

# SEATTLE CENTER ARENA RENOVATION PROJECT

## Final Environmental Impact Statement

**PREPARED FOR**

City of Seattle Department of Construction and Inspections

**IN COOPERATION WITH**

Seattle Center, Office of Economic Development,  
and Seattle Department of Transportation

**PREPARED BY**

Environmental Science Associates, Fehr & Peers

AUGUST 2018





August 30, 2018

## **Seattle Center Arena Renovation Project Final Environmental Impact Statement**

Dear Affected Agencies, Organizations, and Interested Parties:

The City of Seattle (City) is proposing to renovate the existing KeyArena at Seattle Center to provide a modern multi-purpose entertainment and sports center that will host concerts, sporting events, family shows, community-oriented events, and numerous other events, and that could accommodate a professional National Hockey League (NHL) and/or National Basketball Association (NBA) franchise. The proposal would also continue to accommodate many current uses including the Seattle Storm Women's National Basketball Association (WNBA) franchise. For the purposes of this Environmental Impact Statement (EIS), the renovated arena is referred to as the "Seattle Center Arena."

The Seattle Department of Construction and Inspections (SDCI) is the Lead Agency under the State Environmental Policy Act (SEPA) for the proposal and has prepared this Final EIS to analyze potential environmental impacts resulting from the proposed renovation of KeyArena. Seattle Center, the Office of Economic Development (OED), and Seattle Department of Transportation (SDOT) are consulting agencies and partners in the EIS process for the Seattle Center Arena Renovation Project. The City proposes to enter into a lease and development agreement with a private developer, Oak View Group, LLC (OVG), that would design, construct, and operate the arena during the lease term.

This Final EIS incorporates the information contained in the Draft EIS, comments received on the Draft EIS during the public review period, responses to these comments, and additional information developed in response to comments.

The Final EIS will be used by the City of Seattle to inform various decisions and approvals, including:

- Permitting for renovation of the arena infrastructure, buildings, and other related improvements, and associated permits for all other land-altering, building, and construction for the proposed project.
- Approval of a Lease, Development Agreement, and Seattle Center Integration Agreement.
- Possible night-time construction work variance pursuant to the Seattle Noise Control Code (Seattle Municipal Code [SMC 25.08]).
- Possible variance requests, waivers, or departures associated with various code standards, including: through-block pedestrian connection requirements, open space standards, curb cut and driveway standards, accessory surface parking area and lot requirements, building setback requirements, structure width and depth requirements, and landscaping standards between the street and front façades.
- Certificates of Approval from the Landmarks Preservation Board.
- Amendment to the sign code (SMC 23.55), by the Seattle City Council.
- Street Improvement Permits, Street Use Permits, Term Permits, and Utility Relocation and Development Permits from SDOT.

The scope of the Draft and Final EIS has been determined in accordance with the Seattle SEPA Ordinance (SMC 25.05). In September 2017, a public meeting was held to provide opportunity for the public to discuss and identify probable significant environmental impacts that should be addressed in the Draft EIS. Comments received during the scoping period were used by SCDI to inform the issues and alternatives evaluated in the Draft EIS.

The Draft EIS was issued on April 23, 2018, and included a 45-day comment period, which ended on June 7, 2018. A public hearing was held on May 14, 2018 at the Seattle Center, with approximately 30 individuals in attendance. During the Draft EIS comment period, comments were submitted through public testimony at the Draft EIS hearing and written comments, including email and electronic submission to the project website. More than 440 comments were received from 80 individuals, organizations, agencies, and other stakeholders. These comments and responses to the comments are included in Appendix I, Volume 3.

Comments received were broad in scope and topics, but several themes emerged in the comments:

- Transportation impacts, including construction and operational impacts to transportation network operations, parking, transit, pedestrians, bicycles, and other aspects of regional transportation systems.
- Noise, particularly construction noise, and vibration impacts to sensitive receptors at Seattle Center and adjacent residents.
- Disruption to Seattle Center tenants during construction, associated with reduced access, noise and dust, and increased traffic congestion.
- Loss of the skatepark at Seattle Center.
- Long-term impacts to Seattle Center tenants resulting from the increased frequency of arena events and associated congestion.
- Requests for specific detailed mitigation measures for transportation impacts, construction impacts, and measures to reduce impacts to existing Seattle Center tenants.
- Air quality impacts during construction.

Major comment themes are summarized under Common Responses, found in Appendix I, Volume 3, *Comments and Responses on the Draft EIS*. The text of the Final EIS has been revised to reflect new analysis, and to address comments received.

Three alternatives are analyzed in the Final EIS, including the No Action Alternative, Alternative 1: The Oak View Group (OVG) Proposal, and Alternative 2: Modified Proposal.

The Final EIS describes the affected environment, potential impacts of the three alternatives, and potential measures to reduce impacts for the following topics: land use, transportation, earth, historic and cultural resources, recreation, noise and vibration, visual resources, air quality and greenhouse gases, public services and utilities, plants, and cumulative impacts. Key environmental issues are primarily related to potential construction and operations impacts to traffic and transportation, as well as historic and cultural resources, noise and vibration, recreation, and visual resources.

Changes between the Draft and Final EIS are summarized in the introductory sections for each chapter. In response to comments received on the Draft EIS and new project details developed by OVG, transportation evaluations were updated, additional noise monitoring and evaluations were conducted (including development of noise contours), a new signage plan and proposed sign code amendment have been developed, and construction measures have been modified to reduce impacts.

Further information is available at the SDCI webpage: <http://web6.seattle.gov/dpd/edms> under Permit and Property Records for Project Number 3029061 or at <http://www.seattle.gov/arena>.

Thank you for your interest in the Seattle Center Arena Renovation Project.

Sincerely,

A handwritten signature in cursive script that reads "John Shaw".

John Shaw  
Senior Transportation Planner  
Seattle Department of Construction and Inspections

# FACTSHEET

## ***Project Name***

Seattle Center Arena Renovation Project - Project Number 3029061

## ***Proposed Action***

The Proposed Action (Alternative 1) is to renovate KeyArena into a modern multi-purpose arena to accommodate concerts, entertainment, community-oriented events, and sports events, including meeting National Basketball Association (NBA) and National Hockey League (NHL) standards, as well as continuing current uses. The proposal includes an amendment to sign regulations in Seattle Municipal Code (SMC) Chapter 23.55 to establish a Seattle Center sign overlay district that would regulate the number, size, type, content, location, brightness, and operation of signs for the renovated arena, the Northwest Rooms, and the south parcel. Alternative approaches to the proposed renovation and to the sign regulations are described in this Final Environmental Impact Statement (EIS) for the Modified Proposal (Alternative 2).

## ***Project Proponent***

City of Seattle

## ***SEPA Lead Agency***

Seattle Department of Construction and Inspections (SDCI)  
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Seattle, WA, 98124-4019  
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## ***SEPA Responsible Official***

Nathan Torgelson, Director

## ***Date of Issue***

August 30, 2018

## ***Proposed Schedule (estimated dates are subject to change)***

- Publication of a Master Use Permit (MUP) decision may occur in September 2018.
- City Council approval of Transaction Documents may occur in September 2018.
- Other permits and approvals may occur at various times, largely during the fourth quarter of 2018.
- Construction may begin in October 2018.
- City Council action on proposed sign code amendment may occur in the fourth quarter of 2018 or first quarter of 2019.

### **Document Availability**

The Final EIS is available online at <http://www.SeattleCenterArenaEIS.org>, <http://www.seattle.gov/arena>, and the SDCI webpage: <http://web6.seattle.gov/dpd/edms> under Permit and Property Records for **Project Number 3029061**.

Printed copies of the Final EIS are available for review at no charge at:

SDCI Public Resource Center  
700 5<sup>th</sup> Ave, Suite 2000  
Seattle, WA 98124

\*Open 8:00 AM to 4:00 PM on Monday, Wednesday, and Friday, and 10:30 AM to 4:00 PM on Tuesday and Thursday.

Seattle Public Library, Central Library  
1000 4<sup>th</sup> Ave  
Seattle, WA 98104

Seattle Public Library, Queen Anne Branch  
400 W Garfield St  
Seattle, WA 98119

For questions or to obtain a copy of the document contact the SDCI Public Resource Center at the address listed above, referencing Project Number 3029061.

### **Permits, Licenses, and Approvals Likely Required for Proposal**

The following would be required from the City of Seattle:

- Permitting for renovation of the arena infrastructure, buildings and other related improvements, and associated permits for all other land-altering, building, and construction activities for the proposed project, potentially include the following from SDCI: Master Use Permit (MUP), Demolition Permits, Building/Grading/Shoring Permits, Mechanical Permit and Electrical Permits, and Tree and Vegetation Removal Permit.
- Approval of a Significant Structure Term Permit by the City Council for construction of a vehicular tunnel beneath Thomas St. Council action will occur at a public meeting. The meeting date has not been identified.
- Possible variance requests, waivers, or departures from code standards, including through-block pedestrian connection requirements, open space standards, curb cut and driveway standards, accessory surface parking area and lot requirements, building setback requirements, structure width and depth requirements, and landscaping standards between the street and front façades.
- Amendment to the sign code SMC 23.55, by the Seattle City Council. The City Council will hold a public hearing but the date of hearing has not been identified.
- Possible variance(s) to allow night-time construction work pursuant to the Seattle Noise Control Code (SMC 25.08) from SDCI. A public hearing will be held on September 13, 2018.



- Street Improvement Permits, Street Use Permits, Term Permits, and Utility Relocation and Development Permits from the Seattle Department of Transportation.
- Lease Agreement, Development Agreement, and Seattle Center Integration Agreement approvals by the City Council. A City Council public meeting may occur in September 2018.
- Certificates of Approval from the Landmarks Preservation Board. Landmarks Preservation Board action on Certificates of Approval will occur at a public meeting but the date of meeting(s) has not been identified.

### ***Authors and Contributors***

A list of authors and contributors is provided in Chapter 15 of the Final EIS.

### ***Location of Background Materials***

Background materials used in the preparation of this Final EIS are listed in Chapter 16, *References*. All references cited that are not available through public libraries or websites are available through SDCI; contact the SDCI Public Resource Center at the address listed above to request copies. No prior EIS exists for this proposal. However, the EIS for the proposed SODO arena (2015) included analysis of potential impacts from a hypothetical replacement of KeyArena.

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## ACRONYMS AND ABBREVIATIONS

A/NT	formerly known as Art/Not Terminal Gallery
AAMP	Arena Access Management Plan
ADA	Americans with Disabilities Act
ARMP	Archaeological Resources Monitoring Plan
AVO	average vehicle occupancy
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice (also Bicycle Master Plan)
BPSA	Bicycle and Pedestrian Safety Analysis
BRT	Bus Rapid Transit
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CAV	connected autonomous vehicle
CC	Community College
cd/m <sup>2</sup>	candela per square meter
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH <sub>4</sub>	methane
City	City of Seattle
CMP	Construction Management Plan
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
DAHP	Department of Archaeology and Historic Preservation
dB	decibel
dba	A-weighted decibel
DCP	Dust Control Plan
DR	Director's Rule
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Environmental Science Associates
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GHG	greenhouse gas
GIS	geographic information system
GMA	Growth Management Act
gpm	gallons per minute
GPS	global positioning system
GWMA	groundwater management area
HCM	Highway Capacity Manual
HEPA	high efficiency particulate air
HVAC	heating, ventilation, and air conditioning
Hz	hertz
I-5	Interstate 5
IDP	Inadvertent Discovery Plan



IESNA	Illuminating Engineering Society of North America
in/sec	inches per second
L10	noise levels equaled or exceeded 10% of a specified time period
L90	noise levels equaled or exceeded 90% of a specified time period
Ldn	day-night sound level
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
Leq	equivalent sound level
lm/m <sup>2</sup>	lumens per square meter
Lmax	maximum sound level
LOS	Level of Service
M	(Richter) Magnitude
Metro	King County Metro
MMT	million metric ton
MOA	Memorandum of Agreement
MoPOP	Museum of Pop Culture
MOU	Memorandum of Understanding
MOVES	MOtor Vehicle Emissions Simulator
MPH	miles per hour
MUP	Master Use Permit
MUTCD	Manual of Uniform Traffic Control Devices
Mw	Moment Magnitude
N2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NAVD88	North American Vertical Datum of 1988
NBA	National Basketball Association
NCAA	National Collegiate Athletic Association
NHL	National Hockey League
NMMP	Noise Management and Mitigation Plan
NO2	nitrogen dioxide
NOx	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWFL	Northwest Folklife
OED	Office of Economic Development
ORCA	One Regional Card for All
OVG	Oak View Group
P&R	Park and Ride
PAR	Protected Archaeological Resource
PCB	polychlorinated biphenyl
PM	particulate matter
PM10	particulate matter (less than 10 microns in diameter)
PM2.5	particulate matter (less than 2.5 microns in diameter)
PPV	peak particle velocity
PSCA	Puget Sound Clear Air Agency
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
RFID	radio-frequency identification
RPZ	Restricted Parking Zone
SBCC	(Washington) State Building Code Council



SCL	Seattle City Light
SCT	Seattle Children's Theatre
SDCI	Seattle Department of Construction and Inspections
SDOT	Seattle Department of Transportation
SEPA	State Environmental Policy Act
SIFF	Seattle International Film Festival
SMC	Seattle Municipal Code
SM-UP	Seattle Mixed-Uptown
SO <sub>2</sub>	sulfur dioxide
SoDo	South of Downtown
SPD	Seattle Police Department
SPR	Seattle Parks and Recreation
SPS	Seattle Public Schools
SPU	Seattle Public Utilities OR Seattle Pacific University
SR	State Route
ST2	Sound Transit 2
ST3	Sound Transit 3
SWPP	Stormwater Pollution Prevention Plan
TAP	toxic air pollutant
TC	Transit Center
TCO	Traffic Control Officer
TCP	Transportation Control Plan
TNC	Transportation Network Company
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	vibration decibel
VMT	Vehicle miles travelled
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WNBA	Women's National Basketball Association
WTD	(King County) Wastewater Treatment Division

# 1.0 INTRODUCTION & SUMMARY

## 1.1 INTRODUCTION

Seattle Center is a regional center for performance, arts, sports, and recreation. It is home to more than 30 arts, cultural, sports, and entertainment organizations, family attractions, and tourist amenities in the heart of Seattle (see Figure 1-1). The KeyArena building (which is a designated Seattle Landmark) is one of the most prominent structures on the Seattle Center campus and serves as a multi-purpose entertainment and sports venue hosting concerts, sports, and a variety of other events.

As owner of KeyArena, the City of Seattle (City) is proposing to renovate the arena to provide a modern multi-purpose entertainment and sports center that will host concerts, sporting events, family shows, community-oriented events, and numerous other events, and that could accommodate a professional National Hockey League (NHL) and/or National Basketball Association (NBA) franchise. The proposal would also continue to accommodate many current uses, including the Seattle Storm Women's National Basketball Association (WNBA) franchise. The proposed project also provides a number of upgrades, including improvements to enhance accessibility (such as improvements under the Americans with Disabilities Act [ADA]) and meeting a minimum Leadership in Energy and Environmental Design (LEED) threshold.

The City proposes to enter into a lease and development agreement with a private developer, Oak View Group, LLC (OVG). OVG would, at its cost, renovate the arena including designing and obtaining permits for the renovation and operation of the arena during the lease term.

The Seattle Department of Construction and Inspections (SDCI) is the Lead Agency under the State Environmental Policy Act (SEPA) for the proposal and has prepared this Final Environmental Impact Statement (Final EIS) to analyze potential environmental impacts resulting from the proposed renovation of KeyArena. Seattle Center, the Office of Economic Development (OED), and Seattle Department of Transportation (SDOT) are consulting agencies and partners in the EIS process for the Seattle Center Arena Renovation Project.

In this EIS, the renovated arena is referred to as the "Seattle Center Arena" to distinguish it from the existing KeyArena and to reflect that a new name, as part of new sponsorship, is anticipated for the renovated arena.

## 1.2 PROJECT BACKGROUND

The building at Seattle Center known as KeyArena has gone through a number of renovations, name changes, and programming uses over the past 56 years. The structure was originally built for the 1962 Seattle World's Fair as the Washington State Coliseum and was paid for by the State of Washington. The Coliseum was designed by noted Seattle architect Paul Thiry, the lead architect for the World's Fair, and was home to the "World of Tomorrow" exhibit. After the World's Fair, the City purchased the Coliseum from the state, and the building underwent an 18-month conversion into a venue for sports, concerts, and trade shows, including installation of a seating bowl. The building became known as the "Seattle

Center Coliseum.” An early tenant was the Seattle Totems of the Western Hockey League. In 1967, the Coliseum became the home of the Seattle SuperSonics (“Sonics”), an expansion franchise of the NBA. The Coliseum was a multi-purpose arena that also hosted concerts, trade shows, circuses, and other family events.

The Coliseum was renovated again in 1994/1995 to modernize the arena and keep it competitive for multi-purpose uses and retain the NBA Sonics franchise as the anchor sports tenant. Increasing the capacity of the building within the same footprint and roofline required lowering the floor of the building by 38 feet. The superstructure of the old Coliseum was reused, and the roofline and curtain wall structure were preserved, with most of the significant changes occurring below grade. The project also included construction of a 650-stall parking garage south of the Coliseum, called the 1<sup>st</sup> Ave N Garage. Construction for the renovation began in June 1994 and was completed in October 1995. Renamed “KeyArena” as part of a title sponsorship agreement with KeyBank, the renovated facility saw overall attendance of about 1.2 million annually.

In the mid-2000s, after failing to find public funding to renovate KeyArena to meet current NBA standards or to construct a new arena in the Seattle area, the Sonics moved to Oklahoma City. Thus, NBA programming at the Seattle Center ended before the 2008–2009 season. While its major tenant, the Sonics, no longer played at KeyArena, it continues to be a venue in Seattle for concerts and other types of shows. It is also home court for basketball teams, including the Seattle Storm and Seattle University and has continued to host a variety of sporting events, concerts, and other types of events. In 2016 and 2017, there was an average of 102 events and average annual expected attendance was approximately 640,000.

In 2015, the City Council commissioned a study of the existing condition of and future operating and renovation prospects for KeyArena (AECOM, 2015). The study found that the building, although “generally in good condition,” was aesthetically dated and in need of modernization. Factors that affect the arena’s utility included its small size, limited concourse space, and limited backstage, rigging, and loading facilities. Additionally, its configuration was deemed unsuitable for NHL hockey and unable to generate revenues comparable to other NBA arenas. The 2015 study analyzed alternative entertainment and recreation concepts for KeyArena, and found that “the potential revenue that could be generated from other attraction concepts is largely offset by the additional costs of basic operations and maintenance of the KeyArena facility,” leaving the City at a deficit (AECOM, 2015, page 16). The study suggested that if sports or concert uses were not viable, the City could explore the possibility of demolishing the structure and using the site for other purposes.

Subsequently, the City decided to solicit proposals to renovate KeyArena (City of Seattle, 2017a). In response, the City received 2 submittals, 1 from OVG and 1 from Seattle Partners. To choose between them, the Mayor considered input from City review teams, the recommendation of a City Executive Team, and feedback from a Community Advisory Panel. On June 7, 2017, OVG’s proposal was chosen and the City began negotiations to develop a Memorandum of Understanding (MOU) with OVG for the renovation. The City Council approved the MOU on December 4, 2017 (City of Seattle and OVG, 2017). The MOU outlines certain business terms upon which: (1) the City would offer a portion of KeyArena and the surrounding area for lease by OVG; and (2) OVG, as tenant, would seek the necessary permits and approvals and construct leasehold improvements and operate the arena. The “project site” as analyzed in this Final EIS is defined as the proposed lease area, which consists of the area including and surrounding KeyArena, a parcel to the south that contains the Bressi Garage and the 1<sup>st</sup> Ave N Garage (referred to as the “south parcel”), and the location of a truck-loading access tunnel underneath Thomas St.

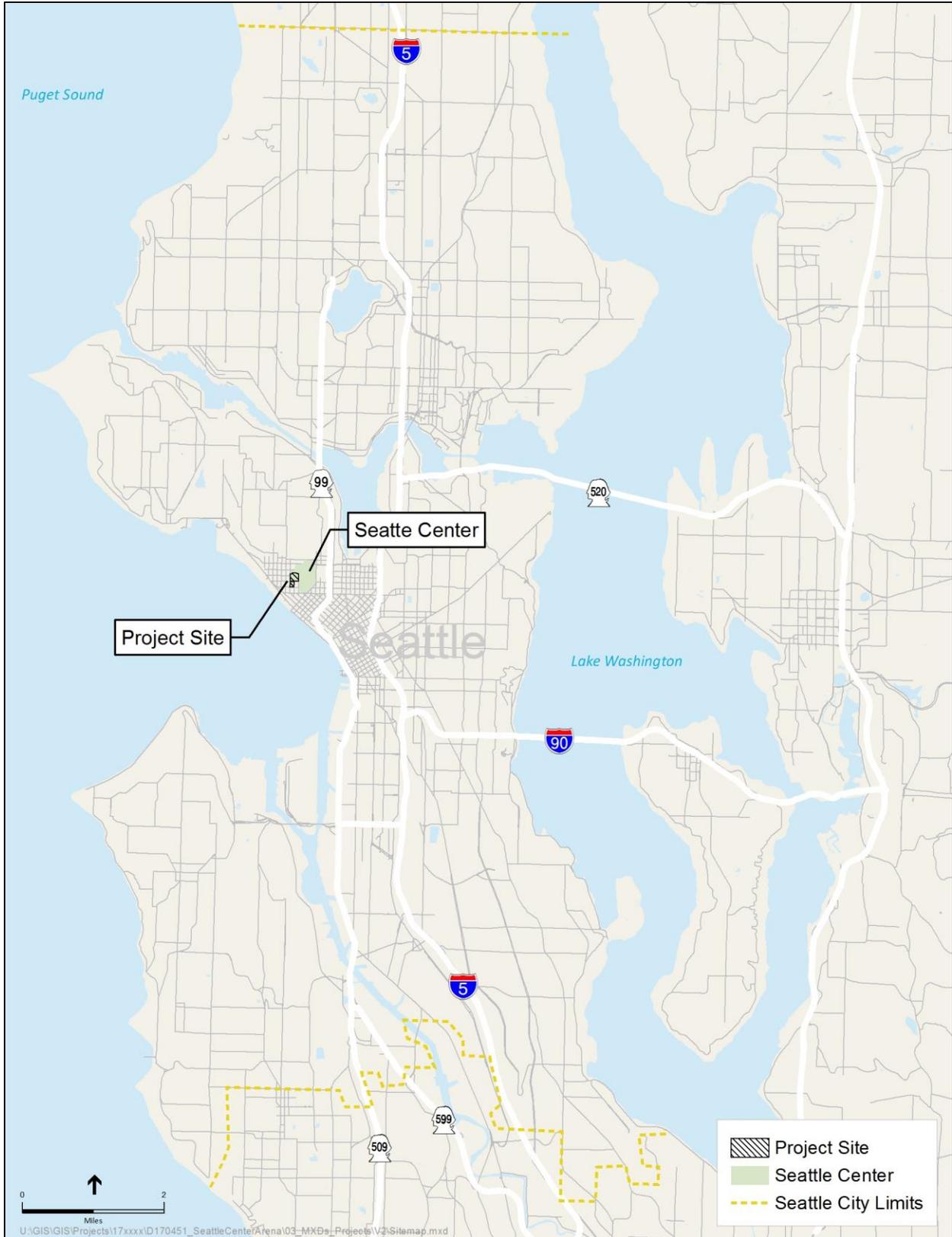


Figure 1-1. Vicinity Map of the Seattle Center

The MOU provides that final terms would be contained in various Transaction Documents, which include the following:

- **Lease:** The proposed lease establishes the terms upon which OVG can occupy, improve, and operate the arena and the 1<sup>st</sup> Ave N Garage parcels. The lease also requires that OVG enter into other related Transaction Documents addressing construction and operation phases and commitments for community benefits.
- **Development Agreement:** The proposed Development Agreement between OVG and the City will address OVG's mitigation commitments with the City, Seattle Center, and its tenants during construction. This agreement includes construction impact mitigation plans and community benefit provisions (described below).
- **Seattle Center Integration Agreement:** This agreement establishes a framework for coordinating procedures and infrastructure across the arena premises and the Seattle Center campus to better integrate City and OVG operations throughout the term of the lease. The Seattle Center Integration Agreement includes provisions for regular communication and sharing of event scheduling information, coordinating management and operations of the campus parking garages, and coordinating security, traffic control, use of curb space, marketing, and sponsorship.

These agreements, all of which are being informed by the preparation of this EIS, will be transmitted to the Seattle City Council for possible approval in September 2018. These documents will be posted when they are completed.

A Community Benefits Summary was developed and includes key ideas that are incorporated within the Transaction Documents listed above. The Arena MOU calls for the development of community benefits to allow for meaningful and ongoing community dialogue and partnerships with OVG during construction and once the renovated arena is operational. The City, OVG, the community, and Seattle Center tenants have agreed on a structure and a series of specific investments by OVG and the City to support community institutions during both construction and operation. The summary establishes an Arena Community Development Fund that will support youth, arts, music, and culture, and also touches on areas of broad community benefit including organizational capacity building and local economic development. It also includes establishing an OVG Community Liaison, who was hired in June 2018, as well as an ombudsperson, who would be a Seattle Center staff member to act as conduit for the community. The Community Benefits Summary is available for viewing at <https://www.seattle.gov/arena>.

On August 2, 2017, the City's Landmarks Preservation Board voted to designate KeyArena/the Washington State Coliseum and Bressi Garage as Seattle Landmarks. In coordination with the City, OVG nominated KeyArena/the Washington State Coliseum for listing in the Washington Heritage Register. On March 8, 2018, the Washington State Advisory Council on Historic Preservation formally listed KeyArena on the Washington Heritage Register and recommended it eligible for listing in the National Register of Historic Places (NRHP). This recommendation was submitted to the National Park Service, which administers the NRHP, for final approval. It was approved by the National Park Service and listed in the NRHP on May 10, 2018. In soliciting proposals for the renovation of KeyArena, the City expressed a preference for preserving the iconic exterior of the KeyArena.

## 1.3 PROJECT OBJECTIVE

The objective of the project is to renovate KeyArena at Seattle Center into a modern multi-purpose arena to accommodate music, entertainment, and sports events, including meeting NBA, NHL, and WNBA league standards, as well as continuing current uses.

## 1.4 SEPA SCOPING PROCESS AND PUBLIC COMMENT

A Notice of Application, Issuance of Determination of Significance, and Request for Comments on the Scope of the EIS for the Seattle Center Arena Renovation Project was initially issued by SDCI on September 7, 2017 (City of Seattle, 2017c). The Notice was reissued on September 14 and 18, to reflect a change in the date of the public scoping meeting. All comments received were considered in the development of the scope of the EIS.

Scoping comments included oral testimonies and written comment forms received at the scoping public meeting, as well as emails and mailed comment letters sent to SDCI. Approximately 24 members of the public attended the public meeting held on September 28, 2017, at Seattle Center. An oral testimony period offered the public an opportunity to provide input about the alternatives being considered, areas of the environment to be included in the EIS, likely impacts, potential mitigation, and other concerns about the process.

A total of 41 comment letters and oral testimonies were received during the scoping period. These letters included a total of 182 individual comments. Public comments were used to inform the alternatives and elements of the environment to be included in this EIS. At the conclusion of scoping, SDCI determined the issues and alternatives to be analyzed in this EIS. Ten broad areas of environmental review are evaluated, including:

- Land Use (Uses, Plans and Policies, Zoning, Neighborhood Character)
- Transportation, including Parking
- Earth (Geology and Soils)
- Historic and Cultural Resources
- Recreation
- Noise and Vibration
- Visual Resources (including Public Views, Light, and Glare)
- Air Quality and Greenhouse Gas (GHG) Emissions
- Public Services and Utilities
- Plants (Trees)

As provided by SEPA (Washington Administrative Code [WAC] 197-11-440(6)(a)), elements of the environment that are not significantly affected do not need to be included in an EIS. After considering the scoping comments and SEPA requirements to inform the appropriate scope of analysis for the proposed project, the Lead Agency determined that the following elements of the environment would

not be significantly affected by the project and are not analyzed in this EIS: Water, Energy and Natural Resources, Animals, and Environmental Health (except for the Noise component).

Transportation impacts were the most frequently cited concern during scoping. Other scoping comments identified concerns about potential impacts from construction and operation to nearby businesses associated with increased traffic congestion, parking, and noise impacts. Some commenters stated that the South of Downtown (SoDo) area was preferable for an arena because they believe that area does not have the same congestion concerns, and some commenters asked that an off-site location be considered as an alternative. Because the objective of the project is the renovation of KeyArena, an off-site location is not evaluated in the EIS. Based on the scoping comments received, no other social or economic issues are evaluated in this EIS. More details on comments received (including the full text of the scoping comments received during the scoping process) can be found in Scoping Comment Summary, Seattle Center Arena (City of Seattle, 2017b) available at: <http://web6.seattle.gov/dpd/edms>; project number: 3029061.

## 1.5 SEPA REVIEW PROCESS

The Draft and Final EIS were prepared pursuant to the state SEPA rules (WAC 197-11), Seattle Municipal Code (SMC) 25.05, and Revised Code of Washington [RCW] 43.21c. This project-level EIS describes potential adverse environmental impacts of each alternative and describes potential mitigation measures to reduce adverse impacts. The SEPA process is designed to inform decision-makers and the public regarding reasonable alternatives, potential adverse environmental impacts, and reasonable mitigation measures associated with a proposal. This EIS document is not an authorization for an action, nor does it constitute a decision or a recommendation for an action.

The following actions for the proposed renovation of KeyArena are encompassed by this EIS:

- Permitting for renovation of the arena infrastructure, buildings, and other related improvements, and associated permits for all other land-altering, building, and construction activities for the proposed project, potentially including the following from SDCI: Master Use Permit (MUP), Demolition Permits, Building/Grading/Shoring Permits, Mechanical Permit and Electrical Permits, Tree and Vegetation Removal Permit.
- Approval of a Significant Structure Term Permit by the City Council for construction of a vehicular tunnel beneath Thomas St. Council action will occur at a public meeting. The meeting date has not been identified.
- Possible variance requests, waivers, or departures from code standards, including through-block pedestrian connection requirements, open space standards, curb cut and driveway standards, accessory surface parking area and lot requirements, building setback requirements, structure width and depth requirements, and landscaping standards between the street and front façades.
- Amendment to the sign code, SMC 23.55, by the Seattle City Council. Possible variance(s) to allow night-time construction work pursuant to the Seattle Noise Control Code (SMC 25.08) from SDCI.
- Possible variance(s) to allow night-time construction work pursuant to the Seattle Noise Control Code (SMC 25.08) from SDCI.

- Street Improvement Permits, Street Use Permits, Term Permits, and Utility Relocation and Development Permits from the SDOT.
- Lease Agreement, Development Agreement, and Seattle Center Integration Agreement approvals by the City Council.
- Certificates of Approval from the Landmarks Preservation Board.

## 1.6 DRAFT EIS AND PUBLIC COMMENT PERIOD

The Draft EIS was issued on April 23, 2018, and included a 45-day comment period, which ended on June 7, 2018. A public hearing was held on May 14, 2018 at the Seattle Center, with approximately 30 individuals in attendance. During the Draft EIS comment period, comments were submitted through public testimony at the Draft EIS hearing and written comments, including email and electronic submission to the project website. More than 440 comments were received from about 80 individuals, organizations, agencies, and other stakeholders. These comments and responses to the comments are included in Appendix I, *Comments and Responses on the Draft EIS*, Volume 3.

Comments received were broad in scope and topics, but several themes emerged in the comments:

- Transportation impacts, including construction and operational impacts to transportation network operations, parking, transit, pedestrians, bicycles, and other aspects of regional transportation systems.
- Noise, particularly construction noise, and vibration impacts to sensitive receptors at Seattle Center and adjacent residents.
- Disruption to Seattle Center tenants during construction, associated with reduced access, noise and dust, and increased traffic congestion.
- Loss of the skatepark at Seattle Center.
- Long-term impacts to Seattle Center tenants resulting from the increased frequency of events and associated congestion.
- Requests for specific detailed mitigation measures for transportation impacts, construction impacts, and measures to reduce impacts to existing Seattle Center tenants.
- Air quality impacts during construction.

Major comment themes are summarized under Common Responses, found in Appendix I. The text of the Final EIS has been revised to reflect new analysis, and to address comments received.

## 1.7 ALTERNATIVES EVALUATED IN THE FINAL EIS

Three alternatives are analyzed in this Final EIS:

- No Action Alternative
- Alternative 1: Oak View Group (OVG) Proposal
- Alternative 2: Modified Proposal

See Chapter 2 for detailed descriptions of each of these alternatives, and a description of the changes to the design, construction methods, and proposed code amendments that have been made following release of the Draft EIS.

## **1.8 SUMMARY OF IMPACTS, POTENTIAL MITIGATION MEASURES, AND KEY FINDINGS**

Table 1-1 summarizes the potential construction impacts from the action alternatives evaluated in this Final EIS, as well as potential mitigation measures to reduce or eliminate construction impacts. Potential impacts and measures to reduce construction impacts are described in more detail in Chapters 3 through 12.

Table 1-2 summarizes the potential operations impacts from the alternatives evaluated in this Final EIS, as well as potential measures to reduce or eliminate impacts. Potential operations impacts and measures to reduce impacts are described in more detail in Chapters 3 through 12.

**Table 1-1. Summary of Potential Construction Impacts and Potential Measures to Reduce Impacts**

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Land Use</b>		
Impacts	<ul style="list-style-type: none"> <li>Demolition of some existing structures, the skatepark, and surface parking in the project site.</li> <li>Temporary displacement of some existing uses from the project site.</li> <li>Some construction-related noise and/or vibration impacts would be significant to adjacent uses, such as recording studios.</li> <li>Curb cut and driveway width, atrium depth, and certain street-level development standards including pedestrian connection, open space, surface parking area and lot requirements, building setback and structure width and depth, and landscaping fall outside of current zoning and Land Use Code standards under Title 23 and would require variances.</li> <li>Amendment to the sign code (SMC 23.55) could allow more and brighter signage at the Seattle Center Arena.</li> <li>Variance(s) to the Seattle Noise Control Code (SMC 25.08) to allow night-time construction.</li> <li>Indirect impacts during construction to nearby businesses/properties due to construction-related loss of parking, noise, and congestion.</li> </ul>	<ul style="list-style-type: none"> <li>Similar to Alternative 1, except no night work would occur, there would be no night-time noise impacts, and a noise variance would not be required.</li> <li>Land Use Code amendment for Alternative 2 would not allow video display signs facing 1<sup>st</sup> Ave N, and the roof signs would not be larger than existing conditions.</li> <li>Indirect impacts to businesses/properties due to construction-related loss of parking, noise, and congestion would last 6 months longer than Alternative 1.</li> </ul>
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Identify measures to maintain access, reduce noise and dust during construction, and reduce disruption.</li> <li>Contribute \$500,000 toward a robust community marketing plan.</li> <li>Relocation of the skatepark to a nearby location.</li> <li>Advance notice to existing Seattle Center tenants of the construction period.</li> <li>Coordination with displaced tenants. Assistance in identifying alternative locations to hold games, concerts, and other events.</li> <li>Assistance in publicizing the relocation of programming to the potential attendees.</li> </ul>	Same as Alternative 1.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>• Close coordination with residents and businesses in the area to provide advance notice of construction schedules and potential detour routes.</li> <li>• Develop and implement a robust public outreach and marketing plan that promotes businesses and organizations prior to and throughout construction.</li> <li>• Support the OVG Community Liaison as described in the Community Benefits Summary.</li> <li>• Appoint a Seattle Center staff person to act as an ombudsperson for the community.</li> <li>• Follow design guidelines prescribed by the City and follow the City procedures for variances.</li> <li>• Follow code amendment process required for some of the signage.</li> </ul>	
<b>Transportation</b>		
Impacts	<ul style="list-style-type: none"> <li>• Closure of streets, bicycle facilities, sidewalks, bus stops, bus layover space, and parking/loading areas, and reduced bus/truck staging during construction would cause the greatest impacts. Degraded traffic operations and pavement deterioration related to truck hauling are also potential impacts.</li> </ul>	Same as Alternative 1, except duration of intense construction-related impacts would increase by at least 6 months.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>• Street use permits and other agreements to provide temporary locations for the following displaced facilities/uses: Metro bus layover and bus stop; school bus parking; bicycle facilities; pedestrian access; parking; and curb space event loading/unloading.</li> <li>• Construction Management Plan (CMP) addressing: truck haul routes and hours, staging areas, employee parking, shifts, and transportation demand management measures; street closure procedures; coordination with large events; and point of contact for neighbors.</li> </ul>	Same as Alternative 1.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Earth</b>		
Impacts	<ul style="list-style-type: none"> <li>Erosion, vibration, slope stability, and other construction-related impacts associated with excavation and other earthwork.</li> <li>Some dewatering likely, which may change groundwater patterns.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Construct project in accordance with best management practices (BMPs) and applicable permit, safety, and building requirements.</li> <li>Adhere to excavation safety standards.</li> <li>Conduct geotechnical hazard evaluations (by licensed geotechnical engineer) and incorporate recommendations into project design.</li> <li>Monitor vibration at Northwest Rooms, Bressi Garage, and other sensitive structures within 100 feet of earthwork to identify any signs of structural damage.</li> <li>Conduct dewatering in accordance with permit requirements and design final drainage system in accordance with City requirements.</li> </ul>	Same as Alternative 1.
<b>Historic and Cultural Resources</b>		
Impacts	<ul style="list-style-type: none"> <li>Significant impacts to 3 designated Landmarks: KeyArena, the Northwest Rooms (including the International Fountain Pavilion and the International Plaza), and Bressi Garage are expected.</li> <li>Designated Landmark features of KeyArena could be impacted by the atrium lobby, new sign on top of the arena, larger cupola, and removal of the south curtain wall. Impacts to Landmark-designated features would be significant.</li> <li>The KeyArena site would be impacted by the alterations to the surrounding plazas; impacts would be significant.</li> <li>Vibration levels from construction near Bressi Garage could result in vibration impacts to the building exterior, a designated Landmark feature. These impacts would be significant.</li> </ul>	<ul style="list-style-type: none"> <li>Impacts from removal of the south curtain wall, a larger cupola, and the new atrium lobby are the same as Alternative 1; these impacts would be significant. The signs on top of the arena would be similar in size and brightness to the existing signs.</li> <li>Potential impacts to Bressi Garage are less than from Alternative 1 because tunneling would be adjacent to rather than underneath the building.</li> <li>Impacts to Landmark-designated features of the Northwest Rooms would be the same as Alternative 1.</li> </ul>

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>• The Northwest Rooms and International Plaza would be impacted by the southeast and southwest portions of the buildings and construction of an ADA ramp in the plaza. Excavation and shoring could result in vibration impacts. These impacts would be significant.</li> <li>• There is a potential to impact the depositional integrity of belowground cultural resources, if present, although the likelihood is low for the arena site and adjacent Northwest Rooms.</li> <li>• The portion of the project site at and surrounding Bressi Garage could contain belowground cultural resources (e.g., the remains of former building foundations, refuse, or privies) that could be disturbed during construction.</li> <li>• Dust from night-time truck hauling along vacated Harrison St has the potential to impact the International Fountain; the outdoor sculpture <i>Typewriter Eraser, Scale X</i>; and the HVAC intakes for the Museum of Pop Culture (MoPOP), which houses museum collections. Increased dust and exhaust emissions could result in damage to the surfaces of the sculpture as well as the museum items inside the MoPOP building.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential impacts to belowground cultural resources are the same as Alternative 1, except that construction of the loading-dock access tunnel in Alternative 2 could impact different belowground cultural resources than described for Alternative 1.</li> </ul>
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>• Consistency with Seattle Historic Preservation Program’s Certificate of Approval process for the KeyArena, Northwest Rooms, and Bressi Garage.</li> <li>• Stabilize buildings as needed.</li> <li>• Restore Bressi Garage exterior as needed.</li> <li>• Reduce dust and exhaust emissions along vacated Harrison St.</li> <li>• Clean <i>Typewriter Eraser, Scale X</i> as needed.</li> <li>• Restore or repair damage to International Fountain, Armory, and Memorial Stadium, as needed.</li> <li>• Provide higher grade HVAC filters for MoPOP during construction.</li> <li>• Prepare and implement an Inadvertent Discovery Plan for the project.</li> <li>• Prepare and implement an Archaeological Monitoring Plan for the project.</li> </ul>	Same as Alternative 1, except vacated Harrison St would not be used; thus, measures to reduce dust would not be needed for <i>Typewriter Eraser, Scale X</i> , Armory, Memorial Stadium, and MoPOP.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Recreation</b>		
Impacts	<ul style="list-style-type: none"> <li>• KeyArena would be closed to recreational events during the construction period, requiring events to be held elsewhere.</li> <li>• Visitors to recreational programming (such as concerts, film screenings, and classes) at Seattle Center tenants in the Northwest Rooms and Bressi Garage could be impacted by visible and audible construction, relocations, or unavailable programming.</li> <li>• Seattle Center tenants that would have some of their operations significantly impacted from construction noise and/or vibration include KEXP, the Seattle International Film Festival (SIFF) Film Center, and The Vera Project. This significant noise and/or vibration impact would also affect recreational programming and visitors to these organizations during the construction period.</li> <li>• The DuPen Fountain would be closed to visitors during the construction period.</li> <li>• Visitors to the International Fountain and Lawn, and South Fountain Lawn could be impacted by visible and audible construction activities.</li> </ul>	Same as Alternative 1, except the duration of construction-related impacts to recreation would be longer and there would be no night-time noise impacts.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>• The Development Agreement would outline measures to minimize impacts to Seattle Center visitors during construction.</li> <li>• To avoid conflicts with scheduled events, Seattle Center is no longer scheduling events at the arena during the planned construction period, and is working to reschedule events already planned during that period.</li> <li>• Impacts to recreational programming at tenants in the Northwest Rooms and Bressi Garage are described under Land Use and Noise and Vibration.</li> </ul>	Same as Alternative 1.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Noise and Vibration</b>		
Impacts	<ul style="list-style-type: none"> <li>Day-time stationary construction activities would temporarily increase ambient noise levels, but would be less-than-significant.</li> <li>Night-time construction, including truck staging and loading, would significantly impact residential receptors. However, with potential mitigation and approval of a Noise Management and Mitigation Plan (NMMP), these impacts would be less-than-significant for residential receptors.</li> <li>Construction noise would significantly impact the night-time operations of KEXP, The Vera Project, and the SIFF Film Center.</li> <li>Noise impacts to Seattle Children’s Theatre would be significant; these impacts could be reduced to less-than-significant with implementation of noise mitigation measures.</li> <li>There would be additional noise from truck pass-by events during construction, especially during the first 6-months. This would be a less-than-noticeable increase of ambient noise levels during daytime hours, and an increase of 4 dBA during night-time, which is less than readily perceptible. Trucks would be routed through the Seattle Center campus at night to avoid sensitive residential receptors.</li> <li>Vibration-inducing construction equipment could result in building damage to sensitive structures (Northwest Rooms and Bressi Garage), which would be significant.</li> <li>Vibration-inducing construction equipment could significantly impact some operations of KEXP, SIFF Film Center, and The Vera Project.</li> </ul>	Impacts similar to Alternative 1, except night-time construction would be consistent with code limits, and would be less-than-significant. The overall duration of construction-related noise would be at least 6 months longer.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Develop and implement a Noise Management and Mitigation Plan.</li> <li>Construct 12-foot high noise barriers on the north, west, and south sides of the construction site.</li> <li>Stationary noise sources located as far as possible from adjacent receptors and muffled to the greatest degree feasible and/or enclosed.</li> </ul>	Same as Alternative 1, except mitigation for night-time would not be needed.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>• Notify building owners and occupants prior to disruptive construction activities.</li> <li>• Project-based diesel engines use silencers during night-time hours.</li> <li>• Project site-based backup warning devices should be the broadband type or an alternative that is allowed by WAC 96-155-610(2)(e).</li> <li>• Not allow trucks to use compression brakes, except for safety reasons.</li> <li>• Coordinate with KEXP, SIFF Film Center, The Vera Project, and other Seattle Center tenants to identify which areas of operation are most directly impacted and develop specific mitigation.</li> <li>• Prohibit impact work such as auger shaking, jack hammering, hoe ram use, or vibratory compacting during night-time hours.</li> </ul>	
<b>Visual Resources</b>		
Impacts	<ul style="list-style-type: none"> <li>• Construction staging and material storage, detours and associated signage, scaffolding and fences, temporary vegetation clearing, and the increased presence of construction vehicles, equipment, materials, and personnel would result in temporary construction impacts to visual quality.</li> <li>• Construction equipment would obscure views of the designated Landmarks during construction. Scenic views of KeyArena, Bressi Garage, and the Northwest Rooms could be impacted during construction.</li> <li>• Increased light and glare from night-time construction lighting could affect residents of Astro Apartments and residents of Sacred Heart shelter, visitors to Fisher Pavilion, and drivers and pedestrians on 1<sup>st</sup> Ave N and Thomas St.</li> <li>• These impacts would be less-than-significant.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as Alternative 1, except that the need for night work lighting would be reduced.</li> <li>• Views of Landmark-designated structures would be obscured for longer because of the extended construction schedule.</li> </ul>
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>• Restore staging areas following project completion.</li> <li>• Replant vegetation.</li> <li>• Reduce timeframe that construction activities would obscure public views.</li> </ul>	Same as Alternative 1.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>Implement a construction lighting plan to limit light and glare impacts from evening and night work.</li> <li>Shield or direct construction lighting to restrict light spillage.</li> <li>Limit night-time construction.</li> </ul>	
<b>Air Quality and GHG Emissions</b>		
Impacts	<ul style="list-style-type: none"> <li>Construction activities would generate dust, air emissions, and GHGs.</li> <li>Construction-related emissions of criteria air pollutants would be below applicable thresholds in King County of 100 tons per year of carbon monoxide or fine particulate matter (PM10).</li> </ul>	The total emissions would be the same as described Alternative 1.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Control fugitive dust from construction activities.</li> <li>Cover haul trucks transporting soil, sand, or other loose material off-site.</li> <li>Remove visible mud or dirt track-out onto adjacent public roads.</li> </ul>	Same as Alternative 1.
<b>Public Services and Utilities</b>		
Impacts	<ul style="list-style-type: none"> <li>Emergency response time to Seattle Center may increase slightly due to increased congestion on roads affected by construction.</li> <li>Nearby residents, Seattle Center tenants, as well as the Center School and the Downtown School may experience sporadic and temporary disruptions during construction.</li> <li>Short-term disruptions to all utilities and garbage/recycling pick-up could occur.</li> <li>Rodent populations could increase in the construction zone during active construction, particularly demolition.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Conduct construction in compliance with the City Fire Code.</li> <li>Coordinate with utility providers to reduce utility outages to area businesses and residences.</li> <li>Provide advance notice of any planned temporary service outages.</li> </ul>	Same as Alternative 1.

	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>Implement rodent control measures a minimum of 15 days prior to any clearing or demolition.</li> </ul>	
<b>Plants</b>		
Impacts	<ul style="list-style-type: none"> <li>Construction activities near exceptional, legacy, or street trees could damage tree roots or canopy.</li> <li>Removal of up to 13 exceptional, legacy, and/or street trees.</li> <li>Removal of existing landscaping including approximately 60 non-exceptional or legacy trees.</li> </ul>	Same as Alternative 1, except fewer trees would be removed (up to 10 exceptional, legacy, and/or street trees).
Measures to reduce or eliminate impacts	<ul style="list-style-type: none"> <li>Develop a Tree, Vegetation, and Soil Protection Plan.</li> <li>Follow protection measures outlined in Director's Rule 30-15 and the Street Tree Manual (SDOT, 2014).</li> <li>Compliance with City's Tree Protection Ordinance would reduce impacts to trees.</li> <li>Comply with Executive Order 03-05 to replace trees at least a 2:1 ratio.</li> </ul>	Same as Alternative 1.

**Table 1-2. Summary of Potential Operations Impacts and Potential Measures to Reduce Impacts**

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Land Use</b>			
Impacts	No direct land use impacts.	<ul style="list-style-type: none"> <li>• Permanent displacement and demolition of some buildings on the project site.</li> <li>• The potential more than doubling of the number of days during the year with highly attended events at the renovated arena would be noticeable in neighboring areas and may be a quality of life consideration for some residents; associated congestion could affect businesses and institutions.</li> </ul>	Same as Alternative 1, except a woonerf on Thomas St would be closed to car and truck traffic during events.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>• Implement provisions outlined in the Community Benefits Summary.</li> <li>• Provide relocation and financial assistance for permanent displacements from the project site.</li> <li>• Develop an Arena Access Management Plan (AAMP).</li> </ul>	Same as Alternative 1, except that advanced notice would be provided to indicate when the woonerf would be closed.
<b>Transportation</b>			
Impacts	<ul style="list-style-type: none"> <li>• The proportion of intersections operating at Level of Service (LOS) E or F is projected to increase from 22% under existing conditions to 61% under 2020 No Action conditions with average Seattle Center attendance.</li> <li>• During the weekday evening peak period, over-capacity conditions in the</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially significant impacts to intersection operations would occur during both pre-event and post-event peak hours.</li> <li>• The I-5 off-ramp vehicle queue would spill back onto the I-5 mainline at the Mercer St exit.</li> <li>• Buses would experience travel time and reliability degradation due to increased intersection delay. Crowding impacts would occur on bus routes to U District and Ballard, and on LINK light rail. Ridehailing vehicles dropping off before events could temporarily block transit access.</li> <li>• Significant pedestrian impacts are expected at the 5<sup>th</sup> Ave N/Harrison St crosswalk due to high demand.</li> <li>• Ridehailing vehicles could temporarily block bicycle facilities before events, resulting in safety impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Intersection LOS and I-5 off-ramp queue spillback similar to Alternative 1, although modestly better adjacent to the arena due to reduced off-street parking supply compared to Alternative 1.</li> <li>• Safety impacts to bicyclists and pedestrians associated with ridehailing after events would be better than No Action because ridehailing would be more dispersed.</li> </ul>

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<p>eastbound directions of Mercer St and Denny Way would result in longer queues and reduced travel speeds as compared to current conditions.</p> <ul style="list-style-type: none"> <li>• Bus travel time and reliability are expected to degrade as congestion increases.</li> <li>• On-street parking is expected to remain similar to existing conditions.</li> </ul>	<ul style="list-style-type: none"> <li>• Drivers circling for parking before events could increase conflicts with pedestrians, bicyclists, and other vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased off-street parking supply immediately south of the arena during events would increase competition for parking elsewhere, increasing modal conflicts.</li> </ul>
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>• Develop and implement an AAMP identifying street/lane closures, placement of traffic control officers, signal timing, curb space management, and temporary signage and equipment. Event management measures could include attendance thresholds to trigger plan elements, performance metrics, and monitoring program.</li> <li>• Develop and implement event demand management measures to reduce private auto and ridehailing trips as part of the AAMP.</li> <li>• Implement traffic signal improvements.</li> <li>• Develop a ridehailing pick-up/drop-off plan to reduce conflicts.</li> <li>• Install bicycle parking and bicycle facility improvements.</li> <li>• Provide pedestrian crossing improvements.</li> <li>• Implement additional bus, light rail, and/or Monorail service.</li> <li>• Implement bus stop improvements.</li> </ul>	Similar to Alternative 1. AAMP strategies would be adjusted to reflect different parking and ridehailing locations.

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		<ul style="list-style-type: none"> <li>Develop and implement off-site Parking Facility Reservation and Best Practices System, real-time parking garage information, on-street parking management revisions, and shuttle program to remote lots.</li> <li>Implement transit speed and reliability improvements.</li> </ul>	
<b>Earth</b>			
Impacts	None	<ul style="list-style-type: none"> <li>Potential to change groundwater patterns and affect the structural stability of buildings.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>Develop monitoring and maintenance program that includes inspection and reporting on structural stability.</li> </ul>	Same as Alternative 1.
<b>Historic and Cultural Resources</b>			
Impacts	None	None	None
Measures to reduce or eliminate impacts	None	None	None
<b>Recreation</b>			
Impacts	KeyArena would continue to be an undersized facility not suitable for NHL or NBA teams.	<ul style="list-style-type: none"> <li>Seattle Center Pavilion would be demolished and not replaced, causing loss of event space.</li> <li>The skatepark would be demolished and replaced off-site, displacing this recreational amenity at Seattle Center.</li> <li>Temporary loss of skatepark would occur, resulting in programming impacts for Skate Like a Girl. Seattle Center would accommodate Skate Like a Girl's 2019 programming on the Seattle Center campus, using temporary equipment as appropriate.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>Replace the skatepark at an off-site location.</li> </ul>	Same as Alternative 1.

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Noise and Vibration</b>			
Impacts	None	<ul style="list-style-type: none"> <li>Exterior noise levels would not increase more than 5 dBA Leq over existing arena events, which already exceed standards.</li> <li>There would be an increase in the frequency of noise-generating events.</li> <li>There may be an increase in outdoor noise levels for special events such as playoffs.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>Comply with SMC noise regulations.</li> <li>Deploy temporary noise mitigation measures during noisiest concerts.</li> </ul>	Same as Alternative 1.
<b>Visual Resources</b>			
Impacts	None	<ul style="list-style-type: none"> <li>The atrium lobby would be a departure from existing visual character as it would be a more modern structure.</li> <li>Atrium lobby glass and use of metal for egress/mechanical buildings have the potential for glare impacts.</li> <li>Landmark features would be removed (e.g., the curtain wall on the south wall of the arena) and substantially altered (e.g., the International Plaza and the Northwest Rooms).</li> <li>The cupola may be wider but not taller than current conditions, increasing the profile of the arena.</li> <li>The roof signs would be larger than existing conditions.</li> <li>Signs would be larger and more numerous than at present or currently allowed under the sign code (SMC 23.55), and could add visual clutter to the site.</li> <li>Night-time lighting would increase due to larger, brighter, and more numerous signs, including a larger and brighter digital sign on 1<sup>st</sup></li> </ul>	<p>Similar to Alternative 1, except Alternative 2 would have reduced potential for driver distraction along 1<sup>st</sup> Ave N. Video displays would not be allowed facing 1<sup>st</sup> Ave N.</p> <p>Roof signs would be similar to existing conditions in size and brightness.</p>

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		<p>Ave N, larger and brighter roof signs, and a large video display or several smaller displays visible through the glass atrium lobby.</p> <ul style="list-style-type: none"> <li>• Glare from the digital sign next to 1<sup>st</sup> Ave N would be limited by the restrictions in the new sign code amendment.</li> <li>• The visibility and length of video messages on the video display sign adjacent to 1<sup>st</sup> Ave N and the length of video messages on that sign could distract drivers and pedestrians and pose a safety risk, and would be a significant impact.</li> <li>• Light spillover from project signs could affect the Astro Apartments across 1<sup>st</sup> Ave N from the project site.</li> <li>• Potential inconsistency with the Uptown Design Guidelines and Century 21 Guidelines resulting from proposed signage.</li> </ul>	
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>• The sign code amendment proposed under Alternative 1 would include measures to reduce impacts from glare and distraction, such as the following: <ul style="list-style-type: none"> <li>○ Use static images on the 1<sup>st</sup> Ave N sign and place restrictions on the length and type of video display allowed for the other proposed signage.</li> <li>○ Place changing image signs located high enough above the street so that drivers are not as easily distracted.</li> <li>○ Adjust light levels emitted from signs to respond to ambient conditions.</li> <li>○ Field verify cumulative light levels and adjust as needed to ensure that cumulative lighting levels do not cause glare impacts for drivers.</li> <li>○ Restrict digital displays from having large areas of reflective elements.</li> </ul> </li> <li>• New fixtures and light sources could focus light on-site.</li> <li>• Fixtures could be LED and shielded.</li> </ul>	<p>Similar to Alternative 1, except that the Alternative 2 sign code amendment would limit video displays facing arterial roadways such as 1<sup>st</sup> Ave N, reducing potential driver distraction.</p> <p>Measures to reduce driver distraction would not be applicable.</p>

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		<ul style="list-style-type: none"> <li>Trees canopy could be increased to reduce glare from the south- and west-facing façades of the atrium lobby.</li> <li>Cladding material and geometry for all new structures could be designed to reduce glare impacts.</li> </ul>	
<b>Air Quality and GHG Emissions</b>			
Impacts	None	<ul style="list-style-type: none"> <li>Operational activities would generate air emissions and GHGs.</li> <li>Operational emissions of criteria air pollutants would be below federal thresholds for carbon monoxide and PM10 in 2020 and would decline further by 2035.</li> <li>Operational GHG emissions would initially reach approximately 28,400 metric tons/year, of which vehicle emissions constitute 95%.</li> <li>Emissions would decline annually to approximately 24,000 metric tons/year by 2035.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>Mitigation is not necessary for criteria air pollutants.</li> <li>Measures to reduce total volume of vehicles arriving to events would help reduce GHG emissions from mobile sources.</li> </ul>	Same as Alternative 1.
<b>Public Services and Utilities</b>			
Impacts	None	<ul style="list-style-type: none"> <li>Additional Seattle Police Department officers may need to work during major arena events to assist with traffic flow and parking enforcement.</li> <li>Increased demand for water and wastewater service due to increased attendance and frequency of events, as well as increased garbage and recycling volume generation.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>Seattle Center Integration Agreement could include coordination of public services and utilities during arena operation.</li> <li>Install low-flow plumbing fixtures to reduce water and wastewater demand.</li> </ul>	Same as Alternative 1.

	No Action	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		<ul style="list-style-type: none"> <li>• If modeling determines that additional sewer system capacity is needed, provide additional capacity or storage.</li> <li>• Incorporate water-efficient and bio-retention landscaping.</li> <li>• Include energy-efficient fixtures to reduce utility demand.</li> </ul>	
<b>Plants</b>			
Impacts	None	<ul style="list-style-type: none"> <li>• Temporal loss of tree canopy from the removal of mature trees and replacement with younger, smaller trees.</li> </ul>	Same as Alternative 1.
Measures to reduce or eliminate impacts	None	<ul style="list-style-type: none"> <li>• Design landscaping to be consistent with the Seattle Center Landscape Management Plan.</li> </ul>	Same as Alternative 1.

## 1.9 CUMULATIVE IMPACTS

Cumulative impacts result from the incremental consequences of a project when added to reasonably foreseeable future actions. The cumulative effects may be undetectable when viewed individually, but when added to impacts from other projects may cause measurable environmental impacts. The Uptown area has experienced substantial redevelopment in the past several years, and this trend is anticipated to continue. Construction activities from the project would contribute to construction impacts that may occur from other projects. The renovation of the Seattle Center Arena would contribute to increased traffic congestion during construction and operation of the facility, adding to traffic accompanying other development projects, and contributing to GHG emissions in the city. The project would contribute to increased lighting levels and overall noise in the area, adding to increased lighting levels and noise associated with other development projects. For additional information and analysis of cumulative impacts, see Chapter 13.

## 1.10 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Significant unavoidable adverse impacts are those for which mitigation measures would be unable to reduce impacts to a level of non-significance. Significant unavoidable impacts are identified for both construction and operation.

**Construction:** Under Alternatives 1 and 2, alterations to Landmark-designated features of KeyArena and the Northwest Rooms (which includes the International Fountain Pavilion and International Plaza) would result in significant unavoidable adverse impacts.

Under Alternative 1, significant unavoidable adverse night-time noise impacts would occur at KEXP, The Vera Project, SIFF Film Center, and Seattle Children's Theatre. Vibration impacts would be significant unavoidable adverse for sensitive receptors (recording studios and performance spaces) at the Northwest Rooms for both Alternatives 1 and 2.

**Operation:** Under Alternatives 1 and 2, significant unavoidable impacts to traffic operations, transit, and parking are expected to occur, resulting from increased traffic volumes associated with events at the renovated arena.

## 1.11 BENEFITS AND DISADVANTAGES OF DELAYING THE PROPOSAL

The EIS must discuss the benefits and disadvantages of delaying implementation of the proposal (WAC 197-11-440(5)(c)).

If the City of Seattle chooses to delay renovation of the arena and associated improvements, potential benefits would include the following:

- Delaying construction impacts and perhaps avoiding conflicts with other construction projects, including residential and multi-use development projects occurring in Uptown.

- Providing more certainty regarding future traffic conditions associated with implementation of planned/proposed improvements to public transportation and transit (e.g., additional Metro routes, Sound Transit LINK light rail to near the arena, potential Monorail service expansion, and other improvements).

The disadvantages of delaying the arena renovation project include the following:

- There would be a delay in meeting the City's objective to renovate KeyArena.
- The site may remain in its existing condition and require maintenance to avoid deterioration. The site would retain the existing structures and uses, unless or until some other renovation is proposed and approved. The City would incur the cost of delayed major maintenance required to keep KeyArena in use as a sports and entertainment venue. Public money would be needed to fix operational, structural, and maintenance issues that arise from retaining KeyArena in its existing condition.
- Due to its small size, bowl configuration, and other limitations, the site would have less capacity to provide recreational sport viewing opportunities compared to peer venues, and would not be a viable location for NBA or NHL teams (AECOM, 2015), with the resulting loss of jobs and economic stimulus that major sports franchises could provide.
- A delay could result in the loss of private funding by OVG to renovate KeyArena.
- Construction costs could increase, and there may be a need for new environmental, economic, and design studies, depending on the length of delay and changes in other conditions.

## 1.12 SIGNIFICANT AREAS OF CONTROVERSY AND UNCERTAINTY

Controversy around the Seattle Center Arena Renovation Project has focused largely on the potential for significant traffic and parking impacts in an already congested area, particularly the Mercer St and Denny Way corridors. These issues have been raised prior to and during EIS scoping, the Draft EIS comment period, and during neighborhood meetings, and have resulted in a comprehensive, detailed evaluation of transportation impacts in the Final EIS.

Comments on the Draft EIS identified issues related to the direct and indirect impacts during construction, including noise/vibration, congestion-related inconvenience and disruption, and the effects on access to recreational programming at Seattle Center. These commenters expressed concern that over the long term, non-profits and other programming aimed at children, diverse populations, and at-risk youth would be displaced by entertainment opportunities for higher income patrons.

Areas of uncertainty relate to the timing and effectiveness of proposed transportation system improvements such as Sound Transit LINK light rail, opening of the State Route (SR) 99 tunnel, and reconnection or "re-knitting" of streets across SR 99, which are anticipated to alleviate traffic congestion. Delay in construction of these regional transportation system improvements could delay the anticipated congestion relief associated with these projects.

## 1.13 POSSIBLE FUTURE DEVELOPMENT ASSOCIATED WITH THE PROPOSAL

In response to requests from the Seattle Design Commission, OVG has conducted conceptual massing and bulk/scale studies under applicable zoning and land use plans to determine that the proposed access tunnel would not preclude future development at the parcel of land currently housing Bressi Garage and the 1<sup>st</sup> Ave N Garage, referred to as the south parcel. At this time, the only improvements planned on the south parcel are those accessory to the Seattle Center Arena use: construction of the tunnel, the related curb cut on 1<sup>st</sup> Ave N, and accessory screening; realignment of curb cuts on John St for access to the 1<sup>st</sup> Ave N Garage; and installation of equipment on the roof of the 1<sup>st</sup> Ave N Garage. Those accessory use improvements are within the scope of the project evaluated in this EIS. No other development is planned on that site. The conceptual studies demonstrate that future development of the site is not precluded by the improvements described above, and does not indicate any current planned development. Any development proposed in the future would comply with applicable regulatory requirements, including SEPA.

## 1.14 ISSUES TO BE RESOLVED

The location of the relocated skatepark has not been determined at the time of Final EIS publication. The City is working with the skatepark community to relocate the skatepark; see Chapter 7, *Recreation*, for details.

A Draft of the AAMP has been released concurrently with the publication of the Final EIS, available at <https://www.seattle.gov/arena>. The Final AAMP will be completed in the fall of 2018.

Additionally, Transaction Documents for the Seattle Center Arena will be finalized after the publication of the Final EIS including:

- Seattle Center Integration Agreement
- Development Agreement
- Lease Agreement

## 2.0 DESCRIPTION OF ALTERNATIVES

This chapter provides an overview of the Seattle Center Arena Renovation Project and the alternatives being considered in the EIS. The alternatives described include the No Action Alternative, Alternative 1 (the OVG Proposal), and Alternative 2 (Modified Proposal). Some information has been updated from that presented in the Draft EIS to reflect the latest design details and construction methods.

The proposed project is the renovation of the arena at Seattle Center and associated improvements to create a modern multi-purpose entertainment and sports center that would host concerts, sporting events, family shows, community-oriented events, and numerous other events, and that would meet NHL and NBA league standards. The project would accommodate many current uses including the Seattle Storm WNBA franchise. The project would include redesigned, reconstructed, and expanded interiors within the arena's existing building envelope to enhance the experience for sports and entertainment events. The renovation would support Seattle Center's mission to serve as a regional destination. Seating capacities would range from approximately 17,300 for hockey games to approximately 18,600 for basketball games, and up to approximately 18,800 for concert configurations. (These numbers have been modified since the Draft EIS; the seating capacities have decreased by less than 2% for hockey and concerts, and increased by less than 2% for basketball games.) The outer structural elements of the existing arena would be maintained, including the Landmark-designated roof structure and the support structures (pylons). Other renovations include a new atrium lobby and expanded parking capacity.

The project site is on City-owned property within the Seattle Center campus and includes the existing KeyArena, surrounding plazas, and associated buildings; as well as the south parcel, which includes Bressi Garage, 1<sup>st</sup> Ave N Garage, and the adjacent surface parking lot. Thomas St between KeyArena and the south parcel is not part of the area to be leased, but an access tunnel is proposed below the surface of Thomas St to provide access to the underground loading dock.

**Changes from the Draft EIS** – Updated information in this chapter of the Final EIS includes the following:

- Revised site design, including equipment and facility locations.
- Revised signage plan and proposed sign code amendment.
- Additional details about construction methods, including scheduling and the use of the International Plaza during construction. See Section 2.6, *Construction*, for construction details.

### 2.1 NO ACTION ALTERNATIVE

Analysis of the No Action Alternative is required under SEPA and serves as the baseline condition against which the action alternatives are evaluated and compared. Under the No Action Alternative, KeyArena would not be renovated, the buildings on the site would remain (with the exception of possible renovations associated with planned maintenance), and no new buildings would be constructed except as directed by existing or proposed Seattle Center planning efforts. Factors that affect the arena's utility (its small size, limited concourse, and limited backstage, rigging, and loading facilities) would remain (AECOM, 2015). In addition, there would be no change to parking or loading (Figure 2-1). Maintenance and ongoing activities and operations at KeyArena would continue as guided by the Seattle Center Master Plan (Seattle Center, 2008).

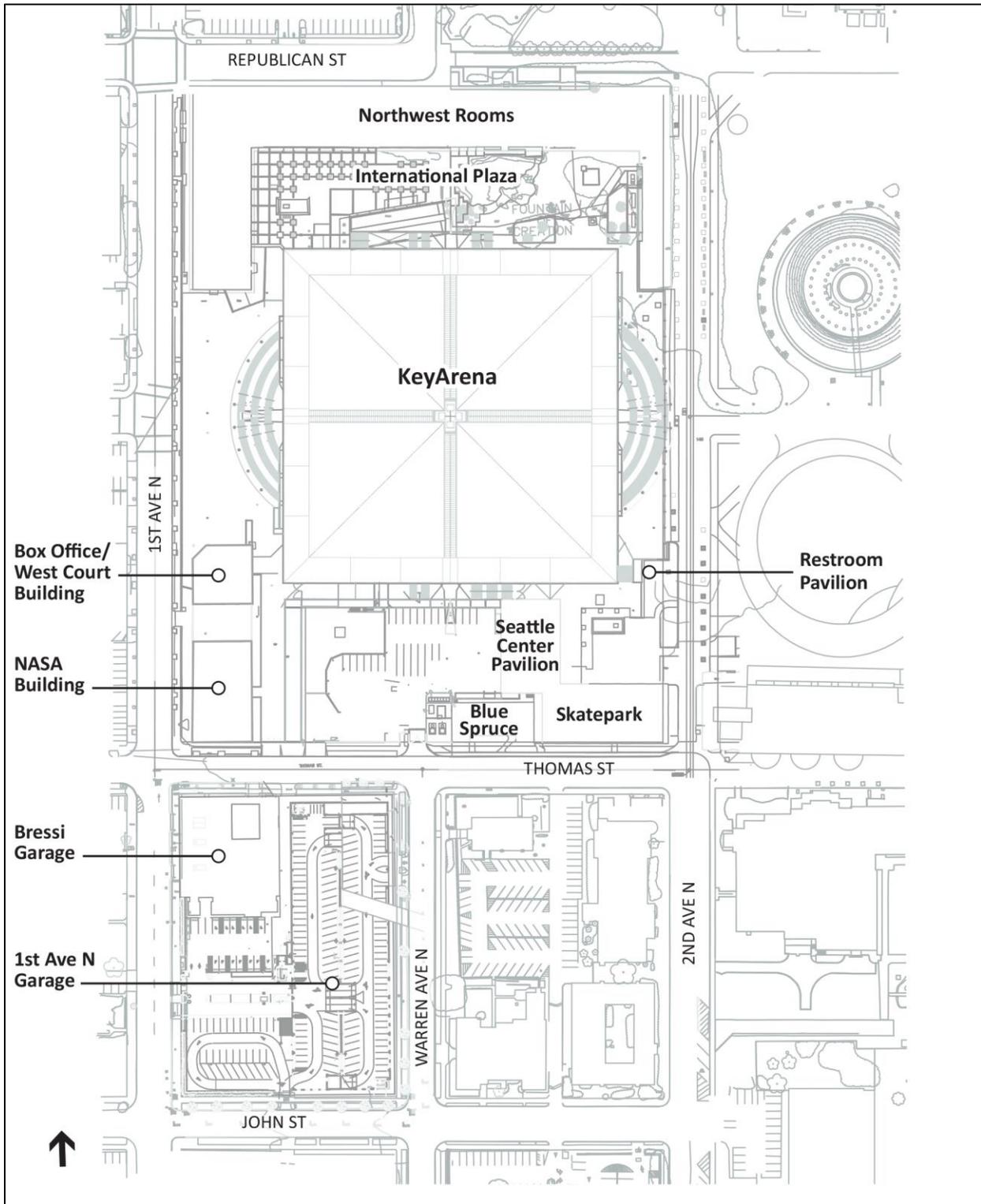


Figure 2-1. No Action Alternative

The No Action Alternative represents the future in the absence of the proposed arena renovation project; it is not the same as existing conditions because a number of projects not associated with the arena are expected to be completed by 2020 (or “Opening Day” as defined for Alternatives 1 and 2). The No Action Alternative was developed based on reasonably foreseeable projects that would be in place by 2020, the majority of which are transportation projects (such as the opening of the SR 99 tunnel, and reconnection of streets across SR 99). The Seattle Opera at Seattle Center on the former Mercer Arena site will be completed in 2018, and other developments such as a new residential building west of the Mercer St Garage are expected to be completed by 2020. Projects considered as part of background conditions for 2020 are listed in Appendix A. See Section 2.4, *Comparison of Alternatives*, for a side-by-side comparison of the No Action Alternative and Alternatives 1 and 2.

## 2.2 ALTERNATIVE 1: OAK VIEW GROUP (OVG) PROPOSAL

Alternative 1 is the renovation of KeyArena to meet NHL and NBA league standards for a professional hockey and basketball arena while maintaining the building’s Landmark-designated design. See Section 2.4, *Comparison of Alternatives*, for a side-by-side comparison of the alternatives.

**Changes from the Draft EIS** – Between the Draft EIS and the Final EIS, OVG refined its proposed design and changed the locations of egress (exit) stairs as well as intake and exhaust mechanical equipment. These changes affected the south ends of the Northwest Rooms, moved structures to the southeast corner of the project site, changed the box office, and affected signage. OVG also updated the sign plan to change the location, size, and orientation of signs. Rather than a variance from sign code standards, a sign code amendment is proposed by SDCI. Changes to construction methods are described in Section 2.6, *Construction*.

The key infrastructure, building, and other proposed project elements included in Alternative 1 are summarized below. Figure 2-2 provides an overview of Alternative 1.

- Landmark-designated arena features would be preserved or restored as required by the City, including the roof and edge beam structure and pylons, and the north, west, and east curtain walls (Figure 2-3).
- The arena would be expanded below-grade to make the interior of the arena wider and deeper (see Figures 2-2 and 2-4).
- An atrium lobby would be added to the south of the arena, which would be the main entrance to the arena (Figure 2-5).
- Five buildings (West Court Building, NASA Building, Blue Spruce Building, Seattle Center Pavilion, and Restroom Pavilion), the Seattle Center Skatepark, a surface parking lot, and the loading/marshalling area to the south of the arena, as well as the plazas to the west and east of the arena, would be demolished (Figure 2-5).
- The exterior plaza level would be returned to a condition similar to its original 1962 grade by removing the below-grade entrances and associated stairs (Figure 2-5). This redesign would make the exterior plazas ADA compliant and would include spaces for recreation, performance, and gathering.
- A new building would be constructed in the south plaza to house a box office, garage egress stairs, and mechanical exhaust (see Figures 2-5 and 2-6).

- In the southeast corner, a new building would be constructed to house an elevator, egress (exit) stairs, and mechanical intake/exhaust. The roof of the egress stairs would be an open exterior platform flush with the surface elevation at the intersection of 2<sup>nd</sup> Ave N and Thomas St (Figure 2-6).
- Northwest Rooms – The southeast end of the Northwest Rooms would be dismantled and replaced with a new structure that would house mechanical intake/exhaust and egress stairs (Figure 2-6).
- Northwest Rooms (near KEXP) – An extension would be added to the southwest end of the Northwest Rooms that would house a mechanical intake (west portion) and egress stairs (east portion) for the arena (Figure 2-6).
- An underground parking garage for approximately 450 vehicles would be built below the south plaza, south of the arena, with a 2-lane driveway entrance/exit from Thomas St (Figures 2-2 and 2-4).
- A loading dock with approximately 8 loading bays would be built underground below the south plaza with access off 1<sup>st</sup> Ave N. The loading dock would be accessed from 1<sup>st</sup> Ave N through a tunnel under the Landmark-designated Bressi Garage (Figures 2-2 and 2-4).
- The driveways to the existing 1<sup>st</sup> Ave N Garage would be reconfigured (Figure 2-2).
- A number of variances from zoning and Land Use Code standards would be needed for Alternative 1.
- Transportation network company (TNC) ridehailing service would be unrestricted during drop-off (i.e., pre-event). After a large event at Seattle Center, including an event at the renovated arena, TNCs would be managed by geofencing. Within the geofence, post-event pick-up would only be allowed to occur at designated locations.
- The Sign Plan would include up to 70 signs ranging from small static image signs to large digital and illuminated signage (Figure 2-7). Proposed new signage and lighting would include the following:
  - The 4 existing roof signs (the KeyArena signs) would be replaced with larger and brighter signs.
  - The existing digital sign on 1<sup>st</sup> Ave N would be removed and replaced with a larger digital video display sign (Sign I-1 on Figure 2-7).
  - Also on 1<sup>st</sup> Ave N, there would be 3 new large signs and a number of smaller signs. The 3 additional signs include a large site identity sign (Sign E) adjacent to the sidewalk that would be static, and 2 digital display wall signs without video (Signs I-2 and I-3) placed on the west and south faces of the mechanical structure.
  - Six digital reader boards are proposed throughout the project site (Sign D).
  - A large digital display or several smaller displays would be visible outside through the glass atrium lobby.
  - Accent lighting would be added on the roof and building façades.
  - Illuminated signs with static messages would be placed above entry doors. Light pole banners, pedestrian direction pylons, digital display signs, and other signs and features, some of which would include sponsor advertising, would be placed throughout the project site.

**Transportation Network Company (TNC)** - TNCs are ridehailing companies such as Uber and Lyft.

**Geofence** - A geofence is a virtual geographic boundary, defined by global positioning system (GPS) or radio-frequency identification (RFID) technology, that enables software to trigger a response when a mobile device enters or leaves a particular area.

Additionally, SDCl is proposing a sign code amendment to the Land Use Code (SMC 23.55) to create a new sign overlay district and other changes that would regulate the number, size, type, content, location, brightness, and operation of signs, including signage for the renovated arena, the Northwest Rooms, and the south parcel.

Construction activities associated with this alternative are described in Section 2.6, *Construction*.

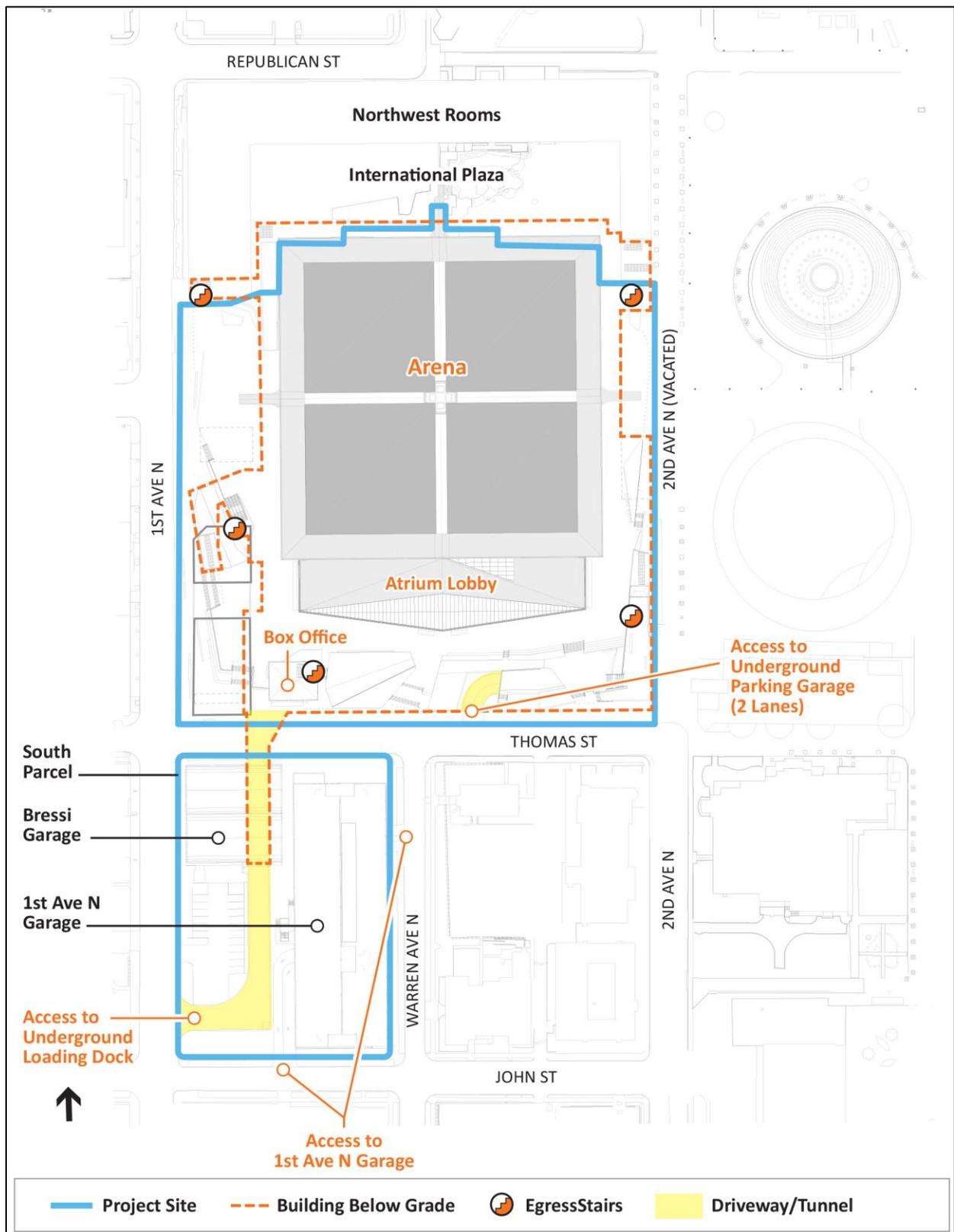


Figure 2-2. Alternative 1: OVG Proposal

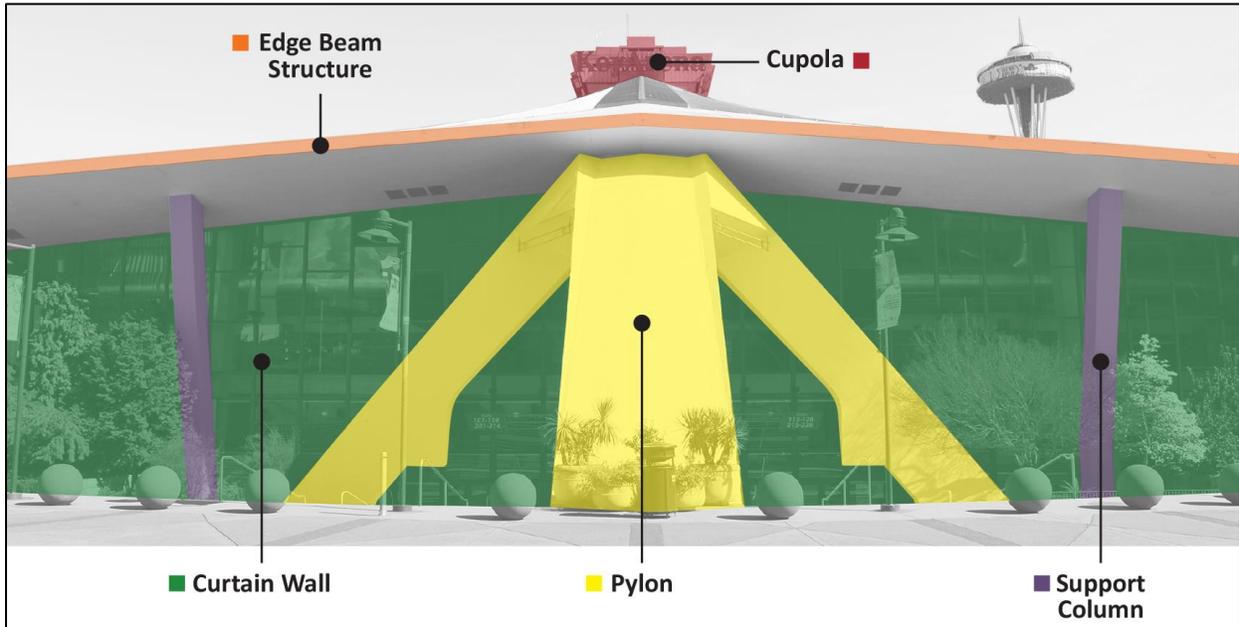


Figure 2-3. Architectural Elements of the Arena

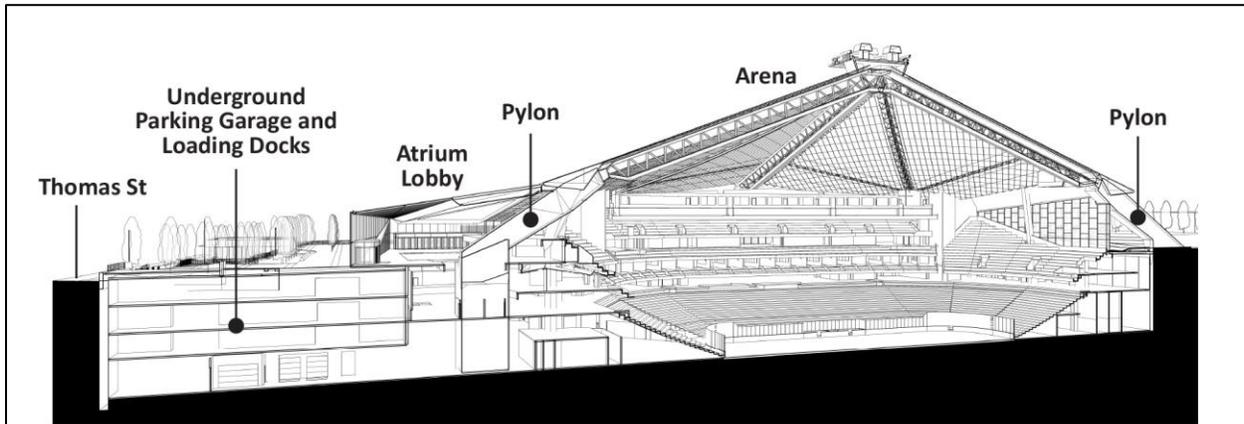


Figure 2-4. Alternative 1: OVG Proposal –Cross Section – Showing Arena and Underground Parking Garage and Loading Dock

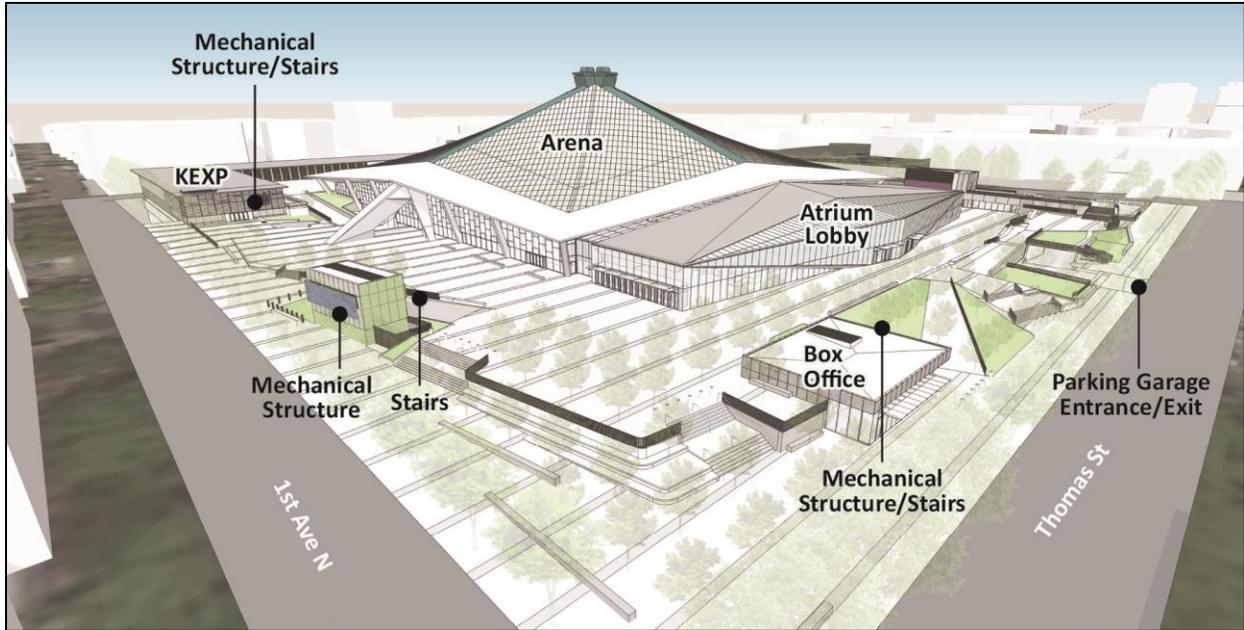


Figure 2-5. Alternative 1: OVG Proposal – Schematic Drawing

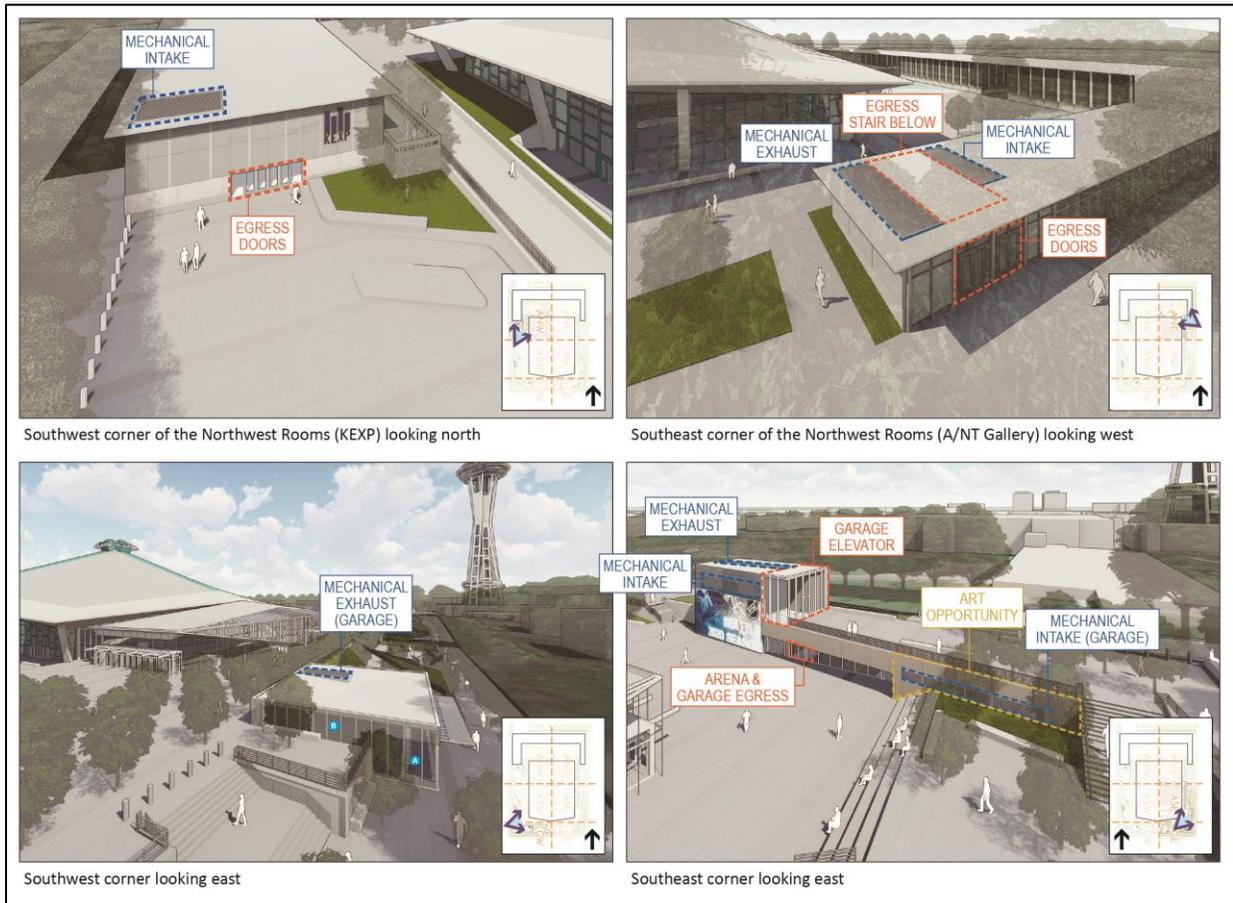
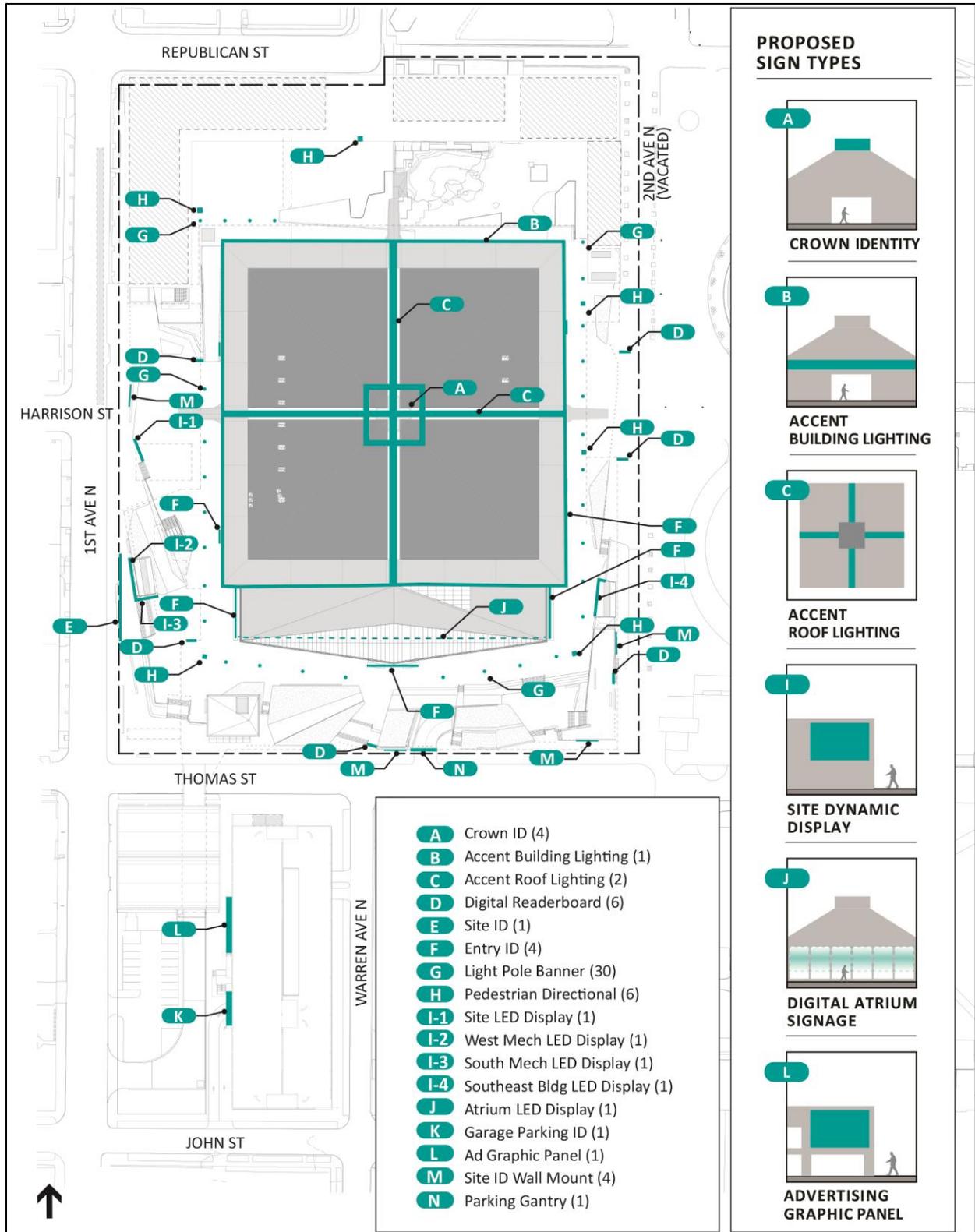


Figure 2-6. Proposed Site Designs



Note: (#) indicates how many of that type of sign is proposed for the project site.

Figure 2-7. Summary of Proposed Alternative 1 Signage and Lighting Plan

## 2.3 ALTERNATIVE 2: MODIFIED PROPOSAL

Alternative 2 would maintain the design of the arena's Landmark-designated features and include the same exterior plaza redesign, atrium lobby, and loading dock as described for Alternative 1 (see Figure 2-8). However, Alternative 2 includes modifications to reduce potential transportation and visual impacts, and eliminates outdoor construction at night to reduce night-time construction noise impacts (although the overall construction duration would increase).

**Changes from the Draft EIS** – Changes to Alternative 2 are similar to Alternative 1, except the signage plan has more restrictions on signage and reflected in the proposed alternative to the sign code amendment.

See Table 2-1 for a side-by-side comparison of the alternatives. Alternative 2 differs from Alternative 1 as summarized below.

### Transportation:

- Underground parking spaces below the south plaza would be fewer than Alternative 1 (200 spaces provided).
- The driveway to the loading dock access tunnel would be from 1<sup>st</sup> Ave N, but farther north than under Alternative 1. The access tunnel would be under the 1<sup>st</sup> Ave N Garage, to the east of Bressi Garage, rather than under it.
- Thomas St between 1<sup>st</sup> Ave N and Warren Ave N would be a “woonerf,” a street with a raised street-bed where pedestrians and bicyclists have priority over motorists. Before, during, and after arena events, this section of Thomas St would be closed to vehicles.
- The driveway to the 1<sup>st</sup> Ave N Garage would be moved to John St, similar to Alternative 1, except that the driveway would be larger and closer to 1<sup>st</sup> Ave N.
- Parking use in the 1<sup>st</sup> Ave N Garage would be capped at 400 spaces (approximately 65% of its current capacity).
- After any large event at Seattle Center, including an event at the renovated arena, TNC would be managed by geofencing and not allow pick-ups to occur anywhere inside a geofence. Alternative 2 would not include the specific pick-up locations within the geofence that are part of Alternative 1. TNC drop-off would be unrestricted, the same as for Alternative 1.

### Signage:

- Alternative 2 would include a sign code amendment similar to Alternative 1 allowing additional signs, but with provisions to reduce the potential visual impacts of the proposed signs. Digital video display signs facing the street would not be allowed under Alternative 2, and the allowable size and height of the roof signs would not be increased over current conditions. Therefore, Sign I-1 would either not be allowed to use video, or it would have to face away from 1<sup>st</sup> Ave N. The existing changing image sign on 1<sup>st</sup> Ave N may remain, and the roof signs would remain approximately the same size and brightness as the existing signs (see Figure 2-7).

Construction activities associated with this alternative are described in Section 2.6, *Construction*.

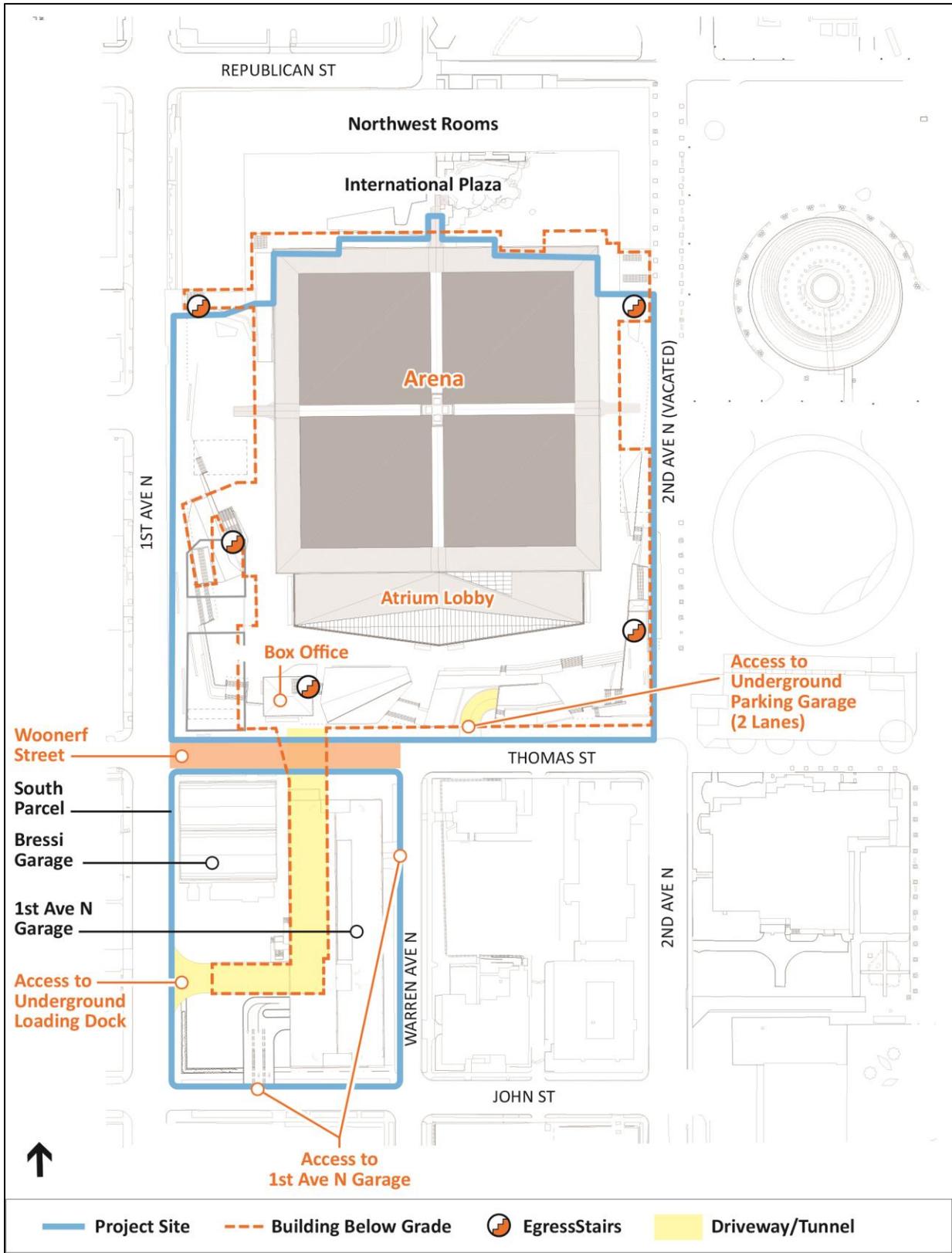


Figure 2-8. Alternative 2: Modified Proposal

## 2.4 COMPARISON OF ALTERNATIVES

The different components of the No Action and action alternatives are listed and summarized in Table 2-1.

**Table 2-1. Comparison of Alternatives**

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>KeyArena Building</b>			
KeyArena (designated Landmark)	No change	<ul style="list-style-type: none"> <li>Internal renovations.</li> <li>Landmark-designated features preserved or restored including the roof, edge beam structure, pylons, and the north, west, and east curtain walls (Figure 2-3). The glass in the north, west, and east curtain walls would be replaced with glazing that is the same color, transparency, and reflectivity as the existing curtain wall glass.</li> <li>Larger cupola on top of the roof for additional exhaust fans (could be up to 50% larger, but not taller, than the existing cupola).</li> <li>Atrium lobby would encase the existing pylon.</li> <li>The south façade glass would be removed and not replaced.</li> <li>Approval from the Landmarks Preservation Board would be required.</li> </ul>	Same as Alternative 1.
Atrium Lobby	No atrium	<ul style="list-style-type: none"> <li>A new glass atrium lobby would be added to the south of the renovated arena.</li> <li>Main entrance to the arena.</li> <li>The atrium lobby walls would be primarily glass, would protect the integrity of the historic roof line, and would not extend beyond the outside west and east edges of the arena.</li> </ul>	Same as Alternative 1.

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Arena Interior Square Footage	360,000	750,000 (the arena would be expanded below-grade to make the interior of the arena wider and deeper.)	Same as Alternative 1.
Leadership in Environmental Energy and Design (LEED)	No change – does not currently meet LEED standards.	<ul style="list-style-type: none"> <li>Project is targeting LEED-BD+C v4 Certification.</li> <li>Energy performance of at least 6% over the ASHRAE 90.1* 2010 baseline.</li> <li>Reduce potable water use by at least 35% over baseline.</li> <li>Minimize potable water used for landscape irrigation.</li> <li>On-site waste management would meet or exceed the 75% or more construction waste diversion.</li> <li>Implement increased air quality strategies, demand response ventilation, and low emitting material specifications.</li> <li>Innovative strategies include low-mercury lighting and waste reduction plan, educational outreach program with signage, and occupant comfort survey and commitment plan.</li> </ul>	Same as Alternative 1.
ADA Design and Facilities	No change – does not meet all ADA requirements.	Would meet ADA requirements.	Same as Alternative 1.
<b>Plazas and Structures Surrounding KeyArena</b>			
Blue Spruce	No change	Removed and not replaced – tenants relocated.	Same as Alternative 1.
Skatepark	No change	Removed and replaced off-site – City is working with the skateboard community to find a new site.	Same as Alternative 1.
Seattle Center Pavilion	No change	Removed and not replaced – events that use this facility may relocate to other event spaces on the Seattle Center campus.	Same as Alternative 1.
West Court Building (existing Box Office)	No change	Removed. A new box office and retail space would be located in the south plaza.	Same as Alternative 1.
NASA Building	No change	Removed and not replaced – storage moved to another location on Seattle Center campus.	Same as Alternative 1.
Restroom Pavilion	No change	Removed and not replaced.	Same as Alternative 1.

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Bressi Garage (designated Landmark; houses Seattle Center maintenance shop and storage facility and Pottery Northwest)	No change	<ul style="list-style-type: none"> <li>• Loading dock access tunnel under Bressi Garage.</li> <li>• Approval from the Landmarks Preservation Board would be required.</li> </ul>	<ul style="list-style-type: none"> <li>• Loading dock access tunnel to the east of Bressi Garage.</li> </ul>
Signage	No change	<ul style="list-style-type: none"> <li>• The 4 existing roof signs (KeyArena signs) would be replaced with larger (approximately 700 square feet each) and brighter signs.</li> <li>• The existing digital sign on 1<sup>st</sup> Ave N (which features approximately 50 square feet of digital display) would be replaced with a larger 140 square-foot digital video display (Sign I-1 on Figure 2-7) on 1<sup>st</sup> Ave N at least 40 feet from the right-of-way.</li> <li>• A large digital display or several smaller displays would be visible through the glass atrium lobby from outdoors and from Thomas St.</li> <li>• A static and internally illuminated site identity sign (Sign E on Figure 2-7) would be adjacent to the sidewalk on 1<sup>st</sup> Ave N near the southwest corner of the site. It would be 8 feet tall and 50 feet wide.</li> <li>• Two wall signs (Signs I-2 and I-3 on Figure 2-7) would be placed on the west and south faces of the mechanical structure near 1<sup>st</sup> Ave N. Sign I-2 (on the west face) would be 15 feet tall and 43 feet wide. Sign I-3 (on the south face) would be 15 feet tall and 20 feet wide. The signs would be changing image digital displays, but not video displays.</li> <li>• Accent lighting would be added on the roof and building façades.</li> <li>• Illuminated signs with static messages would be placed above entry doors. Light pole banners, pedestrian</li> </ul>	<ul style="list-style-type: none"> <li>• Signage would be the same as Alternative 1, with the following modifications: <ul style="list-style-type: none"> <li>○ New signs on top of the arena would be similar in size and brightness as the existing signs.</li> <li>○ The sign code amendment would be similar to Alternative 1 except video display signs would not be allowed facing 1<sup>st</sup> Ave N, and the roof sign would not be increased.</li> </ul> </li> </ul>

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		direction pylons, digital display signs, and other signs and features, some of which would include sponsor advertising, would be placed throughout the project site. <ul style="list-style-type: none"> <li>The sign code (SMC 23.55) would be amended to create a new Seattle Center sign overlay district and other changes that would regulate the number, size, type, content, location, brightness, and operation of signs, including signage for the renovated arena, the Northwest Rooms, and the south parcel.</li> </ul>	
Trees	No change	<ul style="list-style-type: none"> <li>Up to 13 trees designated as exceptional, legacy, and/or street trees would be removed.</li> <li>Trees replaced 2:1 or greater ratio.</li> <li>Approximately 100 new trees would be planted on the project site.</li> </ul>	<ul style="list-style-type: none"> <li>Up to 10 trees designated as exceptional, legacy, and/or street trees would be removed.</li> <li>Legacy trees in the International Plaza would not be removed.</li> <li>Trees replaced at 2:1 or greater ratio.</li> </ul>
Plazas / Outdoor Space	No change	<ul style="list-style-type: none"> <li>All plazas would be redesigned and landscaped to provide an open, pedestrian-friendly setting.</li> <li>The exterior plaza level would be returned to a condition similar to its original 1962 grade by removing the below-grade entrances and associated stairs. Grade would be more level, meet ADA requirements, and would include spaces for recreation, performance, and gathering.</li> </ul>	Same as Alternative 1.
Northwest Rooms (designated Landmark)	No change	<ul style="list-style-type: none"> <li>Approximately 40 feet of the southeast end of the Northwest Rooms would be removed, and stairs and mechanical structures (intake and exhaust) constructed within the same footprint. The reconstructed portion would be clad with re-installed original Paul Thiry panels on the south and west. Glazing and doors on the east would be subject to approval from the Landmarks Preservation Board.</li> </ul>	Same as Alternative 1.

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
		<ul style="list-style-type: none"> <li>An approximately 22-foot extension would be added to the southwest end of the KEXP portion of the Northwest Rooms. The extension would house egress stairs and mechanical intake. The extension would be clad in a contemporary material but designed to honor the original Paul Thiry design. Space for the KEXP donor wall would be included on the building exterior.</li> <li>Approval from the Landmarks Preservation Board would be required for changes to the Northwest Rooms.</li> </ul>	
International Plaza (designated Landmark)	No change	<ul style="list-style-type: none"> <li>In the International Plaza, the existing hardscape and select landscaping and trees would be removed and replaced with landscape, hardscape, lighting, and way-finding to create a consistent 360 degree pedestrian experience around the arena, an east-west oriented ADA ramp would be installed, and the DuPen Fountain and the Thiry-designed planter would be maintained. Approval from the Landmarks Preservation Board would be required.</li> <li>Two legacy trees would be removed, and specimen trees would be planted in the same location.</li> </ul>	Similar to Alternative 1; however, the 2 legacy trees would not be removed.
New Box Office	NA	<ul style="list-style-type: none"> <li>The new building south of the arena would house a box office, garage egress stairs, and mechanical exhaust.</li> <li>The garage stairs would be on the east side of the building and exit level with the sidewalk along Thomas St.</li> <li>The new box office building would be clad in storefront or translucent panels to hide office or mechanical functions.</li> </ul>	Same as Alternative 1.

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
New Building in the Southeast Corner of the Site	NA	<ul style="list-style-type: none"> <li>The new building would house an elevator vestibule, egress (exit) stairs, and mechanical intake/exhaust. The roof of the egress stairs would be an open exterior platform or “overlook” flush with the surface elevation at the intersection of 2<sup>nd</sup> Ave N and Thomas St (Figure 2-6).</li> </ul>	Same as Alternative 1.
Artwork within the Project Site	No change	<ul style="list-style-type: none"> <li>Artwork would be removed and/or relocated in accordance with SMC 3.14.840 (Deaccessioning and Disposition of Surplus Artworks).</li> </ul>	Same as Alternative 1.
<b>Transportation Related</b>			
On-site Parking	No on-site parking	<ul style="list-style-type: none"> <li>450 spaces on-site below the south plaza.</li> <li>2-lane driveway entrance/exit from Thomas St.</li> </ul>	<ul style="list-style-type: none"> <li>200 spaces on-site below-grade.</li> <li>2-lane driveway entrance/exit from Thomas St.</li> </ul>
1 <sup>st</sup> Ave N Garage	1 <sup>st</sup> Ave N Garage - 620 spaces	<ul style="list-style-type: none"> <li>The 1<sup>st</sup> Ave N entrance would be removed.</li> <li>The existing exit on John St would be expanded to the west to serve as both an entrance and exit.</li> <li>The existing driveway on Warren Ave N (which is currently closed) would be reopened and used as an entrance and exit.</li> <li>The existing parking garage would not be changed structurally.</li> <li>Equipment to be located on the roof deck of garage would remove some parking spaces.</li> </ul>	<ul style="list-style-type: none"> <li>Same as Alternative 1, except 1<sup>st</sup> Ave N Garage use capped at 400 spaces before, during, and after events.</li> <li>The garage may be structurally modified to accommodate the loading dock tunnel.</li> </ul>

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Truck Loading	On Warren Ave N, Thomas St, and 2 <sup>nd</sup> Ave N and in parking lot directly south of KeyArena.	<ul style="list-style-type: none"> <li>Below-grade.</li> <li>8 loading bays.</li> <li>Entrance to the loading dock from 1<sup>st</sup> Ave N.</li> <li>Access tunnel under the Landmark-designated Bressi Garage and Thomas St.</li> <li>The SDOT/Seattle Center Memorandum of Agreement (MOA) for Event Curbside Management (2011) would be renegotiated.</li> </ul>	<ul style="list-style-type: none"> <li>Below-grade.</li> <li>8 loading bays.</li> <li>Entrance to the loading dock would be farther north along 1<sup>st</sup> Ave N than Alternative 1.</li> <li>Access tunnel under the 1<sup>st</sup> Ave N Garage and Thomas St.</li> <li>The SDOT/Seattle Center MOA for Event Curbside Management would be renegotiated.</li> </ul>
TNC (Transportation Network Companies)	No TNC Plan	TNC Plan –TNC drop-off is unregulated (no geofencing); after a large event at Seattle Center, pick-up by TNCs would be managed by geofencing. Within the geofence, post-event pick-up would only be allowed at designated locations. All other pick-up would be outside of the geofence.	TNC Plan – TNC drop-off is unregulated; after a large event at Seattle Center, pick-up would be restricted to outside the geofence, and there would be no pick-ups inside the geofence.
Woonerf	Not provided	Not provided.	Woonerf on Thomas St between 1 <sup>st</sup> Ave N and Warren Ave N, which would be closed to vehicles during arena events.
Street Closures to Vehicles during Events	Occasionally (e.g., for large events and festivals)	Same as No Action Alternative. Thomas St between 1 <sup>st</sup> Ave N and Warren Ave N may be closed to vehicles before and after large events at the renovated arena.	Same as Alternative 1.
<b>Operations</b>			
Seating Capacity: Hockey	10,442	17,300	Same as Alternative 1.
Seating Capacity: Basketball	17,072	18,600	Same as Alternative 1.

Specifications	No Action: 2020 Scenario	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Seating Capacity: Concerts	17,459	18,800	Same as Alternative 1.
Outside Events associated with an Event at the Arena	Infrequent	Infrequent	Infrequent
<b>Number of Events at the Arena (Approximate)<sup>1</sup></b>			
NBA Games/Year	0	50	Same as Alternative 1.
NHL Games/Year	0	50	Same as Alternative 1.
WNBA/Year	19	23	Same as Alternative 1.
Concerts/Year	29	40 to 55	Same as Alternative 1.
Other Show Types (e.g., Family Shows) or Sporting Events/ Year: Attendance 5,000 to 15,000	22	43	Same as Alternative 1.
Community Events (Hosted by the City)	7	14	Same as Alternative 1.
<sup>2</sup> Other Events/ Year: Attendance up to 5,000	25	22	Same as Alternative 1.
Total Events/Year	102	242 to 257	Same as Alternative 1.
<sup>3</sup> Average Events / Week	2 to 3/week	4 to 5/week	Same as Alternative 1.

\* American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE, 2016).

<sup>1</sup> The number of events for the No Action Alternative is based on data for 2016 and 2017 provided by Seattle Center. For Alternatives 1 and 2, the number of events proposed by OVG reflects a schedule including pre-season and playoff games with WNBA, NBA, and NHL teams.

<sup>2</sup> Other events include corporate events and speakers.

<sup>3</sup> Does not consider seasonal variations; thus, some times of the year would have more events.

## 2.5 SCHEDULE OF EVENTS

Figure 2-9 summarizes the general schedule of events at the arena, which would be the same for both action alternatives. The solid lines indicate season games, and the dashed lines indicate pre- and post-season games, including playoffs. The No Action Alternative would be the same, but without NBA and NHL games.

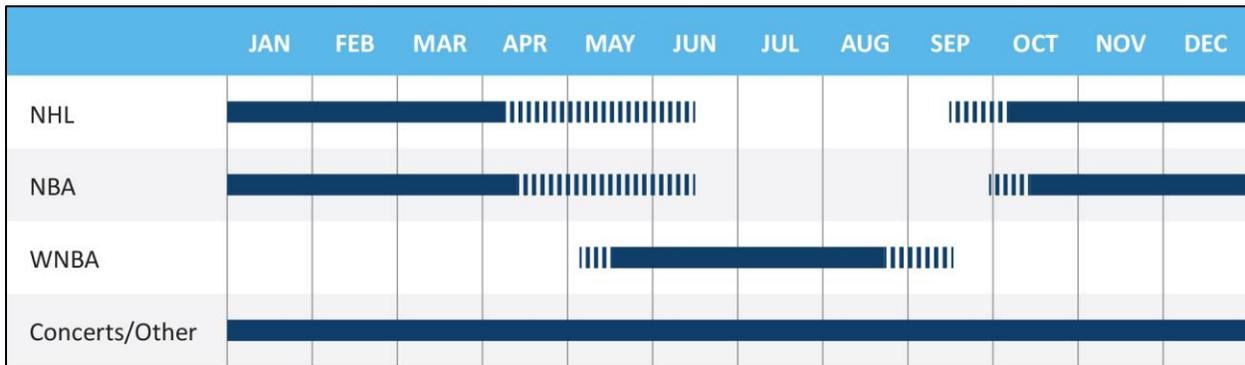


Figure 2-9. Schedule of Events at the Arena

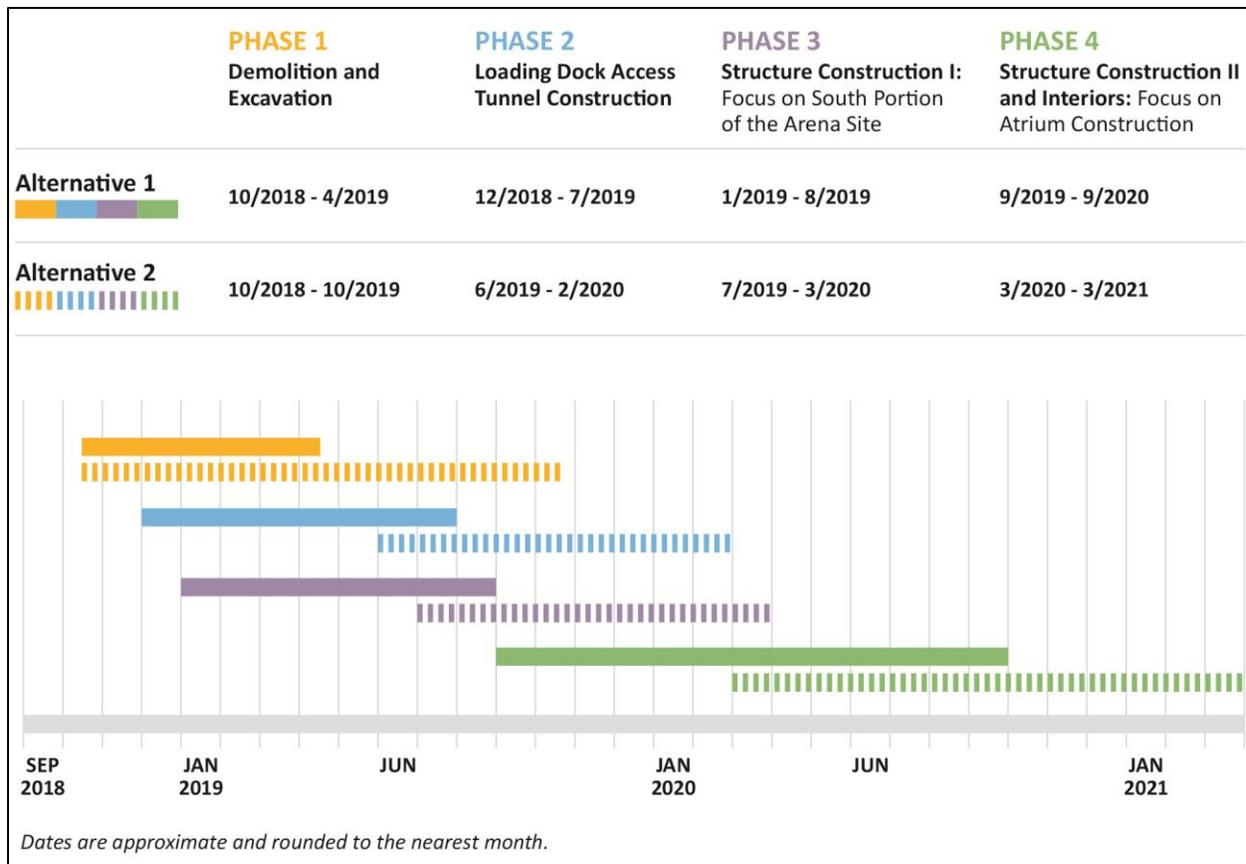
## 2.6 CONSTRUCTION

**Changes from the Draft EIS** – OVG has generally provided more information, clarified construction phasing, changed haul routes and hours that streets would be used, reduced street closures, and provided mitigation to reduce noise.

Construction for Alternative 1 is proposed from approximately October 2018 to October 2020, a duration of approximately 24 months. Because of the dynamic nature of construction, the sequencing, extent, and timing of construction activities would vary, and timelines shown are approximate, representing the currently proposed schedule. The Development Agreement (an agreement between the City and OVG) will identify protocols to minimize effects of construction on existing activities at Seattle Center. This agreement is proposed to be finalized after publication of the Final EIS; the Final EIS will be used to inform that agreement.

Construction for Alternative 2 would be similar to Alternative 1, except no night work would occur outside of the arena building (including no night truck hauling). This would extend the demolition and excavation period by at least 6 months, and total construction would take at least 30 months under Alternative 2. Work involving impact equipment would occur during “daytime,” between 7:00 AM and 7:00 PM on weekdays, and between 9:00 AM and 7:00 PM on weekends and legal holidays (SMC 25.08.425). Truck hauling would be further restricted to avoid peak periods. Additionally, street closures for Alternative 2 would be different than with Alternative 1. See Table 2-2 for a side-by-side comparison of alternatives and Chapter 4, *Transportation*, for construction activities specific to that element.

Construction is generally divided into 4 overlapping phases (see Figure 2-10 for the schedule). Phase 1: Demolition and Excavation would be the most intense (disruptive) phase. Figure 2-11 (a and b) shows proposed construction logistics, including street closures and construction site fencing. Figure 2-12 shows the proposed haul routes. The construction phases are summarized below.



**Figure 2-10. Proposed Construction Schedule**

### Phase 1: Demolition and Excavation

- Work would include interior and exterior demolition, excavation to the perimeter of the existing roof footings, removal of demolished and excavated materials from the site, and installation of earth retention systems including soldier piles immediately outside of the foundation walls around the perimeter of the arena. Soldier piles would be placed using a drilling method, followed by a concrete pour; no pile driving would occur. Hazardous materials in the buildings to be demolished or renovated have been identified and would be removed and disposed of in accordance with SDCI regulations.
- Excavation of the arena building below-grade would begin on the north side of the arena (see Figures 2-2, 2-4, and 2-8 for the extent of building below-grade).
- Demolition of exterior structures (Blue Spruce Building, skatepark, Seattle Center Pavilion, West Court Building [existing box office], Restroom Pavilion, and NASA Building) and plaza hardscape and vegetation is proposed to occur from approximately October 2018 to mid-November 2018.
- Most demolition and excavation materials would be stockpiled at the south ends of the Northwest Rooms, on the west and east sides of the arena.
- For Alternative 1, up to 200 workers would work 2 extended or 3 shifts daily (between 400 and 600 total daily construction workers); Alternative 2 would be limited to 1 extended or 2 shifts daily.

- With night-time work, truck hauling would occur 7 days a week, 18 hours a day, for approximately 6 months. For daytime-only truck hauling operations, truck hauling would be limited to daytime, non-peak hours (approximately 8 hours a day or less).
- Truck hauling on vacated Harrison St within the Seattle Center campus is proposed to occur between 11:30 PM and 6:30 AM.

## **Phase 2: Loading Dock Access Tunnel Construction**

- The loading dock tunnel would be dug out using a mining-style method that would leave Bressi Garage undisturbed. The mining method would involve horizontal drilling with perforated pipes. The pipes would be pressure-grouted to form a shell of grout and enhanced soils. Soils would be removed by hand in 3- to 4-foot increments. The tunnel footings and structure would be built as the tunnel advances.
- Trucks would access the site using the current parking lot access on 1<sup>st</sup> Ave N. Once the loading dock access tunnel is complete, it would serve as the main access point for deliveries.

## **Phase 3: Structure Construction I**

- Excavation for the underground parking garage would be completed and construction of the parking garage and atrium would begin.
- Interior construction would occur including concourse structural work, erection of bridge-level trusses, upgrades to the roof structure, and installation of the rigging structure.
- Retaining and shear wall installation at the parking structure would begin.
- Three cranes would be located on the project site. Deliveries to the southern crane would occur on the closed portion of Thomas St.

## **Phase 4: Structure Construction II and Interiors**

- The remainder of the arena structure would be built and the interiors of the arena installed.
- The rooftop platform and equipment would be installed.
- All levels of the new underground parking garage would be built.
- The plazas, signage, and landscaping would be completed.
- Trucks would enter and exit the project site through the loading dock tunnel.

Table 2-2 lists the construction activities for Alternatives 1 and 2. No construction is anticipated under the No Action Alternative.

**Table 2-2. Construction Activities for Alternatives 1 and 2**

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Construction duration	Approximately 24 months.	At least 30 months.
<b>Night Work</b>		
Night work <sup>1</sup> (as defined in SMC 25.08.425)	<p>Night work for the duration of the project (24 months). Night work would be the most intense during the demolition and excavation phase (approximately 6 months). Night-time work would include truck hauling (summarized under the <i>Transportation</i> heading below).</p> <p>During Phase 1: Exterior and interior night-time construction would include excavation.</p> <p>During Phase 2: No night-time exterior construction activities are proposed.</p> <p>Phases 3 and 4: Night-time work would include structure construction and interior finish work.</p>	Night work only as allowed under SMC 25.08.425.
Impact equipment	<p>Impact equipment may be used during the day and night inside and outside of the arena. A sound-deflecting border would be installed along the north, west, and south sides of the project for the duration of construction.</p> <p>During Phase 1, the following equipment would be used:</p> <ul style="list-style-type: none"> <li>• Excavator-mounted concrete breakers</li> <li>• Hoe rams</li> <li>• Hand-held jack hammers</li> <li>• Robotic demo breakers</li> <li>• Soldier pile drill rig</li> <li>• Tie-back drill rig</li> </ul>	Same as Alternative 1, except no night-time use of impact equipment unless allowed under SMC 25.08.425.

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<ul style="list-style-type: none"> <li>• Pneumatic tools</li> <li>• Impact hammers</li> <li>• Concrete saws</li> <li>• Concrete cutters</li> <li>• Vibratory compactors</li> <li>• No pile driving is proposed</li> </ul> <p>During Phases 3 and 4, the following impact equipment would be used:</p> <ul style="list-style-type: none"> <li>• Impact wrenches for steel erection</li> <li>• Vibratory compactors</li> </ul>	
<b>Excavation</b>		
Arena	The arena would be excavated an additional 15 feet (to 53 feet deep). Excavation would also occur laterally, extending the inside of the arena to out beyond the base of most of the pylons (Figures 2-2 and 2-4). The arena and adjacent Northwest Rooms would be stabilized prior to construction.	Same as Alternative 1 (Figure 2-8).
Loading dock access tunnel	The access tunnel would be excavated using a mining method and is estimated to take 7 months. Bressi Garage would be stabilized. See Figure 2-2 for tunnel location.	Construction method would be the same as Alternative 1. The access tunnel would pass under the 1 <sup>st</sup> Ave N Garage, east of Bressi Garage. See Figure 2-8.
Underground parking garage, underground loading dock, and atrium lobby	Excavation would be open pit, and take 4–5 months (Figure 2-4).	Same as Alternative 1.
Excavation volume (cubic yards)	Approximately 500,000 cubic yards.	Same as Alternative 1.

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
<b>Transportation</b>		
Truck loading and stockpiling <sup>1</sup>	Most demolition and excavation materials would be stockpiled at the 2 south ends of the Northwest Rooms before being removed from the site.  Conveyors would be used to load material into trucks. No truck loading is proposed on the west side of arena after 10 PM.	No loading at night.
Estimated number of truck trips <sup>2</sup>	<ul style="list-style-type: none"> <li>• Approximately 135,500 total truck trips.</li> <li>• Approximately 25,820 truckloads = 51,640 truck trips for months 1–6.</li> <li>• 73,000 truck trips for months 7–18.</li> <li>• 10,800 truck trips for months 19–24.</li> </ul>	<ul style="list-style-type: none"> <li>• Approximately 135,500 total truck trips.</li> <li>• Approximately 51,640 truck trips for months 1–12. Restriction of night truck trips could extend the duration of truck hauling beyond 12 months.</li> <li>• 73,000 truck trips for months 13–24.</li> <li>• 10,800 truck trips for months 25–30.</li> </ul>
Estimated number of truck trips <sup>2</sup> (per day)	<ul style="list-style-type: none"> <li>• 290 per day for months 1–6.</li> <li>• 80–100 per day for months 7–18.</li> <li>• 20–30 per day for months 19–24.</li> </ul>	<ul style="list-style-type: none"> <li>• 130 per day for months 1–12.</li> <li>• 80–100 per day for months 13–24.</li> <li>• 20–30 per day for months 25–30.</li> </ul>
Truck hauling <sup>1</sup>	Truck hauling could occur up to 18 hours a day, 7 days a week during Phase 1, but would change based on time of day to avoid AM/PM peak periods and sensitive night-time receptors. Hauling during other phases would be less.  Phase 1: truck-hauling on vacated Harrison St between 11:30 PM to 6:30 AM and as allowed under an approved noise variance.  Phase 2: Some deliveries may occur at night.  Phases 3 and 4: Some deliveries would occur between 11 pm and 5 am (Monday through Friday).	Truck hauling during daytime, non-peak hours only (approximately 8 hours a day or less), 7 days a week. Construction duration would be extended by at least 6 months.
Truck haul routes (see Figures 2-11a and 11b, and 2-12) <sup>1</sup>	Would use major (arterial) truck streets.  Trucks would access the project site primarily from 1 <sup>st</sup> Ave N and 2 <sup>nd</sup> Ave N. However, site access points would change based on	Same as Alternative 1, except no truck hauling at night and would not occur on the Seattle Center campus. Hauling would likely only occur between 9:00 AM and 3:00 PM.

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<p>construction phase (see text above and Figures 11a and 11b). Truck haul routes are subject to SDOT approval.</p> <p>Most night-time hauling would route trucks through the Seattle Center campus using vacated Harrison St, except during the following campus-wide events in 2018, 2019, and 2020:</p> <ul style="list-style-type: none"> <li>• Installation of Fisher Pavilion Ice</li> <li>• New Year’s Eve</li> <li>• Removal of Fisher Pavilion Ice</li> <li>• Northwest Folklife Festival</li> <li>• Pride Festival</li> <li>• Seafair</li> <li>• Bite of Seattle</li> <li>• Bumbershoot</li> </ul> <p>OVG would provide crosswalks with flaggers to allow pedestrians to cross vacated Harrison St during night hauling.</p>	
<p>Lane and sidewalk closures (see Figure 2-11)</p>	<p>Closed for the duration of construction, unless otherwise specified (approximately 24 months):</p> <ul style="list-style-type: none"> <li>• On Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N, the north-side parking lane and sidewalk would be closed. In Phase 4 only, the north-side travel lane (west-bound) may be closed for a period of time to complete the parking garage. Flaggers would be used to ensure traffic circulation.</li> <li>• Phase 1 only: The western half of vacated 2<sup>nd</sup> Ave N from Thomas St to the south edge of the intersection of vacated Harrison would St be closed. The western half of vacated 2<sup>nd</sup> Ave N would be reopened for the following: New Year’s Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, Bumbershoot, and the installation and removal of</li> </ul>	<p>Closed for the duration of construction (30 months or longer):</p> <ul style="list-style-type: none"> <li>• Thomas St between 1<sup>st</sup> Ave N and Warren Ave N; closures would be the same as Alternative 1.</li> <li>• Thomas St between Warren Ave N and 2<sup>nd</sup> Ave N north curbside lane and north travel lane closed; south travel lane and south curbside lane would be available for event support.</li> <li>• West half of vacated 2<sup>nd</sup> Ave N from Thomas St to the south edge of the intersection of vacated Harrison St; closures would be the same as Alternative 1.</li> <li>• On 1<sup>st</sup> Ave N, the east curbside parking lane between John St and the King County Metro Bus stop closed for the majority of the project and intermittently for the last 6 months or longer; location the same as Alternative 1.</li> </ul>

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
	<p>the Fisher Pavilion ice. It may also be open during the day on other dates.</p> <ul style="list-style-type: none"> <li>On 1<sup>st</sup> Ave N, the east parking lane and sidewalk between Thomas St and the south end of the King County Metro bus stop would be closed (the bus stop would remain open).</li> <li>The King County Metro bus stop along 1<sup>st</sup> Ave N, immediately north of John St would be closed.</li> <li>The bus layover area on 1<sup>st</sup> Ave N would be closed.</li> <li>Phases 2, 3, and 4: East parking lane and sidewalk of 1<sup>st</sup> Ave N between John St and Thomas St closed.</li> </ul>	<ul style="list-style-type: none"> <li>Duration of closures could be extended due to night-time hauling restrictions.</li> </ul>
Truck staging (see Figure 2-11a)	<ul style="list-style-type: none"> <li>On Thomas St, between Warren Ave N and 2<sup>nd</sup> Ave N, in north parking lane.</li> <li>On 1<sup>st</sup> Ave N between John St and the King County Metro Bus stop, in east parking lane.</li> <li>On 2<sup>nd</sup> Ave N between John St and Thomas St only after 10 PM.</li> </ul>	Same as Alternative 1.
Deliveries	<ul style="list-style-type: none"> <li>Materials would be delivered on a just-in-time basis, and thus on-site materials stockpiling would be minimal.</li> <li>Deliveries would be scheduled to the closest route leading to the installation point.</li> </ul>	Same as Alternative 1.
1 <sup>st</sup> Ave N Garage and adjacent surface parking lot	<ul style="list-style-type: none"> <li>The existing 1<sup>st</sup> Ave N Garage would be used for construction worker parking. OVG and the construction manager would work with Seattle Center tenants to make excess spaces available for their events. The roof of the 1<sup>st</sup> Ave N Garage would be used for construction trailers. The adjacent surface parking lot would be closed for the duration of construction.</li> </ul>	Same as Alternative 1.

Specifications	Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Construction logistics (see Figure 2-11)	<ul style="list-style-type: none"> <li>On the north, south, and west sides of the arena building, the construction fence would be a 12-foot noise-deflecting barrier. Art and windows may be placed on the noise barrier.</li> <li>For short periods and periodically, work would occur outside of perimeter fencing including tieback of construction. Tieback work would be drilled from inside the site and should not be noticeable from street level outside the site.</li> <li>For the access tunnel and utility work, construction easements would extend into the adjacent streets. Such work would require excavation, including within the existing road right-of-way.</li> </ul>	Same as Alternative 1.
<b>Other</b>		
Northwest Rooms and International Plaza	<ul style="list-style-type: none"> <li>The south portion of the International Plaza would be closed during construction for the duration of construction.</li> <li>The construction fence would be south of the DuPen Fountain. The fountain would be closed by Seattle Center during construction.</li> <li>Shoring may extend into the International Plaza and adjacent to the Northwest Rooms.</li> </ul>	Same as Alternative 1.
Seattle Center tenant relocation	<ul style="list-style-type: none"> <li>Pottery Northwest (the tenant in Bressi Garage) and tenants in the Northwest Rooms (KEXP, The Vera Project, SIFF, and A/NT Gallery) would not need to relocate during construction, unless a building inspector determines the building would be unsafe during construction.</li> </ul>	Same as Alternative 1.

<sup>1</sup>Timing of night-time work is subject to review by the City (including Seattle Center), and may be changed to reduce impacts to sensitive receptors. For more information, see Chapter 4, *Transportation*, and Chapter 8, *Noise and Vibration*, as well as OVG's Construction Noise Variance Application available at <http://web6.seattle.gov/dpd/edms>.

<sup>2</sup>The number of truck trips for demolition and excavation is estimated based on the volume of excavated material and volume of material that would need to be removed from demolition of a 360,000 square foot building. Assumed approximately 20 cubic yards/truck load (1 truck load = 2 truck trips). CalEEmod model determined that a 360,000 square foot building would result in 818 truckloads of material. This number does not include other types of construction vehicles. To calculate the number of truck trips per day for demolition and excavation for Alternative 1, 180 days (approximately 6 months) was assumed; for Alternative 2, 360 days (approximately 12 months) was assumed.

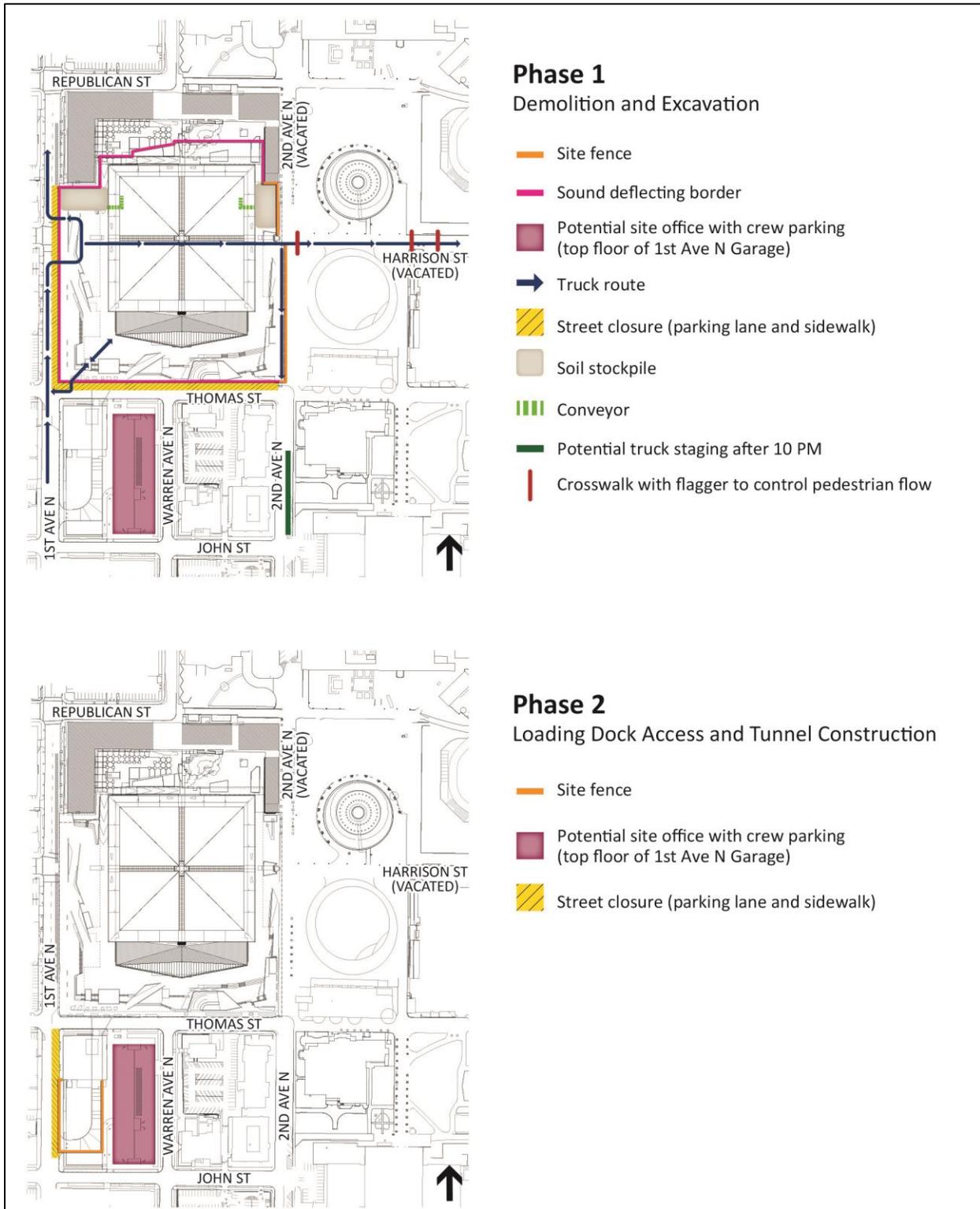


Figure 2-11a. Construction Logistics and Phasing

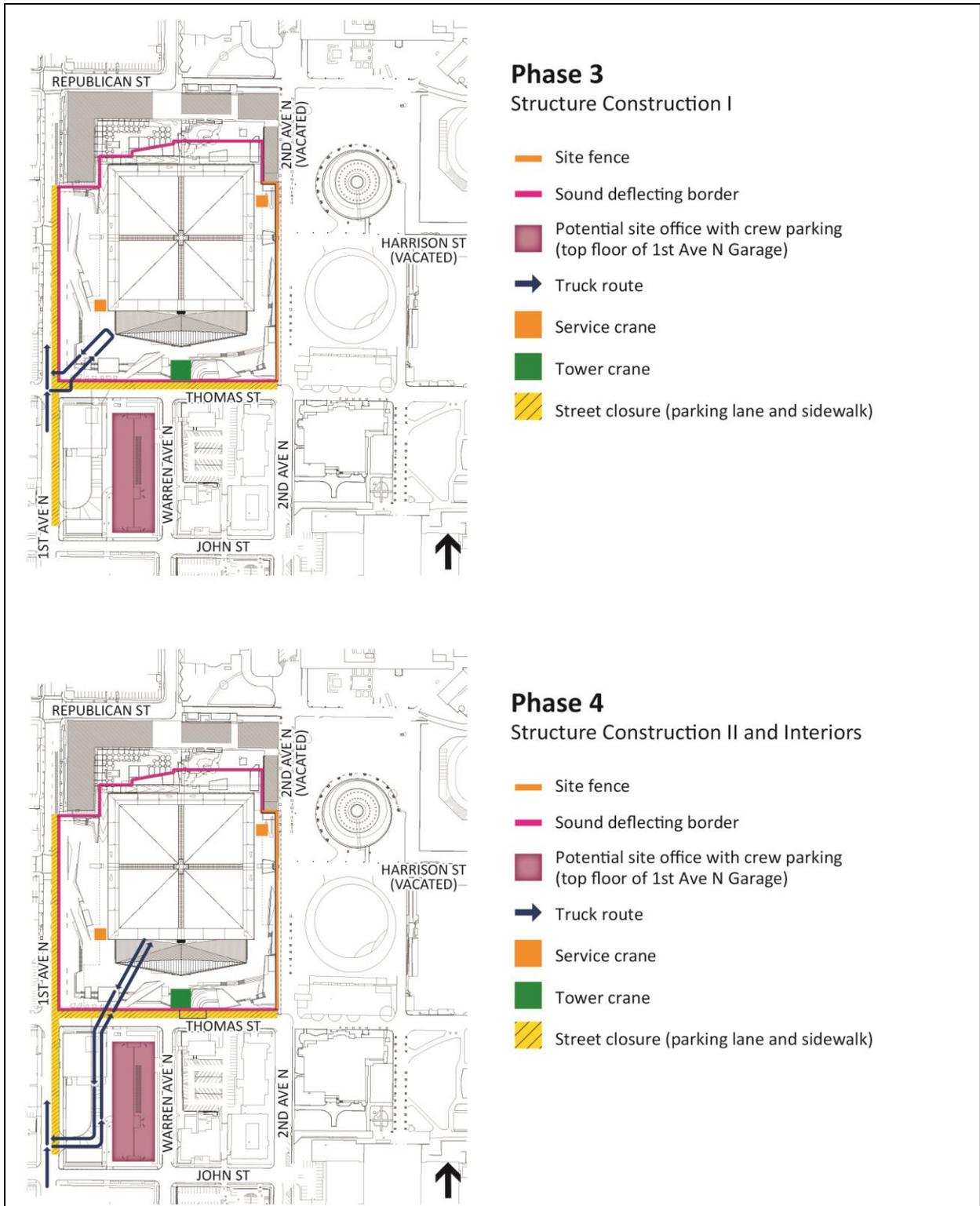
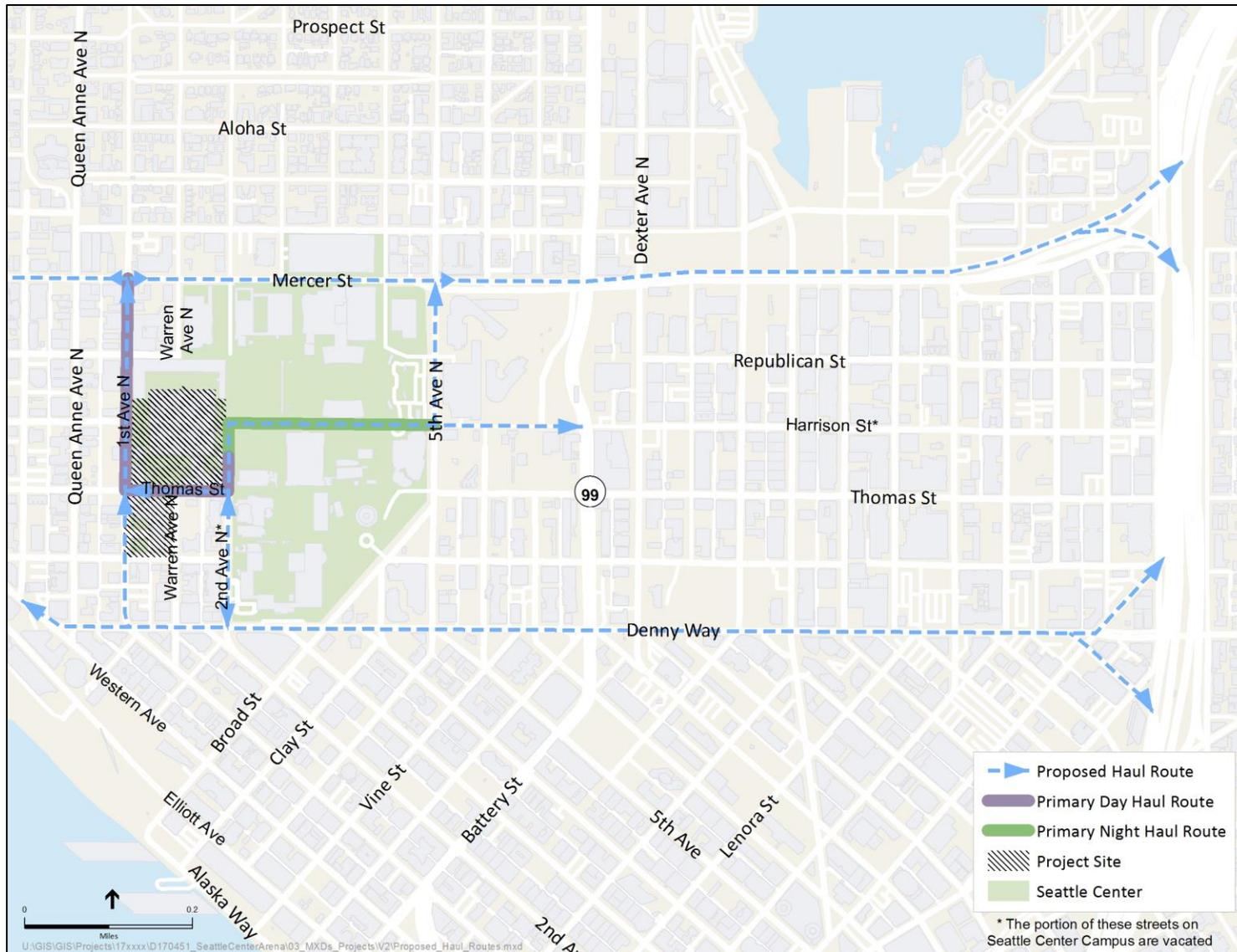


Figure 2-11b. Construction Logistics and Phasing



Note: Specific night-time hours are subject to review and approval by the City through the noise variance process.

**Figure 2-12. Proposed Haul Routes**

## 3.0 LAND USE

This chapter provides an analysis of land uses within the study area and potential land use impacts from the proposed project. A discussion of the project's consistency with existing plans and zoning is also included. Land use is a broad topic that intersects with other elements of the environment, including recreation, traffic, and noise. The potential traffic impacts are more fully analyzed in Chapter 4, *Transportation*, potential impacts on visitors to Seattle Center in Chapter 7, *Recreation*, potential noise impacts in Chapter 8, *Noise and Vibration*, and potential visual quality impacts in Chapter 9, *Visual Resources*.

**Changes from the Draft EIS** – This chapter has been revised since issuance of the Draft EIS to provide additional information on construction-related impacts to Seattle Center tenants (also referred to as resident organizations) and neighbors based on new information. Since the Draft EIS, OVG has incorporated measures into Alternative 1 to avoid, minimize, or mitigate for some of the construction-related impacts that could lead to land use impacts. These measures include reduction of the construction footprint and implementation of a construction noise barrier; reducing (or changing the hours of) closures along Thomas St and 2<sup>nd</sup> Ave N; and proposing a mining construction method for the tunnel under Bressi Garage, rather than a tunneling method.

The chapter was also revised to acknowledge that while there would be significant construction-related noise and vibration impacts, these would result in less-than-significant impacts to land use. Revisions were also made to clarify text and add additional information to figures.

### 3.1 METHODS

Current zoning and land uses were identified by reviewing local, state, and regional maps and planning documents, including online resources and plans from the City and Seattle Center. Construction impacts were analyzed by identifying construction activities that could temporarily limit, disrupt, or displace current land uses in the study area. Operations impacts were analyzed by identifying long-term activities associated with the renovation of the arena that could affect existing on-site or adjacent land uses.

#### **Key Findings for Land Use**

**Direct Impacts:** Alternatives 1 and 2 propose to demolish several buildings, and the tenants may be temporarily or permanently displaced. The skatepark would be permanently removed and replaced. Seattle Center tenants, neighboring residents, businesses, and institutions would experience construction impacts for about 24 months under Alternative 1, and 30 months or longer under Alternative 2.

Alternatives 1 and 2 include requests for variances from zoning and Land Use Code standards. An amendment is proposed to SMC 23.55 to create a sign overlay district and other changes to regulate signage. OVG has requested a variance for night-time construction noise under the Seattle Noise Ordinance, Title 25. Alternative 2 does not include the noise variance. Alternative 2 includes a sign code amendment that would have fewer visual impacts from signage than Alternative 1.

Significant impacts to land use are not expected because the project would follow the City procedures for variance and code amendments.

**Indirect Impacts:** Under Alternatives 1 and 2, the increase in the frequency of events at the renovated arena would add to the congestion and overall activity in Uptown and surrounding areas.

## 3.2 REGULATORY CONTEXT

The proposed project is subject to land use review under SEPA regulations, the Seattle Municipal Code (SMC), City regulatory plans, and other local, state, and regional codes. Washington Administrative Code (WAC) 197-11-440 (6)(d)(i) requires a summary of existing plans (for example, land use and shoreline plans) and zoning regulations applicable to the proposal, and how the proposal is consistent and inconsistent with them. Consistency with regulatory plans and policies is described in Section 3.7, *Relationship to Plans, Policies, and Regulations*.

## 3.3 AFFECTED ENVIRONMENT

### 3.3.1 Land Use Study Area

The land use study area is generally bounded by Mercer St to the north, 5<sup>th</sup> Ave N and Broad St to the east, Denny Way to the south, and Queen Anne Ave N to the west (see Figure 3-1) and includes adjacent areas beyond the boundaries of Seattle Center. The northern boundary extends to Roy St to include the Mercer St Garage. The area is near the north boundary of the Downtown Urban Center in Uptown. Uptown is surrounded by Interbay to the west, South Lake Union to the east, Denny Triangle to the southeast, and Belltown to the south.

### 3.3.2 Existing Land Uses on the Seattle Center Campus

The project site is on the Seattle Center campus. Land within the Seattle Center campus is owned by the City or private entities and is currently developed with a variety of existing uses including performance, entertainment, sports, recreation, museum, commercial, office and storage buildings, and surface and structured parking (see Figure 3-2). The Seattle Center campus includes public spaces such as open lawn areas that contribute to Seattle Center's park-like feel, and large paved public spaces important for festival and exhibition programming, performance and artistry, informal enjoyment of the out-of-doors, and small and large gatherings. Major buildings at Seattle Center include the Armory, Museum of Popular Culture (MoPOP), the Seattle Children's Theatre, the Space Needle, Seattle Opera, Memorial Stadium, McCaw Hall, Pacific Science Center, Chihuly Garden and Glass, Phelps Center/Exhibition Hall, Cornish Playhouse, Seattle Repertory Theatre, and KeyArena. Some of the buildings are operated by Seattle Center (e.g., KeyArena and the Armory), and others are privately operated (e.g., Space Needle, Memorial Stadium, Pacific Science Center, and MoPOP). See Appendix E, *Recreation*, for a list of buildings and activities at Seattle Center.

Main entrances to the Seattle Center campus include 2<sup>nd</sup> Ave N and Thomas St, 1<sup>st</sup> Ave N, Seattle Monorail Terminal on 5<sup>th</sup> Ave N, W Harrison St and 5<sup>th</sup> Ave N, 3<sup>rd</sup> Ave N and Mercer St, and Warren Ave N and Republican St (August Wilson Way).

The project site, which includes the existing KeyArena building and adjacent areas proposed for the Seattle Center Arena Renovation Project, comprises approximately 11 acres of the Seattle Center campus. KeyArena currently has a capacity of approximately 17,000 persons depending on the type of event. Buildings that are currently located on the project site are listed in Table 3-1.

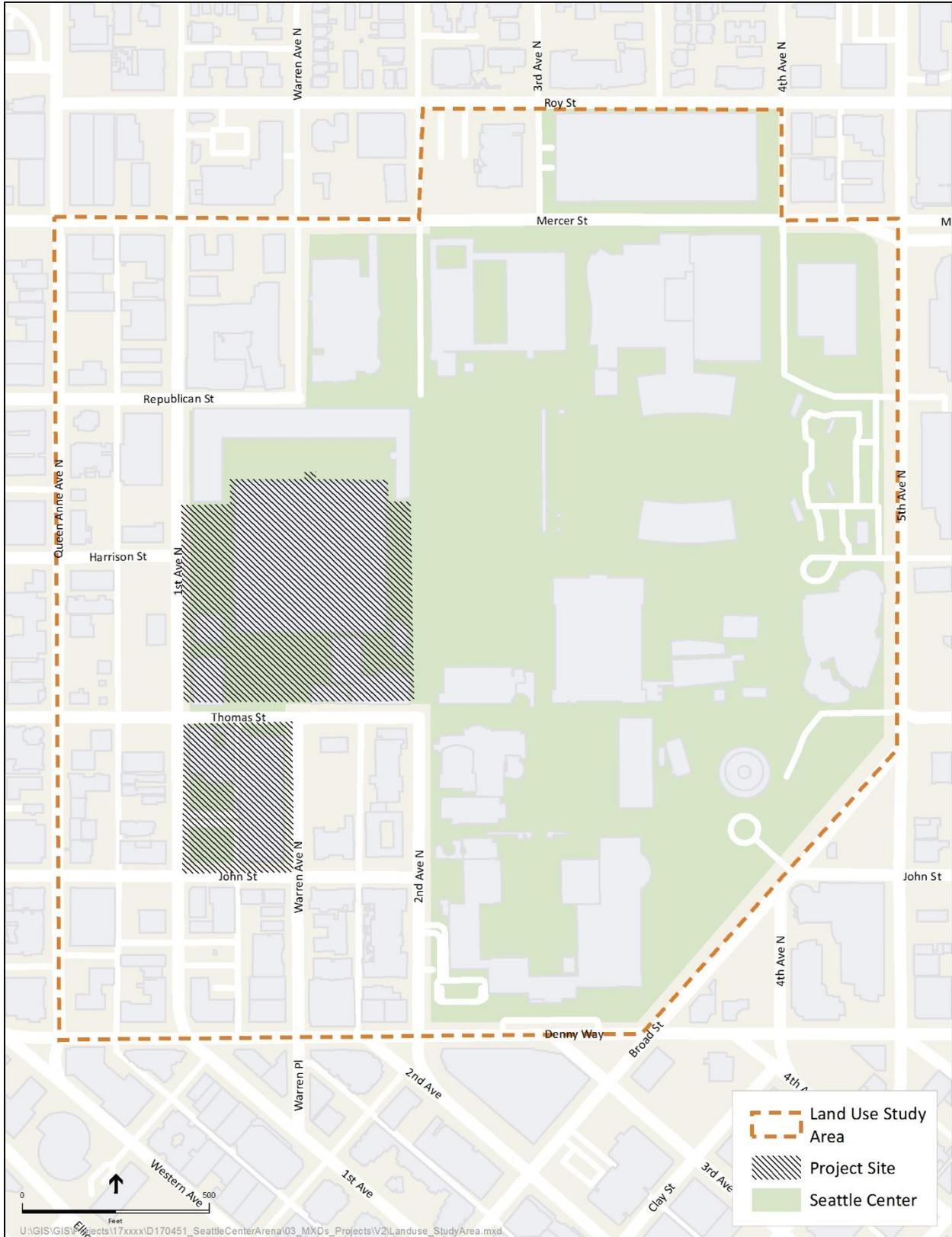
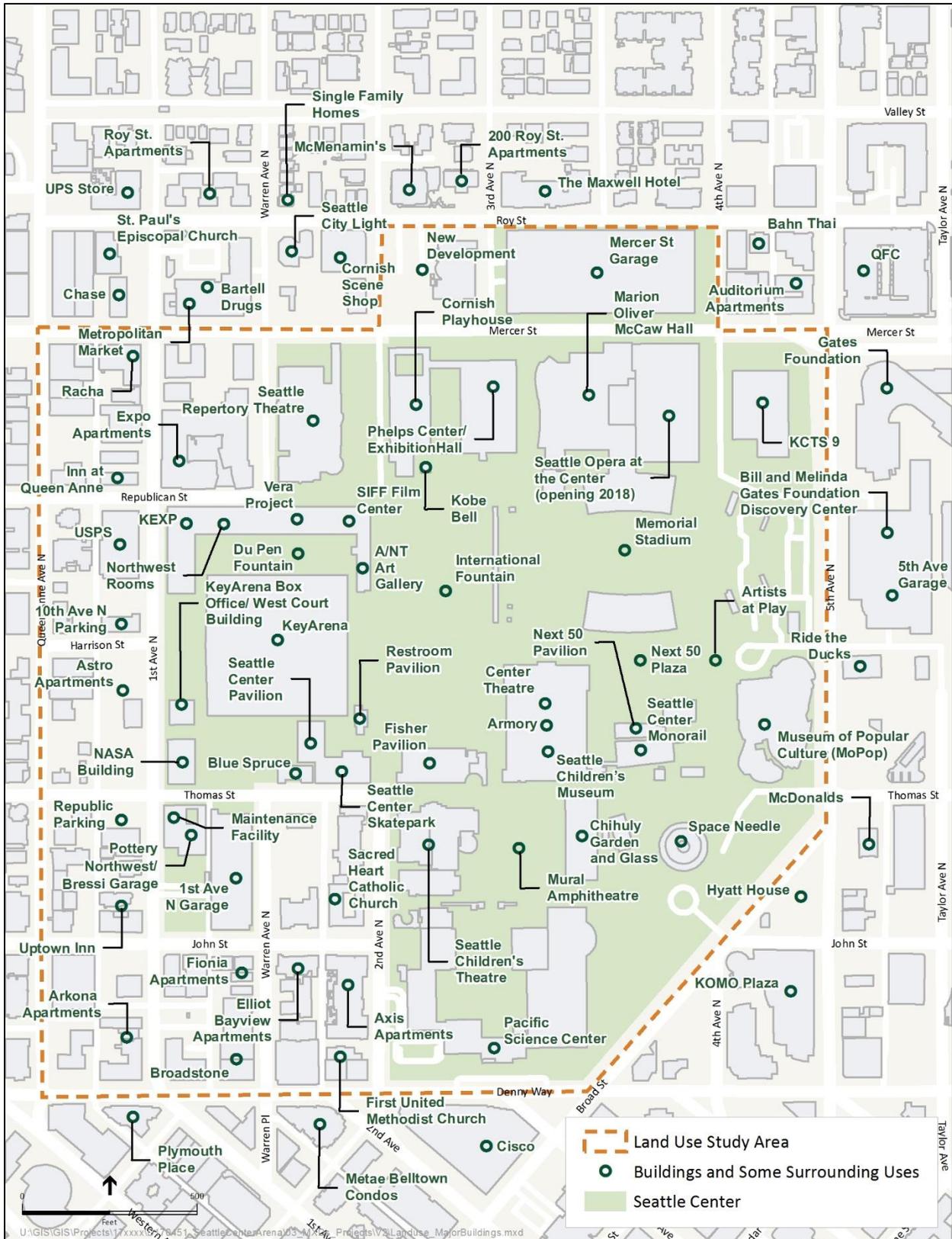


Figure 3-1. Land Use Study Area



Source: Prepared by ESA, 2018.

Figure 3-2. Buildings and Some Surrounding Uses

**Table 3-1. Existing Buildings on the Project Site**

Building Name	Current Use
KeyArena	Performance, entertainment, and sports venue.
KeyArena Box Office/ West Court Building	Ticketing services and offices.
Seattle Center Pavilion	A flexible 5,300-square foot space that is rented for events.
Blue Spruce	Repurposed apartment building that currently functions as office space for nonprofit organizations.
Seattle Center Skatepark	Recreational skatepark.
Restroom Pavilion	Public access restrooms.
Bressi Garage - Pottery Northwest and Seattle Center Maintenance Facility	Half of the building is used as a ceramics studio by tenant Pottery Northwest. Seattle Center maintenance and grounds staff use the other half of the building for office space and storage for equipment, including maintenance vehicles.
NASA Building	Repurposed building used for storage.
1 <sup>st</sup> Ave N Garage	Seattle Center public parking, constructed for use by KeyArena during 1994/1995 renovation.

Tenants currently programmed at KeyArena are listed in Table 3-2.

**Table 3-2. Current KeyArena Tenants**

Current KeyArena Tenant	Programming
Seattle Storm (WNBA)	The Storm hosts 17 regular season games, 1 pre-season game, and a variable number of post-season games at KeyArena (WNBA, 2017).
Seattle University Men's Basketball Team	The Seattle University Men's Basketball Team plays Division I National Collegiate Athletic Association (NCAA) basketball, with KeyArena as their home court. The team played at the Seattle Center Coliseum from 1964–1980 and returned to KeyArena in 2008.
Pac12 Women's Basketball Tournament	The PAC12 Women's Basketball Tournament has been held in KeyArena since 2013.
Concerts and Special Events	Variety of schedules for entertainment.

### 3.3.3 Land Uses Adjacent to the Project Site

The uses directly adjacent to the project site include the following (see Figure 3-2):

**North of KeyArena:** The Northwest Rooms house KEXP, Seattle International Film Festival (SIFF) Film Center, The Vera Project, and A/NT Gallery (formerly known as Art/Not Terminal Gallery), and the International Plaza (which includes the DuPen Fountain), and are immediately north of the project site on the Seattle Center campus. The International Plaza is also called the Northwest Courtyard(s). These uses include other ancillary uses such as a coffee shop and record store that sublease from KEXP. To the north of those buildings are Republican St, the Seattle Repertory Theatre, and the Expo Apartments.

**South of KeyArena:** Thomas St is immediately south of the arena and north of the south parcel. Across Thomas St to the south is the Sacred Heart of Jesus Catholic Church and Rectory, the Sacred Heart Shelter, and the Downtown (Lakeside) School (scheduled to open fall 2018). Southeast of the arena is the Seattle Children's Theatre. John St is south of the existing 1<sup>st</sup> Ave N Garage and surface parking. South of John St are condominiums and apartments.

**East of KeyArena:** The Fountain Lawn, International Fountain, South Fountain Lawn, and Fisher Pavilion on the Seattle Center campus are east of the project site.

**West of KeyArena:** 1<sup>st</sup> Ave N is west of the project site. Adjacent to 1<sup>st</sup> Ave N are apartments and condominiums, including the Astro Apartments, MightyKidz Daycare, Dalmasso Apartments, several surface parking lots, Uptown Inn, and the Queen Anne Post Office Building (also known as the Queen Anne Station).

### 3.3.4 Land Uses Within the Land Use Study Area

Most of the study area to the east and north of the project site is within Seattle Center. West and south of the project site, the neighborhood character transitions to smaller lots, a regular street grid, and a mix of mid-rise and low-rise commercial, residential, and institutional uses. Queen Anne Ave N from Denny Way to the south to Mercer St to the north forms the center of a pedestrian-oriented commercial district that includes dining, entertainment, shopping, and offices that extends for several blocks along both of these arterial streets. Uses within and adjacent to the land use study area include those listed below and found on Figure 3-2:

**North Boundary of the Land Use Study Area:** Mercer St and Roy St form the north boundary of the land use study area and are adjacent to apartments and condominiums, single-family residential, commercial retail, parking, and utility uses.

**South Boundary of the Land Use Study Area:** Denny Way creates the south boundary of the land use study area. First United Methodist Church, Pacific Science Center, apartments and condominiums, surface parking, and commercial retail establishments are adjacent to Denny Way to the south.

**East Boundary of the Land Use Study Area:** 5<sup>th</sup> Ave N and Broad St border the east boundary of the land use study area. KCTS 9, MoPOP, surface parking, and a variety of commercial retail establishments are along the east boundary of the land use study area.

**West Boundary of the Land Use Study Area:** Queen Anne Ave N from Mercer St to the north to Denny Way at the south forms the west boundary of the land use study area and is adjacent to a mix of commercial, retail, offices, apartments, condominiums, restaurants, and parking.

In addition to a few single-family residences, there are approximately 24 multi-family developments in the land use study area, totaling approximately 1,650 housing units. These units are predominantly rental units. Table B-1 in Appendix B lists many of the multi-family housing units in the land use study area.

Two religious institutions in the land use study area provide religious and social services: the Sacred Heart of Jesus Catholic Church, Rectory, and Shelter at 205 2<sup>nd</sup> Ave N; and the First United Methodist Church and Blaine Center at 180 Denny Way. Religious services and other programming are listed in Table B-2 in Appendix B.

Several new development projects are proposed or under construction in the land use study area. Proposed projects include those that have received land use and/or construction permits, or are currently undergoing SDCI review. At the time of Draft EIS preparation, a variety of permit applications were listed in the SDCI permit tracking system including several permit applications for proposed large apartment or condominium buildings in the land use study area. The permit application list has been updated since the Draft EIS, but only the largest development projects are listed below. There are also a number of smaller developments in the area. The permit numbers and addresses for projects in the building application system that may be starting up or be in progress at the time of the proposed arena renovation include the following (City of Seattle, 2018):

- Permit #3015549, 124 Denny Way, 6-story building with 75 units.
- Permit #3015680, 101 Denny Way, 6-story building with 82 units (with an estimated completion date of November 2018).
- Permit #3025946, 225 Roy St, 2 apartment buildings, one 8-story and one 7-story, with a total of 269 units.
- Permit #3028550, 631 Queen Anne Ave N, 6-story building with 46 units.
- Permit #3024089, 320 Queen Anne Ave N, 7-story building with 69 units.
- Permit #3021477, 215 1<sup>st</sup> Ave N, 5-story building with 71 units.
- Permit #3025155, 714 1<sup>st</sup> Ave W, 6-story building with 50 units.
- Permit #3018158, 19 W Harrison St, 6-story building with 50 units.

### 3.3.5 Current Land Use Zoning

The entire land use study area is zoned Seattle Mixed-Uptown (SM-UP) with varying height limits, as shown in Figure 3-3. The project site on the Seattle Center campus is listed as SM-UP 95, which designates a height limit of 95 feet for the parcels in that zone. The area south of Thomas St (the south parcel) where additional project work is planned is zoned SM-UP 85. Other parcels in the land use study area have height limits ranging from 40 to 85 feet.

The SM-UP zoning designation, adopted in October 2017, aims to create a more walkable, livable, and dense Uptown. The SM-UP zone provides for a wide range of uses in medium- to high-density mixed-use development, and includes regulations for the following:

- Maximum building height, width, and façade standards.
- Street-level use and parking standards.
- Maximum and minimum development density.
- Mandatory affordable housing contributions.
- Incentive zoning for provision of public amenities.



Figure 3-3. Land Use Zoning in the Land Use Study Area

## 3.4 POTENTIAL IMPACTS

This section evaluates potential impacts to land uses for the No Action Alternative and Alternatives 1 and 2.

### 3.4.1 Construction Impacts

Potential short-term land use impacts from construction are characterized as less-than-significant or significant. Potentially significant impacts are defined below; impacts that do not reach that threshold are determined to be less-than-significant.

**Criteria for Significant Construction Impacts:** The impacts of construction activities would be significant if disruptive (e.g., noise, dust, visual impediments, access limitations) and of long enough duration to result in a change in the current land use in the land use study area.

#### No Action Alternative

Under the No Action Alternative, there would be no demolition or construction at the site for a renovated arena or associated improvements. The existing KeyArena would remain as is.

#### **Direct Impacts and Indirect Impacts**

No direct or indirect land use impacts would be expected from the No Action Alternative.

#### Alternative 1: OVG Proposal

Alternative 1 proposes to renovate the interior of KeyArena for sports and entertainment events with a design that would accommodate NHL and NBA teams. The project includes demolition and construction on the project site to renovate the facility. See Chapter 2 for a detailed description of Alternative 1. Construction activities are described in Section 2.6, *Construction*. The sequencing, extent, and timing of the proposed construction activities may vary and details are subject to review by the City.

#### **Direct Impacts**

Construction activities would involve the demolition of existing structures, day- and night-time noise, temporary street closures, temporary closures of portions of Seattle Center grounds, and temporary displacement of existing programming or uses. The activities would individually and cumulatively affect neighboring uses. Construction activities are generally not expected to be disruptive enough to adjacent land uses to cause a change in land use, and thus would not be significant, but would cause inconveniences and curtailment of some activities of these uses. As described in Tables 8-8 and 8-9, in Chapter 8, *Noise and Vibration*, construction-related noise and vibration impacts would be significant to some Seattle Center tenants.

**Demolition of Existing Structures:** Five buildings (West Court Building [KeyArena Box Office], NASA Building, Blue Spruce Building, Restroom Pavilion, and Seattle Center Pavilion), the skatepark, the surface parking lot and loading/marshalling area south of the arena, and plazas to the west and east of the arena would be demolished. The demolition of the Blue Spruce Building was supported in the Century 21 Master Plan (Seattle Center, 2008). An extension would be added to the southwest portion of the Northwest Rooms to house mechanical equipment and egress stairs for the arena. The southeast portion of the Northwest Rooms would also be disassembled and rebuilt to house mechanical

equipment and egress stairs. See Chapter 2, Section 2.2, *Alternative 1: OVG Proposal*, and Section 2.6, *Construction*.

**Temporary Street Closures:** Streets around Seattle Center may have lane or sidewalk closures or be used for haul routes during construction. Streets proposed for lane or sidewalk closure for the duration of construction (approximately 24 months) would impact current Seattle Center tenants, visitors, and neighboring land uses by requiring detours or changes in access to the Seattle Center, residences, and businesses. These inconveniences could result in reduced visitation of Seattle Center businesses.

See Section 2.6, *Construction*, for lane and sidewalk closures and haul routes. All street use requires a permit by SDOT. See Appendix B for detailed information on Seattle Center programming that may be affected by street use for construction activities.

Access would be maintained to businesses, residences, and institutions during construction.

**Temporary Construction Impacts on Seattle Center and Adjacent Uses:** Seattle Center averages 12 million visitors per year and hosts approximately 5,000 events and performances. A number of these events would have some level of disruption, depending on the location and timing of the programs or events, for the 2-year construction duration. Impacts may result from the following:

- Construction of mechanical structures on the south ends of the Northwest Rooms (abutting KEXP and AN/T Gallery).
- Vacated Harrison St on the Seattle Center campus would be used for night-time truck hauling under Alternative 1. Flaggers would be used at pedestrian crossings and alternative walking routes would be supported.
- The west half of vacated 2<sup>nd</sup> Ave N between Thomas St and vacated Harrison St would be closed during Phase 1, except during certain campus-wide events.
- The north parking lane and the sidewalk on Thomas St would be closed during construction, which would result in a loss of some event-related curb space on Thomas St.
- The 1<sup>st</sup> Ave N Garage would be closed and used for construction worker parking and trailers. The adjacent surface lot would also be closed.
- Closure of a portion of the International Plaza north of the arena during construction.

See Section 2.6, *Construction*, for a full list of closures and more details about construction. See information on noise and vibration in Chapter 8, *Noise and Vibration*, Section 8.6, *Avoidance, Minimization, and Mitigation Measures*, and also Table 8-8, *Noise Construction Impact Summary*.

**Temporary Displacement of Existing Programming/Uses During Construction:** Renovation of the arena would temporarily displace some existing uses for approximately 24 months. Current KeyArena activities would either discontinue during the renovation or would take place in temporary venues until they could shift back to the renovated arena. The tenants of KeyArena that would be temporarily displaced are listed in Table 3-3.

**Table 3-3. Current KeyArena Tenants Temporarily Displaced Due to Construction**

Current KeyArena Tenant	Proposed Temporary Venue
Seattle Storm (WNBA)	The Storm would likely relocate to the Alaska Airlines Arena at University of Washington in Seattle (capacity 10,000), the Tacoma Dome in Tacoma (capacity 23,000 depending on the seating arrangement), Angel of the Winds Arena in Everett (capacity 10,000), or the ShoWare Center in Kent (capacity 6,500).
Seattle University Men's Basketball Team	The Seattle University campus features the Connolly Center, a 999-seat arena with an NCAA-regulation court. The men's basketball team would play at the Connolly Center during the construction period.
Pac12 Women's Basketball Tournament	The Pac12 Women's Basketball Tournament would relocate outside the City for the duration of the construction period. The Pac12 has announced that the tournament will move to Las Vegas during construction (Allen, 2018).
Concerts and Special Events	The Tacoma Dome (capacity 23,000 depending on the seating arrangement) frequently hosts concerts on the same scale as those held at KeyArena. The Tacoma Dome is currently being renovated, and renovations will be complete by fall of 2018 (Tacoma Dome, 2016). Other arenas in the greater Seattle area that could host concerts during the construction period include the Angel of the Winds Arena in Everett (capacity 10,000), the ShoWare Center in Kent (capacity 6,500), or the Event Center at CenturyLink Field.

Pottery Northwest (a tenant in Bressi Garage) and Seattle Center tenants in the Northwest Rooms (KEXP, The Vera Project, SIFF, and A/NT Gallery) would not need to relocate during construction, unless a building inspector determines a building would be unsafe during construction.

Because other regional spaces/venues have the capacity to support displaced Seattle Center tenant uses during the approximate 24-month construction period, and because Seattle Center has refrained from scheduling events in KeyArena during the proposed construction period, impacts to land use would be temporary and would be considered less-than-significant.

**Variations/Code Amendments:** The following items have been identified as potential variance requests, waivers, or departures from the Land Use Code for Alternative 1, relating to: providing a through-block pedestrian connection; open space requirements; surface parking lot screening and separation from other uses; number and width of curb cuts; allowable maximum width for driveways; setback for the street-facing façade of proposed buildings; structure width and depth greater than the allowable 250 feet; and modifications to landscaping standards between the street and front façades.

An amendment to Seattle's sign regulations in the Land Use Code (SMC 23.55) is proposed, creating a new Seattle Center sign overlay district and other changes that would regulate the number, type, content, location, and operation of signs, including signage for the renovated arena. See Section 9.4.2, *Operations Impacts (Visual Resources)*, for details on proposed signage and the sign code amendment.

Alternative 1 also includes a request for a variance from night-time construction noise under the Seattle Noise Ordinance, Title 25. See Section 3.7, *Relationship to Plans, Policies, and Regulations*, for details.

### ***Indirect Impacts***

During construction, indirect impacts to nearby properties and businesses could occur from the loss of on-street parking, construction noise, and construction-related traffic congestion. Indirect impacts from construction noise would also occur at night due to exterior night work. These disturbances would create intermittent inconvenience and access limitations to some businesses and residents that could ultimately contribute to some residents or business patrons deciding to leave the area, or businesses deciding to relocate.

### **Alternative 2: Modified Proposal**

Construction for Alternative 2 would be the same as Alternative 1, except that no exterior night work (including no night truck hauling) would occur. This could extend the demolition and excavation period by at least 6 months, and total construction would take 30 months or longer. Impacts would decrease at night but would occur for an additional 6 months of daytime.

Alternative 2 includes variance requests, waivers, or departures under Title 23, similar to Alternative 1. However, a noise variance for night work would not be needed. As with Alternative 1, a sign code amendment is proposed; the Alternative 2 amendment includes restrictions on video displays facing the street (the video display would either not be allowed, or would not be allowed to face toward 1<sup>st</sup> Ave N) and the proposed size of the signs on top of the arena would be similar to existing conditions. See Section 9.4.2, *Operations Impacts (Visual Resources)*, for details on proposed signage.

### ***Direct and Indirect Impacts***

The land use impacts (both direct and indirect) due to construction under Alternative 2 would be similar to Alternative 1 during daytime construction. However, the absence of exterior night-time work would prolong the period of daytime construction impacts and associated construction-related traffic congestion impacts by approximately 6 months or more under Alternative 2. Excluding exterior night-time construction work would avoid noise impacts during the night-time hours for adjacent neighbors. Excluding exterior night-time construction work would also prolong the construction noise during the day for Seattle Center tenants, neighbors, and visitors to the campus by at least 6 additional months.

These differences would not substantively change land use impacts from those described for Alternative 1, and because the impacts would not result in permanent land use changes, the impacts would be less-than-significant.

## **3.4.2 Operations Impacts**

This section describes potential long-term land use impacts from the proposed Seattle Center Arena Renovation Project. Potentially significant land use impacts are defined below; impacts that do not reach that threshold are determined to be less-than-significant.

***Criteria for Significant Operations Impacts:*** Impacts would be significant if the project would result in permanent, substantial direct or indirect land use changes that adversely affect neighborhood character, such as blight or disuse of properties.

## **No Action Alternative**

### ***Direct Impacts***

Under the No Action Alternative, there would be no expected change from existing land use conditions in and around the project site and vicinity.

### ***Indirect Impacts***

In general, land uses within the land use study area for the No Action Alternative would be expected to continue along current trends, without influence from changed activity at KeyArena. The No Action Alternative would not allow Seattle Center to achieve the economic benefits of providing expanded KeyArena facilities, and may result in KeyArena becoming less attractive as a venue to major sporting and entertainment events.

## **Alternative 1: OVG Proposal**

### ***Direct Impacts***

Alternative 1 includes the permanent removal or alteration of several buildings on the project site, permanently displacing the uses in those buildings. Alternative 1 would maintain the Landmark-designated features of KeyArena. See Table 3-4 for a summary of these changes.

Relocation and financial assistance for the permanent displacements from the project site and the inclusion of an OVG Community Liaison are included as part of the project. The full-time Community Liaison was hired by OVG in June 2018 and is working with affected stakeholders. The project would provide relocation support through the Transaction Documents, as described in Section 1.2. Therefore, the impacts would be less-than-significant.

The skatepark removal and relocation are described in Chapter 7, *Recreation*.

See Chapter 2, Section 2.2, *Alternative 1: OVG Proposal*, for additional information on infrastructure and buildings.

### ***Indirect Impacts***

Alternative 1 would more than double the frequency of major events and provide increased seating capacity and amenities at the renovated arena. Seating capacities under Alternative 1 would range from approximately 17,300 (for hockey games) to 18,800 (for concert configurations). See Chapter 2, *Description of Alternatives*, for a detailed list of proposed events.

The increased frequency in events under Alternative 1 would increase visitation on the Seattle Center campus and neighboring areas. The experience for residents and businesses in the area would not substantially change on a daily basis, given that this area is currently a highly used sports, recreation, and entertainment destination. However, the increased number of days during the year with highly attended events at the Seattle Center campus would be noticeable in neighboring areas and may be a quality of life consideration for some residents.

Restaurants, bars, and other concessions at and around the Seattle Center campus would likely see an increase in use due to the increased attendance at the arena from the more frequent scheduling of major sporting and entertainment events at the arena. Continued growth and expansion of retail,

restaurants, and entertainment within and around Seattle Center would support surrounding residential and job growth targets, and would likely be seen as a benefit to retail and restaurants operating in the area. KeyArena is a major revenue generator supporting Seattle Center’s operational expenses. A renovated arena would represent a long-term investment that would enhance Seattle Center’s ability to meet its goal of bringing people together through a diverse set of activities and events.

**Table 3-4. Permanent Displacement of Uses on the Project Site**

Building Name	Current Use	Use Under Alternative 1
KeyArena Box Office/ West Court Building	Ticketing services.	Removed and replaced. A new freestanding box office would be constructed in the south plaza.
Seattle Center Pavilion	The building is a flexible 5,300-square foot space that is rented for events. It can be set up theater-style, classroom style, or banquet style.	Removed and not replaced. Events that were held in this venue could be held in the Armory Lofts or other Seattle Center event venues in the future.
Blue Spruce	Repurposed apartment building currently used as office space for nonprofit organizations.	Removed and not replaced, consistent with the Seattle Center Century 21 Plan. Four of the 6 Blue Spruce Building tenants would be relocated on the Seattle Center campus, 3 in the Armory (Northwest Folklife, Skate Like a Girl, and Teen-Tix). Book-It Theater would be relocated to the KCTS facility. The other tenants are not specifically tied to operating at Seattle Center and would relocate to off-site locations.
Skatepark	Public recreation area.	Removed. See discussion in Chapter 7, <i>Recreation</i> , regarding replacement.
Restroom Pavilion	Public access restrooms.	Removed and not replaced.
NASA Building	Used for storing facilities maintenance equipment.	Removed and not replaced. Items stored in NASA Building would be relocated to other storage facilities.
Southeast end of the Northwest Rooms	A portion of the Northwest Rooms is currently the space occupied by the A/NT Gallery.	The southeast end of the Northwest Rooms would be dismantled and replaced with a new structure that would house mechanical intake/exhaust and egress stairs. Following construction, the space leased by A/NT Gallery would be smaller.

## **Alternative 2: Modified Proposal**

### ***Direct Impacts***

Direct impacts for Alternative 2 would be similar to those described for Alternative 1 and would be less-than-significant.

### ***Indirect Impacts***

The indirect impacts under Alternative 2 would be similar to those described for Alternative 1 and would be less-than-significant.

## **3.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES**

### **3.5.1 Construction**

Avoidance, minimization, and mitigation measures are implemented to lessen or eliminate the adverse impacts associated with a proposed action. Such measures can be proposed by the applicant or required as a condition of approvals for construction permits. These potential measures have been updated since publication of the Draft EIS and will be used to inform the Transaction Documents, including the Lease Agreement, Development Agreement, and Seattle Center Integration Agreement. The agreements will contain provisions to enable existing organizations and businesses to continue to operate throughout construction.

OVG has committed to contributing \$500,000 to Seattle Center's operation and development of an "open for business during construction" marketing campaign.

Potential measures to address displacement of Seattle Center tenants during construction include the following:

- Implement the Development Agreement between OVG and the City to address OVG's commitment with the City, Seattle Center, and its tenants during construction. This agreement will include construction impact mitigation plans and community benefit provisions, including providing an OVG Community Liaison, holding monthly meetings, appointing a Seattle Center staff person to act as an ombudsperson, and providing meeting space for community organizations.
- Support the OVG Community Liaison as described in the Community Benefits Summary. OVG has hired a full-time Community Liaison to work with Seattle Center tenants and affected Uptown businesses to ensure the public is aware that businesses are open during construction. The OVG Community Liaison was hired in June 2018, and the position will continue after construction is complete and into project operation.
- Develop and implement a robust public outreach and marketing plan that promotes businesses and organizations prior to and throughout construction; monitor implementation of the plan and adjust as needed to ensure that businesses are well advertised.
- Provide advance notice of the construction activities to Seattle Center tenants and neighboring properties.

- Coordinate with tenants who would be displaced. Provide assistance in identifying alternative locations for holding games, concerts, and other events.
- Follow the City procedures for variances and code amendments.

Measures for construction traffic, parking, noise, and aesthetic impacts are described in their respective sections (see Section 4.5.1 in *Transportation*; Section 8.6.1 in *Noise and Vibration*; and Section 9.6.1 in *Visual Resources*).

### 3.5.2 Operations

Potential measures to reduce impacts from arena operations for Alternatives 1 and 2 include the following:

- **Seattle Center Integration Agreement:** This agreement establishes a framework for coordinating procedures and infrastructure across the arena site and the Seattle Center campus to better integrate City and OVG operations throughout the term of the lease. The Seattle Center Integration Agreement includes provisions for regular communication and sharing of event scheduling information, coordinating management and operations of the campus parking garages, and coordinating security, traffic control, use of curb space, marketing, and sponsorship.
- Continue to support the OVG Community Liaison and Seattle Center ombudsperson, as described in the Community Benefits Summary, in working with the community.
- Develop an Arena Access Management Plan (AAMP).

Additional measures for operations traffic, parking, noise, and aesthetic impacts are described in their respective sections (see Section 4.5.2 in *Transportation*; Section 8.6.2 in *Noise and Vibration*; and Section 9.6.2 in *Visual Resources*).

## 3.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON LAND USE

Alternatives 1 and 2 provide mitigation for temporary or permanent displacement of uses, adhere to the Seattle Municipal Code (Alternatives 1 and 2 would follow the proper procedures and standards for request for variances and a sign code amendment), and provide mitigation for temporary construction impacts that would impact neighboring residents, businesses, and institutions in the area. Therefore, there would be no significant and unavoidable adverse land use impacts expected from either of the action alternatives.

## 3.7 RELATIONSHIP TO PLANS, POLICIES, AND REGULATIONS

This section of the EIS provides a summary and consistency analysis. Unlike potential impacts to the physical environment described in other chapters of the EIS, this section summarizes the general extent to which the alternatives are consistent with zoning regulations and plans. The following analysis focuses on project consistency with relevant goals and policies of the Seattle 2035 Comprehensive Plan (City of Seattle, 2016a) and the Queen Anne (Uptown) Neighborhood Element of the Plan, the Uptown

Rezone Plan Ordinance, and the Seattle Center 21 Master Plan (Seattle Center, 2008). The proposed project is not in a shoreline area or in or nearby an environmentally critical area. Therefore, those policies are not analyzed.

### 3.7.1 Consistency with the Seattle 2035 Comprehensive Plan (2016)

**Summary:** The Seattle 2035 Comprehensive Plan establishes future land use designations to guide growth within the City of Seattle and includes goals and policies that guide general development in the City (City of Seattle, 2016a). The Seattle Center Arena Renovation Project is located at Seattle Center in Uptown. The Comprehensive Plan designates Uptown as 1 of 6 urban centers in the city, and is 1 of the 4 contiguous urban centers referred to as Center City. Urban centers have the highest density neighborhoods in the city and are regional centers that provide a diverse mix of uses, housing, and employment opportunities. Accordingly, Uptown is a key component in the City's housing and job growth strategy.

The Seattle 2035 Comprehensive Plan states that growth in Uptown should be planned in a way that improves pedestrian access and safety, creates more ground-level open space, increases the supply of affordable housing, improves the connection between the neighborhood and Seattle Center, preserves historic buildings and architectural styles, and leverages a multi-modal transportation system (City of Seattle, 2016a). The future land use for the entire land use study area is commercial/mixed use. Table 3-5 lists the Seattle 2035 Comprehensive Plan goals and policies relevant to the No Action Alternative and Alternatives 1 and 2 for the Seattle Center Arena Renovation Project.

**Discussion:** Alternatives 1 and 2 generally support the goals and policies listed in Table 3-5 because the project preserves the existing Landmark-designated portions of the KeyArena building, which maintains the city's cultural identity and heritage as stated in goal LU G14.

Policy LU 5.10 provides general guidance on what should be considered in regulating signage. The proposed sign code amendment (SMC 23.55) will be considered by the City Council. Consistent with this policy, the visual analysis in Chapter 9 of the Final EIS provides information on visual and safety impacts to consider when making that decision. The proposed amendments increasing the video display size and allowing more dynamic video displays could adversely affect safety, in conflict with this policy. The proposed amendment for Alternative 2 includes modifications that would reduce the potential safety impact associated with the video display, requiring the sign to either eliminate the video component or face away from 1<sup>st</sup> Ave N. Potential measures to address visual and safety impacts are also described in Chapter 9, *Visual Resources*.

The project supports the ED 1.4, P G1, P 1.3, P G2, and P 4.3 goals and policies through a project design that supports pedestrian walkways, plazas, gathering spaces, and support for recreational opportunities. The project also includes coordination with transportation planning efforts and investments. These project elements may be included as part of the project proposal and/or through the Transaction Documents.

The project supports goal GS G3 and policy GS 3.9 by preserving or restoring the Landmark-designated arena features as required by the City, including the roof and edge beam structure and pylons, and the north, west, and east curtain walls. This preserves characteristics that contribute to the general identity of the community, such as architectural or social significance.

**Table 3-5. Seattle 2035 Comprehensive Plan Relevant Goals and Policies**

Goal/Policy No.	Relevant Land Use Goals and Policies
LU G14	Maintain the city’s cultural identity and heritage.
ED 1.4	Enrich the vibrancy of neighborhood business districts through the integration of design, public art, public space, historic preservation, small locally owned businesses and cultural spaces and programming.
GS G3	Maintain and enhance Seattle’s unique character and sense of place, including its natural setting, history, human-scaled development, and community identity, as the city grows and changes.
GS 3.8	Encourage the preservation and expansion of the tree canopy throughout the city for the aesthetic, health and environmental benefits trees provide, considering first the residential and mixed-use areas with the least tree canopy in order to more equitably distribute the benefits to residents.
GS 3.9	Preserve characteristics that contribute to communities’ general identity, such as block and lot patterns and areas of historic, architectural, or social significance.
GS 3.26	Design public spaces that consider the nearby physical context and the needs of the community.
LU 5.10	Regulate signage to encourage reasonable identification of businesses and to communicate information of community interest while limiting visual clutter, protecting the public interest, and enhancing the city’s appearance and safety.
P G1	Provide a variety of outdoor and indoor spaces throughout the city for all people to play, learn, contemplate, and build community.
P 1.3	Provide urban trails, green streets, and boulevards in public rights-of-way as recreation and transportation options and as ways to connect open spaces and parks to each other, to urban centers and villages, and to the regional open space system.
P G2	Continue to provide opportunities for all people across Seattle to participate in a variety of recreational activities.
P 4.3	Recognize that visitors to major regional attractions can impact the neighborhoods surrounding those facilities, and look for ways to limit those impacts, including through enhanced walking, biking, and transit connections.

The project does not comply with policy GS 3.8 in terms of preserving all of the existing trees. Alternative 1 would remove up to 13 trees designated as exceptional, legacy, and/or street trees, and Alternative 2 would remove up to 10 trees. The trees would be replaced at a 2:1 ratio or greater as required by Executive Order (EO) 03-05 (Tree Replacement). The removal of large trees would result in a temporal loss of tree canopy because replacement trees take many years to grow to mature size. Trees would be protected to the greatest extent practicable during construction by following the protection measures outlined in Director’s Rule (DR) 30-2015 (Standards for Landscaping, including Green Factor)

and the Street Tree Manual (SDOT, 2014). A Tree, Vegetation, and Soil Protection Plan could be developed for the project. Historic markers may be installed to recognize the legacy of the removed trees, and steps may also be taken to preserve other legacy trees on the campus.

The project supports policy GS 3.26 because it designs the public spaces considering the nearby physical context and the needs of the community. Pedestrian circulation would be enhanced around the arena and plazas, and the paths would be designed to be universally accessible. The current service area south of the arena would be redesigned into a new atrium and plaza for event and community use. The redevelopment would enhance pedestrian connections between Seattle Center and the neighborhoods west of the arena. All vistas and view corridors currently associated with adjacent street rights-of-way would be maintained.

### 3.7.2 Consistency with the Seattle 2035 Comprehensive Plan Queen Anne (Uptown) Neighborhood Element

**Summary:** The Queen Anne (Uptown) Neighborhood Element is a subset of the Seattle 2035 Comprehensive Plan. Table 3-6 lists the Seattle 2035 Comprehensive Plan Queen Anne (Uptown) Neighborhood Element goals and policies relevant to the No Action Alternative and Alternatives 1 and 2 for the Seattle Center Arena Renovation Project.

**Discussion:** Many of the Queen Anne (Uptown) Neighborhood Element goals and policies listed in Table 3-6 directly address the interaction between the neighborhood and Seattle Center and the importance of maintaining a positive relationship, which supports the goals of the neighborhood as well as those of Seattle Center.

The No Action Alternative would maintain current conditions and would not be inconsistent with the goals and policies for Uptown.

**Table 3-6. Seattle 2035 Comprehensive Plan Queen Anne (Uptown) Relevant Goals and Policies**

Goal/Policy No.	Queen Anne (Uptown) Element Land Use Goals and Policies
QA-G3	The Urban Center is a vital residential community as well as a viable and attractive commercial/employment center and mixed-use neighborhood that enjoys a strong relationship with Seattle Center.
QA-G7	Queen Anne recognizes the impacts that traffic congestion may have on the community's quality of life and strives to address traffic and transportation issues while improving the efficiency of the local and regional transportation system.
QA-P1	Seek to create and maintain attractive pedestrian-oriented streetscapes and enhance Queen Anne's community character with open space, street trees, and other vegetation.
QA-P15	Seek ways to ensure that Seattle Center remains a vibrant and valuable community resource and a premier regional amenity.

Alternatives 1 and 2 would not change land uses, but both action alternatives would provide project elements that result in moving forward or working toward goals listed in Table 3-6.

Both Alternatives 1 and 2 are consistent with goal QA-G3 because both propose to maintain a strong relationship between the vitality of the neighborhood and Seattle Center by renovating KeyArena to attract major league sports back to the area. This, in turn, would support commercial/employment center goals.

Goal QC-G7 recognizes challenges with existing traffic congestion but does not address or contemplate the expansion of major sports events as expected under Alternatives 1 and 2. As noted in Chapter 4, *Transportation*, transportation impacts from this project could be significant even with an AAMP. Consistent with goal QA-G7, the City, OVG, and Seattle Center would continue to work with the community to improve efficiency in the local and regional transportation system.

Both Alternatives 1 and 2 are consistent with policy QA-P1 because the design of the project site includes open space pedestrian plazas with landscaping to the south of the arena. The streetscapes and landscapes in both Alternative 1 and 2 are designed to enhance transitions between Seattle Center and Uptown, and the project would preserve and enhance existing park and open spaces.

Both Alternatives 1 and 2 are consistent with policy QA-P15 because they would make the renovated arena a more attractive venue for professional sports, concerts, and other events, increasing the number of events held at Seattle Center and contributing to the vibrancy of the Seattle Center as a premier regional amenity.

Depending on the perspective, some may view Alternatives 1 and 2 as a benefit to the City and Uptown and adjacent neighborhoods, while some may see the project as an inconvenience and a contributor to congestion and loss of neighborhood character in Uptown.

Based on a review of the Comprehensive Plan goals and policies above and the recognition that the City may negotiate additional project elements that would help meet the goals and policies, Alternatives 1 and 2 are generally consistent with the Seattle 2035 Comprehensive Plan and Queen Anne (Uptown) Neighborhood Element.

### **3.7.3 Consistency with the Uptown Rezone Plan Ordinance and Land Use Code (2017)**

**Summary:** The Uptown Rezone amended SMC 23.30.10 to provide for rezoning in Uptown, which includes the entirety of the land use study area. The Uptown Rezone Plan, “[...] seeks to advance the principles set out in the Uptown Urban Design Framework, which are the result of a multi-year community planning process” (City of Seattle, 2017). The rezone and companion changes to development standards were an outgrowth of a neighborhood-wide urban design framework (City of Seattle, 2016b). Zoning changes focused on creating a more walkable, livable, and dense Uptown. Regulatory requirements built into the new SM-UP zone (SMC 23.48.002) would apply to Uptown and would apply to the Seattle Center Arena Renovation Project.

**Discussion:** The No Action Alternative presents no change from existing conditions. Except for the existing non-conforming structures on the project site, both Alternatives 1 and 2 are generally consistent with the set of regulations in the Uptown Rezone Plan Ordinance. Compliance with Land Use Code standards, including relevant sections of SMC 23.48, would be determined through zoning review of the building plans for the project. Under both Alternatives 1 and 2, OVG would make a mandatory housing affordability payment to the City, as required by the City’s Land Use Code.

KeyArena is a unique structure with use that is unlike the general type of structures and uses that are contemplated when zoning standards are adopted for an area in the city, such as conventional residential or commercial buildings. The existing KeyArena, 1<sup>st</sup> Ave N Garage, and Bressi Garage structures and sites do not entirely conform to code under existing conditions. Accordingly, the project would not conform with all general zoning development standards. Alternative 1 would require variances, waivers, or departures for through-block pedestrian connection, surface parking lot screening, landscaping standards, the number and width of curb cuts and driveways, atrium depth, maximum setback for arena accessory structures, street-level design features, and night-time construction, as well as other Land Use Code nonconformities described in Section 3.4. The variance process and City Council Land Use Action process (SMC 23.76) are designed to provide flexibility in development standards when a project is otherwise consistent with the spirit and purpose of the Land Use Code. The proposed land use nonconformities are summarized in Table 3-7. A variance would also be requested for night-time construction work under Title 25. Alternative 2 as proposed would not require a noise variance.

Signage would change under both Alternatives 1 and 2, including new and larger digital and illuminated signage. An amendment to Seattle's sign regulations in the Land Use Code (SMC 23.55) is proposed, creating a new Seattle Center sign overlay district and other changes that would regulate the number, size, type, content, location, brightness, and operation of signs, including signage for the renovated arena. The amendment would add specific requirements for the project site and the Northwest Rooms. See Table G-1, Appendix G for a summary of the proposed changes. These proposed changes would allow for more dynamic signage options at Seattle Center while limiting the effects that signs would have on adjacent uses and the general public on and near Seattle Center. The sign code amendment would allow an increase in the number of signs, increase the allowable sizes of signs, and allow larger digital wall signs as described in Chapter 2. See Chapter 9, *Visual Resources*, for an analysis of the visual and safety impacts of these signs. Alternative 2 would limit video display signs, and the size of the signs on top of the arena would be similar to existing conditions.

### **Consistency with Land Use Code**

The project is an allowable use in the SM-UP zone and would comply with most applicable use and development standards. The No Action Alternative would not change any uses or structures; therefore, a Land Use Code analysis is not required. Table 3-7 provides a summary of the current Land Use Code sections that Alternative 1 would not comply with. These aspects of the project may be allowed through variance approval or City Council Land Use Action pursuant to SMC 23.76.

City sign regulations (SMC 23.55) currently limit the number, size, type, illumination, video display, commercial content, and other characteristics of signs associated with the arena. An amendment to SMC 23.55 is proposed that would create a Seattle Center sign overlay district that would regulate the number, size, type, content, brightness, location, and operation of signs, including signage for the renovated arena, the Northwest Rooms, and the south parcel (see Appendix G). Chapter 9, Section 9.4.2, Table 9-1, and Figure 9-5 provide detailed information on the proposed signage and amendment.

Alternative 2 would need the same set of variances as Alternative 1, except no noise variance would be needed. Similar to Alternative 1, Alternative 2 would require a code amendment for signage. The proposed amendment for Alternative 2 would reduce the potential safety impact associated with the video display by requiring the sign to either eliminate the video component or face away from 1<sup>st</sup> Ave N, and maintains the existing size and brightness of the signs atop the arena.

**Table 3-7. Land Use Code Nonconformities for Alternatives 1 and 2**

Section	Summary of Code	Proposed Variance or Land Use Code Amendment
SMC 23.54.030.F Curb Cuts	Limits the number and width of curb cuts based on use, zone, and street classification. Curb cuts for non-residential uses are generally limited to 25 feet in width to accommodate 2-way traffic. A width of up to 30 feet may be allowed if necessary for safe access, or if truck and auto access are combined.	<p><b>Alternative 1:</b> The curb cut on 1<sup>st</sup> Ave N for the driveway entrance to the access tunnel and the new location for the driveway entrance to the 1<sup>st</sup> Ave N Garage on John St would not adhere to code and would require variances.</p> <p><b>Alternative 2:</b> Same as Alternative 1.</p>
SMC 23.54.030.D Driveways	Width limit for driveways.	<p><b>Alternative 1:</b> Would exceed the driveway width limit for the 1<sup>st</sup> Ave N tunnel access driveway.</p> <p><b>Alternative 2:</b> Same as Alternative 1.</p>
SMC 23.55 Signs	Limits the type, number, size, location, and other aspects of signs.	<p><b>Alternative 1:</b> A sign code amendment has been proposed for the Seattle Center campus to regulate signage (see Appendix G).</p> <p><b>Alternative 2:</b> Alternative 2 includes a similar amendment that would have less impacts.</p>
SMC 23.48.740 Street Level Development Standards	Provides street-level development standards that apply to all streets in the SM-UP zones. The standards address street-facing façades, setbacks, required outdoor amenity spaces, and maximum usable space.	<p><b>Alternative 1:</b> New accessory structures set back from street exceed 12 feet, and the areas between those structures and the street property line are not landscaped, and the project requests modifications to landscaping standards between the street and front façades. Open space requirements and pedestrian access requirements do not meet code for the south portion of the site because the project would not provide a through-block pedestrian connection.</p> <p><b>Alternative 2:</b> Same as Alternative 1.</p>
SMC 23.48.732 Width and Depth Standards	Provides allowable maximum width and depth of structures in SM-UP zones.	<p><b>Alternative 1:</b> The existing arena does not conform to the width and depth standards in this code provision. Adding the atrium structure at the south façade of the arena increases the depth or width of the structure as measured from 1<sup>st</sup> Ave N or Thomas St frontage.</p> <p><b>Alternative 2:</b> Same as Alternative 1.</p>
SMC 23.48.755 Surface parking lot screening	Parking is not permitted at street level unless it is screened from the street by other uses.	<p><b>Alternative 1:</b> The project requests allowance for a reduction in screening of a surface parking lot.</p> <p><b>Alternative 2:</b> Same as Alternative 1.</p>

### 3.7.4 Consistency with the Seattle Center Century 21 Master Plan (2008)

**Summary:** The Seattle Center Century 21 Master Plan as adopted by the City articulates a vision for the future of Seattle Center over a 20-year period (Seattle Center, 2008). KeyArena is a major revenue generator supporting Seattle Center's operational expenses. The Century 21 Master Plan goals for the KeyArena Zone (pages 28 and 29) include the following:

- KeyArena is a major revenue generator supporting Seattle Center.
- KeyArena will continue to be the premiere venue in Seattle for touring concerts and family shows.
- KeyArena maintains its competitive edge among similar local venues and expands into new lines of business in the future.
- The area encircling KeyArena is ripe for public/private partnerships.

**Discussion:** Under the No Action Alternative, KeyArena would continue to host programming unless a different project is proposed in the future.

Both Alternatives 1 and 2 would fulfill many of the goals in the Seattle Center Century 21 Master Plan, including making improvements to the existing KeyArena building to enhance the building's performance systems, providing opportunities that could generate ongoing revenues for Seattle Center, and maintaining a competitive edge among similar venues. Alternatives 1 and 2 are consistent with the Seattle Center Century 21 Master Plan.

## 4.0 TRANSPORTATION

This chapter describes the potential effect of a renovation of KeyArena on the transportation system. A variety of travel modes are addressed, including auto, freight, bicycles, pedestrians, and transit. Parking, curb space management, and safety are also analyzed. The chapter begins with the *Methods* section, which describes the analysis methodologies and data relied upon in the study. It then presents the *Regulatory Context*, which outlines various regulations and guidelines that govern traffic operations and construction activities. Next, the *Affected Environment* section is presented, which describes the transportation system as it currently functions. The *Potential Impacts* section describes conditions under a No Action Alternative and 2 renovation alternatives for the years 2020 and 2035. The *Avoidance, Minimization, and Mitigation Measures* section describes potential approaches to mitigate the impacts of the 2 arena renovation alternatives, and the final section identifies impacts that are likely to be significant and unavoidable.

**Changes from the Draft EIS** – Based on comments received on the Draft EIS, this chapter of the Final EIS was revised as follows:

- The Construction Impacts and Construction Mitigation sections were updated based on more recent information regarding construction staging, haul routes, and transportation facility closures.
- A discussion of 2025 mode share and an overview of potential impacts related to an increased transit mode share have been added to Section 4.4.3, *Operations Impacts*.
- The operations analysis has been updated to include the integration of 6 additional study intersections into the microsimulation model.

### **Key Findings for Transportation**

Traffic conditions in the study area are expected to worsen with or without the arena renovation since a substantial amount of new development is approved and forecasted in the area.

In the near-term, the project would worsen traffic conditions, increase the demand for parking, and also cause localized impacts to non-auto modes.

A variety of mitigation measures, if implemented, would improve the efficiency of the transportation network to accommodate project trips. Measures proposed include implementation of an Arena Access Management Plan (AAMP), a parking reservation system, and construction of physical improvements near the project site.

### 4.1 METHODS

The study area selected for the transportation impact analysis includes the intersections and corridors most likely to be affected by project traffic, covering the area from Queen Anne Ave N to Interstate 5 (I-5) and Roy St to roughly half a mile south of Denny Way (Figure 4-1). The pedestrian, bicycle, transit, and parking analysis is more narrowly focused on the area surrounding the project site.

Data sources for the analysis include the following:

- SDOT – data on signal timings; parking supply and occupancy; freight, pedestrian, and bicycle networks; and collisions. Planned capital projects from the City’s modal plans (Pedestrian,

Bicycle, Freight, and Transit Master Plans) and project websites (City of Seattle 2017a, 2017b, 2016a, and 2016b, respectively).

- SDCI – current and planned land use development data (SDCI, 2016a, 2016b, 2017).
- Seattle Center – event attendance, Monorail ridership.
- King County Metro – route maps, frequencies and capacities, transit ridership.
- Washington State Department of Transportation (WSDOT) – planned improvements near the SR 99 North Tunnel Portal; timing of improvements.
- Traffic, pedestrian, and bicycle volume; corridor travel time; parking supply and occupancy data collected for this analysis.
- Puget Sound Regional Council (PSRC) – project travel demand model based on PSRC’s regional travel demand model (PSRC, 2017; Fehr & Peers, 2018).

This chapter includes a multimodal analysis of project effects on the roadway, transit, bicycle, and pedestrian networks, as well as an evaluation of effects on freight and goods movement, ferry service, roadway safety, and truck staging and loading. Traffic operations (vehicles, buses, pedestrians in crosswalks, and bicycles crossing streets) were evaluated using micro-simulation software for transportation operations.

The simulation was conducted using the Vissim and Synchro/SimTraffic software packages, which use inputs that include current and future traffic/pedestrian/bicycle volumes, transit operations, and traffic signal timings (Trafficware, 2014; PTV Group, 2017). These models were calibrated to reflect existing conditions and then applied to the future year alternatives. Various data can be extracted from micro-simulation models including average delay experienced by vehicles at intersections, corridor travel times, bus travel times, interactions between pedestrians/bicycles at intersections, and queue lengths. More details are found in Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*. In addition, transit capacity, pedestrian capacity, bicycle facilities, and on-street and off-street parking occupancy under existing and future conditions were evaluated.

The transportation analysis differs from the other chapters in this EIS in 2 important ways:

- **Cumulative Condition:** The transportation analysis is performed for years 2020 and 2035. Year 2020 is assumed to be the year of opening of the arena, and year 2035 provides a longer term horizon year that is consistent with the City’s land use and transportation plans, as well as regional plans including LINK light rail expansion. Both analysis years represent a cumulative condition that includes background traffic growth and other planned transportation improvements that would occur regardless of the proposed arena renovation project. This background growth is included in all alternatives—the only difference between the No Action Alternative and the action alternatives is the proposed project. Therefore, the difference between the No Action Alternative and Alternatives 1 and 2 indicates the direct impacts of the proposed project.
- **Multiple Scenarios:** The project is on the Seattle Center campus, which is home to many attractions and venues with widely varying degrees of activity over the course of a year. To reflect the spectrum of conditions in the study area, 2 scenarios are considered for each project alternative: a day with Average Seattle Center Attendance (based on the 50<sup>th</sup> percentile of Seattle Center attendance, i.e., attendance is below this level half of the time and above this level half of the time), and a day with Above-Average Seattle Center Attendance (based on the 90<sup>th</sup> percentile of Seattle Center attendance; i.e., 9 out of 10 days have attendance below this level).

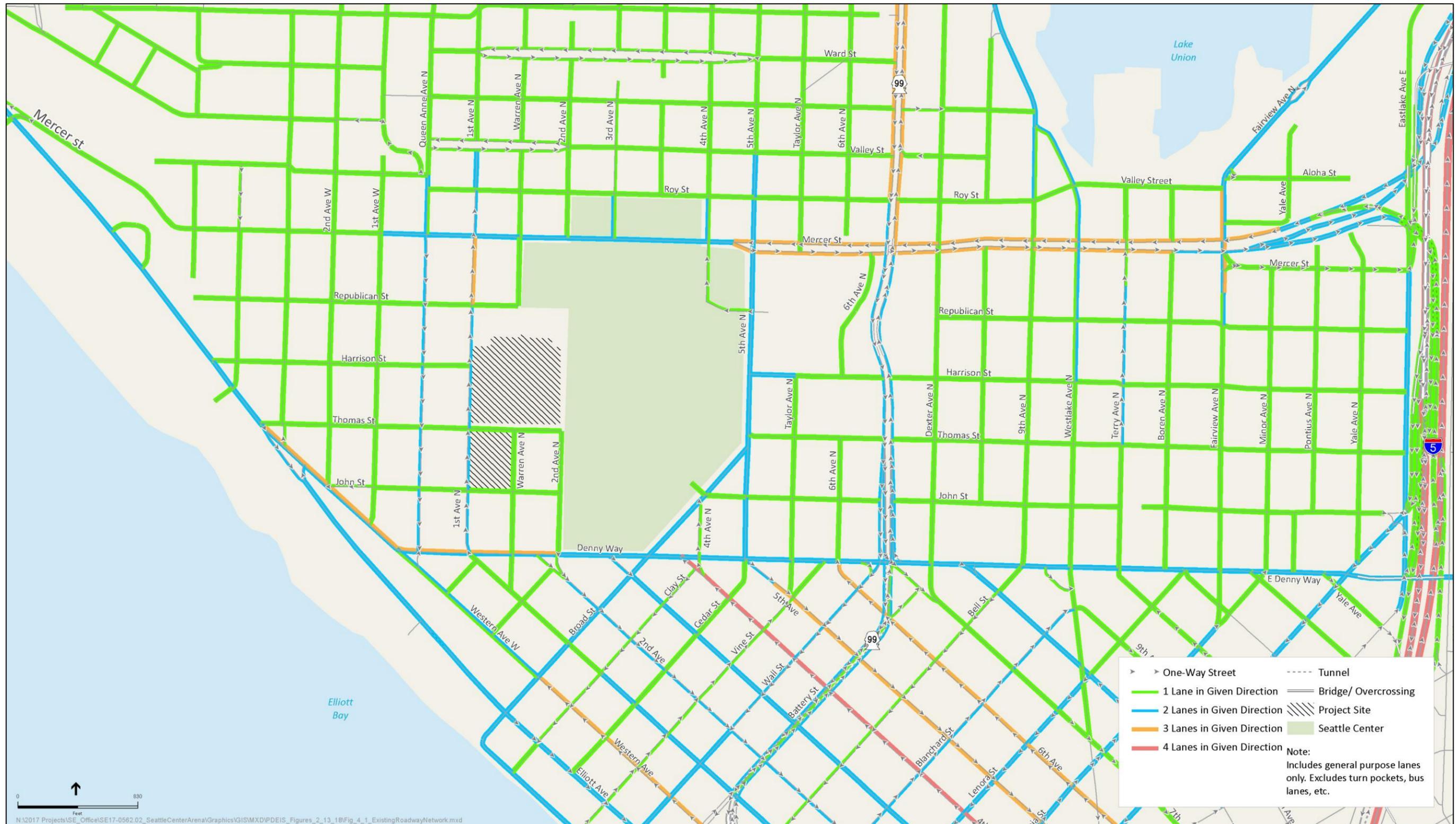


Figure 4-1. Existing Roadway Network

## 4.2 REGULATORY CONTEXT

The project must comply with existing regulations and guidelines. Those that govern traffic operations and construction activities within the transportation impact analysis study area are listed in Table 4-1.

**Table 4-1. Regulations and Guidelines Applicable in the Study Area**

Document or Regulation Name	Description
Street Use Permits (SMC 15.04)	Construction activities that affect the city's transportation system are subject to SDOT's street use and construction use regulations. The City works with developers/contractors to ensure adequate use of the right-of-way for transportation purposes during construction.
Memorandum of Agreement (MOA) for Event Curbside Management (SDOT and Seattle Center, 2011)	Agreement between SDOT and Seattle Center regarding procedures to reserve right-of-way curb space for loading, unloading, and staging of vehicles for events at Seattle Center (including KeyArena).
Seattle Streets Illustrated, Right-of-Way Improvements Manual (City of Seattle, 2018)	Provides design guidance, standards, and processes on how to design, build, and manage within the right-of-way.
Manual of Uniform Traffic Control Devices (MUTCD) (2009 with revisions incorporated 2012) (Federal Highway Administration, 2012)	Defines standards used by agencies nationwide to install and maintain traffic control devices on public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is a compilation of national standards for all traffic control devices, including road markings, highway signs, and traffic signals. The MUTCD includes standards for signs, flagging, and barricades in temporary construction work zones.

## 4.3 AFFECTED ENVIRONMENT

### 4.3.1 Study Area

The project site is on the west side of Seattle Center in the Uptown Urban Center, which is bordered by Belltown to the south, South Lake Union to the east, Queen Anne to the north, and Elliott Bay to the west. Transportation conditions in the study area reflect the area's dense mixed-use urban setting with a variety of available travel modes and congested conditions during peak hours. The transportation impact analysis study area varies depending on mode, but generally stretches east to I-5, west to Queen Anne Ave N, north to Roy St, and south to roughly a half-mile south of Denny Way. Because the study area encompasses key routes used to access residential areas such as Uptown and Queen Anne, project-related effects to travelers originating from or destined to these areas are considered in the analysis.

### 4.3.2 Traffic Operations

Figure 4-1 displays the existing roadway network in the study area. Regional access to the project site is provided by I-5 and SR 99. The key surface streets that provide access to the project site are Mercer St, Denny Way, 2<sup>nd</sup> Ave, 4<sup>th</sup> Ave, and the 1<sup>st</sup> Ave N/Queen Anne Ave N couplet. Both Mercer St and Denny Way are major east-west arterials connecting the project site to I-5 to the east and Western Ave and Elliott Ave to the west. Both corridors feature closely spaced signalized intersections. Denny Way and Roy St also provide access from southbound SR 99.

Between Denny Way and Mercer St, 1<sup>st</sup> Ave N and Queen Anne Ave N operate as a 1-way couplet with 1<sup>st</sup> Ave N consisting of 2 northbound lanes (a third lane is added approaching Mercer St) and Queen Anne Ave N consisting of 2 southbound lanes. These streets facilitate travel within Uptown and are also prominent bus routes. South of Denny Way, the street grid shifts to a northwest/southeast orientation. Some streets allow 2-way travel while others are 1-way only.

The City designates Denny Way, Mercer St, and SR 99 as major truck streets and Broad St and 5<sup>th</sup> Ave N as minor truck streets (SDOT, 2018). Major truck streets serve as primary routes for movement of goods and services; they accommodate significant freight movement through the City, and to and from major freight traffic generators. Minor truck streets provide secondary connections to major truck streets, tend to carry lower volumes of trucks, and may have more restrictions in terms of oversized vehicles.

Construction is underway to replace the Battery St Tunnel and the elevated Alaskan Way Viaduct with a new tolled tunnel with access points north and south of Downtown. New street connections across the existing SR 99 will be constructed east of the project site. These improvements will be complete by 2020, and are assumed in the Opening Day (2020) conditions analysis. See Appendix C, *Tech Memo 3, Year 2020 and 2035 Background Transportation Network* for full details of the transportation network assumptions.

Figure 4-2 displays the study area including the 65 existing intersections chosen for analysis for each of the following 3 “peak hour” analysis periods:

- **Weekday from 5:30 to 6:30 PM (Weekday Pre-Event Peak Hour)** – Represents the pre-event peak hour for a future scenario that evaluates a sold-out 18,350-person NBA Basketball Game that starts at 7 PM. NHL hockey games would have slightly less seating capacity than a basketball game, but similar travel characteristics based on observations by Fehr & Peers at other urban arenas that host NHL hockey including facilities in San Jose, California and Washington, DC.
- **Weekday from 9:30 to 10:30 PM (Weekday Post-Event Peak Hour)** – Represents the post-event peak hour for a future scenario that evaluates a sold-out 18,350-person NBA Basketball Game that starts at 7 PM. NHL hockey games would have slightly less seating capacity than a basketball game, but similar travel characteristics.
- **Saturday from 6:00 to 7:00 PM (Saturday Pre-Event Peak Hour)** – Represents the pre-event peak hour for a future scenario that evaluates a sold-out 19,125-person concert that starts at 7:30 PM. Post-event traffic on Saturday is not analyzed because the results are expected to be similar to the weekday post-event condition.

These 3 analysis periods were selected based on traffic volume counts in the study area and event arrival patterns at KeyArena and other comparable venues; additional information is found in Appendix C, *Tech Memo 1, Selection of Time Periods*.

The revised design of the arena includes slightly different seating capacities than were studied in the Draft EIS. The design includes 250 more seats for NBA sporting events (18,600 now proposed), 200 fewer seats for NHL sporting events (17,300 now proposed), and 325 fewer seats for concerts (18,800 now proposed). Because the reduction in seating capacity for NHL and concert events does not increase the impacts that were studied in the Draft EIS, no additional analysis is warranted as a result of those reductions. The increase in seating capacity for NBA games from 18,350 seats to 18,600 is an increase of 1.4% and is not expected to substantially change the nature of impacts described in the Draft EIS.



Figure 4-2. Study Intersections

The Final EIS includes a supplemental evaluation of the seating capacity change for NBA games; see the *Modified Arena Seating Capacity Evaluation* in Section 4.4.3.

During the pre-event peak hour, substantial recurring congestion is present in both directions of I-5 and SR 99. Eastbound traffic on Mercer St queues back to 5<sup>th</sup> Ave N due to congestion on I-5 and high volumes of vehicles joining the corridor at key cross streets. Similar conditions exist in the eastbound direction of Denny Way. The off-ramp from northbound I-5 to Mercer St can also be busy in the weekday pre-event peak hour because of the sharp curve and limited sight distance in the tunnel under the southbound lanes. While busy, no other off-ramps in the study area experience congestion in the weekday pre-event peak hour or the other study time periods.

Intersection operations were measured using the intersection Level of Service (LOS) scale that ranges from LOS A (which represents minimal delay) to LOS F (which represents high delay and severe congestion). LOS is defined by the *2010 Highway Capacity Manual – HCM* (Transportation Research Board, 2010). Table 4-2 displays the range of delays corresponding to each LOS grade. For this analysis, the average delay and LOS at signalized intersections are the weighted average of all vehicles passing through a given intersection (i.e., on all approaches of the intersection). For side-street stop sign-controlled intersections, the average delay and LOS are reported for the worst minor street movement. For all-way stop intersections, the average delay and LOS are reported for the entire intersection. Average delay values are rounded to the nearest integer.

**Table 4-2. Level of Service (LOS) and Delay Thresholds for Signalized and Unsignalized Intersections**

LOS	Signalized Intersections Delay per Vehicle (seconds)	Unsignalized Intersections Delay per Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Source: Highway Capacity Manual (Transportation Research Board, 2010).

All study intersections along and north of Denny Way were analyzed using the Vissim micro-simulation model. This software program considers numerous roadway conditions (e.g., volumes, signal timings, lane utilization, pedestrian flows, transit vehicles, blockages caused by pick-up/drop-off activity, etc.), all of which influence traffic operations. The model underwent a thorough validation process to accurately replicate existing conditions such as the back of the vehicle queue on eastbound Mercer St, flow rates onto I-5, and average travel times/speeds. Study intersections south of Denny Way were analyzed using Synchro/SimTraffic due to their specific conditions (i.e., level of traffic, congestion, pre-timed/coordinated conditions, etc.). Additional detail is found in Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*.

Table 4-3 summarizes the existing average delay and LOS by location for the 3 analysis periods. Traffic counts were collected in September and October 2017 and May 2018 on dates identified by Seattle

Center and SDOT staff as representative of typical activity at Seattle Center. These dates did not include an event at KeyArena so the LOS results presented here represent conditions without arena activity. Additional detail is found in Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*.

**Table 4-3. Intersection Level of Service – Existing Conditions**

Corridor / Subarea	Description	Number of Intersections	Level of Service	Number of Intersections		
				Weekday Pre-Event 5:30–6:30 PM	Weekday Post-Event 9:30–10:30 PM	Saturday Pre-Event 6:00–7:00 PM
Mercer St Corridor	From Elliott Ave W to Fairview Ave N (Inclusive)	16	D or better	11	16	16
			E	3	0	0
			F	2	0	0
Roy St Corridor	From Queen Anne Ave N to Fairview Ave N (Inclusive)	9	D or better	5	9	7
			E	2	0	2
			F	2	0	0
Queen Anne Ave N and 1 <sup>st</sup> Ave N Couplet	Between (but not including) Denny Way and Mercer St	8	D or better	8	8	8
			E	0	0	0
			F	0	0	0
5 <sup>th</sup> Ave N and Broad St	Between (not including) Denny Way and Mercer St)	5	D or better	5	5	5
			E	0	0	0
			F	0	0	0
Denny Way Corridor	From Western Ave W to Stewart St (Inclusive)	15	D or better	11	14	14
			E	1	1	1
			F	3	0	0
Other	Various <sup>1</sup>	12	D or better	11	12	12
			E	1	0	0
			F	0	0	0
Total		65	D or better	51	64	62
			E	7	1	3
			F	7	0	0

<sup>1</sup> Includes intersections in Belltown, Downtown, and near I-5 (on Yale Ave and Howell St).

Source: Prepared by Fehr & Peers, 2018, based on data collected in September and October 2017. Results from VISSIM and SimTraffic analyzed using the methods defined in the Highway Capacity Manual (Transportation Research Board, 2010).

Figure 4-3 shows the intersections operating below the City's LOS threshold (LOS E or F for signalized intersections, and LOS F for unsignalized intersections).

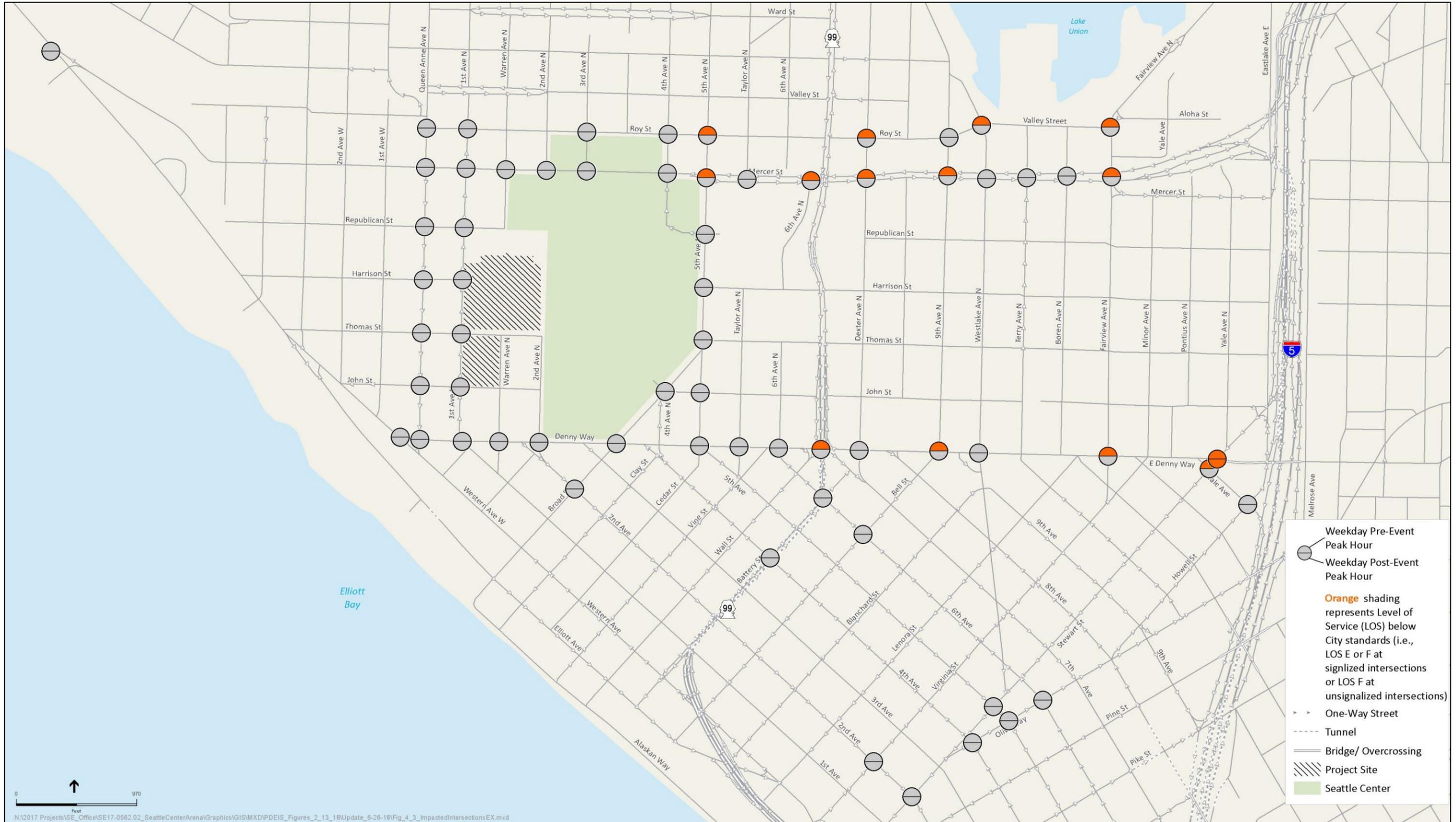


Figure 4-3. Intersection Level of Service – Existing Weekday Pre-Event and Post-Event Peak Hour Conditions

Because overall intersection delay is averaged among all approaches for signalized intersections (as shown in Table 4-3), delay results may not align with a driver's experience driving the corridor since they are traveling on a single approach. Figure 4-4 shows the directional LOS along eastbound and westbound Denny Way and Mercer St for weekday pre-event conditions.

As shown, the eastbound approaches are routinely in the LOS F range, while westbound approaches are typically at LOS C or better, which represents relatively uncongested travel toward Seattle Center and KeyArena. This occurs as a result of traffic congestion on I-5, which limits the flow of traffic onto the freeway from the eastbound travel directions on Mercer St and Denny Way. Some blocks reflect better directional LOS than may be expected with the congested conditions; this is because the delay is spread among multiple closely spaced signals.

The congested conditions on eastbound Mercer St and Denny Way between 5<sup>th</sup> Ave N and I-5 result in substantial queuing on some side-street approaches to those corridors. Observations revealed substantial queues in the southbound left-turn and northbound right-turn lanes along Mercer St at Dexter Ave N, 9<sup>th</sup> Ave N, Westlake Ave N, Terry Ave N, Boren Ave, and Fairview Ave N. Substantial queues were also observed on side-streets approaching Denny Way including Aurora Ave N, Battery St, Westlake Ave N, Fairview Ave N, and on all approaches at the closely spaced Denny Way/Stewart St and Yale Ave/Stewart Ave intersections.

The LOS results for intersections along the 1<sup>st</sup> Ave N and Queen Anne Ave N couplet show less congestion than the intersections farther to the east. This is principally because the queuing that stems from I-5 congestion generally does not reach that far west into Uptown.

### **Collision Analysis**

Collision history data provided by SDOT at the study intersections is summarized in Table 4-4. The total number of collisions and the annual average collisions from October 2014 through October 2017 are shown. The table lists collisions that were injury-related, those involving bicyclists or pedestrians, and the most common collision type. None of the reported collisions caused a fatality.

The City designates intersections as "high collision locations" if there are an average of 10 or more reported collisions per year for signalized intersections or an average of 5 or more reported collisions per year for unsignalized intersections. Intersections with this designation are targeted for future safety improvements to reduce the frequency of collisions.

Based on the reported collision data, none of the study intersections reached the collision frequency threshold to be considered a high collision location. The Mercer St/Fairview Ave N, 5<sup>th</sup> Ave/Olive Way, Mercer St/Queen Anne Ave N, Denny Way/Stewart St, and Denny Way/Dexter Ave N signalized intersections each averaged 6 or 7 collisions over the 3-year period. The highest number of collisions involving bicyclists or pedestrians occurred at the Mercer St/Queen Anne Ave and Denny Way/Westlake Ave N intersections.



**Figure 4-4. Directional Level of Service and Travel Time on East/West Roadways – Existing Weekday Pre-Event Peak Hour (5:30–6:30 PM) Conditions**

**Table 4-4. Intersection Collision History**

ID	Intersection <sup>1</sup>	Number of Collisions				Most Common Collision Type <sup>2</sup>
		Average Per Year	3- Year Totals			
			Total Collisions	Injury Collisions	Involving Pedestrians or Bicyclists	
1	Mercer St/Queen Anne Ave N	6	19	9	7	Pedestrian
2	Mercer St/1 <sup>st</sup> Ave N	2	5	4	2	Pedestrian
3	Mercer St/Warren Ave N	2	7	2	1	Left Turn
4	Mercer St/2 <sup>nd</sup> Ave N	2	5	3	1	NA
5	Mercer St/3 <sup>rd</sup> Ave N	1	4	1	0	Rear Ended
6	Mercer St/4 <sup>th</sup> Ave N	2	7	4	1	Angles
7	Mercer St/5 <sup>th</sup> Ave N	3	8	3	2	Sideswipe
8	Mercer St/6 <sup>th</sup> Ave N	None Reported				
9	Mercer St/Dexter Ave N	1	3	0	0	NA
10	Mercer St/9 <sup>th</sup> Ave N	4	11	4	3	Bicycles, Angles
11	Mercer St/Westlake Ave N	3	9	1	0	Angles
12	Mercer St/Terry Ave N	2	7	4	3	Pedestrian
13	Mercer St/Boren Ave N	1	2	1	1	NA
14	Mercer St/Fairview Ave N	7	22	7	2	Left Turn
15	Queen Anne Ave N/Republican St	1	3	1	1	NA
16	1 <sup>st</sup> Ave N/Republican St	1	3	1	1	NA
17	5 <sup>th</sup> Ave N/Republican St	None Reported				
18	Queen Anne Ave N/Harrison St	1	3	0	0	Left Turn
19	1 <sup>st</sup> Ave N/Harrison St	2	6	0	1	Left Turn
20	5 <sup>th</sup> Ave N/Harrison St	0	1	1	0	Left Turn
21	Queen Anne Ave N/Thomas St (U)	1	2	1	0	NA
22	1 <sup>st</sup> Ave N/Thomas St (U)	3	9	1	1	Angles
23	5 <sup>th</sup> Ave N/Thomas St/Broad St	1	3	2	1	Other
24	Queen Anne Ave N/John St (U)	1	4	1	0	Angles
25	1 <sup>st</sup> Ave N/John St (U)	1	3	2	1	NA
26	Broad St/John St	None Reported				
27	5 <sup>th</sup> Ave N/John St (U)	1	4	1	0	Angles, Left Turn
28	Denny Way/Queen Anne Ave N/Western Ave	2	6	2	1	Sideswipe
29	Denny Way/1 <sup>st</sup> Ave N	2	7	0	1	Sideswipe
30	Denny Way/Warren Ave N (U)	2	6	3	0	Angles, Left Turn
31	Denny Way/2 <sup>nd</sup> Ave N <sup>3</sup>	2	5	2	0	Angles
32	Denny Way/Broad St	1	2	1	0	Angles
33	Denny Way/5 <sup>th</sup> Ave N	4	13	4	2	Angles
34	Denny Way/Taylor Ave N	0	1	1	1	Angles
35	Denny Way/6 <sup>th</sup> Ave N	1	3	0	0	NA
36	Denny Way/Aurora Ave N/7 <sup>th</sup> Ave	4	12	2	1	Angles

ID	Intersection <sup>1</sup>	Number of Collisions				Most Common Collision Type <sup>2</sup>
		Average Per Year	3- Year Totals			
			Total Collisions	Injury Collisions	Involving Pedestrians or Bicyclists	
37	Denny Way/Dexter Ave N	6	17	5	4	Left Turn
38	Denny Way/Bell St/9 <sup>th</sup> Ave N	2	6	4	0	Angles, Right Turn
39	Denny Way/Westlake Ave N	4	12	8	6	Pedestrian
40	Denny Way/Fairview Ave N	4	12	2	0	Angles, Left Turn
41	Denny Way/Stewart St	6	17	7	5	Left Turn
42	Yale Ave/Stewart St	3	10	3	1	Left Turn
43	Broad St/2 <sup>nd</sup> Ave	3	10	7	1	Angles
44	6 <sup>th</sup> Ave/Battery St	None Reported				
45	6 <sup>th</sup> Ave/Bell St	0	1	1	1	Pedestrian
46	Yale Ave/Howell St/I-5 SB on-ramp	1	4	1	1	NA
47	4 <sup>th</sup> Ave/Battery St	4	12	4	0	Angles
48	6 <sup>th</sup> Ave/Olive Way	3	9	3	1	Left Turn, Sideswipe
49	5 <sup>th</sup> Ave/Stewart St	3	9	2	0	Angles
50	5 <sup>th</sup> Ave/Olive Way	7	21	5	1	Left Turn
51	4 <sup>th</sup> Ave/Olive Way	1	4	1	1	Sideswipe
52	2 <sup>nd</sup> Ave/Virginia St	3	10	6	1	Angles
53	2 <sup>nd</sup> Ave/Stewart St	4	11	2	2	Sideswipe
54	Queen Anne Ave N/Roy St	1	3	0	0	NA
55	1 <sup>st</sup> Ave N/Roy St	None Reported				
56	3 <sup>rd</sup> Ave N/Roy St	1	3	3	3	Bicycles
57	4 <sup>th</sup> Ave N/Roy St	0	1	0	0	Left Turn
58	5 <sup>th</sup> Ave N/Roy St	1	2	1	1	NA
70	Mercer St/Taylor Ave N	3	9	5	3	Angles
71	W Mercer Pl/Elliott Ave W	2	5	1	0	Sideswipe
72	Roy St/Dexter Ave N	2	6	3	3	Bicycles
73	Roy St/9 <sup>th</sup> Ave N	3	9	4	1	Angles
74	Valley St/Westlake Ave N	1	4	3	2	Bicycles
75	Valley St/Fairview Ave N	1	4	0	0	Other

<sup>1</sup> Intersections 21, 22, 24, 25, 27, and 30 are unsignalized (U).

<sup>2</sup> "Angles" are multi-vehicle collisions in which the vehicles collide at an angle (most often head-on). "Pedestrian" are when a motor vehicle strikes a pedestrian. "NA" means no single common collision type.

<sup>3</sup> The Denny Way/2<sup>nd</sup> Ave N intersection was reconfigured in late 2017 to convert 1 of the southbound receiving lanes into a bicycle lane.

Source: Prepared by Fehr & Peers, 2018 based on data provided by SDOT.

## **Curb Space Management**

Figure 4-5 displays a block-by-block inventory of the currently permitted usage of curb space along the frontage of Seattle Center. This includes both sides of the street along 1<sup>st</sup> Ave N, Warren Ave N, Mercer St, 4<sup>th</sup> Ave N, Republican St, 5<sup>th</sup> Ave N, Broad St, Denny Way, 2<sup>nd</sup> Ave N, and Thomas St. The figure shows the permitted usage of curb space for a weekday evening; Saturday evening restrictions are generally the same as weekdays with minor exceptions. Several signs along 1<sup>st</sup> Ave N and Thomas St have curb space signage that expire or transition at 6:00 PM, but Figure 4-5 is generally representative of curb space restrictions starting at the 5:30 PM pre-event analysis period. This figure shows that a variety of different curb space uses are designated including:

- Loading/unloading zones
- King County Metro (Metro) bus stops and layover areas
- Passenger loading/unloading only
- Charter bus parking
- School bus parking
- Designated disabled parking
- 2-hour metered parking (expires at 6:00 PM)
- 4-hour metered parking (expires at 8:00 PM)
- Taxi zones
- Restricted Parking Zone (RPZ) parking
- Unpaid, unrestricted parking
- Unpaid, time-limited parking

Figure 4-5 indicates that passenger loading/unloading (from private vehicles, ridehailing or Transportation Network Companies [TNCs] such as Uber and Lyft, or taxis) is permitted along portions of 1<sup>st</sup> Ave N, 2<sup>nd</sup> Ave N, and Mercer St. Parking is prohibited along the vast majority of 5<sup>th</sup> Ave N, Broad St, and Denny Way. Time limits and paid parking are not in effect on Sundays.

A Memorandum of Agreement (MOA) between Seattle Center and SDOT describes the process to reserve curb space on specific streets for the purposes of loading, unloading, and staging events at Seattle Center (SDOT and Seattle Center, 2011). The term of the MOA is indefinite unless amended or replaced by agreement of both parties. The MOA allows curb space reservations along a number of streets around Seattle Center including Thomas St, Republican St, Roy St, Warren Ave N, and 2<sup>nd</sup> Ave N, as shown in Figure 4-5. Due to channelization changes on Roy St since the MOA was signed, Roy St is no longer used for truck staging, thereby increasing the loading, unloading, and staging demand on the remaining MOA streets. Bus/truck staging activities have priority over all other uses of the curbs covered by the MOA.

### **4.3.3 Transit Routes and Operations**

The proximity of the project site to the Downtown Seattle core transit network allows for access to a range of local and regional transit services. This section describes the existing transit services within the study area, including fixed route bus, Monorail, streetcar, light rail, and ferry facilities and services.

## **Fixed Route Bus Service**

King County Metro is the primary operator of fixed route bus services in the vicinity of the project site. Figure 4-6 illustrates the existing fixed route bus services within the study area. As shown in Figure 4-6, buses operate north-south along the 1<sup>st</sup> Ave N / Queen Anne Ave N couplet immediately west of the project site. East-west bus service is present on Denny Way and on Mercer St west of 1<sup>st</sup> Ave N. Several roadways accommodate north-south bus service through the study area, including Elliott Ave W, 5<sup>th</sup> Ave N, 3<sup>rd</sup> Ave, and Aurora Ave N. Table 4-5 summarizes the existing weekday, Saturday, and Sunday frequency and span of service for Metro bus routes in the study area.

Metro and the City are collaborating on the implementation of additional RapidRide lines (RapidRide Lines C, D, and E are already in operation in or near the study area). RapidRide bus routes provide service at least every 10 minutes during the morning and evening peak periods and also provide late night and early morning service every day of the week. RapidRide buses allow faster boarding than typical buses (through off-board payment and boarding through multiple doors) and often travel along routes with transit priority treatments. Metro is planning to have RapidRide H (Burien–Downtown Seattle) in service by 2020; Madison Bus Rapid Transit (BRT) is currently scheduled to open in 2021. By 2035, an additional 5 RapidRide lines would be in service (Roosevelt, Rainier, Market, Fremont, and 23<sup>rd</sup>), several of which would serve South Lake Union and/or Downtown.

Figure 4-7 displays bus services and individual stop locations in the Seattle Center vicinity. Denny Way carries the highest bus volumes in the vicinity, with 71 weekday pre-event peak hour bus trips (eastbound and westbound combined) on the segment between Western Ave and 3<sup>rd</sup> Ave. The Queen Anne Ave N and 1<sup>st</sup> Ave N couplet also accommodates high bus volumes, with 32 weekday pre-event peak hour bus trips on each roadway (64 total peak hour trips).

As shown in Figure 4-7, existing bus stops in the vicinity of the project site are located on Queen Anne Ave N, 1<sup>st</sup> Ave N, 5<sup>th</sup> Ave N, and Denny Way. Some bus stops have pullouts while others stop in the travel lane. Shelters and benches are provided at many, but not all, locations. Buses along Denny Way often experience congestion. To address this situation, a bus-only queue bypass lane will be implemented in 2018 on eastbound Denny Way between Fairview Ave N and Stewart St. This project is included in the Opening Day (2020) conditions analysis. Refer to Appendix C, *Tech Memo 3, Year 2020 and 2035 Background Transportation Network*, for details.

### ***Fixed Bus Route Capacity***

Fixed bus route capacity was evaluated for all routes with stops within one-quarter mile of the project site. Reserve capacity was calculated based on the existing service levels, vehicle types, and ridership levels. This analysis was conducted for 2 locations along each route: at Seattle Center and at the point on the route with the maximum passenger load. Details are presented in Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*. Under non-event conditions, all of the Metro routes in the study area have reserve capacity (i.e., room for additional passengers) at Seattle Center and at the route's maximum passenger load point on weekdays during the pre- and post-event analysis periods (King County Metro, 2017).

**Passenger load** is the number of passengers on a bus at a single location or point in time. Accounting for both seated and standing passengers, a **crush load** is defined as the passenger load exceeding either 125% or 150% (depending on bus type) of the seated capacity of the bus.

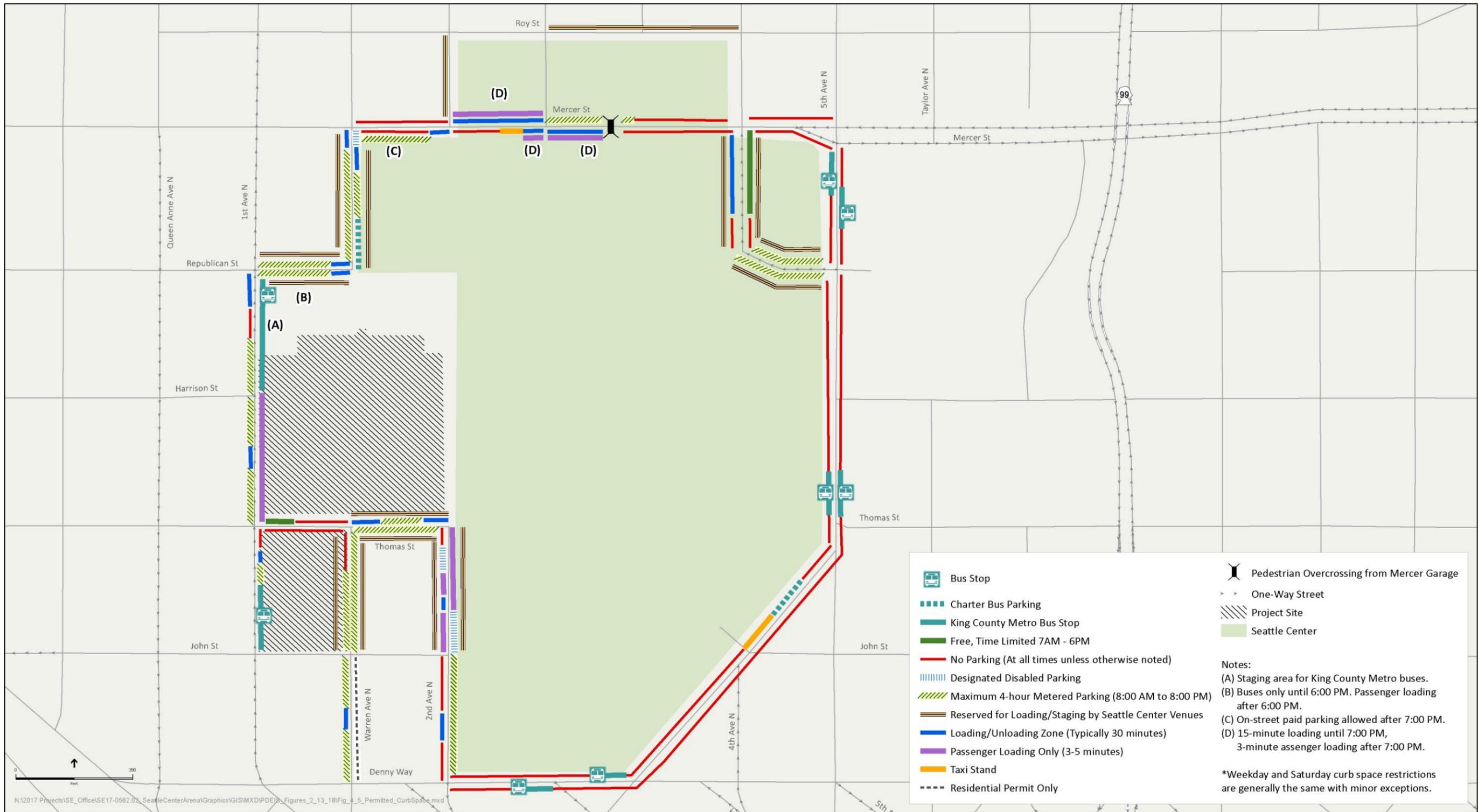


Figure 4-5. Existing Weekday/Saturday Evening Curb Space Permitted Usage

**Table 4-5. Fixed Route Bus Services in the Study Area – Existing Conditions**

Route	Description	Metro Service Type	Weekday		Saturday		Sunday	
			Frequency (Peak/Off-Peak)	Span of Service	Frequency (Peak/Off-Peak)	Span of Service	Frequency (Peak/Off-Peak)	Span of Service
1	Kinnear to Downtown	Very Frequent	15/20	5 AM–1 AM	20/20	6 AM–1 AM	30/30	5:30 AM–1 AM
2/13	SPU to Downtown to Madrona Park	Very Frequent	10/15	4:30 AM–2 AM	15/15	5 AM–2 AM	15/15	5:30 AM–2 AM
3/4	SPU to Downtown to Judkins Park	Frequent	10/15	4 AM–3:30 AM	15/15	4 AM–3:30 AM	30/30	4 AM–3:30 AM
5	Shoreline CC to Greenwood to Downtown	Very Frequent	12/15	24 hrs	15/15	24 hrs	15/15	24 hrs
8	Mt. Baker TC to Cap. Hill to Seattle Center	Very Frequent	10/12	5 AM– 1 AM	15/15	5:30 AM–1 AM	20/20	6 AM–1 AM
19	West Magnolia to Downtown	Peak	20/--	Peak Only	--	--	--	--
24	West Magnolia to Downtown	Local	15/30	5 AM–1 AM	30/30	6 AM–1 AM	30/30	6 AM–1 AM
29	Ballard to SPU to Downtown	Peak	15/--	Peak Only	--	--	--	--
32	Magnolia to Fremont to University District	Local	15/30	6 AM–1 AM	15/30	6 AM–1:30 AM	30/30	6 AM–1 AM
33	Discovery Park to Downtown	Local	30/30	5 AM–12 AM	30/30	6 AM–11 PM	30/30	6 AM–11 PM
40	Northgate TC to Ballard to Downtown	Very Frequent	8/15	5 AM–2 AM	15/15	6 AM– 2 AM	15/15	6 AM–2 AM
62	Sand Point to Green Lake to Downtown	Peak	10/15	5 AM–2 AM	15/15	6 AM–2 AM	15/15	6 AM–2 AM
63	Northgate TC to Cherry Hill	Peak	20/--	Peak Only	--	--	--	--
70	University District to Eastlake to Downtown	Very Frequent	10/15	24 hrs	15/15	24 hrs	15/15	24 hrs
5X	Shoreline CC to Greenwood to Downtown	Peak	12/--	Peak Only	--	--	--	--
15X	Blue Ridge to Crown Hill to Downtown	Peak	10/--	Peak Only	--	--	--	--
17X	Sunset Hill to Ballard to Downtown	Peak	15/--	Peak Only	--	--	--	--
18X	North Beach to Ballard to Downtown	Peak	15/--	Peak Only	--	--	--	--
26X	Northgate TC to Green Lake to Downtown	Peak	10/30	5 AM–2 AM	30/30	6:30 AM–2 AM	30/30	6:30 AM–2 AM
28X	Broadview/Carkeek Park to Downtown	Peak	10/30	5 AM– 1 AM	30/30	6 AM–1 AM	30/30	6 AM–1 AM
64X	Jackson Park to Cherry Hill	Peak	20/--	Peak Only	--	--	--	--
309X	Kenmore P&R to First Hill	Peak	30/--	Peak Only	--	--	--	--
C Line	Westwood Village to South Lake Union	RapidRide	6/12	24 hrs	12/12	24 hrs	15/15	24 hrs
D Line	Crown Hill to Ballard to Uptown to Downtown	RapidRide	8/12	24 hrs	12/12	24 hrs	15/15	24 hrs
E Line	Aurora Village to Downtown	RapidRide	5/10	24 hrs	12/12	24 hrs	15/15	24 hrs

All frequencies shown in minutes. SPU = Seattle Pacific University; TC = Transit Center; CC = Community College; P&R = Park and Ride.

Source: Prepared by Fehr & Peers, 2018. Ridership data provided by King County Metro for spring 2016 (King County Metro, 2017).

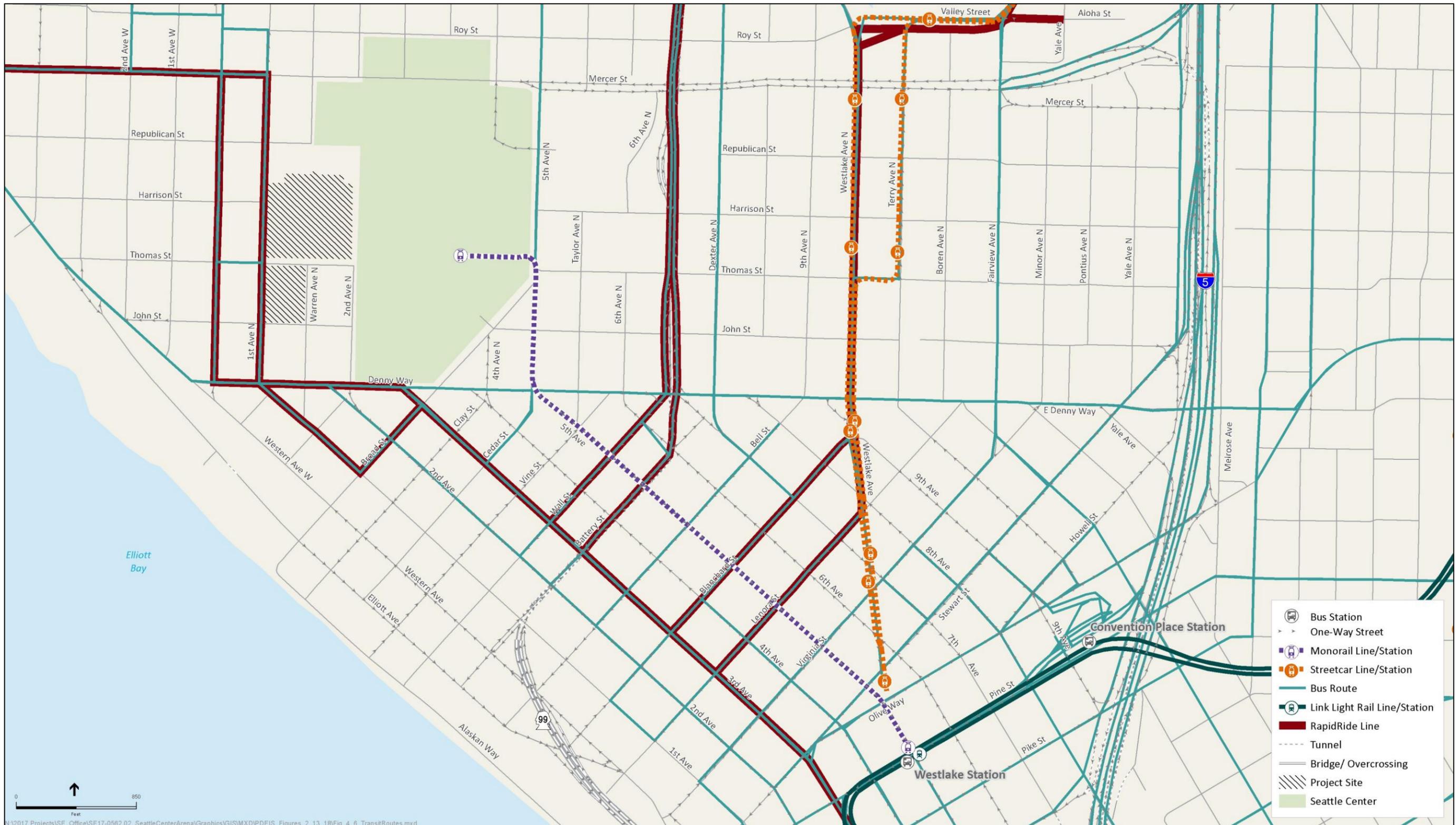


Figure 4-6. Existing Regional Transit Routes in the Study Area



Figure 4-7. Existing Bus Routes and Stops Near the Project Site

The amount of reserve capacity varies by route and direction, particularly during the pre-event peak hour when bus routes serving evening commuters leaving Downtown have less reserve capacity than those traveling in the opposite direction toward Downtown. During the late evening hours, fewer buses operate and the frequency of trips is lower when compared to the pre-event peak hour. This reduction in frequency corresponds with a decrease in available reserve capacity for outbound bus service leaving the study area during the post-event peak hour. Metro's data reflect the average peak loading during the peak hour. Some buses would be full and pass-up passengers during the peak hour, but Metro data indicate that over the entire peak hour there is reserve capacity on all routes serving the Seattle Center area. See Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*, for details of existing peak hour trips, total capacity, and reserve ridership capacity by route.

### **Streetcar**

As shown in Figure 4-6, the South Lake Union Line of the Seattle Streetcar operates along Westlake Ave N and Terry Ave N between Westlake Station and the South Lake Union neighborhood. This line is about two-thirds of a mile east of the project site. On weekdays, the line operates with a 10-minute frequency from 7:00 AM to 7:00 PM, and a 15-minute frequency from 6:00 AM to 7:00 AM and 7:00 PM to 9:00 PM (11:00 PM on Fridays). On weekends, the frequency is 15 minutes running from 6:00 AM to 11:00 PM on Saturdays, and 10:00 AM to 7:00 PM on Sundays and holidays. In general, the streetcar carries moderate ridership and is not typically overloaded.

### **Monorail**

Monorail service is available between Seattle Center and Westlake Station in Downtown Seattle, as depicted in Figure 4-6. At Seattle Center, passengers can board and alight (exit) the Monorail approximately 1,000 feet east of the project site (less than a 5-minute walk). Typical operations include service every 10 minutes from 7:30 AM to 11:00 PM. The Monorail alignment carries passengers along a grade-separated track between the 2 termini. The 1-way travel time is less than 2 minutes, with an additional 2 minutes of dwell time at each terminus for passenger boardings and alightings. For large events, Monorail service can be ramped up to 5-minute frequencies, providing capacity for approximately 3,000 passengers per hour (250 passengers per train) in each direction. The actual volume of Monorail boardings varies considerably depending on the time of the year and level of activities at Seattle Center. For instance, daily boardings on days without large events at Seattle Center ranged from 10,000 to 16,000 persons in late July 2016 to 3,000 to 9,000 persons in late April 2016. Anecdotally, ridership on the Monorail increases during large Seattle Center events, although exact figures vary due to the range of events at the campus. Riding the Monorail currently requires a separate ticket purchase. However, the City is working with the Monorail operator on a plan to integrate the Monorail into the ORCA (One Regional Card for All) fare system.

### **Light Rail**

Sound Transit operates LINK light rail service between the University of Washington and Angle Lake in SeaTac, with a total of 16 stations. Typical operations include 6-minute peak frequencies and 10- to 15-minute off-peak frequencies, 7 days a week, with service available between 5:00 AM and 1:00 AM. Off-peak and weekend service details are as follows:

- Weekday service frequencies drop to every 10 minutes beginning at 6:30 PM and to every 15 minutes beginning at 10:00 PM.

- Saturday service is available from 5:00 AM to 1:00 AM, with 10-minute frequencies until 10:00 PM, at which point headways drop to every 15 minutes.
- Sunday service is available from 6:00 AM to 12:00 AM, with 10-minute frequencies provided until 10:00 PM, at which point headways drop to every 15 minutes.

Currently, the station nearest the project site is Westlake Station, about 1.1 miles to the south. At Westlake Station, light rail riders may transfer to the south Monorail terminus or use a variety of fixed route bus services to connect to the arena.

Sound Transit 3 (ST3), the ballot measure passed in November 2016 to expand the regional transit system, will extend the light rail system to West Seattle and Tacoma by 2030 and to Ballard by 2035 (Sound Transit, 2016). The Ballard extension will include a station planned in close proximity to KeyArena. Construction of Sound Transit 2 (ST2) projects is already underway with light rail extensions north to Lynnwood, south to Federal Way, and east to Redmond scheduled to open by 2024. As the ST2 light rail extensions open, Seattle Center visitors from a broad regional area would be able to travel via light rail to Westlake Station and complete their trip to Seattle Center using the Monorail or other modes.

### **Ferry and Water Taxi Service**

Figure 4-8 displays the ferry and water taxi/passenger-only ferry routes. Washington State Ferries operates a fleet of ferries from Colman Dock in Downtown Seattle, about 1.5 miles from the project site. Existing ferry service from Downtown Seattle (serving both walk-on passengers and vehicles) serves Bremerton and Bainbridge Island. Ferries often reach vehicle carrying capacities during summer months, particularly during pre-event times, but in the outbound (leaving Seattle) direction. Ferries have high passenger capacities and rarely are overloaded. Metro operates 2 passenger-only water taxis from Downtown Seattle, serving Vashon Island and West Seattle. A separate passenger-only ferry operated by Kitsap Transit serves Bremerton. The Kitsap ferry experiences high outbound demand in the pre-event period and operates on a reservation system. However, the inbound trip is generally not full in the afternoons. Passenger-only ferry service between Kingston and Downtown Seattle is planned to begin in late 2018 and passenger-only ferry service between Southworth and Downtown Seattle is planned to begin in summer 2020.

### **4.3.4 Pedestrian and Bicycle Facilities**

The project site is in a dense urban area with relatively high pedestrian and bicycle mode shares (the proportion of travel by those modes). This section summarizes the pedestrian and bicycle facilities in the vicinity of Seattle Center.

#### **Bicycle Network**

Existing bicycle facilities are shown on Figure 4-9 and consist of multi-use off-street trails, protected off-street bicycle lanes (2-way), protected in-street bicycle lanes, in-street bicycle lanes, and sharrows (a pavement marking indicating that the roadway is shared by both vehicles and bicycles). A number of other bicycle facilities and amenities are located within the project vicinity including bicycle crosswalks, bicycle signals, bicycle signal detection, and green skip-striping (to indicate areas of potential conflict) of on-street lanes through intersections and across driveways. Bicycling is permitted across the Seattle Center campus. Bicycle racks with a capacity to accommodate approximately 95 bicycles are provided adjacent to KeyArena along the west, north, and east sides.



Figure 4-8. Existing Ferry and Water Taxi Routes

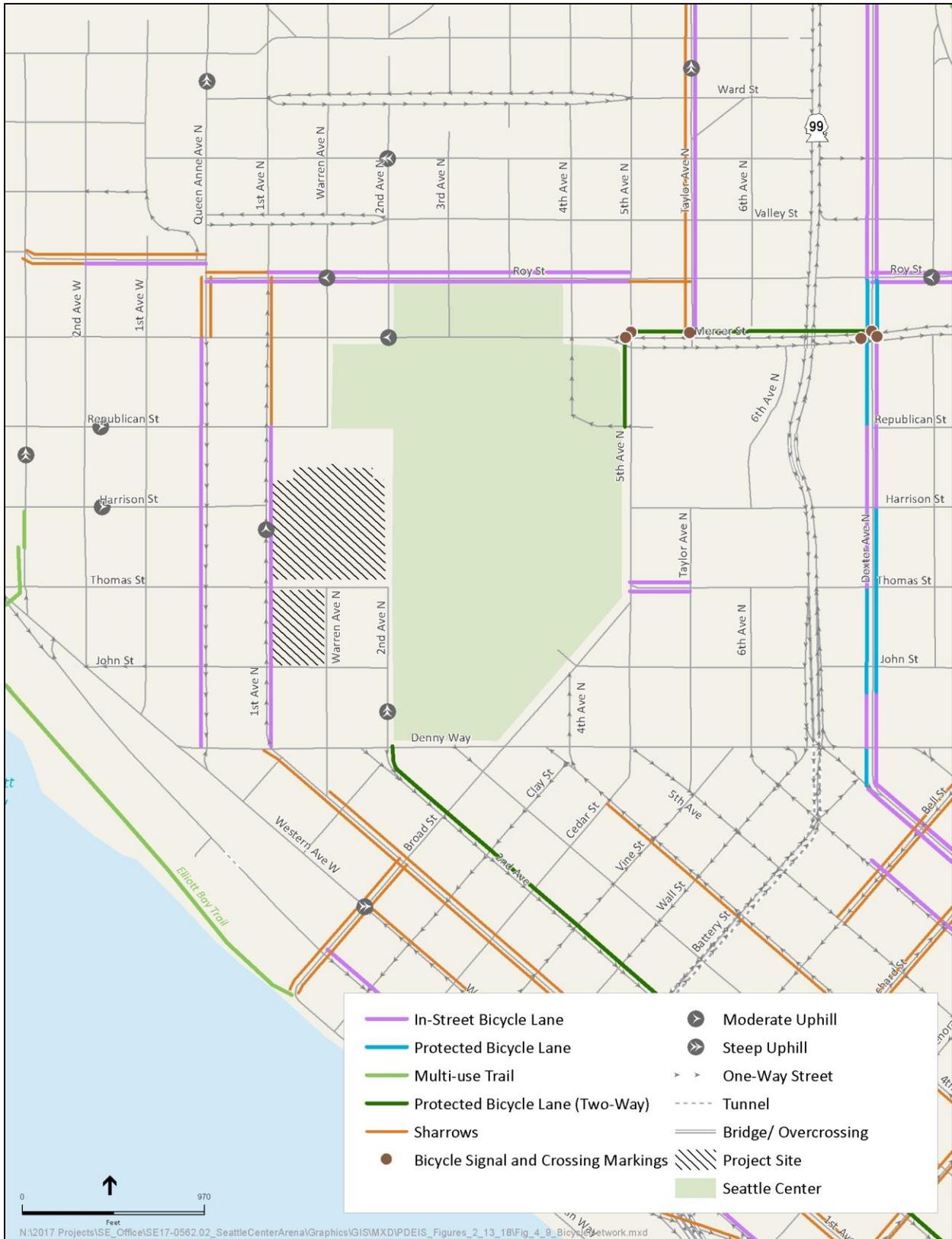


Figure 4-9. Existing Bicycle Network

Racks accommodating roughly 20 bicycles are located a short distance away (across 1<sup>st</sup> Ave N and near the Armory). During crowded festival conditions, Seattle Center adds bicycle corrals at the perimeter of the campus for additional bicycle storage.

The bicycle network in the vicinity of Seattle Center is well developed along some corridors. Good connectivity is provided between Seattle Center and the Dexter Ave N bicycle facilities via the Mercer St protected off-street bicycle lanes. Additionally, bicycle connectivity to the east will be enhanced by the reconnection of John St, Thomas St, and Harrison St across SR 99 to Dexter Ave N in 2020 after the SR 99 Tunnel project opens. An additional proposal for a trail, known as Lake to Bay, would connect Lake Union to Elliott Bay with connections along 5<sup>th</sup> Ave N, Broad St, and Thomas St on the periphery and through the Seattle Center campus. Portions of this trail are complete, such as the section along Mercer St between 5<sup>th</sup> Ave N and Dexter Ave; portions are on the Bicycle Master Plan (BMP) Implementation Plan (SDOT, 2017b), such as the protected bicycle lane along Broad St between 5<sup>th</sup> Ave N and the Elliott Bay Trail; and portions of the trail are not yet planned.

1<sup>st</sup> Ave N and Queen Anne Ave N are key north-south connectors with in-street bicycle lanes. Preferred bicycle routes connecting to Downtown include 2<sup>nd</sup> Ave, 6<sup>th</sup> Ave, and 7<sup>th</sup> Ave due to the designated spaces for bicycle travel. Roy St connects bicycle trips to and from the east, but bicyclists must divert south to the Mercer St underpass to cross SR 99. East of SR 99, Roy St connects to the Dexter Ave N in-street bicycle lanes and Westlake Ave N off-street 2-way protected bicycle lane, which are key routes to neighborhoods north of the Ship Canal and into Downtown.

Dexter Ave N carries substantial volumes of bicyclists during peak periods given its connectivity between Downtown and residential areas to the north, as well as convenient and comfortable bicycling facilities. It also provides access to the protected off-street bicycle lane on Mercer St to the west. Bicyclists often have difficulties crossing Mercer St during peak periods due to vehicles that block intersections (despite the presence of “Do Not Block Intersection” signs).

Three bike share companies operate in the City; 1 of the companies offers electric-assisted bikes in addition to regular bicycles. All operate with a dock-less set-up, meaning bicycles are available throughout many parts of the city and can be used through a mobile app. Bicycles can be rented for \$1 to \$4 per hour. Bike share bicycles are sometimes parked/stored outside of the sidewalk’s furniture zone (the area between the curb and the through zone where street furniture and amenities are located), which can affect pedestrian flows during busy periods.

Protected bicycle lanes recently opened on 2<sup>nd</sup> Ave south of Denny Way. The Seattle Bicycle Master Plan Implementation Plan 2017–2021 (April 2017) includes a variety of new facilities in the project vicinity. Bicycle lanes are planned on Thomas St east of 5<sup>th</sup> Ave N with a connecting bicycle facility along the Vine St/Taylor Ave/Taylor Ave N corridor. Protected bicycle lanes are planned for portions of 1<sup>st</sup> Ave N, Queen Anne Ave N, 8<sup>th</sup> Ave, 9<sup>th</sup> Ave, Roy St, Dexter Ave N, 4<sup>th</sup> Ave, Broad St, Bell St and/or Blanchard St, and Alaskan Way.

## **Pedestrian Network**

The pedestrian network surrounding Seattle Center is very well developed as shown on Figure 4-10. This figure also displays the various pedestrian access routes used to enter/exit Seattle Center. The vast majority of streets have complete sidewalks, although some sidewalks are temporarily closed due to adjacent property construction. Intersections near Seattle Center and on main arterials have crosswalks. Some signalized crosswalks are activated by pedestrian push buttons while others operate on auto recall (i.e., operate each phase regardless of a pedestrian call). Pedestrian countdown signals (equipment at an intersection that includes a display counting down the number of seconds remaining in the pedestrian flashing “don’t walk” phase) are provided at many signalized intersections.

Many sidewalks have street signs, tree wells, bus shelters, parked vehicle encroachment (i.e., vehicles overhanging the sidewalk), and other features that limit the effective width of the walkway. Some intersections have curb bulbs to expand waiting areas for pedestrians, while others are more limited in size. Within Seattle Center, many sidewalks and walking paths accommodate travel through the campus and to the venues within the campus.

### **4.3.5 Parking**

The parking study area was defined based on the expected distance that typical arena visitors would be willing to walk from their vehicle, based on experience with other urban arena projects and knowledge of the neighborhood. Figure 4-11 shows the supply of on-street and off-street parking within the parking study area. Parking supply data were collected from a variety of sources including SDOT and Seattle Center (SDOT, 2017a; Seattle Center, 2017a). The data shown on Figure 4-11 represent parking that is currently expected to be open to the general public during a typical evening event. For off-street locations, garages or lots consisting of 50 spaces or greater were surveyed. A number of smaller garages and surface lots also serve the study area. Additional parking is provided around South Lake Union as well as in garages south of Denny Way, although those locations require walking a greater distance to reach the project site. By 2020, additional parking garages are expected to be constructed along the Dexter Ave N corridor, which could provide additional parking opportunities for arena attendees.

Figure 4-11 indicates there are 8,229 publicly available parking spaces in the parking study area. Off-street lots/garages represent 62% of the total parking supply. The 3 garages operated by Seattle Center (Mercer St Garage, 1<sup>st</sup> Ave N Garage, and 5<sup>th</sup> Ave N Garage) consist of a combined 2,944 spaces, which is 58% of the total off-street supply shown on Figure 4-11.

Figure 4-12 and Table 4-6 display the estimated evening peak parking occupancy for a typical weekday when an event is not being held at KeyArena (SDOT, 2017a; Seattle Center, 2017a). Parking occupancy is summarized by the subareas shown in Figure 4-11. As shown, the total weekday evening (between 5:30 PM and 7:00 PM) peak parking occupancy was 2,691 vehicles, which represents 33% of the total available supply. On-street parking was occupied to a much greater degree than off-street parking (67% versus 11%, respectively). These findings are consistent with the 2017 Uptown & Seattle Center Strategic Parking Study (Seattle Center, 2017b), which found there is an excess of off-street parking during most daytimes and evenings, and that overall parking occupancy for evening conditions is about 35%.

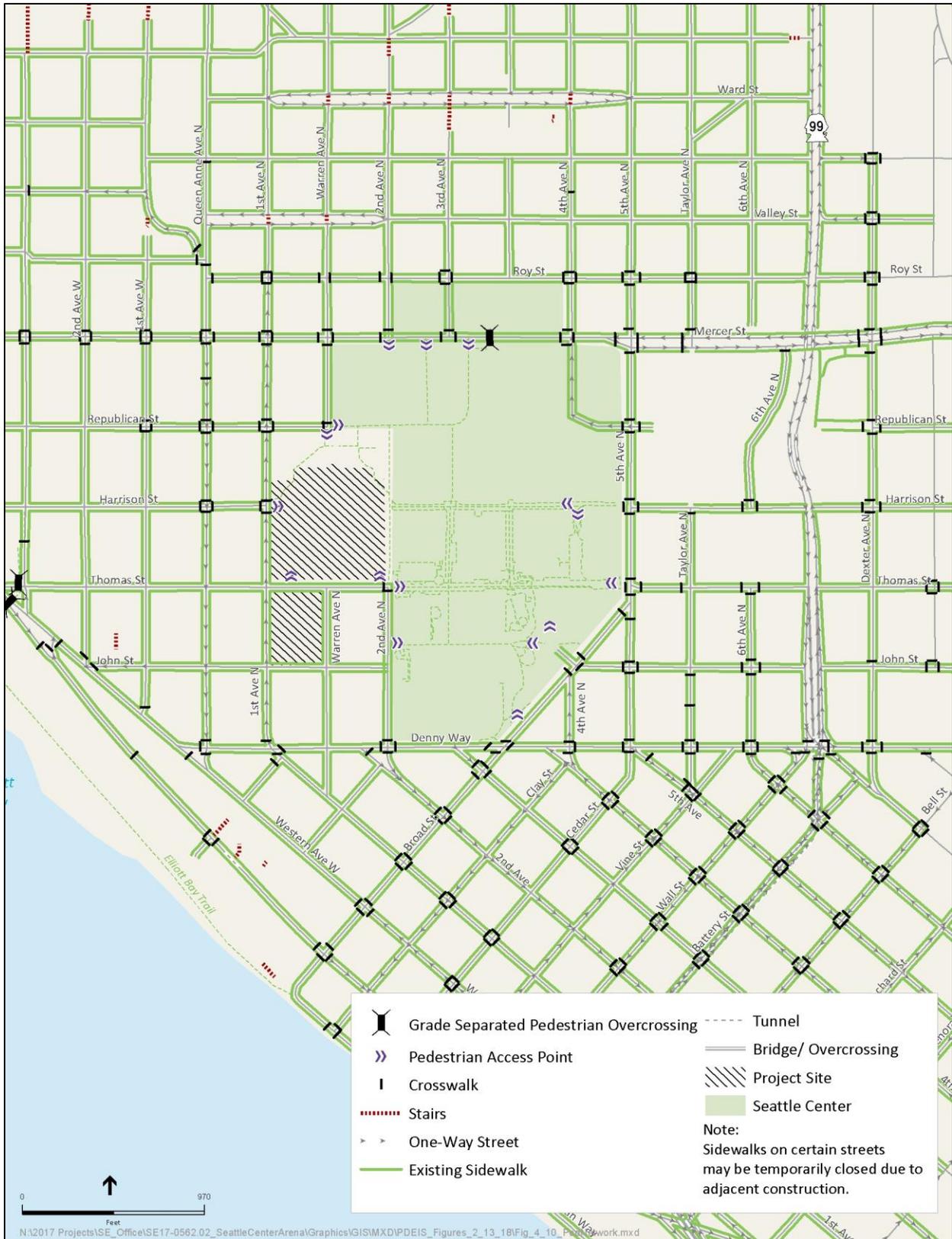


Figure 4-10. Existing Pedestrian Network



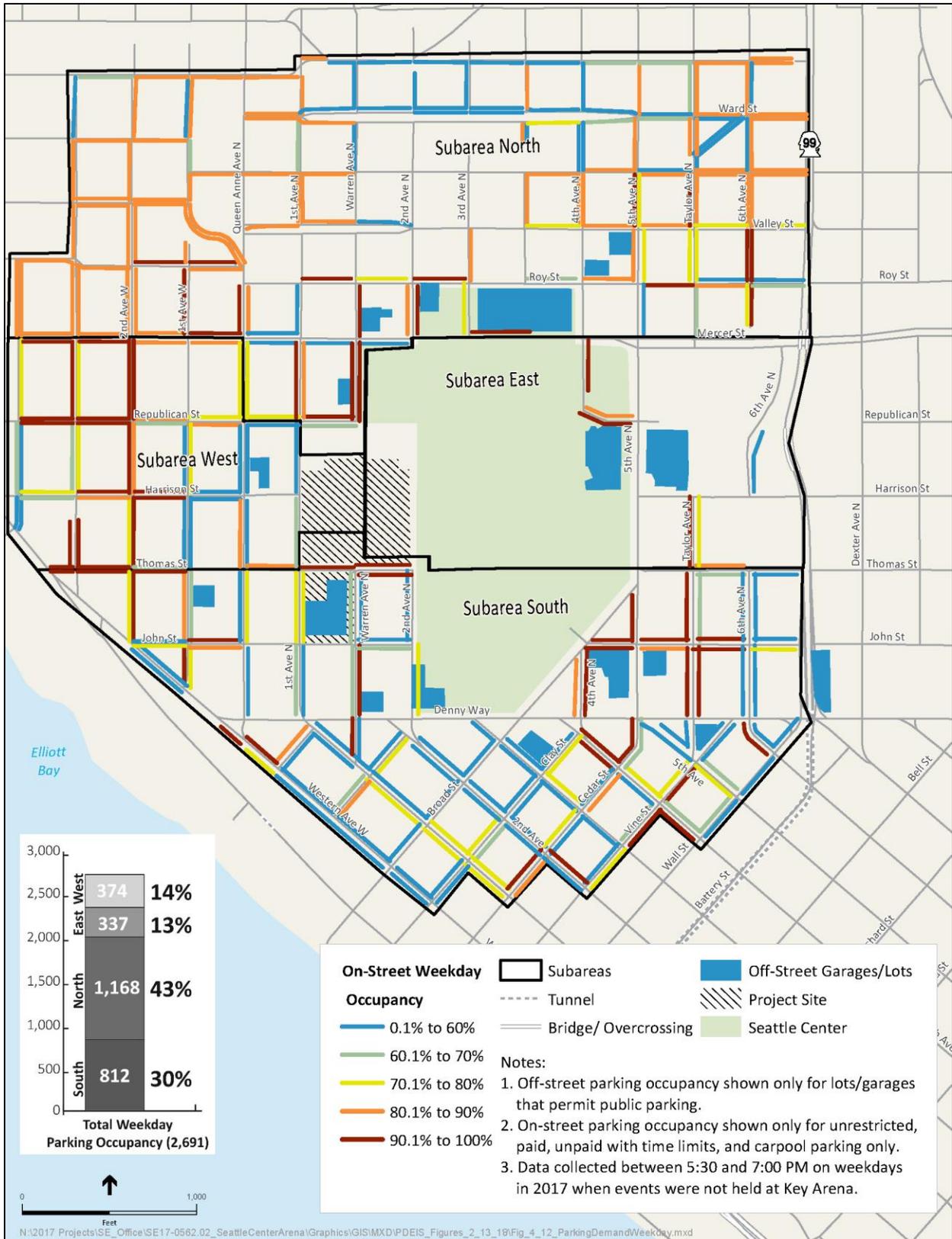


Figure 4-12. Existing Parking Occupancy During Weekday Pre-Event Peak Hour

Figure 4-13 and Table 4-6 display the estimated peak parking occupancy for a typical Saturday when an event is not being held at KeyArena (based on data collected for this EIS in September, October, and November 2017; Idax Data Solutions, 2017). Saturday evening peak parking occupancy was 3,630 vehicles, which represents 44% of the total available supply. The garages and lots surrounding Seattle Center were modestly utilized (22%), but had twice the occupancy as during the weekday condition. The overall on-street parking occupancy also increased relative to the weekday condition (from 67 to 81%). Time limits and paid parking are not in effect on Sunday, and Sunday parking studies have shown higher parking occupancy than any other study day.

Currently, most Seattle Center venue employees park in off-street garages because parking passes are offered at an inexpensive, monthly rate to employees. The number of employee vehicles occupying spaces in the garages varies depending on the events.

**Table 4-6. Parking Supply and Occupancy – Existing Conditions (Pre-Event Peak Hour)**

Parking Type	Subarea	Parking Supply	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	105	73 (70%)	69 (66%)
	North	1,489	1,055 (71%)	1,356 (91%)
	South	1,056	637 (60%)	708 (67%)
	West	481	348 (72%)	390 (81%)
	<b>Subtotal</b>	<b>3,131</b>	<b>2,113 (67%)</b>	<b>2,523 (81%)</b>
Off-Street	East	2,183	264 (12%)	272 (12%)
	North	1,377	113 (8%)	481 (35%)
	South	1,442	175 (12%)	349 (24%)
	West	96	26 (27%)	5 (5%)
	<b>Subtotal</b>	<b>5,098</b>	<b>578 (11%)</b>	<b>1,107 (22%)</b>
On-Street & Off-Street	<b>Total</b>	<b>8,229</b>	<b>2,691 (33%)</b>	<b>3,630 (44%)</b>

Source: Prepared by Fehr & Peers, 2018 based on data collected in September–November, 2017.

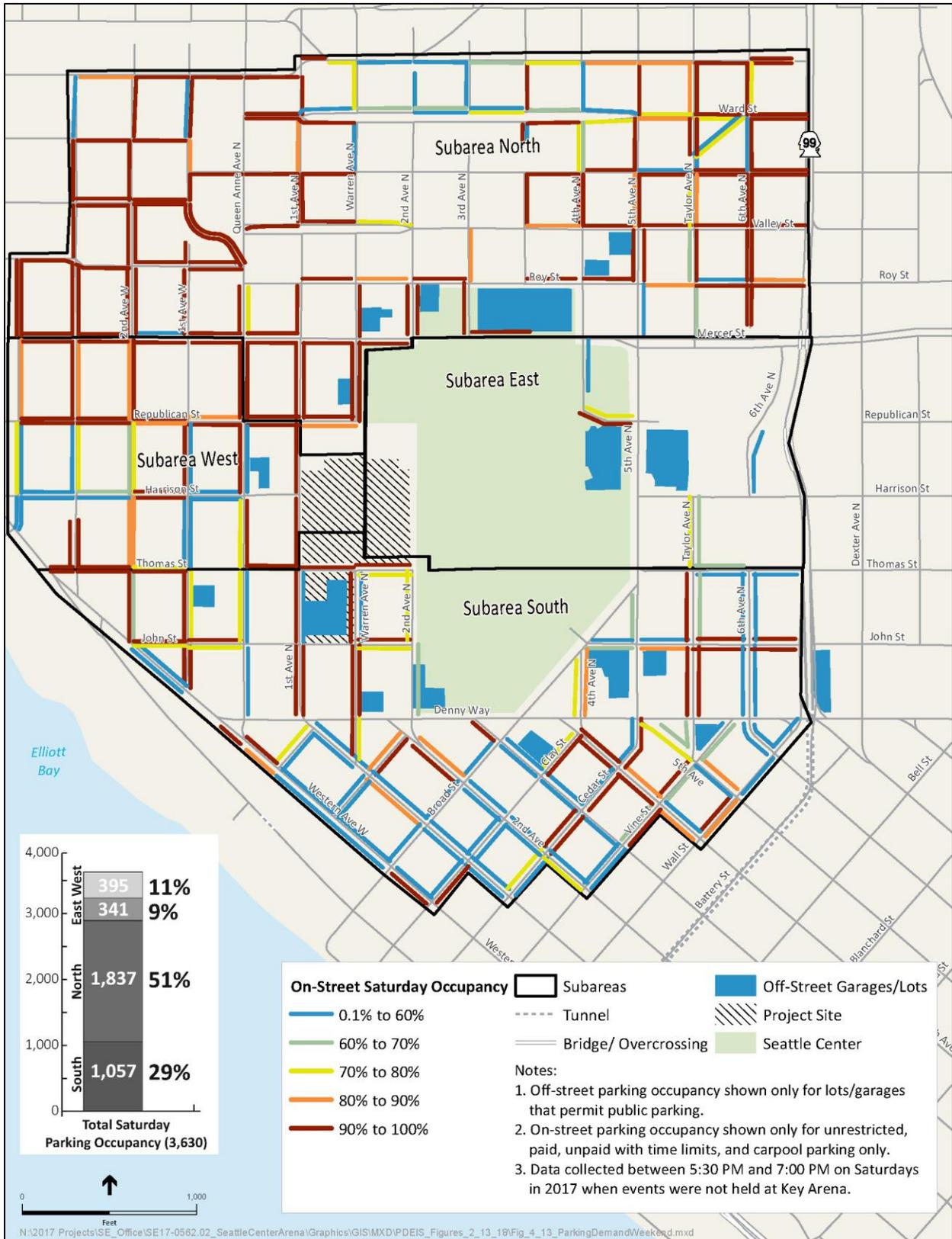


Table 4-7 shows the availability of weekday and Saturday evening parking spaces by subarea. This table shows that there are 5,538 currently available spaces for a weekday evening when there is no event at KeyArena. Similarly, there are 4,599 currently available spaces for a Saturday evening. The vast majority of parking availability is north, east, and south of the project site. Parking availability influences directionality of pre-event and post-event pedestrian flows.

**Table 4-7. Available Parking – Existing Conditions**

Parking Type	Subarea	Weekday Evening Available Parking Spaces	Saturday Evening Available Parking Spaces
On-Street	East	32	36
	North	434	133
	South	419	348
	West	133	91
	<b>Subtotal</b>	<b>1,018</b>	<b>608</b>
Off-Street	East	1,919	1,911
	North	1,264	896
	South	1,267	1,093
	West	70	91
	<b>Subtotal</b>	<b>4,520</b>	<b>3,991</b>
On-Street & Off-Street (% of total by geographic area)	East	1,951 (35%)	1,947 (42%)
	North	1,698 (31%)	1,029 (23%)
	South	1,686 (30%)	1,441 (31%)
	West	203 (4%)	182 (4%)
	<b>Total</b>	<b>5,538</b>	<b>4,599</b>

Includes only publicly available spaces that could potentially be open to arena attendees for evening events at KeyArena or the proposed Seattle Center Arena. Does not include any planned facilities east of SR 99 that may be open by 2020 and accessible via the street grid reknitting. Such facilities are considered in the analysis as part of the Opening Day 2020 conditions analysis.

Source: Prepared by Fehr & Peers, 2018.

Seattle Center and its tenants employ several hundred staff, both full-time and intermittent, who regularly use parking in the 3 garages currently operated by Seattle Center. Many staff travel from outside the Seattle city limits and work off-peak hours due to their event-related schedule. Existing labor agreements include provisions for Seattle Center staff parking at below-market rates for the neighborhood. As a result of these circumstances, a portion of available parking in Seattle Center garages is often occupied by staff.

### 4.3.6 Ridehailing

Ridehailing vehicles, also known as Transportation Network Companies (TNCs) such as Uber and Lyft, are a rapidly growing mode of motorized urban transportation in the United States. They operate on a business model where a smartphone app connects a passenger traveling to a predetermined destination with a driver willing to transport them for a fare exchanged via the app. Based on a visitor survey

conducted at the September 27, 2017 Janet Jackson concert at KeyArena, 15% of attendees used a ridehailing vehicle to arrive at the venue. Roughly 660 of the 9,200 concert attendees were surveyed. While a much smaller proportion of travel, taxis and other for-hire vehicles are also analyzed as ridehailing vehicles in this EIS.

Ridehailing vehicles typically involve passenger loading/unloading along a public street. Figure 4-5 shows that 3- or 5-minute passenger loading/unloading zones are present along portions of 1<sup>st</sup> Ave N, Mercer St, and 2<sup>nd</sup> Ave N in the vicinity of Seattle Center. Observations before and after events at KeyArena indicate that those areas are frequently used for ridehailing activity. During congested conditions (i.e., during events at KeyArena), ridehailing vehicles have been observed to stop in travel lanes (i.e., double park) along 1<sup>st</sup> Ave N and Queen Ave N to pick-up and drop-off passengers. They have also been observed to use curb space dedicated for buses and bicycle lanes. A decision by a patron to order an Uber, Lyft, or a taxi results in both an inbound trip and an outbound trip to the area, which means more vehicle trips being generated for that single patron's trip versus travel via private vehicle.

### 4.3.7 Other Modes

Observations at Seattle Center indicate that patrons arrive and depart from Seattle Center in a variety of travel modes beyond those described previously. Examples of these other modes include:

- Taxis
- Limousines
- Chartered buses
- Paratransit
- Car share services with either free floating (e.g., Car2Go) or designated parking (e.g., ZipCar) models
- Self/assist-powered wheeled devices such as scooters, Segways, etc.

A taxi zone exists along the Broad St frontage of Seattle Center. Designated staging for charter buses is also provided along Broad St. Paratransit is required by ADA to provide direct and convenient connections for disabled patrons. This typically means identifying curb space that is close to the venue entrance/exit and is designed to meet ADA requirements (cross slope, ADA-compliant ramps, etc.).

The Seattle Police Department manages traffic flow on certain streets near KeyArena after large events through 2 Event Traffic Control Plans (TCPs) – 1 related to the egress of the 1<sup>st</sup> Ave N Garage and the other related to egress from the Mercer Garage. These TCPs include event attendance thresholds that identify when police officer control is warranted and how many officers are likely required.

## 4.4 POTENTIAL IMPACTS

This section describes potential transportation impacts of the alternatives related to construction activities in the short term, and operational impacts in both the short and long term. Impacts can be directly or indirectly caused by the alternative. Note that transportation impacts are, by their nature, considered in a cumulative context. Transportation impacts are evaluated when considering the new transportation demand layered on top of current and future foreseeable background traffic conditions. The direct impacts caused by the proposed project are evaluated by comparing the performance of the transportation system with and without the project.

#### 4.4.1 Scenarios Evaluated

For transportation impacts, 2 horizon years are analyzed: 2020 and 2035. As described in Section 4.3, *Affected Environment*, 3 analysis periods are analyzed: weekday pre-event (5:30 to 6:30 PM), weekday post-event (9:30 to 10:30 PM), and Saturday pre-event (6:00 to 7:00 PM). These time periods were selected to align with 2 specific types of events: a sold-out NBA basketball game on a weekday, and a sold-out concert on a Saturday. These are the 2 largest events expected to occur regularly at the renovated arena; NHL hockey games would have slightly less seating capacity than an NBA basketball game, but similar travel characteristics. Saturday post-event conditions would generally be comparable to weekday post-event conditions so that time period is not analyzed, except for transit capacity.

In addition to studying the No Action Alternative, 2 project alternatives are analyzed, as described in Chapter 2 and summarized below.

- **Alternative 1: OVG Proposal.** This alternative is the design proposed by OVG. This includes a new 450-space below-grade garage and loading dock adjacent to the arena (just north of Thomas St), and full utilization of the 1<sup>st</sup> Ave N Garage (620 parking spaces). The parking garage driveway would be on Thomas St and consists of a 2-lane driveway. Within a geofence boundary around Seattle Center post-event ridehailing pick-ups would be restricted to several designated locations. Pick-ups outside of the geofence would be unrestricted.
- **Alternative 2: Modified Proposal.** This alternative would have different design elements to reduce the potential impact of the project. For transportation, the major difference related to Alternative 2 is a smaller parking garage under the south plaza (200 rather than 450 parking spaces), and lower utilization of the 1<sup>st</sup> Ave N Garage (400 rather than 620 parking spaces). The underground loading dock and 1<sup>st</sup> Ave N Garage driveway access points would function nearly the same as Alternative 1. Ridehailing pick-ups would be regulated such that they occur outside a designated geofence boundary around Seattle Center with no required designated pick-up locations.

Both alternatives would provide access to the underground loading dock from a new driveway on 1<sup>st</sup> Ave N. The current driveway that serves the 1<sup>st</sup> Ave N Garage would be removed. As a result, all access to/from the 1<sup>st</sup> Ave N Garage would occur from Warren Ave N and John St.

Activity at Seattle Center varies widely depending on the events taking place on campus, ranging from days with very few scheduled events to days with multiple and/or large events. High attendance on the campus is generated in a variety of ways, for example a single large festival or an event at KeyArena, or a combination of more moderately sized events occurring simultaneously on the campus. To reflect the variability in activity at Seattle Center, 2 different conditions are evaluated in the transportation chapter: Average Seattle Center Attendance and Above-Average Seattle Center Attendance.

The Average Seattle Center Attendance scenario reflects the 50<sup>th</sup> percentile of daily Seattle Center visitors, and the Above-Average Seattle Center Attendance scenario reflects the 90<sup>th</sup> percentile of daily Seattle Center visitors. The details of the determination of these 2 activity levels are described in Appendix C, *Tech Memo 2, Background Attendance Levels at Seattle Center*. For simplicity, these conditions can be considered as follows:

- **Average Seattle Center Attendance:** Typical Seattle Center attendance of daily visitors and several small scheduled events. This attendance level does not include an event at KeyArena.

- **Above-Average Seattle Center Attendance:** Above-Average Seattle Center Attendance of daily visitors plus 1 or more large events. This attendance level includes an average-sized event at KeyArena.

Figure 4-14 summarizes how these Seattle Center attendance levels relate to the proposed arena renovation project. The No Action Alternative – Average Seattle Center Attendance scenario represents a typical day at Seattle Center (i.e., no major events). Alternative 1 or 2 with Average Seattle Center Attendance represents the No Action condition plus the addition of a sold-out arena event (18,350 to 19,125 additional visitors depending on whether a sporting event or concert is held). In contrast, the Above-Average Seattle Center Attendance scenario reflects a busy day at Seattle Center including events at KeyArena as well as other venues. Because the renovated Seattle Center Arena would replace KeyArena, some of the attendees assumed under the No Action Alternative would be “replaced” by attendees of the renovated Seattle Center Arena. Therefore, the difference in total Seattle Center attendance between No Action and Alternatives 1 or 2 represents a change in visitors that is less than the sold-out arena capacity.

#### 4.4.2 Construction Impacts

This section summarizes the potential transportation impacts related to the construction of the Seattle Center Arena Renovation Project. The following defines potentially significant impacts from construction, which are short term. Impacts not reaching these thresholds are considered less-than-significant.

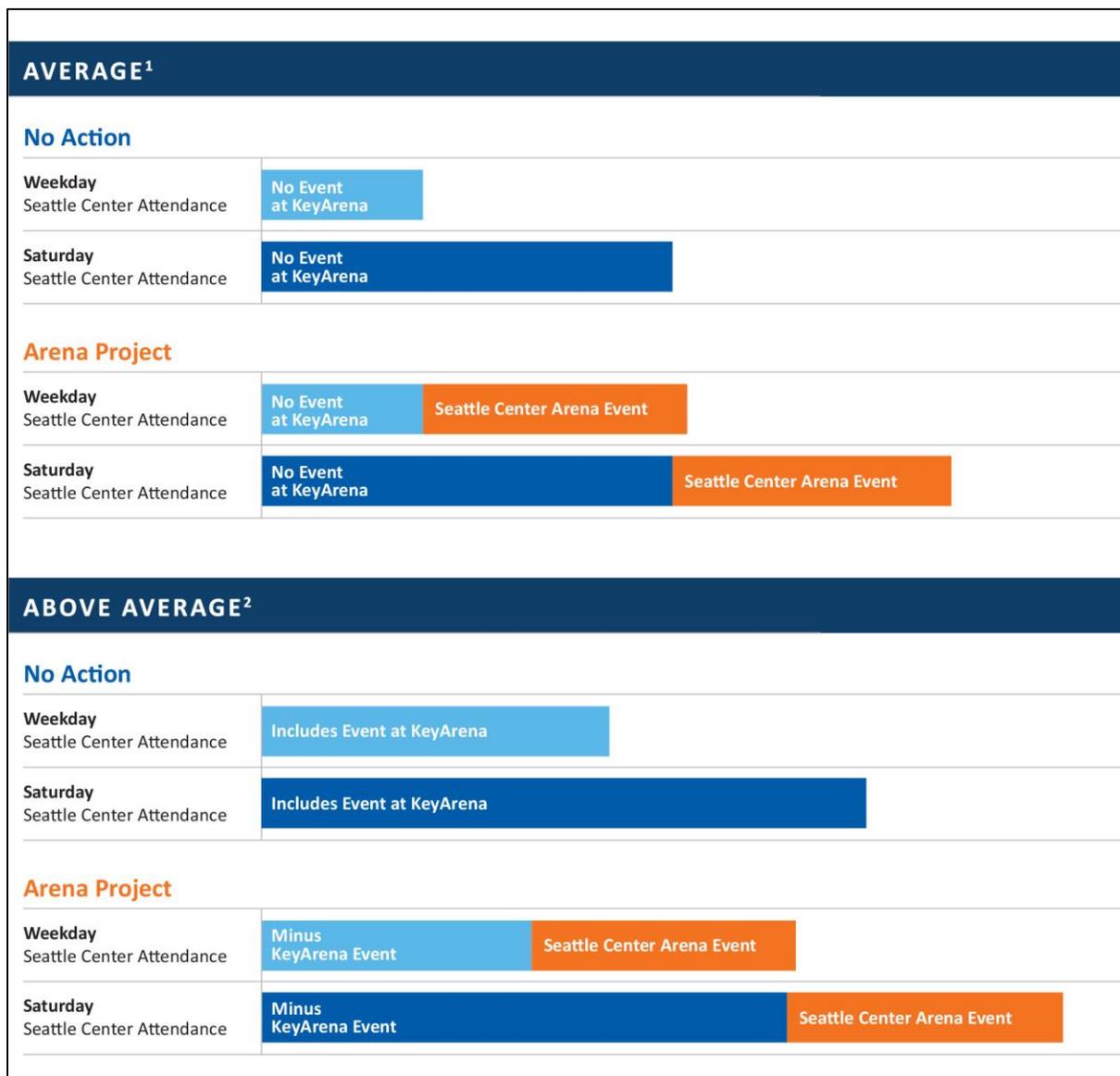
##### **Criteria for Significant Construction Impacts to Transportation:**

- Construction activity results in modifications to transportation facilities, which could substantially increase the number of conflicts between modes.
- Construction activity results in the long-term loss of bus/truck staging areas identified in the MOA between SDOT and Seattle Center (see Curb Space Management in Section 4.3.2).
- Construction activities would result in significant traffic operations or parking impacts as defined in Section 4.4.3, *Operations Impacts*.

Construction in the city may result in the temporary closure of sidewalks, transit facilities, bicycle facilities, and vehicle lanes, all of which require a street use permit from SDOT. These types of closures are not considered a significant impact since they are common throughout areas like Uptown, South Lake Union, and Downtown.

##### **No Action Alternative**

No construction is proposed at the project site under this alternative, so there would be no construction-related transportation impacts.



<sup>1</sup> Average Seattle Center Attendance is the 50<sup>th</sup> percentile of daily attendance and is assumed not to include an event at KeyArena.

<sup>2</sup> Above-Average Seattle Center Attendance is the 90<sup>th</sup> percentile of daily attendance and is assumed to include a moderately-size event at KeyArena.

**Figure 4-14. Seattle Center Attendance Scenarios**

**Alternative 1: OVG Proposal**

Based on information from OVG, construction for Alternative 1 is expected to take approximately 24 months and would start in October 2018. Under Alternative 1, construction would occur throughout the day and night, including truck hauling at night. The greatest construction-related impacts would be related to the closure of transportation facilities (lanes, streets, sidewalks, bicycle facilities, bus stops, etc.) to facilitate demolition, movement of materials, truck staging, and construction. Up to 200 workers at a time are expected to be on-site, working in 2–3 shifts per day (between 400 and 600 total daily construction workers). The project would generate a substantial number of truck trips during portions of

construction to haul away material from the construction site. Per the information in Section 2.6, truck trips are not anticipated during the AM or PM peak periods, except for periods that require continuous concrete pours. Section 2.6 includes more information regarding the planned activities for each construction phase. Key transportation elements and their effects are described in this section.

OVG has identified several potential haul routes, although they are still preliminary (as the routes largely depend on the truck destination) and subject to approval by SDOT and by Seattle Center for those roadways on the campus. These haul routes are shown in Figure 2-12 and include travel on the following streets:

- To and from I-5 via 2<sup>nd</sup> Ave N and Denny Way.
- To I-5 via Thomas St, 1<sup>st</sup> Ave N, and Mercer St.
- To SR 99 via 6<sup>th</sup> Ave N and Harrison St through the Seattle Center campus.
- To Interbay via 1<sup>st</sup> Ave N and Mercer St/W Mercer Pl.
- To Interbay via 2<sup>nd</sup> Ave N, Denny Way, and Elliott Ave W.

To limit impact to Seattle Center events, patrons, and tenants, Seattle Center and OVG would establish mutually agreed-upon time limits for haul routes on vacated 2<sup>nd</sup> Ave N and vacated Harrison St through the Seattle Center campus. When the haul route through the campus is in use, the OVG construction manager will use flaggers to allow pedestrians to cross the haul route. Barricades will also be placed along the haul route through campus, with breaks in the barricades to allow pedestrians to cross. The time limits for hauling are subject to review and approval from the City as part the Noise Variance application process.

Figure 2-11 summarizes the current plans for construction; the figure depicts the fence line, access routes, and facility closures. Based on information from OVG, the following closures are expected for some portion of construction:

- The parking/loading lane and sidewalk along the east side of 1<sup>st</sup> Ave N between Thomas St and the north end of the KeyArena plaza (just south of the Metro bus stop) for the duration of construction.
- The parking/loading lane and sidewalk along the east side of 1<sup>st</sup> Ave N between John St and Thomas St.
- The north parking lane and sidewalk along Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N for the duration of construction. During Phase 4, the north travel lane may be closed for a period of time to complete the parking garage; during that time, flaggers would be used to allow traffic to circulate safely.
- Temporary lane restrictions are also planned along streets adjacent to the construction site for curb cut revisions, access tunnel construction, and utility work.
- The western half of vacated 2<sup>nd</sup> Ave N from Thomas St to the south edge of the intersection of vacated Harrison St would be closed, during Phase 1. The western half of vacated 2<sup>nd</sup> Ave N would not be closed for the following campus-wide events: New Year's Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, and Bumbershoot, as well as the installation and removal of the Fisher Pavilion ice.

Additional areas may be used for truck staging such as 1<sup>st</sup> Ave N between John St and the King County Metro bus stop; on Thomas St between Warren Ave N and 2<sup>nd</sup> Ave N; and on 2<sup>nd</sup> Ave N between John St and Thomas St only after 10 PM. Truck staging requires a street use permit from SDOT.

### **Traffic Operations**

The primary traffic operations impacts are related to the closure of streets and traffic lanes identified above and when truck hauling is operating at its highest frequency. Because the parking/loading lane along 1<sup>st</sup> Ave N between John St and the north end of the KeyArena plaza does not provide any vehicle travel capacity, no traffic operations impacts are anticipated from the closure of this lane; however, some short-term traffic operations impacts could be caused by flaggers restricting traffic in travel lanes to allow trucks to enter/exit the curbside lane. Short-term traffic operations impacts to traffic flow on 2<sup>nd</sup> Ave N, John St, Warren Ave N, and Thomas St are also likely. Maintaining travel lanes on Thomas St would allow school buses to continue to load and unload on the east side of 2<sup>nd</sup> Ave N (adjacent to Seattle Children's Theatre) and then turn west on Thomas St to exit the area.

In addition to the closures identified above, the EIS Consultant Team considered the potential for trips generated by construction workers, and trucks to impact traffic operations. Construction activities would occur 24 hours a day, 7 days a week. The 200 construction workers on-site are not anticipated to cause significant impacts to area traffic operations. No substantial traffic operations impacts from trucks are anticipated since they would operate during off-peak periods (except for occasional activity during continuous concrete pours). The heavy truck traffic could deteriorate the pavement quality on the potential haul routes, but this degradation of pavement is not expected to be severe enough to result in a significant traffic operations impact.

### **Transit**

Construction activity is expected to close the following transit facilities:

- The bus layover area at the north end of the parking/drop-off lane on 1<sup>st</sup> Ave N (at the north end of the KeyArena plaza) for the duration of construction. This layover area is approximately 100 feet long and typically accommodates a single bus.
- The bus stop along 1<sup>st</sup> Ave N just north of John St (affecting Routes 1, 2, 8, 13, and RapidRide D) from December 2018 through the completion of construction. (The bus stop along 1<sup>st</sup> Ave N, just south of Republican St, would remain open).

### **Pedestrian**

Construction activity is expected to close the following sidewalks:

- The sidewalk along the east side of 1<sup>st</sup> Ave N from the south end of the Northwest Rooms to Thomas St for the duration of construction.
- The sidewalk along 1<sup>st</sup> Ave N from John St to Thomas St.
- The north sidewalk along Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N for the duration of construction.
- The sidewalks along Warren Ave N (west side of street) and John St (north side of street) adjacent to the 1<sup>st</sup> Ave N garage intermittently throughout the duration of construction for curb cut refinements and utility relocations.

Pedestrian access to Seattle Center to and from the west would be affected by the construction because access would be limited between Republican St and John St. A portion of 2<sup>nd</sup> Ave N, north of Thomas St, is vacated as a public street, but is used as a part of the Seattle Center campus for loading/unloading as well as events. The western half of the vacated portion of 2<sup>nd</sup> Ave N would be closed, except for during campus-wide events such as New Year's Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, and Bumbershoot, as well as the installation and removal of the Fisher Pavilion Ice. See Appendix B, Table B-3 for a list of events/performances that use vacated 2<sup>nd</sup> Ave N on the Seattle Center campus.

The haul route through the Seattle Center campus on vacated Harrison St may introduce modal conflicts and decrease connectivity for pedestrians that are accustomed to using that corridor for travel in the late evening and early morning hours. Vacated Harrison St would not be used during campus-wide events such as New Year's Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, Bumbershoot, and the installation and removal of the Fisher Pavilion Ice.

### ***Bicycle***

Construction activity is expected to close the following bicycle facility for the duration of construction:

- The bicycle lane along 1<sup>st</sup> Ave N from the north end of the KeyArena plaza to John St.

The haul route through the Seattle Center campus on vacated Harrison St may introduce modal conflicts and decrease connectivity for bicycles that are accustomed to using that corridor for travel in the late evening and early morning hours. Vacated Harrison St would not be used during campus-wide events such as New Year's Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, Bumbershoot, and the installation and removal of the Fisher Pavilion Ice.

### ***Parking***

The street and lane closures described above would impact on-street parking during construction. The following on-street parking closures are expected:

- East side of 1<sup>st</sup> Ave N between Harrison St and John St.
- North side of Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N.
- West side of Warren Ave N between Thomas St and Johns St.
- North side of John St between 1<sup>st</sup> Ave N and Warren Ave N.

The parking areas along Thomas St and 1<sup>st</sup> Ave N are expected to be closed for the duration of the construction activities (except for the portion of 1<sup>st</sup> Ave N between Thomas St and John St, which may not close until December 2018). Depending on how pedestrian and bicycle traffic is accommodated through the construction area, it is possible that parking could be eliminated throughout the duration of construction on both sides of 1<sup>st</sup> Ave N to allow for safe pedestrian and bicycle travel through the construction area. Parking closures on Warren Ave N and John St are anticipated to be of shorter duration and intermittent to facilitate curb cut and utility modifications.

In addition to the on-street parking, OVG is planning to use the 1<sup>st</sup> Ave N Garage for construction worker vehicle parking. During the busiest phases of construction, it is possible that some construction workers would need to park at off-site lots and garages. OVG would work with the construction manager and Seattle Center tenants to make any excess spaces available to accommodate tenant events. The roof of

the 1<sup>st</sup> Ave N Garage would be used for the construction manager's construction trailers. The surface lot adjacent to the 1<sup>st</sup> Ave N Garage would be closed for the duration of construction.

### ***Bus/Truck Staging***

Charter buses and trucks currently stage using curb space in the vicinity of the project site in accordance with the SDOT and Seattle Center MOA for Event Curbside Management (SDOT and Seattle Center, 2011). Through that agreement, Seattle Center reserves curb space on Thomas St, Warren Ave N, 2<sup>nd</sup> Ave N, Republican St, and 4<sup>th</sup> Ave N for loading, unloading, and staging of events.

The partial closure of Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N would result in the loss of the bus/truck staging area used for event loading/unloading identified in the MOA on the north side of the street. This closure would last the duration of the construction period, which would be a significant impact to bus/truck staging. The closures on Warren Ave N and John St are temporary and not considered a significant impact. Construction truck staging on 2<sup>nd</sup> Ave N would only occur after 10 PM; however, there could still be impacts to other vehicles accessing the campus during those times. Because this condition would be temporary and occur when traffic is limited, this is not considered a significant impact. See Appendix B, Table B-4 for a list of events/performances that use Thomas St.

### ***Safety***

The closures of parking/loading lanes, sidewalks, and bicycle facilities all could result in a substantial increase in modal conflicts within the study area. The Harrison St haul route through the Seattle Center campus could also cause modal conflicts in the late evening and early morning hours.

### ***Summary of Transportation Impacts During Construction under Alternative 1***

As described above, construction to renovate the arena would result in a variety of impacts to transit facilities, pedestrian, bicycle, parking, truck/bus staging, event loading/unloading, and safety. Some of the impacts would result in an inconvenience during construction, for example requiring travelers to find another route or another location to park, but do not rise to a significant level of impact due to their type of effect and temporary nature. However, safety impacts related to the closed pedestrian and bicycle facilities, and the reduction in bus/truck staging areas are all significant impacts.

Mitigation measures for the construction-related impacts are identified in Section 4.5.1, *Construction Mitigation*.

### **Alternative 2: Modified Proposal**

Construction-related transportation impacts of Alternative 2 are similar to Alternative 1; however, construction activities would be conducted between 7 AM and 7 PM, with potential further time restrictions on truck hauling (e.g., truck hauling could be restricted to 9 AM to 3 PM, to avoid peak hours). The reduced construction window would change several conditions related to construction impacts on transportation:

- The overall construction duration would increase beyond 24 months, to at least 30 months.
- The partial closure of Thomas St between Warren Ave N and 2<sup>nd</sup> Ave N would include the north curbside and north travel lane. The south travel lane would be open for 1-way vehicle

circulation, and the south curbside lane would be available for loading/parking. The closure between 1<sup>st</sup> Ave N and Warren Ave N would be the same as Alternative 1.

- The duration of demolition activities would increase by 6 months or more, which would increase the length of time that some facilities are closed.
- There would be fewer truck trips per day since the demolition period is extended over more months; however, there may be more mid-day truck trips. Truck trips are not expected to impact traffic operations to any substantial degree.
- Up to 200 workers at a time are still expected to be on-site, but would be limited to 1–2 shifts per day (between 200 and 400 total daily construction workers).

Significant construction impacts on the transportation system from Alternative 2 are expected to be the same as for Alternative 1: safety impacts from the closed pedestrian and bicycle facilities, and the reduction in bus/truck staging areas from construction activities. However, the duration of closures and the impacts associated with those closures would be longer under Alternative 2 than Alternative 1.

### 4.4.3 Operations Impacts

Two horizon years are analyzed in this section: 2020 and 2035. Year 2020 is assumed to be the year of opening of the arena, and year 2035 provides a longer term cumulative condition that is consistent with the City's land use and transportation plans, as well as regional plans including LINK light rail expansion.

#### Thresholds of Significance

The following defines long-term (operations) impacts to the transportation system. The No Action Alternative is the baseline against which impacts of the action alternatives are evaluated. Potential significant operations impacts to transportation are defined as follows, and impacts not reaching these thresholds are considered less-than-significant.

#### *Traffic Operations*

##### **Criteria for Significant Operations Impacts on Traffic Operations:**

- A signalized intersection operates acceptably (i.e., LOS D or better) under the No Action Alternative, but under Alternative 1 or 2 the operation of that signalized intersection is unacceptable (i.e., LOS E or F) and that signalized intersection would have an additional delay of at least 5 seconds per vehicle.
- A signalized intersection operates unacceptably (i.e., LOS E or F) under the No Action Alternative, and under Alternative 1 or 2 that signalized intersection would have an additional delay of at least 5 seconds per vehicle.
- Alternative 1 or 2 would cause a substantial increase in delays (i.e., well into a LOS F condition) and also result in modal conflicts at an unsignalized intersection due to the magnitude of traffic generated by the arena, proximity to major arena entrances/garage access points, and other conditions.
- Alternative 1 or 2 would cause the average corridor travel speed on Mercer St or Denny Way to decrease to 40% or less of the free-flow speed during the weekday pre-event peak hour.

- Free-flow speeds on Mercer St or Denny Way under the No Action Alternative are already 40% of the free-flow speed, and Alternative 1 or 2 would further decrease the average corridor travel speed by another 5% during the weekday pre-event peak hour.
- Alternative 1 or 2 would cause freeway off-ramp queues that spill back onto the I-5 mainline.
- Freeway off-ramp queue spills back onto the mainline under the No Action Alternative, and Alternative 1 or 2 would result in a substantial increase in freeway off-ramp queue length.

These criteria were developed based on conditions unique to the project and its location, as well as past practices of the City on other EISs. The City typically considers LOS D as the minimum desired operating condition in downtown urban areas. A 5-second increase in delay is frequently used in transportation assessments because it is considered a value beyond which the public may perceive a noticeable difference in traffic conditions. Given the highly directional nature of athletic and other special events, directional travel time is important to consider because signalized intersection LOS measures the overall operation of an intersection versus a single approach. The use of 40% of the free-flow speed is supported by the Highway Capacity Manual (Transportation Research Board, 2010). Freeway off-ramp queuing is important because under certain conditions, traffic spillbacks can adversely affect freeway operations and/or cause speed differentials in adjacent lanes, which could affect safety.

In 2016 and 2017, Fehr & Peers staff visited stadiums/arenas in urban areas of San Diego, CA, Portland, OR, Washington, DC, Salt Lake City, UT, San Francisco, CA, Atlanta, GA, and Denver, CO. Observations focused on a variety of operational strategies, ranging from the use of advanced signage, lane closures, parking best practices, special TNC pick-up/drop-off locations, expanded transit service, special accommodation for travel by bicycle and walking, and other considerations. These observations were insightful in understanding how these factors can influence urban stadiums/arenas operations. They were also used in the development of significance criteria for the travel modes described below.

### ***Ridehailing***

#### **Criteria for Significant Operations Impacts from Ridehailing:**

- If ridehailing vehicles or other pick-up/drop-off vehicles block vehicle through lanes to pick-up/drop-off passengers (unless regulated by an Arena Access Management Plan [AAMP] that safely permits such activities).
- If ridehailing vehicles wait in bicycle facilities or bus pullouts to pick-up/drop-off passengers.

These criteria were selected based on observed travel conditions during events at KeyArena and other venues. When vehicle pick-ups/drop-offs occur in travel lanes, congestion can quickly form and pedestrians may walk between idling vehicles. The traffic operations impacts associated with ridehailing vehicles are accounted for in the traffic and transit operations impact thresholds. In other words, the traffic and transit delays caused by ridehailing vehicles accessing the arena, circulating to pick-up/drop-off passengers, etc. are identified in the traffic and transit impacts sections.

#### ***Arena Access Management Plan (AAMP)***

As is described in detail in Section 4.5.2, *Operations (Avoidance, Minimization, and Mitigation Measures)*, OVG will work with the Seattle Police Department, SDOT, SDCI, King County Metro, and Seattle Center to develop and implement an AAMP. The AAMP includes traffic, parking, and travel demand management strategies that would be put in place before, during, and after events and is referred to throughout this EIS.

## **Transit**

### **Criteria for Significant Operations Impacts to Transit:**

- Additional ridership would cause a transit route (including buses, Monorail, or LINK light rail) serving the project site to exceed its crowding threshold.
- A transit route serving the project site travels through intersections whose LOS has been significantly impacted as defined in the *Traffic Operations* section, resulting in additional delay for that route.

The crowding thresholds are based on Metro and Sound Transit guidelines; the traffic operations threshold is consistent with that used for other vehicle traffic above.

## **Pedestrians**

### **Criteria for Significant Operations Impacts to Pedestrians:**

- Pedestrian demand on a sidewalk or crosswalk exceeds capacity, causing pedestrians to walk on streets that are open to vehicular or bicycle traffic.

This criterion reflects the inherent differences in safety for persons walking versus traveling in a vehicle (private, TNC, or bus). Pedestrian flows that repeatedly spill onto streets can cause conflicts between travel modes, and often require proactive pedestrian flow management as part of an AAMP.

## **Bicycles**

### **Criteria for Significant Operations Impacts to Bicycles:**

- Bicycle facilities are consistently (i.e., for the majority of the analysis period) blocked by pedestrian overflows from corners, sidewalks, or bus stops, resulting in conflicts between bicycles and other modes.
- On-street bicycle facilities are consistently blocked by vehicles picking up or dropping off patrons at the project site resulting in conflicts between bicycles and other modes.
- Insufficient bicycle parking is provided for event attendees or employees.

These criteria reflect the inherent differences in safety for persons biking versus traveling in a vehicle (private, TNC, or bus). Bicycle flows that consistently spill into vehicle lanes or sidewalks can cause conflicts between travel modes, and often require proactive management as part of an AAMP. Insufficient bicycle parking may lead to bicycles parked in locations that cause modal conflicts.

## **Parking**

### **Criteria for Significant Operations Impacts to Parking:**

- The demand for parking would substantially increase, which then causes adverse effects to other travel modes such as vehicles blocking crosswalks/driveways; vehicle conflicts with buses, pedestrians, or bicycles; and vehicles circulating for multiple blocks looking for parking.

### **Bus/Truck Staging**

#### **Criteria for Significant Operations Impacts to Bus/Truck Staging:**

- Charter buses/trucks used for event loading/unloading stage on study area streets without obtaining SDOT permits, resulting in modal conflicts between authorized curb space users that were displaced.

This threshold is based on the existing MOA regarding curb space management between Seattle Center and SDOT.

### **Paratransit**

#### **Criteria for Significant Operations Impacts to Paratransit:**

- Paratransit vehicles lack designated loading/unloading curb space adjacent to the project site.
- Paratransit vehicles are blocked from accessing designated loading/unloading curb space by non-transit vehicles.

This threshold is in place to ensure ADA-compliant access to the arena.

### **Safety**

#### **Criteria for Significant Operations Impacts to Safety:**

- There is a substantial increase in the collision rate at an intersection identified as a high collision location.
- Pedestrian or bicycle safety is compromised as a result of modal conflicts identified by the pedestrian and bicycle impact thresholds.

These thresholds are based on City standard practices to address safety concerns.

### **2020 Impacts**

The transportation system will change substantially by 2020 due to growing traffic volumes and the opening of the SR 99 Tunnel and reknitted streets across SR 99. Refer to Figure 4-15 for configuration of the reknitted roadway network between 5<sup>th</sup> Ave N, Dexter Ave N, Mercer St, and Denny Way. This figure displays 11 additional intersections selected for micro-simulation study in this area based on the reknitted street grid (Intersections 59–69).

In addition to the reconnected street grid, which would serve all modes, a variety of pedestrian, bicycle, and transit projects are expected to be built by 2020. See Appendix C, *Tech Memo 3, Year 2020 and 2035 Background Transportation Network*, for more details on the projects planned to be in place by 2020.



Figure 4-15. 2020 Street Network

## No Action Alternative

This section describes the conditions of the transportation system under the No Action Alternative in which KeyArena is not renovated. The No Action Alternative is the baseline against which the impacts of the project are assessed. In other words, the 2020 No Action Alternative represents the anticipated transportation conditions in 2020 without the proposed project, while Alternatives 1 and 2 represent conditions with a renovated arena.

Under the No Action Alternative, KeyArena would continue to hold events, although those events would be smaller and less frequent than under Alternatives 1 and 2. The Average Seattle Center Attendance scenario represents a day with no event taking place at KeyArena, and the Above-Average Seattle Center Attendance scenario represents a day with an event at KeyArena.

### Traffic Operations

Traffic volume forecasts were developed for 2020 conditions using the PSRC regional travel demand model. The forecasts take into account existing volumes, planned land use growth within the immediate study area (as well as throughout the city and region), and changing traffic patterns associated with planned projects such as the SR 99 Tunnel. These forecasts represent changing travel demand and travel patterns that would occur with no renovation at KeyArena (and assuming an event is not being held at KeyArena). The following describes the expected growth in traffic between existing and 2020 No Action Alternative – Average Seattle Center Attendance conditions for the weekday pre-event peak hour:

- Mercer St** – The eastbound direction is forecast to experience traffic growth in the range of 150 to 225 vehicles over existing conditions. This represents a modest increase (13%) near Fairview Ave N, but a fairly sizeable increase (45%) west of Queen Anne Ave N. Since traffic levels on eastbound Mercer St west of Queen Anne Ave N are only 15% of the volume present at Fairview Ave N, similar increases in added vehicles across the corridor show larger percentage increases to the west. Traffic growth on westbound Mercer St is in the 10% to 15% range, with a net increase of 75 to 150 vehicles depending on the location.
- Denny Way** – The eastbound direction is forecast to experience traffic growth in the range of 175 to 225 vehicles, which would represent a 20% to 33% increase over existing conditions. Traffic growth on westbound Denny Way is in the 5% to 15% range, with a net increase of 25 to 125 vehicles depending on the location.

### Average Seattle Center Attendance

Intersection delay and corridor travel times are expected to increase substantially by 2020 independent of arena renovation. Overall, the proportion of intersections operating at LOS E or F during the weekday pre-event peak hour would increase from 22% under existing conditions to 61% under 2020 No Action – Average Seattle Center Attendance conditions.

Eastbound travel operations of Mercer St and Denny Way are expected to experience greater queue spillback due to additional traffic growth. Results from the Vissim model output show that the percent demand served on these corridors drops well below 100%, indicating over-capacity conditions that would result in a longer period of major congestion on study area roadways.

**Percent demand served** is defined as the proportion of the hourly vehicle demand that is able to travel through the street network. When percent demand served falls well below 100%, there is more demand than capacity and some vehicles would not be able to enter the model's street network. This results in a longer period with congested traffic conditions (i.e., peak hour spreading).

During the weekday post-event peak hour in 2020, the Denny Way/Stewart St intersection would operate at LOS E. All other intersections would operate at LOS D or better. During the Saturday pre-event peak hour, 4 intersections would operate at LOS E and 3 intersections would operate at LOS F:

- Denny Way/Stewart St (LOS E)
- W Mercer Pl/Elliott Ave W (LOS E)
- Roy St/Dexter Ave N (LOS E)
- Valley St/Westlake Ave N (LOS E)
- Mercer St/Dexter Ave N (LOS F)
- Mercer St/Taylor Ave N (LOS F)
- Valley St/Fairview Ave N (LOS F)

The weekday post-event and Saturday pre-event peak hours do not experience the same percent demand served issues that are present during the weekday pre-event peak hour. In other words, even with growth in the area, the additional traffic would be able to travel through the study area with relatively little congestion. This is because congestion on I-5, which impedes the flow of eastbound traffic on each corridor during the pre-event peak hour, is not present to the same degree during the weekday post-event and Saturday pre-event peak hours.

Travel time along Mercer St and Denny Way was analyzed to identify corridor travel speed impacts. Table 4-8 summarizes projected travel speeds by 2020. Refer to Figure 4-16 for directional LOS on segments of Mercer St and Denny Way between Seattle Center and I-5. This table reveals the following findings:

- A comparison of Figure 4-16 with Figure 4-4 indicates that average travel speeds on Mercer St between Seattle Center and I-5 would be unchanged relative to existing weekday pre-event peak hour conditions. However, greater levels of queue spillback occur in the eastbound direction, so it would take a motorist more time (in 2020 versus existing conditions) to travel the entire Mercer corridor from Elliott Ave W to I-5.
- On Denny Way, the average eastbound travel speed between Seattle Center and I-5 decreases from 3 miles per hour (MPH) under existing conditions to 2 MPH under 2020 No Action Alternative conditions. The westbound travel speed decreases from 9 MPH under existing conditions to 7 MPH under 2020 No Action Alternative conditions. This means the average travel speed would decrease from 90% to 70% of the base free-flow speed.

See Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems* for detailed traffic operations analysis results for the 2020 condition.



**Figure 4-16. Directional Level of Service and Travel Time on East/West Roadways – 2020 No Action Alternative – Average Seattle Center Attendance Weekday Pre-Event Peak Hour Conditions**

**Table 4-8. Corridor Travel Speed – 2020 No Action Alternative – Average Seattle Center Attendance**

Corridor	2020 Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2	20%	10	100%
Denny Way	2	20%	7	70%

MPH = miles per hour. Average free-flow travel speed of 10 MPH assumed given the presence of controls and measured speeds in this range under mostly free-flow conditions on these corridors.

Source: Prepared by Fehr & Peers, 2018.

**Above-Average Seattle Center Attendance**

Due to the additional increment of visitors to the Seattle Center campus, the Above-Average Seattle Center Attendance scenario would result in operations that are worse than those expected with Average Seattle Center Attendance.

On a day with Above-Average Seattle Center Attendance, the proportion of intersections operating at LOS E or F during the weekday pre-event peak hour would increase from 61% (under 2020 No Action – Average Seattle Center Attendance conditions) to 68%. Further, the number of these intersections operating at LOS F would increase from 36 to 45. Refer to Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*, for more detail.

Eastbound travel time along Mercer St and Denny Way would remain similar to the Average Seattle Center Attendance scenario, but the additional traffic would degrade westbound travel speed on Mercer St from 10 MPH (under 2020 No Action – Average Seattle Center Attendance conditions) to 4 MPH. Table 4-9 summarizes projected travel speeds by 2020.

**Table 4-9. Corridor Travel Speed – 2020 No Action Alternative – Above-Average Seattle Center Attendance**

Corridor	2020 Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed (MPH)	% of Free Flow Speed
Mercer St	2	20%	4	40%
Denny Way	2	15%	7.5	75%

MPH = miles per hour.

Source: Prepared by Fehr & Peers, 2018.

### **Ridehailing**

Under the No Action Alternative in 2020, ridehailing is expected to operate the same as it does today. Pick-ups and drop-offs would occur in those locations most convenient to drivers and passengers rather than in a designated area.

#### **Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions, pick-up and drop-off activity would not consistently block through lanes, bicycle facilities, or bus pullouts.

#### **Above-Average Seattle Center Attendance**

Under Above-Average Seattle Center Attendance conditions, more visitors are traveling to Seattle Center, and ridehailing would occur within a more congested traffic environment. Drivers may have a more difficult time finding appropriate curb space for loading and unloading, resulting in more frequently blocked through lanes, bicycle facilities, or bus pullouts. This condition is expected to be similar to what currently occurs during major events at Seattle Center and at large KeyArena events.

### **Transit**

#### **Average Seattle Center Attendance**

As noted in Appendix C, *Tech Memo 4, Affected Environment/Existing Conditions*, a variety of King County Metro bus routes currently serve Seattle Center. All routes currently have peak rider loads that are less than the route's crowding capacity threshold. However, many of these routes are well utilized, and standing is not uncommon. Under the No Action Alternative in 2020, ridership levels would be similar, if not slightly greater (e.g., 5%) than current levels due to continued development in the area, which adds ridership demand. This increase would not cause ridership levels to reach the crowding threshold based on the current reserve capacity of each line. Similarly, the Monorail would have ample reserve capacity under the No Action Alternative in 2020.

Buses would continue to operate on roadways such as Denny Way that are currently congested. Moreover, the traffic operations analysis results indicate worsening congestion on 1<sup>st</sup> Ave N and Queen Anne Ave N between Denny Way and Mercer St during the weekday pre-event peak hour under the No Action Alternative in 2020. Therefore, bus travel time and reliability would degrade as congestion increases.

#### **Above-Average Seattle Center Attendance**

Under the 2020 No Action Alternative – Above-Average Seattle Center Attendance, Seattle Center events (including those at KeyArena) would cause surges in transit ridership before and after events. Although the reserve capacity on an hourly basis is capable of accommodating the surges, post-event attendees may need to wait longer to board a bus with available capacity, as some buses could fill at the Seattle Center stops. Additionally, post-event traffic congestion on 1<sup>st</sup> Ave N would degrade travel times and cause buses difficulty accessing bus stops.

## **Pedestrian Travel**

### **Average Seattle Center Attendance**

Observations of pedestrian activity on a typical day with Average Seattle Center Attendance suggest that no sidewalks or crosswalks routinely have demand exceeding capacity during the analysis periods.

### **Above-Average Seattle Center Attendance**

Observations of pedestrian activity on a typical day with Above-Average Seattle Center Attendance (for example, a mid-sized event at KeyArena) suggest that no sidewalks or crosswalks routinely have demand exceeding capacity. However, it is noted that large events (i.e., over 10,000 persons) can temporarily result in such conditions at certain locations near the event venue (which could be KeyArena or another Seattle Center venue, depending on the large event location).

## **Bicycle Travel**

As described previously, all 2020 scenarios would result in greater degrees of congestion on most streets when compared to existing conditions. The congestion on portions of 1<sup>st</sup> Ave N, Queen Anne Ave N, 5<sup>th</sup> Ave N, and Dexter Ave N are particularly notable as these streets have on-street bicycle lanes. Bicyclists may feel less comfortable traveling on these streets when adjacent lanes experience “stop-and-go” traffic. Such conditions can result in side-street vehicles encroaching into the major street to merge, thereby temporarily blocking the bicycle lane. Conversely, further reductions in auto travel time reliability could make travel to the venue by bicycle more attractive.

The reknitting of east-west streets (Harrison St, Thomas St, and John St) between 5<sup>th</sup> Ave N and Dexter Ave N would provide new east-west bicycle facilities that could encourage bicycle travel. These facilities may be particularly desirable given the lack of bicycle facilities on Denny Way between 1<sup>st</sup> Ave N and Aurora Ave N. Bicycle parking supply would remain the same as existing conditions under the No Action Alternative.

### **Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions, no bicycle facilities are expected to be consistently blocked by pedestrian overflows or vehicles dropping off or picking up patrons.

### **Above-Average Seattle Center Attendance**

Under Above-Average Seattle Center Attendance conditions, no bicycle facilities are expected to be consistently blocked by pedestrian overflows from sidewalks or crosswalks. However, vehicles (ridehailing or otherwise) are likely to temporarily block bicycle facilities when dropping off or picking up passengers.

## Parking

On-street parking supply in 2020 is expected to remain similar to existing conditions. New developments within the study area would add some off-street supply within a walkable distance to the project site, particularly to the east. The Seattle Center employee parking demand is expected to remain similar to current conditions, with a large percentage of employees parking in off-street garages because parking is provided at an inexpensive, monthly rate.

### Average Seattle Center Attendance

Table 4-10 summarizes parking occupancy under Average Seattle Center Attendance conditions. Total on-street parking occupancy is expected to be 67% on a weekday and 81% on a Saturday. Total off-street parking occupancy is expected to be 12% on a weekday and 23% on a Saturday.

**Table 4-10. Parking Occupancy – 2020 No Action Alternative – Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	73 (70%)	69 (66%)
	North	1,055 (71%)	1,356 (91%)
	South	637 (60%)	708 (67%)
	West	348 (72%)	390 (81%)
	<b>Subtotal</b>	<b>2,113 (67%)</b>	<b>2,523 (81%)</b>
Off-Street	East	273 (13%)	275 (13%)
	North	147 (11%)	532 (39%)
	South	190 (13%)	364 (25%)
	West	26 (27%)	5 (5%)
	<b>Subtotal</b>	<b>636 (12%)</b>	<b>1,176 (23%)</b>
On-Street & Off-Street	<b>Total</b>	<b>2,749 (33%)</b>	<b>3,699 (45%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea.

Source: Prepared by Fehr & Peers, 2018.

### Above-Average Seattle Center Attendance

Table 4-11 summarizes parking occupancy under Above-Average Seattle Center Attendance conditions. With above-average attendance, parking occupancy would increase for both on-street and off-street facilities, although most of the additional demand is expected to use off-street parking due to its close proximity to various Seattle Center venues. Total on-street parking occupancy is expected to be 69% on a weekday and 82% on a Saturday. Total off-street parking occupancy is expected to be 46% on a weekday and 53% on a Saturday.

**Table 4-11. Parking Occupancy – 2020 No Action Alternative – Above-Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	73 (70%)	69 (66%)
	North	1,085 (73%)	1,386 (93%)
	South	657 (62%)	728 (69%)
	West	348 (72%)	390 (81%)
	<b>Subtotal</b>	<b>2,163 (69%)</b>	<b>2,573 (82%)</b>
Off-Street	East	688 (32%)	895 (41%)
	North	1,130 (82%)	1,082 (79%)
	South	580 (40%)	740 (51%)
	West	26 (27%)	5 (5%)
	<b>Subtotal</b>	<b>2,424 (46%)</b>	<b>2,722 (53%)</b>
On-Street & Off-Street	<b>Total</b>	<b>4,587 (56%)</b>	<b>5,295 (64%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea.

Source: Prepared by Fehr & Peers, 2018.

#### Bus/Truck Staging

Charter buses and trucks currently stage using curb space in the vicinity of the project site in accordance with the SDOT and Seattle Center MOA for Event Curbside Management (SDOT and Seattle Center, 2011). Through that agreement, Seattle Center reserves curb space on Thomas St, Warren Ave N, 2<sup>nd</sup> Ave N, Republican St, and 4<sup>th</sup> Ave N for loading, unloading, and staging of events. It is assumed this arrangement stays in place and all KeyArena charter bus and truck staging consistent with that arrangement is permitted by SDOT. In other words, there are no changes related to charter buses or truck staging under the No Action Alternative.

#### Paratransit

Under the No Action Alternative, paratransit vehicles would continue to load and unload along the east side of 1<sup>st</sup> Ave N adjacent to KeyArena, as well as on 2<sup>nd</sup> Ave N just south of KeyArena. This designated passenger loading/unloading curb space would be available under both Seattle Center attendance conditions. However, with an unregulated ridehailing system, it is likely that the passenger loading/unloading space used by paratransit would sometimes be blocked by non-transit vehicles during periods of high demand.

#### Safety

No study intersections are identified as high collision locations.

## Average Seattle Center Attendance

Under Average Seattle Center Attendance conditions, pick-up and drop-off activity generally does not block through lanes, bicycle facilities, or bus pullouts so bicycle facilities are not expected to be affected from a safety perspective.

## Above-Average Seattle Center Attendance

Under Above-Average Seattle Center Attendance conditions, bicycle safety may be affected by vehicles (ridehailing or otherwise) temporarily blocking bicycle facilities when dropping off or picking up passengers.

### **Summary of Transportation Conditions in 2020 – No Action Alternative**

During an Average Seattle Center Attendance condition (i.e., no event at KeyArena), substantial intersection delay and low eastbound travel speed on Denny Way and Mercer St result in traffic operations falling below the City's standards. The degraded intersection LOS and travel speed are caused by local and regional growth in the area. Although transit capacity is expected to be sufficient under 2020 No Action Alternative – Average Seattle Center Attendance, the traffic operations conditions indirectly affect transit service during the weekday pre-event peak hour. These conditions are related to commute traffic throughout the Uptown, South Lake Union, Belltown, and Downtown Urban Centers.

During an Above-Average Seattle Center Attendance condition, such as a mid-sized event at KeyArena or another Seattle Center venue, more localized effects are experienced in the study area in addition to the degraded traffic operations and transit conditions described above. Because ridehailing vehicles would not have regulated loading and unloading locations under the No Action Alternative, it is expected that they would frequently block through lanes, bicycle facilities, and bus pullouts during events, adversely affecting transit, bicycle travel, paratransit, and safety (similar to what currently exists at KeyArena during events).

### **Alternative 1: OVG Proposal**

With a renovated arena, Alternative 1 would result in larger and more frequent events that could affect the transportation system. This section describes the potential impacts to transportation that are likely under Alternative 1.

The travel characteristics of arena attendees are key to understanding how the project may affect the transportation system. These characteristics include considerations such as the mode of travel an attendee uses, their origin and destination, and when they choose to travel. The EIS Consultant Team considered a variety of data to estimate project travel characteristics, including KeyArena attendee mode share, KeyArena attendee geographic distribution, and travel characteristics at comparable sports and concert arenas such as mode share, trip origin and destination, temporal distribution, and average vehicle occupancy. Table 4-12 summarizes the mode share estimates for attendees of the arena.

**Table 4-12. Expected Mode Share for Arena Attendees in 2020**

Travel Mode	Weekday NBA Game Pre-Event Peak Hour	Weekday NBA Game Post-Event Peak Hour	Saturday Concert Pre-Event Peak Hour	Notes
Private Vehicle	63%	67%	68%	Some of these trips may also include longer walks or bike share bicycle travel to the arena to/from a remote lot/garage.
Bus	8%	6%	6%	Reflect transit trips to/from routes adjacent to Seattle Center. Bus/LINK light rail to Westlake & ferry trips are assumed to arrive to arena by walk, bicycle, TNC, Monorail, or bus.
Taxi/TNC/Other Drop-off	15%	12%	15%	Percentages represent final primary mode of travel to/from Seattle Center vicinity. Travel by ferry, or bus/LINK light rail to Westlake Station is associated with some of these trips.
Walk	10%	10%	8%	
Monorail	3%	4%	2%	
Bicycle	1%	1%	1%	

Source: Prepared by Fehr & Peers, 2018. Refer to Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*.

An average vehicle occupancy (AVO) factor is necessary to estimate the total number of vehicles that would transport attendees to the arena based on the mode share percentages in Table 4-12. Based on observations at KeyArena and comparable venues, the following estimates are applied for arena attendees in 2020 (refer to Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*, for more details):

- Weekday NBA Game:
  - 2.3 persons per vehicle during pre-event peak hour.
  - 2.45 persons per vehicle during post-event peak hour (higher AVO due to shift in TNC/bus mode in pre-event to private vehicle, i.e., carpooling on the return trip).
- Saturday Concert:
  - 2.4 persons per vehicle during pre-event peak hour.

Temporal distribution estimates of arrivals and departures are also required to determine the trip generation during the analysis periods. Observations at KeyArena and comparable venues were used to develop the following estimates for arena attendees in 2020:

- Weekday NBA Game:
  - 60% of vehicles arrive during pre-event peak hour.
  - 95% of vehicles depart during post-event peak hour.
- Saturday Concert:
  - 50% of vehicles arrive during pre-event peak hour.

Note that not all the attendees arrive or leave the venue via vehicle within the pre- or post-event peak hour. This reflects the fact that many patrons arrive early to the neighborhood to eat, drink, or socialize. While less common in the post-event condition, some patrons would also stay late after an event to “wait out” traffic congestion, likely at area restaurants and bars.

Table 4-13 summarizes the arena trip generation estimates using the mode share, AVO, and temporal distribution estimates described above. These estimates reflect the sold-out capacity for the renovated arena and apply to both Alternatives 1 and 2. During the weekday pre-event peak hour, attendees arriving to the venue by TNC, taxi, or other drop-off would result in approximately 720 outbound vehicle trips, some of which would be added to the peak eastbound travel directions on Mercer St and Denny Way.

**Table 4-13. Peak Hour Vehicle Trip Generation of Proposed Arena (Alternatives 1 and 2) in 2020**

Traveler Type	Weekday NBA Game Pre-Event Peak Hour Vehicle Trips			Weekday NBA Game Post-Event Peak Hour Vehicle Trips			Saturday Concert Pre-Event Peak Hour Vehicle Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Attendees traveling by private vehicle	3,016	0	3,016	0	4,776	4,776	2,709	0	2,709
Attendees traveling by TNC/taxi/drop-off vehicle	718	718	1,436	910	910	1,820	598	598	1,196
Employees traveling by private vehicle	30	0	30	0	60	60	30	0	30
Employees traveling by TNC/Taxi/Drop-off	2	2	4	4	4	8	2	2	4
Miscellaneous <sup>1</sup>	15	5	20	5	10	15	15	5	20
<b>Total</b>	<b>3,781<sup>2</sup></b>	<b>725</b>	<b>4,506</b>	<b>919</b>	<b>5,760<sup>2</sup></b>	<b>6,679</b>	<b>3,354</b>	<b>605</b>	<b>3,959</b>

<sup>1</sup>. Miscellaneous trips include delivery vehicles, emergency vehicles, utility vehicles, etc.

<sup>2</sup>. Weekday pre-event inbound trips and weekday post-event outbound trips are not equal due to differing mode share assumptions, AVO, and temporal distribution of travel for each analysis period.

Source: Prepared by Fehr & Peers, 2018.

The distribution of trips to the arena would be different for weekday NBA games versus Saturday concerts due to different attendee geographic and demographic characteristics, familiarity with different modes of travel, and frequency of visiting the area. Additionally, the effects of weekday home-to-work travel, which result in a greater likelihood of some Downtown workers traveling to the arena directly from Downtown, also influence both mode split and trip distribution. Spatial distribution of ticket purchases for a variety of KeyArena events were reviewed to develop a geographic distribution estimate. Table 4-14 summarizes the estimates used for this EIS analysis, and a full discussion of the process is found in Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*.

**Table 4-14. Trip Origin/Destinations of Attendees**

Origin/Destination	Weekday NBA Game <sup>1</sup>	Saturday Concert
Northwest Seattle / Shoreline	2%	1.5%
North Seattle / Lake Forest Park	1.5%	2%
Kenmore / Bothell / Woodinville	2%	2%
Ballard / Crown Hill	6%	4.5%
Northeast Seattle	4.5%	2.5%
Kirkland / Redmond	12%	5%
Magnolia / Queen Anne	2%	2%
Westlake / South Lake Union / Uptown	3%	2%
Capitol Hill / Central District	4.5%	4.5%
Downtown / Belltown	3%	2%
Bellevue / Mercer Island	8.5%	3%
West Seattle / South Seattle / Renton	5%	6.5%
SeaTac / Tukwila / Kent	3%	5.5%
Renton/Covington	5%	4%
Sammamish / Issaquah	7%	4%
Snohomish / Millcreek	5%	4.5%
Everett / Edmonds	3%	5%
Other	23%	39%

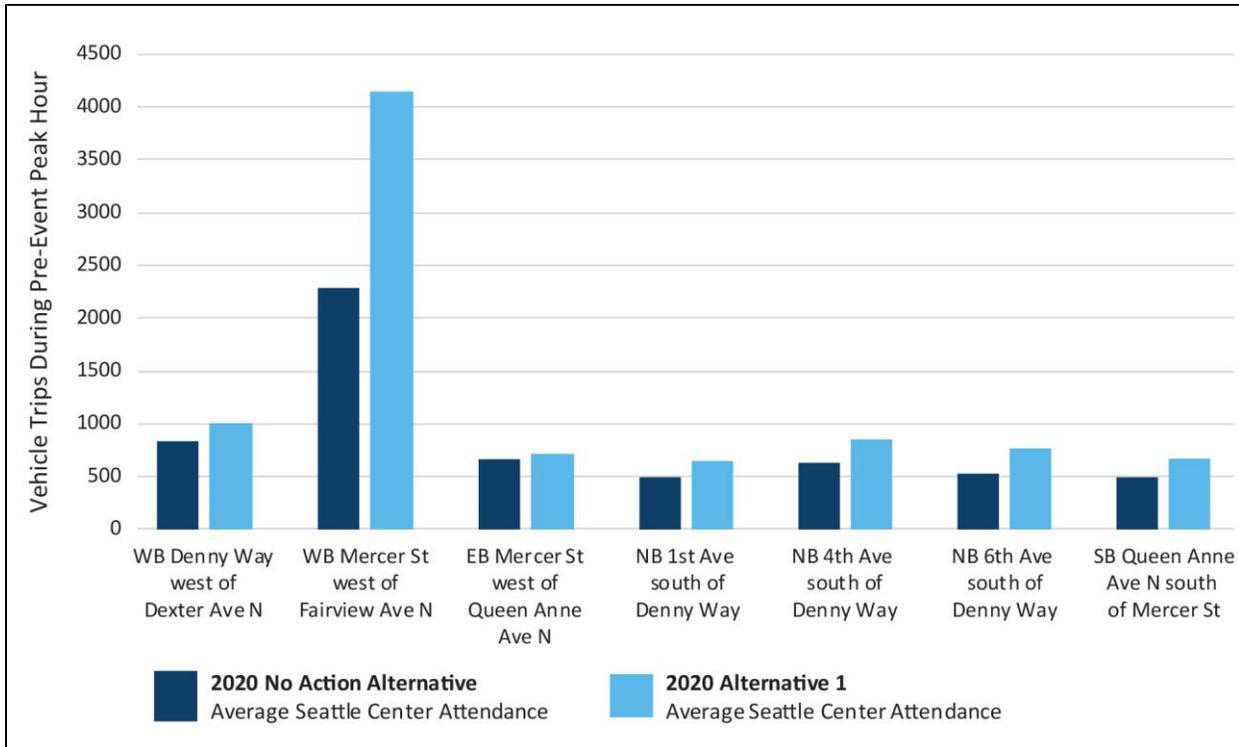
<sup>1</sup>. NBA weekday basketball game percentages do not reflect the patrons who work in Downtown, South Lake Union, or Uptown and who are less likely to travel from home to attend a game. These workers were accounted for in the trip generation and mode share calculations – see Appendix C, *Tech Memo 5*. Some patrons are also likely to arrive early and/or stay late prior to event. This table does not account for their location immediately prior or after an event. However, this temporal pattern is described above and is accounted for in the analysis.

Source: Prepared by Fehr & Peers, 2018.

For more details on project travel characteristics, see Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*.

### Traffic Operations

Traffic volumes associated with the renovated arena, as described above, were layered on top of the No Action Alternative forecasts for the traffic operations analysis. This approach is conservative in that it assumes no redistribution of background traffic away from the streets near Seattle Center during event evenings. Figure 4-17 displays the traffic growth (over the No Action Alternative) on key corridors resulting from Alternative 1. This figure indicates that the greatest increase in inbound travel occurs along Mercer St from I-5. However, a number of other roadways also experience increases in traffic.



**Figure 4-17. Project Traffic Growth on Key Corridors – 2020**

This analysis scenario does not assume any formalized traffic management strategies to accommodate arriving attendees during the pre-event peak hour. Assumptions include the following: Signals operate in normal mode, no turning movement restrictions are present, advanced signage is not provided to direct motorists to available parking, traffic control officers are not present at intersections, parking garage occupancy levels are not managed, no changes to existing on-street parking management are implemented, ridehailing vehicles are not restricted in their passenger drop-off behavior, and no measures are taken to encourage attendees to travel by non-auto modes.

Seattle Center and SDOT currently use several traffic management strategies during the post-event period after KeyArena events; these would continue under Alternative 1 or 2. These strategies include the following:

- Placement of traffic control officers at the 2<sup>nd</sup> Ave N/Denny Way intersection to assign right-of-way and accommodate the heavy southbound flow on 2<sup>nd</sup> Ave N. Left-turns onto eastbound Denny Way are prohibited.
- Closure of Thomas St between 1<sup>st</sup> Ave N and Warren Ave N.
- Westbound right-turn prohibited from Harrison St and the north driveway of the 5<sup>th</sup> Ave N Garage onto northbound 5<sup>th</sup> Ave N to discourage travel toward Mercer St corridor.
- Special event signal timings on the Mercer St and Denny Way corridors.

**Average Seattle Center Attendance**

Figure 4-18 displays the number of intersections operating at LOS D or better, LOS E, and LOS F for Average Seattle Center Attendance conditions under the No Action Alternative and with Alternatives 1

and 2 (Alternative 2 is described in a subsequent section). Note that Western Ave W/Denny Way and Denny Way/Queen Anne Ave N are considered separate intersections (and labeled 28 and 28a on Figure 4-2 and subsequent figures) so the number of total intersections is 76. Key findings from this figure include the following:

- Under weekday pre-event peak hour conditions, the number of intersections operating at LOS E or F would be similar between the No Action Alternative and Alternative 1. However, Alternative 1 would cause a number of significant intersection impacts due to added delays at intersections already operating unacceptably under the No Action Alternative.
- Under weekday post-event peak hour conditions, the number of intersections operating at LOS E or F would increase dramatically, from 1 under the No Action Alternative to 39 under Alternative 1.
- Under Saturday pre-event peak hour conditions, the vast majority of intersections would continue operating at LOS D or better. The proportion operating at LOS E or F would increase from 9% under the No Action Alternative to 14% under Alternative 1.

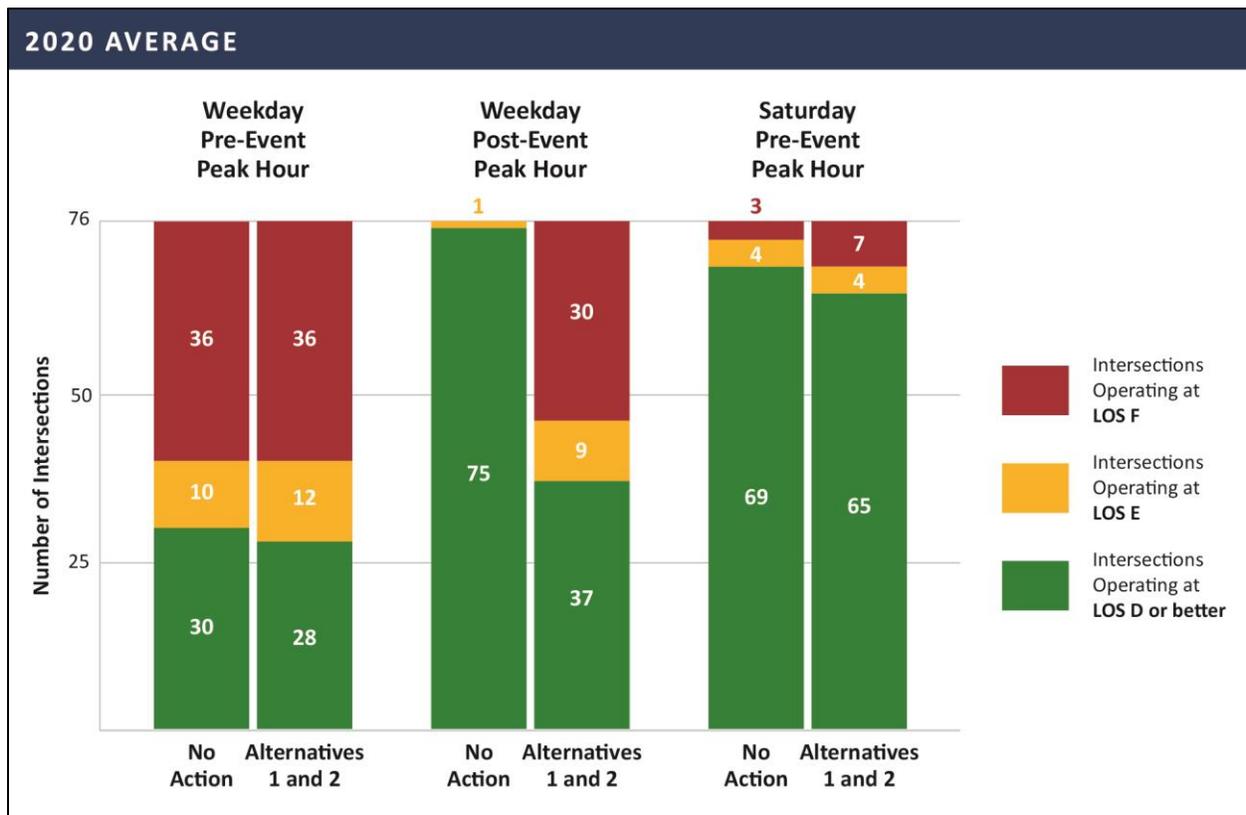


Figure 4-18. Intersection LOS Summary – 2020 Conditions with Average Seattle Center Attendance

During the weekday pre-event peak hour on a day with Average Seattle Center Attendance, 22 intersections would be impacted by the project. For intersections that operate acceptably under the No Action Alternative, this is defined as dropping to an unacceptable LOS (LOS E or F) and adding 5 or more seconds of delay for signalized intersections and adversely affected unsignalized intersections based on degree of congestion increase, modal conflicts, and other considerations. For intersections that operate unacceptably under the No Action Alternative, this is defined as Alternative 1 adding at least 5 seconds

of delay. These impacted intersections are shown in Figure 4-19 and listed in Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*.

Figure 4-20 shows the directional LOS on segments of Mercer St and Denny Way between Seattle Center and I-5. This figure indicates that Alternative 1 would cause westbound travel on these roadways to experience moderate to substantial delay increases when compared to the No Action Alternative (refer to Figure 4-16 for comparison). Refer to Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*, for more detail.

The micro-simulation models used to evaluate traffic operations suggest that not all of the travel demand under Alternative 1 could be served on westbound Mercer St and Denny Way due to bottlenecks to the east (principally the I-5 off-ramp merge). Because only a portion of that traffic is expected to be able to travel through those corridors, some intersections may operate slightly better than would otherwise be expected. Conversely, queues would spill back from bottlenecks, affecting the LOS at upstream intersections.

During the weekday pre-event peak hour, traffic exiting I-5 (from the north and south) onto westbound Mercer St would exceed the capacity of the Mercer St/Fairview Ave N intersection, causing traffic to spill back onto the freeway mainline. This is caused primarily by the large influx of project-related vehicle trips. While it is accurate to report that the off-ramps cannot serve the projected demand, it is also true that capacity limitations on I-5 may constrain travel demand from reaching the off-ramps. (In other words, the significant queues on southbound I-5 north of the Ship Canal and westbound I-90 and SR 520 could limit how many vehicles could arrive at the Mercer St off-ramps during the pre-event peak hour.)

During the weekday post-event peak hour on a day with Average Seattle Center Attendance, 37 intersections would be impacted under Alternative 1. These impacted intersections are displayed in Figure 4-19 and listed in Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*. During the Saturday pre-event peak hour on a day with Average Seattle Center Attendance, 8 intersections would be impacted under Alternative 1. The impacted intersections are:

- Mercer St/Dexter Ave N
- Mercer St/Fairview Ave N
- Mercer St/Taylor Ave N
- W Mercer Pl/Elliott Ave W
- Denny Way/Stewart St
- Roy St/5<sup>th</sup> Ave N
- Roy St/Dexter Ave N
- Valley St/Fairview Ave N

Table 4-15 summarizes projected travel speeds along Mercer St and Denny Way under Alternative 1 – Average Seattle Center Attendance.

This table shows the following findings:

- Average travel speeds on eastbound Mercer St between Seattle Center and I-5 would be unchanged relative to the No Action Alternative. Westbound travel speeds on Mercer St would be reduced from 10 MPH under the No Action Alternative to 5 MPH under Alternative 1 –

Average Seattle Center Attendance. As noted above, the Mercer St/Fairview Ave N intersection meters the flow of westbound traffic into the corridor, thereby limiting further reductions in travel speed (i.e., vehicles are queued on the I-5 off-ramps).

- On Denny Way, the average eastbound travel speed between Seattle Center and I-5 would be unchanged relative to the No Action Alternative. The westbound travel speed would decrease from 7 MPH under the No Action Alternative to 5.5 MPH under Alternative 1 – Average Seattle Center Attendance.
- As was the case in the No Action Alternative, the fact that the eastbound travel times do not change is more of a reflection of the complete saturation of eastbound lanes due to the bottleneck caused by I-5. Under Alternative 1, the percent demand served is lower than under the No Action Alternative, which indicates that the congested peak period would extend in duration.

**Table 4-15. Corridor Travel Speed – 2020 Alternative 1 – Average Seattle Center Attendance**

Corridor	Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2	20%	5	50%
Denny Way	2	20%	5.5	55%

MPH = miles per hour. Average free-flow travel speed of 10 MPH assumed given presence of controls and measured speeds in this range under mostly free-flow conditions on these corridors.

Source: Prepared by Fehr & Peers, 2018.

This scenario would result in traffic queuing back onto the I-5 freeway mainline from the Mercer St off-ramps.

#### Above-Average Seattle Center Attendance

Figure 4-21 displays intersection LOS for Above-Average Seattle Center Attendance conditions under the No Action Alternative and with Alternative 1. This figure indicates that a greater percentage of intersections would operate at LOS D or better during the weekday pre-event peak hour under Alternative 1 than under the No Action Alternative (Alternative 2 operations are described in a subsequent section). This occurs for several reasons. First, the project would add greater amounts of traffic in the non-peak directions of Mercer St and Denny Way. In some instances (e.g., Mercer St/9<sup>th</sup> Ave N), this causes the weighted average delay for all movements at the intersection to be reduced, thereby causing a better LOS result. Additionally, Alternative 1 causes bottlenecks at certain upstream intersections, thereby causing delays to be reduced at downstream intersections due to fewer approaching vehicles. Despite these findings, a visual inspection of the traffic simulation shows that there is additional traffic congestion under Alternatives 1 and 2 when compared to the No Action condition, consistent with expectations.

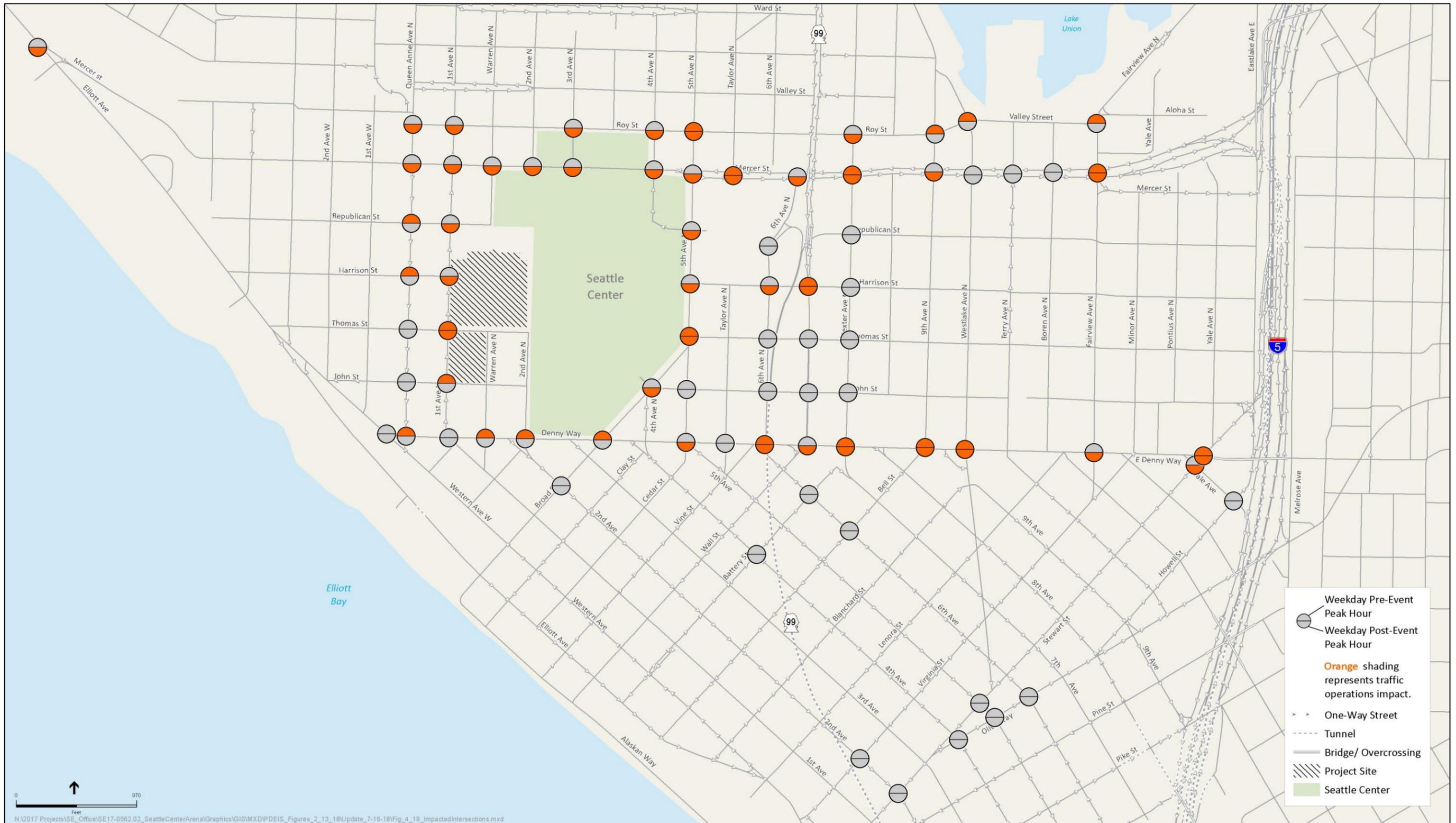
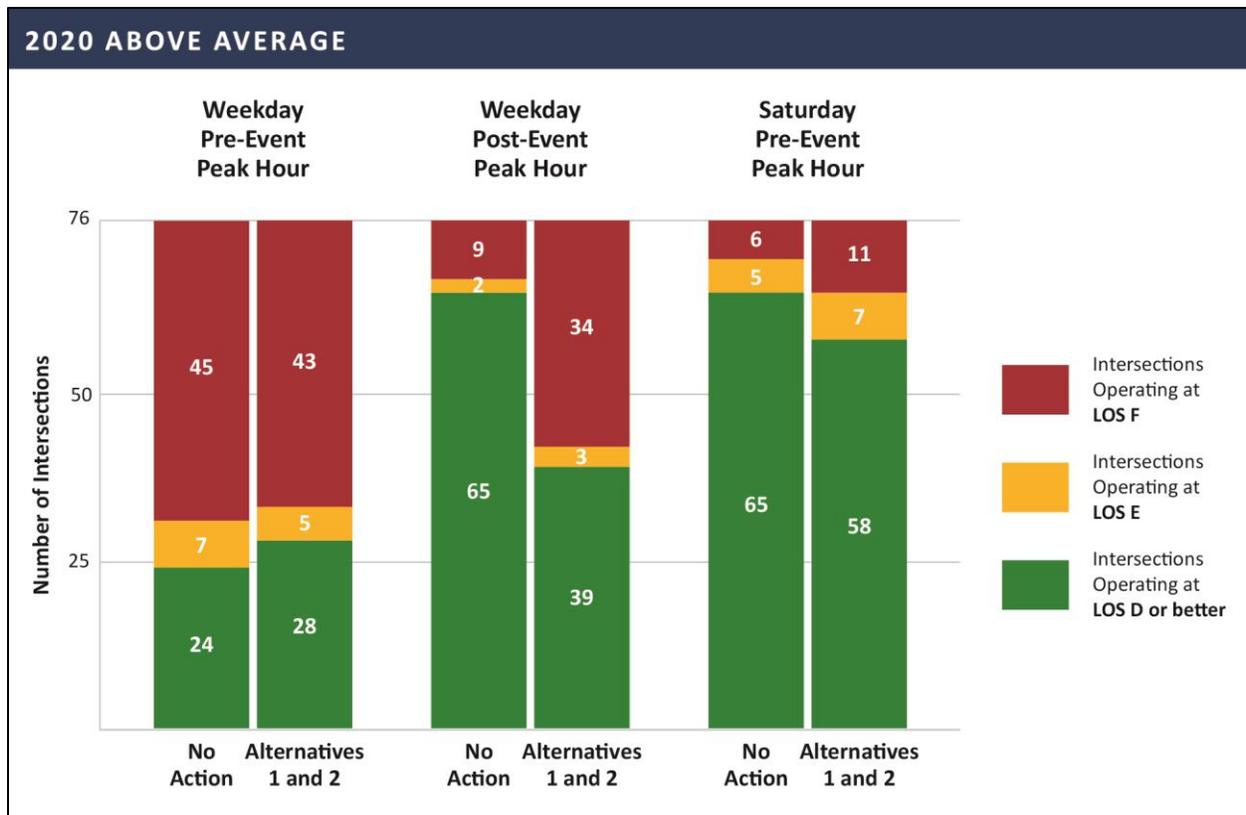


Figure 4-19. Impacted Intersections – 2020 Alternative 1 – Average Seattle Center Attendance Weekday Pre-Event and Post-Event Peak Hour Conditions



**Figure 4-20. Directional Level of Service and Travel Time on East/West Roadways – 2020 Alternative 1 – Average Seattle Center Attendance Weekday Pre-Event Peak Hour Conditions**



**Figure 4-21. Intersection LOS Summary – 2020 Conditions with Above-Average Seattle Center Attendance**

During the weekday pre-event peak hour on a day with Above-Average Seattle Center Attendance, 20 intersections would be impacted by the project. For intersections that operate acceptably under the No Action Alternative, this is defined as dropping to an unacceptable LOS (LOS E or F) and adding 5 or more seconds of delay for signalized intersections and adversely affected unsignalized intersections based on the degree of congestion increase, modal conflicts, and other considerations. For intersections that operate unacceptably under the No Action Alternative, this is defined as Alternative 1 adding at least 5 seconds of delay. These impacted intersections are displayed in Figure 4-22 and listed in Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*. During the weekday post-event peak hour on a day with Above-Average Seattle Center Attendance, 34 intersections would be impacted under Alternative 1 (the No Action Alternative assumes a mid-sized KeyArena event that does not result in widespread poor operations during the post-event peak hour when background traffic is minimal). These impacted intersections are displayed in Figure 4-22 and listed in Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*.

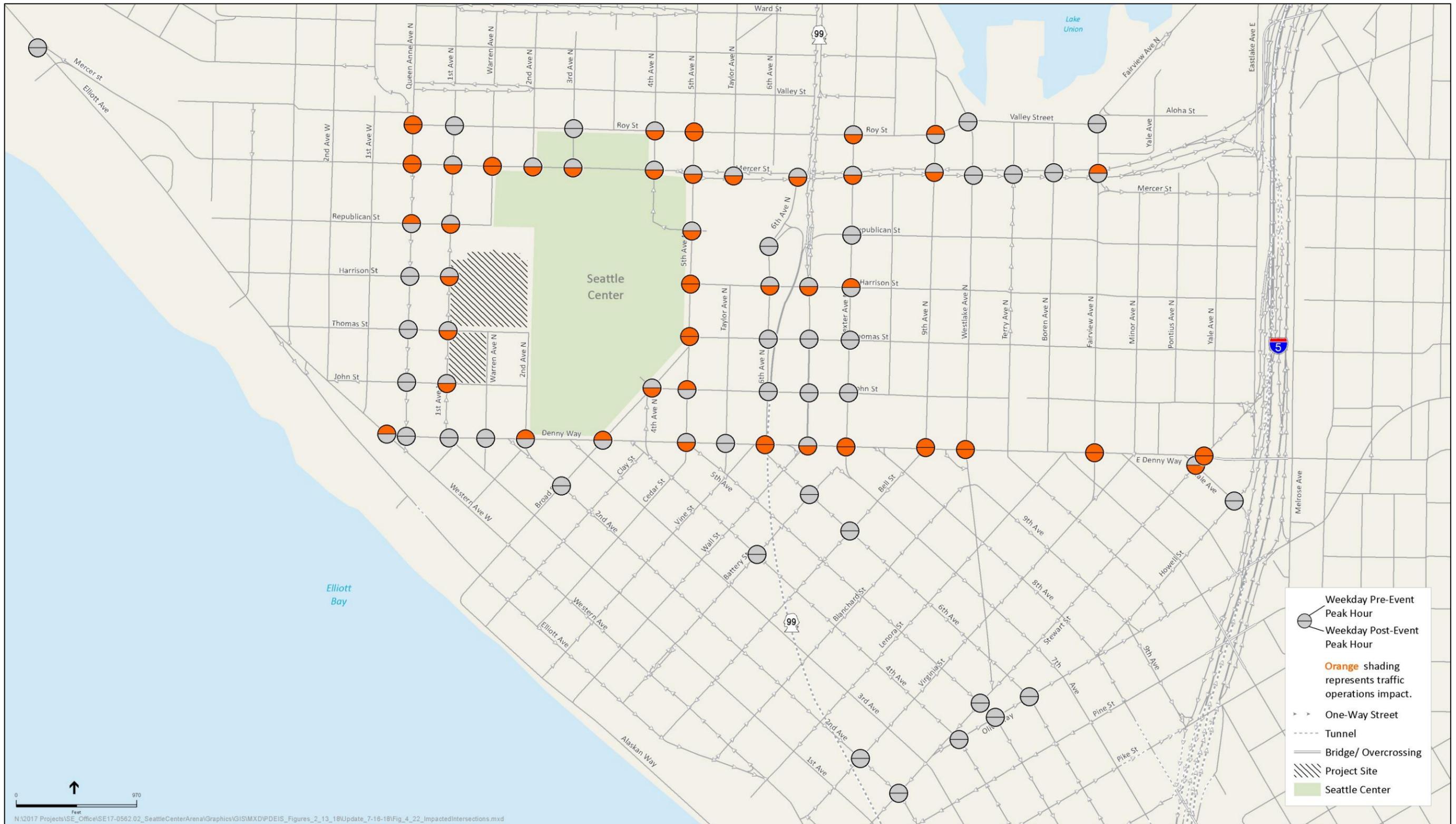


Figure 4-22. Impacted Intersections – 2020 Alternative 1 – Above-Average Seattle Center Attendance Weekday Pre-Event and Post-Event Peak Hour Conditions

During the Saturday pre-event peak hour on a day with Above-Average Seattle Center Attendance, 14 intersections would be impacted under Alternative 1. The impacted intersections are:

- Mercer St/4<sup>th</sup> Ave N
- Mercer St/5<sup>th</sup> Ave N
- Mercer St/Dexter Ave N
- Mercer St/Taylor Ave N
- W Mercer Pl/Elliott Ave W
- Denny Way/Warren Ave N
- Denny Way/Fairview Ave N
- Denny Way/Stewart St
- Roy St/4<sup>th</sup> Ave N
- Roy St/5<sup>th</sup> Ave N
- Roy St/Dexter Ave N
- Roy St/9<sup>th</sup> Ave N
- Valley St/Westlake Ave N
- Valley St/Fairview Ave N

Table 4-16 summarizes projected travel speeds along Mercer St and Denny Way under Alternative 1 – Above-Average Seattle Center Attendance. This table indicates that westbound travel speeds on Mercer St would remain similar to the No Action Alternative because the travel speed comparison begins downstream of the Mercer St/Fairview Ave N bottleneck. Hence, the volume served and speed of traffic passing through the corridor under each scenario are similar. Figure 4-23 shows the directional LOS on segments of Mercer St and Denny Way between Seattle Center and I-5.

**Table 4-16. Corridor Travel Speed – 2020 Alternative 1 – Above-Average Seattle Center Attendance**

Corridor	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2	20%	5	50%
Denny Way	2	20%	4.5	45%

MPH = miles per hour.

Source: Prepared by Fehr & Peers, 2018.

The following conclusions are drawn regarding traffic impacts of Alternative 1 under the Average and Above-Average Seattle Center Attendance scenarios:



Figure 4-23. Directional Level of Service and Travel Time on East/West Roadways – 2020 Alternative 1 – Above-Average Seattle Center Attendance Weekday Pre-Event Peak Hour Conditions

### Weekday Pre-Event Peak Hour

- Alternative 1 impacts are measured against the No Action Alternative as follows:
  - For Average Seattle Center Attendance conditions, no major event occurs at KeyArena or Seattle Center. Thus, for this scenario, the Alternative 1 impacts are based on the entirety of the project's travel effects.
  - For Above-Average Seattle Center Attendance conditions, greater levels of background attendance are assumed at Seattle Center, including an event at KeyArena under the No Action Alternative. Thus, when Alternative 1 conditions are compared against the No Action Alternative, the net increase in overall traffic is less than when comparing the same scenarios under Average Seattle Center Attendance conditions.
  - Under both scenarios, conditions along Mercer St and Denny Way are over-saturated, with vehicle queue spillbacks extending onto various north-south streets. The net effect is the same number of impacted intersections caused by Alternative 1 under Average and Above-Average Seattle Center Attendance conditions, although impacts do occur at different locations.

### Weekday Post-Event Peak Hour

- The severity of Alternative 1 impacts (nearly half of all intersections are impacted) is similar under Average and Above-Average Seattle Center Attendance conditions because neither assumes an AAMP. As a result, queue spillbacks occur from multiple intersection bottlenecks, adversely affecting the overall roadway network in a similar manner for each condition.

### Saturday Pre-Event Peak Hour

- Alternative 1 causes significant impacts at 14 intersections under the Above-Average Seattle Center Attendance scenario, versus 8 under the Average Attendance scenario.

#### **Ridehailing**

Ridehailing vehicles tend to drop off passengers in accordance with their selected destination and often at whatever specific block location the passenger requests. Alternative 1 would not alter this typical drop-off behavior—drop-offs tend to be more dispersed than pick-ups in both time (people stagger their arrival more than their departure) and in space (people drop off at more locations and tend to be picked up near the exit door). However, based on input from SDOT, the City would regulate post-event pick-ups to only occur at a handful of locations surrounding and at the perimeter of the Seattle Center campus.

Under this plan, during pre-determined event times (to be coordinated by Seattle Center and SDOT), customers requesting a ride from the geofenced area encompassing Seattle Center would have to meet their vehicle at 1 of the designated pick-up locations during post-event conditions. Specific geofence boundaries would be determined and periodically updated in the AAMP. Ridehailing activity would result in a substantial number of “deadhead” trips added to the area because each pick-up or drop-off results in 2 trips: 1 carrying the arena attendee(s) and 1 trip with only the driver (unless the ridehailing vehicle is connected with another passenger in the vicinity of the arena). The impacts of the ridehailing trips are analyzed as part of the traffic and transit operations impacts.

## Average Seattle Center Attendance

Under Alternative 1 – Average Seattle Center Attendance, the renovated arena would attract substantial ridehailing activity during events such as an NBA game or concert. Drop-off activity would be similar to that observed during large KeyArena events, which sometimes results in ridehailing vehicles blocking through lanes, bicycle facilities, or bus pullouts, particularly along 1<sup>st</sup> Ave N between Harrison St and Republican St. Some of the designated ridehailing pick-up locations may temporarily repurpose a parking or travel lane, but this would be in accordance with an AAMP in coordination with SDOT to minimize the effects to other modes.

## Above-Average Seattle Center Attendance

Under Alternative 1 – Above-Average Seattle Center Attendance, ridehailing would occur within a slightly more congested traffic environment. Drivers may have a more difficult time finding appropriate curb space to drop off passengers, resulting in more frequently blocked through lanes, bicycle facilities, or bus pullouts during the pre-event peak hours, particularly along 1<sup>st</sup> Ave N between Harrison St and Republican St. Some of the designated ridehailing pick-up locations may temporarily repurpose a parking or travel lane, but this would occur in accordance with an AAMP in coordination with SDOT to minimize the effects to other modes.

### Transit

## Average Seattle Center Attendance

Table 4-17 displays the number of event attendees that are expected to ride a bus directly to the renovated arena during each peak hour under Alternative 1 (i.e., this does not include bus riders who stop at Westlake Station or other locations and then complete their trip to the arena by another mode). This table also shows similar information for Monorail ridership. The following describes the analysis performed for each of these travel modes.

### *Travel by Bus*

A detailed ridership estimate and capacity analysis (by individual route) was conducted for weekday and Saturday conditions. As described in the table footnotes, the analysis concluded that buses with stops at/near Seattle Center have adequate reserve capacity to accommodate the additional riders associated with Alternative 1 during the weekday and Saturday pre-event peak hour.

During the weekday post-event peak hour, the analysis shows that project-related riders would consume approximately half of the reserve capacity. However, demand to travel northbound to the University District and Ballard would exceed the crowding threshold on routes serving these areas. Note that while the majority of the routes would have capacity during the post-event peak hour, some individual trips could reach capacity and turn away riders. A description of Saturday post-event conditions is included in the impact summary section.

Buses would continue to operate on roadways such as Denny Way that are currently congested. Under both pre-event and post-event conditions, 1<sup>st</sup> Ave N and Queen Anne Ave N between Denny Way and Mercer St are expected to operate under congested conditions. Transit travel time and reliability would be adversely affected under Alternative 1 – Average Seattle Center Attendance during all 3 peak hour analysis periods. Additionally, ridehailing vehicle drop-offs could occasionally block bus stops or layover areas, which could delay bus riders or interfere with transit operations.

**Table 4-17. Transit Capacity – 2020 Alternative 1 – Average Seattle Center Attendance**

Time Period	Travel by Bus (Directly to/from Arena)		Travel by Monorail (to/from Arena)	
	Number of Arena Attendee Riders <sup>1</sup>	Percent Usage of Overall Reserve Capacity by Arena Attendees <sup>2</sup>	Number of Arena Attendee Riders <sup>1</sup>	Evaluation
Weekday Pre-Event Peak Hour	881	37%	330	Demand can be accommodated by existing service <sup>4</sup>
Weekday Post-Event Peak Hour	1,046	51%	697	
Saturday Pre-Event Peak Hour <sup>3</sup>	574	N/A	191	

<sup>1</sup> See Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*. These totals refer only to added riders that would board or alight at or near Seattle Center (on either bus or Monorail), not total transit usage.

<sup>2</sup> To assess usage of individual bus routes that stop at Seattle Center, bus riders were assigned to individual routes based on the relative proportion of bus trips expected to originate/be destined from areas such as Downtown, Uptown/Belltown, Queen Anne, Mercer West, east of I-5, and points to the north that feature direct bus service. Then, additional ridership demand was evaluated against unused seats (in the appropriate travel direction) to determine adequacy of transit capacity.

<sup>3</sup> Since bus ridership data were not available for Saturday conditions, this evaluation focused on the relative change in bus service on Saturdays versus weekdays. It was found that Saturday pre-event peak hour service levels (for routes arriving to/near Seattle Center) are about 62% of weekday service levels. Since Saturday pre-event peak hour project attendee ridership is 65% of weekday pre-event peak hour ridership, the proportional scaling back of project ridership and service levels from weekday to Saturday conditions suggests that findings regarding project ridership for weekday pre-event conditions would also apply to Saturday.

<sup>4</sup> The Monorail operates on 10-minute headways that can carry 250 persons per train. Under Average Seattle Center Attendance conditions, evening ridership is well below train capacity. The maximum demand for ridership would occur after an event. Assuming 75% of the demand arrives within a 30-minute window, 523 persons would need to be accommodated in 3 trains. In all likelihood, first train would be completely full, second train would be mostly occupied, and third train would be uncrowded.

Source: Prepared by Fehr & Peers, 2018.

Capacity at nearby bus stops was also considered. The northbound stop at 1<sup>st</sup> Ave N and Republican St is expected to have adequate capacity because riders could spill back into the arena plaza during periods of highest demand. However, the southbound stops along Queen Anne Ave N are more constrained due to sidewalk width and street furniture, particularly at John St and Harrison St. This could lead to riders blocking other pedestrians trying to travel along the sidewalk while waiting for buses during the post-event peak hour.

#### *Travel by Monorail*

As shown in the table, Monorail ridership by project attendees would be greatest after an event. During the post-event peak hour, project-related riders could be accommodated via normal service (i.e., 10-minute headways). However, some passengers may have to wait up to 20 minutes due to Monorail train capacity constraints. While the train capacity over the course of the post-event peak hour is sufficient, improvements to the ingress, egress, and operating hours of the Monorail could make it a more attractive option for event attendees to make the first/last mile connection to the arena with less delay to board post-event, thereby mitigating some of the traffic congestion impacts caused by private autos and ridehailing. This analysis assumes that the Monorail capacity remains the same as existing conditions because there is no current funding commitment to improve capacity and convenience.

## Above-Average Seattle Center Attendance

Table 4-18 summarizes the transit capacity findings for Alternative 1 – Above-Average Seattle Center Attendance. Below is a description of the findings for bus and Monorail.

**Table 4-18. Transit Capacity – 2020 Alternative 1 – Above-Average Seattle Center Attendance**

Time Period	Travel by Bus (Directly to Arena)		Travel by Monorail (to/from Arena)	
	Number of New Riders <sup>1</sup>	Percent Usage of Overall Reserve Capacity <sup>2</sup>	Number of New Riders <sup>1</sup>	Evaluation
Weekday Pre-Event Peak Hour	881	41%	330	Demand can be accommodated by existing service <sup>4</sup>
Weekday Post-Event Peak Hour	1,046	54%	697	
Saturday Pre-Event Peak Hour <sup>3</sup>	574	N/A	191	

<sup>1,2,3,4</sup> See the notes as presented in Table 4-17.

Source: Prepared by Fehr & Peers, 2018.

### *Travel by Bus*

The number of bus riders generated by the arena would be the same regardless of the attendance levels on the Seattle Center campus. However, reserve capacity on buses would be lower because some of that space would be occupied by other Seattle Center visitors. The bus riders generated by the arena would take up a larger percentage of the reserve capacity, but could still be accommodated on most routes without overcrowding.

During the weekday post-event peak hour, demand to travel northbound to the University District and Ballard would exceed the crowding threshold on routes serving those areas. While the majority of the routes would have capacity during the post-event peak hour, some individual trips could reach capacity and turn away riders. A description of Saturday post-event conditions is included in the impact summary section.

Buses would operate on congested roadways such as Denny Way, 1<sup>st</sup> Ave N, and Queen Anne Ave N. Transit travel time and reliability would be adversely affected under Alternative 1 – Above-Average Seattle Center Attendance during all 3 peak hour analysis periods.

As described above, the southbound bus stops along Queen Anne Ave N are somewhat constrained, particularly at John St and Harrison St. This could lead to riders blocking other pedestrians trying to travel along the sidewalk while waiting for buses during the post-event peak hour.

### *Travel by Monorail*

Monorail ridership by project attendees would remain the same under Above-Average Seattle Center Attendance conditions. Although the background reserve capacity would be lower, it is expected that the Monorail could still accommodate all riders over the course of the post-event peak hour. However, some passengers may have to wait up to 20 minutes due to Monorail train capacity constraints.

## Pedestrian Travel

The pedestrian system evaluation focuses on the adequacy of existing facilities to accommodate surges in pedestrians associated with large events. The 6<sup>th</sup> Edition of the Highway Capacity Manual (HCM) includes a detailed methodology to calculate whether crosswalks and sidewalks can accommodate projected pedestrian flows (Transportation Research Board, 2016). For this study, the metric used to determine facility adequacy is average pedestrian space, which considers average walk speeds, hourly pedestrian flows, and effective sidewalk width (i.e., the width of the sidewalk that is not obstructed by trees, overhanging vehicles, utility poles, etc.). At signalized crosswalks, it also considers the length of the walk interval, crosswalk width, and signal cycle length. Per HCM recommendations, a threshold of 13 square feet per pedestrian for sidewalks, and 11 square feet per pedestrian for crosswalks is applied as a threshold to determine whether the project may result in pedestrians overflowing onto streets, which can cause conflicts with moving vehicles and other forms of travel. A detailed discussion of this methodology and results is found in Appendix C, *Tech Memo 6, 2020 Analysis Results for Roadway and Pedestrian Systems*.

### Average Seattle Center Attendance

Figures 4-24 and 4-25 display expected pedestrian flows for Alternative 1 – Average Seattle Center Attendance during the weekday pre-event and weekday post-event peak hours, respectively. Results are not shown for Saturday pre-event conditions because a concert would generate fewer peak hour pedestrian trips due to a more uniform arrival pattern when compared to a basketball game (60% of basketball game attendees are expected to arrive during the pre-event peak hour compared to only 50% for a concert; see Appendix C, *Tech Memo 5, Project Travel Characteristics – Year 2020*). These estimates include pedestrians who walk directly from their origin as well as those who arrive to the study area by another mode, but then walk to the arena from their parked car, ridehailing drop-off, or transit stop. The volumes shown also include background pedestrian activity that is unrelated to the arena. Background activity is lower during the post-event peak hour so some locations would have lower total volumes despite the increase in project pedestrian volumes. The pedestrian volumes on these figures are not shown for all sidewalks/crosswalks, but rather for those anticipated to carry the highest volumes of pedestrians.

Under Average Seattle Center Attendance conditions, all sidewalks would have sufficient capacity to carry the pedestrian demand without overflow into adjacent streets. The facility nearest the capacity threshold would be 2<sup>nd</sup> Ave N between John St and Denny Way. Some signalized intersections in the vicinity of the project provide sizeable areas for pedestrians to wait to cross the intersection. Examples exist along portions of 5<sup>th</sup> Ave N (e.g., at Harrison St). Other intersections have limited size waiting areas to accommodate pedestrians, such as the 1<sup>st</sup> Ave N/Mercer St and 1<sup>st</sup> Ave N/Harrison St intersections.

The project site plan shows pedestrian facilities along 1<sup>st</sup> Ave N and Thomas St, including wide sidewalks with frequent access points to the arena plaza. These facilities would provide more capacity than existing sidewalks, particularly along Thomas St, and would be sufficient to serve the pedestrian demand. Event attendees would walk through Seattle Center from nearly all of its public street access points. These facilities are of substantial width to accommodate large events.

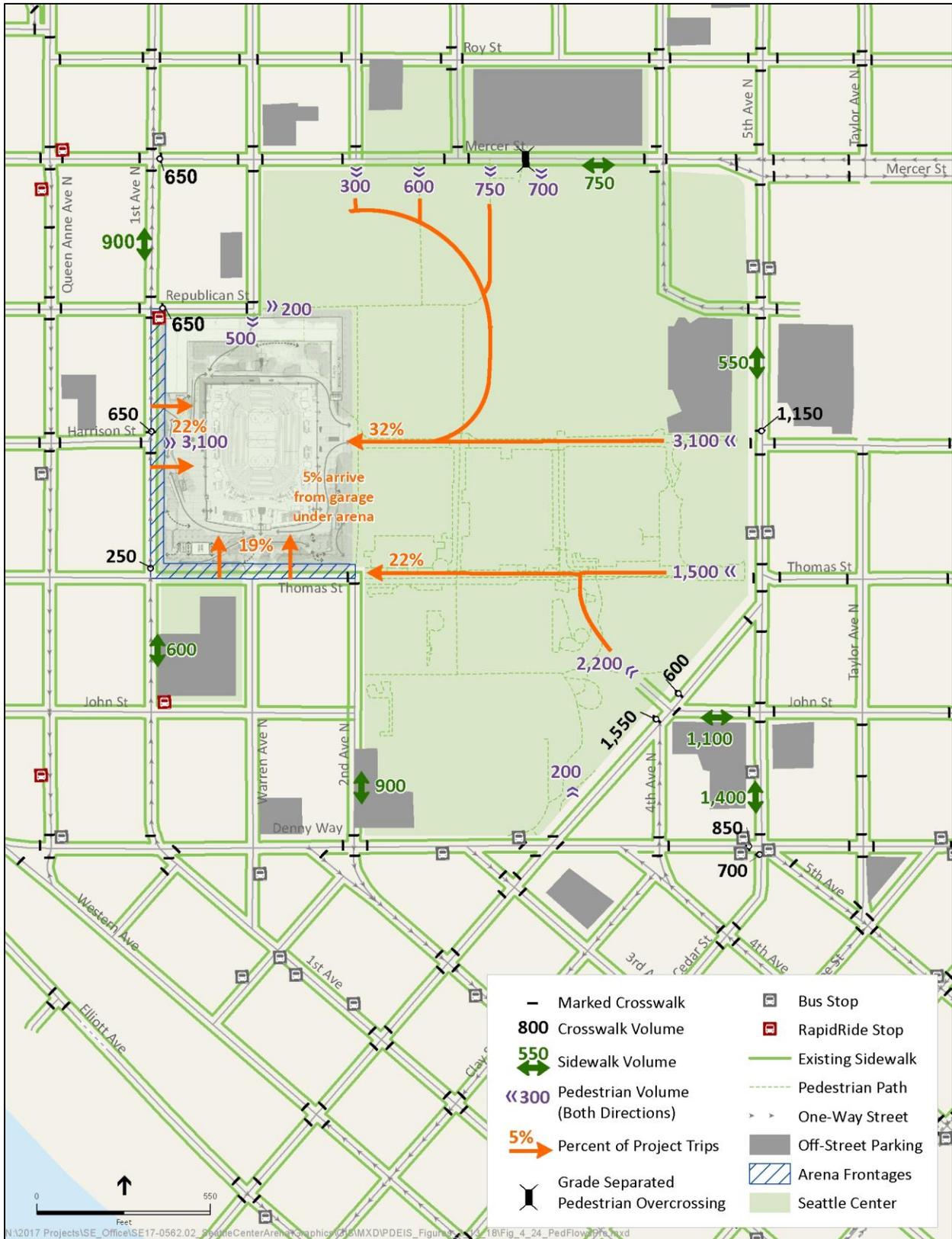


Figure 4-24. Pedestrian Flows – 2020 Alternative 1 – Average Seattle Center Attendance Weekday Pre-Event Peak Hour Conditions



**Figure 4-25. Pedestrian Flows – 2020 Alternative 1 – Average Seattle Center Attendance Weekday Post-Event Peak Hour Conditions**

Demand would exceed capacity at one crosswalk: the north leg of the 5<sup>th</sup> Ave N/Harrison St intersection. This crosswalk is projected to accommodate 1,150 pre-event peak hour pedestrians and 2,100 post-event peak hour pedestrians. The high pedestrian flows are due to the crosswalk's proximity to the 5<sup>th</sup> Ave N Garage as well as its usage to travel from the project site (through Seattle Center) east along Harrison St to new parking garages on Dexter Ave N. Several other crosswalks would have volumes nearing capacity, but would typically not result in pedestrians walking outside of crosswalks (although they may feel very crowded). Increased demand across 1<sup>st</sup> Ave N is expected at the unmarked, unsignalized crossings at Thomas St and John St.

### Above-Average Seattle Center Attendance

Under Above-Average Seattle Center Attendance conditions, the majority of the added pedestrian travel (beyond Average Seattle Center Attendance conditions) would occur between the Mercer St, 1<sup>st</sup> Ave N, and 5<sup>th</sup> Ave N garages and Seattle Center venues east of the arena. Few additional sidewalks and crosswalks would be affected by a direct trip between these parking facilities and the arena. In other words, the sidewalks and crosswalks between these parking facilities and the Seattle Center venues tend to have capacity, with the exception of the 5<sup>th</sup> Ave N/Harrison St north leg crosswalk, which would be further impacted by people parking east of Seattle Center and traveling to campus venues. Attendees who visit nearby restaurants may result in additional sidewalk/crosswalk use, but this travel would not result in sidewalks/crosswalks exceeding capacity.

Although some crosswalks do not have capacity constraints from a pedestrian demand perspective, they would cause operational issues in which the flow of vehicular traffic is restricted by frequent pedestrian crossings. Some examples include crosswalks along the north side of Denny Way between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N, and the east side crosswalk at the Mercer St/3<sup>rd</sup> Ave N intersection. These pedestrian flow impacts to traffic operations are integrated into the results presented earlier.

### Bicycle Travel

Assuming a 1% mode share for event attendees, the bicycle parking demand would be for roughly 190 bicycles (which could be personal bicycles or bike share bicycles). OVG's design accommodates bicycle racks for approximately 102 bicycles. OVG has committed to providing bike valet services at the site, with locations and conditions to be established through the AAMP in coordination with Seattle Center, SDCI, and SDOT.

### Average Seattle Center Attendance

Under Average Seattle Center Attendance conditions, vehicles (ridehailing or otherwise) could temporarily block bicycle facilities when dropping off passengers during the pre-event peak hours. While temporary, the blockage would create a challenging environment for bicyclists who must pull into a vehicle lane to move around a stopped vehicle blocking the bicycle facility. Post-event blockages are unlikely to occur because SDOT would designate ridehailing pick-up locations such that they would not routinely interfere with bicycle facilities.

### Above-Average Seattle Center Attendance

With Above-Average Attendance on the Seattle Center campus, including an event at the arena, vehicles (ridehailing or otherwise) could temporarily block bicycle facilities when dropping off passengers during the pre-event peak hours. This would likely be more frequent given the increased congestion during an Above-Average Seattle Center Attendance condition. While temporary, this blockage would create a

challenging environment for bicyclists that must pull into a vehicle lane to move around a stopped vehicle blocking the bicycle facility. Post-event blockages are unlikely to occur because SDOT would designate ridehailing pick-up locations such that they would not routinely interfere with bicycle facilities.

### Parking

Vehicle trips generated by the renovated arena were assigned to on-street and off-street parking locations that are currently anticipated to be available for public parking. This includes 510 employees of the arena who are expected to arrive primarily by private vehicle. Locations were selected based on the origin/destination of the trip; for example, a trip arriving via I-5 is likely to park to the east of the arena while a trip arriving via Elliott Ave is expected to park to the west of the arena.

### Average Seattle Center Attendance

Table 4-19 summarizes parking occupancy under Alternative 1 – Average Seattle Center Attendance. Total on-street parking occupancy is expected to be 88% on a weekday and 94% on a Saturday. Total off-street parking occupancy is expected to be 79% on a weekday and 91% on a Saturday. Since no formal wayfinding program or parking reservation system is currently proposed, Alternative 1 would most likely result in occupancies on both weekdays and Saturdays that cause a substantial number of vehicles to circulate for multiple blocks looking for parking and increasing conflicts with other modes. Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

**Table 4-19. Parking Occupancy – 2020 Alternative 1 – Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	98 (93%)	99 (94%)
	North	1,315 (88%)	1,426 (96%)
	South	897 (85%)	958 (91%)
	West	448 (93%)	450 (94%)
	<b>Subtotal</b>	<b>2,758 (88%)</b>	<b>2,933 (94%)</b>
Off-Street	East	1,508 (69%)	1,959 (90%)
	North	1,177 (85%)	1,308 (95%)
	South	1,620 (86%)	1,724 (91%)
	West	76 (79%)	75 (78%)
	<b>Subtotal</b>	<b>4,381 (79%)</b>	<b>5,066 (91%)</b>
On-Street & Off-Street	<b>Total</b>	<b>7,139 (82%)</b>	<b>7,999 (92%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea. Includes the 450-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

## Above-Average Seattle Center Attendance

Table 4-20 summarizes parking occupancy with Above-Average Seattle Center Attendance conditions. Under Alternative 1 on a weekday, Above-Average Seattle Center Attendance would result in roughly 800 more vehicles parking within the study area than with Average Seattle Center Attendance. On a Saturday, the increase is approximately 300; this smaller increase reflects that less parking is available on a Saturday in the study area so more visitors would park in more remote locations, such as along Dexter Ave N, South Lake Union, or Westlake Center parking facilities.

**Table 4-20. Parking Occupancy – 2020 Alternative 1 – Above-Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	98 (93%)	99 (94%)
	North	1,365 (92%)	1,416 (95%)
	South	947 (90%)	978 (93%)
	West	448 (93%)	450 (94%)
	<b>Subtotal</b>	<b>2,858 (91%)</b>	<b>2,943 (94%)</b>
Off-Street	East	1,888 (86%)	2,096 (96%)
	North	1,308 (95%)	1,308 (95%)
	South	1,792 (95%)	1,851 (98%)
	West	86 (90%)	92 (96%)
	<b>Subtotal</b>	<b>5,074 (91%)</b>	<b>5,347 (96%)</b>
On-Street & Off-Street	<b>Total</b>	<b>7,932 (91%)</b>	<b>8,290 (96%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea. Includes the 450-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

Total on-street parking occupancy is expected to be 91% on a weekday and 94% on a Saturday. Total off-street parking occupancy is expected to be 91% on a weekday and 96% on a Saturday. Again, lacking any formal wayfinding program or parking reservation system, Alternative 1 would most likely result in occupancies on both weekdays and Saturdays that cause a substantial number of vehicles to circulate for multiple blocks looking for parking and increasing conflicts with other modes. Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

The Above-Average Seattle Center Attendance scenario reflects a situation in which there are multiple events occurring on campus of varying size and timing. Visitors arriving for an earlier event would be more likely to find parking at the most convenient lots, while those arriving for a later event may find those lots full. Because of the dynamic nature of event scheduling at Seattle Center, this would affect venues differently depending on the other events on campus on any particular day.

### **Bus/Truck Staging**

Charter buses and trucks currently stage using curb space in the vicinity of the project site in accordance with the SDOT and Seattle Center MOA for Event Curbside Management (2011). Through that agreement, Seattle Center reserves curb space for loading, unloading, and staging of events on Thomas St, Warren Ave N, 2<sup>nd</sup> Ave N, Republican St, and 4<sup>th</sup> Ave N. While most of those locations would remain available with a renovated arena, charter buses would not be staged on Thomas St due to the new south plaza and underground parking garage entrance on Thomas St. Alternative 1 has additional underground truck/bus storage compared to the space available south of KeyArena today. However, given the larger (both in terms of attendance and on-stage equipment) shows that would be accommodated by the renovated arena, it is likely that on-street staging would still be required. Seattle Center and SDOT would likely modify the MOA to include other nearby locations for staging with a similar permitting process as is currently used, such that enough staging space is available whether Seattle Center is operating at an average or above-average attendance level. This process would likely be part of a broader review of curb space management in the area by SDOT. Renegotiation of the MOA could affect on-street parking supply if curb space currently used for general on-street parking is regularly reserved for event staging.

### **Paratransit**

Under Alternative 1, it is expected that paratransit vehicles would continue to load and unload along the east side of 1<sup>st</sup> Ave N adjacent to the arena as well as on 2<sup>nd</sup> Ave N just south of KeyArena. This designated passenger loading/unloading curb space would be available under both the average and above-average conditions. Although ridehailing pick-ups would be regulated, drop-offs during the pre-event peak hours would remain unregulated. Based on observations of current drop-off activity at KeyArena, passenger loading/unloading space used by paratransit would sometimes be blocked by non-transit vehicles during periods of high demand, such as drop-offs before an event at the renovated arena.

### **Safety**

No study intersections are currently identified as high collision locations. Under both Average and Above-Average Seattle Center Attendance conditions, bicycle safety may be affected by vehicles (ridehailing or otherwise) temporarily blocking bicycle facilities when dropping off passengers during the pre-event peak hour. Pedestrian safety could be affected at the 5<sup>th</sup> Ave N/Harrison St crosswalk where pedestrians may spill out of the crosswalk into vehicle lanes to cross the street.

To enhance the understanding of potential pedestrian and bicycle conflicts at study intersections, additional collision data were evaluated. This supplemental information will be considered to inform the AAMP in terms of where additional measures could be implemented to improve the pedestrian and bicycle experience around the arena. In 2016, SDOT completed a Bicycle and Pedestrian Safety Analysis (BPSA) (SDOT, 2016). That report studied 8 years of citywide data to identify the roadway designs and user behavior characteristics most highly correlated with collisions involving people walking or bicycling. Key findings from that work included the following:

- Most bicycle and pedestrian crashes occur at intersections.
- 75% of bicycle crashes and 80% of pedestrian crashes occur on arterial streets.

- Pedestrian intersection crashes are more likely at signalized intersections, although caution was urged regarding interpretation of this finding (due to lack of controlling for signal phasing and vehicle volumes).
- The most common types of bicycle and pedestrian crashes were “left hook,” “right hook,” and angle crashes. Left and right hook collisions involve vehicles turning left or right in front of a bicyclist or pedestrian. Angle collisions involve vehicles and bicycles/pedestrians approaching one another from perpendicular directions.

The BPSA analysis ranked intersections based on a variety of factors, including past crash history and other significant crash risk predictors. For this evaluation, those BPSA intersections were cross-referenced against study intersections, and 14 of those were selected for further analysis given the expected increase in vehicle, bicycle, or pedestrian travel at each during major events at Seattle Center Arena. The 14 study intersections are listed below:

- Queen Anne Ave N / Mercer St
- Queen Anne Ave N / Republican St
- Queen Anne Ave N / Harrison St
- Queen Anne Ave N / Thomas St
- 1<sup>st</sup> Ave N / Mercer St
- 1<sup>st</sup> Ave N / Republican St
- 1<sup>st</sup> Ave N / Denny Way
- 2<sup>nd</sup> Ave N / Denny Way
- Broad St / John St
- 5<sup>th</sup> Ave N / Mercer St
- 5<sup>th</sup> Ave N / Harrison St
- 5<sup>th</sup> Ave N / Thomas St
- 5<sup>th</sup> Ave N / John St
- 5<sup>th</sup> Ave N / Denny Way

WSDOT crash records for 2011 through May 2018 were requested for these intersections, and each bicycle or pedestrian involved accident was reviewed (WSDOT, 2018). The crash circumstance that appeared most frequently was a vehicle turning left or right into a bicycle or pedestrian who had the right-of-way. Given the results of the BPSA report in terms of factors affecting crash likelihood, the 14 identified BPSA intersections in the project vicinity, and the EIS results pertaining to project-related increases in vehicle, pedestrian, and bicycle traffic, the following locations were identified as candidates for additional traffic management during events (and have identified management strategies included in the AAMP).

- 1<sup>st</sup> Ave N / Mercer St
  - Expected surges in post-event attendees using the east leg crosswalk would conflict with a heavy expected northbound right-turn movement.
- 1<sup>st</sup> Ave N / Republican St
  - Expected surges in post-event attendees using the east leg crosswalk would conflict with vehicles that may attempt to use Republican St and Warren Ave as a short-cut to access eastbound Mercer St.
- 5<sup>th</sup> Ave N at Mercer St, Republican St, and Harrison St
  - Heavy pedestrian volumes across 5<sup>th</sup> Ave N would conflict with auto volumes stemming from the 5<sup>th</sup> Ave N garage.
- Denny Way / 2<sup>nd</sup> Ave N
  - Pedestrian volumes across the north leg crosswalk would conflict with westbound right-turning vehicles.

The AAMP is a living document and subject to change depending on observed conditions and changes in the background environment. As part of the planning and design process that would lead up to the arena's opening, OVG and the City may explore expanded traffic management, particularly focusing on Queen Anne Ave N / Mercer St, 1<sup>st</sup> Ave N/Denny Way, and 5<sup>th</sup> Ave / Thomas St, all of which are BPSA intersections.

#### **Summary of Transportation Impacts in 2020 – Alternative 1**

##### **Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions, Alternative 1 would result in adverse impacts when compared to the No Action Alternative. This comparison reflects how the transportation system would be affected on a day without a KeyArena event versus a day with a sold-out event at the renovated arena. Alternative 1 would cause significant impacts at 22 intersections during the weekday pre-event peak hour, 37 intersections during the weekday post-event peak hour, and 8 intersections during the Saturday pre-event peak hour. During the weekday pre-event peak hour, the average travel speed on westbound Mercer St from Fairview Ave N to Seattle Center would be reduced from 10 MPH (under No Action Alternative) to 5 MPH (under Alternative 1). Although this is not classified as a significant impact, the additional delays would be noticeable to westbound motorists. Alternative 1 would also cause traffic exiting both directions of I-5 at Mercer St to queue back toward the mainline.

Transit would experience significant impacts due to overcapacity conditions on some routes, as well as travel time and reliability degradation associated with degraded traffic operations. Because ridehailing vehicles would not have regulated unloading locations during the pre-event peak hours, they would sometimes block through lanes, bicycle facilities, and bus pullouts, resulting in significant impacts to transit, bicycle travel, and safety. No significant impacts related to ridehailing are expected during the post-event peak hours. Some of the traffic and transit delays described above are attributable to ridehailing traffic (drop-off, pick-up, deadhead, and circulating activities).

Significant pedestrian impacts are expected at the 5<sup>th</sup> Ave N/Harrison St crosswalk due to high demand.

Parking occupancy levels on weekdays and Saturdays suggest that a substantial number of motorists could circulate for multiple blocks looking for parking. This would increase conflicts with other modes, thereby causing a significant impact. Because paid parking and time limits are not in effect on Sundays, parking impacts are also expected on Sundays.

### Above-Average Seattle Center Attendance

With Above-Average Seattle Center Attendance conditions, traffic operations would be congested under both the No Action Alternative and Alternative 1, although Alternative 1 would result in additional delays on key corridors and intersections. This comparison reflects how the transportation system would change from a high activity day at Seattle Center including a KeyArena event to a high activity day at Seattle Center with a sold-out event at the renovated arena.

The impacts described for the Average Seattle Center Attendance scenario would be exacerbated under the Above-Average Seattle Center Attendance scenario. Alternative 1 would cause significant impacts at 20 intersections during the weekday pre-event peak hour, 34 intersections during the weekday post-event peak hour, and 14 intersections during the Saturday pre-event peak hour. During the weekday pre-event peak hour, the average travel speed on westbound Denny Way from Fairview Ave N to Taylor Ave would be reduced from 7.5 MPH (under No Action Alternative) to 4.5 MPH (under Alternative 1). Although this is not classified as a significant impact, the additional delays would be noticeable to westbound motorists. Alternative 1 would also cause traffic exiting both directions of I-5 at Mercer St to queue back toward the mainline. Transit is expected to experience significant impacts due to overcapacity conditions on some routes, as well as travel time and reliability degradation associated with the traffic operations findings.

Compared to the No Action Alternative, Alternative 1 – Above-Average Seattle Center Attendance would improve the weekday post-event condition related to ridehailing, bicycle travel, and paratransit. However, significant impacts are still expected during the pre-event peak hours because ridehailing vehicles would not have regulated unloading locations. Significant pedestrian impacts are expected at the 5<sup>th</sup> Ave N/Harrison St crosswalk due to high demand. Lastly, Alternative 1 would result in parking impacts to both on-street and off-street parking that would not occur under the No Action Alternative.

Saturday post-event conditions were also considered although not analyzed for all modes because conditions would be similar to weekday post-event conditions. The exception would be transit, which includes lower service levels for some routes on the weekends. The combined transit capacity of routes during the Saturday post-event peak hour serving the project site is 85% of the weekday post-event peak hour. Frequencies of the routes with potential overcrowding (to the University District and Ballard) are the same between the weekday and Saturday post-event peak hours so no additional crowding impacts on those routes are expected. No additional impacts are expected on routes serving the renovated arena during the Saturday post-event peak hour even with reduced weekend capacity.

### **Alternative 2: Modified Proposal**

This section describes the potential impacts to transportation that would likely occur under Alternative 2. The transportation-related assumptions for Alternative 2 differ from Alternative 1 in the following key ways:

- Less underground parking (200 spaces instead of 450 spaces) beneath the arena.
- Parking before, during, and after events at the 1<sup>st</sup> Ave N Garage would be capped at 400 spaces.

- Thomas St between 1<sup>st</sup> Ave N and Warren Ave N would function as a “woonerf” (a street with a raised street-bed where pedestrians and bicyclists have priority over motorists), or urban curbless street as defined in the City’s Right-of-Way Improvements Manual (City of Seattle, 2018), and would be closed to traffic before, during, and after events.
- Ridehailing would be regulated such that no pick-ups may occur after events within the geofenced area encompassing Seattle Center (specific geofence boundaries would be determined and periodically updated in the AAMP). No regulation of drop-offs would occur.

The travel characteristics (mode share, origin/destination, etc.) of attendees at the renovated arena under Alternative 2 would be the same as under Alternative 1 given their similar proposed transportation conditions and the fact that the arena capacity is the same.

### **Traffic Operations**

Traffic volume forecasts for Alternative 2 would be similar to Alternative 1. The differences are focused on the locations where parking would be limited: the garage beneath the arena and the 1<sup>st</sup> Ave N Garage. Because less parking would be provided in those garages compared to Alternative 1, less traffic is projected in the area immediately south of the arena under Alternative 2. However, volumes along the key corridors accessing the arena would be equivalent to Alternative 1. The ridehailing regulations would also disperse some traffic from the area immediately surrounding the arena to other nearby corridors during post-event conditions.

### **Average Seattle Center Attendance**

The traffic operations findings for Alternative 2 are similar to Alternative 1 in most locations. However, by providing fewer parking spaces south of the arena, the amount of time to empty garages/streets in this area after events would be reduced. While there would be a modest traffic increase on other streets associated with this displaced parking (largely expected to be east or south of Seattle Center), this would most likely occur a considerable distance from the site where parking is available and congestion is less severe. Similarly, traffic volumes associated with ridehailing activity would be shifted to areas outside the ridehailing pick-up boundary. Therefore, Alternative 2 is expected to result in a slight improvement (relative to Alternative 1) in traffic conditions at intersections adjacent to and south of the arena. However, the intersection LOS degradations identified under Alternative 1 would also occur at most locations with Alternative 2 given their similar travel characteristics. Similarly, Alternative 2 would result in comparable degradations in travel times and freeway off-ramp queues as described for Alternative 1.

### **Above-Average Seattle Center Attendance**

Under Alternative 2 – Above-Average Seattle Center Attendance, conclusions regarding traffic operations would be similar to those described for the Average Seattle Center Attendance condition. However, Alternative 2 would offer some beneficial circulation effects during the post-event condition because traffic would be more dispersed due to the adjacent parking garage capacity limits and restrictions on post-event passenger pick-ups near the arena.

### **Ridehailing**

Under Alternative 2, ridehailing drop-offs would occur in those locations most convenient to drivers and passengers rather than in a designated area. However, pick-ups would be regulated using a “geofence,” which is a virtual geographic boundary. Customers that request a pick-up while in the geofence would be limited in where they can meet their car. During pre-determined event times (to be coordinated by

Seattle Center and SDOT), customers requesting a ride from the geofenced area encompassing Seattle Center would have to meet their vehicle outside of that restricted area. The Alternative 2 geofence differs from the Alternative 1 geofence in that Alternative 2 does not have designated pick-up locations within the geofence. Rather, under Alternative 2, people using a ridehailing vehicle after an event would have to walk outside of the geofence for pick-up. Specific geofence boundaries would be determined and periodically updated in the AAMP. This approach would reduce the amount of vehicle traffic in the immediate vicinity of the project site and Seattle Center relative to Alternative 1. Ridehailing activity would result in a substantial number of “deadhead” trips added to the area because each pick-up or drop-off results in 2 trips: 1 carrying the arena attendee(s) and 1 trip with only the driver (unless the ridehailing vehicle is connected with another passenger in the vicinity of the arena). These deadhead and pick-up/drop-off trips are accounted for in the traffic and transit delays described above.

### Average Seattle Center Attendance

Under Alternative 2 – Average Seattle Center Attendance, the renovated arena would draw substantial ridehailing activity during events such as an NBA game or concert. Drop-off activity would be similar to that observed during large KeyArena events, which sometimes results in ridehailing vehicles blocking through lanes, bicycle facilities, or bus pullouts, particularly on 1<sup>st</sup> Ave N between Thomas St and Republican St. Although ridehailing pick-up locations would not be allowed within the geofence, those ridehailing vehicles may stop in travel lanes, bicycle facilities, or bus pullouts outside that area, causing congestion and blockages to other modes.

### Above-Average Seattle Center Attendance

Under Alternative 2 – Above-Average Seattle Center Attendance, ridehailing would occur within a slightly more congested traffic environment. However, findings would be similar to those described for the Average Seattle Center Attendance scenario.

#### **Transit**

The transit impact findings described for Alternative 1 are also representative of conditions for Alternative 2.

#### **Pedestrian Travel**

Alternative 2 would include a woonerf, or urban curbless street, along Thomas St between 1<sup>st</sup> Ave N and Warren Ave N that would be closed to vehicle traffic before, during, and after events. This street design would make crossing Thomas St more comfortable for pedestrians due to the decreased conflicts with vehicles.

Alternative 2 would limit the parking capacity at the 1<sup>st</sup> Ave N Garage to 400 spaces and the capacity in the underground garage to 200 spaces. Therefore, Alternative 2 would result in more dispersed parking (relative to Alternative 1), primarily in areas east and south of the arena. This would require attendees to walk longer distances to reach the arena and increase pedestrian flows on some sidewalks and crosswalks. However, the overall change in volume at any 1 facility is expected to be modest given the large number of alternative parking areas, and therefore the pedestrian impacts described for Alternative 1 are representative of conditions under Alternative 2.

### Bicycle Travel

As described above, Alternative 2 would make crossing Thomas St more comfortable for bicyclists due to decreased conflicts with vehicles. Aside from this benefit, the bicycle impact findings described for Alternative 1 are representative of conditions for Alternative 2.

### Parking

Alternative 2 would limit the parking capacity at the 1<sup>st</sup> Ave N Garage to 400 spaces and the capacity in the underground garage to 200 spaces. Therefore, under Alternative 2 more than 400 vehicles would need to park in a different location than under Alternative 1. This section presents parking occupancy tables reflecting that change.

### Average Seattle Center Attendance

Table 4-21 summarizes parking occupancy under Alternative 2 – Average Seattle Center Attendance. Total on-street parking occupancy is expected to be the same as Alternative 1. Total off-street parking occupancy is expected to be 86% on a weekday and 94% on a Saturday. This assumes that some vehicles that would park within the parking study area under Alternative 1 would find parking outside that area under Alternative 2, particularly on a Saturday evening when off-street occupancy is higher. Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

**Table 4-21. Parking Occupancy – 2020 Alternative 2 – Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	98 (93%)	99 (94%)
	North	1,315 (88%)	1,426 (96%)
	South	897 (85%)	958 (91%)
	West	448 (93%)	450 (94%)
	<b>Subtotal</b>	<b>2,758 (88%)</b>	<b>2,933 (94%)</b>
Off-Street	East	1,708 (78%)	2,015 (92%)
	North	1,292 (94%)	1,308 (95%)
	South	1,305 (92%)	1,343 (94%)
	West	76 (79%)	85 (89%)
	<b>Subtotal</b>	<b>4,381 (86%)</b>	<b>4,751 (94%)</b>
On-Street & Off-Street	<b>Total</b>	<b>7,139 (87%)</b>	<b>7,684 (94%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Includes the 200-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

## Above-Average Seattle Center Attendance

Table 4-22 summarizes parking occupancy under Alternative 2 – Above-Average Seattle Center Attendance. Total on-street parking occupancy is expected to be the same as Alternative 1. Total off-street parking occupancy is expected to be 95% on a weekday and 96% on a Saturday. Under Above-Average Seattle Center Attendance conditions, the majority of displaced vehicles (relative to Alternative 1) would find parking outside the study area. Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

**Table 4-22. Parking Occupancy – 2020 Alternative 2 – Above-Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	98 (93%)	99 (94%)
	North	1,365 (92%)	1,416 (95%)
	South	947 (90%)	978 (93%)
	West	448 (93%)	450 (94%)
	<b>Subtotal</b>	<b>2,858 (91%)</b>	<b>2,943 (94%)</b>
Off-Street	East	2,074 (95%)	2,096 (96%)
	North	1,308 (95%)	1,308 (95%)
	South	1,356 (95%)	1,375 (97%)
	West	86 (90%)	90 (94%)
	<b>Subtotal</b>	<b>4,824 (95%)</b>	<b>4,869 (96%)</b>
On-Street & Off-Street	<b>Total</b>	<b>7,682 (94%)</b>	<b>7,812 (95%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Includes the 200-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

### Bus/Truck Staging

The charter bus and truck staging impact findings described for Alternative 1 are also representative of conditions for Alternative 2.

### Paratransit

The paratransit impact findings described for Alternative 1 are also representative of conditions for Alternative 2.

## **Safety**

The safety impact findings described under Alternative 1 are also representative of conditions for Alternative 2.

### **Summary of Transportation Impacts in 2020 – Alternative 2**

Impacts to the transportation system under Alternative 2 would generally be similar to those identified for Alternative 1. The differences relate to traffic operations, ridehailing, and on-street and off-street parking. Due to more dispersed traffic caused by limiting off-street parking availability south of the arena and the ridehailing regulations, there would be fewer and/or less severe impacts at locations immediately surrounding the arena, particularly on the south side. The significant impact findings described under Alternative 1 related to ridehailing during the pre-event peak hours are also representative of conditions under Alternative 2. During the post-event peak hours, the ridehailing activity would shift to nearby corridors, where impacts could occur during the post-event peak hours due to blockages of travel lanes, bicycle facilities, and/or bus pullouts. However, because the blockages would be temporary and considerably more dispersed compared to an unregulated condition, these impacts are not considered significant.

The decreased off-street parking supply immediately south of the arena would result in more competition for on-street and off-street parking, with some patrons having to park farther from the arena. Parking occupancy levels on weekdays and Saturdays suggest that a substantial number of vehicles would circulate for multiple blocks looking for parking and increasing conflicts with other modes; this would be a significant impact. Because paid parking and time limits are not in effect on Sundays, parking impacts are also expected on Sundays.

### **Frequency of Events**

The preceding analysis focuses on the magnitude of impacts that could occur during typical weekday and Saturday evening periods associated with sold-out events held at a renovated arena. The frequency of these conditions is also an important factor when considering the overall impact to the transportation system. Under the No Action Alternative, KeyArena would have roughly 102 events per year, or 2 to 3 per week. Under Alternatives 1 and 2, the frequency of arena events would increase to between 242 and 257 per year, or roughly 4 to 5 times per week. Events such as family shows, community events, WNBA, and other types of smaller sporting events are expected to stay constant among the alternatives. The increase in event frequency would be primarily due to NBA and NHL games (roughly 50 each per year) and large concerts, which are expected to increase from 25 per year under the No Action Alternative to between 40 and 55 under Alternatives 1 and 2. Therefore, the impacts described in this chapter relating to large events at the project site would be more frequent (i.e., twice as often over the course of a year) under Alternatives 1 and 2 than under the No Action Alternative. Moreover, with the increase in arena events, there would be more days of the year when an arena event coincides with another large event on the Seattle Center campus.

### Summary of Significant Impacts in 2020 by Alternative

The following table summarizes the significant impacts identified for Alternatives 1 and 2.

**Table 4-23. 2020 Comparison of Alternatives 1 and 2 Significant Impacts to the No Action Alternative**

Mode	No Action Alternative	Significant Impacts	
		Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Traffic Operations	<p>LOS E/F intersections:</p> <ul style="list-style-type: none"> <li>• <i>Average Seattle Center Attendance</i>: 46 weekday pre-event, 1 weekday post-event, and 7 Saturday pre-event.</li> <li>• <i>Above-Average Seattle Center Attendance</i>: 52 weekday pre-event, 11 weekday post-event, and 11 Saturday pre-event.</li> </ul> <p>Slow eastbound speeds on Mercer St and Denny Way.</p>	<p>Impacted intersections:</p> <ul style="list-style-type: none"> <li>• <i>Average Seattle Center Attendance</i>: 22 weekday pre-event, 37 weekday post-event, and 8 Saturday pre-event.</li> <li>• <i>Above-Average Seattle Center Attendance</i>: 20 weekday pre-event, 34 weekday post-event, and 14 Saturday pre-event.</li> </ul> <p>Queues spill back onto I-5 mainline at Mercer St.</p>	<p>Modestly improved traffic operations adjacent to arena because of dispersal of traffic volumes due to off-street parking limits.</p> <p>Same as Alternative 1 beyond arena site.</p>
Ridehailing	<p>Unregulated pick-up/drop-off system may cause blockages before and after large events.</p>	<p>Impacts to transit, bicycles, and safety before events due to the potential of unregulated drop-offs that block facilities.</p> <p>No impacts and improved conditions after events due to designated pick-up locations.</p>	<p>Impacts to transit, bicycles, and safety before events due to the potential of unregulated drop-offs that block facilities.</p> <p>No impacts after events because activity is dispersed from arena.</p>
Transit	<p>Transit speed and reliability affected by congested traffic operations and ridehailing pick-up/drop-off activities.</p> <p>Sufficient total bus capacity although many routes have standing room only.</p> <p>Ample Monorail capacity.</p> <p>Occasional transit blockages by ridehailing vehicles.</p>	<p>Transit speed and reliability impacted by poor traffic operations and ridehailing drop-off activities.</p> <p>Crowding impacts on buses to U District and Ballard.</p> <p>Bus stop blockage impact from ridehailing before events; improved conditions after events (see ridehailing section).</p>	<p>Same as Alternative 1.</p>
Pedestrian	<p>Generally acceptable with occasional capacity issues during large events.</p>	<p>Impact at 5<sup>th</sup> Ave N/Harrison St crosswalk.</p>	<p>Impact at 5<sup>th</sup> Ave N/Harrison St crosswalk.</p> <p>More comfortable to cross Thomas St due to woonerf.</p>

Mode	No Action Alternative	Significant Impacts	
		Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Bicycle	Occasional blockages caused by ridehailing vehicles during large events.	Bicycle lane blockage impact from ridehailing before events; improved conditions after events (see ridehailing section).	Impact from ridehailing before events; improved conditions after events (see ridehailing section). More comfortable to cross Thomas St due to woonerf.
Parking	Overall sufficient capacity with higher on-street occupancies than off-street occupancies.	Impacts due to modal conflicts caused by motorists circulating for parking (high occupancy levels would cause more cruising for parking).	Same as Alternative 1.
Charter Bus/ Truck Staging	Accommodated via MOA for Event Curbside Management.	No significant impacts.	No significant impacts.
Paratransit	Accommodated in existing passenger loading zones.	No significant impacts, although ridehailing could cause delays in curb space availability in the pre-event period.	Same as Alternative 1.
Safety	Occasional, temporary effects from ridehailing vehicles.	Modal conflict impact from ridehailing before events; improved conditions after events (see ridehailing section).	Same as Alternative 1.

Source: Prepared by Fehr & Peers, 2018.

## **2035 Impacts**

The roadway network in place in 2035 is expected to be very similar to 2020. However, the expansion of the LINK light rail system would have a major effect on how people travel within the region. By 2035, Sound Transit LINK light rail service is to be extended north to Ballard and Lynnwood, east to Bellevue and Redmond, and south to Tacoma. This includes a new line extending from Westlake Station toward Seattle Center, Magnolia, and Ballard. These expansions would create a more robust light rail system that provides direct access to the proposed Seattle Center Arena via a new station near the northwest corner of Seattle Center (the precise location has yet to be determined). Bus networks would also be restructured to coincide with LINK light rail expansion.

A variety of pedestrian and bicycle projects are expected to be built by 2035, including the Lake to Bay streetscape improvements along Broad St, Thomas St, and Terry Ave N; green street improvements on Thomas St; and protected bicycle lanes on the 1<sup>st</sup> Ave N/Queen Anne Ave N couplet. See Appendix C, *Tech Memo 3, Year 2020 and 2035 Background Transportation Network*, for more details on the projects planned to be in place by 2035.

## **No Action Alternative**

This section describes the conditions of the transportation system under the 2035 No Action Alternative in which KeyArena is not renovated. The 2035 No Action Alternative is the baseline against which the impacts of the project in 2035 are assessed. In other words, the 2035 No Action Alternative represents the cumulative transportation condition in 2035 without the proposed project, and Alternatives 1 and 2 represent that cumulative condition plus the proposed project. A comparison of the No Action Alternative versus Alternatives 1 and 2 indicates the direct impacts of the proposed arena.

### **Traffic Operations**

As with the 2020 analysis, traffic volume forecasts were developed for 2035 conditions using the PSRC regional travel demand model. The forecasts take into account existing volumes, planned land use growth within the immediate study area (as well as throughout the city and region), and changing traffic patterns associated with planned projects. These forecasts represent changing travel demand and travel patterns that would occur with no renovation at KeyArena. Although the transit mode share within the City and the surrounding region is expected to grow with the light rail expansion, the continued growth throughout the region is nonetheless expected to result in a roughly 10% increase in pre-event peak hour traffic on Denny Way and Mercer St compared to 2020.

Connected autonomous vehicles (CAVs) could be widespread by 2035. But it is currently unknown whether they would be privately owned or would take the form of a subscription service in which individuals do not own a vehicle but rather use one from a pool of vehicles. It is also unknown whether government policies would result in increased vehicle occupancies (i.e., pooled rides), less “deadheading” (i.e., traveling to a destination with no one in the vehicle for a pick-up), managed curb space, parking restrictions, and other transportation effects. Some planners believe CAVs would reduce congestion and parking demand in urban areas, while others believe that if unregulated, they could lead to further suburban sprawl and growth in vehicle travel. Given the speculative nature of this evolving form of transportation, this study applies a “business as usual” approach and assumes that CAVs may be in the vehicle fleet by 2035 but operate in a similar way to current private vehicles. That said, it is expected that ridehailing would serve a greater percentage of trips under Alternatives 1 and 2 under 2035 conditions versus 2020 based on this mode’s recent growth in the Seattle area, combined with the potential that if ridehailing vehicles became autonomous, the cost per ride would likely decrease (due to removal of the driver), further incentivizing its use. However, ridehailing vehicles are not assumed to be ubiquitous in 2035.

### **Average Seattle Center Attendance**

Intersection delay and corridor travel times are expected to continue increasing between 2020 and 2035 independent of the arena renovation. On a day with Average Seattle Center Attendance, the number of intersections operating at LOS E or F would increase from 46 intersections in 2020 to 51 intersections in 2035 during the weekday pre-event peak hour. Additionally, eastbound travel operations of Mercer St and Denny Way are expected to experience greater queue spillback due to additional traffic growth. During the weekday post-event and Saturday pre-event peak hours in 2035, 2 and 10 intersections, respectively, would operate at LOS E or F.

Travel time along Mercer St and Denny Way was analyzed to identify corridor travel speed impacts. Table 4-24 summarizes projected travel speeds in 2035. Average travel speeds in the westbound directions of these streets would further degrade due to background traffic growth.

**Table 4-24. Corridor Travel Speed – 2035 No Action Alternative – Average Seattle Center Attendance**

Corridor	2035 Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2	20%	5.5	55%
Denny Way	1.5	15%	7.5	75%

MPH = miles per hour. Average free-flow travel speed of 10 MPH assumed given the presence of controls and measured speeds in this range under mostly free-flow conditions on these corridors.

Source: Prepared by Fehr & Peers, 2018.

**Above-Average Seattle Center Attendance**

Due to the additional increment of visitors to the Seattle Center campus, the Above-Average Seattle Center Attendance scenario would result in operations that are slightly worse than those expected with Average Seattle Center Attendance (Table 4-25).

**Table 4-25. Corridor Travel Speed – 2035 No Action Alternative – Above-Average Seattle Center Attendance**

Corridor	2035 Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2 MPH	20%	5 MPH	50%
Denny Way	1.5 MPH	15%	5.5 MPH	55%

MPH = miles per hour.

Source: Prepared by Fehr & Peers, 2018.

**Ridehailing**

Under the No Action Alternative in 2035, ridehailing is expected to operate the same as it does today, although the overall share of trips is expected to increase as ridehailing increases in popularity. Pick-ups and drop-offs would occur in those locations most convenient to drivers and passengers rather than in a designated area.

**Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions, pick-up and drop-off activity is not expected to routinely block through lanes, bicycle facilities, or bus pullouts.

### Above-Average Seattle Center Attendance

Under Above-Average Seattle Center Attendance conditions, more visitors are traveling to Seattle Center, and ridehailing would occur within a more congested traffic environment. Drivers may have a more difficult time finding appropriate curb space for loading and unloading, resulting in more frequently blocked through lanes, bicycle facilities, or bus pullouts. This condition is expected to be similar to, or slightly worse than, what currently occurs during major events at Seattle Center. The area along 1<sup>st</sup> Ave N between Harrison St and Republican St would be the most affected.

#### Transit

As described earlier, the regional light rail transit system will expand substantially by 2035, with a station near the northwest corner of Seattle Center. Specific bus routing and service levels are not as certain, but based on historic service level changes, it is assumed that bus frequencies would be higher in the future. METRO CONNECTS, King County Metro’s long range transit vision (King County Metro, 2016), anticipates that transit service hours (i.e., total hours of bus service provided to riders) could roughly double between 2016 and 2040.

Transit is poised to expand significantly between 2024 (when the ST2 expansion projects are complete) and 2035 (when the Ballard extension is complete). In the interim period, however, the new ST2 LINK light rail extensions (east to Redmond, south to Federal Way, north to Lynnwood) could significantly shift how people reach the arena. These regional lines converge at Westlake Station and could substantially add to “last mile” trips between Westlake and the arena via the Monorail, 3<sup>rd</sup> Ave bus routes, bike share, walking, or ridehailing. This is discussed in more detail at the end of Section 4.4.3, *Operations Impacts*.

### Average Seattle Center Attendance

Reserve capacity on the LINK light rail was estimated based on Sound Transit’s 2035 ridership demand model and the best available information regarding Sound Transit’s service level plans (Sound Transit, 2018). Reserve capacity under the No Action Alternative – Average Seattle Center Attendance scenario is summarized in Table 4-26. These values pertain specifically to the new line that would extend from Westlake Station north through the study area, toward Ballard. For all analysis periods studied, reserve capacity is expected to be available on LINK light rail in both directions.

**Table 4-26. LINK Light Rail Reserve Capacity – No Action Alternative – Average Seattle Center Attendance**

Analysis Period	Service Assumptions		Reserve Capacity (Number of Passengers)	
	Headway (minutes)	Cars per Train	To/From the South	To/From the North
Weekday Pre-event Peak Hour	6	4	2,901	6,784
Weekday Post-event Peak Hour	10	3	1,050	2,992
Saturday Pre-event Peak Hour	10	4	2,458	2,587

Source: Prepared by Fehr & Peers, 2018.

Metro is expected to restructure bus routing and service levels in the future to match regional growth and the light rail expansion. As is the case under 2020 conditions, it is projected that bus service would be provided such that ridership would not routinely reach crowding thresholds, although individual trips during the highest demand times may exceed those thresholds. The Monorail is also expected to have reserve capacity under the No Action Alternative – Average Seattle Center Attendance in 2035.

However, buses would be affected by the worsening congestion on study area corridors during the weekday pre-event peak hour under No Action Alternative – Average Seattle Center Attendance in 2035. Therefore, bus travel time and reliability would degrade as congestion increases.

### Above-Average Seattle Center Attendance

During Above-Average Seattle Center Attendance conditions, the additional increment of visitors to the campus would result in increased ridership on LINK light rail and nearby bus routes. Reserve capacity under the No Action Alternative – Above-Average Seattle Center Attendance is summarized in Table 4-27. For all analysis periods studied, reserve capacity is expected to be available on LINK light rail in both directions.

**Table 4-27. LINK Light Rail Reserve Capacity – No Action Alternative – Above-Average Seattle Center Attendance**

Analysis Period	Service Assumptions		Reserve Capacity (Number of Passengers)	
	Headway (minutes)	Cars per Train	To/From the South	To/From the North
Weekday Pre-event Peak Hour	6	4	2,399	6,664
Weekday Post-event Peak Hour	10	3	725	2,914
Saturday Pre-event Peak Hour	10	4	2,097	2,500

Source: Prepared by Fehr & Peers, 2018.

With the additional influx of visitors to Seattle Center, individual bus trips during the highest demand times are more likely to exceed crowding thresholds. The Monorail is also expected to have reserve capacity under No Action Alternative – Above-Average Seattle Center Attendance in 2035.

Buses would be operating in more severe congestion on study area corridors during the weekday pre-event peak hour under Above-Average Seattle Center Attendance conditions. Bus travel time and reliability would degrade as congestion increases.

### Pedestrian Travel

#### Average Seattle Center Attendance

As the city's population and employment continue to grow, pedestrian activity in the study area would increase. The sidewalks and crosswalks in the study area are expected to accommodate that growth in the coming years, with no facilities routinely having demand exceed capacity.

## Above-Average Seattle Center Attendance

Observations of pedestrian activity on a typical day with Above-Average Seattle Center Attendance (for example, a mid-sized event at KeyArena) suggest that no sidewalks or crosswalks routinely have demand exceeding capacity. Even with additional background growth in pedestrians by 2035, these conditions are not expected to substantively change. However, it is noted that large events (i.e., over 10,000 persons) can temporarily result in such conditions at key locations near the event venue (which could be KeyArena or another Seattle Center venue, depending on the large event location).

### **Bicycle Travel**

All 2035 scenarios would increase congestion on most streets compared to 2020. The congestion on portions of 1<sup>st</sup> Ave N, Queen Anne Ave N, 5<sup>th</sup> Ave N, and Dexter Ave N are particularly notable as these facilities have on-street bicycle facilities. Bicyclists may feel less comfortable traveling on these streets when adjacent lanes experience “stop-and-go” traffic because such conditions can result in side-street vehicles encroaching into the major street to merge, thereby temporarily blocking the bicycle facilities. Conversely, further reductions in auto travel time reliability could make travel to the venue by bicycle more attractive.

Bicycle parking supply would remain the same as existing conditions under the No Action Alternative. The City has plans to construct protected bicycle lanes along the 1<sup>st</sup> Ave N and Queen Anne Ave N couplet by 2035. Under either attendance scenario, no bicycle facilities are expected to be consistently blocked by pedestrian overflows or vehicles dropping off or picking up patrons.

### **Parking**

SDOT will continue to adjust its management of on-street parking supply to ensure that curb space is designated appropriately for the changing conditions. In particular, SDOT would proactively manage parking within roughly a quarter-mile of light rail stations to discourage commuter parking, which would include much of the parking study area. New developments in the study area would add some off-street supply within a walkable distance to the arena site, but it would be speculative to estimate which locations and how much parking would be publicly available. For the purposes of this analysis, the parking supply is expected to remain the same as 2020. Overall, background parking occupancy is expected to increase by 10% over 2020 conditions, which is commensurate with overall vehicle trip growth.

## Average Seattle Center Attendance

Table 4-28 summarizes parking occupancy under Average Seattle Center Attendance conditions. Total on-street parking occupancy is expected to be 74% on a weekday and 88% on a Saturday. Total off-street parking occupancy is expected to be 14% on a weekday and 25% on a Saturday.

## Above-Average Seattle Center Attendance

The mode share of visitors to Seattle Center will change substantially by 2035 as private vehicle use decreases in favor of light rail and ridehailing trips. This change in travel behavior would result in lower parking demand from Seattle Center visitors. Table 4-29 summarizes parking occupancy under Above-Average Seattle Center Attendance conditions. Total on-street parking occupancy is expected to be 75% on a weekday and 89% on a Saturday. Total off-street parking occupancy is expected to be 35% on a weekday and 44% on a Saturday.

**Table 4-28. Parking Occupancy – 2035 No Action Alternative – Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	80 (76%)	76 (72%)
	North	1,161 (78%)	1,477 (99%)
	South	701 (66%)	779 (74%)
	West	383 (80%)	429 (89%)
	<b>Subtotal</b>	<b>2,325 (74%)</b>	<b>2,761 (88%)</b>
Off-Street	East	300 (14%)	303 (14%)
	North	162 (12%)	585 (42%)
	South	209 (14%)	400 (28%)
	West	29 (30%)	5 (5%)
	<b>Subtotal</b>	<b>700 (14%)</b>	<b>1,293 (25%)</b>
On-Street & Off-Street	<b>Total</b>	<b>3,025 (37%)</b>	<b>4,054 (49%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea.

Source: Prepared by Fehr & Peers, 2018.

**Table 4-29. Parking Occupancy – 2035 No Action Alternative – Above-Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	80 (76%)	76 (72%)
	North	1,178 (79%)	1,477 (99%)
	South	713 (68%)	809 (77%)
	West	383 (80%)	429 (89%)
	<b>Subtotal</b>	<b>2,354 (75%)</b>	<b>2,791 (89%)</b>
Off-Street	East	549 (25%)	675 (31%)
	North	752 (55%)	915 (66%)
	South	443 (31%)	626 (43%)
	West	29 (30%)	5 (5%)
	<b>Subtotal</b>	<b>1,773 (35%)</b>	<b>2,221 (44%)</b>
On-Street & Off-Street	<b>Total</b>	<b>4,127 (50%)</b>	<b>5,012 (61%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea.

Source: Prepared by Fehr & Peers, 2018.

Under Average Seattle Center Attendance conditions for the No Action Alternative, weekday evening off-street parking occupancy increases from 12% under 2020 conditions to 14% under 2035 conditions. In contrast, under Above-Average Seattle Center Attendance conditions, the weekday evening off-street parking occupancy decreases from 46% under 2020 conditions to 35% under 2035 conditions. This decrease is caused by a greater percentage of Above-Average Seattle Center event attendees shifting to non-private auto modes of travel (i.e., less parking demand) between 2020 and 2035.

### **Bus/Truck Staging**

Charter buses and trucks currently stage using curb space in the vicinity of the arena site in accordance with the SDOT and Seattle Center MOA for Event Curbside Management (2011). Through that agreement, Seattle Center reserves curb space on Thomas St, Warren Ave N, 2<sup>nd</sup> Ave N, Republican St, and 4<sup>th</sup> Ave N for loading, unloading, and staging of events. It is assumed this arrangement stays in place and all KeyArena charter bus and truck staging consistent with that arrangement is permitted by SDOT. In other words, there are no changes related to charter buses or truck staging under the No Action Alternative.

### **Paratransit**

Under the No Action Alternative, paratransit vehicles would continue to load and unload along the east side of 1<sup>st</sup> Ave N adjacent to KeyArena, as well as on 2<sup>nd</sup> Ave N just south of KeyArena. This designated passenger loading/unloading curb space would be available under both Seattle Center attendance conditions. However, with an unregulated ridehailing system, the passenger loading/unloading space used by paratransit would sometimes be blocked by non-transit vehicles during periods of high demand.

### **Safety**

No study intersections are identified as high collision locations. With the implementation of protected bicycle lanes along 1<sup>st</sup> Ave N, pick-up/drop-off activity is not expected to block through lanes, bicycle facilities, or bus pullouts.

### **Summary of Transportation Conditions in 2035 for the No Action Alternative**

Despite the extension of LINK light rail to the study area by 2035, continued land development in the area would result in an approximately 10% increase in vehicle traffic over 2020 conditions. This results in marginally worse overall intersection operating conditions and a decrease in travel times on primary east-west corridors. Although bus capacity is expected to be sufficient under the 2035 No Action Alternative – Average Seattle Center Attendance scenario, the traffic operations conditions affect transit service during the weekday pre-event peak hour. These conditions are related to commute traffic throughout the Uptown, South Lake Union, Belltown, and Downtown Urban Centers and would degrade bus speeds and schedule reliability. LINK light rail would have reserve capacity during all analysis periods under the No Action Alternative – Average Seattle Center Attendance scenario.

During an Above-Average Seattle Center Attendance condition, more localized effects are experienced in the study area in addition to the degraded traffic operations and transit conditions described above. Because ridehailing vehicles would not have regulated loading and unloading locations under the No Action Alternative and the number of ridehailing vehicles would increase by 2035, it is expected that they would regularly block through lanes, bicycle facilities, and bus pullouts before and after events, adversely affecting transit, bicycle travel, paratransit, and safety. LINK light rail would have reserve capacity during all analysis periods under the No Action Alternative – Above-Average Seattle Center Attendance scenario.

**Alternative 1: OVG Proposal**

This section describes the potential impacts to transportation that are likely under Alternative 1. The travel characteristics of attendees at the arena would change by 2035. In particular, light rail is expected to carry nearly one-quarter of arena attendees, with a slight decrease in bus ridership as some transit users shift from bus to light rail. The growth of ridehailing is expected to continue, carrying one-quarter of arena attendees by 2035. As the mode share of light rail and ridehailing grows, private vehicle use by arena attendees would drop to 35%. Table 4-30 summarizes the mode share estimates for attendees of the arena in 2035. Details are presented in *Tech Memo 7, Project Travel Characteristics – Year 2035*.

**Table 4-30. Expected Mode Share for Arena Attendees in 2035**

Travel Mode	Weekday NBA Game Pre-Event Peak Hour	Weekday NBA Game Post-Event Peak Hour	Saturday Concert Pre-Event Peak Hour	Notes
Private Vehicle	35%	38%	41%	Some of these trips may also include longer walks or bike share travel to arena.
Light Rail to/from Seattle Center Arena	23%	23%	20%	Some of these light rail trips may require transfers at Westlake Station.
Bus to/from Seattle Center Arena	6%	5%	5%	Percentages reflect bus trips to/from routes that have access directly adjacent to Seattle Center.
Taxi / TNC / Other Drop-off	25%	22%	25%	Percentages represent final mode of travel in/out of study area.
Walk to/from Nearby Origin	8%	8%	6%	
Monorail	2%	3%	2%	
Bicycle	1%	1%	1%	

Source: Prepared by Fehr & Peers, 2018. Refer to Appendix C, *Tech Memo 7, Project Travel Characteristics-Year 2035*.

Table 4-31 summarizes the arena trip generation estimates using the mode share described above. AVO and temporal distribution estimates are expected to remain the same as described for 2020. These estimates reflect the sold-out capacity for the renovated arena and apply to both Alternatives 1 and 2. The distribution of trips to the arena would be the same in 2035 as 2020 (see Table 4-14).

**Traffic Operations**

Traffic volumes associated with the renovated arena are layered on top of the No Action Alternative forecasts for the traffic operations analysis. Similar to 2020 conditions, this scenario does not assume any formalized traffic management strategies to accommodate arriving attendees during the pre-event peak hour or departing vehicles during the post-event peak hour beyond what is currently in place.

**Average Seattle Center Attendance**

Figure 4-26 displays the intersection LOS for Average Seattle Center Attendance conditions under the No Action Alternative and with Alternative 1 (Alternative 2 is described later). Figure 4-27 displays the intersections impacted under 2035 Alternative 1 – Average Seattle Center Attendance.

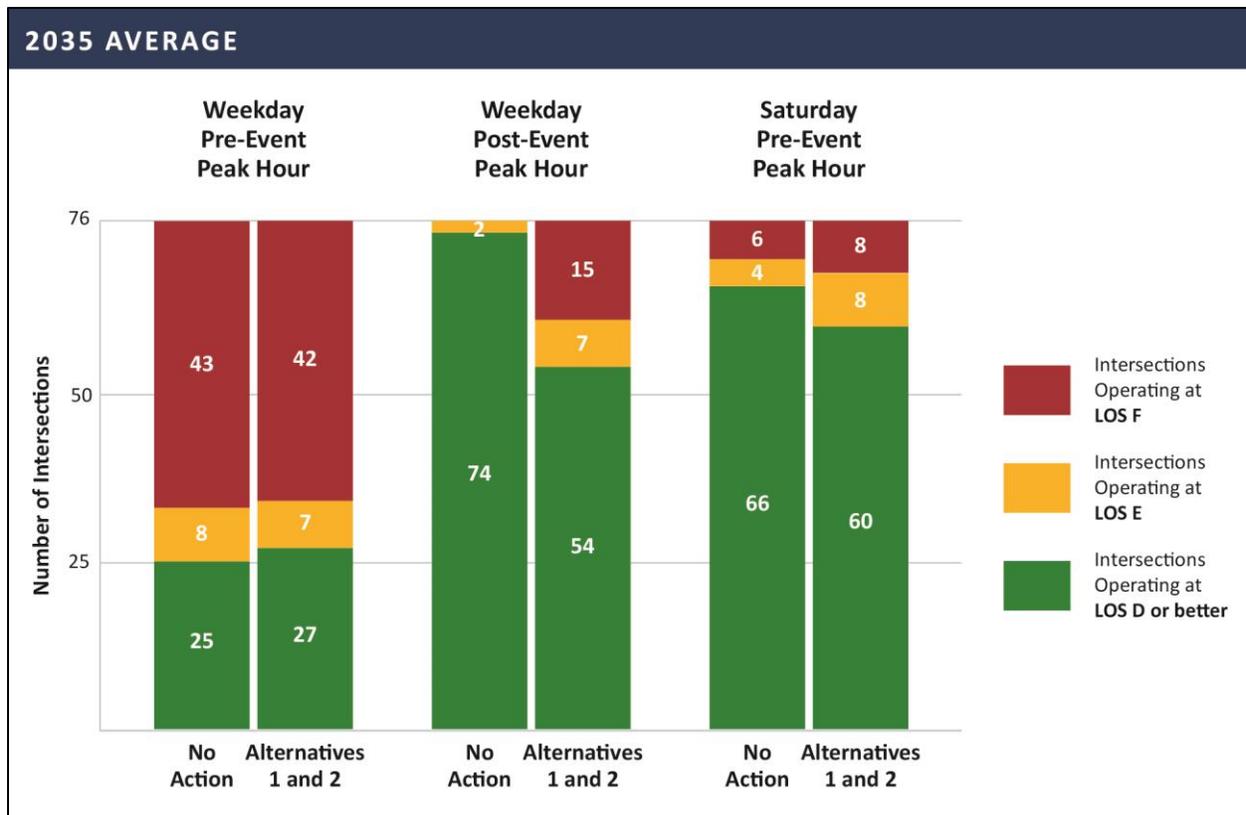


Figure 4-26. Intersection LOS Summary – 2035 Conditions with Average Seattle Center Attendance

Table 4-31. Peak Hour Vehicle Trip Generation of Proposed Arena (Alternatives 1 and 2) in 2035

Traveler Type	Weekday NBA Game Pre-Event Peak Hour Vehicle Trips			Weekday NBA Game Post-Event Peak Hour Vehicle Trips			Saturday Concert Pre-Event Peak Hour Vehicle Trips		
	In	Out	Total	In	Out	Total	In	Out	Total
Attendees traveling by private vehicle	1,676	0	1,676	0	2,653	2,653	1,634	0	1,634
Attendees traveling by TNC/taxi/drop-off vehicle	1,197	1,197	2,394	1,667	1,667	3,334	996	996	1,992
Employees traveling by private vehicle	16	0	16	0	32	32	16	0	16
Employees traveling by TNC/Taxi/ Drop-off	5	5	10	10	10	20	5	5	10
Miscellaneous <sup>1</sup>	15	5	20	5	10	15	15	5	20
<b>Total</b>	<b>2,909<sup>2</sup></b>	<b>1,207</b>	<b>4,116</b>	<b>1,682</b>	<b>4,372<sup>2</sup></b>	<b>6,054</b>	<b>2,666</b>	<b>1,006</b>	<b>3,672</b>

<sup>1</sup> Miscellaneous trips include delivery vehicles, emergency vehicles, utility vehicles, etc.

<sup>2</sup> Weekday pre-event in and weekday post-event are not equal due to differing mode share assumptions, AVO, and temporal distribution of travel for each analysis period.

Source: Prepared by Fehr & Peers, 2018.

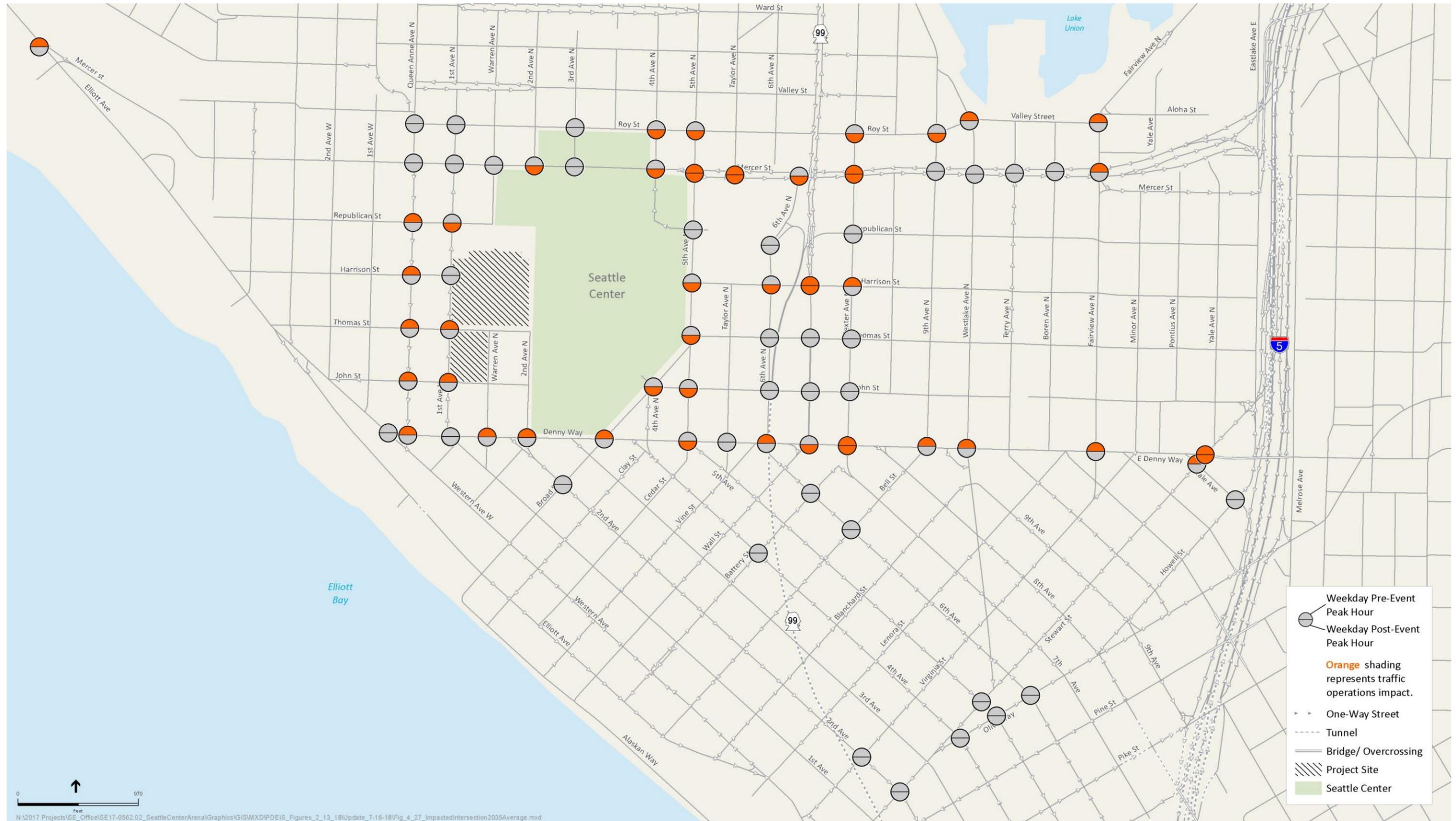


Figure 4-27. Impacted Intersections – 2035 Alternative 1 –Average Seattle Center Attendance Weekday Pre-Event and Post-Event Peak Hour Condition

For intersections that operate acceptably under the No Action Alternative, this is defined as dropping to an unacceptable LOS (LOS E or F) and adding 5 or more seconds of delay for signalized intersections or adversely affecting unsignalized intersections based on the degree of congestion increase, modal conflicts, and other considerations. For intersections that operate unacceptably under the No Action Alternative, this is defined as Alternative 1 adding at least 5 seconds of delay.

Alternative 1 would cause westbound travel on these roadways to experience moderate to substantial delay increases when compared to the No Action Alternative. Refer to Appendix C, *Tech Memo 8, 2035 Analysis Results for Roadway and Pedestrian Systems*, for more detail. As described in the 2020 analysis section, the number of intersections within the study area operating at LOS D or better actually increases under the weekday pre-event peak hour for Alternatives 1 and 2. As was the case before, this is more of a technical anomaly than a description of actual conditions. Some intersections toward the center of the study area would experience better LOS because congestion entering the network (e.g., existing I-5, traveling from the west, etc.) will constrain the traffic that reached downstream intersections. Additionally, because intersection LOS is the average of delay experienced on all approaches, higher westbound traffic volumes will reduce the average overall delay along the Mercer St and Denny Way corridors.

During the weekday pre-event peak hour on a day with Average Seattle Center Attendance, 26 intersections would be impacted under Alternative 1. During the weekday post-event peak hour, 21 intersections would be impacted under Alternative 1. During the Saturday pre-event peak hour, 11 intersections would be impacted under Alternative 1. The impacted intersections are listed in Appendix C, *Tech Memo 8, 2035 Roadway System Analysis Results*. Table 4-32 summarizes projected travel speeds along Mercer St and Denny Way under Alternative 1 – Average Seattle Center Attendance.

**Table 4-32. Corridor Travel Speed – 2035 Alternative 1 – Average Seattle Center Attendance**

Corridor	Weekday Pre-Event Peak Hour			
	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed	% of Free Flow Speed
Mercer St	2 MPH	20%	4.5 MPH	45%
Denny Way	1.5 MPH	15%	3.5 MPH	35%

MPH = miles per hour. Average free-flow travel speed of 10 MPH assumed given presence of controls and measured speeds in this range under mostly free-flow conditions on these corridors.

Source: Prepared by Fehr & Peers, 2018.

This table reveals the following findings:

- Average travel speeds on eastbound Mercer St and Denny Way between Seattle Center and I-5 would be unchanged relative to the No Action Alternative. Westbound travel speeds on Mercer St would be reduced from 5.5 MPH under the No Action Alternative to 4.5 MPH under Alternative 1 – Average Seattle Center Attendance. The westbound travel speed on Denny Way would decrease from 7.5 MPH under the No Action Alternative to 3.5 MPH under Alternative 1 –

Average Seattle Center Attendance. Because the westbound travel speed would degrade from above to below 40% of the free flow travel speed, this is a significant impact.

Above-Average Seattle Center Attendance

Figure 4-28 displays the number of intersections operating at LOS D or better, LOS E, and LOS F for Above-Average Seattle Center Attendance conditions under the No Action Alternative and with Alternative 1. Impacted intersections are shown in Figure 4-29. For intersections that operate acceptably under the No Action Alternative, this is defined as dropping to an unacceptable LOS (LOS E or F) and adding 5 or more seconds of delay for signalized intersections or adversely affecting unsignalized intersections based on the degree of congestion increase, modal conflicts, and other considerations. For intersections that operate unacceptably under the No Action Alternative, this is defined as Alternative 1 adding at least 5 seconds of delay.

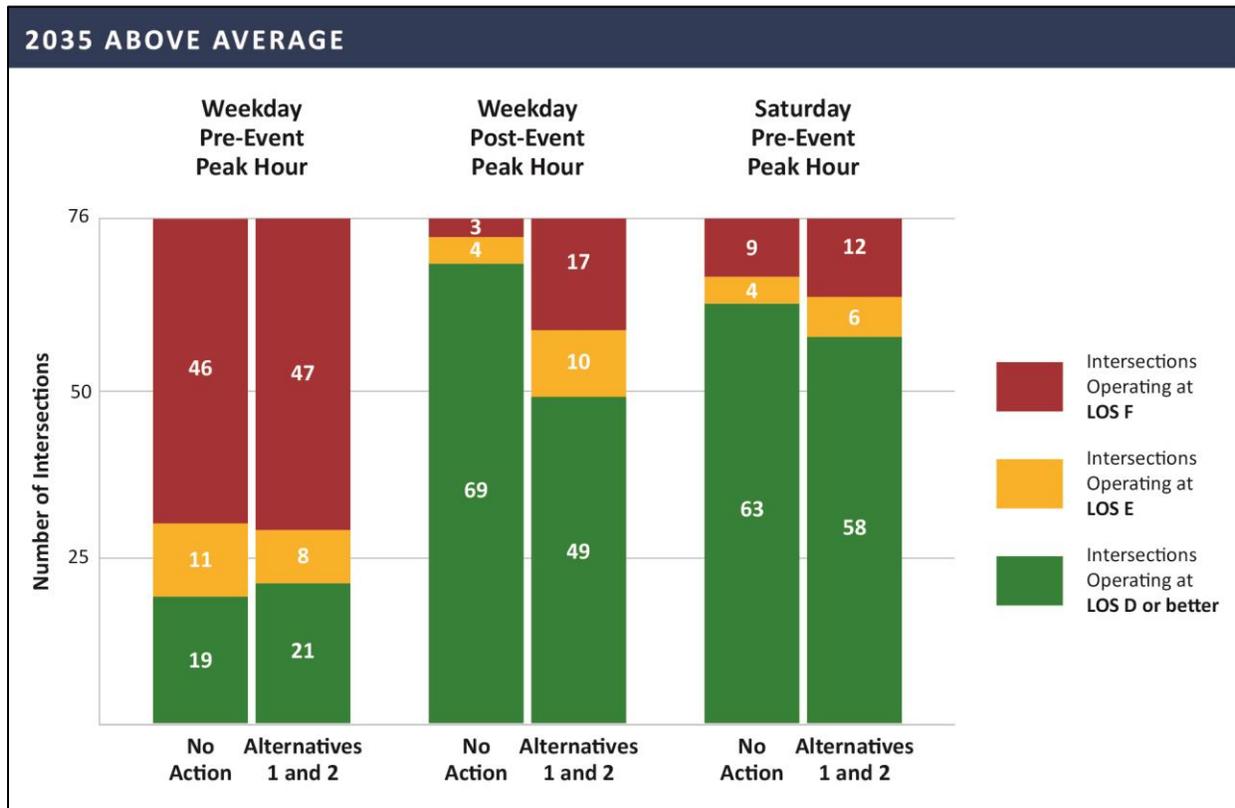


Figure 4-28. Intersection LOS Summary – 2035 Conditions with Above-Average Seattle Center Attendance

Alternative 1 – Above-Average Seattle Center Attendance would cause significant impacts at 15 intersections during the weekday pre-event peak hour, 23 intersections during the weekday post-event peak hour, and 13 intersections during the Saturday pre-event peak hour. The impacted intersections are listed in Appendix C, *Tech Memo 8, 2035 Roadway System Analysis Results*.

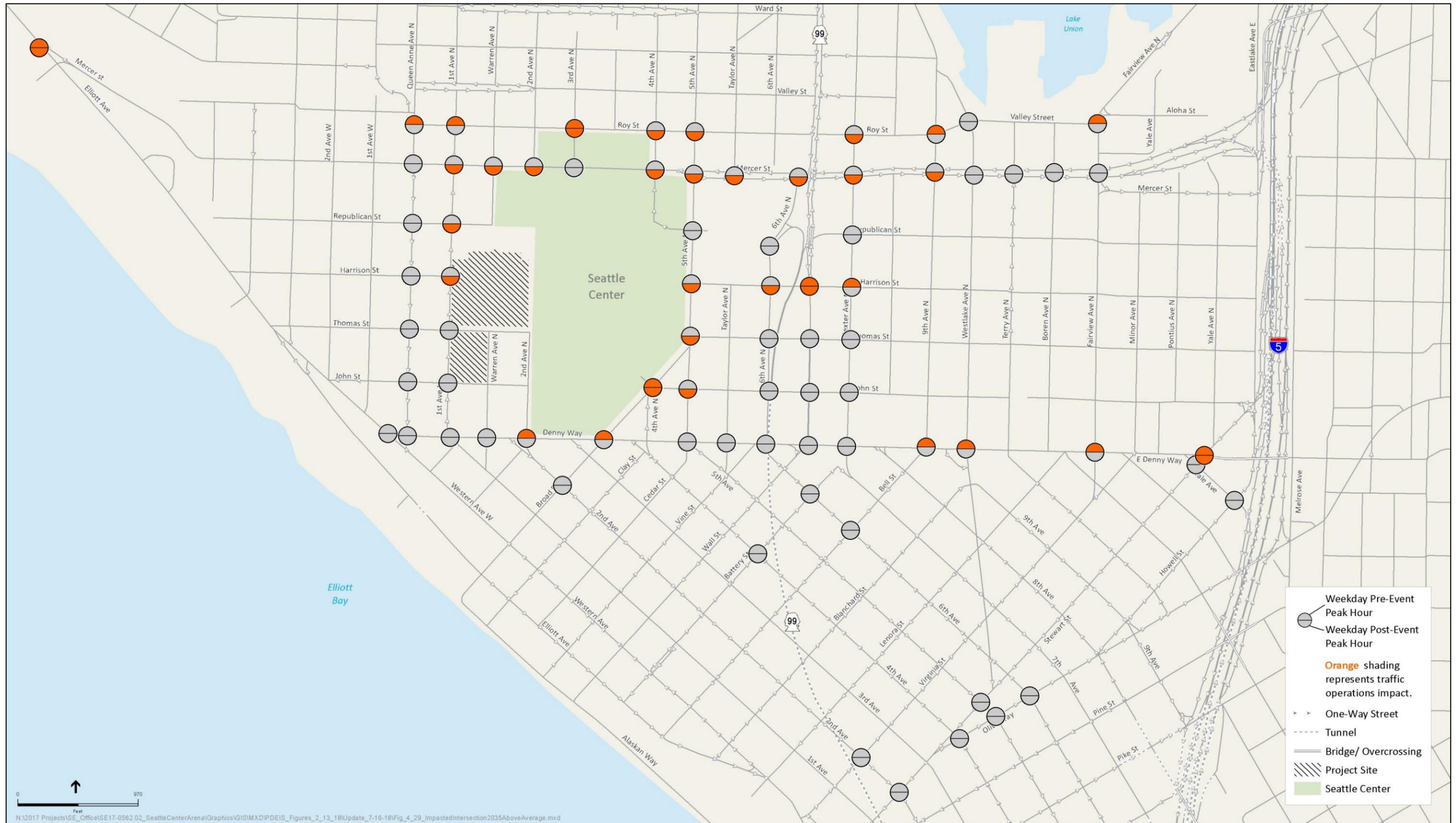


Figure 4-29. Impacted Intersections – 2035 Alternative 1 – Above-Average Seattle Center Attendance Weekday Pre-Event and Post-Event Peak Hour Condition

Table 4-33 summarizes projected travel speeds along Mercer St and Denny Way under Alternative 1 – Above-Average Seattle Center Attendance. During the weekday pre-event peak hour, the average travel speed on westbound Denny Way from Fairview Ave N to Taylor Ave would be reduced to less than 40% of its free-flow speed. Alternative 1 – Above-Average Seattle Center Attendance would also cause traffic exiting both directions of I-5 at Mercer St to queue back toward the mainline.

**Table 4-33. Corridor Travel Speed – 2035 Alternative 1 – Above-Average Seattle Center Attendance**

Corridor	Eastbound		Westbound	
	Average Travel Speed (MPH)	% of Free Flow Speed	Average Travel Speed (MPH)	% of Free Flow Speed
Mercer St	2	20%	4.5	45%
Denny Way	1.5	15%	3	30%

MPH = miles per hour.

Source: Prepared by Fehr & Peers, 2018.

**Ridehailing**

Ridehailing is expected to become more prevalent by 2035, and its regulation would be the same in 2035 as in 2020. Ridehailing vehicles would drop off passengers in accordance with their selected destination and often at whatever specific block location the passenger requests. The City would regulate post-event pick-ups to only occur at a handful of locations surrounding and near the perimeter of the Seattle Center campus.

Under this plan, during pre-determined event times (to be coordinated by Seattle Center and SDOT), a customer requesting a ride from the geofenced area encompassing Seattle Center would have to meet their vehicle at 1 of the designated pick-up locations during post-event conditions. Specific geofence boundaries would be determined and periodically updated in the AAMP. Ridehailing activity would result in a substantial number of “deadhead” trips added to the area because each pick-up or drop-off results in 2 trips: 1 carrying the arena attendee(s) and 1 trip with only the driver (unless the ridehailing vehicle is connected with another passenger in the vicinity of the arena). Some of the traffic and transit delays described above are attributable to ridehailing traffic (drop-off, pick-up, deadhead, and circulating activities).

**Average Seattle Center Attendance**

Under Alternative 1 – Average Seattle Center Attendance, the renovated arena would attract substantial ridehailing activity during events such as an NBA game or concert. Drop-off activity would be similar to that observed during large KeyArena events, which sometimes result in ridehailing vehicles blocking through lanes, bicycle facilities, or bus pullouts, particularly along the arena frontage along 1<sup>st</sup> Ave N. Some of the designated ridehailing pick-up locations may temporarily repurpose a parking or travel lane, but this would be in accordance with an AAMP in coordination with SDOT to minimize the effects to other modes.

## Above-Average Seattle Center Attendance

Under Alternative 1 – Above-Average Seattle Center Attendance, ridehailing would occur within a slightly more congested traffic environment. Drivers may have a more difficult time finding appropriate curb space to drop off passengers, resulting in more frequently blocked through lanes, bicycle facilities, or bus pullouts during the pre-event peak hours, particularly along 1<sup>st</sup> Ave N. Some of the designated ridehailing pick-up locations may temporarily repurpose a parking or travel lane, but this would occur in accordance with an AAMP in coordination with SDOT to minimize the effects to other modes.

### Transit

## Average Seattle Center Attendance

Table 4-34 lists the number of event attendees and employees that are expected to ride LINK light rail to the renovated arena during each peak hour under Alternative 1 – Average Seattle Center Attendance. During the weekday post-event peak hour, nearly 3,900 attendees and employees are expected to leave the arena heading south via light rail. This demand is well in excess of reserve capacity, assuming 10-minute headways and 3 cars per train (typical Sound Transit service levels for the evening). To serve this post-event surge in demand, LINK light rail would need to operate 4 cars per train at 7-minute headways. All other analysis periods and directions could accommodate the attendee demand over the course of the peak hour.

**Table 4-34. LINK Light Rail 2035 Reserve Capacity – Alternative 1 – Average Seattle Center Attendance**

Analysis Period	To/From the South		To/From the North	
	Number of Arena LINK Riders	Percent Usage of Overall Reserve Capacity	Number of Arena LINK Riders	Percent Usage of Overall Reserve Capacity
Weekday Pre-event Peak Hour	2,432	84%	128	2%
Weekday Post-event Peak Hour	3,861	368%	203	7%
Saturday Pre-event Peak Hour	1,844	75%	97	4%

Service level assumptions are the same as shown for the No Action Alternative.

Source: Prepared by Fehr & Peers, 2018.

### Travel by Monorail

The findings for 2020 would also apply to 2035 because Monorail ridership is expected to be slightly lower than in 2020 (due to the more direct connection from other transit service via light rail). In summary, the largest demand would occur after an event, with the first train completely full, the second train mostly occupied, and the third train uncrowded. During the post-event peak hour, project-related riders could be accommodated via normal service (i.e., 10-minute headways). However, some passengers may have to wait up to 20 minutes due to Monorail train capacity constraints. While the train capacity over the course of the post-event peak hour is sufficient, improvements to the ingress, egress, and operating hours of the Monorail could make it a more attractive option for event attendees to make the first/last mile connection to the arena with less delay to board post-event, thereby mitigating some of the traffic congestion impacts caused by private autos and ridehailing. This analysis

assumes that the Monorail capacity remains the same as existing conditions because there is no current funding commitment to improve capacity and convenience.

*Travel by Bus*

As stated under the No Action Alternative, Metro is expected to restructure bus routing and service levels such that ridership would not routinely reach crowding thresholds, although individual trips during the highest demand times may exceed those thresholds. Project demand for buses would decrease somewhat by 2035 because some of the transit demand would shift to LINK light rail. Therefore, bus capacity effects of the project would be less than those stated for 2020. However, increasing congestion would adversely affect bus speeds and reliability in 2035. Additionally, ridehailing pick-up and drop-off activities have the potential to block bus stops and layover areas, slowing bus travel and interfering with transit operations.

Capacity at nearby bus stops was also considered. The northbound stop at 1<sup>st</sup> Ave N and Republican St is expected to have adequate capacity because riders could spill back into the arena plaza during periods of highest demand. However, the southbound stops along Queen Anne Ave N are more constrained due to sidewalk width and street furniture, particularly at John St and Harrison St. This could lead to riders blocking other pedestrians trying to travel along the sidewalk while waiting for buses during the post-event peak hour.

**Above-Average Seattle Center Attendance**

Table 4-35 lists the number of event attendees and employees that are expected to ride LINK light rail to the renovated arena during each peak hour under Alternative 1 – Above-Average Seattle Center Attendance. The number of riders generated by the renovated arena would remain the same, but there would be lower reserve capacity available because of the additional ridership generated by other events at Seattle Center.

**Table 4-35. LINK Light Rail Reserve Capacity – 2035 Alternative 1 – Above-Average Seattle Center Attendance**

Analysis Period	To/From the South		To/From the North	
	Number of Arena LINK Riders	Percent Usage of Overall Reserve Capacity	Number of Arena LINK Riders	Percent Usage of Overall Reserve Capacity
Weekday Pre-event Peak Hour	2,432	101%	128	2%
Weekday Post-event Peak Hour	3,861	532%	203	7%
Saturday Pre-event Peak Hour	1,844	88%	97	4%

Service level assumptions are the same as shown for the No Action Alternative.  
 Source: Prepared by Fehr & Peers, 2018.

Again, the weekday post-event peak hour would not have enough reserve capacity to the south to accommodate the ridership surge with typical evening service. To serve this post-event surge in demand, LINK light rail would need to operate 4 cars per train at 7-minute headways. With Above-Average Seattle Center Attendance, the additional riders during the weekday pre-event peak hour would slightly exceed the reserve capacity from the south. Because the trains would already be

operating at peak hour service levels, this indicates that without staging additional trains, LINK light rail would be beyond the crowding threshold for at least an hour and some riders would need to wait for the next train to board. All other analysis periods and directions could accommodate the attendee demand over the course of the peak hour.

#### *Travel by Monorail*

Monorail ridership by project attendees would remain the same under Above-Average Seattle Center Attendance conditions. Although the background reserve capacity would be lower, the Monorail should still accommodate all riders over the course of the post-event peak hour. Some passengers may have to wait up to 20 minutes due to Monorail train capacity constraints.

#### *Travel by Bus*

As stated under the No Action Alternative, Metro is expected to restructure bus routing and service levels such that ridership would not routinely reach crowding thresholds, although individual trips during the highest demand times may exceed the thresholds. Project demand for buses would decrease somewhat by 2035 because some of the transit demand would shift to LINK light rail. Therefore, bus capacity effects of the project would be less than those stated for 2020. However, increasing congestion would adversely affect bus travel time and reliability in 2035.

As described above, the southbound bus stops along Queen Anne Ave N are somewhat constrained, particularly at John St and Harrison St. This could lead to riders blocking other pedestrians trying to travel along the sidewalk while waiting for buses during the post-event peak hour.

#### **Pedestrian Travel**

In 2035, fewer people would walk between parking lots and the arena due to the decreased private vehicle mode share, but more people would walk to the nearby LINK light rail station and the designated ridehailing pick-up locations. The largest shift in pedestrian flows would be due to the new LINK light rail station, so the 2035 analysis focused on the capacity of nearby sidewalks and crosswalks to accommodate that demand. The specific station location is unknown, but for the EIS analysis, the project demand was distributed across the crosswalks at 2 nearby intersections to test the capacity if arena attendees crossed an adjacent street to reach the station (in other words, no station portal was assumed to be east of 1<sup>st</sup> Ave N).

#### **Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions with Alternative 1, all sidewalks would have sufficient capacity to carry the pedestrian demand without overflow into adjacent streets. The facility nearest the capacity threshold would be 2<sup>nd</sup> Ave N between John St and Denny Way. Some signalized intersections in the vicinity of the project provide sizeable areas for pedestrians to wait to cross the intersection. Examples exist along portions of 5<sup>th</sup> Ave N (e.g., at Harrison St). However, other intersections have limited size waiting areas to accommodate pedestrians. Examples include the 1<sup>st</sup> Ave N/Mercer St and 1<sup>st</sup> Ave N/Harrison St intersections.

As noted in the 2020 analysis, pedestrian flows at 1 crosswalk (the north leg of the 5<sup>th</sup> Ave N/Harrison St intersection) are expected to exceed capacity. Increased demand across 1<sup>st</sup> Ave N is expected at the unmarked, unsignalized crossings at Thomas St and John St. Lastly, the new light rail station planned near Seattle Center by 2035 would be used by some arena attendees. Assuming a station location west of 1<sup>st</sup> Ave N, the east-west crosswalks that most directly access the station (likely Republican St or

Harrison St) would not meet the travel demand. Additionally, the corner waiting areas at the west sides of these intersections may be too small to accommodate pre-event surges.

### Above-Average Seattle Center Attendance

Under Above-Average Seattle Center Attendance conditions, the majority of the added pedestrian travel (beyond Average Seattle Center Attendance conditions) would occur between the LINK light rail stations, Mercer St, 1<sup>st</sup> Ave N, and 5<sup>th</sup> Ave N garages and Seattle Center venues east of the arena. Few additional sidewalks and crosswalks would be affected by a direct trip between these parking facilities and the arena. In other words, the sidewalks and crosswalks between these parking facilities and the Seattle Center venues tend to have capacity, with the exception of the 5<sup>th</sup> Ave N/Harrison St north leg crosswalk, which would be further impacted by people parking east of Seattle Center and traveling to campus venues. Attendees who visit nearby restaurants may result in additional sidewalk/ crosswalk use, but this travel would not exceed capacity. As described earlier, the same crosswalks and corner waiting areas that provide access between the LINK light rail station and the arena are likely to be too small to meet demand under 2035 Above-Average Seattle Center Attendance conditions with the renovated arena.

#### **Bicycle Travel**

Assuming a 1% mode share for event attendees, bicycle parking demand would be for roughly 190 bicycles (which could be personal bicycles or bike share bicycles). OVG's current design accommodates bicycle racks for approximately 102 bicycles. OVG has committed to providing bike valet services at the site, with locations and conditions to be established through the AAMP in coordination with Seattle Center, SDCI, and SDOT.

### Average Seattle Center Attendance

Under Average Seattle Center Attendance conditions, vehicles (ridehailing or otherwise) could temporarily block bicycle facilities when dropping off passengers during the pre-event peak hours. While temporary, this blockage would create a challenging environment for bicyclists that must pull into a vehicle lane to move around a stopped vehicle blocking the bicycle facility. Post-event blockages are unlikely to occur because of the designated ridehailing pick-up locations.

### Above-Average Seattle Center Attendance

With above-average attendance on the Seattle Center campus, including an event at the arena, vehicles (ridehailing or otherwise) could temporarily block bicycle facilities when dropping off passengers during the pre-event peak hours. This would likely be more frequent given the increased congestion during an Above-Average Seattle Center Attendance condition. While temporary, this blockage would create a challenging environment for bicyclists that must pull into a vehicle lane to move around a stopped vehicle blocking the bicycle facility. Post-event blockages are unlikely to occur because of the designated ridehailing pick-up locations.

#### **Parking**

Parking demand generated by Alternative 1 would decrease by 2035 (compared to 2020) commensurate with the decrease in private vehicle trip generation. Parking assignments were completed in the same way as described for 2020: vehicle trips generated by the renovated arena were assigned to on-street and off-street parking locations that are currently anticipated to be available for public parking. Again,

parking that would occur outside of the parking study area (for example at lots along the Dexter Ave N corridor) is not reflected in the following tables.

### Average Seattle Center Attendance

Table 4-36 summarizes 2035 parking occupancy under Alternative 1 – Average Seattle Center Attendance. Total on-street parking occupancy is expected to be 86% on a weekday and 96% on a Saturday. Total off-street parking occupancy is expected to be 50% on a weekday and 65% on a Saturday. Compared to the No Action Alternative, Alternative 1 would result in on-street occupancies that cause a substantial number of vehicles to circulate for multiple blocks while looking for parking and increasing conflicts with other modes. Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

**Table 4-36. Parking Occupancy – 2035 Alternative 1 – Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	94 (90%)	94 (90%)
	North	1,307 (88%)	1,419 (95%)
	South	847 (80%)	1,029 (97%)
	West	439 (91%)	465 (97%)
	<b>Subtotal</b>	<b>2,687 (86%)</b>	<b>3,007 (96%)</b>
Off-Street	East	992 (45%)	1,269 (58%)
	North	739 (54%)	1,095 (80%)
	South	1,010 (53%)	1,216 (64%)
	West	57 (59%)	47 (49%)
	<b>Subtotal</b>	<b>2,798 (50%)</b>	<b>3,627 (65%)</b>
On-Street & Off-Street	<b>Total</b>	<b>5,485 (63%)</b>	<b>6,634 (76%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea. Includes the 450-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

### Above-Average Seattle Center Attendance

Table 4-37 summarizes parking occupancy with Above-Average Seattle Center Attendance conditions. Compared to the Average Seattle Center Attendance condition, Alternative 1 – Above-Average Seattle Center Attendance would result in a slight increase to on-street parking because the occupancies are already quite high. Larger increases would occur for off-street parking.

Total on-street parking occupancy is expected to be 88% on a weekday and 96% on a Saturday. Total off-street parking occupancy is expected to be 59% on a weekday and 68% on a Saturday. Alternative 1 – Above-Average Seattle Center Attendance would result in on-street occupancies that cause vehicles to circulate for multiple blocks while looking for parking and increasing conflicts with other modes.

Because paid parking and time limits are not in effect on Sundays, on-street parking occupancies would likely be higher than reflected for weekdays and Saturdays.

**Table 4-37. Parking Occupancy – 2035 Alternative 1 – Above-Average Seattle Center Attendance**

Parking Type	Subarea	Weekday Evening Occupancy	Saturday Evening Occupancy
On-Street	East	94 (90%)	94 (90%)
	North	1,335 (90%)	1,425 (96%)
	South	875 (83%)	1,029 (97%)
	West	439 (91%)	465 (97%)
	<b>Subtotal</b>	<b>2,743 (88%)</b>	<b>3,013 (96%)</b>
Off-Street	East	1,221 (56%)	1,356 (62%)
	North	928 (67%)	1,131 (82%)
	South	1,045 (55%)	1,256 (66%)
	West	63 (66%)	53 (55%)
	<b>Subtotal</b>	<b>3,257 (59%)</b>	<b>3,796 (68%)</b>
On-Street & Off-Street	<b>Total</b>	<b>6,000 (69%)</b>	<b>6,809 (78%)</b>

Includes only publicly available spaces that are expected to be open to attendees for evening. Refer to Figure 4-11 for each geographic parking subarea. Includes the 450-space garage beneath the renovated arena.

Source: Prepared by Fehr & Peers, 2018.

The Above-Average Seattle Center Attendance scenario reflects a situation with multiple events occurring on campus of varying size and timing. Visitors arriving for an earlier event would be more likely to find parking at the most convenient lots, while those arriving for a later event may find those lots full. Because of the dynamic nature of event scheduling at Seattle Center, this will affect venues differently depending on the other events on campus on any particular day.

#### **Bus/Truck Staging**

Charter buses and trucks currently stage using curbside space in the vicinity of the project site in accordance with the SDOT and Seattle Center MOA for Event Curbside Management (2011). Through that agreement, Seattle Center reserves curbside space on Thomas St, Warren Ave N, 2<sup>nd</sup> Ave N, Republican St, and 4<sup>th</sup> Ave N for loading, unloading, and staging of events. While most of those locations would remain available with a renovated arena, charter buses would not be staged on Thomas St due to the new south plaza and underground parking garage entrance on Thomas St.

Alternative 1 would have additional underground truck/bus storage compared to the space available south of KeyArena today. However, given the larger shows accommodated by the renovated arena, on-street staging would still likely be required. Seattle Center and SDOT would likely modify the MOA to include other nearby locations for staging with a similar permitting process as currently used, such that enough staging space is available whether Seattle Center is operating at an average or above-average attendance level. This would likely be part of a broader review of curbside space management in the area by

SDOT. Renegotiation of the MOA could affect on-street parking supply if curb space currently used for general on-street parking is regularly reserved for event staging.

### **Paratransit**

Under Alternative 1, paratransit vehicles would continue to load and unload along the east side of 1<sup>st</sup> Ave N adjacent to the arena, as well as on 2<sup>nd</sup> Ave N just south of KeyArena. This designated passenger loading/unloading curb space would be available under both the average and above-average conditions. Although ridehailing pick-ups would be regulated, drop-offs during the pre-event peak hours would remain unregulated. Based on observations of current drop-off activity at KeyArena, passenger loading/unloading space used by paratransit would sometimes be blocked by non-transit vehicles during periods of high demand, such as drop-offs before an event at the renovated arena.

### **Safety**

No study intersections are currently identified as high collision locations. Under both Average and Above-Average Seattle Center Attendance conditions, bicycle safety may be affected by vehicles (ridehailing or otherwise) temporarily blocking bicycle facilities when dropping off passengers during the pre-event peak hours. Depending on the final location and design of the LINK light rail station, pedestrian safety could be affected by large surges of pedestrian demand between the arena and the station.

## **Summary of Transportation Impacts in 2035 – Alternative 1**

### **Average Seattle Center Attendance**

Under Average Seattle Center Attendance conditions in Year 2035, Alternative 1 would result in adverse impacts when compared to the No Action Alternative. This comparison reflects how the transportation system would be affected on a day without a KeyArena event versus a day with a sold-out event at the renovated arena. Alternative 1 would cause significant impacts at 26 intersections during the weekday pre-event peak hour, 21 intersections during the weekday post-event peak hour, and 11 intersections during the Saturday pre-event peak hour. During the weekday pre-event peak hour, the average travel speed on westbound Denny Way from Fairview Ave N to Taylor Ave would be reduced to less than 40% of its free-flow speed, which would be a significant impact. Alternative 1 would also cause traffic exiting both directions of I-5 at Mercer St to queue back toward the mainline.

Transit would experience significant impacts due to overcapacity conditions on southbound LINK light rail trains in the post-event condition, as well as travel time and reliability degradation associated with the traffic operations findings. Because ridehailing vehicles would not have regulated unloading locations during the pre-event peak hours, they would sometimes block through lanes, bicycle facilities, and bus pullouts, resulting in significant impacts to transit, bicycle travel, and safety, particularly along 1<sup>st</sup> Ave N. No significant impacts related to ridehailing are expected during the post-event peak hours.

Compared to No Action Alternative, Alternative 1– Average Seattle Center Attendance would improve the weekday post-event condition related to ridehailing, bicycle travel, and paratransit because ridehailing vehicles would only pick-up in designated spaces. Significant pedestrian impacts are expected at the 5<sup>th</sup> Ave N/Harrison St crosswalk due to high demand and at the pedestrian crossings and western corners of the intersection that provides the most direct access to LINK light rail.

On-street parking occupancy levels on weekdays and Saturdays suggest that a substantial number of vehicles would circulate for multiple blocks looking for parking and increasing conflicts with other

modes; this would be a significant impact. Because paid parking and time limits are not in effect on Sundays, parking impacts are also expected on Sundays.

### Above-Average Seattle Center Attendance

With Above-Average Seattle Center Attendance conditions, traffic operations would be congested under both the No Action Alternative and Alternative 1, although Alternative 1 would result in additional delays on key corridors and intersections. This comparison reflects how the transportation system would change from a high activity day at Seattle Center including a KeyArena event to a high activity day at Seattle Center with a sold-out event at the renovated arena.

The impacts described for the Average Seattle Center Attendance scenario would be exacerbated under the Above-Average Seattle Center Attendance scenario. Alternative 1 would cause significant impacts at 15 intersections during the weekday pre-event peak hour, 23 intersections during the weekday post-event peak hour, and 13 intersections during the Saturday pre-event peak hour. During the weekday pre-event peak hour, the average travel speed on westbound Denny Way from Fairview Ave N to Taylor Ave would be reduced to less than 40% of its free-flow speed, which would be a significant impact. Alternative 1 would also cause traffic exiting both directions of I-5 at Mercer St to queue back toward the mainline. LINK light rail would experience significant impacts due to overcapacity conditions on northbound trains during the weekday pre-event peak hour and southbound trains in the weekday post-event peak hour. Transit is expected to experience significant impacts due to overcapacity conditions on some bus routes, as well as travel time and reliability degradation associated with degraded traffic operations.

Compared to the No Action Alternative, Alternative 1 – Above-Average Seattle Center Attendance would improve the weekday post-event condition related to ridehailing, bicycle travel, and paratransit. However, significant impacts are still expected during the pre-event peak hours because ridehailing vehicles would not have regulated unloading locations. Significant pedestrian impacts are expected at the same intersections identified for the Average Attendance with Alternative 1 condition.

Saturday post-event conditions are expected to be similar to weekday post-event conditions for all modes. While bus frequencies would likely be somewhat less on Saturdays in 2035, it is likely that there would be reserve capacity in the post-event condition. Post-event crowding on LINK light rail would be similar as described for the Average Seattle Center Attendance condition.

### **Alternative 2: Modified Proposal**

This section describes the potential impacts to transportation in 2035 under Alternative 2. The transportation-related assumptions for Alternative 2 differ from Alternative 1 in the following key ways:

- Less underground parking (200 spaces instead of 450 spaces) at the renovated arena.
- Parking before, during, and after events at the 1<sup>st</sup> Ave N Garage would be capped at 400 spaces.
- Thomas St between 1<sup>st</sup> Ave N and Warren Ave N would function as a “woonerf” (a street with a raised streetbed where pedestrians and bicyclists have priority over motorists), or urban curbsless street as defined in the City’s Right-of-Way Improvements Manual, and would be closed to traffic during events.
- Ridehailing would be regulated such that no pick-ups may occur after events within the geofenced area encompassing Seattle Center. The Alternative 2 geofence differs from the

Alternative 1 geofence in that Alternative 2 does not have designated pick-up locations within the geofence. Rather, under Alternative 2, people using a ridehailing vehicle after an event would have to walk outside of the geofence for pick-up. Specific geofence boundaries would be determined and periodically updated in the AAMP. No regulation of drop-offs would occur.

The travel characteristics (mode share, origin/destination, etc.) of attendees at the renovated arena under Alternative 2 would be the same as under Alternative 1 given their similar proposed transportation conditions and the fact that the arena capacity is the same.

### **Traffic Operations**

Traffic volume forecasts for Alternative 2 are similar to Alternative 1. The differences are focused on the locations where parking would be limited: the garage beneath the arena and the 1<sup>st</sup> Ave N Garage. Because less parking would be provided in those garages compared to Alternative 1, less traffic is projected in the area immediately south of the arena under Alternative 2. The ridehailing regulations would also disperse some traffic from the area immediately surrounding the arena to other nearby corridors during post-event conditions.

### **Average Seattle Center Attendance**

The traffic operations findings for Alternative 2 are similar to Alternative 1 in most locations. However, by providing fewer parking spaces south of the arena, the amount of time to empty garages/streets in this area after events would be reduced. While there would be a modest traffic increase on other streets associated with this displaced parking (largely expected to be east or south of Seattle Center), this would most likely occur a considerable distance from the site where parking is available and congestion is less severe. Additionally, with fewer private vehicles traveling to the arena, the number of dispersed vehicles is lower than under 2020 conditions. Similarly, traffic volumes associated with ridehailing activity would be shifted to areas outside the ridehailing pick-up boundary. Therefore, Alternative 2 is expected to result in a slight improvement (relative to Alternative 1) in traffic conditions at intersections adjacent to and south of the arena. However, the intersection LOS degradations identified under Alternative 1 would also occur at most locations with Alternative 2, given their similar travel characteristics. Similarly, Alternative 2 would result in comparable degradations in travel times and freeway off-ramp queues as described for Alternative 1.

### **Above-Average Seattle Center Attendance**

Under Alternative 2 – Above-Average Seattle Center Attendance, conclusions regarding traffic operations would be similar to those described for the Average Seattle Center Attendance condition. However, the relative improvements under Alternative 2 would likely be greater during post-event conditions because traffic would be more dispersed due to the adjacent parking garage capacity limits and restrictions on post-event passenger pick-ups.

### **Ridehailing**

Under Alternative 2, ridehailing drop-offs would occur in those locations most convenient to drivers and passengers rather than in a designated area. However, pick-ups would be regulated using a “geofence,” which is a virtual geographic boundary. Customers that request a pick-up while in the geofence would be limited in where they can meet their car. During pre-determined event times (to be coordinated by Seattle Center and SDOT), a customer requesting a ride from the geofenced area encompassing Seattle Center would have to meet their vehicle outside of that restricted area. The Alternative 2 geofence differs from the Alternative 1 geofence in that Alternative 2 does not have designated pick-up locations

within the geofence. Rather, under Alternative 2, people using a ridehailing vehicle after an event would have to walk outside of the geofence for pick-up. Specific geofence boundaries would be determined and periodically updated in the AAMP. This approach would limit the amount of vehicle traffic in the immediate vicinity of the project site and Seattle Center. Ridehailing activity would result in a substantial number of “deadhead” trips added to the area because each pick-up or drop-off results in 2 trips: 1 carrying the arena attendee(s) and 1 trip with only the driver (unless the ridehailing vehicle is connected with another passenger in the vicinity of the arena). These deadhead and pick-up/drop-off trips are accounted for in the traffic and transit delays described above.

### Average Seattle Center Attendance

Under Alternative 2 – Average Seattle Center Attendance, the renovated arena would draw substantial ridehailing activity during events such as an NBA game or concert. Drop-off activity would be similar to that observed during large KeyArena events, which sometimes results in ridehailing vehicles blocking through lanes, bicycle facilities, or bus pullouts, particularly along 1<sup>st</sup> Ave N. Although ridehailing pick-up locations would not be allowed within the geofence, those ridehailing vehicles may stop in travel lanes, bicycle facilities, or bus pullouts outside that area, causing congestion and blockages to other modes.

### Above-Average Seattle Center Attendance

Under Alternative 2 – Above-Average Seattle Center Attendance, ridehailing would occur within a slightly more congested traffic environment. However, findings would be similar to those described for the Average Seattle Center Attendance scenario.

#### **Transit**

The transit impact findings described for Alternative 1 in 2035 are also representative of conditions for Alternative 2.

#### **Pedestrian Travel**

Alternative 2 would include a woonerf, or urban curbsless street, along Thomas St between 1<sup>st</sup> Ave N and Warren Ave N. This street design would make crossing Thomas St more comfortable for pedestrians due to the decreased conflicts with vehicles.

Alternative 2 would limit the parking capacity at the 1<sup>st</sup> Ave N Garage to 400 spaces and the capacity in the underground garage to 200 spaces. Under Alternative 2, more than 400 vehicles would need to park farther from the arena than under Alternative 1, requiring passengers to walk longer distances to reach the arena and add volumes on some sidewalks and crosswalks. However, the overall change in volume at any 1 facility is expected to be modest given the large number of alternative parking areas and lower overall private vehicle mode share compared to 2020; therefore, the pedestrian impacts described for Alternative 1 are representative of conditions under Alternative 2.

#### **Bicycle Travel**

As described above, Alternative 2 would make crossing Thomas St more comfortable for bicyclists due to decreased conflicts with vehicles. Aside from this benefit, the bicycle impact findings described for Alternative 1 are representative of conditions for Alternative 2.

### **Parking**

Alternative 2 would limit the parking capacity at the 1<sup>st</sup> Ave N Garage to 400 spaces and the capacity in the underground garage to 200 spaces. Under Alternative 2, more than 400 vehicles would need to be parked in a different location than under Alternative 1. In 2035, the off-street parking occupancies indicate that those vehicles could shift to alternate garages within the same geographic subarea rather than search for parking farther away. With the reduction in parking supply, off-street parking occupancies for Alternative 2 – Average Seattle Center Attendance would be 55% on weekdays and 71% on Saturdays. Off-street parking occupancies for Alternative 2 – Above-Average Seattle Center Attendance would be 64% on weekdays and 75% on Saturdays. These totals represent about a 5% increase over the values for Alternative 1.

### **Bus/Truck Staging**

The charter bus and truck staging impact findings described for Alternative 1 are also representative of conditions for Alternative 2.

### **Paratransit**

The paratransit impact findings described for Alternative 1 are also representative of conditions for Alternative 2.

### **Safety**

The safety impact findings described under Alternative 1 are also representative of conditions for Alternative 2.

### **Summary of Transportation Impacts in 2035 – Alternative 2**

Impacts to the transportation system under Alternative 2 would be similar to those identified for Alternative 1. The differences relate to traffic operations, ridehailing, and both on-street and off-street parking. Due to the dispersed traffic caused by limiting off-street parking south of the arena and the ridehailing regulations, there would be fewer and/or less severe impacts at locations immediately surrounding the arena, particularly on the south side.

The significant impact findings described under Alternative 1 related to ridehailing during the pre-event peak hours are also representative of conditions under Alternative 2. During the post-event peak hour, the ridehailing activity would shift to nearby corridors, where impacts are expected due to blocked travel lanes, bicycle facilities, and/or transit facilities. Given the substantial increase in ridehailing mode share in 2035 compared to 2020, there could be potentially significant adverse impacts related to blocked travel lanes, transit facilities, or bicycle facilities just outside of the geofence.

The decreased off-street parking supply adjacent to the renovated arena would create more competition for on-street and off-street parking. However, patrons would find alternative parking locations within the parking study area. On-street parking occupancy levels on weekdays and Saturdays suggest that a substantial number of vehicles would circulate for multiple blocks looking for parking and increasing conflicts with other modes; this would be a significant impact. Because paid parking and time limits are not in effect on Sundays, parking impacts are also expected on Sundays.

### **2035 Summary of Significant Impacts by Alternative**

The following table summarizes the significant impacts identified for Alternatives 1 and 2.

**Table 4-38. 2035 Comparison of Alternative 1 and 2 Significant Impacts to the No Action Alternative**

Mode	No Action Alternative	Significant Impacts	
		Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Traffic Operations	<p>LOS E/F intersections:</p> <ul style="list-style-type: none"> <li>• <i>Average Seattle Center Attendance</i>: 51 weekday pre-event, 2 weekday post-event, and 10 Saturday pre-event.</li> <li>• <i>Above-Average Seattle Center Attendance</i>: 57 weekday pre-event, 7 weekday post-event, and 13 Saturday pre-event.</li> </ul> <p>Slow eastbound speeds on Mercer St and Denny Way.</p>	<p>Impacted intersections:</p> <ul style="list-style-type: none"> <li>• <i>Average Seattle Center Attendance</i>: 26 weekday pre-event, 21 weekday post-event, and 11 Saturday pre-event.</li> <li>• <i>Above-Average Seattle Center Attendance</i>: 15 weekday pre-event, 23 weekday post-event, and 13 Saturday pre-event.</li> </ul> <p>Speed impact on westbound Denny Way. Queues spill back onto I-5 mainline at Mercer St.</p>	<p>Modestly improved traffic operations adjacent to arena because of dispersal of traffic volumes due to off-street parking limits. Same as Alternative 1 beyond arena site.</p>
Ridehailing	<p>Increased ridehailing activity in 2035. Unregulated pick-up/drop-off system may cause blockages before and after large events.</p>	<p>Impacts to transit, bicycles, and safety before events due to the potential of unregulated drop-offs that block facilities. No impacts and improved conditions after events due to designated pick-up locations.</p>	<p>Impacts to transit, bicycles, and safety before events due to the potential of unregulated drop-offs to that block facilities. No impacts after events because activity is dispersed from arena.</p>
Transit	<p>Transit speed and reliability affected by congested traffic operations and ridehailing pick-up/drop-off activities. Sufficient total bus and LINK capacity though many routes have standing room only. Ample Monorail capacity. Occasional transit blockages by ridehailing vehicles.</p>	<p>Transit speed and reliability impacted by poor traffic operations and ridehailing drop-off activities. Crowding impacts on northbound LINK before weekday events and southbound LINK after events. Bus stop blockage impact from ridehailing before events; improved conditions after events (see ridehailing section).</p>	<p>Same as Alternative 1.</p>
Pedestrian	<p>Generally acceptable with occasional capacity issues during large events.</p>	<p>Impact at 5<sup>th</sup> Ave N/Harrison St crosswalk and crossings to LINK station.</p>	<p>Impact at 5<sup>th</sup> Ave N/Harrison St crosswalk and crossings to LINK station. More comfortable to cross Thomas St due to woonerf.</p>
Bicycle	<p>Occasional blockages caused by ridehailing vehicles during large events.</p>	<p>Bicycle facility blockage impact from ridehailing before events; improved conditions after events (see ridehailing section).</p>	<p>Impact from ridehailing before events; improved conditions after events (see ridehailing section). More comfortable to cross Thomas St due to woonerf.</p>

Mode	No Action Alternative	Significant Impacts	
		Alternative 1: OVG Proposal	Alternative 2: Modified Proposal
Parking	Overall sufficient capacity with higher on-street occupancies than off-street occupancies.	Impacts due to modal conflicts caused by motorists circulating for parking (high occupancy levels would cause more cruising for parking).	Same as Alternative 1.
Charter Bus/ Truck Staging	Accommodated via MOA for Event Curbside Management.	None.	Same as Alternative 1.
Paratransit	Accommodated in existing passenger loading zones.	No significant impacts expected, although there could be delays in curb space availability caused by ridehailing in the pre-event period.	Same as Alternative 1.
Safety	Occasional, temporary effects from ridehailing vehicles.	Modal conflict impact from ridehailing before events; improved conditions after events.	Same as Alternative 1.

Source: Prepared by Fehr & Peers, 2018.

### **Changing Travel Behavior between 2020 and 2035**

Transit service will expand significantly between 2024 when the ST2 light rail expansion projects are complete, and 2035 when the Ballard extension (including a station adjacent to the Seattle Center Arena) is complete. By 2024, the new ST2 LINK light rail extensions (east to Redmond, south to Federal Way, and north to Lynnwood) will provide a more convenient transit option for many Seattle Center Arena visitors. Based on the expected geographic distribution of attendee visitors, roughly two-thirds of those in regions slated to gain access to LINK light rail between 2020 and 2035 would have that access by 2025. Therefore, much of the potential benefit of increased use of LINK light rail transit to Westlake could be realized within 5 years of the Seattle Center Arena opening.

The ST2 regional light rail lines will converge at Westlake Station and could add to “last mile” trips between Westlake and the arena via the Monorail, 3<sup>rd</sup> Ave bus routes, bike share, walking, or ridehailing. In particular, the City and Seattle Monorail Services have studied improvements to station configuration, accessibility, and transit integration that have the potential to increase capacity of the Monorail to transport major event crowds. According to the Seattle Center Monorail Stations Reconfiguration Evaluation Report (VIA Architects et al., 2018), event ridership on the Monorail could triple if the improvements to station configuration, accessibility, and transit integration are implemented. In addition to that increase in Monorail mode share for the last mile connection, bus, walk, bicycle, and ridehailing shares would also increase as LINK light rail riders choose a variety of modes to complete the last mile connection. Accordingly, private vehicle mode share is expected to decrease by 2025 as attendees shift from private vehicles to transit. However, because ridehailing (which involves use of private vehicles) is projected to continue to grow in popularity independent of transit connection changes, the associated decrease in total vehicle trip generation would be moderated.

For example, compared to 2020, it is estimated that 240 fewer vehicles would access the arena vicinity during the pre-event peak hour in 2025. The modest change is due to the decrease in private vehicle traffic being largely offset by the potential for increasing ridehailing activity, which generates 2 vehicle trips (to and from Seattle Center Arena vicinity) rather than the 1 generated by a private vehicle that parks near the arena. The continued rise in ridehailing would create even more demand for the limited curb space around the project, which would result in increasing adverse effects on traffic congestion and modal conflicts.

The increase in Monorail mode share would bring ridership to approximately 1,000 during the weekday pre-event peak hour, which could be accommodated by the system. Buses between Westlake Station and Seattle Center would already be quite full during the afternoon commute; therefore, additional ridership from LINK light rail riders would result in overcrowded conditions. However, as noted earlier, the Monorail has excess capacity (up to 3,000 riders per hour per direction) and could serve more of that demand with an improved connection with Westlake. This capacity is also sufficient during the post-event surge, which could reach nearly 1,800 by 2025.

### **Transit Mode Share Sensitivity Analysis**

The preceding analysis does not assume any demand management strategies aimed at shifting trips from autos to transit. If such strategies are pursued (as is discussed in Section 4.5.2, *Operations*), transit ridership could be higher and potentially require additional service to accommodate the demand.

To evaluate the degree of transit ridership increases that would result in additional crowding threshold exceedances, a sensitivity test was performed in which the transit mode share was iteratively increased until additional transit routes experienced significant crowding. The results indicate that routes from Downtown Seattle to the Seattle Center are fairly close to exceeding the crowding threshold during the pre-event peak hour during both weekday and Saturday conditions. This is notable given the very high frequencies on these routes (a bus comes every few minutes). A 2% increase in the transit mode share (from 8 to 10%) would result in crowding on these routes in the weekday condition, and a 1% increase in transit mode share would result in crowding on Saturday during the pre-event condition. Note that many other routes could serve people traveling from Downtown Seattle to the arena, including the Monorail and routes heading north from Downtown via Aurora or Dexter Ave, which while relatively crowded could absorb some of the overflow.

No additional crowding threshold exceedances would be expected in the post-event condition. The routes to Ballard and the U District would be even more crowded in these conditions, which could cause a shift to other routes, but these are expected to have adequate capacity to absorb the additional riders.

### **Modified Arena Seating Capacity Evaluation**

As stated above, the revised design of the arena includes slightly different seating capacities than were studied in the Draft EIS. The design includes 250 more seats for NBA events, 200 fewer seats for NHL events, and 325 fewer seats for concerts. Because the reduction in seating capacity for NHL and concert events does not increase the impacts that were studied in the Draft EIS, no additional analysis is warranted as a result of those reductions. The increase in seating capacity for NBA games from 18,350 seats to 18,600 is an increase of 1.4% and is not expected to substantially change the nature of impacts described in the EIS. However, the following section provides a transportation mode-by-mode evaluation of potential effects of this seating capacity change for NBA games.

The proposed change for NBA games is not expected to alter any of the project's travel characteristics (i.e., mode split, average vehicle occupancy, arrival/departure periods, route choices, etc.). Based on the trip generation data contained in Table 4-13, the proposed design change would generate 62 additional vehicle trips during the pre-event peak hour and 92 additional vehicle trips during the post-event peak hour under 2020 conditions. By 2035 (when the project is expected to have a reduced private vehicle mode share as compared to 2020), the proposed design change would generate 57 additional vehicle trips during the pre-event peak hour and 84 additional vehicle trips during the post-event peak hour. Based on a review of all intersection LOS and delay results, 3 additional intersections could be impacted by the increase in volumes, although the additional delay would be very minor and likely not perceptible for most drivers. The proposed design change would also result in marginally increased usage of pedestrian, bicycle, transit, and parking facilities.

### **Roadway Network**

Additional vehicle trips resulting from the proposed design change for NBA games could result in marginally increased delay at some intersections and potential changes to LOS; this could result in additional intersections being impacted. A systematic review was conducted to identify those intersections that were on the cusp of being impacted previously and may be impacted by the incremental increase in project trips. Intersections meeting this criterion typically were either at the cusp of operating unacceptably (i.e., signalized intersections reported at LOS D, but nearly in the LOS E range) or were already unacceptable but just short of experiencing a 5-second increase in delay. Based on this in-depth review, the following additional intersections are expected to be impacted as a result of the proposed design change for NBA games:

- 2020 Average Seattle Center Attendance Conditions
  - One intersection (Denny Way/Aurora Ave/7<sup>th</sup> St) impacted during pre-event peak hour conditions, and no additional intersections impacted during post-event conditions.
- 2020 Above Average Seattle Center Attendance Conditions
  - No additional intersections impacted during pre-event and post-event peak hour conditions.
- 2035 Average Seattle Center Attendance Conditions
  - No additional intersections impacted during pre-event peak hour, and 1 intersection (1<sup>st</sup> Ave N/Harrison St) impacted during post-event peak hour conditions.
- 2035 Above Average Seattle Center Attendance Conditions
  - No additional intersections impacted during pre-event peak hour, and 1 intersection (Mercer St/3<sup>rd</sup> Ave N) impacted during post-event peak hour conditions.

These additional intersection impacts represent a very small proportion of the total number of impacted intersections, which is to be expected given that the proposed design change would result in a 1.4% increase in project vehicle trips. Moreover, the additional delay caused by the additional vehicles is expected to result in only a few seconds of additional delay, which would likely not be perceptible for most drivers. (The additional delay referred to here is between the NBA event with 18,350 versus 18,600 attendees.) The strategies described in the Draft EIS for mitigating intersection impacts would also apply to these intersections because they are within the arena vicinity and would directly benefit from the

traffic and demand management measures contained within the AAMP, which is a potential mitigation for the project's transportation impacts.

### ***Parking Occupancy***

Under 2020 conditions, the proposed design change for NBA games would increase parking occupancy in the project's vicinity by 62 spaces during the weekday evening. This would increase the total on-street and off-street parking occupancy from 82% to 83% under 2020 Average Seattle Center Attendance conditions. Under 2020 Above Average Seattle Center Attendance conditions, the proposed design change would increase the total on-street and off-street parking occupancy from 91% to 92%. Parking occupancy increases under 2035 would be incrementally less due to a lower anticipated private vehicle mode split. The proposed design change would incrementally increase the modal conflicts due to drivers circulating for parking, but would not change any Draft EIS conclusions with respect to parking-related impacts.

### ***Transit Ridership***

Under 2020 conditions, an additional 12 bus riders would be expected for NBA games during the pre-event peak hour, and an additional 15 bus riders would be expected during the post-event peak hour. By 2035, the additional bus riders for the pre-event and post-event peak hours are expected to be 9 and 12, respectively. This would result in small increases in demand on the already impacted routes to Ballard and the University District, but no additional routes are expected to be impacted. The Monorail would carry an additional 5 riders during the pre-event peak hour and an additional 10 riders during the post-event peak hour. This increase could be served by the reserve capacity of the Monorail without resulting in an impact. Under 2035 conditions, the proposed design change would cause a 35 passenger increase in light rail demand during the pre-event peak hour and a 55 passenger increase during the post-event peak hour. This would not change any EIS conclusions with respect to LINK light rail impacts. Therefore, the proposed design change is not expected to result in any changes to transit impacts and potential mitigation measures as identified in the EIS.

### ***Pedestrian and Bicycle Facilities***

While most of the 250 additional attendees for NBA games would become pedestrians for their last connection to the arena, 15 are expected to walk as their primary mode during the pre-event peak hour, and 24 are expected to walk as their primary mode during the post-event peak hour. When these additional pedestrians are distributed throughout the network, they would have little to no noticeable impact on overall pedestrian flow. Further, they would not cause any pedestrian facilities (i.e., sidewalks or crosswalks) to have pedestrian densities that would cause spillover onto adjacent streets. Approximately 3 additional attendees are expected to travel to and from the arena by bicycle. This would not change any EIS conclusions with respect to bicycle impacts beyond the slight increase in needed bicycle parking. Therefore, the proposed design change is not expected to result in any changes to the pedestrian or bicycle impacts and potential mitigation measures as identified in the EIS.

In conclusion, although the small increase in potential attendees for NBA games would slightly increase some intersection traffic impacts, and potentially impact 3 additional intersections, the EIS already identifies significant and unavoidable impacts to traffic operations, transit, and parking. This conclusion is unchanged by the change in seating capacity described above.

## 4.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

### 4.5.1 Construction

This section describes potential measures to reduce the magnitude of the construction impacts to the transportation system. Most of these measures will be developed as part of the permitting process with the City. The City and OVG are also negotiating Transaction Documents including the Development Agreement, Seattle Center Integration Agreement, and Lease, all of which will reference transportation impacts and associated mitigation commitments. Construction mitigation measures would be the same for both action alternatives.

#### **Street Use Permits and Other Agreements**

SDOT issues street use permits when construction activities encroach and impact the ability to use the public right-of-way. Through the Street Use Right-of-Way Construction Use Permit process, SDOT seeks to accommodate construction activities and maintain the mobility functions of the right-of-way. As part of the street use permitting process and the development of other agreements, it is recommended that SDOT, Seattle Center, and OVG identify the following measures to reduce the significance of the construction-related transportation impacts:

- An adequate location for a temporary King County Metro bus layover facility to replace the layover space at the north end of the arena plaza. This may result in the loss of some on-street parking spaces and would require coordination with King County Metro and Seattle Center.
- An adequate location for a temporary loading zone to serve school buses that use the 1<sup>st</sup> Ave N loading zone along the arena plaza.
- A temporary bus stop to replace the stop just north of John St along 1<sup>st</sup> Ave N. This may result in the loss of additional on-street parking and would require coordination with King County Metro.
- Temporary bicycle lane accommodations to replace any loss of the on-street bicycle lane along 1<sup>st</sup> Ave N between John St and the north edge of the arena plaza. Potential alternatives could be shifting the lanes along 1<sup>st</sup> Ave N to the west to accommodate all existing bicycle and vehicle lanes. This could also be designed as a protected bicycle lane along the west side of the street. This would require the temporary loss of on-street parking and may require traffic signal modifications.
- A plan to ensure adequate pedestrian access around the construction zone. This could require a safe pedestrian pathway to be accommodated along Thomas St between 1<sup>st</sup> Ave N and 2<sup>nd</sup> Ave N, or an alternative pathway with appropriate detour signage. Improved pedestrian crossings, an alternative pathway (which could require the shifting of bicycle and travel lanes to the west), or advanced signage may be added to accommodate pedestrian travel along 1<sup>st</sup> Ave N between John St and Republican St.
- A construction outreach plan and implementation to businesses and residences along 1<sup>st</sup> Ave N if the temporary flex zone (i.e., on-street parking) loss occurs.

- If construction worker parking is not fully accommodated in the 1<sup>st</sup> Ave N Garage, potential accommodations could include an agreement for construction workers to park outside of the area (more than 0.5 mile) and shuttle in.
- Revise the MOA for Event Curbside Management between SDOT and Seattle Center to accommodate construction activities, events, and loading needs for Seattle Center. Examples include 1-way operations of Thomas St to allow continued curb space use between Warren Ave N and 2<sup>nd</sup> Ave N, or identification of new curb space in the immediate vicinity that Seattle Center can use (along with necessary accommodations to address neighborhood parking impacts). See Appendix B, Tables B-3 through B-8 for a list of events/performances that use curb space reservation via the MOA.
- OVG would repair project related roadway damage on haul routes through Seattle Center campus and on designated non-arterial haul routes, to the satisfaction of SDOT and/or Seattle Center.
- Signal timing modifications during heaviest periods of truck hauling.

### **Construction Management Plan**

Prior to the issuance of any grading or demolition permits, OVG would work with SDOT, Seattle Center, King County Metro, and SDCI to prepare a Construction Management Plan (CMP). The plan should include (but not be limited to) items such as:

- Guidance on the number and size of trucks per day entering and leaving the project site.
- Identification of arrival/departure times that would minimize traffic impacts.
- Approved truck circulation patterns.
- Locations of truck staging areas.
- Locations of employee parking and methods to encourage carpooling and use of alternative transportation.
- Methods for partial/complete street closures (e.g., timing, signage, location and duration restrictions).
- Criteria for use of flaggers and other traffic controls.
- Preservation of safe and convenient passage for bicyclists and pedestrians through/around construction areas.
- Monitoring for roadbed damage and timing for completing repairs.
- Best management practices for control of dust and debris from trucks (e.g., wheel washing); restoration of mid-campus haul route on a daily basis after night-time hauling.
- Coordination with Seattle Center and limitations on construction activity and parking restrictions during peak/holiday weekends and special events.
- Points of contact for nearby residents and businesses to obtain construction information, have questions answered, and convey complaints.

## 4.5.2 Operations

This section describes strategies to reduce the magnitude of the operations impacts to the transportation system. Mitigation measures would be the same for both action alternatives. The City may consider additional measures as conditions of approval for project permits. The City and OVG are also negotiating Transaction Documents including the Development Agreement, Seattle Center Integration Agreement, and Lease, all of which will reference transportation impacts and associated mitigation commitments. These potential mitigation measures are described in the remainder of this section.

### **Measures for Traffic Operations Impacts**

The following measures are recommended to mitigate the potential traffic operations impacts identified in this EIS analysis. Final mitigation measures will be determined by SDOT, SDCI, and Seattle Center.

- OVG would work with Seattle Police Department, SDOT, SDCI, King County Metro, and Seattle Center to develop and implement an Arena Access Management Plan (AAMP). The Draft AAMP is available at <https://www.seattle.gov/arena>.
  - The AAMP would identify street/lane closures, placement of traffic control officers (TCOs), special signal timings, prohibited turn movements, curb space management, specified locations for ridehailing pick-up/drop-off activity with supportive programming and enforcement, and placement of permanent and/or temporary signage and equipment (e.g., barricades, portable signs, dynamic or changeable message signs, etc.).
  - The AAMP would include attendance thresholds that consider both the arena and other events at Seattle Center, which would identify a range of management strategies that become increasingly expansive as the combined attendance levels at the arena and Seattle Center increase.
  - The AAMP would include performance metrics that describe the intended effectiveness of the program. It would also describe a periodic monitoring program to measure its performance. The AAMP would be updated annually based on the results of the monitoring program and changing traveler preferences and events at the arena. The parties to the AAMP may make more frequent operational changes as needed.
- OVG would work with SDOT, SDCI, and King County Metro to develop demand management strategies as part of the AAMP to reduce the number of private auto and ridehailing trips to the arena to reduce the traffic impacts associated with these travel modes.
  - The AAMP could contain thresholds/targets like private auto/ridehailing mode shares or total pre-event/post-event peak hour vehicle trip targets. To achieve these goals, the AAMP could include incentives like subsidized transit/Monorail/bike share passes, and first/last mile access to major transit hubs. In addition, regulatory/pricing mechanisms could be employed (some of which would need to be managed by the City) including, but not limited to, minimum parking fees at arena-controlled garages, peak period ridehailing surcharges, and reservation-based parking bundles at remote parking facilities with a shuttle/Monorail/transit pass/bike share credit.
  - The AAMP would include strategies for both arena attendees and employees. Employee demand management strategies could include subsidized transit passes, carpool matching services, a requirement that employees pay full market rate for off-street parking, and a commute trip reduction program manager. When developing an

employee AAMP, it may be beneficial to coordinate with Seattle Center to determine if a larger-area employee AAMP can be developed that covers both arena and Seattle Center employees.

- Specific performance metrics and targets would be defined in the AAMP and a periodic monitoring program would also be defined. It is recommended that the AAMP be updated annually to respond to changing travel preferences, transit system changes, and events at the arena.
- To accommodate the additional patron and employee demand for non-auto travel, some physical investments could also be identified in the AAMP. Examples include bicycle and pedestrian wayfinding signs, and improved access to transit service and transit reliability.
- OVG would work with SDOT to improve traffic flow and pedestrian progression at the 1<sup>st</sup> Ave N/Thomas St and potentially other locations along either 1<sup>st</sup> Ave N or Queen Anne Ave N. This is primarily an issue in post-event conditions. Improvements could include new traffic signals. These signalized intersections should include marked crosswalks on all approaches, pedestrian signal countdown heads (i.e., remaining seconds of the flashing “don’t walk” phase are shown), and “blank out” signs installed on poles and mast arms where necessary to advise motorists of temporarily prohibited turn movements to avoid pedestrian conflicts. These signalized intersections would be interconnected with adjacent traffic signals to allow for coordinated signal operations. Alternatively, these intersections could be manually controlled.
- OVG would work with SDOT to investigate opportunities for improving pre- and post-event traffic operations impacts on affected area roadways like Mercer St, Denny Way, 1<sup>st</sup> Ave N, Queen Anne Ave N, Harrison St, 5<sup>th</sup> Ave N, Dexter Ave, Westlake Ave, Fairview Ave, etc. Potential improvements could include new traffic signal timing plans, implementation of adaptive signal control, “blank out” signs to temporarily restrict turning movements, red light cameras to improve compliance of keep-clear areas, etc. OVG would work with SDOT to make a fair-share contribution to these traffic control improvements.
- OVG would work with SDOT and WSDOT to investigate opportunities to monitor and potentially reduce off-ramp queuing from Mercer St onto I-5. A review of the Vissim model indicates that simple fixes like traffic signal retiming would not be successful because SDOT already operates the SCOOT adaptive traffic signal system on the corridor and it is processing a high volume of traffic. Potential solutions include directions to the arena that include alternative routes to area garages (Stewart St, Seneca St, etc.), a garage reservation system that includes customized directions to the garages that avoid Mercer St, free transit tickets and directions to regional park-and-ride lots as part of a game/event ticket, and free Monorail ticket with directions to Downtown and Westlake area parking and transit options.
- OVG has hired a Community Liaison to coordinate with Seattle Center regarding event scheduling logistics. Seattle Center is home to multiple organizations that regularly host performances and events beginning in the same window of time as proposed arena events. In past years, Seattle Center has encouraged cooperation between these organizations to stagger event start times when possible and to plan for traffic officers at congested locations when multiple events start or end simultaneously.
- OVG would partner with Seattle Center and Seattle Monorail Services to implement high priority Monorail improvements recommended in the Seattle Center Monorail Stations Reconfiguration Evaluation Report. These recommendations would improve the boarding and egress experience

at both stations (which would help attract more riders) and increase the Monorail's capacity. Coupled with a program to encourage parking around Westlake Center, these improvements would help mitigate traffic operations and parking impacts of the arena by providing a convenient last mile connection.

### **Measures for Ridehailing Impacts**

The following measures are recommended to mitigate the potential ridehailing impacts identified in this EIS analysis.

- OVG would work with Seattle Police Department, SDOT, SDCI, King County Metro, and Seattle Center to develop, implement, and periodically update the AAMP.
  - The AAMP could identify the placement of TCOs, curbspace management among ridehailing and other modes, specified locations for ridehailing pick-up/drop-off activity with supportive programming and enforcement, and placement of temporary signage and equipment (e.g., barricades, portable signs, changeable message signs, etc.).
  - In particular, the AAMP could address pre-event drop-off congestion along 1<sup>st</sup> Ave N (and other locations identified after the arena begins operations) that could result in modal conflicts from drop-offs that might occur in the travel lanes, bicycle facilities, or transit stops. TCOs could be on-site to ensure appropriate use of the curbspace.
  - The AAMP is integral to the successful management of ridehailing vehicles and their adverse transportation impacts. The AAMP would identify the amount of curbspace required to accommodate pick-up and drop-offs, and SDOT would manage this curbspace to ensure adequate ridehailing pick-up and drop-off capacity. In addition, the AAMP could identify a target ridehailing mode share or number of ridehailing trips that reduces the traffic and transit operations impacts from this mode and the potential modal conflicts that arise from pick-ups and drop-offs.

### **Measures for Bicycle Impacts**

To address potential impacts to bicycle facilities, the following mitigation is recommended:

- To accommodate potential bicycle parking, it is recommended that OVG provide at least 200 free short-term bicycle parking spaces during high-attendance events like sports events or concerts. This amount of bicycle parking could accommodate the expected 1% of bicycle event arrivals for large events. Various bicycle parking locations would accommodate bike share bicycles. As part of the periodic AAMP review process, OVG could recalculate the amount of bicycle parking provided as modal preferences change. OVG could also work with the bike share providers to ensure there are adequate bicycles after an event to meet demand and that the bicycles are distributed around the arena (but out of the right-of-way) to ensure convenient access to the bicycles.
- OVG would work with SDOT to implement bicycle improvements along and connected to 1<sup>st</sup> Ave N to address the modal conflicts between drop-offs and bicycles in front of the arena. Improvements could include a protected bicycle lane on the west side of the roadway.
- OVG would work with SDOT to implement other bicycle safety projects that arise from increased modal conflicts between bicycles and arena traffic. In particular, intersections with high turning vehicle conflicts could benefit from physical improvements like curb bulbs, temporary turning

restrictions, or management strategies like temporary crosswalk closures, traffic control officers, etc.

### **Measures for Pedestrian Impacts**

The following measures are recommended to mitigate the potential impacts to pedestrian facilities:

- OVG would work with SDOT to improve the pedestrian crossing at the 5<sup>th</sup> Ave N/Harrison St intersection to accommodate heavy pedestrian flows during pre- and post-event conditions. Recommended improvement would be to widen the crosswalk from 11 feet to 15 feet, or signal retiming or manual traffic control.
- OVG would work with SDOT to identify intersection corners that are subject to crowding and would benefit from curb extensions or barricades to reduce the risk of pedestrians spilling into the intersection during the pre- and post-event conditions. Potential intersections that could benefit from additional corner space or barricades include, but are not limited to: the NW corner of Harrison St/5<sup>th</sup> Ave N, the SW corner of Mercer St/1<sup>st</sup> Ave N, the NW corner of Harrison St/1<sup>st</sup> Ave N, and the NW and SW corners of Republican St/1<sup>st</sup> Ave N.
- OVG would work with SDOT to implement other pedestrian safety projects that arise from increased modal conflicts between pedestrians and arena traffic. In particular, intersections with high turning vehicle conflicts could benefit from physical improvements like curb bulbs, temporary turning restrictions, or management strategies like temporary crosswalk closures, traffic control officers, etc.

### **Measures for Transit Impacts**

The following measures are recommended to mitigate the potential impacts to transit crowding and speed and reliability:

- OVG would work with King County Metro and other transit providers to determine whether additional bus route service could be provided to the arena on days with large events, and fund that service if warranted. Service could include both routes that directly serve the arena and regional routes that serve Westlake Station (e.g., routes that access regional park-and-ride lots). To accommodate this additional service, OVG would work with King County Metro to identify additional passenger accommodations or bus layover space. A substantial amount of lead-time is required to implement additional transit service, so early coordination would be required.
- OVG would coordinate with Seattle Center Monorail and Sound Transit to determine the need for and provision of additional high-capacity service to accommodate surges in pre-event and/or post-event riders during large events.
- OVG would work with SDOT and King County Metro to identify and implement transit speed/reliability/pedestrian amenity physical improvements to address pre-event and post-event traffic congestion that slows bus service around the arena and high demand for transit caused by events. Routes that use Queen Anne Ave N, 1<sup>st</sup> Ave N, 5<sup>th</sup> Ave N, and Denny Way are most likely to require speed/reliability improvements. Improvements could include reconfiguration of parking/travel lanes to accommodate bus-only lanes, transit signal priority, queue jump lanes, revised transit stops/shelters, bus bulbs, pedestrian lighting at shelters, etc.

- OVG would work with SDOT and King County Metro to address potential bus stop crowding during the post-event peak period at the bus stops along Queen Anne Ave N south of Harrison St and John St. Potential improvements could include the removal of existing transit shelters and replacement with canopies to clear obstructions on the sidewalk, or relocation to adjacent bus stops with more pedestrian capacity. New benches toward the back of the sidewalk could also be installed. This mitigation is similar to what was recently built at the stop along Queen Anne Ave N south of Mercer St.

### **Measures for Parking Impacts**

To address potential modal conflicts caused by reduced on- and off-street parking supply, the following mitigation measures are recommended:

- OVG would work with SDOT, Seattle Center, and private garage owners/operators to develop an “Off-Site Parking Facility Reservation and Best Practices System.” This system could allow attendees to reserve parking in advance of an event via a website or mobile app. This system can be operated so that parking occupancy can be managed (and limited if necessary) to enable post-event traffic to be able to exit the garage in a reasonable period of time and to spread traffic to areas with more capacity, like Downtown/Westlake Center.
  - Private garage owners/operators may opt into this reservation system, provided they agree to operate their garages during events according to a series of “best practices,” which include ways to minimize pre-event on-street queuing to enter the garage, accommodation of pedestrians walking across garage driveways, and maximum permitted occupancy levels to improve surrounding traffic operations.
  - Garages could include sites beyond the study area if they have convenient access to transit or shuttle service. The garages around Westlake Center are potential candidates given the Monorail and frequent transit along 3<sup>rd</sup> Ave. Monorail tickets should be bundled with any parking near Westlake Center.
- OVG would work with SDOT to improve the availability of real-time off-street parking garage information to arena attendees. This could be achieved by expanding the City’s ePark guidance system through additional participating garages and new dynamic message signs installed in the vicinity of the arena.
- OVG would work with SDOT to explore and implement improvements to the on-street parking management program in the area. Examples of potential changes to on-street parking management could include changes to the Restricted Parking Zone (RPZ) boundaries, modifications to the hours where paid parking is enforced, new paid parking areas, implementation of paid parking on Sundays, or parking fee changes.
- OVG would work with SDOT and Seattle Center as they revise and update the MOA for Event Curbside Management around Seattle Center to address the needs for charter bus/truck staging for events at the renovated arena, recognizing the existing use of the curbside for Seattle Center events.
- As part of the AAMP for employees at the arena (and potentially Seattle Center as well), alternative remote lots could be included to reduce the amount of parking consumed by arena employees during events. A shuttle program may be required to access the remote lots if transit

does not provide a frequent connection (this may be an issue in the post-event condition when transit service in the area is less frequent).

## **4.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS TO TRANSPORTATION**

This section summarizes the significant and unavoidable adverse transportation impacts for both construction and operations of the proposed arena.

### **4.6.1 Construction**

There are potential construction-related transportation impacts to pedestrian and bicycle safety, and bus/truck staging areas. The recommended mitigation measures would adequately address all of the construction-related transportation impacts so that they are reduced to a less-than-significant level.

### **4.6.2 Operations**

The extensive mitigation measures proposed above would reduce the magnitude of all transportation impacts. However, the large number of events (number of days an event would occur) and large number of attendees would result in significant and unavoidable adverse impacts to traffic operations, transit, and parking during major events (NBA/NHL and large concerts/events) at the renovated arena, even with the extensive mitigation program implemented. This degree of impact would occur on many more days during the year than under the No Action Alternative because the renovated arena would attract higher-profile events like NBA/NHL games and larger concerts than can be accommodated by KeyArena. While an extensive program to manage parking demand and direct patrons to less-congested parking areas is recommended, there is no guarantee that the numerous private parking operators in the area will work with OVG to coordinate parking demand and the associated modal conflicts caused by patrons cruising for available on or off-street parking.

With the implementation of the AAMP, impacts related to ridehailing, pedestrian, bicycle, and safety are expected to be brought to a less-than-significant level during pre-event and post-event conditions.

## 5.0 EARTH

Geology, soil, and groundwater considerations important to the project include the underlying geological characteristics and properties of subsurface materials, soil characteristics, and hydrogeology, as well as seismic and other related geotechnical hazards. Regional geology and seismicity would not change as a result of the project, but they influence how the project is designed and constructed. These considerations affect the type of construction methods used for the project and, if not adequately considered during project design, could affect the long-term safety of the project. Any dewatering activities from the project could also have an impact on groundwater levels in the area. Analysis in this chapter focuses on erosion, slope failure, seismic hazards, liquefaction, unstable soils, and groundwater (including dewatering).

**Changes from the Draft EIS** – Information about dewatering was added to this chapter for the Final EIS.

### **Key Findings for Earth**

Construction would require substantial quantities of earthwork, which if not adequately designed and implemented, could create safety hazards for construction workers. Compliance with excavation safety standards and shoring requirements would ensure that construction impacts are minor. Seismic and geotechnical hazards, including ground shaking, liquefaction, slope stability, and other hazards, would be addressed through a final design-level geotechnical analysis and report. Impacts would be minor with implementation of final geotechnical recommendations in accordance with regulatory requirements.

### 5.1 METHODS

Potential impacts were determined by identifying the geologic, soils, and hydrogeologic conditions at the project site and vicinity, and evaluating how the proposed improvements might be affected for both the construction and operation phases. Existing conditions related to seismicity were obtained from a number of sources, including publicly available information from the Washington Department of Natural Resources (WDNR, 2004) and a peer-reviewed Geological Society of America paper (Troost and Booth, 2008). In addition, site-specific conditions were based on boring logs completed as part of a preliminary geotechnical investigation for the project by Hart Crowser geotechnical engineers in 2017 (Hart Crowser, 2017), and the Draft Geotechnical Engineering Design Report (Hart Crowser, 2018).

### 5.2 REGULATORY CONTEXT

Washington State's Growth Management Act (GMA) (RCW Chapter 36.70A) requires all cities and counties to identify critical areas within their jurisdictions and to formulate development regulations for their protection. Among the critical areas designated by the GMA are geologically hazardous areas, which are areas susceptible to erosion, sliding, earthquake, or other geologic events. These hazards could affect the design, construction, and operation of the project and, if not considered appropriately, could pose a risk to public safety.

The Washington State Building Code Council (SBCC) was created to advise the Legislature on building code issues and to develop the building codes used in Washington State. These codes ensure that buildings and facilities constructed in the state are safe and healthy for building occupants, workers, and the public. The State Building Code is modeled on the 2015 International Building Code and other

national model codes that are adopted by reference and combined with Washington State Amendments.

In accordance with the GMA, each city must include codes regulating development in or near geologically hazard areas. These policies and codes require measures to address hazards such as liquefaction or unstable fill materials unless a geotechnical investigation can demonstrate feasibility with recommendations for appropriate site preparations and foundation design. Other hazards such as erosion and ground shaking are addressed through implementation of regulatory requirements (e.g., National Pollutant Discharge Elimination System [NPDES]) and building code standards that include seismic design measures, while erosion hazards are typically addressed through drainage control requirements both during construction and post-construction.

Construction dewatering discharge to the sewer system is permitted through the King County Department of Natural Resources and Parks/Industrial Waste Program under King County Ordinance No. 11-34 (Document Code No. PUT 8-14 (PR)). Discharge rates and maximum volumes are also set by the County for construction dewatering, with strict restrictions during the wet season.

The SMC contains specific provisions that describe the scope of the SEPA analysis for the earth element. Relevant policies from SMC 25.05.675 generally provide that the City's policy is to protect life and property from loss or damage from landslides, strong ground motion, liquefaction, soil creep, settlement/subsidence, erosion, and other hazards related to earth movement and instability. SMC 25.05.675 also provides the authority to apply mitigation measures to reduce impacts related to earth movement or instability.

## 5.3 AFFECTED ENVIRONMENT

### 5.3.1 Geologic Setting

The greater Seattle area is part of the Puget Sound Lowland, an elongate structural and topographic basin between the Cascade Range to the east and the Olympic Mountains to the west. The Puget Sound Lowland area has been affected by repeated glaciation in the past 2.4 million years, along with crustal deformation related to the Cascadia subduction zone. The present landscape has been formed by repeated cycles of glacial scouring and deposition, tectonic activity, landsliding, stream erosion and deposition, volcanic mudflows, and also human activity (Troost and Booth, 2008).

Tectonic deformation associated with the subduction zone results in a north-south shortening producing east-west trending folds and faults. Three major bedrock structures characterize the greater Seattle area, which include (from south to north) the Seattle uplift, the Seattle fault zone, and the Seattle basin. The Seattle fault zone is an approximately 4-mile wide zone that runs east-west across the south part of the city. During a large earthquake about 1,100 years ago, land north of the fault subsided by as much as 3 feet, and areas south of the fault uplifted as much as 20 feet (Troost and Booth, 2008). The surface rupture that occurred 1,100 years ago resulted from an estimated moment magnitude ( $M_w$ ) 7.5 earthquake. The estimated probabilities of an earthquake with a magnitude of greater than magnitude ( $M$ ) 6.5 occurring on the Seattle fault zone or another shallow-crustal source in the

**Moment magnitude ( $M_w$ )** is related to the physical size of a fault rupture and movement across a fault. Moment magnitude provides a physically meaningful measure of the size of a faulting event, whereas the Richter Magnitude ( $M$ ) is a relative measurement of an earthquake to the reference 3.0 earthquake.

Puget Sound region are approximately 5% in 50 years (also referred to as a 1,000-year recurrence interval) to as much as 15% in 50 years (333-year recurrence interval). These probability estimates have large uncertainties due to the limited data.

The surficial deposits of Seattle are generally grouped into the following categories: postglacial deposits, late glacial deposits, Vashon glacial deposits, pre-Vashon deposits, and bedrock. Most of these deposits are fine-grained but also include coarser-grained deposits (Troost and Booth, 2008). According to a liquefaction susceptibility map produced by WDNR, the project site is in an area with a very low to low potential for liquefaction (WDNR, 2004).

King County has 5 groundwater management areas (GWMAs) within the county boundaries: East King County, Issaquah Creek Valley, Redmond Bear Creek Valley, South King County, and Vashon-Maury Island. The project site is north of the South King County GWMA and outside of any GWMA boundary. Groundwater in the region is not a potable source of water supply. Water supply in the region is provided from the Cedar River and Tolt River watersheds and delivered across the region by a network of pipelines.

### 5.3.2 Geology, Soils, and Groundwater at the Project Site

Soils at the project site have been reworked and disturbed by previous development and are no longer in their native condition. According to the boring logs completed as part of the preliminary geotechnical investigation, the project site is underlain by approximately 10 to 30 feet of artificial fill that consists primarily of poorly graded silty sand (Hart Crowser, 2017 and 2018). The fill material is underlain by sequences of gravels, sands, and silts with varying sediment sizes that are generally dense or stiff. Below this layer is a unit of very stiff to hard fine-grained deposits at depths of 60 to 80 feet below ground surface.

Groundwater was encountered in the borings at depths ranging from approximately 23 to 32 feet below ground surface (elevation of between 95 and 105 feet North American Vertical Datum of 1988 [NAVD88]). The boring explorations went to a maximum depth of 186 feet below ground surface, and no bedrock was encountered. These observations are consistent with previous borings conducted in 1994 for the previous arena renovation but may not be representative of natural conditions due to the drainage system at the site (Hart Crowser, 2018). In general, saturated, loose unconsolidated materials are potentially liquefiable if encountered within 50 feet of ground surface. Groundwater is present at depths within 50 feet; however, the density of the sandy layers and other conditions present at the site indicate that the potential for liquefaction and liquefaction-induced hazards is very low (Hart Crowser, 2018).

## 5.4 POTENTIAL IMPACTS

Impacts can be short-term related to construction activities, or long-term related to the permanent structure and operation of the project.

### 5.4.1 Construction Impacts

The magnitude of the potential construction (short-term) impacts to earth resources from the project would be characterized as significant if the impacts meet the definition below. Impacts that do not reach this threshold are characterized as less-than-significant.

**Criteria for Significant Construction Impacts:** Significant impacts on earth resources could occur if the project construction resulted in substantive injury or death to workers or visitors or damage to the proposed or adjacent improvements during or following construction, and as such would not meet applicable regulatory requirements and industry standards for construction. Significant impacts would also occur if substantive changes to hydrogeologic conditions (including a temporary lowering of the groundwater table) would result from construction.

### **No Action Alternative**

There would be no construction impacts, as no construction would occur under the No Action Alternative.

### **Alternative 1: OVG Proposal**

**Erosion.** Alternative 1 would result in a less-than-significant impact for erosion associated with construction activities. Alternative 1 would disturb more than 1 acre and thus is required to obtain a General Construction Permit through the NPDES program. Such projects must include construction best management practices (BMPs), as detailed in a Stormwater Pollution Prevention Plan (SWPPP). These BMPs are developed on a project-specific basis and may vary depending on the activities involved. Typical examples of construction BMPs include the installation of silt fences, use of hay bales, covering trucks that haul soils, or application of soil stabilization measures that are designed to minimize the potential for erosion on exposed areas. In general, these water quality and construction BMPs are effective in minimizing erosion and the loss of topsoil such that additional protection measures are not necessary.

**Slope Failure.** Alternative 1 would conform with existing building code requirements, which would result in a less-than-significant impact for excavation activities during construction. Construction activities would involve substantive earthwork, including excavation, tunneling, grading, and stockpiling of soils. Excavation for the subterranean levels of the arena would extend approximately 15 feet below the current floor level, which if not managed appropriately could be susceptible to caving and slope instability or cause vibration to levels that damage nearby improvements or property. An estimated 500,000 cubic yards would be excavated as part of the renovation. The access tunnel under Bressi Garage would be constructed by a mining-style method, which would also generate soils for disposal. Off-site disposal would result in temporary truck traffic, dust, road runoff, and other indirect construction-related impacts. In addition, any stockpiled soils could become exposed to winds and water flows that can result in soil erosion or loss of topsoil.

Excavation safety standards for construction work are defined in WAC 296-155 Part N (Excavation, Trenching, and Shoring). Part N applies to all open excavations including trenches, which shall not damage underground installations, surface improvements, or adjacent structures. Excavations that are classified as trenches are required to have a safety system. Additional requirements for safety systems that apply to adjacent structures including monitoring for vibration are defined in WAC 296-155 Part Q (Underground Construction). A registered professional engineer is responsible for ensuring that adjoining buildings, walls, sidewalks, pavement, and appurtenant structures are not undermined or otherwise damaged by vibration, and are adequately supported with shoring, bracing, or underpinning.

#### **Excavation Hazards**

Deep excavations can leave sidewalls susceptible to instability; however, excavation safety standards required by WAC 296-155, which require shoring safety standards, would be implemented to minimize those hazards.

Shoring is a means of supporting the earth in a trench or vertical cut for building and roadway construction or other underground installation activities. There are many types of shoring and ground support techniques for earth reinforcement or support of excavations. A properly installed shoring system for excavation is critical for maintaining the structural integrity of the adjacent roadway structures and underground utility infrastructure. Construction work would include the installation of earth retention systems with soldier piles immediately outside of the foundation walls at the perimeter of the existing arena, and new shoring/foundation elements to support the roof structure during excavation. The City of Seattle Standard Specifications for Road, Bridge, and Municipal Construction (Standard Specification 2-04) also provide specific information on general trench shoring requirements (City of Seattle, 2014). Adherence to these stringent excavation and shoring requirements would protect adjacent structures and improvements and minimize sidewall instability hazards.

**Seismic Hazards.** Adherence to building code and regulatory requirements would reduce potential seismic hazards during construction to less-than-significant levels. Seismic activity will likely occur during the life of the proposed improvements and could include the construction period. A seismic event could be substantial, resulting in significant damage, injury, and death, if the construction activities and facilities are not designed appropriately. Grading and construction would adhere to the specifications, procedures, and site conditions contained in the final design plans, which would fully comply with the seismic recommendations of the State Building Code (based on the 2015 International Building Code) and any local building code amendments. Construction methods and employee and site safety measures would also be implemented in accordance with applicable regulatory standards.

**Liquefaction.** Site preparation measures as determined in a final design-level geotechnical report would further reduce identified potential liquefaction impacts during construction, which are expected to be less-than-significant. Liquefaction of soils during an earthquake could result in substantive damage and injury if improvements are not designed appropriately. The liquefaction potential of the site would be confirmed during the geotechnical investigation of the site as required by law, but the site is mapped in an area with very low to low potential for liquefaction, confirmed by the geotechnical investigation (WDNR, 2004; Hart Crowser, 2018).

**Unstable or Unsuitable Soils.** Similar to the liquefaction hazards described above, unstable or unsuitable soils would be addressed during the site preparations in accordance with the findings of the geotechnical report. Existing soils at the site include artificial fill, which could be unsuitable for use as structural fill. Removal of any identified soils not suitable for the proposed improvements would occur during excavation activities. Therefore, implementation of the construction measures within the final design-level geotechnical report consistent with current building code requirements would reduce potential impacts related to unsuitable soils to less-than-significant levels.

**Groundwater.** Some temporary dewatering is anticipated during construction activities, which may result in changes to groundwater patterns, potentially causing any off-site contaminants, if present, to migrate onto the project site. However, considering the temporary nature of the dewatering, that water is already collected and discharged off-site as part of current operations as well as permit requirements for dewatering during construction, it would cause less-than-significant impacts to groundwater quality.

## **Alternative 2: Modified Proposal**

Alternative 2 would require the same amount of excavation as Alternative 1, and be susceptible to similar excavation stability hazards. As with Alternative 1, the existing excavation safety standards would apply and with oversight by a registered geotechnical engineer, there would no change in impact

severity compared to Alternative 1. Conformance to current excavation and building code requirements would reduce potential impacts to less-than-significant.

## 5.4.2 Operations Impacts

Potentially significant operations impacts on earth resources are defined as follows. Impacts that do not reach this threshold are characterized as less-than-significant.

**Criteria for Significant Operations Impacts:** The magnitude of the potential operations impacts to geology and soils from the project would be significant if operation of the project could cause earth-related hazards that could cause substantive injury or death to occupants and visitors, or damage to the proposed or adjacent improvements following construction, and as such would not meet applicable regulatory requirements and industry standards. Significant impacts would also occur if substantive changes to hydrogeologic conditions (including a permanent lowering of the groundwater table) would result from the project, causing a change to groundwater flow patterns.

### No Action Alternative

There would be no long-term impacts on earth resources under the No Action Alternative.

### Alternative 1: OVG Proposal

**Erosion.** Redevelopment of the site could alter drainage patterns and potentially expose soils to the erosive effects of wind and water. However, once the project is constructed, the site would continue to be largely covered in impervious surfaces with some minor vegetated landscaping, and would not result in a substantial change from existing conditions; the potential impact would be less-than-significant.

**Slope Failure.** Unstable soils or subgrade walls could result in failure of some structures or parts of structures. Following construction, the risk of instability of the excavated sidewalls would be eliminated by completion of the retaining walls and foundation improvements. The foundation improvements would be designed and constructed in accordance with the final design parameters consistent with the final geotechnical recommendations and with current building code. The project site is otherwise located in a developed area with relatively gentle topography that is not susceptible to slope instability. As a result, the project would not be susceptible to damage from slope instability during operation, and the potential impact would be less-than-significant.

**Seismic Hazards.** Seismic activity will likely occur during the life of the proposed improvements and could be substantial, resulting in significant damage, injury, and death, if the facilities are not designed appropriately. The proposed improvements (including site preparation, foundation design, walkways, and utility connections) would be required to be designed in accordance with a final design-level geotechnical report prepared by a Washington-licensed geotechnical engineer. The final design-level geotechnical report would include recommendations to design the project facilities to withstand probable seismically induced ground shaking in accordance with the seismic design criteria contained in the current building code. Grading and construction would adhere to the specifications, procedures, and site conditions in the final design plans, which would fully comply with the seismic recommendations of the State Building Code and local building code amendments. Adherence to these building code requirements would reduce potential seismic hazards to less-than-significant levels.

**Liquefaction.** Liquefaction of soils during an earthquake could result in substantive damage and injury if improvements are not designed appropriately. The liquefaction potential of the site would be confirmed

during the geotechnical investigation of the site as required by law, but the site is in an area with very low to low potential for liquefaction (WDNR, 2004). Design of structures to resist seismic forces and secondary effects such as liquefaction in accordance with the current building code would be required. Implementation of site preparation measures as determined in a final design-level geotechnical report would reduce any identified potential liquefaction impacts to less-than-significant.

**Unstable or Unsuitable Soils.** Development on unstable or unsuitable soils could result in the failure of some structures or parts of structures. Existing soils that cannot support proposed improvements, cannot be reused as structural fill or landscape material, or could cause corrosion of subsurface improvements and be a source of damage to the new facilities over the operational life of the project would need to be either replaced with engineered fill or treated to meet geotechnical requirements. The final geotechnical investigation would identify underlying materials and their engineering characteristics. Soils identified as unsuitable for use as structural fill, such as improperly compacted artificial fill, expansive soils, or compressible soils, would require off-site disposal. The site is underlain by artificial fill that would likely be removed during excavation activities. Therefore, implementation of the recommendations of the final design-level geotechnical report consistent with current building code requirements would reduce potential impacts over the operational life of the project related to unstable soils to less-than-significant levels.

**Groundwater.** The proposed redevelopment would lower the depth of improvements, which could potentially bring the foundation floor below the existing perched groundwater table. Groundwater conditions at the site are currently influenced by the existing drainage system at the site, which collects water at a sump and pumps it to a storm drain (Hart Crowser, 2018). The proposed foundation design would similarly include a permanent drainage system with redundant pumps. Even with waterproofing the foundation slab, use of drainage board against the wall, perimeter drains, and drainage fill beneath the foundation slab directing perched groundwater into a collection system, pumping the water out would be necessary to ensure that hydrostatic pressures do not build up. Therefore, dewatering would likely be required for the improvements; however, the collection system would largely collect groundwater passively similar to the existing system, which would reduce the potential for substantive changes to groundwater patterns. According to the preliminary geotechnical investigation estimates (Hart Crowser, 2018), the site will have a permanent drainage rate of 50 gallons per minute (gpm). On April 17, 2018, the inflow rate into the existing groundwater pumping system was measured at 15 to 20 gpm. OVG's engineers have recommended that the pumps be sized for 50 gpm. In addition, all extraction of groundwater would be done in accordance with City requirements, which would ensure that the site does not discharge any contaminants, if present. The proposed design would be subject to City Director's Rules (City of Seattle Stormwater Manual [City of Seattle, 2017]), which can limit the volume of water entering the City storm drains. OVG would continue to work with the City's civil engineer on the final discharge requirements. The proposed foundation would be designed with improvements to the drainage system and implementation of a waterproofing system to minimize the amount of dewatering required. Therefore, the proposed design, in accordance with City requirements, would ensure that there would be no impact to groundwater levels related to the operations of the renovated arena.

### **Alternative 2: Modified Proposal**

There would be no change in the potential impact severity of Alternative 2 when compared to Alternative 1. Alternative 2 would encounter the same existing geotechnical hazards, and with adherence to current building code requirements would have less-than-significant impacts on earth resources.

## 5.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

### 5.5.1 Construction

Potential construction measures are the same for both Alternative 1 and Alternative 2 and include the following recommendations to address geotechnical and erosional hazards at the site.

- Confirm that a Washington-licensed geotechnical engineer conducts geotechnical hazard evaluations for proposed elements addressing ground shaking, fault rupture, liquefaction, and landslides, and that geotechnical recommendations have been incorporated into the project design.
- Conduct construction activities in accordance with BMPs within the required SWPPP, consistent with the NPDES General Construction Permit.
- Design proposed project components in accordance with the design recommendations presented in a final design-level project geotechnical report. This would ensure that facilities are designed to State Building Code standards, which are based on International Building Code seismic standards.
- Conduct excavation activities in accordance with WAC and City requirements and include required shoring and safety systems.
- Monitor earthwork activities to ensure that conditions encountered are consistent with the findings of the final design-level geotechnical report, using a Washington-licensed geotechnical engineer.
- Conduct vibration monitoring for the Northwest Rooms and International Plaza, Bressi Garage, and any other sensitive structures within about 100 feet of earthwork activities to ensure that the structural integrity of these buildings is not compromised. Any signs of foundation or pavement cracking or displacement shall require suspension of construction activities in accordance with oversight from the construction geotechnical engineer and the City.
- Conduct any dewatering necessary in accordance with permit requirements.
- Establish protocols for the contractor to work with the OVG Community Liaison during the construction period to help address concerns raised by the public or agencies in accordance with the community benefits provisions in the Transaction Documents.

### 5.5.2 Operations

Potential operations measures are the same for both Alternative 1 and Alternative 2 and include the following recommendations to address geotechnical and erosional hazards.

- Implement required storm drainage features to reduce the potential for erosion. City drainage control requirements would be required and included as part of the final design plans.
- Develop a monitoring and maintenance program that includes inspection and reporting on structural stability. Monitor all improvements for changes in conditions such as cracking foundations or observed settlement that could reduce the ability of structures to resist seismic disturbances.



- If changes are identified during future inspection and monitoring of conditions, implement additional measures as directed by a Washington-licensed geotechnical engineer to reduce or minimize those impacts.
- Design the final drainage and waterproofing system for the walls and slabs in accordance with the City's Director's Rules to ensure that any discharge of collected groundwater is in accordance with City requirements.
- Continue to provide a Community Liaison to help address concerns raised by the public or agencies, in accordance with the community benefits provisions in the Transaction Documents.

## **5.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON GEOLOGY AND SOILS**

There would be no significant and unavoidable adverse impacts to geology and soils from either action alternative.

## 6.0 HISTORIC AND CULTURAL RESOURCES

This chapter provides a project-level analysis of potential impacts to known and probable historic and cultural resources in the study area. Historic and cultural resources can exist belowground and aboveground and can be archaeological sites, traditional cultural properties, buildings, structures, objects, or districts.

To be considered a historic resource, the resource generally must meet minimum age requirements. However, historic resources are not defined solely by their age but also by criteria related to their historic or cultural importance; this is known as “significance.” Significant historic resources represent important themes, cultures, or patterns in our past. The significance of a resource may be at the national, state, or local level. For this analysis, the criteria used to evaluate the significance of a historic resource are established by the City’s Landmarks Preservation Ordinance (SMC Chapter 25.12).

The evaluation status of a historic resource can vary. A historic resource can be listed in a historic register, recommended eligible for listing, or determined eligible for listing. Resources that have been evaluated and were determined to be not eligible for listing do not require consideration.

Belowground cultural resources can also be listed in historic registers. Under Washington State law, a historic archaeological resource must be eligible for listing in the National Register of Historic Places (NRHP) before it is considered “protected,” but all precontact cultural resources are protected regardless of eligibility determinations. Historic archaeological resources that are determined to be eligible for listing in the NRHP and precontact cultural resources are collectively referred to hereafter as “protected archaeological resources” (PARs).

**Changes from the Draft EIS** – Based on comments received on the Draft EIS, this Final EIS chapter has been revised to include additional discussion of the historic property inventory results, as well as potential impacts to Pottery Northwest’s ceramic art collection, the MoPOP museum collection, the *Typewriter Eraser*, *Scale X* outdoor sculpture, the International Fountain, the Armory, and Memorial Stadium. The Final EIS includes additional analysis of potential vibration impacts to buildings during construction and additional potential mitigation measures for these potential impacts. A historic property inventory was prepared by BOLA Architecture + Planning, and a cultural resources assessment was prepared by ESA. The historic property inventory report was submitted to the Department of

### **Key Findings for Historic and Cultural Resources**

There are 3 designated Seattle Landmarks in the aboveground historic resources study area: KeyArena, Bressi Garage, and the Northwest Rooms (this includes the International Fountain Pavilion and the International Plaza). Significant impacts to all 3 Landmarks are expected under both Alternatives 1 and 2.

The character-defining elements of these Landmarks could be preserved through the Seattle Historic Preservation Program’s Certificate of Approval process. This process is intended to preserve and maintain designated features of Landmarks according to the Secretary of the Interior’s Standards.

There are no recorded belowground cultural resources, traditional cultural properties, or districts on the project site. Precontact-era resources are unlikely to be present due to the previous development of the site. However, the area may contain historic-era resources associated with the early residential and commercial uses, especially at Thomas St and Bressi Garage. If resources are identified during construction, compliance with state law could result in less-than-significant impacts.

Archaeology and Historic Preservation (DAHP) for review prior to publication of the Final EIS. The cultural resources assessment was submitted to DAHP prior to publication of the Final EIS.

## 6.1 METHODS

The EIS Consultant Team reviewed historic registers, historical maps, photographs, and other documents to analyze past use of the aboveground historic resources study area and belowground cultural resources study area. In addition, all recorded belowground cultural resources within the study area were reviewed to determine the sensitivity for additional, unrecorded belowground cultural resources.

Information on the age of historic resources in the aboveground historic resources study area was compiled from the King County Department of Assessments and records provided by the Seattle Center. Because construction could begin as soon as October 2018, this analysis primarily addresses aboveground buildings, structures, and objects that were built in or before 1968 (50 years old or older at the time of construction). However, for consideration as a potential Seattle Landmark, a property must be at least 25 years old or older; for this project, that would apply to resources constructed in or before 1993.

The study area for aboveground historic resources is defined as the project site and the Northwest Rooms and International Fountain Pavilion, which includes the International Plaza (collectively referred to hereafter as “Northwest Rooms”). There are 17 aboveground historic resources adjacent to the aboveground historic resources study area; BOLA Architecture + Planning conducted a reconnaissance-level inventory of these resources in March 2018 for OVG with updates in July 2018 (BOLA Architecture + Planning, 2018). This report was submitted to DAHP on May 24, 2018 and is still in review to date. The study area for belowground cultural resources is a 0.5-mile radius from the project site.

**Data Sources:** The analysis relied on records provided by the Seattle Center; King County Department of Assessments (2018); Washington Information System for Architectural and Archaeological Records Data (WISAARD) (DAHP, 2017); the Statewide Archaeological Predictive Model (DAHP, 2010; Kauhi, 2013); national, state, and local historic registers; existing cultural resources assessments; geological and historical maps (United States Surveyor General, 1859; USGS, 1895, 1897); geotechnical logs (Hart Crowser, 2017, 2018); local histories; and published ethnographic resources.

### **Key Terms – Cultural and Historic Resources**

**Precontact Cultural Resource:** A resource that predates the point of contact between Native and non-Native peoples (including explorers, fur traders, and military personnel). In King County, the precontact era ended in 1792 with the arrival of explorer Captain George Vancouver. Non-Native settlement of the Seattle area began with the Denny Party in 1851.

**Protected Archaeological Resource (PAR):** A term developed for this analysis to encompass the types of resources protected under state law: a historic archaeological site eligible for listing in the NRHP and any precontact archaeological site, regardless of NRHP eligibility status.

**Register-Listed:** A resource that is listed on a national, state, or local historic register or is a designated Seattle Landmark.

**Traditional Cultural Property:** A property that is eligible for listing in the NRHP based on its associations with the traditional cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community.

## Impact Analysis

Potential impacts to historic and cultural resources can be direct or indirect. Examples of direct and indirect impacts that could occur during the project are:

- **Aboveground Historic Resources:** Direct impacts could occur from demolition, vibration, or physical alterations that minimize a resource's integrity of design, materials, or workmanship. Indirect impacts to a resource's integrity of location, setting, feeling, or association are not anticipated.
- **Belowground Cultural Resources:** All impacts would be direct. These could occur from ground disturbance or modifications to the ground surface. No indirect impacts would occur.

## 6.2 REGULATORY CONTEXT

This project is subject to historic and cultural resources review under SEPA regulations, the Seattle Landmarks Preservation Ordinance (SMC 25.12), and Washington State archaeological resources laws. The City has adopted substantive SEPA policies to address historic and cultural resources issues (SMC Chapter 25.05.675(H)). Cultural resources are defined as historic buildings, special historic districts, and sites of archaeological significance.

Historic properties in Seattle may be recognized at the local level for their historical significance through the Seattle Landmarks Preservation Ordinance (SMC 25.12). The ordinance defines historic and cultural resources as objects, sites, or improvements (buildings, structures, or objects) that are at least 25 years old and have "interest or value as part of the development, heritage or cultural characteristics of the City, state, or nation, if it has integrity or the ability to convey its significance" and that meet at least 1 of 6 categories of significance (SMC 25.12.350). Changes to designated Seattle Landmarks are managed through a Certificate of Approval process with the Seattle Historic Preservation Program within the City's Department of Neighborhoods. This process is intended to manage change and find a reasonable approach that will be consistent with the Secretary of the Interior's Standards (Landmarks Preservation Board, 1987).

Four Washington State cultural resources protection laws would apply to this project during construction. These laws apply to all projects in Washington State, including those subject to SEPA: Archaeological Sites and Resources (RCW 27.53), Indian Graves and Records (RCW 27.44), Abandoned and Historic Cemeteries and Historic Graves (RCW 68.60), and Human Remains (RCW 68.50). If a project requires work within the boundaries of a PAR, an excavation permit is required from the Washington State Department of Archaeology and Historic Preservation (DAHP). Information regarding archaeological site locations is exempt from public distribution and disclosure under Washington State law (RCW 42.56.300).

OVG is applying for federal historic rehabilitation tax credits from the Federal Historic Preservation Tax Incentives Program. However, this project does not constitute a federal undertaking that would require compliance with the National Historic Preservation Act. The project is not subject to compliance with federal cultural resources regulations because no federal funds, federal permits, or federal lands are involved.

On March 8, 2018, the Washington State Advisory Council on Historic Preservation formally listed KeyArena on the Washington Heritage Register and recommended it eligible for listing in the NRHP. This recommendation was forwarded to the National Park Service, which administers the NRHP, for final approval. It was approved by the National Park Service and listed in the NRHP on May 10, 2018.

## 6.3 AFFECTED ENVIRONMENT

This analysis uses 2 study areas: 1 for belowground cultural resources and 1 for aboveground historic resources (Figure 6-1). The study area for belowground cultural resources is a 0.5-mile radius from the project site. This study area provides context for an analysis of potential impacts within the project site by incorporating information about previous archaeological investigations and recorded archaeological sites with project-specific geotechnical information. The study area for aboveground historic resources includes the project site and the Northwest Rooms.

### 6.3.1 Geology and Soils

Geotechnical logs indicate that the project site is broadly covered by placed fill ranging from approximately 10 to 30 feet in thickness (Hart Crowser, 2018). The lack of substantial natural deposition during the Holocene epoch, coupled with extensive site preparation to construct KeyArena, suggests that the project site has a low likelihood to contain buried, intact archaeological sites. For more detail, see Appendix D.

### 6.3.2 Precontact and Ethnographic Eras

Archaeological and historical records document Native American use of the belowground cultural resources study area, suggesting a potential for ephemeral belowground archaeological resources in the study area. A Native American trail known as *schÁkWshud* (“trail to the beach”) trail passed immediately north of the project site, roughly following the alignment of today’s Republican St (United States Surveyor General, 1859). The trail led from Lake Union to Elliott Bay. The Duwamish village of *babáqWab / báqWbaqWab* or “Little Prairie / Large Prairie” was located along the trail, in the vicinity of Belltown (Hilbert et al., 2001; Thrush, 2007; Waterman, 1922). The village consisted of at least 2 longhouses measuring 48 by 96 feet (Thrush, 2007). Historical accounts of the village’s exact location vary, but it appears to have been within 0.5 mile of the project site (Bass, 1937; Lewarch et al., 2004). For more detail, see Appendix D.

### 6.3.3 Historic Era

This section provides a brief history of development of the aboveground historic resources study area and belowground cultural resources study area in order to provide context for analysis of the potential that belowground cultural resources are present within the project site, as well as to provide context for the existing buildings in the aboveground historic resources study area. Non-Native development of the belowground cultural resources study area began in the early 1890s (Sanborn Map Company, 1893; USGS, 1895, 1897). The earliest detailed maps of the project site date to 1893 and show it as sparsely residential with a few stores and a Seventh-Day Adventist Church. Density increased through the late 1890s, and by 1905 the project site featured single-family and multi-family residences, a drug and meat store, and a cigar factory.

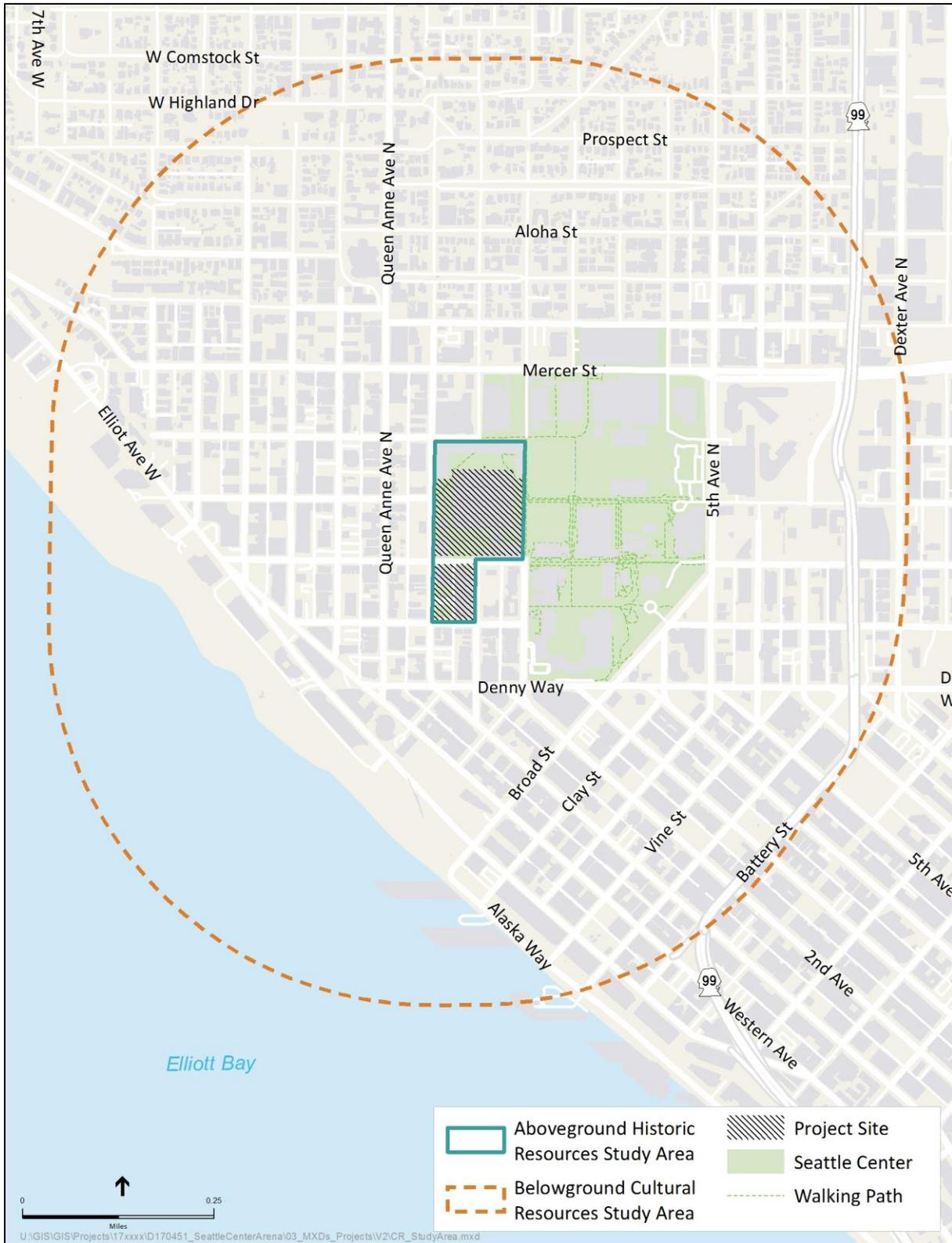


Figure 6-1. Historic and Cultural Resources Study Areas

The area became known as the Warren Avenue neighborhood. The neighborhood was dominated by the large 1903 Warren Avenue Public School on Block 35, which is now the northeast quadrant of the KeyArena site. The school served as a neighborhood anchor until its demolition in 1959. By 1917, more stores were located in the project site on Block 30, along 1<sup>st</sup> Ave N (blocks are shown in Figure 6-2). The mostly working class neighborhood continued to sustain a mix of residential and commercial uses through the 1950s (Artifacts Architectural Consulting, 2013).

When Seattle voters approved construction of a Civic Center in 1957 to host the 1962 World's Fair, the Warren Avenue neighborhood changed drastically. The World's Fair, also known as the Century 21 Exposition (Exposition), changed the once residential and small-scale commercial setting into a planned complex of futuristic buildings, structures, and objects (Becker et al., 2011). Residents moved away from the neighborhood and within a few years nearly all existing resources were demolished to make way for the complex. Several buildings on the project site remained: Bressi Garage, Blue Spruce Apartments, and the West Court Building (known then as the Western Pacific Insurance Company offices). These buildings were repurposed for the Century 21 Exposition, with the exception of Bressi Garage, which continued to operate in its original capacity until the City purchased the property in 1966 (Pratt, 2017).

After the Exposition ended, the grounds became a City-owned cultural and recreational facility. Some of the buildings and structures erected for the Exposition have been renovated or demolished, and new buildings have been added over time. Commercial growth within Uptown during the late 1960s and early 1970s was met with resistance from residents who sought to retain neighborhood views and character (Lentz and Sheridan, 2005). More waves of construction took place in the 1990s and included the renovation of KeyArena in 1994–1995 and construction of the 1<sup>st</sup> Ave N Garage in 1998. Within the last decade, several large mixed-use buildings were erected in the neighborhood, including the block-long Astro Apartments building in 2014 along 1<sup>st</sup> Ave N between Thomas St and Harrison St.

### **6.3.4 Aboveground Historic Resources**

#### **Project Site**

The aboveground historic resources study area contains 3 designated Seattle Landmarks: the KeyArena/Washington State Coliseum (referred to in this EIS analysis as “KeyArena” for clarity), Bressi Garage, and the building complex known as the Northwest Rooms and International Fountain Pavilion, which includes the associated International Plaza (referred to collectively in this EIS analysis as the “Northwest Rooms”). The Northwest Rooms, International Fountain Pavilion, and International Plaza were designated as Seattle Landmarks together (Table 6-1, Figure 6-2). Bressi Garage is currently occupied by Pottery Northwest, which stores its ceramic art collection in the building.

Three other buildings in the aboveground historic resources study area were reviewed by the Landmarks Preservation Board in 2017 and were denied designation as Seattle Landmarks: the West Court Building/Western Pacific Insurance Company (built in 1953), NASA Building/Century 21 NASA Pavilion (built in 1962), and the Blue Spruce Apartments/Century 21 Administration Building (built in 1956) (Landmarks Preservation Board Meeting Minutes, August 2, 2017). No further analysis of these 3 resources is warranted for this Final EIS.

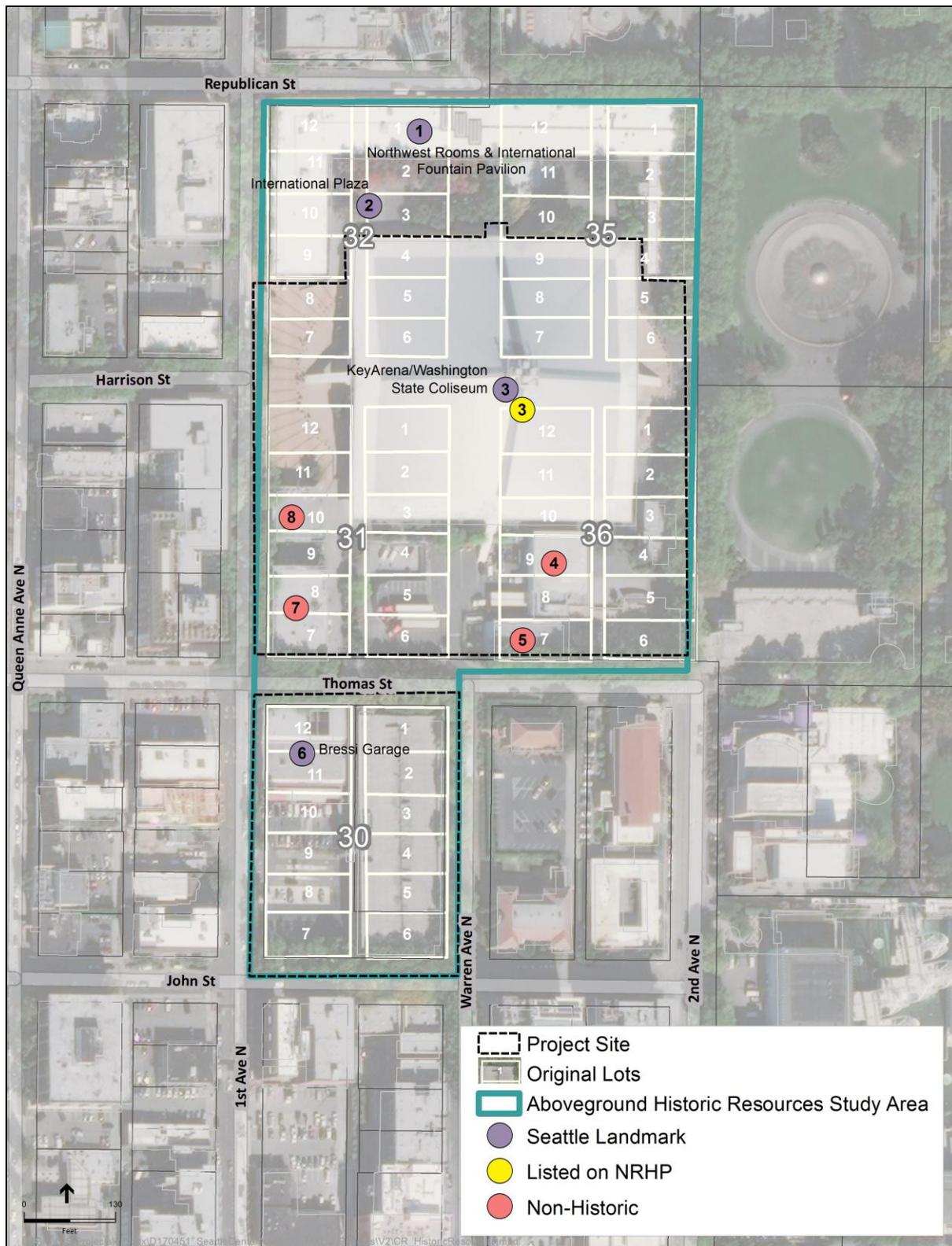


Figure 6-2. Aboveground Historic Resources in the Study Area

**Table 6-1. Designated Landmarks in the Aboveground Historic Resources Study Area**

Map No. <sup>1</sup>	Landmark Name	Year Built	Designated Features	Controls and Incentives Agreement Status
1, 2	Northwest Rooms <sup>2</sup>	1962	“a portion of the site (delineated in Attachment A [see Appendix] and the exteriors of the building” <sup>3</sup>	Finalized 2014
3	KeyArena/Washington State Coliseum	1962	“the site and exterior” <sup>4</sup>	Finalized 2018
6	Bressi Garage	1923	“the exteriors of the two former garage buildings, and the interior roof trusses and decking” <sup>3</sup>	Finalized 2018

<sup>1</sup>See Figure 6-2.

<sup>2</sup>The Northwest Rooms include the International Fountain Pavilion and International Plaza.

<sup>3</sup>Controls and Incentives Agreement, April 2014 (Nellams and Gordon, 2014).

<sup>4</sup>Landmarks Preservation Board Meeting Minutes, August 2, 2017.

Proposed changes to designated Landmarks would be subject to Controls and Incentives Agreements. These agreements state what alterations would require a Certificate of Approval from the Landmarks Preservation Board and include specific lists of exceptions (e.g., in-kind maintenance or repairs of the site and exterior).

The Controls and Incentives Agreements for KeyArena and Bressi Garage were finalized in 2018 (see Appendix D). The Controls and Incentives Agreement for the Northwest Rooms was signed in 2014. This agreement is included in Appendix D.

### **Vacated Harrison St Haul Route**

Two aboveground historic resources are located along the vacated Harrison St haul route that are listed or determined eligible for listing in a historic register. The first is the Washington National Guard Armory (aka Center House, Food Circus, Seattle Center House), which is a designated Seattle Landmark and was determined eligible for listing in the NRHP in 2000 (Wickwire, 2000). The second is Memorial Stadium, which was determined eligible for listing in the NRHP in 2003 (ENTRIX, Inc., 2003).

The haul route would also pass by the International Fountain, built in 1962 and renovated in 1995 (BOLA Architecture + Planning, 2018; City of Seattle, 2018). The International Fountain was surveyed in 2000 and 2018. Both surveys acknowledge that the fountain was renovated extensively in 1995; however, the 2000 survey found it to still retain its basic form, character, and intent of the original design (City of Seattle, 2018). The 2018 survey found the fountain to retain its overall form, but considered there to be insufficient integrity to meet the criteria for listing in the NRHP or as a Seattle Landmark (BOLA Architecture + Planning, 2018).

Lastly, the haul route would pass in front of the outdoor sculpture *Typewriter Eraser, Scale X* by Claes Oldenburg and Coosje van Bruggen (1999). It was moved from the Seattle Art Museum's Olympic Sculpture Park to its current location on the Seattle Center campus in 2016. The sculpture is located in the northwest corner of the MoPOP building, in the center of the vehicular turnaround. The haul route is adjacent to the MoPOP building, which stores and exhibits museum collections.

## **Adjacent to Project Site**

In March 2018, BOLA Architecture + Planning conducted a reconnaissance-level historic property inventory for OVG of historic resources adjacent to the project site (BOLA Architecture + Planning, 2018). The inventory was submitted to DAHP in May 2018 and updated July 2018. The inventory identified 17 historic-aged resources (Table 6-2, Figure 6-3). BOLA evaluated these resources for their potential eligibility for designation as Seattle Landmarks and for listing in the NRHP, following DAHP standards (DAHP, 2018).

The inventory recommended 12 of the historic resources as potentially eligible for designation as Seattle Landmarks and for listing in the NRHP; 3 of these are already designated Landmarks (the Northwest Rooms, the International Plaza, and Bressi Garage). The inventory recommended 5 of the resources as not eligible for designation as Seattle Landmarks nor for listing in the NRHP.

### **6.3.5 Belowground Cultural Resources**

A draft cultural resources assessment was prepared for this project and was submitted to the City for review; the final assessment will be submitted to DAHP for comment prior to publication of the Final EIS. No subsurface testing was conducted as part of this assessment due to the high degree of existing impervious surfaces. The assessment will be submitted to DAHP for comment. The assessment recommends that some elements of construction be monitored by a professional archaeologist under the terms of an Archaeological Resources Monitoring Plan (ARMP). OVG contracted with Willamette Cultural Resources Associates to prepare an Inadvertent Discovery Plan (IDP), which was submitted to the City and DAHP for review on June 22, 2018. The assessment recommends that the finalized IDP be included as an appendix to the ARMP and that OVG submit the ARMP for review by the City, DAHP, and affected Tribes prior to construction.

No belowground cultural resources are recorded within or immediately adjacent to the project site (DAHP, 2017). No previous subsurface archaeological investigations have been conducted on the project site. To assess the affected environment for belowground cultural resources and the potential for previously unidentified belowground cultural resources at the project site, the belowground cultural resources study area was reviewed to provide context.

Numerous previous cultural resources assessments have been completed within the belowground cultural resources study area (see Appendix D). These were conducted between 1997 and 2015 and included both subsurface surveys and non-fieldwork management documents. They were prepared for unrelated projects.

There are 3 previously recorded historic archaeological sites between 0.12 mile and 0.5 mile of the project site (see Appendix D). One of the sites also included a potential precontact component. Two of the sites relate to City infrastructure, and the third is the location of ruins of former residential and commercial properties. None of the sites have been determined eligible for listing in the NRHP.

**Table 6-2. Historic Property Inventory Results**

Map No.	Resource Name	Address	Year Built <sup>1</sup>	BOLA Seattle Landmark Eligibility Recommendation	BOLA NRHP Eligibility Recommendation
1	Northwest Rooms & International Fountain Pavilion <sup>2</sup>	305 Harrison St / 354-472 1 <sup>st</sup> Ave N	1961–1962	Eligible (already designated)	Eligible
2	International Plaza <sup>2</sup>	---	1961–1962	Eligible (already designated)	Eligible
3	International Fountain	215 Harrison St	1961–1962 (renovated 1995)	Not Eligible	Not Eligible
4	Nile Shrine Temple / 21 Club (Seattle Children's Theatre)	201–229 Thomas St	1956, 1995, 1999–2000	Not Eligible	Not Eligible
5	Sacred Heart Parish, School (Building A)	160 John St	1927	Eligible	Eligible
6	Sacred Heart Parish, Convent / Child Care Center (Building B)	167 Thomas St	1929	Eligible	Eligible
7	Sacred Heart Parish Rectory (Building C)	205 2 <sup>nd</sup> Ave N	1959	Eligible	Eligible
8	Sacred Heart Parish, Church (Building D)	231 2 <sup>nd</sup> Ave N	1960	Eligible	Eligible
9	Pittsburgh Apartments (A)	117 John St	1907–1908	Eligible	Eligible (already determined eligible by DAHP)
10	Pittsburgh Apartments (B)	125 Warren Ave N	1907-1908	Eligible	Eligible (already determined eligible by DAHP)
11	Fionia Apartments	122 1 <sup>st</sup> Ave N	1922	Eligible	Eligible
12	Avalon Apartments	22 John St	1908	Eligible	Eligible (already determined eligible by DAHP)
13	Multi-Family Residence	209 1 <sup>st</sup> Ave N	1908	Not Eligible	Not Eligible
14	Office Building	215 1 <sup>st</sup> Ave N	1958	Not Eligible	Not Eligible
15	Uptowner Apartments	229 1 <sup>st</sup> Ave N	1908	Not Eligible	Not Eligible
16	Delmasso Apartments	26 Harrison St	1930	Eligible	Eligible (already determined eligible by DAHP)
17	Bressi Garage	226–232 1 <sup>st</sup> Ave N	1923	Eligible (already designated)	Eligible

<sup>1</sup> Obtained from King County Department of Assessments

<sup>2</sup> These properties were inventoried individually; however, the Seattle Landmarks Preservation Board considers them 1 property and designated them as a single Landmark.

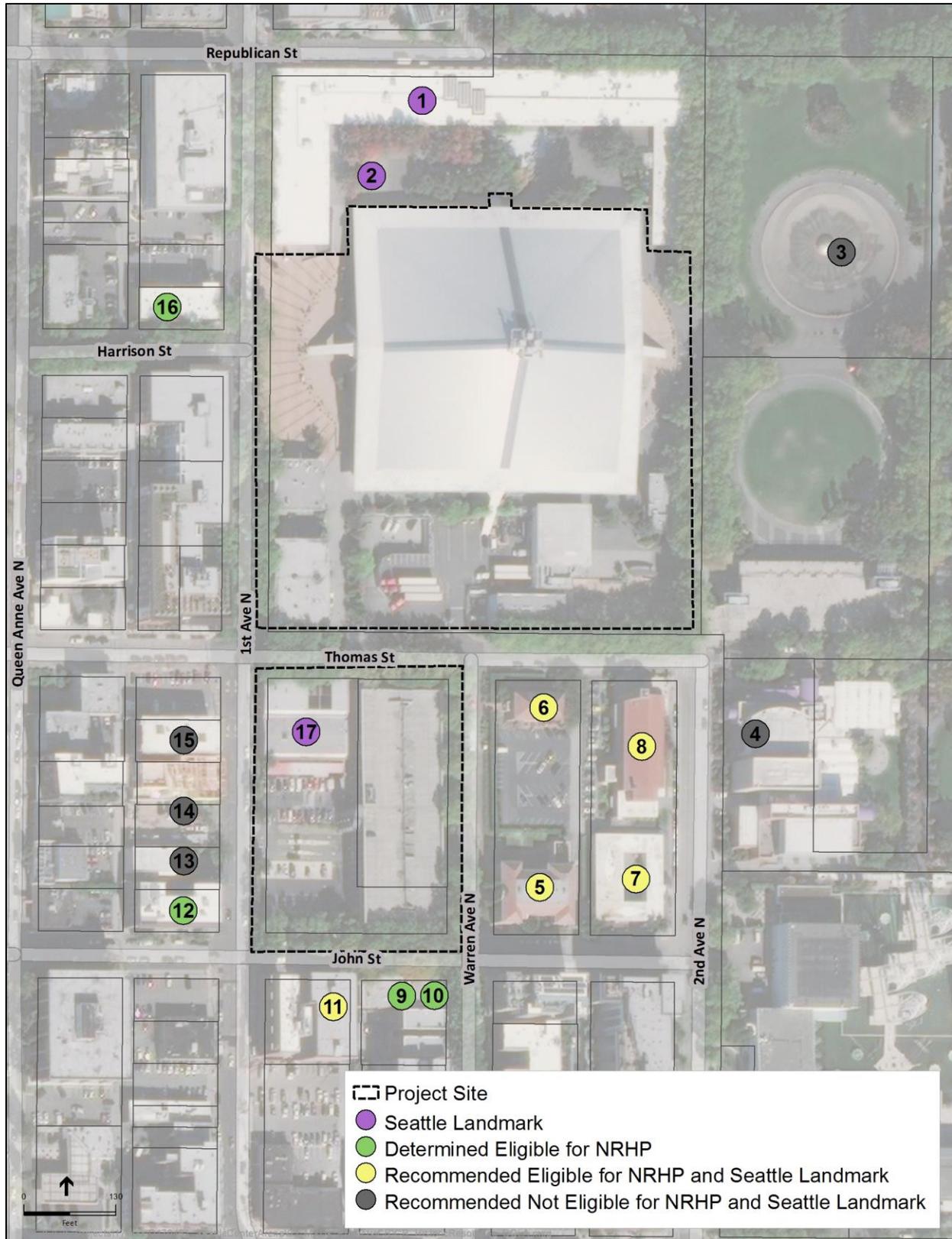


Figure 6-3. Historic Property Inventory Map

## **Precontact Cultural Resources Potential**

DAHP maintains a predictive tool – the Statewide Archaeological Predictive Model – used by archaeologists and planners to evaluate the risk for precontact archaeological sites (DAHP, 2010). The model was developed to statistically evaluate multiple environmental factors (e.g., elevation, slope percent, aspect, distance to water, soils, and landforms) to predict where precontact archaeological resources might be found on a broad scale (Kauhi, 2013). An important limitation of the model is that it generally does not incorporate data regarding historical and recent land use.

Although the Statewide Archaeological Predictive Model classifies the project site as Very High to High Risk for containing precontact archaeological sites (the 2 highest possible classifications), due to the extensive historical and recent development of the project site, it is highly unlikely that precontact archaeological sites, if ever present on the project site, remain intact. Urbanization and development frequently destroy precontact archaeological sites, particularly those on landforms with little to no natural deposits, such as the project site.

## **Historic-Era Cultural Resources Potential**

The Statewide Archaeological Predictive Model does not assess risk for encountering historic-era archaeological resources. The potential for the presence of historic-era archaeological resources is based on the review of known past development. The project site has contained buildings, structures, and objects since at least 1893; therefore, it is possible that archaeological remains from the historic-era exist within the project site. However, it is highly likely that the development of KeyArena, including widespread grading and deep excavation into glacial-aged deposits, severely disturbed or completely removed any earlier historic-era archaeological remains that may have been present within this portion of the project site. It is highly likely that construction of the 1<sup>st</sup> Ave N Garage severely disturbed or completely removed any earlier historic-era archaeological remains that may have been present in this location. However, the sediments below Bressi Garage and the existing surface parking lot to the south of Bressi Garage may be less disturbed because minimal excavation would have been needed for construction of these facilities.

## **6.4 POTENTIAL IMPACTS**

Impacts can be related to construction activities or to the operation of the project.

### **6.4.1 Construction Impacts**

Potentially significant construction impacts to historic and cultural resources are defined as follows. Impacts not reaching the threshold would be less-than-significant.

***Criteria for Significant Construction Impacts to Aboveground Historic Resources:*** The impacts to aboveground historic resources would be significant if construction were to demolish or permanently alter a Landmark's designated features.

***Criteria for Significant Construction Impacts to Belowground Cultural Resources (Protected Archaeological Resources):*** The impacts to belowground cultural resources would be significant if

construction were to modify the depositional integrity (i.e., distribution of artifacts in relation to each other) of the resources.

### **No Action Alternative**

No construction impacts to historic and cultural resources are anticipated, as KeyArena would not be renovated; the buildings on site would remain (with the exception of possible renovations associated with planned maintenance); no new buildings would be constructed except as directed by existing and proposed Seattle Center planning efforts; and there would be no change to Bressi Garage or the Northwest Rooms. Future modifications to KeyArena, the Northwest Rooms, and Bressi Garage would be managed through the Seattle Historic Preservation Program's Certificate of Approval process.

### **Alternative 1: OVG Proposal**

#### ***Aboveground Historic Resources***

##### **KeyArena**

Potential construction impacts to KeyArena's Landmark-designated features under Alternative 1 include changes to the existing building exterior and site. Changes to the interior would also occur from redesign and reconstruction, but KeyArena's interiors are not Landmark-designated features. Alternative 1 would preserve and restore KeyArena's roof and edge beam structure, pylons, and the north, west, and east curtain walls. The south façade, including the curtain wall, would be removed and not replaced. Roof panels, which were last replaced during the 1994/1995 renovation, may require replacement. On the south of the building, a primarily glass atrium lobby would be built and would modify and enclose the south pylon and V-shaped support columns. The atrium lobby would not be wider than the existing façade and roofline or taller than the existing roofline. Digital signage would be visible through the glass. The design includes accent lighting strips on the roof.

Additional exhaust fans may make the cupola on the roof up to 50% wider, but not taller, than the existing cupola. A larger and brighter sign than currently exists would be placed on top. The existing display adjacent to 1<sup>st</sup> Ave N would be replaced by a larger 140 square-foot digital video display south of the location of the existing sign. A site identity sign would be adjacent to the sidewalk on 1<sup>st</sup> Ave N near the southwest corner of the site. Two signs would be placed on a mechanical structure on the southwest portion of the arena site. Additional digital signs would be installed on the east and south plazas (see Figure 2-7 in Chapter 2, *Project Description*, for more information about proposed signs). In addition to the roof, accent lighting would be added to the building and throughout the site (see Chapter 9, *Visual Resources*, for more information about signs and lighting).

Potential construction impacts to the exterior of KeyArena could also result from vibration from construction (see Chapter 8, *Noise and Vibration*). Alterations to the KeyArena site would occur through the demolition of adjacent buildings (Table 6-3), 1 surface parking lot and loading/marshalling area to the south of KeyArena, and open-space pedestrian plazas to the west and east of KeyArena that would be replaced with new open-space pedestrian plazas that approximate the grade and elevations of the original 1962 design. A belowground parking garage would be constructed below the south plaza with vehicle access from Thomas St.

The proposed atrium lobby, new sign on top of KeyArena, and demolition of existing surrounding buildings and open-space pedestrian plazas would permanently alter KeyArena's exterior and site, resulting in significant impacts to its Landmark-designated features. However, according to the

KeyArena Controls and Incentives Agreement, some of these changes (such as changes to signage) would not diminish the building's character-defining elements if the signage changes are consistent with a building/property signage plan approved by the Landmarks Preservation Board. Other changes would require review and approval from the Seattle Historic Preservation Program through the Certificate of Approval process. Refer to Appendix D for the full text of the Controls and Incentives Agreement and a more detailed description of the Certificate of Approval process.

**Table 6-3. Buildings and Structures Proposed for Alterations Under Alternative 1**

Map No. <sup>1</sup>	Building / Structure	Potential Direct Impact	Seattle Landmark Status	Potential Impact Magnitude
1, 2	Northwest Rooms (includes International Fountain Pavilion and International Plaza)	Alterations to Building and Site	Designated	Significant
3	KeyArena/Washington State Coliseum	Vibration and Alterations to Building and Site	Designated	Significant
4	Seattle Center Pavilion	Demolition	N/A – less than 25 years old	N/A – not historic
5	Blue Spruce Apartments	Demolition	Denied	N/A – not historic
6	Bressi Garage	Alterations to Building and Site	Designated	Less-than-significant
6	Kiln Shed at Bressi Garage	Demolition	Excluded (a non-designated feature of Bressi Garage)	N/A – not historic
7	NASA Building	Demolition	Denied	N/A – not historic
8	West Court Building	Demolition	Denied	N/A – not historic
--	Skatepark	Demolition	N/A – less than 25 years old	N/A – not historic
--	Restroom Pavilion	Demolition	N/A – less than 25 years old	N/A – not historic

<sup>1</sup> See Figure 6-2.

#### Northwest Rooms

Alternative 1 would significantly impact the Landmark-designated features of the Northwest Rooms (the exterior and a portion of the site). Impacts would occur from excavation immediately adjacent to the east and west ends of the Northwest Rooms, changes to or partially blocking the southeast and southwest designated façades by the construction of an addition on the south façade of the portion occupied by KEXP, removing the existing exterior stairs near KEXP, the permanent installation of an ADA ramp in the International Plaza, and deconstruction and reconstruction of approximately 40 feet of the International Fountain Pavilion portion of the Northwest Rooms (A/NT Art Gallery) to enclose a mechanical structure and egress stairs. Impacts could occur from the removal and replacement of existing hardscape, removal of 2 legacy trees, and removal of artwork (which would be stored and reinstalled). OVG will stabilize the south sides of the Northwest Rooms during adjacent excavation.

The analysis presented in Chapter 8, *Noise and Vibration* (Table 8-2) identifies thresholds for potential building damage from vibration based on building structural type (e.g., reinforced-concrete, steel, or timber buildings and unreinforced masonry buildings). The Noise and Vibration analysis found that the Northwest Rooms can be exposed to groundborne vibration peak particle velocity (PPV) levels of up to 0.5 inches per second (in/sec) without experiencing structural damage (Section 8.5.1) and that construction activities may result in vibration levels above this level. Vibration impacts to the Northwest Rooms would be significant. See Chapter 8, *Noise and Vibration*, for a description of potential measures for vibration.

#### **Bressi Garage**

The Landmark-designated features of Bressi Garage are its exterior and interior trusses and roof decking. The analysis presented in Chapter 8, *Noise and Vibration*, found that Bressi Garage can be exposed to groundborne vibration PPV levels of up to 0.2 in/sec without experiencing structural damage (Section 8.5.1). Proposed tunneling under Bressi Garage for Alternative 1 would result in vibration levels below this level (see Chapter 8, *Noise and Vibration*). However, other construction methods could result in vibration levels above this level and thus may result in impacts to the exterior of Bressi Garage or Pottery Northwest's ceramic art collection. Impacts to the exterior of Bressi Garage would be significant. If needed, the building would be stabilized during excavation by OVG. For unreinforced masonry buildings like Bressi Garage, the masonry units (bricks) could break or be damaged during construction and would require replacement.

Pottery Northwest stores a ceramic art collection in Bressi Garage. This collection will be packed and relocated prior to construction. Packing and transporting the collection would be temporary and thus would not be a significant impact. OVG will pay to remove and store the Pottery Northwest ceramic art collection to protect it during construction activities.

#### **Armory, Memorial Stadium, and International Fountain**

Proposed truck hauling on vacated Harrison St would pass next to the Landmark-designated Armory building and the determined-eligible Memorial Stadium. Both buildings are reinforced-concrete structures and, as such, the level of vibration from truck hauling would be below the threshold for potential building damage. Truck hauling could increase the amount of dust and exhaust emissions; however, these increases would not result in significant impacts as increased dust and exhaust emissions on the building exteriors could likely be removed through cleaning, and thus would not be permanent.

Truck hauling along vacated Harrison St would also pass directly adjacent to the International Fountain, a daily Seattle Center attraction. Increased dust and exhaust emissions could damage the surface of the fountain; however, because surface cleaning could likely remove this build-up, the damage would not be permanent and thus would not be a significant impact. Mitigation measures are proposed to minimize dust along the haul route (see Section 10.5.1 in *Air Quality and GHG Emissions*).

#### **Typewriter Eraser, Scale X**

Increased dust and exhaust emissions could damage the surface of this sculpture; however, this damage could likely be removed through surface cleaning. Because dust and exhaust emissions could be removed, they would not be permanent and thus would not be a significant impact. Mitigation measures for minimizing dust along the haul route are proposed in Chapter 10, *Air Quality and GHG Emissions*. The vibration levels produced by truck hauling would be below the threshold for structural

damage to the sculpture. If the sculpture is damaged, OVG would clean and restore the object as needed after construction is complete.

#### **MoPOP Museum Collections**

Increased dust and exhaust emissions along the vacated Harrison St haul route could enter the MoPOP building through the museum's heating, ventilation, and air conditioning (HVAC) system intakes. Increases in dust and exhaust within a museum interior could damage the museum's historic objects collection. Damage could be permanent, depending on the severity of exposure and the object's material type. If MoPOP's current HVAC filtration system uses filters with a MERV rating (i.e., Minimum Efficiency Reporting Value) of less than 9, OVG could upgrade the filter to MERV 12 for the duration of the construction, with monthly replacement. MERV 12 filters have a 90% capture rate for particles of 3 to 10 microns in diameter.

#### **Adjacent Buildings and Structures**

Chapter 8, *Noise and Vibration*, does not identify potential vibration impacts to the adjacent buildings and structures inventoried by OVG.

#### **Summary**

In summary, construction of Alternative 1 would significantly impact designated Landmarks. Proposed work would impact the exterior and site of KeyArena and the exterior and site of the Northwest Rooms. Vibration from construction could impact the exterior of Bressi Garage. Buildings will be stabilized if needed to protect their Landmark-designated features. The construction would be undertaken to be consistent with requirements of the Seattle Historic Preservation Program's Certificate of Approval process, which is intended to preserve and maintain designated features of Landmarks.

#### ***Belowground Cultural Resources***

Alternative 1 has the potential to impact the depositional integrity of precontact-era and historic-era belowground cultural resources, if present within the project site. All potential construction impacts to belowground cultural resources would be direct and permanent. Construction impacts could occur from excavation, compaction, or vibration. No subsurface testing has been conducted within the project site to date, and no belowground cultural resources are known to exist. The majority of the project site has been highly disturbed during multiple construction projects.

While recorded archaeological sites and documented trails and villages are in close proximity to the project site, historic development of the area (including widespread grading and deep excavation into glacial-aged deposits for the original construction of KeyArena) has likely severely disturbed or completely removed any precontact archaeological remains that may once have been present. Any precontact archaeological sites remaining within the project site would meet the definition of a PAR, resulting in impacts under Alternative 1; however, such resources, if present, would likely consist of sparse artifact scatters that would not require intensive investigation to mitigate.

The project site, in particular the Bressi Garage area, has the potential to contain resources related to the early development of the Warren Avenue neighborhood, which could be represented by the archaeological remains of building foundations, domestic and commercial refuse, or privies. The proposed access to a new underground parking garage off Thomas St and a tunnel under Bressi Garage parallel to 1<sup>st</sup> Ave N would pass through the former locations of single-family residences and associated automobile garages present from 1905–1917 until c.1957. If present, the nature, extent, and age of

these historic archaeological resources would determine whether they meet the definition of a PAR, and thus result in impacts under Alternative 1. Based on the types of archaeological remains that could be present (partial building foundations, domestic and commercial refuse, or privies), it is probable that these would not meet the criteria for consideration as a PAR based on DAHP's evaluation of similar types of resources.

The KeyArena portion of the project site could contain remains related to the Warren Avenue Public School, Seventh Day Adventist Church, or the many former residences and stores within the project site. The potential that intact cultural resources exist in these portions of the project site is unlikely due to the amount of disturbance during construction of KeyArena and the Northwest Rooms. Although unlikely, if belowground resources are encountered, the impact would be significant. For potential mitigation measures relating to belowground cultural resources, see Section 6.5.2.

Temporary construction easements may extend outside of the project site for tieback of construction walls and/or placement of crane(s) for garage construction. To the north and east of KeyArena, construction easements would extend outside of the project site into the Seattle Center campus. To the west and south of KeyArena, the construction easements may extend into the immediately adjacent streets. For tunnel and utility work, construction easements would extend into adjacent streets, particularly Thomas St. Such work would require excavation, including for utility work within existing road right-of-way. Excavation could impact the depositional integrity of belowground cultural resources, if present.

In summary, Alternative 1 has the potential to impact the depositional integrity of belowground cultural resources, if present. As noted above, it is unlikely that belowground cultural resources are present in the KeyArena and Northwest Rooms portion of the belowground cultural resources study area, which has already been highly disturbed. However, the Bressi Garage portion could contain the remains of former building foundations, domestic and commercial refuse, or privies. For potential mitigation measures relating to potential belowground cultural resources, see Section 6.5.2.

## **Alternative 2: Modified Proposal**

### ***Aboveground Historic Resources***

#### **KeyArena**

Potential construction impacts to KeyArena and buildings on the KeyArena site would be the same as those under Alternative 1, with the exception of the sign on the top of the arena and the digital sign on 1<sup>st</sup> Ave N. The sign on the top of the arena would have a similar size and brightness as the existing sign. The digital sign on 1<sup>st</sup> Ave N would either not be allowed to use video, or it would have to face away from 1<sup>st</sup> Ave N. Alternative 2 would have signs similar to Alternative 1, with similar impacts.

#### **Northwest Rooms**

Potential construction impacts to the Northwest Rooms would be the same as those under Alternative 1, with the exception of retaining the 2 legacy trees.

#### **Bressi Garage**

Potential construction impacts to Bressi Garage would be the same as those under Alternative 1.

### **Armory, Memorial Stadium, and International Fountain**

Under Alternative 2, no truck hauling would occur on vacated Harrison St; therefore, no potential construction impacts to the Armory, International Fountain, or Memorial Stadium would occur.

### ***Typewriter Eraser, Scale X***

Under Alternative 2, no truck hauling would occur on vacated Harrison St; therefore, no potential construction impacts to the *Typewriter Eraser, Scale X* sculpture would occur.

### **MoPOP Museum Collections**

Under Alternative 2, no truck hauling would occur on vacated Harrison St; therefore, no potential construction impacts to the MoPOP museum collections would occur.

### **Adjacent Buildings and Structures**

Potential construction impacts to the adjacent buildings and structures would be the same as those under Alternative 1.

### **Summary**

In summary, Alternative 2 would result in significant impacts to aboveground historic resources. Proposed work would impact the exterior and site of KeyArena and the exteriors of the Northwest Rooms, and vibration from construction could impact the exterior of Bressi Garage. Changes to Landmark-designated features would be undertaken in a way that is consistent with requirements of the Seattle Historic Preservation Program's Certificate of Approval process, which is intended to preserve and maintain designated features of Landmarks.

### ***Belowground Cultural Resources***

Potential construction impacts to belowground cultural resources at the Thomas St underground parking garage entrance would be the same as Alternative 1. The potential construction impacts from the new loading dock access tunnel off 1<sup>st</sup> Ave N would be similar to Alternative 1 but have the potential to affect different belowground cultural resources. The tunnel would pass through the locations of single-family residences built in 1904 and 1905 and their associated detached automobile garages, multi-family dwellings, and the Victor Garage built in 1917. All structures and houses were extant until c.1957. Additionally, potential impacts to belowground cultural resources from temporary construction easements would be the same as Alternative 1.

In summary, Alternative 2 has the potential to impact the depositional integrity of belowground cultural resources, if present. As noted above, it is unlikely that belowground cultural resources are present in the KeyArena portion of the belowground cultural resources study area, which has already been highly disturbed. However, the Bressi Garage portion could contain the remains of former building foundations, domestic and commercial refuse, or privies. For potential mitigation measures relating to potential belowground cultural resources, see Section 6.5.2.

## **6.4.2 Operations Impacts**

Potentially significant operations impacts to historic and cultural resources are defined below. Impacts not reaching the threshold would be less-than-significant.

**Criteria for Significant Operations Impacts to Aboveground Historic Resources:** The impacts of operations activities would be significant if they were to result in ongoing modifications to historic resources that derive their historic significance from their integrity of setting, feeling, or association and which cannot be mitigated.

**Criteria for Significant Operations Impacts to Belowground Cultural Resources:** Operations impacts to belowground cultural resources would not occur. Any impact would occur during construction, as described in Section 6.4.1.

### **No Action Alternative**

No operations impacts to historic and cultural resources are anticipated, as impacts to historic and cultural resources occur during construction, not operation, and no construction is proposed. Additionally, no operational changes are proposed.

### **Alternative 1: OVG Proposal**

#### ***Aboveground Historic Resources***

No operations impacts to aboveground historic resources are anticipated, as impacts to KeyArena, the Northwest Rooms, and Bressi Garage would occur during construction, not during operation. Additionally, the buildings and structures would retain their same functions after construction is complete.

#### ***Belowground Cultural Resources***

There would be no operations impacts to belowground cultural resources. All potential impacts to belowground cultural resources would occur during construction, as described in Section 6.4.1.

### **Alternative 2: Modified Proposal**

#### ***Aboveground Historic Resources***

Potential operations impacts to aboveground historic resources are anticipated to be the same as those under Alternative 1.

#### ***Belowground Cultural Resources***

There would be no operations impacts to belowground cultural resources. All potential impacts to belowground cultural resources would occur during construction, as described in Section 6.4.1.

## **6.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES**

### **6.5.1 Aboveground Historic Resources**

It is City policy to maintain and preserve significant historic sites and structures; for projects involving designated Landmarks, the City considers compliance with the Landmarks Preservation Ordinance as

compliance with this policy (SMC 25.05.675(H)(2)), but does not consider this compliance to be a mitigation measure. Additionally, for projects that are adjacent to or across the street from a Landmark, such as KeyArena's adjacency to the Northwest Rooms, the City may require mitigation to reduce impacts on the adjacent Landmark. Subject to the City's Overview Policy (SMC 25.05.665), potential mitigating measures are limited to the following (SMC 25.05.675(H)(2)(d)):

- Sympathetic façade treatment.
- Sympathetic street treatment.
- Sympathetic design treatment.
- Reconfiguration of the project and/or relocation of the project on the project site.

Significant impacts to KeyArena, the Northwest Rooms, and Bressi Garage under Alternative 1 and Alternative 2 could be managed through the Certificate of Approval process, which is a process to manage change in such a way that it will be consistent with the Secretary of the Interior's Standards. Consistency with this process would preserve character-defining elements of the designated features of these Landmarks. A Controls and Incentives Agreement exists for the Northwest Rooms, KeyArena, and Bressi Garage. Additionally, impacts to the exteriors of KeyArena, the Northwest Rooms, and Bressi Garage could be minimized through building stabilization. Impacts to the exterior masonry walls of Bressi Garage could be minimized through restoration (e.g., in-kind tuck-pointing and cleaning) as necessary. OVG could conduct vibration monitoring for the Northwest Rooms and Bressi Garage. Dust and particulate impacts to the International Fountain and sculpture adjacent to the vacated Harrison St haul route could be reduced by implementation of a dust control program, and regular cleaning of the sculpture and fountain area.

## 6.5.2 Belowground Cultural Resources

If an archaeological resource is identified during project construction, mitigation measures will be developed through consultation with the SEPA Lead Agency, DAHP, and affected Tribes. DAHP has certain regulatory authority over archaeological resources in Washington State. In accordance with state law (RCW 27.53), an archaeological resource identified during construction is protected until DAHP determines whether or not it is eligible for listing in the NRHP; isolated (single) artifacts, either precontact or historic-era, are not protected because they do not meet the definition of a "site" under state law [WAC 25-48-020(9)]. If human remains are discovered during construction, OVG will follow procedures dictated by state law (RCW 27.44).

It is City policy to maintain and preserve significant historic sites and structures and to provide the opportunity for analysis of archaeological sites; for projects with potential archaeological significance, the City may require an assessment of the archaeological potential of the site (SMC 25.05.675(H)(2)(e)). Subject to the City's Overview Policy (SMC 25.05.665), measures that may be required to mitigate adverse impacts to an archaeological site include but are not limited to the following (SMC 25.05.675(H)(2)(e)):

- Relocation of the project on the site.
- Providing markers, plaques, or recognition of discovery.
- Imposing a delay of as much as 90 days (or more than 90 days for extraordinary circumstances) to allow archaeological artifacts and information to be analyzed.

- Excavation and recovery of artifacts.

OVG hired Willamette Cultural Resources Associates to prepare an Inadvertent Discovery Plan (IDP) for the project. The IDP was submitted to the City and DAHP for comment on June 22, 2018. Once finalized, OVG will implement the IDP during construction. The IDP establishes the procedures to follow if any subsurface historic or cultural resources are encountered during project construction. The IDP follows state law and local ordinances specific to the protection of archaeological resources. The cultural resources assessment prepared for this project recommends that OVG also prepare an Archaeological Monitoring Plan that will be implemented by a professional archaeologist during construction.

## **6.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON HISTORIC AND CULTURAL RESOURCES**

Both Alternative 1 and Alternative 2 would result in significant and unavoidable adverse impacts to aboveground historic resources. Alternative 1 and Alternative 2 would impact the Landmark-designated features of KeyArena and the Northwest Rooms through alterations to their exteriors and sites. Alternatives 1 and 2 could also impact the Landmark-designated features of Bressi Garage. It is likely that potential impacts can be managed through compliance with the Seattle Historic Preservation Ordinance, which is intended to manage change and find a reasonable approach that is consistent with the Secretary of the Interior's Standards, but the City does not consider this process to be mitigation. No significant and unavoidable adverse impacts to belowground cultural resources are anticipated by the project.

## 7.0 RECREATION

This chapter provides a project-level analysis of potential impacts to recreation from the Seattle Center Arena Renovation Project. Recreation includes current uses of KeyArena and other recreational facilities at the project site; facilities, uses, and events at Seattle Center; and other recreational uses in Uptown. Because the project is located within Seattle Center (an arts, culture, sports, and entertainment campus), recreation evaluated in this section includes performance and entertainment events as well as public parks and open space. Impacts to recreation-related Seattle Center tenants (such as Pottery Northwest) are addressed in Chapter 3 (*Land Use*). This Recreation chapter describes impacts to users of recreational programming associated with those tenants.

**Changes from the Draft EIS** – This chapter has been revised since the Draft EIS to provide additional clarification on impacts to the Seattle Center Skatepark based on new information, and to reflect updated information about noise impacts to KEXP and other Seattle Center tenants.

### 7.1 METHODS

Recreational facilities, amenities, and uses were identified by gathering maps and programming information for recreational features in the recreation study area from online sources and from Seattle Center. Construction impacts were analyzed by identifying construction activities that could temporarily limit, disrupt, or displace recreational facilities, activities, or programming in the study area. Operations impacts were analyzed by identifying the recreational facilities proposed in the alternatives and by considering how existing programming would (or would not) be able to use those facilities.

### 7.2 REGULATORY CONTEXT

The proposed project is subject to SEPA regulations, the Seattle Municipal Code, and other local plans.

#### **Key Findings for Recreation**

During the construction period, the Seattle Center Arena Renovation Project would temporarily displace recreational events (such as concerts and Seattle Storm basketball games) that currently take place at KeyArena. However, these events could be accommodated elsewhere in the greater Seattle area. The DuPen Fountain would be closed during the duration of the construction period. Construction activity on 2<sup>nd</sup> Ave N would impact the International Fountain and Lawn, and loss of curb space due to road closure would affect event load-in and load-out as well as school bus unloading. Construction noise would be audible to recreationists at Seattle Center facilities, including programming at KEXP, SIFF Film Center, The Vera Project, Seattle Children's Theatre, Seattle Repertory Theatre, and the Cornish Playhouse, as well as at campus-wide festivals and events such as Folklife, Pride, Bite of Seattle, and Bumbershoot. Recreationists at KEXP, SIFF Film Center, and The Vera Project would experience significant noise impacts.

Operational impacts would include the permanent removal of the Seattle Center Pavilion. However, other events spaces on the Seattle Center campus (such as Fisher Pavilion and the Exhibition Hall) could accommodate events currently held at the pavilion. The Seattle Center Skatepark would also be removed but would be replaced elsewhere.

A renovated arena would provide Seattle Center and the city with an updated sports and entertainment arena that could accommodate NHL and NBA teams, and would provide an upgraded recreational experience for existing uses such as concerts and Seattle Storm games.

### 7.2.1 Seattle 2035 Comprehensive Plan

The Seattle 2035 Comprehensive Plan sets goals and policies for various planning elements, including Parks and Open Space, and for neighborhoods, including Queen Anne (Uptown). The Parks and Open Space element of the plan lists Seattle Center as a “unique urban amenity that offers both open space and a wide variety of cultural activities.” Goal P-G1 in the plan is to “[p]rovide a variety of outdoor and indoor spaces throughout the city for all people to play, learn, contemplate, and build community” (City of Seattle, 2016).

The Queen Anne (Uptown) element of the plan includes Goal QA-G5: “Queen Anne is a neighborhood that meets the parks and open space needs of its population by maintaining existing parks, identifying future needs, providing connections between parks and the community, and enhancing historic Queen Anne Boulevard.”

The element also includes the following policies related to recreation:

- QA-P14: Encourage Seattle Center to plan and implement development that will enhance the quality of life in the Queen Anne neighborhood.
- QA-P15: Seek ways to ensure that Seattle Center remains a vibrant and valuable community resource and a premier regional amenity.
- QA-P19: Seek to maintain Queen Anne parks and open spaces and replace aging parks facilities used by the public, and seek to ensure no net loss of parks, park facilities, or open spaces while recognizing the need for a citywide balance in ongoing maintenance and investment.
- QA-P20: Accommodate a range of uses in parks to meet the needs and interests of the Queen Anne population.
- QA-P21: Strive to meet the open space and parks and recreation needs of the Queen Anne population, including the Urban Center.
- QA-P22: Strive to provide trails and non-motorized linkages throughout and around Queen Anne.
- QA-P23: Seek to provide abundant green spaces and streetscapes throughout Queen Anne.
- QA-P28: Ensure that public park lands are retained and maintained for public use.
- QA-P38: Strive to provide a system of bicycle facilities and routes within and around Queen Anne to encourage increasingly safe and convenient commuter and recreational bicycle use as an alternative to motorized travel (City of Seattle, 2016).

### 7.2.2 Seattle Parks and Recreation 2017 Parks and Open Space Plan

The Seattle Parks and Recreation 2017 Parks and Open Space Plan (Seattle Parks and Recreation [SPR], 2017a) sets goals and policies and analyzes gaps in the park system.

The goals in the plan are to:

1. Provide a variety of outdoor and indoor spaces throughout the city for all people to play, learn, contemplate, and build community.

2. Continue to provide opportunities for all people across Seattle to participate in a variety of recreational activities.
3. Manage the City's park and recreation facilities to provide safe and welcoming places.
4. Plan and maintain Seattle's parks and facilities to accommodate park users and visitors.
5. Engage with community members on Parks and Recreation plans, and design and develop parks and facilities, based on the specific needs and cultures of the communities that the park is intended to serve.

The Gaps in Walkability analysis in the Seattle Parks and Recreation Gap Analysis web portal associated with the Parks and Open Space Plan shows that there are no Parks and Recreation facilities in Uptown that are greater than 10,000 square feet in size (the cutoff chosen by Parks and Recreation for the walkability analysis). The majority of Uptown is mapped as having a gap in walkability to recreation facilities. Taking Seattle Center (which is not owned or operated by Parks and Recreation) into account as a recreational facility, the majority of Uptown is shown as within walking distance of a recreational facility; however, 4 areas still show gaps in walkability to recreation facilities (SPR, 2017b).

### **7.2.3 Seattle Center Century 21 Master Plan**

The Seattle Center Century 21 Master Plan articulates a vision for the future of Seattle Center (Seattle Center, 2008). The Master Plan includes the following goals:

- Enhance Seattle Center's position as the Nation's Best Gathering Place.
- Dramatically increase open space.
- Connect Seattle Center's dynamic facilities into a synergistic whole.
- Provide capacity for existing and future arts, cultural and recreational programs, to be nurtured, grown and developed.
- Create program and design that captivates and attracts private funding partners.
- Build on the history of Seattle Center while creating the flexible framework to provide for the needs of the future.
- Integrate environmental sustainability in design, construction and operations to reduce energy demands and serve as a model for sustainable development.
- Enrich and connect to the fabric of adjacent neighborhoods through welcoming design, programming and operations.
- Increase accessibility to the center of the grounds for all users.
- Encourage greater mass transit use and easier non-motorized connections.
- Improve pedestrian safety.
- Provide the programs and destinations to attract a larger and increasingly diverse number of visitors (Seattle Center, 2008).

### **7.2.4 City of Seattle Citywide Skatepark Plan**

SPR and the Skatepark Advisory Task Force developed the City of Seattle Citywide Skatepark Plan (2007) in response to a City Council resolution "recognizing skateboarding as a healthy and popular recreation" (SPR, 2007). The Skatepark Plan recommended development of skateparks at 26 sites in the city and established a system of types of skateparks:

- Skatedots, or integrated skateable terrain, of 20 to 1,500 square feet.
- Skatespots, neighborhood facilities ranging from 1,500 to 10,000 square feet.
- District facilities, meant to serve a larger area and ranging in size from 10,000 to 30,000 square feet.
- Regional facilities, larger than 30,000 square feet and attracting users from around the region.

When the Skatepark Plan was written, the SeaSkate Park at Seattle Center had been closed for development of the Bill and Melinda Gates Foundation Campus, and the City was looking for a replacement location. One of the recommendations of the Skatepark Plan was to collaborate with Seattle Center to “find a replacement site for SeaSkate somewhere in the downtown core” (SPR, 2007).

## 7.3 AFFECTED ENVIRONMENT

### 7.3.1 Study Area

The primary study area for recreation is Seattle Center (Figure 7-1), and the secondary study area is Uptown (Figure 7-2). Recreational facilities within the project site, including KeyArena, Seattle Center Skatepark, and the Seattle Center Pavilion, are described in Section 7.3.2. Recreational facilities adjacent to the project site are described in Section 7.3.3. Other recreation at Seattle Center is described in Section 7.3.4, and other recreation in Uptown is described in Section 7.3.5.

### 7.3.2 Recreation Within the Project Site

#### KeyArena

KeyArena is a sports, entertainment, and concert arena with an approximate 11,000 to 17,500-seat capacity, depending on the type of event. The arena was the home arena for the Seattle SuperSonics from 1967 to 2008. KeyArena is owned by the City and currently operated by AEG Facilities (Seattle Center, 2017c).

Recreational events at KeyArena, based on the 2016 and 2017 Seattle Center Events Attendance Rosters (Seattle Center, 2016, 2017b), include the following:

- **Concerts.** A range of artists perform at KeyArena, which hosted over 20 concerts in 2016 (including Adele, Bruce Springsteen, Rihanna, and The Who) and over 25 in 2017 (including Arcade Fire, Janet Jackson, and Macklemore, among other major acts).
- **PAC12 Women’s Basketball Tournament.** The PAC12 Women’s Basketball Tournament has been held in KeyArena since 2013 and was under contract to be held in KeyArena through 2019.
- **Seattle Storm (WNBA).** The Seattle Storm is a franchise in the Women’s National Basketball Association (WNBA). The Storm was founded in 2000 and has used KeyArena as its home arena for its entire history. The Storm hosts 17 regular season games, 1 pre-season game, and a variable number of post-season games at KeyArena (WNBA, 2017).
- **Seattle University Men’s Basketball.** The Seattle University Men’s Basketball Team play Division I National Collegiate Athletic Association (NCAA) basketball, with KeyArena as their

home court. The team played at the Seattle Center Coliseum from 1964–1980 and returned to KeyArena in 2008.

- **Other.** KeyArena hosts a variety of other events. In 2016: The International (Dota 2 esports tournament), the Harlem Globetrotters, Kellogg’s Tour of Gymnastics, Marvel Universe Live, the Comedy Get Down, and WWE Raw. In 2017: Big3 Basketball, the Game of Thrones Live Concert Experience, the Harlem Globetrotters, Jim Gaffigan (comedy), Stars on Ice, the WNBA All Star Game, and WWE Smackdown.

In addition to the recreational events listed above, KeyArena has hosted several non-recreational events, including the annual Seattle/King County Clinic, high school graduations, WE Day, and a Bernie Sanders rally in 2016. KeyArena also hosts occasional private events.

### **Seattle Center Skatepark**

The Seattle Center Skatepark, also known as “SeaSk8,” is directly southeast of KeyArena. The skatepark opened in 2009 and features 10,000 square feet of skating elements, including ledges, stairs, and transitions for various skill levels and structural glass riding surfaces (Seattle Center, 2017a). The skatepark is a free, accessible, and highly used recreational amenity open to the public.

The skatepark is open to the public during daylight hours. The skatepark occasionally hosts events. For example, in 2016, the skatepark hosted Go Skateboarding Day and a series of Skate Like a Girl classes (Seattle Center, 2016). Skate Like a Girl is a nonprofit organization that hosts free youth clinics, summer camps, and other programming at the Seattle Center Skatepark.

The original skatepark at Seattle Center was removed in 2007 for construction of the Bill and Melinda Gates Foundation Campus (SPR, 2007). The current location was constructed to replace that skatepark.

### **Seattle Center Pavilion**

The Seattle Center Pavilion is a 5,300 square foot pavilion with 2 meeting rooms, a lobby, and restrooms. The Pavilion includes exhibit and trade-show space for up to 60 booths and hosts cultural events, workshops, gaming events, exhibitions, conventions, and craft events (Seattle Center, 2016, 2017b, 2017d). No permanent concessions, businesses, or other recreational facilities are located in the Seattle Center Pavilion.

### **Pottery Northwest**

Pottery Northwest is a nonprofit arts organization located in the historic Bressi Garage building on the Seattle Center campus. Pottery Northwest, founded in 1966, hosts artist residences, exhibitions, classes, and lectures. The facility features a kiln yard, electric and gas-fired kilns, a variety of equipment, a glaze area, and recently upgraded heating, lighting, and air filtration systems.

## **7.3.3 Recreation Adjacent to the Project Site**

Recreational facilities adjacent to the project site include the DuPen Fountain (Fountain of Creation), the International Fountain and Lawn, and South Fountain Lawn. Additionally, Seattle Center tenants in the adjacent Northwest Rooms program recreational activities. Portions of the Northwest Rooms are not part of the project site but are within the construction footprint (see Section 2.6, *Construction*, for more information).

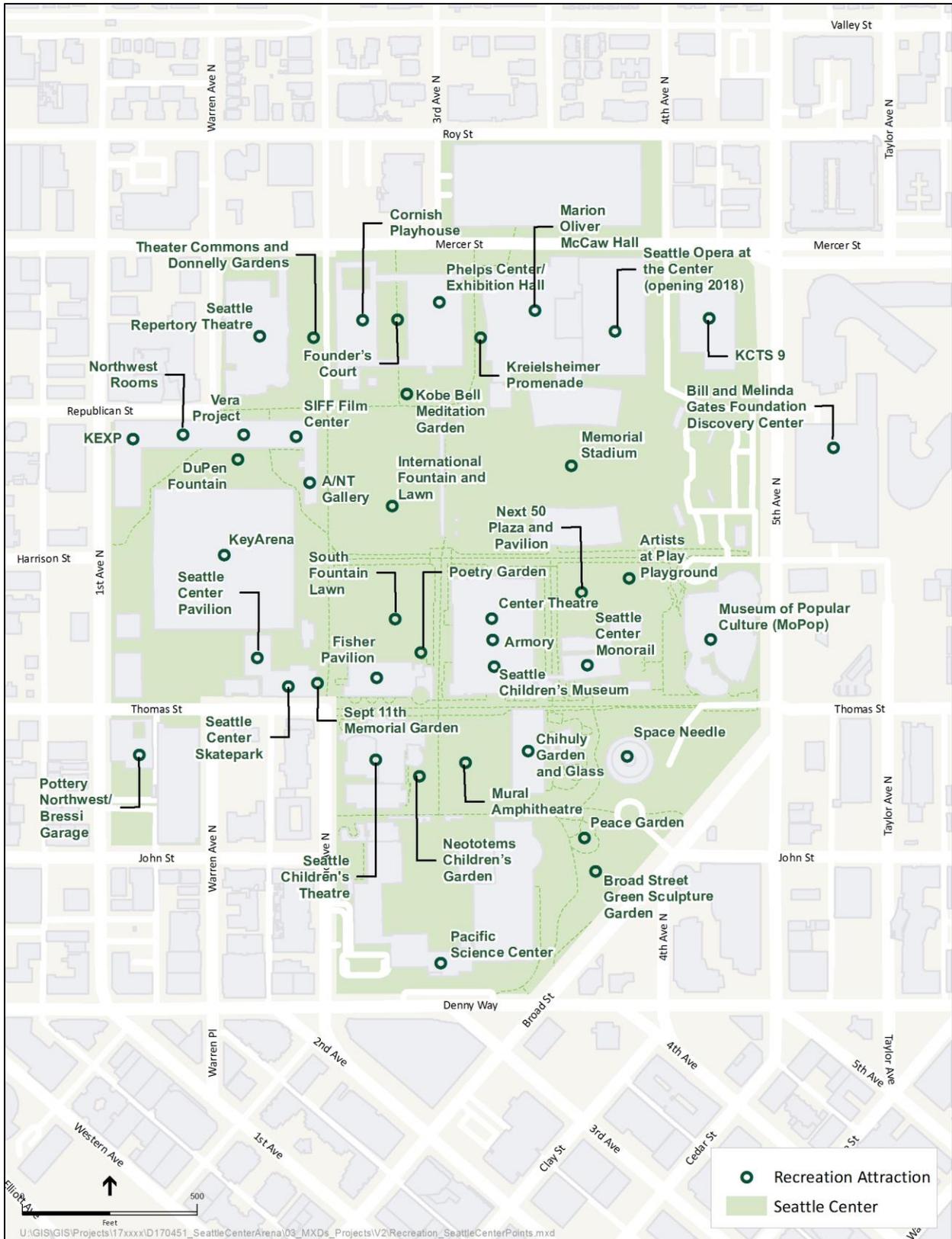


Figure 7-1. Recreational Attractions at Seattle Center

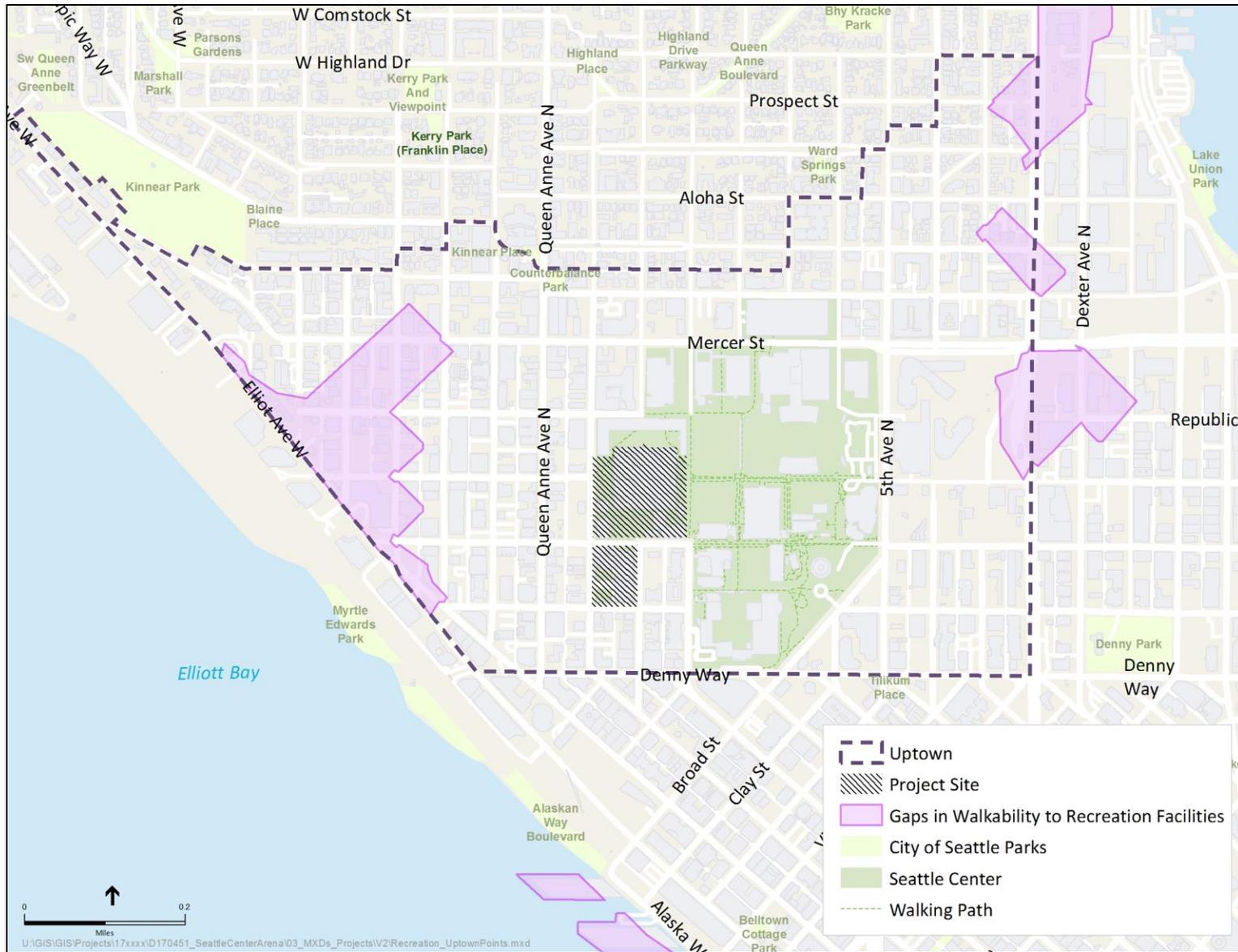


Figure 7-2. Recreation in Uptown

The DuPen Fountain is directly north of KeyArena. The fountain consists of a bronze and stone water garden and is used for wading. It was created by Everett DuPen in 1962 and renovated in 1992. The International Fountain and Lawn and South Fountain Lawn are east of KeyArena. The International Fountain is a large concrete fountain accessible for wading.

Seattle Center tenants in the Northwest Rooms, including KEXP, The Vera Project, the SIFF Film Center, and the A/NT Gallery, draw visitors for recreational events including live music performances and concerts, classes, exhibitions, lectures, film screenings, and art viewing.

### **7.3.4 Seattle Center**

Seattle Center is a 74-acre campus in Uptown featuring arts, cultural, sports, and entertainment attractions. Seattle Center is 1 of the top attractions in the region, welcoming millions of visitors annually. Seattle Center was opened in 1962 as the site of the 1962 World's Fair. Seattle Center is owned and operated by the City.

Seattle Center features over 40 recreational attractions. Major recreational features at Seattle Center include the Seattle Repertory Theatre, Marion Oliver McCaw Hall (home of the Seattle Opera and Pacific Northwest Ballet), Memorial Stadium, the Armory, the Museum of Pop Culture (MoPOP), Seattle Children's Theatre, the Mural Amphitheatre, Chihuly Garden and Glass, the Space Needle, the Artists at Play playground, the Seattle Children's Museum, and the Pacific Science Center. A variety of recreational, entertainment, sports, and performance events are held at venues around Seattle Center, including film screenings, theater performances, opera, ballet, sports events, and summer camps. Appendix E includes more information on recreational attractions at Seattle Center and the events held there.

Seattle Center hosts a number of recurring Seattle Center-wide events that draw large crowds, including the Northwest Folklife Festival, Bumbershoot, Seattle PrideFest, the Seafair Torchlight Fanfest, the Bite of Seattle, and Winterfest. Appendix E includes more information on Seattle Center events.

### **7.3.5 Uptown**

As described above in Section 7.2.2, most of Uptown is not within walking distance (defined as a 5-minute walk within an Urban Village) of an SPR park greater than 10,000 square feet in size (SPR, 2017b). Including Seattle Center, the majority of the neighborhood is within walking distance of a recreational facility, although 4 areas of Uptown are still not within walking distance of a park (SPR, 2017b). While Seattle Center provides extensive open space and a range of recreational attractions, Uptown still lacks some recreational features typically provided by city parks, such as athletic fields and basketball hoops.

The only City park in Uptown is Counterbalance Park at the corner of Queen Anne Ave N and Roy St. The park, opened in 2008, is a flat lot with gravel and benches. At night, the park features multi-colored light shows on the concrete walls along 2 sides of the park (SPR, 2017c). As a densely populated residential neighborhood, Uptown is also the site of informal recreational use of roads and sidewalks for walking, jogging, and biking. Commercial areas on Queen Anne Ave N, 1<sup>st</sup> Ave N, and Mercer St and surrounding Seattle Center include restaurants, bars, shops, the On the Boards performance venue, and the SIFF Cinema Uptown theater (operated by the Seattle International Film Festival), all of which are frequented by visitors to Seattle Center and are a recreational draw to the neighborhood in their own right.

In 2017, Uptown was designated an Arts & Cultural District by the Office of Arts & Culture because of its concentration of arts and culture spaces and activities. The Uptown Arts & Culture Coalition advocates for the neighborhood as an Arts & Cultural District.

## 7.4 POTENTIAL IMPACTS

### 7.4.1 Construction Impacts

Potential short-term impacts on recreation include the loss of a recreational use during construction activities. The magnitude of the potential impact on recreation is classified as less-than-significant or significant. Significant impacts are defined below, and impacts not reaching that threshold are considered less than significant.

**Criteria for Significant Construction Impacts:** The impacts of construction activities would be significant if construction were to displace recreational features or programming that cannot be accommodated elsewhere in the greater Seattle area or for which equivalent recreational opportunities are not available.

#### No Action Alternative

Under the No Action Alternative, no major construction would occur at the KeyArena site. Construction associated with other projects at Seattle Center, private development in Uptown, and transportation projects in the area could cause noise, traffic, and detours that would be noticeable to people using Seattle Center for recreation.

#### Alternative 1: OVG Proposal

Recreational features within the project site include KeyArena, the Seattle Center Skatepark, and the Seattle Center Pavilion. Impacts to the Seattle Center Skatepark and Seattle Center Pavilion would be permanent and are therefore described in Section 7.4.2, *Operations Impacts*. During the approximately 24-month construction period, KeyArena would be closed and no arena would be available at Seattle Center. This would impact concerts, the PAC12 Women's Basketball Tournament, the Seattle Storm, the Seattle University Men's Basketball Team, and other recreational events currently held at KeyArena.

Arena-scale concerts and other recreational events would not be held at Seattle Center during the approximately 24-month construction period. This impact would be less-than-significant because capacity at other arenas in the greater Seattle area is sufficient to absorb concert dates that would otherwise have been scheduled at KeyArena during the construction period. The Tacoma Dome in Tacoma is an arena with a capacity of 23,000 (depending on the seating arrangement) that frequently hosts concerts on the same scale as those held at KeyArena (Tacoma Dome, 2016). The Tacoma Dome is currently being renovated, and renovations will be complete by fall of 2018 (Tacoma Dome, 2016). Other arenas in the greater Seattle area that could host concerts during the construction period include the ShoWare Center in Kent (capacity 6,500) and Angel of the Winds Arena in Everett (capacity 10,000). There would be no arena venue for concerts within the City of Seattle, although other concert venues of various sizes are available in the city. People seeking to see concerts could travel to Tacoma, Kent, and Everett to attend arena concerts. This could be inconvenient or impractical for some concert goers and more convenient for others. Larger events at Seattle Center, such as Bumbershoot, sometimes use

KeyArena as 1 of a number of venues on the campus. During construction, these events could be accommodated in other Seattle Center facilities.

The Seattle Storm would not be able to play in an arena at Seattle Center for up to 2 seasons (in 2019 and 2020). The Storm would likely relocate to Alaska Airlines Arena (capacity 10,000), the Tacoma Dome, Angel of the Winds Arena, or the ShoWare Center during the construction period. Temporary relocation of the team would inconvenience some fans and could potentially decrease attendance. However, the team draws attendance from the greater Seattle area, so relocation of the team could be more convenient for other fans. This impact would be temporary, and it is common for professional sports teams to relocate during arena or stadium construction timeframes. Because the team could be accommodated elsewhere in the greater Seattle area and because the relocation would be temporary, this would be a less-than-significant impact.

Because KeyArena would not be available in 2019, the PAC12 Women's Basketball Tournament would relocate. The PAC12 has announced that the tournament will move to Las Vegas during construction (Allen, 2018). College basketball fans could attend Washington Huskies men's or women's basketball games at Alaska Airlines Arena, or Seattle University men's or women's basketball games at the Connolly Center. Therefore, this impact would be less-than-significant.

The Seattle University Men's Basketball Team also would be displaced from KeyArena during the construction period. The Seattle University campus features the Connolly Center, a 999-seat arena with an NCAA-regulation court. The men's basketball team would be expected to play at the Connolly Center during the construction period, where it played until 2008 and where the Seattle University Women's Basketball Team currently plays. Because the Connolly Center is available, displacement of the team during the construction period would be a less-than-significant impact.

Construction would also affect recreation adjacent to the project site and elsewhere at Seattle Center. The DuPen Fountain and the International Plaza (also referred to as the Northwest Courtyards) would be closed to the public during a portion of or the full duration of the 24-month construction period. Because other fountains are available on the Seattle Center campus, including the International Fountain and the Fountain of the Northwest, this would be a less-than-significant impact.

Construction impacts to Seattle Center tenants in the Northwest Rooms and Bressi Garage are described in Chapter 3, *Land Use*, and Chapter 8, *Noise and Vibration*. Some recreational programming provided by those tenants, such as concerts at KEXP and The Vera Project, pottery classes at Pottery Northwest, and art viewing at A/NT Gallery, may be less accessible, less frequent, or unavailable during the construction period. Because the Seattle Center tenants would continue to offer programming throughout the construction period, and because other concerts, art classes, and galleries are available in the Seattle area, this would be a less-than-significant impact. Pottery Northwest would not need to relocate during the construction phase, and programming would continue to be available to students and recreationists at the current location. Although not expected, it is possible that a building inspector may determine that it is unsafe for Pottery Northwest to remain in the building during construction. If that were to occur and if the recreational activities could not be accommodated elsewhere, impacts would be significant.

Table 8-7, *Noise Construction Impact Summary*, in Section 8.5.1, *Construction Impacts (Noise and Vibration)*, summarizes construction noise impacts. Seattle Center tenants that would have some of their operations significantly impacted from construction noise and/or vibration under Alternative 1 include KEXP, SIFF Film Center, and The Vera Project. This significant noise and/or vibration impact

would also impact recreational programming and visitors to these three organizations during the construction period.

Construction activities, including the use of the western half of vacated 2<sup>nd</sup> Ave N and the night-time use of vacated Harrison St on the Seattle Center campus for truck access, would be audible and visible for visitors to recreational programming in the Northwest Rooms and potentially for visitors to the International Fountain and Lawn and South Fountain Lawn. Disruption from visible and audible construction activities would be temporary and would be a less-than-significant impact.

Construction of the Seattle Center Arena would also be noticeable and potentially distracting to recreationists at other facilities and amenities at Seattle Center (such as Seattle Children's Theatre) and attendees at major events like the Bite of Seattle, Folklife, Bumbershoot, Festál, parades, walks, and runs. Construction noise would be audible at other Seattle Center facilities; additional information on potential noise construction impacts is included in Section 8.5, *Noise and Vibration*. The City and OVG would enter into a Development Agreement that would outline how construction activities would be managed to minimize impacts to Seattle Center visitors. Disruption from construction activities would be temporary and would be a less-than-significant impact. Recreational visitors at many Seattle Center amenities, such as Seattle Children's Theatre, are a different demographic than likely attendees for the renovated arena and include children, families, and people of varying physical abilities and mobility. Seattle Center and OVG will work with tenants to ensure that free or low-cost recreational and cultural opportunities for families are accessible at Seattle Center during and following arena renovation.

The western half of vacated 2<sup>nd</sup> Ave N and vacated Harrison St on the Seattle Center campus would be used for night hauling, except during certain campus-wide events. The haul routes are adjacent to the International Fountain and Lawn, South Fountain Lawn, the Armory, Memorial Stadium, and MoPOP. Truck hauling on vacated Harrison St would occur at night and would not occur during certain campus-wide events. Portions of streets around Seattle Center could be closed or used for haul routes during construction. Street closure would require permits from SDOT and would affect event load-in/load-out and school bus parking. The 1<sup>st</sup> Ave N Garage would be closed and used for construction worker parking and construction trailers. See Section 2.6, *Construction*, for details regarding construction logistics. Access to Seattle Center facilities and other parking garages would be maintained throughout construction. However, some visitors to Seattle Center would notice, and could be temporarily delayed by, construction use of adjacent streets during the 24-month construction period. These impacts would be short-term and less-than-significant.

### **Alternative 2: Modified Proposal**

Construction impacts of Alternative 2 on recreation would be similar to those described for Alternative 1, but the duration of construction would be approximately 6 months longer, increasing the amount of time recreation in the area would be impacted. As there would be no night work, there would be no hauling on the Seattle Center campus.

## **7.4.2 Operations Impacts**

Potential impacts on recreation include the loss of a recreational use or a substantive change in the overall user enjoyment or recreational experience. Significant impacts are defined below, and impacts not reaching that threshold are considered less-than-significant.

***Criteria for Significant Operations Impacts:*** The impact of operations activities would be significant if operations were to permanently displace current KeyArena programming or sports teams that cannot

be accommodated elsewhere in the greater Seattle area; or to cause a loss of a recreational use at Seattle Center that is not replaced or available elsewhere at Seattle Center or in the vicinity of Uptown.

### **No Action Alternative**

Under the No Action Alternative, KeyArena would continue to be the venue of a number of recreational activities, including concerts, the Seattle Storm, and the Seattle University Men's Basketball Team. The PAC12 Women's Basketball Tournament could take place in KeyArena in 2019.

KeyArena would continue to be an undersized facility that is not suitable for NHL or NBA teams, as determined in a 2015 study (AECOM, 2015). The study also found the arena is unlikely to support alternative entertainment and recreation concepts (AECOM, 2015). KeyArena, which was last renovated in 1995, would continue to age, reducing its ability to compete with other venues as a regional recreational facility. The arena would require an investment in deferred major maintenance.

Recreational activities would continue to occur at the Seattle Center Skatepark and the Seattle Center Pavilion.

### **Alternative 1: OVG Proposal**

A renovated arena would provide Seattle Center and the City with an updated sports and entertainment arena that could accommodate NHL and NBA teams. The Seattle Center Arena would provide an upgraded facility for existing recreational events such as concerts and the Seattle Storm. The Seattle University Men's Basketball Team would not return to the Seattle Center Arena following construction but would likely play in the Connolly Center. The Seattle Center Arena could potentially also be the home arena for NHL and NBA teams, bringing new recreational opportunities to the greater Seattle area and the State of Washington.

The Seattle Center Pavilion would be demolished and not replaced. This would cause a loss of 5,300 square feet of pavilion space. However, other exhibition space is available at Seattle Center that could hold events. The Armory Loft meeting rooms accommodate similarly sized events to those currently held at Seattle Center Pavilion. In addition, Fisher Pavilion features 12,500 square feet and the Exhibition Hall features 34,000 square feet. No permanent concessions, businesses, or recreational facilities are located in the Seattle Center Pavilion that would be displaced by demolition of the building. Because recreational uses at the Seattle Center Pavilion can be accommodated elsewhere at Seattle Center, this would not be a significant impact.

The Seattle Center Skatepark would also be demolished in fall 2018. However, part of the MOU for the Seattle Center Arena Renovation Project includes funding to the City to replace the skatepark off-site. The site of the replacement skatepark has not yet been determined, but 3 potential sites have been identified in Uptown and South Lake Union. Depending on the site selected, the skatepark may have a different configuration than at the current location. There would be a time gap between demolition of the existing skatepark and opening of the new skatepark. Although the existing skatepark would be demolished in fall 2018 and a date for opening of the new skatepark has not been determined, the recreational use (skateboarding) would be replaced. Because the replacement skatepark would be within or adjacent to Uptown, the impact would be less-than-significant; however, if the skatepark is not replaced within the vicinity of Uptown, impacts would be significant.

The City is working with the skateboarding community in Seattle to identify a location for the replacement skatepark. The new skatepark would likely be located on an existing site owned by the City

of Seattle, such as a park. The new skatepark would displace whatever use is currently occurring at that location, likely a recreational use if the skatepark is located in a park. However, it would likely be possible to site the skatepark in an open space area of an existing park that would feature other open space areas that could continue to be used by recreationists. The addition of a skatepark would increase the recreational amenities and uses available at the site where it is installed. However, it may be considered an impact by existing users of the site. Seattle Center would consider these benefits and impacts for all potential skatepark sites.

Events at Seattle Center Arena could cause noise that would be noticeable and potentially distracting at other Seattle Center facilities, particularly adjacent facilities like the DuPen Fountain, KEXP, SIFF Film Center, The Vera Project, and A/NT Gallery. NHL and NBA games would most frequently be held in the evening, when outdoor activities at Seattle Center are generally less frequent, reducing the number of recreationists who would be subject to noise from operation of the new Seattle Center Arena. The noise from events at the arena would not be noticeably louder than existing conditions, but events would be more frequent. More detail on noise impacts is included in Section 8.5, *Noise and Vibration*. These impacts would not displace any recreational activities and therefore would be less-than-significant.

The Seattle Center Arena would be consistent with the Seattle 2035 Comprehensive Plan and 2017 Parks and Open Space Plan, and would contribute to meeting the goal (in each plan) of providing a variety of indoor recreation spaces. The project was not planned for in the vision for KeyArena included in the Seattle Center Century 21 Master Plan; however, the project is consistent with and would contribute to meeting the goals of the plan. Removal of the skatepark is not consistent with the goals of the Citywide Skatepark Plan; however, finding a replacement site for the skatepark would be consistent with the Skatepark Plan.

### **Alternative 2: Modified Proposal**

Recreational impacts would be the same as those described for Alternative 1.

## **7.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES**

### **7.5.1 Construction**

Potential measures for construction traffic, parking, noise, and aesthetic impacts are described in Section 4.5.1, *Transportation*, Section 8.6.1, *Noise and Vibration*, and Section 9.6.1, *Visual Resources*. The project would obtain permits and approvals required by the City of Seattle for construction activities, including traffic and noise. Seattle Center and OVG are working on a Development Agreement that will outline how construction activities would minimize impacts to Seattle Center and its tenants during construction.

During construction, the DuPen Fountain would be renovated and reopened when the arena opens. Seattle Center is coordinating the design of the renovations with stakeholders, including the adjacent Seattle Center tenants, the Landmarks Preservation Board, the Office of Arts and Culture, and the family of the artist, Everett DuPen, who created the original bronze sculptures within the fountain. To avoid conflicts caused by the unavailability of KeyArena during construction, Seattle Center is no longer scheduling events during the planned construction period, and is working with already scheduled events

that would need to be moved. The contract between the Seattle Storm and the City includes funding allocated to the Storm to cover relocation costs.

### **7.5.2 Operations**

As described in Section 7.4.2, the City would replace the skatepark. Seattle Center would accommodate Skate Like a Girl's 2019 programming on the Seattle Center campus, using temporary equipment as appropriate. OVG would assume the City's lease with the Seattle Storm or develop a new agreement with the team. To ensure that there would be no long-term impacts to recreational programming, OVG would provide the City with rent-free use of the arena for up to 14 non-consecutive days per calendar year for community events, including the Bumbershoot festival.

Potential measures for operations impacts to traffic and parking are described in Section 4.5.2, *Transportation*, and mitigation measures for operations impacts to noise are described in Section 8.6.2, *Noise and Vibration*.

## **7.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON RECREATION**

Section 8.5.1, *Construction Impacts (Noise and Vibration)*, describes a significant construction noise and/or vibration impact to operations at KEXP, SIFF Film Center, and The Vera Project; this significant noise and/or vibration impact would also impact recreational programming and visitors to these 3 organizations during the construction period. If the replacement skatepark cannot be located within or adjacent to Uptown as currently planned, this recreational use would be lost for the neighborhood, which would be a significant impact. However, this impact could be avoided if a location for a replacement skatepark can be found within the vicinity of Uptown. There would be no other significant and unavoidable adverse impacts on recreation from either action alternative.

Although not expected, it is possible that a building inspector may determine that it is unsafe for Pottery Northwest to remain in the Bressi Garage building during the construction phase. If that were to occur and if the recreational activities could not be accommodated elsewhere, impacts would be significant.

## 8.0 NOISE AND VIBRATION

This chapter describes terminology and concepts used for analyzing noise and vibration, provides a synopsis of the regulations as they pertain to noise exposure in the City of Seattle, and describes the methodology employed for assessing noise and vibration impacts.

Construction-related and operational noise and vibration impacts are assessed and mitigation identified, as appropriate.

**Changes from the Draft EIS** – Based on comments received on the Draft EIS, this chapter was updated in the Final EIS to include the following: (1) sound level monitoring of existing conditions at additional receptors in the project vicinity, (2) inclusion of a technical appendix (Appendix F) where the bulk of noise monitoring data can be found, (3) impact assessment for additional sensitive receptors in the project vicinity, (4) addition of a graphic presenting noise contours associated with construction activities, and (5) additional mitigation measures to further address significant and unavoidable construction-related noise and vibration impacts identified in the Draft EIS. Two summary tables have been added (Table 8-8, *Noise Construction Impact Summary*, and Table 8-9, *Vibration Construction Impact Summary*) to clarify which sensitive receptors would be impacted.

**Sound** is mechanical energy transmitted by pressure waves through a medium such as air. **Noise** is defined as unwanted sound, which is characterized by various parameters such as the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), a logarithmic loudness scale with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain (Figure 8-1). Because sound pressure can vary by over 1 trillion times within the range of human hearing, the logarithmic loudness scale is used to calculate and manage sound intensity numbers conveniently.

### **Key Findings for Noise and Vibration**

During day-time construction for both Alternatives 1 and 2, the project would temporarily and noticeably increase noise, but the increases would be consistent with the restrictions of the SMC for daytime construction activities.

The SMC establishes separate noise standards for daytime and night-time construction activities. Night-time construction noise with Alternative 1 would be above the limits established in the SMC, which would result in significant impacts to some sensitive receptors. A proposed noise barrier and other identified measures would reduce night-time noise impacts for residential uses and the Seattle Children's Theatre to less-than-significant, but impacts to KEXP, The Vera Project, and the SIFF Film Center would be significant and unavoidable. Noise impacts from construction trucks on local roadways would be less-than-significant.

During construction, vibration impact equipment would generate vibration levels below the Federal Transit Administration (FTA) threshold levels at residential receptors, which would result in less-than-significant impacts. Vibration levels could exceed structural damage criteria at Bressi Garage and the Northwest Rooms, which would be a significant impact. Vibration levels would be above FTA thresholds established for the sensitivity of recording studios and concert halls, resulting in a significant impact to KEXP, The Vera Project, and the SIFF Film Center. With implementation of identified mitigation measures, these impacts would be reduced to less-than-significant.

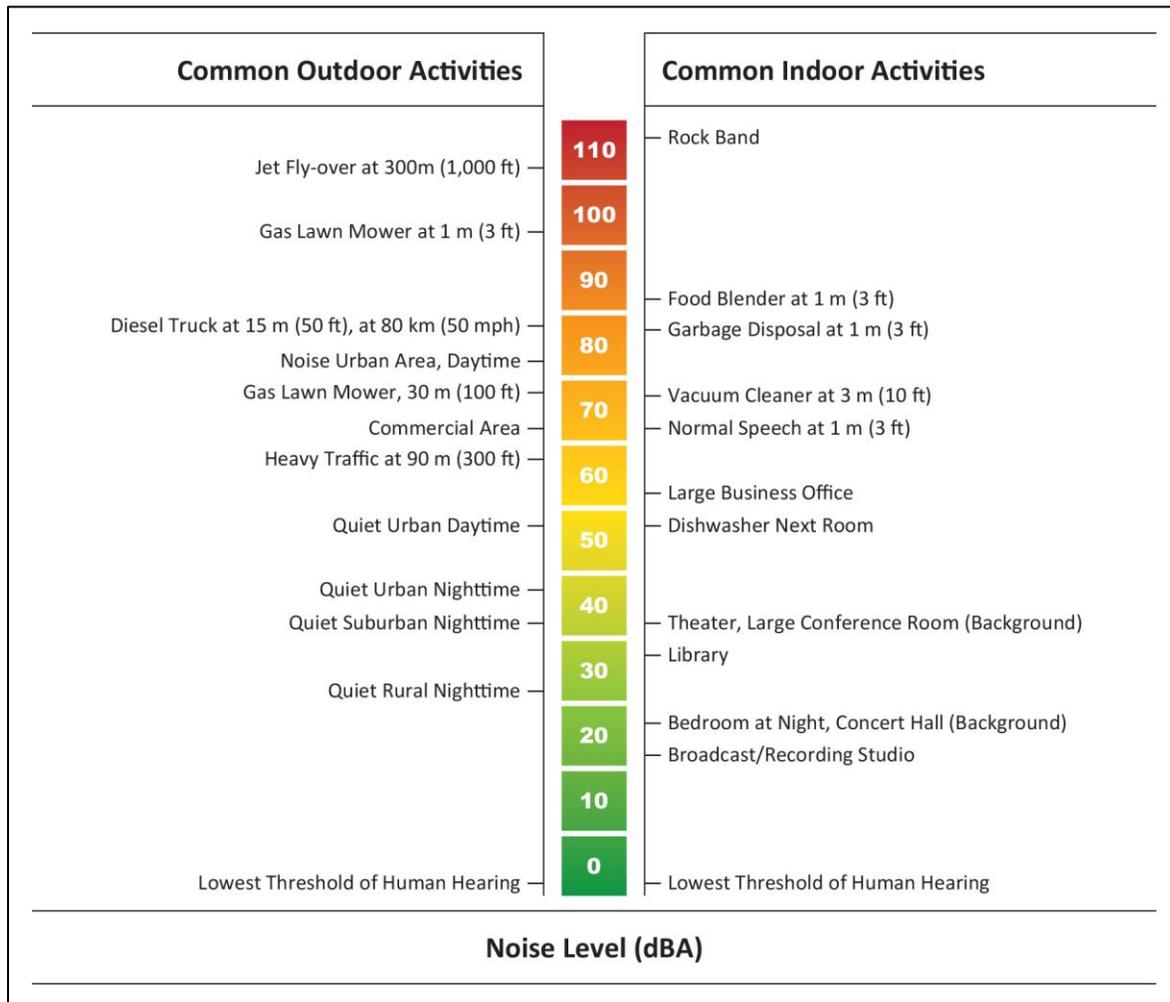
Under Alternative 2, no night-time construction would occur; thus, there would be no significant noise impacts. Vibration impacts would be similar to Alternative 1, but construction would be at least 6 months longer in duration.

For operations, the number of events would more than double, but the noise levels within a single hour would be similar to levels that currently occur and would not constitute an impact. Levels are already above the 75 dBA Lmax limit set by SMC 25.08.410(B). Operation of any amplified equipment at the arena would be required to comply with the Seattle Municipal Code.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Therefore, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz in a manner corresponding to the human ear’s decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of **A-weighted decibels (dBA)**. All quantified decibel estimates in this EIS analysis are in reference to A-weighted decibels.

Given the variation of community noise level from instant to instant, **community noise levels** must be measured over an extended period of time to characterize a community noise environment and evaluate cumulative sound impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are as follows.

**Steady-state sound** is sound for which average characteristics remain constant in time (e.g., the sound of an air conditioner, fan, or pump) and is typically described using the Leq descriptor. **Impulse sound** is sound generated over a relatively short duration (e.g., a car horn or back-up alarm). Impulsive sound is typically characterized using the Lmax.



Source: Caltrans, 2009.

**Figure 8-1. Perceptible Noise Thresholds**

## 8.1 EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed into 3 categories: (1) subjective effects of annoyance, nuisance, and dissatisfaction; (2) interference with activities such as speech, sleep, and learning; and (3) physiological effects such as hearing loss or sudden startling.

Because of the variation in individual noise thresholds, an important way of predicting human reaction to a new or changed noise environment is the way the noise levels compare to the existing environment to which one has adapted, or the “ambient” noise level. In general, the more a new noise exceeds the existing ambient noise level, the less acceptable the new noise will be to the individual. Evaluations conducted by the Federal Highway Administration (FHWA) are widely used to characterize the relationships relative to increases in A-weighted noise levels.

### **Key Terms for Noise Analysis**

**Leq:** The average noise exposure level for a given time period, generally measured in dBA.

**Lmax:** The instantaneous maximum noise level measured during the measurement period of interest, generally measured in dBA.

With regard to increases in A-weighted noise levels, the following relationships occur (FHWA, 2011):

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by the human ear.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

### 8.1.1 Vibration Fundamentals and Descriptors

Vibration is an oscillatory motion through a solid medium in which the motion’s amplitude can be described in terms of displacement, velocity, or acceleration. Groundborne vibration causes buildings to shake and generates audible rumbling sounds (FTA, 2006). Vibration levels can also result in interference or annoyance impacts at residences or other land uses where people sleep, such as hotels and hospitals. Some common sources of groundborne vibration, such as construction activities, involve operating heavy earth-moving equipment. Vibration intensity is generally expressed as peak particle velocity (the maximum speed that the ground moves while it temporarily shakes, referred to as PPV). Since ground-shaking speeds are very small, PPV is measured in inches per second (in/sec). The PPV is defined as the maximum instantaneous peak of the vibration signal and is frequently used to describe physical vibration impacts on buildings. Another useful vibration descriptor is known as vibration decibels, or VdBs. VdBs are generally used when evaluating human response to vibration, as opposed to structural damage (for which PPV is the more commonly used descriptor). Vibration decibels are established relative to a reference quantity, typically  $1 \times 10^{-6}$  in/sec (FTA, 2006).

Types of construction activities associated with groundborne vibration include the use of hoe rams for demolishing large concrete structures, and drilling. Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration.

## 8.1.2 Sensitive Receptors

### Noise

Sensitive receptors for noise (FTA, 2006) nearest the project site are residential uses, church uses, recording studios, concert halls, theaters, and a school. The nearest residences are the Astro, Dalmasso, and Expo Apartment buildings (Figure 8-2). The Astro Apartments is a multi-use structure that includes a daycare (MightyKidz) on the first floor with residents above, and is approximately 30 feet west of the project site and 175 feet west of the arena on 1<sup>st</sup> Ave N. The Dalmasso Apartments are located west of Seattle Center, a similar distance from the project site as the Astro Apartments. The Expo Apartments are located across Republican St, approximately 115 feet north of the project site and 250 feet north of the arena. The nearest church, Sacred Heart of Jesus Catholic Church, which includes a shelter for women and children with 30 beds, is 250 feet south of the arena and approximately 40 feet south of the closest portion of the project site. Concert halls and recording studios include KEXP, which has multiple audio and video recording studios, a radio broadcast facility, and event space and is immediately northwest of the existing arena (in the U-shaped Northwest Rooms); and The Vera Project, which provides artistic performance space, operates a recording studio, and provides instruction in silk screening and audio engineering. The Northwest Rooms range from approximately 50 feet to immediately adjacent to the project site and approximately 30 to 115 feet from the arena (the Northwest Rooms house KEXP, The Vera Project, and the SIFF Film Center). The SIFF Film Center, Seattle Children's Theatre, Seattle Repertory Theatre, and Cornish Playhouse are all multi-purpose performance spaces and are considered sensitive receptors. The nearest school facility, the Downtown (Lakeside) School at 204 Warren Ave N, is about 200 feet east of the 1<sup>st</sup> Ave N Garage and 300 feet south of Seattle Center, and is scheduled to open in fall 2018.

### Vibration

The designation of vibration-sensitive land uses depends not only on the type of activities commonly associated with a given land use, but also considers nearby structures that could be damaged by vibration-inducing activities. High-sensitivity uses include land uses where vibrations would interfere with interior operations and include hospitals, research operations, television and recording studios, and concert halls. The KEXP recording studios are a high-sensitivity use with respect to vibration. Residential uses or other uses where people normally sleep are also vibration-sensitive, particularly during night-time hours. The nearest such uses are the Astro Apartments (and daycare), the Dalmasso Apartments, the Expo Apartments, and the shelter at Sacred Heart Church. However, some special buildings (such as concert halls, TV and recording studios, and theaters) can be very sensitive to vibration and noise but do not fit into typical assessment categories. Because of the sensitivity of these buildings, they usually warrant special attention during an environmental assessment. Art galleries are not considered sensitive receptors, but the A/NT Gallery is described because of its proximity. The silk screen operations of The Vera Project, while not identified as a vibration-sensitive use in vibration assessment guidance, for this project is evaluated as sensitive the same as The Vera Project's recording operations.

Several structures that may be structurally sensitive to vibration-inducing construction activities are adjacent to proposed excavation and shoring activities. These buildings include Bressi Garage (unreinforced masonry building) and the Northwest Rooms.

## 8.2 METHODS

To assess potential construction and operations noise impacts, the EIS Consultant Team measured noise levels to characterize the existing environmental noise conditions of the existing arena, and estimate changes to the noise environment from the project's increased frequency and size of events. It is anticipated that the future operational noise levels will be similar to existing levels as the project is the modification of an existing arena, and would not introduce a new noise source. Environmental noise conditions were assessed by reviewing policies in the Seattle 2035 Comprehensive Plan (2016) and SMC 25.08 Noise Control regulations for construction and operation noise level limits.

For identifying the thresholds of impact for operational noise from events, exterior standards established in SMC 25.08.410(A) are applied. A 5-dBA increase over ambient is applied as an impact threshold for noise increases from construction haul trucks on public roadways (FHWA, 2011). Construction-related noise from equipment on construction sites is assessed using standards in SMC 25.08.425 as well as standards historically implemented through the City's Noise Variance process.

The City of Seattle does not regulate vibration levels. As such, assessment of vibration impacts is commonly based on guidelines within the Federal Transit Administration's 2006 Transit Noise and Vibration Impact Assessment Manual (FTA, 2006). A general assessment of potential vibration impacts on sensitive land use categories was conducted, based on the FTA Vibration Impact Criteria. Vibration levels would depend on the construction equipment used, the distance to the sensitive categories, and whether the vibration event is transient or continuous.

### 8.2.1 Noise Monitoring

The existing noise environment was characterized based on short- and long-term noise monitoring conducted in the study area. Noise monitoring was conducted on non-event days and multiple event days in 2017 and 2018. The monitoring results establish a baseline. Short-term monitoring was conducted at multiple locations during multiple concert events at KeyArena and during non-event days. Monitoring locations are shown in Figure 8-2. Please refer to Appendix F, *Noise Monitoring*, for detailed information on sound level measurements conducted at multiple sensitive receptor locations surrounding the project site.

## 8.3 REGULATORY CONTEXT

Noise impacts are listed as elements that may be examined through the SEPA process, as designated by SMC 25.05.675(B) and (L). Impacts from vibration are also included in this analysis because of its connection with noise-generating construction equipment. Disruption caused by noise and vibration were identified as areas of concern in the scoping comments; both elements are therefore covered in both the Draft EIS and this Final EIS.

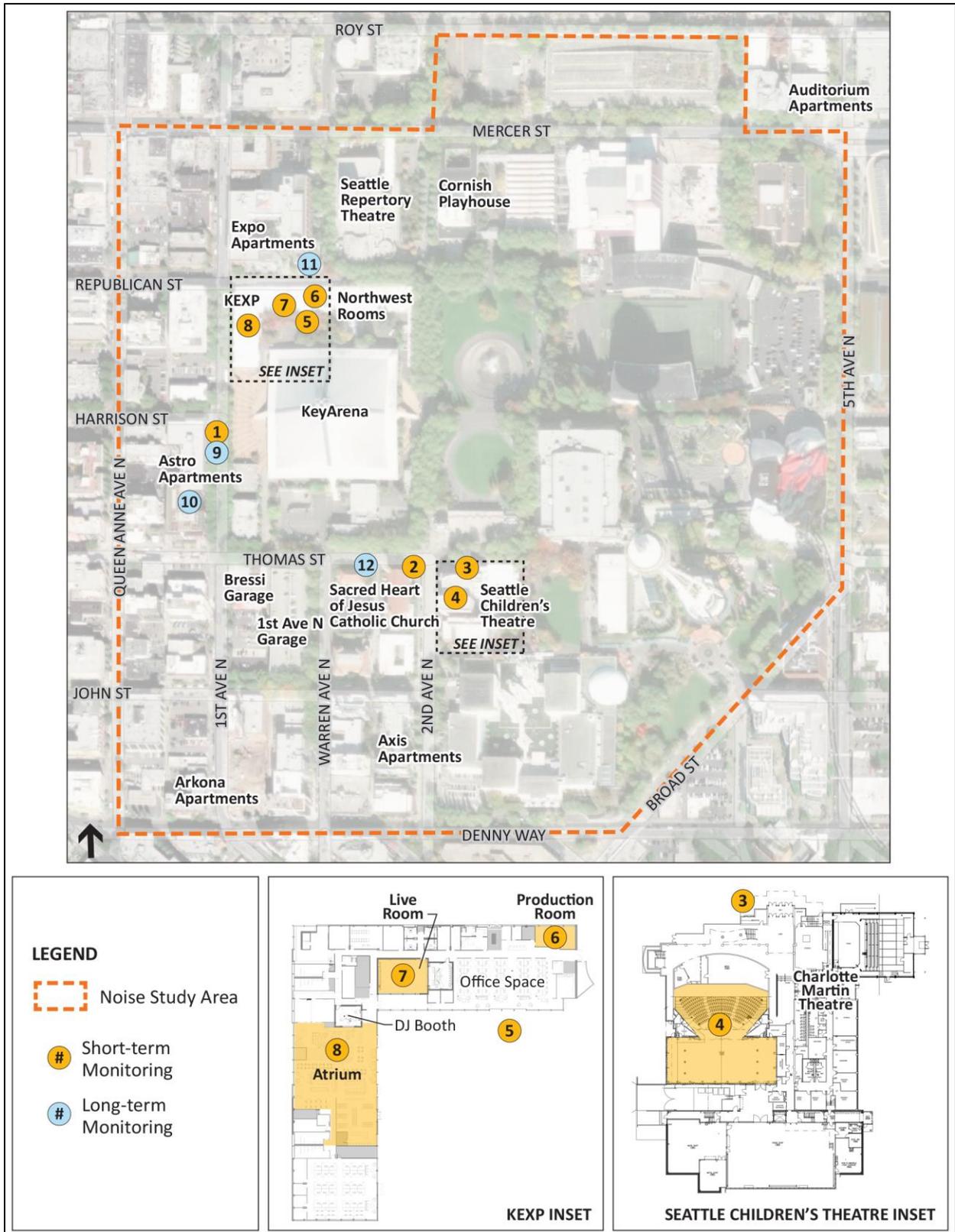


Figure 8-2. Noise Monitoring Locations

## 8.3.1 Noise

### **Washington State Noise Control Act of 1974**

Recognizing the harm that excessive noise can have on public health, safety, and well-being, the State of Washington established rules to abate and control noise pollution (RCW 70.107). The regulations on Maximum Environmental Noise Levels (WAC 173.60) apply to a variety of activities and facilities including general construction activities, park-and-ride lots, and maintenance facilities; exemptions include electrical substations, mobile noise sources, vehicles traveling in public right-of-way, as well as safety warning devices such as bells. The exterior noise standards established in WAC 173.60 align with those established by the City in SMC 25.08.410.

### **Seattle Municipal Code 25.08 - Noise Control**

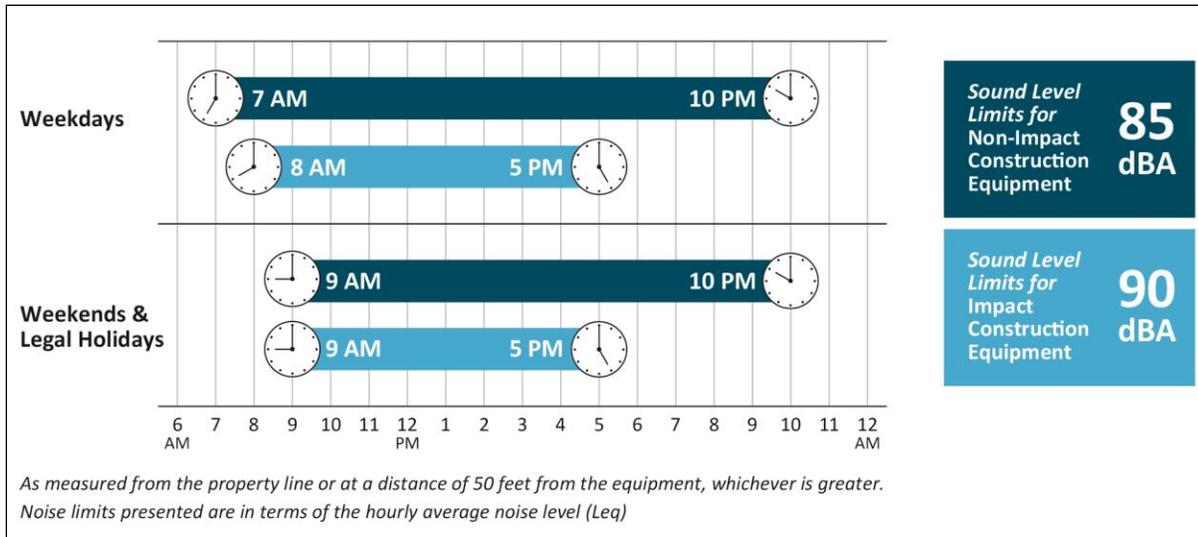
#### ***Construction Noise Standards***

SMC 25.08 establishes exterior sound level limits for specified land use zones or “districts,” which vary depending on the district generating the sound and the district affected by the sound. The project site and surrounding study area are zoned Seattle Mixed-Uptown (SM-UP) (see Section 3.3.5 in Chapter 3, *Land Use*). SMC 25.08.100 classifies SM zones as commercial districts. The exterior sound level limit applicable to the project site would need to meet the 60 dBA Leq standard for a commercial district generating the sound and a commercial district receiving (or affected by) the sound during construction.

Certain types of construction equipment operating in commercial districts are allowed to exceed exterior sound level limits between 7 AM and 10 PM on weekdays and between 9 AM and 10 PM on weekends and legal holidays (SMC 25.08.425). The types of equipment that would usually exceed the exterior sound level limit of 60 dBA are loaders, excavators, and cranes. The code allows for an exceedance of the 60 dBA standard in commercial zones when measured at a reference distance of 50 feet by up to 25 dBA (an 85 dBA standard) between 7 AM and 10 PM on weekdays and between 9 AM and 10 PM on weekends and legal holidays (Figure 8-3). Use of impact equipment, such as a concrete breaker, is restricted to 8 AM to 5 PM on weekdays and 9 AM to 5 PM on weekends and legal holidays, and limited to a continuous noise level of 90 dBA and a non-continuous maximum noise level of 99 dBA Lmax when measured at a reference distance of 50 feet (Figure 8-3).

#### ***Operation Noise Standards***

The operational exterior noise level applicable to the project site is 60 dBA Leq pursuant to SMC 25.08.410, which also allows maximum noise levels of up to 15 dBA beyond this standard (up to 75 dBA Lmax), provided the average hourly noise level attains the 60 dBA standard, meaning that particular activities could be louder than the 60 dBA limit for short durations within a given hour.



Source: Prepared by Environmental Science Associates.

**Figure 8-3. Construction Noise Time Limits for Projects in Low-rise, Mid-rise, and High-rise, Residential-Commercial and Neighborhood Commercial Zones under the City of Seattle’s Noise Ordinance**

### 8.3.2 Vibration

#### Construction Vibration Standards

##### *Human Annoyance and Sensitive Equipment*

There are no adopted state or local policies or standards for groundborne vibration with regard to human annoyance; however, the FTA has established standards for acceptable levels of vibration associated with impact equipment as experienced by sensitive receptors. Those criteria are established in terms of vibration velocity decibel level (VdB) by land use category (Table 8-1).

Category 1 buildings typically include land uses such as research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. The vibration limits for Category 1 are based on acceptable vibration for moderately vibration-sensitive equipment such as microscopes with vibration isolation systems (FTA, 2006).

Buildings such as concert halls, TV studios, and recording studios are considered special buildings that can be sensitive to noise and vibration and are evaluated using the same vibration impact levels as for Category 1 land uses (FTA, 2006). Theaters and auditoriums are also considered special buildings but have a higher vibration impact level.

##### *Building or Structure Damage*

There are no adopted state or local policies or standards for groundborne vibration with regard to structures. However, the FTA establishes acceptable levels of vibration associated with equipment potentially causing groundborne vibration on structures. The criteria are established by Peak Particle Velocity (PPV) in in/sec (Table 8-2).

**Table 8-1. Vibration Impact Level Limits for Land Uses**

Land Use Category	Vibration Impact Level for Frequent Events (VdB) <sup>1</sup>	Vibration Impact Level for Infrequent Events (VdB) <sup>1</sup>
<b>General Assessment Land Use Categories</b>		
<b>Category 1:</b> Buildings where low ambient vibration is essential for interior operations	65	65
<b>Category 2:</b> Residences and buildings where people normally sleep	72	80
<b>Category 3:</b> Institutional land uses with primarily daytime use	75	83
<b>Special Buildings</b>		
<b>Concert halls, TV studios, recording studios</b>	65	65
<b>Auditoriums, theaters</b>	72	80

<sup>1</sup> FTA defines “Frequent events” as 70 or more per day. “Infrequent events” are fewer than 70 per day. “Events” are defined as a vibration occurrence. VdB=vibration velocity level in decibels.

Source: FTA, 2006.

**Table 8-2. Guideline Vibration Damage Potential Threshold Criteria for Structures**

Structure Type and Condition	Maximum Peak Particle Velocity (PPV), inches per second (in/sec)
Fragile buildings	0.12
Non-engineered timber and masonry buildings	0.2
Engineered concrete and masonry buildings	0.3
Reinforced concrete steel or timber buildings	0.5

Source: FTA, 2006.

### **Operational Vibration Standards**

The City has not established regulations with respect to vibration levels. Consequently, this EIS analysis applies the same standards for operational vibration impacts as for construction. In general, operational vibration impacts result from sources such as transit and railroad operations, and mining and blasting activities, and would not be associated with events from the arena.

## 8.4 AFFECTED ENVIRONMENT

### 8.4.1 Study Area

The study area for the noise and vibration analysis is shown in Figure 8-2 and is comprised of mixed-use zones that include recreational, commercial, residential, and parking uses, all of which generate and receive noise, and which also receive groundborne vibration. Sensitive receptors for noise and vibration are described in Section 8.1.2.

### 8.4.2 Existing Noise Environment

KeyArena is in a downtown urban area characterized by activities typical of commercial businesses and dense residential areas. The predominant noise source in the area is vehicular and bus traffic on roads adjacent to the project site. During events at KeyArena, pedestrian activity on the surrounding sidewalks increases just prior to an event start and shortly after its completion. Other typical urban noise sources include emergency vehicles, delivery trucks, and individuals visiting nearby businesses.

Existing ambient night-time noise levels were monitored over a week at the nearest residential uses in May, June, and July 2018. Measurements were conducted at the rooftop of the Expo Apartments, both ground level and rooftop of the Astro Apartments, and at the ground level of the Sacred Heart Shelter. As shown in Table F-7 in Appendix F, average exterior ambient noise levels at the Expo Apartments, the Astro Apartments, and the Sacred Heart Shelter during the 10 PM to 11 PM and 5 AM to 7 AM periods averaged 58 dBA, 60 dBA, and 60 dBA, respectively. The ground level noise level at the Astro Apartments building during this time period averaged 68 dBA. At these same measurement locations, average ambient noise levels during the 12 AM to 5 AM period averaged 54 dBA, 56 dBA, and 54 dBA at the Expo Apartments, Astro Apartments, and Sacred Heart Shelter, respectively.

The noise monitoring methods are described in detail in Appendix F, *Noise Monitoring*, including the results of the short-term ambient noise measured in the study area during multiple arena events. The first concert event monitored was the A Perfect Circle concert on Friday, December 1, 2017. The concert doors opened at 6:30 PM, the opening act began at 7:30 PM, A Perfect Circle began at 8:30 PM, and the event ended at approximately 10:15 PM. The second concert event monitored was the Lorde concert on Friday March 9, 2018. The concert doors opened at 6:00 PM, the opening act began at 7:00 PM, and the event ended at approximately 10:25 PM. The third concert event was the Paul Simon show on Friday, May 18, 2018. The doors opened at approximately 7:00 PM, and the event ended at approximately 10:30 PM.

As shown in Table F-4 in Appendix F, the occurrence of an event at KeyArena did not meaningfully affect the noise levels averaged over the entirety of daytime or night-time periods. The results also indicate that the noise levels were consistent throughout the day and night due to exposure to the same predominant noise source – traffic on a wet surface.

Table 8-3 shows the differences in Leq and Lmax at the street-level of the Astro Apartments between the peak activity hours of 5:00 PM and 11:00 PM for each of the events monitored. Lmax values can vary widely in urban environments and can result from sporadic individual events such as car doors slamming shut, motorcycle pass by-events, and emergency vehicle sirens. The data in Table 8-3 compare noise levels with and without an event. These data indicate that concert events have little to no effect on local noise levels at areas surrounding the arena, with some no-event days experiencing higher noise levels than on days when events occur, likely the result of traffic or other urban sources dominating the noise environment.

**Table 8-3. Comparison of Leq and Lmax outside of the Astro Apartments at Street Level between 5:00 PM and 11:00 PM on Non-Event days and Event Days**

Time	dBA, Leq		dBA, Lmax	
	Thursday Nov. 30, 2017 (non-event)	Friday Dec. 1, 2017 (event)	Thursday Nov. 30, 2017 (non-event)	Friday Dec. 1, 2017 (event)
5:00 PM	70	69	90	87
6:00 PM	70	69	89	84
7:00 PM	68	69	86	88
8:00 PM	68	68	90	81
9:00 PM	68	71	83	100
10:00 PM	73	68	103	82
11:00 PM	67	69	85	88
	Thursday March 8, 2018 (non-event)	Friday March 9, 2018 (event)	Thursday March 8, 2018 (non-event)	Friday March 9, 2018 (event)
5:00 PM	72	70	85	83
6:00 PM	72	70	91	86
7:00 PM	71	69	90	88
8:00 PM	69	69	83	83
9:00 PM	69	67	86	84
10:00 PM	68	68	87	84
11:00 PM	66	67	82	82
	Thursday May 17, 2018 (non-event)	Friday May 18, 2018 (event)	Thursday May 17, 2018 (non-event)	Friday May 18, 2018 (event)
5:00 PM	71	70	91	87
6:00 PM	69	68	85	85
7:00 PM	67	68	81	85
8:00 PM	73	68	101	82
9:00 PM	67	66	83	83
10:00 PM	68	70	89	97
11:00 PM	67	68	86	86

Source: Field monitoring conducted by Environmental Science Associates, 2017, 2018.

The results of both the short-term and long-term noise measurements generally reflect existing noise conditions, which are noisy and influenced by typical activities surrounding mixed-use residential and commercial land uses in a downtown urban area.

Noise measurement data sheets for noise monitoring are included in Appendix F.

## 8.5 POTENTIAL IMPACTS

The project would increase the frequency and capacity of sporting and entertainment events, potentially increasing ambient noise levels to nearby sensitive land uses. This analysis evaluates the potential increase in noise and vibration from both construction and operation of the project and the project's compliance with applicable regulations.

### 8.5.1 Construction Impacts

Potential short-term noise and vibration impacts from construction are characterized as less-than-significant or significant. Potentially significant impacts are defined below; impacts that do not reach that threshold would be less-than-significant.

**Criteria for Significant Noise Impacts During Construction:** Noise generated from standard construction equipment (including off-highway trucks) that would expose people to, or generate, noise levels that would result in sustained and substantial annoyance and disruption of activities for receptors, exceeding the limits for commercial districts, as defined in SMC 25.08.425(A) and SMC 25.08.425(B) would be significant. For daytime construction activities, the threshold for a significant impact from activity within a commercially zoned district on receptors within a commercially zoned district is 85 dBA for all equipment excluding impact equipment.

For night-time construction noise impacts, the City generally considers that noise levels should not exceed 6 dBA over the operational (non-construction) permissible noise limit of 60 dBA when considering a noise variance for an activity within a commercially zoned district on receptors within a commercially zoned district. However, monitoring at both the Astro Apartments and the Expo Apartments indicates that this noise level is already exceeded at these receptors even during the quietest night-time hours.

Impact equipment that would only operate during daytime hours, such as jackhammers and hoe rams, would expose people to, or generate, noise levels that could result in sustained and substantial annoyance and disruption of activities for receptors, and would exceed the limits defined in SMC 25.08.425(C), 90 dBA per hourly Leq. As described in Section 2.6, *Construction*, pile driving is not a proposed method of construction, and proposed soldier piles would be installed using a drilling method.

Construction truck trips along roadways are considered separately from off-road equipment because they are not regulated by the City's noise ordinance. Therefore, to assess noise increases along roadways used as the proposed haul routes, this analysis applies a noise increase of 5 dBA that the FHWA recognizes as the increase required before any noticeable change in human response would be expected.

**Criteria for Significant Vibration Impacts During Construction:** Construction activities would generate vibration levels substantial enough to potentially damage nearby structures or buildings, or result in sustained vibration levels established by FTA as an annoyance to sensitive residential land uses and other uses where people normally sleep during night-time hours or during all hours at land uses with vibration-sensitive operations such as recording studios.

#### **No Action Alternative**

Under the No Action Alternative, noise and vibration levels associated with KeyArena would remain as they are; no construction would occur and no construction noise or vibration would occur.

## **Alternative 1: OVG Proposal**

The impacts of construction on noise and vibration would vary by construction phase, as each phase of construction would involve different levels of intensity and equipment types. Periods would occur when construction of multiple phases could overlap. Construction phasing for the noise analysis differs from the phasing presented in Chapter 2. Chapter 2 presents phasing based on broader construction logistics. The construction phasing for the noise analysis is based on when overlap of noise-generating activities would occur.

- Phase 1 (October 2018 to March 2019): Demolition, shoring, and excavation of existing arena.
- Phase 2 (November 2018 to June 2019): Loading dock tunnel excavation and construction.
- Phase 3 (February 2019 to June 2020): Structure construction.
- *Phase 1–3 overlap: January 2019 to March 2019.*
- Phase 4 (September 2019 to September 2020): Interior buildout.
- *Phase 3–4 overlap (September 2019 to June 2020).*

### **Noise**

#### **Mobile Sources**

Mobile sources involved with construction activities primarily include trucks using public roadways to haul demolition materials and excavated soils off-site. Phase 1 is the most intense phase of construction with respect to excavation, demolition, and truck hauling activities and would occur over a period of approximately 6 months. Mobile source noise impacts on local roadways during other phases would be less than during Phase 1; thus, Phase 1 is the worst-case and the focus of the evaluation for mobile source noise impacts. Demolition and construction activities that require the use of heavy trucks to off-haul demolition waste and excavation materials would increase hourly noise levels on nearby streets. During construction, the delivery/haul trucks, as well as employee vehicles, would travel to and from the project site daily, although hauling during the AM/PM peak traffic hours is not planned and construction shifts would be staggered to avoid shift changes during AM/PM peak hours. For more information on haul routes and impacts related to AM/PM peak hour traffic, see Section 2.6, *Construction*, and Chapter 4, *Transportation*.

Demolition and excavation would occur during approximately the first 6 months of construction (Phase 1), and would generate approximately 290 truck trips per 24-hour work day, 7 days a week. For Phase 1, truck hauling could occur 7 days a week, 18 hours a day, for approximately 6 months but would avoid AM/PM peak periods. Figure 2-12 shows the proposed haul routes for construction trucks, which include 1<sup>st</sup> Ave N, 2<sup>nd</sup> Ave N, Thomas St, Mercer St, Denny Way, and vacated Harrison St. The primary haul routes during the day would be north on 1<sup>st</sup> Ave N to Mercer St or south to Thomas St, then north on 1<sup>st</sup> Ave to Mercer St. At night (proposed between 11:30 PM and 6:30 AM), the primary route would be east on vacated Harrison St through the Seattle Center campus to 5<sup>th</sup> Ave N to Mercer St or to SR 99. Routes on the Seattle Center campus would not be available during specific campus-wide events (see Table 2-2 for list of events). From 10:00 PM to 11:30 PM, the primary haul route would be south on vacated 2<sup>nd</sup> Ave N, west on Thomas St, then north on 1<sup>st</sup> Ave N and east on Mercer St. These primary haul routes would locate truck traffic past multiple apartment/condominium buildings on 1<sup>st</sup> Ave N, Mercer St, and Denny Way (e.g., Arkona, Astro, Dalmasso, Expo Apartments, Century, Taylor Verve, the Matae), as well as Seattle Center campus performance spaces (Seattle Children's Theatre). See Section 2.6, *Construction*, for more information. Truck loading activities are considered separately below as a stationary source of

construction noise. Timing of night-time hauling is subject to review by the City (including Seattle Center), and may be changed to reduce impacts.

The proposed off-haul route would increase truck pass-by events per hour, especially over the first 6-month period. Because trucks would use separate routes to and from the freeway and each trip reflects either a trip to the project site or a trip away from the project site, the increase in pass-by events for any given receptor along the route in a given hour is conservatively estimated as 12. Using the FHWA (2004) Traffic Noise Model, noise contributions of these truck trips are estimated to be an hourly Leq of 58.1 dBA at a receptor 33 feet from the center of the roadway (1<sup>st</sup> Ave N). Under existing daytime conditions, ground-level noise levels at the Astro Apartments on 1<sup>st</sup> Ave N average 69 to 74 dBA, Leq; the addition of truck traffic would not result in a noticeable increase of ambient noise levels. During night-time periods when the ground-level hourly Leq was monitored to be as low as 62 dBA during the quietest hours, the contribution of truck traffic would result in an increase of 2 dBA. Such an increase would be less than the 5 dBA increase that is considered a readily perceptible change (FHWA, 2011), and the impact of adding 12 truck trips per hour would be less-than-significant during the quieter night-time periods. Most night-time hauling would be east across the Seattle Center campus to avoid sensitive residential receptors.

#### **Stationary Sources**

Stationary construction-related activities, which are non-transportation related activities likely using the construction equipment listed in Table 8-4, would temporarily increase ambient noise levels in the study area; see Appendix F for additional ambient monitoring data. Construction noise levels surrounding the project site would fluctuate depending on the particular type, number, location, and duration of use of various pieces of construction equipment. Construction noise levels would depend on the type of construction activity on a given day and the equipment used, the distance between construction activities and the nearest receptors, intervening structures (e.g., noise barrier), and the existing noise levels around the site.

For stationary noise sources, Phase 1 and the overlap of Phase 3 and Phase 4 of project construction would be the most intense periods of construction, and analysis of noise levels impacts is provided for both of these peak periods. Construction of Alternative 1 is proposed to occur from October 2018 to October 2020, or approximately 24 months. Construction would occur 24 hours per day and 7 days a week, except for Phase 2 work.

Phase 1, the initial demolition and excavation phase, would be a high noise-intensive scenario during daytime, with occasional use of impact equipment lasting approximately the first 6 months. After the first 6 months, impact equipment would still be used but would be infrequent. As described in Section 2.6, *Construction*, pile driving is not a proposed method of construction, and proposed soldier piles would be installed using a drilling method. Because of the dynamic nature of construction, the sequencing, extent, and timing of construction activities would vary to some degree. Table 8-4 shows the type of equipment that would likely be used for construction of the project.

**Table 8-4. Typical Noise Levels from Construction Equipment**

Construction Equipment	Night-time Use?	Noise Level (dBA, Leq at 50 feet)
Hoe ram (concrete breaker) (impact equipment)	No	90 <sup>a</sup>
Concrete saw	No	83 <sup>a</sup>
Jack hammer (impact equipment)	No	89 <sup>a</sup>
Auger drill	Yes	73 <sup>b,c</sup>
Excavator	Yes	81
Generator	Yes	81
Roller	No	73
Concrete mixer	Yes	81
Conveyer	Yes	62
Dump truck	Yes	69
Crane, mobile	Yes	81
Paver	No	77
Backhoe/loader	Yes	74
Air compressor	Yes	78
Impact wrench	Yes	85 <sup>c</sup>

<sup>a</sup> Impact equipment metric in terms of Lmax, consistent with SMC noise limits. Both equipment types have a usage factor of 20%

<sup>b</sup> Noise level from auger drill is reported for engine noise only. Auguring can also generate noise from shaking the bit to remove sticky soils.

<sup>c</sup> Leq noise level based on monitoring by Ramboll (2018).

Source: Ramboll, 2018; FHWA, 2006.

**Daytime:** As shown in Table 8-4, all of the equipment identified as likely to be used for Alternative 1 would operate at less than 85 dBA Leq at a distance of 50 feet, except for the hoe ram, concrete saw, and jack hammer. The SMC 25.08.425(C) specifically addresses impact equipment, including hoe rams and jackhammers, by establishing separate time restrictions and noise standards for such equipment. As indicated in Table 8-4, impact equipment operates at a maximum noise level of up to 90 dBA Lmax at 50 feet, which would be below the maximum noise level restriction of 99 dBA Lmax and would not exceed the daytime continuous noise level restriction of 90 dBA Leq (averaged over the daytime construction period). Impact equipment, including hoe rams, may be required for construction, but their operation would be below the maximum noise level restriction of 99 dBA Lmax, as they have a standard usage factor of 20% (FHWA, 2008). Therefore, construction activities at the project site under Alternative 1 would comply with the restrictions of the SMC 25.08.425 during daytime hours.

On the north, south, and west sides, the temporary construction fence is proposed to be a 12-foot noise-deflecting barrier that would reduce noise levels to sensitive receptors.

**Night-time:** Under Alternative 1, construction on the interior of the building as well as excavation, truck loading and staging, and truck hauling would occur during night-time hours. Night-time construction activities would require the use of construction equipment within 175 feet of the Astro and Dalmasso Apartments, 200 feet of the Expo Apartments, and 135 feet of the shelter at Sacred Heart Church.

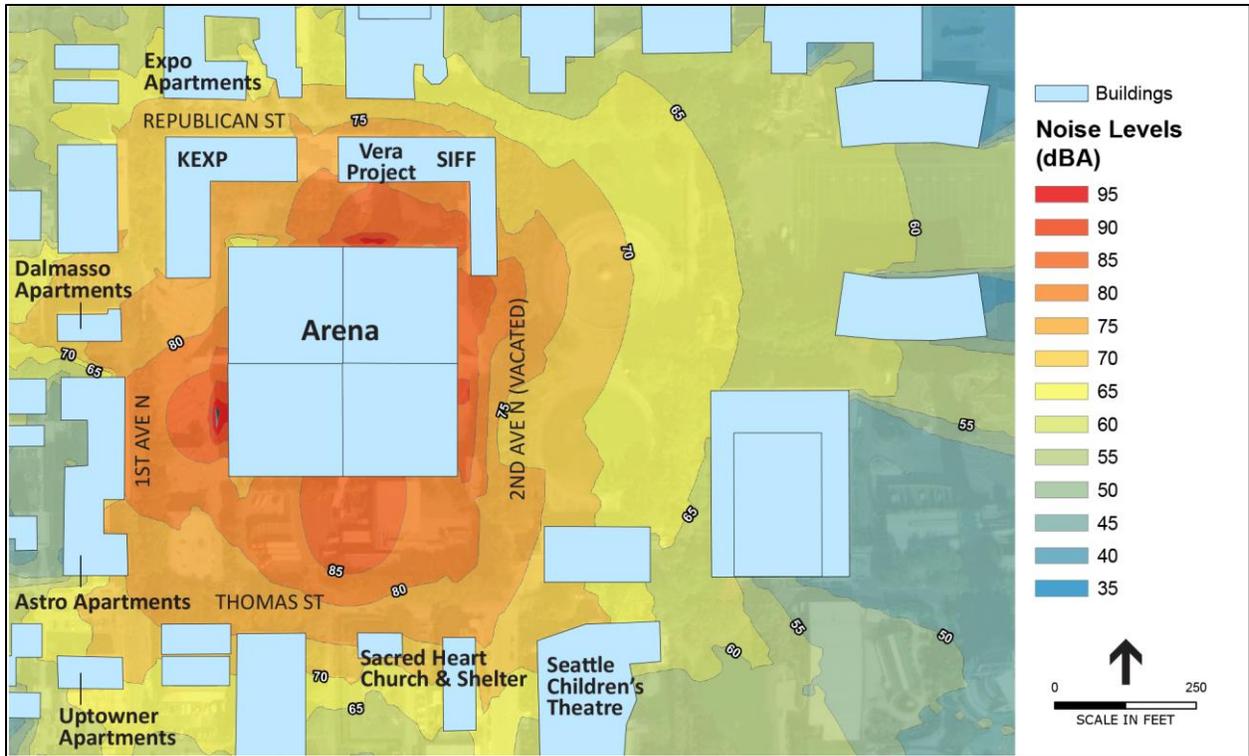
Three-dimensional noise modeling was conducted for the project construction as a part of the Noise Management and Mitigation Plan (NMMP) (Ramboll, 2018). This modeling considers the simultaneous operation of multiple pieces of equipment as well as on-site truck movements at loading areas and along vacated Harrison St heading east. Figure 8-4 presents estimated unmitigated night-time noise level contours from peak night-time construction activity, which occurs during the overlap of Phase 3 and Phase 4 of construction. Contours shown in Figure 8-4 do not reflect the presence of the proposed noise barrier, while Figure 8-5 presents the mitigated noise contours that include the presence of the noise barrier and other mitigation measures described in Section 8.6. Noise contours presented in Figures 8-4 and 8-5 represent noise levels at 60 feet in elevation, reflecting the worst-case noise levels at the top story for the Astro Apartments and Expo Apartments buildings where the noise reduction potential of the proposed noise barrier would be least effective. For receptors at lower elevations, such as the tenants of the Northwest Rooms, Sacred Heart Shelter, and Seattle Children's Theatre, noise levels would be less than indicated in these figures. The Seattle Children's Theatre has events that may conclude between 10 PM and 11 PM and is considered a potential night-time receptor during these hours.

Construction activities requiring grading and earth movement would necessitate material and soil to be excavated and loaded onto haul trucks. To achieve the proposed excavation rate, haul trucks would need to be staged and ready to accept materials outside of the enclosed arena where excavation would occur. Trucks would be loaded to the west of the arena adjacent to 1<sup>st</sup> Ave N and to the east of the arena on or adjacent to vacated 2<sup>nd</sup> Ave N (see Figure 2-11, in Chapter 2, *Description of Alternatives*).

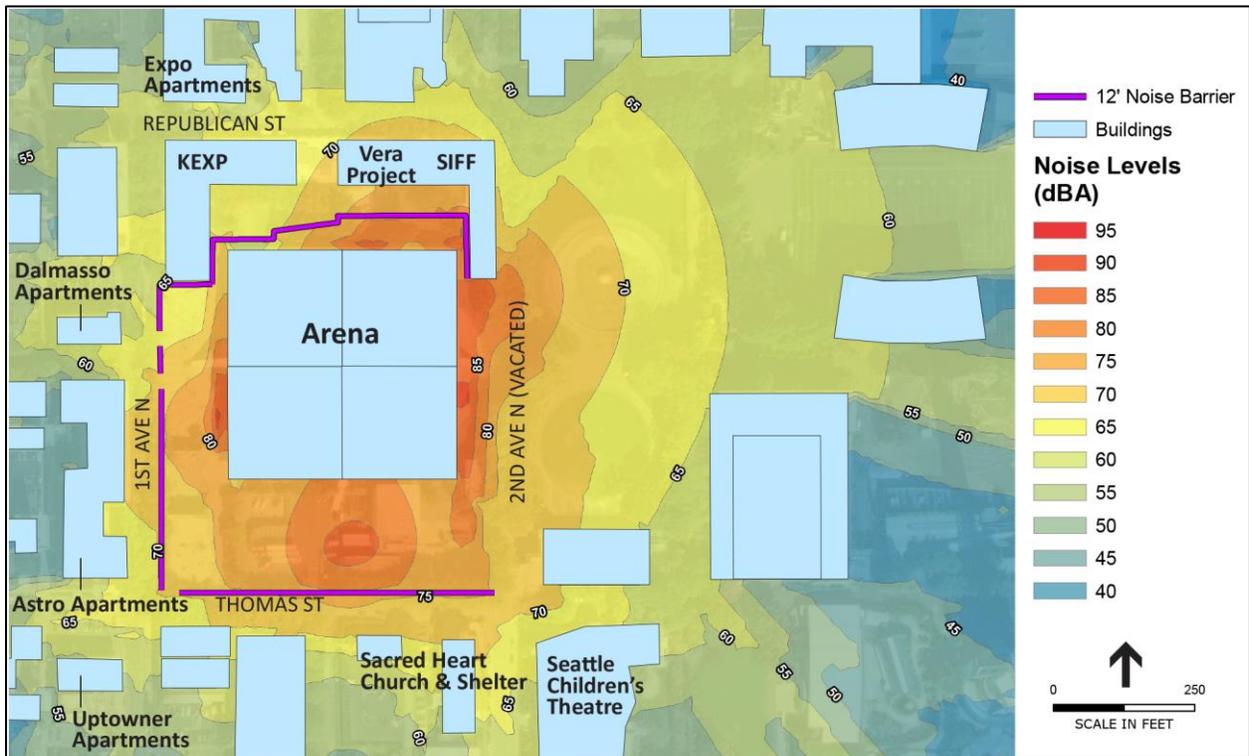
Truck staging would occur on 1<sup>st</sup> Ave N and on Thomas St between Warren Ave N and 2<sup>nd</sup> Ave N; at-night staging may also occur on 2<sup>nd</sup> Ave N north of John St to mid-block on 2<sup>nd</sup> Ave N. Truck loading is not proposed to occur on the west side of the arena adjacent to 1<sup>st</sup> Ave N after 10 PM. These locations are within 100 feet of the Astro and Dalmasso Apartments. Timing of night-time work is subject to review by the City (including Seattle Center), and may be changed to reduce impacts.

Excavation of the new underground parking garage and the loading dock immediately south of the arena would be open-pit (non-enclosed). Staging at the 1<sup>st</sup> Ave N Garage could also be a source of noise. The project would generate approximately 290 daily truck trips over a 6-month period for excavation and demolition, 80–100 daily trips for the next year, and 20–30 daily trips for the last 6 months. These construction activities under Alternative 1 would not comply with the restrictions of the SMC 25.08.425 during night-time hours and could disturb occupants of residential land uses, which would be a significant impact.

Night-time construction work would require a variance from the restrictions of the noise ordinance for non-conforming activities affecting residential uses. The potential to exceed the noise limits in SMC 25.08.425 during night-time construction activities, including truck loading, would be a non-conforming activity, and therefore would be a significant impact to the closest residential uses. Noise reduction measures identified by the variance process are described in the mitigation measures in Section 8.6, which is a process that applies only to residential uses although they would also benefit surrounding non-residential uses as well. Substantial night-time noise increases could also impact non-residential uses such as KEXP, SIFF Film Center, and The Vera Project when their programming occurs at night.



**Figure 8-4. Unmitigated Construction Noise Contours for Overlap of Phase 3 and Phase 4 of Project Construction at an Elevation of 60 feet, Between 10 PM – 11 PM, 5 AM – 7 AM**



**Figure 8-5. Mitigated Construction Noise Contours for Overlap of Phase 3 and Phase 4 of Project Construction at an Elevation of 60 feet, Between 10 PM – 11 PM, 5 AM – 7 AM**

Source: Ramboll, 2018.

As shown in Figure 8-4, unmitigated night-time noise levels of up to 80 dBA are predicted to occur at the top (6<sup>th</sup>) floor of the Astro Apartments while noise levels of between 65 and 70 dBA Leq are estimated to occur at the top (6<sup>th</sup>) floor of the Expo Apartments. Noise levels of between 71 and 76 dBA Leq are estimated to occur at the Dalmasso Apartments, while levels up to 69 dBA are predicted for the Sacred Heart Shelter. These values are predicted for between the hours of 10 PM and 11 PM and 5 AM to 7AM. Noise levels between 11 PM and 5 AM would be reduced due to fewer activities during these hours.

These resultant night-time noise levels would have the potential to result in sleep interference at the nearest receptors, and would be significant. The Expo Apartments are approximately 300 feet north of the west loading area (and 400 feet from the east loading area), and noise from loading could be noticeable if windows were open. Commenters have noted that the Expo Apartments do not have air conditioning, resulting in windows being open during warm weather. Night-time loading would be approximately 600 feet from the Sacred Heart Church and Shelter.

Night-time construction noise has the potential to impact KEXP, SIFF Film Center, and The Vera Project immediately north of KeyArena in the Northwest Rooms, which are active during the evening and some night-time hours. Additionally, evening performances of the Seattle Children's Theatre to the southeast and outdoor festival performances at the Fountain and South Fountain Lawns could also be significantly impacted. Excavation activities would abut the south ends of the foundation of the Northwest Rooms, and would be approximately 100 feet south of the remainder of the U-shaped building (see Figure 2-2 in Chapter 2, *Description of Alternatives*). As indicated in Figure 8-4, unmitigated night-time noise levels of 75 to 85 dBA could be experienced at the outside of the buildings. The A/NT Gallery would also experience night-time construction noise impacts, but it is not considered a sensitive receptor. Unmitigated night-time noise impacts to KEXP, SIFF Film Center, and The Vera Project would be as much as 31 dBA over existing exterior evening noise levels and would be a significant impact. Reduced, but potentially significant, impacts could also occur at more distant receptors such as the Seattle Children's Theatre.

MightyKidz Daycare, Seattle Repertory Theatre, and the Cornish Playhouse either do not operate during evening hours or are far enough away that they would not be significantly impacted by the construction noise.

Potential mitigation measures to reduce these predicted significant night-time noise impacts are identified in Section 8.6. OVG has committed to installing a temporary 12-foot noise-deflecting barrier as a construction fence on the north, south, and west sides of the project perimeter. These measures will substantially reduce predicted resultant noise levels at surrounding sensitive receptors, as indicated in Figure 8-5. Table 8-5 presents the modeled mitigated noise levels at the nearest residential receptors and compares them to the modified noise limits (6 dBA over quietest night-time ambient) for each of the proposed construction phases, as requested in OVG's Construction Noise Variance Application. The uppermost floors of both the Astro Apartments and Expo Apartments would receive limited benefit of the proposed noise barrier and would experience night-time noise levels equivalent to, but not exceeding, the respective modified noise limits. All other floor levels of these nearest apartment buildings would experience greater noise attenuation from the proposed noise barrier.

Mitigated noise levels at the Sacred Heart Shelter would be greatest during Phase 1 excavation and demolition and hauling activities but would still be well below the applicable modified noise limit of 66 dBA. Consequently, with mitigation, night-time noise levels at surrounding residential land uses would be less-than-significant.

**Table 8-5. Predicted Noise Levels and Modified Noise Limits for Residential Receptors**

Sensitive Receptor	Floor	Modeled Sound Levels (unmitigated/mitigated)		Modified Limit (dBA)	Exceeds Limit with mitigation?
		Construction Phase 1 - Peak Excavation (dBA)	Construction Phases 3 and 4 – Peak Equipment Operations (dBA)		
Astro Apartments	2 <sup>nd</sup>	70/59	80/62	72	No
	3 <sup>rd</sup>	72/63	80/67	71	No
	4 <sup>th</sup>	72/63	80/67	70	No
	5 <sup>th</sup>	72/63	80/67	69	No
	6 <sup>th</sup>	72/64	79/67	67	No
Expo Apartments	2 <sup>nd</sup>	59/52	67/59	64	No
	3 <sup>rd</sup>	61/54	67/61	64	No
	4 <sup>th</sup>	63/55	69/63	64	No
	5 <sup>th</sup>	63/56	70/64	64	No
	6 <sup>th</sup>	63/57	69/64	64	No
Sacred Heart Shelter	1 <sup>st</sup>	63/58	64/57	66	No
	2 <sup>nd</sup>	65/62	68/58	66	No

Note: Noise levels presented in this table are specific to the elevation of the receptor (floor) location. Consequently, values at lower elevations will differ from those shown in Figure 8-5, which are at an elevation of 60 feet, representing the 6<sup>th</sup> floor.

Source: Ramboll, 2018.

As indicated in Figure 8-5, mitigated night-time construction noise impacts to KEXP, SIFF Film Center, and The Vera Project immediately north of KeyArena in the Northwest Rooms could be 70 to 75 dBA outside of the buildings, although these values are conservative as they reflect noise levels at a 60-foot elevation. The A/NT Gallery would also experience night-time construction noise impacts, but it is not considered a sensitive receptor. Mitigated night-time noise impacts to KEXP, SIFF Film Center, and The Vera Project would be as much as 22 dBA over existing exterior evening noise levels intermittently during peak periods of construction and would be a significant impact. These peak periods would most likely occur during the overlap of Phases 3 and 4 if activity is concentrated on the north side of the arena. Therefore, night-time construction noise impacts at uses in the Northwest Rooms would be a significant and unavoidable impact. Noise levels at more distant non-residential receptors such as the Seattle Children’s Theatre would be reduced to below a 6 dBA increase over existing ambient levels.

### **Vibration**

There are no adopted state or local policies or standards for groundborne vibration. However, the FTA has published guidance relative to vibration impacts for construction, and this guidance is commonly applied to assess potential vibration impacts from construction. The average person is quite sensitive to ground motion, and levels as low as 0.02 in/sec can be detected by the human body when background noise and vibration levels are low. Vibration intensity is expressed as PPV, the maximum speed at which the ground moves while it temporarily shakes.

### **Building Damage**

Since groundshaking speeds are very slow, PPV is measured in inches per second. According to the FTA, non-engineered timber and masonry buildings, such as Bressi Garage and the Sacred Heart Church, can be exposed to groundborne vibration PPV levels of up to 0.2 in/sec without experiencing structural

damage, while reinforced-concrete, steel, or timber buildings, such as the Astro Apartments and Northwest Rooms, can be exposed to PPV levels of up to 0.5 in/sec (FTA, 2006). The nearest structures to vibration-intensive equipment/activities are Bressi Garage and the Northwest Rooms. Excavation under the KeyArena building would extend to the north of the arena structure into the International Plaza and about the south ends of the Northwest Rooms (see Figure 2-2 in Chapter 2, *Description of Alternatives*). However, this assessment focuses on vibration-intensive equipment/activities as identified in guidance documents (FTA, 2006), which does not identify excavators and backhoes as major sources of construction-related vibration. The Addendum to the Final EIS for the Seattle Center Master Plan (Seattle Center, 2016) indicates that the Northwest Rooms underwent structural improvements and modifications to the building shell and core.

Table 8-6 presents reference vibration levels at 25 feet as reported by FTA as well as vibration levels at the nearest structure, the Northwest Rooms (at an approximately 30-foot distance to reflect potential impacts from drill rig operations for pile installation activities at the arena footprint). Installation of piles may be a necessary feature of building renovation during construction but would not involve impact or vibratory pile driving. The potential exists for building damage to occur if certain equipment types (hoe rams, vibratory rollers, or drill rigs) were operated close to buildings, which would be a significant vibration-related impact. For example, operation of a vibratory roller within 25 feet of an older or historic structure, such as Bressi Garage, would generate a PPV of 0.21 inch/second, which would be over the standard of 0.2 inch per second for such structures (see Table 8-2). This would be a potentially significant impact to Bressi Garage. The Northwest Rooms are immediately adjacent to construction activities and although vibration levels are not anticipated to be over 0.5 in/sec at 25 feet, because of proximity of construction, vibration may be sufficient for structural damage and could result in a significant impact. All other structures are sufficiently distant from the proposed work areas to avoid structural damage. Consequently, mitigation is identified in Section 8.6 to establish performance standard buffer distances for vibration-generating construction equipment to address these potential impacts. KeyArena, the Northwest Rooms, and Bressi Garage are designated as Seattle Landmarks; see Section 6.4, *Historic and Cultural Resources* for a discussion of potential impacts to these Landmark-designated structures.

**Table 8-6. Construction Equipment Vibration Levels (PPV Metric)**

Construction Equipment	Reference Vibration Level (PPV at 25 feet)	Vibration Level (PPV at 30 feet) <sup>1</sup>	Vibration Level (PPV at nearest residence; 135 feet)
Vibratory roller	0.210	0.17	0.032
Hoe ram	0.089	0.073	0.014
Caisson drilling	0.089	0.073	0.014
Jackhammer	0.035	0.029	0.005

<sup>1</sup> 30 feet is the approximate minimum distance between the arena roofline and KEXP.

Source: Developed by ESA based on FTA, 2006.

#### Human Annoyance/Sensitive Building Operations

The closest land uses where people would be expected to sleep are the Expo Apartments (approximately 115 feet north of the active construction area of the project site), the Astro Apartments and the Dalmasso Apartments (approximately 30 feet west of the project site and 175 feet from the arena), and the Sacred Heart Shelter (approximately 40 feet south of the closest portion of the project site). The KEXP recording studio is approximately 30 feet from the northwest side of the arena, the A/NT Gallery is approximately 25 feet from the northeast side of the arena, and The Vera Project and SIFF Film

Center are approximately 115 feet to the north. The FTA identifies groundborne vibration criteria relative to human disturbance or sensitive equipment operations in terms of VdB, instead of the PPV metric. For both residential land uses where people normally sleep as well as recording studios, the FTA identifies the types of construction activities associated with propagation of groundborne vibration including impact equipment (such as hoe-rams) for demolishing large concrete structures, and caisson drilling. Impact equipment such as hoe rams and jackhammers is not proposed for use during night-time hours and therefore would not result in annoyance impacts when most people are trying to sleep.

Table 8-7 presents reference vibration levels at 25 feet in the VdB metric as reported by the FTA, as well as estimated vibration levels at KEXP and at a 135-foot distance from potential impact equipment or vibratory roller use to reflect potential impacts to the nearest receptors where people would be expected to sleep. While excavation would abut the south ends of the foundation of the U-shaped Northwest Rooms where KEXP and the A/NT Gallery are located, equipment involved with excavation activities such as excavators and backhoes which may generate some vibration is not typically associated with vibration impacts. Vibration-inducing construction equipment such as those identified in Table 8-7 could have an impact on operations of KEXP, as well as the other Seattle Center tenants in the Northwest Rooms: A/NT Gallery, SIFF Film Center, and The Vera Project. Even at a distance of 100 feet, the 65 VdB threshold for recording studios and concert halls (performance spaces) would be exceeded by drill rig operations. Consequently, operation of vibration-inducing construction equipment could result in an impact by disrupting the operations of KEXP and the A/NT Gallery, SIFF Film Center, and The Vera Project if such equipment were to operate within 100 feet. These impacts would be significant for KEXP, The Vera Project, and for SIFF Film Center, because these uses are sensitive receptors whose operations require vibration-free conditions. Impacts to the nearest residential uses could also occur if operation of vibration-inducing construction equipment were to occur within 75 feet during night-time hours; however, no such uses would be this close to active construction areas, and vibration-related annoyance impacts to residences or other areas where people would be expected to sleep would be less-than-significant. Section 8.6 presents mitigation measures to address significant construction-related vibration impacts. Identified significant vibration impacts would be reduced to less-than-significant levels with the inclusion of the mitigation measures.

**Table 8-7. Construction Equipment Vibration Levels (VdB Metric)**

Construction Equipment	Reference Vibration Level (VdB at 25 feet)	Vibration Level (VdB at 30 feet <sup>1</sup> )	Vibration Level (VdB at nearest residence; 135 feet <sup>2</sup> )
Vibratory roller	94	92	72
Hoe ram	87	85	65
Caisson drilling	87	85	65
Jackhammer	79	77	57
FTA Criteria Threshold (VdB) for Occasional Events			
Category 1 Land Use (Concert Halls, TV Studios, and Recording Studios)		65	
Category 2 Land Use (Nearest Residence)		80	

<sup>1</sup> 30 feet is the approximate minimum distance between the arena roofline and KEXP.

<sup>2</sup> 135 feet is the approximate minimum distance between the work areas and Sacred Heart Church.

Source: Developed by ESA based on FTA, 2006.

### Construction Impacts Summary for Alternative 1

Significant impacts associated with construction of Alternative 1 would include construction noise from excavation, truck loading, and operation of impact equipment during night-time hours that require a variance from the City's noise ordinance. During the day, construction noise would be within the limits of the SMC and impacts would be noticeable but less-than-significant for all surrounding uses. During the night-time periods, impacts to the operations of the KEXP recording studio, The Vera Project, SIFF, and the Seattle Children's Theatre would be significant. The impacts are summarized in Table 8-8.

**Table 8-8. Noise Construction Impact Summary**

Land Use/Building Occupant	Sensitive Receptor? (Y/N)	Sensitivity during Day, Night, or Both	Will Construction Noise Be Noticeable? <sup>1</sup> (Y/N)	Significant Impact? <sup>1</sup> (Y/N)	Equipment/Activity Causing Impact
KEXP	Y	Both	Y	Night: Y Day: N	Demolition, excavation; haul truck traffic
A/NT Gallery	N	Both	Y	Night: N Day: N	Demolition, excavation
SIFF Film Center	Y	Both	Y	Night: Y Day: N	Demolition, excavation; haul truck traffic
The Vera Project	Y	Both	Y	Night: Y Day: N	Demolition, excavation
Sacred Heart Shelter	Y	Night	Y	Night: Y Night (mitigated): N Day: N	Impact equipment, demolition, excavation
Expo Apartments	Y	Night	Y	Night: Y Night (mitigated): N Day: N	Demolition, excavation; haul truck traffic
Astro Apartments	Y	Night	Y	Night: Y Night (mitigated): N Day: N	Demolition, excavation, truck loading; haul truck traffic
MightyKidz Daycare	Y	Day	Y	Night: N Day: N	None-
Dalmasso Apartments	Y	Night	Y	Night: Y Night (mitigated): N Day: N	Demolition, excavation, truck loading; haul truck traffic
Seattle Children's Theatre	Y	Both	Y	Night: Y Night (mitigated): N Day: N	Demolition, excavation, truck loading
Seattle Repertory Theatre	Y	Both	Y	Night: N Day: N	None
Cornish Playhouse	Y	Both	Y	Night: N Day: N	None-

<sup>1</sup> Only construction noise that exposes people to noise levels that would result in sustained and substantial annoyance and disruption of activities for receptors and/or exceeding the limits as defined in SMC 25.08.425(A) – (C) is considered a significant impact. Construction noise may be noticeable to residents, workers, and visitors to buildings and spaces in the vicinity of the project site, but not rise to a level that would make it a significant impact.

Vibration generated by impact equipment could also result in significant impacts to some sensitive receptors. These impacts are summarized in Table 8-9.

**Table 8-9. Vibration Construction Impact Summary**

Land Use/Building Occupant	Sensitive Receptor? (Y/N and Type of Receptor) <sup>1</sup>	Category of Receptor for Use-Based Receptors <sup>2</sup>	Vibration Impact? (Y/N)	Significant? (Y/N)	Equipment/Activity Causing Impact
KEXP	Y (use- recording studio)	1	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
A/NT Gallery	N	-	Y	N	Hoe rams, rollers, drill rigs
SIFF Film Center	Y (use)	1	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
The Vera Project	Y (use – recording studio)	1	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
Sacred Heart Shelter	Y (use and building type) <sup>3</sup>	2	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
Bressi Garage	Y (building type) <sup>3</sup>	-	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
Northwest Rooms	Y (building type)	-	Y	Y (mitigated): N	Hoe rams, rollers, drill rigs
Expo Apartments	Y (use)	2	N	N	None
Astro Apartments	Y (use)	2	N	N	None
MightyKidz Daycare	N	-	N	N	None
Dalmasso Apartments	Y (use)	2	N	N	None
Seattle Children’s Theatre	Y (use)	1	N	N	None
Seattle Repertory Theatre	Y (use)	1	N	N	None
Cornish Playhouse	Y (use)	1	N	N	None

<sup>1</sup> Sensitive receptors to vibration are determined in 2 different categories: land use and whether the structure itself could be impacted by vibrations. Land use-based vibration receptors include locations where vibrations would interfere with interior operations. Structure-based vibration receptors include buildings that are constructed with materials that are sensitive to vibrations, or are of an age that makes them vulnerable.

<sup>2</sup> FTA-generated vibration impact categories by land use. Category 1 uses are buildings where low ambient vibration is essential for interior operations, and will be impacted by vibrations of 65 VdB for both frequent and infrequent events. Category 2 uses are residences and buildings where people normally sleep, and are impacted at 72 VdB for frequent events and 80 VdB for infrequent events (FTA, 2006).

<sup>3</sup> Both Bressi Garage and the Sacred Heart Shelter are unreinforced masonry buildings.

## **Alternative 2: Modified Proposal**

### **Noise**

Daytime construction-related noise levels generated by Alternative 2 would be similar to those described for Alternative 1. The location of construction equipment used for Alternative 2 would be the same; however, Alternative 2 would result in a longer construction period since work hours would be limited to daytime, those allowed under SMC 25.08.425. Under Alternative 2, construction would take at least 6 additional months, and thus the types of daytime noise impacts described for Alternative 1 would be experienced for a longer duration. The A/NT Gallery would also be impacted by construction noise.

However, as there would be no night-time work (except work allowed inside the arena under SMC 25.08.425) under Alternative 2, there would be no night-time noise impacts. All construction noise impacts under Alternative 2 would be less-than-significant for all receptors.

### ***Vibration***

Construction vibration impacts for Alternative 2 would be no greater than those described for Alternative 1. However, as there would be no night-time work outside the arena under Alternative 2, there would be no night-time impacts. The locations and type of construction equipment used for Alternative 2 are anticipated to be similar to Alternative 1, although the duration of construction would be longer. Like Alternative 1, vibrations generated by impact equipment could impact the Northwest Rooms and result in significant impacts to the building as well as operations of the KEXP recording studio, SIFF Film Center, and The Vera Project.

## **8.5.2 Operations Impacts**

The magnitude of the potential noise and vibration impacts from the project during operations is classified as less-than-significant or significant. Significant impacts are defined as meeting the following threshold. Less-than-significant impacts fall below this threshold. Impact characterization is based on consistency with noise regulation criteria, which are based on potential annoyance and disturbance to receptors.

### **Noise**

***Criteria for Significant Noise Impacts:*** The applicable exterior noise standard established in SMC 25.08.410(A) are applied to operational noise impacts. The anticipated exterior noise level standard is increased by 5 dBA over existing ambient noise levels when the ambient noise levels already exceed SMC 25.08.410(A) during the hosted events at the project site. The increase of traffic volumes during events would also be considered in this threshold pursuant to FHWA's definition of a readily perceptibly increase in traffic noise levels.

### **Vibration**

Vibration is primarily a construction-related issue. During project operations, vibration is anticipated to be similar to existing conditions and is therefore not analyzed further as part of the EIS.

### **No Action Alternative**

The No Action Alternative would not increase noise levels over existing conditions, which range between approximately 63 and 69 dBA Leq for a 24-hour period (both on a day with and without an event based on recent monitoring). Impacts would be less-than-significant.

### **Alternative 1: OVG Proposal**

Project operations would increase the frequency of existing noise sources, both stationary and mobile, within the study area. Stationary noise sources would include the operation of public address systems and amplification equipment, not only inside the arena but also for occasional outdoor performances and events. Mobile noise sources would include increased traffic and crowd ingress and egress noise on local streets.

## Noise

The project is within an existing arena and event center that is surrounded by a characteristically noisy urban environment where the existing noise level exceeds the current 60 dBA allowable limit for commercial uses in SMC 25.08.410(A), as indicated by the results of the long-term measurements revealing between 63 and 69 dBA Leq for a 24-hour period (both on a day with and without an event). Additionally, all building infrastructure and equipment, including HVAC systems and vents, must adhere to the Seattle Noise Control limits found in SMC 25.08.

### Event-Related Noise

Amplified sound, either interior or exterior, would be required to be consistent with the noise ordinance. Comparison of noise monitoring data of hourly Leq during a concert event and a non-event indicated that only the 7:00 PM, 9:00 PM, and 11:00 PM hours reflected a measureable 1 dBA to 3 dBA Leq increase in noise levels during a concert event (see Table 8-3).

The project would generate exterior noise levels similar to existing conditions, and thus would not meaningfully add to the existing ambient noise levels in the study area. The project would be consistent with the restrictions of the noise ordinance. In addition, the anticipated exterior noise levels would not increase more than 5 dBA Leq over existing ambient noise levels when the ambient noise levels already exceed those specified in SMC 25.08.410(A). Event-related noise is anticipated to be a less-than-significant impact.

### Frequency of Events

Operation of the project would increase the frequency of events. The existing arena hosts approximately 2 or 3 events per week on average. Upon completion, the Seattle Center Arena would host approximately 4 or 5 events per week, depending on season, introducing NHL and NBA games, in addition to continued concert events and WNBA games. Noise sources that currently exist (such as amplified sound, outdoor events, and plaza programs for both pre-and-post events) would occur more often. Exterior noise data indicate that the increase in noise levels during an event was minor and of short duration, often related to vehicular or foot traffic of the crowd upon arrival and exiting (see discussion under *Event-Related Noise*, above). In commercial districts, the allowable noise level can increase up to 75 dBA Lmax for short durations within a given hour. Noise monitoring revealed that Lmax levels during the events ranged from 69.4 dBA Lmax to 86.8 dBA Lmax. Although the number of events would approximately double, the noise level within a single hour already exceeds the 75 dBA Lmax limit set by SMC 25.08.410(B). These Lmax values can be associated with common urban activities including sirens and car horns. Therefore, the increase in frequency of events at the arena would be a less-than-significant impact.

### Outdoor Plaza Events

Portions of the proposed outdoor plazas may be equipped with video screens and speakers during certain events. This could accommodate activities such as outdoor festivals up to 2 hours before doors open and 1 hour after event end; overflow crowds watching a sold-out game via boards and fan festivals in the plaza area outside the venue; pre-concert radio booth/small stage with local support band before larger indoor concert; and festivals that encompass inside and outside stages. Equipment for these events could operate prior to and/or after some games or events.

While most of these activities would attract ticketed attendees for the arena event, some have the potential to draw visitors in excess of the arena capacity, resulting in the need for and use of outdoor screens and sound amplification. However, these instances are expected to be infrequent, such as a local team participating in a playoff or championship game. The operator of the amplified equipment

would be required to comply with SMC 25.08.520, which necessitates sound-control monitoring for amplified sound at public parks and places such as the Seattle Center. Because the frequency of such events would be low, and outdoor amplification currently occurs associated with events such as fun runs, outdoor concerts, and gatherings, this would be a less-than-significant impact.

#### **Traffic-Related Noise**

Alternative 1 would increase the number of events at KeyArena. Current event-related traffic is generated by about 100 events a year (2–3 a week); this would increase to about 240–260 annually (4 to 5 a week). Consequently, event-related traffic and its associated noise would not, by itself, increase with the proposed project, but rather the frequency of event-related traffic days would increase.

Event-related noise, including roadside traffic, in the study area is captured in the monitoring data presented in Table 8-3. The results of both the short-term and long-term noise measurements generally reflect existing noise conditions, which are noisy and influenced by typical activities surrounding mixed-use residential and commercial land uses in a downtown urban area. Table 8-3 indicates that while hourly average Leq noise levels during an event can be as much as 3 dBA greater than those during the same hour without the event, noise levels during most other hours were recorded to be similar to those without an event. Consequently, the increase in the number of events under Alternative 1 would result in additional hours per year where roadside noise levels would be increased, but the magnitude of those increases would be at a level characterized as barely perceptible and would be a less-than-significant impact.

#### **Stationary Source Noise**

Alternative 1 would construct ancillary structures adjacent to each of the 4 corners of the arena that would house air intake and exhaust portals for the arena's ventilation system. These would include an approximately 22-foot extension to the southwest end of the Northwest Rooms that would house a mechanical intake tower (west portion) and stairwell (east portion) for the arena. This intake portal would be approximately 1 foot taller than flat rooftop of the existing building and, while adjacent to KEXP, would not be directed toward any receptors. Additionally, a new building would be constructed in the south plaza to house a box office, garage stairs, and a mechanical exhaust portal. Mechanical functions would be flush with the flat rooftop of the box office building at an elevation of approximately 15 feet and approximately 160 feet east of the nearest receptor (Astro Apartments). This new box office structure would replace the existing box office and NASA Building, the latter of which has 3 existing street-side mechanical exhaust louvers directly facing the Astro Apartments at a distance of approximately 80 feet to the west. Alternative 1 would replace the existing mechanical exhaust equipment with newer equipment positioned farther away from the Astro Apartments. An intake in the southeast corner of the project site would be approximately 165 feet from the nearest receptor (Sacred Heart Shelter).

Mechanical equipment for the project would be subject to the maximum permissible operational noise limits of SMC 25.08.410, which establishes a 60 dBA noise limit for commercially zoned properties impacting other commercially zoned properties. The limits of the noise ordinance would not be exceeded by the proposed project.

#### ***Operational Impacts Summary for Alternative 1***

Based on the EIS analysis, operations noise impacts would be less-than-significant for event-related noise, outdoor plaza noise, and event-related traffic.

## **Alternative 2: Modified Proposal**

### **Noise**

Operations noise impacts for Alternative 2 would be the same as those described for Alternative 1.

## **8.6 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES**

OVG will comply with all applicable regulatory requirements, including variance conditions. OVG is working with the City to finalize Transaction Documents that specify commitments. Refer to Section 1.3 for additional discussion of the Transaction Documents.

### **8.6.1 Construction**

#### **Measures to Reduce Construction Noise Impacts**

To address impacts related to the proposed construction activities outside of normal weekday hours, OVG has applied for a Construction Noise Variance, which includes a Noise Management and Mitigation Plan (NMMP). OVG's Construction Noise Variance Application available at <http://web6.seattle.gov/dpd/edms>. The NMMP contains a description of the exterior sound level limits of the chapter of the code expected to be exceeded, estimates of the amount(s) by which these levels are expected to be exceeded and by what equipment, the exterior sound level limits that will be in effect during the variance, the time periods during which the pre-variance exterior sound level limits may be exceeded, and the expected sources of the sound during each of the time periods (e.g., types of equipment or activity causing the exterior sound level limits to be exceeded). Additionally, the NMMP includes measures and provisions to be taken to avoid exceeding the exterior sound level limits of the chapter of the code expected to be exceeded; provisions to mitigate sounds that exceed the exterior sound level limits and that cannot otherwise be avoided; and a process for informing the public in the affected areas about the provisions of the variance.

It is recommended that construction contractors use the following standard best practices during both daytime and night-time construction:

- Perform construction activity within the existing building shell when feasible to provide shielding to noise-sensitive receptor locations.
- Reduce ramp grades from maximum possible slopes to reduce vehicle engine power needed to ascend roadways.
- Prohibit compression brakes.
- Construct enclosures around stationary equipment that is outside the existing shell of the arena.
- Perform particularly noisy operations during daytime hours and/or schedule several noisy operations to occur concurrently rather than separately.
- Employ time constraints for noisy operations to reduce potential impacts during sensitive time periods.
- Train supervisors to increase awareness of construction noise as it relates to the noise-sensitive



surroundings and the requirements of the NMMP.

- Use properly sized and maintained mufflers, engine intake silencers (if feasible), and engine enclosures (if feasible).
- Turn off idle equipment after no more than 5 minutes.
- Line truck beds with rubberized, shock- and noise-absorbing material when used to load and haul heavy materials such as concrete debris.
- Maintain and/or lubricate material conveyors to ensure they do not squeak.
- Provide a 24-hour construction noise monitoring system to log construction site noise.
- Use strobe warning lights, flaggers, or broadband backup alarms, in lieu of pure-tone alarms, during night-time hours.
- Restrict truck hauling during the AM and PM peak traffic hours (typically between 7 and 10 AM and between 4 and 7 PM, Monday through Friday).
- Work with affected Seattle Center tenants to identify which areas of operation are most directly impacted by construction noise and offer methods of soundproofing that dampen the noise to acceptable levels to meet their operational needs.
- Use OVG's full-time Community Liaison to coordinate with affected organizations during the construction phase to reduce noise-related impacts, including to events at the Fountain and South Fountain Lawns and the surrounding community, and follow up regularly with affected stakeholders.

For impacts caused by construction noise, the following potential measures are identified in the NMMP to be implemented between 10 PM and 7 AM weekdays and 10 PM and 9 AM weekends and legal holidays:

- Construct 12-foot high noise barriers on the north, west, and south sides of the construction site.
- Use conveyors to load excavated material into trucks for off-site transport.
- Use a quieted loader on the west side of the arena for activities related to the off-site transport of excavated materials (75 dBA at 50 feet) for construction Phases 1 through 3.
- Operate concrete mix or pump trucks in the northeast corner of the north plaza construction area or, alternatively, around the nearest corners to the east.
- Prohibit mobile crane use west of the arena during night-time hours.
- Reduce impact wrench noise by 10 dBA when operating north, west, or south of the arena, by using quieter equipment, portable noise barriers, enclosures, or combinations thereof.
- Prohibit impact work such as auger shaking, jack hammering, hoe ram use, or vibratory compacting during night-time hours.
- Use drilling methods in lieu of impact driving methods for shoring (i.e., soldier pile walls) and pier installation.
- Prohibit concrete saw use during night-time hours.
- In lieu of pure-tone, mobile equipment backup alarms, use strobe warning lights or flaggers when possible. When the use of strobe warning lights or flaggers is not feasible, the construction contractor will use broadband backup alarms. Also, create site logistics that minimize the need for mobile equipment to reverse.

- Conduct continuous noise monitoring at locations representing sensitive receptors in the vicinity of the site to ensure that night-time construction activities comply with the proposed modified night-time construction noise limits. Submit weekly monitoring reports to SDCI. This function could be implemented by an independent noise monitor, which would be an individual, firm, or contracted staff member within SDCI independent from the contractor whose responsibility is to oversee the monitoring of sound levels from construction covered by the Construction Noise Variance and to report directly to the SDCI Coordinator for Noise Abatement.
- Use OVG's full-time Community Liaison to coordinate with affected organizations during the construction phase to reduce noise-related impacts, including to events at the Fountain and South Fountain Lawns and the surrounding community, and follow up regularly with affected stakeholders.

Additional noise mitigation measures may be offered to locations where bedroom/sleeping room windows would be exposed to levels over the 60-dBA standard night-time limit due to night-time construction as follows:

- For buildings more than 20 years old, new bedroom/sleeping room windows may be offered. Current construction plans and predictive noise modeling identify that the following older buildings may receive night-time construction sound levels in excess of 60 dBA:
  - The Dalmasso Apartments facing 1<sup>st</sup> Ave N and the construction site.
  - The Sacred Heart Shelter facing the construction site.
- For buildings without central air conditioning (i.e., all buildings except the Astro Apartments, where air conditioning is available), offer to purchase portable or window air conditioning units for bedrooms/sleeping rooms where predicted levels exceed 60 dBA.
  - Floors 2 through 5 of the Expo Apartments facing Republican St.
  - The Dalmasso Apartments facing 1<sup>st</sup> Ave N.
  - The Sacred Heart Shelter facing the construction site.

### **Measures to Reduce Construction Vibration Impacts**

The City may require the contractors to implement the following vibration control measures related to impact equipment and excavation activities:

- Require that contractors use non-vibratory excavator-mounted compaction wheels and small, smooth drum rollers for final compaction of any asphalt base and asphalt concrete. If needed to meet compaction requirements, smaller vibratory rollers will be used to minimize vibration levels during repaving activities where needed to meet vibration standards.
- Prior to commencing impact equipment operations, require the contractor to notify Seattle Center and affected tenants of the dates, hours, and expected duration of such activities.
- Structures sensitive to vibration may require stabilization during construction and/or repair after construction.
- Require ongoing vibration monitoring of Bressi Garage, the Northwest Rooms, and KEXP throughout construction in conjunction with the Seattle Landmarks Preservation Board, as needed. Submit weekly Monitoring Reports to SDCI when active demolition, drilling, or heavy-duty compaction is to occur. This function could be implemented by an independent vibration monitor.

- Prior to commencement of any construction activities and at the completion of construction activities, retain the services of qualified structural engineer to perform pre- and post-construction assessments of the Bressi Garage, Northwest Rooms, and KEXP buildings to document building conditions, including written and photographic descriptions of the existing condition of exterior and interior locations.
- Use the OVG full-time Community Liaison to coordinate with local community organizations during the construction phase to minimize vibration-related impacts to the surrounding community, and follow up regularly with affected stakeholders.

## 8.6.2 Operations

By complying with SMC noise regulations and deploying temporary noise measures during the noisiest concert events (e.g., a noise dampening curtain), noise impacts from operations of the arena would be reduced to levels that are less-than-significant. To ensure that noise levels from stationary sources such as ventilation intakes and exhaust comply with applicable regulations, mitigation measures are identified below.

### Measures to Reduce Stationary Source Noise Impacts

It is recommended that OVG provide any necessary controls to ensure that noise from mechanical equipment intakes or exhaust portals associated with arena operations does not exceed a performance standard of 60 dBA at the nearest commercially zoned land uses, as required by SMC 25.08.410. Potential measures to achieve this standard may include but are not limited to:

- Use of sound absorptive barriers or enclosures.
- Installation of duct silencers.
- Installation of intake air sound baffle.

## 8.7 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON NOISE AND VIBRATION

Significant unavoidable adverse impacts from noise may result, even after implementation of mitigation measures, due to the exceedance of the allowable noise levels in SMC 25.08.425. Night-time construction would require a noise variance from the City; however, the granting of a variance, although it requires implementation of an NMMP, would be unlikely to decrease the night-time construction sound to levels conducive to recording studios and other activities at KEXP, The Vera Project, and the SIFF Film Center over the duration of the construction period. Identified significant vibration impacts would be reduced to less-than-significant levels after inclusion of identified mitigation measures.

## 9.0 VISUAL RESOURCES

This chapter describes the visual character surrounding the project site and the potential for the project to result in reduced visual quality, impacts to scenic views, and increased light and glare.

**Changes from the Draft EIS** – This chapter has been revised since issuance of the Draft EIS to provide additional information about project features that have been refined or changed, and to refine information on potential light and glare impacts. Substantive revisions have been made to reflect additional evaluations relating to impacts to drivers from video signage, to clarify text, and to add information to figures. The proposed signage plan has been revised by OVG, accompanied by a detailed lighting analysis based on the updated proposal. These evaluations were reviewed by the EIS Consultant Team and incorporated as appropriate into the Final EIS.

Alternative 1 (the OVG Proposal) includes a proposed sign code amendment to SMC 23.55, proposed by SDCl, that would create a Seattle Center sign overlay district and other changes that would regulate the number, size, type, location, brightness, content, and operation of signs, including signage for the renovated arena, the Northwest Rooms, and the south parcel (see Appendix G). Alternative 2 includes a modified version of the proposed sign code amendment, as described below. The potential effects of the code amendment are analyzed in the Final EIS.

### 9.1 METHODS

This analysis includes potential impacts: (1) on visual quality, (2) on scenic views, and (3) from light and glare.

#### Visual Quality

To assess impacts on visual quality, changes in the height, bulk, scale, and character of the proposed project were reviewed for consistency with applicable plans, policies, and regulations identified in Section 9.2, *Regulatory Context*.

#### Scenic Views

Potential impacts on scenic views were evaluated through a review of the project design, Google Street View, and field observations.

#### **Key Findings for Visual Resources**

Construction-related impacts on visual quality, scenic views, and light and glare would be less-than-significant due to the short duration of construction and use of a construction lighting plan.

Operational impacts on visual quality would be less-than-significant as long as the project is designed to meet City and neighborhood design guidelines.

Operational impacts on scenic views would be less-than-significant because the project would not obstruct or substantially change existing scenic views.

Operational impacts on light and glare are anticipated to be significant under Alternative 1 because video signage associated with the project could impair the safety of drivers through distraction. Alternative 2 eliminates the video feature to reduce impacts to drivers.

Unmitigated light spillover could adversely affect adjacent residential uses.

Indirect and cumulative impacts on visual quality, scenic views, or light and glare are anticipated, but these additional impacts would themselves be less-than-significant, and would not add to the severity of the operational impacts that were considered potentially significant.

## Light and Glare

Impacts from increased light and glare were assessed qualitatively in the Draft EIS, comparing existing light and glare conditions with proposed light conditions (based on the increased use of light and lighted fixtures) and the potential for glare based on building materials. For the Final EIS, a quantitative analysis of light spill and light glare was prepared for OVG (RWDI, 2018). The findings of that analysis are incorporated into this revised Final EIS chapter. In addition, Fehr & Peers evaluated driver distraction, taking into account the RWDI study as well as other research on driver distraction related to illuminated and changing image signs (Appendix C, *Tech Memo 9, Evaluation of Potential Effects of Proposed Digital Sign on Distracted Driving*). An analysis of shade and shadow is not warranted because the project would not create shade or shadow impacts on any existing public open space due to the solar orientation of the new open space and the small scale of structures that would be placed within the new open space. This is described in further detail in Section 9.4.2, *Operations Impacts*.

## 9.2 REGULATORY CONTEXT

The City has adopted SEPA policies and regulations for height, bulk, and scale (SMC 25.05.675.G); public view protection (SMC 25.05.675.P); and light and glare (SMC 25.05.675.K). Regulations related to aesthetics and light and glare are also codified within the Land Use Code (SMC Title 23).

A number of City plans and policies are intended to set an aesthetic standard for development that aligns with City and neighborhood visions for the appearance of the built environment. The Seattle 2035 Comprehensive Plan (City of Seattle, 2016a) provides an overview of aesthetic values citywide; the Queen Anne (Uptown) Neighborhood Plan provides neighborhood-specific policies (City of Seattle, 2016a); the Seattle Center Century 21 Master Plan (Century 21 Plan) outlines a 20-year vision for redevelopment at Seattle Center (Seattle Center, 2008); and the Century 21 Design Guidelines provide a set of guidelines specific to Seattle Center (Seattle Center, 2009). The City's Uptown Urban Design Framework also describes the desired neighborhood character and urban form for Uptown (City of Seattle, 2016b), with the assumption that the Century 21 Plan would be implemented. There is also a green street concept plan for Thomas St (also called an Urban Village

### Key Terms and Concepts

**Visual Quality** – How well the overall visual character of an area or field of view meets viewer preferences. It is the aggregate of the visible attributes of a scene or object, including natural and built features. In urban settings, the visual character is influenced primarily by the land use type and density, urban landscaping and design, and topography. For this analysis, high visual quality is assigned to development that meets City regulations for height, bulk, and scale; transparency, setbacks, and landscaping; and neighborhood and City design guidelines and design review requirements.

**Scenic Views** – Views of Mount Rainier, the Cascade and Olympic Mountain ranges, Puget Sound, Lake Washington, Lake Union, the Ship Canal, and the Downtown skyline, including protected public viewpoints (as identified in the Seattle SEPA regulations), public views of Landmarks, view corridors, and scenic routes.

**Glare** – Glare occurs when a viewer observes a source of light to which their eyes are not sufficiently adapted. Glare can be disabling (i.e., physically prevents a viewer from effectively perceiving objects) or can create distraction through visual discomfort.

**Luminance** – The amount of visible light emanating from a surface. Typically measured in candela per square meter ( $\text{cd}/\text{m}^2$ ); this unit is also referred to as "nits." A common candle emits light with roughly 1 candela luminous intensity.

**Illuminance** – The amount of visible light falling onto a surface. Measured in lumens per square meter ( $\text{lm}/\text{m}^2$ ), which is also called "lux." The lux value varies depending on the distance the measurement is taken from a light source and the orientation of the surface relative to the light source.

Neighborhood Access Street) (DPD and SDOT, 2013); the concept plan includes principles to complement existing neighborhood character and promote visual quality. Compliance with the plan is voluntary, and therefore consistency with this plan is not evaluated in the Final EIS.

The Seattle Design Guidelines (City of Seattle, 2013a) and Uptown Neighborhood Design Guidelines (City of Seattle, 2013b) are used by the Seattle Design Commission to review projects. The Seattle Design Commission reviews public projects and makes recommendations in the areas of urban design merit, street vacation, public access, open space planning, integration of public art, and streetscape design. The City is in the process of updating the Uptown Neighborhood Design Guidelines, which are expected to be submitted to the City Council in late 2018 or early 2019 (City of Seattle, 2018).

Height, bulk, and scale requirements for Seattle Mixed (SM-UP) zones are detailed in SMC 23.48.702. Height and bulk controls and other zoning regulations are used to protect scenic views; however, project-specific review is often required to adequately assess impacts to public scenic views identified in SMC 25.05.675.P. This includes public views of Historic Landmarks, which “contribute to the distinctive quality or identity of their neighborhood or the City.” Specified view corridors are protected through setback requirements in the Land Use Code. Light and glare from land uses in the Seattle Mixed zone are regulated through SMC 23.47A.022. Light and glare from signs are regulated through SMC 23.55.016.

Signage for the project is regulated under Land Use Code section SMC 23.55. A comparison of the applicable existing code provisions with proposed amendments is included in Appendix G. SDCI is proposing to create a new sign overlay district and other changes that would regulate the number, size, type, content, location, brightness, and operation of signs, including signage for the renovated arena, the Northwest Rooms, and the south parcel. The existing KeyArena structure and rooftop signage exceed current zoning height limits for rooftop signage, but this nonconforming signage is legally established (see Chapter 3, *Land Use*).

## 9.3 AFFECTED ENVIRONMENT

The affected environment is described according to the existing visual quality, scenic views, and light and glare.

### 9.3.1 Study Area

The study areas for visual quality, scenic views, and light and glare are shown on Figure 9-1.

#### Visual Quality

The visual quality study area is the 1 to 2 blocks surrounding the project site. This is based on the developed nature of the area, which restricts the sight distance for viewers in the immediate vicinity. Impacts to visual quality are most likely to occur where the site is most visible. However, all of Seattle Center is included in the visual quality study area in recognition of the fact that there are plans and guidelines for consistent visual quality at the Seattle Center (Seattle Center, 2008, 2009). Although the renovated arena would be visible from areas outside of the study area, changes to height, bulk, and scale would not be visible (except for changes to the cupola [the structure at the top of the roof] and roof signage). Changes to the roof and the cupola are considered as part of the scenic views assessment.



Figure 9-1. Study Area for Visual Resources

## **Scenic Views**

The study area for scenic views is the area within 1/2 mile of the project site parcels. The arena is visible outside of this study area, but the potential for view change or alteration is low due to the relative scale of the project within the urban landscape and the likelihood that views would be obscured by topography and existing development. The study area used to assess impacts on public views of Landmarks is the same as the study area used for the Historic and Cultural Resources assessment of aboveground resources (see Chapter 6). The Landmark study area is also shown on Figure 9-1. The scale of development would not obstruct views of Landmarks outside of the project site, so this analysis focuses on changes to the Landmarks themselves and potential impacts to public views.

## **Light and Glare**

The study area for light and glare includes the streets and buildings adjacent to the project site. The project is in an urban environment with existing light and glare, as well as buildings that limit the distance of light and glare impacts.

### **9.3.2 Existing Visual Quality, Scenic Views, and Light and Glare**

This section describes existing conditions for visual quality, scenic views, and light and glare.

#### **Visual Quality**

KeyArena is a prominent structure on the west side of the Seattle Center campus in Uptown, a mixed-use area between residential development on Queen Anne Hill to the north and larger scale development in Downtown Seattle to the south. The topography of the study area and project site slopes generally to the southwest, except for the east boundary of the site, where the topography slopes downhill to the north. Vegetation in the study area includes mostly street trees and urban landscaping (e.g., a variety of deciduous trees, grass, and flowering and non-flowering shrubs and bushes). Seattle Center is a prominent feature in the study area and has its own unique built environment, hosting a variety of architectural styles, larger buildings than the immediate surroundings, and 40 acres of landscaped and green open space (City of Seattle, 2016a). This EIS analysis focuses on the visual character of the built environment within and immediately adjacent to the project site. Figure 9-2 illustrates the prominent structures in the surrounding built environment.

## **Scenic Views**

The following section describes the scenic views from protected public viewpoints and scenic routes, public views of Landmarks, and private scenic views.

### ***Public Views***

SMC 25.05.675.P identifies protected viewpoints within the city. City policy protects public views of the Space Needle from a number of public places, including selected local parks. There is 1 protected public viewpoint within the scenic views study area from which the project would be perceptible: Kerry Park.

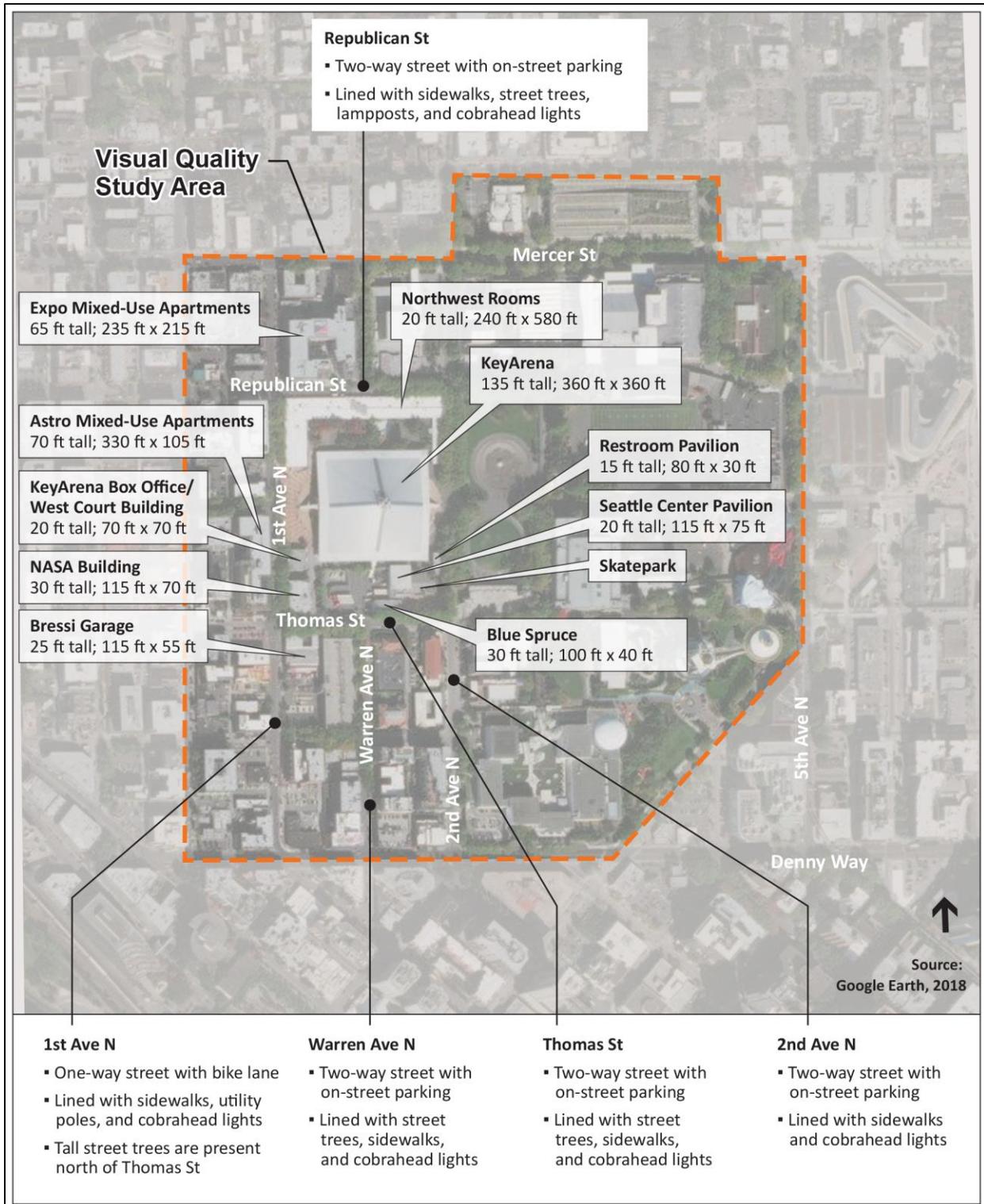


Figure 9-2. Prominent Structures within the Visual Quality Study Area

Although Myrtle Edwards Park and Bhy Kracke Park are also in the study area, a field visit in November 2017 determined that changes to the arena would not be visible from either of these locations due to topography and the density of development. As shown in Photo 9-1, Kerry Park provides scenic views of Seattle Center, Downtown, Elliott Bay, and West Seattle.

### **Scenic Routes**

City of Seattle Ordinances #97025 (Scenic Routes identified by the Seattle Engineering Department's Traffic Division) and #114057 (Scenic Routes identified as protected view rights-of-way by the Seattle Mayor's April 1987 Open Space Policies Recommendation) identify specific scenic routes throughout the city where protection of views is encouraged. Some streets around the arena are designated as scenic routes by the City for their territorial views of the city and surrounding mountains and water bodies as well as for their views of structures within Seattle Center. The scenic routes with views of KeyArena are Mercer St, 2<sup>nd</sup> Ave N, Thomas St, and 1<sup>st</sup> Ave N (Figure 9-3).



**Photo 9-1. View of KeyArena and Elliott Bay from Kerry Park**

### **Landmarks**

City policy protects public views of Historic Landmarks designated by the Landmarks Preservation Board (SMC 25.05.675.P). Four Landmarks are evaluated in the Landmark study area: KeyArena, Bressi Garage, the Northwest Rooms, and International Plaza. This assessment evaluates changes to Landmark-designated sites and building exteriors that would alter how the Landmark contributes to the distinctive quality or identity of the neighborhood or the city. Consistency with the Landmarks Preservation Ordinance is evaluated in Chapter 6, *Historic and Cultural Resources*.

### **Private Scenic Views**

Mount Rainier, the Cascade and Olympic Mountain ranges, Puget Sound, Lake Washington, Lake Union, the Ship Canal, and the Downtown skyline can be seen from private properties throughout the study area. However, the potential for private scenic view impacts from the project is greatest where the arena is in the foreground. Due to the surrounding topography, impacts would most likely occur to scenic views of the Downtown skyline from residences on Queen Anne Hill, where changes to the roof would be most noticeable.



**Figure 9-3. Scenic Views, Scenic Routes, and Landmarks Map**

## **Light and Glare**

The project site is in an urban area with many sources of night-time lighting, as well as buildings with surfaces that reflect both sunlight and artificial lighting at night. RWDI prepared a study of existing day and night-time lighting levels in the vicinity of the project site for OVG (RWDI, 2018). Ambient light at night varied from relatively dark streets and pathways on the north, east, and south sides of KeyArena (2 lux), to relatively bright night-time conditions along 1<sup>st</sup> Ave N, ranging from 6 to 14 lux (RWDI, 2018). Night-time lighting levels along 1<sup>st</sup> Ave N are typical for the level of commercial and mixed-use development in the immediate vicinity and in Downtown Seattle. Street lights, building lights, vehicle headlights, signage, and security lighting are all present in the study area. The luminance of existing light sources ranges from 500–5,000 candela per square meter (cd/m<sup>2</sup>) for retail lighting, to 90,000 cd/m<sup>2</sup> for streetlights, and up to 120,000 cd/m<sup>2</sup> for vehicle headlights (head on) (RWDI, 2018). (Note that units of measurement differ for luminance, which uses cd/m<sup>2</sup> or nits, and illuminance, which uses lux. These units are defined under *Key Terms and Concepts* on page 9-2.)

The project site, as it exists today, includes the following light sources (some of which are shown in Figure 9-4):

- Lighted signs (KeyArena sign, the digital sign on 1<sup>st</sup> Ave N, etc.).
- Light fixtures under building overhangs.
- Light from the interior of KeyArena shining through the glass windows.
- Street lights.
- Pedestrian-scale lighting along sidewalks (1<sup>st</sup> Ave N) and pathways within the Seattle Center.
- Landscape lighting.
- Security lighting.

Glare also occurs during the daytime when sunlight reflects from glass or metal surfaces. Sources of glare in the study area are largely reflections from building façades. The roof of the arena can also produce a moderate amount of glare, depending on the position of the sun and the viewer (RWDI, 2018).

## **9.4 POTENTIAL IMPACTS**

Impacts can be short-term related to construction activities, or long-term related to the permanent structure and operation of the project.

### **9.4.1 Construction Impacts**

Although impacts on visual quality as a result of construction are not expected to be significant due to their temporary and short-term nature, potential impacts are described briefly below. The magnitude of potential impacts on scenic views or light and glare as a result of construction would be characterized as significant as follows. Impacts that do not reach this threshold would be less-than-significant.



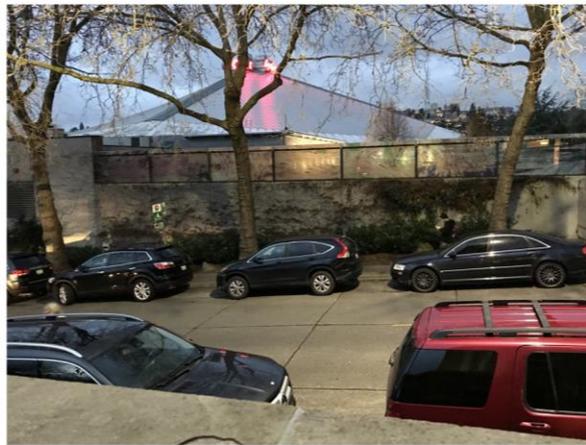
View from the Seattle Center looking west



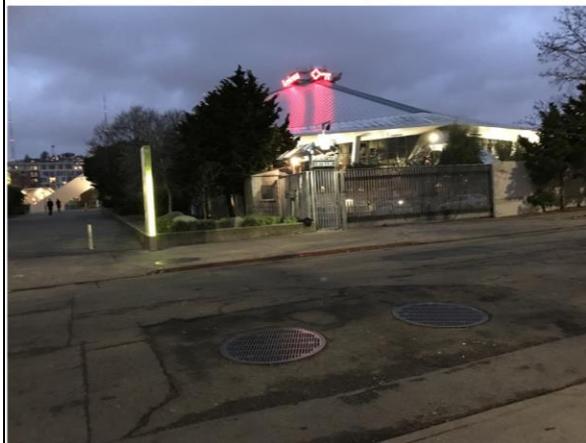
View from 1st Ave looking east



View from the Seattle Center Skatepark looking northwest



View from Thomas St looking north



View from Thomas St looking northeast



View from 1st Ave and Thomas St looking south

**Note:** These photos were taken at twilight (4:30 PM in mid-December) to show lighting conditions in the study area. Twilight is an ideal time to photograph light conditions because it is light enough for viewers to identify surrounding buildings, but dark enough that the light and glare impacts are fully shown.

**Figure 9-4. Existing Light Conditions at KeyArena**

**Criteria for Significant Construction Impacts:** The impacts of construction activities would be significant if construction would largely block or obstruct a scenic view for more than 3 years, or if construction produced light and glare that would impair the safety of nearby drivers and pedestrians.

### **No Action Alternative**

Under the No Action Alternative, there would be no changes to the arena, surrounding buildings, or the arena property. No significant impacts on visual quality, scenic views, or light and glare would occur.

### **Alternative 1: OVG Proposal**

#### ***Visual Quality***

Potential impacts on visual resources can result from construction staging and material storage; detours; fencing around the perimeter of the construction area; signage, including wayfinding signs for vehicles, bicycles, and pedestrians; land use notices; construction company signage; scaffolding; temporary vegetation clearing; and the increased presence of construction vehicles, equipment, materials, and personnel. Overall, construction-related significant impacts to visual quality are not anticipated due to the limited geographic extent of impacts and their temporary nature.

#### ***Scenic Views***

Construction of the project is expected to take approximately 24 months. Construction activities visible from Kerry Park would be minimal and would be associated with installing a larger cupola and new signs on top of the arena. The majority of construction activities (e.g., demolition of existing structures, construction staging, etc.) would be visible from locations along 1<sup>st</sup> Ave N, 2<sup>nd</sup> Ave N, and Thomas St. Views from these scenic routes would be slightly altered for much of the construction period. As described in Section 9.2, *Regulatory Context*, public views of Landmarks are protected as a scenic resource because they contribute to the distinctive quality and identity of the neighborhood and city.

KeyArena, Bressi Garage, the Northwest Rooms, and International Plaza are designated Landmarks. Construction activities would likely obscure views of these Landmarks during active construction. Dismantling of Bressi Garage was considered in the Draft EIS, but OVG has since determined that the tunnel would be constructed using a mining method that does not require dismantling of the building. Only the east portion of the Pottery Northwest kiln shed would be removed. Modification to the south ends of the Northwest Rooms, the curtain wall on the south façade of the arena, and the International Plaza would affect the appearance of those portions of the Landmarks during construction (See Section 2.6, *Construction*, for more information). During construction, staging and construction equipment could obscure or detract from the enjoyment of these Landmarks although the impacts would be temporary. Permanent impacts to designated Landmarks would be subject to the City's Certificate of Approval process. The project would comply with any restoration required as part of that approval.

Due to the 2-year duration of construction, construction impacts to scenic views would be less-than-significant.

#### ***Light and Glare***

Night work outside of the arena would occur during the first 6 months of construction and periodically for the remainder of construction, requiring lighting. This would include light-emitting diode (LED) perimeter lighting, lights from construction vehicles, and lighting on cranes that would be pointed

downward and inward toward the site. Light from night work would be most noticeable to residents of the Astro Apartments and the shelter at Sacred Heart Church, which face the project site. These residents would see lighting for demolition of the buildings south of KeyArena and excavation of the underground parking garage and loading dock. Seattle Center tenants at the Northwest Rooms would see lighting from work in the plaza north of the arena. The lighted construction area would also be noticeable from the Seattle Center campus to the east including Fisher Pavilion, 1<sup>st</sup> Ave N, and Thomas St; however, the presence of existing trees would partially shield construction lighting. With the exception of construction lighting for work on the roof of the arena, lighting would be less visible north of the project site because the Northwest Rooms building would prevent spilling of construction lighting onto adjacent properties. Construction lighting would be shielded or directed (to the extent feasible) to avoid light trespass that could create light and glare issues for passing drivers and pedestrians. Because they would not last 3 years or longer or result in impacts to pedestrian or driver safety, these impacts would be less-than-significant.

With implementation of a construction lighting plan that would limit light spillage, as described in section 9.6.1 *Construction*, impacts from increased light and glare would be less-than-significant.

### **Alternative 2: Modified Proposal**

Construction impacts on visual quality, scenic views, and light and glare would be similar to those described for Alternative 1; however, there would be no night work and thus less impact from night-time lighting. Because of the short daylight hours in the winter in Seattle, some construction lighting would likely be necessary, even for normal daytime work. Also, construction would last at least 30 months, and impacts would occur over a longer period of time. Impacts would be less-than-significant due to their limited geographic extent and temporary nature.

## **9.4.2 Operations Impacts**

The following defines long-term (operations) impacts on visual quality, scenic views, and light and glare. The project could have an impact if it caused a substantial disruption or change to the existing or future visual environment. The magnitude of the potential impacts would be classified as significant as defined below. Impacts that do not reach this threshold would be less-than-significant.

***Criteria for Significant Operations Impacts:*** The project would have a significant impact if it resulted in a substantial decrease in visual quality to the point that it would not align with the City and neighborhood visions for the visual environment as expressed through applicable plans, policies, and guidelines; substantially and permanently changed a scenic view; or produced light and glare that would impair the safety of drivers and pedestrians.

### **No Action Alternative**

Under the No Action Alternative, there would be no changes to the arena, surrounding buildings, or the arena property. No significant impacts on visual quality, scenic views, or light and glare would occur.

## **Alternative 1: OVG Proposal**

Impacts associated with Alternative 1 are described in terms of impacts on visual quality, scenic views, and light and glare.

### ***Visual Quality***

Table 9-1 describes anticipated changes in visual character under Alternative 1.

The atrium lobby would be a departure from the existing visual character by introducing a glass-walled structure with a more modern appearance. However, it has been designed to fit within the width (to the west and east) of the existing façade. Overall, the bulk and scale of the project would be reduced because 5 structures and the skatepark would be removed. The new box office and stairs/mechanical buildings would be similar in height, bulk, and scale to the existing buildings on the south plaza. Under Alternative 1, the height of the arena would be unchanged.

Alternative 1 would result in views across the site being more open and less obstructed because buildings adjacent to the lot line, existing gates, and loading dock equipment would be removed, and new buildings would be constructed more centrally within the site. In addition, the grade on the south side of the site would be leveled to provide a flat plaza that is at-grade with the street and the arena, retaining open views across that portion of the site. More public open space would be provided, which would include landscaping and urban design features that meet City and neighborhood design guidelines.

The increased number and size of allowable signs, banners, and lights could lead to additional visual clutter.

Overall, the visual quality of the project site would change as a result of the project. Some people would find the modernized appearance of the site to be more aesthetically pleasing than others. It is not anticipated that there would be a substantial decrease in visual quality to the point that the project would not align with the City and neighborhood visions for the visual environment. Therefore, impacts to visual quality would be less-than-significant.

### ***Scenic Views***

Most of the changes to the project site would not be visible from the protected view at Kerry Park. Changes to the roof (i.e., the larger and brighter signs, larger cupola on top of the arena, and accent lighting on the roof) would not significantly impact views of Downtown because they would not obstruct or hinder views from Kerry Park. In addition, construction of larger signs would not result in a long-term perceptible change to the view of the arena from Kerry Park. Impacts to private views from residences on Queen Anne Hill would likely be similar to those from Kerry Park, except the arena may be more centrally located within some residential views. The project would also be visible from protected viewpoints outside of the study area. However, it is unlikely that views would be substantially altered due to the relative scale of the project within the urban landscape. In addition, the project would not be visible from many of the viewpoints due to topography, vegetation, or existing development.

### ***Proposed Sign Code Amendment***

City sign regulations currently limit the number, size, type, illumination, video display, commercial content, and other characteristics of signs associated with the arena. As part of Alternative 1, the City is proposing a sign code amendment to the Land Use Code (SMC 23.55), to create a new Seattle Center sign overlay district and other changes that would regulate the number, size, type, location, brightness, content, and operation of signs for the renovated arena, the Northwest rooms, and the accessory parking sites to the south.

**Table 9-1. Changes to Visual Character Under Alternative 1**

<p><b>Changes to Height, Bulk, and Scale</b></p>	<ul style="list-style-type: none"> <li>• Wider cupola (may be up to 50% wider but not taller).</li> <li>• Larger roof signs (approximately triple in size; the maximum proposed area for each of the 4 roof signs is 700 square feet).</li> <li>• Full-color digital display wall signs on the west and south façades of a new mechanical equipment structure approximately 28 feet from 1<sup>st</sup> Ave N.</li> <li>• A digital display sign facing 1<sup>st</sup> Ave N (replacing the existing free-standing digital display sign), with video capability.</li> <li>• A new static site identity sign adjacent to the sidewalk along 1<sup>st</sup> Ave N near the southwest corner of the site.</li> <li>• Addition of a glass atrium on the south side of the arena. The atrium would include a large digital display, or several smaller displays totaling approximately 2,400 square feet, which would be visible through the glass walls of the atrium, including from Thomas St.</li> <li>• NASA Building, West Court Building (existing box office), Blue Spruce Building, Seattle Center Pavilion, Restroom Pavilion, and skatepark demolished.</li> <li>• Addition of new box office building (approximately 50 feet by 62 feet and 15 feet tall), which would also house stairs and mechanical structures.</li> <li>• Building equipment (e.g., envelope cooling towers) added to the rooftop of the 1<sup>st</sup> Ave N Garage.</li> <li>• Equipment in the southeast portion of the Northwest Rooms (A/NT Art Gallery) would be replaced with mechanical equipment and egress stairs.</li> <li>• The southwest portion of the Northwest Rooms (adjacent to KEXP) would be extended to house mechanical equipment and egress stairs.</li> </ul>
<p><b>Changes to Transparency, Setbacks, Site Fixtures, Sign Operation, and Landscaping</b></p>	<ul style="list-style-type: none"> <li>• Less obstructed views across site due to removal of buildings, existing gates, and loading dock equipment, and placement of new buildings more centrally within the site.</li> <li>• Additional on-site pedestrian sidewalks and open spaces along north side of Thomas St allow increased visibility.</li> <li>• New trees, low-level planting, and furnishings (e.g., seating and bicycle racks).</li> <li>• Trees removed would be replaced according to mitigation requirements.</li> <li>• Grade of the south side of the site would be leveled, replacing the depressed grade of the current loading area with a flat plaza that is at-grade with street and the arena.</li> <li>• Elevations of west and east plazas would be restored to elevations more consistent with the arena as it existed in 1962.</li> <li>• Public artwork on the project site would be removed in accordance with SMC 3.14.840 (Deaccessioning and Disposition of Surplus Artworks).</li> <li>• Increased size and abundance of signs, banners, and light fixtures.</li> <li>• Video display signs would have images and video that change more rapidly than currently allowed by code, and would be visible from adjacent streets.</li> <li>• Brightness of all illuminated signs, including changing image and video displays, would be restricted to no more than 0.3 foot-candles over ambient conditions at specified distances, which vary by sign size.</li> <li>• Security gates, railings, loading dock equipment, and security lighting in the service area south of the arena removed.</li> <li>• Other parking accessories removed in the south parcel surface parking.</li> </ul>

Public views from scenic routes could be improved from Thomas St, 1<sup>st</sup> Ave N, and 2<sup>nd</sup> Ave N with the removal of buildings, gates, and equipment on the south and west sides of the arena and new structures being placed away from the lot line, allowing for more open views of Seattle Center. The 3 digital signs and a large site identity sign proposed along 1<sup>st</sup> Ave N, along with the other proposed signage and lighting, would change the views of the arena from 1<sup>st</sup> Ave N. However, they would not result in significant scenic view obstruction or alteration because they would be surrounded by open space, and the majority of the west plaza of the arena would remain visible from the street. Sign I-1 would be 140 square feet and have video display. The other 2 digital display signs (I-2 and I-3) would be on the west and south walls, respectively, of a new mechanical structure and would have digital displays but not video. The site identity sign would be adjacent to the sidewalk on 1<sup>st</sup> Ave N and would be illuminated, with the potential to change color. The new signs would attract the eye of passersby, especially when video imagery is displayed. However, due to the scale of the arena and surrounding plaza, a proposed required setback of 25 feet from the face of the curb for the video display signs, and the street trees on 1<sup>st</sup> Ave N that would remain, these signs would not detract from the existing scenic views along the adjacent streets.

The proposed roof signs would not result in significant adverse impacts to scenic views from designated viewpoints due to the placement of the signs in a developed setting with taller, lighted buildings in the background.

Impacts to scenic views of designated Landmarks would occur. However, they are considered significant only if they would result in a Landmark no longer contributing to the distinctive quality and identity of the neighborhood and city. Additionally, all changes to designated Landmarks would be subject to Landmarks Preservation Board review and approval. The proposed accent lighting along the roof would change the visual character of the roofline (a designated feature of the Landmark). However, the lighting would not substantially change views of the arena because the symmetry of the roof would be the same and the lighting would not make the roof unrecognizable from existing conditions.

The new atrium lobby would change the south façade of the arena building but would preserve the view of Landmark-designated pylon and V-shaped support columns. The south façade, including the curtain wall (the curtain wall is a

#### **Key Lighting Terminology:**

Sources used both metric and non-metric units for describing light intensity. The City's existing sign code uses a metric measure, and the proposed code amendment uses a non-metric unit. These terms are explained below.

#### **What is a candela?**

A candela is a non-metric unit of light (luminous intensity), roughly equivalent to the luminous intensity emitted by a common candle.

#### **What is a nit?**

A metric unit of luminance, defined as candela (luminous intensity) per square meter ( $\text{cd}/\text{m}^2$ ). Nits quantify surface brightness, or the amount of light an object gives off.

Outdoor Advertising Association of America recommendations for digital billboard luminance = 300–350 nits.

The Illuminating Engineering Society of North America (IESNA) recommendations for digital billboard luminance = 250 nits (day), 125 nits (night). [Source: Young, 2010]

In Seattle, SMC 23.55.005A.10 states: *"between dusk and dawn the video display shall be limited in brightness to no more than 500 units."* Because "units" are not defined in the code, for the purposes of this EIS, we assume that the units are nits.

#### **What is a foot-candle?**

A foot-candle is non-metric measure of the amount of light cast on a surface (illuminance) by a 1-candela source 1 foot away. In the U.S., foot-candles are the commonly used metric for measuring light in buildings and outdoor spaces.

The proposed amendment to the sign code would use foot-candles as a measure of the brightness of light emitted by illuminated signs, because illuminance is more easily measured than luminance, and because light meters that measure illuminance in foot-candles are relatively inexpensive and easy to use for enforcement purposes.

Landmark-designated feature), would be removed for the new atrium lobby. Because other Landmark-designated features would remain in place, removal of the south curtain wall would not eliminate the visual integrity of the structure. Therefore, the structure would still convey its historical significance.

The new extension to the Northwest Rooms (adjacent to KEXP) for egress stairs and mechanical equipment would change the visual character of the Northwest Rooms by extending the building farther to the south. The building extension design would emulate the existing height, bulk, and scale of the Northwest Rooms; therefore, it is not expected to adversely affect the character of the site or vicinity. The proposed sign code amendment would also allow a new “ticker tape” sign proposed by KEXP, adding a new feature at the northwest corner of the Northwest Rooms that would attract the viewer’s eye. The sign would not significantly change the overall character of the rest of the building and would be a relatively small-sized (1.5 feet in height) and minor visual feature in the context at the corner of 1<sup>st</sup> Ave N and N Republican St. Note that the ticker tape sign is proposed by KEXP and is not part of the Seattle Center Arena Renovation Project; it is included in this discussion because it would be allowed under the proposed sign code amendment.

Changes would also be made to the International Plaza north of the existing arena. Changes include removal and replacement of the existing hardscape, art, lighting, and 2 legacy trees, and installation of an ADA ramp. As a result, the appearance of the plaza would substantially change. However, the plaza does not currently contribute to the distinctive quality and identity of the neighborhood and city due to its limited visibility; therefore, impacts would be less-than-significant.

Under Alternative 1, the exterior of the Bressi Garage building would be preserved during construction. Removal of the east portion of the kiln shed would increase visibility of the Bressi Garage Landmark. Adverse impacts to Bressi Garage are not anticipated. These changes would be less-than-significant.

In addition, all changes to designated Landmarks would be subject to Landmarks Preservation Board review and approval. This review helps ensure that any impacts to designated Landmarks would not be significant.

In summary, no significant impacts to scenic views would occur.

### ***Light and Glare***

The project would add new night-time lighting on the project site, increasing the illumination levels of the existing setting. Figure 9-5 shows the proposed signage at Seattle Center, with the various types of signs and lighting components indicated by letters A–N. Proposed placement of the sign types is indicated in the figure. See Figure 9-5 and the Seattle Center Arena Exterior Sign Proposal in Appendix G. The major signage and lighting components include the following:

- Four internally illuminated crown identity or roof signs (approximately 16 feet high by 43 feet wide) that could change color for different events (sign A on Figure 9-5).
- A 140-square foot digital display sign with video capability near the intersection of 1<sup>st</sup> Ave N and Harrison St (sign I-1). The sign would face 1<sup>st</sup> Ave N and would replace the existing 50-square foot digital display at the arena.
- The mechanical structure southwest of the arena would have a 645-square foot digital display wall sign on the west façade (sign I-2) facing toward 1<sup>st</sup> Ave N, and a 300-square foot digital display sign on the south façade of the structure (sign I-3). (Under existing code requirements, a wall sign could be up to 672 square feet.)

- Accent lighting on the roof would be approximately 6 inches wide by 160 feet long (lighting feature labeled as “C”).
- Digital signage would be displayed in the atrium lobby and visible outside of the arena through the glass.
- Illuminated signs would be placed above entry doors with static messages, and light pole banners (approximately 30 square feet per sign face), pedestrian direction pylons (approximately 3 feet wide by 11 feet high), and 2-sided digital reader boards or digital wall signs (approximately 10 feet high by 5 feet wide) would be placed throughout the site.

Under the proposed sign code amendment, the maximum number of ground, roof, and projecting signs along the frontage on public rights-of-way could be allowed to increase from 6 to approximately 24 signs if the amendment is adopted as proposed (see Appendix G). Also, up to 35 poles with pole-banner signs could be placed in outdoor areas, along with a variety of wall signs. Such an increase in signs of various types would change the appearance of the arena; more lighting and dynamic signs would make the arena a more prominent focal point within the visual environment, contrasting with surrounding development. Because the existing arena is a unique land use, there is already a high degree of contrast in the lighting and signage. However, the collective effect of these proposed changes would be to sharpen the contrast even more. Individually and collectively, the signage allowed under the proposed sign code amendment and included in the project design would add new light sources that could cause both spillover light and glare.

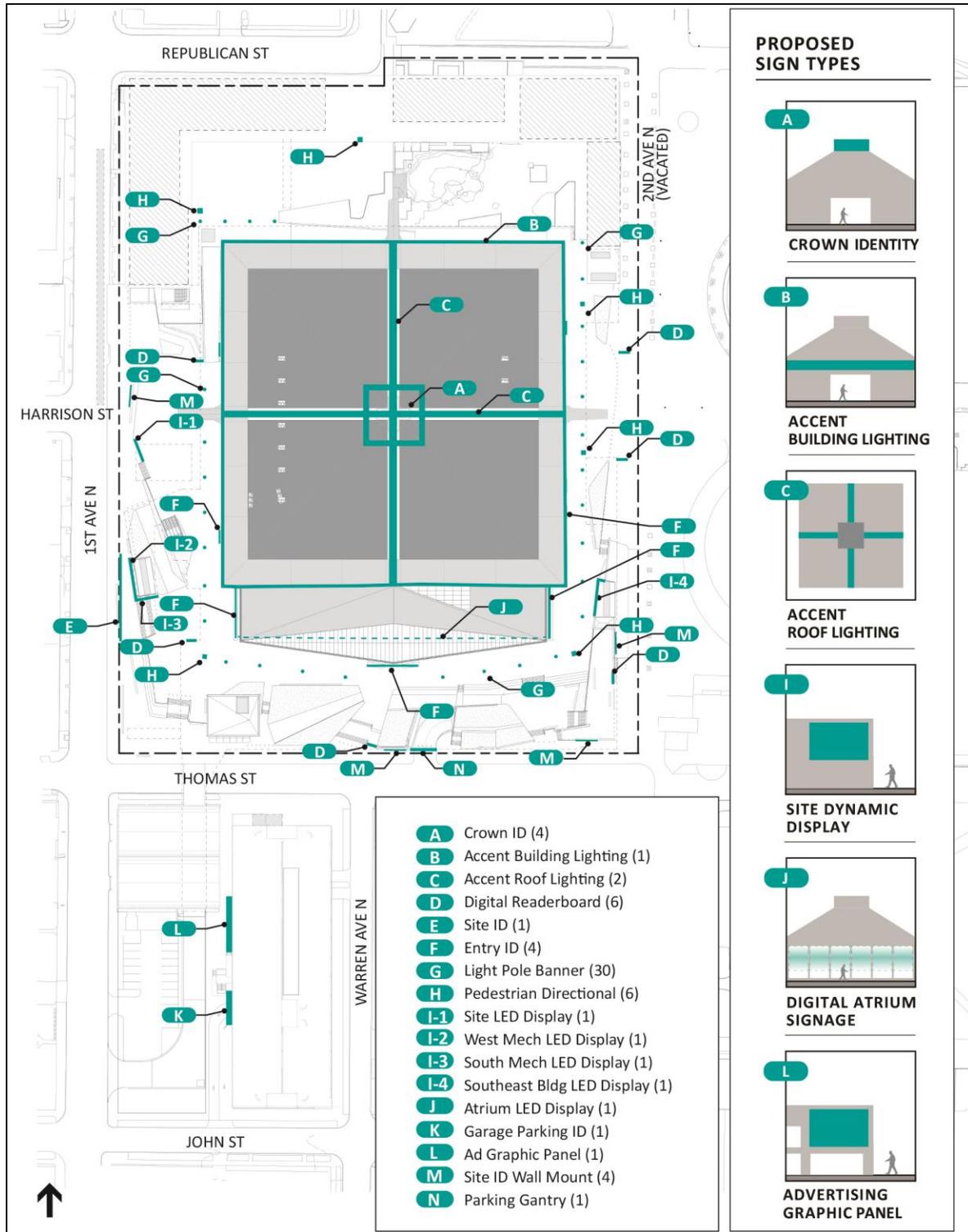
Figure 9-6 is a rendering of what the renovated arena might look like from Fisher Pavilion, with a digital reader board in the foreground and the digital atrium signage.

#### **Sign Brightness**

In general terms, glare occurs when a viewer observes a source of light to which their eyes are not sufficiently adapted. Glare can be disabling (i.e., physically prevents a viewer from effectively perceiving objects) or can create distraction through visual discomfort. Glare depends on the physiology and psychology of the viewer as well as the luminance levels within their field of view, and has been studied sufficiently to understand what light levels are generally found offensive or considered a safety risk along roadways (Lighting Sciences, 2008).

Luminance refers to the surface brightness of an object, and is not dependent on either the distance of the viewer or the ambient light levels. The current sign code (SMC 23.55) limits sign luminance at night to reduce the likelihood of glare and spillover light.

The proposed sign code amendment would establish brightness limits based on measurement of foot-candles. The brightness of any illuminated sign, including a changing image or video display sign, would be limited to 0.3 foot-candles measured at a specified distance from the sign face, depending on the size of the sign. This limit would allow signs that are bright enough at night to be readable, but would limit the apparent brightness to a level that individually should not cause significant glare from the specified distance, which varies with sign size.



Source: Provided by Populous 2018

Figure 9-5. Highlights of Proposed Signage with Light and Glare Impacts



**Figure 9-6. Potential Signage and Lighting Conditions**

Using the assumption that the proposed signs would meet the proposed brightness limits, RWDI calculated maximum night-time luminance for each of the large signs along 1<sup>st</sup> Ave N, using the “nit” metric currently found in SMC 23.55.005A.10 for video signs (Munn, 2018). Based on the proposed sign sizes and these brightness limits, the largest signs proposed, including those adjacent to 1<sup>st</sup> Ave N, would generally have luminance that is lower than the 500-nit dusk-to-dawn limit established in SMC 23.55.005A.10. The proposed video display sign (I-1) could be as bright as 520 nits at night, a slight increase from the current code limit, but not a large difference in brightness. At these levels and given the ambient light levels at the arena along 1<sup>st</sup> Ave N, new signs along this street would generally not cause glare problems at night (Lighting Sciences, 2008). However, the proposed standard does not address the cumulative effect of multiple signs in the same location, so it is possible that glare could occur when several signs are clustered within a particular view. OVG has proposed some smaller signs around the arena that could have a night-time luminance up to 1,400 nits (RWDI, 2018); however, due to their limited size and the ambient light within the project site, none of these is expected to cause glare issues on adjacent streets.

RWDI also analyzed the potential for night-time glare affecting drivers on 1<sup>st</sup> Ave N, by calculating the veiling luminance ratio, a measure that examines the light from a light source relative to ambient light levels. Generally, a ratio of 30% or lower is acceptable (RWDI 2018; Appendix C: *Tech Memo 9*). In all cases except one, the ratios were below 30%. The instance where the ratio was at 48% was from a position approximately 1 block south of the site identity sign and the 2 large digital display signs on the mechanical building. The ambient light level would be relatively low from this position, and the arena signs would form a bright spot on the right side of 1<sup>st</sup> Ave N for drivers. However, within a half a block, the ratio drops substantially; thus, exposure would be very short. In addition, the model used did not include street trees, the trunks of which would somewhat obscure the view of the signs from this distance. Based on these findings, glare would not likely impair vision during the night-time in a

significantly adverse manner and thus would not likely impact the safety of drivers or pedestrians. The signs could contribute to driver distraction, however, as described below under *Changing Image Signs*.

During the daytime, signage luminance would increase so as to remain above ambient light levels, but would be limited at all times to no more than 0.3 foot-candles above ambient light levels (a restriction that is not included under current regulations). This would ensure that the proposed luminance levels would not cause glare that would impair vision in a manner that would significantly impact the safety of drivers or pedestrians in the daytime. However, the proposed luminance levels could contribute to driver distraction, as described below.

The amendment to the sign code would allow some smaller signs to be brighter than the current code would allow, but overall would limit sign brightness to levels that are not expected to cause glare impacts.

#### Light Spillover from Signs

Site lighting and brightly lit signs, especially those with dynamic displays that change in light intensity, could affect the interior light levels in adjacent buildings, in the worst case possibly affecting sleep and general enjoyment for occupants of those buildings. RWDI analyzed the level of probable light spillover from all of the light sources proposed with the project.

The east and north sides of the arena face internally toward other uses at Seattle Center. Because spillover light in those directions would be very limited and of low intensity, and because those uses are not considered sensitive to spillover light, the project would not adversely affect adjacent uses within Seattle Center. The roof of the arena is visible from the Expo Apartments to the north. This means the proposed rooftop accent lighting and the enlarged illuminated roof signs would be visible to Expo Apartments residents. RWDI found that light spillover levels from the project would not adversely affect the Expo Apartments (RWDI, 2018).

The west side of the arena faces residential and commercial uses and an arterial street, and the south side faces a church and shelter. In these areas where the signs and other lighting would be visible, the general public and these adjacent uses could be adversely affected by brightly lit signs and video displays that could operate throughout the day and into the early night for many nights of the year.

The proposed limits on glare were developed based on a methodology originally developed to limit spillover light or light trespass in a report produced by Lighting Sciences (2008). As the report states, *“(t)he limitation values were determined from an extensive human factors research project into the levels of light trespass that may or may not be considered objectionable in the various zones. Application of the limits would keep light trespass to a low level that is unlikely to be considered objectionable to most persons”* (Lighting Sciences, 2008). The proposed sign code amendment includes a table based on this methodology that specifies the distance from an illuminated sign at which the specified limit of 0.3 foot-candles over ambient light levels must be measured.

RWDI also modeled the potential light levels from the arena renovation project where they reach adjacent uses, which are generally closer than the distances in the sign code amendment. They found that none of the light levels would be high enough to be disturbing when site conditions were taken into account (RWDI, 2018). In all areas surrounding the project, light spillover from the project would be low

#### Qualitative Descriptions of Light Spillover Effects

The RWDI analysis compared the light spillover levels with a number of qualitative metrics from various studies that examined “visual comfort.” While visual comfort is subjective, these studies developed various metrics to quantify impacts on visual comfort. For its analysis, RWDI looked at the level of impacts using the various metrics and summarized into 4 subjective glare rankings: *imperceptible*, *perceptible*, *disturbing*, and *intolerable*.

and similar to existing conditions, with the exception of the sidewalk west of the site identity sign on 1<sup>st</sup> Ave N, and at the east façade of the Astro Apartments across 1<sup>st</sup> Ave N from the large digital signs and site identity sign, as described below.

The light spillover on the sidewalk would create an area of brightly lit sidewalk surface but would not adversely affect adjacent uses.

The Astro Apartments building has units on the 2<sup>nd</sup> through 6<sup>th</sup> floors. The RWDI model showed that if signs were lit and unobstructed, light levels on the façade of the Astro Apartments could be as high as 7 foot-candles, which is potentially bright enough to be disturbing. Because 1<sup>st</sup> Ave N is lined with large street trees, RWDI analyzed light levels with trees in leaf and without. This analysis found that trees, even without leaves, would sufficiently screen the light such that light levels would be perceptible but not disturbing (RWDI, 2018). This analysis assumed that the branching on the trees would be uniform and did not consider if some trees might have few lower limbs. Thus, it is possible that light levels at the lower-level apartments could be near or above a level that could be disturbing. These light levels could be reduced with interior window coverings or by dimming the light levels.

The new atrium lobby would include video-capable digital signage that could be up to 30% of the size of the glass atrium wall (with a video display or displays totaling approximately 2,400 square feet). Because of the distance from the street, light spillover from this signage would not adversely affect adjacent properties.

The name and logo on the roof signs would change from existing conditions, but the signs would not be brighter than currently allowed at night. Accent lighting on the roof would be added. The upper floors of the Expo Apartments to the north have views of the upper portion of the arena, including the internally illuminated roof signs. The closest point of the Expo Apartments is approximately 450 feet horizontally north and 50 vertical feet below the existing roof signs. Accent lighting would consist of light reflected off of the concrete beams that support the roof of the arena and embedded lights at the roof seams and eaves, and is not expected to cause adverse impacts, although it would make the beams, seams, and eaves more visible at night. Depending on the combined luminance of the roof signs and accent lighting at night, the apartments could experience a noticeable increase in light spillage, but it is not expected to adversely affect residents.

Proposed changes to the sign code would limit night-time luminance from all illuminated signs to 0.3 foot-candles over ambient light levels; the current sign code only limits the brightness of video signs. The sign code does not regulate the brightness of accent lighting. The sign code amendment would also increase the size and number of pole, ground, roof, and projecting signs. Overall, the added limit to sign brightness would reduce the potential for individual signs to be the cause of any light spillover, but would leave the possibility that the combined effect of more and larger signs could lead to light spillover.

### **Changing Image Signs**

Changing image signs include any type of sign on which the display image can change, either mechanically or digitally. The proposal includes a number of digital changing image signs. Digital changing image signs include displays of static images that change intermittently, as well as video displays where the images move as on a television screen. Under Alternative 1, larger and more numerous changing image signs are proposed on the site. Some of the signs proposed could distract drivers.

With frequent changes in color, light intensity, and motion, the changing image signs on 1<sup>st</sup> Ave N, even those without video, could distract drivers on 1<sup>st</sup> Ave N and Harrison St, and at 1<sup>st</sup> Ave N and Thomas St. In particular, the sign with video display capability (sign I-1) has the potential to impair the safety of drivers and pedestrians, and therefore significant impacts could occur.

Non-video changing image signs could be operated 24 hours a day. Video displays would be limited to operating between 7 AM and 10 PM on non-event days. On event days, video displays could also be used until 1 hour after the event ends regardless of the time of day. The proposed changing image displays would be visible from neighboring streets and properties, and could display messages up to 10-seconds in length before a still or blank image is displayed. There would be 10 seconds of a still or blank image between videos. The changing image displays on 1<sup>st</sup> Ave N would each be several times larger than the existing digital display on the site, and closer to the street.

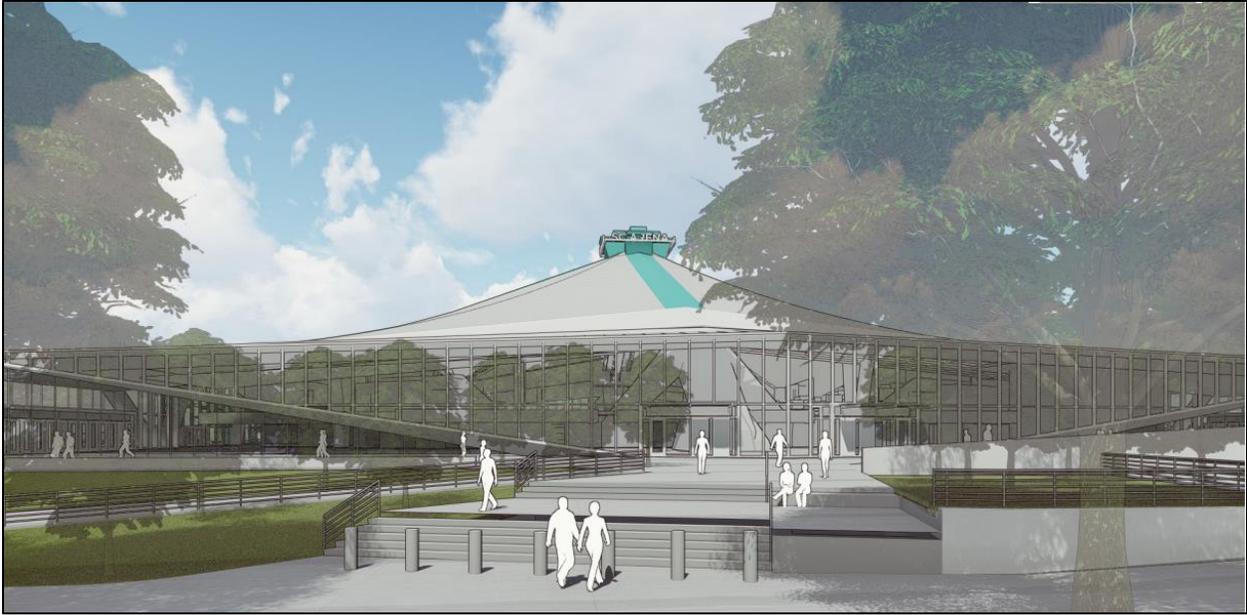
Proposed video display(s) on, or visible through the atrium lobby may be up to 30 feet above the ground, and equal to 30% of the area of the glass atrium wall, or about 2,400 square feet. The sign or signs would be visible from outside the atrium and would likely attract the attention of pedestrians and drivers on Thomas St. However, impacts would likely be reduced by trees that would be planted in the plaza, some of which would hold leaves year-round (see Figure 9-7) as well as the elevation difference between Thomas St and the atrium, which would likely block portions of the sign or signs.

Under SMC 23.55.005, the maximum duration of a video display message is 5 seconds, video signs may not face a street or adjacent property, and video signs are limited to 1,000 square inches (approximately 7 square feet). The proposed amendment to SMC 23.55 under Alternative 1 would allow video signage at the arena project site to face a street, increase the allowable length of video, and increase the allowable size of video display to 150 square feet. The combination of these changes would increase the likelihood of driver distraction. Studies have shown that drivers look at digital billboards significantly longer than other signs, with the digital signs often taking a driver's eyes off the road for more than 2 seconds (Dukic et al., 2012; Appendix C: *Tech Memo 9*). Anything that takes a driver's eyes off the road for more than 2 seconds increases the risk of a crash, with nearly 80% of all crashes involving driver inattention just prior to (within 3 seconds) of the crash (Virginia Tech, 2006).

The use of video displays and digital images close to and facing 1<sup>st</sup> Ave N has the potential to impair driver safety through distraction.

### **Reflective Surfaces**

The project would introduce a new potential source of reflective glare (the glass atrium lobby), which could result in glare impacts. Due to the orientation of the sun and angle of the windows, vertical windows on the south sides of buildings cannot cast sun glare far from the building. Similarly, vertical windows on the east and west sides of buildings have limited capability to cast glare. However, if a building window is angled, it could cast reflections of the sun horizontally for large distances or even upward into the sky. Glare from sunlight reflected from east-facing or west-facing windows and metallic materials would be limited, occurring only when the sun is very low in the sky, primarily in the first half-hour after sunrise or the last half-hour before sunset. Glare in the early morning would be directed eastward and downward, toward the Fisher Pavilion. Glare just before sunset would be directed westward and downward, toward the development south of Thomas St and west of 1<sup>st</sup> Ave N. Due to the angle of the atrium lobby surface facing south, surrounding streets and open space areas would not experience significant glare impacts. Although glare may be visible to drivers on 1<sup>st</sup> Ave N, it would likely be off-axis and not bright enough to distract attention or impair vision.



**Figure 9-7. Proposed Conditions from Thomas St looking North**

Glare impacts to the Astro Apartments could occur in summer during the late morning when the sun is high above the horizon and east of the atrium lobby. Due to the building's location to the west of the renovated arena and its height, light reflected up from the atrium roof might strike the upper floors of the Astro Apartments. However, glare impacts would likely be reduced by the presence of trees, which would have their leaves during the summer months when this high sun angle would occur (see Photo 9-2). The shelter at Sacred Heart is not expected to be impacted because it is located to the south and is a single-story building.



Source: Google Earth, 2018

**Photo 9-2. View of Astro Apartments from 1<sup>st</sup> Ave N looking North**

Due to the topography of the site and the lack of taller buildings that would be exposed to reflective glare, no significant glare impacts would occur as a result of reflective glare. In addition, trees would reduce light and glare impacts and would be included on all sides of the structure facing streets.

It is possible that polished metal panels may be used on the egress and mechanical buildings. This limited use of polished metal paneling would not result in adverse impacts.

#### **Shadows on Open Spaces**

No significant impacts from shadows on open spaces are expected. Existing structures would be removed and replaced with smaller structures (e.g., the new box office) on the south portion of the plaza. In addition, the atrium lobby, which would be the largest new structure, would be made of glass and would not produce shadows onto the plaza.

### **Indirect Impacts**

No significant indirect impacts on visual resources are expected as a result of the project. If the type of businesses in the study area shift toward ventures that cater to the new activities supported by the arena (such as NBA and NHL games), they would likely either take over existing commercial space, or build new spaces. Any new buildings would be expected to be consistent with adopted land use plans for the area.

### **Summary of Operational Impacts from Alternative 1**

Changes to the project site would not significantly impact the visual quality of the study area. There could be some increase in visual clutter due to new signs, but there would also be more open space after removal of 5 buildings on the site. Overall, the project is expected to align with the City and neighborhood visions for the visual environment.

Changes to the roof would not significantly impact views of Downtown from Kerry Park, the nearest protected viewpoint that could be affected. Although there would be some changes to views of designated Landmarks, none would substantially affect the distinctive quality and identity of the neighborhood and city.

Light and glare impacts would arise primarily due to increased signage. While glare impacts are unlikely due to the project design, significant impacts from illuminated signs could occur due to spillover light and driver distraction.

The proposed amendment to the sign code (SMC 23.55) would allow more and larger signs, and would allow video signs to face a street. Given the scale of the arena renovation project site, the additional signs allowed by the amendment would not result in adverse impacts on visual quality or scenic views. By allowing video to face a street, a potentially significant impact on driver distraction could occur. The amendment would also include limits on sign brightness and frequency of changing images on all changing image signs, not just video signs. Brightness limits and limiting the frequency of changing images for non-video changing image signs would limit the potential impacts from the increased presence of signs allowed under the regulations. Brightness limits would not take into account the light spillage or glare formed by multiple signs in close proximity, which could lead to adverse impacts, including both driver distraction and spillover light reaching adjacent residential uses. For video display signs, the amendment would allow larger and longer video images with shorter periods between clips, contributing to the potential for significant impacts.

### **Alternative 2: Modified Proposal**

Impacts from Alternative 2 would be similar to Alternative 1, except that video display would not be allowed to face the street. Therefore, the proposed sign on 1<sup>st</sup> Ave N (sign I-1) would either not be allowed to include video, or would not be allowed to face the street, which would eliminate the potential for driver distraction from the video display. Roof signs would not be allowed to be larger or brighter than the existing roof signs.

Other aspects of signage under Alternative 2 would be the same as Alternative 1. The proposed code amendment would allow Alternative 2 to have additional and larger signage, similar to Alternative 1, and would include the brightness limits for illuminated signs that are proposed under Alternative 1. Video display signs would be allowed to face non-arterial streets, so the atrium sign or signs would be allowed, as in Alternative 1.

In addition, the legacy trees in the International Plaza would remain, preserving the existing views of those trees.

Overall, the changes proposed for Alternative 2 would result in fewer adverse visual impacts than Alternative 1, and would not result in potentially significant impacts to driver safety associated with distracted driving.

## 9.5 CONSISTENCY WITH PLANS AND POLICIES

This section analyzes pertinent plans, policies, and regulations that guide or inform the Seattle Center Arena Renovation Project. These include the City's Comprehensive Plan (City of Seattle, 2016a); the Queen Anne (Uptown) Neighborhood Plan (City of Seattle 2016a); the Seattle Center Century 21 Master Plan (Seattle Center, 2008); Century 21 Design Guidelines (Seattle Center, 2009); the Uptown Neighborhood Design Guidelines (City of Seattle, 2013b); and the City-adopted SEPA policies and regulations for height, bulk, and scale, public view protection, and light and glare.

The project alternatives were reviewed for consistency with each of these plans and policies. The new atrium lobby, the new box office, and the new stairs/mechanical buildings would conform to zoning requirements for height, maximum structure width and depth, and floor area ratio. The existing KeyArena exceeds current zoning standards for height (see Chapter 3, *Land Use*). This would continue to be the case under the No Action Alternative, Alternative 1, and Alternative 2.

Under Alternative 1, there is the potential for inconsistency with the Uptown Neighborhood Design Guidelines, which state that *"throughout Uptown tasteful signs designed for pedestrians (as opposed to passing vehicles) are preferred. Backlit signs, animated reader boards and similar signs are discouraged. Blade signs, wall-mounted signs, signs below awnings, and similar signs are preferred."* Design guidelines would be considered by the Seattle Design Commission during review of the project. The Uptown Neighborhood Design Guidelines are being updated to incorporate consideration of contemporary design approaches, and this may translate into revised guidelines regarding reader boards and signage. As proposed, the Seattle Center Arena Renovation Project would be inconsistent with the current City sign code. City sign regulations (SMC 23.55) currently limit the number, size, type, illumination, video display, commercial content, and other characteristics of signs throughout the city. Under Alternative 1, the project includes a request to modify many of the restrictions of the sign regulations as they apply to this project (see Appendix G, Table G-1). Mitigation of adverse impacts would be part of the decision-making process.

The proposed signage may be inconsistent with the Century 21 Design Guidelines. The guidelines include *"key and fundamental tenets for integrating electronic technology and a digital media network into the Seattle Center campus,"* including restrictions barring LED displays from internal portions of the campus, size and color limitations for reader boards associated with a single campus facility, and signage design that is consistent campus-wide. Additionally, the Century 21 Design Guidelines state that proposed updates or changes to the campus perimeter digital reader boards *"comply with the Seattle sign code, be sensitive to and minimize any impacts on neighbors, and be mindful of a spare and uncluttered design aesthetic for perimeter streets that surround Seattle Center"* (Seattle Center, 2009).

Under the Land Use Code, glare diagrams that identify potential adverse glare impacts on residential zones and on arterials are required when a proposed structure has a façade of reflective coated glass or other highly reflective material, and the structure is less than 200 feet from a residential zone or is 400

feet from an arterial with more than 15,000 vehicle trips per day. This does not apply to the project because it is not within 200 feet of a residential zone or 400 feet from an arterial with more than 15,000 vehicle trips per day. However, once the design is refined, further glare analysis may be conducted to better quantify adverse impacts from glare. Adverse impacts could be reduced through design changes to the angles of the building and use of glare-resistant materials.

Alternative 2 would be similar to Alternative 1 in regard to these applicable policies. Alternative 2 would be more consistent with the Century 21 Guidelines because the video display would not be allowed or would not be allowed to face the street, and the area on the west side of the arena could appear less cluttered as viewed from the street. Retaining the current size of the roof signs would not likely affect the consistency with any of these policies, other than complying with the current sign code.

## 9.6 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

### 9.6.1 Construction

The following are potential measures during construction to avoid, minimize, or mitigate impacts to visual resources:

#### *Visual Quality*

- Restore staging areas as quickly as possible following project completion to reduce impacts on visual quality from construction staging and material storage.
- Replant vegetation removed for construction activities to reduce impacts on visual quality from temporary vegetation clearing.
- Place art on the construction fences surrounding the site.
- Add signage to fencing to increase awareness and wayfinding.

#### *Scenic Views*

- To the extent practicable, reduce the timeframe that construction activities would obscure public views to reduce impacts on scenic views.

#### *Light and Glare*

- To address light and glare impacts associated with night-time construction:
  - Develop and implement a construction lighting plan.
  - Ensure that all lighting related to construction activities is shielded or directed to restrict direct illumination onto properties located outside of the project site.
  - Minimize fugitive light from portable sources used for construction.
  - Limit night-time exterior construction work as much as possible.

## 9.6.2 Operations

As part of the design and approval process for the project, visual impacts will be considered by the Landmarks Review Board, the Seattle Design Commission, and Seattle Center. This includes evaluating consistency of the project with area plans, policies, and design guidelines, as well as reviewing any changes to scenic views of designated Landmarks. To limit visual impacts, the following potential measures for Alternative 1 or 2 (note that measures related to video displays facing the street would not be necessary for Alternative 2, since street-facing displays would not be allowed under that alternative):

### *Visual Quality*

- Install new public art as part of the proposed project to mitigate impacts associated with the removal of existing artwork.

### *Scenic Views*

- Minimize alterations to the Bressi Garage exterior to the greatest extent practicable to lessen impacts associated with changes to views of the Bressi Garage façade.

### *Light and Glare*

The following measures are based on design guidelines and code requirements for lighting and video display.

- To reduce potential driver distraction from changing image signs that are visible from streets, place signs high enough above street level so that a driver cannot easily see the display as they near the sign.
- To reduce potential driver distraction from changing image signs that are visible from streets, display static images only on digital display signs (i.e., restriction for any type of sign that contains images, text, parts, or illumination that flash, change, move, blink, or otherwise refresh in whole or in part). Static images would change after a safe duration of 2 to 5 seconds, consistent with research that indicates that distraction of a driver for more than 2 seconds creates a potential safety hazard.
- To reduce potential glare impacts to drivers from illuminated signs, in addition to limiting the brightness of individual signs as specified in the proposed sign code amendment, conduct a cumulative measurement where 2 or more signs would be in view simultaneously to adjust lighting levels below the threshold.
- To mitigate light and glare impacts from illuminated signs of all types, adjust light levels emitted to respond to ambient conditions, and thereby avoid excessive brightness that could spill to neighboring uses. The transition from day to night-time brightness could occur gradually, to prevent a sudden change in perceptible brightness levels by pedestrians and drivers.
- To mitigate glare from new signage, restrict digital displays from having large areas of reflective elements.
- To mitigate the potential for spillover light from new exterior lighting, design new fixtures and light sources to focus light on-site.
- To limit impacts to dark sky, use fixtures that are LED and shielded.



- To limit glare to pedestrians and adjacent properties, plant and retain trees along Thomas St and 1<sup>st</sup> Ave N to reduce direct sunlight falling on the south- and west-facing façades of new structures.
- To reduce glare to the street and neighboring buildings, design cladding material and geometry for all new structures to reduce impacts.
- To reduce or avoid potential for glare, spillover light and driver distraction, signs could be relocated or re-oriented.

## **9.7 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON VISUAL QUALITY, PUBLIC VIEWS, AND LIGHT AND GLARE**

There would be no significant unavoidable impacts on visual quality and scenic views from either of the action alternatives. There would be significant adverse impacts on light and glare under Alternative 1 as currently proposed, due to potential driver safety impacts from distraction. However, these impacts could be reduced through restrictions on luminance and the frequency and length of video display.

## 10.0 AIR QUALITY AND GHG EMISSIONS

This chapter analyzes quantitatively how the project alternatives may increase air pollutant emissions or contribute to global climate change through greenhouse gas (GHG) emissions related to increases in transportation and energy demand. Transportation systems contribute to air quality reduction primarily through the emissions of ozone precursors and particulate matter. Transportation systems contribute to climate change primarily through the emissions of certain GHGs (carbon dioxide [CO<sub>2</sub>], methane [CH<sub>4</sub>], and nitrous oxide [N<sub>2</sub>O]) from nonrenewable energy (primarily gasoline and diesel fuels) used to operate passenger, commercial, and transit vehicles. Land use changes contribute to climate change through construction and operational use of electricity and natural gas, water demand, and waste production.

GHG emissions, as they contribute to climate change, are of a global concern, while criteria air pollutants are a regional concern. Consequently, the air quality and GHG study area generally consists of the proposed arena renovation area but also considers the indirect increase in vehicle miles travelled throughout the Puget Sound region resulting from the project.

**Changes from the Draft EIS** – Based on comments received on the Draft EIS, additional information about hazardous materials that may be released during construction and potential measures related to dust control have been added to this chapter of the Final EIS. Additional references have been added, and the text has been clarified in some sections. The analysis also addresses refinements to the project, including floor area and seating capacity changes that have been developed since the Draft EIS was published.

### **Key Findings for Air Quality and GHG**

Construction would generate temporary emissions of criteria air pollutants, but they would be below federal thresholds for CO and PM<sub>10</sub>.

Temporary GHG emissions from construction would be less than the level that Ecology recognizes as a significant impact.

Operational air pollutant emissions would be below the federal thresholds for CO and PM<sub>10</sub> in 2020 and decline further by 2035.

Operational GHG emissions would initially reach approximately 28,400 metric tons per year, of which emissions from vehicles constitute over 99%. Emissions would decline annually to approximately 24,000 metric tons per year by 2035.

### 10.1 METHODS

The EIS Consultant Team reviewed the following sources of information on air quality and GHG emissions and local climate action efforts:

- Washington State Greenhouse Gas Emissions Inventory 2010–2013 (Ecology, 2016).
- U.S. Environmental Protection Agency (EPA), MOtor Vehicle Emissions Simulator (MOVES) (version 2014a) (EPA, 2014).
- NONROAD 2008 Model (version 2014b) (EPA, 2014).
- Our Nation’s Air (EPA, 2017).
- U.S. Council on Environmental Quality (CEQ) Final Guidance for Greenhouse Gas Emissions and Climate Change Impacts (CEQ, 2016; withdrawn 2017).

- King County Strategic Climate Action Plan (King County, 2015).
- City of Seattle Comprehensive Plan 2035 (City of Seattle, 2016a).
- City of Seattle Greenhouse Gas Inventory, 2014 (City of Seattle, 2016b).
- City of Seattle Climate Action Plan (2013 CAP) (City of Seattle, 2013a).
- City of Seattle Climate Action Strategy (City of Seattle, 2018a).
- City of Seattle Executive Order 2018-01: Climate Impact Assessment (City of Seattle, 2018b).
- City of Seattle Drive Clean Initiative, Resolution 31696 (City of Seattle, 2016c).
- City of Seattle Resource Conservation Management Plan, Resolution 31491 (City of Seattle, 2013b).
- City of Seattle Resolution 31326 Sustainable Buildings and Sites Policy (City of Seattle, 2011).
- City of Seattle Greenhouse Gas Ordinance 122574 (2007).
- Puget Sound Clean Air Agency (PSCAA) Air Quality Data Summary (PSCAA, 2017).
- California Emissions Estimator Model (CalEEMod) (California Air Pollution Control Officers Association [CAPCOA], 2017).

The City developed a GHG worksheet in 2007 to calculate GHG emissions; however, this worksheet was developed for general land use development projects and contains older emission factors and therefore was not suited for estimating emissions from an arena renovation project. Consequently, the above sources were used to develop project-specific emission estimates.

### 10.1.1 Analysis of Construction Impacts

Short-term construction activities generate temporary emissions from the use of heavy-duty construction equipment, vehicle trips hauling materials, and construction workers traveling to and from the project site. The assessment of construction-related air quality impacts considers each of these sources and recognizes that construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and (for dust) the prevailing weather conditions. Fugitive dust emissions were estimated using EPA's AP-42 Chapter 13.2.4 methodology for fugitive emissions from loading, road dust, and dumping of demolition and excavation material (EPA, 2006).

The City has a worksheet for GHG analysis that applies to common types of construction. The project is both an atypical use and an existing building that would be renovated, conditions that are not addressed in the worksheet. Therefore, the worksheet was not used. The Washington State Department of Ecology (Ecology) previously identified resources for methods and protocols for calculating and evaluating GHG emissions for SEPA analyses. There are no other Seattle or Washington State-specific guidelines for GHG emission analysis under SEPA, but the Ecology website refers to a methodology published by the Bay Area Air Quality Management District (BAAQMD, 2017). (In 2016, Ecology withdrew its "Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews.") The BAAQMD methodology was generally applied in determining GHG sources to be considered for this EIS analysis, because it addresses construction-related GHG emissions similar to those expected by the arena renovation project.

The anticipated project-specific schedule and CalEEMod default off-road equipment assumptions were used to determine emissions. CalEEMod is a land-use emissions model used in California that includes default construction equipment based on the size of construction project as determined from surveys of construction sites. Emissions factors for off-road equipment were determined using EPA's NONROAD model, specific to King County.

Emissions factors generated by the EPA MOVES model (version 2014a) were used in conjunction with estimated truck trip data for excavation activities provided by OVG to calculate construction-related on-road emissions. The EPA NONROAD model was used in conjunction with construction equipment estimates from the CalEEMod model to calculate construction-related emissions associated with the action alternatives. For construction, worker, vendor, and hauling vehicle class emission factors were determined, and CalEEMod default estimates for the number of trips and trip lengths were used to determine vehicle miles traveled, with an exception for hauling trips; hauling trips during excavation are estimated to be 290 trips per day for the anticipated 6 months of excavation.

Emissions were calculated for every year in which an action alternative is under construction using off-road and on-road emissions factors. The total sum of construction emissions for a given year was then compared to the federal general conformity *de minimis* thresholds applicable in King County for air quality. For GHG, Ecology retracted its prior guidance regarding significant impacts, and therefore there is currently no threshold established for GHG emissions for SEPA or other regulatory compliance. For reference, GHG impacts are compared to thresholds for reporting GHGs.

### 10.1.2 Analysis of Operations Impacts

Long-term air and GHG emission impacts would be associated with the operation of the renovated arena and mobile sources associated with changes in permanent use of the project site. Long-term emissions are primarily mobile source emissions from an increase in vehicle trips associated with the project.

#### **Pollutants of Concern**

The main criteria pollutants of interest for project construction are carbon monoxide (CO), particulate matter (PM), ozone precursors, volatile organic compounds (VOCs), and nitrogen oxides (NOx). Both federal and state standards regulate these pollutants.

**CO** is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. The federal CO standards have not been exceeded in the Puget Sound area for the past 20 years (PSCAA, 2011). However, the Puget Sound region continues to be designated as a maintenance area for CO until EPA changes this designation.

**PM** is measured in 2 size ranges: PM10 and PM2.5. Fine particles are emitted directly from a variety of sources, including wood burning, vehicles, and industry. The federal annual PM2.5 standard has not been exceeded in the Puget Sound area since monitoring began. All 4 counties in Puget Sound have been below the daily and annual PM10 federal standards from the early 1990s until monitoring was ceased in 2006 (PSCAA, 2008). However, the Puget Sound region continues to be designated as a maintenance area for PM10 until EPA changes this designation.

**Ozone** is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving VOCs and NOx. The main sources of VOC and NOx, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. The Puget Sound region is designated as an attainment area for the federal ozone standard.

Any new stationary sources (such as natural gas heaters or backup generators) and uses would also result in pollutant emissions. Emissions factors generated by the MOVES model were used to estimate operational emissions, adjusted to match estimates of alternative-specific vehicle miles travelled (VMT) developed for Section 4.4, *Transportation*. The MOVES model run included model defaults appropriate for the area such as vehicle age distribution, average speed distribution, fuel supply, fuel formulations, fuel usage fractions, alternative vehicle and fuel technology, meteorology, and road type distribution. Remaining stationary source emissions were estimated using natural gas demand rates, water demand rates, and solid waste disposal rates specific to arena land uses (CAPCOA, 2017). The total sum of operational emissions for the build-out year was then compared to the federal general conformity *de minimis* thresholds applicable in King County for air quality. As noted above, for GHG, Ecology retracted its prior guidance regarding significant impacts, and therefore there is currently no threshold established for GHG emissions for SEPA. For reference, GHG impacts are compared to thresholds for reporting to Ecology (WAC 173-441).

## 10.2 REGULATORY CONTEXT

The following briefly describes the regulatory setting for both air quality and GHG emissions relative to the proposed project. Please see Appendix H for a more detailed discussion of the regulatory setting.

### 10.2.1 Air Quality Regulations

Air quality in the Puget Sound region is regulated and enforced by federal, state, and local agencies—the EPA, Ecology, and the PSCAA; each has its own role in regulating air quality.

#### Environmental Protection Agency

EPA has identified 6 criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established: Ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and lead. Additionally, subsets of PM have been identified for which permissible levels have been established; these include PM<sub>10</sub> (matter that is less than or equal to 10 microns in diameter) and PM<sub>2.5</sub> (matter that is less than or equal to 2.5 microns in diameter). See Table H-1 in Appendix H for details.

The Clean Air Act established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from air pollution, which are also specified in Appendix H.

The Puget Sound region is currently classified as a maintenance area for the CO and PM<sub>10</sub> NAAQS, which indicates that EPA requires that these pollutants be considered in environmental analysis. These designations are used in assessing significance with respect to emissions of criteria air pollutants.

#### Washington State Department of Ecology

Ecology maintains an air quality program with a goal of safeguarding public health and the environment by preventing and reducing air pollution. Ecology strives to improve air quality throughout the state by overseeing the development of and conformity with the State Implementation Plan (40 Code of Federal Regulations [CFR] Part 52.2470(e)), which is the state's plan for meeting and maintaining NAAQS. Ecology has maintained its own air quality standard for 1-hour ozone concentrations and established its own more stringent air quality standards for annual NO<sub>2</sub>, SO<sub>2</sub>, and PM concentrations.

## **Puget Sound Clean Air Agency**

PSCAA has local authority for setting regulations and permitting of stationary air pollutant sources and construction emissions. PSCAA also maintains and operates a network of ambient air quality monitoring stations throughout its jurisdiction.

## **10.2.2 Greenhouse Gas Policies and Regulations**

### **Revised Code of Washington (RCW) 70.235.020 Greenhouse Gas Emissions Reductions**

In 2008, RCW 70.235.020 established goals for GHG emissions reduction. These goals include the following:

The state shall limit emissions of GHGs to achieve the following emission reductions for Washington state:

- By 2020, reduce overall emissions of GHGs in the state to 1990 levels.
- By 2035, reduce overall emissions of GHGs in the state to 25% below 1990 levels.
- By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to 50% below 1990 levels, or 70% below the state's expected emissions that year.

The Seattle Center Arena Renovation Project is not subject to the reporting requirements of Chapter 173-441 WAC – Reporting of Emissions of Greenhouse Gases because its emissions from stationary on-site sources are well below the threshold for reporting.

### **RCW 47.01.440 Adoption of Statewide Goals to Reduce Annual per Capita Vehicle Miles**

Reducing vehicle miles generally results in lower GHG emissions. RCW 47.01.440 establishes the following goals for reductions in annual per capita vehicle miles traveled, using 2004 as a baseline:

- Decrease the annual per capita vehicle miles traveled by 18% by 2020.
- Decrease the annual per capita vehicle miles traveled by 30% by 2035.
- Decrease the annual per capita vehicle miles traveled by 50% by 2050.

### **City of Seattle GHG Evaluation Requirement**

In 2008, Seattle adopted Ordinance 122574, which requires City planning staff “to evaluate climate impacts, including but not limited to those pertaining to carbon dioxide and other greenhouse gases when reviewing the environmental impacts of public or private proposals.” The ordinance does not establish any thresholds, standards, or restrictions regarding GHG emissions. Executive Order 2018-01 directs staff to develop an assessment methodology.

### **City of Seattle Comprehensive Plan 2035**

The City of Seattle Comprehensive Plan 2035 addresses climate change within its Environmental Element (City of Seattle, 2016a). Climate change-related goals and policies within the environmental element of the current Comprehensive Plan are listed in Appendix H. Specifically, Goal EN G3 calls for

Seattle to reduce GHG emissions by 58% from 2008 levels by 2030, and become carbon neutral by 2050. Related policies include methods for reducing GHG emissions.

### **Other City of Seattle GHG-Related Policies and Ordinances**

Seattle became the first city in the nation to adopt a green building goal for all new municipal facilities, and in 2001 the City created a Leadership in Energy and Environmental Design (LEED) incentive program for private projects. LEED is a rating system to evaluate the environmental performance of a building, which includes energy conservation measures among other measures. The green building goals for municipal facilities were updated in 2011. The City of Seattle Sustainable Buildings and Sites Policy, Resolution 31326, sets goals for City-owned properties. Goals include that new construction and major renovations meet LEED Gold and key performance requirements, and that projects follow best management practices.

City Resolution 30144 established Seattle City Light's long-term goal of meeting all of Seattle's electrical needs with zero net GHG emissions. Seattle City Light achieved GHG neutrality in 2005 through eliminating and reducing emissions, inventorying remaining emissions, and offsetting the remaining emissions, and has maintained GHG neutrality since that date (City of Seattle, 2013a). Consequently, as Seattle City Light is the local electricity provider for the project area, electrical demand in the project area is not a source of GHG emissions.

The City of Seattle Resource Conservation Management Plan (2013b) was adopted to improve resource efficiency across the City of Seattle's building portfolio. The Building Tune-Ups Ordinance (SMC 22.930) was adopted in 2016, and requires periodic building energy tune-ups for certain nonresidential buildings. In conjunction, Resolution 31652 requires municipal buildings to meet the requirements for Building Tune-Ups, and would apply to the arena project.

Seattle also established the Drive Clean Seattle electrification initiative, which contains a municipal fleet emissions reduction strategy, calls for infrastructure investment by Seattle City Light to use Seattle's electrical assets to move Seattle and overall accelerates transportation electrification in Seattle.

### **City of Seattle Climate Action Plan**

In 2011, the City Council adopted a long-term climate protection vision for Seattle (through Resolution 31312), which included achieving net zero GHG emissions by 2050 and preparing for the likely impacts of climate change. To achieve these goals, the City prepared a Climate Action Plan (2013 CAP) that focuses on City actions to reduce GHG emissions while also supporting other community goals. City actions in the 2013 CAP focus on road transportation, building energy, and waste, which comprise the majority of local emissions. With 2008 as the baseline year, the 2013 CAP identifies the following applicable targets by 2030:

- 20% reduction in vehicle miles travelled.
- 75% reduction in GHG emissions per mile of Seattle vehicles.
- 10% reduction in commercial building energy use.
- 45% reduction in commercial building emissions.

The CAP goals also address residential development energy use, but this project does not relate to residential energy use.

## **City of Seattle Climate Action Strategy**

In April 2018, Seattle adopted the Climate Action Strategy, which lays out specific goals to help Seattle achieve its overall long-term climate action goals. These include a goal of 40% reduction in municipal building energy use and GHG emissions by 2025. The strategy also proposes initiatives to increase electric vehicle usage, such as developing Shared Mobility Hubs, increasing awareness of charging infrastructure, and requiring charging in all new and major renovations to parking structures, with a goal of 30% of light duty vehicle being electric citywide by 2030.

## **10.3 AFFECTED ENVIRONMENT**

### **10.3.1 Climate and Air Quality**

Seattle is in the Puget Sound lowland, which is buffered by the Olympic and Cascade mountain ranges and Puget Sound. The Puget Sound lowland has a relatively mild, marine climate with cool summers and mild, wet, and cloudy winters.

The prevailing wind direction in the summer is from the north or northwest. The average wind velocity is less than 10 miles per hour. Persistent high-pressure cells often dominate summer weather and create stagnant air conditions, which occasionally contribute to the formation of photochemical smog.

Although the Puget Sound lowland area is the most densely populated and industrialized area in Washington, there is enough wind most of the year to disperse air pollutants released into the atmosphere. If poor dispersion persists for more than 24 hours, the PSCAA can declare an “air pollution episode” or local “impaired air quality.”

### **10.3.2 Air Quality Pollutants of Concern**

Air quality is affected by pollutants that are generated by both natural and manmade sources. In general, the largest manmade contributors to air emissions are transportation vehicles and power-generating equipment, both of which typically burn fossil fuels. The main criteria pollutants of interest for land use development are CO, PM, ozone, and ozone precursors (volatile organic compounds [VOCs], and oxides of nitrogen [NO<sub>x</sub>]). Both federal and state standards regulate these pollutants, along with 2 other criteria pollutants, SO<sub>2</sub> and lead. However, the Puget Sound region is in attainment and not a maintenance area for ozone, NO<sub>2</sub>, lead, and SO<sub>2</sub> (EPA, 2018).

The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions, and there would be no lead emissions associated with development under the Seattle Center Arena Renovation Project. Emissions of NO<sub>2</sub> associated with the project are estimated because they are a precursor to ozone formation and assessed relative to their potential impact on ozone concentrations. SO<sub>2</sub> emissions have dropped over the past 20 years because control measures were added for some sources, some larger SO<sub>2</sub> sources shut down, and the sulfur content of gasoline and diesel fuel was cut by nearly 90% (PSCAA, 2011). SO<sub>2</sub> emissions would not be appreciably generated by development under the project and, given the unclassified status of the region, are not further considered in this EIS analysis. The largest contributors of pollution related to development under the project are construction equipment, motor vehicles, and off-road construction equipment. The main pollutants emitted from

these sources are CO, PM, ozone precursors (VOC and NO<sub>x</sub>), GHGs, and Toxic Air Pollutants (TAPs). For more information on these pollutants and their health effects, see Appendix H.

### 10.3.3 Air Quality Information Sources, Monitoring, and Trends

The PSCAA monitors criteria air pollutant concentrations at 5 facilities within the Seattle city limits. The primary monitoring station within Seattle is in Beacon Hill, which is 4 miles from the project site. This station collects data for ozone, CO, NO<sub>2</sub>, and SO<sub>2</sub>. In 2014, PSCAA began operating a new station at 10<sup>th</sup> Ave S and S Weller St near I-5. PSCAA no longer monitors PM<sub>10</sub> but is focusing its efforts on PM<sub>2.5</sub> because PM<sub>2.5</sub> is associated with the most serious health effects. Based on the most recent 3 years of available monitoring data at these locations, the air pollutant concentration trends for these pollutants remain below the NAAQS (PSCAA, 2017) (also see Appendix H).

Emission projections and ongoing monitoring throughout the central Puget Sound region indicate that the ambient air pollution concentrations for CO and PM<sub>2.5</sub> have been decreasing over the past decade. Measured ozone concentrations, in contrast, have remained fairly static. Regulations on fuel and motor vehicles reduced ozone concentrations from 1990 by more than 22% by 2016 (EPA, 2017).

### 10.3.4 Study Area

GHG emissions, as they contribute to climate change, are of a global concern and criteria air pollutants are a regional concern. However, the geographic scope of the air quality and GHG analysis focuses on project-related emissions. Consequently, the study area generally is the project site but also considers the indirect increase in vehicle miles travelled throughout the Puget Sound region resulting from the project.

### 10.3.5 Sensitive Receptors in the Study Area

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. Population subgroups sensitive to the health effects of air pollutants include the elderly and the young; populations with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and populations with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. Land uses and facilities such as schools, children's daycare centers, hospitals, and nursing and convalescent homes are more sensitive than the general public to poor air quality because the populations associated with these uses have increased susceptibility to respiratory distress.

Residential areas are more sensitive to air quality conditions compared to commercial and industrial areas because people generally spend longer periods of time at their residences, with proportionally greater exposure to ambient air quality conditions.

Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupational Safety and Health Administration to ensure the health and well-being of their employees relative to their own operations.

The sensitive land uses nearest the project site include the overnight shelter at Sacred Heart Church and multi-family residential uses and a daycare, along 1<sup>st</sup> Ave N and along Republican Way W and north of the site.

Pedestrians and outdoor recreational users at Seattle Center are not necessarily more sensitive to air quality impacts but can be more susceptible to irritation from fugitive dust and particulates than building occupants, because buildings often have windows closed and filters for outside air.

### 10.3.6 Existing Greenhouse Gas Emissions in Washington

Ecology estimated that in 2013, Washington produced about 94 million gross metric tons (MMTCO<sub>2e</sub>; about 104 million U.S. tons) of CO<sub>2</sub> equivalents (CO<sub>2e</sub>) (Ecology, 2016). (The abbreviation for “million metric tons” is MMT; thus, million metric tons of CO<sub>2</sub> equivalents is written as MMTCO<sub>2e</sub>.)

Transportation is the largest source, at 43% of the state’s GHG emissions, followed by residential, commercial, and industrial energy use at 22%, and electricity generation (both in-state and out-of-state) at 19%. The sources of the remaining 16% of emissions are agriculture, waste management, and industrial processes.

### 10.3.7 Existing Greenhouse Gas Emissions in Seattle

The City updated its inventory of GHG emissions in 2016, which reflects emissions generated in 2014. Primary sources (core emissions) of GHG emissions include on-road transportation, building energy, and waste generation. Transportation sources comprise approximately 66% of inventoried emissions, while building energy (electricity generation and natural gas and other fuel combustion) comprise an additional 32%. Core GHG emissions of GHGs declined from 3.7 MMTCO<sub>2e</sub> in 2008 to 3.5 MMTCO<sub>2e</sub> in 2014, a 6% decline. This decline occurred despite an overall increase in population of 13% during the same period (City of Seattle, 2016b).

## 10.4 POTENTIAL IMPACTS

Impacts can be short term related to construction activities, or long term related to the permanent structure and operation of the project.

### 10.4.1 Construction Impacts

For the air quality and GHG analyses, the magnitude of construction-related impacts was classified as being either less-than-significant or significant. Significant impacts are defined below; impacts that do not meet that threshold are defined as less-than-significant.

**Criteria for Significant Construction Impacts:** The impact of construction-related criteria pollutants would be significant if total construction-related emissions were at or above the federal general conformity *de minimis* thresholds applicable in King County of 100 tons per year of carbon monoxide or fine particulate matter (PM<sub>10</sub>).

For the GHG analysis, as noted above, since Ecology retracted its prior guidance regarding significant impacts for GHG, there is no established quantitative threshold for GHG emissions for SEPA.

### No Action Alternative

Under the No Action Alternative, no major construction would occur at the KeyArena site; therefore, there would be no construction-related emissions from this project. Construction associated with other

projects at Seattle Center, private development in Uptown, and transportation projects in the area could cause increases in emissions.

### **Alternative 1: OVG Proposal**

Short-term construction impacts related to Alternative 1 would result from temporary emissions associated with construction. Construction would generate air emissions through the use of heavy-duty construction equipment, from vehicle trips hauling materials, and from construction workers traveling to and from the project site. The assessment of construction air quality impacts considers each of these sources and recognizes that construction emissions can vary substantially from day to day, depending on the level of activity, the specific type of operation, and (for dust) the prevailing weather conditions. These sources would also result in the emissions of GHGs.

Alternative 1 would include renovation of the interior of KeyArena, while maintaining the building's outer structural elements, including the Landmark-designated roof structure. The existing 1<sup>st</sup> Ave N Garage would be used for temporary staging and laydown during construction activities.

Excavation and demolition activities would require off-road equipment and trucks to off-haul excavated materials. Approximately 500,000 cubic yards of material would be excavated and hauled from the site. As described in Chapter 2, *Description of Alternatives*, construction of Alternative 1 would take approximately 24 months. During this period, air emissions would be generated from the use of heavy-duty construction equipment, from vehicle trips hauling materials, and from construction workers traveling to and from the project site. Mobile source emissions, primarily NO<sub>x</sub>, would be generated from the use of construction equipment such as excavators, bulldozers, wheeled loaders, and cranes. The off-hauling of excavated materials would be the predominant source of on-road emissions.

#### ***Construction-Related Air Pollutant Emissions***

Air pollutant emissions were calculated for every year in which an action alternative is under construction. Table 10-1 shows the "worst-case" year or the maximum annual emissions for the project.

The construction-related criteria air pollutant emissions from development under Alternative 1 (Table 10-1) would be well below annual emission thresholds and would be considered a minor, temporary impact on air quality. Although temporary, fugitive dust could also affect adjacent residents, pedestrians, and outdoor recreation users. No significant air quality impacts with respect to emission of criteria air pollutants are anticipated for sensitive receptors in the vicinity of the project.

**Table 10-1. Maximum Annual Construction-related Emissions for Alternative 1**

Year	Maximum Annual Emissions (tons/year)				
	VOC	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>
2018	0.53	6.81	2.47	4.75	1.34
2019	1.71	17.24	8.88	5.41	2.08
2020	1.50	13.80	8.02	1.95	1.19
<b><i>De minimis</i> threshold for Puget Sound airshed</b>	<b>N/A</b>	<b>N/A</b>	<b>100<sup>1</sup></b>	<b>100<sup>1</sup></b>	<b>N/A</b>

<sup>1</sup> Notwithstanding the continued attainment of federal CO and PM<sub>10</sub> standards, the Puget Sound region continues to be designated as a maintenance area for CO and PM<sub>10</sub> and, therefore, is subject to the application of the *de minimis* threshold for CO and PM<sub>10</sub> maintenance areas until EPA changes these designations to attainment.

### ***Fugitive Dust***

Demolition, excavation, grading, and other construction activities from the project may cause wind-blown dust that could contribute PM into the local atmosphere. Construction-related dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and the weather. In the absence of mitigation, dust generated from construction activities may result in adverse impacts on a temporary and intermittent basis during the construction period, particularly at immediately adjacent land uses. Therefore, BMPs for control of fugitive dust are included as a mitigation measure. Given the proximity of Seattle Center tenants in the Northwest Rooms to dust-generating activities, several potential additional dust control and monitoring measures are identified to reduce the potential for significant dust-related impacts.

### ***Hazardous Materials***

Due to the age of the buildings to be demolished, it is likely that hazardous materials, such as asbestos-containing materials, lead-containing paint/components, polychlorinated biphenyl (PCB) light ballasts, and mercury-containing light tubes, are present. Where hazardous materials are present, construction would comply with applicable regulations for removal and disposal. The majority of hazardous materials are removed or abated from the building prior to demolition of the building. Demolition of areas containing hazardous materials would be encapsulated or wetted to contain the dust.

A hazardous materials consultant for the project would test for any regulated hazardous materials and prepare bid documents for safe removal, handling, and disposal. The removal of any hazardous materials will be in accordance with federal, state, and City regulations including adherence to WAC 173-303, which regulates hazardous materials, as well as 40 CFR Part 761.62, which regulates PCBs.

### ***Construction-Related GHG Emissions***

Construction-related GHG emissions would also be emitted by the use of off-road construction equipment as well as by haul truck, vendor truck, and construction worker vehicle trips. Maximum annual GHG emissions would occur during the first full year of construction (2019) totaling approximately 4,572 metric tons of CO<sub>2</sub>e. For comparison, Washington's GHG reporting threshold for facilities is 10,000 metric tons CO<sub>2</sub>e per year. The State of Washington GHG reporting threshold applies only to stationary sources and is exclusive of mobile sources. It is used in this analysis for reference because there is no quantitative threshold suggested by either EPA or the State of Washington with regard to construction-related GHG emissions.

### **Alternative 2: Modified Proposal**

Impacts would be the same as described for Alternative 1 with regard to total emissions. Emissions for 2018 would be slightly lower due to fewer trucks hauling excavated material, and slightly higher in 2019 and 2020, reflecting the longer construction schedule associated with Alternative 2.

## **10.4.2 Operations Impacts**

For the air quality and GHG analyses, the magnitude of operations-related impacts was classified as being either less-than-significant or significant. Significant impacts are defined below; impacts that do not meet that threshold are defined as less-than-significant.

**Criteria for Significant Operations Impacts:** The operations impacts associated with the project would be significant if they were to result in operational emissions at or above the federal general conformity *de minimis* thresholds applicable in King County of 100 tons per year of carbon monoxide or fine particulate matter (PM10).

For the GHG analysis, as noted above, since Ecology retracted its prior guidance regarding significant impacts for GHG, there is no established quantitative threshold for GHG emissions for SEPA.

### **No Action Alternative**

Under the No Action Alternative, operations at the KeyArena site would continue as currently managed, with no increase in annual events resulting from physical improvements to KeyArena or policy changes. Under the No Action Alternative, sporting events, concerts, and other events would generate approximately 29.2 million VMT per year. Future operations of other projects at Seattle Center, private development in Uptown, and transportation projects in the area could cause increases in emissions.

### **Alternative 1: OVG Proposal**

The project would result in additional annual concerts, sporting events, family shows, community-oriented events, and other events, and would also increase capacity of the arena. Consequently, the increase in events would generate new vehicle trips to and from the event by attendees as well as by workers and supporting delivery trucks and buses for vendors and performers.

Data provided by the transportation consultant analyst estimate that each weekday sporting event would result in generation of approximately 311,274 VMT, while each weekend concert event would generate approximately 549,255 VMT (Fehr & Peers, 2018). Based on an increase of 100 sporting events and 30 concert events per year, total annual VMT is predicted to increase by approximately 47.6 million miles per year. The final design of the arena includes 250 more seats for NBA events, 200 fewer seats for NHL events, and 325 fewer seats for concerts. These changes also affect the total annual VMT, decreasing it slightly.

Resulting increases in annual air pollutant and GHG emissions from mobile sources were calculated using the increase in VMT and composite emission factors developed for years 2020 and 2035.

The project would also result in increased GHG emissions from heating and cooling, solid waste handling, water use, and wastewater treatment.

### **Operational Air Pollutant Emissions**

Operational emissions of criteria air pollutants from the increase in the number and attendance of events at Seattle Center Arena are presented in Table 10-2 for the first year of operation (2020) as well as for the future year (2035) used in the transportation analysis. As can be seen from the table, the only

### ***Seating Capacity, Vehicle Miles Traveled (VMT), and Floor Area Assumptions Used for GHG Analysis***

Seating capacity estimates were changed after the Draft EIS. The revised design of the arena includes slightly more seats for NBA events, and slightly fewer seats for NHL events and concerts. In the GHG analysis for the Final EIS, the VMT assumptions were not adjusted to address these changes, because they would have resulted in a very small reduction in annual GHG from vehicles compared to the Draft EIS. In addition, the analysis of operational GHG emissions was revised in the Final EIS to correct an outdated number used in the Draft EIS for the design floor area, resulting in a small increase from stationary sources of GHG, as compared to the Draft EIS.

pollutant that would come close to the 100 ton per year *de minimis* emission threshold would be CO, which would fall just below this value in year 2020. By year 2035, improvements to the statewide motor vehicle fleet would result in significant reductions to air emissions from the project, with CO emissions dropping by more than 50%. Because the project would not result in operational emissions at or above the federal general conformity *de minimis* thresholds applicable in King County of 100 tons per year for CO or PM<sub>10</sub>, air pollution emissions would result in a less-than-significant impact. It is acknowledged, however, that the estimated emissions for CO in 2020 are just under the threshold, and without expected reductions associated with fleet improvements, or trip reduction strategies recommended as part of transportation mitigation, significant impacts could occur.

**Table 10-2. Maximum Annual Operational Emissions for Seattle Center Arena Renovation**

Year of Analysis	Maximum Annual Emissions (tons/year)				
	VOC	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>
2020 – First Year of Operation	3.28	46.18	99.46	28.11	6.53
2035	0.84	14.89	37.77	26.89	5.40
<b><i>De minimis</i> threshold for Puget Sound airshed</b>	<b>N/A</b>	<b>N/A</b>	<b>100<sup>1</sup></b>	<b>100<sup>1</sup></b>	<b>N/A</b>

<sup>1</sup> Notwithstanding the continued attainment of federal CO and PM<sub>10</sub> standards, the Puget Sound region continues to be designated as a maintenance area for CO and PM<sub>10</sub> and, therefore, is subject to the application of the *de minimis* threshold for CO and PM<sub>10</sub> maintenance areas until EPA changes these designations to attainment.

CO = carbon monoxide; N/A = not applicable; NO<sub>x</sub> = nitrogen oxides; PM<sub>2.5</sub> = fine particulate matter; PM<sub>10</sub> = particulate matter; VOC = volatile organic compounds.

### **Operational GHG Emissions**

Increased GHG emissions from the greater number and attendance of events during operation of the project include sources such as transportation, increased solid waste disposal, increased water usage, and increased wastewater generation. Table 10-3 presents the estimated GHG emissions associated with the project for each source type.

Transportation-related (mobile source) emissions were estimated with the same methodology used in the analysis of air quality emissions. Mobile source emissions represent over 99% of total emissions. These mobile emissions reflect the substantial trip lengths that event attendees would travel as the NBA, NHL, and concert events would draw from throughout the northwest region.

VMT was based on average trip lengths as described in the transportation analysis. These were based on residence zip codes from sports and concert databases. The concert database also includes some long distance trips from Portland, Oregon and Vancouver, British Columbia that influence average trip length. A high percentage of the trips less than 5 miles would likely involve travel by modes other than private vehicle and could skew the average lower, so these relatively short, non-private vehicle trips were excluded from the calculation of average trip length. The average trip length was then multiplied by the total projected daily trips by private vehicles to arrive at VMT for private vehicles, resulting in a conservative estimate.

**Table 10-3. Operational GHG Emissions (metric tons [MT] of CO<sub>2</sub>e per year)**

Emission Source	Total Emissions (MT/Year)
	Total CO <sub>2</sub> e
Mobile Sources (2020)	26,751
Mobile Sources (2035)	22,372
Solid Waste	3.8
Water	110
Wastewater	189
Natural Gas	1,332
<b>Total 2020</b>	<b>28,385</b>
<b>Total 2035</b>	<b>24,007</b>

Note: Columns may not total precisely due to rounding.

Source: Prepared by ESA, 2018.

As can be seen from Table 10-3, the project would initially result in GHG emissions exceeding 28,000 metric tons per year in its first full year of operation (fall 2020 to fall 2021) if the arena provided events for both an NBA and an NHL team. Of these emissions, approximately 95% would be from vehicles. Implementation of clean air requirements for motor vehicles in Washington State would reduce GHG emissions over time. By 2035, this would reduce GHG emissions from the project by an estimated 16% as compared to 2020.

As described above, the City prepared a Climate Action Plan (City of Seattle, 2013a), and the Environment Element of the City's 2035 Comprehensive Plan targets a 20% reduction in VMT by 2030 (using 2008 as a baseline). Additionally, Washington State targets a reduction in statewide VMT of 18% by 2020 and 30% by 2030 (using 2004 as a baseline).

The project would increase VMT in the region and within the Seattle city limits, and since these vehicles would generate additional GHG, this would be inconsistent with the City's goal of becoming carbon neutral by 2050 (Goal EN G3) and Washington State goals of reducing VMT as a strategy for reducing GHG emissions. The increase in GHG emissions that would result from this is equivalent to approximately 0.03% of the total GHG emissions statewide (comparing the projected 2020 emissions from the project to the 2014 GHG emissions estimate). Assuming that up to 50% of the VMT would occur within Seattle city limits, GHG emissions from the project are equivalent to approximately 0.4% of the total GHG emissions citywide (comparing the projected 2020 emissions from the project to the 2014 GHG emissions estimate).

Relative to all building energy GHG emissions from the portfolio of City-owned buildings, the project represents an increase in GHG emissions of approximately 3%.

The project would also produce additional demand for electricity, solid waste disposal, water, wastewater treatment, and natural gas. Seattle City Light achieved GHG neutrality in 2005 (City of Seattle, 2013a) and, as Seattle City Light is the local electricity provider for the project area, electrical

demand in the project area is not a source of GHG emissions. Remaining stationary source emissions were estimated using natural gas demand rates, water demand rates, and solid waste disposal rates specific to arena land uses (CAPCOA, 2017). Because the existing arena generates stationary source emissions from these sources, it was assumed that the proposed project increment was 50% of those of a renovated arena of 750,000 square feet. Relative to the portfolio of City-owned buildings, the stationary source GHG emissions represent an increase of approximately 3%, largely due to the increase in natural gas consumption.

Electricity use can produce GHG emissions if the electricity is generated by the combustion of fossil fuel. As described relative to the City CAP above, the local electricity provider, Seattle City Light, is carbon neutral and has been for over a decade. Consequently, there would be no incremental GHG emissions associated with the increased electrical demand of the project.

Resulting emissions associated with waste generation and disposal in landfills are indirect. Landfills emit anthropogenic methane from the anaerobic breakdown of material.

Water and wastewater generation rates and solid waste generation rates specific to arena land uses (CAPCOA, 2017) were used to estimate GHG emissions, in lieu of the availability of data specific to arenas in Washington State and, therefore provide a conservative estimate. The additional events that would occur as a result of this project would constitute roughly 50% of the total events that would occur at the arena annually. Therefore, it was conservatively estimated that the additional demand from the increased number of events under Alternative 1 would generate 50% of the operational, water, wastewater, and solid waste typically associated with a typical arena of this size. No reduction was assumed for increased resource conservation at the renovated arena.

Water and wastewater demand generate GHG emissions through the electricity used for the treatment and transport of both water and wastewater, which may occur outside the service area of Seattle City Light. Indirect emissions from increased electricity associated with water and wastewater use were estimated using Puget Sound Energy's CO<sub>2</sub> emission factor for electricity applied in King County's GHG emission inventory, as this was the more conservative assumption. Consequently, an emission factor of 1,034 pounds of CO<sub>2</sub> per megawatt hour was used (King County, 2012).

Natural gas use results in the emissions of 2 types of GHG: methane (the major component of natural gas) and CO<sub>2</sub> from the combustion of natural gas. Based on similar assumptions as used for water consumption, it was conservatively assumed that the additional demand resulting from the increased number of events from the project would generate 50% of the estimated operational natural gas consumption for an arena of this size, based on national data.

These assumptions are conservative, because the Seattle Center Arena Renovation Project would meet a minimum LEED threshold, and would therefore likely generate somewhat less than these estimates from national data

### **Alternative 2: Modified Proposal**

Operations impacts would be the same as described for Alternative 1.

## 10.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

### 10.5.1 Construction

The following potential measures could be implemented to avoid or minimize impacts to air quality.

Prior to obtaining a grading, excavation, site, building, or other permit from the City that includes soil disturbance activities, OVG would obtain approval of a Dust Control Plan (DCP) from the City. Compliance with the DCP shall be required as a condition of the permit.

The DCP would be submitted to and approved by the City prior to the beginning of construction, and OVG must ensure the implementation of all specified dust control measures throughout construction. The DCP may include the following specific measures to the extent deemed necessary by the City to achieve no visible dust at the property boundary:

- Establish a hotline for surrounding community members who may be potentially affected by project-related dust. The contact person shall respond to and take corrective action within 48 hours. Post publicly visible signs around the site with the hotline number and make sure the numbers are given to adjacent tenants, residents, shelters, schools, and businesses.
- Prescribe methods to keep all graded and excavated areas, areas around soil improvement operations, visibly dry unpaved roads, and parking and staging areas wetted as needed daily during construction to prevent visible dust emissions from crossing the property line. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour.
- Analyze wind direction and place particulate dust monitors upwind and downwind.
- Hire an independent third party to conduct inspections for visible dust and keep records of those inspections.
- Set requirements for shutdown conditions based on wind, dust migration, or if dust is contained within the property boundary but not controlled after a specified number of minutes.
- Install dust curtains and windbreaks on the windward and downwind sides of the property lines, as necessary. Windbreaks on the windward side should have no more than 50% air porosity.
- Halt all construction activities that could generate exterior dust during periods of sustained strong winds with hourly average wind speeds of 25 miles per hour or greater.
- Limit the area subject to construction activities at any 1 time.
- Limit the amount of soil in trucks hauling soil around the job site to the size of the truck bed and cover with a tarpaulin or ensure the soil contains adequate moisture to minimize or prevent dust generation during transportation.
- Enforce a 15 mph speed limit for vehicles entering and exiting construction areas.
- Wash down all equipment before moving from the project site onto the Seattle Center campus or a paved public road. Install and use wheel washers to clean truck tires.

- Clean all visible track-out soil from the paved public road and the Seattle Center campus by street sweeping or a high efficiency particulate air (HEPA) filter equipped vacuum device within 24 hours.
- Apply soil stabilization methods to inactive areas.
- Minimize the amount of excavated material or waste materials stored on-site.
- Adequately wet all storage piles, treat with chemical dust suppressants, or cover piles when material is not being added to or removed from the pile.

## 10.5.2 Operations

No additional mitigation is recommended for impacts to air quality from criteria air pollutants. Mitigation described in Chapter 4, *Transportation*, to reduce the total volume of vehicles arriving to events would also provide mitigation for GHG emissions from mobile sources. The following measures could reduce the total GHG from the project over time:

- Meet a minimum LEED threshold for the arena renovation, which may include:
  - Achieve a modeled energy use intensity performance that is a minimum of 15% more efficient than a baseline building meeting the 2009 Seattle Energy Code.
  - Achieve projected water use performance that is a minimum of 30% more efficient (not including irrigation) than a baseline building meeting the 2009 Uniform Plumbing Code.
  - Provide bicycle parking and changing/showering facilities appropriate to accommodate expected future demand.
- Operate the arena to comply with Resolution 31326.
- Conduct Building Tune-ups – Building tune-ups are a recent City requirement that all non-residential buildings over 50,000 square feet have a building energy “tune-up” every 5 years, to optimize energy and water performance. The first required tune-up for the renovated arena would be in 2028.
- Implement carpool incentive programs for employees (as described in Chapter 4, *Transportation*).
- Implement waste diversion at KeyArena.

## 10.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON AIR QUALITY AND GHG EMISSIONS

There would be no significant and unavoidable adverse impacts to air quality or GHG emissions from either action alternative.

## 11.0 PUBLIC SERVICES AND UTILITIES

This chapter considers the potential impacts the proposed project may have on the provision of public services and utilities. Public services addressed in this section include fire, police, and school services. Utilities evaluated include water, sewer, stormwater, and electricity.

**Changes from the Draft EIS** – Based on comments received on the Draft EIS, this chapter was updated in the Final EIS to include additional information about rodent abatement (in both the construction impacts and mitigation sections), clarify compliance with the City’s stormwater requirements, and provide an update regarding water and wastewater capacity serving the project. No other substantive changes were made to the analysis or conclusions.

### **Key Findings for Public Services and Utilities**

Existing local and regional emergency services are expected to be adequate to address any increased demand from the renovated arena. Impacts on response times to incidents at the Seattle Center during construction are expected to be less-than-significant. Seattle Center and OVG will coordinate with existing utility service providers to ensure that adequate utility service is available.

### 11.1 METHODS

Public service providers and utility services in the study area were obtained from online sources and from Seattle Center. Construction impacts were analyzed by identifying construction activities that could temporarily limit, disrupt, or displace public services and/or utilities or impact public health in the study area. Operations impacts were analyzed by identifying the services and utilities proposed in the alternatives and by considering how existing services would (or would not) change following implementation.

### 11.2 REGULATORY CONTEXT

Public services in the State of Washington, including the City of Seattle, are governed by the Growth Management Act and local comprehensive plans. Comprehensive plans describe general provisions for police, fire, and emergency services, as well as schools and public utilities such as water, wastewater, stormwater, and garbage pickup.

Public services are provided under Article VI (Police) and Article X (Fire) of the Charter of the City of Seattle, enacted as law, for the purpose of protecting and enhancing the health, safety, environment, and general welfare of the people and to enable the municipal government to provide services and meet the needs of the people efficiently.

SMC 15.52 requires crowd control for events, as determined by the Special Events Committee. The committee can require a special events permit, which may include the following provisions related to public services and utilities:

- Crowd control, traffic control, safety, and security.

- Compliance with health and sanitary regulations as required by the Seattle-King County Health Department for the event.
- Coordination with the Fire Department or medical personnel for emergency treatment and evacuation of people who may need immediate care, cardio-pulmonary resuscitation, or ambulance service.
- Emergency communications, fire suppression equipment with structures, and maintenance of unobstructed emergency passageways.
- Proper waste, recycling, and compost receptacles and a disposal plan as explicated by Seattle Public Utilities, as well as a clean-up plan.

Section 3303 of the 2015 Seattle Building Code requires initiation of rat eradication a minimum of 15 days prior to the start of demolition or any clearing and grading conducted for the project.

## 11.3 AFFECTED ENVIRONMENT

### 11.3.1 Study Area

The primary study area for public services and utilities is the Seattle Center, and the secondary study area is Uptown (Figures 7-1 and 7-2, respectively, in Chapter 7, *Recreation*).

### 11.3.2 Current Public Services

#### Police and Security

The Seattle Police Department (SPD) provides police protection services to the City of Seattle, including the Seattle Center. The Seattle Center is served by the West Precinct, located at 810 Virginia St.

Seattle Center provides campus security, including for emergencies and disaster response. Seattle Center staff are trained in preparedness policies and procedures to respond to emergencies of various types (Seattle Center, 2018).

#### Fire

The Seattle Fire Department provides fire and rescue response, fire prevention and education, fire investigation, and emergency medical services throughout the city, including the Seattle Center. Emergency medical services include basic life support and advanced life support. Fire Station 2, located at 2334 4<sup>th</sup> Ave, serves the Seattle Center.

#### Schools

Seattle Public Schools (SPS) serves nearly 52,000 students in 97 schools throughout the City of Seattle. Seattle Center is within the Hay Elementary and Queen Anne Elementary attendance area for elementary school, McClure attendance area for middle school, and the Ballard High School attendance area for high school (SPS, 2018). The Seattle Center site contains 1 public school, the Center School, within the Center House. The Center School is a high school for approximately 300 students in grades 9 through 12 (SPS, 2018). The Downtown School, at 204 Warren Ave N, is a private high school that is

slated for opening in the fall of 2018. This school, owned and operated by Lakeside School, is anticipated to accommodate 160 students at full enrollment (The Downtown School, 2018).

### **11.3.3 Current Utilities**

The original electrical, water, and wastewater utility infrastructure was built in 1962 as part of the World's Fair campus. Some of the current utilities serving Seattle Center are likely original, while others have been added and upgraded over the years.

#### **Electricity**

Electricity is provided to the City of Seattle, including the Seattle Center area, by Seattle City Light (SCL). SCL is an electric utility owned by the City of Seattle. With the completion of the Denny Substation project, the existing Broad Street Substation and transmission infrastructure is expected to meet future needs through 2035 (Seattle City Light, 2015). SCL is planning to construct a utility vault and relocate utilities on Thomas St. It is anticipated this work would be completed in 2018.

#### **Water, Sewer, Stormwater, Garbage**

Seattle Public Utilities (SPU) operates a regional water supply system that provides drinking water to most of King County, including the City of Seattle. A network of water supply pipes is located throughout Seattle Center to supply water to the entire campus.

Local sewer and stormwater collection service to Seattle Center is provided throughout the campus in lines owned and maintained by SPU and transported to wastewater treatment facilities owned and operated by King County Wastewater Treatment Division (WTD). The pipelines surrounding the Seattle Center are combined sewer and storm drainage lines. King County WTD also owns and operates a 72-inch brick sewer, the Lake Union Tunnel constructed in 1894, beneath the southeast portion of the 1<sup>st</sup> Ave N Garage.

Garbage and recycling pickup service is managed throughout the city by SPU.

#### **Communications**

Cable television, internet connectivity, and telephone service in the area are provided by private utility companies (Comcast, Wave Broadband, CenturyLink, and others). Comcast and Wave Broadband have franchise agreements with the City for placement of their cable transmission lines within the public right-of-way. Free Microsoft Wi-Fi is currently available at Seattle Center.

## **11.4 POTENTIAL IMPACTS**

Impacts can be short-term related to construction activities, or long-term related to the permanent structure and operation of the project.

### **11.4.1 Construction Impacts**

Potential short-term impacts on public services and utilities include the loss or delay of a service during construction activities. The magnitude of the potential impact on public services and utilities is classified

as less-than-significant or significant. Significant impacts are defined below; impacts that do not meet that threshold are defined as less-than-significant.

**Criteria for Significant Construction Impacts:** The construction impacts would be significant if they caused: (1) a disruption in emergency service response time that results in a substantial delay of service; (2) a disruption or delay in a utility service that results in lengthy, widespread, or substantial loss of service or in loss of business; or (3) restoration of the utility would be lengthy and/or difficult, resulting in lengthy service loss.

### **No Action Alternative**

Under the No Action Alternative, no major construction would occur at the KeyArena site. Construction associated with other projects at Seattle Center, private development in Uptown, and transportation projects in the area could cause noise, traffic, and detours that could cause emergency response delays or utility disruptions to the Seattle Center.

### **Alternative 1: OVG Proposal**

During construction, emergency response time to the Seattle Center for police and fire may increase slightly. Non-emergency response times could also increase, primarily due to temporary street changes, construction vehicles and equipment, and by increased traffic and congestion on roads affected by active construction. Refer to Chapter 4, *Transportation*, for a more detailed analysis of construction-related impacts relating to traffic and congestion. The increased congestion and delays would have an impact on emergency vehicle access to and from the construction area. The Seattle Center Integration Agreement will include coordination of public services and utilities during construction (and operation) of the arena. Because of the plan to coordinate construction activities and public services, and the temporary nature of these impacts, they would be less-than-significant.

The Center School and The Downtown School may experience disruptions during construction. Students may experience some delay reaching school due to temporary construction detours, or experience increased noise during active construction. These impacts would be sporadic and temporary and would be less-than-significant.

As noted by OVG, electric, water, and wastewater utilities that are currently networked through connections that serve the Seattle Center campus will be separated to allow the renovated arena to operate under new, upgraded utility connections.

During construction, short-term disruptions to utilities, including communications, could occur due to construction activities or the need for relocation of underground systems. These disruptions may impact Seattle Center tenants, as well as nearby areas, and are anticipated to be short-term and intermittent, while the alternate connection is made. The City's electric, water, and wastewater utility providers are identifying utility separation and system upgrade needs to avoid or minimize disruptions to services during construction activities. Inadvertent damage to underground utilities could occur during construction if utility locations are uncertain or misidentified. Although such incidents are infrequent, such a disruption could result in a longer service outage than a planned outage. Because of the temporary nature of these impacts, they would be less-than-significant.

To ensure that construction-related impacts to King County's 120-year-old 72-inch brick lined sewer do not occur, the project designers will coordinate with King County WTD. With proper planning and utility sizing, impacts to the County's sewer system would be less-than-significant. Construction-related

stormwater at the site will be managed in accordance with SPU requirements, to minimize off-site discharge of stormwater.

Garbage and recycling pickup locations may need to be temporarily relocated as a result of construction activities, depending on where active construction is occurring. Because the temporary relocation would not result in a lack or reduction of service, this impact would be less-than-significant.

A number of comments on the Draft EIS identified the potential for rodent infestation during construction, particularly during building demolition. To control rodents during construction, the project will comply with the requirements outlined in Section 3303 of the 2015 Seattle Building Code. Initiation of rat eradication measures is required a minimum of 15 days prior to the start of demolition or any clearing and grading conducted for the project. The rat eradication program must be approved by a qualified pest control agent and in compliance with Seattle-King County Public Health Department guidelines and approved by the SDCI building official prior to demolition permit issuance (2015 Seattle Building Code).

### **Alternative 2: Modified Proposal**

Construction impacts associated with Alternative 2 would be similar to those described for Alternative 1.

### **11.4.2 Operations Impacts**

Potential impacts on public services and utilities include the loss of, or a significant delay in, a service or utility.

The following defines long-term (operations) impacts to public services and utilities. The project would have an adverse impact on these elements if it caused a substantial disruption or change to existing or emergency service providers or to public utility service in the area. The magnitude of the potential public services and utilities impacts is classified as less-than-significant or significant. Significant impacts are defined below; impacts that do not meet that threshold are considered less-than-significant.

***Criteria for Significant Operations Impacts:*** The operations impacts would be significant if they caused a permanent increase in demand for public services, or permanent changes in response times that could tax the ability to provide adequate emergency response services; or a loss of utility service or inadequate utility capacity through operation of the facility that cannot be mitigated.

### **No Action Alternative**

Operations impacts to public services and utilities would remain unchanged from existing conditions under the No Action Alternative.

### **Alternative 1: OVG Proposal**

As with other events throughout the city, SPD may need additional traffic flow and parking enforcement officers to staff events at the Seattle Center Arena during, or after, major events since traffic will be congested and parking in the area is limited. These events are typically staffed with off-duty police officers. Because of the scheduled nature of events at the arena and the ability to plan well in advance for large events, this increase in police activity would be less-than-significant. The increases in event traffic volumes related to an arena event would have an impact on emergency vehicle access and circulation to the arena as well as through the area. This may require emergency response vehicles to

use on-board flashing lights and sirens to navigate through the congestion and reduce delays. In addition, during periods of heavy congestion, manual traffic control may be necessary to facilitate the passage of emergency vehicles.

Operations impacts to schools would not change as a result of the project. Events such as major concerts and sporting events would largely be scheduled when school is out of session (i.e., in the evenings or on weekends).

Increased demand for water and sewer service would periodically occur as a result of operation of the larger arena facility. Increased attendance at events at the arena would result in corresponding increased demand in water and sewer service, as well as increased refuse/recyclable material generation. Increased demand for electricity would occur as a result of more events held at the arena each year. Based on information available at the time of Final EIS preparation and discussions with SPU, it is anticipated that adequate water is available to meet demand, including for fire flow. There are several combined (storm and sanitary) sewers in the vicinity. SPU is conducting modeling to confirm that adequate sewer capacity is available to convey the increased wastewater flows from the expanded arena. SPU is modeling the available downstream capacity to the south and west of the arena. The available downstream capacity will determine the available points of connection for the sanitary sewer leaving the arena. If the modeling indicates that downstream sewer capacity is not available for peak flows, the project would be required to either detain peak flows on-site or upsize downstream pipelines.

Utility system upgrades would result in additional capacity as well as greater opportunities to reduce or manage service demands. Separating arena electric, water, and sewer service demands from the existing Seattle Center campus facilities would provide greater capacity to Seattle Center, including the arena. The upgraded systems will likely be sufficient to meet increased demand from the larger arena and more frequent events, and will also create additional capacity and redundancies for the remaining Seattle Center systems. Updated utility systems would incorporate higher efficiency systems, which would result in lesser demand on the utilities serving the arena.

The water and wastewater demands of the project will be calculated during project design, and reviewed and approved by SPU and King County WTD. If needed, the final design could include storage to meet project requirements of the facility. In accordance with the City of Seattle's Stormwater Code contained in SMC 22.800 to 22.808, on-site stormwater management BMPs (which include green stormwater infrastructure) will be implemented to the extent feasible to detain stormwater on-site (SPU, 2018).

Additional garbage and recyclables pickup can be accommodated by providers with advanced notice. Community members in Uptown have expressed concerns about garbage and recycling pickup extending into the neighborhood following larger and more frequent events at the renovated arena. Because of the ability to plan for and accommodate these services, this increase in utility demand would be less-than-significant.

OVG will provide 5G and Wi-Fi coverage for visitors to the arena and into the surrounding plazas. Major cellular service providers will also be engaged to bring their services to the renovated arena for coverage inside and outside the facility. The coverage will also provide the necessary connectivity for life safety communications purposes.

## **Alternative 2: Modified Proposal**

Because the arena capacity and number of events would be the same as Alternative 1, impacts to public services and utilities would be identical to Alternative 1.

## **11.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES**

### **11.5.1 Construction**

Potential measures for construction traffic impacts are described in *Transportation*, Section 4.5.1. The following measures are recommended to reduce the impacts described above. The project would obtain permits and approvals required by the City of Seattle for construction activities, including traffic, which would minimize the delay of emergency vehicles to the Seattle Center and surrounding area. All construction would be conducted in compliance with the City of Seattle Fire Code, which is based on the International Fire Code and provides minimum standards for fire and life safety for buildings, access roads, and fire protection equipment installation (SDCI, 2015). Workplace safety and construction site BMPs, such as fencing, designated pedestrian walkways, business access points, signage, etc., would be used to protect construction workers, pedestrians, and visitors to Seattle Center during active construction.

Rat eradication measures will begin a minimum of 15 days prior to the start of clearing or demolition to minimize the potential for rat infestation in neighboring areas in accordance with demolition permit requirements as approved by the Seattle-King County Public Health Department and the SDCI building official. Additional rodent control measures may be developed as part of the Development Agreement to be implemented prior to, and during, construction.

Close coordination with utility providers and utility separation work would reduce utility outages to area businesses and residences, including Seattle Center tenants. Potholing and utility location and identification would be conducted in advance of any construction activity to minimize the potential to inadvertently disrupt underground utility services.

Construction drawings of the project will be sent to King County WTD for review prior to construction. Coordination with SPU and King County during project design would reduce the potential for construction-related impacts to existing pipes or other facilities.

Communication to area users, including Seattle Center tenants, in advance of any planned temporary service outages would allow users and residents to plan accordingly, thus minimizing the impact of a temporary service outage.

OVG has hired a full-time Community Liaison to coordinate with local community organizations during the construction phase to minimize impacts to the surrounding community.

## 11.5.2 Operations

### **Alternative 1: OVG Proposal**

In addition to the Seattle Fire Code described above, adequate fire flow will be provided to serve the arena, as well emergency access requirements as prescribed under the Fire Code provisions. The Seattle Center Integration Agreement will include coordination of public services and utilities during operation of the arena.

#### ***Police and Security***

Operation of the arena would be conducted in a manner that promotes a safe experience for all attendees. Both the NBA and NHL strive to adhere to their respective codes of conduct for fans. Below are excerpts from the NBA Fan Code of Conduct that would result in orderly sporting events and the reduced need for police activity. The NHL has a similar fan conduct code.

##### **NBA Fan Code of Conduct**

The NBA and team arenas are committed to creating a safe, comfortable, and enjoyable sports & entertainment experience (NBA, 2018). NBA fans have a right to expect an environment where:

- Guests will enjoy the basketball experience free from disruptive behavior, including foul or abusive language or obscene gestures.
- Guests will consume alcoholic beverages in a responsible manner. Intervention with an impaired, intoxicated, or underage guest will be handled in a prompt and safe manner.
- Guests will not engage in fighting, throwing objects, or attempting to enter the court, and those who engage in any of these actions will immediately be ejected from the game.
- Guests will comply with requests from arena staff regarding arena operations and emergency response procedures.

The arena staff will be trained to intervene where necessary to ensure that the above expectations are met, and guests are encouraged to report any inappropriate behavior to the nearest usher, security guard, or guest services staff member.

As required by SMC 15.52, a Special Events permit is required for major events, which requires coordination with fire, police, and emergency services.

#### ***Utilities***

As part of the proposal, OVG is planning to install low-flow plumbing fixtures to reduce the amount of water and wastewater demand during events. The project will incorporate water-efficient and bio-retention landscaping where feasible, and rainwater harvesting/irrigation reuse will be studied during design to reduce peak stormwater runoff. The project will comply with the City's stormwater regulations and peak rate flow control discharge rates. All collected stormwater from the site will be conveyed to the proposed on-site stormwater management BMPs and detention facilities. The renovated arena will include modern water- and energy-efficient fixtures, which will reduce the demand on electrical and water and wastewater utilities. The project will comply with the City's Energy Code requirements to achieve energy savings.



OVG has hired a full-time Community Liaison who will run outreach operations, including coordinating with local community organizations, to minimize impacts to utilities associated with operation of the renovated arena. Ensuring adequate garbage and recycling collection and overall neighborhood cleanliness are efforts that the liaison would oversee.

### **Alternative 2: Modified Proposal**

Measures would be the same as those described for Alternative 1.

## **11.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON PUBLIC SERVICES AND UTILITIES**

There would be no significant and unavoidable adverse impacts on public services or utilities from either action alternative.

## 12.0 PLANTS

This chapter provides an analysis of potential impacts to plants within the study area. Consistency of the alternatives with relevant plans, policies, and regulations is also provided. Because the KeyArena site is an existing facility within an urban area, it provides minimal habitat to animals that are not adapted to urban environments.

**Changes from the Draft EIS** – There have been no substantive changes to this chapter from the Draft EIS. Additional trees were assessed after the publication of the Draft EIS. Some of the trees within the arena project site that were identified for removal in the Draft EIS have now been classified as exceptional trees. This results in an increase in the number of exceptional trees to be removed, but not in an increase in the overall number of trees to be removed under Alternative 1.

### **Key Findings for Plants**

**Construction Impacts:** Alternative 1 would remove up to 13 trees designated as exceptional, legacy, and/or street trees. Alternative 2 would remove up to 10 trees designated as exceptional, legacy, and/or street trees. Trees would be replaced at a 2:1 ratio or greater. Removal of trees would not be significant.

**Operations Impacts:** Removal of large trees would result in a temporal loss of tree canopy because replacement trees take many years to grow to mature size.

### 12.1 METHODS

Potential impacts were evaluated by reviewing the documents and other sources listed below. Given the urban nature of the environment, the analysis focuses on exceptional, legacy, and street trees (as defined in Section 12.3.4, below). The study area is limited to the project site and immediately adjacent streets (Figures 2-2 and 2-8 in Chapter 2, *Description of Alternatives*).

The following data sources were reviewed:

- Arborist Report (Urban Forestry Services, 2018a,b).
- Memorandum re: Appraisal of Trees to be Impacted (Tree Solutions, 2018).
- Century 21 Design Guidelines, Chapter 2: Landscape Management Plan (Seattle Center, 2009).
- Urban Forest Stewardship Plan (City of Seattle, 2013).
- U.S. Fish and Wildlife Service (USFWS) Critical Habitat Mapper (USFWS, 2018).
- Washington Natural Heritage Program Database (WDNR, 2018).
- Priority Habitats and Species Database (Washington Department of Fish and Wildlife [WDFW], 2018a).
- Washington State Species of Concern Lists (WDFW, 2018b).
- Geographic Information System (GIS) data from SDCI (City of Seattle, 2018).
- Seattle Tree Inventory Map (SDOT, 2017).

The study area is urbanized, with most of the area covered with impervious surfaces. However, there are several large trees that surround the site as well as smaller shrubs and landscaped areas that provide habitat for urban-adapted wildlife such as crows, gulls, some songbirds, raccoons, and rodents.

There are no Priority Habitats and Species (WDFW, 2018a), State Species of Concern (WDFW, 2018b), and no critical areas (City of Seattle, 2018) within or immediately adjacent to the study area. There is no critical habitat for federally threatened species listed for the area. Bald eagles may be seen in the study area, but there are no known bald eagle nests in the study area (USFWS, 2018; WDFW, 2018a). No populations of threatened or endangered plant species are documented in the study area (WDNR, 2018). Due to the urban nature of the study area, animals and non-protected plants are not addressed further in this EIS analysis.

## 12.2 REGULATORY CONTEXT

Trees on the Seattle Center campus are protected by SMC 25.11 and Executive Order (EO) 2017-11 (Tree Protection), EO 03-05 (Tree Replacement), Director's Rule (DR) 30-2015 (Standards for Landscaping, including Green Factor), and DR 16-2008 (Designation of Exceptional Trees). Street trees in the public right-of-way, are regulated by SMC 15.43, Tree and Vegetation Management in Public Places. Trees (especially the management of canopy trees) are an important element of the Seattle Center Century 21 Master Plan (Seattle Center, 2008), Landscape Management Plan (Seattle Center, 2009), and the Urban Forest Stewardship Plan (City of Seattle, 2013).

## 12.3 AFFECTED ENVIRONMENT

### 12.3.1 Study Area

The study area includes the project site and to the centerline of immediately adjacent streets (including vacated 2<sup>nd</sup> Ave N to the east of KeyArena) (Figures 2-2 and 2-8 in Chapter 2, *Description of Alternatives*).

The study area is urbanized, with most of the area covered with impervious surfaces. However, there are several large trees that surround the site as well as smaller shrubs and landscaped areas.

Trees (especially the management of canopy trees) are an important element of the Seattle Center Century 21 Master Plan (Seattle Center, 2008), Landscape Management Plan (Seattle Center, 2009), and the Urban Forest Stewardship Plan (City of Seattle, 2013). Trees shape the character of Seattle Center and ensure that it is a dynamic and engaging public space and an important component of the aesthetics, feel, and history of Seattle Center.

Seattle Center recognizes "exceptional trees," "legacy trees," and "dedicated trees" on the campus.

### 12.3.2 Exceptional Trees

Exceptional trees are defined in SMC 25.11. An exceptional tree designation is given when a tree or group of trees that, because of unique historical, ecological, or aesthetic value, constitutes an important community resource. The purpose of SMC 25.11 is to encourage the protection of trees over a certain size and exceptional trees, which are trees with unique historical, ecological, or aesthetic value to the community. There are approximately 19 exceptional trees in the study area (Urban Forestry Services, 2018a,b).

### 12.3.3 Legacy and Dedicated Trees

A legacy tree is a Seattle Center designation given to a tree or group of trees that are considered important community resources because of unique or noteworthy characteristics or values; some of these legacy trees pre-date the 1962 World's Fair. Legacy trees can also be exceptional or street trees. A dedicated tree has a plaque, marker, or other documentation on file to commemorate its prominence. There are 70 legacy trees and no dedicated trees within the study area. The Landscape Management Plan identifies 3 potential legacy trees in the International Plaza north of the existing KeyArena. Two of these 3 trees are also considered exceptional under SMC 25.11. The London plane trees that line vacated 2<sup>nd</sup> Ave N to the east of KeyArena and the International Fountain Pavilion are also legacy trees. All London plane trees on the Seattle Center campus are legacy trees. Seattle Center's policy is to retain legacy and dedicated trees if possible, but allows for the removal or relocation of these trees if other options are infeasible (Seattle Center, 2009).

### 12.3.4 Street Trees

Street trees are "trees located in public places which includes public right-of-way and the space above or beneath its surface, whether or not open or improved, including streets, avenues, ways, boulevards, drives, places, alleys, sidewalks, planting strips, squares, triangles, and plazas that are not privately owned" (SDOT, 2014). Street trees are regulated under SMC 15.43. Street trees are located around the perimeter of the study area and along Thomas St. Street trees that may be affected by the project line 1<sup>st</sup> Ave N, Thomas St, Warren Ave N, and John St (SDOT, 2017).

## 12.4 POTENTIAL IMPACTS

This section evaluates potential impacts to trees for the No Action Alternative and Alternatives 1 and 2.

### 12.4.1 Construction Impacts

Criteria for determining short-term potential impacts to plants from construction are characterized as less-than-significant or significant. Potentially significant impacts are defined below; impacts that do not reach this threshold are determined to be less-than-significant.

***Criteria for Significant Construction Impacts:*** The impacts of construction activities would be significant if they would be disruptive and/or continue long enough to result in a permanent loss of exceptional, legacy, dedicated, or street trees or other vegetation that cannot be mitigated.

#### **No Action Alternative**

Under the No Action Alternative, there would be no demolition or construction at the site. There would be no expected changes to exceptional, legacy, or street trees, other than regular management. If a tree becomes unhealthy, dies, or a hazard to public safety, it may be removed. Impacts to plants (trees) would be less-than-significant.

#### **Alternative 1: OVG Proposal**

Trees would be protected during construction in accordance with SMC 25.11, DR 30-2015, and the Street Tree Manual (2014) to avoid impacts to the extent possible. Construction activities near exceptional, legacy, or street trees have the potential to damage a tree's roots or canopy.

For Alternative 1, up to 13 exceptional, legacy, and/or street trees would be removed during construction. See Figure 12-1 for exceptional, legacy, and/or street trees that are proposed for removal. Installation of the foundation walls at the north end of the arena and its expanded underground footprint would require the removal of 3 trees: 1 exceptional/legacy tree, 1 exceptional tree, and 1 legacy tree in the International Plaza.

Construction of the underground parking garage entrance on Thomas St would require the removal of 1 legacy/street tree. Construction of the garage entrance on John St would require the removal of 1 legacy/street tree, and 1 street tree would be removed for the loading dock tunnel entrance on 1<sup>st</sup> Ave N. One legacy tree on Thomas St would be removed for the tunnel, and the roots of street trees along Thomas St may be impacted by tunneling under the street (under the trees), depending on the depth of the tunnel. Depending on the depth, tunneling activities could destroy tree roots, which in some cases could ultimately kill the trees.

Additionally, all existing landscaping, shrubs, and trees including 7 trees that are exceptional within the project site would be removed (approximately 60 trees). Figure 12-1 shows trees to be removed within the project site. The removal of legacy, exceptional or street trees would be a less-than-significant impact because they can be replaced with mitigation. All plazas would be redesigned, and new landscaping would include a number of trees. Preliminary landscape drawings include at least 100 new trees.

SMC 25.11.090 requires tree replacement at a ratio of at least 1:1. However, EO 03-05 (Tree Replacement) requires all City departments to replace every tree removed from City-owned land with 2 new trees (2:1 ratio). EO 2017-11 (Tree Protection) clarifies that trees may be replaced at a higher ratio at the request of SDOT (for street trees) or Seattle Center (for all other trees). City plans promote the retention of existing trees and tree canopy on City-owned land but allow for their removal if certain conditions are met.



**Photo 12-1. Legacy Trees Proposed for Removal Under Alternative 1**

The Seattle 2035 Comprehensive Plan has a policy to “Enhance wildlife habitat by restoring forests and expanding the tree canopy on City-owned land” (City of Seattle, 2016). With planned mitigation, the project would be consistent with this plan.

The Urban Forest Stewardship Plan (City of Seattle, 2013) supports a healthy and regenerative urban forest across Seattle’s public and privately owned lands; maintaining existing trees and planting new trees are priority actions. Although the removal of existing mature trees is not consistent with this plan, the replanting of trees is consistent with the plan.

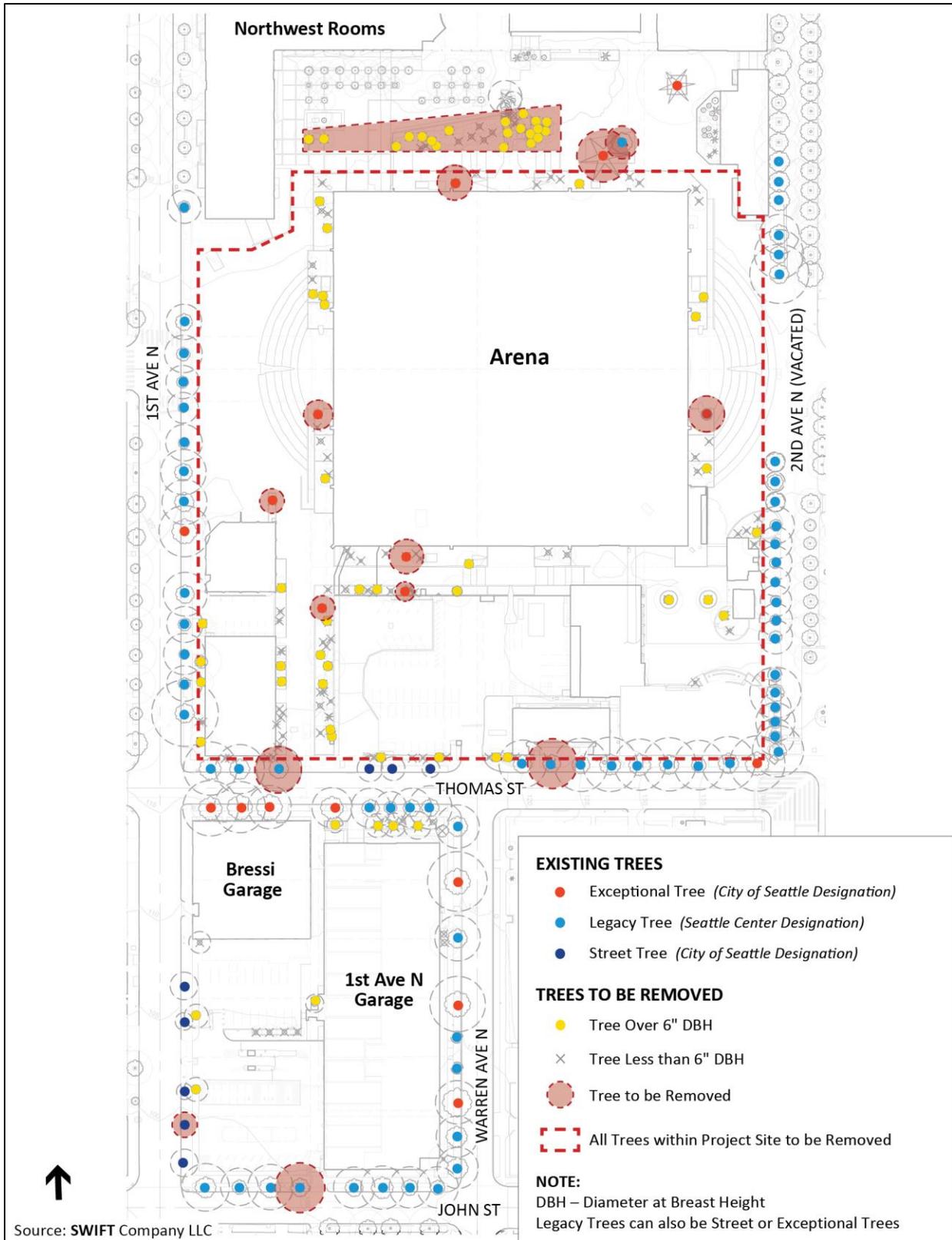


Figure 12-1. Trees to be Removed under Alternative 1

The Landscape Management Plan (Seattle Center, 2009) outlines a management philosophy and framework for Seattle Center's landscape and outdoor spaces. It aims to retain legacy or dedicated trees when possible, but they can be removed with approval from the Director of Seattle Center. With planned mitigation, the project would be consistent with this plan.

### **Alternative 2: Modified Proposal**

Alternative 2 would likely require the removal of 10 exceptional, legacy, and/or street trees. The north end of the arena would be redesigned to avoid removal of the 2 legacy trees in the International Plaza that would be removed under Alternative 1. However, the roots of these trees may be compromised from foundation construction, which could ultimately kill the trees. The third tree east of 1<sup>st</sup> Ave N on the north side of Thomas St would remain under Alternative 2. Roots of street trees may also be impacted by tunneling. As with Alternative 1, 3 trees would be removed for driveways: 1 legacy/street tree on Thomas St would be removed for construction of the entrance to the underground parking garage, 1 legacy/street tree on John St for the relocated driveway to the 1<sup>st</sup> Ave N parking garage; and 1 street tree on 1<sup>st</sup> Ave N for the loading dock access tunnel driveway. The trees removed on John St and 1<sup>st</sup> Ave N would be different from Alternative 1 because the driveways are in different locations. As with Alternative 1, all existing landscaping, shrubs, and trees larger than 6-inches diameter at breast height that are not exceptional, legacy, or street trees on the arena parcel of the project site would be removed (approximately 60 trees).

### **12.4.2 Operations Impacts**

This section describes potential operations impacts to trees from the proposed Seattle Center Arena Renovation Project. Potentially significant impacts are defined below. Impacts that do not reach this threshold would be less-than-significant.

***Criteria for Significant Operations Impacts:*** An impact would be significant if it resulted in a permanent loss of exceptional, legacy, dedicated, or street trees or other vegetation that cannot be mitigated.

#### **No Action Alternative**

No impacts are expected to plants (trees) from operation of the existing KeyArena under the No Action Alternative.

#### **Alternative 1: OVG Proposal and Alternative 2: Modified Proposal**

Trees removed during construction would be replaced at a ratio of at least 2:1 as described above. However, there would be a temporal loss of tree canopy from the removal of mature trees and replacement with younger, smaller trees. Tree canopy would be replaced over time as replacement trees mature.

The operational impacts under Alternative 2 would be similar to Alternative 1, except that effects on tree canopy would be less.

## 12.5 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

### 12.5.1 Construction

#### Alternatives 1 and 2

Potential measures include the following: Comply with the tree protection measures outlined in DR 30-2015 and the Street Tree Manual (SDOT, 2014). A Tree, Vegetation, and Soil Protection Plan is recommended to be developed for the project. OVG has committed to tree replacement at a 2:1 ratio as required by EO 03-05 (Tree Replacement). Historic markers may be installed to recognize the legacy of the removed trees, and steps may also be taken to preserve other legacy trees on the campus. OVG has committed to planting approximately 100 new trees on the project site, including specimen trees to be planted in the same location as the 2 legacy trees that would be removed from the southeast portion of the International Plaza.

### 12.5.2 Operations

#### Alternatives 1 and 2

Potential measures include the following: Develop a landscape plan in coordination with Seattle Center, and the landscape design for the project would be consistent with the Seattle Center Landscape Management Plan (Seattle Center, 2009). Over time, tree canopy would be replaced as new planted trees mature.

## 12.6 SIGNIFICANT AND UNAVOIDABLE ADVERSE IMPACTS ON PLANTS

There would be no significant and unavoidable adverse impacts to plants.

## 13.0 CUMULATIVE IMPACTS

This chapter evaluates and summarizes the potential cumulative impacts of the project alternatives. Cumulative impacts are impacts that could result from the incremental consequences of an action (in this case, the project alternatives) when added to other reasonably foreseeable future actions. When impacts of an action are viewed individually, they may appear minor, but when considered collectively (cumulatively) with the impacts of other actions (especially over a period of time), the impacts can be more significant. The purpose of the cumulative impacts analysis is to ensure that decision-makers consider the full range of consequences for the proposed project, including the project's incremental contribution to cumulative impacts on the environment. The analysis includes only the elements of the environment for which cumulative impacts occur.

### 13.1 REGULATORY CONTEXT

SEPA directs lead agencies to consider the direct, indirect, and cumulative impacts of proposed actions. This cumulative impact analysis is prepared in accordance with SMC 25.05.670, SEPA (RCW 43-21C), the SEPA Rules (WAC 197-11-060 and 197-11-792), and the SEPA Handbook (Ecology, 2003).

#### 13.1.1 Methods

This analysis provides a broad assessment of potential cumulative impacts related to implementing the project. An array of other past, present, and reasonably foreseeable future actions near the project site were reviewed. The cumulative impact analysis used the following approach:

- Identification of geographic boundaries (i.e., the study area). The preceding chapters of this Final EIS describe the potential impacts of the project on elements of the environment. As described in those chapters, the study areas are the areas where the project has the potential to affect elements of the environment. In general, the study areas include the project site and surrounding areas. The cumulative impact assessment uses the same study area for each element of the environment, as the study areas represents the area where the project, in combination with other past, present, or reasonably foreseeable future actions, could result in cumulative impacts.
- Identification of reasonably foreseeable future projects and actions within the geographic and time-based boundaries.
- Analysis of the cumulative impacts of these reasonably foreseeable future projects and actions together with the direct and indirect impacts of the project.

#### 13.1.2 Reasonably Foreseeable Future Projects

Reasonably foreseeable future major construction and development projects in the vicinity of the project that are known or are projected to occur during approximately the same time frame as the proposed project were considered in this cumulative impact analysis and are summarized below. The projects considered include both public and private projects. The Seattle Center Arena Renovation

Project is in an area that is rapidly growing, and it is difficult to project future developments and redevelopments with accuracy.

A number of transportation improvements and projects were considered as part of the transportation analysis included in Chapter 4, *Transportation*. Additional details on roadway, pedestrian, bicycle, and transit projects considered for the transportation analysis are included in Appendix C, Tech Memo #3 (*Year 2020 & 2035 Background Transportation Network*). Some major projects, such as the extension of LINK light rail north to Lynnwood Transit Center and the Ballard to West Seattle extension, will affect transportation impacts and are described in Chapter 4, *Transportation*.

- Alaskan Way Viaduct Replacement Project. SR 99 tunnel open to traffic with tolls, Alaskan Way Viaduct would be closed and demolished, and Alaskan Way/Elliott Ave W surface streets would be reconstructed.
- “Reknitting” or reconnection of surface streets across SR 99, including Harrison St, Thomas St, and John St.
- Waterfront Seattle.
- Expedia Campus Major Phased Development.
- Redevelopment activities at the Seattle Center campus, including potential modifications to Memorial Stadium, potential construction of a new high school facility, and potential renovations to the KCTS 9 site.
- LINK light rail extended north to Lynnwood Transit Center and Ballard, west to West Seattle, and east to Redmond. Includes a station near Seattle Center.

In addition, new residential and commercial development in Uptown, Belltown, and South Lake Union may occur in the same or near timeframe. At the time of Final EIS preparation, 6 permit applications were listed in the SDCI permit tracking system for proposed large apartment or condominium buildings within 2 blocks of the project site.

None of the above activities are functionally related to the project (i.e., one could proceed without the other). Each of the projects would be required to conduct separate, project-specific SEPA environmental review, as appropriate. Mitigation measures for each project would decrease the potential for cumulative impacts.

If any of these projects were constructed at the same time as the arena renovations, there is a potential for a cumulative impact from construction-related congestion, parking demands, noise and dust, and associated inconveniences to Seattle Center tenants as well as adjacent residents and business. These impacts would occur over the approximately 24-month construction period for Alternative 1, or the approximately 30-month construction period for Alternative 2. Construction management of the Seattle Center Arena Renovation Project would include coordination with other developments to reduce the potential cumulative construction impacts on Seattle Center tenants, neighboring residents, and businesses; however, construction-related inconveniences would likely occur throughout the construction period.

There are no cumulative impacts associated with the No Action Alternative for any element of the environment. Potential cumulative impacts would be the same for Alternatives 1 and 2, as described below. Only those environmental elements with cumulative impacts are described.

## 13.2 LAND USE

During construction, there may be indirect impacts to nearby properties, Seattle Center tenants, residents, and businesses from the loss of on-street parking, construction noise, and construction traffic. These disturbances, concurrent with other construction projects in the study area, would create intermittent inconvenience to Seattle Center tenants, businesses, and residents that could ultimately contribute to some residents or patrons deciding to avoid or leave the area, or businesses deciding to relocate.

Both action alternatives would increase the frequency of major events, resulting in a greater number of visitors during the year to the Seattle Center Arena, Seattle Center campus, and neighboring areas. This could make the area more attractive to sports and entertainment-related businesses, but could make it less attractive for businesses and non-profit organizations not associated with sports or entertainment.

The potential for more parking and traffic congestion would be cumulative with the increased development density planned for in the Uptown and surrounding neighborhoods. Numerous comments were received on the Draft EIS noting this trend as a negative impact, characterizing the increased densification of the area as a contributor to a loss of neighborhood character, reduction in affordable housing availability, and a detriment to long-time businesses in the area not associated with sports or entertainment.

Surrounding businesses may see an increase in demand for services as a result of the increase in frequency of programming and subsequent number of visitors during the year. Businesses that could experience increased demand based on the increased frequency of events include nearby restaurants, coffee shops, and some retail uses. This could be seen as a positive or negative impact, depending on the perspective of existing businesses in Belltown, Uptown, and South Lake Union.

## 13.3 TRANSPORTATION

Chapter 4, *Transportation*, includes analysis of both a 2020 and 2035 scenario, which includes trips and parking demand from other anticipated development in the study area. The Transportation analysis presents the results of a cumulative analysis. See Section 4.4, *Potential Impacts*, for details. In general, increased vehicle trips associated with event attendees at the renovated arena would add to congestion on area streets, resulting in significant impacts to traffic operations. This increased traffic and associated congestion would contribute to the trend of increasing regional traffic congestion. Numerous comments were received on the Draft EIS expressing concern about the proposed project contributing to the worsening congestion in the study area.

Depending on which alternative is implemented, the inconvenience and disruption associated with the 24- to 30-month construction period would cumulatively add to the other construction projects in the study area.

## 13.4 HISTORIC AND CULTURAL RESOURCES

The increased frequency of events associated with the Seattle Center Arena Renovation Project alternatives could cumulatively contribute to accelerated change in the character of adjoining

neighborhoods, as the area undergoes a transition toward higher density development, and existing, older buildings are demolished and replaced.

## 13.5 NOISE AND VIBRATION

Noise and vibration from construction of the project would contribute to an already noisy environment, including construction activities from other projects if they occur nearby. These cumulative increases would be most noticeable at night, particularly to residents of apartments and housing shelters near Seattle Center. Noise analysis is by nature cumulative; higher ambient noise levels affect how new noise is perceived. Overall, the Seattle Center Arena Renovation Project would contribute to a noisier environment caused by sports fans, amplified outdoor broadcasts, and a higher level of activity prior to and following events. The increased frequency of these events would cumulatively add to other noisy events in the study area.

## 13.6 VISUAL RESOURCES

Increased lighting associated with signage would contribute to higher levels of lighting in Uptown, as the area increases in density and businesses install signage and outdoor lighting. Proposed signage, including video signage proposed for Alternative 1, would add to driver distraction as drivers travel near Seattle Center.

## 13.7 AIR QUALITY AND GHG EMISSIONS

Cumulative impacts on air quality would be related to short-term increases in construction activity associated with the project along with other proposed construction projects in the area. Cumulative impacts on GHG emissions would result from the operation of the renovated arena. Long-term cumulative increases in traffic volumes, vehicle miles traveled, and congestion would result from the increased number of events and from future growth in traffic from other future projects in the area. The increased vehicular traffic associated with the greater number of events at the renovated arena would contribute to GHG emissions from background traffic in the area that is also expected to increase, which would cumulatively contribute to inconsistency with the City's GHG reduction goals. Near Seattle Center, air pollution emissions could increase from vehicular traffic diverted by tolling the new SR 99 tunnel, Waterfront Seattle, and new residential and commercial development in Uptown, Belltown, and South Lake Union, although over time, improvements in vehicle emissions should reduce most air pollutants from vehicles.

## 13.8 PUBLIC SERVICES AND UTILITIES

Renovation of the arena and the associated increased number of events would contribute to the general trend of increased demand on public services and utilities throughout the city, particularly water and sewer utilities. Congestion associated with larger events and other proposed developments in the area



could create delays for emergency vehicles that would cumulatively add to the potential for increased congestion-related delays on study area roadways.

## **13.9 PLANTS**

The removal of large trees would contribute to an overall temporal decrease in canopy cover that has been occurring in the city as the result of development, which is inconsistent with City policies to retain large trees and increase tree canopy cover.

## 14.0 DISTRIBUTION LIST

The following parties have received copies of the full Final EIS:

### ***Tribal Governments***

Duwamish Tribe

Muckleshoot Indian Tribe

Snoqualmie Tribe

Stillaguamish Tribe

Suquamish Tribe

Tulalip Tribes

### ***Regional***

Puget Sound Clean Air Agency

Puget Sound Regional Council

Sound Transit

### ***Washington State***

Department of Archaeology and Historic Preservation

Department of Ecology SEPA Register

SEPA Public Information Center

### ***Libraries***

Central Branch

Queen Anne Branch

### ***Local***

King County Executive's Office

King County Metro Transit

King County Wastewater Treatment Division

Seattle Center

Seattle City Council Legislative Department



Seattle City Light

Seattle Department of Construction & Inspections

Seattle Department of Neighborhoods, Historic Preservation Program

Seattle Department of Parks and Recreation

Seattle Department of Transportation

Seattle Design Commission

Seattle Fire Department

Seattle Law Department

Seattle Office of Economic Development

Seattle Office of the Mayor

Seattle Public Schools

Seattle Public Utilities

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