Street) lies within unincorporated King County and the City of Seattle. The two-block area between the riverbank and Dallas Avenue S. is in King County, and the city blocks to the south are in the City of Seattle.

Land uses in the project area are mixed residential, retail commercial, and industrial. The Boeing Company's Plant 2 dominates the north side of the Duwamish Waterway. On the south side, retail commercial and light industrial land uses front on 14th Avenue S. and along the south bank upstream of the South Park Bridge. Single-family residences, however, generally characterize the area off of this main transportation artery.

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[1] City of Seattle, *South Park Residential Urban Village Plan*, 1998.

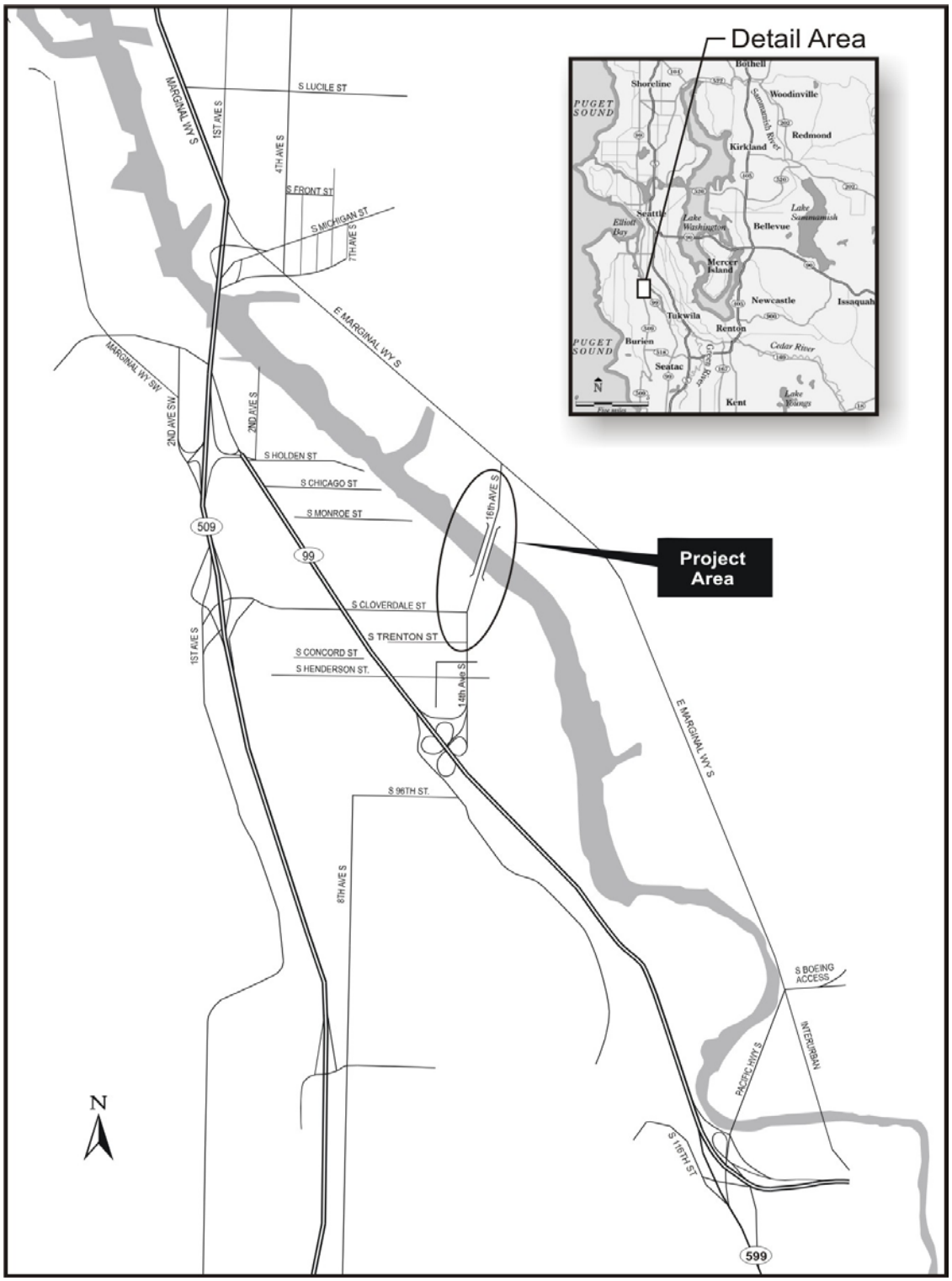

Figure 1
Project Area and Vicinity

2.1.2 The Existing South Park Bridge

The South Park Bridge was constructed in 1929-1931 (see Figure 2). The existing structure consists of a Scherzer rolling-lift double-leaf bascule movable span. Because it is the only operational example of a Scherzer rolling-lift bascule bridge in Washington, the bridge is listed on the National Historic Register.[2]

Each side is flanked by two truss approach spans and twelve concrete slab approach spans. The overall length of the bridge is approximately 1,045 feet abutment-to-abutment and approximately 1,340 feet in entirety to the grade match points. The double-leaf bascule movable span has a center-to-center distance between the front bearing points of approximately 190 feet. The roadway consists of four 9.5-foot lanes. The pavement is 38 feet with 6-foot sidewalks on both sides. Reinforced concrete piers founded on timber piling support the bascule span. Two large in-water piers support the counterweights, track supports, and racks for the rolling lift. The attached towers house the operating machinery, electrical equipment, and operator control room.

The South Park Bridge spans the Duwamish Waterway, which is used for industrial, commercial, and recreational purposes. The bridge is near the upstream limit of heavy industrial uses along the Duwamish Waterway, but it is within the section of the navigation channel maintained by the U.S. Army Corps of Engineers. The existing maximum vertical clearance of the bridge when closed is approximately 34 feet at Mean High Water (MHW). Bridge openings occur approximately three times per day on average to accommodate waterway traffic, although on some days the bridge does not open at all. The existing navigable horizontal clearances is approximately 118 feet at the water level (fender-to-fender), but narrows to 92 feet approximately 114 feet above the water between the open bascule leaves. The depth of the navigation channel is approximately 15 feet at Mean Lower Low-Water (MLLW).

2.1.3 Bridge Condition

In spite of substantial on-going maintenance and repairs, the South Park Bridge has suffered considerable deterioration over the past 70 years. In particular, the bascule piers are cracked and unstable resulting in the misalignment of the movable spans. Consequently, the center lock and glide tracks require on-going modifications and adjustments to allow the bridge to operate properly. Long-term, the stability of the entire bridge is at risk due to the original shallow placement of the supporting piles, which has resulted in movement of the bridge piers over the decades. The condition of the bridge worsened significantly following the Nisqually Earthquake in February 2001, and it remains vulnerable to future seismic events. A 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100

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[2] King County Landmarks and Heritage Commission. *Findings and Fact Decision – 14th Avenue South Bridge*, decision made December 19, 1996 and filed January 2, 1997.

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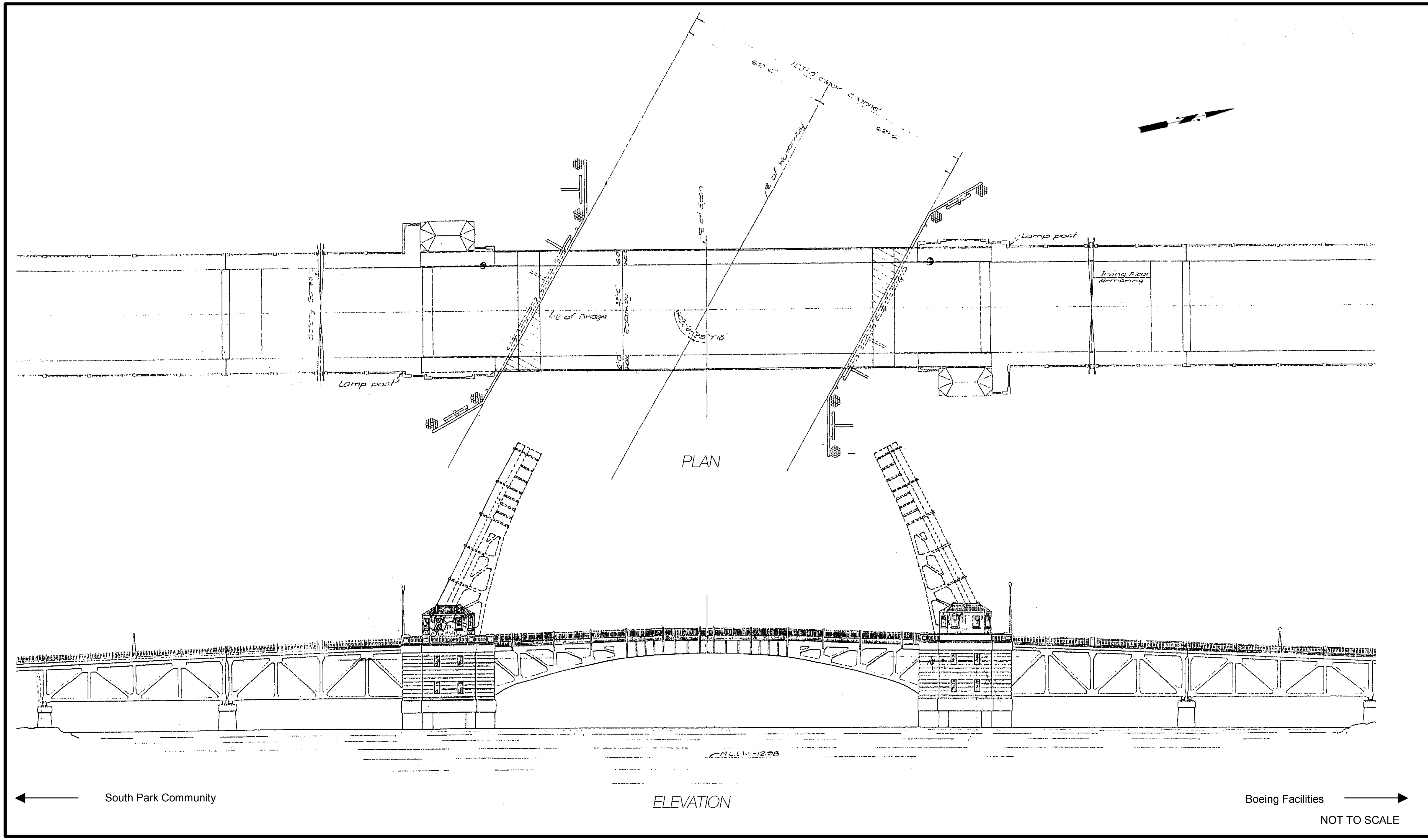

Figure 2
Existing South Park Bridge

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(based on Federal Highway Administration criteria).[3] This was among the lowest ratings given any bridge structure in the State of Washington in 2002.

2.1.4 Roadway Network

The bridge presently accommodates an average daily traffic volume of approximately 20,000 vehicles per day, based on 2001 City of Seattle traffic counts. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For South Park community residents, the bridge is the primary direct means of access to the north, downtown Seattle, and I-5.

The existing roadway network surrounding the South Park Bridge consists of a variety of roadway types. They range from local two-lane streets to major limited-access highways. Regional traffic movement in the South Park area is concentrated to three nearby north-south corridors including SR-99, SR-509, and East Marginal Way S. Local circulation is provided through a system of local and collector streets. Features such as the Duwamish Waterway and large-scale facilities such as Boeing Field and the Boeing Plant 2 create barriers within the road network and limit opportunities for access to and from the major regional routes.

2.1.5 Freight, Transit, and Pedestrians

Freight movement in peripheral areas of the South Park community is significant due to the high concentration of industrial and manufacturing uses in the general area. Major truck traffic is primarily directed along East Marginal Way S. and SR-99. The South Park Bridge and S. Cloverdale Street are also designated truck routes for oversized vehicles. Trucks use S. Cloverdale Street to access the City of Seattle South Recycling and Disposal Station located at 8105 Fifth Avenue S. as well as SR-509 and SR-99 located on the western edge of the South Park community. With respect to rail movements, the only train crossing in the study area exists immediately south of the intersection of East Marginal Way S. and 16th Avenue S.

Bus routes serving the South Park community are primarily located along major north-south corridors, including East Marginal Way S., 14th and 16th Avenues S., and S. Cloverdale Street. Six major King County Metro bus routes serve the area. Routes 60 and 130 cross the South Park Bridge and four of the six bus routes travel along S. Cloverdale Street.

Pedestrians and bicyclists are commonly seen in the South Park area, especially near the community's center near the intersection of 14th Avenue S. and S. Cloverdale Street. Mid-day pedestrian volumes are higher than the morning or evening commute periods due to shopping, transit use, and lunch-related walking trips.

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[3] King County, *Bridge Inspection Report*, August 1, 2002.

2.2 History of Project

Since 1931, the moveable bridge has crossed the Duwamish Waterway in the South Park community of the City of Seattle. The following sections contain an overview of the studies preceding the start of the current environmental review effort, a summary of two key documents that framed the initial development of project alternatives, and ongoing reports documenting the changing condition of the bridge.

2.2.1 Overview of Studies

In recent history, over 20 engineering studies have been prepared on the South Park Bridge. Starting in 1987, when the bridge was 56-years-old, King County contracted for the preparation of a general engineering investigation report to assess the condition of the bridge. In 1991 and 1993, additional studies were completed including a geotechnical study, foundation design report, and a life-cycle cost analysis. This information led King County to undertake a series of studies in 1994 addressing liquefaction risks as well as the condition of the concrete, substructures, approach span joints and loading rating. In addition, a study was conducted to evaluate potential replacement alternatives for the bridge and another study investigated community issues related to the bridge. Since 1994, King County has recognized that the bridge required either rehabilitation or replacement and has continued to investigate the condition and vulnerabilities of the bridge in an effort to evaluate these options.

2.2.2 Summary of Key Engineering Reports

Two key engineering studies were conducted that helped to frame the current pursuit to evaluate potential alternatives to rehabilitate or replace the South Park Bridge. A 1994 Sverdrup study evaluated potential design options and a 1999 Entranco study researched and presented the likely steps required to conduct the necessary environmental review of the project alternatives and to complete necessary permitting. These studies are summarized below.

2.2.2.1 Sverdrup Study

In November 1994, Sverdrup Civil, Inc. completed a report titled *14th/16th Avenue South Park Bridge Rehabilitation/Replacement – Design Report* for the King County Department of Public Works. The objective of that report was to evaluate alternative alignments and bridge types, impacts of the alternatives studied and to present to King County results, findings, conclusions, and recommendations of a preferred replacement bridge for the existing South Park Bridge.

The 1994 design report studied five alternatives: rehabilitation of the existing bridge; two fixed-span bridge replacements (a 100-foot vertical clearance bridge and a 60-foot vertical clearance bridge); a new moveable bridge (double-leaf bascule bridge); and bridge closure (permanent closure and demolition of the existing bridge). Other alternatives that had been evaluated but were not carried forward, according to this report were: locating the replacement bridge immediately east (upstream) of the existing

alignment; matching the existing alignment; and locating the northbound and southbound lanes on separate structures. These three alternatives were not considered feasible and thus were not studied further.

The 1994 design report concluded that the 60-foot vertical clearance fixed-span bridge design could be used to replace the existing South Park Bridge, with consideration of mitigation of impacts to some users.

2.2.2.2 Entranco Study

In July 1999, Entranco completed the *16th Avenue S. Bridge Replacement Project: Environmental Review Report* for the King County Department of Transportation. The objective of this report was to present to King County a summary of environmental review and permitting activities that would likely be required for replacing the bridge.

The report identified the proposed project as a replacement of the existing bridge, including improvements to the approach road – 14th Avenue S. to the south and 16th Avenue S. to the north of the Duwamish Waterway. The project limits were identified as East Marginal Way S. on the north and S. Cloverdale Street on the south. The report asserted three Build Alternatives should be selected for evaluation in the EIS, including alternatives with differing alignments and bridge types. It was further noted that three alternatives would be the least number needed to provide a reasonable range of alternatives under National Environmental Policy Act (NEPA) and Washington State Environmental Policy Act (SEPA) regulations.

Entranco outlined the various tasks that would be required under the WSDOT Environmental Procedures Manual and Federal Highway Administration (FHWA) guidelines. The report identified these tasks to include the following: the development of bridge alternatives, screening, and selection of alternatives for analysis in the EIS; preliminary engineering design, including an update to the1994 rehabilitation/replacement report; survey and mapping work; hydraulic and geotechnical studies, and conceptual-level design documentation. The report concluded that the alternatives proposed, including rehabilitation of the existing bridge, had not been designed in enough detail to make a decision regarding a preferred alternative. Related to the environmental review process, the report recommended the public involvement program include coordination with an Interdisciplinary Team (IDT) of agency representatives and a community advisory committee. The report also listed 17 specific environmental discipline reports that would likely be required for the preparation of the EIS.

The findings and recommendations presented in the Entranco report formed the basis from which King County staff developed the current contracted scope of work for environmental review. The scope includes engineering, environmental review, agency coordination, and public involvement tasks.

2.2.3 Continuing Deterioration

Since 1999, King County has continued to move forward to develop alternatives for rehabilitating or replacing the existing South Park Bridge. Bridge conditions have worsened since the engineering studies were conducted in the mid-1990s. In February 2001, the Puget Sound Nisqually Earthquake caused significant and widespread damage to the bridge. Over $740,000 was required to repair the bridge in order to keep it operational.[4] The King County 2001 bridge inspection report recorded a rating of 8.0 out of a total possible score of 100 (based on FHWA criteria).[5] The following year, this rating decreased to 6.0.[6]

2.3 Purpose and Need of Project

As a required element of the EIS, a Purpose and Need Statement was developed for the South Park Bridge Project to clarify the underlying basis for the proposed action. The development of the initial draft Purpose and Need Statement involved review and comment by a number of parties including King County staff and the Project Advisory Committee (PAC) that includes agencies with jurisdiction over the proposed project. The draft Purpose and Need Statement was also revised based on comments received at several public involvement events. In April 2002, King County forwarded the draft Purpose and Need Statement to the Federal Highways Administration (FHWA) for review and approval. The text of the FHWA-approved version of the Propose and Need Statement is presented in the following sub-sections, although minor revisions and footnotes have been included for clarification.

2.3.1 Function and Role of the South Park Bridge

The King County Department of Transportation (KCDOT) is proposing the rehabilitation or replacement of the South Park Bridge located in King County, Washington. Since 1931 the moveable span bridge has carried traffic along the 14th Avenue South and 16th Avenue South corridor across the Duwamish Waterway. On a typical workday, a mix of approximately 20,000 cars, trucks and buses use the bridge to access employment centers in downtown Seattle and the Duwamish industrial area. Many of the vehicle trips originate in residential neighborhoods in the communities of West Seattle, White Center, and SeaTac. For residents of the community of South Park, the bridge is the only immediate means of access to and from destinations east of the community. The moveable structure spans the navigation channel of the Duwamish Waterway. When open, large-size industrial and recreational vessels have access to upriver destinations. The South Park Bridge is also a major route for heavy truck traffic traveling to and from large industrial manufacturers including the Boeing Company.

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[4] Time Lane, King County Department of Transportation, Telephone Conversation, September 23, 2002.

[5] King County, *Bridge Inspection Report*, August 21, 2001.

[6] King County, *Bridge Inspection Report*, August 1, 2002.

2.3.2 *Purpose of Proposed Project*

The purpose of the proposed action is to find the most feasible long-term solution to address the deteriorated condition and increasing seismic vulnerability of the South Park Bridge. The proposed action must also maintain the vital transportation linkage for cars, trucks, buses, bicyclists and pedestrians across the Duwamish Waterway.

2.3.3 *Need for the Proposed Project*

In spite of substantial ongoing maintenance and repairs, the South Park Bridge has suffered substantial deterioration over the past 70 years. Existing problems with the bridge worsened significantly following the Nisqually Earthquake in February 2001 and the bridge remains vulnerable to future seismic events. A recent 2002 bridge inspection conducted by King County resulted in an existing condition rating of 6.0 out of a possible score of 100 (based on FHWA criteria).[7] This is among the lowest ratings given any bridge structure in the State of Washington.

The bridge could be closed as a consequence of excessive structural deterioration or failure of the moveable span operations (particularly in the event of another seismic event). Closure of the bridge would have a significant impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area-- including SR-99, SR-509, First Avenue S. and East Marginal Way S. Improvements are required in the near future to protect public safety and to maintain a transportation corridor that is critical to the local and regional economy.

2.3.3.1 Seismic Vulnerability

The February 28, 2001 Nisqually earthquake (magnitude 6.8, located 35 miles from Seattle and deep below the surface) caused significant damage to the South Park Bridge. Since the earthquake, operation of the moveable span has been less reliable, requiring the bridge to be closed for repairs intermittently for several days. The continuing periodic closure of the bridge for repairs has heightened the awareness of the need for rehabilitation or replacement of the existing bridge.

2.3.3.2 Roadway Design Deficiencies

The South Park Bridge does not meet current roadway design standards and has many design deficiencies. For example, the overall bridge width including lane widths, shoulders and sidewalks should be 64 feet according to current design standards. The existing bridge width is currently only 52 feet (measured outside-to-outside).

2.3.3.3 Transportation Issues

An average of 20,000 daily vehicle trips cross the Duwamish Waterway on the South Park Bridge. It is a significant link between the east and west side of the Duwamish, both locally and regionally. The South Park Bridge is also a route for heavy and oversize

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[7] The original text of the FHWA-approved Purpose and Need Statement cited the condition rating of 8.0 from the 2001 King County Bridge Inspection Report. The current cited condition rating of 6.0 is from the King County *Bridge Inspection Report* dated August 1, 2002.

truck traffic. According to previous studies, closure of the bridge would have a significant noticeable impact on the transportation system and traffic conditions throughout the lower Duwamish industrial area – including the Highway 99 and East Marginal Way S. corridors.

2.3.4 Key Issues

2.3.4.1 Community Impacts

The existing South Park Bridge is a highly valued feature of the South Park community. There is widespread concern in the community that changes to the bridge could have a significant adverse impact on the community and the emerging economic vitality of the South Park business district centered along 14th Avenue South. The *South Park Residential Urban Village Plan of 1998* (the neighborhood plan) identified one of its primary objectives as "finding a solution for the South Park Bridge that is sensitive to the needs of the community."

The South Park community is also ethnically diverse. Approximately 30 percent of the populations' primary language is not English. These factors require greater emphasis on the consideration of environmental justice[8] in order to ensure that the potential adverse effects from the proposed project do not have a disproportionate impact on lower-income or minority populations.

2.3.4.2 Aquatic Habitat Protection

The Duwamish Waterway is an important route for juvenile and adult salmon migrating between the upper Green River, Elliott Bay and the Pacific Ocean. However, much of the waterway in the vicinity of the South Park Bridge currently provides poor habitat for chinook salmon (listed as threatened under the Endangered Species Act) and other marine organisms. The armored shoreline along the waterway in the project area provides minimal habitat for young chinook salmon during their critical rearing period. Recovery plans now underway for threatened and endangered salmon will address potential means of enhancing habitat favorable to the survival and growth of young salmon from the

Duwamish/Green River system. Restoration of the shoreline in the vicinity of the project would address immediate and long-term needs for habitat improvement along the Duwamish Waterway.[9]

2.3.4.3 Duwamish Waterway Navigation

The Duwamish Waterway is used for industrial, commercial and recreational purposes. The South Park Bridge is near the upstream limit of heavy industrial uses along the

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[8] Environmental justice concerns the need to avoid disproportionate, significant adverse impact on minority and/or low-income communities.

[9] This section highlights the importance of addressing aquatic habitat values in the project area, as well as the implications for species currently listed under the ESA; however, it is not intended as a complete characterization of the factors that need to be considered in this regard.

waterway, but it is within the section of the waterway maintained by the U.S. Army Corps of Engineers as a navigation channel. A number of local businesses, as well as the U.S. Coast Guard, have emphasized to King County that any engineering solutions for the South Park Bridge must maintain navigational access upstream of the existing bridge.

2.4 Description of Alternatives

This section describes the No Action Alternative, the Rehabilitation Alternative, and the three replacement bridge alternatives (Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives). The first section explains the transportation engineering criteria and standards used to design the Rehabilitation Alternative and the three replacement bridge alternatives. The second section describes the horizontal and vertical profile of the bridge alternatives, navigation channel clearances, and impacts to the local road network. The last section describes construction activities associated with each of the five alternatives for the South Park Bridge Project.

2.4.1 Design Criteria

Except for the No Action Alternative, construction of any of the project alternatives would incorporate current transportation engineering design criteria for the cross-section, alignment, design speed, maximum grade, and transition segment. The road cross-section design is a key design element that would change for any of the Build Alternatives (see Figure 3). The existing bridge cross-section incorporates four 9.5-foot travel lanes, raised curbs on both sides of the pavement, and a 6-foot sidewalk on either side of the roadway. The outside-to-outside dimension of the existing bridge is 52 feet. These lane widths are non-standard and would be changed for the Rehabilitation Alternative and for the three replacement bridge alternatives. For the Rehabilitation Alternative, the pavement would remain approximately the same width as it is currently, but would be reconfigured for three standard lanes. There would be two 12-foot lanes on the outside and one 11-foot lane in the middle of the roadway. Traffic would use one 12-foot lane for northbound travel and the other two lanes for southbound travel. The 6-foot sidewalk on either side

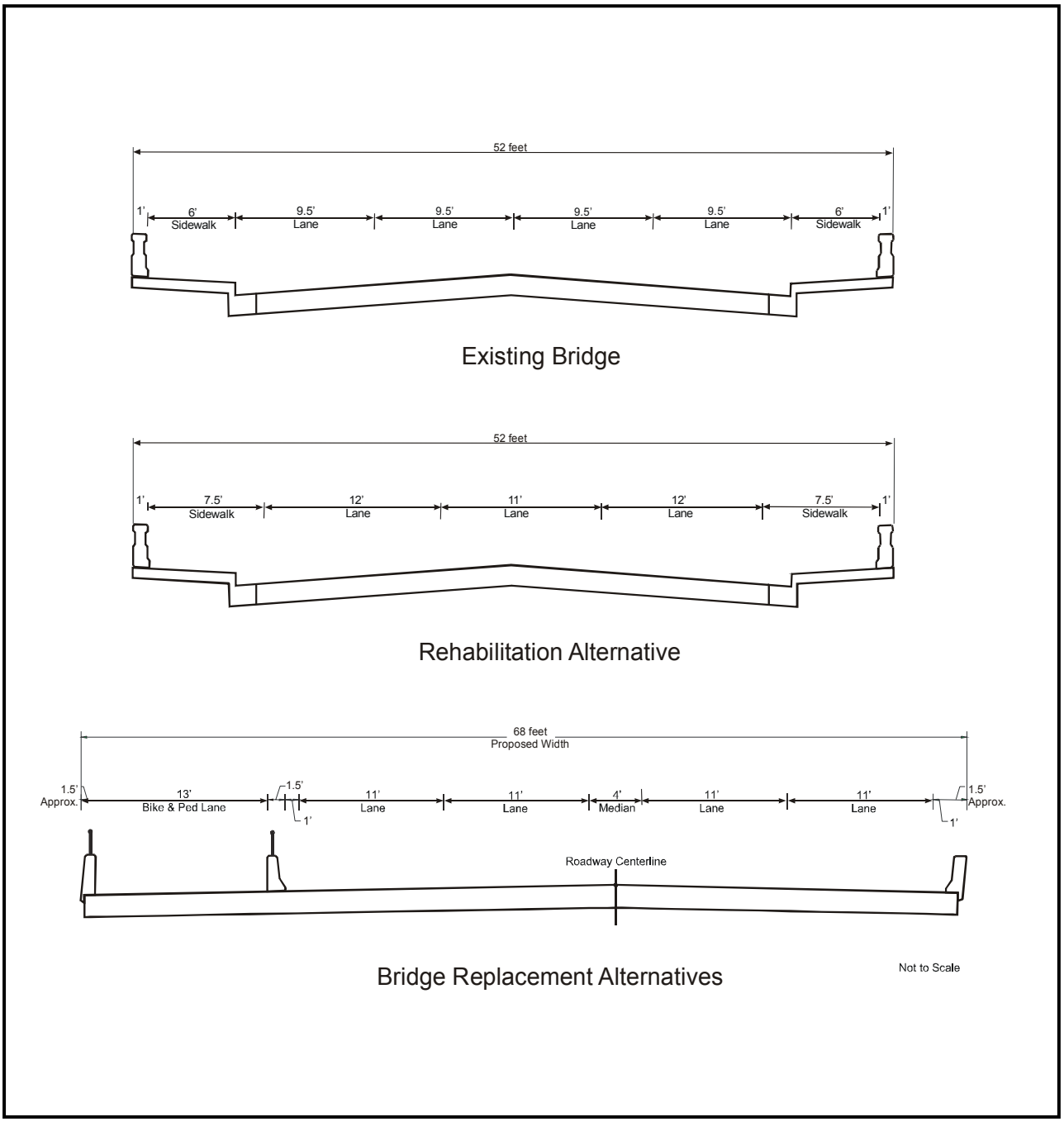

Figure 3
Existing and Proposed
Bridge Cross-Section Designs

of the roadway would be enlarged to approximately 7.5 feet. In contrast, each of the replacement bridge alternatives would be designed with four standard 11-foot lanes, traffic barriers or a painted median down the center, a traffic barrier on each side of the pavement, and a single combined 13-foot pedestrian/bike path on the west (downstream) side of the bridge. The width of the cross-section for the new replacement bridge alternatives including the exterior barriers would total approximately 68 feet (outside-to-outside of the bridge structure).

An initial range of potential bridge alternatives and alignments was considered based on earlier studies,[10] current input from stakeholders, and the project team. During the course of this initial alternatives development process, it was determined that there were no practical alternative alignments for a replacement bridge other than to parallel the existing bridge. It was determined that replacement bridge alternatives should be aligned to the west (downstream) of the existing bridge in order to minimize impacts to existing land uses. Conceptual engineering for the replacement bridge alternatives set the alignment for these bridges at approximately 80 feet to the west of the centerline of the existing bridge (i.e., as close to the existing structure as practicable without compromising constructability). The initial alignment of the new roadway was the same as the existing road alignment on the south side of the waterway. The existing roadway is quite narrow. Matching the centerline of the new bridge alternatives to the existing would require acquisition of both land and buildings on both sides of 14th Avenue S. To minimize these impacts, the alignment of the new transition segment was shifted slightly to the east of the existing road alignment because there are fewer parcels and buildings located on the east side of the road compared to the west. In addition, more of the buildings located on the east side are set back from the existing sidewalk than on the west side. In this way, the proposed alignment for the replacement alternatives has been developed to avoid or minimize potential land use and relocation impacts.

Other design factors affecting impacts to adjacent properties include the new bridge's design speed and maximum grade. King County road standards call for a 35 mph design speed and a maximum of 8 percent grade. Initially, these standards were incorporated into each of the alternatives. Implementation of an 8 percent maximum grade for the High-Level Fixed-Span Bridge Alternative, however, would have resulted in a very long bridge (project terminus to terminus). For example, the north terminus would have extended across East Marginal Way S. and into Boeing Field. To reduce impacts to land use, the maximum grade for the High-Level Fixed-Span Bridge Alternative would need to slightly exceed 8 percent. In this manner, the north side of the bridge would terminate south of East Marginal Way S. This grade change reduced the overall length of the bridge on both south and north ends of the bridge by several hundred feet for the High-Level Fixed-Span Alternative.

Community impacts would also be affected depending on the design of the transition segment. This is the segment of the roadway that merges the differing widths of the new

[10] Entranco, Inc., *Environmental Review Report: 16th Avenue S. Bridge Replacement*, July 1999.

roadway and the existing narrow roadway. Typically, transition segments begin at the point the grade of the bridge matches the grade of the existing roadway and extends beyond some distance. The actual rate at which the width of the roadway is reduced is defined by transportation engineering design standards. To minimize impacts to land uses along 14th Avenue S., King County proposes to start the transition segment from the abutment for all alternatives. This means that by the time the bridge matches the grade of the existing roadway, the width of the new bridge is nearly the same width as the existing road. As a result, the total length of the roadway is reduced potentially several hundred feet in length. In addition, the width of the transition segment for the Mid-Level Fixed-Span Bridge Alternative is further reduced by having the single combined 13-foot pedestrian/bike path split off from the main bridge structure at approximately S. Orr Street and descended to ground level in a zigzag fashion. This design modification further reduced the overall impact of the Mid-Level Fixed-Span Alternative.

Together, the design criteria discussed in this section would allow for the construction of a replacement bridge that provides increased safety for vehicles, bicyclists, and pedestrians.

2.4.2 The Alternatives

A total of five alternatives were selected for evaluation in the environmental review process including: the No Action Alternative, the Rehabilitation Alternative, the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative, and the High-Level Fixed-Span Bridge Alternative. These alternatives were selected from an initial group of nine preliminary project alternatives.[11] The alternatives proposed for evaluation in the environmental review process were selected because they had fewer potential impacts than the other preliminary alternatives. Based on comparison ratings for seven evaluation criteria (regional mobility, local access, navigation, community impacts, aquatic habitat, construction impacts, and estimated project costs), the following preliminary alternatives were dropped from further consideration: a low-level fixed-span bridge, a movable swing bridge, a vertical lift movable bridge, and a tunnel option. The following sections describe each of the proposed project alternatives to be considered in the environmental review process based on conceptual civil and structural engineering.[12] [13]

2.4.2.1 No Action Alternative

The No Action Alternative assumes that the existing bridge structure's poor condition would require it to be closed at some time in the future. Deterioration due to use could allow the bridge to continue to operate for the foreseeable future, but at some time in the

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[11] Parsons Brinckerhoff. *South Park Bridge Project: Summary Technical Memo - Alternatives Development and Screening*, September 6, 2002.

[12] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

[13] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

future, the bridge would need to be closed. As such, for purposes of environmental review, it is assumed the existing bridge would be closed permanently sometime before 2027.

However, the bridge could be closed for other reasons than simply deteriorated condition. Another earthquake could cause an unexpected emergency closure of the bridge at any time. The on-going movement of the bridge foundations could eventually cause the moveable spans to become misaligned to the extent that repairs would be infeasible. Or, the cost of maintaining the bridge could become more than King County is willing to expend. Under any of these circumstances, the bridge would be closed.

When closed, no vehicular, bicycle, or pedestrian traffic would be allowed to use the bridge. As a navigable waterway, the U.S. Coast Guard regulates bridges that span waterways such as the Duwamish Waterway. If the bridge were no longer operating, the U.S. Coast Guard regulations would require demolition and removal of the bridge. With no structures remaining, there would be no potential navigation obstructions in the Duwamish Waterway.

Under this alternative, there would be no change in the local street network except 14th and 16th Avenue S. would be dead-ended on both the south and north shores of the Duwamish Waterway. Figure 4 shows the existing local street network and Figure 5 shows the local street network following the removal of the existing bridge in the No Action Alternative. As the road does not currently provide direct access to the adjacent Boeing Company properties, the exact location of the road closure on the north side would need to be negotiated with Boeing as well as the owner of the railroad tracks immediately south of East Marginal Way S. In addition, the site of the removed bridge would be restored.

2.4.2.2 Rehabilitation Alternative

For the Rehabilitation Alternative, much of the existing bridge structure would need to be replaced. The existing steel trusses of the approach spans and the bascule leaves would be refurbished and reused. The mechanical and electrical operating systems would be refurbished and/or replaced (see Figure 6). Studies have confirmed the existing bridge piers are gradually shifting because the foundation pilings were not originally driven to a sufficient depth. Although the initial goal was to rehabilitate the existing piers, the design team's structural analyses determined that the existing bascule piers and truss approach span piers must be replaced in order to ensure the long-term (approximately 75 years) integrity of the bridge. If the bascule piers were reconstructed, the longevity of the Rehabilitation Alternative would be similar to the expected minimum life of a new bridge structure.

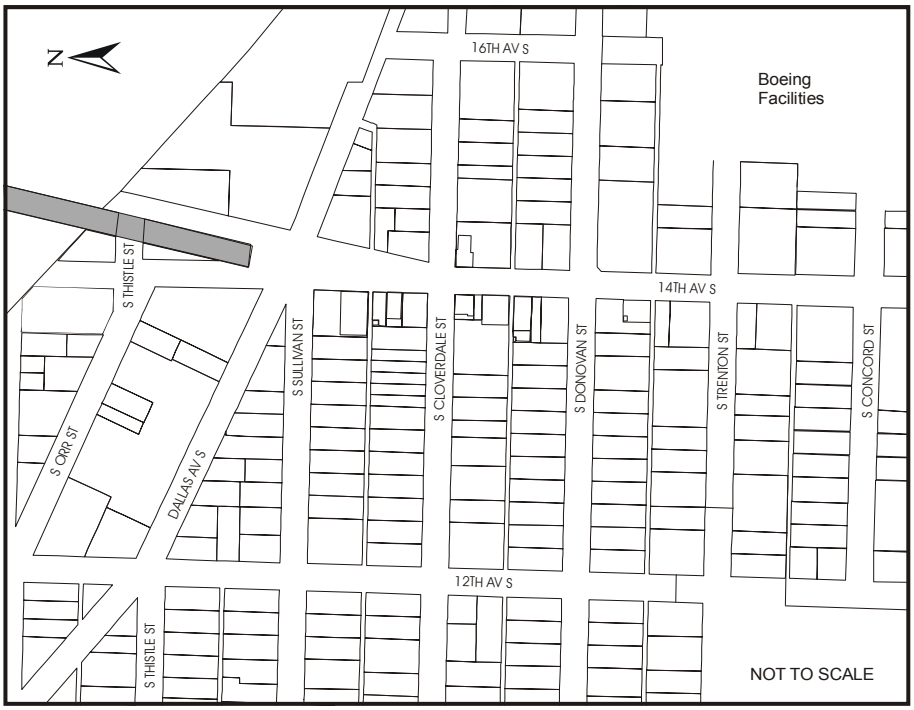

Figure 4
Existing Conditions Street Network

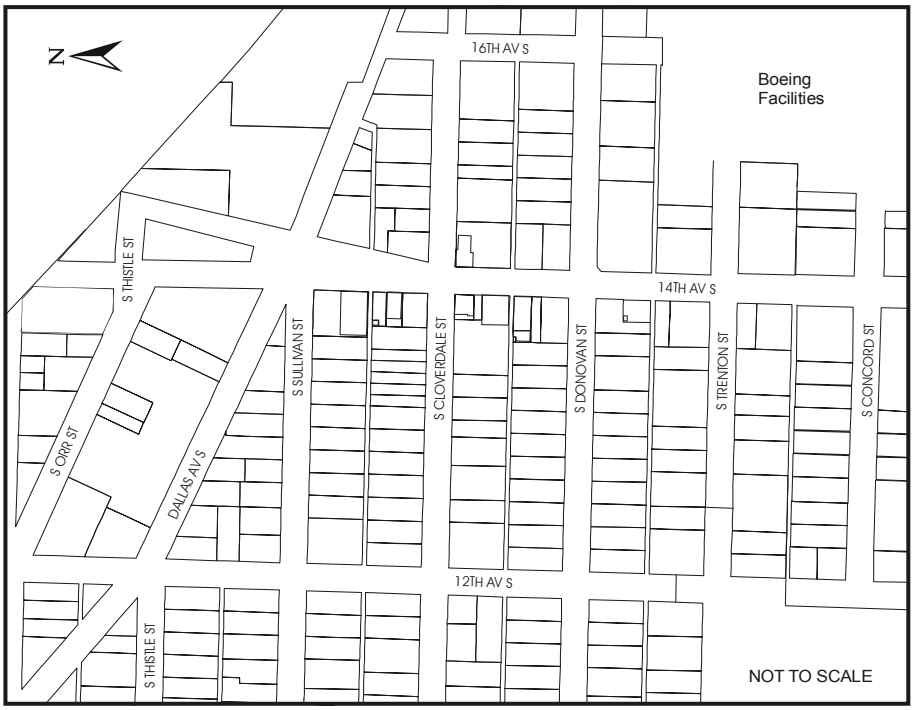

Figure 5
No Action Alternative Street Network

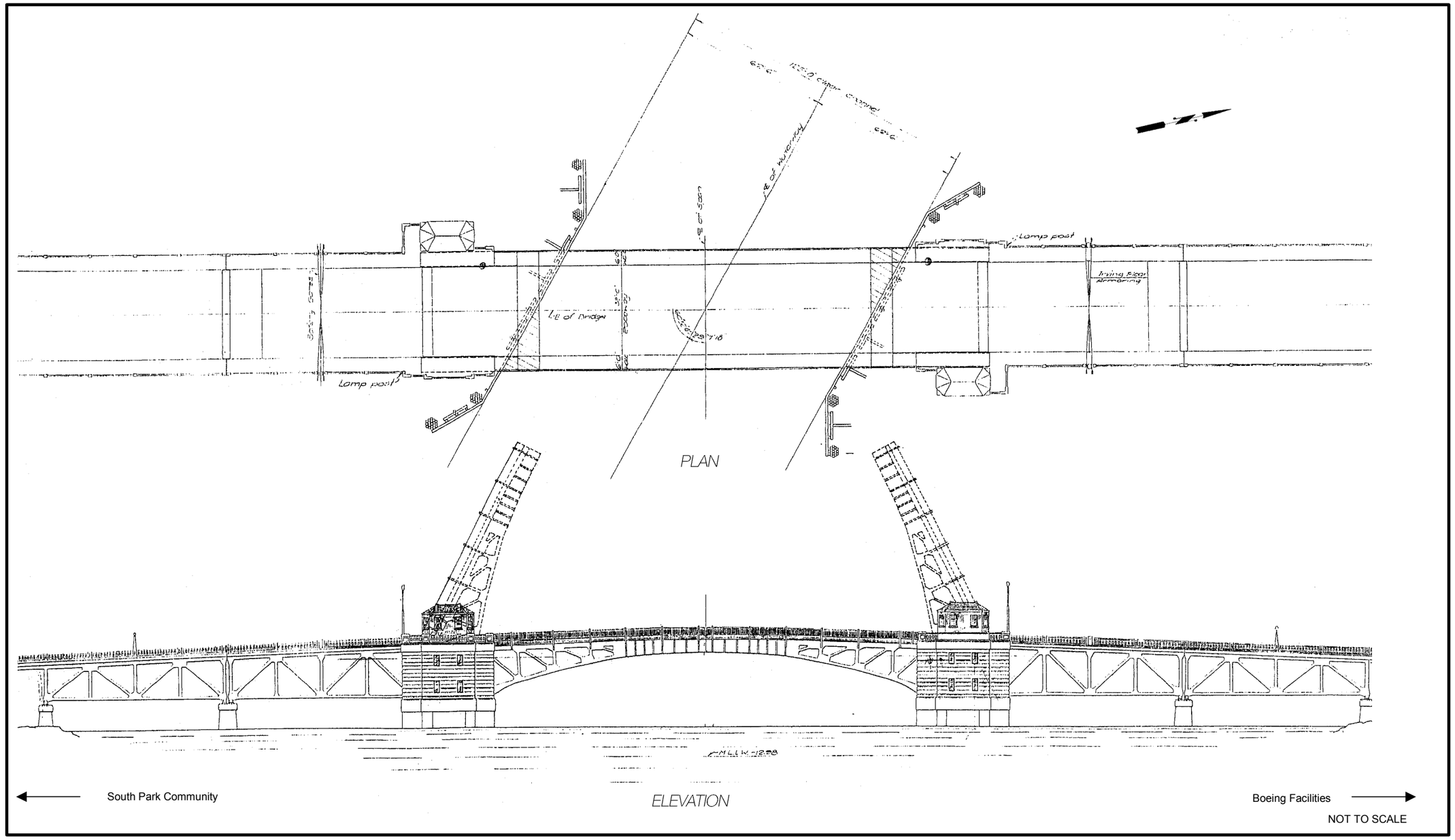

Figure 6
Rehabilitation Alternative

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For the Rehabilitation Alternative, the new bascule piers are proposed to be approximately the same size, location, and historic character as the existing piers. To construct the new bascule piers, the bascule leaves and steel approach spans would need to be removed. The steel truss elements of the bridge structure would be taken to another site for repair, refurbishment, and/or painting before they are reinstalled following the construction of the new piers. The concrete shafts or pilings supporting the foundations of the new piers would extend below the existing pilings to a depth beneath the riverbed where stable soils exist. The removal of the steel truss spans would also allow for replacement of the steel approach piers. The concrete approach spans and bridge abutments would be replaced and the bridge deck would be reconstructed. Like the existing bridge, there would be piers both on land and in the water. The first on-land piers would be only an estimated 20 feet from the top of the south embankment and the closest in-water piers would be approximately 20 feet from the top of the embankment. The piers on the north shoreline would extend through the existing Boeing dock. The conceptual engineering analysis also determined that the mechanical and electrical systems should be replaced. Any required construction activities, including replacement of the bridge railings, bridge tender towers, and lamp posts, would be done in a manner that preserves the historic character of the existing bridge to the greatest extent possible.

To meet current roadway design standards, the new bridge deck would remain approximately the same as the existing, but the pavement would be striped to accommodate three standard traffic lanes. Bicycle and pedestrian traffic would continue to be able to use the bridge via a 7.5-foot pedestrian path on each side of the bridge.

Following construction, the existing 118-foot navigable channel width would be preserved so existing waterway users would be able to continue to use the navigation channel to travel upriver of the South Park Bridge. The extended closure of the bridge during construction, however, would have a significant temporary impact on access to the South Park community.

Following construction, there would be only slight changes in the local street network. Figure 7 shows the local street network in the South Park community following construction activities for the rehabilitation of the existing bridge. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. (For comparison, Figure 8 shows the local street network following the construction of the Bascule Bridge Alternative.) To improve vehicular safety, S. Sullivan Street would intersect Dallas Avenue S., which would become the main cross street intersection with 14th Avenue S. The 16th Avenue S. (immediately east of the bridge) intersection with Dallas Avenue S. as well as 14th Avenue S. may also need to be reconfigured. Access to points north via the South Park Bridge would be maintained.

2.4.2.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would result in the construction of a new movable bridge immediately downriver of the existing bridge (see Figure 9). The bridge mechanism could be a Scherzer rolling lift type (no longer a common design for new movable

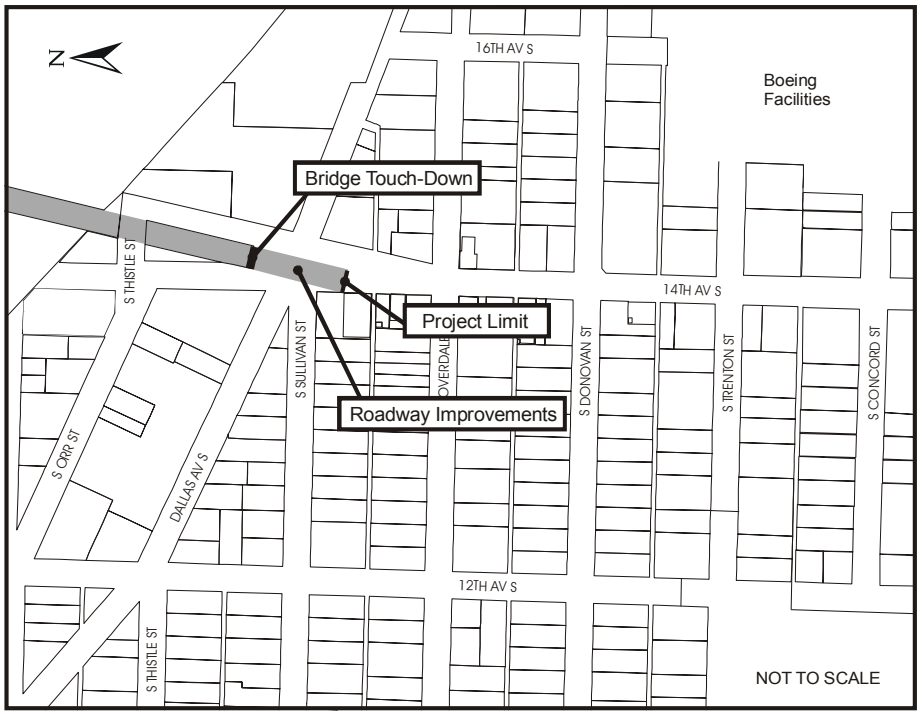

Figure 7
Rehabilitation Alternative Street Network

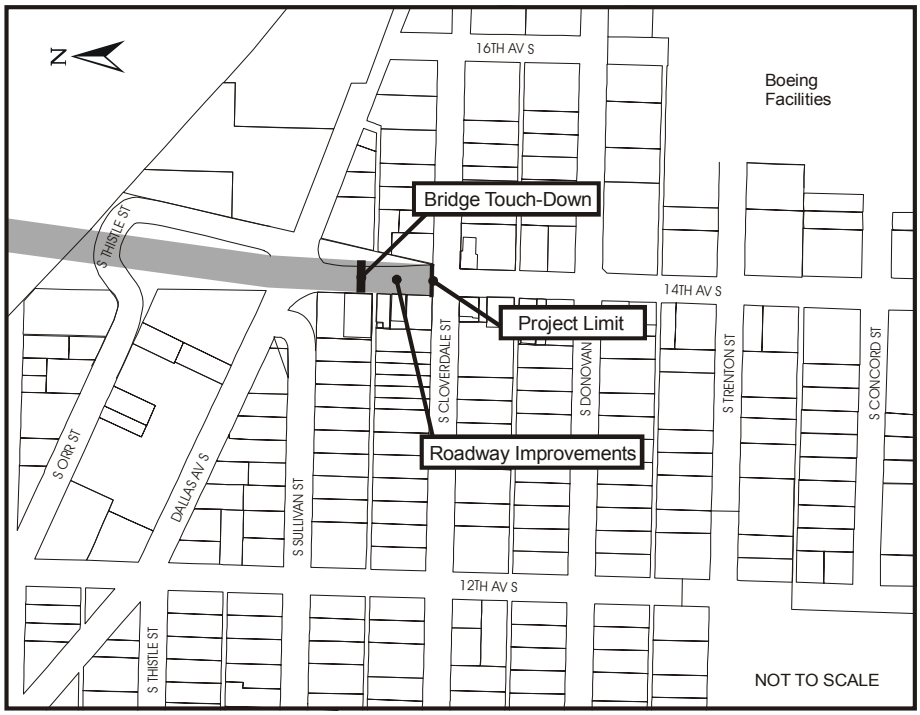

Figure 8
Bascule Bridge Alternative Street Network

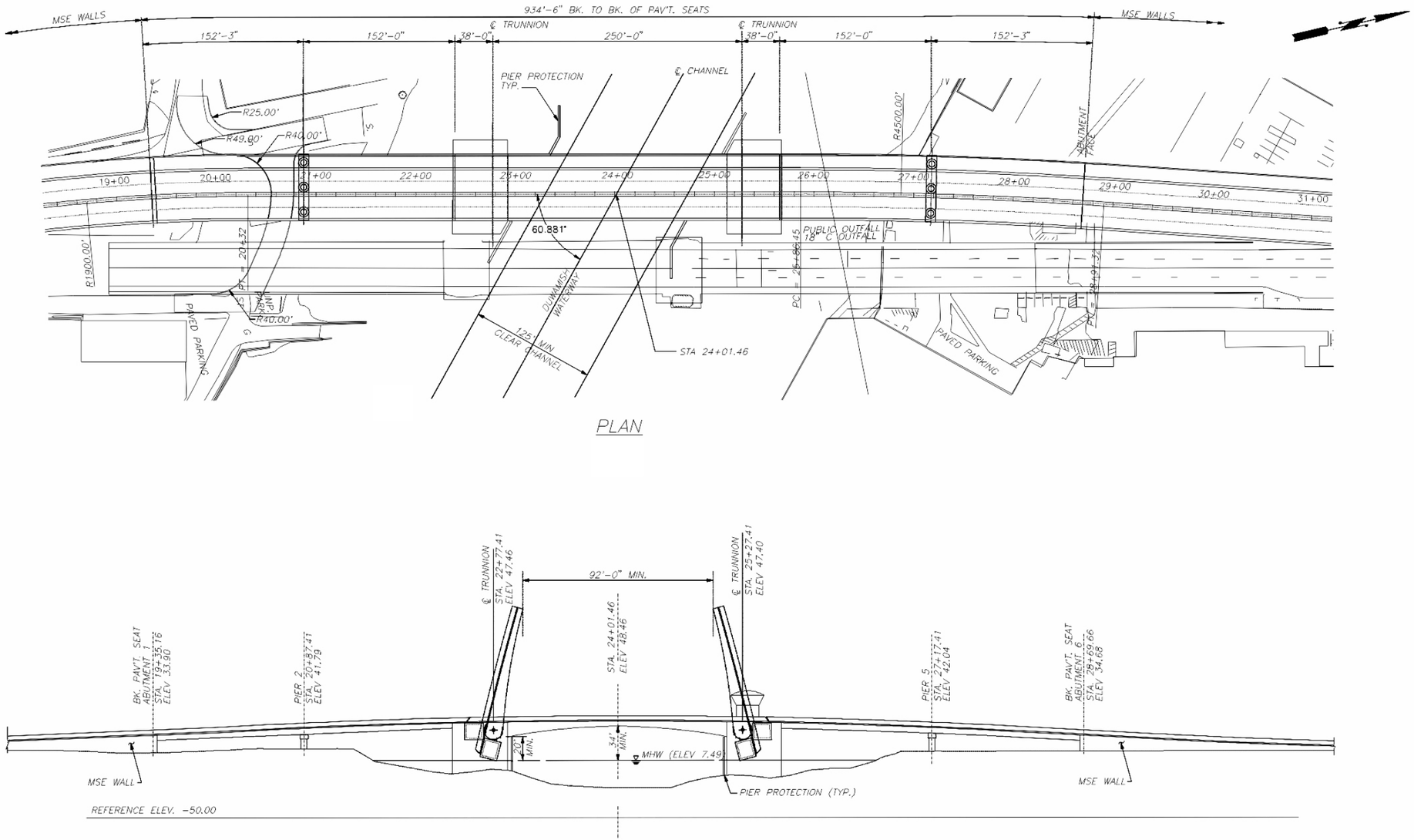

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Figure 9
Bascule Bridge Alternative

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bridges) or another type. The bridge length would be approximately 935 feet from abutment-to-abutment, not including roadway approaches. Road improvements would extend from a point just north of S. Cloverdale Street on the south side of the waterway and north to a point opposite the northeast corner of Boeing Building 2-15. The interior walls of the bridge abutments would be approximately 200 feet from the top of the embankment, or approximately 50 feet closer to the shore than the existing bridge. With fewer piers than the existing bridge, the first on-land piers of this alternative would be approximately 55 feet from the top of the south embankment at the shortest distance and the closest in-water piers would be approximately 65 feet away. On the north shoreline, the closest in-water piers would be approximately 95 feet from the top of the embankment and the closest on-land piers would be approximately 30 feet away. Unlike the existing bridge's grated bascule leaves, the bridge deck of the bascule leaves would be solid surface to improve vehicle traction and to control stormwater runoff.

Similar to the existing bascule bridge, this bridge profile would be approximately 34 feet above the Duwamish Waterway when in the closed position. The mid-section span would be comprised of two movable leaves that could be raised to open the bridge. The navigation channel would be approximately 125 feet in width (slightly greater than the existing 118-foot-wide channel). This two-leaf bascule bridge would not impose limitations to the height of waterway users passing the bridge, because the new bridge would be approximately 125 feet between the tips of the raised spans.

Following construction, there would be some change in the local street network (see Figure 8). S. Sullivan Street would be permanently closed or reconfigured to improve traffic safety and vehicular and truck turning movements from the new bascule bridge to Dallas Avenue S. S. Sullivan Street would no longer have direct access to 14th Avenue S. and the bridge. The intersection of 16th Avenue S. (immediately east of the bridge) and Dallas Avenue S. may also need to be reconfigured. To ensure adequate vertical clearance for vehicles, S. Thistle Street would need to be slightly realigned further to the north and closer to the Duwamish Waterway. This figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. Access to points north via the South Park Bridge would be maintained. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would result in the construction of a non-movable bridge (see Figure 10). The bridge length would be approximately 1,660 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 550 feet from the top of the Duwamish Waterway embankment, or 300 feet further setback than the existing bridge. The closest on-land piers would be approximately 85 feet from the south embankment and the closest in-water piers would be approximately 100 feet away. On the north side, the closest in-water piers would be approximately 130 feet from the top of the embankment and the closest on-land piers would be approximately 65 feet away. Road improvements would

extend slightly north of S. Donovan Street and north to a point approximately 320 feet south of East Marginal Way S.

The mid-point of the bridge profile across the Duwamish Waterway would be approximately 65 feet above MHW of the Duwamish Waterway. The horizontal clearance would be approximately 125 feet, or slightly greater than the existing clearance. The vertical clearance, however, would restrict use of some waterway traffic, including some tugs and barges. Most vessels that currently pass the existing bridge would continue to be able to use the navigation channel. As described earlier in the discussion of the design considerations, the width of the new mid-level bridge is reduced when the bike-pedestrian path is separated from the elevated approach roadway near the south side abutment. This design feature reduces land use and relocation impacts.

Following construction, there would be changes in the local street network (see Figure 11). (For comparison, Figure 12 shows the local street network following the construction of the High-Level Fixed-Span Bridge Alternative.) The location of the south abutment and its vertical clearance would require modification of Dallas Avenue S. and S. Sullivan Street. S. Sullivan Street would likely be merged into Dallas Avenue S. just west of the new structure and a new roadway would be constructed under the new bridge. The alignment of this roadway would be slightly to the north to ensure it would have a minimum allowable vertical clearance. Neither street would have direct access to the new South Park Bridge. Figure 11 also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on the both sides of 14th Avenue S. for the majority of the distance between S. Sullivan Street and S. Cloverdale Street. Traffic would be able to access the bridge at S. Cloverdale Street, which would be raised a maximum of approximately 5 feet at the intersection to meet the descending grade of the bridge. This change in the intersection would allow traffic on S. Cloverdale Street to continue to have direct access to 14th Avenue S. though a retaining wall would also need to be constructed around the four corners of the intersection of S. Cloverdale Street and 14th Avenue S. due to the grade change. S. Orr Street would be closed due to the location of the support structures for the proposed separated pedestrian/bike path, which would allow bicyclists and pedestrians to descend from the bridge level to the street level. In addition, S. Thistle Street would be closed as it would no longer be able to connect to S. Orr Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.2.5 High-Level Fixed-Span Bridge Alternative

The High-Level Fixed-Span Bridge Alternative is a non-movable bridge (see Figure 13). The bridge length would be approximately 2,332 feet abutment-to-abutment, not including roadway approaches. The interior walls of the abutments would be approximately 900 feet from the top of the Duwamish Waterway embankment, or 650 feet further set back than the existing bridge. The on-land and in-water piers of this

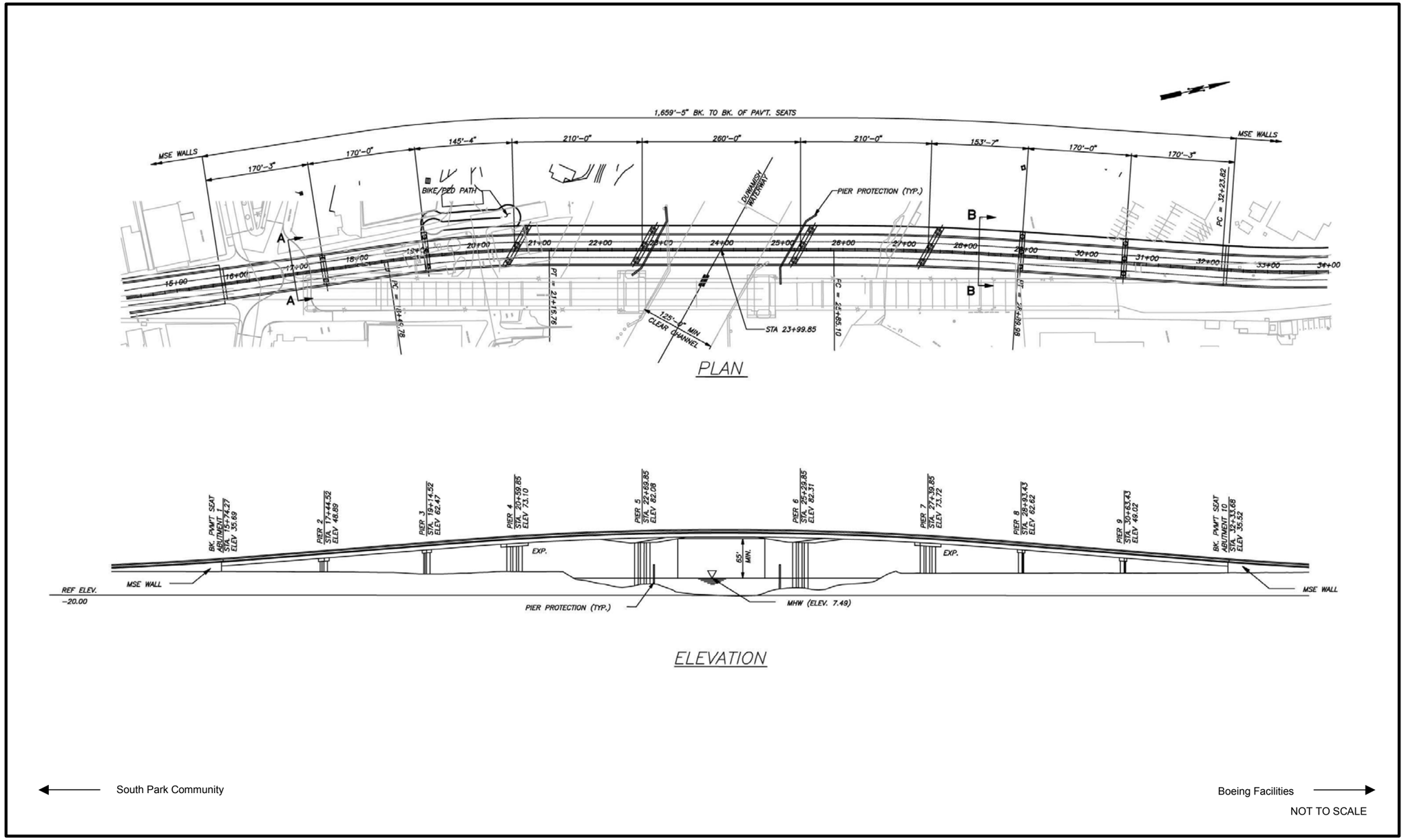

Figure 10
Mid-Level Fixed-Span
Bridge Alternative

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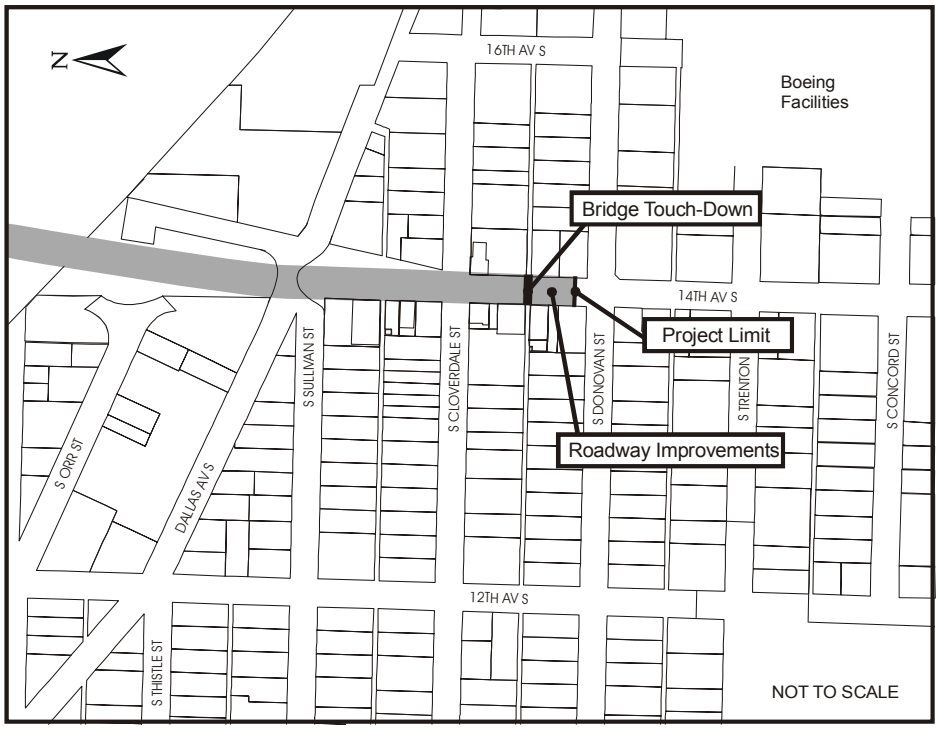

Figure 11
Mid-Level Fixed-Span Bridge Alternative Street Network

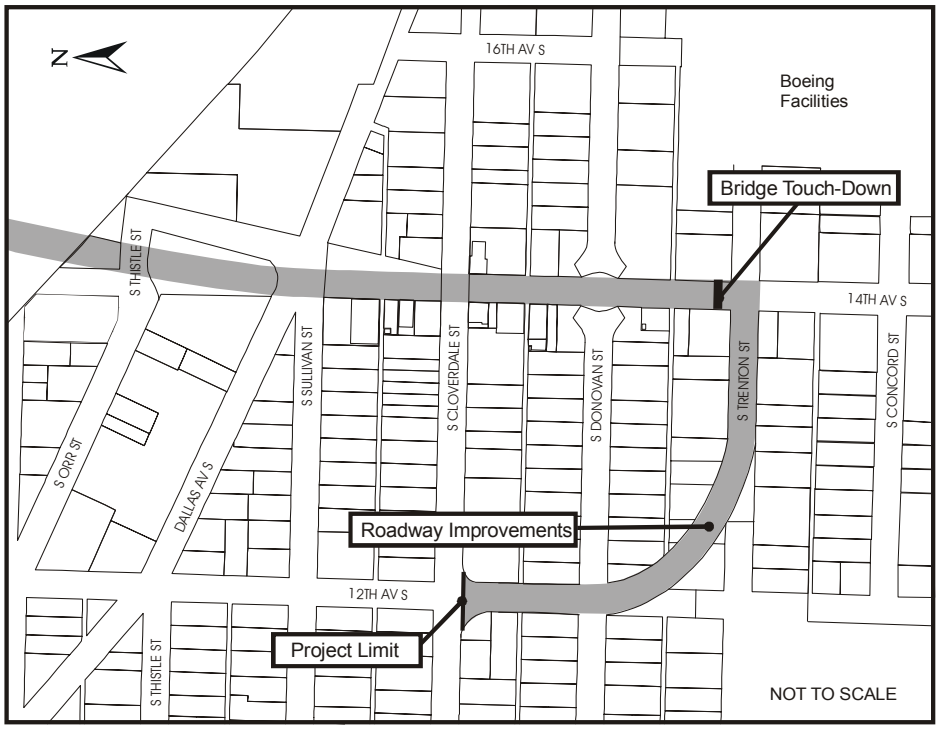

Figure 12
High-Level Fixed-Span Bridge Alternative Street Network

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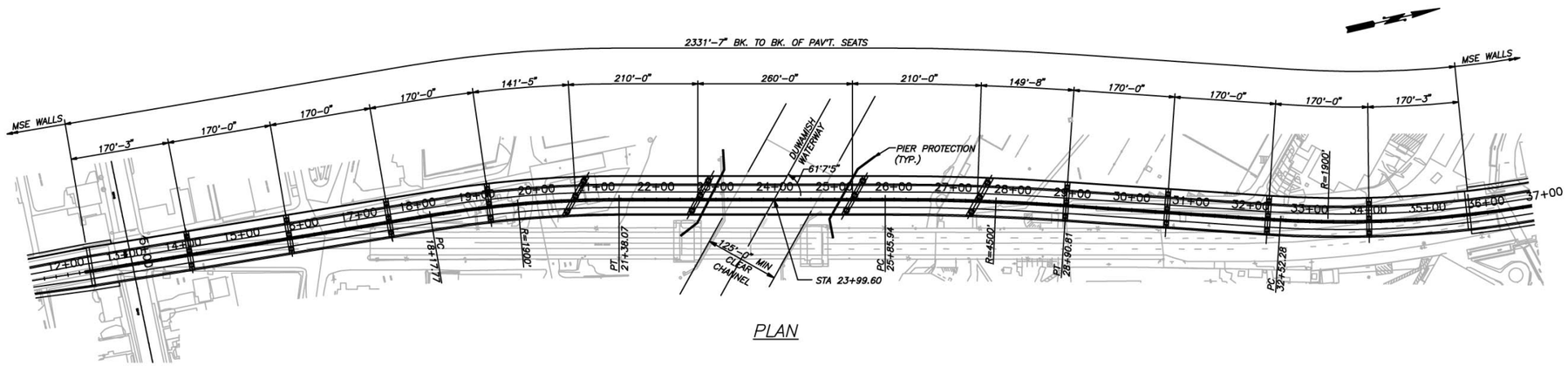

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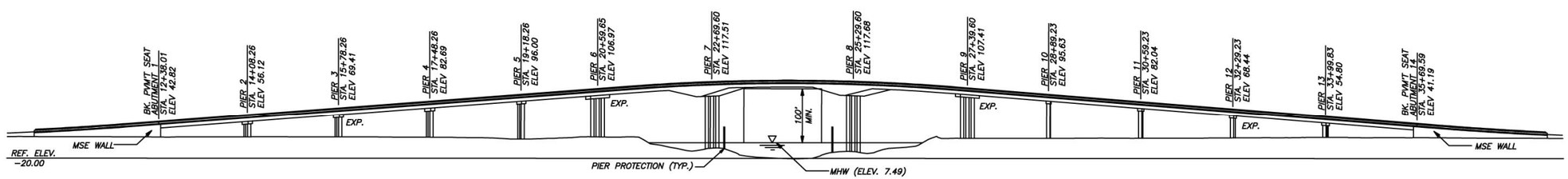

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Figure 13
High-Level Fixed-Span Bridge Alternative

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alternative are approximately in the same location as proposed for the Mid-Level Fixed-Span Bridge Alternative. Road improvements would extend from S. Trenton Street and continue north to East Marginal Way S. This alternative would require minor modification of the 16th Avenue S. East Marginal Way S. intersection and of the existing railroad track crossing immediately south of this intersection.

The bridge design would allow for approximately 100 feet of vertical clearance above the MHW of the Duwamish Waterway as requested by the U.S. Coast Guard. The horizontal waterway clearance for the navigation channel would be approximately 125 feet, which is slightly greater than the existing 118-foot clearance (fender-to-fender). The bridge's vertical clearance would not be expected to limit the height of boats and barges currently passing the bridge. However, vessels larger than those currently using the navigation channel might not be able to pass the bridge in the future.

Following construction, there would be numerous changes in the local street network as shown in Figure 12. The figure also shows the portion of the project alternative that would be elevated for the bridge structure, the bridge touch-down point, and the portion that would have surface roadway improvements. The bridge south abutment would require Dallas Avenue S., S. Sullivan Street, and S. Cloverdale Street to be converted to underpasses under the new South Park Bridge. A retaining wall supporting the elevated approach roadway would be constructed immediately adjacent to properties fronting on both sides of 14th Avenue S. for the majority of the two-block distance between S. Cloverdale Street and S. Trenton Street. S. Donovan Street would be closed at 14th Avenue S. due to obstruction from the bridge abutment and a vehicle turn-around would be constructed on either side of the abutment on S. Donovan Street. To allow traffic to access the new South Park Bridge, a new principle arterial roadway would need to be constructed between S. Trenton Street and 12th Avenue S. and road improvements would be required on 12th Avenue S. north to S. Cloverdale Street. This new route would allow traffic, trucks, and buses to continue to access the new South Park Bridge from S. Cloverdale Street via 12th Avenue S. and S. Trenton Street. Following construction and transfer of the traffic to the new bridge, the existing bridge would be demolished and removed as described for the No Action Alternative.

2.4.3 Construction Durations and Activities

Construction of a rehabilitation or replacement bridge for the existing South Park Bridge is planned to take approximately two to three years, including the demolition and removal of the existing bridge. Construction is anticipated to start within the next several years and opening of the rehabilitation or a replacement bridge is currently anticipated to occur by 2009. The actual time required for construction activities vary for each of the alternatives. Construction activities associated with the No Action Alternative involves only demolition of the existing bridge and restoration of the site. The construction period for this alternative would be the shortest of all alternatives, approximately 8 months. The other alternatives would additionally require rehabilitation or construction of a new replacement bridge. Anticipated construction durations (demolition of existing and construction of new) would be approximately 32 months for the Rehabilitation Alternative, 33 months for the Bascule Bridge Alternative, 20 months for the Mid-Level

Fixed-Span Bridge Alternative, and 24 months for the High-Level Fixed-Span Bridge Alternative.[14]

From a construction perspective, the five project alternatives include three different types of construction activities. The No Action Alternative assumes the existing bridge condition would eventually require closure and removal of the bridge structures. Construction activities would focus on demolishing the existing bridge and restoring the project area. The Rehabilitation Alternative would require bridge closure for approximately 30 months for rehabilitation or replacement of various elements of the existing bridge. The Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives would all result in constructing a replacement bridge approximately 80 feet downstream of the existing bridge. For these three alternatives, the new bridge would be constructed while the existing bridge continues to be operational. When the new bridge is connected to the existing road, there would be short-term temporary bridge closures. These closures could be limited to weekends or could extend for approximately one month, depending on the alternative. Once the new bridge is completed, traffic would be rerouted to the new bridge and then the existing bridge structure would be demolished in a similar fashion as described for the No Action Alternative.

Rehabilitation of the existing bridge would require closure of the existing bridge for approximately 30 months, although efforts would be made to minimize the closure period as much as possible. Reconstruction activities would begin as soon as possible after completion of design engineering and acquisition of construction permits. Traffic would be given advance notice to take alternate routes prior to closure of the existing bridge. The construction of a temporary dock and a construction staging area would be required on both banks of the waterway (see Figure 14). Construction of the new bascule piers would likely be the first major construction activity. This would entail removing the existing pier protection fenders, installing temporary supports for the bridge superstructure, removing the bascule leaves as well as the steel truss spans, installing cofferdams around the existing steel truss approach piers and bascule piers, and demolishing the existing piers.

The bascule leaves and steel truss approach spans would be removed from the construction site for refurbishment. Construction of the new piers would involve drilling shafts through the existing timber piles, constructing the pile cap, dewatering the construction area inside the cofferdam, constructing the upper portions of the pier, removing the cofferdam, and finally reconstructing the upper portions of the bascule pier and bridge towers. Workers would reconstruct the concrete approach spans and replace the abutments. Workers would also reconstruct the bridge deck and replace the mechanical and electrical systems used to operate the bridge. Replacement of the piers,

[14] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

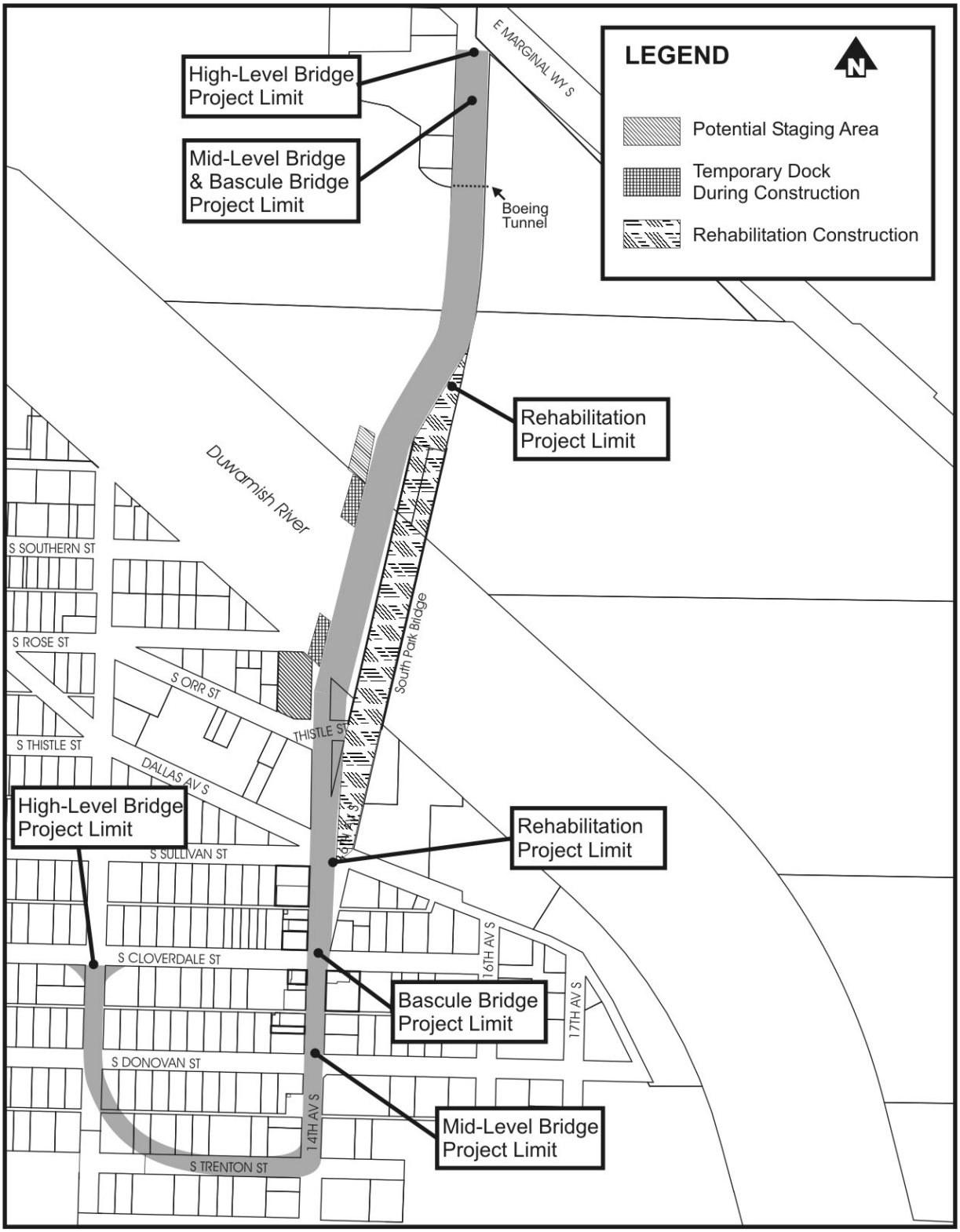

Figure 14
Proposed Construction Staging Areas

bridge tender towers, bridge railings, and lamp posts would be done in a manner that would preserve the historic character of these features of the existing bridge.

Major construction activities and sequencing would be similar for the Bascule, Mid-Level Fixed-Span, and High-Level Fixed-Span bridge alternatives. The construction duration and the impact area for each of these three alternatives, however, would clearly differ. Following completion of design engineering, acquisition of construction permits, purchase of needed property, and relocation of residents and businesses, construction activities would begin. The first activities would include establishing the construction staging areas and constructing temporary docks with pilings on both sides of the waterway (see Figure 14).

Buildings affected by the construction activities would be demolished and utilities would be either temporarily or permanently relocated. To minimize traffic impacts, construction activities would begin with the construction of the in-water piers. Construction activities would progress landward from the central portion of each bridge alternative. Both in-water and on-land construction would begin with construction of the sub-structures (piers and abutment) and would be followed by placement of the superstructure (beams, deck, rails). On-land construction of the piers, abutment, retaining walls, and transition segments at either end of the bridge would likely require temporary closure of adjacent or nearby roads and rerouting of local traffic. If possible, these temporary closures would be limited to weekend and/or night times to minimize impacts to the community. Construction activities on the north and south portions of the new bridge structures could also occur either separately or concurrently. The last of the construction activities would be the construction of the new curb and gutter of the at-grade roadway, and paving the roadway to match the existing width of 14th Avenue S. Figure 14 shows the project limits, or start and end points, of construction activities for each of the project Build Alternatives.

For the rehabilitation and new bridge alternatives, new girders and other oversized materials would most likely be delivered to the project site by barge. Large cranes located on the barges or temporary docks would off-load the materials and place them in the nearby construction staging area. Removal of the existing bridge pier foundations and construction of the new bascule and steel truss piers would all require the use of cofferdams to isolate the construction activities. Construction of the new approach-span piers would use drilled shafts, which would likely incorporate the use of temporary casings to isolate the construction activities. This in-water work would be performed by equipment operated from the temporary docks or from barges.

Demolition of the existing bridge would involve disassembly and removal of the existing bascule leaves, superstructure, bridge piers, protection fenders, and abutment. Cranes would use the existing bridge structure and approaches as much as possible to remove the various elements of the bridge. Barges would likely be used to remove oversized materials. At this time, this demolition work is not planned to require construction of temporary docks or the acquisition or temporary use of property on the banks of the Duwamish Waterway for a staging area. Removal of the abutment foundations, however,

would likely require temporary short-term closure of adjacent and/or nearby streets. During this time, local traffic would be temporarily rerouted from the immediate area.

Following the completion of the construction activities associated with any of the project alternatives, disturbed areas would be restored. Conceptual site restoration plans would be developed for each alternative based on additional consultation with resource agencies and other stakeholders.

2.4.4 Cost Estimates for the Alternatives

Cost estimates for each of the proposed project alternatives have been prepared by the project engineers (see Table 2).[15] The cost estimate for each project alternative, including the No Action alternative, is broken down into the following components: 1) plans, specifications, and estimates (PS&E), 2) right-of-way costs, and 3) construction and construction-related costs. The total cost estimates are provided in 2003 dollars as well as estimated costs escalated for 2008, the anticipated mid-point of the project construction period. These cost estimates were calculated based on the conceptual engineering plans that were prepared for each of the alternatives.[16]

Table 2. Cost Estimates of the Project Alternatives

	PS&E	Right-of-Way	Construction	Total (2003 dollars)	Total (2008 dollars)
No Action	$ 250,000	$ 0	$ 6,750,000	$ 7,000,000	$ 9 M
Rehabilitation	$ 6,843,000	$ 754,000	$56,333,000	$63,930,000	$ 74 M
Bascule	$ 8,253,000	$ 3,655,000	$ 65,426,000	$ 77,334,000	$ 90 M
Mid-Level Fixed-Span	$ 4,235,000	$ 6,377,000	$ 50,911,000	$61,523,000	$ 71 M
High-Level Fixed-Span	$ 5,261,000	$ 15,310,000	$ 49,889,000	$ 70,460,000	$ 82 M

Source: Parsons Brinckerhoff, November 2003.

[15] Parsons Brinckerhoff. *South Park Bridge Project: Structural Alternatives Study*, November 2003.

[16] Parsons Brinckerhoff. *South Park Bridge Project: Conceptual Plans*, June 2003.

Clearly, the No Action Alternative is the least expensive as the existing bridge would not be rehabilitated nor would a new replacement bridge be constructed. The cost to remove the existing bridge structure would be approximately $7,000,000 (2003 dollars). The estimated costs to either rehabilitate or replace the existing bridge structure range between approximately $62 million to $77 million in 2003 dollars. The least costly of the Build Alternatives is the proposed Mid-Level Fixed-Span Alternative, which is estimated to cost approximately $61,523,000 to design and construct. The Rehabilitation Alternative is estimated to cost approximately $63,930,000 and the High-Level Fixed-Span Alternative is estimated to cost approximately $70,460,000. The most costly of the Build Alternatives is the Bascule Bridge Alternative, which is estimated to cost $77,334,000. The escalated 2008 dollar estimates to design and construction the project alternatives are also shown in the table.

2.5 Project Coordination

Coordination to date for the South Park Bridge Project has involved members of the public, a special community advisory group, and representatives of government agencies. Formal scoping was initiated through publication of the NEPA Notice of Intent and the SEPA Determination of Significance and Scoping Notice on February 7, 2002 and February 14, 2002, respectively. Separate scoping meetings were conducted in the South Park community for relevant agencies and members of the public. Both meetings were held on February 28, 2002. Written and verbal comments received through the scoping process were reviewed by King County and used in the development of the project alternatives and topics for environmental impact assessment.

A public involvement plan for the proposed South Park Bridge Project was developed during the initial stages of project planning. The Project Advisory Committee (PAC) and the Community Advisory Group (CAG) reviewed this document and provided comments to King County. The first public involvement efforts began prior to the formal scoping period. A public workshop was held in the South Park community on January 17, 2002. At this meeting, the nine preliminary project alternatives were presented. A second public workshop was held on June 19, 2002. At this meeting, the five proposed project alternatives were presented. Members of the public were encouraged to provide comments at both of these meetings. To facilitate participation and input from Hispanic persons living in the community, a bilingual translator attended all meetings. In addition, handouts and newsletters for the project were published in English and Spanish, and public notices were published in “Siete Dias”, a local Spanish-speaking newspaper. Future opportunities for public involvement are also planned, including a public hearing and workshop following publication of the Draft Environmental Impact Statement in 2004.

Establishing a CAG was a significant component of the public involvement plan. A total of 17 individuals were chosen to participate in the CAG to represent community stakeholder interests and public concerns. The CAG meets periodically to be briefed on the progress of the project and to provide input to the South Park Bridge project team. Again, a bilingual English-Spanish translator attends the meeting to facilitate

communication with Spanish-speaking individuals on the CAG. To date, CAG meetings have been held on April 10, May 21, June 4, June 11, and October 29 of 2002 and on January 7 and November 18, 2003. Additional CAG meetings are planned for the future.

As part of the environmental review process, King County periodically meets with the Project Advisory Committee (PAC) to give a status report of the project, answer questions, and to solicit comments. This committee is comprised of members of various agencies that have potential jurisdiction over the proposed South Park Bridge Project. The committee is the Interdisciplinary Team (IDT) required under NEPA implementation guidelines and provides technical support to King County staff. To date, the PAC has met on January 10, February 20, May 9, May 23, and October 10 of 2002. Coordination with the PAC is planned at critical future steps in the environmental review process.

A non-scientific survey was also conducted of South Park businesses located on 14th Avenue S. during the late spring of 2003.[17] The goal of the survey was to help assess potential impacts to businesses, especially minority-owned and –operated (employees) businesses. The survey respondents were also asked to identify their particular concerns about the proposed rehabilitation or replacement of the existing South Park Bridge. A total of 18 businesses were successfully surveyed. Spanish and Vietnamese translators were provided, as needed, to assist business representatives understand and respond to the questions. In addition, the data was used to assess the potential effects displaced businesses and jobs would have on the South Park community. The analysis of the survey findings are discussed in detail in the Economic, Social, and Relocation technical reports supporting the analysis in the EIS.

As key issues have arisen during development of the project alternatives and in assessing potential environmental impacts, special meetings have also been held with key stakeholders and organizations in the South Park community, as well as with other government agencies and jurisdictions with an interest in the project. For example, on December 3, 2002, King County met with owners of property along 14th Avenue S, and information booths were set up at the Sea Mar Community Health Center-sponsored annual Fiesta Patrias on September 14, 2002 and at a family night event held at the Concord Elementary School on September 27 and November 22 of 2002. Periodic coordination meetings have also been held with representatives of the City of Seattle and the City of Tukwila, and other government agencies. These coordination activities will continue to occur on an on-going basis as the EIS is prepared and finally adopted.

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[17] Parsons Brinckerhoff. *South Park Bridge Project: Survey of 14th Avenue South Businesses*, August 22, 2003.

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Existing planning documents and published reports relevant to historic and current social conditions in the project area were reviewed, including adopted comprehensive plans for King County, the City of Tukwila, and the City of Seattle. The Project Team also coordinated with the City of Seattle, including the Department of Neighborhoods, and the City of Tukwila at key points in the development of the conceptual plans and the preparation of the EIS. The citizen's South Park Residential Urban Village Plan (City of Seattle, 1998) was reviewed to gain an understanding of the community's goals for the future. Existing data used to develop the *Land Use Technical Report* and the *Economic Technical Report* was also reviewed.

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Chapter 4 Methodology

This section summarizes key aspects of the methodology used to conduct the analysis in this report. These topics include a review of government regulations and guidelines pertinent to the preparation of this report. Definitions of terms used in this report are presented. The general sources of data and information are summarized. In addition, specific information regarding the use and analysis of census data is presented.

4.1 Regulatory Overview

The analysis of potential social impacts resulting from the proposed South Park Bridge Project follows both federal and Washington regulations and guidelines. The governing laws, regulations, and guidelines include the following:

- National Environmental Policy Act (NEPA)
- Washington State Environmental Policy Act (SEPA)

The federal and Washington State guidelines consulted include the following:

- Federal Highway Administration (FHWA) NEPA guidelines
- FHWA Technical Advisory T6640.8A *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*
- FHWA's *Community Impact Assessment: A Quick Reference for Transportation*
- WSDOT Environmental Procedures Manual Sections 457 (March 2003)
- King County environmental procedures (King County Code Title 20, Section 44)

In addition, preparation of the data and analysis to support the environmental justice discussion was prepared in compliance with the following:

- Title VI of the Civil Rights Act of 1964
- Presidential Executive Order 12898 on *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* (1994)
- Title 49 of the Code of Federal Regulations Part 21 Nondiscrimination in Federally Assisted Programs of the Department of Transportation, Effectuation of Title VI of the Civil Rights Act of 1964
- Title 23 of the United Stated Code, Section 109(h), Federal Highway Administration Effectuation of Title VI of the Civil Rights Act of 1964

- U.S. Department of Transportation (USDOT) Order 5610.2 on *Environmental Justice*

- FHWA *Actions to Address Environmental Justice in Minority Populations & Low-Income Populations*

- *Governor's* Executive Order 93-07 *Affirming Commitment to Diversity and Equity in the Service Delivery and in the Communities of the State* (1993)

Guidance to prepare the environmental justice analysis was provided by the Council on Environmental Quality Environmental Justice: Guidance Under the National Environmental Policy Act (1997) and the WSDOT Environmental Procedures Manual, Section 458 (March 2003). Note, the FHWA Technical Advisory T6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents, was published in 1987, prior to the Presidential Executive Order 12898, and does not address environmental justice issues.

4.2 Use of Terms

To avoid misunderstanding and confusion, the author would like to define several terms as they are used in the analysis. These terms are as follows:

- **Project Corridor**—This is the area that encompasses the alignments and rights-of-way of all five project alternatives. The area generally extends along 14th Avenue S. from S. Trenton Street north to East Marginal Way S. The project corridor also includes the proposed connector road between S. Trenton Street and 12th Avenue S. (north to S. Cloverdale Street), which is proposed as part of the High-Level Fixed-Span Bridge Alternative.

- **Study Area**—This is the area defined by four census tracts that encompass the project corridor from the southern terminus to the northern terminus. These census tracts include the following: 109, 112, 263, and 264. (See Figure 15).

- **South Park Community**—This term is used in two different ways. The term, "South Park community" is a place name that generally encompasses the area between the Duwamish Waterway on the north and east, SR509 on the west, and approximately to S. 100th Street on the south. This is the term that is most frequently used to refer to South Park. The term "South Park Community" is the area specifically defined by the geographic area encompassed by census tract 112. The area covered by these two terms, however, is nearly the same.

- **South Park Neighborhood**—This term refers to the specific geographic area addressed in the *South Park Urban Village Plan* (City of Seattle, 1998). This document is the neighborhood plan for South Park, but encompasses an area smaller than the geographic area covered by the term South Park community. The

area generally excludes land uses north of S. Southern Street, or the northern quarter of the South Park community.

4.3 Data and Information

Data was collected from a variety of federal, state, and local sources. A major portion of the analysis relies on 1990 and 2000 statistics published by the U.S. Bureau of the Census. Section 4.4 below provides detailed information about the use of census data. Additional information on public services and recreation was obtained from local government agency materials published on the Internet. In addition, the Yahoo! Yellow Pages < http://yp.hahoo.com/ > were used to identify existing and nearby businesses as well as community and social services in the South Park community.

Particular community issues were identified through review of the *South Park Urban Village Plan* (City of Seattle, 1998) as well as records of public comment on the project. In particular, public comments were obtained at the scoping meeting and two public workshops held by King County. Because the community was identified as a potential Hispanic community from the start of project planning, special efforts were made to ensure the Spanish-speaking members of the community would both express their concerns and feel like their concerns were recognized by the Project Team. In particular, Spanish translators were in attendance at all public meetings and public handouts were prepared in Spanish as well as English (see Section 2.5).

In addition, the findings of the Project Team survey of the business owners along 14th Avenue S. were reviewed and information related to environmental justice concerns was incorporated into this report. (See the *Economics Technical Report* for additional information.) Both Spanish and Vietnamese translators were used to conduct the survey of business owners (Parsons Brinckerhoff, 2003).

4.4 Census Data Analysis

Much of the data analysis in this report, particularly population and demographic information, is based on statistics published by the U.S. Bureau of the Census. Census figures from the 1990 census and the 2000 census are often compared and contrasted to evaluate potential changes in the community. The boundaries of some census tracts as well as some census tract block groups changed slightly between 1990 and 2000. Generally, the boundary changes for the census tracts are not significant and the census tract data of 1990 and 2000 are comparable.

The 1990/2000 changes in census tract block group boundaries, however, were more significant. Often times, block groups were divided to create two block groups where one block group existed before. In other cases, two block groups were combined to represent the same area previously represented by a single block group. For example, there were four block groups in census tract 112 in 1990, but only three block groups in 2000. Block

groups 1 and 2 were combined to represent block group 2 in 2000. As such, 1990 block group 2 data is not comparable to 2000 block group 2.

As such, the division and combining of block groups resulted in renumbering of block groups. As described above for census tract 112, block groups 1 and 2 were combined to create block group 2 in 2000. Rather than preserve the numbering of block groups from 1990, block groups were renumbered sequentially starting with block group 1. Block group 3 is comparable between 1990 and 2000, however block group 4 from 1990 was renumbered block group 1 in 2000. Changes such as these mean the reader cannot assume the geographic area of block groups from one census to the next is comparable. For this reason, the analysis in this report summarizes data by census tract, though generally equivalent block groups are presented for each year in the tables presented in the appendices.

Chapter 5 Affected Environment

This section describes the existing social conditions of the South Park community and its environs. The following sections address the general community character, population, demographics, household characteristics, housing, community and social services, public services, recreational amenities in the community as well as pedestrian, bicycle, and transit services and facilities. The last two sections discuss the elements of the community that define its cohesion and environmental justice issues.

5.1 Overview of Community Character

South Park is a small urban community located at the southernmost boundaries of the City of Seattle. It is an old community settled in the late 19th century by truck farmers and dairymen (City of Seattle, 1998). The community sits along the banks of the Duwamish Waterway, which has long been an important and economic means of bulk transportation for the region. Barges and tugs to this day continue to move cargo up and down the river passing the South Park Bridge most days. From early times, the City of Seattle foresaw the area supporting industrial development and designated much of the area for industrial and manufacturing in 1923 when the City adopted its first zoning code. Much of the industrial development surrounding the community has developed alongside the growth and prosperity of Boeing. In fact, Boeing's Plant 2 and the King County International Airport (known as Boeing Field) are located immediately north of South Park. Additional information on the history of South Park is contained in the *Cultural and Historical Resources Technical Report*.

Despite early plans that the South Park community would eventually be converted to industrial land uses, the original residential character of the community remains intact. The center of the community is focused along 14th Avenue S. where local retail businesses serving the community are located. Multi-family residences are scattered in the community, but the majority of housing is single-family detached. The community has its own community center, a public elementary school, and a large community park. Many of these community facilities, including the proposed site for the new neighborhood library, are concentrated along 8th Avenue S., which is more than one-half mile from the project corridor.

The racial and ethnic composition of the residents is diverse. There is a significant Hispanic population as well as a significant Asian population residing in South Park. As a whole, though, the community has an identity as an Hispanic community. Several community restaurants serve Mexican foods, and each September the community health clinic and social services agency hosts the annual "Fiesta Patrias," which attracts attendees from throughout the Seattle metropolitan region.

5.2 Population

The population of the Study Area is approximately 10,600 and includes an area much larger than the project corridor. The Study Area encompasses the following area: the industrial along East Marginal Way S. south of 1st Avenue S. towards the Boeing facilities; the South Park community between 1st Avenue S., the Duwamish Waterway, and south to approximately S. 92nd Street; the Boeing industrial facilities along East Marginal Way S. south to SR 99; and the residential area bounded by SR 509 and the Duwamish Waterway south of the heart of the South Park community to approximately S. 117th Street (see Figure 15). The area includes the existing South Park Bridge, as well as nearby residential and commercial areas, and arterials that may be affected by the proposed project.

The South Park Community (census tract 112) encompasses the area immediately adjacent to the project corridor. With a population of approximately 3,700, it is the size of a small village. In 1990, the U.S. Bureau of the Census reported the population of the South Park Community was 2,809 (see Table 3). In contrast, the population of the Study Area was 9,034 and the City of Seattle was 516,259. The Study Area comprises less than 1 percent of the total population of the city.

Table 3. Population, 1990 and 2000

	1990	2000	Average Annual Percent Increase
South Park Community	2,809	3,717	3.2 %
Study Area	9,034	10,609	1.7 %
City of Seattle	516,259	563,374	0.9 %

Note: The Study Area is defined by the following census tracts: 109 (part), 112, 263 (part), and 264. The South Park Community is defined by census tract 112.

Source: U.S. Census, 1990 and 2000.

By 2000, the census population figures for the Study Area had increased to 10,609. This was an average annual increase of an estimated 1.7 percent. Of this growth, more than a third was located in the South Park Community, which increased from 2,809 to 3,717. This was an increase of 908 persons and the average annual increase for the South Park Community for the previous decade was an estimated 3.2 percent. In comparison, the growth rate of the entire City of Seattle was considerably slower, averaging only 0.9 percent per year. For additional detailed population information, please see Appendix A.

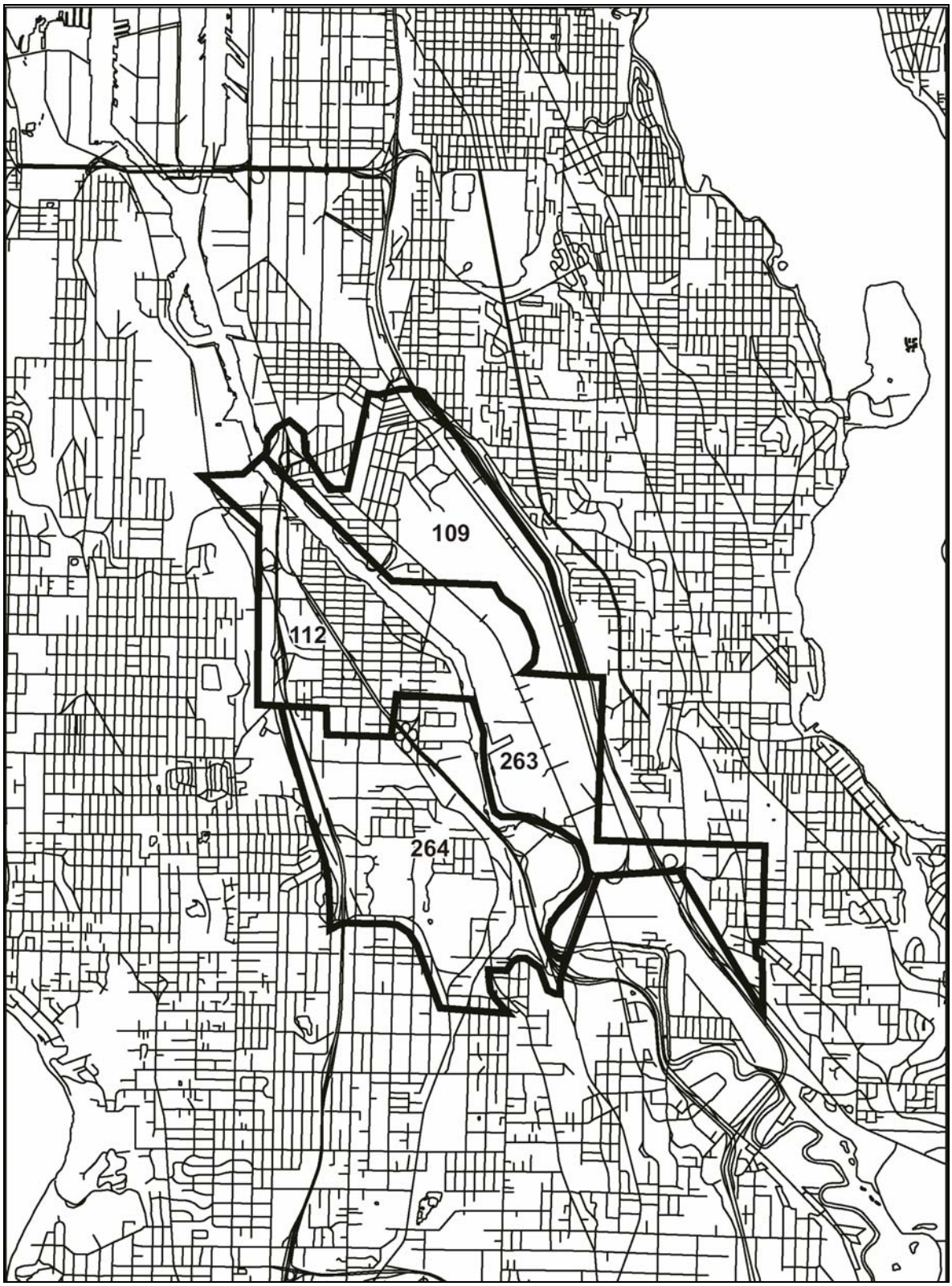

Figure 15
South Park Community Study Area

5.3 Demographics

The population demographics of the South Park Community and the Study Area are quite diverse and very different from the population of the City of Seattle. In 1990, the U.S. Census defined a total of five racial categories, including the following: White; Black; American Indian, Eskimo, and Aleut; Asian and Pacific Islander; and Other (one other race or more than one race). In 1990, the population of the South Park Community was approximately 67 percent White and 33 percent Persons of Color, or persons whose race is other than White (see Table 4and Appendix B for details). The racial composition of the Study Area in 1990 was more predominantly White with approximately 74 percent of the population White, and approximately 26 percent were Persons of Color in 1990. The Study Area demographics were more similar to those of the City of Seattle, which was reported as approximately 75 percent White and 25 percent Persons of Color.

Table 4.Population Race and Hispanic Characteristics, 1990 and 2000

	1990			2000		
	White	**Persons of Color**	**Hispanic**	**White**	**Persons of Color**	**Hispanic**
South Park Community	1,874 (67%)	935 (33%)	420 (15%)	1,626 (44%)	2,091 (56%)	1,379 (37%)
Study Area	6,715 (74%)	2,319 (26%)	773 (9%)	5,579 (53%)	5,030 (47%)	2,511 (24%)
City of Seattle	388,858 (75%)	127,401 (25%)	18,349 (4%)	394,889 (70%)	168,485 (30%)	29,719 (5%)

Source: U.S. Census, 1990 and 2000.

The demographics of the South Park Community and the Study Area, however, appear to have changed considerably over the past decade. In 2000, approximately 44 percent of the population of the South Park Community was White, a decrease of 23 percent since 1990. Concurrently, the proportion of the population comprised of Persons of Color increased from 33 percent to 56 percent, nearly a doubling in the numbers of Persons of Color residing in the South Park Community. The demographics of the Study Area as a whole similarly changed to reflect a more diverse population. By 2000, the population of the Study Area more closely resembled the South Park Community with approximately 53 percent White and 47 percent Persons of Color. In comparison, the population of the City of Seattle changed very little considering the population of Persons of Color increased from 25 percent to 30 percent.

The definitions of the categories people could use to define their racial make-up, however, changed between the 1990 and the 2000 census. The recent census included a total of seven basic categories, or two additional categories than were included in the 1990 census. The categories in 2000 included the following: White; Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and Other Pacific Islander; Other (one race); and a separate category for persons wishing to characterize themselves as two or more races. Overall, this change in categories resulted in a general increase in reported Persons of Color across the U.S. This increase in reporting would be expected to be similar for the City of Seattle and the Study Area. In Table 4, however, the change in racial composition of the Study Area and the South Park Community showed a more significant increase than could be attributable to changes in data reporting alone.

The U.S. Bureau of the Census also reports the number of persons of any race who consider themselves Hispanic (see Table 4). In 1990, the population of the South Park Community was approximately 15 percent Hispanic and the Study Area was approximately 9 percent. Both geographic areas differed considerably in Hispanic population composition from the City of Seattle, with only 4 percent of the population reported to be Hispanic in 1990. Similar to the increase in racial diversity of the South Park Community and the Study Area over the past decade, the percentage of the population that considered itself Hispanic also increased substantially. For the South Park Community, the U.S. Bureau of the Census reported an estimated 37 percent of the population was Hispanic and the percentage for the Study Area was 24 percent. These figures clearly indicate the growing significance of the Hispanic community that has settled in South Park, especially considering 5 percent of the population of the City of Seattle is Hispanic.

Related to racial and ethnic diversity, the U.S. Bureau of the Census collects data from the short-form sample survey relating to the primary language spoken in the home. In 2000, an estimated 26 percent of the households in the South Park Community spoke primarily Spanish and an estimated 11 percent of the households in the Study Area spoke Spanish. This information shows a higher proportion of the residents of the South Park Community are Hispanic compared to the larger Study Area. An additional 10 percent and 13 percent of the households, respectively for the same two geographic areas, spoke an Asian or Pacific Island language (see Appendix C). The data does not identify which of the many Asian or Pacific Island languages are spoken. These figures do not indicate whether members of the households can speak English or if the household is isolated from the community due to their lack of knowledge of English. But these figures clearly indicate the strength of the Hispanic and Asian cultures in the community. In comparison, only 4 percent of the households in the City of Seattle are primarily Spanish-speaking. With this understanding of potential language barriers in the South Park community, Spanish language translators were in attendance at the South Park public meeting, handouts were prepared in Spanish and English. Vietnamese translators, not Spanish translators, were used to help conduct the survey of the business owners on 14th Avenue S. Additional research is needed to determine if 5 percent or more of South Park residents speak other foreign languages besides Spanish. The planning of future public meetings,

hearings, and/or newsletters should consider this information, particularly in relationship to the upcoming publication of the Draft EIS, as it may warrant the publication of materials or use of translators in languages in addition to Spanish.

5.4 Household Characteristics

There is less disparity between the South Park Community and the Study Area with the City of Seattle relating to household characteristics compared to the racial and ethnic heritage of residents. In 2000, the U.S. Bureau of the Census measured a number of descriptive household characteristics for the community (see Table 5and Appendix D for details). In general, the average number of persons per household is higher for the South Park Community and the Study Area than the City of Seattle—3.02, 2.61, and 2.18 persons, respectively. Higher percentages of the households are families or families with children. In fact, the proportion of South Park Community households that were families with children in 2000 is nearly twice as high as the City of Seattle. In contrast, the percentage of one-person households in the South Park Community is substantially less than for the entire city. These household characteristics are reported in both the 1990 as well as the 2000 census figures. Overall, they are similar to the characteristics of other Seattle residential communities outside of the downtown area. The figures, however, also indicate that more families and children are residing in the community than a decade ago, whereas the trend for the entire city is decreasing.

Table 5. Household Characteristics, 1990 and 2000

	1990				2000			
	Persons/ HH	**Families**	**Families with Children**	**One - Person HH**	**Persons/ HH**	**Families**	**Families with Children**	**One - Person HH**
South Park Community	2.52	621 (56%)	372 (33%)	370 (11%)	3.02	747 (61%)	435 (35%)	335 (27%)
Study Area	2.34	2,075 (54%)	1,022 (26%)	1,341 (12%)	2.61	2,294 (57%)	1,207 (30%)	1,309 (32%)
City of Seattle	2.18	112,969 (48%)	47,378 (20%)	94,179 (12%)	2.18	113,400 (44%)	46,310 (18%)	105,542 (41%)

Note: HH = household.

Source: U.S. Census, 1990 and 2000.

Table 6 provides statistics on the ages of residents of the South Park Community, the Study Area, and the City of Seattle (see Appendix E for details). What is most interesting is that the percentage of the population under 18 years of age residing in the South Park Community is increasing. This is consistent with changes seen in household characteristics. In 1990, a total of 27 percent of the population was under 18 years of age. In 2000, 28 percent of the population was children. This trend is opposite to demographic

changes seen over the past decade for the City of Seattle where the percent of the population under 18 years of age decreased from 17 percent to 16 percent over the past decade. Both the percentage of elderly (over 64 years of age) and population age trends over the past decade for the South Park Community and Seattle are similar.

Table 6.Age Characteristics, 1990 and 2000

	1990				2000			
	< 5 yrs	**5-17 yrs**	**18-64 yrs**	**> 64 yrs**	**< 5 yrs**	**5-17 yrs**	**18-64 yrs**	**> 64 yrs**
South Park Community	265 (9%)	496 (18%)	1,725 (61%)	323 (11%)	318 (9%)	714 (19%)	2,356 (63%)	329 (9%)
Study Area	678 (8%)	1,269 (14%)	5,861 (65%)	1,226 (14%)	827 (8%)	1,825 (17%)	6,897 (65%)	1,060 (10%)
City of Seattle	29,269 (6%)	55,661 (11%)	352,929 (68%)	78,400 (15%)	26,215 (5%)	61,612 (11%)	407,740 (72%)	67,807 (12%)

Source: U.S. Census, 1990 and 2000.

5.5 Housing

Like many of Seattle's urban neighborhoods, the majority of housing in South Park is single-family detached dwellings though only 42 percent own their own home. In 1990, the U.S. Bureau of the Census reported an estimated 61 percent of the dwellings in the South Park Community were single-family compared to an estimated 46 percent for the Study Area and 52 percent for the City of Seattle (see Table 7and Appendix F for details). Vacancy rates were higher for the South Park Community (9 percent) and the Study Area (6 percent) compared to the City of Seattle (5 percent). The proportion of households owning their residence in the South Park Community was only slightly less than for the entire City, 42 percent compared to 49 percent, respectively.

Table 7.Housing Characteristics, 1990 and 2000

	1990			2000		
	Single-Family	**Owner-Occupied**	**Renter-Occupied**	**Single-Family**	**Owner-Occupied**	**Renter-Occupied**
South Park Community	750 (61%)	468 (42%)	648 (58%)	809 (66%)	555 (45%)	675 (55%)
Study Area	1,887 (46%)	1,682 (44%)	2,180 (56%)	2,054 (50%)	1,803 (44%)	2,255 (56%)
City of Seattle	128,618 (52%)	115,709 (49%)	120,993 (51%)	132,908 (53%)	125,165 (48%)	133,334 (52%)

Source: U.S. Census, 1990 and 2000.

In 2000, the U.S. Bureau of the Census statistics reported a general increase in homeownership in the South Park Community. Over the past decade, the number of single-family detached dwellings in the South Park Community increased from 750 to 809, or 61 percent to 66 percent of the total number of dwellings in the community, respectively. Owner-occupancy also increased from 42 percent to 45 percent during the same period. In April 2000, vacancy rates for housing in the community were more similar to rates for the City as well, 6 percent compared to 4 percent, respectively. The lower number of owner-occupied dwellings compared to single-family detached dwellings, however, continues to indicate a significant number of the single-family dwellings are occupied by renters. More than likely, these households are families who may not be able to find apartments with sufficient numbers of bedrooms to adequately accommodate family needs. Overall, these housing statistics seem to indicate a strengthening in the local housing market in South Park since 1990.

The City of Seattle has an inventory of affordable subsidized housing units by census tract. The most recent inventory listed a total of 74 units located in the South Park Community (City of Seattle, 2003; Hewitt, 2003a). This is approximately 6 percent of the total number of dwelling units. These affordable units include multi-family buildings, four-plexes, duplexes, as well as single-family dwellings. None of the affordable housing units are located in the project corridor along 14th Avenue S. Most are located on the western side of the community. The affordable housing located closest to the project area is near the intersection of S. Rose Street and 10th Avenue S.

5.6 Income

One of the prime indicators of the ability of households to acquire housing is income. Typically, median household income and per capita income are used for comparison. Statistics in the 1990 census reported the 1989 median household income for the South Park Community was $20,977 and $26,655 for the Study Area (see Table 8and Appendix G for details). Both of these figures are considerably less than the $29,353 annual median income reported for all Seattle households. Household incomes were nearly 30 percent less than the median household income reported for the City of Seattle. The differences in per capita income were even more dramatic. For 1989, the per capita income for the South Park Community was $9,766 compared to $18,308 for Seattle households. At that time, approximately 25 percent of the households in the South Park Community had incomes reported to be at or below the poverty level. In comparison, an estimated 12 percent of households in Seattle had a reported income at or below the poverty level. Clearly, the substantially higher proportion of households with incomes at or below the poverty level indicates the South Park Community was a low-income community a decade ago.

Table 8. Household Income Characteristics, 1990 and 2000

	1990	2000

	1989 Med. HH Income	1989 Per Capita Income	HH with Public Assist.	1989 Pop. Below Poverty	1989 Med. HH Income	1989 Per Capita Income	HH with Public Assist.	1999 Pop. Below Poverty
South Park Community	$20,997	$9,766	NA	696 (25%)	$31,304	$15,846	113 (9%)	446 (13%)
Study Area	$26,655	$13,850	NA	1,532 (18%)	$36,515	$24,537	218 (5%)	1,237 (12%)
City of Seattle	$29,353	$18,308	NA	61,681 (12%)	$45,736	$30,306	7,638 (3%)	64,068 (12%)

Note: HH = household

Source: U.S. Census, 1990 and 2000.

Over the past 10 years, the economic welfare of community residents has improved. In 2000, the U.S. Bureau of the Census reported median household income for the South Park Community had increased from $20,977 to $31,304, an increase of nearly 50 percent. The median household income for the larger Study Area also increased, though less dramatically, from $26,655 to $36,515, or approximately 37 percent. For comparison, the median household income for all of Seattle increased from $29,353 to a reported $45,736, an increase of approximately 56 percent. Thus, the increases in median household income in the project area trailed behind increases seen by City of Seattle households generally. Per capita incomes similarly increased, though approximately 12 to 13 percent of South Park households have incomes at or below the poverty level in April 1999. The percentage of households receiving public assistance in the South Park Community, however, was approximately three times the rate reported for the City of Seattle. Despite the fact that approximately 9 percent of the households in the South Park Community received public assistance in 1999, only an estimated 6 percent of the dwelling units are affordable or subsidized units (City of Seattle, 2003).

These statistics show a dramatic improvement in the financial resources available to community residents. And, the proportion of the population living at or below the poverty level is now very similar to the proportion reported for all of the City of Seattle. Overall, though, the community residents have substantially lower median incomes, lower per capita incomes, and a higher proportion receiving public assistance compared to the residents of the City of Seattle as a whole.

A specific measure of economic well-being of the community is a proportional comparison of the median household income of the community to the larger city or region. For the South Park Community and the City of Seattle, the U.S. Bureau of the Census reported the 1999 median income was $31,304 and $45,736, respectively (Census, 2000). As such, the median household income of the Community is approximately 68 percent of the median income of the City of Seattle. Considering the federal government defines poverty for statistical purposes as 80 percent of median family income, the South Park Community has a sizable low-income population. Recent

studies by the City of Seattle, in fact, have examined a number of factors in additional to median household income and has concluded the South Park community is "economically distressed" (Hewitt, 2003b).

5.7 Community and Social Services

There are few community facilities or social services located in the immediate project area, though there are a number within the South Park community. The following paragraphs describe the community centers, library, social services, and religious institutions located in South Park. See Figure 16 for a map of community and social services located in the South Park community.

The South Park Community Center is located approximately a half mile west of the project area on 8th Avenue S. The community center provides a variety of recreational and social activities for area residents. In addition, the South Park Neighborhood Center is located at 8201 10th Avenue S. This building houses several non-profit organizations, including the Environmental Coalition of South Seattle (ECOSS). The locally sponsored teen boxing program meets in the basement. Many in the community informally refer to the building as the "senior center."

The City of Seattle is planning to construct a neighborhood library in the South Park community (Jennings, 2003). The architects have just recently been awarded a contract and the site has been selected. The new library will be located on the southeast corner of S. Cloverdale Street and 8th Avenue S. The library is anticipated to open in 2006.

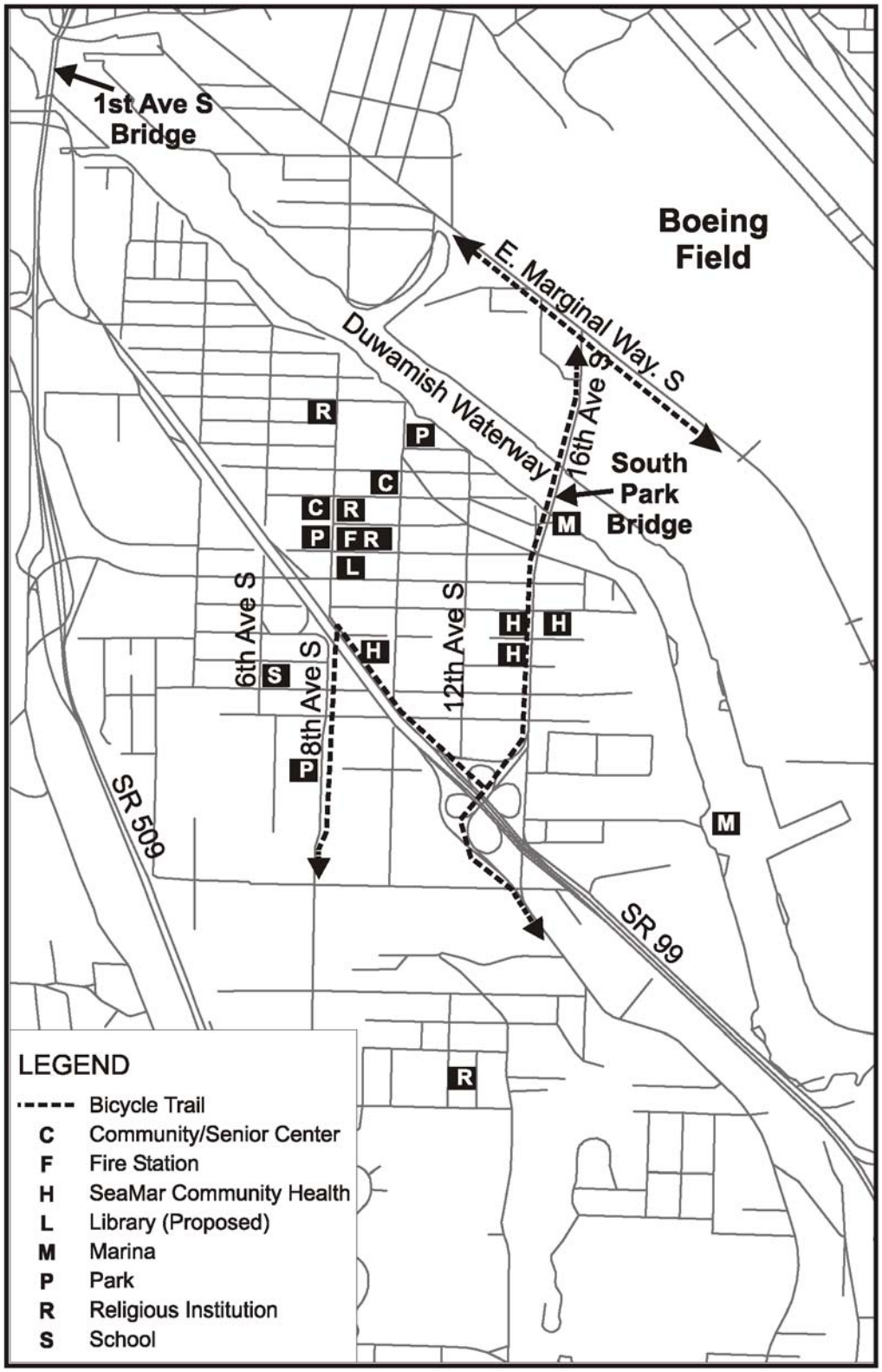

Figure 16
South Park Community and Social Services

The closest social service facility in the project area is the Sea Mar Community Health Center near the southern terminus of the project corridor. This health center and clinic is operated by a non-profit organization that also operates a number of other facilities in Western Washington. The Sea Mar Community Health Center is housed in several buildings and provides a wide array of services for the metropolitan Seattle area. The medical and dental clinics and pharmacy are located in three separate buildings on separate corners of the intersection of 14th Avenue S. and S. Trenton Street. The clinic is actively involved in providing health care services for the South Park community as well as the Hispanic community in the larger metropolitan region. The clinic provides comprehensive, affordable, and culturally sensitive health and human services to the Hispanic, low-income, disadvantaged, migrant, and seasonal farm worker populations. Services provided include medical care; dental care; laboratory and radiology services; health education; women, infant, and children nutrition program; home care; Latino and Senior assistance; mental health/substance abuse counseling; and adult and youth treatment centers. In addition, child development, intergenerational day care services, and the skilled nursing center are located at 1040 S. Henderson Street, several blocks west and south of the project corridor.

There are no religious institutions located within the immediate project corridor; however, there are three Christian churches in the community including the United Oromo Church (850 S. Cloverdale Street), the New Hope United Presbyterian Church (833 S. Thistle Street), and the UPC Asia (727 S. Kenyon Street). Despite the fact the community identifies itself as a Hispanic community, there are no catholic churches located in South Park. Our Lady of Lourdes Catholic Church, the closest catholic church, is located at 10240 12th Avenue S. Holy Names Catholic Church and its parochial school are located at 9622 20th Avenue SW west of the South Park community in White Center.

5.8 Public Services

Buildings housing public services for the project area are located outside of the immediate area that would be affected by the proposed rehabilitation or replacement of the South Park Bridge. Fire, police, and schools located in the area are described below.

5.8.1 Fire

There is a City of Seattle fire station, Fire Station No. 26, that is located at 800 S. Cloverdale Street, approximately one-half mile west of the project area. This station provides fire suppression, emergency medical, and salvage capabilities. The station has an emergency response time of approximately five minutes.

Due to the moderately high density of buildings in the South Park community and surrounding industrial land uses, personnel and equipment from several surrounding fire stations typically are asked to respond to emergencies (Young, 2003). Fire stations that could be called to an emergency in South Park include Fire Stations No. 11 (1514 SW Holden Street), No. 27 (1000 S. Myrtle Street), and No. 32 (3715 SW Alaskan Way).

From each of these fire stations, direct access to an emergency in South Park may or may not involve travel across the existing South Park Bridge. If an emergency response vehicle is caught in a traffic delay due to opening of the bridge, calls are made to alert the dispatch office of expected delays (Young, 2003). The dispatch officer, in turn, may call in additional back-up for the emergency situation. Similarly, if an emergency call directs personnel and equipment from the South Park Fire Station No. 26 to respond, then the emergency vehicles may or may not need to cross the South Park Bridge to travel to emergencies north of the community. All personnel working in surrounding area fire stations are trained to consider potential delays from opening of the South Park Bridge and familiarize themselves with alternate routes should the bridge be open.

5.8.2 Police

The proposed project is located within the Seattle Police Department's Southwest Precinct. This is a newly established precinct comprising the western portion of the old South Precinct, which had headquarters located at 3001 S. Myrtle Street, east of I-5 and approximately 5.9 miles northwest of the bridge. The new Southwest Precinct building located at 2300 SW Webster Street in Delridge was opened in March 2003 and serves an area of approximately 20 square miles, including West Seattle, Georgetown, and South Park. The precinct has 95 police personnel and provides the full range of emergency response and public safety services to prevent crime and enforce the law. The new precinct headquarters office is less than 2 miles from the heart of South Park.

Due to potential traffic delays when the bridge is open, patrol officers are trained to consider using alternate routes other than the South Park Bridge during an emergency (Nolette, 2003). In addition, if an officer is caught in traffic due to opening of the bridge, the officer will call the dispatcher so another officer can be assigned.

5.8.3 Schools

The nearest public school to the project area is the Concord Elementary School. This school is located at 723 S. Concord Street, approximately one mile southwest of the bridge. The boundary for the school is one of the largest in the City of Seattle because it serves children of residential neighborhoods scattered in the industrial area between I-5 and SR 509 from the city limits north almost to the 1st Avenue S. Bridge and portions of Georgetown.

Enrollment in 2002 was 334 students from kindergarten through fifth grade. The Concord Elementary School 2001 Annual Report described the student body is more diversified than the overall Seattle School District. Twelve percent of the student body is classified as Caucasian, 48 percent are Latino, and 22 percent are Asian. The school also provides in-school day care, a full-day Head Start Program, before and after school care for children provided by the YMCA of Greater Seattle. In addition, the school provides space for adult English as a Second Language (ESL) evening classes as well as monthly family dinner and education nights.

The Seattle School District contracts with First Student, Inc., to transport children to and from far-away residential areas. In 2002-2003 there were only two buses that transported

students attending Concord Elementary School (Leonzal, 2003). Due to potential traffic delays caused by opening the bridge, the bus routes typically use the 1st Avenue S. Bridge rather than the South Park Bridge. In addition, the overnight storage lot for the buses is located at 130 S. Kenyon Street, immediately south of the 1st Avenue S. Bridge. Most children walk or bike to the school. Because the school is located west of SR99, there is a footbridge across the highway at S. Henderson Street that allows students to walk or bike to school without traveling along busy S. Cloverdale Street to cross under the highway.

South Park children generally attend Denny Middle School and Chief Sealth High School. Both of these schools are located west of the South Park community in White Center. The two schools have adjoining campuses. In addition, the South Campus of the Seattle Community College is located approximately 1 mile from South Park, just northwest of the 1st Avenue South Bridge.

5.9 Recreation

There are few recreational resources in the immediate project corridor, though several are located in the surrounding residential areas. The South Park Community Center, located at 8319 8th Avenue S., is approximately one-half mile west of the south side of the bridge. One of 24 citywide community centers operated by Seattle Parks and Recreation, the center provides a variety of educational, family, and athletic programs, classes, and special events for the local community. The South Park Playground is located immediately adjacent to the south side of the community center at 738 S. Sullivan Street. The 5.6-acre playground provides facilities for baseball, softball, and soccer games. South Park Meadow is a one-acre neighborhood park located at approximately 9100 8th Avenue S., approximately 1 mile southwest of the bridge.

The Duwamish Waterway Park is located at 7900 10th Avenue South, approximately 0.4 miles west of the South Park Bridge. This park is located along the southern shore of the Duwamish Waterway. The small 1.5-acre park provides opportunities for passive recreation and open space. Visitors to this park have views of the South Park bridge from the shoreline.

In addition, there are plans to restore the southern waterway shoreline between the Duwamish Waterway Park and the South Park Bridge for improved public access. The plan is to clean up and replant the existing shoreline and make it a salmon-friendly shoreline. It is hoped this project, sponsored by the Environmental Coalition of South Seattle (ECOSS), will become a model for public/private partnership for salmon recovery along the Duwamish River. The focus of the project is to encourage public involvement and to develop a community-based stewardship program.

The Duwamish Waterway is a popular recreational asset in the community and the region. Immediately east of the bridge on the South Park side of the navigation channel there is a private marina called the South Park Marina. Approximately 160 boats, both sail boats and power boats, are moored at the marina (Crow, 2003). In addition, there is

dry dock space for an additional 165 boats nearby. There is no public boat ramp available in the South Park community. A boat ramp, however, is located adjacent to the 1st Avenue S. Bridge, but it is reserved for use by Tribal members. The nearest public boat ramp is located on Alki Point. The Duwamish Yacht Club is located upstream approximately 1 mile from the South Park Bridge and provides additional moorage space for sail and power boats. Due to pollution levels in the Duwamish Waterway, signs are posted to warn people against fishing for bottom fish or gathering shellfish for human consumption. Tribal members, however, tie their boats to the existing bridge piers to fish for seasonally migrating salmon.

5.10 Pedestrian, Bicycle, and Transit

As described above, large industrial plants, highways, and the Duwamish Waterway surround the South Park community. Access to adjacent neighborhoods, like Georgetown and White Center as well as downtown Seattle, is more circuitous due to these surrounding land uses and existing physical barriers. Generally, pedestrian, bicycle, and transit use rates are lower than rates for the City of Seattle. In particular, the 2000 census reported that an estimated 13 to 16 percent of workers 16 years of age or older used transit compared to 18 percent of all of the residents of Seattle (see Appendix H). Approximately 1 percent used a bicycle and 4 to 5 percent walked to work. These rates, though, are only slightly less than citywide averages. Most residents use private vehicles to travel to their work destinations. However, only 14 percent of the households in the South Park Community have no access to a private vehicle and are dependent upon public transit. This is less than most Seattle households, where 16 percent are transit dependent.

In the project corridor, sidewalks are located along both sides of 14th Avenue S. Many of the adjacent side streets also have sidewalks, though not all. Six-foot sidewalks are also present along both sides of the existing South Park Bridge. Due to the narrow traffic lanes on 14th Avenue S. and the relatively high traffic volumes, bicyclists often use the sidewalks alongside pedestrians. This narrow width of the sidewalks, however, is non-standard for combined pedestrian and bicycle use and could lead to accidents. Workers from Boeing and other businesses north of South Park walk across the bridge to patronize the community's restaurants during mid-day hours on weekdays. And residents walk north across the bridge to the bus stop on East Marginal Way S. Here again, the narrow traffic lanes and high traffic lanes encourages bicyclists, especially recreational cyclists, to use the non-standard sidewalks instead of the roadway pavement. Pedestrians are common along 14th Avenue S. while conducting errands, shopping, or waiting for the bus. Only a few pedestrian crossings, however, are marked on 14th Avenue S. In addition, the existing configuration of the intersection of S. Sullivan Street/Dallas Avenue S. and 14th Avenue S. is poorly configured and is a safety concern when pedestrians try to cross 14th Avenue S. at this intersection.

King County Metro provides transit service to the project area, primarily along major north-south transportation corridors. Routes 130, 132, and 60 operate on 14th Avenue S. and nearby adjacent streets, and on-street bus stops are located in the project area. Routes

154, 173, and 174 also travel through the community from Auburn, Federal Way, and Sea-Tac International Airport. The frequency of bus service on these routes is between 10-30 minutes during peak periods and 20-60 minutes during off-peak. Bus ridership statistics indicate that the heaviest usage of these routes originates at the following intersections: 14th Avenue S. and S. Sullivan Street; 14th Avenue S. and S. Cloverdale Street; and S. Cloverdale Street and 12th Avenue S. (See the *Transportation and Traffic Technical Report* for additional information.)

At stated above, separate bicycle facilities are not provided on 14th Avenue S., 16th Avenue S., nor are bicycle lanes provided on the bridge. Serious bicycle commuters using the King-County-designated bicycle trail tend to ride in the traffic lanes and recreational bicyclists tend to ride on the sidewalk with the pedestrians. There is an existing bicycle lane on 14th Avenue S. between SR 99 and S. Cloverdale Street. North of S. Cloverdale Street, this bicycle lane is discontinuous, but reappears briefly on the west side of East Marginal Way S. at 14th Avenue S. King County is planning to add a paved regional trail extension at the 14th Avenue S. intersection with SR 99 that would connect with an existing regional bicycle trail traveling south on SR 99.

5.11 Community Cohesion

Community cohesion for the South Park community is quite strong. It is defined by a variety of factors. The community boundaries are greatly defined by natural topography, major north-south highways, the Duwamish Waterway. The residential community surrounds a small commercial district. The residents have a diverse heritage, particularly Hispanic and Asian. There are special events celebrated in the community and generally held concerns for preserving the unique residential neighborhood and commercial district on 14th Avenue S. The following sections describe these elements of community cohesion in more detail.

5.11.1 Community Physical Features

The South Park community is generally isolated from adjacent residential areas. It is located on the west side of the Duwamish River valley between the navigation channel and the steep hillside defining the valley. To the south, the river meanders far to the west side of the valley and the hillside follows the meander and forms a natural barrier cutting off the community from residential areas to the south. The community is nestled up against the hillside and stretches across the valley floor to the Duwamish Waterway.

The Duwamish Waterway and valley hillside limit the number of transportation corridors in and out of the community. Vehicles crossings the Duwamish Waterway are limited to only two bridges in the vicinity of South Park—the 1st Avenue S. Bridge to the north of the community and the South Park Bridge at 16th Avenue S. Major north-south transportation corridors, however, traverse the community. On the north immediately south of the 1st Avenue S. Bridge, the community is bounded by a large highway interchange between SR 509 and SR 599. SR 509 continues south along the base of the hillside and then ascends the hillside and continues south. Vehicles on SR 509 take the S. Cloverdale Street Interchange to get to the South Park community. SR 99 traverses

diagonally from northwest to southeast across the community. This highway has an interchange with 14th Avenue S. several blocks south of the project area. Considering SR 509 is an at-grade limited access highway and the hillsides west and south of the community are steep, few local streets cross the highway or connect South Park residential areas to residential areas to the west or the south.

Moreover, industrial land uses adjacent to South Park separate this residential community and its business district from adjacent residential neighborhoods. Industrial development stretches along the entire east shore of the Duwamish across from South Park. Industrial buildings are located north of the SR 509 and SR 99 interchange and the 1st Avenue S. Bridge. In addition, industrial land uses and warehouses are located south of the South Park community at the foot of the hillside that forms the southern edge of the community. The size of the industrial parcels, changes in the street network, as well as the scale of the buildings all help to isolate the community.

Figure 17 is an aerial photo of the South Park vicinity and clearly depicts the wooded hillsides, highways, industrial land uses, and the Duwamish Waterway that surround the community. These community features effectively isolate the community from adjacent residential areas and focus community interaction between South Park residents as well as the residents and local businesses.

5.11.2 Community Characteristics

The community characteristics of South Park in many ways make the community similar to a stand-alone small town within the metropolitan area. The community is organized by a traditional small block grid pattern of narrow streets. The structures in the community are predominantly small-scale single-family houses. The community has its own centrally located business district along 14th Avenue S. extending from the Duwamish Waterway south to S. Concord Street (immediately to the south of the project area). In addition, 14th Avenue S. is a busy principle arterial street with both private and commercial vehicular traffic.

The commercial district includes most of the basic types of retail businesses required to meet the everyday needs of the community (Parsons Brinckerhoff, 2003). There is a grocery store, pharmacy, dry cleaner, hair salon, video store, taxi service, travel agency, several restaurants, a gas station, and an auto repair shop. Basic services and retail businesses that do not appear to be located in the community include a bank, movie theatre, and larger commercial stores like junior department stores and hardware stores. The business owners have formed their own South Park Business Association as well as the South Park Merchants Association.

Figure 17
South Park Community Study Area

As described above, the community has its own elementary school (Concord Elementary School), community center, senior citizen center, churches, health clinic, and social services provider. Like a suburban town, though, most workers in the community travel outside of the community to work. The 2000 U.S. Bureau of the Census reported an estimated 78 percent of the workers in the community travel 15 minutes or more to their place of work. Moreover, a survey of businesses located on 14th Avenue S. indicated that employees do not necessarily live in the community, but rather commute from quite distance locales within King County (Parsons Brinckerhoff, 2003).

5.11.3 Unique Community Identity

In part because the South Park community is somewhat isolated from adjacent residential areas and is nearly a self-contained community, the community has developed a sense of unique community identity. Access to the community is limited to only a few specific entrance points into and out of the community. Driving a car from the west and south, one descends into South Park. From the north and east, you cross over a bridge spanning the Duwamish Waterway. The community is a riverside "town" where residents can watch commercial tugs and barges as well as recreational boats travel up and down the waterway. At the two public workshops held for the South Park Bridge Project, members of the community repeatedly stated they wanted the existing historic South Park Bridge to be rehabilitated. The old bridge is a key gateway to the community. It links the community with the navigational traffic and provides the community with a unique identity.

5.11.4 Diverse Community Heritage

Though the South Park community historically was the home of Italian truck farmers, the community's residents today are of diverse racial and ethnic backgrounds. As described above for the Study Area, approximately 47 percent of residents are Persons of Color, 24 percent are Hispanic, 16 percent and 10 percent, respectively, speak primarily Spanish or an Asian or Pacific Island language at home (U.S. Census, 2000). The households are predominantly family households. In addition, the median household income in the Study Area is modest, a number of households receive public assistance, and many individuals live at or below the poverty level. In many ways, the residents face any similar problems, which can pull the community together.

In addition, the community ethnicity has lead to a concentration of businesses catering to the local and regional Hispanic population. Based on a survey of local businesses, a total of three of the seven restaurants in South Park are Mexican (see the *Land Use Technical Report* and *Economics Technical Report*). Moreover, none of these restaurants are franchises of chain restaurants, e.g. Taco Time. Rather, they are family-owned and operated businesses. The grocery store carries specialty items for the Hispanic community, including traditional bakery and pastry goods. In addition, the Sea Mar Community Health Center is dedicated to providing health care for the Spanish-speaking and low-income populations in the Seattle metropolitan area. Responses to a survey of businesses located on 14th Avenue S. indicated that many of the business owners felt this concentration of Hispanic businesses helped pull customers from outside the community to shop in South Park (Parsons Brinckerhoff, 2003). Others commented that customers

may initially visit the South Park community for medical services, but will also shop for favorite or traditional Mexican foods at the local grocery and bakery. Together, these businesses help to create South Park's special identity as a Hispanic community.

5.11.5 Special Community Events

The residents of South Park participate in community activities, which over the years have helped to solidify community identity. Ethnic festivals such as the "Fiesta Patrias" celebrate the community's strong Hispanic cultural identity. This annual fall festival celebrates Mexico's historic independence from Spain. The celebrations include a parade with traditional Mexican costumes, music, and displays of the Mexican flag. Many families in the community also continue to celebrate the Mexican traditional rite of passage for their daughters (Seattle Times, 2002). The often-lavish *quinceañera* includes traditional music, dancing, food, and a special catholic Mass honoring the young women. The South Park elementary school, Concord Elementary, hosts monthly family dinner and education nights to provide an opportunity for neighbors to meet and talk informally. Together, these types of community activities help to build and maintain a feeling of community cohesion among residents and businesses.

5.11.6 Community Concerns

A strong indicator of the community cohesion in South Park has been the common desire to preserve and enhance the residential character and community commercial district of South Park. The following paragraphs summarize: 1) community goals and objectives in the South Park neighborhood plan, 2) public comments received on the proposed project at several public meetings, 3) the concerns expressed by the project Community Advisory Group, and 4) the issues raised by property owners and business owners.

5.11.6.1 Neighborhood Plan

The public participation activities held in late 1990 associated with the development of the *South Park Residential Urban Village Plan* (City of Seattle, 1998) identified community goals for the South Park community. In total, five key planning activities were identified to improve the quality of life in the community. These activities include 1) provide a library for South Park, 2) improve the business district, 3) improve infrastructure, 4) improve buffers for residential areas, especially to keep trucks out of the residential neighborhoods, and 5) annex the unincorporated portion of South Park to the City of Seattle.

The neighborhood plan also identifies a total of seven key objectives specifically designed to improve the 14th Avenue S. business district. These key objectives are listed below:

- Improve pedestrian safety, traffic circulation, and the visual character along 14th Avenue S. and the 16th Avenue South Bridge, including reconfigure the S. Sullivan Street intersection with 14th Avenue S.

- Attract desired services along 14th Avenue S. for those who live and work in South Park, including a pharmacy, a bank, a dry cleaner, and a novelty store

- Focus economic reinvestment on 14th Avenue S. to benefit the existing population
- Make it easier to establish and maintain businesses along 14th Avenue S.
- Seek ways to improve the environment for small businesses to thrive in South Park through technical assistance for business start-up and/or expansion
- Address the special needs of South Park, which has historically experienced less economic opportunity and has high concentrations of people living in economic hardship

The planning activities and key objectives recognize the strong neighborhood characteristics of the South Park community. It is a residential community encompassing the small commercial district along 14th Avenue S. Members of the community recognize this tie and want to preserve and reinvigorate their "downtown" area as the heart of the community.

5.11.6.2 Public Comments

To date, King County has held two public meetings and a public scoping meeting to solicit public comment on the proposed rehabilitation or replacement of the South Park Bridge. The first public workshop was held in January 2002, the public scoping meeting was held in February 2002, and the second public workshop was held in June 2002. Additional written and verbal comments also have been received by King County.

The comments can be grouped into five categories (Index, September 2002). Many comments voiced support of a particular option. Other comments discussed potential adverse impacts in general or related to a specific bridge alternative. Comments addressed the planning process and funding issues. In addition, members of the public suggested different alternatives than those currently under consideration.

Many of the same comments were repeatedly made. They express concern about traffic and access to, around, and out of the community. There is concern about potential impacts to 14th Avenue S. as well as the marina, Delta Marine, the historic South Park Bridge, and the residents of the community. There also is concern about the scale, visual impacts, and aesthetics of a replacement bridge structure compared to the existing bridge.

The most common comments addressed potential impacts to the businesses on 14th Avenue S. The public is concerned about potential affects on the retail core, reduction in retail space, the number of businesses affected, changes in traffic flow and speeds that might affect the commercial district, construction impacts on shopping and visits for health care providers at SeaMar Community Health Center, and the overall relationship of the community and the commercial district. These comments highlight that potential impacts to the retail core occurring as a result of rehabilitation or replacement of the bridge could cause changes opposite to the goal to preserve and enhance the retail core as expressly stated in the *South Park Residential Urban Village Plan* (Seattle, 1998).

5.11.6.3 CAG Concerns

As part of the project public involvement activities, King County established a Community Advisory Group (CAG). This group is comprised of South Park residents, property owners, and business owners who represent a broad spectrum of community interests. County representatives have met with the CAG periodically during the development of conceptual engineering and the preparation of the EIS. The County representatives have briefed the CAG members on the proposed alternatives, the analysis of potential environmental impacts, public comments, and project schedule. These meetings also provide representatives of the community opportunity to voice their concerns about the project. To date, a total of seven meetings have been held.

The CAG members have expressed a number of concerns about the potential impacts that would result from each of the project alternatives. Above all, the members have expressed a desire to rehabilitate the existing historic bridge, if possible. As an alternative, they have supported the selection of the Bascule Bridge Alternative, as it would be similar in size and function of the existing historic bridge structure, but would have increased capacity. Plus, the members commented that a new bascule bridge could be constructed to look similar to the existing bridge. The CAG members attending the June 4, 2002, meeting, however, were worried that each of the other project Build Alternatives would significantly affect "community cohesion." And secondarily, the other alternatives would adversely impact the residential neighborhoods and the community commercial district in South Park. They fear that some alternatives could break apart the community. The members have repeatedly expressed concern for potential short-term and/or long-term reduction in on-street parking, decreased access to public bus transportation, loss of revenue to local businesses, displacement of businesses, construction noise impacts, and adverse impacts to navigation traffic and upstream water-dependent economic development. Several members have also voiced concern that delays in selection of the preferred alternative could discourage commercial property owners from making additional property investments to the overall detriment of the community commercial district.

5.11.6.4 Property Owners' Comments

On December 3, 2002, King County hosted a meeting with property owners along 14th Avenue S. The purpose of this meeting was to review the project alternatives, review the schedule for the preparation of the EIS, and to generally describe the right-of-way acquisition process. A good portion of the meeting was dedicated to questions and answers.

At this meeting, there were a number of issues raised that addressed both potential impacts of the project alternatives as well as potential mitigation measures that could mitigate impacts of project alternatives and improve the business district. A key point was that the preliminary conceptual plans at that time showed S. Sullivan Street would be closed to traffic following construction of several of the alternatives. Attendees pointed out the need to keep S. Sullivan Street open to serve industrial property. This goal is called out in the *South Park Residential Urban Village Plan* (Seattle, 1998). Property owners pointed out there is very little on-street parking for customers on 14th Avenue S.

Many of the attendees voiced their opinion that the High-Level Fixed-Span Bridge Alternative should not be considered due to the severe impacts that this alternative would have on the community's commercial district. Others were concerned about the changes in circulation within the community, especially with the High-Level Fixed-Span Bridge Alternative routing of principle arterial traffic from the bridge through the residential neighborhood via S. Trenton Street and 12th Avenue S.

5.11.7 Summary

In summary, the existing South Park community is somewhat geographically isolated from adjacent residential communities due to natural topographic features and the river. Despite two major highways that traverse the community, access to and from the community is served by only a few exits. The two bridges across the Duwamish Waterway also limit access to the community. This isolation has fostered a unique, diverse, and cohesive community. Residents look to the existing historic South Park Bridge as a major symbol and gateway to the community. Repeatedly, they have voiced their desire to preserve the old historic bridge, which transports residents from an industrial area and across the river to a growing single-family residential community catering to families and children. South Park celebrates its racial and ethnic diversity as demonstrated by events held annually in the community.

Members of the community through a number of forums have repeatedly expressed their concern about potential impacts to their community, and especially the eight-block commercial district on 14th Avenue S. They are particularly concerned about potentially significant right-of-way acquisition associated with the High-Level Fixed-Span Bridge Alternative. They want to preserve and enhance their community commercial district, which many in the community see as the core, or focus, of the community. Community residents, business owners, and property owners see impacts of any sort that require the acquisition of property and demolition of existing buildings on 14th Avenue S. as contrary to community goals. The fact that these comments and concerns expressed at the various public forums focus on community interests, rather than the particular concerns of individual property owners, is a strong indication of the strength of community cohesion in South Park.

5.12 Environmental Justice

This section on environmental justice is divided into four separate discussions. The first summarizes the legislative background related to requirements to assess potential disproportionately high and adverse impacts on minority and low-income communities. The second section summarizes various analyses conducted to make this assessment. The third section is a discussion on the presence of minority and low-income populations in the South Park community. The fourth section describes specific public involvement activities targeted to include minorities in the process.

5.12.1 Background

The concept of environmental justice is defined in Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* issued on February 11, 1994. The legal standing for this Executive Order, however, lies in Title VI of the Civil Rights Act of 1964. In the Executive Order, federal agencies are directed to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Key terms in this statement related to environmental justice compliance are defined as follows:

- **Low-Income** means a household income at or below the Department of Health and Human Services poverty guidelines
- **Minority** means a person who is:
  - Black (having origins in any of the black racial groups of Africa)
  - Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race)
  - Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
  - American Indian and Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition)
- **Low-Income Population** means any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy, or activity
- **Minority Population** means any readily identifiable groups of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed FHWA program, policy, or activity
- **Adverse Effects** means 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 man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or community's economic vitality; destruction or disruption of the availability of public and

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; and the denial of reduction in, or significant delay in the receipt of, benefits of FHWA programs, policies, or activities

- **Disproportionately High and Adverse Effect on Minority and Low-Income Populations** means an adverse effect that:
    - Is predominately borne by a minority population and/or a low-income population
    - Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population

For NEPA compliance, Executive Order 12898 requires Federal agencies to recognize that impacts upon minority populations, low-income populations, or Indian tribes may be different from impacts on the general population due to a community's distinct culture. All groups within an affected community, particularly minority and low-income populations, must be provided with a meaningful opportunity to participate in the development of alternatives and comment on potential impacts and mitigation measures. A NEPA EIS must ensure and document public input of all community groups and the potential adverse impacts on these groups. Final selection of a preferred project alternative should avoid, if possible, selecting alternatives that have disproportionately adverse effects on minority or low-income populations. Or, if the alternative would result in disproportionately adverse effects, then the effects can be minimized through the implementation of mitigation measures.

5.12.2 Approach

To document compliance with environmental justice policies, an approach was developed to investigate whether or not minority populations or low-income populations would be disproportionately affected by the proposed South Park Bridge Project. This methodology is specific to the circumstances and conditions that exist in the Study Area. The analysis of potential impacts to minority, low-income, or special needs populations was comprised of several tasks including the following:

- Year 1990 and 2000 census data was examined to identify population characteristics (race and ethnicity) in the Study Area and the South Park Community (see Sections 5.2 and 5.3). The census statistics for the Study Area and the South Park Community were compared to those for the City of Seattle to see if the proportion of the population in the Study Area and the South Park Community are similar or dissimilar to those of the City of Seattle. If significantly higher, then the Study Area and the South Park Community are assumed to be

minority communities (per Section 2c in Exhibit 458-1 of the WSDOT Environmental Procedures Manual of March 2003). If similar, the Study Area and the South Park Community are assumed to reflect the racial and/or ethnic characteristics of the region and not a minority community, even though minority individuals may reside in the Study Area and/or the South Park Community.

- Year 1990 and 2000 census data was examined to identify the number and proportion of persons living at or below the poverty level for the Study Area and the South Park Community (see Section 5.6). The census statistics for the Study Area and the South Park Community were compared to those for the City of Seattle to see if the proportion of the population in the Study Area and the South Park Community is similar or dissimilar to statistics for the City of Seattle. If significantly higher, then the Study Area and the South Park Community are assumed to be low-income communities (per Section 2c in Exhibit 458-1 of the WSDOT Environmental Procedures Manual of March 2003). If similar, the Study Area and the South Park Community are assumed to reflect the income characteristics of the region and neither are low-income communities, though low-income individuals may reside in the Study Area and/or the South Park Community.

- At the start of the project, the Project Team assumed the Study Area and South Park community would likely include minority and/or low-income populations. The public involvement strategy was developed and implemented with these considerations in mind to solicit public comment from these populations concerning anticipated impacts that might result from the proposed project. The public perceptions of potential impacts are reviewed in Section 5.11.6.

- The anticipated project environmental impacts (as defined and those perceived by the community) were evaluated to see if the impacts would be disproportionately born by individuals in the minority or low-income populations residing in the Study Area and the South Park Community. A number of potential environmental impacts were evaluated, including social, economic, access, and displacement.

- Finally, public input was considered and incorporated into the assessment of potential environmental impacts and suggested mitigation measures.

Together, these analyses form the basis for determining whether or not the potential effects of the proposed project are significant, and if any significant impacts disproportionately affect legally protected minority or low-income populations.

5.12.3 Minority and Low-Income Populations

Discussions in previous sections describe the demographics and household income of residents in the South Park Community and the larger Study Area. Section 5.3 presents detailed racial statistics reported in the 1990 and 2000 censuses. For purposes of discussion, the term “Persons of Color” is generally used in this report in place of the term “minority” to collectively refer to Non-White racial groups. To be consistent with

federal policy language on environmental justice, the term "minority" is used in this section. Section 5.6 above also provides detailed descriptive income statistics for the project area.

In 1990, the population of the South Park Community (census tract 112) was approximately 33 percent Minority (see Table 4 and Appendix B). Both the Study Area and the City of Seattle were reported to have Minority populations comprising 26 percent and 25 percent, respectively. The residents of the South Park Community were even more racially diverse a decade later. The census in 2000 reported the majority, or 56 percent, of the residents of the South Park Community were Minority persons. For comparison, the proportion of the Minority population for the Study Area had increased to 47 percent and the City's population had increased to 30 percent Minority. Considering a significantly higher proportion (almost double) of the South Park Community population is Minority compared to the City of Seattle, the South Park Community is clearly a minority community. The similar disparity between the percentage of South Park Community/Study Area and City of Seattle population that is Hispanic only reinforces that the project area encompasses a minority community (see Table 4).

Per the Presidential Executive Order 12898, low-income populations are households with income at or below the Department of Health and Human Services (HHS) poverty guidelines. The HHS poverty guidelines are referred to as the "federal poverty level" and are used to define eligibility of persons to receive benefits of some federal government programs such as Head Start and the Food Stamp Program (HHS, 2003). The HHS poverty guidelines define eligibility based on the size of the family for the 48 contiguous states, Alaska, and Hawaii. The HHS poverty guidelines, however, only reflect price changes through the calendar year prior to the year the guidelines are published (HHS, 2003). As such, the census figures for persons living at or below the poverty level in 1999 incorporate the 2000 HHS poverty guidelines for low-income populations.

Over the past decade, the welfare of South Park community residents has improved substantially, though many residents still live at or below the poverty level. The 1990 census reported approximately 25 percent of the population in the South Park Community had incomes at or below the poverty level in 1989. This was over twice the 12 percent rate for the City of Seattle and substantially higher than the 18 percent rate for the Study Area. By 1999, the proportion of the population that had incomes at or below the poverty level in the South Park Community had decreased significantly from 25 percent to 13 percent. The fact that the percentage of the populations residing in the South Park Community and the Study Area with incomes at or below the poverty level is within one percentage point of the proportion reported for the City of Seattle (i.e. 12 percent) indicates that the proportion of low-income persons in the South Park Community is similar to the City of Seattle. Per Presidential Executive Order 12898 guidelines, South Park is not a low-income community. Comparison of median household income of the South Park Community and the City of Seattle, however, indicates South Park Community households continue to have a median income that is substantially below citywide statistics (see Table 8).

In addition, Minority persons and persons of Hispanic heritage own many businesses in the South Park community. A survey of businesses in the community commercial district along 14th Avenue S. indicated that approximately 72 percent of the businesses are minority-owned (Parsons Brinckerhoff, 2003). The retail establishments are primarily owned by either Asian or Hispanic persons. These businesses include three Mexican restaurants, three Asian-owned restaurants, a Mexican grocery store, as well as other retail establishments catering to personal services owned by Hispanic and Asian persons, including Vietnamese, Korean, and East Indian.

The environmental justice analysis of potential disproportionately high and adverse effects on the minority populations of the South Park community is contained in the next section, Chapter 6 Impacts.

5.12.4 Targeted Public Involvement Activities

Because the Study Area and South Park Community were anticipated to include minority and/or low-income populations from the start of the project, the public involvement plan was designed to incorporate elements that would encourage members of these populations to partake in the public involvement activities. In particular, the goal of the public involvement activities was to enlist the help of members of these communities to identify perceived environmental impacts and potential mitigation measures to alleviate adverse impacts. The public involvement activities implemented to date are listed below.

- Public participation meetings were held in the project Study Area and included the following: a public workshop on January 17, 2002; a public scoping meeting on February 28, 2002; and another public workshop held on June 19, 2002. Materials distributed at these meetings were printed in both English and Spanish. In addition, a bi-lingual Spanish translator attended these meeting to assist persons with limited capabilities to speak or understand English. The Project Team also had information booths at several community gatherings, including the annual fall "Fiesta Patrias" and one of the monthly family dinner and education nights held at the local elementary school.

- Members of the community were invited to submit written comments at the January 17 and June 19, 2002, public workshops and the February 28, 2002, public scoping meeting. In addition, the public involvement firm has maintained a telephone line that members of the public can call and leave verbal questions and comments. These 54 written and 22 verbal comments were summarized and reviewed to learn about the community's concerns about potential impacts of the project alternatives (Index, September 2002).

- The Project Team has worked closely with the Community Advisory Group (CAG) established for this King County project. This selected group is comprised of 17 community members who represent broad stakeholder and public concerns, including owners of businesses located on 14th Avenue S. A special effort was taken by King County to include persons of Hispanic heritage when members were selected. A Spanish translator attends all CAG meetings to assist members

who may have limited understanding of English. The CAG was provided with periodic updates of the project progress and was asked to comment on various aspects of the project and the alternatives. The Project Team attended these meetings and reviewed the minutes prepared for each of the CAG meetings to assess potential community concerns.

- On December 3, 2002, the Project Team held a special meeting with property owners along 14th Avenue S. to discuss potential impacts of the project alternatives and to solicit ideas for mitigation of the potential impacts. The CAG members were also invited to attend this meeting. A Spanish translator was present at the meeting to assist Spanish-speaking persons attending the meeting. The Project Team reviewed the minutes of this meeting to identify particular concerns of the commercial property owners.

- During May and June 2003, the Project Team conducted interviews with owners and managers of commercial and retail businesses located on 14th Avenue S. The purpose of the interviews was to collect general information about the businesses, the owners, the employees, and the customers. In addition, respondents were asked why their business was located in South Park, what aspects of South Park are most important to their business, have they ever considered relocating, and if they had any additional comments about the South Park Bridge Project. At the beginning of each interview, the respondents were asked if they would like a Spanish or other language translator to help with the interview. No respondents requested a Spanish translator, but a King County employee native of Vietnam assisted with two interviews. The information obtained from the interviews with the South Park businesses was reviewed to identify additional business impacts resulting from the project alternatives. (See the *Economics Technical Report* for additional information concerning the results of the interviews.)

Attendees of these several meetings and responses to the business owner survey identified a number of potential environmental impacts (Index, September 2002; Parsons Brinckerhoff, 2003). Repeatedly, members of the public have expressed concern for the potential short- and long-term impacts to businesses on 14th Avenue S. Other concerns have included traffic impacts, access into and out of the South Park community, adverse impacts to the South Park Marina and Delta Marine, the desire to preserve the historic bridge, and impacts on the South Park residents and ethnic communities. Perceived construction impacts included access to healthcare providers and Mexican groceries. One comment stated that people in the community are opposed to the "long" bridge (i.e., the High-Level Fixed-Span Bridge Alternative). Others expressed concern for potential environmental justice issues.

Particular mitigation measures were recommended by members of the public to address potential adverse environmental impacts. Most of the mitigation measures were discussed at the meeting with the property owners located on 14th Avenue S. Business owners located on 14th Avenue S. who responded to the survey were not asked to recommend specific mitigation measures as the objectives of the survey did not include soliciting

input for mitigation. Considering that most land uses on 14th Avenue S. are commercial or retail establishments, attendees were especially concerned about potential impacts on businesses. Suggested mitigation included:

- Provide additional on- and/or off-street parking, especially during construction
- Keep Dallas Avenue S. open (important for truck traffic)
- Minimize street closures during construction
- Install street amenities
- Construct a park or open space on the shore of the Duwamish Waterway
- Allow for expansion of the marina
- Allow for additional commercial development in the community
- Redevelop the commercial core following construction
- Preserve a portion of the existing bridge as a "museum"
- Ensure pedestrian access across the Duwamish Waterway during construction

In conclusion, the attendees at the public meetings and property owners' meeting represented the local minority population, but the types of mitigation measures suggested did not address issues pertinent only to minority property or business owners.

Chapter 6 Impacts

This section discusses the direct, secondary, and cumulative social impacts resulting from the several proposed South Park Bridge Project alternatives. Direct impacts, including both construction and operation impacts, are discussed for the following topics: population and housing; community and social services; public services; recreation; pedestrian, bicycle, and transit; community cohesion; and environmental justice. Following the discussion of direct impacts, there is a brief discussion of potential secondary and cumulative impacts related to social issues.

6.1 Direct Impacts

6.1.1 Common to All Build Alternatives

A number of potential environmental impacts would be similar for any of the Build Alternatives, the rehabilitation of the existing bridge or construction of a replacement bridge. In particular, these impacts common to all alternatives include the following: noise and vibration, air quality, consistency with land use plans and policies, and general effects on displaced persons.

Changes in noise and vibration can affect the perceived quality of life. Changes could potentially affect the desirability of communities and could potentially result in changes in population and community character. Noise levels are based substantially on forecast traffic volumes, but background noise from the urban environment also contributes to overall noise levels. Under all of the Build Alternatives, construction activities would result in temporary short-term exceedance of regulated noise levels, but this is allowable under the regulations. Implementation of Best Management Practices (BMPs) would minimize these effects. Currently, several of the modeled sites approach or exceed FHWA criteria. In the future, several of the modeled sites would approach or exceed FHWA criteria. The construction of noise barriers to reduce noise levels was not found to be feasible for any of the alternatives. Insulation of the Sea Mar Community Health Clinic buildings could be feasible, but additional analysis is needed to make this determination. Proposed construction methods and conceptual bridge design for the Build Alternatives would not be expected to result in significant adverse impacts from vibration.

Changes in air quality also can affect the quality of life. Such changes could potentially affect the desirability of communities and could potentially result in changes in population and community character. Under all of the Build Alternatives, air quality would deteriorate temporarily during construction. In particular, fugitive dust levels would increase. BMPs are recommended to control predicted changes in air quality. During operation, predicted worst-case eight-hour carbon monoxide levels would generally increase. The levels, however, would not exceed the National Ambient Air Quality Standards (NAAQS) for the Seattle area. As such, the impacts would not be considered significant adverse impacts and no mitigation measures would be required.

Construction of one of the Build Alternatives, either rehabilitation or a new replacement bridge, would be consistent with adopted city and neighborhood goals and policies. The South Park Bridge is a recognized vital link in the local and regional transportation network. It is a designated heavy and oversized truck route and it is a designated emergency route. The implementation of any of the Build Alternatives would result in the continued existence of a bridge across the Duwamish Waterway at 14th Avenue S. in South Park.

Under any of the Build Alternatives, residences would be acquired for right-of-way and for the establishment of a laydown and construction staging area. Property owners and tenants would be displaced. Considering that the median household income in South Park is substantially less than median income of households citywide, it is possible that subsidies may be needed to assist displaced persons. As owner-occupied and renter-occupied single-family dwellings and small apartment complexes would be displaced, it would be unlikely that this mix of displaced residents would want to be moved as a group. Tenants could potentially find other rental properties in the South Park community or nearby residential neighborhoods, which have similar-cost rental housing. It would likely be more difficult for displaced persons owning their own home to find replacement housing due to the very low cost of housing in the South Park community compared to costs of residential property in the Seattle area. More than likely, such displaced persons might need to move to a neighborhood located further away from downtown Seattle. Assuming displaced persons relocate somewhere in the Seattle metropolitan area, they will likely have the ability to keep their current job or will have access to other employment opportunities. In addition, displaced persons would be expected to have access to social and community services, community facilities, and other amenities similar to those found in the South Park community. In addition, the displaced persons would be expected to have access to public transit.

The following sections described the different social impacts resulting from each of the proposed project alternatives—No Action, Rehabilitation, Bascule Bridge, Mid-Level Fixed-Span Bridge, and High-Level Fixed-Span Bridge alternatives.

6.1.2 Population and Housing

6.1.2.1 No Action Alternative

Under the No Action Alternative there would be no bridge across the Duwamish River. No direct impacts to population or housing would occur for the No Action Alternative during demolition or operation phase of the project (see the *Relocations Technical Report*). Property would not be acquired for this alternative.

This alternative would not be expected to significantly affect either forecast population or the housing in the community. The proposed project is a transportation project and the No Action Alternative would not directly result in a population increase as opposed to projects involving the construction of new housing or places of employment. Under the No Action Alternative there would be no bridge across the Duwamish Waterway, which would definitely create transportation access inconveniences for existing residents in the

community and would lead to rerouting of the traffic and transit that currently uses the bridge. Some residents may decide to move from the community, but others might consider moving to the community due to increased isolation of the community from the adjacent industrial development and decrease in traffic volumes.

During demolition or operation of the proposed project alternative, there would not likely be an impact or change in the existing racial or demographic characteristics of the existing South Park community.

6.1.2.2 Rehabilitation Alternative

Direct impacts to population and housing would occur for the Rehabilitation Alternative during the construction phase of the project (see the *Relocations Technical Report*). Two single-family residences would be acquired for the construction of this alternative. Approximately five persons would be displaced based on the average persons per household reported in the 2000 census. The loss of these two residences is not statistically significant considering there are approximately 1,300 dwellings in the South Park Community (Census, 2000). Both properties would be required for construction work and staging areas, not for the actual right-of-way for the bridge or the associated street improvements. No data are available concerning the specific racial, ethnic, or income status of the households residing in these dwellings proposed for acquisition. An additional non-residential parcel would also be affected by right-of-way acquisition.

The proposed project is a transportation project and the Rehabilitation Alternative would not directly result in a population increase compared to the construction of new housing or places of employment over the long-term. Under the Rehabilitation Alternative, transportation access would be improved to the community for the long-term. The proposed project, however, would not be expected to directly cause an increase in population or housing in the community in the future, but could help to accommodate any potential increases in population.

During construction or operation of the proposed project under any of the alternatives, there would not likely be an impact or change in the existing racial or demographic characteristics of the existing South Park community.

6.1.2.3 Bascule Bridge Alternative

The impacts to population and housing for the Bascule Bridge Alternative would be nearly the same as described for the Rehabilitation Alternative. One residence (renter-occupied) would be required for the construction staging area. The second residence (owner-occupied) located on S. Thistle Street would be required for right-of-way acquisition considering the new bridge would be immediately west of the existing bridge. No information is available about the racial, ethnic, or household income of the current occupants of either of these residences. Approximately five persons would be displaced. An additional five non-residential parcels would be affected by right-of-way acquisition.

Neither operation nor construction of the Bascule Bridge Alternative would be expected to significantly affect population, demographics, or household characteristics of the South Park community.

6.1.2.4 Mid-Level Fixed-Span Bridge Alternative

The impacts to population and housing for the Mid-Level Fixed-Span Bridge Alternative would be the similar to the Bascule Bridge Alternative. In addition to the two single-family residences, at least one additional apartment located over a commercial business would be acquired. Approximately eight persons would be displaced. An additional 12 non-residential parcels would be affected by right-of-way acquisition.

Neither operation nor construction of the Mid-Level Fixed-Span Bridge Alternative would be expected to significantly affect population, demographics, or household characteristics of the South Park community.

6.1.2.5 High-Level Fixed-Span Bridge Alternative

The construction of the High-level Fixed-Span Bridge Alternative would require the acquisition of part or all of a total of 12 residential properties, both single-family and multi-family properties. In addition to the 12 residential properties, at least 3 additional apartments located over commercial businesses would be acquired. Approximately 48 persons would be displaced. In addition, 25 non-residential properties would be affected by right-of-way acquisition.

Two of the properties would be the same properties required for construction of the Bascule Bridge Alternative. One would be for the staging area and one for right-of-way acquisition. An additional multifamily four-plex residential property plus at least three apartments over commercial businesses would be required for construction of the South Park Bridge along 14th Avenue S. Construction of the new connector road between S. Trenton Street and 12th Avenue S. would require acquisition of nine residential properties, including one duplex). The acquisition of these 12 residential properties (19 dwellings) would not constitute a statistically significant portion of the approximately 1,300 dwelling units in the South Park Community (Census, 2000). Nor, would the relocation of the residents from these few dwellings be statistically significant compared to the total population in the South Park Community. No data are available concerning the specific racial, ethnic, or household income of the residents of these dwellings proposed for acquisition.

Similar to the other Build Alternatives, operation of this alternative would not be expected to significantly affect either the population or the housing in the community. The proposed project is a transportation project and the construction of the alternative would not directly result in a population increase compared to the construction of new housing or places of employment. Under this alternative, transportation access would be maintained in the community for the long-term. The proposed project would not directly cause an increase in population or housing in the community in the future, but could help to accommodate any potential increases in population.

During construction or operation of the proposed project under the High-Level Fixed-Span Bridge Alternative, there would not likely be a direct impact that would cause a change in the existing racial or demographic characteristics of the existing South Park community. Household characteristics, including income, would also not be expected to change.

6.1.3 Community and Social Services

6.1.3.1 No Action Alternative

The implementation of the No Action Alternative would mean the existing South Park Bridge would be eventually closed and demolished. Long-term this would have little effect on residents' access to existing community and social services located in the South Park community. However, the removal of the bridge would permanently reroute traffic traveling north across the Duwamish River, which would create inconveniences and travel time delays to community and social services serving the South Park community but located outside of the community. For example, travel north to libraries, social service providers, and churches in Seattle's Georgetown community would be inconvenienced.

6.1.3.2 Rehabilitation Alternative

The implementation of the Rehabilitation Alternative would cause the existing bridge to be closed for the majority of the construction period. These temporary construction impacts to social and community services would be similar to the long-term impacts described above for the No Action Alternative. Following construction, there would be no impacts that would affect travel to community and social services located outside of the South Park community. The bridge would be open to allow travel north of the South Park community, and there would be only a very small change to the local street network to improve traffic flow at the intersection of 14th Avenue S. and Dallas Avenue S.

6.1.3.3 Bascule Bridge Alternative

Under the Bascule Bridge Alternative, construction of a new replacement bridge would occur immediately downstream of the existing bridge. Except for the temporary short-term periods when road closures would be required during the construction period, impacts to community and social services would generally not be expected. Very minor rerouting of travel patterns would occur in the South Park community during the operation phase of the alternative, but travel north of the community to access community and social service providers would not be affected.

6.1.3.4 Mid-Level Fixed-Span Bridge Alternative

Implementation of the Mid-Level Fixed-Span Bridge Alternative would cause the approximate same level of impacts to community and social services as described for the Bascule Bridge Alternative for both the construction and operation phases of the project.

6.1.3.5 High-Level Fixed-Span Bridge Alternative

Under the High-Level Fixed-Span Bridge Alternative, there would be substantial impacts to community and social services in the South Park community. Required property acquisition would require the purchase of two of the three Sea Mar Community Health Center buildings clustered near the intersection of 14th Avenue S. and S. Trenton Street. Buildings located on the northeast and southwest corners of 14th Avenue S. and S. Trenton Street would be displaced and the services relocated. This community health and social services facility serves residents of the South Park community, particularly Hispanics and low-income persons, as well as persons from outside of the community. Because the Sea Mar Community Health Center provides many essential health services,

to these legally protected populations, the loss of these facilities, unless moved elsewhere in the immediate area, would result in a significant adverse impact on the community. Moreover, the displacement of these services may jeopardize the ability of this community health provider to continue to provide other health and social service housed in other Sea Mar buildings located in the immediate proximity of the project corridor near the intersection of S. Henderson Street and 12th Avenue S.

During operation, the impacts to access to community and social services in the South Park community would be similar as those described for the Mid-Level Fixed-Span Bridge Alternative. There would be minor detours due to road reconfiguration or closure. Access to South Park services from residents outside of the community as well as South Park community residents' ease of access to community and social services outside of the community could be more circuitous and could increase travel time due to the rerouting of traffic along the new connector road on 12th Avenue S. and S. Trenton Street to use the South Park Bridge.

During construction, access to community and social service facilities would likely be somewhat circuitous and inconvenient due to needed temporary road closures and detours. Special care would need to be taken to ensure the adequate access for both vehicular, bicycle, and pedestrian traffic to community and social services located in the South Park community. The very long length of the High-Level Fixed-Span Bridge Alternative and the need to construct "hammer-head" turnarounds on S. Donovan Street and the construction of the new 12th Avenue S. to S. Trenton Street connector, however, would also result in substantially greater long-term impacts affecting local access to community and social services located in the South Park community. In particular, persons living east of 14th Avenue S. would have a much more circuitous route to take to access the community and neighborhood centers located on 10th Avenue S. and 8th Avenue S., respectively.

6.1.4 Public Services

6.1.4.1 No Action Alternative

Under the No Action Alternative, the existing bridge would eventually be demolished and a replacement bridge would not be constructed at the current location of the South Park Bridge. This alternative would not require the acquisition of any property, including property owned by local government public services—fire and emergency response, police, and public schools.

The removal of the existing bridge, however, would likely affect normal patrol routes for police service as well as fire and emergency response routes during both the demolition and long-term operation phases of the project. Access to the South Park community from the north would be limited to the 1st Avenue S. Bridge, which could increase response times. This change would be much more significant than the current conditions associated with the risk that emergency vehicles are caught in traffic delays due to opening of the existing bridge because the infrequent opening of the existing bridge means the bridge can be used most of the time.

The No Action Alternative, however, would not be expected to affect access to the Concord Elementary School during construction or operation phases of the project as the bus routes serving students north of the Duwamish Waterway typically do not use the South Park Bridge.

6.1.4.2 Rehabilitation Alternative

The Rehabilitation Alternative would not require acquisition of property currently owned by local government public service agencies. The reconstruction of the existing bridge would not result in any long-term changes to the provision of existing fire, emergency vehicle, police, or public school services. Impacts would be restricted to those that would occur during the construction phase of the project.

During construction, emergency, fire, and police vehicles as well as school buses could experience delays and detours caused by construction activities and equipment. The duration of these impacts under this alternative would last for nearly the entire duration of the construction period—approximately two years. These delays and detours could delay emergency response times.

6.1.4.3 Bascule Bridge Alternative

The potential impacts to public services during the construction and operation phases of the Bascule Bridge Alternative would be similar to those described for the Rehabilitation Alternative. In contrast to the Rehabilitation Alternative, however, the duration of the construction delays and detours would be limited to only short periods during the construction period as the majority of the bridge could be constructed while the existing bridge remained operational. In addition, the extent of the on-land construction activities would encompass a relatively small area compared to other replacement alternatives. As such, only a minimal area of the existing street network would be disrupted by construction-related detours and delays. Following construction, crossing of the Duwamish Waterway at approximately 14th Avenue S. would continue for the long-term operation of the bridge.

6.1.4.4 Mid-Level Fixed-Span Bridge Alternative

The potential impacts to public services (fire, emergency vehicles, police, and public schools) for the Mid-Level Fixed-Span Bridge Alternative would be similar in nature to the potential impacts described for the Bascule Bridge Alternative. The construction of the transition segments that would join the newly constructed bridge and the existing road facilities, however, are longer than those of the Bascule Bridge Alternative. As such, the duration of the several short-term delays and detours cause by construction activities would be somewhat longer in duration.

The long-term operational impacts to public services would also be similar to those described for the Bascule Bridge and Rehabilitation Alternatives. The bridge would continue to permit crossing of the Duwamish Waterway at approximately 14th Avenue S. for the long-term. Changes to the local street network would be only minimal, so access for police, fire and emergency vehicles, as well as school buses would be similar to current conditions.

6.1.4.5 High-Level Fixed-Span Bridge Alternative

Like the other replacement bridge alternatives, the High-Level Fixed-Span Bridge Alternative would continue to guarantee crossing of the Duwamish Waterway at approximately 14th Avenue S. for the long-term. No properties would be acquired that are currently owned by local government public service agencies. The extensive area that would be disrupted by construction activities as well as the permanent changes to the local street network, however, would affect access for police, fire and emergency vehicles, and public school buses in the South Park community.

During the construction period, a major share of the bridge structure would be constructed while the existing bridge remains operational. The significantly larger area affected by construction activities associated with the longer length of this alternative would mean there would be a series of sequential construction phases, each with their own plan for detours as construction of the bridge progressed both south and north of the Duwamish Waterway. Individual temporary detours and delays might be similar to those associated with the other replacement bridge alternatives, however, there would be more construction phases. The overall length of time traffic would be affected by the construction activities would likely be longer.

In addition, the long-term changes to the local traffic network would be more substantial than for any of the other replacement bridge alternatives following construction. East-west travel across 14th Avenue S. would be limited as well as travel north-south on 14th Avenue S. Police, fire, and emergency vehicle access would not have difficulty with the proposed grade of the bridge approach spans, however, access to particular neighborhoods could have long-term increases in response times due to changes in the local street network. Student access (bicycle and pedestrian) access to the Concord Elementary School would also be affected due to changes in the local street network. Bus routes to and from the school, however, would not likely be affected due to current infrequent use of the existing South Park Bridge.

6.1.5 Recreation

6.1.5.1 No Action Alternative

Construction and demolition activities under the No Action Alternative could have a beneficial impact on proposed improvements to open space public access proposed by the Environmental Coalition of South Seattle (ECOSS) to restore the shoreline between the South Park Bridge north to the Duwamish Waterway Park. The ECOSS proposal includes improved public access to the shoreline and restored fisheries habitat. At this time, this proposal has not been funded, however, if funded, the restoration of the site of the existing bridge foundations following demolition could provide substantial opportunities to expand on the ECOSS plan. Similarly, new recreational resources could be constructed at the old site of the bridge.

Long-term, access within the South Park community to and from local recreation parks and the local community center would not likely be affected by demolition of the existing bridge. The local street network would remain essentially the same as current conditions.

Access to other types of recreational facilities located outside of the community such as YMCA/YWCA, Boys & Girls Club, and private gyms and health clubs could be affected if located north of the Duwamish Waterway.

Demolition activities, however, could temporarily affect the operation of the South Park Marina as well as recreational boat users. Following completion of the demolition activities, there would no longer be any obstructions in the waterway that could affect navigation traffic.

6.1.5.2 Rehabilitation Alternative

Construction activities associated with the Rehabilitation Alternative could present opportunities to expand on improvements to Duwamish Waterway public access and habitat restoration proposed by ECOSS. If funded, the implementation of the Rehabilitation Alternative could allow for opportunities to expand on the ECOSS plan, though less than what could be possible under the No Action Alternative. Fewer opportunities would be available to construct new recreational resources compared to the No Action Alternative.

In addition, land used for construction staging under the Rehabilitation Alternative could be converted to recreation amenities. Additional lands potentially available for recreational development could include property acquired for right-of-way located along 14th Avenue S.

Similar to the potential long-term operation impacts of the No Action Alternative, this alternative would not be expected to affect access to recreation facilities and resources within the community. In contrast to the No Action Alternative, access to recreational resources and facilities located north of the community, however, would be maintained under the Rehabilitation Alternative. The considerable period of time during which the community would experience delays and detours during construction for this alternative would affect access to these facilities during the construction period.

Construction activities associated with the rehabilitation of the bridge could temporarily affect the operation of the South Park Marina as well as recreational boat users. Following rehabilitation, there would be no impacts to recreational boat users in the area.

6.1.5.3 Bascule Bridge Alternative

The long-term impacts to recreation resources in the South Park community under the Bascule Bridge Alternative would be similar to those described for the Rehabilitation Alternative. Following construction, a bridge would continue to span the Duwamish Waterway to facilitate access to recreational facilities and amenities. The period of construction disruptions, however, would be considerably shorter in duration than described for the No Action Alternative and would have less impact on access to recreation facilities and resources in the community as well as outside of the community.

Construction activities associated with the Bascule Bridge Alternative could temporarily affect the operation of the South Park Marina as well as recreational boat users. Following construction, the navigation channel would be slightly wider than currently

and the vertical clearance would continue to be unlimited. There would be no long-term impacts to recreational boat users.

6.1.5.4 Mid-Level Fixed-Span Bridge Alternative

The construction and long-term operation impacts on parks and other land-based recreation resources under the Mid-Level Fixed-Span Bridge Alternative would be very similar to those described for the Bascule Bridge Alternative.

Similar to the Bascule Bridge Alternative, construction impacts could affect the South Park Marina as well as other recreational boat users of the Duwamish Waterway. Following construction, the navigation channel would be slightly wider than current conditions, but the vertical clearance would be limited to approximately 65 feet. This height limitation could limit some recreational boat travel in the Duwamish Waterway. The vast majority of boat users would not be affected. Delta Marine, however, is located upstream of the South Park Bridge and this firm manufactures very large luxury power boats that are sold around the world. These large yachts are launched on their maiden voyage and currently are able to pass the South Park Bridge. The ever-increasing size of these boats, however, may prohibit their passage in the future should the vertical clearance of the bridge be limited to approximately 65 feet.

6.1.5.5 High-Level Fixed-Span Bridge Alternative

The design of the Rehabilitation Alternative is quite elevated as it crosses the south shoreline of the Duwamish Waterway and could potentially offer opportunities to expand public access and habitat restoration proposed by ECOSS. Land underneath the bridge could be developed, though less land would be available than what could be possible under the No Action Alternative. In addition, land used for construction staging under the Rehabilitation Alternative could be converted to recreation amenities. Additional lands potentially available for recreational development could include property acquired for right-of-way located along 14th Avenue S.

The construction impacts on recreation resources within the South Park community would consist of a series of traffic detours to accommodate the progression of the construction activities both north and south of the Duwamish Waterway. Each detour would not likely be too circuitous, but the cumulative duration construction detours would affect traffic access to and from recreational resources both within the South Park community as well as resources located north of the community. These construction traffic detours would increase travel times for residents.

Following construction, there would be a number of changes in the local street network due to road closures and permanent rerouting that would permanently affect access to some recreational resources. S. Donovan Street would be closed at 14th Avenue S. and direct access to the South Park Bridge would be rerouted from S. Cloverdale Street to 12th Avenue S. to S. Trenton Street. Access within the South Park community would be affected only slightly, though access north to recreational resources would be more circuitous.

Similar to the Bascule Bridge Alternative, construction impacts could affect the South Park Marina as well as other recreational boat users of the Duwamish Waterway. Following construction, the navigation channel would be slightly wider than current conditions, but the vertical clearance would be limited to approximately 100 feet. This height limitation is not anticipated to restrict the vast majority of recreational boat users. Delta Marine, however, is located upstream of the South Park Bridge and the firm manufactures very large luxury power boats that are sold around the world. These large yachts currently are able to pass the South Park Bridge. The ever increasing size of these boats, however, could potentially prohibit their passage in the future should the vertical clearance of the bridge be limited to approximately 100 feet.

6.1.6 Pedestrian, Bicycle, and Transit

6.1.6.1 No Action Alternative

The No Action Alternative would affect pedestrian, bicycle, and transit during both construction and operation. During the 8-month duration of the demolition activities, pedestrian, bicycle and bus service across the bridge as well as in close proximity of the existing bridge abutments would be prohibited. Travelers would experience delays and detours, especially for travel outside of the South Park community. In comparison to the other alternatives, the relatively short duration of the demolition activities would reduce pedestrian and bicycle safety concerns.

Following all construction, pedestrian and bicycle travel in the South Park community would resume. These modes of transportation could increase due to the overall decrease in through-traffic along 14th Avenue S. Restoration of the bridge area following demolition, however, would likely improve pedestrian and bicycle safety in the commercial district. Pedestrian, bicycle, and transit travel across the Duwamish Waterway, however, would not be possible due to removal of the bridge. As detours to nearby bridges across the Duwamish River are located some distance from the South Park community, the pedestrian and bicycle modes of transportation to and from points north of the community would not likely continue in the future. Buses would need to be rerouted and bus stops relocated to continue to serve the South Park community. Time required to travel by transit would likely increase due to new, more-circuitous routes.

6.1.6.2 Rehabilitation Alternative

Construction activities associated with the Rehabilitation Alternative would disrupt local pedestrian, bicycle, and transit travel. Construction activities would require closure of the bridge for nearly the entire 32-month duration of the construction period. Pedestrian and bicyclists would not be able to cross the Duwamish Waterway at this point and would need to use other bridges. Pedestrians and bicycles would ideally use alternative routes in close proximity to construction activities. Buses would also need to be rerouted to continue to serve the South Park community during the construction period. Minor delays and temporary reroutes would also be needed as the rehabilitation work progressed southerly towards the abutment. In sharp contrast to the No Action Alternative, the 32-month construction period for the Rehabilitation Alternative could result in increased

risk to pedestrian and bicyclist safety in close proximity of construction activities and traffic detours.

Long-term, the rehabilitation of the South Park Bridge would continue to provide access for pedestrians, bicyclists, and transit service north across the Duwamish Waterway. The bridge sidewalk would be standard, slightly wider, than the current sidewalk, which would improve pedestrian safety. The lack of a separate bicycle lane, however, would mean bicyclists would likely continue to ride on the sidewalk. This could lead to pedestrian and bicycle accidents due to the narrow pavement shoulders and bimodal use of the facility. No changes would be expected in bus routes as a direct response to the proposed rehabilitation of the existing bridge. Reconfiguration of the S. Sullivan Street and Dallas Avenue S. intersection with 14th Avenue S. as well as the reconstruction of S. Thistle Street would improve pedestrian and bicycle access in the north end of 14th Avenue S.

6.1.6.3 Bascule Bridge Alternative

Pedestrian, bicycle and bus service on 14th Avenue S. would experience temporary delays and detours during the estimated 33 months of construction activities. The majority of the construction activities would not affect such travel as the new bridge would be constructed while the existing bridge is still operational. Construction of the abutment as well as the transition segments between the new bridge and the existing roadway on both the north and south sides of the Duwamish Waterway would affect pedestrian, bicycle, and bus service due to temporary minor delays and detours. Though the construction period for the Bascule Bridge Alternative is estimated to be 33 months, road closures and traffic detours are anticipated to be very short term, perhaps only one month total in duration. As such, potential safety risks for pedestrians and bicyclists would be similar to current conditions.

Following construction, the long-term operation of the Bascule Bridge Alternative would provide improved pedestrian and bicycle access across the Duwamish Waterway. The new bridge design would have a single combined standard-design pedestrian/bicycle trail. There would also be a barrier between moving traffic and the combined trail. Use of this facility would be safer for both pedestrians and bicyclists than the existing non-standard facility as well as the Rehabilitation Alternative.

The new bascule bridge would continue to provide bus service across the Duwamish Waterway. Existing bus routes would likely remain following construction. As such, there would not likely be any long-term changes in bus service directly tied to the construction of the replacement bridge.

Reconstruction of S. Thistle Street and reconfiguration of the S. Sullivan Street and Dallas Avenue S. intersection with 14th Avenue S. would permanently improve pedestrian and bicycle facilities at the north end of 14th Avenue S. Some of these streets currently do not have sidewalks or striping defining the edge of the travel lane. The new standard roadways would improve safety for both pedestrians and bicyclists.

6.1.6.4 Mid-Level Fixed-Span Bridge Alternative

During construction, pedestrian, bicycle, and bus service on 14th Avenue S. would experience temporary delays and detours as the Mid-Level Fixed-Span Bridge Alternative is constructed (approximately 20 months). For the majority of the construction period, existing travel across the Duwamish Waterway, however, could be maintained because construction of the new bridge would generally not affect operation of the existing bridge. Construction of the abutments and transition segments on both the north and south sides of the Duwamish Waterway would require short-term traffic reroutes due to temporary road closures. Travel times for pedestrians, bicyclists, and especially bus users would increase during the temporary road closures. Like the Bascule Bridge Alternative, the Mid-Level Fixed-Span Bridge Alternative is anticipated to have road closures and traffic detours for only a very short period during the 20-month construction period. As such, safety for pedestrians and bicyclists would be similar to current conditions.

Following construction, the new bridge would change pedestrian, bicycle, and transit access to and from the South Park community. The design incorporates a combined 13-foot pedestrian/bicycle trail that is separated from moving vehicular traffic by a barrier. This design is safer for both pedestrians and bicyclists compared to the existing facility. The slope of the bridge approaches, however, would be considerably steeper and longer than the current approaches, which would make crossing of the Duwamish Waterway more difficult for both pedestrians and bicyclists. To minimize right-of-way acquisition on 14th Avenue S., a bicycle/pedestrian ramp would be constructed from the top of the bridge near S. Orr Street. Some bicyclists might not like using the bicycle ramp, especially if the 13-foot ramp with numerous hair-pin turns also is used by pedestrians. In addition, the bicycle ramp would mean rerouting the existing designated King County bicycle route that currently extends the full length of 14th Avenue S. from the bridge to an access road adjacent to SR 509.

Construction of this alternative would also permanently close S. Thistle Street. Neither pedestrian nor bicycle travel would be able to continue to cross under the bridge at the far north end of 14th Avenue S. Reconfiguration of the S. Sullivan Street and Dallas Avenue S. intersection into an underpass under the new bridge should improve both pedestrian and bicycle access safety as well as on-street bicycle use of the roadway pavement.

The existing bus service in the South Park community that uses the South Park Bridge may also change. Currently, there are bus stops on both sides of 14th Avenue S. north of S. Cloverdale Street. These bus stops would not be usable following the construction of the Mid-Level Fixed-Span Bridge Alternative. The abutment would extend the full length of the block between S. Cloverdale Street and S. Sullivan Street and would prevent vehicular and transit use of this at-grade portion of 14th Avenue S. As such, the bus stops would be eliminated and either new bus stops could be established or the bus route could be revised slightly to continue to provide similar bus service to the community.

6.1.6.5 High-Level Fixed-Span Bridge Alternative

Pedestrian, bicycle, and bus service on 14th Avenue S. would experience temporary delays and detours during construction of the High-Level Fixed-Span Bridge Alternative. For a portion of the construction period, travel across the Duwamish Waterway could be maintained because construction of the new bridge would not affect operation of the existing bridge. Construction of the long approach spans, abutments, and transition segments between the Duwamish Waterway south to S. Trenton Street would likely require multiple short-term traffic reroutes due to temporary road closures as the construction work progressed southward. Travel times for pedestrians, bicyclists, and especially bus users would increase during construction activities down 14th Avenue S. Local pedestrian and bicycle use of the roadways adjacent to 14th Avenue S. would also be affected by construction activities. The duration of road closures and traffic detours during the 24-month construction of the High-Level Fixed-Span Bridge Alternative would be very short, perhaps several weeks or a couple of months. Potential safety concerns for pedestrians and bicyclists under the High-Level Fixed-Span Bridge Alternative would be similar to the other bridge replacement alternatives and similar to current conditions.

Following construction, the new bridge would change pedestrian, bicycle, and transit access to and from the South Park community. The slope of the bridge approaches would be considerably steeper and longer than the current approaches, which would make crossing of the Duwamish Waterway much more difficult for both pedestrians and bicyclists. Pedestrian and bicycle users would be safer than with the current facility due to the proposed incorporation of a combined 13-foot pedestrian/bicycle trail that would be separated from moving traffic by a barrier, thus increasing pedestrian and bicyclist safety. This combined trail would extend the entire length of the bridge project, from terminus to terminus. The views of the surrounding area from the top of the 100-foot bridge would be expansive, but the exertion required to attain the top of the bridge at grades potentially exceeding 8 percent would likely discourage all but the most athletic individuals. Use of the bridge by pedestrians, in addition, would be expected to decline considerably. The reduced volume of through-traffic on 14th Avenue S. and potential construction of a pedestrian-friendly environment underneath the elevated portions of the High-Level Fixed-Span Bridge Alternative could substantially increase safety for both pedestrians and bicyclists in the South Park business district. The shaded environment under the bridge, however, may discourage such use.

Operation of this alternative would also change the local street network, which would affect local pedestrian and bicycle use in South Park. S. Thistle Street, the intersection of 14th Avenue S. and S. Sullivan Street and Dallas Avenue S., and S. Cloverdale Street would be retained as underpasses under the new bridge and would maintain current east-west pedestrian and bicycle use of the north end of 14th Avenue S. Much of 14th Avenue S., however, would be closed to north-south traffic, which could affect both pedestrian and bicycle access. In addition, S. Donovan Street would be permanently closed at 14th Avenue S. due to the abutment, which would create a permanent detour for both pedestrians and bicyclists. The design of the new connector road between S. Trenton Street and 12th Avenue S. could help facilitate pedestrian and bicycle access in the

community. The anticipated substantial traffic volumes on the new connector road, however, may decrease pedestrian and bicycle use on S. Trenton Street and 12th Avenue S. due to increased safety concerns.

Following construction, the new High-Level Fixed-Span Bridge Alternative would permanently change existing bus routes in the South Park community. Several bus routes currently travel across the existing South Park Bridge and turn west on S. Cloverdale Street. Others cross the bridge and continue south on 14th Avenue S. The existing bus stops on 14th Avenue S. north of S. Donovan Street could not be used in the future. Buses would likely need to be rerouted from the bridge to the proposed S. Trenton Street connector road to 12th Avenue S. and S. Cloverdale Street. These bus routes would be more circuitous; and travel times to walk to bus stops and to use buses would most likely increase. In addition, residents living west of 14th Avenue S. would need to walk further to catch their bus. As such, the many bus stops would be eliminated and either new bus stops could be established or the bus routes would be revised to continue to provide similar bus service to the South Park community.

6.1.7 Community Cohesion

6.1.7.1 No Action Alternative

For the No Action Alternative, the existing South Park Bridge is expected to eventually require demolition and removal. The removal of the bridge, by itself, would not be expected to affect community cohesion in South Park. The removal of the bridge would not create a barrier within the community that might disrupt social interactions. The lack of a bridge would not be expected to affect the diverse heritage of the community or the special community events. The residential community would continue to have access to the community commercial district. The community could continue to function as a separate, stand-alone small town. The South Park residents, however, would lose one of the community's most significant symbols of community identity.

Following the removal of the bridge, however, the cohesion of the community would be expected to change, potentially quite substantially. The bridge is one of the primary routes into and out of the community. In the future, traffic into and out of the community would need to take permanent detours, which would increase travel time.

The decrease in through-traffic along 14th Avenue S., however, could improve the shopping ambiance in the South Park commercial district. The removal of the bridge would reduce traffic on both 14th Avenue S. as well as S. Cloverdale Street. Additional on-street parking could be permitted in the commercial district. Site restoration activities following the demolition activities could potentially add some amenities and attractions to the commercial district. Together, the commercial district could become a more pleasant environment for pedestrians.

The removal of the bridge, however, would also end pedestrian and bicyclists access across the Duwamish Waterway. Residents could not walk to East Marginal Way S. to catch a bus. Persons seeking medical or social services at the Sea Mar Community Health

Clinic could no longer take a bus to East Marginal Way S. and walk over the waterway to the clinic. Industrial workers could no longer walk across the bridge to take lunch at one of the many restaurants in South Park.

Removal of the bridge would increase the isolation of the community from other areas of Seattle, especially neighborhoods located to the north of South Park. This would especially be the case for the Georgetown Neighborhood, where many resident obtain goods and services not found in the South Park commercial district. This change in access to and from the community could affect the frequency that others from outside of the community visit South Park. Despite the fact the majority of local business owners feel their businesses are not heavily dependent upon through-traffic (Parsons Brinckerhoff, 2003), some businesses could be affected and could fail. In addition, the circuitous route of the permanent detour could change purchasing patterns. In particular, businesses dependent upon purchases by surrounding industrial businesses and businesses dependent upon the current easy access to highways would likely be adversely affected by the removal of the bridge.

As such, it is uncertain the degree to which the business community would be affected by the removal of the bridge. But, if greatly affected, then the stability of the perceived core of the community, the commercial district on 14th Avenue S. could be jeopardized. In turn, this could change the overall cohesiveness of the community, which is dependent upon both the surrounding South Park residents as well as visitors seeking out the Hispanic community found in South Park.

6.1.7.2 Rehabilitation Alternative

The Rehabilitation Alternative would require closure of the existing bridge for the majority of the two-year construction period. The effects of this closure would be similar to those described above for the No Action Alternative following removal of the bridge. Some businesses would likely suffer loss of revenue due to customers needing to take longer, more time-consuming travel routes to South Park. The duration of the construction period, however, is substantial and could cause customers from outside of the community to alter their purchasing and shopping patterns on a permanent basis. If this were to occur, then the long-term effects of this alternative could be very similar to those described for the No Action Alternative. In either case, there would minimally be a temporary disruption in the cohesiveness of the community during the construction period. The historic bridge is a symbol of community identity and it would be preserved for this alternative.

Following construction activities to rehabilitate the existing bridge, there would be no new barriers within the community. Social interactions among racial and ethnically diverse community residents and businesses would be expected to remain unchanged, though it could take time for people and businesses to resume their previous patterns following a two-year bridge closure period. The community would not be any more isolated from adjacent Seattle neighborhoods than they are today. The South Park community would be expected to continue to be its own rather self-contained small community.

6.1.7.3 Bascule Bridge Alternative

The construction of the Bascule Bridge Alternative would be expected to have only very minor effects on the cohesion of the South Park community. During the construction period, it is proposed that the existing bridge would remain operational for the majority of the construction period. Traffic in and out of the community would continue to flow very similar to current levels. Short-term temporary detours required for construction activities would only minimally alter pedestrian, bicycle, and vehicular circulation. Though the existing historic bridge structure would be demolished, there would be good opportunities to construct a bridge in a style similar to the existing bridge, thus preserving a symbol of the community's identity. There would be no barriers that would create long periods of dramatically altered circulation patterns or patterns of social interaction.

Following construction, the operation of the new bascule bridge would not be expected to affect community cohesion, though it would change the community. The location of the abutment of the new bridge would be slightly further south into the existing commercial district. The abutment retaining walls would extend nearly the entire block between S. Orr Street and S. Sullivan Street. The abutment would create a visual barrier between the two sides of 14th Avenue S. north of S. Sullivan Street. It would also eliminate some on-street parking. These impacts, however, remain at the northern end of the commercial district. Furthermore, these changes would not be expected to alter the stand-alone character of the community, its current affinity with adjacent neighborhoods, diversity of residents or businesses. These changes are similar to the existing effects of the South Park Bridge abutment, but moved approximately one-half block to the south.

6.1.7.4 Mid-Level Fixed-Span Bridge Alternative

The construction impacts of the Mid-Level Fixed-Span Bridge Alternative would be quite similar to the types of construction impacts described for the Bascule Bridge Alternative, though perhaps slightly longer in duration. There would be temporary short-term disruptions to the community during the construction of the transition segment between the existing roadway and the new bridge. These disruptions would not be expected to substantially affect community cohesion. The construction of this fixed-span alternative, however, would require demolition of the existing historic bridge, a strong symbol of the community identity in South Park.

Following the construction of the new bridge, however, there would be some substantial changes in the commercial district. For starters, the height of the bridge at mid-point would be approximately 65 feet, nearly double the existing bridge height. This height, even north of S. Sullivan Street, would be well above adjacent primarily one-story buildings. The bridge would begin to dominate the urban landscape at the far north end of the commercial district.

The location of the abutment of the new bridge would be further south into the central portion of the commercial district compared to the Rehabilitation and Bascule Bridge alternatives. The tall abutment retaining walls would extend nearly the entire block between S. Sullivan Street and S. Cloverdale Street. The existing businesses in this block

are mostly local retail businesses, as oppose to a few large commercial businesses further to the north (principally Rick's Master Marine, The Tire Factory, and the County Line Bar and Grill). Required right-of-way acquisition would displace one of these businesses, the tavern, which has been a long-time institution in the South Park community. The abutment would create a visual barrier between the two sides of 14th Avenue S. north of S. Cloverdale Street. It would also eliminate current on-street parking and would require relocation of the existing bus stops. These impacts, however, remain in the northern portion of the commercial district.

These long-term changes in the community would not be expected to alter the stand-alone character of the community. The route of the principle arterials through the community would not change. The community would likely maintain its current affinity with adjacent neighborhoods, diversity of residents, or businesses.

6.1.7.5 High-Level Fixed-Span Bridge Alternative

The construction impacts of the High-Level Fixed-Span Bridge Alternative would be quite different to the effects described for the other replacement bridge alternatives. There would be temporary short-term disruptions to the community during construction of transition segments between the existing roadway and the new bridge. The length of the bridge, however, would require many more phases of construction activities, or if constructed concurrently, the duration of the single period requiring temporary rerouting of pedestrian and vehicular traffic would be longer in duration. These disruptions would also affect S. Cloverdale Street, which is currently a principal arterial serving the community. The demolition of the existing historic bridge structure would remove a symbol of the community's identity. In addition, at some point during the construction, travel on the South Park Bridge would likely be closed until the new connector road could be constructed. These impacts would be quite disruptive due to both the duration and intrusiveness of the construction activities into the commercial district.

Following the construction of the new bridge, however, there would be substantial changes in the commercial district as well as the larger South Park community. The height of the bridge at mid-point would be approximately 100 feet, more than triple the height of the existing bridge. This height, even north of S. Cloverdale Street, would be well above adjacent primarily small-scale one-story residential buildings. The bridge would clearly dominate the landscape in the northern portion of the community.

The location of the abutment of the new bridge would be further south into the central portion of the commercial district compared to the Rehabilitation and Bascule Bridge alternatives. The tall abutment retaining walls would extend nearly the entire two blocks between S. Cloverdale Street and S. Trenton Street. In addition, S. Donovan Street would be permanently closed and vehicular traffic would no longer be able to travel along major portions of 14th Avenue S. due to the positioning on the bridge piers in the public road right-of-way. The existing businesses in these blocks are local retail businesses. Required property acquisition would displace most of these businesses, leaving only two to three blocks of the existing eight-block commercial district intact. The abutment would create a visual and physical barrier between the two sides of 14th Avenue S. north of S.

Cloverdale Street and divide the northern part of the community. It would also eliminate current on-street parking and would require relocation of the existing bus stops.

Though these changes would not be expected to alter the stand-alone character of the community, its current affinity with adjacent neighborhoods, or diversity of residents or businesses, the impacts would be very substantial. The impacts would extend into the central portion of the community's eight-block long commercial district. Much of the commercial district would be displaced. This significant displacement would cause residents to change their shopping patterns as historically available goods and services would no longer be available in the South Park community. Shopping in Georgetown or White Center or some of the other adjacent neighborhoods would alter residents' ties with the South Park community. Rather than a small, almost self-contained town of its own, South Park would likely evolve into a satellite residential community heavily dependent upon other neighborhoods for goods and services, unless significant redevelopment of the commercial properties occurred. Redevelopment, however, would take some time. The height of the bridge would also deter all but the most athletic individuals from walking across the bridge. Moreover, these adverse impacts and changes were repeatedly voiced by members of the community as completely unacceptable impacts on the community.

Combined, these effects would likely have nearly the same decisive, or barrier effect of the existing route of SR 599 through the middle of the residential portion of the community. Disruptive impacts would extend nearly the entire length of the corridor from the bridge, down 14th Avenue S., and along the new S. Trenton Street connector to 12th Avenue S. to S. Cloverdale Street. The addition of this major transportation corridor and bridge structure through the community would cause the community to be further separated into isolated pockets of residential areas with basically no community commercial shopping area remaining. As such, both the short-term construction and long-term operation of the High-Level Fixed-Span Bridge Alternative should be considered extremely disruptive and would cause significantly adverse impacts to community cohesion in South Park.

6.1.8 Environmental Justice

As described in Sections 5.3 and Section 5.6, the South Park Community should be considered a minority community per federal guidelines set forth in Presidential Executive Order 12898. As such, analysis of potential disproportional adverse effects is a key concern of the proposed South Park Project. In particular, the direct effects of potential property acquisition and displacement of residents, businesses, and employees of affected businesses are one of the most significant adverse effects of the proposed project.

From the early project planning efforts, King County concluded that adverse impacts on the community could be avoided or minimized if the alignment for the project alternatives were located as close as possible to the alignment of the exiting bridge and approaches. On the north shore of the Duwamish Waterway, Boeing owns nearly all of the property on both sides of the existing roadway so proposed alternatives would not

result in direct effects on either minority or low-income persons in this portion of the project corridor. The South Park community south of the Duwamish Waterway, however, has a large proportion of the population that is known to be Persons of Color (minorities) and persons with ethnic heritage, particularly Hispanic heritage.

The following sections discuss the direct effects of property acquisition and displacement in detail for the South Park community. Additional information is provided in Appendices I and J as well as the *Relocations Technical Report* and *Economics Technical Reports.*

6.1.8.1 No Action Alternative

The No Action Alternative would not require the acquisition of any property in order to remove the existing South Park Bridge. This alternative would not affect property owners, residents, businesses, or employees. As such, this alternative would not cause disproportional impacts to protected minority, ethnic, or low-income persons as a result of property acquisition.

6.1.8.2 Rehabilitation Alternative

The Rehabilitation Alternative would require the acquisition of a total of three properties in the South Park Community. These properties include one commercial and two residential properties. Commercial enterprises own all three properties and no information is currently available about the racial or ethnic heritage of these property owners (see Appendix I). One residence is believed to be owner-occupied and the other is renter-occupied. No primary source data (e.g. resident interview data) is available about the racial, ethnic, or income status of these residents. In addition, the survey of South Park businesses was not able to successfully conduct an interview with the owner or manager of the business currently operating on the commercial property, so no information is available about the racial, ethnic, or income status of the business owner or employees of this business (Parsons Brinckerhoff, 2003). As such, it is uncertain whether or not the construction of this alternative would affect, let alone disproportionately affect, protected minority, ethnic, or low-income persons. This alternative, however, would only affect three properties and would have the least impact compared to all of the Build Alternatives. Furthermore, the impacts of these property acquisitions would have the least impact on the entire community commercial district and, therefore, the least impact on the entire minority and ethnic community.

6.1.8.3 Bascule Bridge Alternative

The Bascule Bridge Alternative would require the acquisition of a total of five properties in the South Park Community. These include three commercial properties and two residential properties. The residential properties are the same as those affected by the Rehabilitation Alternative, so no information is available about the racial, ethnic, or income status of either of these property owners or residents.

Based simply on the last names of the commercial property owners, one of the three commercial property owners would appear to be minority (see Appendix I). No primary source data, however, is available to confirm this information. Of the commercial properties that would be acquired, the survey of 14th Avenue S. businesses surveyed only

two of the three businesses located on these three commercial properties (Parsons Brinckerhoff, 2003). Both of these businesses are currently owned by minority persons. Between the two businesses, 12 workers are employed (full- or part-time) and all of these employees are considered to be minority persons by the business owner (see Appendix J). No income information about these workers is available, however, the wages for the types of retail and service sector jobs held by these persons tend to be low to modest.

In summary, five properties would be acquired for the construction of this alternative in the South Park Community. Compared to the other Build Alternatives, it would have the second lowest number of properties affected. Based on names of property owners and the racial and ethnic heritage of both business owners and employees, however, this alternative would primarily affect minority or ethnic persons, at least based on available information. This alternative, compared to other alternatives would have a low to moderate impact on the commercial district.

6.1.8.4 Mid-Level Fixed-Span Bridge Alternative

The Mid-Level Fixed-Span Bridge Alternative would require the acquisition of a total of twelve properties in the South Park Community. These include ten commercial properties and two residential properties. The residential properties are the same as those affected by the Rehabilitation and Bascule Bridge alternatives, so no information is available about the racial, ethnic, or income status of either of these property owners or residents.

Information is available about the property and business owners of the ten commercial properties. Based on the last names of the property owners, one property appears to be owned by a minority person and four properties appear to be owned by Hispanic persons (see Appendix I). No primary source data, however, is available to confirm the actual racial or ethnic heritage of the property owners. Of the commercial properties that would be acquired, the survey of businesses in the South Park community surveyed a total of nine of the fourteen businesses that would be affected by property acquisition (Parsons Brinckerhoff, 2003). Of the nine businesses surveyed, four are minority-owned and persons of Hispanic heritage own an additional four businesses (see Appendix J). Between these businesses, a total of 57 workers are employed (full- or part-time) and the business owners reported in the survey of businesses that 17, or an estimated 30 percent, are minorities and an additional 36, or 63 percent, are Hispanic. No income information is available concerning the income of these workers or their families, however, the wages for the types of retail and service sector jobs held by these persons tend to be low to modest.

In summary, a total of 12 properties would be acquired in South Park for the construction of the Mid-Level Fixed-Span Bridge Alternative. Compared to other Build Alternatives, it would have the second highest number of properties affected, but only one-third as many properties as would be affected for the High-Level Fixed-Span Bridge Alternative. Based on the names of property owners and the racial and ethnic heritage of both business owners and employees, however, this alternative could primarily affect minority or ethnic persons, at least based on available information. This alternative would likely have a substantial affect on the commercial district, which is a primary focus of the entire

community. The displacement of approximately three to four blocks of the eight-block commercial district could jeopardize the long-term stability and viability of the commercial district. In turn, this could have a substantial affect on the cohesion of the entire Hispanic community.

6.1.8.5 High-Level Fixed-Span Bridge Alternative

The construction of the High-Level Fixed-Span Bridge Alternative would require the acquisition of 36 property owners in the South Park Community. A total of 12 of these properties are residential and the remaining 24 are commercial properties.

Based on the last names of the property owners, it would appear that a minimum of three properties are currently owned by minority persons and an additional nine properties are owned by persons of Hispanic heritage (see Appendix I). The minority and ethnic status of the other 24 property owners cannot easily be determined. No primary source data, however, is available to confirm this information that a minimum of one-third of the property owners are Minority or Hispanic persons

The 12 residential properties include single-family as well as multi-family residences. In total, there are an estimated 16 residences that would be acquired. In addition, the survey of 14th Avenue S. businesses determined three or more apartments are located above commercial businesses (Parsons Brinckerhoff, 2003). Considering the average persons per household for the South Park Community as reported in the 2000 census, the population of these 19 residences potentially affected by the construction of this alternative could be an estimated 48 persons. Unfortunately, no primary source data is available concerning what proportion of the households residing in these dwelling units are owners or renters; but based on 2000 census statistics, an estimated 45 percent and 55 percent would be expected to be owner-occupied and renter-occupied, respectively. There is no information about the cost of monthly rates for the rental units, but census statistics would indicate households would typically have an income that is approximately 68 percent of the median household income of Seattle households and a proportion have income at or below the poverty level.. Furthermore, no primary source data is available concerning the racial, ethnic heritage, or income status of residents, but census statistics indicate a majority are Minorities and a substantial proportion are Hispanic. As such, adverse impacts on residents could be disproportionate to residents who are minorities, of ethnic heritage, and/or low-income.

Of the 24 commercial properties that would be acquired for this alternative, an estimated 23 businesses would be affected. The survey of businesses in the South Park community, however, only included 16 of these businesses (Parsons Brinckerhoff, 2003). A total of five of the surveyed businesses are owned by minority persons and an additional six businesses are owned by Hispanic persons (see Appendix J). As such, a minimum of 48 percent of the business owners consider themselves to be either a minority or a person of ethnic heritage.

Between the 16 businesses surveyed, a total of an estimated 90 workers are employed, exclusive of workers employed by the Sea Mar Community Health Clinic. An estimated 21 percent of these workers are minorities and an additional 53 percent are Hispanic

persons. The Sea Mar Community Health Clinic is by far the largest employer in the South Park commercial district and the non-profit has three buildings on 14th Avenue S. plus additional facilities on S. Henderson Street. This employer has a reported 450 employees and approximately 23 percent are minorities and an additional 53 percent are Hispanic. No income information is available about any of these workers in South Park that could be displaced by property acquisitions related to this alternative.

In summary, a total of 36 properties in the South Park Community would be acquired for the construction of this alternative. Compared to the other Build Alternatives, it would have the most severe adverse effects of any of the alternatives based on number of properties affected. This alternative would affect three times as many properties as the Mid-Level Fixed-Span Bridge Alternative, which would have the next largest number of properties that would be affected. Based on the names of property owners and the racial and ethnic heritage of both business owners and employees, this alternative would primarily affect minority and/or ethnic persons based on available information (see Appendix J). The impacts of the acquisition of the commercial properties would displace approximately six blocks of the eight-block commercial district. This would have significant adverse affects on the commercial district and its future viability. More importantly, the construction of the S. Trenton Street connector road to 12th Avenue S. would also disrupt the adjacent residential neighborhood. In addition, property acquisition would displace three buildings of the Sea Mar Community Health Clinic, which focuses on providing health care and social services to minority, Hispanic, and low-income persons throughout the Seattle metropolitan area. As such, this alternative, compared to other alternatives, would by far have the most significant adverse effects on the 14th Avenue S. commercial district, the minority and Hispanic South Park community, and potential effects would likely extend to minority, Hispanic, and low-income persons within the region. Considering the extent of these impacts, this alternative must be seen as an alternative that would have disproportionate adverse impacts on protected minority and low-income populations per Presidential Executive Order 12898.

6.2 Secondary and Cumulative Impacts

This section discusses potential secondary and cumulative impacts that could occur as a result of implementing one of the five proposed project alternatives. These impacts could include potential impacts to population and housing, community and social services, public services, recreation resources in the community, pedestrian and bicycle paths and transit services, community cohesion, and environmental justice.

6.2.1 Secondary Impacts

Secondary impacts are impacts that are indirectly a result of a proposed project or its alternatives and occur at a later point in time or farther removed in distance, but are still reasonably foreseeable. Secondary impacts to public services, pedestrian and bicycle facilities, and transit service would not be expected under any of the alternatives. The

paragraphs below describe anticipated secondary impacts for each of the proposed project alternatives.

Adverse secondary impacts would occur if the No Action Alternative were selected. The eventual closure and demolition of the bridge would prohibit cross-river traffic. The decrease in traffic, especially truck traffic, along 14th Avenue S. through the middle of the community could improve the pedestrian and shopping ambience of the community business district. In addition, this change could improve residents' perceptions of the community as a quieter residential community without the intrusion of truck traffic. It would no longer be possible for pedestrians to walk across the bridge to have lunch in South Park. Overall, however, it is uncertain the degree to which the removal of the bridge would affect local businesses, as most owners feel their customers make a special trip to make their purchases of goods and services (Parsons Brinckerhoff, 2003).

With increasing length of each build alternative, however, the potential secondary adverse impacts to the local commercial district would likely be more severe. The Rehabilitation Alternative would directly affect, through property acquisition, approximately one-fifth of the length of the commercial district; the Bascule Bridge Alternative, approximately one-third; the Mid-Level Fixed-Span Bridge Alternative, approximately one-half; and the High-Level Fixed-Span Bridge Alternative, nearly two-thirds of the commercial district. The more extensive the direct impacts, the more likely these impacts would cause disruption to the remaining businesses in the commercial district. And, the more extensive the district is disrupted, the more likely these remaining businesses could fail. The loss of several of the restaurants or the loss of a particularly unique commercial establishment, such as the Mexican grocery store, could have an overall effect that could discourage people from shopping along 14th Avenue S. The property acquisition and extent of disruption of the commercial district could cause some of the remaining local businesses to fail. The potential loss of additional businesses could adversely affect the stability of the remaining commercial district. The community could lose some of its current attraction to both existing and potential future residents as well as businesses. In turn, residents could decide to leave the project area. Such scenarios could affect long-term population growth in the community due to a perceived decline in the attractiveness and vitality of the community.

Any potential adverse secondary impacts resulting from the implementation of the Rehabilitation and Bascule Bridge alternatives would be expected to be minor. The proposed loss of two commercial properties from required property acquisition would not likely affect the commercial district or residents in the community. Access to destinations outside of the community would be maintained and the community could attract people to move to the community. The number of persons who might move to the community, however, would be determined by available existing and future housing (for purchase and for rent). This increased desirability of housing in the community in turn could cause property values to increase. The rehabilitated bridge or the construction of a new bridge could even become an impetus for additional development in the community, especially considering the community's proximity to downtown Seattle.

In contrast, the potential secondary impacts for the Mid-Level Fixed-Span and High-Level Fixed-Span bridge alternatives could be substantial and adverse. The new bridge would create a visual and transportation mobility obstruction in the community. It would become a barrier separating community residential areas. A large proportion of the downtown commercial properties would be acquired for construction activities. Moreover, proposed acquisition of the Sea Mar Community Health Center buildings in the existing cluster of medical, dental, and social services could cause the entire complex to move from the South Park community under the High-Level Fixed-Span Bridge Alternative. This would reduce the availability of these services in the community. In addition, the Sea Mar Community Health Center's community outreach events and activities (i.e. Fiesta Patrias), which currently help to draw community residents together, and potentially attract shoppers to the commercial district, would potentially be lost to the community, which would deteriorate community identity. Together, these effects could cause the attractiveness of the community to decline and property values could decrease. The condition of housing and landscaping in the community could deteriorate. This in turn could cause residents to choose to move away from the community. Together, these factors could lead to deterioration in community cohesion, especially under the High-Level Fixed-Span Bridge Alternative.

6.2.2 Cumulative Impacts

Cumulative impacts are the total environmental effects of the proposed project when combined with other actions roughly occurring during the same frame. For the proposed South Park Bridge Project, construction activities are planned to occur over a two- to three-year period. Operation of the rehabilitation or replacement bridge is assumed to occur by 2009. During this approximate same time period, two other projects are planned for the immediate project area.

One of these projects is the planned construction of an engineered contaminated sediment cap on the bottom of the Duwamish Waterway to either side of the existing South Park Bridge. The exact timing of this work is currently unknown. Potential engineering problems could occur if construction activities for the two projects are not coordinated. Construction activities associated with the two projects would likely occur sequentially. This would lengthen the period of time community residents would need to endure construction impacts. Access to destinations outside of the community during construction activities of both projects could increase the number of temporary closures of the bridge and/or approach roadways. The extended period of construction would lengthen the period of time during which emergency medical, fire, and police vehicles would need to take detours, which could increase response times. The increased duration of construction vehicles traversing local arterials, including 14th Avenue S., could deter community residents and Boeing workers from patronizing local shops and restaurants. Or, during the expanded construction period, customers could find alternatives to shopping in the South Park community and they might not continue to patronize the community businesses following the completion of construction activities. These effects would disrupt existing community cohesion.

Following the construction of these two projects, public perception of the community would likely improve under the Rehabilitation, Bascule Bridge, and Mid-Level Fixed-Span Bridge

alternatives. Only a small portion of the commercial district would be acquired for right-of-way and some of this property would be sold following construction for redevelopment. Transportation access to and from the community would be maintained. It is unknown if construction activities associated with the cleanup would require closure of the bridge. And furthermore, the cleanup of the Lower Duwamish Waterway Superfund Site could improve potential negative public perceptions of the community. Together, the two projects could increase the perceived attractiveness of the community, encourage people to move to the community, and could result in increased property values. Overall, such effects would help to improve the cohesion of the community.

In contrast, the implementation of the High-Level Fixed-Span Bridge Alternative combined with the Lower Duwamish Waterway cleanup activities could magnify negative perceptions of the community. The construction of this replacement bridge alternative would have significant adverse impacts on the community commercial district, local access, transit service, and it would create both a physical and visual barrier in the community. Together, these two projects could further deteriorate perceptions that the community is not valued, which could further deteriorate community cohesion.

Under any of the project alternatives, recreation resources in the community could be cumulatively increased. The ECOSS proposes to restore of the Duwamish River shoreline and fisheries habitat. This work is proposed immediately downstream of the existing South Park Bridge and would extend to the existing Duwamish Waterfront Park at the north end of 10th Avenue S. Potential site restoration associated with construction activities for the South Park Bridge Project alternatives could also include passive recreational amenities. In particular, site restoration would be needed for properties acquired for construction staging as well as the area where demolition of the existing bridge would occur. These amenities could include walking paths, benches, and a network of nature interpretive signs that could be linked with those proposed for the ECOSS project. Associated project mitigation landscaping and street improvements could also extend the ECOSS green corridor along the Duwamish Waterway south along 14th Avenue S. The pedestrian sidewalk incorporated into the design of the project Build Alternatives could also encourage people to extend their walk from the ECOSS green corridor to view points along the bridge overlooking the river. These opportunities for expanded recreational amenities, however, would not be as effective under the High-Level Fixed-Span Bridge Alternative. The size of the bridge structure would diminish the visual qualities offered by a green corridor. Moreover, pedestrian access to the bridge sidewalk would likely be located some distance from the ECOSS green corridor and it would require substantial physical effort to walk up the pedestrian walkway to the full height of the bridge deck more than 100 feet above the Duwamish Waterway. Coordination between the proposed ECOSS project and the proposed South Park Bridge Project alternatives also could bolster public perceptions and improve community cohesion.

Chapter 7 Mitigation

The following is a list of potential mitigation measures recommended to avoid or minimize anticipated social impacts to the South Park community. These social impact mitigation measures are in addition to those already incorporated into the design and alignment of each of the project alternatives to minimize land use impacts (see Section 2.4.1, Design Criteria).

7.1 Population and Housing

- No mitigation measures are recommended to address potential population impacts as none are anticipated.
- Provide compensation for the occupants of all residential properties acquired for right-of-way or construction staging areas per the federal Uniform Relocation and Real Properties Policy Act of 1970.
- Establish a project area advisory group prior to the start of construction activities to solicit input for mitigation measures to minimize construction impacts.
- Periodically mail notices and/or hold public meetings to alert members of the public of planned construction activities and traffic detours.

7.2 Community and Social Services

- Plan temporary construction impacts to minimize disruptions to access to community and social services.
- Periodically mail notices of planned construction and/or demolition activities, planned temporary road closures and detours, changes in other access routes, and the schedule for these activities to all community facilities and social services operating in the South Park community.
- Should the High-Level Fixed-Span Bridge Alternative be selected, the Project Proponent should work closely with the Sea Mar Community Health Center to ensure the continuance of health care services in the project area due to proposed displacements under this alternative. This coordination should include assistance in temporarily or permanently relocating buildings and/or services affected by the proposed project.

7.3 Public Services

- Coordinate construction and/or demolition activities, planned temporary road closures and detours, and the schedule for these activities with the City of Seattle Fire and Police departments and the School District.

- If the No Action Alternative is selected, the Project Team will coordinate closely with the Seattle Fire Department Station #27 and #26 to ensure adequate fire protection is provided to the South Park community following closure and demolition of the bridge.

7.4 Recreation

- Coordinate planned design and construction activities with ECOSS to minimize potential impacts to the proposed waterfront restoration along the south shore of the Duwamish River downstream of the existing South Park Bridge.

7.5 Pedestrian, Bicycle, and Transit

- Plan temporary construction impacts, including traffic detours, to minimize disruptions to pedestrian, bicycle, and transit routes in the community.

- Distribute periodic press releases, newsletters, or notices to South Park residents to advise them of changes in pedestrian, bicycle, or transit routes during construction and/or demolition activities. These notices should be prepared in English and other appropriate languages, especially Spanish, to ensure notices are comprehended by all.

- Following selection of the preferred alternative and the initiation of preliminary engineering, the Project Team will initiate detailed coordinated efforts with King County Metro to ensure transit services are maintained during construction and demolition activities associated with any of the proposed project alternatives.

- Coordinate with King County Metro to ensure current levels of transit services continue to be provided to the South Park community following construction and/or demolition activities. In particular, this coordination should carefully study alternatives to replace bus service affected by the closure and demolition of the South Park Bridge under the No Action Alternative.

7.6 Community Cohesion

- Plan construction and/or demolition activities to minimize potential impacts to community-wide activities, including the popular “Fiesta Patrias.”

- Carefully consider community land use plans and policies in the *South Park Residential Urban Village Plan* (Seattle, 1998) when finalizing site restoration following construction and overall project mitigation measures.

- Consider conducting an additional project-specific community outreach program to solicit potential ideas for post-construction site restoration and project mitigation measures. In particular, input for potential street furniture, landscaping, relocation of transit stops, open space, or parks would help the community participate in the redevelopment of the project area. These activities could also address land use goals and objectives for 14th Avenue S., especially regarding properties that would be acquired for right-of-way, construction laydown areas, or construction activities for the Rehabilitation or replacement bridge alternatives.

- Consider hosting a community event to announce the opening of a rehabilitated or newly constructed South Park Bridge to mark the conclusion of construction and/or demolition activities.

7.7 Environmental Justice

- Prepare all public notices, press releases, or newsletters produced to alert community facilities, social services, businesses, and residents of the planned construction, demolition, and long-term impacts to the community in English as well as other major languages spoken in the community, particularly Spanish.

- Do not rely on Internet media for public notices as this is a resource that may not be as prominently used by modest and low-income populations residing in the community.

- Distribute public notices to local businesses, shops, restaurants, community centers, social service agencies, and other organizations in the community.

- Publish press releases in both regional as well as local daily and/or weekly newspapers, e.g. the "Siete Dias."

- If a replacement bridge alternative is selected, solicit public input on bridge aesthetics and design in an effort to meet community objectives to maintain the historic character of a key gateway to the community.

- Due to the significance of the 14th Avenue S. business district in the community, replace all displaced on-street and off-street parking in the immediate project area to facilitate long-term viability of project corridor businesses.

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City of Seattle, 2003. *Citywide Subsidized Housing List*. Office of Housing. 2003.

City of Seattle, 1998. *South Park Residential Urban Village Plan*, 1998.

City of Seattle, Department of Neighborhoods. Internet web page URL < www.ci.seattle.wa.us/seattle/don/c112.htm >.

City of Seattle, Fire Department. Internet web page URL < www.cityofseattle.net/fire/home.htm >.

City of Seattle, Police Department, 2003. Internet web page URL < www.cityofseattle.net/police >.

City of Seattle School District. 2003. Internet web page URL < www.seattleschools.org/area/main/index.dxml >.

Council on Environmental Quality, 1997. *Environmental Justice: Guidance Under the National Environmental Policy Act*, December 10, 1997.

Crow, Guy (2003); Manager South Park Marina. Personal communication on July 8, 2003 regarding facilities at the marina.

Environmental Coalition of South Seattle (ECOSS), 2003. Internet web page URL < www.users.qwest.net/~ecoss/duwamish/duwamish.html >.

Federal Highway Administration, 1998. *Actions to Address Environmental Justice in Minority Populations & Low-Income Populations, and Low-Income Populations*, Order 6640.23, December 2, 1998.

Federal Highway Administration, 1996. *Community Impact Assessment: A Quick Reference for Transportation*, Publication No. FHWA-PD-96-036, September 1996.

Federal Highway Administration, 1987. *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, Technical Advisory T6640.8A, October 30, 1987.

Federal Highway Administration, *NEPA Guidelines*, 23 CFR 771.

Governor's Executive Order 93-07, *Affirming Commitment to Diversity and Equity in the Service Delivery and in the Communities of the State,* 1993.

Hewitt, Laura (2003a); Seattle Office of Housing. Personal communication on July 3, 2003 regarding low-income and affordable housing.

Hewitt, Laura (2003b); Seattle Office of Housing. Personal communication on July 25, 2003 regarding economic well-being of the South Park community.

Index (2003). Summary of Public Comments, Draft Memorandum,. September 2002.

Jennings, Ingrid (2003); Seattle Public Library. Personal communication on July 2, 2003, regarding planned construction of a new neighborhood library in South Park.

Leonzal, Frank (2003); First Student, Inc. Personal communication on July 3, 2003 regarding bus service for Concord Elementary School.

National Environmental Policy Act (NEPA), 42 USC Section 4231.

Nolette, Officer (2003); Seattle Police Department Media Relations. Personal communication on July 3, 2003 regarding Police Department use of the South Park Bridge.

Parsons Brinckerhoff, Inc., 2003. *South Park Bridge Project: Survey of 14th Avenue South Businesses*. Prepared for King County Department of Transportation. August 22, 2003.

Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, February 11, 1994.

Seattle Times, The. "Reaching for the Future," in *Pacific Northwest*. December 15, 2002, pages 26-41.

U.S. Bureau of the Census, 2000. *Census of Population and Housing, 2000 (100% & Sample Survey)*, URL < http://factfinder.census.gov >.

U.S. Bureau of the Census, 1990. *Census of Population and Housing, 1990 (100% & Sample Survey)*, URL < http://factfinder.census.gov >.

U.S. Department of Health and Human Services (HHS), 2003. *The 2000 HHS Poverty Guidelines* ,URL < http://aspe.dhhs.gov/poverty/00poverty.htm >.

U.S. Department of Transportation Order 5610.2, *Environmental Justice,* April 15, 1997.

Washington State Department of Transportation, 2003. *Environmental Procedures Manual, M 31-11*, Sections 457 & 458, September 2003.

Washington State Environmental Policy Act (SEPA), WAC 197-11.

Young, Chief (2003); Seattle Fire Department. Personal communication on July 3, 2003 regarding Seattle Fire Department response issues in South Park.

APPENDICES

Appendix A Population Trends, 1990 and 2000

Appendix B Population Race and Hispanic Characteristics, 1990 and 2000

Appendix C Primary Language Spoken at Home, 2000

Appendix D Household Characteristics, 1990 and 2000

Appendix E Population Age Characteristics, 1990 and 2000

Appendix F Housing Characteristics, 1990 and 2000

Appendix G Household Income Characteristics, 1990 and 2000

Appendix H Means of Transportation to Work, 2000

Appendix I Impacts to Potential Minority and Hispanic South Park Property Owners

Appendix J Impacts to Potential Minority and Hispanic South Park Business Owners

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Appendix A. Population Trends, 1990 & 2000.

Area	Tract	1990 Block	1990 Population	2000 Block	2000 Population	Difference	% Increase
Project Study Area							
East Marginal Way S.	109	3	628	1	675	47	7.5%
South Park	112	4	879	1	1,238	359	
Community		1	21	2	746		
		2	681				
		3	1,228	3	1,733	505	
			2,809		3,717	908	32.3%
Boeing Industrial	263	1	318	1	393		
		9	136				
			454		393	(61)	-13.4%
SR 509 - SR 99	264	1	493	1	662	169	
		2	1,002	2	1,315	313	
		3	1,415	3	1,412	(3)	
		4	1,309	4	1,442	133	
		5	924	5	993	69	
			5,143		5,824	681	13.2%
Total			9,034		10,609	1,575	17.4%
City of Seattle			516,259		563,374	47,115	9.1%

Source: U.S. Bureau of the Census, 1990 and 2000.

Note:

The boundaries of some census tract block groups changed between 1990 and 2000.

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Appendix B. Population Race and Hispanic Characteristics, 1990 & 2000.

		1990								2000									
Area	Tract	Block	White	Black	AI,E,A	A or PI	Other	Hispanic	TOTAL	Block	White	B or AA	AI & AN	Asian	NH & OPI	Other	2 or More	Hispanic	TOTAL
Project Study Area																			
East Marginal Way S.	109	3	397	63	32	78	58	82	628	1	384	47	20	125	11	57	31	103	675
			63%	*10%*	*5%*	*12%*	*9%*	*13%*			*57%*	*7%*	*3%*	*19%*	*2%*	*8%*	*5%*	*15%*	
South Park	112	4	616	72	14	126	51	109	879	1	518	95	25	238	29	278	55	371	1,238
Community		1	16	-	-	-	5	8	21	2	418	38	21	94	3	130	42	227	746
		2	484	43	25	79	50	80	681										
		3	758	123	57	160	130	223	1,228	3	690	179	28	192	19	508	117	781	1,733
			1,874	238	96	365	236	420	2,809		1,626	312	74	524	51	916	214	1,379	3,717
			67%	*8%*	*3%*	*13%*	*8%*	*15%*			*44%*	*8%*	*2%*	*14%*	*1%*	*25%*	*6%*	*37%*	
Boeing Industrial	263	1	211	62	1	41	3	8	318	1	171	92	5	93	1	7	24	20	393
		9	118	11	6	-	1	8	136										
			329	73	7	41	4	16	454		171	92	5	93	1	7	24	20	393
			72%	*16%*	*2%*	*9%*	*1%*	*4%*			*44%*	*23%*	*1%*	*24%*	*0%*	*2%*	*6%*	*5%*	
SR 509 - SR 99	264	1	357	69	13	48	6	17	493	1	293	120	14	69	11	107	48	131	662
		2	774	52	17	137	22	38	1,002	2	725	143	11	214	33	103	86	167	1,315
		3	1,138	80	32	123	42	79	1,415	3	852	114	17	174	41	137	77	263	1,412
		4	1,145	45	11	74	34	64	1,309	4	967	122	16	156	25	86	70	162	1,442
		5	701	131	25	45	22	57	924	5	561	68	19	110	26	153	56	286	993
			4,115	377	98	427	126	255	5,143		3,398	567	77	723	136	586	337	1,009	5,824
			80%	*7%*	*2%*	*8%*	*2%*	*5%*			*58%*	*10%*	*1%*	*12%*	*2%*	*10%*	*6%*	*17%*	
Total			6,715	751	233	911	424	773	9,034		5,579	1,018	176	1,465	199	1,566	606	2,511	10,609
			74%	*8%*	*3%*	*10%*	*5%*	*9%*			*53%*	*10%*	*2%*	*14%*	*2%*	*15%*	*6%*	*24%*	
City of Seattle			388,858	51,948	7,326	60,819	7,308	18,349	516,259		394,889	47,541	5,659	73,910	2,804	13,423	25,148	29,719	563,374
			75%	*10%*	*1%*	*12%*	*1%*	*4%*			*70%*	*8%*	*1%*	*13%*	*0%*	*2%*	*4%*	*5%*	

Source: U.S. Bureau of the Census, 2000.

Notes:

The boundaries of some census tract block groups changed between 1990 and 2000.

1990 Race Definitions:

AI,E,A = American Indian, Eskimo, or Aleut

A or PI = Asian or Pacific Islander

Other = Another race or more than one race

2000 Race Definitions:

B or AA = Black or African American

AI & AN = American Indian and Alaska Native

NH & OPI = Native Hawaiian and Other Pacific Islander

Other = Some other race alone

2 or More = Two or more races

Hispanic = For both 1990 and 2000, the term Hispanic includes persons of any race who are Hispanic.

South Park Bridge Project

Appendix C. Primary Language Spoken at Home, 2000.

Area	Tract	Block	2000 English	Spanish	Other Indo-European	Asian & Pacific Island	Other	Household TOTAL
Project Study Area								
East Marginal Way S.	109	1	185	43	39	20	6	293
			63%	*15%*	*13%*	*7%*	*2%*	
South Park	112	1	233	93	25	44	-	395
Community		2	197	46	13	22	3	320
		3	266	181	6	60	-	513
			696	320	44	126	3	1,228
			57%	*26%*	*4%*	*10%*	*0%*	
Boeing Industrial	263	1	136	6	-	30	-	172
			136	6	-	30	-	172
			79%	*3%*	*0%*	*17%*	*0%*	
SR 509 - SR 99	264	1	204	29	7	28	14	282
		2	381	29	25	69	-	504
		3	342	61	10	103	28	544
		4	576	66	24	50	-	716
		5	167	82	8	55	-	312
			1,670	267	74	305	42	2,358
			71%	*11%*	*3%*	*13%*	*2%*	
Total			2,687	636	157	481	51	4,051
			66%	*16%*	*4%*	*12%*	*1%*	
City of Seattle			205,381	11,636	14,505	23,047	4,066	258,635
			79%	*4%*	*6%*	*9%*	*2%*	

Source: U.S. Bureau of the Census, 2000.

South Park Bridge Project

Appendix D. Household Characteristics, 1990 & 2000.

		1990								2000							
Area	Tract	Block	Pop.	HH	Average Persons per HH	1-Person HH	Family HH (with and without children)	Family HH with Children	Non-Family HH (non-related persons)	Block	Pop.	HH	Average Persons per HH	1-Person HH	Family HH (with and without children)	Family HH with Children	Non-Family HH (non-related persons)
Project Study Area																	
East Marginal Way S.	109	3	628	298	2.11	134	128	67	36	1	675	315	2.14	153	124	52	38
						45%	*43%*	*22%*	*12%*					*49%*	*39%*	*17%*	*12%*
South Park	112	4	879	333	2.64	101	204	132	28	1	1,238	408	3.03	103	266	152	39
Community		1	21	9	2.33	5	3	2	1	2	746	276	2.70	89	154	92	33
		2	681	276	2.47	96	144	78	36								
		3	1,228	498	2.47	168	270	160	60	3	1,733	546	3.17	143	327	191	76
			2,809	1,116	2.52	370	621	372	125		3,717	1,230	3.02	335	747	435	148
						33%	*56%*	*33%*	*11%*					*27%*	*61%*	*35%*	*12%*
Boeing Industrial	263	1	318	149	2.13	68	62	32	19	1	393	165	2.38	62	96	37	7
		9	139	76	1.83	42	29	10	5								
			457	225	2.03	110	91	42	24		393	165	2.38	62	96	37	7
						49%	*40%*	*19%*	*11%*					*38%*	*58%*	*22%*	*4%*
SR 509 - SR 99	264	1	493	234	2.11	92	115	57	27	1	662	308	2.15	139	142	89	27
		2	1,002	448	2.24	160	249	118	39	2	1,315	523	2.51	172	294	168	57
		3	1,415	529	2.67	160	315	148	54	3	1,412	527	2.68	139	340	171	48
		4	1,309	658	1.99	236	329	82	93	4	1,442	652	2.21	223	348	131	81
		5	924	354	2.61	79	227	136	48	5	993	338	2.94	86	203	124	49
			5,143	2,223	2.31	727	1,235	541	261		5,824	2,348	2.48	759	1,327	683	262
						33%	*56%*	*24%*	*12%*					*32%*	*57%*	*29%*	*11%*
Total			9,037	3,862	2.34	1,341	2,075	1,022	446		10,609	4,058	2.61	1,309	2,294	1,207	455
						35%	*54%*	*26%*	*12%*					*32%*	*57%*	*30%*	*11%*
City of Seattle			516,259	236,702	2.18	94,179	112,969	47,378	29,554		563,374	258,499	2.18	105,542	113,400	46,310	39,557
						40%	*48%*	*20%*	*12%*					*41%*	*44%*	*18%*	*15%*

Source: U.S. Bureau of the Census, 2000.

Notes:

The boundaries of some census tract block groups changed between 1990 and 2000.

Pop. = Population

HH = Household

South Park Bridge Project

Appendix E. Population Age Characteristics, 1990 & 2000.

		1990						2000					
Area	Tract	Block	< 5 yrs.	5-17 yrs.	18-64 yrs.	> 64 yrs.	TOTAL	Block	< 5 yrs.	5-17 yrs.	18-64 yrs.	> 64 yrs.	TOTAL
Project Study Area													
East Marginal Way S.	109	3	50	88	397	93	628	1	30	89	494	62	675
			8%	*14%*	*63%*	*15%*			*4%*	*13%*	*73%*	*9%*	
South Park	112	4	83	178	526	92	879	1	106	251	774	107	1,238
Community		1	2	3	11	5	21	2	58	149	480	59	746
		2	62	95	442	82	681						
		3	118	220	746	144	1,228	3	154	314	1,102	163	1,733
			265	496	1,725	323	2,809		318	714	2,356	329	3,717
			9%	*18%*	*61%*	*11%*			*9%*	*19%*	*63%*	*9%*	
Boeing Industrial	263	1	16	47	190	65	318	1	23	63	238	69	393
		9	5	11	95	25	136						
			21	58	285	90	454		23	63	238	69	393
			5%	*13%*	*63%*	*20%*			*6%*	*16%*	*61%*	*18%*	
SR 509 - SR 99	264	1	26	76	363	28	493	1	62	96	465	39	662
		2	76	129	672	125	1,002	2	117	235	845	118	1,315
		3	102	186	895	232	1,415	3	120	254	912	126	1,412
		4	45	102	921	241	1,309	4	87	189	922	244	1,442
		5	93	134	603	94	924	5	70	185	665	73	993
			342	627	3,454	720	5,143		456	959	3,809	600	5,824
			7%	*12%*	*67%*	*14%*			*8%*	*16%*	*65%*	*10%*	
Total			678	1,269	5,861	1,226	9,034		827	1,825	6,897	1,060	10,609
			8%	*14%*	*65%*	*14%*			*8%*	*17%*	*65%*	*10%*	
City of Seattle			29,269	55,661	352,929	78,400	516,259		26,215	61,612	407,740	67,807	563,374
			6%	*11%*	*68%*	*15%*			*5%*	*11%*	*72%*	*12%*	

Source: U.S. Bureau of the Census, 2000.

Note:

The boundaries of some census tract block groups changed between 1990 and 2000.

South Park Bridge Project

Appendix F. Housing Characteristics, 1990 & 2000.

		1990						2000					
Area	Tract	Block	Housing Units	Single Family	Vacant Units	Owner Occupied	Renter Occupied	Block	Housing Units	Single Family	Vacant Units	Owner Occupied	Renter Occupied
Project Study Area													
East Marginal Way S.	109	3	318	188	20	113	185	1	336	191	21	130	185
				59%	*6%*	*38%*	*62%*			*60%*	*6%*	*41%*	*59%*
South Park	112	4	365	271	32	177	156	1	423	330	15	228	180
Community		1	11	9	2	5	4	2	299	182	23	125	151
		2	300	194	24	116	160						
		3	554	276	56	170	328	3	582	297	36	202	344
			1,230	750	114	468	648		1,304	809	74	555	675
				61%	*9%*	*42%*	*58%*			*66%*	*6%*	*45%*	*55%*
Boeing Industrial	263	1	161	87	12	65	84	1	184	106	19	82	83
		9	84	38	8	31	45						
			245	125	20	96	129		184	106	19	82	83
				51%	*8%*	*43%*	*57%*			*43%*	*10%*	*50%*	*50%*
SR 509 - SR 99	264	1	248	64	14	81	153	1	372	191	64	96	212
		2	463	188	15	186	262	2	540	179	17	199	324
		3	553	270	24	270	259	3	550	249	23	278	249
		4	675	190	17	369	289	4	673	186	21	350	302
		5	369	112	15	99	255	5	349	143	11	113	225
			2,308	824	85	1,005	1,218		2,484	948	136	1,036	1,312
				36%	*4%*	*45%*	*55%*			*41%*	*5%*	*44%*	*56%*
Total			4,101	1,887	239	1,682	2,180		4,308	2,054	250	1,803	2,255
				46%	*6%*	*44%*	*56%*			*50%*	*6%*	*44%*	*56%*
City of Seattle			249,032	128,618	12,330	115,709	120,993		270,524	132,908	12,025	125,165	133,334
				52%	*5%*	*49%*	*51%*			*53%*	*4%*	*48%*	*52%*

Source: U.S. Bureau of the Census, 2000.

Notes:

The boundaries of some census tract block groups changed between 1990 and 2000.

South Park Bridge Project

Appendix G. Household Income Characteristics, 1990 & 2000.

		1990								2000							
Area	Tract	Block	HH Total	1989 Median HH Income	1989 Per Capita Income	Pop.	HH with Public Assistance	Pop. Poverty Status Determined	1989 Pop. Below Poverty	Block	HH Total	1999 Median HH Income	1999 Per Capita Income	Pop.	HH With Public Assistance	Pop. Poverty Status Determined	1999 Pop. Below Poverty Level
Project Study Area																	
East Marginal Way S.	109	3	250	$ 22,000	$ 11,274	628	NA	591	133	1	293	$ 34,135	$ 21,362	675	9	647	151
									23%						*3%*		*23%*
South Park	112	4	323	$ 22,969	$ 10,246	879	NA	814	126	1	395	$ 32,352	$ 15,891	1,238	54	1,289	102
Community		1	10	$ 14,583	$ 6,294	21	NA	24	-	2	320	$ 35,556	$ 22,701	746	21	718	68
		2	277	$ 22,578	$ 10,211	681	NA	717	194								
		3	497	$ 18,918	$ 9,235	1,228	NA	1,265	376	3	513	$ 27,844	$ 12,864	1,733	38	1,555	276
			1,107	$ 20,977	$ 9,766	2,809	NA	2,820	696		1,228	$ 31,304	$ 15,846	3,717	113	3,562	446
									25%						*9%*		*13%*
Boeing Industrial	263	1	162	$ 20,714	$ 14,876	318	NA	287	29	1	172	$ 27,500	$ 17,491	*393*	-	402	27
		9	94	$ 13,333	$ 9,353	139	NA	140	26								
			256	$ 18,004	$ 13,196	457	NA	427	55		172	$ 27,500	$ 17,491	393	-	402	27
									13%						*0%*		*7%*
SR 509 - SR 99	264	1	205	$ 33,403	$ 17,763	493	NA	464	54	1	282	$ 31,786	$ 15,973	662	5	662	7
		2	477	$ 29,708	$ 15,721	1,002	NA	1,044	204	2	504	$ 37,262	$ 18,886	*1,315*	43	1,287	161
		3	508	$ 31,731	$ 15,805	1,415	NA	1,115	82	3	544	$ 34,500	$ 16,623	1,412	17	1,396	199
		4	622	$ 35,804	$ 20,530	1,309	NA	1,278	90	4	716	$ 45,417	$ 24,537	1,442	24	1,437	156
		5	383	$ 22,886	$ 11,767	924	NA	947	218	5	312	$ 50,385	$ 16,167	993	7	996	90
			2,195	$ 31,058	$ 16,453	5,143	NA	4,848	648		2,358	$ 40,183	$ 18,942	5,824	96	5,778	613
									13%						*4%*		*11%*
Total			3,808	$ 26,655	$ 13,850	9,037	NA	8,686	1,532		4,051	$ 36,515	$ 24,537	10,609	218	10,389	1,237
									18%						*5%*		*12%*
City of Seattle			236,908	$ 29,353	$ 18,308	516,259	NA	498,333	61,681		258,635	$ 45,736	$ 30,306	563,374	7,638	543,198	64,068
									12%						*3%*		*12%*

Source: U.S. Bureau of the Census, 2000.

Notes:

HH = Households

Pop. = Population

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Appendix H. Means of Transportation to Work, 2000.

Area	Tract	Block	Vehicle	Transit	Motorcycle	Bicycle	Walk	Other	Work at Home	Workers 16+ yrs. TOTAL
			2000							
Project Study Area										
East Marginal Way S.	109	1	253	56	-	12	27	-	10	358
			71%	*16%*	*0%*	*3%*	*8%*	*0%*	*3%*	
South Park	112	1	443	45	-	3	-	-	-	491
Community		2	182	71	11	-	50	-	10	324
		3	525	130	-	18	32	12	-	717
			1,150	246	11	21	82	12	10	1,532
			75%	*16%*	*1%*	*1%*	*5%*	*1%*	*1%*	
Boeing Industrial	263	1	158	18	-	-	19	-	-	195
			158	18	-	-	19	-	-	195
			81%	*9%*	*0%*	*0%*	*10%*	*0%*	*0%*	
SR 509 - SR 99	264	1	197	45	-	13	43	-	20	318
		2	439	114	-	-	-	-	-	553
		3	595	87	-	9	5	10	15	721
		4	676	-	-	-	6	-	16	698
		5	406	82	-	-	-	9	6	503
			2,313	328	-	22	54	19	57	2,793
			83%	*12%*	*0%*	*1%*	*2%*	*1%*	*2%*	
Total			3,874	648	11	55	182	31	77	4,878
			79%	*13%*	*0%*	*1%*	*4%*	*1%*	*2%*	
City of Seattle			214,351	55,652	1,005	5,943	23,291	1,638	14,613	316,493
			68%	*18%*	*0%*	*2%*	*7%*	*1%*	*5%*	

Source: U.S. Bureau of the Census, 2000.

South Park Bridge Project

Appendix I. Impacts to Potential Minority and Hispanic South Park Property Owners

	PROPERTIES	COMMERCIAL PROPERTIES				RESIDENTIAL PROPERTIES				TOTAL Minority and/or Hispanic
Alternative	**TOTAL**	Total	Minority	Hispanic	Unknown	Total	Minority	Hispanic	Unknown	
No Action	0	0				0				0%
Rehabilitation	3	1			1	2			2	0%
Bascule Bridge	5	3	1		2	2			2	20%
Mid-Level Fixed-Span Bridge	12	10	1	4	7	2			2	42%
High-Level Fixed-Span Bridge	36	24	2	7	15	12	1	2	9	*33%*

Source: King County, property assement records, July 2003. Relocation Technical Report, June 2003.

Notes:

1. This table does not include acquisition of property owned by The Boeing Company on the north side of the Duwamish Waterway.
2. Commercial properties are categorized as such because the primary land use is commercial. A business, however, may have an apartment on the second floor, etc.
3. Minority - This category includes individual property owners who have a last name that generally is recognized as one belonging to a person of color (minority race), particularly Asian.
4. Hispanic - This category includes individual property owners who have a last name that generally is recognized as Hispanic.
5. Unknown - This categories includes corporate property owners as well as individual property owners for which the last name is generally recognized as one for person could be a person of color or of Hispanic heritage.
6. Two of the commercial properties that would be acquired for construction of the High-Level Fixed-Span Bridge Alternative are classified as unknown, but are owned by the non-profit SeaMar Community Health Clinic. This clinic particularly provides services for low-income and Hispanic individuals.

South Park Bridge Project

Appendix J. Impacts to Potential Minority and Hispanic South Park Business Owners

Alternative	Commercial Properties Acquired	Businesses Impacted	Businesses Impacted Surveyed	Minority Businesses	Hispanic Businesses	Not Minority, Not Hispanic	Unknown	Minority and/or Hispanic Businesses Impacted
No Action	0	0	0					0%
Rehabilitation	1	1	0				1	Unknown
Bascule Bridge	3	3	2	2			1	66% min.
Mid-Level Fixed-Span Bridge	10	14	9	4	4	1	5	57% min.
High-Level Fixed-Span Bridge	24	23	16	5	6	5	7	48% min.

Source: Relocation Discipline Report, July 2003. South Park Bridge: Survey of 14th Avenue S. Businesses (Draft), July 18, 2003.

Notes:

1. Some businesses operate on more than one commercial parcel, but are counted as one businesses.
2. Some commercial parcels have more than one business.