Draft

ENVIRONMENTAL IMPACT STATEMENT

Quendall Terminals

Renton, Washington

December 2010

prepared by

City of Renton
Department of Community and Economic Development

Denis Law
Mayor

City of Renton

Department of Community and Economic Development
Alex Pietsch, Administrator

December 10, 2010

Dear Reader:

Attached is a copy of the Draft Environmental Impact Statement (DEIS) for the Quendall Terminals mixed use development. The proposal is located adjacent to Lake Washington on 21.46 acres of Commercial/Office/Residential (COR) zoned property. The DEIS evaluates potential impacts resulting from the proposed development. The following are alternatives evaluated within the DEIS: Alternative 1, which consists of 800 residential units, 245,000 square feet of office, 21,600 square feet of retail and 9,000 square feet of restaurant; Alternative 2, which consist of a less dense alternative where the office component is eliminated and residential units are reduced to 708 units; and Alternative 3, a no action alternative.

In November 2009, Campbell Mathewson of Century Pacific, L.P. submitted a Land Use Master Application (LUA09-151) for Environmental Review, Master Site Plan Review, Binding Site Plan, and Shoreline Substantial Development Permit. The City of Renton Environmental Review Committee issued a Determination of Significance (DS) on February 15, 2010. On April 27, 2010, a public scoping meeting was held to receive written and oral comments on the proposed scope of study for the EIS. A scoping summery is provided in Appendix B.

The issues identified through the scoping process are addressed in the DEIS. These include: earth, critical areas, environmental health, energy – greenhouse gas emissions, land and shoreline use, relationship to plans, policies and regulations, aesthetics/views, parks and recreation, and transportation.

For each environmental issue, an analysis is provided and significant environmental impacts attributable to the Alternatives 1 & 2 are reported. Where significant impacts were determined to potentially exist, options for possible mitigation were suggested.

Written public comment on the DEIS will be accepted for a 30-day review period, starting on Friday, December 10, 2010 and ending at 5:00 p.m. Monday, January 10, 2011. Written comments should be addressed to: Vanessa Dolbee, Senior Planner; Planning Division, 6th floor Renton City Hall; 1055 South Grady Way; Renton, WA 98057.

A public hearing has been scheduled to accept both written and oral comments on the DEIS. It will be held on Tuesday, January 4, 2011, at 6:00 p.m., in the City Council Chambers, 7th floor Renton City Hall, 1055 South Grady Way; Renton, WA.

Following the public comment period, the City will prepare and issue a Final Environmental Impact Statement (FEIS) that will include responses to the comments received during the public comment period and any additional analysis necessary to adequately evaluate the proposal. The City will then issue a Mitigation Document which will set forth the necessary conditions to diminish or eliminate environmental impacts as one portion of the approval of the Proposed Action.

If you have any question or require clarification of the above, please contact Vanessa Dolbee, Senior Planner, at (425) 430-7314.

The City of Renton appreciates your interest and participation.

For the Environmental Review Committee,

[Signature on file]

Gregg Zimmerman, P.E.
Public Works Administrator

FACT SHEET

PROJECT TITLE	**Quendall Terminals Redevelopment Project**
PROPONENT/APPLICANT	Century Pacific, L.P.
LOCATION	The approximately 21.5-acre Quendall Terminals site is located in the northern portion of the City of Renton, within the Southwest ¼ of Section 29, Township 24 North, Range 5 East, King County. The site includes an approximately 20.3-acre Main Property along Lake Washington, and an approximately 1.2-acre Isolated Property to the northeast. The Main Property is generally bordered by a Puget Sound Energy easement and the Seattle Seahawks Training Facility to the north, the Railroad right-of-way, Lake Washington Boulevard and Ripley Lane N to the east, the Barbee Mill residential development to the south and Lake Washington to the west. The Isolated Property is generally bounded by Ripley Lane N to the west, and the southbound I-405 off-ramp to the east and south.
EIS ALTERNATIVES	The Quendall Terminals site has received a Superfund designation from the U.S. Environmental Protection Agency (EPA) and will undergo cleanup/remediation prior to redevelopment, under the oversight of the EPA. Potential impacts associated with cleanup/remediation activities will be addressed through the separate EPA process. The impact analyses in this DEIS assume an existing/baseline condition subsequent to cleanup/remediation (that is, the condition of the site after remediation has been accomplished).

This DEIS analyzes two redevelopment alternatives (Alternative 1 – the subject of the November 2009 application and Alternative 2 – a lower density alternative), as well as the No Action Alternative. These alternatives are briefly described below:

Alternative 1 – Application

Mixed-use development under Alternative 1 would include 800 multifamily residential units, 245,000 sq. ft. of office space, 21,600 sq. ft. of retail space and 9,000 sq. ft. of restaurant space on the Main Property. Parking for 2,171 vehicles would be provided within the proposed buildings and in one surface parking area. New public roadways and private driveways would provide vehicular access through the site and would include sidewalks and pedestrian amenities. A publically accessible trail would provide pedestrian access to the Lake Washington shoreline. No new development is proposed on the Isolated Property under Alternative 1.

Alternative 2 – Lower-Density Alternative

Mixed-use development under Alternative 2 would include 708 multifamily residential units, 21,600 sq. ft. of retail space and 9,000 sq. ft. of restaurant space on the Main Property; no office uses would be provided under this alternative. Parking for 1,364 vehicles would be provided within the proposed buildings, in two surface parking areas and two deck parking areas. New public roadways and private driveways would provide vehicular access through the site and would include sidewalks and pedestrian amenities. A publically accessible trail would also provide pedestrian access to the Lake Washington shoreline. No new development is proposed on the Isolated Property under Alternative 2.

No Action Alternative

Under the No Action Alternative, no new mixed-use development would occur on the Quendall Terminals site at this time. Cleanup/remediation activities associated with the site's status as a Superfund site by EPA will still occur. A Shoreline Restoration Plan will be implemented in conjunction with site cleanup/remediation. Since the cleanup/remediation remedy plan will anticipate potential redevelopment of the site, if no redevelopment occurs under the No Action Alternative, the baseline condition (post-remediation) would likely be somewhat different than the baseline conditions assumed for Alternatives 1 and 2 (i.e. no shoreline trail would be constructed and an interim stormwater control system would be installed).

LEAD AGENCY (SEPA) City of Renton Environmental Review Committee

SEPA RESPONSIBLE OFFICIAL

City of Renton Environmental Review Committee
Dept. of Community & Economic Development
Planning Division
1055 S Grady Way
Renton, WA 98057

EIS CONTACT PERSON

Vanessa Dolbee, Senior Planner
Dept. of Community & Economic Development
Planning Division
1055 S Grady Way
Renton, WA 98057
Phone: (425) 430-7314

FINAL ACTION

Approvals/permits by the City of Renton to authorize development, construction and operation of the Quendall Terminals mixed-use development, as well as infrastructure improvements to serve the development.

PERMITS AND APPROVALS

Preliminary investigation indicates that the following permits and/or approvals could be required or requested for the Proposed Actions. Additional permits/approvals may be identified during the review process associated with specific development projects.

Agencies with Jurisdiction

- ***Federal***
  - CERCLA Remediation (for site cleanup/remediation prior to redevelopment)

- ***State of Washington***
  - Dept. of Ecology, Construction Stormwater General Permit
  - Dept. of Ecology, NPDES Stormwater Discharge Permit
  - Dept. of Fish and Wildlife, Hydraulic Project Approval

- ***City of Renton***
  - Master Site Plan Approval
  - Shoreline Substantial Development Permit
  - Construction Permits
  - Building Permits
  - Development Permits
  - Binding Site Plan
  - Site Plan Review
  - Development Agreement (possible)
  - Utility Approvals
  - Property Permits & Licenses

DRAFT EIS AUTHORS AND PRINCIPAL CONTRIBUTORS

The *Quendall Terminals Draft Environmental Impact Statement* has been prepared under the direction of the City of Renton and analyses were provided by the following consulting firms:

DEIS Project Manager, Primary Author, Energy and GHG Emissions Land and Shoreline Use, Relationship to Existing Plans, Policies and Regulations, Aesthetics/Views and Parks and Recreation.

EA | Blumen
720 Sixth Street S, Suite 100
Kirkland, WA 98033

Earth
AESI
911 5th Avenue
Kirkland, WA 98033

Critical Areas
Raedeke Associates
5711 Northeast 63rd Street
Seattle, WA 98115

Visual Analysis (Simulations)
The Portico Group
1500 4th Avenue - 3rd Floor
Seattle, Washington 98101

Transportation/Traffic
Transportation, Engineering Northwest, LLC
816 6th Street S
Kirkland, WA 98033

LOCATION OF BACKGROUND INFORMATION

Background material and supporting documents are located at the office of:

EA | Blumen
720 Sixth Street S, Suite 100
Kirkland, WA 98033

City of Renton
Vanessa Dolbee, Senior Planner
Department of Community & Economic Development, Planning Division
1055 S Grady Way
Renton, WA 98057

DATE OF DRAFT EIS ISSUANCE

December 10, 2010

DATE DRAFT EIS COMMENTS ARE DUE

January 10, 2011

DATE OF DEIS PUBLIC MEETING

In addition to the opportunity to provide written comments by January 10, 2011, a DEIS public meeting will be held on Thursday, **<u>January 4, 2011</u>**, to provide agencies, organizations, tribes and the general public with an opportunity to provide comments on the DEIS.

The public meeting will commence at **<u>6 PM</u>** and will be held at:
Renton City Hall
1055 South Grady Way
7th Floor, Council Chambers
Renton, WA 09057

AVAILABILITY OF THE DRAFT EIS

This DEIS has been distributed to agencies, organizations and individuals noted on the Distribution List contained in **Appendix A** to this document. Copies of the DEIS are also available for review at the following King County Library System Renton public libraries:

Renton Main Library
100 Mill Avenue South
Renton, WA 98057

Renton Highlands Library
2902 NE 12th Street
Renton, WA 98056

Copies of this DEIS may be purchased at the City of Renton's Finance Department (1st Floor of City Hall) for $25 per hard copy or $10.00 per CD, plus tax and postage (if mailed).

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SECTION I

SUMMARY

CHAPTER 1
SUMMARY

1.1 Introduction

This chapter provides a summary of the Draft Environmental Impact Statement (DEIS) for the Quendall Terminals Redevelopment Project. It briefly describes the Application (Alternative 1), Lower Density Alternative (Alternative 2) and No Action Alternative, and contains a comprehensive overview of significant environmental impacts identified for the alternatives. Please see **Chapter 2** of this DEIS for a more detailed description of the alternatives, and **Chapter 3** for a detailed presentation of the affected environment, significant impacts of the alternatives, mitigation measures, and significant unavoidable adverse impacts.

The Quendall Terminals site includes an approximately 20.3-acre Main Property along Lake Washington and an approximately 1.2-acre Isolated Property to the northeast. The site has received a Superfund designation from the U.S. Environmental Protection Agency (EPA) and will undergo cleanup/remediation prior to redevelopment, under the oversight of EPA. The Quendall Terminals owners and EPA are currently conducting a remedial investigation and feasibility study at the site. This work is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; i.e., Superfund). CERCLA cleanup actions specified in a final cleanup remedy are assumed to include remediation of hazardous substances in lake sediments and in some of the upland portions of the site (Main Property), including placement of a soil cap across the entire Main Property and shoreline restoration (see **Chapter 2** for a complete list of the cleanup/remediation assumptions).

Potential impacts associated with cleanup/remediation activities will be addressed through the separate EPA process. The DEIS impacts analyses assume an existing/baseline condition subsequent to cleanup/remediation (that is the condition of the site after remediation has been accomplished).

1.2 Proposed Actions

The Proposed Actions for the Quendall Terminals Redevelopment Project include:

- Master Plan approval from the City;
- Binding Site Plan approval from the City;
- Shoreline Substantial Development Permit approval from the City;
- Possible Development Agreement between the City and the applicant;
- Other local, state and federal permit approvals for construction and redevelopment; and,
- Construction and operation of the Quendall Terminals Redevelopment Project.

1.3 Alternatives

In order to disclose environmental information relevant to the Quendall Terminals redevelopment and in compliance with SEPA, this DEIS evaluates two redevelopment alternatives (Alternative 1 – the subject of the November 2009 application, and Alternative 2 – a lower density alternative), as well as the No Action Alternative. Through further evaluation by the City and the applicant and based on public input, either the Alternative 1 redevelopment plan, the Alternative 2 redevelopment plan, a modification of either plan or a combination of the two plans could be carried forward for possible approval by the City.

Alternative 1 - Application

Mixed-use development under Alternative 1 would include 800 multifamily residential units, 245,000 square feet of office space, 21,600 square feet of retail space, and 9,000 square feet of restaurant space on the Main Property. Parking for 2,171 vehicles would be provided within the proposed buildings, in one surface parking area and along the main east/west roadway onsite. New public roadways and private driveways would provide vehicular access through the site and would include sidewalks and pedestrian amenities; private driveways would also provide additional access to the buildings at the north and south ends of the site. A proposed trail would provide pedestrian access to the Lake Washington shoreline. No new development is proposed on the Isolated Property under Alternative 1.

Alternative 2 - Lower Density Alternative

Mixed-use development under Alternative 2 would include 708 multifamily residential units, 21,600 square feet of retail space, and 9,000 square feet of restaurant space on the Main Property; no office uses would be provided under this alternative. Parking for 1,364 vehicles would be provided within the proposed buildings, in two surface parking areas, two deck parking areas and along the main east/west roadway. New public roadways and private driveways would provide vehicular access through the site and would include sidewalks and pedestrian amenities. A proposed trail would also provide pedestrian access to the Lake Washington shoreline. No new development is proposed on the Isolated Property under Alternative 2.

No Action Alternative

Under the No Action Alternative, no new mixed-use development would occur on the Quendall Terminals site at this time. Cleanup/remediation activities associated with the site's status as a Superfund site by EPA would still occur. A Shoreline Restoration Plan would be implemented in conjunction with site cleanup/remediation. Since the cleanup/remediation remedy plan will anticipate potential redevelopment of the site, if no redevelopment occurs under the No Action Alternative, the baseline condition (post-remediation) would likely be somewhat different than the baseline conditions assumed for Alternatives 1 and 2 (i.e. no shoreline trail would be constructed and an interim stormwater control system would be installed).

1.4 Impacts

Table 1-1 highlights the impacts that would potentially result from the alternatives analyzed in this DEIS. This summary table is not intended to be a substitute for the complete discussion of each element that is contained in **Chapter 3**.

Table 1-1
SUMMARY MATRIX

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
Earth		
• A minimal amount of clearing and grading (approximately 53,000 – 133,000 CY of fill), primarily in the upland portion of the Main Property would be required for redevelopment.	• Same as Alternative 1.	• Clearing and grading would not be required.
• Grading activities could impact the integrity of the soil caps installed during site cleanup/remediation. Implementation of institutional controls defined in the final remediation plans would ensure that the caps would remain intact during excavation.	• Same as Alternative 1.	• Grading and potential disturbance of the soil caps installed during site cleanup/remediation would not be required.
• Site disturbance during construction activities could result in increased potential for erosion and sedimentation of on-site wetlands and Lake Washington. Significant impacts would not be expected with implementation of the temporary erosion and sedimentation control plan (TESCP) required by the City.	• Same as Alternative 1.	• Site disturbance and increased potential for erosion and sedimentation would not occur.
• A deep building foundation system (i.e. piles) and/or ground improvements would likely be required for structural support. Installation of piles, as well as excavation for utilities, could impact the integrity of the soil caps installed during site remediation and could transmit contamination to site areas that are not contaminated. Significant impacts would not be expected with implementation of institutional controls	• Same as Alternative 1	• Installation of deep foundations and utilities would not be required, and there would be no potential to impact on-site soil caps and transmit contamination.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
defined in the final remediation plans.		
• Differential settlement could occur between structures that would be pile–supported and underground utilities serving the structures, causing damage to utility lines. Significant impacts would not be expected with implementation of institutional controls defined in the final remediation plans.	• Same as Alternative 1.	• Installation of piles and underground utilities would not be required and associated potential for settlement would not result.
• With redevelopment, the amount of impervious surface area onsite and associated runoff rates would increase and could result in erosion hazards at stormwater outfalls at the lake. Significant impacts would not be expected with installation of a permanent stormwater control system, as required by the City, including energy dissipation measures at the outfalls.	• Same as Alternative 1.	• Redevelopment would not occur and impervious surfaces, stormwater runoff and potential for erosion would not increase.
• Potential impacts to site structures could occur during seismic events due to ground motion, liquefaction and lateral spreading hazards. All proposed structures would be built to the most current IBC code to address potential effects of seismic events and buildings would likely be supported on piles to reduce these hazards.	• Same as Alternative 1.	• Redevelopment and associated potential for seismic impacts to structures would not occur.
• Groundwater could be encountered during construction activities. Significant impacts would not be expected with dewatering and other construction techniques.	• Same as Alternative 1.	• Construction activities and potential to encounter groundwater would not occur.
• With redevelopment, impervious surfaces would increase and potential for infiltration	• Same as Alternative 1.	• Redevelopment and associated potential to impact underlying aquifers would not occur.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
of rainfall to underlying aquifers would decrease. However the majority of the recharge to the aquifers originates from off-site sources to the east, and significant impacts would not be expected.		
Critical Areas		
• The entire Main Property would be capped with soil during site cleanup/remediation, resulting in the fill of all of the wetlands and elimination riparian habitat on this property. Wetlands will be re-established/expanded and riparian habitat will be recreated/enhanced with implementation of the Shoreline Restoration Plan.	• Same as Alternative 1.	• Similar to Alternative 1; however, no additional riparian habitat restoration area is assumed to be established during site remediation/cleanup that would connect Wetlands A and D.
• Proposed construction and redevelopment could cause indirect impacts to on-site wetlands, riparian habitat and lake habitat related to hydrologic conditions (in the case of the wetlands) and potential for erosion and sediment deposition (particularly during construction). Significant impacts, including to salmonid fish in the lake, would not be expected with implementation of a temporary erosion and sedimentation control plan (TESCP) during construction and installation of a permanent stormwater control system, as required by the City.	• Same as Alternative 1.	• Redevelopment and its associated potential to impact on-site wetlands, riparian habitat, and lake habitat would not occur.
• With proposed redevelopment, no direct impacts would occur to the retained/expanded wetlands (Wetlands I and J) on the Isolated Property, or the re-established/expanded wetlands (Wetlands A, D and H) on the Main Property.	• Same as Alternative 1.	• Redevelopment and its associated potential to impact wetlands would not occur.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
• With proposed redevelopment, a portion of the buffer on Wetland D would be reduced to 25 feet; other portions of the buffer would be expanded to provide compensatory areas, as allowed by the buffer averaging provisions of the City of Renton Municipal Code.	• Same as Alternative 1.	• Redevelopment and its associated potential to impact wetland buffers would not occur.
• Proposed buildings would be setback a minimum of 50 feet from the shoreline, as required by the City of Renton Shoreline Master Program.	• Same as Alternative 1.	• No buildings would be built and no encroachment into the shoreline setback would occur.
• Three stormwater outfalls would be constructed within the shoreline areas. These outfalls would be located to avoid direct impacts to wetlands and would be designed to prevent erosions/siltation during construction and operation. Therefore, no significant impacts to wetlands and the lake would be expected.	• Same as Alternative 1.	• No stormwater outfalls would be constructed and no impacts to wetlands and the lake would occur.
• With proposed redevelopment, the Shoreline Restoration Area would largely remain intact. A publically accessible trail with interpretive viewpoints would be included in the shoreline area. The upland portion of the Main Property would be covered in buildings, paved areas and landscaping, providing habitat for certain wildlife species adapted to urban environments.	• Same as Alternative 1.	• Redevelopment would not occur and no shoreline trail would be constructed.
<u>Environmental Health</u>		
• The entire Main Property would be capped with soil during site cleanup/remediation, limiting the potential for exposure to	• Same as Alternative 1.	• Same as Alternative 1, except that no redevelopment would occur at this time and no potential to disturb the soil cap would occur.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
underlying contaminants. To the greatest extent possible, this cap would remain intact with proposed redevelopment.		
• The installation of deep foundations (i.e. piles) and utilities could generate contaminated soil and/or groundwater to which workers and City staff inspectors could be exposed. City staff that maintain utilities could also be exposed to contaminated soils/groundwater. With proper protection equipment, training and handling and disposal of contaminants, no significant impacts would be anticipated.	• Same as Alternative 1.	• Installation of deep foundations and utilities would not be required, and workers/City staff would not be exposed to contaminants.
• Volatile contaminants in the subsurface could generate vapors that could intrude into utility trenches and above-grade structures. With separation of living/working areas from contaminants by the soil cap and under-building parking, as well as implementation of institutional controls specified during site remediation, no significant impacts would be anticipated.	• Same as Alternative 1.	• Redevelopment would not occur, and there would be no potential for exposure of residents and employees to volatile contaminants.
Energy – Greenhouse Gases		
• Proposed redevelopment would result in and an increase in Greenhouse Gas (GHG) emissions relative to existing conditions due to the increase in building density and site population. Development would result in an estimated 1,297,536.8 $MTCO_2e$ in lifespan GHG emissions.	• Similar to Alternative 1, however GHG emissions would be less due to less building density and site population. Development would result in an estimated 860,434.8 $MTCO_2e$ in lifespan GHG emissions	• Redevelopment would not occur and GHG emissions would not increase.
• New development would utilize energy in the form of electricity for heating, cooling, lighting and other energy demands, and	• Similar to Alternative 1; however, energy usage would be lower due to lower density development on the site.	• Redevelopment would not occur and energy usage would not increase.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
natural gas for heating and cooking.		
<u>Land and Shoreline Use</u>		
• Under the proposal, the site would be subdivided into seven lots, four of which would contain mixed-use development, and three of which would contain the Shoreline Restoration Area.	• Same as Alternative 1.	• Redevelopment would not occur. The site would remain in the post-remediation condition, including the Shoreline Restoration Area.
• Redevelopment would occur in nine buildings on the Main Property, and would include: – 800 residential units – Approx. 245,000 sq. ft. of offices uses – Approx. 21,600 sq. ft. of retail uses – Approx. 9,000 sq. ft. of restaurant uses – 2,171 parking spaces No development would occur on the Isolated Property.	• Redevelopment would occur in nine buildings on the Main Property, and would include: – 708 residential units – No offices uses – Approx. 21,600 sq. ft. of retail uses – Approx. 9,000 sq. ft. of restaurant uses – 1,364 parking spaces No development would occur on the Isolated Property.	• No redevelopment would occur at this time.
• Site preparation and construction of buildings and infrastructure would result in temporary construction-related impacts to adjacent land uses over the buildout period (i.e. air emission, noise and increased traffic). Due to the temporary nature of construction and required compliance with City of Renton construction code regulations, no significant impacts would be expected.	• Same as Alternative 1.	• Site preparation and construction would not occur, and no temporary construction-related impacts on adjacent land uses would result.
• Redevelopment would convert the site from its current vacant, partially vegetated state to a mixed-use development, and would restore a Superfund site to a productive use.	• Same as Alternative 1.	• Redevelopment would not occur and the site would remain in its current vacant, partially vegetated state. The Superfund site would not be restored to a productive use.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
• Redevelopment would result in increased activity levels onsite (i.e. noise, traffic, etc.). In general, these activity levels would be greater than the adjacent residential uses to the south (Barbee Mill), but similar to the commercial uses to the north (Seahawks Training Facility) and the existing and planned commercial and hotel uses to the east (proposed Hawk's Landing hotel and commercial uses east of I-405). Activity levels would be consistent with the existing urban character of the area and no significant impacts would be expected.	• Similar to Alternative 1; however, activity levels onsite and their associated potential to impact adjacent land uses would be less due to lower density development onsite.	• Redevelopment would not occur and no increases in activity levels would result.
• Proposed buildings onsite would be up to 80 feet high, and from approximately 94,600 to 209,000 sq. ft. in size. The proposed height and bulk would be consistent with the type and size of development contemplated in the COR land use/zoning classification and the Urban shoreline environment.	• Proposed buildings onsite would be up to 67 feet in height, and from approximately 77,000 to 112,800 sq. ft. in size. The proposed height and bulk would be consistent with the type and size of development contemplated in the COR land use/zoning classification and the Urban shoreline environment.	• No buildings would be built onsite at this time.
• Proposed buildings would be greater in height and bulk than the adjacent residential buildings to the south; however, they would generally be similar to the surrounding commercial and planned hotel buildings to the north and east. Existing off-site features (i.e. roadways and the PSE easement) and proposed on-site features (i.e. setbacks, driveways, parking areas and landscaping) would provide buffers between proposed buildings and adjacent uses. Architectural features would be included that are intended to enhance the compatibility of the proposed	• Similar to Alternative 1; however building height and bulk would be less.	• No buildings would be built onsite at this time, and no land use compatibility impacts would result.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
development with surrounding uses. Overall, no significant land use compatibility impacts would be expected.		
Relationship to Plans, Policies and Regulations		
• The proposed project would generally be consistent with applicable plans, policies and regulations. However, it is unclear at this time whether proposed redevelopment would be consistent with all of the COR land use/zoning classification goals and requirements, particularly regarding the design of the project. Possible mitigation measures could be implemented to enhance the design of the project and achieve consistency with these goals and requirements.	• Same as Alternative 1.	• This alternative would not convert a Superfund site to a productive use, and help the City reach its targets to provide housing and employment. City policies that encourage the provision of access to the shoreline would also not be met, as no publically accessible trail along the shoreline would be provided.
Aesthetics, Light and Glare		
• Proposed redevelopment would change the aesthetic character of the site to a new mixed-use development with nine buildings, roadways, parking areas, and open space/landscaping. Buildings would be seven stories and would range from 94,600 square feet to 209,000 square feet.	• Similar to Alternative 1; however, proposed buildings would be six stories and would range from 77,000 square feet to 112,800 square feet,	• This alternative would not change the aesthetic character of the site.
• Proposed buildings would be greater in height and bulk than the adjacent Barbee Mill development to the south and would be generally similar in height and bulk to the Seahawks Headquarters and Training Facility to the north.	• Similar to Alternative 1, although proposed buildings would be slightly lower in height and bulk.	• No building would be built onsite at this time and no compatibility impacts would result.
• Views toward the site would change substantially to reflect a seven-story mixed-	• Similar to Alternative 1; however proposed buildings would be six stories.	• Views toward the site would not change under this alternative.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
use development. Architectural features and landscaping would be provided to enhance the project's visual appeal. Possible mitigation measure could be implemented to further enhance the aesthetic character of the development and maintain views of the lake.		
• View corridors are proposed along the main east/west public roadway (Street "B") and along the private driveways at the north and south ends of the site to provide views across the site towards Lake Washington. Views toward the lake would be blocked or partially blocked from certain public view points. Possible mitigation measures could be implemented to enhance views across the site.	• Similar to Alternative 1.	• Views towards the lake would not change under this alternative.
• Proposed redevelopment would add new sources of light and glare, and would produce shadows at the site. New light sources would be similar to existing sources at the Barbee Mill development and Seahawks Headquarters and Training Facility; however, the general lighting levels on the site would be higher. Noise levels would be typical of an urban development. Shadows from the project would not impact off-site uses, but would extend onto certain on-site outdoor areas.	• Similar to Alternative 1, except that lighting levels would be lower due to lower building density.	• No new sources of light, glare or shadows would be provided under this alternative.
Transportation		
• The proposed redevelopment would generate approximately 9,000 daily vehicular trips at full buildout, including approximately 865 AM peak hour trips and	• Proposed redevelopment would generate approximately 5,800 daily vehicular trips at full buildout, including approximately 445 AM peak hour trips and 540 PM peak hour trips.	• This alternative would not generate any new vehicular trips.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
950 PM peak hour trips.		
• With proposed redevelopment, four intersections would operate at LOS E/F at full buildout without the WSDOT I-405 Improvement project at the I-405/NE 44th Street interchange. One intersection would operate at LOS E/F at full buildout with the I-405 Improvements.	• Similar to Alternative 1.	• Redevelopment would not occur and no associated changes to LOS operations would result.
• Excessive southbound queues (between 700-800 feet) would be anticipated at the Lake Washington Boulevard/Ripley Lane N intersection without I-405 Improvements. Excessive southbound queues at the Lake Washington Boulevard/Ripley Lane N intersection, as well as along Lake Washington Boulevard and adjacent intersections, would also be anticipated with I-405 Improvements.	• Similar to Alternative 1.	• Redevelopment would not occur and no queuing impacts would result.
• Without I-405 Improvements, the site access at Ripley Lane N is anticipated to operate at LOS F and the site access at NE 43rd Street is anticipated to operate at LOS C/D. With I-405 Improvements, site access at Ripley Lane is anticipated to operate at LOS C/D and site access at NE 43rd Street is expected to operate at LOS D.	• Similar to Alternative 1.	• Redevelopment would not occur and no changes to site access points would result.
• Given the site location, it is anticipated that the proposed redevelopment would be	• Similar to Alternative 1	• No impacts to public transportation are anticipated under this alternative.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
occupied by residents and employees who primarily rely on personal automobiles and no significant impacts to public transportation would be anticipated.		
• Increases in population onsite would result in associated increased need for non-motorized facilities. Curbs, gutters and sidewalks would be provided onsite, as well as along the west side of Lake Washington Boulevard and Ripley Lane N. A publically accessible trail is also proposed along the shoreline.	• Similar to Alternative 1.	• No impacts to non-motorized transportation facilities would occur under this alternative.
• 2,153 parking stalls would be required based on the City of Renton Municipal Code standards; 2,171 parking spaces would be provided onsite. Parking demand is estimated to be approximately 2,107 stalls on a weekday and 1,251 stalls on weekend day. Demand could be reduced by 20 percent on weekdays and 55 percent on weekend days through the implementation of shared parking between residential and commercial uses. Bicycle parking would be provided in accordance with City of Renton standards.	• 1,362 parking stalls would be required under this alternative; 1,364 parking spaces would be provided onsite. Similar parking demand relationships would occur under Alternative 2.	• No new parking would be provided onsite under this alternative.
Parks and Recreation		
• Approximately 11.7 acres of open space and related areas would be provided onsite, including: paved plazas, natural areas, landscaped areas, unpaved trails and sidewalks. These areas may or may	• Similar to Alternative 1, except that slightly more open space and related areas would be provided onsite (11.8 acres).	• No redevelopment would occur and the site would remain as an open area. No publically accessible shoreline trail would be provided in conjunction with site cleanup/remediation.

Alternative 1 (Application)	Alternative 2 (Lower Density Alternative)	No Action Alternative
not meet the City's standards, regulations and procedures for open space. Approximately 3.4 acres of the on-site open space and related areas would be visually and physically accessible to the general public (i.e. the natural shoreline area and the shoreline trail, respectively).		
• Increases in the on-site residential population (1,300 residents), as well as on-site employees (1,050 employees) would increase demands on neighborhood and regional parks, open space, trails and recreation facilities. Parks/recreational facilities most likely to receive increased demand would include facilities near the site, such as: May Creek Greenway, Kennydale Beach Park, and Gene Coulon Memorial Park. The latter two parks are already at or exceeding capacity on warm days; the proposal would contribute to these capacity issues. Additional parks and recreational facilities could be needed in the City, based on the increased on-site population. Certain on-site facilities (i.e. the shoreline trail) would provide opportunities for passive recreation. Areas for active recreation could be provided onsite as well. Parks mitigation/impact fees would be paid to help offset the impacts of the project on City parks and recreational facilities.	• Similar to Alternative 1, except that there would be slightly less residents on the site (1,132 residents) and fewer employees (50 employees); demands on neighborhood and regional parks, opens space, trails and recreation facilities would be reduced accordingly.	• Redevelopment would not occur and there would be no additional demand for parks, open space, trails or recreation facilities.

1.5 Mitigation Measures and Significant Unavoidable Adverse Impacts

The following list presents the mitigation measures and significant unavoidable adverse impacts that would potentially result from the redevelopment alternatives analyzed in this DEIS. Required/proposed mitigation measures are those actions to which the applicant has committed and/or are required by code, laws or local, state and federal regulations. Possible mitigation measures are actions that could be undertaken, but are not necessary to mitigate significant impacts, and are above and beyond those proposed by the applicant.

Earth

Mitigation Measures

Required/Proposed Mitigation Measures

During Construction

- A temporary erosion and sedimentation control plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented, per the 2009 KCSWD adopted by the City of Renton. This plan would include the following measures:
    - All temporary (and/or permanent) devices used to collect stormwater runoff would be directed into tightlined systems that would discharge to an approved stormwater facility.
    - Soils to be reused at the site during construction would be stockpiled or stored in such a manner to minimize erosion from the stock pile. Protective measures could include covering with plastic sheeting and the use of silt fences around pile perimeters.
    - During construction, silt fences or other methods, such as straw bales, would be placed along surface water runoff collection areas in proximity to Lake Washington and the adjacent wetlands to reduce the potential of sediment discharge into these waters. In addition, rock check dams would be established along roadways during construction.
    - Temporary sedimentation traps or detention facilities would be installed to provide erosion and sediment transport control during construction.
- A geotechnical engineer would review the grading and TESCP plans prior to final plan design to ensure that erosion and sediment transport hazards are addressed during and following construction. As necessary, additional erosion mitigation measures could be required in response to specific design plans.
- Site preparation for roadways, utilities and structures, and the placement and compaction of structural fill would be based upon the recommendations of a geotechnical engineer.

- Temporary excavation dewatering would be conducted if groundwater is encountered during excavation and construction activities. Such dewatering activities would be conducted in a manner that would minimize potential impacts due to settlement.

- Structural fill would be placed to control the potential for settlement of adjacent areas; adjacent structures/areas would be monitored to verify that no significant settlement occurs.

- Deep foundation systems (such as piles or aggregate piers) would be installed and/or ground improvements would be made to minimize potential damage from soil settlement, consolidation, spreading and liquefaction.

- If deep foundation systems (such as piles or aggregate piers) are used to support structures, the following measures would be implemented:

  – Measures would be employed to ensure that the soil cap would not be affected and that installation of the piles/piers would not mobilize contamination that is currently contained by the cap. Such measures could include: installation of surface casing through the contaminated zone; installation of piles composed of impermeable materials (steel or cast-in-place concrete) using soil displacement methods; the use of pointed tip piles to prevent carry down of contamination; and, the use of ground improvement technologies, such as in-place densification or compaction grouting.

  – A pile vibration analysis and vibration monitoring would be conducted during pile installation in order to ensure that impacts due to vibration do not occur.

  – Suitable pile and pile hammer types would be matched to the subsurface conditions to achieve the required penetrations with minimal effort to reduce potential vibration. Potential pile types could include driven open-end steel pipe piles, driven closed-end steel pipe piles, or driven cast-in-place concrete piles. Potential hammer types could include percussion hammers or vibratory hammers.

  – Suitable hammer and pile cushion types would be used for the specific conditions to reduce potential noise. A typical hammer employs the use of a heavy impact hammer that is controlled by a lead, which is in turn supported by a crane.

  – Pile installation would occur during regulated construction hours.

- Fill soils would be properly placed and cuts would be utilized to reduce the potential for landslide impacts during (and after) construction.

- The appropriate management of contaminated soils that could be disturbed and groundwater that could be encountered during redevelopment of the site would be addressed through the cleanup/remediation process and by institutional control requirements overseen by EPA (see Section 3.3, **Environmental Health**, for details).

Following Construction

- A permanent stormwater control system would be installed in accordance with the 2009 KCSWDM adopted by City of Renton.

- Offshore outfall locations for stormwater discharge from the permanent stormwater control system would be equipped with energy dissipation structures or other devices to prevent erosion of the lake bottom.

- All buildings would be designed in accordance with the 2009 IBC (or the applicable design codes that are in effect at the time of construction) to address the potential for seismic impacts.

- The majority of the site would be covered with impervious surfaces following redevelopment. Permanent landscaping would also be provided to reduce the potential for erosion and sedimentation with redevelopment.

Other Possible Mitigation Measures

- Flexible utility connections could be employed to minimize the risk of damage to the lines due to differential settlement between structures and underground utilities.

Significant Unavoidable Adverse Impacts

There would be a risk of ground motion impacts and landslides beneath Lake Washington adjacent to the site during a seismic event; however, such impacts would occur with or without the proposed redevelopment. No significant unavoidable earth-related impacts would be anticipated.

Critical Areas

Mitigation Measures

Required/Proposed Mitigation Measures

During Construction

- A temporary erosion and sedimentation control plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented during construction, per the 2009 King County Surface Water Design Manual (KCSWDM) adopted by the City of Renton (see Section 3.1, **Earth**, and **Appendix D** for details). Implementation of this plan would prevent or limit impacts to the lake and shoreline wetlands from erosion and sedimentation.

Following Construction

- Proposed redevelopment would avoid direct impacts to the retained/re-established/expanded wetlands onsite.

- Re-established/expanded wetlands would be retained in an open space tract that includes required buffers and a riparian habitat enhancement area.

- Wetland buffer areas would meet or exceed the minimum City-required buffers for Wetlands A, D and H (the Wetland D buffer would meet the City's requirement through buffer averaging). Wetland I and J would also be provided with buffers that meet or exceed City requirements.

- Proposed buildings would be setback a minimum of 50 feet from the OHWM, as required by the City of Renton's 1983 Shoreline Master Program.

- A permanent stormwater control system would be installed consistent with the requirements of the 2009 KCSWDM adopted by the City of Renton. The system would collect and convey stormwater runoff to Lake Washington via a tight-lined system. Water quality treatment would be provided for runoff from pollution-generating surfaces to prevent water quality impacts to the lake and shoreline wetlands.

- Native plant species would be included within landscaping of the redeveloped upland area on the Main Property to the extent feasible, and could provide some limited habitat benefits to native wildlife species.

- Introduction of noxious weeds or invasive species would be avoided to the extent practicable in areas re-vegetated as part of the proposed redevelopment. Together with the native species planted, this would help limit the unnecessary spread of invasive species that could adversely affect the suitability of open space habitats on site and in the vicinity for wildlife.

- A publicly accessible, unpaved trail would be provided through the shoreline area that would include interpretive wetland viewpoints.

Other Possible Mitigation Measures

- Trenching for utilities and stormwater outfalls could be incorporated into site grading associated with remediation efforts to limit or prevent later disturbance of re-vegetated areas.

- Upland areas on the Main Property could be temporarily re-vegetated following site remediation, depending on the timing of redevelopment.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to critical areas would be anticipated.

Environmental Health

Mitigation Measures

Required/Proposed Mitigation Measures

- Redevelopment of the site is being coordinated with the cleanup/remediation process, and would be conducted consistent with the requirements in the final cleanup remedy selected and overseen by EPA, and with any associated institutional controls.

- The appropriate management of contaminated soils that could be disturbed and groundwater that could be encountered during redevelopment of the site would be addressed through the cleanup/remediation process and by institutional control requirements overseen by EPA. As necessary, lightweight fill materials, special capping requirements, vapor barriers and other measures would be implemented to ensure that unacceptable exposures to contaminated soils, groundwater or vapors would not occur.

- Institutional controls would be followed to prevent the alteration of the soil cap without EPA approval, and to prevent the use of on-site groundwater for any purpose.

- An Operations, Maintenance and Monitoring Plan would be implemented to prevent the excavation of soils, installation of utilities or other site disturbances without prior EPA approval.

- As necessary, personal protection equipment for workers would be used and special handling and disposal measures followed during construction activities to prevent contact with hazardous materials and substances.

- Living/working areas on the Main Property would be separated from soil/groundwater contaminants by under-building garages; institutional controls would also be implemented to prevent exposure to unacceptable vapors.

Other Possible Mitigation Measures

- Planned utilities (including the main utility corridors) could be installed as part of the planned remedial action so that disturbance of the soil cap and underlying contaminated soils/groundwater would not be necessary subsequent to capping of the Main Property.

- Personal protection measures and special training should be provided for City of Renton staff that provide inspection during construction and maintenance following construction in areas of the site that could generate contaminated soils or groundwater.

- Buried utilities and public roads serving the site development should be placed in clean fill material (with the utilities in a trench with sufficient width and depth of 3 to 4 feet below the invert of the utility), along with an acceptable barrier to prevent recontamination of the clean fill material, in order to protect the utility from contamination and to allow future maintenance of the road or utility lines.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse environmental health-related impacts would be anticipated.

Energy – Greenhouse Gas Emissions

Mitigation Measures

Other Possible Mitigation Measures

- Development could incorporate low-impact/sustainable design features into the design of proposed buildings on the site to reduce the demand for energy and reduce the amount of GHG emissions. Such features have not been identified at this time, but could include architectural design features; sustainable building materials; use of energy efficient products; natural drainage/green roof features; use of native plants in landscaping; and/or, other design features.

Significant Unavoidable Adverse Impacts

Development on the Quendall Terminals site would result in an increase in demand for energy and an increase in GHG emissions. However, the direct and indirect impacts of GHG emissions and energy use under Alternative 1 and 2 would not be considered significant. Determining whether the cumulative impacts of GHG emissions and energy use from development of the Quendall Terminals site is significant or not significant implies the ability to measure incremental effects of global climate change. The body of research and law necessary to connect individual land uses, development projects, operational activities, etc. with the broader issue of global warming remains weak. Scientific research and analysis tools sufficient to determine a numerical threshold of significance are not available at this time and any conclusions would be speculative. Further information on the potential cumulative impacts of GHG emissions is not considered essential to a reasoned choice among the alternatives in this DEIS.

Land and Shoreline Use

Mitigation Measures

Required/Proposed Mitigation Measures

- New driveways, landscaping, surface parking areas and proposed building setback areas would provide a buffer between proposed buildings and adjacent land uses.

- Proposed landscaping, particularly along the north and south boundaries of the Main Property, would provide a partial visual screen between proposed buildings and adjacent uses (see **Figure 2-7**, Preliminary Landscape Plan - Alternative 1).

- Architectural features (i.e. roof slope, façade modulation, building materials, etc.) would be incorporated into the design of each building and are intended to enhance the compatibility between the proposed development and surrounding land uses (see **Figures 2-5** and **2-9** for representative architectural elevations and Section 3.7, **Aesthetics/Views**, for further information on the building and site design).

- A fire mitigation/impact fee would be paid for the proposed development at the time of building permit issuance to help offset the impacts of the project on the City's emergency services.

Significant Unavoidable Adverse Impacts

Redevelopment under Alternative 1 and Alternative 2 would result in the conversion of the approximately 21.5-acre Quendall Terminals site from a vacant, partially vegetated area to a new mixed-use development with an associated increase in building density and activity levels. No significant unavoidable adverse land use impacts would be anticipated.

Relationship to Plans, Policies and Regulations

Significant Unavoidable Adverse Impacts

The proposed redevelopment would generally be consistent with applicable plans, policies and regulations. However, it is unclear at this time whether the project would be consisted with all of the COR land use/zoning classification goals and requirements, particularly regarding project design.

Aesthetics/Views

Mitigation Measures

Required/Proposed Mitigation Measures

- Building design would include a variety of details and materials that are intended to create a human scale and provide a visually interesting streetscape and façade, such as horizontal plan modulation, projecting vertical elements, and alternating façade materials and details.

- Street-level, under-building parking areas would be concealed from sidewalks and streets by retail and offices uses along certain façades. Where this parking extends to the exterior of the building, elements, such as architectural façade components, trellises, berms and landscaping, would be used for screening.

- Public view corridors toward Lake Washington are proposed provided along the main east/west roadway onsite (Street "B") and along the private driveways at the north and south ends of the site. Public views of the lake would also be possible from the publically accessible trail in the shoreline restoration area in the western portion of the Main Property. Additional views of the lake would be provided for project residents from semi-private landscaped courtyard areas between the new buildings onsite.

- New landscaping would be provided in the upland area of the Main Property that is intended to enhance the visual character of the site. Landscaping would include new trees, shrubs and groundcovers of various sizes and species.

- A landscaped edge along the north and south boundaries of the site would provide a buffer and partial visual screen between new development on the site and adjacent properties.

- The natural vegetation in shoreline restoration areas on the Main Property and on the Isolated Property would be retained with proposed site development.

Other Possible Mitigation Measures

- The amount of required parking could be reduced, relocated or redesigned (i.e. though implementation of transportation demand management measures or other means) so that additional areas of the street-level, under-building parking could be setback from the exterior of the building, particularly along Streets "A", "C" and the lake side of the development. This would allow other uses, including retail, restaurant, commercial and residential uses, and plaza areas to occupy these areas and potentially enhance the aesthetic character at the ground level.

- Exterior building lighting, parking lot lighting and pedestrian lighting could be directed downward and away from surrounding buildings and properties to minimize the impacts to adjacent uses.

- Reflectivity of glazing materials, as well as the use of shading devices, could be considered as part of the façade design in order to minimize the potential glare impacts to surrounding uses.

- Building modulation or design treatments such as tiering/tapering or stepping the building back as the height increases and/or building setbacks could be provided, particularly along the shoreline, to enhance the aesthetic character of development and retain views of Lake Washington.

- Building heights along the shoreline could be reduced to maintain views of Lake Washington.

- The surface parking located adjacent to the shoreline under Alternative 2 and the parking at the terminus of Street "B" could be relocated on the site to enhance the aesthetic character of development, particularly from the shoreline trail.

- Design features such as: public art, special landscape treatment, additional open space/plazas, landmark building form, special paving/pedestrian scale lighting, or prominent architectural features could be provided as part of development to further enhance the gateway/landmark features on the site.

Significant Unavoidable Adverse Impacts

Development of the Quendall Terminals site under Alternatives 1 and 2 would change the site from its existing open, partially vegetated condition to a new mixed-use development. The proposed development would represent a continuation of urban development along the Lake Washington shoreline. The proposed building height and bulk would be generally similar to surrounding uses (i.e. the Seahawks Headquarters and Training Facility and the planned Hawk's Landing Hotel) and greater than other uses in the area (i.e. the Barbee Mill residential development). Certain views across the site towards Lake Washington and Mercer Island would be obstructed with the proposed development; however, view corridors towards Lake Washington and Mercer Island would be established and new viewing areas along the lake would also be provided.

No significant light, glare, or shadow impacts would be anticipated.

Parks and Recreation

Mitigation Measures

Required/Proposed Mitigation Measures

Public Open Space and Related Areas/Fees[1]

- A parks mitigation/impact fee would be paid for each multifamily unit in the proposed development at the time of building permit issuance to help offset the impacts of the project on City parks and recreation facilities.

- 3.4 acres (Alternative1)/3.5 acres (Alternative 2) of public open space and related areas would be provided on the site that would be visually and physically accessible to the public, including the shoreline trail and natural open space areas along the shoreline.

- Frontage improvements, including sidewalks, would be provided along the west side of Lake Washington Boulevard and Ripley Lane N along the site. These sidewalks could connect to sidewalks to the north and south, which connect to other pedestrian facilities in the area.

- Public parking for the shoreline trail would likely be provided in the same general area as the retail/restaurant parking; the applicant would specifically identify this parking prior to site plan approval.

- Signage, detours and safety measures would be put in place to detour bicyclist utilizing the Lake Washington Loop trail at time of construction.

Measures to Improve Semi-Private Recreation Access for Residents

- Semi-private landscaped courtyards on top of the parking garages would be provided as shared open space for residents of the site. These areas would help to meet the demand for passive recreation facilities from project residents.

- Street level landscaping, plazas and sidewalks would be provided. These areas would help meet the project's demand for passive recreation facilities.

[1] Hours of public access would need to meet park standards of sunrise to sunset to count toward public recreation.

Other Possible Mitigation Measures

Public Open Space and Related Areas[2]

- The hours of use of the shoreline trail could be extended to sunrise to sunset, consistent with other City of Renton parks, in order to meet the requirements for public access.

- The connection between the shoreline trail and Lake Washington Boulevard could be enhanced by providing wider sidewalks (i.e. 12-foot wide) that are part of public rights-of-way.

- Additional open space could be provided onsite for active recreation (i.e. frisbee, softball, etc.).

- A crosswalk across Lake Washington Boulevard could be provided in order to connect to the May Creek Trail on the east side of the Boulevard.

Measures to Improve Semi-Private Recreation Access for Residents

- Shared roof gardens and indoor amenity space (i.e. gyms, common rooms, etc.) could be provided as part of the project.

Significant Unavoidable Adverse Impacts

Residents of the proposed development would use nearby parks and recreation facilities, including Gene Coulon Memorial Park and Kennydale Beach Park, which are already at or exceeding capacity in the summer. Demand from, project residents would contribute to the existing capacity issues at these parks.

Transportation

Mitigation Measures

Based upon the results of the transportation analysis of future intersection operations, general key findings include:

- There exists today and will be in the future a moderate to high level of background traffic that travels in the vicinity of the site area given approved and other planned pipeline projects.

- The existing transportation network with and without I-405 Improvements would adequately accommodate Alternatives 1 and 2 at full buildout in 2015, with the additional required/proposed transportation improvements (listed below)

[2] Ibid.

Required/Proposed Mitigation Measures

Level of Service / Queuing

<u>With I-405 Improvements – Alternative 1 and Alternative 2</u>

The following improvements (in addition to the planned I-405 Improvements) would be necessary under Alternative 1 and Alternative 2 to mitigate off-site impacts:

- **Lake Washington Boulevard (between Barbee Mill Access (N 43rd Street) and Ripley Lane N.** Extend the planned eastbound and westbound through lanes by WSDOT beyond and through the Barbee Mill access intersection. This would result in two through lanes in each direction on Lake Washington Boulevard from the I-405 interchange past the Barbee Mill access (NE 43rd Street). Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way), and adjacent private development.

- **Intersection #3 – Ripley Lane N/ Lake Washington Boulevard.** Construct a southbound left-turn lane at this signalized intersection (signal assumed as an I-405 Improvement).

<u>Without I-405 Improvements – Alternative 1 and Alternative 2</u>

Without the planned I-405 Improvements, the following improvements would be necessary under Alternative 1 and Alternative 2 to mitigate off-site impacts:

- **Install Traffic Signals.** Install traffic signals at the intersections of the I-405 NB and SB ramp intersections, as well as at the intersection of Ripley Lane N/Lake Washington Boulevard.

- **Intersection #1 - I-405 NB Ramps/NE 44th Street.** Widen the southbound and northbound approaches so that a separate left turn lane and shared thru-right turn lane is provided on both legs of the intersection.

- **Intersection #3 - Ripley Lane N/ Lake Washington Boulevard.** Widen the westbound approach to include a separate right turn-only lane.

- **Lake Washington Boulevard (between Barbee Mill Access (N 43rd Street) and I-405 SB Ramps.** Construct additional channelization improvements between the Barbee Mill access and the I-405 SB ramps. Alternatively, additional eastbound and westbound lanes could be constructed to provide additional queue storage created by the traffic signals required at the SB ramp and Ripley Lane along Lake Washington Boulevard. Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way) and adjacent private development.

See **Appendix H** for detailed level of service worksheets for the mitigation measures outlined above to meet the City of Renton and WSDOT standards.

Non-Motorized Transportation

- Infrastructure improvements within the site would include full curbs, gutters and sidewalks, as well as frontage improvements (curb, gutter and sidewalk) along the west side of Lake Washington Boulevard and Ripley Lane N in front of the project site. Provisions for safe pedestrian circulation could encourage future transit usage when planned public transit becomes available.

- A pedestrian trail would be provided onsite along the shoreline that would be accessible to the public and would connect to Lake Washington Boulevard through the internal sidewalk system.

City of Renton Mitigation/Impact Fees

- In addition to the project-specific mitigation measures described above, a traffic mitigation/impact fee would be paid for the proposed development at the time of building permit issuance to help offset the impacts of the project on the City's roadways.

Parking

- The proposed parking supply under Alternatives 1 and 2 would meet the minimum off-street parking requirements of the City of Renton.

<u>Other Possible Mitigation Measures</u>

Level of Service/Queuing

- Implementation of Transportation Demand Management (TDM) measures could reduce the number of vehicle trips and thus provide some benefit to improving LOS and queuing impacts at study intersections.

Public Transportation

- In order to promote a multimodal transportation network, redevelopment on the Quendall Terminals site could include site amenities (i.e. planting strip, street lighting, etc.) and access to future transit zones on Lake Washington Boulevard and at the I-405/NE 44th Street interchange to encourage and accommodate public transportation access in the future (future potential public transportation in the vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT with a flyer stop at the I-405/NE 44th Street interchange).

Non-Motorized Transportation

- A paved bicycle lane could be provided along the east side of Ripley Lane to mitigate potential conflicts between bicycles and the Quendall Terminals site access point on Ripley Lane.

Parking

- Shared parking agreements between on-site uses and implementation of transportation demand management (TDM) measures for proposed office and residential uses could be implemented to potentially reduce parking demand during peak periods, thereby reducing the necessary parking supply.

Fire Apparatus Access

- Fire access would be provided per Renton Municipal Code, or City approved alternative fire protection measures could be proposed by the applicant.

Significant Unavoidable Adverse Impacts

No significant unavoidable adverse transportation impacts would be anticipated.

SECTION II

DESCRIPTION OF PROPOSED ACTION(S) and ALTERNATIVES

CHAPTER 2
DESCRIPTION OF PROPOSED ACTION(S) AND ALTERNATIVES

This chapter of the Draft Environmental Impact Statement (DEIS) describes the Proposed Action(s) and Alternatives for the Quendall Terminals Redevelopment Project. Background information and a summary of historic site activities are also presented. Please see **Chapter 1** of this document for a summary of the findings of this DEIS and **Chapter 3** for a detailed presentation of the affected environment and probable significant environmental impacts of the Proposed Action(s) and Alternatives.

2.1 INTRODUCTION

Century Pacific, the applicant, is proposing redevelopment of the Quendall Terminals site (see **Figure 2-1**, Regional Map). The approximately 21.5-acre site, comprised of a Main Property along Lake Washington and a separate Isolated Property to the northeast, is currently vacant (see **Figure 2-2**, Vicinity Map and **Figure 2-3**, Existing Site Conditions). Redevelopment is proposed in order to create a mixed-use development, including residential, potentially office, retail and restaurant uses, as well as open space, and vehicular and pedestrian improvements. For this EIS, it is assumed that the Quendall Terminals redevelopment would be fully built out by 2015; however, actual buildout would depend upon market conditions.

2.2 BACKGROUND

The Quendall Terminals site is the location of a former creosote manufacturing facility and has been contaminated with coal tar, pitch, creosote and other hazardous chemicals (see the Site History section in this chapter, Section 3.3, **Environmental Health**, and **Appendix D** for details). As a result of this prior contamination, cleanup of the site is required under federal and state law. The Washington State Department of Ecology (Ecology) initially served as the lead regulatory agency for overseeing cleanup of the site. A Remedial Investigation report and a draft Risk Assessment/Focused Feasibility Study were completed for the site, under the oversight of Ecology in 1997 and 2004, respectively. In 2005, Ecology requested that the U.S. Environmental Protection Agency (EPA) take the lead for overseeing cleanup at the site. EPA assumed the role of lead agency, and in 2006, the site was added to the EPA's Superfund[1] National Priorities List. In September 2006, the property owners entered into an Administrative Order on Consent (AOC) with EPA. The AOC requires the property owners to complete a remedial investigation and feasibility study (RI/FS). Based on the RI/FS, EPA will propose a preferred cleanup remedy, and after public comment will select a final cleanup remedy for the site. EPA is currently reviewing the revised draft RI. The property owners expect the draft FS to be completed by April 2011.

[1] Superfund is the name given to the federal environmental program established to address sites requiring cleanup under Federal law. It is also the name of the fund established by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, that can be used by EPA to perform site cleanup work. The Superfund program allows the EPA to compel responsible parties to perform cleanups or to perform cleanups itself and then seek reimbursement from responsible parties for EPA's cleanup costs.

Source: *Google Maps,* 2010.

N
(Not to scale)

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-1 Regional Map

------- City of Renton City Limits

N

Source: *Blumen Consulting Group*, 2010.

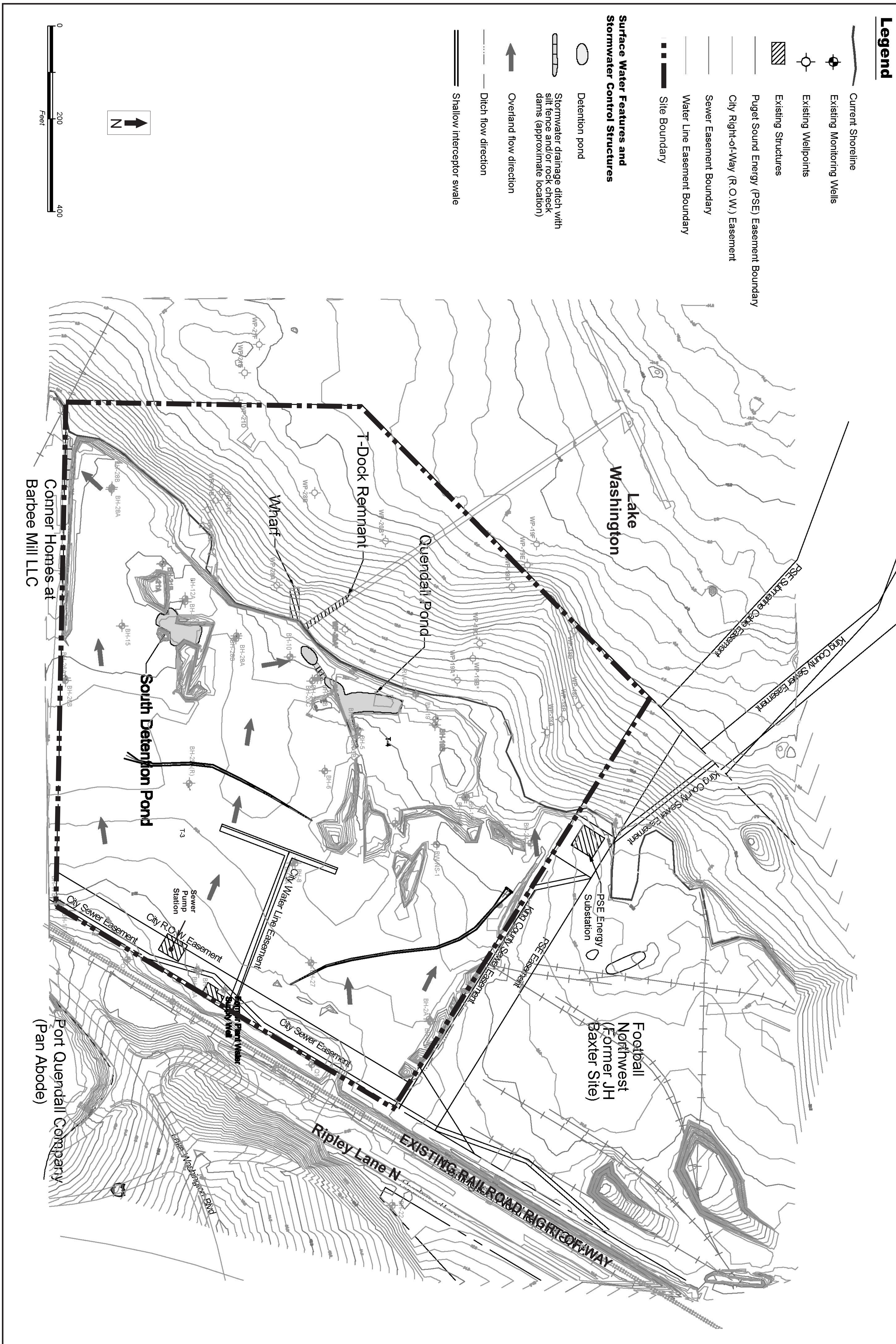
(Not to scale)

BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 2-2

Vicinity Map



Source: *Aspect Consulting,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-3
		Existing Site Conditions

The site will undergo cleanup/remediation under EPA oversight based on its status as a Superfund site, pursuant to the final cleanup plans defined by EPA. EPA is expected to select the final cleanup action in late 2011. As part of this ongoing process, applicable cleanup methods will consider potential redevelopment plans for the site. Certain activities related to redevelopment, such as grading, treatment of wetlands, stormwater control, utility/building construction, public access, etc., will be dictated by EPA in coordination with the City of Renton and other agencies (see **Chapter 3**, and **Appendices D** and **E** for details).

This DEIS briefly summarizes the history of the site and the site's current conditions; refers to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and its regulatory requirements; and, discusses protocols and institutional controls that will ultimately set out requirements and compliance methods for construction and long-term redevelopment. The DEIS impact analyses assume an existing/baseline condition subsequent to cleanup/remediation (that is, the condition of the site after remediation has been accomplished). Baseline condition assumptions have been determined based on the various studies completed in conjunction with the draft RI/FS and with specific feedback from EPA; they form the basis for evaluation of potential impacts associated with redevelopment. Therefore, only the probable significant environmental impacts and applicable mitigation measures related to redevelopment of the site are addressed in this DEIS; potential impacts associated with cleanup/remediation activities will be addressed through the separate EPA process (see Section 3.3, **Environmental Health**, and **Appendix D** for details). The following elements are assumed to be included as part of the site cleanup/remediation process and form the baseline/existing condition for purposes of analysis in this DEIS. As described above, the cleanup/remediation is an ongoing process being conducted by EPA, and it is possible that there could be some changes to these assumptions as remedies and plans are finalized.

- Placement of a 2-foot-thick sand cap over the upland portion of the Main Property.

- Placement of a 2- to 3-foot-thick layered cap consisting of organoclay, sand, gravel and topsoil over most of the sediments within the shoreline area adjacent to and lakeside of the former Quendall Pond (approximately 300 linear feet of shoreline).

- Excavation of shoreline soil to accommodate the shoreline cap.

- Filling of certain existing on-site wetlands. Implementation of a Shoreline Restoration Plan, including re-establishing and expanding certain wetlands, and recreating/enhancing riparian habitat to replicate the existing riparian functions.

- Possible localized soil removal (i.e. in the former railroad loading area and in planned utility corridors onsite).

- Possible installation of a permeable shoreline groundwater treatment wall adjacent to portions of the lake shoreline.

- Implementation of institutional controls to prevent alteration of the cap during redevelopment without EPA approval, and to prevent the use of on-site groundwater for any purpose.

- Implementation of an Operations, Maintenance and Monitoring Plan (OMMP) that would present a process for obtaining EPA approval if future excavations, utility installations or other site disturbances are necessary after implementation of the final remedial action.

See Section 3.3, **Environmental Health**, and **Appendix D** for more information on these assumptions.

Though a cleanup action performed under Superfund authorities (e.g., a Consent Decree) would be exempt from the procedural requirements of federal, state and local environmental laws (including the environmental review process), the action must nevertheless comply with the substantive requirements of such laws. EPA will determine whether the selected cleanup action complies with all applicable or relevant and appropriate requirements and will also provide technical documents and the proposed cleanup plan for public review prior to finalizing its cleanup decision.

2.3 ENVIRONMENTAL REVIEW PROCESS AND PURPOSE

SEPA EIS and Lead Agency

For purposes of the Quendall Terminals Redevelopment Project, the City of Renton is responsible for performing the duties of a lead agency, as required by the State Environmental Policy Act (SEPA). The City's Environmental Review Committee serves as the Responsible Official for the SEPA review. As indicted above, EPA is the responsible entity for all cleanup/remediation plans and actions.

Determination of Significance and EIS Scoping

On November 18, 2009, the applicant submitted an application for Master Plan, Shoreline Substantial Development Permit and Binding Site Plan approval for the Quendall Terminals Redevelopment Project. The City of Renton, as SEPA lead agency, determined that the project may have a significant impact on the environment. As a result, an EIS is required, per WAC 43.21C.030(2)(c) and must be prepared consistent with WAC 197-11-400 through 460. On February 19, 2010, the City issued a Determination of Significance (DS) and Request for Comments on the Scope of the EIS. The DS indicated that a public meeting would be held to provide an opportunity for the public to learn more about the Proposed Actions and to provide input into the environmental review process, and that the EIS scoping period would end on March 12, 2010. However, the initial EIS scoping period ended before the public scoping meeting could be held. As a result, a second public scoping period was opened in order to accommodate a public meeting (this scoping period ended on April 30, 2010). The two scoping periods comprise expanded EIS scoping under SEPA (per WAC 197-11-408 through 410).

The EIS public scoping meeting was held on April 27, 2010, to provide the public with opportunities to comment on the range of environmental issues, alternatives and actions that should be considered in the EIS. During the EIS scoping meeting, the public was encouraged to provide both written and/or oral comments on the scope of the EIS. A total of nine people signed in and a total of four people spoke at the public meeting.

During the two EIS scoping comment periods, a total of five comment letters/emails were received, including: two comment letters from agencies (Washington State Department of Transportation and King County), one comment letter from the Muckleshoot Indian Tribe, and two comment letters from one individual. All of the comment letters/emails are available for review at the City of Renton Department of Community and Economic Development. See **Appendix B** for further information on the scoping process and a summary of the scoping comments.

The majority of the comments that were received during the public scoping period for the Quendall Terminals EIS related to Recreation/Public Shoreline Access, Utilities (utility construction), Critical Areas, and Transportation/Traffic. Following EIS scoping, the City identified the following elements to be analyzed in this DEIS:

- Earth
- Critical Areas
- Environmental Health
- Energy – Greenhouse Gas Emissions
- Land and Shoreline Use
- Relationship to Plans, Policies and Regulations
- Aesthetics/Views
- Parks and Recreation
- Transportation/Traffic

Purpose of EIS Analysis

Per WAC 197-11-400, an EIS is an objective, impartial evaluation of the environmental consequences of a proposed project. It is a tool that will be used by the City of Renton, other agencies and the public in the decision-making process. An EIS does not recommend for or against a particular course of action.

The Draft EIS (DEIS) is the City's initial analysis of probable significant environmental impacts of the Proposed Actions and alternatives for a range of topics, such as: earth, critical areas, land use, transportation, etc. The DEIS has been issued and distributed to agencies, organizations, and the public for review as part of a public comment period. A public meeting will be held following issuance of the DEIS to gather comments regarding the DEIS. Comments on the DEIS can be given verbally at the public meeting or in writing at any time during this comment period.

Based on the comments received on the DEIS, a Final EIS (FEIS) will be prepared as the final step in the EIS process. The FEIS provides responses to comments received on the DEIS from agencies, organizations and the public, and may contain clarifications to the analysis of environmental impacts. The DEIS and FEIS together comprise the document that the City will use – along with other analyses and public input – regarding decisions on the redevelopment project.

After the FEIS is issued, City staff will make recommendations to the decision-makers on the Quendall Terminals Redevelopment Project. A public hearing will be held as part of the decision-making process on the project. Ongoing opportunities for public input will occur as part of the decision-making process.

2.4 APPLICANT'S OBJECTIVES

For purposes of SEPA (WAC 197-11-440) the following are the applicant's (Century Pacific's) primary objectives for the proposal:

- Create a compact, urban residential development that allows for inclusion of a compatible mix of uses, including retail uses, as well as potentially office uses, as the market allows.
- Consistent with the Growth Management Act, establish housing at high densities in close proximity to existing employment centers in downtown Renton and other primary employment centers on the Eastside.
- Create an overall urban design concept that is consistent throughout the site.
- Provide appropriate visual corridors through the site to the shoreline.
- Create a development that provides opportunities, such as public walkways or a plaza, for visitors and residents to visually or physically access the shoreline of Lake Washington.
- Allow for remediation of the site and ensure that future redevelopment is compatible with the environmental remediation effort.
- Work cooperatively with the City of Renton to adopt a binding site plan and possible development agreement that provide the necessary predictability, consistency and expediency for long-term success of the redevelopment and allow for flexibility to respond to market factors over time.
- Coordinate with state, federal and local agencies, tribes, organizations, institutions, public and private sector interests and other interested parties to facilitate implementation of both a successful remediation and redevelopment plan in an expeditious manner that returns the property to productive use.
- Allow for redevelopment of the property that is financially viable from a real estate market perspective and allows financial return in a timely fashion.

2.5 SITE DESCRIPTION

The approximately 21.5-acre Quendall Terminals site is located in the northern portion of the City of Renton, within the Southwest ¼ of Section 29, Township 24 North, Range 5 East, King County. The junction of Interstate Highways 405 and 90 is located approximately 3.5 miles to the northeast (see **Figure 2-1**). The site includes the approximately 20.3-acre Main Property, located adjacent to Lake Washington, and an approximately 1.2-acre Isolated Property, to the northeast of the Main Property. The Main Property is located at 4350 Lake Washington Boulevard and is generally bounded by Lake Washington on the west; a Puget Sound Energy Easement and the Seahawks Headquarters and Training Facility on the north; Railroad right-of-way; Lake Washington Boulevard and Ripley Lane N on the east; and, the Barbee Mill residential development on the south. The adjacent Isolated Property is generally bounded by

Ripley Lane N on the north and west, and the southbound Interstate-405 off-ramp on the south and east (see **Figure 2-2**).

2.5.1 Site History

Beginning in 1917, creosote and related products were manufactured on the site for about 53 years. The creosote manufacturing facility refined and processed coal tar and oil-gas tar residues that were shipped or barged to the site from Lake Union. Tars and creosote products were released in portions of the site where transport, production and/or storage of the products were performed. In 1972, the site was sold to Quendall Terminals. Between 1969 and 1978, the site was used intermittently to store diesel, crude and waste oils. Beginning in 1975, the site was used as a log sorting and storage yard (see Section 3.3, **Environmental Health**, and **Appendix D** for details).

2.5.2 Existing Site Conditions

The Quendall Terminals site is currently vacant and essentially unused. The site gently slopes from east to west and is partially vegetated, including mature trees along the western and southern edges of the Main Property. Ten wetlands totaling approximately 0.9 acres are present onsite, eight on the Main Property and two on the Isolated Property (see Section 3.2, **Critical Areas**, and **Appendix E** for details). A small brick building, a sewer pump station and a shack are located on the eastern edge of the Main Property. A dock remnant and wharf are situated along the Lake Washington shoreline. There are no other buildings onsite (see **Figure 2-3**).

Existing Utilities

Water

The City of Renton currently provides water service to the site. There is an existing 12-inch water main located offsite to the west of the existing railroad tracks within the Railroad right-of-way, and a 10-inch water line on the Main Property. The City's water system in the vicinity of the project has the capacity to supply a maximum of 5,600 gallons per minute (GPM) at 20 PSI residual pressure. The site is located in the 320 Water Pressure Zone and static pressure is approximately 124 PSI at the street level (City of Renton, 2009).

Sewer

The City of Renton currently provides sewer service to the site. An existing 12-inch sewer line and the Baxter Sewer Pump Station are located in the eastern portion of the Main Property. The line runs along the east property line (west of the Railroad right-of-way). The Baxter Sewer Pump Station was designed to serve the Quendall Terminals site, as well as the Seahawks Headquarters and Training Facility and Barbee Mill development. The pump station was designed for an overall peak flow of 594 gallons per minute (GPM) and a flow of 97.2 GPM from the Quendall Terminals site. The pump station has the ability to be modified to increase the station's capacity by over 300 GPM (KPFF, 2010).

Stormwater

An interim stormwater control system is present on the Main Property and consists of swales and berms, as well as a previously constructed sediment pond. The purpose of the interim system is to control site runoff and erosion/sedimentation prior to site cleanup and remediation. Surface runoff currently infiltrates or is conveyed to Lake Washington via surface flow or swales.

Existing Comprehensive Plan, Zoning and Shoreline Designations

The *City of Renton Comprehensive Plan* (2009) designates the Quendall Terminals site (including the Main Property and the Isolated Property) as Commercial/Office/Residential (COR). Per the COR Purpose Statement, this designation provides opportunities for large-scale office, commercial, retail, and multifamily residential projects that develop through a master plan and site plan process and incorporate significant site amenities and/or gateway features. The zoning classification of the Quendall Terminals site (including both properties) is Commercial/Office/Residential (COR). Per Renton Municipal Code (RMC) 4-2-020(O), the COR zone is intended to provide a mix of intensive office, hotel, convention center and residential activity in a high-quality, master-planned development that is integrated with the natural environment. The Lake Washington shoreline along the Main Property is classified as an Urban environment in the City of Renton Shoreline Master Program (1983). Per RMC 4-3-090(J), the objective of the Urban environment is to ensure optimum utilization of the shoreline by providing for public use and access, and by managing development to enhance and maintain the shoreline for viable and necessary urban uses (see Section 3.6, **Relationship to Plans, Policies, and Regulations** for details).

2.6 DESCRIPTION OF PROPOSED ACTION(S)

2.6.1 Proposed Actions

The Proposed Actions for the Quendall Terminals Redevelopment Project include:

- Master Plan approval from the City;
- Binding Site Plan approval from the City;
- Shoreline Substantial Development Permit approval from the City;
- Possible Development Agreement between the City and the applicant[2];
- Other local, state and federal permit approvals for construction and redevelopment; and,
- Construction and operation of the Quendall Terminals Redevelopment Project.

2.7 DESCRIPTION OF ALTERNATIVES

This DEIS addresses the probable significant environmental impacts of proposed redevelopment of the Quendall Terminals site. In order to disclose environmental information relevant to the Quendall Terminals redevelopment and in compliance with SEPA, this DEIS evaluates two redevelopment alternatives (Alternative 1- the subject of the November 2009 application, and Alternative 2 - a lower density alternative), as well as the No Action Alternative. Through further evaluation by the City and the applicant and based on public input, either the

[2] The possible Development Agreement between the City of Renton and the applicant could identify infrastructure requirements, phasing (as appropriate), and specific development standards for the site.

Alternative 1 redevelopment plan, the Alternative 2 redevelopment plan, a modification of either plan or a combination of the two plans could be carried forward for possible approval by the City.

2.7.1 EIS Alternatives Concept Overview

The Quendall Terminals project is intended to create a vibrant waterfront redevelopment that would convert a Superfund site into a compatible mix of uses, including residential, office (under Alternative 1 only), retail and restaurant uses. Redevelopment would represent a compact, urban form, with a consistent design concept throughout the site. Opportunities would be provided for visitors and residents to visually or physically access the shoreline of Lake Washington via public walkways and plazas, as well as through proposed view corridors created by on-site roadways, surface parking areas and open space. The project would be required to be consistent with the final cleanup/remediation plan for the site approved by the EPA, including protocols and institutional controls for construction and long-term redevelopment.

2.7.2 EIS Alternatives Summary

Mix of Uses

Alternatives 1 and 2 would include a mix of residential, office (under Alternative 1 only), retail, restaurant uses, as well as open space and parking. The mix of uses under Alternatives 1 and 2 would differ slightly as shown in **Table 2-1**. Alternative 2 would include the same amount of retail and restaurant uses as Alternative 1. However, Alternative 2 would feature fewer residential units and parking spaces than Alternative 1, and no office uses. More open space would be provided under Alternative 2 than under Alternative 1.

Site Area Breakdown

Table 2-2 provides a breakdown of the site area under Alternatives 1 and 2. As shown in **Table 2-2**, similar amounts of area would be in built/impervious surfaces, and in vegetated/pervious areas under the redevelopment alternatives.

Table 2-1
SUMMARY OF REDEVELOPMENT – ALTERNATIVES 1 & 2

	Alternative 1 (sq. ft.)	Alternative 2 (sq. ft.)
Residential	800[1]	708[1]
Office	245,000	0
Retail	21,600	21,600
Restaurant	9,000	9,000
Open Space[2]	509,600	518,300
Parking	2,171[3]	1,364[3]

Source: Lance Mueller and Associates, 2010.
[1] Residential data represents the total number of residential units on the site.
[2] For purpose of this DEIS, open space includes: paved plazas, sidewalks, natural areas, landscaped areas and unpaved trails. These areas may or may not meet the City's standards, regulations, and procedures for open space.
[3] Parking data represents the total number of parking spaces on the site.

Table 2-2
SITE AREA BREAKDOWN -
ALTERNATIVES 1 & 2

Site Uses	Alternative 1 (acres)	Alternative 2 (acres)
Built Areas (Impervious Areas)		
Building footprints	5.0	4.1
Paved rights-of-way, roads, pedestrian/bike paths	4.2	3.9
Surface parking areas	1.4	2.7[3]
Paved plazas	0.2	0.1
Subtotal	**10.8**	**10.8**
Vegetated Areas (Pervious Areas)		
Natural areas[1]	4.4[1]	4.4[1]
Landscaped areas	6.0	6.1
Unpaved trails	0.2	0.3
Subtotal	**10.6**	**10.8**
Total	**21.5[2]**	**21.5[2]**

Source: Lance Mueller Architects, 2010.
[1] Includes the adjacent 1.2-acre Isolated Property to the northeast that is part of the site.
[2] Totals differs from sums of subtotals due to rounding.
[3] Although there is less total parking under Alternative 2 than Alternative 1, more of the parking is surface parking, which is why the surface parking areas acreage is greater under Alternative 2 than Alternative 1.

Assumed Buildout Date

Redevelopment of the Quendall Terminal site would occur subsequent to EPA's decision on the final cleanup/remediation plans, and implementation of these plans (EPA is expected to select a remedy in late 2011). Some redevelopment activities could be initiated in conjunction with the remediation effort (i.e. some utilities could potentially be installed in conjunction with grading under the remediation). For this EIS, it is assumed that the Quendall Terminals redevelopment would be fully built out by 2015; however, actual buildout would depend upon market conditions. A specific phasing schedule for redevelopment has not been defined at this point.

2.7.3 Description of Redevelopment Alternatives

Alternative 1 – Application

The approximately 21.5-acre site would be subdivided into 7 lots, 4 of which would contain mixed-use buildings and three of which would contain the Shoreline Restoration Area. Below is a description of the specific features of redevelopment under Alternative 1 (see **Figure 2-4**, Site Plan - Alternative 1).

Residential

Alternative 1 would provide a total of 800 multifamily residential units. Residential units would be located in all of the buildings onsite, except buildings NE 1 and SE 3 (see **Figure 2-4**). A net residential density of 46 dwelling units per acre would result (800 dwelling units/17.23 acres of useable area). Both apartment and condominium units would likely be provided. Due to the site's waterfront location, it is anticipated that the proposed residential units would be targeted towards middle and upper income households. Proposed residential uses are anticipated to generate approximately 1,300 residents.

Office

Alternative 1 would feature approximately 245,000 square feet of office uses. These uses would be located in buildings NE 1 and SE 3 (see **Figure 2-4**). Proposed office uses are anticipated to employ approximately 1,000 people.

Retail and Restaurant

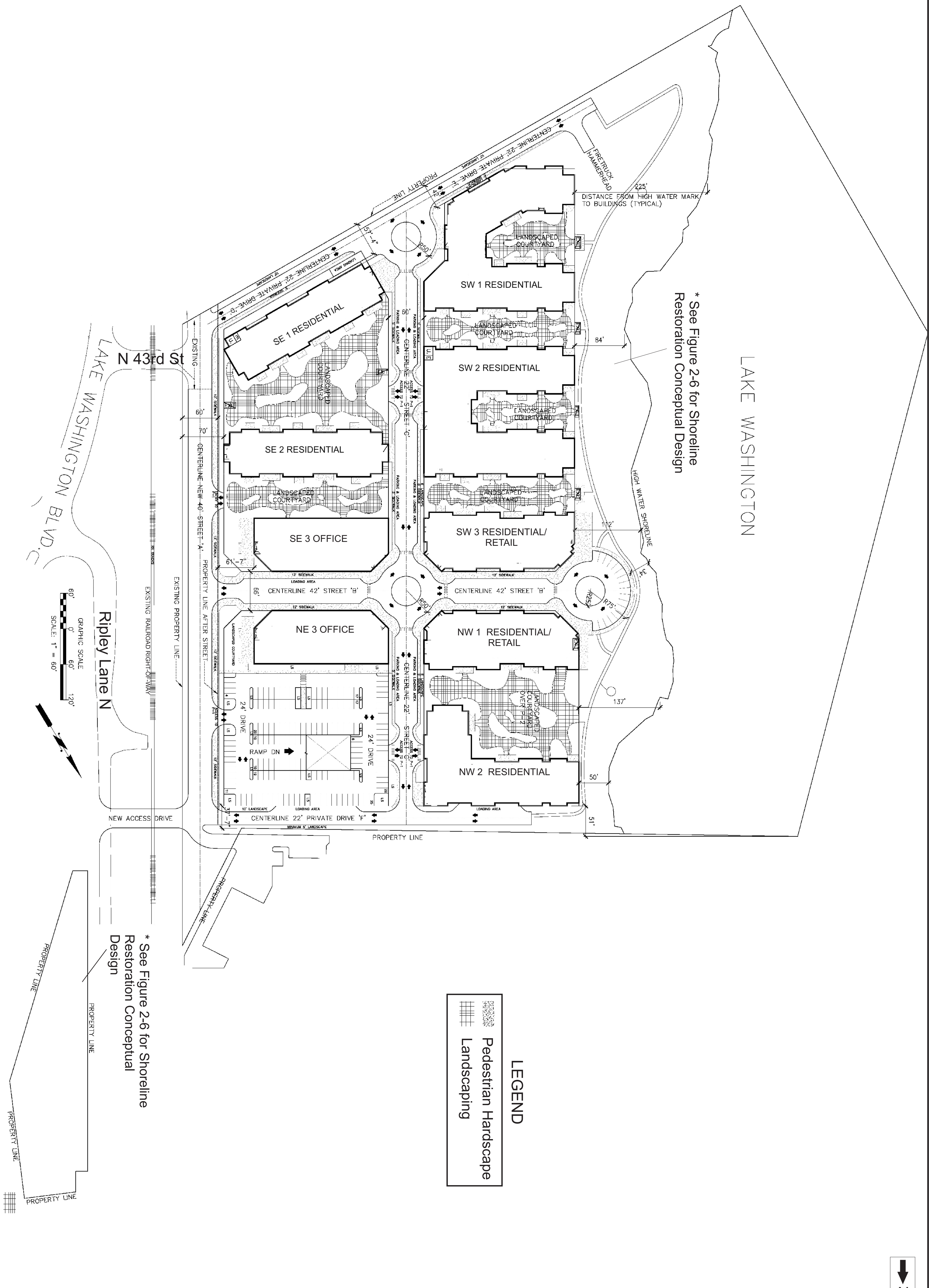
Approximately 21,600 square feet of retail and approximately 9,000 square feet of restaurant uses would be included in Alternative 1. These uses would be located at ground level in buildings NW 1 and SW 3, along Street "B" (see **Figure 2-4**). These uses are anticipated to employ approximately 50 people.

Access/Parking

Vehicular access to the site would be provided via a new access drive connecting to Ripley Lane N in the northeast quadrant of the site, as well as via the extension of N 43rd Street (from the existing Barbee Mill access) in the southeast quadrant of the site. The applicant proposes to dedicate or set aside approximately 3.7 acres of additional right-of-way, as required to provide access to the 7 proposed lots. East-west access within the site would be provided by Drives "D", "E" and "F" (private driveways) and Street "B" (a public street); north-south access within the site would be provided by Streets "A" and "C" (both public streets). Three traffic circles and a hammerhead fire truck turnaround at the terminus of Drive "E" are also proposed (see **Figure 2-4** and **Appendix C** for cross-sections of the on-site roadways).

Certain of the proposed roadways onsite do not currently meet City of Renton requirements for fire access. The southwest fire access could be lengthened or extended along the west side or lake side of the proposed structures from the hammerhead to meet the access criteria. The access surface could be an all weather asphalt or an alternate surface (i.e. grass-crete) pending assurance by a geotechnical engineer that the soils could support fire fighting equipment.

The two access points to the site cross Port of Seattle property (the Railroad right-of-way) at N 43rd Street and a new access drive onto Ripley Lane N in the northeast quadrant of the site (see **Figure 2-4**). These site access roads would be within dedicated public rights-of-way and would include sidewalks, curb cuts and gutters.



Source: *Lance Mueller & Associates,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	**Figure 2-4**
		Alternative 1- Site Plan

Parking spaces for 2,171 cars would be provided in both structured and surface parking areas. Approximately 1,986 structured parking stalls would be located above grade in two levels beneath the proposed buildings. Approximately 185 at-grade surface parking stalls would occur in one lot in the northeast quadrant of the site, as well as along and at the terminus of Street "B" (see **Figure 2-4**). No underground parking would be provided.

Open Space/Recreational Facilities

For purposes of this DEIS, it has been calculated that approximately 11.7 acres of open space and related areas would be provided onsite, including: paved plazas, natural areas, landscaped areas, unpaved trails and sidewalks. This open space and related areas may or may not meet the City's standards, regulations and procedures to be considered open space. Approximately 3.4 to 3.5 acres of the on-site open space and related areas would be visually and physically accessible to the general public (i.e. the natural shoreline area and the shoreline trail, respectively). Approximately 4.3 to 4.1 acres of semi-private landscaped courtyards with views toward Lake Washington and passive recreation opportunities (i.e. for gathering and strolling) would be available for Quendall Terminals residents. Approximately 1.2 acres of natural, un-useable open space (wetland habitat) would be provided at the Isolated Property (see **Figure 2-4**). Additional semi-private areas could be provided as rooftop gardens and private balconies would be provided in the proposed buildings. Recreational facilities (i.e., workout rooms) could be included in the buildings (see Section 3.8, **Parks and Recreation**, for details).

New roadways proposed on the Main Property would include sidewalks to provide pedestrian access. As part of redevelopment, a pedestrian corridor/trail would also be constructed along the Lake Washington shoreline during cleanup/remediation. This trail would provide a range of pedestrian amenities and passive recreation opportunities that would be available to the general public during reasonable hours (anticipated to be from 10 AM to dusk). Two interpretive wetland viewpoints would be incorporated into the design of the trail. The trail would likely be 10 feet wide and would be built with a surface that would support a maintenance pickup truck and ambulance, and would also meet ADA guidelines. The trail would link to the site's upland internal pedestrian circulation system (sidewalks), which would connect to Lake Washington Boulevard, where existing pedestrian and bicycle facilities are present. The trail would be privately owned and maintained.

Building Design

Nine buildings would be constructed on the Main Property under Alternative 1. These buildings would range in size from approximately 94,600 to 209,000 square feet. The maximum height of the buildings would be 7 stories (5 stories over 2 stories of parking) or approximately 80 feet.
Redevelopment would represent a compact, urban form, with a consistent design concept throughout the site. The proposed design of the buildings is intended to be coordinated through a variety of details and materials, and provide a human scale with visually interesting streetscapes and facades. Ground-level uses (retail and restaurant) would include canopies, pedestrian/street lighting and alternating façade materials to enhance the visual appeal of the buildings, particularly along Street "B". Upper-level uses would be setback from the ground-level façade for modulation and visual interest; additional architectural elements would be included, such as façade modulation, and alternating materials and details. Decorative screening of under-building parking would be provided. Exterior building materials would include: glass, painted metal, concrete, brick veneer, metal panel siding, stucco and composite panel siding (see **Figure 2-5**, Representative Building Elevations - Alternative 1).

The design of the building would meet fire protection and detection requirements from the current City of Renton fire code ordinance and the 2009 International Building Code, including: fire protection and detection requirements (fire sprinkler, fire alarm and dry standpipe systems), elevators, high-rise building provisions, pre-fire planning and building radio coverage requirements. A fire mitigation/impact fee would be paid for the proposed development at the time of building permit issuance to help offset the impacts of the project on the City's emergency services.

Landscape Design

It is anticipated that a Shoreline Restoration Plan will be developed in conjunction with site cleanup/remediation, and will be subject to separate review and approval by the EPA and/or appropriate resource agencies. A conceptual design has been included in this DEIS that represents the assumed plan for the shoreline restoration. As shown on this conceptual plan, restoration would occur in the shoreline setback along Lake Washington that is assumed to average 68 feet in width, and include re-vegetation with native plant species. Wetlands would be reestablished and expanded in the shoreline area of the Main Property, as well as on the Isolated Property. Riparian habitat would be recreated/enhanced (see **Figure 2-6**, Shoreline Restoration Conceptual Design - Alternative 1 and **Figure 2-7**, Wetland D Buffer Width Averaging - Alternatives 1 and 2).

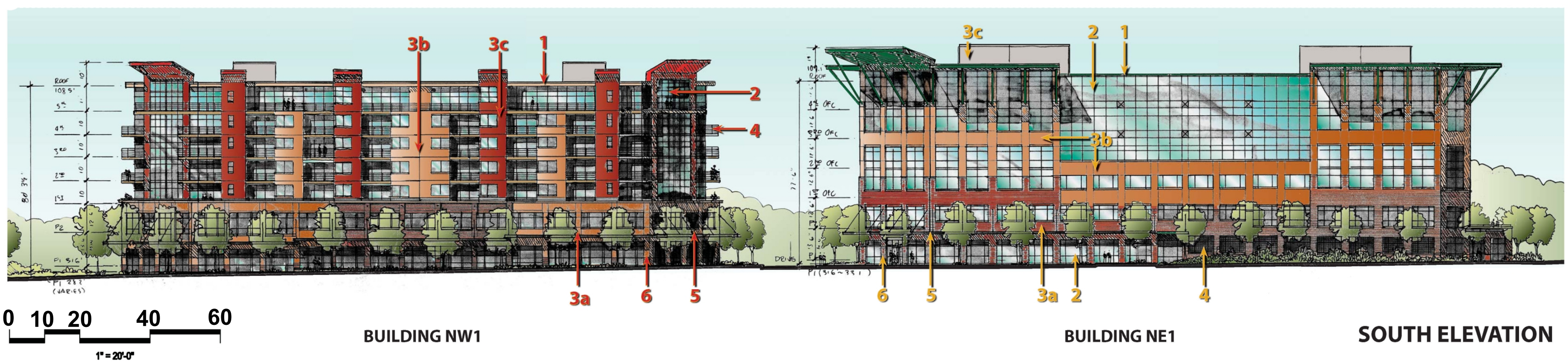
A preliminary landscape plan has been prepared for proposed redevelopment of the upland portion of the Main Property. According to this plan, native and ornamental plants that are suited for this climate zone would be installed as landscaping throughout the site. The intent of the plan is to create a landscape that is functional, aesthetically pleasing, diverse and water efficient. Landscaping would include new trees, shrubs and groundcovers of various sizes and species. Landscaping would be provided between the buildings, including landscaped courtyards that would provide views of Lake Washington, gathering areas and passive recreation opportunities for building residents. Street trees and street landscaping would be planted along the new roadways onsite; surface parking areas would also include landscaping, as required by City of Renton regulations. Under-building parking would be screened by landscaping. A landscaped edge along the north and south boundaries of the site would provide a buffer and partial visual screen between the on-site development and adjacent properties (see **Figure 2-8**). New buildings could also include rooftop plazas with landscaping and green roof elements.

Grading

Under its status as a Superfund site by EPA, preliminary grading of the Main Property will be accomplished for site cleanup/remediation. Applicable cleanup methods will consider redevelopment plans for the site. For this EIS, the baseline condition assumes that limited disturbance of site soils will be necessary and capping of the upland and shoreline portions of the Main Property will occur with cleanup/remediation. The capping will require the fill of several existing wetlands onsite. Wetlands will be reestablished and current wetlands will be expanded in the shoreline area of the Main Property, as well as on the Isolated Property, as compensation for this filling (see Section 3.2, **Plants and Animals**, and **Appendix E** for details).

Buildings NW1 and NW2

Building NW1 and NE1

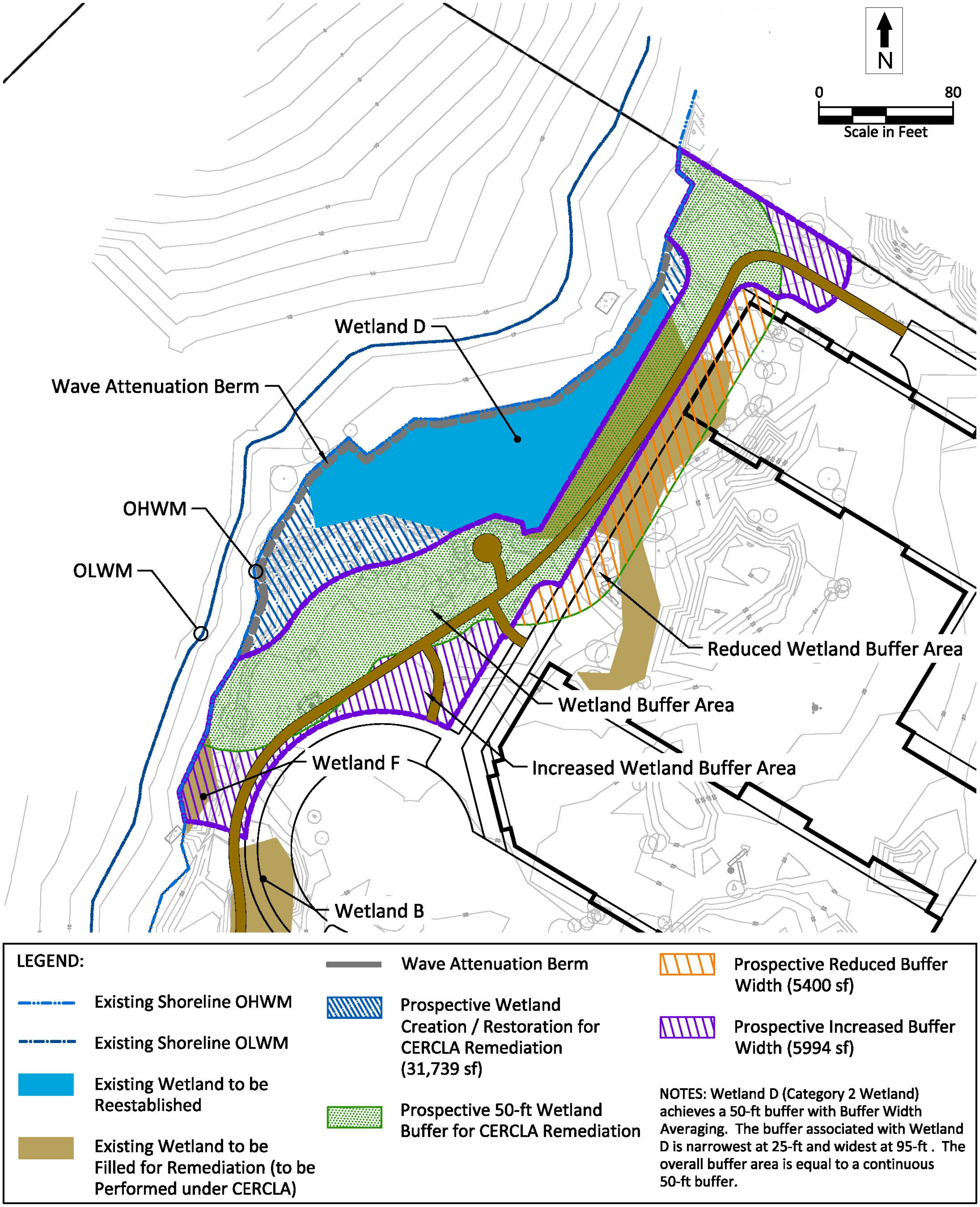


Source: *Lance Mueller & Associates*, 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-5 Alternative 1 - Representative Building Elevations

Source: *Anchor QEA,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-6
		Alternative 1 - Shoreline Restoration Conceptual Design



Source: *Anchor QEA,* 2010.

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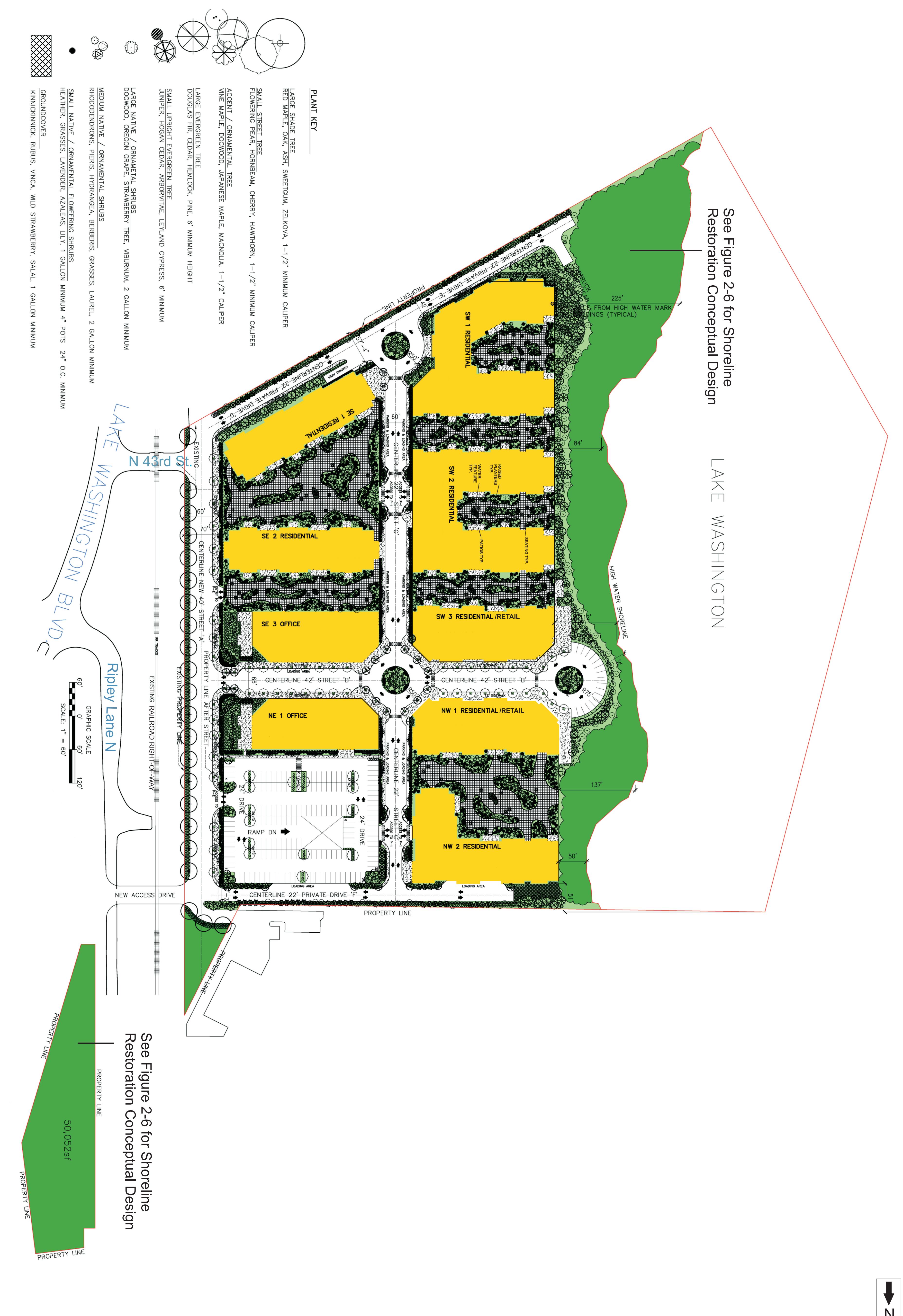
Figure 2-7

Alternatives 1 & 2 - Wetland D Buffer Width Averaging



Source: *Lance Mueller & Associates*, 2010.

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Quendall Terminals

Figure 2-8

Alternative 1-
Preliminary Landscape Plan

Minimal additional grading would be required for the proposed redevelopment. The actual amount of grading that would be required has not been quantified at this time; some fill would be required to achieve the proposed site grades. It is estimated that approximately 53,000 to 133,000 cubic yards of fill would be required, depending on the average fill depth at the site. It is assumed that the fill material would be imported from an approved location. Some cut/fill would be required for installation of utilities (installation of certain utilities could be coordinated with the cleanup/remediation effort). Buildings and roads would likely be constructed on piles/piers.

Utilities

Water

Water service to Alternative 1 would be provided by the City of Renton via the existing water main in the Railroad right-of-way. The existing water main onsite would be abandoned and a new looped 12-inch water main with fire hydrants would be installed around the site, in accordance with City of Renton requirements. Per the City's requirements, any new construction must have one fire hydrant capable of delivering a minimum of 1,000 GPM located within 100 feet of buildings and additional hydrants within 300 feet of buildings. Automatic fire sprinklers would also be included within all buildings. As described under Existing Conditions in this chapter, the City's water system in the vicinity of the Quendall Terminals site has the capacity to supply a maximum of 5,600 GPM at 20 PSI. The City has calculated that a preliminary fire flow of 5,000 GPM would be required for the project. It is anticipated there is sufficient capacity in the City's water system to serve the project and meet the City of Renton's requirements. However, a hydraulic analysis of the City's water system, with the proposed project building demands included, would be completed prior to construction in order to confirm that the water demands of the proposed project can be met by the existing system (KPFF, 2010).

Sewer

Sewer service to Alternative 1 would be provided by the City of Renton via the existing sewer line in Lake Washington Boulevard. The existing sewer line onsite would be reused or abandoned and additional lines provided to connect to the off-site line. The existing Baxter Pump Station onsite would remain and would be incorporated into the proposed sewer system.

As described under 2.5.2 **Existing Site Conditions** in this chapter, the Baxter Pump Station was designed to handle sewage flow of 97.2 GPM from the Quendall Terminals site. The estimated flow from the Quendall Terminals Redevelopment Project would be approximately 614 GPM. Therefore, the capacity of the Baxter Pump Station would need to be increased by approximately 517 GPM to 1,111 GPM to accommodate the proposed project. The Baxter Pump Station was designed with the ability to increase capacity by changing pump impellers and increasing the wet well capacity; these measures could be included as part of redevelopment of the site (KPFF, 2010).

Stormwater

The interim stormwater control system would be eliminated with cleanup/remediation of the site. During construction of the Quendall Terminals Redevelopment Project, a Temporary Erosion and Sedimentation Control Plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented, per the 2009 *King County Surface Water Design Manual* (KCSWDM) adopted by City of Renton. Following construction, a permanent stormwater control system would be installed in accordance with the 2009 KCSWDM. Stormwater runoff would be collected from impervious surfaces and conveyed to Lake Washington through a piped stormwater drainage system. Stormwater would be discharged to the lake via three new outfalls. Stormwater runoff from pollution-generating surfaces (i.e. roadways and surface parking lots) would be treated prior to discharge to the lake. No stormwater detention would be required, per City regulations (see Section 3.2, **Critical Areas**, for details).

Institutional controls approved by EPA would be implemented for future utility installations requiring site disturbance after implementation of the final remedial action.

Alternative 2 - Lower-density Alternative

Similar to Alternative 1, the site would be subdivided into 7 lots, 4 of which would contain mixed-use buildings and three of which would contain the Shoreline Restoration Area. Below is a description of the specific features of redevelopment under Alternative 2 (see **Figure 2-9**, Site Plan – Alternative 2 and **Tables 2-1** and **2-2** for a summary/break down of redevelopment under Alternative 2).

Residential

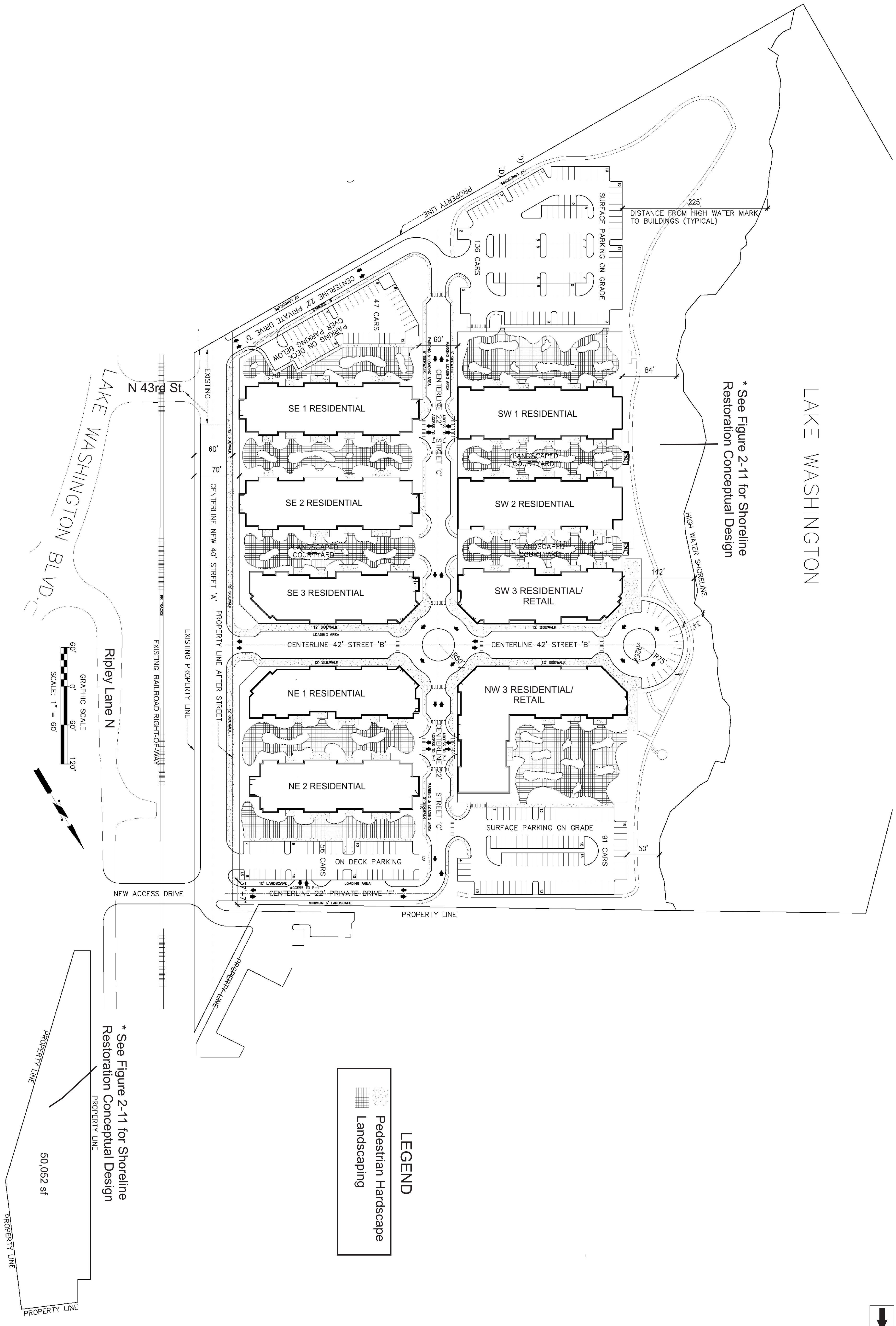
Alternative 2 would provide a total of 708 multifamily residential units. Residential units would be located in all of the buildings onsite. A net residential density of 40 dwelling units per acre would result (708 dwelling units/17.53 acres of useable area). Like Alternative 1, both apartment and condominium units would likely be provided, and it is anticipated that the units would be targeted towards middle and upper income households.

Office

Alternative 2 would not feature any office uses.

Retail and Restaurant

The same amount of retail (21,600 SF) and restaurant (9,000 SF) uses in the same general areas onsite would be included under Alternative 2 as under Alternative 1 (at ground level in buildings NW 1 and SW 3, along Street “B”). These uses are anticipated to employ approximately 50 people.



Source: *Lance Mueller & Associates,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	**Figure 2-9** **Alternative 2- Site Plan**

Access/Parking

As under Alternative 1, vehicular access would be provided via a new access drive onto Ripley Lane N in the northeast quadrant of the site, as well as via the extension of N 43rd Street (from the exiting Barbee Mill access) in the southeast quadrant of the site. The applicant proposes to dedicate approximately 3.6 acres of public right-of-way to provide access to the 7 proposed lots. East-west access within the site would be provided by Drives “D” and “F” (private driveways) and Street “B” (a public street); north-south access within the site would be provided by Streets “A” and “C” (both public streets). Two traffic circles are also proposed (see **Figure 2-9** and **Appendix C** for cross-sections of the on-site roadways). Fire apparatus access roads would need to meet applicable fire code requirements.

The two access points to the site would cross Port of Seattle property (the Railroad right-of-way) at N 43rd Street and a new access drive onto Ripley Lane N in the northeast quadrant of the site (see **Figure 2-9**). These site access roads would be within dedicated public rights-of-way and would include sidewalks, curb cuts and gutters.

Parking for approximately 1,364 cars would be provided in structured and surface parking areas. Approximately 988 structured parking stalls would be located above grade in one level beneath the proposed buildings, as well as on two parking decks located in the northeast and southeast quadrants of the site. Approximately 376 at-grade surface parking stalls would occur in two surface parking lots located in the northwest and southwest quadrants of the site, as well as along and at the terminus of Street “B” (see **Figure 2-9**). No underground parking would be provided.

Open Space/Recreational Facilities

For purposes of this EIS, it has been calculated that approximately 11.8 acres of open space and related areas would be provided onsite, including: paved plazas, natural areas, landscaped areas, unpaved trails and sidewalks. The characteristics of the open space and related areas would be similar to Alternative 1. This open space and related areas may or may not meet the City’s standards, regulations, and procedures to be considered open space.

Building Design

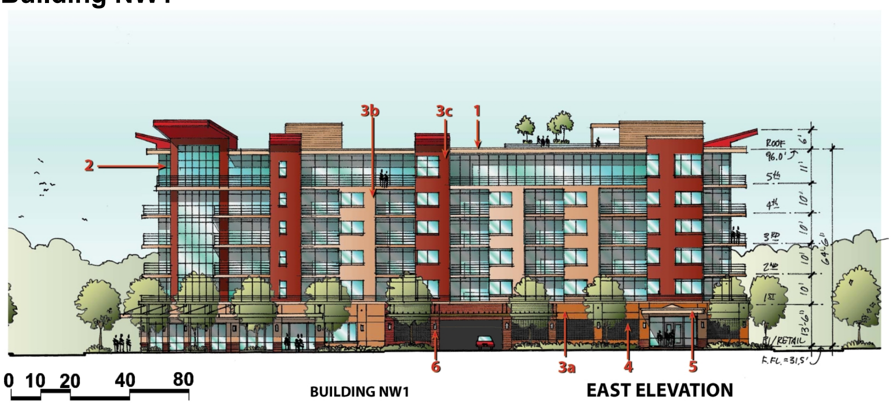
Similar to Alternative 1, nine buildings would be constructed on the Main Property under Alternative 2. These buildings would range in size from approximately 77,000 to 112,800 square feet. The maximum height of the buildings would be 6 stories (5 stories over 1 story of parking) or a maximum of approximately 67 feet, as compared to 7 stories and a maximum of 80 feet under Alternative 1.

Building design concepts would be similar to Alternative 1 (see **Figure 2-10,** Representative Elevations – Alternative 2) and would meet fire protection and detection requirements from the current City of Renton fire code ordinance and the 2009 International Building Code.

Landscape Design

The Shoreline Restoration Plan would be similar to Alternative 1 (see **Figure 2-11**, Shoreline Restoration Conceptual Design – Alternative 2 and **Figure 2-7**, Wetland D Buffer Width Averaging - Alternatives 1 and 2). The landscape design for the upland area of the Main Property would also be similar to Alternative 1 (see **Figure 2-8**).

Building NW1



Buildings NW1 and NE1

Source: *Lance Mueller & Associates*, 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 2-10** **Alternative 2 - Representative Building Elevations**

Source: *Anchor QEA,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-11 Alternative 2 - Shoreline Restoration Conceptual Design

Grading

Grading for site cleanup/remediation and redevelopment would be similar to Alternative 1.

Utilities

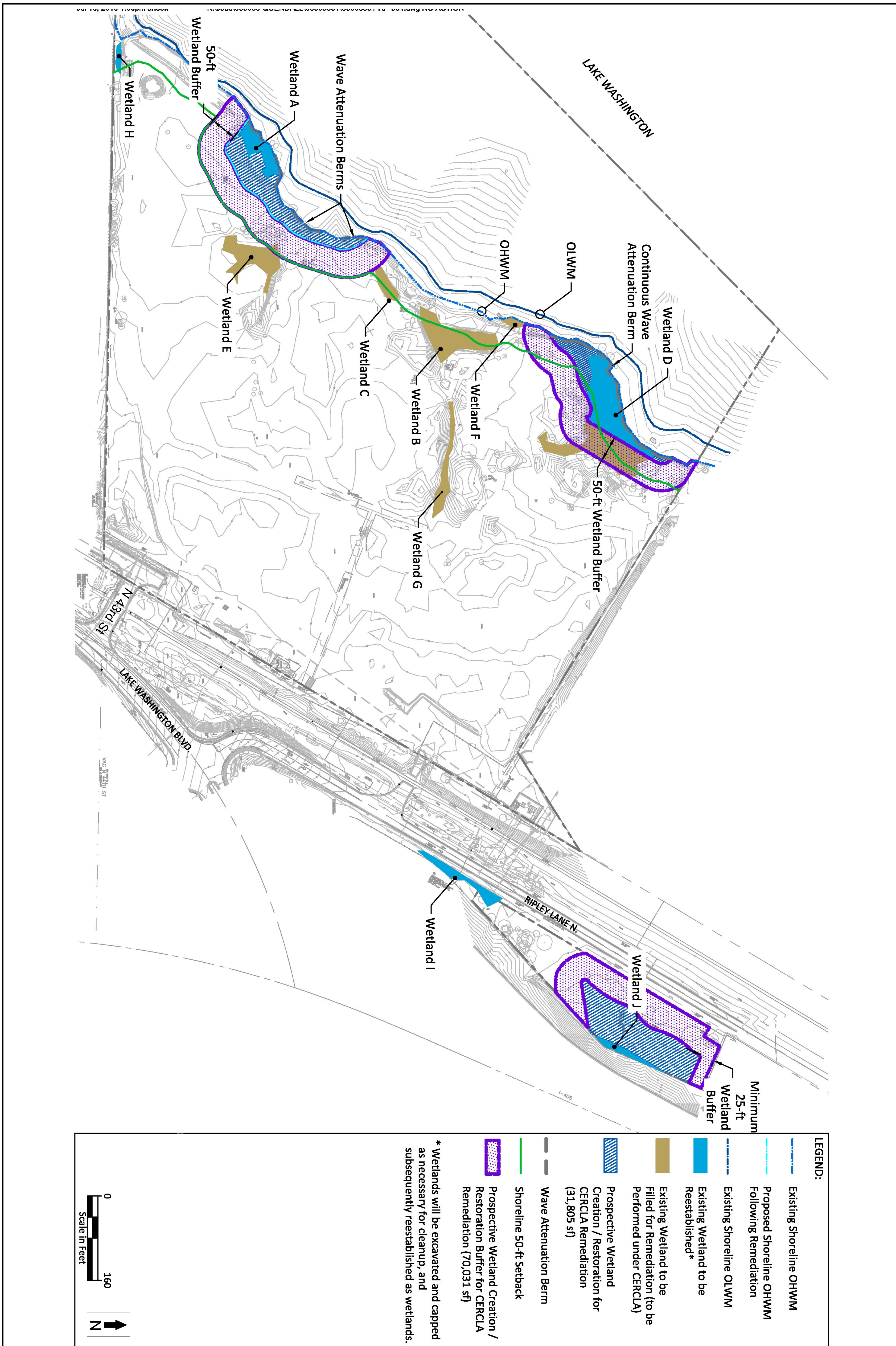
The provision of utilities (water, sewer and stormwater control) would be similar to Alternative 1.

2.7.4 No Action Alternative

Under the No Action Alternative, no new mixed-use development would occur on the Quendall Terminals site at this time. Cleanup/remediation activities associated with the site's status as a Superfund site by EPA will still occur (see Sections 2.2 **Background** and 3.3, **Environmental Health**, of this chapter for details). A Shoreline Restoration Plan will be implemented in conjunction with site cleanup/remediation under the No Action Alternative. Since the cleanup/remediation remedy plan will anticipate potential redevelopment of the site, if no redevelopment occurs under the No Action Alternative, the baseline condition (post-remediation) will likely be somewhat different than the baseline conditions assumed for Alternatives 1 and 2, and described earlier in this chapter. Such differences could include:

- No publically accessible shoreline trail will be provided.
- Shoreline areas outside of the wetland/wetland buffer will not likely be restored.
- Remediation of the upland portion of the Main Property will include seeding/temporary re-vegetation to prevent erosion and sedimentation until development occurs at some point in the future.
- An interim stormwater control system will be installed, similar to under existing conditions.

(See **Figure 2-12**, Shoreline Restoration Conceptual Design – No Action Alternative.)



Source: *Anchor QEA*, 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 2-12 No Action Alternative - Shoreline Restoration Conceptual Design

2.8 BENEFITS AND DISADVANTAGES OF DEFERRING PROJECT IMPLEMENTATION

The benefits of deferring approval of the Proposed Actions and implementation of redevelopment of the Quendall Terminals site include deferral of:

- Potential impacts of the redevelopment on the natural environment (i.e. critical areas); and,
- Potential impacts of the redevelopment on the manmade environment (i.e. traffic operations and aesthetics/views).

The disadvantages of deferring approval of the Proposed Actions and implementation of redevelopment include deferral of:

- The opportunity to restore the site to a productive use after remediation;
- The opportunity to provide a mixed-use development in the Kennydale neighborhood of Renton, including residential, possibly office, retail, restaurant and open space uses;
- Development of a publically accessible trail along the Lake Washington shoreline; and,
- Tax revenues and other fees (i.e. permit, inspection and utility connection fees) that would accrue to the City of Renton.

SECTION III

AFFECTED ENVIRONMENT, IMPACTS, ALTERNATIVES, MITIGATION MEASURES, AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

CHAPTER 3

AFFECTED ENVIRONMENT, IMPACTS, ALTERNATIVES, MITIGATION MEASURES, AND SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

This chapter describes the affected environment, impacts of the alternatives, mitigation measures and any significant unavoidable adverse impacts on the environment that would be anticipated from redevelopment of the EIS alternatives.

The DEIS impacts analyses assume an existing/baseline condition subsequent to cleanup/remediation under the oversight of the Environmental Protection Agency (EPA) (that is, the condition of the site after remediation has been accomplished). Baseline condition assumptions have been determined based on the various studies completed in conjunction with the draft Remedial Investigation/Feasibility Study for site cleanup/remediation and with specific feedback from EPA; these assumptions form the basis for evaluation of potential impacts associated with redevelopment (see Section 2.2 in **Chapter 2** for a list of these assumptions) Therefore, only the probable significant environmental impacts and applicable mitigation measures related to redevelopment of the site are addressed in this DEIS; potential impacts associated with cleanup/remediation activities will be addressed through the separate EPA process.

3.1 EARTH

This section of the DEIS describes the existing topographic, soils, geologic and groundwater conditions on the Quendall Terminals site and in the site vicinity, and evaluates the potential impacts from redevelopment under the EIS alternatives. This section is based on the *Technical Report: Geology, Ground Water, and Soils* (November 2010) prepared by Associated Earth Sciences, Inc. (see **Appendix D to this DEIS**).

3.1.1 Affected Environment

Background Information

Information on the affected environment is based on available soil, hydrogeologic, geologic, geotechnical, and environmental reports for the site and site vicinity, including published regional geology and groundwater reports, City of Renton geologic hazards maps, and private consulting reports specific to the Quendall Terminals site, Barbee Mill site and Seahawks Headquarters and Training Facility site. A brief field visit was conducted as part of this process; however, no reconnaissance or subsurface explorations were performed for this study.

Topography

The topography of the Quendall Terminals site is relatively flat with a gentle slope from east to west or 0 to 5 percent; slopes increase along the shoreline area of the site, adjacent to Lake Washington at up to 1 horizontal/1 vertical slopes (see **Figure 2-3** for an illustration of the existing topography on the site). As part of remediation and cleanup activities, a two- to three-foot soil cap will be placed on the site. The onsite topography will remain relatively level;

however, certain existing wetlands will be filled and re-established/expanded. Certain utility lines associated with potential redevelopment under Alternatives 1 and 2 could also be installed during the site remediation process.

Geology

Regional Geology

The Quendall Terminals site and vicinity is generally located in the low-lying region between the Cascade and Olympic Mountains referred to as the Puget Lowland. During glacial periods, the southwestern margin of the Cordilleran ice sheet advanced southeastward from British Columbia into the Puget Lowland. The most recent continental glacial advance has been mapped as the Vashon Stade of the Fraser Glaciation; depositional and erosional processes occurring during the Vashon Stade shaped the present day topography in the Puget Lowland. Vashon lodgement till and advance outwash deposits are widely exposed at the ground surface in the uplands surrounding the Renton area. Vashon deposits in the Renton area are underlain by older glacial and non-glacial deposits and Tertiary age bedrock at depth. Surface exposures of undifferentiated pre-Vashon glacial and non-glacial deposits and bedrock are generally limited to erosional features and slopes extending from the valley floor to the uplands (see **Appendix D** for details on regional geology).

Site Geology/Soils

Geologic conditions at the Quendall Terminals site were evaluated using published geologic studies and subsurface conditions documented in site-specific reports (see **Appendix D** for details). Geologic units identified at the site include alluvium and lacustrine deposits. These deposits are overlain by fill soils.

The fill soils range from one to ten feet thick across the entire site and are thinnest along the southern and eastern boundaries of the Main Property and thickest in the northwest corner of the Main Property. The fill generally consists of a mixture of silt, sand, gravel and wood debris with scattered foundry slag and brick and metal fragments.

Alluvium deposits are located below the fill layer and consist of two types: Shallow Alluvium and Deep Alluvium.[1] The Shallow Alluvium at the site generally occurs at a depth ranging from approximately 25 to 40 feet and typically consists of interbedded sand, silt, clay silt, organic silt and peat. Due to the nature of their deposition, the shallow alluvium deltaic sediments consist of very loose to soft, alternating fine and coarse grained, discontinuous soils and peat. The Deep Alluvium at the site underlies the Shallow Alluvium and generally occurs at a depth ranging from approximately 40 to 135 feet. The Deep Alluvium typically consists of medium dense to dense sand and gravel.

The deepest geologic units identified beneath the site are lacustrine deposits which underlie the Deep Alluvium and generally occur at a depth ranging from approximately 90 to 135 feet. These older lacustrine deposits typically consist of very soft to medium stiff silty clay (see **Appendix D** for details on site geology).

1 Alluvium deposits on the Quendall Terminals site are associated with the former location of May Creek, which previously flowed through the site. May Creek was diverted to the south of the site in 1920.

It should be noted that in 1916, the water level of Lake Washington was lowered approximately nine feet due to the construction of the Lake Washington Ship Canal, which linked Lake Washington and Puget Sound. The lowering of Lake Washington exposed soils that were once covered by water, including areas along the Quendall Terminals site.

Existing soils on the Quendall Terminals site also include a variety of contaminants associated with historic industrial operations on the site. Various remediation alternatives are currently being evaluated under the EPA process to address site contamination. The remedial action assumed in this DEIS includes placement of a soil cap over the upland and shoreline portions of the site. A two-foot thick sand cap will be placed over the upland portion of the site and a two- to three-foot layered cap will be placed over the shoreline area. The layered shoreline area cap will consist of organoclay, sand, gravel, and topsoil (see **Appendix D** and Section 3.3, **Environmental Health**, for further details on hazardous materials and contaminants on the site).

Geologic Hazards

The City of Renton defines and identifies geologic hazard areas in its Critical Areas Regulations in the Municipal Code (Section 4-3-050). The Quendall Terminals site does not meet the criteria for and is not located in a mapped landslide, erosion hazard, coal mining hazard or steep slope area. No evidence of landslide activity or erosion issues has been documented in the site area in previous studies or site investigations. However, based on the site soils and groundwater characteristics (soft, loose density and/or fill soils with shallow groundwater present), the entire site has been mapped in an area of high seismic hazard and moderate to high liquefaction hazard.

Seismic Hazard

Earthquakes occur in the Puget Lowland with great regularity. Most seismic events in the Puget Sound area are low magnitude earthquakes and usually are not felt by people. Three types of earthquakes typically occur in the Pacific Northwest: subduction zone earthquakes; deep intraplate or subduction zone ruptures; and, shallow crustal earthquakes in faults in the North American plate. Subduction and intraplate ruptures of the Juan de Fuca and North American plate can result in large magnitude earthquakes that can affect the Puget Sound region. Shallow crustal earthquakes occur within the North American plate and several shallow surficial faults in the Puget Sound region form the Seattle Fault Zone. The Quendall Terminals site and vicinity are located on the southern boundary of the Seattle Fault Zone. No evidence of faulting has been documented on the site or in the surrounding area. However, there are several active crustal faults in the Western Washington that may pose a seismic hazard at the site and in the site vicinity.

Five types of potential geologic hazards are usually associated with seismic events:

- Ground rupture along a surficial fault zone;
- Ground motion response;
- Liquefaction;
- Seismically induced landslides; and,
- Lateral spreading.

Ground Rupture

No evidence of surficial ground rupture (faults) has been documented at the Quendall Terminals site and the potential for surficial ground rupture in the site area is considered to be low.

Ground Motion Response

Ground motion from an earthquake is caused by shear, pressure and surface waves propagating through the earth's crust from the earthquake's hypocenter. The ground motion caused by these waves is the shaking felt during an earthquake. The intensity of the shaking at a given location during and immediately after an earthquake is the result of several variables, including: the magnitude of the earthquake; distance from the epicenter; depth of the epicenter; the type of bedrock and unconsolidated sediments underlying a given site; and, attenuation of the seismic energy between the epicenter and a given location. The seismically induced loss of soil strength can result in failure of the ground surface and can be expressed as landslides or lateral spreads, surface cracks and settlements, and/or sand boils.

As described previously, the site is underlain by approximately 40 to 135 feet of loose alluvium and fill. Unconsolidated deposits may amplify ground motion and areas underlain by unconsolidated deposits can experience more intense ground motion than those predicted for hard rock sites. Based on existing soil characteristics and the potential for liquefiable soils, the subsurface conditions at the site correspond to Site Class F, as defined by the 2009 International Building Code (IBC). Design guidelines for addressing potential earthquake damage to structures based on anticipated ground motion for a specific region are included in the IBC (see **Appendix D** for details on ground motion response).

Liquefaction

Shaking during an earthquake can cause an increase in pore water pressure in the soil and decrease the soil shear strength. The loss of shear strength can cause the soils to temporarily behave as a liquid. Soils are considered to liquefy when nearly all of the weight of the soil is supported by the pore water pressure. Seismically induced liquefaction typically occurs in loose, saturated, non-cohesive sandy and silty soils.

Based on the presence of fine-grained loose deltaic deposits, alluvium, and fill soils underlying the site, it is anticipated that the site would have a high potential for liquefaction. Preliminary estimates indicate that potential liquefaction induced settlement could range from 12 to 30 inches across the site.

Seismically Induced Landslides

Earthquake vibration can cause landslides which result from failures along existing planes of weakness within bedrock or within unconsolidated material. No evidence of seismically induced surficial landslides has been documented at the site. However, based on the documentation of mass movements in Lake Washington (below the water) and the nature of the deltaic/lacustrine deposits underlying the site, the potential for seismically induced landslides below the water does exist in the deltaic deposits adjacent to the site in Lake Washington.

Lateral Spreading

Lateral spreading refers to rapid fluid-like ground movements that occur on relatively gentle slopes. Due to the fact that the sediments underlying the site are highly susceptible to liquefaction, the potential for lateral spreading is also high. Liquefaction-induced lateral spreading was evaluated under a range of potential earthquake conditions (108-year to 2,475-year return periods). Preliminary estimates indicate that horizontal displacements due to lateral spreading under a 108-year return period earthquake condition (lower magnitude, higher frequency) could range from 3.5 to 15.5 inches near the shoreline and 0.5 to non-existent across the central and eastern portions of the site. Under the 2,475-year return period earthquake condition (higher magnitude, lower frequency), preliminary estimates indicate that horizontal displacement due to lateral spreading could range from 8 to 13 feet near the shoreline and 1 to 3 feet at the eastern edge of the site (see **Appendix D** for details on lateral spreading and other geologic hazard conditions).

Groundwater

Regional Hydrogeology

The Quendall Terminals site is located in the May Creek drainage basin. Groundwater in this portion of the May Creek basin is present in glacial and non-glacial sediments in the upland areas and relatively coarse-grained deltaic deposits in and at the mouth of May Creek. The groundwater in the upland glacial and non-glacial deposits and direct precipitation onto the flatter nearshore areas flow downgradient and provides recharge to the May Creek deltaic deposits (including on the Quendall Terminals site). These flows ultimately discharge to May Creek and Lake Washington, or directly discharge into Lake Washington.

Vashon advance outwash deposits are the main upland aquifer unit with scattered offsite/upslope wells within the May Creek basin utilizing this deposit for domestic water supply. Recharge to the upland aquifer is from infiltration of precipitation through till surfaces and windows in the till that expose advance outwash deposits. Groundwater in the upland aquifer ultimately discharges to Lake Washington or alluvial deposits and pre-Vashon glacial/non-glacial deposits underlying Lake Washington.

May Creek occupies a narrow drainage basin that extends approximately seven miles from Lake Washington (south of the Barbee Mill development) to Highway 900, west of Squak Mountain. The May Creek stream valley is underlain by recessional outwash sand and gravel terraces on the flanks and wetland and alluvium around the stream channel. The May Creek Alluvial Aquifer is recharged by direct precipitation, surface water runoff from the surrounding uplands and spring or seeps where the upland aquifer discharges into the May Creek stream valley. May Creek empties into Lake Washington approximately 1,300 feet south of the southern property boundary of the Quendall Terminals site and comes within approximately 400 feet of the southeastern portion of the Quendall Terminals site when it passes under Lake Washington Boulevard. Runoff from the Quendall Terminals site does not drain to May Creek.

Site Hydrogeology

Three aquifer zones are located beneath the Quendall Terminals site: the Shallow Aquifer, the Deep Aquifer, and the Artesian Aquifer. The Shallow Aquifer is located approximately two to ten feet below the ground surface, within fill and alluvium deposits (Shallow Alluvium) that consist of interbedded peat, silt and sand. Complex interbedding within the Shallow Alluvium is assumed to result in near horizontal groundwater flow and impedance of vertical groundwater movement. Recharge to the Shallow Aquifer is predominantly through direct precipitation and surface water flow from the upland to the east of the site.

The Deep Aquifer is located in the coarser grained alluvium (Deep Alluvium) consisting of medium dense sand and gravel from a depth of approximately 35 to 140 feet below the ground surface. Recharge to the Deep Aquifer is likely from underflow originating east of the site and downward migration of water from the Shallow Aquifer at the eastern portion of the site. Consistent downward gradients were recorded at existing shallow/deep groundwater monitoring well pairs located from the center of the site eastward.

The presence of a deep, confined aquifer beneath the Deep Aquifer has been postulated based on information collected from the former creosote plant water supply well. This well was reportedly 180 feet deep and exhibited artesian flow when the cap was removed from the well. This is the only well drilled to that depth at the site (see **Appendix D** for details on the site and regional hydrogeology).

3.1.2 Impacts

This section evaluates potential earth-related impacts on the Quendall Terminals site during construction and operation of the proposed redevelopment.

Alternatives 1 and 2

Redevelopment under Alternatives 1 and 2 would include mixed-use development with a variety of densities and building heights; however construction activities under Alternatives 1 and 2 are anticipated to require a similar amount of grading and cut/fill for the installation of utilities and construction of redevelopment. Therefore, it is anticipated that potential earth-related impacts would be similar under Alternatives 1 and 2.

Construction

Site Preparation

It is anticipated that a minimal amount of clearing and grading, primarily in the upland portion of the Main Property would be required for the proposed redevelopment. It is estimated that approximately 16.45 acres of the 21-acre site would require fill ranging from two to five feet thick. The volume of fill required for the site would range from approximately 53,000 cubic yards to 133,000 cubic yards. It is assumed that the fill material would be from an approved source.

Redevelopment under Alternatives 1 and 2 would require limited cut and fill for installation of underground utilities (as mentioned previously, installation of certain utilities could be coordinated with cleanup/remediation efforts). This grading could impact the integrity of the soil caps installed during site cleanup/remediation. Institutional controls will be defined in the final remediation plans to ensure that the soil caps would remain intact during excavation. Temporary, unsupported cut slopes in the fill and upper alluvial site deposits would require temporary slopes for excavations above the groundwater table to reduce the risk of sidewall cave-ins. Should groundwater be encountered during excavations, the temporary excavation slopes could be inclined at a shallower angle.

Site disturbance during construction activities could result in increased potential for erosion and sedimentation of on-site wetlands and Lake Washington. The upper site soils (soil cap) may contain fine grained material which would make them moisture sensitive and subject to disturbance when wet; mitigation measures such as covering areas with plastic sheeting, straw, mulch or hydroseed could be implemented to protect exposed soils. A Temporary Erosion and Sedimentation Control Plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented during construction, per the 2009 King County Surface Water Design Manual (KCSWDM) adopted by City of Renton. As a result, no significant erosion/sedimentation impacts would be anticipated.

Structural Fill

As indicated above, anticipated grading activities under Alternatives 1 and 2 would include minimal amounts of fill, including backfill around new structures, backfill within utility trenches, and backfill beneath parking and road areas. Proper subgrade preparation and drainage control would be employed prior to placing any structural fill in order to support the structural fill and provide proper drainage.

Large amounts of fill placed at the site could induce settlement in the soil caps and underlying sediments, as well as mobilization of contaminants present beneath the caps. However, it is not anticipated that a large amount of fill would be required for redevelopment; therefore, these impacts would not be anticipated.

Utilities

Installation and connection of underground utilities would be required under Alternatives 1 and 2. As stated above, grading for utility installation could impact the integrity of the soil caps installed during site cleanup/remediation. There is also a potential for differential settlement between structures that would be pile-supported and underground utilities serving the structures. This settlement could cause damage to utility lines. Institutional controls will be defined in the final remediation plans to ensure that the soil caps installed during remediation would remain intact with any post-remediation grading/excavation activities and the potential for damage to utility lines with soil settlement would be addressed. Various installation methods could be used during construction, depending on the location, depth and type of utility. These methods could include conventional trenching, jack and bore, microtunneling or directional drilling. Flexible utility connections could be used to address the risk of damage due to differential settlement.

Foundations

The existing site soils at the Quendall Terminals site are likely not suitable for shallow foundation support due to the loose density/soft consistency of the soils and the potential for the soils to liquefy during seismic events. As a result, a deep building foundation system and/or ground improvements would likely be used for structural support under Alternatives 1 and 2 in order to address the potential for impacts to new structures from settlement, consolidation, spreading or liquefaction of soils. Various types of piles could be used, including driven or drilled piles. The installation of the piles could impact the integrity of the soil caps and could transmit contamination to areas beneath the site that are currently uncontaminated. Institutional controls will be defined in the final remediation plans. To ensure that the caps remain intact and transmission of contamination is prevented, institutional controls would be put in place and the process for EPA approval if future excavations, utility installations or other post-remediation site disturbances are necessary will be defined in the Operations, Maintenance and Monitoring Plan (OMMP).

There are several alternatives for construction of deep foundation systems that could be used to mitigate potential impacts. These measures could include: installing surface casing through the contaminated zone; installing piles composed of impermeable materials (e.g. steel or driven cast-in-place concrete) using soil displacement methods; the use of pointed tip piles to prevent carry down of contamination; and, the use of ground improvement technologies such as in-place densification or compaction grouting. Aggregate piers could also be used for structural support. The installation of aggregate piers would generate excess soil that may contain contaminants from beneath the soil caps. This soil would require special handling and disposal in order to prevent these potential impacts (see **Appendix D** for details on building foundations).

Driven piles would likely consist of either open-end or closed-end steel pipe or driven cast-in-place concrete piles that displace the soil rather that remove the soil for pile construction. Hammers that are typically used to drive steel pipe or the steel casings for the cast-in-place concrete piles consist of either percussion hammers or vibratory hammers. Percussion hammers mechanically drive the pipe into the ground with a heavy weight typically powered by diesel fuel or compressed air. Vibratory hammers vibrate the pile using hydraulic motors.

The installation of driven piles could cause local ground vibration and noise impacts during construction. In areas characterized by loose/soft soils (such as at the Quendall Terminals site) pile driving vibrations can cause settlement and vibration-related damage to nearby structures. Potential vibration impacts could be mitigated through vibration monitoring during test pile and production pile installation and by selecting pile and pile hammer types that are matched to the subsurface conditions. Potential noise impacts could be mitigated through the use of suitable hammer and pile cushion types and by limiting pile installation to regulated construction hours and other measures described in the City of Renton's noise level regulations (Chapter 7 of the Renton Municipal Code).

The duration of pile installation would be dependent on the type of pile construction, the depth of pile penetration, and the number of buildings under construction at any time. Alternative 1 includes the construction of nine buildings with approximately 19,000-square foot footprints. An estimate of the duration of pile installation activities under Alternative 1 would be approximately two- to three weeks per building (see **Appendix D** for further information).

<u>Geologic Hazards</u>

Erosion Hazards

As mentioned previously, grading operations during construction could increase the potential for erosion at the Quendall Terminals site through the direct exposure of soil to precipitation and stormwater runoff. In particular, construction of three new outfalls for the permanent stormwater control system would have the potential to increase erosion and result in sedimentation of Lake Washington. A TESCP, including BMPs for erosion and sedimentation control, would be implemented during construction, per the 2009 KCSWDM adopted by the City of Renton, and no significant erosion/sedimentation impacts would be anticipated. Following construction, a permanent stormwater control system would be installed in accordance with the 2009 KCSWDM adopted by the City of Renton. With redevelopment, the amount of impervious surface area and associated stormwater runoff rates would increase under Alternatives 1 and 2 and could result in an increase in erosion hazard risks at the proposed stormwater outfall locations. However, energy dissipation measures could be included at the outfalls to reduce the risk of erosion and sediment transport at the outfalls.

Landslide Hazards

The upland portion of the site is essentially level and the risk of landslides would be considered low. Redevelopment on the site would not increase the existing low landslide hazard risks provided that no engineered cut or fill slopes are constructed. Appropriate mitigation measures would be implemented to reduce the risk of sidewall cave-ins during the excavation for utility trenches. There would be some risk of subaqueous landslides on the May Creek delta face (specifically along the historic May Creek delta located adjacent to the western edge of the site, within Lake Washington) during a large seismic event due to the low density and saturated nature of the near offshore sediments; however, the potential for this impact would be present with or without development on the site.

Seismic Hazards

Ground Rupture Hazard. As stated previously, no evidence of surficial ground rupture has been documented in the site area. Therefore, the potential of a ground surface rupture impacting the site as a result of seismic activity is low.

Ground Motion Hazard. Earthquakes with magnitudes of up to 7.2 have been recorded in the Puget Sound area in the past and could affect development on the Quendall Terminals site and in the site vicinity. However, these large earthquakes are generally considered to have a recurrence interval of more than 100 years in the Puget Sound area. Potential impacts to proposed structures could occur due to ground motion hazards. All structures on the site that are proposed under Alternatives 1 and 2 would be designed in accordance with the 2009 IBC, or the most current code, to address the potential effects of seismic events, including the potential for impacts to structures from ground motion.

Liquefaction Hazard. The existing deltaic deposits and fill soils beneath the Quendall Terminals site area are considered to be highly susceptible to liquefaction and could cause potential impacts to development on the site under Alternatives 1 and 2. Mitigation measures, such as the use of deep foundations (piles or aggregate piers), would be implemented to reduce the risk of settlement or deformation of structures from potential liquefaction events.

Seismically Induced Landslide Hazards. The upland area of the site is generally level and the risk of seismically induced landslides is considered to be extremely low and not significant for that portion of the site. The near offshore areas of Lake Washington are underlain by loose, saturated alluvial deltaic deposits that could be prone to landslides beneath the water caused by a large seismic event. However, these potential impacts from seismically induced landslides would be present with or without development on the site.

Lateral Spreading Hazards. The existing sediments beneath the site area are considered to have a high potential for lateral spreading due to their high susceptibility to liquefaction (see Affected Environment for details on the potential for lateral spreading). Mitigation measures, such as the use of deep foundation systems (piles or aggregate piers), would be implemented to reduce the potential impacts from lateral spreading hazards on development under Alternatives 1 and 2 (see **Appendix D** for details on potential geologic hazard impacts).

Groundwater

Following redevelopment under Alternatives 1 and 2, most of the site would be covered with impervious surfaces and limited infiltration would occur on the site (primarily in the shoreline and landscaped areas). Stormwater would be conveyed to Lake Washington through a piped stormwater conveyance system. While the recharge to the Shallow Alluvial aquifer would be substantially reduced at the site due to the reduction in the amount of direct precipitation reaching the aquifer, the majority of recharge to the aquifer originates from off-site sources to the east. Therefore, the potential for significant impacts to aquifer recharge would be considered low with redevelopment under Alternatives 1 and 2.

The groundwater table on the Quendall Terminals site can occur as shallow as two to ten feet below site grades and groundwater could be encountered during construction activities, particularly during excavation for new utilities and buildings. Dewatering would be employed during construction if groundwater is encountered. If groundwater levels are significantly decreased with redevelopment, ground settlement could result in impacts to nearby buildings, roads and parking areas. Appropriate mitigation measures, such as dewatering and the use of proper construction techniques, would be implemented to address the potential for this ground settlement and its associated impacts (see **Appendix D** for details on potential groundwater impacts).

The Quendall Terminals site is located at the discharge point for the groundwater flow system related to the May Creek drainage. Under the current conditions, groundwater flowing down the May Creek valley discharges through the alluvial deltaic sediments and into Lake Washington. Under Alternatives 1 and 2, groundwater from the May Creek drainage would still discharge in this manner and no impacts to the regional groundwater system would be anticipated.

No impacts to the off-site water supply wells in the May Creek Basin would be anticipated as a result of proposed redevelopment, as the wells are located upslope of the site.

No Action Alternative

Under the No Action Alternative no redevelopment and its potential earth-related impacts would occur on the Quendall Terminals site at this time. The site would remain in a post-remediation condition, with soil caps over the entire Main Property. It is anticipated that the upland portions of the Main Property would be seeded with some type of cover crop to prevent erosion/sedimentation. A temporary stormwater control system would also be installed.

Mitigation Measures

Required/Proposed Mitigation Measures

During Construction

- A temporary erosion and sedimentation control plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented, per the 2009 KCSWD adopted by the City of Renton. This plan would include the following measures:

    - All temporary (and/or permanent) devices used to collect stormwater runoff would be directed into tightlined systems that would discharge to an approved stormwater facility.

    - Soils to be reused at the site during construction would be stockpiled or stored in such a manner to minimize erosion from the stock pile. Protective measures could include covering with plastic sheeting and the use of silt fences around pile perimeters.

    - During construction, silt fences or other methods, such as straw bales, would be placed along surface water runoff collection areas in proximity to Lake Washington and the adjacent wetlands to reduce the potential of sediment discharge into these waters. In addition, rock check dams would be established along roadways during construction.

    - Temporary sedimentation traps or detention facilities would be installed to provide erosion and sediment transport control during construction.

- A geotechnical engineer would review the grading and TESCP plans prior to final plan design to ensure that erosion and sediment transport hazards are addressed during and following construction. As necessary, additional erosion mitigation measures could be required in response to specific design plans.

- Site preparation for roadways, utilities and structures, and the placement and compaction of structural fill would be based upon the recommendations of a geotechnical engineer.

- Temporary excavation dewatering would be conducted if groundwater is encountered during excavation and construction activities. Such dewatering activities would be conducted in a manner that would minimize potential impacts due to settlement.

- Structural fill would be placed to control the potential for settlement of adjacent areas; adjacent structures/areas would be monitored to verify that no significant settlement occurs.

- Deep foundation systems (such as piles or aggregate piers) would be installed and/or ground improvements would be made to minimize potential damage from soil settlement, consolidation, spreading and liquefaction.

- If deep foundation systems (such as piles or aggregate piers) are used to support structures, the following measures would be implemented:

  – Measures would be employed to ensure that the soil cap would not be affected and that installation of the piles/piers would not mobilize contamination that is currently contained by the cap. Such measures could include: installation of surface casing through the contaminated zone; installation of piles composed of impermeable materials (steel or cast-in-place concrete) using soil displacement methods; the use of pointed tip piles to prevent carry down of contamination; and, the use of ground improvement technologies, such as in-place densification or compaction grouting.

  – A pile vibration analysis and vibration monitoring would be conducted during pile installation in order to ensure that impacts due to vibration do not occur.

  – Suitable pile and pile hammer types would be matched to the subsurface conditions to achieve the required penetrations with minimal effort to reduce potential vibration. Potential pile types could include driven open-end steel pipe piles, driven closed-end steel pipe piles, or driven cast-in-place concrete piles. Potential hammer types could include percussion hammers or vibratory hammers.

  – Suitable hammer and pile cushion types would be used for the specific conditions to reduce potential noise.

  – Pile installation would occur during regulated construction hours.

- Fill soils would be properly placed and cuts would be utilized to reduce the potential for landslide impacts during (and after) construction.

- The appropriate management of contaminated soils that could be disturbed and groundwater that could be encountered during redevelopment of the site would be addressed through the cleanup/remediation process and by institutional control requirements overseen by EPA (see Section 3.3, **Environmental Health**, for details).

Following Construction

- A permanent stormwater control system would be installed in accordance with the 2009 KCSWDM adopted by City of Renton.

- Offshore outfall locations for stormwater discharge from the permanent stormwater control system would be equipped with energy dissipation structures or other devices to prevent erosion of the lake bottom.

- All buildings would be designed in accordance with the 2009 IBC (or the applicable design codes that are in effect at the time of construction) to address the potential for seismic impacts.

- The majority of the site would be covered with impervious surfaces following redevelopment. Permanent landscaping would also be provided to reduce the potential for erosion and sedimentation with redevelopment.

Other Possible Mitigation Measures

- Flexible utility connections could be employed to minimize the risk of damage to the lines due to differential settlement between structures and underground utilities.

3.1.3 Significant Unavoidable Adverse Impacts

There would be a risk of ground motion impacts and landslides beneath Lake Washington adjacent to the site during a seismic event; however, such impacts would occur with or without the proposed redevelopment. No significant unavoidable earth-related impacts would be anticipated.

3.2 CRITICAL AREAS

This section describes critical areas on the Quendall Terminals site, including wetlands and riparian habitat. Potential impacts to critical areas from redevelopment under the EIS alternatives are evaluated. This section is based on the *Wetland and Habitat Assessment Report* (October 2010) prepared by Raedeke Associates, Inc. (see **Appendix E** to this DEIS).

Background Information

This section is based on a review of available documentation on the site and proposed redevelopment, including the November 2009 wetland assessment, lake study, and habitat data report prepared by Anchor QEA; the July 2010 conceptual Shoreline Restoration Conceptual Design prepared by Anchor QEA; the November 2009 drainage report prepared by KPFF; and, the March 2010 draft remedial investigation prepared by Anchor QEA and Aspect Consulting. Site conditions and mapped resources were also reviewed through King County's iMap system. See **Appendix E** for additional information on sources that were reviewed.

3.2.1 Affected Environment

Pre-remediation Conditions

The Quendall Terminals site is partially vegetated in trees, shrubs, grasses and herbaceous plant species associated with upland, and wetland and riparian habitat along Lake Washington. The disturbed upland area on the Main Property was heavily used during past log sorting activities and primarily consists of grasses and herbs (see **Chapter 2** for further information on the site's past uses). Several wetlands in the upland area were originally constructed for interim historical wastewater and stormwater control facilities and currently contain primarily scrub-shrub vegetation, including invasive species. Shrub and forested areas occur in the western portions of the Main Property, including along the Lake Washington shoreline. The Main Property contains over 450 trees that range from 6 inches to 32 inches in diameter. The riparian habitat on the Main Property along the lake shoreline, including the wetland buffer areas, contains features such as snags and downed woody debris. Vegetation on the Isolated Property typically includes scrub-shrub and emergent vegetation associated with wetland areas, including invasive species.

Wetlands

Ten existing wetlands, labeled A through J and totaling approximately 0.9 acres have been identified and delineated on the site (see Figure 20 in **Appendix D** for a map of the existing wetlands). Eight of the delineated wetlands (A through H) are located on the Main Property, primarily in the western part of the property near and along the Lake Washington shoreline. Four of these wetlands (A, D, F and H) are slope and/or lake-fringe wetlands associated with Lake Washington. Of these, Wetlands A, D and F derive their hydrologic conditions largely from Lake Washington. Wetland D also has an upper arm that extends farther from the lake to the south, and likely collects some surface runoff from surrounding uplands. Wetland H was excavated in 2006 in conjunction with installation of an interim stormwater control system to convey stormwater into the lake from a ditch along the south Main Property boundary, while trapping silt and wood debris in several check dams.

The other four wetlands on the Main Property (B, C, E and G) are depressional wetlands which are not associated with other surface waters. These were originally constructed as wastewater and/or stormwater control facilities. These wetlands currently seasonally contain standing water.

As mentioned above, an interim stormwater control system is present on the Main Property and consists of swales and berms, as well as a previously constructed sediment pond. The purpose of the interim system is to control site runoff and erosion/sedimentation prior to site cleanup and remediation. Surface runoff currently infiltrates or is conveyed to Lake Washington via surface flow or swales. The existing on-site wetlands that correspond to constructed stormwater features include Wetlands B, C, E, G and H.

The remaining two wetlands onsite (I and J) are present on the Isolated Property. Wetland I is a depressional wetland, and Wetland J is a depressional and slope wetland that flows to an adjacent stream. These two wetlands were created through grading and road construction and receive stormwater runoff from adjacent impervious surfaces.

The wetlands on the Quendall Terminals site typically consist of forest and scrub-shrub or scrub-shrub and emergent vegetation, or combinations of all three cover types. Wetlands were rated according to the Washington Department of Ecology (Ecology) rating system, as well as the City of Renton (2010) Critical Areas Regulations. All the wetlands onsite met the criteria for Category III wetlands according to Ecology's rating system, except for Wetland D (Category II) and Wetlands C and H (Category IV). Based on the City of Renton's wetland rating criteria, Wetlands B and E were rated as Category 1, wetland A, D and F were rated as Category 2, and the remaining wetlands, C, G, H, I and J, were rated as Category 3.

The snags, downed woody debris and dense cover in the riparian habitat along the Lake Washington shoreline on the Main Property provides habitat for a variety of species, including cavity-nesting birds, small mammals, and waterfowl. No priority habitats have been identified on the project site. Priority wetland habitat occurs south and east of the site (within approximately 500 feet) along May Creek and its tributaries. Priority fish species, including coho, fall Chinook, and sockeye salmon, as well as resident cutthroat trout and winter steelhead, are documented to occur in May Creek. These species, as well as Dolly Varden/bull trout, are also documented to occur within Lake Washington.

May Creek comes within approximately 400 feet of the southeastern portion of the site when it passes under Lake Washington Boulevard. However, no runoff from the Quendall Terminals site drains to May Creek. Any protective buffers associated with May Creek do not extend onto the site. There are also wetlands located on the Seahawk's property to the north. Buffers associated with these wetlands do not extend onto the Quendall Terminals site.

Post-Remediation Existing Conditions

Following site cleanup and remediation, it is assumed that the entire Main Property, including the upland and shoreline areas, will be capped with two to three feet of soil. This capping will result in the fill of all of the existing wetlands and elimination of riparian habitat on this property. No capping and associated fill of wetlands will occur on the Isolated Property. Certain wetlands will be reestablished/expanded and riparian habitat will be recreated/enhanced with implementation of a Shoreline Restoration Plan (see **Figures 2-6** and **2-11** for the Shoreline Restoration Conceptual Design under Alternatives 1 and 2, respectively).

Wetlands

As mentioned above, all of the wetlands on the Main Property will be filled with the assumed capping of this property for cleanup/remediation. Three of the wetlands along the shoreline (A, D and H) will be re-established, and two of these wetlands (A and D) will be expanded to mitigate for wetland fill on the remainder of the site. The two wetlands identified on the Isolated Property (I and J) will not be impacted by the cleanup/remediation. Wetland J will be expanded as part of the mitigation for wetland impacts associated with site remediation.

Subject to EPA approval, impacts to on-site wetlands with cleanup/remediation will likely be mitigated at a 1.5:1 ratio, except for those that are exempt from critical area regulation (e.g. Wetland G) which will be mitigated at a 1:1 ratio per City of Renton critical areas regulations (RMC 4-3-050.C(f), due to its small size and physical isolation. Based on the Shoreline Restoration Conceptual Designs for Alternatives 1 and 2, the overall compensatory wetland creation/expansion (at Wetlands A, D and J) will total approximately 31,800 square feet (see **Figures 2-6** and **2-11**). The wetlands that will be re-established or expanded along the Lake Washington shoreline with remediation will be classified as Category 2 wetlands per the City of Renton (2010) Municipal Code, which requires a 50-foot buffer. The expanded Wetland J in the Isolated Property will remain a Category 3 wetland, which requires a 25-foot buffer under the City of Renton (2010) Municipal Code. Wetland I will remain a Category 3 wetland, which requires a 25-foot buffer. None of the proposed wetland buffers would extend onto adjacent properties, due to buffer averaging.

The reestablished/expanded wetlands along Lake Washington (A, D and H) will include emergent, scrub-shrub and forested components to mitigate for the losses of similar cover types along the shoreline. These will also include open water components and large woody debris to diversify habitat conditions along the shoreline. The expansion of Wetland J will similarly include a mix of emergent, scrub-shrub, and forested habitats. This is intended to compensate for remediation impacts to on-site wetlands not associated with Lake Washington (B, C, E and G) and is expected to diversify and improve wetland habitat on this part of the site over the current mix of invasive species, primarily Himalayan blackberry and reed canarygrass.

Wetland/riparian buffer areas will also be revegetated along the Lake Washington shoreline following remediation. The baseline condition assumes re-vegetation of at least the minimum 50-foot wetland buffer areas, consistent with City of Renton regulations. The wetland/riparian buffers will likely consist of a variety of cover types, including shrub habitat of willows and other water-tolerant shrubs, as well as both deciduous and coniferous forest cover types.

The newly planted wetland vegetation is expected to establish within the first growing season. Generally, after the first growing season, 80 to 90 percent of tree and shrub species plantings can be expected to survive, and emergent wetland plantings can be expected to provide 10 to 15 percent cover. As the tree and shrub species grow, they will continue to provide more cover and structural diversity in the restored/enhanced wetland and buffer areas. Functional habitat will be provided immediately following establishment of new plantings, but will continue to improve as the wetland matures. Fully functioning habitat is generally provided after three to five growing seasons, when total cover of tree and shrub plantings is on the order of 30 to 40 percent, and cover of emergent wetland plantings is on the order of 50 to 75 percent (Anchor QEA, 2010).

A 25-foot buffer, at a minimum, will remain on the expanded Wetland J and retained Wetland I within the Isolated Property. Thus, the baseline condition for this part the site is assumed to consist of Wetland I and its buffer and an expanded and diversified Wetland J and its buffer. The Washington State Department of Transportation may use the Isolated Property for the future I-405 widening and NE 44th Street interchange improvement project (see Section 3.9, **Transportation**, for additional information). However, a final design is not complete for this project, and WSDOT would be responsible for providing compensation if the wetlands or wetland buffers on this area of the site are impacted.

The Shoreline Restoration Conceptual Design under Alternatives 1 and 2 includes construction of a small, continuous wave-attenuation berm composed of permeable material, such as sand and gravel, between Wetland D and the lake to protect the wetland from wave energy and to minimize erosion and associated habitat disturbance. A similar, but discontinuous berm will be constructed along the lake along portions of Wetland A. The water level and hydrology of the re-established/expanded Wetlands A and D will be controlled by the water surface elevation of Lake Washington, but surface water connection will only be present between the lake and portions of Wetland A. The continuous wave attenuation berm that will separate all of Wetland D from the lake will be controlled by Lake Washington elevations via a groundwater connection. As a result, while both Wetlands A and D will be "associated" with the shoreline, Wetland D will not be contiguous with the lake, and the ordinary high water mark (OHWM) in this area will follow the wetland boundary for wetlands contiguous with Lake Washington (west of Wetland D in this case). With the discontinuous wave attenuation berm that will be constructed along the lake along portions of Wetland A, the OHWM in the Wetland A area will follow the re-established/expanded wetland boundary (the eastern wetland boundary in this case; see **Figures 2-10** and **2-11**).

3.2.2 Impacts

This section evaluates potential impacts to wetland and riparian habitats on the Quendall Terminals site during construction and operation of the proposed redevelopment.

Alternative 1

Under Alternative 1, mixed-use development is proposed on the upland portion of the Main Property, in an area that will be capped with site cleanup/remediation. The capped shoreline restoration area along Lake Washington, totaling approximately 3.2 acres, would largely remain in the post-remediation condition. This area would consist of a revegetated riparian zone that includes reestablished/expanded wetland areas, wetland buffers, and restored/enhanced riparian habitat. A trail that would be accessible to the public would be provided along the shoreline, and would include interpretive wetland viewpoints (see **Figure 2-6**, Shoreline Restoration Plan Conceptual Design - Alternative 1). No development would occur on the Isolated Property. This property would remain in its post-remediation condition as retained/expanded wetlands and their buffers.

Direct Impacts

Under Alternative 1, no direct impacts would occur to the retained/expanded wetlands (Wetlands I and J) on the Isolated Property, or the re-established/expanded wetlands (Wetlands A, D and H) on the Main Property. The wetlands along the Lake Washington shoreline (Wetlands A, D and H) would be retained within a re-vegetated riparian zone. Similarly, Wetlands I and J on the Isolated Property would be retained within natural open space.

A portion of the buffer on Wetland D would be reduced to 25 feet; other portions of the buffer would be expanded to provide compensatory area, as allowed by the buffer averaging provisions in the City of Renton Municipal Code (see **Figure 2-7** for a depiction of the Wetland D buffer averaging). The area of buffer expansion (nearly 6,000 square feet) would exceed the area of buffer reduction (approximately 5,400 square feet) so that more total buffer area would be provided with the proposed buffer averaging, consistent with buffer averaging provisions in the Code. Wetland A would be provided with a minimum 50-foot buffer, plus additional upland riparian habitat within the re-vegetated riparian zone. Thus, the buffer width along Wetland A would range from 50 feet to well over 100 feet. Wetland H would be protected with a 50-foot buffer, which exceeds the required 25-foot minimum buffer based on its classification. A publically accessible, unpaved pedestrian trail is also proposed within the riparian habitat and would cross the wetland buffer areas.

Proposed buildings would be setback a minimum of 50 feet from the shoreline under Alternative 1, as required by the City of Renton 1983 Shoreline Master Program, as amended (Renton Municipal Code Section 4-3-090). This setback would be measured from the eastern edge of Wetland A and from the OHWM, including along the continuous shoreline attenuation berm near Wetland D. The re-vegetated riparian area extends well beyond the required 50-foot shoreline setback in several locations (see **Figure 2-7**).

Three stormwater outfalls would be constructed within the shoreline area to convey treated stormwater from the developed areas of the site to Lake Washington. Construction of these outfalls would be in accordance with the 2009 KCSWDM to prevent erosion and sedimentation of the lake. These outfalls would be located to avoid direct impacts to the reestablished/expanded wetland areas and designed with energy dissipation to prevent erosion during operation. Together with the proposed trail, these are relatively minor encroachments that are not expected to adversely affect the integrity of the Lake Washington shoreline. These outfalls could be constructed during site cleanup/remediation to reduce potential impacts to the shoreline area.

Indirect Impacts

Proposed redevelopment under Alternative 1 has the potential to cause indirect impacts to the reestablished/expanded wetlands relating to hydrologic conditions and potential for erosion and sediment deposition. Grading and construction of impervious surfaces and operation of the permanent stormwater collection and treatment facilities would modify the surface hydrologic conditions of the site, and thus potentially could affect hydrologic conditions of the wetlands.

During Construction

Clearing and grading activities associated with the proposed redevelopment would expose erodible soils on the site. The potential for erosion and delivery of sediments to the wetlands along the shoreline and to Lake Washington would be greatest during the construction period and would depend on the construction season, soil types, the amount of exposed soils, slopes, surface drainage patterns and mitigation measures employed. Sediment transport and deposition, particularly during construction, can adversely impact plant and animal communities of the wetlands and the lake by affecting water quality (increased turbidity, suspended and settleable solids, temperature, pollutants), which could adversely affect the suitability of aquatic habitats for various forms of vertebrate and invertebrate wildlife.

Installation of certain utilities (i.e. the conveyance pipes to the stormwater outfalls) could disturb vegetation that has been established in the Shoreline Restoration area with site remediation. Trenching for utilities and stormwater outfalls could be incorporated into site grading associated with remediation efforts to limit or prevent later disturbance of re-vegetated areas.

The project would include implementation of a TESCP during construction, per the 2009 KCSWDM adopted by the City of Renton, including BMPs for erosion and sedimentation control, which would limit or prevent erosion or sediment deposition into the shoreline wetlands and the lake. Some sediment deposition could occur within the wetland buffers, and potentially the wetlands, especially during construction; however, the impacts to the wetlands are not expected to be significant. Proposed buffers would range from 50 to well over 100 feet on Wetland A and from 25 feet to over 100 feet on Wetland D. With appropriate erosion control measures (e.g. silt fences), and to the extent that vegetation is established within the buffers as a part of site remediation, and on-site slopes are assumed to be relatively gentle, the potential for sediment deposition into the wetlands would be very limited. Therefore, no significant impacts to the shoreline wetlands, riparian habitat and the lake would be anticipated during construction.

Following Construction

Following construction, the exposed upland portions of the Main Property would be covered in buildings, paved areas and landscaping. A preliminary landscape plan has been prepared for this portion of the site. According to this plan, ornamental plants and, as possible, native plants that are suited for this climate zone would be installed as landscaping throughout the property. Landscaping would include new trees, shrubs and groundcovers of various sizes and species (see **Figure 2-8**, Alternative 1 - Preliminary Landscape Plan). There would be much less potential for erosion and sedimentation with the proposed redevelopment. Introduction of noxious weeds or invasive species would be avoided to the extent practicable in areas that would be re-vegetated as part of the proposed redevelopment. Together with the native species planted, this would help limit the unnecessary spread of invasive species that could adversely affect the suitability of open space habitats onsite and in the vicinity for wildlife.

A permanent stormwater control system would be installed in accordance with the 2009 KCSWDM adopted by the City of Renton. Stormwater runoff would be collected from impervious surfaces; conveyed to Lake Washington through a piped stormwater drainage system; and, discharged to the lake via three new outfalls. Stormwater runoff from pollution-generating surfaces (i.e. roadways and surface parking lots) would be treated prior to discharge to the lake. Roof runoff (considered to be non-pollution generating) would be collected and discharged directly to the lake separately. No stormwater detention would be required, per City regulations. The system would be designed to contain and convey the 25-year peak flows from developed conditions for on-site tributary areas. No upstream tributary areas would drain to the project site or the proposed stormwater control system. Thus, no severe flooding or erosion problem would be expected from potential overflow from a 100-year storm event. In addition, the outfalls to the lake from the stormwater control system would be designed to prevent erosion at their outlets. Based on these factors, together with the lack of direct stormwater discharge to the reestablished/expanded wetlands in the shoreline area, no significant impacts to the on-site wetlands from erosion or sediment deposition would be expected during operation of the project. Water quality impacts to the wetlands and lake also would not be expected.

The reestablished/expanded wetlands along the lake shore (Wetlands A, D and H) would derive their hydrology from the lake (as under existing conditions), rather than surface water runoff.

The hydrology of the wetlands on the Isolated Property (Wetlands I and J) would not be affected, as no development is proposed in that area.

Wildlife Habitat Impacts

With respect to wildlife habitat, after completion of the remediation measures, most of the site will be left as bare soil, except the re-vegetated shoreline habitat, including the reestablished/ expanded wetland areas. Consequently, redevelopment of the upland areas would not be expected to remove significant habitat features or to displace wildlife from these upland areas. Some disturbance of the re-vegetated shoreline habitat from human and construction activity may occur during construction. However, this vegetation would likely be relatively recently established and would initially provide limited habitat during this period.

After redevelopment, some wildlife species adapted to urban environments (e.g. starlings, house sparrows, American robins, various swallows, American crows, raccoons) would likely come to use the site over time and utilize the developing vegetation in the upland portion of the site, as well as the native vegetation within the riparian zone. Given the urban context of the site and vicinity, some of these urban-adapted species (e.g. starlings, crows) may limit use of the re-vegetated shoreline habitats by other native species, such as cavity-nesting birds and songbirds.

Public use of the proposed shoreline trail within the re-vegetated riparian zone would likely cause some noise and disturbance to wildlife in the vicinity of the trail. The trail itself would also form a break in native vegetation within the area and maintain some fragmentation of the developing habitat over time. However, the trail would also limit pedestrian access to the riparian area, and would prevent human use and degradation of the re-vegetated shoreline area.

Overall, Alternative 1 is not expected to adversely impact terrestrial priority species, as none are known to occur onsite. A variety of fish species, including salmonid fish, several of which are federal or state-listed species, are known to use nearshore habitats within Lake Washington. Following remediation, nearshore habitat conditions are expected to recover and improve over pre-remediation conditions. The only development proposed in this area would be the stormwater outfalls, which would be installed in accordance with the 2009 KCSWDM. As mentioned above, water quality treatment would be provided for stormwater runoff from pollution-generating surfaces. Therefore, no significant impacts to the priority fish species in the lake would be anticipated.

Alternative 2

Similar to Alternative 1, under Alternative 2 mixed-use development is proposed on the upland portion of the Main Property, in an area that will be capped with site cleanup/remediation. The capped shoreline restoration area along the Lake Washington, totaling approximately 3.2 acres, would largely remain in the post-remediation condition. This area would consist of a re-vegetated riparian zone that includes re-established/expanded wetland areas, wetland buffers, and restored/enhanced riparian habitat. A trail that would be accessible to the public would be provided along the shoreline, and would include interpretive wetland viewpoints (see Figure 2-11, Shoreline Restoration Plan Conceptual Design - Alternative 2). No development would occur on the Isolated Property. This property would remain in its post-remediation condition as retained/expanded wetlands and their buffers.

Under Alternative 2, mixed-use development would include fewer residential units, essentially the same area for commercial/retail uses and no office space. The shoreline restoration area, encompassing the re-established/expanded wetlands and their buffers and restored/enhanced shoreline habitat along the shoreline would be provided, encompassing slightly more area than Alternative 1 (approximately 1,400 square feet more).

As under Alternative 1, no direct wetland impacts would occur under Alternative 2. No development would occur within the Isolated Property, thus no direct impacts would occur to Wetlands I and J, as under Alternative 1.

The same buffer averaging for Wetland D would be applied under Alternative 2, such that the minimum buffer would be 25 feet and additional compensatory buffer area would be provided (see **Figure 2-7**). Wetland A would be provided with essentially the same buffer as under Alternative 1, ranging from a minimum of 50 feet wide to well over 100 feet wide.

Alternative 2 is assumed to include implementation of a similar TESCP plan during construction and a similar permanent stormwater control plan as Alternative 1. Thus, significant indirect impacts to on-site wetlands and the lake would not be expected from stormwater runoff during construction and operation of the project.

With a similar footprint and site features, such as the publicly accessible trail, the redevelopment under Alternative 2 would be expected to result in essentially the same impacts to wildlife habitat as under Alternative 1. With fewer residential units and no office development, human activity and noise levels would be slightly less than under Alternative 1. Given the urban context of the area, however, impacts from disturbance and noise would likely be similar to under Alternative 1.

No Action Alternative

Under the No Action Alternative, no redevelopment would occur on the Quendall Terminals site at this time. The site would remain in a post-remediation condition, with a cap over the entire Main Property and re-established and expanded wetlands along the shoreline and an expanded wetland (Wetland J) on the Isolated Property. The restored/enhanced and re-vegetated areas along the lake are assumed to include fully-re-vegetated 50-foot buffers of Wetlands A and D, as part of the remediation. No additional riparian habitat restoration area is assumed to be established that would connect Wetlands A and D. No buffer averaging would be necessary on Wetland D. No publically accessible trail with interpretive wetland viewpoints would be provided in the shoreline restoration area. It is anticipated that the upland portions of the site would be seeded with some kind of cover crop to provide temporary re-vegetation until development occurs at some time in the future.

Under the No Action Alternative, no direct or indirect impacts would occur to the wetlands along the Lake Washington shoreline on the Main Property or on the Isolated Property. Less area along the shoreline would be re-vegetated to establish riparian habitat than under Alternatives 1 and 2. However, it is assumed that vegetation would gradually become established over time along the shoreline between the re-established wetlands and their buffers.

The process of natural succession would occur under the No Action Alternative, as long as the site is not redeveloped. Vegetation in the restored/enhanced areas would grow and develop over time. Given enough time and lack of a major disturbance (such as fire), the seeded upland areas would gradually re-vegetate as well, as has occurred after cessation of activities on the site previously. This vegetation would likely consist of a combination of native (e.g. red alder, black cottonwood, willow) and exotic invasive species (e.g. Himalayan blackberry, Japanese knotweed) adapted to disturbed areas.

No impacts to wildlife, including priority fish species in the lake, would be anticipated under this alternative.

3.2.3 Mitigation Measures

Required/Proposed Mitigation Measures

<u>During Construction</u>

- A temporary erosion and sedimentation control plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented during construction, per the 2009 King County Surface Water Design Manual (KCSWDM) adopted by the City of Renton (see Section 3.1, **Earth**, and **Appendix D** for details). Implementation of this plan would prevent or limit impacts to the lake and shoreline wetlands from erosion and sedimentation.

<u>Following Construction</u>

- Proposed redevelopment would avoid direct impacts to the retained/re-established/expanded wetlands onsite.

- Re-established/expanded wetlands would be retained in an open space tract that includes required buffers and a riparian habitat enhancement area.

- Wetland buffer areas would meet or exceed the minimum City-required buffers for Wetlands A, D and H (the Wetland D buffer would meet the City's requirement through buffer averaging). Wetland I and J would also be provided with buffers that meet or exceed City requirements.

- Proposed buildings would be setback a minimum of 50 feet from the OHWM, as required by the City of Renton's 1983 Shoreline Master Program.

- A permanent stormwater control system would be installed consistent with the requirements of the 2009 KCSWDM adopted by the City of Renton. The system would collect and convey stormwater runoff to Lake Washington via a tight-lined system. Water quality treatment would be provided for runoff from pollution-generating surfaces to prevent water quality impacts to the lake and shoreline wetlands.

- Native plant species would be included within landscaping of the redeveloped upland area on the Main Property to the extent feasible, and could provide some limited habitat benefits to native wildlife species.

- Introduction of noxious weeds or invasive species would be avoided to the extent practicable in areas re-vegetated as part of the proposed redevelopment. Together with the native species planted, this would help limit the unnecessary spread of invasive species that could adversely affect the suitability of open space habitats on site and in the vicinity for wildlife.

- A publicly accessible, unpaved trail would be provided through the shoreline area that would include interpretive wetland viewpoints.

Other Possible Mitigation Measures

- Trenching for utilities and stormwater outfalls could be incorporated into site grading associated with remediation efforts to limit or prevent later disturbance of re-vegetated areas.

- Upland areas on the Main Property could be temporarily re-vegetated following site remediation, depending on the timing of redevelopment.

3.2.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to critical areas would be anticipated.

3.3 ENVIRONMENTAL HEALTH

This section of the DEIS describes the existing environmental health-related conditions on the Quendall Terminals site and provides a summary of the site remediation and cleanup process. Potential environmental health-related impacts associated with redevelopment under the EIS alternatives and mitigation measures to address potential impacts are identified. This section is based on the Hazardous Substances section of the *Technical Report: Geology, Groundwater, and Soils* (November 2010) prepared by Associated Earth Sciences, Inc. (see **Appendix D** to this DEIS).

3.3.1 Affected Environment

Site History

In 1916, early homesteaders sold the Quendall Terminals Main Property to Peter Reilly, who began the operation of Republic Creosoting in 1917. The property was used for creosote manufacturing for more than 50 years, until 1969. Operations on the property primarily included the distillation of coal and oil-gas tar residues (coal tar) that were obtained from local coal gasification plants. Tar feedstock was typically transported to the facility onsite from Lake Union and unloaded from tankers or barges at a t-dock that extended out into Lake Washington or at a shorter, near-shore pier. The feed stock was unloaded into two two-million gallon, above-ground storage tanks. Above-ground pipes transferred the feedstock from the tanks to the manufacturing facilities. Once distilled, several fractions were stored in tanks (light distillates and creosote) or below-grade pitch bays (heavy distillates) prior to being transported offsite for various uses. Light distillates were used for chemical manufacturing feedstock, middle distillates (creosote) were used for wood preservation and heavy (bottom) distillates (pitch) were used for applications such as roofing tar. At the peak of its productivity, the Republic Creosoting facility produced approximately 500,000 gallons of tar per month. Wastes produced by the manufacturing processes were disposed of onsite; solid wastes were placed near the shoreline and liquid wastes were discharged to two sumps. In addition to site-produced wastes, foundry slag from PACCAR was reportedly used as fill at the site.

In 1971, Quendall Terminals purchased the site and leased the above-ground tanks that remained from the creosote facility for the storage of waste oil, diesel, and lard. From 1975 until 2009, Quendall Terminals used the Main Property for log storage and sorting.

The Quendall Terminals Isolated Property is generally vacant and is comprised of existing trees and vegetation associated with two wetlands. There have been no historic industrial uses on the Isolated Property site and no associated site contamination or hazardous substance issues.

Both the Quendall Terminals Main Property and Isolated Property are currently vacant and essentially unused.

Site Remediation and Cleanup Process

As stated above, from about 1916 to 2008, various industrial activities, including creosote manufacturing, petroleum product storage, and log sorting/storage, have occurred on the Quendall Terminals Main Property, and have resulted in the release of various contaminants to the soil and groundwater at the property. From the 1980s through 2005, the Washington State

Department of Ecology (Ecology) provided oversight for the remediation/cleanup of the site under the Model Toxics Control Act (MTCA). Under Ecology's guidance, a Remedial Investigation report was completed in 1997 and a draft Risk Assessment/Feasibility Study was completed in 2004.

In 2005, Ecology requested that the United States Environmental Protection Agency (EPA) assume responsibility for directing and overseeing the remediation of the Quendall Terminals Main Property and the property was subsequently added to EPA's Superfund National Priorities List (NPL) in 2006. In September 2006, the property owners (Altino Properties and J.H. Baxter and Company) entered into an Administrative Order on Consent (AOC) with EPA that required them to complete a remedial investigation (RI) and feasibility study (FS). The RI/FS is intended to comprehensively evaluate environmental conditions at the site and review various remediation options from which EPA will chose a preferred cleanup remedy; a final cleanup remedy will be selected following a public comment period. Remediation activities will be conducted as part of a separate action and are not a part of the AOC requirements or the environmental review for the proposed Quendall Terminals redevelopment.

Currently, the property owners have completed a Draft RI that is under review by EPA and are in the process of preparing a Draft FS. It is anticipated that the draft RI/FS will be completed by April 2011. A summary of the Draft RI and Draft FS are provided below. The site will undergo cleanup/remediation under its status as a superfund site by EPA, pursuant to the final cleanup plans defined by EPA. EPA is expected to select the final site remedy in late 2011.

Draft Remedial Investigation (RI)

The Draft RI for the Quendall Terminals Main Property includes a summary of the history of the property and past industrial activities; a summary of past site characterization data; identification of data gaps; identification of contaminants of interest; and, documentation of the extent of contamination in all the media (soil, groundwater and sediment). The Draft RI identifies hazardous chemicals associated with past site use that could potentially pose a risk to human health and the environment. Chemicals of potential concern are listed in Table 2 of **Appendix D** and include arsenic, benzene and polynuclear aromatic hydrocarbons (PAHs), among others.

Extent of Contamination

Most of the contamination that is present on the Quendall Terminals Main Property is isolated and contained within the property. Contamination on the Main Property consists of chemicals of potential concern that are adhered to soil particles, dissolved into water or concentrated as dense, non-aqueous phase liquid (DNAPL) in the subsurface. The DNAPL represents actual liquid product that has leaked into the ground. Since DNAPL has a higher density than water, it will tend to sink below the water table to accumulate in the higher permeability portions of the subsurface soils (see Figure 11 in **Appendix D** for the approximate locations of DNAPL in the subsurface of the site).

Large areas of soil contamination are located on the east side of the Main Property, near the former manufacturing facility and railroad auxiliary track, and at the east end of the former T-dock pier. Along the southern and eastern boundaries of the property, fill soils range from about 1 to 2 feet thick, while in other areas the fill is more than 10 feet thick (see Figures 12 and 13 in **Appendix D** for the approximate extent of soil contamination).

Groundwater contamination in the Shallow Aquifer beneath the site underlies a majority of the Quendall Terminals Main Property. Contamination in the Deep Aquifer mostly occurs under the western portion of the Main Property, generally centered along the shoreline of Lake Washington (see Figures 14 and 15 in **Appendix D** for the approximate extent of groundwater contamination).

Sediment contamination is generally centered around the former T-dock pier and east of the Quendall Terminals Main Property boundary (see Figures 16 and 17 in **Appendix D** for the approximate extent of contamination in the sediments underlying Lake Washington).

Draft Feasibility Study (FS)

The purpose of the Draft FS is to evaluate appropriate remedial alternatives and select a preferred remediation alternative for the Quendall Terminals site. Various remedial alternatives have been evaluated as part of the Draft FS process and it is anticipated that EPA will select a remedial alternative that consists of the following elements (the remedial actions assumed in this DEIS):

- Placement of a two-foot thick sand cap over the upland portion of the Main Property.
- Placement of a two- to three-foot thick layered cap consisting of organoclay, sand, gravels and topsoil over most of the sediments within the shoreline area adjacent to and lakeside of the former Quendall Pond (approximately 300 linear feet of shoreline).
- Excavation of shoreline soil to accommodate the placement of the shoreline cap.
- Filling of certain existing on-site wetlands. Implementation of a Shoreline Restoration Plan, including re-establishing and expanding certain wetlands, and recreating/enhancing riparian habitat.
- Possible localized soil removal in the former railroad loading area and in planned utility corridors onsite.
- Possible installation of a permeable shoreline groundwater treatment wall adjacent to the lake, spanning the entire shoreline area.
- Implementation of institutional controls to prevent the alteration of the cap without EPA approval, and to prevent the use of on-site groundwater for any purpose.
- Implementation of an Operations, Maintenance, and Monitoring Plan (OMMP) that would present a process for obtaining EPA approval if future excavations, utility installations or other site disturbances are necessary after implementation of the final remedial action.

Impacts

Redevelopment under Alternatives 1 and 2 would include mixed-use development with a variety of densities and building heights; however, construction activities under Alternatives 1 and 2 are anticipated to be similar and would require a similar amount of grading and cut/fill as part of redevelopment. Therefore, it is anticipated that potential environmental health-related impacts associated with redevelopment would be similar under Alternatives 1 and 2.

Alternatives 1 and 2

Prior to redevelopment under Alternatives 1 and 2, the Quendall Terminals Main Property will undergo cleanup and remediation under the oversight of the EPA, as described in the previous section. The assumed elements of this cleanup/remediation are listed above. It is assumed that the entire Main Property will be capped with remediation, which will limit the potential for exposure to contaminated soils and groundwater that pose a risk to humans and the environment during and following construction. As necessary, a permeable shoreline groundwater treatment wall could also be installed to prevent the migration of contaminants in groundwater to Lake Washington. Redevelopment of the site is being coordinated with the cleanup/remediation process and would be conducted consistent with the requirements in the final cleanup remedy selected and overseen by EPA, and with any associated institutional controls.

The majority of the upland portion of the Main Property, outside of the shoreline setback area, would be developed with new buildings and paved areas under Alternatives 1 and 2. Due to the soft and loose nature of the existing subsurface soils, construction of these features could result in settlement of the site as a result of the potential loads imposed by foundations, utilities and traffic (see Section 3.1, **Earth**, and **Appendix D** for details). It is assumed that Alternatives 1 and 2 would not include any below-grade excavations for parking or basements; however, it is likely that the construction of new buildings onsite would require deep foundation supports (such as piles) due to the nature of existing soils on the site. The construction of deep foundations for each building could generate contaminated soil or groundwater to which workers would be exposed. As necessary, personal protection equipment for workers would be used and special handling and disposal measures followed during construction activities to prevent contact with hazardous materials and substances, and no significant impacts would be anticipated. Personal protection measures and special training could also be provided for City of Renton staff that provides inspection during construction and maintenance following construction in areas of the site that could generate contaminated soils or groundwater. Alternatively, buried utilities and public roads serving the site could be placed in clean fill material. The clean fill material should be of sufficient width and depth (3 to 4 feet below the invert of the utility) to allow for maintenance of utilities without human exposure to contaminated soils. In order to prevent future contamination of clean fill material a barrier to prevent recontamination of the fill material could be provided.

Under Alternatives 1 and 2, the main utility corridors for the proposed development could be installed during the proposed remedial action onsite. Additional utility excavations could also be required to connect specific buildings to the main utility corridor with redevelopment. Additional excavations during redevelopment could generate contaminated soil or groundwater that would require additional personal protection measures for workers and special handling and disposal measures.

In addition to potential impacts from utility and deep foundation excavations, there is also the potential for volatile contaminants in the subsurface to generate vapors that could intrude into utility trenches and above-grade structures due to the fact that the planned remedial action would leave contaminated soil, groundwater, sediments and DNAPL in place beneath the site. If no addressed by the development design, these vapors could pose a potential risk to human health. Separation of living/working areas from the contaminants by the soil cap and under-building garage, as well as implementation of potential institutional control measures would ensure that future building inhabitants would not be exposed to unacceptable vapors accumulating within buildings or utility corridors from contaminated soils and groundwater, and no significant impacts would be anticipated.

No Action Alternative

Under the No Action Alternative, no redevelopment and its potential environmental health-related impacts would occur on the Quendall Terminals site at this time. The site would remain in a post-remediation condition, which would include placement of soil caps over the entire Main Property and possible installation of a permeable shoreline groundwater treatment wall adjacent to the lake. These remediation features would prevent direct contact with contaminants at the ground surface, and address the potential for contaminants to enter Lake Washington via groundwater.

3.3.2 Mitigation Measures

Required/Proposed Mitigation Measures

- Redevelopment of the site is being coordinated with the cleanup/remediation process, and would be conducted consistent with the requirements in the final cleanup remedy selected and overseen by EPA, and with any associated institutional controls.

- The appropriate management of contaminated soils that could be disturbed and groundwater that could be encountered during redevelopment of the site would be addressed through the cleanup/remediation process and by institutional control requirements overseen by EPA. As necessary, lightweight fill materials, special capping requirements, vapor barriers and other measures would be implemented to ensure that unacceptable exposures to contaminated soils, groundwater or vapors would not occur.

- Institutional controls would be followed to prevent the alteration of the soil cap without EPA approval, and to prevent the use of on-site groundwater for any purpose.

- An Operations, Maintenance and Monitoring Plan would be implemented to prevent the excavation of soils, installation of utilities or other site disturbances without prior EPA approval.

- As necessary, personal protection equipment for workers would be used and special handling and disposal measures followed during construction activities to prevent contact with hazardous materials and substances.

- Living/working areas on the Main Property would be separated from soil/groundwater contaminants by under-building garages; institutional controls would also be implemented to prevent exposure of residents/employees to unacceptable vapors.

Other Possible Mitigation Measures

- Planned utilities (including the main utility corridors) could be installed as part of the planned remedial action so that disturbance of the soil cap and underlying contaminated soils/groundwater would not be necessary subsequent to capping of the Main Property.

- Personal protection measures and special training should be provided for City of Renton staff that provides inspection during construction and maintenance following construction in areas of the site that could generate contaminated soils or groundwater.

- Buried utilities and public roads serving the site development should be placed in clean fill material (with the utilities in a trench with sufficient width and depth of 3 to 4 feet below the invert of the utility), along with an acceptable barrier to prevent recontamination of the clean fill material, in order to protect the utility from contamination and to allow future maintenance of the road or utility lines.

3.3.3 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse environmental health-related impacts would be anticipated.

3.4 ENERGY/GREENHOUSE GAS EMISSIONS

This section provides a quantitative discussion of potential impacts from the EIS Alternatives on greenhouse gas (GHG) emissions and energy use, as they relate to climate change, based upon the best information available at this time. GHG emissions are calculated using the SEPA Greenhouse Gas Emissions spreadsheet tool developed by King County (see **Appendix F** for the full spreadsheets for Alternative 1 and 2). A qualitative discussion of the potential impacts of the alternatives on global climate change is also provided in this section.

3.4.1 Affected Environment

Greenhouse Gas Emissions and Climate Change

The global climate is continuously changing, as evidenced by repeated episodes of warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. Scientists have observed, however, an unprecedented increase in the rate of warming in the past 150 years. This recent warming has coincided with the Industrial Revolution, which resulted in widespread deforestation to accommodate development and agriculture and an increase in the use of fossil fuels, which has released substantial amounts of greenhouse gases into the atmosphere.

Greenhouse gases (GHG), such as carbon dioxide, methane, and nitrous oxide, are emitted by both natural processes and human activities and trap heat in the atmosphere. The accumulation of GHG in the atmosphere affects the earth's temperature. While research has shown that the earth's climate has natural warming and cooling cycles, evidence indicates that human activity has elevated the concentration of GHG in the atmosphere beyond the level of naturally-occurring concentrations resulting in more heat being held within the atmosphere. The Intergovernmental Panel on Climate Change (IPCC), an international group of scientists from 130 governments, has concluded that it is "very likely" - a probability listed at more than 90 percent - that human activities and fossil fuels explain most of the warming over the past 50 years."[1]

The IPCC predicts that under current human GHG emission trends, the following results could be realized within the next 100 years:[2]

- Global temperature increases between 1.1 – 6.4 degrees Celsius;
- Potential sea level rise between 18 to 59 centimeters or 7 to 22 inches;
- Reduction in snow cover and sea ice;
- Potential for more intense and frequent heat waves, tropical cycles and heavy precipitation; and,
- Impacts to biodiversity, drinking water and food supplies.

The Climate Impacts Group (CIG), a Washington-state based interdisciplinary research group that collaborates with federal, state, local, tribal, and private agencies; organizations; and,

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1 IPCC, Fourth Assessment Report, February 2, 2007.
2 IPCC, Summary for Policymakers, April 30, 2007.

businesses studies impacts of natural climate variability and global climate change on the Pacific Northwest. CIG research and modeling indicates the following possible impacts of human-based climate change in the Pacific Northwest:[3]

- Changes in water resources, such as decreased snowpack; earlier snowmelt; decreased water for irrigation, fish and summertime hydropower production; increased conflict over water; increased urban demand for water;
- Changes in salmon migration and reproduction;
- Changes in forest growth and species diversity and increases in forest fires; and,
- Changes along coasts, such as increased coastal erosion and beach loss due to rising sea levels; increased landslides due to increased winter rainfall, permanent inundation in some areas; and, increased coastal flooding due to sea level rise and increased winter streamflow.

Energy

One source of GHG emissions is the fossil fuels (especially coal) used to produce power used by consumers for electrical power and home heating needs. In the Pacific Northwest - unlike other regions in the United States - power companies are able to utilize hydro-electric energy sources which are considered renewable.

Puget Sound Energy (PSE) is one of three electrical service providers for the City of Renton, and provides service to the Quendall Terminals site and vicinity. PSE has a variety of sources of power including: hydro-electric (41 percent), coal (36 percent), natural gas (20 percent), nuclear (1 percent), and other sources[4] (2 percent)[5]. A percentage of the power provided by PSE is generated from fossil fuels with the majority coming from hydro-electric and natural gas sources. PSE offers consumers options for reducing or offsetting their energy carbon footprint as part of the Green Power Program. Consumers who participate in this program allow PSE to purchase renewable energy credits (solar and wind) from regional renewable energy sources on their behalf for a portion or all of their electricity use.

Other strategies that can further reduce greenhouse gas from energy use are: employing design features that naturally reduce energy use, such as daylighting and green roofs; retaining mature trees to provide carbon sequestration, air purification and cooling; and, providing on-site power generation, such as solar panels or wind turbines.

The Quendall Terminals site is currently vacant and does not contain any structures or facilities that would consume electricity at this time.

Regulatory Context

United States Environmental Protection Agency

The United States Environmental Protection Agency (EPA) is charged with enforcing the Clean Air Act and has established air quality standards for common pollutants.

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3 Climate Impacts Group, Climate Impacts in Brief, http://www.cses.washington.edu/cig/pnwc/ci.shtml.
4 Other sources include wind, petroleum, landfill gas, biomass and waste.
5 Puget Sound Energy, http://www.pse.com/energyEnvironment/energysupply/Pages/EnergySupply-Electricity-PowerSupplyProfile.aspx.

On September 22, 2009, the EPA released final regulations that require 29 categories of facilities to report their GHG emissions annually, starting in 2011. Facilities covered by these regulations include oil refineries, pulp and paper manufacturing, landfills, and a variety of other manufacturing and industrial sources of emissions. Individual development projects, such as the Quendall Terminals Redevelopment project evaluated in this DEIS, are not subject to these regulations.

Western Regional Climate Action Initiative

On February 26, 2007, the Governors of Arizona, California, New Mexico, Oregon and Washington signed the Western Climate Initiative (WCI) to develop regional strategies to address climate change. WCI is identifying, evaluating and implementing collective and cooperative ways to reduce greenhouse gases in the region. Subsequent to this original agreement, the Governors of Utah and Montana, as well as the Premiers of British Columbia and Manitoba joined the Initiative. The WCI objectives include setting an overall regional reduction goal for GHG emissions, developing a design to achieve the goal and participating in The Climate Registry, a multi-state registry to enable tracking, management and crediting for entities that reduce their GHG emissions.

On September 23, 2008, the WCI released their final design recommendations for a regional cap-and-trade program. This program would cover GHG emissions from electricity generation, industrial and commercial fossil fuel combustion, industrial process emissions, gas and diesel consumption for transportation and residential fuel use. The first phase of the program, which will regulate electricity emissions and some industrial emission sources, is to begin January 1, 2012.

State of Washington

In February of 2007, Executive Order No. 07-02 was signed by the Governor establishing goals for Washington regarding reductions in climate pollution, increases in jobs and reductions in expenditures on imported fuel.[6] This Executive Order established Washington's goals for reducing GHG emissions as follows: to reach 1990 levels by 2020, 25 percent below 1990 levels by 2035 and 50 percent below 1990 levels by 2050. This order was intended to address climate change, grow the clean energy economy and move Washington toward energy independence.

In 2007, the Washington legislature passed SB 6001, which among other things adopted the Executive Order No. 07-02 goals into statute.

In 2008, the Washington Legislature built on SB 6001 by passing E2SHB 2815, the Greenhouse Gas Emissions Bill. While SB 6001 set targets to reduce emissions, the E2SHB 2815 made those firm requirements and directed the state to submit a comprehensive GHG reduction plan to the Legislature by December 1, 2008. As part of the plan, the Washington State Department of Ecology (Ecology) was mandated to develop a system for reporting and monitoring GHG emissions within the state and a design for a regional multi-sector, market-based system to reduce statewide GHG emissions.

[6] http://www.governor.wa.gov/execorders/eo_07-02.pdf

In 2008,[7] Ecology issued a memorandum stating that climate change and GHG emissions should be included in all State Environmental Policy Act (SEPA) analyses and committed to providing further clarification and analysis tools.

In 2009, Executive Order 09-05 was signed ordering Washington state actions to reduce climate-changing GHG emissions, to increase transportation and fuel-conservation options for Washington residents, and protect the state's water supplies and coastal areas. The Executive Order directs state agencies to develop a regional emissions reduction program; develop emission reduction strategies and industry emissions benchmarks to make sure 2020 reduction targets are met; work on low-carbon fuel standards or alternative requirements to reduce carbon emissions from the transportation sector; address rising sea levels and the risks to water supplies; and, increase transit options, such as buses, light rail, and ride-share programs, and give Washington residents more choices for reducing the effect of transportation emissions.

On October 7, 2009, Ecology issued a draft rule requiring certain industrial facilities and large vehicle fleets to report GHG emissions, starting in 2010. At this time, the rule is still undergoing public review.

On June 1, 2010, Ecology issued draft guidelines entitled, *Guidance on Climate Change and SEPA*, for a 25-day public comment period. These draft guidelines include: guidance regarding the types of GHG emissions that should be calculated; a discussion of how to determine if emissions surpass a threshold of "significance"; and, a description of different types of mitigation measures. Guidance is also provided regarding the requirement to discuss the ability of a proposal to adapt to climate changes as a result of global warming. After closure of the public comment period on June 25, 2010, the Department of Ecology issued a statement indicating that significant changes would be required to the Draft Guidelines before they are issued. If the final *Guidance on Climate Change and SEPA* are issued subsequent to the issuance of this DEIS, but before issuance of the FEIS, additional analysis may be included in the FEIS.

3.4.2 Impacts

Alternative 1 – Preferred Alternative

Greenhouse Gas Emissions

The following tabulation of GHG emissions is based on the SEPA Greenhouse Gas Emissions spreadsheet tool developed by King County. In accordance with findings regarding the primary sources of greenhouse gas emissions, this tabulation focused on three areas/sources of emissions as described below.

- Building Materials and Processes (Embodied Emissions). This portion of the calculation considered emissions that are created through the extraction, processing, transportation, construction and disposal of building materials, as well as emissions created through landscape disturbance (by both soil disturbance and changes in above-ground biomass). Types of buildings include residential buildings, office land use, retail land use, restaurant land use and underground parking structures. The lifespan of the buildings is

[7] Manning, Jay. RE: Climate Change - SEPA Environmental Review of Proposals, April 30, 2008.

projected to be 62.5 years for retail/office, and 80.5 years for multifamily residential buildings, based on the King County spreadsheet model.

- Post-development Energy Usage (Energy). This element considered energy consumption, such as heating and electrical usage. For this calculation, the energy values were adjusted to reflect the usage reported for the Pacific Northwest (as opposed to national averages). For the analysis, there is no assumption of construction of Built Green or Energy Star ratings.

- Transportation (Transport). This component considered GHG emissions related to vehicle travel of residents and employees. The King County default calculation was used, because no other project-specific data were available.

Redevelopment on the Quendall Terminals Main Property under Alternative 1 would result in an increase in GHG emissions when compared to existing conditions due to the increase in building density and site population. No new development is anticipated on the Isolated Property. **Table 3.4-1** provides a summary of the potential estimated GHG emissions that could result from construction and operation of development under Alternative 1.

Table 3.4-1
QUENDALL TERMINALS ESTIMATED GREENHOUSE GAS EMISSIONS – ALTERNATIVE 1 AND 2

Source	Square Footage	Embodied Emissions $MTCO_2e$	Energy Emissions $MTCO_2e$	Transportation Emissions $MTCO_2e$	Lifespan Emissions $MTCO_2e$
Alternative 1					
Residential	800[1]	26,400	285,600	612,800	924,800
Office	245,000	9,555	177,135	144,060	330,750
Retail	21,600	842.4	12,463.2	5,335.2	18,640.8
Restaurant	9,000	351	17,946	5,049	23,346
Estimated Total GHG Emissions		**37,148.4**	**493,144.2**	**767,244.2**	**1,297,536.8**
Alternative 2					
Residential	708[1]	23,364	252,756	542,328	818,448
Office	0				0
Retail	21,600	842.4	12,463.2	5,335.2	18,640.8
Restaurant	9,000	351	17,946	5,049	23,346
Estimated Total GHG Emissions		**24,557.4**	**283,165.2**	**552,712.2**	**860,434.8**

Source: EA|Blumen, 2010.
[1] Indicates the total number of residential units under each alternative.
*The numbers in this table differ slightly from the GHG Emissions Worksheet (**Appendix F**) due to rounding.

As noted in **Table 3.4-1**, development under Alternative 1 would result in an estimated total 1,297,536.8 $MTCO_2e$ in lifespan GHG emissions.[8] A majority of the emissions would be from residential and office development on the site. These calculations have not taken into consideration any potential efforts to reduce the carbon footprint of development under Alternative 1, such as: Leadership in Energy and Environmental Design (LEED) building techniques; vehicle trip reductions through building a walkable community where residents can live, work and play; energy conservation measures, etc., even though these measures may be incorporated into the final development (see **Appendix F** for the SEPA GHG Emissions spreadsheet for Alternative 1).

Energy

New development on the Quendall Terminals Main Property under Alternative 1 would utilize energy in the form of electricity and natural gas. Electricity would be used for heating, cooling, lighting and other energy demands; natural gas would be used primarily for heating and cooking. PSE would continue to provide electricity and natural gas service to the site. Development under Alternative 1 would result in an increase in energy usage levels when compared to the existing conditions. However, LEED building techniques and other energy conservation measures could be incorporated into the final development that would lower the energy demands associated with site development.

Alternative 2 – Lower Density Development

Greenhouse Gas Emissions

Redevelopment on the Quendall Terminals Main Property under Alternative 2 would also result in an increase in GHG emissions when compared to existing conditions; however, the associated increase in GHG emissions would be lower than Alternative 1 due to the lower density development. No new development is anticipated on the Quendall Terminals Isolated Property. New development under Alternative 2 would result in an estimated total 860,434.8 $MTCO_2e$ in lifespan GHG emissions. A majority of the emissions would be from residential development on the site. As described under Alternative 1, these calculations have not taken into consideration any potential efforts to reduce the carbon footprint of development, even though these measures may be incorporated into the final development. See **Table 3.4-1** for a summary of the potential estimated GHG emissions that could result from construction and operation of development under Alternative 2 and **Appendix F** for the SEPA Greenhouse Gas Emissions spreadsheet for Alternative 2.

Energy

New development on the Quendall Terminals Main Property under Alternative 2 would utilize similar energy sources to those described under Alternative 1. Development under Alternative 2 would result in an increase in energy usage levels when compared to the existing conditions; however, the increase in energy usage would be lower than Alternative 1 due to lower density development on the site. LEED building techniques and other energy conservation measures

[8] $MTCO_2e$ is defined as Metric Ton Carbon Dioxide Equivalent and equates to 2,204.62 pounds of CO_2. This is the standard measure of the amount of CO emissions reduced or sequestered. Carbon is not the same as CO_2. Sequestering 3.67 tons of CO_2 is equivalent to sequestering one ton of carbon.

could be incorporated into the final development that would lower the energy demands associated with site development.

No Action Alternative

Under Alternative 3, no mixed-use development would occur on the site at this time and no associated increases in energy demand or GHG emissions would occur.

3.4.3 Mitigation Measures

Other Possible Mitigation Measures

- Development could incorporate low-impact/sustainable design features into the design of proposed buildings on the site to reduce the demand for energy and reduce the amount of GHG emissions. Such features have not been identified at this time, but could include architectural design features; sustainable building materials; use of energy efficient products; natural drainage/green roof features; use of native plants in landscaping; and/or, other design features.

3.4.4 Significant Unavoidable Adverse Impacts

Development on the Quendall Terminals site would result in an increase in demand for energy and an increase in GHG emissions. However, the direct and indirect impacts of GHG emissions and energy use under Alternative 1 and 2 would not be considered significant. Determining whether the cumulative impacts of GHG emissions and energy use from development of the Quendall Terminals site is significant or not significant implies the ability to measure incremental effects of global climate change. The body of research and law necessary to connect individual land uses, development projects, operational activities, etc. with the broader issue of global warming remains weak. Scientific research and analysis tools sufficient to determine a numerical threshold of significance are not available at this time and any conclusions would be speculative. Further information on the potential cumulative impacts of GHG emissions is not considered essential to a reasoned choice among the alternatives in this DEIS.

3.5 LAND AND SHORELINE USE

This section of the DEIS describes existing land uses occurring on the site (before and after cleanup and remediation activities) and the pattern of land uses in the site vicinity. The section also evaluates how redevelopment under the EIS Alternatives would affect on-site land uses (post cleanup/remediation), as well as land uses in the site vicinity, either directly or indirectly. Section 3.6, **Relationship to Plans, Policies and Regulations**, compares the consistency of the alternatives with relevant City of Renton land use plans, policies and zoning regulations.

3.5.1 Affected Environment

The approximately 21.5-acre Quendall Terminals site, comprised of the approximately 20.3-acre Main Property and the approximately 1.2-acre Isolated Property, is located within the Kennydale Neighborhood in the northern portion of the City of Renton. The Main Property is generally bordered by the Puget Sound Energy (PSE) easement and the Seahawks Headquarters and Training Facility to the north, Lake Washington Boulevard and Ripley Lane N to the east, the Barbee Mill residential development to the south, and Lake Washington to the west. The Isolated Property is generally bordered by the southbound I-405 off-ramp to the south and east, and Ripley Lane N to the north and west.

Existing Land Uses

<u>Site</u>

Main Property

The Quendall Terminals Main Property was historically used as a creosote manufacturing facility, beginning in 1917 as Republic Creosoting Company and later changing to Reilly Tar and Chemical Corporation in 1956. The creosote facility refined and processed coal tar and oil-gas tar residues that were shipped or barged to the property from Lake Union. In 1971, the property was sold to Quendall Terminals and was used intermittently to store diesel fuel and crude/waste oils. Fuel and oil storage operations were ceased in 1978 when the property began to be used as a log sorting and storage yard.

Historic industrial operations on the Main Property have resulted in a variety of contamination issues, and cleanup of the site is required by law. The Washington State Department of Ecology (Ecology) initially served as the lead regulatory agency for overseeing the cleanup of the property. In 2005, Ecology requested that the US Environmental Protection Agency (EPA) take the lead for overseeing cleanup and in 2006 the property was added to the EPA's Superfund National Priorities List. In September 2006, the property owners entered into an Administrative Order on Consent with EPA, which requires the property owners to complete a remedial investigation and feasibility study (RI/FS). Based on the RI/FS, EPA will propose a preferred cleanup remedy, and after public comment will select a final cleanup remedy for the site. EPA is currently reviewing a draft RI/FS. They expect the RI/FS to be completed by April 2011. The site will undergo cleanup/remediation under its status as a superfund site by EPA, pursuant to the final cleanup remedy. EPA is expected to select the final site remedy in late 2011 (see Section 3.3, **Environmental Health**, and **Appendix D** for further details on the existing contamination issues and the cleanup/remediation plan). All cleanup and remediation activities will be conducted as part of a separate action by the EPA.

The Quendall Terminals Main Property is currently vacant and essentially unused. A small brick building, a sewer pump station and a shack are located on the eastern edge of the property; no other buildings are present. A wharf and a dock remnant are situated along the western edge of the property; these features were associated with the historic industrial and log storage operations on the property and are no longer in use. The remainder of the property is partially covered with vegetation, including vegetation associated with approximately 0.8 acres of wetlands, located primarily along the shoreline. Existing mature trees are present on the western edge of the property. No public access to the shoreline is presently provided (see **Figure 2-3**, Existing Site Conditions, Section 3.2, **Critical Areas**, and **Appendix E** for details).

In conjunction with the cleanup and remediation activities, the existing vegetation, small vacant building and dock/wharf will be removed on the Main Property; the sewer pump station will remain. It is assumed that some of the contaminated materials will be removed from the property, and a soil cap will be placed on the upland and shoreline areas. Remediation activities will result in the fill of all of the wetlands on this property. A Shoreline Restoration Plan will be implemented in the shoreline area that will include the re-establishment/expansion of certain wetlands and restoration/enhancement of the shoreline habitat (see **Figure 2-6**, Shoreline Restoration Conceptual Design – Alternative 1, Section 3.2, **Critical Areas**, and **Appendix E** for details).

Isolated Property

The approximately 1.2-acre Quendall Terminals Isolated Property is vacant and unused and is generally comprised of existing vegetation, including approximately 0.1 acres of existing wetlands.

Subsequent to remediation activities, it is assumed that one existing wetland will be retained on this property and another existing wetland will be expanded (see Section 3.2, **Critical Areas**, and **Appendix E** for details).

Site Vicinity

A variety of land uses are present in the site vicinity, including single family residential, multifamily residential, commercial and former industrial uses.

Main Property

To the immediate north of the Main Property is an approximately 80-foot wide Puget Sound Energy (PSE) easement and an energy substation. Further north is the Seahawks Headquarters and Training Facility. The Seahawks Headquarters and Training Facility includes outdoor fields, an indoor field and administrative and training facilities. Three full-size football fields are located at the south end of the facility, adjacent to the Quendall Terminals Main Property. The north end of the facility includes an approximately 200,000-square foot training building with an indoor practice field, training facilities, locker rooms, and administrative offices. The offices and training facilities are located in the three-story portion of the building. The indoor practice field portion of the building is approximately 115 feet high to allow for kicking and punting. Public access to the Lake Washington shoreline is provided in this development at the north end of the property. Further to the north is a multifamily residential building and several single family residences.

To the east of the Main Property are the Railroad right-of-way, Ripley Lane N, the Isolated Property, and Interstate 405. Further east, beyond Interstate 405, are a variety of commercial uses (including retail, restaurant, hotel, commercial storage, etc.) and multifamily residences. To the southeast of the site is the Pan Abode Cedar Homes property, which formerly housed industrial manufacturing operations, and currently is used for building materials storage. In May 2009, an application was submitted to the City of Renton to redevelop the Pan Abode site. The proposed redevelopment (also known as Hawk's Landing) would include an approximately 60-foot high, 122,000-square foot hotel building. The building would contain approximately 173 hotel rooms, retail space, restaurant and a parking garage; approximately 124 surface parking stalls would also be located on the property. In October 2009, the City of Renton Hearing Examiner approved the plan with conditions; however, no construction has occurred on the property to date. Further to the southeast is the May Creek, open space area, approximately 40 acres in size, surrounding May Creek. It should be noted that the area on the south side of May Creek has been approved for a preliminary plat for single family residential development.

To the immediate south of the Main Property is the Barbee Mill residential development. Similar to Quendall Terminals, the Barbee Mill property was originally used for industrial operations. As a result of historic industrial operations, the Barbee Mill site was contaminated with a variety of organic and inorganic substances and a cleanup/remedial action was conducted under oversight by Ecology. The site is currently being redeveloped by Connor Homes to include approximately 114 two- to three-story, paired homes that range from approximately 2,600 square feet to 4,000 square feet. Several of the buildings are constructed and occupied. Access for the general public to the Lake Washington shoreline is provided in this development at the south end of the property.

Lake Washington is located to the immediate west of the Main Property. Beyond Lake Washington are single family residential development and parks on the east shore of Mercer Island. See **Figure 3.5-1** for a map of existing land uses in the vicinity of the Main Property.

Isolated Property

To the north of the Isolated Property (across Ripley Lane N) are the Seahawks Headquarters and Training Facility and existing residential uses. To the east of the property is I-405. To the south of the property are I-405 and NE 44th Street. To the west of the property (across Ripley Lane N) is the Quendall Terminals Main Property (see **Figure 3.5-1** for a map of existing land uses in the vicinity of the Isolated Property).

Source: *Google Maps,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 3.5-1
		Surrounding Land Uses

Existing Land Use, Zoning and Shoreline Designations

Site

Comprehensive Plan

The *City of Renton Comprehensive Plan* (2009) designates the Quendall Terminals site (including the Main Property and the Isolated Property) as Commercial/Office/Residential (COR). Per the COR Purpose Statement, this designation provides opportunities for large-scale office, commercial, retail and multifamily residential projects that develop through a master plan and binding site plan process and incorporate significant site amenities and/or gateway features. COR sites are typically transitioning from an industrial use to a more intensive land use (see Section 3.6, **Relationship to Plans and Policies**, for details).

Zoning

Per the City of Renton Municipal Code, the zoning classification of the Quendall Terminals site (including both properties) is Commercial/Office/Residential (COR). Per Renton Municipal Code (RMC) 4-2-020(O), the COR zone is intended to provide a mix of intensive office, hotel, convention center, and residential activity in a high-quality, master-planned development that is integrated with the natural environment (see Section 3.6, **Relationship to Plans and Policies**, for details).

Shoreline

The Lake Washington shoreline along the Main Property is classified as an Urban environment in the City of Renton Shoreline Master Program (1983, as amended). Per RMC 4-3-090(J), the objective of the Urban environment is to ensure optimum utilization of the shoreline by providing for public use and access, and by managing development to enhance and maintain the shoreline for viable and necessary urban uses (see Section 3.6, **Relationship to Plans and Policies**, for details).

Site Vicinity

Comprehensive Plan

Similar to the Quendall Terminals site, the areas immediately adjacent to the site are designated Commercial/Office/Residential (COR) in the Comprehensive Plan. Properties further to the north and south are designated as Residential Single Family (RSF). The RSF designation is intended to be used for quality detached residential development organized into neighborhoods at urban densities. Further to the east, beyond I-405, properties are designated as Commercial Corridor (CC). The CC designation is intended to allow existing “strip commercial” linear business districts to evolve into business areas that are characterized by enhanced site planning and amenities.

Zoning

The zoning classification of the areas immediately surrounding the Quendall Terminals site is Commercial/Office/Residential (COR), similar to the site. The areas further to the north and south of the site are zoned Residential – 8 Dwelling Units per Acre (R-8). The R-8 zone was established for single family residences at a range of four to eight dwelling units per acre. The area to the east of the site, beyond I-405, is zoned Commercial Arterial (CA). The CA zone provides for a wide variety of retail sales, services and other commercial activities in business areas along high-volume traffic corridors (see **Figure 3.5-2** for a map of zoning classifications in the site vicinity).

Shoreline

The Lake Washington shoreline to the north and south of the Main Property is classified as an Urban environment in the City of Renton Shoreline Master Program (1983, as amended), similar to the shoreline along the Main Property.

3.5.2 Impacts

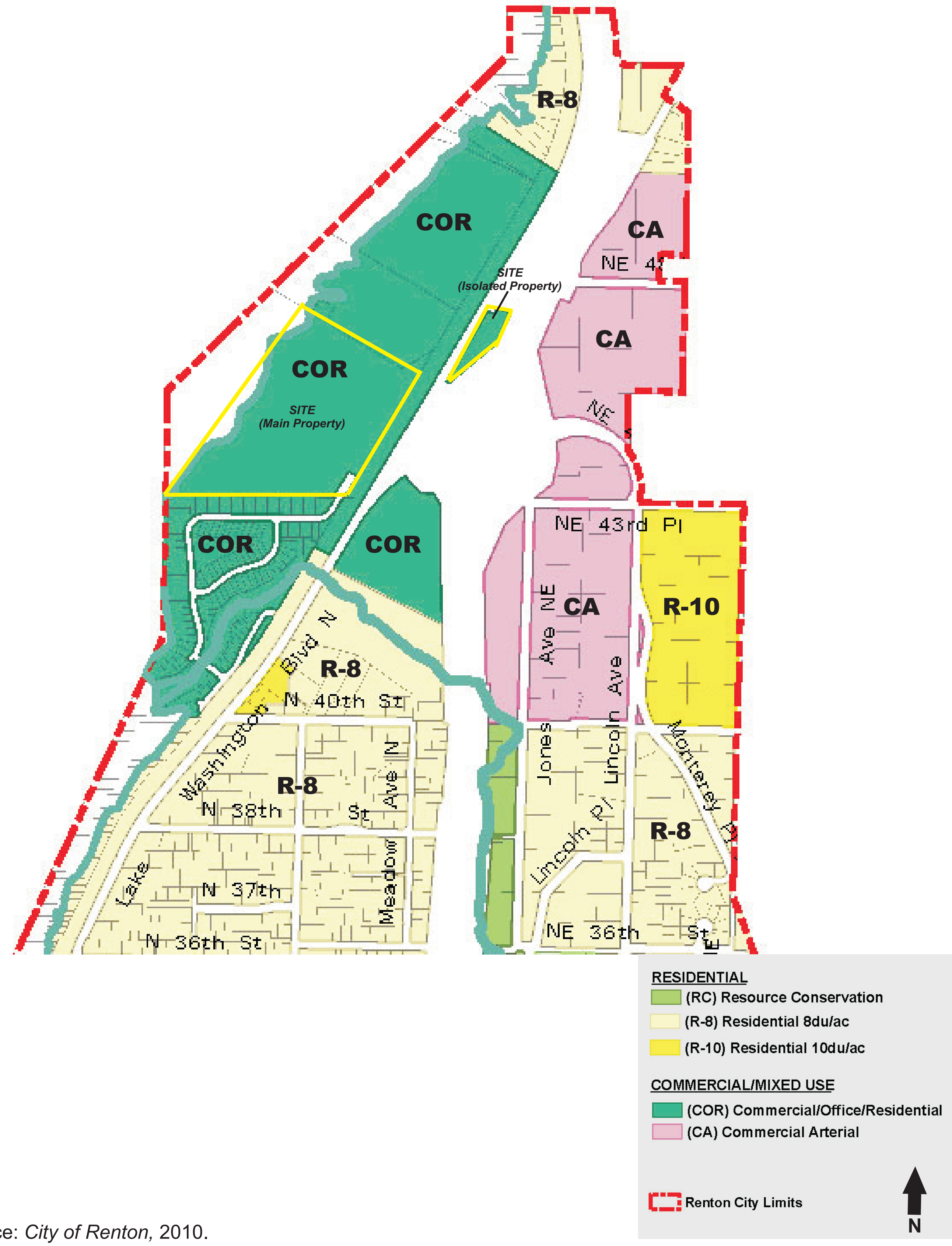
As described in **Chapter 2**, the Quendall Terminals site is currently in the process of undergoing cleanup/remediation in association with its status as a Superfund site with oversight by the EPA. Potential impacts associated with the cleanup/remediation activities will be addressed through the separate EPA process. The analysis of impacts in this DEIS assumes a baseline condition subsequent to cleanup/remediation activities; this baseline forms the basis for the evaluation of potential land use impacts associated with redevelopment under the EIS Alternatives.

Alternative 1 – Application

Overview

Following cleanup/remediation activities, the Quendall Terminals site would be subdivided into seven lots, four of which would contain mixed-use development, and three of which would contain the Shoreline Restoration Area. This redevelopment would occur in nine buildings on the Main Property. Mixed-use development would include 800 residential units, approximately 245,000 square feet of office use, approximately 21,600 square feet of retail use, and approximately 9,000 square feet of restaurant use. Parking for 2,171 vehicles would be provided within the proposed buildings and in one surface parking area. New roadways would provide vehicular access through the site and would include sidewalks and pedestrian amenities; private driveways would provide additional access to the buildings at the north and south ends of the site. A proposed trail area would provide public access to the shoreline area adjacent to Lake Washington. No new development is proposed on the Isolated Property under Alternative 1 subsequent to remediation activities (see **Figure 2-4**, Site Plan – Alternative 1).

See **Table 2-1** for a breakdown of proposed mixed-use redevelopment under Alternative 1 and **Table 2-2** for a detailed breakdown of on-site uses under Alternative 1.



Source: *City of Renton*, 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 3.5-2
		Surrounding Zoning

Construction

Site preparation and construction of buildings and infrastructure on the Main Property under Alternative 1 would result in temporary construction-related impacts to adjacent land uses over the buildout period (it is assumed that the Quendall Terminals redevelopment would be fully built out by 2015; however, actual buildout would depend upon market conditions). Temporary construction-related impacts could include emissions from construction vehicles and equipment; increased noise levels from construction activities; increased dust associated with construction activities; vibration associated with construction (including the potential installation of piles); and, increased traffic associated with construction vehicles and construction workers. Construction activities are anticipated to occur incrementally over the buildout period, and would move around the site, resulting in temporary impacts to adjacent land uses when site construction is proximate to those adjacent areas. Due to the temporary nature of construction and required compliance with City of Renton construction code regulations, no significant construction-related land use impacts would be anticipated.

Operation

Direct Impacts

The types of direct land use impacts that could potentially occur from implementation of Alternative 1 relate to the conversion of land uses and the compatibility of the proposed land uses with surrounding land uses, including changes in land use intensity or activity levels. These types of potential impacts are discussed below.

Conversion of Uses. Redevelopment under Alternative 1 would restore a Superfund site to a productive use after remediation. The site would be converted from its current vacant, partially vegetated state to a mixture of residential, office, retail, restaurant and open space uses; parking; open space; and associated infrastructure (see **Figure 2-4**, Alternative 1 - Site Plan). Approximately 5.1 acres of the site would be converted to new buildings housing residential, office, retail and restaurant uses; an additional approximately 0.2 acres would be converted to plaza areas. Approximately 4.2 acres of the site would be converted to roadways and sidewalk areas; an additional approximately 1.4 acres of the site would be converted to surface parking areas. Approximately 6.0 acres of the site would be converted to landscape areas, including courtyards associated with the new buildings; approximately 0.2 acres would be converted to trail areas; and, approximately 3.2 acres would remain in natural landscaped areas (i.e. the restored shoreline area and enhanced wetlands on the Isolated Property). See **Table 2-1** for a breakdown of proposed mixed-use building development under Alternative 1 and **Table 2-2** for a detailed breakdown of onsite uses.

Relationship to Surrounding Uses. The relationship of redevelopment of the Quendall Terminals site to surrounding uses would primarily be a function of the intensity of the new uses, the intensity of surrounding uses, the proximity of the new uses to surrounding uses and provisions for buffers between the new uses and surrounding uses.

Activity levels (i.e. noise, traffic, etc. associated with increased site population) on the site would increase as a result of redevelopment under Alternative 1 due to the onsite population. Mixed-use development on the site would result in new residents living on the site and new employees traveling to and from the site each day (there are currently no residents or employees at the site). Per the 2009 Master Plan, Shoreline Substantial Development Permit and Binding Site

Plan application by the applicant, proposed residential uses are anticipated to house approximately 1,300 residents and proposed office, retail and restaurant uses are anticipated to employ approximately 1,050 people. The increase in on-site population would result in increased activity levels, including pedestrian activity and vehicle traffic to and from the site. Vehicle access to the site would be provided at the north end of the site (via Ripley Lane N) and at the south end of the site (via Lake Washington Boulevard). Internal roadways would provide access through the site and would connect to private driveways located at the north and south ends of the site. The proposed private driveway at the south end of the site would result in an increase in vehicular traffic noise and activity adjacent to the Barbee Mill residential development. The increased activity levels at the site from residential and office/commercial development would also increase demands on public services (i.e. police and fire services).

Proposed plazas and courtyard areas associated with new buildings would provide gathering areas for onsite residents and employees and would also be a source of new activity. These plazas and courtyards would be generally located within the building development area and the associated noise and activity in these areas would not be expected to significantly impact surrounding land uses. A proposed trail within the shoreline area would also provide pedestrian amenities and passive recreational opportunities for on-site residents, employees and the general public during daylight hours (approximately 10 AM to dusk) and would result in additional new activity on the site. This trail would link to the site's upland internal pedestrian circulation system (sidewalks), which would connect to Lake Washington Boulevard, where existing pedestrian and bicycle facilities are present. The trail would not connect to the Barbee Mill residential development or the Seahawks Headquarters and Training Facility, and, therefore, would not directly increase noise/activity on those properties.

In general, increased activity levels associated with redevelopment under Alternative 1 would be greater than that associated with single family residential uses to the south (Barbee Mill residential development) due to the increase in residents and employees onsite. However, the activity levels would be similar to commercial uses to the north (the Seahawks Headquarters and Training Facility), as well as existing and planned commercial and hotel uses to the east (i.e. the proposed Hawk's Landing hotel and commercial uses east of I-405), albeit at a somewhat greater scale. Associated activity levels would be consistent with the existing urban character of the area and no significant land use impacts to surrounding uses would be anticipated.

Redevelopment under Alternative 1 would include nine new mixed-use buildings on the site, each of which would be seven stories (five stories over two stories of parking) and up to approximately 80 feet in height (less than the 125 feet allowed by the COR Zoning). The new buildings would range from approximately 94,600 square feet to approximately 209,000 square feet in size. The proposed mixed-use buildings would be greater in height and bulk than the adjacent two- to three-story, approximately 2,600 square feet to 4,000 square feet single family residential buildings to the south (Barbee Mill residential development); however, they would be generally similar in height and bulk to surrounding commercial and planned hotel buildings to the north and east (i.e. the approximately 115-foot high, 200,000-square Seahawks Headquarters and Training Facility building to the north and the approximately 60-foot high, 122,000-square foot planned Hawk's Landing building to the east; the proposed building would not be as tall as the Seahawks Headquarters and Training Facility, however). Mixed-use buildings on the site would be located approximately 45 to 95 feet from the south property line (adjacent to Barbee Mill); this separation would serve as a buffer between proposed development and existing adjacent residences. Mixed-use buildings at the north end of the site would be located approximately 40 to 310 feet from the property line (adjacent to the Seahawks

Headquarters and Training Facility). The proposed height and bulk of development under Alternative 1 would also be consistent with the existing urban character and the applicable provisions of the City of Renton regulations (i.e. the mixed use development would be consistent with the type and size of development contemplated in the COR land use/zoning classification and the Urban shoreline environment; see Section 3.6, **Relationship to Plans**, **Policies and Regulations**, for details); based on the above factors, no significant height and bulk impacts would be anticipated.

Existing off-site features (i.e. roadways such as Lake Washington Boulevard and the PSE easement) would provide buffers between proposed buildings and adjacent land uses. New on-site driveways, landscaping, surface parking areas and proposed building setback areas would also provide buffers between proposed buildings and adjacent land uses, particularly in relation to single family residential uses to the south of the site. Proposed landscaping, especially along the north and south boundaries of the Main Property, would provide a partial visual screen between proposed buildings and adjacent uses (see **Figure 2-7**, Preliminary Landscape Plan - Alternative 1). Architectural features (i.e. roof slopes, façade modulation, building materials, etc.) would also be incorporated into the design of each building. These features would be intended to enhance the compatibility between the proposed development and surrounding uses and add to the visual quality of the development (see **Figure 2-5**, Representative Architectural Elevations - Alternative 1 and Section 3.7, **Aesthetics/Views**, for further information on the proposed building and site design). No significant land use compatibility impacts would be anticipated.

Indirect/Cumulative Impacts

New mixed-use redevelopment under Alternative 1 would contribute to the cumulative residential and employment growth, and intensification of land uses in the City of Renton. Together with other planned projects (i.e. Hawk's Landing), such redevelopment would help achieve state and local goals for directing growth toward urban infill areas, and focusing growth in areas with adequate public services and utilities. An increase in on-site resident and employment population would contribute to a cumulative increase in vehicular traffic on surrounding streets in the site vicinity (see Section 3.9, **Transportation/Traffic**, and **Appendix G** for details on traffic). The increase in population and employment would also result in an increased demand for retail goods and services. A portion of this demand could be fulfilled by the proposed retail development onsite, while any additional demand would likely be fulfilled by surrounding businesses in the area. Redevelopment on the Quendall Terminals site is not anticipated to generate substantial pressure for more intense development in the area due to the fact that major properties in the site vicinity have already been recently redeveloped (Barbee Mill and Seahawks Headquarters and Training Facility) or are in the process of redeveloping in the near future (Pan Abode site). Overall, no significant indirect or cumulative land use impacts would be anticipated.

Alternative 2 – Lower Density Development

Overview

Similar to Alternative 1, following cleanup/remediation activities, the Quendall Terminals site would be subdivided into seven lots, four of which would contain mixed-use development and three of which would contain the Shoreline Restoration Area. This redevelopment would occur in nine buildings on the Main Property. Redevelopment under Alternative 2 would feature lower density development than under Alternative 1. Mixed-use development under Alternative 2 would include 708 residential units, approximately 21,600 square feet of retail use and approximately 9,000 square feet of restaurant use; no office uses would be provided under this alternative. Parking for 1,364 vehicles would be provided within the proposed buildings and in two surface parking lots, and two one-story decks. New roadways would provide vehicular access through the site and would include sidewalks and pedestrian amenities. A proposed trail area would also provide public access within the shoreline area adjacent to Lake Washington. As under Alternative 1, no new development is proposed on the Isolated Property under Alternative 2 subsequent to remediation activities (see **Figure 2-8**, Site Plan – Alternative 2).

See **Table 2-1** for a breakdown of proposed mixed use building development under Alternative 2 and **Table 2-2** for a detailed breakdown of on-site uses under Alternative 2.

Construction

Construction-related impacts under Alternative 2 would generally be similar to those described under Alternative 1. Redevelopment would result in temporary construction-related impacts to adjacent land uses over the buildout period and could include emissions from construction vehicles and equipment; increased dust associated with construction activities; vibration associated with construction (including the potential installation of piles); increased noise levels from construction activities; and, increased traffic associated with construction vehicles and construction workers. Similar to Alternative 1, no significant land use impacts would be anticipated during construction due to the temporary nature of construction and compliance with applicable City of Renton regulations.

Operation

Direct Impacts

Conversion of Uses. Similar to Alternative 1, redevelopment under Alternative 2 would restore the Superfund site to a productive use after remediation. The site would be converted from its current vacant, partially vegetated state to a mixture of residential, retail, restaurant and open space uses and associated infrastructure. Alternative 2 would include less building area and roadways on the site and more surface parking than Alternative 1. Approximately 4.1 acres of the site would be converted to new buildings; an additional 0.1 acres would be converted to plaza areas. Approximately 3.9 acres of the site would be converted to roadways and sidewalk areas; an additional approximately 2.7 acres of the site would be converted to surface parking areas. Approximately 6.1 acres of the site would be converted to landscape areas, including courtyards associated with the new buildings; approximately 0.3 acres would be converted to trail areas (slightly more area in trails than Alternative 1, because the trail would extend further down the south property line); and, approximately 3.2 acres would remain in natural landscaped areas (i.e. the restored shoreline area and enhanced wetlands on the Isolated Property). See **Table 2-1** for a detailed breakdown of on-site uses and **Table 2-2** for a breakdown of proposed mixed-use building development under Alternative 2.

Relationship to Surrounding Uses. Similar to Alternative 1, activity levels (i.e. noise, traffic, etc. associated with increased site population) on the site would result in an increase over existing conditions. However, no activity associated with office uses would occur under Alternative 2 and activity associated with residential uses would be somewhat less due to the lower number of residential units (708 dwelling units under Alternative 2 versus 800 dwelling units under

Alternative 1). General activity levels associated with new building development under Alternative 2 would be lower than under Alternative 1. However, Alternative 2 includes surface parking areas along the southern end of site, adjacent to the Barbee Mill development; the location of parking in this area of the site could result in greater traffic activity levels adjacent to the single family residences than under Alternative 1. Overall, activity levels would be consistent with the existing urban character of the area and no significant land use impacts would be anticipated.

Redevelopment under Alternative 2 would be slightly lower in height and bulk than Alternative 1 due to the lower density development. Buildings would be six stories (five stories over one story of parking) and up to 67 feet in height (less than the 125 feet allowed by the COR Zoning). The new buildings would range from approximately 77,000 square feet to up to 112,800 square feet in size. As under Alternative 1, the proposed mixed-use buildings would be greater in height and bulk than the adjacent single family residential buildings to the south (Barbee Mill development); however, they would be generally similar in height and bulk to surrounding commercial and planned hotel buildings to the north and east (the proposed buildings would not be as tall as the approximately 115-foot Seahawk Headquarters and Training Facility, however). Mixed-use buildings on the site would be located further from the south property line (approximately 95 to 380 feet) than under Alternative 1; this separation would serve as a greater buffer between proposed development and existing adjacent residences on the Barbee Mill site. Mixed-use buildings at the north end of the site would be located approximately 144 to 192 feet from the property line (adjacent to the Seahawks Headquarters and Training Facility); the existing PSE easement and existing football fields would provide a further buffer between proposed buildings and existing adjacent buildings. Landscaping and architectural features would also be incorporated into this alternative to enhance compatibility with adjacent uses (see **Figure 2-9**, Representative Architectural Elevations - Alternative 2). The proposed height and bulk and setbacks of development under Alternative 2 would be consistent with the existing urban character of the area and the applicable provisions of the City of Renton regulations; therefore, no significant height and bulk or land use compatibility impacts would be anticipated.

Indirect/Cumulative Impacts

New mixed-use redevelopment under Alternative 2 would contribute to the cumulative residential and employment growth, and intensification of land uses in the City of Renton, similar to Alternative 1, but on a lesser scale due to the lower density of the development. Together with other planned projects (i.e. Hawk's Landing), such redevelopment would help achieve state and local goals for directing growth toward urban infill areas, and focusing growth in areas with adequate public services and utilities. The on-site resident population and employees would increase and would contribute to cumulative increases in vehicular traffic on surrounding streets in the vicinity (see Section 3.9, **Transportation/Traffic**, for further details on traffic). The increase in population would also result in an increased demand for retail goods and services (such increases in traffic and demand for retail services would be less than Alternative 1 due to the reduced amount of housing and absence of office employment). A portion of this demand could be fulfilled by proposed retail development onsite and any additional demand would likely be fulfilled by surrounding businesses in the site vicinity. Similar to Alternative 1, redevelopment under Alternative 2 is not anticipated to create additional pressure for more intense development in the site vicinity. Overall, no significant indirect land use impacts would be anticipated.

No Action Alternative

Under the No Action Alternative, no new mixed-use redevelopment would occur on the Quendall Terminals site at this time. Cleanup/remediation activities in association with the site's status as a Superfund site with oversight by the Environmental Protection Agency (EPA) would occur as part of the separate EPA process. Restoration of the Superfund site to a productive use after remediation would not occur. No construction-related land use impacts, increases in on-site activity levels, or increases in residential and employment density would occur under this alternative. State and local goals to direct growth toward urban infill areas and focusing growth in areas with adequate public services and utilities would not occur.

3.5.3 Mitigation Measures

Required/Proposed Mitigation Measures

- New driveways, landscaping, surface parking areas and proposed building setback areas would provide a buffer between proposed buildings and adjacent land uses.

- Proposed landscaping, particularly along the north and south boundaries of the Main Property, would provide a partial visual screen between proposed buildings and adjacent uses (see **Figure 2-7**, Preliminary Landscape Plan - Alternative 1).

- Architectural features (i.e. roof slope, façade modulation, building materials, etc.) would be incorporated into the design of each building and are intended to enhance the compatibility between the proposed development and surrounding land uses (see **Figures 2-5** and **2-9** for representative architectural elevations and Section 3.7, **Aesthetics/Views**, for further information on the building and site design).

- A fire mitigation/impact fee would be paid for the proposed development at the time of building permit issuance to help offset the impacts of the project on the City's emergency services.

3.5.4 Significant Unavoidable Adverse Impacts

Redevelopment under Alternative 1 and Alternative 2 would result in the conversion of the approximately 21.5-acre Quendall Terminals site from a vacant, partially vegetated area to a new mixed-use development with an associated increase in building density and activity levels. No significant unavoidable adverse land use impacts would be anticipated.

3.6 RELATIONSHIP TO PLANS, POLICIES AND REGULATIONS

This section of the DEIS evaluates the consistency of the EIS redevelopment alternatives with relevant City of Renton plans, policies and regulations, including the *City of Renton Comprehensive Plan, City of Renton Shoreline Master Program, City of Renton Development Regulations* and *City of Renton Critical Areas Regulations*.

City of Renton Comprehensive Plan

The *City of Renton Comprehensive Plan* was originally developed in 2004 in compliance with the Washington State Growth Management Act (GMA) and has been updated on an annual basis (most recently in November 2009). The Comprehensive Plan establishes the goals and policies which guide future land uses and coordinate growth within the City of Renton over a 20-year planning horizon. In particular, the Comprehensive Plan serves as a guide for designating land uses, infrastructure development and community services. Its policies also serve as the foundation for the City's zoning regulations. In accordance with GMA, the Comprehensive Plan includes the following required elements: Land Use; Transportation; Housing; Capital Facilities; and, Utilities. The Comprehensive Plan also includes the following additional elements: Community Design; Economic Development; Environmental; Human Services; Parks, Recreation, Open Space and Trails; and, Community Planning.

Goals and policies from the Comprehensive Plan that are most relevant to proposed redevelopment of the Quendall Terminals site are highlighted below, followed by a discussion of the consistency of the EIS redevelopment alternatives with the goals/policies (the consistency of Alternatives 1 and 2 with these goals/policies is assumed to be similar unless noted otherwise).

Community Design Element

Summary: The purpose of the Community Design Element is to establish policies that set standards for high quality development, improve aesthetics and functionality of existing neighborhoods and commercial areas, and guide the development of new neighborhoods that are part of a better community.

Goal 1 – To raise the aesthetic quality of the City.

Goal 2 – To strengthen the economy through high quality development.

Goal 3 – To ensure that a high quality of life is maintained as Renton evolves.

Policy CD-3 – Site design should maximize public access to and create opportunities for use of shoreline areas in locations contiguous to a lake, river, stream or wetland where such access would not jeopardize habitats and other environmental attributes of the water body.

Policy CD-4 – Development review of proposed projects should identify opportunities for increasing public access to Lake Washington, the Cedar River, wetlands, streams and creeks in the City.

Discussion: The Quendall Terminals redevelopment is intended to be an aesthetically pleasing, high quality project. The Main Property is located adjacent to Lake Washington and associated wetlands. A shoreline restoration area will be created along the lake in conjunction with the site cleanup/remediation under the oversight of the federal Environmental Protection Agency (EPA). As part of redevelopment, an approximately 0.2-acre pedestrian corridor/trail would be constructed along the Lake Washington shoreline during cleanup/remediation. The trail would provide new access along the shoreline area and passive recreation opportunities for residents, employees and the general public during reasonable hours (anticipated to be from 10AM to dusk). Viewpoint areas would be included along the trail to provide views of Lake Washington and interpretive information on wetlands (see **Figures 2-6** and **2-11** for the Shoreline Restoration Conceptual Designs under Alternatives 1 and 2, respectively, and Section 3.8, **Parks and Recreation**, for details).

Policy CD-23 – Development should have buildings oriented toward the street or a common area rather than toward parking lots.

Policy CD-24 – Non-residential structures should be clustered and connected within the overall development through the organization of roads, blocks, yards, focal points and amenity features to create a neighborhood.

Discussion: Proposed office (in the case of Alternative 1 only), retail and restaurant uses would occur in buildings oriented around the proposed street system onsite, which would provide access and intersect in the central portion of the Main Property. A view corridor toward Lake Washington is proposed along the main east/west roadway onsite, Street "B". Other amenities, including landscaped plazas, would also be provided along this roadway (see **Figures 2-4** and **2-9** for the Site Plans under Alternatives 1 and 2, respectively). Proposed residential buildings would be centered on landscaped courtyards (see **Figure 2-8** for the Preliminary Landscape Plan under Alternative 1). Passive recreation opportunities and views toward the lake would be available for building residents from the courtyards.

Policy CD-31 – Neighborhoods, commercial areas, and centers should have human-scale features, such as pedestrian pathways and public spaces (e.g. parks or plazas) that have discernable edges, entries, and borders.

Policy CD-33 – Site design for office uses and commercial and mixed-use development should consider ways of improving transit ridership through siting, locating of pedestrian amenities, walkways, parking, etc. Ground floor uses and design should be pedestrian-oriented.

Discussion: The proposed buildings would be designed with a variety of details and materials that are intended to provide a human scale and a visually interesting streetscape and building façades. Ground floor uses, including retail and restaurants, would be oriented towards the sidewalk to encourage a pedestrian-friendly environment, particularly along Street "B". The on-site sidewalks would connect to off-site pedestrian facilities, including along Lake Washington Boulevard. Canopies and pedestrian lighting and landscaping would be provided at the ground level to enhance the pedestrian environment and alternate façade materials and details on the buildings would be utilized to provide visual interest (see Section 3.7, **Aesthetics/Views** for details).

At this point, it is unclear if the ground floor uses along certain streets onsite (i.e. Streets "A," and "C"), as well as along the lake side of the development, would be pedestrian-oriented, as parking is currently proposed in these locations. As a possible mitigation measure, the amount of required parking could be reduced, relocated or redesigned (i.e. through transportation demand management (TDM) measures or other means) so that street level, under-building parking could be setback from the exterior of the building. This would allow other more pedestrian-oriented uses, such as retail, restaurant, commercial or residential uses, and plaza areas, to occupy these locations.

<u>Policy CD-37</u> – *When appropriate, due to scale, use, or location, onsite open space and recreational facilities in developments should be required.*

<u>Policy CD-38</u> – *Developments should be designed so that public access to and use of parks, open space, or shorelines, is available where such access would not jeopardize the environmental attributes of the area.*

<u>Discussion:</u> The redevelopment alternatives would provide open space and related areas on the site, including: paved plazas, landscaped areas, unpaved trails and sidewalks. These open space areas may or may not meet the City standards, regulations and procedures for open space. Approximately 3.4 to 3.5 acres of the on-site open space and related areas would be visually and physically accessible to the general public (i.e. the natural shoreline area and the shoreline trail, respectively). Semi-private landscaped courtyards would be provided as shared open space for residents on top of the parking garages. A total of 11.7 and 11.8 acres of on-site open space and related areas would be provided under Alternatives 1 and 2, respectively (see Section 3.8, **Parks and Recreation**, for details).

<u>Policy CD-39</u> – *Ensure quality development by supporting site plans and plats that incorporate quality building, development, and landscaping standards that reflect unity of design and create a distinct sense of place.*

<u>Policy CD-44</u> – *Development should be designed (e.g. site layout, building orientation, setbacks, landscape areas and open space, parking, and outdoor activity areas) to result in high quality development as a primary goal, rather than to maximize density as a first consideration.*

<u>Discussion:</u> Redevelopment under Alternatives 1 and 2 would represent a compact, urban form, with a consistent design concept throughout the site. The proposed design of the site and buildings is intended to be coordinated through a variety of details and materials to achieve a high quality development (see **Figures 2-5** and **2-9** for Representative Buildings Elevations of Alternatives 1 and 2). New landscaping would be provided throughout the Quendall Terminals Main Property that is intended to enhance the visual appeal of the development (see **Figure 2-8** for the Preliminary Landscape Plan under Alternative 1). Proposed residential density would be less than the maximum density allowed by the Renton Municipal Code (see Section 3.5, **Land Use**, for details).

<u>Policy CD-48</u> – *Locate and design residential-commercial mixed-use development in a manner that preserves privacy and quiet for residents.*

<u>Discussion:</u> Under Alternative 1, residential units would be located in all of the buildings onsite, except buildings NE 1 and SE 3 (see **Figure 2-4**); under Alternative 2, residential uses would be located in all of the buildings onsite (see **Figure 2-9**). Residential uses onsite would be located in multi-story buildings, with design features to preserve privacy and quiet. For example, residential uses would be separated from the ground level by parking garages. Also, semi-private landscaped courtyards would be provided above the garages for the shared use of project residents.

Policy CD-54 – Development should be designed to consider potential adverse impacts on adjacent, less intensive uses, e.g. lighting, landscaping, and setbacks should all be considered during site design.

Policy CD-55 – Landscape buffers, additional setbacks, reduced height, and screening devices such as berms and fencing should be employed to reduce impacts (e.g. visual, noise, odor, lighting) on adjacent, less intensive uses.

Discussion: Proposed buildings would be setback from site boundaries (particularly to the north and south, adjacent to the Seahawks Headquarters and Training Facility and Barbee Mill residential development, respectively). Larger setbacks would be provided under Alternative 2 (see Section 3.7, **Aesthetics/Views**, for details). Proposed building heights would be less than the maximum building height allowed by the Renton Municipal Code. A landscaped edge along the north and south boundaries of the site would be included under the redevelopment alternatives to provide a buffer and partial visual screen between new development and adjacent properties (see **Figure 2-8** for the Preliminary Landscape Plan under Alternative 1). Redevelopment on the Quendall Terminals Main Property under Alternatives 1 and 2 would add a variety of new sources of light, glare and noise to the site. The lighting levels and amounts of glare and noise generated from the development would be typical of an urban environment. Exterior building lighting, parking lot lighting and pedestrian lighting could be directed downward and away from surrounding buildings and properties to minimize the impacts to adjacent uses. Reflectivity of glazing materials, as well as the use of shading devices, could be considered as part of the façade design in order to minimize the potential glare impacts to surrounding uses.

Objective CD-I – Protect and enhance public views of distinctive features from public streets and other focal points within the City and surrounding area.

Policy CD-64 – Scenic views and view corridors along roadways in the City should be identified and preserved through application of development standards.

Policy CD-65 – Access from public roadways to views of features of distinction should be enhanced through the development of public viewpoints where appropriate.

Policy CD-66 – Neighborhood identity should be established by featuring views, highlighting landmarks or creating focal points of distinction.

Policy CD-67 – Focal points should have a combination of public areas, such as parks or plazas; architectural features, such as towers, outstanding building design, transit stops, or outdoor eating areas; and landscaped areas. These features should be connected to pedestrian pathways.

Discussion: View corridors are proposed along the main east/west roadway (Street "B") and along the private driveways at the north and south ends of the site (Drives "D," "E" and "F") to provide views across the site towards Lake Washington. At this point, it is unclear how much of a view corridor would be provided along Street "B". In particular, parking located at the terminus of this street could block views. As a possible mitigation measure, this parking could be relocated onsite to enhance the view corridor. Views of the lake could be further enhanced by providing additional building modulation and building setbacks, and/or by reducing building heights, particularly along the shoreline.

Landscaping, street trees, new buildings and plaza areas would flank Street "B" on both sides to frame the proposed view corridor. Additional views towards Lake Washington would be available for building residents from landscaped courtyards located between the residential buildings on top of the parking garages. The proposed trail in the shoreline restoration area, which would include interpretive viewpoints, would also provide views of the lake for residents and employees of the proposed development, as well as the general public. Public plazas and sidewalks would be included along Street "B", and restaurant uses along this roadway could include outdoor eating areas.

<u>Objective CD-N</u> – Site plans for new development projects for all uses, including residential subdivisions, should include landscape plans.

<u>Policy CD-85</u> – Landscaping is encouraged, and may be required in parking areas to improve their appearance and to increase drainage control.

<u>Policy CD-91</u> – Landscape plans for proposed developments projects should include public entryways, street rights-of-way, stormwater detention ponds, and all common areas.

<u>Objective CD-O</u> – Promote development of attractive, walkable neighborhoods and shopping areas by ensuring that streets are safe, convenient, and pleasant for pedestrians.

<u>Policy CD-109</u> – Sidewalks or walking paths should be provided along residential streets. Sidewalk width should be ample to safely and comfortably accommodate pedestrian traffic.

<u>Policy CD-110</u> – Street trees should be used to reinforce visual corridors along major boulevards and streets.

<u>Policy CD-130</u> – Parking lots and structures should employ and maintain landscaping and other design techniques to minimize the visual impacts of these uses.

<u>Discussion:</u> A landscape plan would be implemented on the upland portion of the Main Property to enhance the visual appearance of the proposed development. Landscaping would include new trees, shrubs and groundcovers of various species and sizes. Landscaping adjacent to new buildings is intended to enhance the pedestrian environment. Courtyard areas between the residential buildings would be landscaped and would provide views of Lake Washington, passive recreation and gathering space for project residents. Parking lot landscaping would be provided in accordance with City of Renton regulations and would help encourage a pedestrian-friendly environment (see **Figure 2-8,** Preliminary Landscape Plan - Alternative 1). Street trees would be planted to enhance visual appeal and ensure safe areas for pedestrians; street trees would frame the view toward Lake Washington along Street "B" onsite. New roadways would include sidewalks to provide pedestrian access throughout the site (see **Appendix C** for proposed Road Cross-Sections). As described previously, the proposed building design, including ground floor retail and restaurant uses, as well as plaza areas, would promote a pedestrian-friendly environment, particularly along Street "B". At this point, it is unclear whether similar amenities would be provided along Street "A", Street "C" or along the lake side of the development that would enhance the visual appeal and promote a pedestrian-friendly environment. As a possible mitigation measure, retail, restaurant, commercial or residential uses and plaza areas could be provided at the ground level in these locations, instead of parking.

<u>Policy CD-134</u> – Accommodate parking within a parking structure in Commercial and Center land use designations. Where structured parking is infeasible due to site configuration, parking should be located in back or the side of the primary structure.

<u>Discussion:</u> Parking would be provided within structured parking garages for each of the new buildings onsite. Under Alternative 1, additional parking would be provided in a surface parking lot located in the northeast corner of the site (see **Figure 2-4**). Under Alternative 2, additional parking would be provided on two parking decks located in the northeast and southeast corners of the site and in two surface parking lots located in the northwest and southwest corners of the site; some additional parking would be provided along and at the terminus of Street "B" (see **Figure 2-9**). The proposed surface parking lots would include landscaping to minimize visual impacts, in accordance with City of Renton regulations. Structured parking areas would be screened from the street by retail/restaurant/office uses or through the use of architectural façade elements, trellis elements, berms and landscaping. Since specific plans are not available for these architectural elements/landscaping, it is unclear if these features would provide sufficient screening of the parking, particularly from the shoreline and the adjacent Barbee Mill development. Additional or more complete screening could be provided, as necessary.

Economic Development Element

<u>Summary:</u> The Economic Development Element encourages collaborations between the public and private sector to ensure the long-term economic health of Renton and its citizens. The policies encourage a mix of industrial, retail, service and office uses that will result in a diversified employment base and encourage the quality development necessary to sustain a high standard of living in Renton.

<u>Goal 1</u> – Create and maintain a broad and stable economic base to sustain a high quality of life for the Renton community.

<u>Objective ED-B</u> – Expand the retail and office base within the City.

<u>Policy ED-5.1</u> – Encourage economic development and job creation to increase the household income of the City's population.

<u>Policy ED-16</u> – Work with private property owners and governmental agencies to remedy contaminated sites and prepare sites for redevelopment.

<u>Discussion:</u> As described in **Chapter 2**, the Quendall Terminals site is currently planned for cleanup/remediation under the oversight of EPA, in association with its status as a Superfund site. The Quendall Terminals project is intended to create a vibrant waterfront redevelopment that would convert a "Superfund" site into a compatible mix of uses, including residential, office (under Alternative 1 only), retail and restaurant uses. These uses would expand the retail and office base in the City of Renton. The development of office, retail and restaurant uses would also provide new employment opportunities within the City. It is estimated that approximately 1,050 employees would be generated under Alternative 1 and 50 employees under Alternative 2.

Environmental Element

<u>Summary:</u> The Environmental Element is intended to help protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water. This element provides the policy background and basis for future environmental actions by the City of Renton as it attempts to balance urbanization, economic development, tree canopy cover, natural area protection, and a high quality of life for all residents. Environmental policies will be implemented through economic development decisions, natural resource management and planning, critical areas regulations and incentives for environmental protection.

<u>Goal 1</u> – Protect and enhance Renton's natural ecosystems, natural beauty, and environmental quality.

<u>Objective EN-B</u> – Preserve and protect wetlands for overall system functioning.

<u>Policy EN-5</u> – Achieve no overall net loss of the City's wetlands. In no case should development activities decrease net acreage of existing wetlands.

<u>Policy EN-6</u> – When development may impact wetlands, the following hierarchy should be followed in deciding the appropriate course of action:

1. *avoid impacts to the wetland;*
2. *minimize impacts to the wetland;*
3. *restore the wetland when impacted;*
4. *recreate the wetland at a ratio which will provide for its assured viability and success; and,*
5. *enhance the functional values of an existing degraded wetland.*

<u>Policy EN-36</u> – Where appropriate, combine environmentally sensitive areas with to provide public access and educational opportunities.

<u>Discussion:</u> Previous site investigations delineated ten wetlands on the Quendall Terminals site (Wetlands A through J), including eight wetlands on the Main Property (Wetlands A through H) and two wetlands on the Isolated Property (Wetlands I and J). Cleanup/remediation activities that will occur in conjunction with the site's Superfund status will require that all wetlands on the Quendall Terminals Main Property be filled. In association with implementation of a Shoreline Restoration Plan, three of the wetlands on the Main Property (Wetlands A, D and H) will be re-established and two of the wetlands (Wetlands A and D) will also be expanded to mitigate for the wetlands that will be filled on the remainder of the site. In addition, one wetland on the Isolated Property (Wetland J) will be expanded to mitigate impacts from remediation. Wetland/riparian buffer areas will also be revegetated and riparian habitat will be recreated/enhanced as part of remediation activities (see Section 3.2, **Critical Areas**, and **Appendix E**, for details on wetland impacts/mitigation during site remediation/clean up and **Figures 2-6** and **2-11** for the Shoreline Restoration Conceptual Design under Alternatives 1 and 2, respectively).

Subsequent to remediation activities, redevelopment under Alternative 1 and 2 would not be anticipated to result in direct impacts to on-site wetlands. A portion of the buffer for Wetland D would be reduced to 25 feet and other portions of the buffer would be expanded to provide compensatory area (see **Figure 2-7** for the Wetland D Buffer Width Averaging under Alternative

1 and 2). The area of buffer expansion would exceed the area of buffer reduction and would be consistent with City of Renton regulations that allow buffer averaging. In conjunction with new development, a total of 137,400 square feet of natural open space along the shoreline would be retained under Alternative 1 and 138,500 square feet under Alternative 2. This open space would consist of an averaged 90-foot riparian zone that includes restored/expanded wetlands, wetland buffers and recreated/enhanced riparian habitat. As described previously, a trail would be provided within the shoreline area with redevelopment, to provide new public access and viewing areas along the shoreline; interpretive wetland viewpoint areas would be included as part of the proposed trail (see Section 3.2, **Critical Areas**, and **Appendix E** for details).

Housing Element

Summary: The Housing Element is based on an assessment of the City of Renton's current demographics and existing housing stock. It considers how the City will accommodate its share of projected regional growth and how it will provide housing for all economic segments of its population, while also providing the framework for addressing the housing needs of current and future residents. In addition, it serves as a guide for protecting and enhancing the quality of life in residential and mixed-use areas.

Goal 1 – Ensure sufficient land capacity to accommodate the existing and future housing needs of the community, including Renton's share of forecasted regional growth.

Goal 2 – Ensure that housing exists for all economic segments of Renton's populations.

Objective H-A – Maintain a balance in the number of single family and multifamily housing units outside of the urban center, through adequately zoned capacity.

Policy H-2 – Ensure that sufficient multifamily capacity is provided within the city boundaries in order to accommodate housing demand, provide adequate housing options, meet urban center criteria under the Growth Management Act (GMA) and Countywide Planning Policies (CPP), and prevent unnecessary increases in housing costs.

Objective H-C – Increase housing opportunities for upper income households.

Policy H-6 – Achieve the target of 30 percent of new housing units annually through 2022 to be affordable to upper income households that earn over 120 percent of county median income, as established by the City in response to the CPP.

Policy H-11 – Encourage the construction of luxury condominium developments in mixed-use areas.

Policy H-12 – Support site plans and subdivisions incorporating amenity features such as private recreation facilities, e.g. pools, tennis courts, and private parks to serve luxury developments.

Discussion: Development under Alternatives 1 and 2 would provide new opportunities for housing in the City of Renton and ensure that sufficient multifamily capacity is provided within the City. A total of 800 residential units are proposed under Alternative 1 and 708 residential units under Alternative 2. Both apartment and condominium units would likely be provided. Due to the site's waterfront location, it is anticipated that the proposed residential units would be targeted towards middle and upper income households; the upper income units would assist the City in reaching its goal of providing 30 percent of housing that would be affordable to upper income households. The proposed residences would be constructed as part of a mixed-use development that would include office (in the case of Alternative 1 only), retail and restaurant uses. Landscaped courtyard area would be provided between the residential buildings to allow for views of Lake Washington and passive recreation opportunities for building residents; additional recreation areas and entertainment space could be provided within the buildings as well (see Section 3.8, **Parks and Recreation**, for details).

Land Use Element

Summary: The Land Use Element provides the framework for future growth of the City of Renton based on regionally developed growth forecasts, adopted growth targets and land capacity as determined through implementation of GMA. This element promotes new development and neighborhoods in the City that contribute to a strong sense of community and neighborhood identity, offer a variety of housing types, are varied and unique in character, and are visually attractive, safe, and healthy environments in which to live. It also provides guidance for the implementation of land use regulations contained in the City of Renton Municipal Code. The City of Renton Comprehensive Plan designates the Quendall Terminal site as Commercial/Office/Residential (COR). The following goals and policies are most relevant to the proposed development and the site's COR designation.

Goal 7 – Promote new development and neighborhoods in the City that:

1. *Contribute to a strong sense of community and neighborhood identity;*
2. *Are walkable places where people can live, shop, play and get to work without always having to drive;*
3. *Are developed at densities sufficient to support public transportation and make efficient use of urban services and infrastructure;*
4. *Offer a variety of housing types for a population diverse in age, income, and lifestyle;*
5. *Are varied and unique in character;*
6. *Support "grid" and "flexible grid" street and pathway patterns where appropriate;*
7. *Are visually attractive, safe, and healthy environments in which to live;*
8. *Offer connection to the community instead of isolation; and,*
9. *Provide a sense of home.*

Discussion: The Quendall Terminals project is intended to create a vibrant waterfront redevelopment that would convert a "Superfund" site into a compatible mix of uses, including residential, office (under Alternative 1 only), retail and restaurant uses. Redevelopment would represent a compact, urban form, with a consistent design concept throughout the site. The proposed design of the buildings is intended to be coordinated through a variety of details and materials, and provide a human scale with visually interesting streetscapes and facades, particularly along Street "B". At this point, it is unclear whether amenities would be provided along Street "A", Street "C" or along the lake side of the development that would enhance the visual appeal and promote a pedestrian-friendly environment. As a possible mitigation measure, retail, restaurant, commercial or residential uses and plaza areas could be provided at the ground level in these locations, instead of parking.

Opportunities would be provided for visitors and residents to visually or physically access the site and shoreline of Lake Washington via public walkways and plazas, as well as through proposed view corridors created by on-site roadways, surface parking areas and open space.

The project would be required to be consistent with the final cleanup/remediation plan for the site approved by the EPA, including protocols and institutional controls for construction and long-term redevelopment (see **Figures 2-4** and **2-9** for the proposed Site Plans under Alternatives 1 and 2, respectively).

Residential density under Alternative 1 would be 46 dwelling units per acre, and under Alternative 2 would be 40 dwelling units per acre; these densities would be within the range allowed by the COR zoning classification in the Renton Municipal Code. Due to the site's waterfront location, it is anticipated that the proposed residential units would be targeted towards middle and upper income households.

The on-sites street system is proposed as a "grid" pattern, and would connect to the area street system at two points. The shoreline trail and sidewalk system onsite would link to Lake Washington Boulevard, where existing pedestrian and bike facilities are present. In order to further promote a multimodal transportation network, the applicant could work with King County Metro Transit and Sound Transit to provide for site amenities and transit zones to encourage and accommodate public transportation access in the future.

<u>Goal 9</u> – Support existing businesses and provide an energetic business environment for new commercial activity providing a range of service, office, commercial, and mixed-use residential uses that enhance the City's employment and tax base along arterial boulevards and in designated development areas.

<u>Goal 10</u> – Achieve a mix of land uses including industrial, high technology, office, and commercial activities in Employment Areas that lead to economic growth and a strengthening of Renton's employment base.

<u>Policy LU-4</u> – Adopt the following growth targets for the period from 2001 to 2022, consistent with the targets adopted for the region by the Growth Management Planning Council for the 2002 Renton City limits and Potential Annexation Areas:

1. *City of Renton Housing: 6,198 units*
2. *City of Renton Jobs: 27,597 jobs*
3. *Potential Annexation Area Housing: 1,976 units*
4. *Potential Annexation Area Jobs: 458 jobs*

<u>COR Purpose Statement</u> – The COR designation provides opportunities for large-scale office, commercial, retail, and multifamily projects developed through a master plan and site plan process incorporating significant site amenities and/or gateway features. COR sites are typically transitions from an industrial use to a more intensive land use. The sites offer redevelopment opportunities on Lake Washington and/or the Cedar River. Commercial/Office/Residential zoning implements the COR land use designation.

<u>Objective LU-CCC</u> – Development at the Commercial/Office/Residential designations should be cohesive, high quality, landmark developments that are integrated with natural amenities. The intention is to create a compact, urban development with high amenity values that creates a prominent identity.

<u>Policy LU-272</u> – Uses in COR designations should include mixed-use complexes consisting of office, and/or residential uses, recreational and cultural facilities, hotel and convention center type development, technology research and development facilities, and corporate headquarters.

<u>Policy LU-273</u> – Commercial uses such as retail services should support the primary uses of the site and be architecturally and functionally integrated into the development.

<u>Policy LU-276</u> – Sites that have significant limitations on redevelopment due to environmental, access, and/or land assembly constraints should be granted flexibility of use combinations and development standards through the master plan process.

<u>Policy LU-278</u> – Master plans should coordinate the mix and compatibility of uses, residential density, conceptual building, site and landscaping design, identification of gateway features, signs, circulation, transit opportunities, and phasing regardless of ownership of individual parcels.

<u>Policy LU-279</u> – Residential densities at COR designated sites should provide the flexibility to allow for high density residential development, that could support the potential onsite commercial uses and, at the same time, provide for the opportunity for mixed-use developments that can support the City's employment goals. The same area used for commercial and office development may also be used to calculate residential density.

<u>Policy LU-280</u> – COR master plans should be guided by design criteria specific to the location, context, and scale of the designated COR. COR Design Guidelines should fully integrate signage, building height, bulk, setbacks, landscaping, and parking considerations for the various components of each proposed project within the COR development.

<u>Discussion:</u> Redevelopment under Alternatives 1 and 2 would be generally consistent with the purpose of the COR designation. The site is located on a "Superfund" site on the shores of Lake Washington. The proposed redevelopment would represent a transition from a site previously in industrial uses to more intensive land uses. Under Alternative 1, mixed-use development on the Quendall Terminals site would include 800 residential units, 245,000 square feet of office space, 21,600 square feet of retail space, and 9,000 square feet of restaurant space. Under Alternative 2, mixed-used development would include 708 residential units, 21,600 square feet of retail space and 9,000 square feet of restaurant space. These uses would enhance the City's employment and tax base along arterial boulevards (in this case Lake Washington Boulevard) and in designated development areas (the site is designated COR in the Comprehensive Plan and zoned COR in the Municipal Code, which promotes this type of development). It is estimated that Alternative 1 would generate 1,050 jobs, and Alternative 2 would generate 50 jobs. Both alternatives would help the City achieve its targets for housing/jobs; however Alternative 1 would help the City reach its targets faster due to the provision of more housing and employment uses. The proposed mixed-use project would be developed through a master plan and binding site plan process.

Proposed redevelopment would represent a compact urban form with features intended to create a high quality development. Office (under Alternative 1 only) and retail buildings would be oriented toward the proposed roadway system with the main east/west roadway (Street "B") also proposed as a visual corridor to Lake Washington that would serve as a gateway to the site. The gateway would be reinforced with landscaping and public plazas. At this point, it is unclear whether sufficient gateway/landmark features would be included in the proposed redevelopment to address these policies. Possible mitigation measures to enhance the gateway/landmark qualities of the development could include the provision of: public art, special landscape treatment, additional open space/plazas, landmark building form, special paving/pedestrian scale lighting and/or prominent architectural features.

Parks, Recreation, Open Space, and Trails Element

Summary: The Parks, Recreation, Open Space, and Trails Element encourages the creation of a park system with a variety of parks types and recreational facilities throughout the City.

Goal 1 – Provide a high quality comprehensive park, recreation, open space, and trails system to meet the short- and long-term needs of current and future Renton residents.

Objective P-A - Provide park and recreational facilities throughout the City, maximizing public access to and involvement in a variety of leisure and cultural activities.

Policy P-48 - Impact mitigation shall be collected to help offset cost of acquisition, improvement, and development of the City's park system.

Policy P-49 - Impact mitigation may occur using fees, land dedication, or facilities based on the following criteria:

a. Developer-constructed public trails, public on-site park and recreational facilities, and/or developer-constructed public off-site facilities (in a nearby park) may be considered for mitigation if the facility is built to City parks construction and maintenance standards.

Policy P-50 – Levels of Service standards, as identified in the adopted Long Range Comprehensive Park, Recreation, Open Space, and Trails Plan, will be used to determine proportional costs of park system mitigation for new development.

Objective P-E - Conserve, enhance, and create a variety of open space, wildlife, and natural resource areas.

Policy P-51 – Expand the open space network as population and employment densities increase.

Policy P-52 – Multiple uses of public open space should be provided. Interconnect the open space network. Include lands such as active and passive parks, schools, public open space, trails, private open spaces and native vegetation easements with public access easements, utility rights-of-way, waterways, and unusual open spaces (areas of protected habitat).

Policy P-55 – Where feasible, encourage educational opportunities in public open space areas.

Policy P-60 – Increase public awareness of, and appreciation for, specific natural features through education and interpretive programs.

Policy P-66 – Informal or private pathways should form a secondary system with linkages to the public system. These trails should be developed and maintained under joint public/private partnership.

Policy P-68 – Within the City, linkages should be provided among residential areas, employment areas, centers, and recreational areas.

Policy P-72 – Provide adequate separation between non-motorized and motorized traffic to ensure safety.

Discussion: Public access along the shoreline would be provided onsite as part of the redevelopment concept under Alternatives 1 and 2. A proposed pedestrian corridor/trail along the water's edge would provide a range of pedestrian amenities and passive recreation opportunities that would be available to the general public during reasonable hours, anticipated to be from 10 AM to dusk. Two interpretive wetland viewpoints would be incorporated into the design of the trail. The trail would link to the site's upland internal pedestrian circulation system (sidewalks), which connects to Lake Washington Boulevard, where existing pedestrian and bicycle facilities are present. The trail would be privately owned and maintained.

According to the City's LOS standards, additional park and recreational facilities could be needed in the City based on the increased on-site residential population under Alternative 1 and Alternative 2. The payment of mitigation/impact fees and the provision of the publically accessible open space and shoreline trail would help to offset these needs.

Alternatives 1 and 2 would provide open space and related areas onsite in the form of natural and landscaped open space areas at the street-level (including plazas and walkways). Semi-private landscaped courtyards would be provided as shared open space for residents on top of the parking garages. A total of 11.7 acres of on-site open space would be provided under Alternative 1 and 11.8 acres under Alternative 2. These areas may or may not meet the City's standards, regulations and procedures for open space. Additional recreational facilities could be provided within the residential buildings, and additional open space could be provided onsite for active recreation (see Section 3.8, **Parks and Recreation**, for additional information).

Shoreline Master Program (City of Renton Municipal Code)

Summary: The Shoreline Management Act (SMA) of 1971 (RCW 90.58) is intended to protect the public interest associated with shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. The primary implementing tool of the SMA is the adoption by local jurisdictions of Shoreline Master Programs, which must also be approved by the Department of Ecology (Ecology). The SMA establishes two basic categories of shoreline: "Shoreline of State-wide Significance," which are identified in the SMA; and "shorelines," which includes all of the water areas of the state and their associated wetlands, together with the lands underlying them. The Lake Washington shoreline area located on the Quendall Terminals site is considered a "Shoreline of State-wide Significance."

The *City of Renton Shoreline Master Program* (SMP), adopted in 1983 (and subsequently amended), was developed in accordance with the SMA of 1971, with approval by Ecology. The regulatory provisions of the City's currently adopted SMP are contained within the Renton Municipal Code (4-3-090).

The City of Renton is currently in the process of updating its SMP. The updated SMP was reviewed and accepted by the City Council on September 27, 2010, and will be sent to Ecology for further review. The updated SMP will include a new inventory and characterization of shorelines in the City, a public visioning process, new policy language, new regulations, a cumulative impact analysis and a restoration plan.[1] Since the updated SMP is not complete, the Quendall Terminals proposal is subject to the provisions of the existing SMP contained in the City's Municipal Code, as described below.

[1] City of Renton. Shoreline Master Program Update. http://rentonwa.gov/business/default.aspx?id=15508.

The currently adopted SMP for the City of Renton establishes goals and guidelines for uses within 200 feet of the Ordinary High Water Mark (OHWM). In order to provide a uniform basis for applying policies and use regulations, the SMP designates three types of shoreline environment areas: Natural, Conservancy and Urban. The Lake Washington shoreline area along the Quendall Terminals site is classified as an Urban environment. Per RMC 4-3-090(J), the objective of the Urban environment is to ensure optimum utilization of the shoreline by providing for public use and access, and by managing development to enhance and maintain the shoreline for viable and necessary urban uses.

With respect to public access, regulations for Urban environments state that:

> b. priority is also given to planning for public visual and physical access to water in the Urban environment…To enhance waterfront and ensure maximum public use, industrial and commercial facilities shall be designed to permit pedestrian waterfront activities where practicable, and the various access points ought to be linked to non-motorized transportation routes such as bicycle and hiking paths.

The following SMP regulations are most applicable to the proposed Quendall Terminals redevelopment.

K. General Use Regulations for All Shoreline Uses:

2. Environmental Effects:

a. Pollution and Ecological Disruption: The potential effects on water quality, water and land vegetation, water life and other wildlife (including, for example, spawning areas, migration and circulation habits, natural habitats, and feeding), soil quality and all other environmental aspects must be considered in the design plans for any activity or facility which may have detrimental effects on the environment.

b. Burden on Applicant: Applicants for permits must explain the methods that will be used to abate, avoid, or otherwise control the harmful effects.

c. Erosion: Erosion is to be controlled through the use of vegetation rather than structural means where feasible.

d. Important geological factors – such as possible slide areas – on a site must be considered. Whatever activity is planned under the application for the development permit must be safe and appropriate in view of the geological factors prevailing.

Discussion: Subsequent to remediation activities conducted under the oversight of the EPA, redevelopment under Alternatives 1 and 2 is not anticipated to result in impacts to onsite wetlands or wetland buffers (buffering averaging would be employed to achieve adequate buffers in the case of one wetland, Wetland D), riparian habitat or habitat in Lake Washington (i.e. for salmonid fish species). During construction, a temporary erosion and sedimentation control plan (TESCP), including Best Management Practices (BMPs) for erosion and sedimentation control, would be implemented, per the 2009 King County Surface Water Design Manual (KCSWDM) adopted by the City of Renton. Following construction, a permanent stormwater control system would be installed in accordance with the 2009 KCSWDM adopted by the City of Renton. Stormwater runoff would be collected and conveyed via a piped stormwater system to new outfalls at Lake Washington. Runoff from pollution-generating surfaces would be treated prior to discharge to the lake. The stormwater outfall pipes would be situated to avoid crossing the restored/created wetland areas. These outfalls could be constructed during site remediation to reduce impacts to shoreline vegetation (see Section 3.2, **Critical Areas**, and **Appendix E** for details). No evidence of landslide activity has been documented in the site area. Overall no significant impacts to critical areas located in the shoreline would be anticipated with construction and operation of the project.

4. Public Access:

> *a. Where possible, space and right-of-way shall be left available on the immediate shoreline so that trails, nonmotorized bike paths, and/or other means of public use may be developed providing greater shoreline utilization.*
> *b. Any trail system shall be designed to avoid conflict with private residential property rights.*
> *c. No property shall be acquired for public use without just compensation to the owner.*

<u>Discussion:</u> Redevelopment under Alternatives 1 and 2 would occur on private property; however, public access to the shoreline would be provided. As part of redevelopment, a pedestrian trail would be constructed along the shoreline during site remediation, providing a range of pedestrian amenities and passive recreation opportunities that will be available to the general public during reasonable hours, anticipated to be from 10 AM to dusk. Public access would be restricted to this time period in order to avoid conflict with private property rights. The trail would provide visual and physical access to the shoreline, consistent with SMP policies that call for public shoreline access. Two interpretive wetland viewpoints would be incorporated into the design of the trail. The trail would likely be 10 feet wide and would be built with a surface that would support a maintenance pickup truck and ambulance, and would also meet ADA guidelines. It is assumed that the shoreline trail would only be located in the proposed wetland buffer areas, and would not cross wetlands. The trail would link to the site's upland internal pedestrian circulation system (sidewalks), which connects to Lake Washington Boulevard, where existing pedestrian and bicycle facilities are present.

5. Use Compatibility and Aesthetic Effects:

> *a. The potential impact of any of the following on adjacent, nearby, and possibly distant land and shoreline users shall be considered in the design plans and efforts made to avoid or minimize detrimental aspects:*
>
> > *i. View Obstruction: Buildings, smokestacks, machinery, fences, piers, poles, wires, signs, lights, and other structures.*
> > *ii. Community Disturbances: Noise, odors, night lighting, water and land traffic, and other structures and activities.*
> > *iii. Design Theme: Architectural styles, exterior designs, water and land traffic, and other structures and activities.*

<u>Discussion:</u> Under Alternatives 1 and 2, proposed buildings on site would block or partially block views of Lake Washington and beyond from certain public viewpoints. There would be somewhat less view blockage under Alternative 2. View corridors are proposed onsite under both redevelopment alternatives by east/west roadways, surface parking areas and open space. View corridors along the north and south property lines would be larger under Alternative 2 than under Alternative 1 (see Section 3.7, **Aesthetics/Views** for details).

Redevelopment on the Quendall Terminals Main Property under Alternatives 1 and 2 would add a variety of new sources of light and glare to the site. The lighting levels and amount of glare generated from the development would be typical of an urban environment. Exterior building lighting, parking lot lighting and pedestrian lighting could be directed downward and away from surrounding buildings and properties to minimize the impacts to adjacent uses. Reflectivity of glazing materials, as well as the use of shading devices, could be considered as part of the façade design in order to minimize the potential glare impacts to surrounding uses.

Traffic and other activity would be generated by the proposed development, as is typical of urban development. With implementation of the required/proposed mitigation measures, no significant transportation-related impacts would be anticipated (see Section 3.9, **Transportation,** for details).

Proposed redevelopment would represent a compact, urban form, with a consistent design concept throughout the site. The proposed design of the buildings is intended to be coordinated through a variety of details and materials, and provide a human scale with visually interesting streetscapes and facades (see **Figures 2-5** and **2-10** for Representative Building Elevations under Alternatives 1 and 2, respectively). At this point, it is unclear if the proposed ground floor uses in the buildings facing the lake (under-building parking) would be aesthetically-pleasing from the shore (i.e. from the shoreline trail) and lake. As a possible mitigation measure, retail, restaurant, commercial or residential uses and plaza areas could be provided at the ground level, instead of parking.

6. Landscaping: The natural and proposed landscaping should be representative of the indigenous character of the specific types of waterway (stream, lake edge, marshland) and shall be compatible with the Northwest image. The scenic, aesthetic, and ecological qualities of natural and developed shorelines should be recognized and preserved as valuable resources.

7. Unique and Fragile Areas: Unique features and wildlife habitats should be preserved and incorporated into the site. Fragile areas shall be protected from development and encroachment.

Discussion: Native vegetation appropriate for the lake edge and compatible with the Northwest image will be installed during site remediation in the shoreline restoration area. The shoreline restoration areas would be preserved with the proposed redevelopment. Native vegetation would be incorporated into the proposed landscaping of the upland portion of the Main Property, as possible (see **Figure 2-8** for the Preliminary Landscape Plan). Unique and fragile areas on and adjacent to the site, including wetlands and their buffers, and riparian habitat would be protected with the proposed development (see Section 3.2, **Critical Areas**, and **Appendix E** for details).

L. Specific Use Regulations:

5. Commercial Developments:

a. Location of Developments:

i. New commercial developments are to be encouraged to locate in those areas where current commercial uses exist.

ii. New commercial developments on Lake Washington which are neither water-dependent, nor water-related, nor water-enjoyment, nor which do not provide significant public access to and along the water's edge will not be permitted upon the shoreline.

b. Incorporation of Public Recreation Opportunities: Commercial developments should incorporate recreational opportunities along the shoreline for the general public.

c. View Impacts: the applicant must state in his permit what steps have been taken in the design of the proposed commercial development to reduce to a minimum interference with the scenic view enjoyed by any significant number of people in the area.

d. Setback: A commercial building should be located no closer than fifty feet (50') to the ordinary high water mark.

Discussion: New commercial development is proposed under Alternatives 1 and 2. This development would occur in an area where existing commercial uses are present (i.e. the Seahawks Headquarters and Training Facility to the north of the site) and planned (the Hawk's Landing hotel to the southeast of the site). As part of redevelopment, a pedestrian trail would be constructed along the water's edge during site remediation that would provide a range of pedestrian amenities and passive recreation opportunities that would be available to the general public during reasonable hours. View corridors are proposed onsite by east/west roadways, surface parking areas and open space. All commercial buildings would be a minimum of 50 feet from the OHWM.

11. Parking:

a. Public Parking: In order to encourage public use of the shoreline, public parking is to be provided at frequent locations. Public parking facilities should be discouraged along the water's edge. Public parking facilities are to be designed and landscaped to minimize adverse impact upon the shoreline and adjacent lands and upon the water view.

b. Private Parking: Private parking facilities are to be located away from the water's edge where possible.

Discussion: Parking on the site under the redevelopment alternatives would be provided within structured parking garages beneath the new buildings, in surface parking lots, in deck parking areas (under Alternative 2 only) and along and at the western terminus of Street "B". Public parking would be available in the surfaces parking lots and on Street "B". Parking that is proposed at the terminus of Street "B" and in the surface lot in the northwest corner of the site (under Alternative 2 only) could be considered to be located along the water's edge. As a possible mitigating measure, parking in these areas could be relocated elsewhere on the site, if necessary. Landscaping would be provided within the surface parking areas in accordance with City of Renton regulations and could minimize adverse impacts upon the shoreline and adjacent properties and the upon the water view.

13. Recreation:

b. Public recreation: Public recreational uses shall be permitted within the shoreline only when the following criteria are considered:

i. Accessibility to the water's edge is provided consistent with public safety needs and in consideration of natural features.

ii. Recreational development shall be of such variety as to satisfy the diversity of demands of the local community; and
iii. Just compensation is provided to the owner for property acquired for the public use; and,
iv. It is designed to avoid conflicts with owner's legal property rights and create minimum detrimental impact on the adjoining property; and
v. It provides parking spaces to handle the designed public use, and it will be designed to have a minimum impact on the environment.

c. Private recreation: Private recreation uses open to the public shall be permitted only when the following standards are met:
i. There is reasonable public access to the recreational uses, including access along the water's edge where appropriate. In the case of Lake Washington, significant public access shall be provided.
ii. The proposed facility will have no significant detrimental effects on adjacent parcels; and
iii. Adequate, screened, and landscape parking facilities that are separated from pedestrian paths are provided.

Discussion: As part of redevelopment, a pedestrian trail will be constructed along the water's edge during site remediation, providing a range of pedestrian amenities and passive recreation opportunities that would be available to the general public. This trail would be privately owned and maintained. The trail would not connect to the properties to the north and south. It is unclear if the parking at the terminus of Street "B" and the parking lot in the northwest corner of the site (under Alternative 2 only) would be adequately screened and separated from the trail. As a possible mitigation measure, additional screening of this parking could be provided or the parking could be relocated elsewhere onsite.

14. Residential Development: Residential developments shall be allowed only when:
a. Adequate public utilities are available; and
b. Residential structures are set back inland from the ordinary high water mark a minimum of twenty five feet (25') or consistent with setback provisions of the Renton Municipal Code, whichever provides the greater setback; and
c. Density shall not increase beyond the zoning density outlined in the Renton Comprehensive Plan and Zoning Code.
d. New residential development shall be encouraged to provide public access. Unless deemed inappropriate due to health, safety or environmental concerns, new multi-family, condominium, planned unit developments, and subdivisions except short plats, shall provide public access along the water's edge; in the case of Lake Washington, significant public access shall be provided.

Discussion: Adequate public utilities are available to residential and other uses proposed at the site under Alternatives 1 and 2. Proposed residential buildings would be seback a minimum of 25 feet from the OHWM. Residential density under the redevelopment alternatives would not exceed the maximum density allowed by the Renton Municipal Code. A publically accessible trail would be provided along the Lake Washington shoreline with redevelopment.

15. Roads and Railroads:

a. Scenic Boulevard: Shoreline roadways should be scenic boulevards where possible.

b. Sensitive Design: Roadways located in shoreland areas should be limited and designed and maintained to prevent soil erosion and to permit natural movement of groundwater.

c. Debris Disposal: All debris and other waste materials from construction are to be disposed of in such a way as to prevent their entry by erosion into any water body.

d. Road Locations: Road locations are to be planned to fit the topography, where possible, in order that minimum alteration of existing natural conditions will be necessary.

Discussion: All proposed roadways would be located in the upland areas of the Main Property. This area is relatively flat and proposed roadways would require minimal grading. Roadway construction would not restrict the natural movement of groundwater. During construction, a TESCP, including BMPs for erosion and sedimentation control, would be implemented, per the 2009 KCSWDM adopted by the City of Renton to prevent impacts to water resources (i.e. on-site wetlands and the lake; see Section 3.1, **Earth**, and **Appendix D** for details).

17. Trails:

b. Permitted Uses: Trail uses shall be permitted within the shoreline, when the following standards are met:

i. Provisions for maintenance operation and emergency access have been provided.

ii. They link water access points along the shoreline, or they link water access points along the shoreline with upland community facilities.

iii. They are designed to avoid conflict with private property rights and to create the minimum objectionable impact on adjacent property owners.

v. They ensure the rights and privacy of the adjoining property owners.

vi. Over-water structures required by the trails are determined to be in the public interest.

vii. They are designed with a surface material which will carry the actual user loads and will have a minimum impact on the environment.

Discussion: See the previous discussion under Public Access.

18. Utilities:

a. Native Vegetation: The native vegetation shall be maintained whenever possible. When utility projects are completed in the water or shoreland, the disturbed area shall be restored and landscaped as nearly as possible to the original condition, unless new landscaping is determined to be more desirable.

b. Landscaping: All vegetation and screening shall be hardy enough to withstand the travel of service trucks and similar traffic in areas where such activity occurs.

Discussion: Piped conveyances to three stormwater outfalls that would be part of the permanent stormwater control system under Alternatives 1 and 2 would pass through the shoreline restoration area. Some disturbance of vegetation would occur to construct theses outfalls and re-vegetation would be provided. Alternatively, construction of the outfalls could occur during site remediation to eliminate disturbance of vegetation (see Section 3.2, **Critical Areas**, and **Appendix E** for details).

City of Renton Municipal Code Development Regulations

Summary: The City of Renton Department of Community and Economic Development administers the development regulations in the *City of Renton Municipal Code* (RMC). These regulations control the type and scale of development within the City. The development regulations are contained in Title 4 of the Code and are updated on an annual basis.

The Quendall Terminals site is designated as Commercial/Office/Residential (COR) per the City of Renton. The purpose of the COR Zone is to provide for a mix of intensive office, hotel, convention center, and residential activity in a high-quality, master-planned development that is integrated with the natural environment. Commercial retail and service uses that are architecturally and functionally integrated are also permitted. Also, commercial uses that provide high economic value may be allowed if designed with the scale and intensity envisioned for the COR Zone. The scale and location of these sites will typically denote a gateway into the City and should be designed accordingly.

Renton Municipal Code (RMC) Section 4-2-060 summarizes the uses allowed within each of the City's zoning designations. Permitted uses in the COR Zone include: attached residential dwellings; assisted living facilities; offices; conference centers[2]; eating and drinking establishments[3]; retail sales[1]; taverns[1]; hotels, and, parking garages.

Discussion: Proposed uses under Alternatives 1 and 2 would include multifamily residential, office (under Alternative 1 only), retail and restaurant uses. These are all permitted uses in the COR Zone. Certain gateway features are included in the proposed redevelopment (i.e. the proposed view corridor along Street "B" and associated amenities, such as landscaping and plaza areas). It is unclear if these gateway/landmark features would be sufficient to address the code requirements. Possible additional mitigation measures to enhance the gateway/landmark qualities of the development could include the provision of: public art, special landscape treatment, additional open space/plazas, landmark building form, special paving/pedestrian scale lighting and/or prominent architectural features.

The proposed development is situated adjacent to Lake Washington. Approximately 3.2 acres of natural area restored during site cleanup/remediation would be retained adjacent to the lake with redevelopment. This area would be accessible to the public via a shoreline trail. Views toward the lake and shoreline would be available from the trail, proposed buildings and proposed view corridors onsite. The project may not be fully "integrated with the natural environment." In particular, parking would be provided along the shoreline and a pedestrian presence may be lacking at the interface between the lake and development. As possible mitigation measures, the parking could be relocated onsite, redesigned or reduced (i.e. with implementation of TDM measures). Other more pedestrian-friendly uses, such as retail, restaurant, commercial or residential uses, could occupy this interface area.

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[2] Per RMC 4-2-080(21), these uses are permitted in conjunction with offices, hotels, residences, convention centers or research and development facilities. Uses shall be architecturally and functionally integrated into the development.

[3] Per RMC 4-2-080(27), this use shall be architecturally and functionally integrated into the overall development. Freestanding establishments may be permitted only if they are 5,000 square feet or larger per establishment. These requirements may be adjusted through the Master Plan review process.

RMC Section 4-2-120B outlines the development standards for commercial zoning designations in the City of Renton, including the COR Zone. Specific development standards for the COR Zone include the following:

- *<u>Maximum Lot Coverage for Buildings</u> – 65 percent of total lot area or 75 percent if parking is provided within the building or within parking garage.*

<u>Discussion:</u> New building development under Alternative 1 would cover approximately 24 percent of the total site area and under Alternative 2 would cover approximately 19 percent of the total site area. The majority of the parking would be provided under the proposed buildings. Proposed building coverage would be considerably less than the 65 percent total site area coverage allowed.

- *<u>Minimum Net Residential Density</u> – Where a development involves residential uses, the minimum density shall be 30 dwelling units per net acre. The same area used for commercial and office development can also be used to calculate residential density.*
- *<u>Maximum Net Residential Density</u> – Maximum net residential density shall be 50 dwelling units per net acre, except that a density of up to 75 dwelling units per net acre may be permitted subject to the conditions in RMC 4-9-065, Density Bonus Review.*

<u>Discussion:</u> Proposed residential density would be approximately 46 dwelling units per net acre under Alternative 1 and 40 dwelling units per net acre under Alternative 2, both within the allowed minimum and maximum density.

- *<u>Setbacks</u> – Minimum and maximum front, rear and side setbacks are determined through the site development plan review process, with the exception of the minimum freeway frontage setback which requires a 10-foot landscaped setback from the property line.*
- *<u>Upper Story Setbacks</u> – Buildings or portions of buildings which exceed 50 feet in height shall include upper story setbacks as follows: the minimum setback for a fifth story and succeeding stories shall be 10 feet minimum from the preceding story, applicable to each story.*

<u>Discussion:</u> Under Alternative 1, the proposed buildings setbacks on the north, east and south sides of the site would be a minimum of approximately 35 feet from the property lines and would include landscaping, roadways, sidewalks and a surface parking area; buildings along the west side of the site would be setback a minimum of 50 feet from the OHWM. Under Alternative 2, the proposed building setbacks on the north, east and south sides of the site would be a minimum of approximately 75 feet from the property lines and include landscaping, roadways, sidewalks and surfaces parking areas; buildings along the west side of the site would be setback a minimum of 50 feet from the OHWM. Residential uses above the ground level would be setback from the base façade to provide modulation and visual interest.

- *<u>Maximum Building Height</u> – Maximum building height is 10 stories or 125 feet. However, the maximum building height when a building is abutting a residential zoned lot would be determined through the site development plan review process.*

Discussion: Building heights would range from 75 to 80 feet under Alternative 1 and from 65 to 67 feet under Alternative 2. These heights would be well under the maximum allowed building height.

- *<u>Roofline and Façade Modulation</u> – Buildings shall provide vertical and horizontal modulation of the rooflines and facades of a minimum of two feet at an interval of a minimum of 40 feet on a building face or an equivalent standard which adds interest and quality to the project.*

Discussion: Vertical and horizontal modulation of rooflines and facades would be provided in accordance with this regulation.

- *<u>Parking and Loading</u> – Parking and loading standards, including parking requirements, stall size requirements, parking lot design standards, driveway requirements and design standards, and loading space standards are located in RMC 4-4-080. A total of 2,153 parking spaces and 1,362 parking spaces, respectively, would be required under Alternatives 1 and 2.*

Discussion: Parking would be provided within structured parking garages beneath the new buildings, in surface lots, deck parking lots (under Alternative 2 only) and parking along and at the terminus of Street "B". A total of 2,171 spaces would be provided under Alternative 1 and a total of 1,364 spaces would be provided under Alternative 2. Required parking could be reduced with implementation of transportation demand management (TDM) measures.

- *<u>Pedestrian Access</u> – Pedestrian access standards are determined through the site development plan review process.*

Discussion: Development on the Quendall Terminals site is intended to provide pedestrian access opportunities and encourage a pedestrian-friendly environment. Sidewalks would be included as part of the proposed roadway system on the Main Property and street trees and landscaping would enhance pedestrian safety and visual appeal. A new trail would also be provided along the west side of the site and would afford public access to the shoreline area of Lake Washington. The proposed trail would connect with the new roadway system to allow convenient pedestrian access.

- *<u>Landscaping</u> – Development standards for landscaping are outlined in RMC 4-4-070, including landscaping abutting street frontage, street trees, and parking lot landscaping.*

Discussion: Landscaping would be provided throughout the site in accordance with City of Renton regulations (RMC 4-4-070) and would be intended to enhance the visual appeal of the development and provide required screening. Proposed landscaping would include new trees, shrubs and groundcovers of various species and sizes. Landscaping would be provided adjacent to proposed buildings to enhance the pedestrian environment, including landscaped courtyard areas above the parking garages for passive recreation and gathering by project residents. Street trees and parking lot landscaping would be provided and would also encourage a pedestrian-friendly environment. A landscaped edge along the north and south boundaries of the site would provide a buffer and partial visual screen between new development and adjacent properties (i.e. Barbee Mill to the south and Seahawks Headquarters and Training Facility to the north). The shoreline area along the west boundary of the site would be retained in natural landscaping.

City of Renton Municipal Code Critical Areas Regulations

The City of Renton has adopted codes (RMC 4-3-050) to define and regulate critical areas in order to: manage development activities to protect environmental quality; provide City officials with information to evaluate, approve, condition or deny public or private development proposals with regard to critical area impacts; and, minimize and manage the adverse environmental impacts of development within and abutting critical areas. RMC 4-3-050 defines six types of environmentally critical areas including: aquifer protection, flood hazards, geologic hazards, habitat conservation, streams and lakes, and wetlands. The following is an overview of key critical areas regulation related to the Quendall Terminals site: geologic hazards and wetlands.[4]

Geologic Hazards

Summary: Geologic hazard regulations apply to activities on sites with steep slopes, landslide hazards, erosion hazards, seismic hazards, and/or coal mine hazards. The Quendall Terminals site does not meet the criteria for and is not located in mapped landslide, erosion hazard, coal mining hazard, or steep slope areas, and no evidence of landslide activity or erosion issues have been documented in the site area in previous studies or site investigations. Based on the site soils and groundwater characteristics, the entire site has been mapped in an area of high seismic hazard and moderate to high liquefaction hazard.

The code states that:

> *a. Whenever a proposed development requires a development permit and a geologic hazard is present on the site of the proposed development or on abutting or adjacent sites within fifty feet (50') of the subject site, geotechnical studies by qualified professionals shall be required.*
>
> *b. The required studies shall demonstrate the following review criteria can be met:*
>
> > *i. The proposal will not increase the threat of the geological hazard to adjacent properties beyond pre-development conditions; and*
> >
> > *ii. The proposal will not adversely impact other critical areas; and*
> >
> > *iii. The development can be safely accommodated on the site.*
>
> *c. A mitigation plan may be required by the Responsible Official, consistent with subsection F8 of this Section.*

Discussion: A geotechnical study by a qualified professional was completed for the proposed development. All structures on the site that are proposed under Alternatives 1 and 2 would be designed in accordance with the 2009 IBC, or the most current code, to address the potential effects of seismic events, including the potential for impacts to structures from ground motion. The existing deltaic deposits and fill soils beneath the Quendall Terminals site area are considered to be highly susceptible to liquefaction and could cause potential impacts to development on the site under Alternatives 1 and 2. Mitigation measures, such as the use of deep foundations (piles or aggregate piers), would be implemented to reduce the risk of settlement or deformation of structures and lateral spreading from potential liquefaction events (see Section 3.1, **Earth**, and **Appendix D** for further information).

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[4] Although the Quendall Terminals site is located on Lake Washington, streams and lakes critical area regulations are not included for discussion, because the code states that these policies do not apply to Class 1 waters, which are already regulated by the Shoreline Master Program regulations under 4-30-090. Lake Washington is a Class 1 water regulated under the Shoreline Master Program and is, therefore, not discussed in this section.

Wetlands

Summary: Wetlands within the City of Renton are required to be classified in accordance with 4-3-050(M) of the Renton Municipal Code. The purposes of the wetland regulations are to:

> *a. Ensure that activities in or affecting wetlands do not threaten public safety, cause nuisances, or destroy or degrade natural wetland function and values; and*
> *b. Preserve, protect and restore wetlands by regulating development within them and around them; and*
> *c. Protect the public from costs associated with repair of downstream properties resulting from erosion and flooding due to the loss of water storage capacity provided by wetlands; and,*
> *d. Prevent the loss of wetland acreage and functions and strive for a net gain over present conditions.*

Wetland buffers are required of all proposed regulated activities abutting regulated wetlands. The width of the required wetland buffer zones is determined according to the wetland category, as follows in the table below.

Wetland Category	***Standard Buffer***
Category 1	*100 feet*
Category 2	*50 feet*
Category 3	*25 feet*

Standard wetland buffer zones may be modified by averaging buffer widths, provided that certain conditions are met.

Discussion: Following site cleanup/remediation, there would be five wetlands on the Quendall Terminals site. Three of these, Wetlands A, D and H, would be located along the shoreline of the Main Property and would be classified as Category 2 wetlands requiring 50 foot buffers. The remaining two wetlands (I and J) located on the Isolated Property would be Category 3 wetlands requiring 25 foot buffers.

With redevelopment under Alternatives 1 and 2, there would be no direct impacts to the wetlands on the Isolated Property (I and J), or the re-established/expanded wetlands (Wetlands A, D and H) on the Main Property. The wetlands along the Lake Washington shoreline (Wetlands A, D, and H) would be retained within a re-vegetated riparian zone. Similarly, Wetlands I and J, on the Isolated Property, would be retained within natural open space. Per the City's requirements, 50-foot buffers would be maintained for Wetlands A and H. A 50-foot buffer would also be maintained for the majority of Wetland D; however, a portion of the buffer on Wetland D would be reduced to 25 feet; other portions of the buffer would be expanded to provide compensatory area, as allowed by the buffer averaging provisions in the City of Renton Municipal Code. A 25-foot buffer, at a minimum, would remain on Wetland I and Wetland J (see Section 3.2, **Critical Areas**, and **Appendix E** for details).

3.7 AESTHETICS/LIGHT AND GLARE

This section of the DEIS describes the existing aesthetic conditions on the Quendall Terminals site and the site vicinity, and evaluates how each of the alternatives would affect these characteristics. Light, glare and shadow conditions are also discussed.

3.7.1 Affected Environment

Methodology

Visual Analysis

Viewpoints

For the visual analysis, viewpoints were selected based on the ability to view the proposed site development and the potential for views of proposed site development to change the character of the existing view. These viewpoints consist of public locations, including public streets, sidewalks, Lake Washington and a public park, where the site may potentially be seen by many people. No views of the site were possible from any other community facilities in the site vicinity. A total of ten viewpoints were ultimately selected as most representative of area views toward the proposed development at the Quendall Terminals site. The viewpoints are listed in **Table 3.7-1** and shown in **Figure 3.7-1**.

Table 3.7-1
VIEWPOINT LOCATION

Viewpoint	Description
Viewpoint 1	Clarke Beach Park – City of Mercer Island
Viewpoint 2	Residential Neighborhood East of I-405 – City of Newcastle
Viewpoint 3	Railroad Corridor/Future Planned Trail
Viewpoint 4	Southbound I-405 Off-Ramp
Viewpoint 5	Ripley Lane N/NE 44th Street Intersection
Viewpoint 6	Northbound I-405
Viewpoint 7	Lake Washington Boulevard
Viewpoint 8	Barbee Mill Residential Development – Looking Northwest
Viewpoint 9	Barbee Mill Residential Development – Looking North
Viewpoint 10	Lake Washington

Source: EA/Blumen, 2010.

Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 3.7-1
		Viewpoint Location Map

Building Massing

Based on the selected viewpoints, visual simulations of proposed site development under Alternatives 1 and 2 were prepared. The specific design of the proposed mixed-use development under these alternatives has not been determined at this stage of the evaluation process; therefore, the exact visual appearance of the buildings is not depicted. For purposes of the visual analysis, however, preliminary building massing concepts are portrayed in the simulations, based on information provided by the applicant's architect. These simulations are expected to be representative of the building locations, massing and form that are proposed to occur at the site and are considered suitable for purposes of this DEIS. The simulations do not represent the exact details of the building design (i.e. roof lines, façade modulation, building materials, fenestration, etc.) or the proposed landscaping of the site. Therefore, the simulations represent a very conservative condition.

The visual simulations also show dashed yellow lines, which represent the maximum development envelope which could be built on the site under the site's Commercial/Office/Residential (COR) zoning classification and Shoreline Master Program (SMP) Urban designation. These dashed lines represent the site's maximum allowed building heights (125 feet) and required building setbacks. Based on the SMP, shoreline setbacks of 25 feet are required for residential buildings and 50 feet setbacks are required for commercial/office buildings; based on the COR zoning, no setbacks are required along the north, south or east property lines (these setback would be established through the binding site plan approval process). Therefore, the maximum building envelope represented in the simulations extends to the property line along these site boundaries. As demonstrated by the visual simulations, the proposed redevelopment under Alternatives 1 and 2 would be less than the maximum allowed development envelope under the COR zoning and SMP designation. It should be noted that the DEIS impact analysis is based on the preliminary building massing, rather than the maximum development envelope permitted by the zoning/SMP designation and depicted by the dashed yellow lines in the visual simulations.

Photographic and Simulation Methods

Photographs of existing views of the Quendall Terminals site were taken by The Portico Group and City of Renton staff from the selected viewpoints using digital 6 and 8 MegaPixel cameras with 35 mm lenses (this lens closely approximates what can be seen with the unaided human eye). The camera height above grade was typically 6 feet.

To prepare the photographs for generating the visual simulations of the Quendall Terminals proposed development, digital files were set up in Adobe Photoshop to build the potential views from the ten selected viewpoints. The foreground of each photograph (i.e. the image between the camera and site development) was then separated into different "layers" from the background.

Based on the building massing concepts described above, simulations of building heights and scale under the Quendall Terminals redevelopment alternatives were generated for each viewpoint using Autodesk 3D Studio Max software.

Cameral locations for each simulation were registered using a combination of field measurements, existing terrain and survey data, and GPS information, adding 6 feet for the photographer's height (an adjustment to this height was made for the photograph taken by City staff). Lens types and field of view settings were matched within the software to the type used for each viewpoint. Proportions of building massing concepts were adjusted to the proportions of the photographs that were taken. The resulting simulations, which represent the proposed building massing, were then inserted into the prepared existing condition photographs, between the foreground and background layers.

Existing Visual Character

Site

The Quendall Terminals site is comprised of the Main Property and the Isolated Property, both of which are located in the northern portion of the City of Renton. This area of the City is generally characterized by a variety of urban uses and building types, including single family residential, multifamily residential, commercial, and former industrial uses, in a variety of building forms and materials.

Prior to cleanup and remediation activities, which are scheduled to begin in 2011 with or without the project, the current visual character of the Quendall Terminals Main Property is generally open and partially vegetated, and includes approximately 0.9 acres of wetlands. The property slopes gently from east to west toward Lake Washington. Approximately 463 trees are located on the site and range in size from six (6) inches in diameter to 32 inches in diameter. The majority of these trees are located along the western and southern edges of the site. An existing, brick-clad structure, a shack and a sewer pump station are located in the eastern portion of the site. A wooden wharf and a dock remnant are located along the western edge of the site. The remainder of the site area is primarily comprised of existing natural vegetation, including grasses, shrubs and herbs, as well as unpaved dirt roadways.

With cleanup and remediation activities, the existing vegetation, small brick building, shack and docks will be removed; the sewer pump station will remain. It is assumed that a soil cap will be placed on the upland and shoreline areas of the Main Property (no cap will be placed on the Isolated Property). The cap will raise that property 2 to 3 feet. A shoreline restoration plan will be implemented in the shoreline area, including re-vegetation of wetland and riparian areas filled with the capping (see Section 3.3, **Environmental Health** for details).

The Quendall Terminals Isolated Property is generally comprised of existing trees and vegetation, including approximately 0.1 acre of existing wetland areas. This property is relatively flat. Subsequent to remediation activities, the existing trees and vegetation on the property will be retained/enhanced.

The DEIS aesthetics analysis assumes a baseline condition subsequent to cleanup/remediation.

Site Vicinity

Surrounding properties to the north, south and west of the Quendall Terminals site are at similar elevations to the site. The Railroad corridor and Ripley Lane N to the east of the site are also at similar elevations to the site. The topography then slopes up toward I-405 and the area further east.

The visual character of the area to the north of the Quendall Terminals site is primarily characterized by the Seahawks Headquarters and Training Facility. The southern portion of the facility, immediately adjacent to the Quendall Terminals site, is comprised of three full-size grass football fields. The north end of the site includes the approximately 200,000-square foot training facility building. The office and training facilities portion of the building is three stories in height, while the indoor practice field portion of the building is approximately 115 feet in height. The building is primarily constructed of brick, concrete, glass and metal. The area further to the north, beyond the Seahawks Headquarters and Training Facility, is primarily comprised of multifamily and single family residences that generally range from two (2) to three (3) stories.

The area to the east of the site is characterized by Ripley Lane N, vegetated areas, I-405, and the NE 44th Street overpass. Further to the east, beyond I-405, are a variety of commercial and multifamily residential buildings. Buildings in this area are generally one (1) to four (4) stories in height. To the southeast of the site is the former Pan Abode Cedar Homes property. This property currently contains industrial and storage type buildings; however, an application has been approved by the City of Renton for the development of a new hotel building on the site. The planned building would be approximately 60 feet tall with approximately 122,000 square feet of building space and a parking garage/surface parking.

The area to the south of the site is characterized by the Barbee Mill residential development. This property is currently under construction and will ultimately feature approximately 114 paired homes on the site. The new residences are primarily two (2) to three (3) stories in height and range from 2,600 to 4,000 square feet; building materials emphasize the use of wood, glass, rock and other natural elements. The area further to the south is generally characterized by single family residential development of up to two (2) stories.

The area to the west of the site is characterized by Lake Washington. The area beyond Lake Washington is generally characterized by single family residential and park development on Mercer Island.

City of Renton Viewshed Policies

The City of Renton Comprehensive Plan Community Design Element includes policies regarding public views and view corridors. The City of Renton considers views as a resource that should be preserved for public access to the greatest extent possible. Focal points should be created and used to enhance the community. The objective of the City's view policies is to protect and enhance public views of distinctive features from public streets and other focal points within the City and surrounding area (see Section 3.6, **Relationship to Plans and Policies and Regulations**, for further details on the relationship of the proposed development on the Quendall Terminals site to applicable City of Renton Comprehensive Plan policies).

Light, Glare and Shadows

Site

As described above, the Quendall Terminals Main Property and Isolated Property sites are primarily comprised of existing vegetation and do not contain any existing sources of light or glare. Shadows are currently cast by the mature trees primarily located in the western and southern portions of the Main Property. For the most part, these shadows are generated when the trees are in leaf (i.e. in the late spring, summer and early fall), and extend onto Lake Washington and the Main Property itself.

Site Vicinity

Lighting conditions surrounding the Quendall Terminals site are typical of an urban environment. Light sources to the north of the site are generally associated with the Seahawks Headquarters and Training Facility and include interior and exterior building lighting, pedestrian walkway lighting, parking lot lighting, street lighting, and vehicular headlights. Lighting to the east of the site is generally comprised of street lighting associated with I-405, NE 44th Street and Lake Washington Boulevard, and vehicular headlights. Lighting conditions to the south of the site include interior and exterior building lighting associated with the Barbee Mill residential development, street lighting and vehicular headlights. Lighting to the west of the site is generally comprised of building lighting associated with residential development and vehicular headlights; these light sources are located at a distance from the site, beyond Lake Washington, on Mercer Island.

Existing sources of glare in the vicinity of the Quendall Terminals site include vehicles, parking areas, roadway surfaces and building surfaces (such as glass, metal, etc.) associated with adjacent residential and commercial development.

The existing buildings located on the properties to the north and south of the site cast shadows. The Seahawks Headquarter and Training Facility buildings are located on the northern portion of that property and would not cast shadows onto the site. Residential buildings on the Barbee Mill property are two (2) to three (3) three stories in height and are setback from the Quendall Terminals southern property line. Therefore, shadows from these buildings would not be expected to extend onto the Quendall Terminals site.

3.7.2 Impacts

Alternatives 1 and 2

Aesthetics

Aesthetic Character

Proposed redevelopment of the Quendall Terminals Main Property would change the aesthetic character from an open, partially vegetated property to a new mixed-use development with nine buildings, roadways, parking areas and open space/landscaping. Proposed buildings would range from approximately 94,600 square feet to 209,000 square feet under Alternative 1 and from approximately 77,000 square feet to 112,800 square feet under Alternative 2. Maximum buildings heights would range from seven stories (75 to 80 feet) under Alternative 1 to six stories (65 to 67 feet) under Alternative 2.

The Quendall Terminals Redevelopment is intended to be an aesthetically pleasing, high quality project. Redevelopment under Alternatives 1 and 2 would represent a compact, urban form, with a consistent design concept throughout the site. The proposed design of the buildings is intended to be coordinated through a variety of details and materials, and provide a human scale with visually interesting streetscapes and facades. Ground-level uses (retail and restaurant) would include canopies, pedestrian/street lighting and alternating façade materials to enhance the visual appeal of the buildings, particularly along Street "B.". Upper-level uses would be setback from the ground-level façade for modulation and visual interest; additional architectural elements would be included, such as façade modulation, and alternating materials and details. Exterior building materials would include: glass, painted metal, concrete, brick veneer, metal panel siding, stucco and composite panel siding (see **Figures 2-5** and **2-9** for Representative Building Elevations under Alternatives 1 and 2, respectively).

The specific design of the proposed development under Alternatives 1 and 2 has not been determined at this stage of the evaluation process; therefore, the exact visual appearance of the buildings and other specific site design elements is not available. It is, therefore, unclear if the proposed development would achieve all of the design goals, policies and regulations associated with the site's COR land use/zoning classification (i.e. pedestrian-friendly design, provision of landmark/gateway features and integration with natural amenities). It is also unclear if the proposed development would be consistent with all of the City Shoreline Master Program's (SMP) regulations regarding aesthetic effects (i.e. related to view obstruction and design theme; see Section 3.6, **Relationship to Plans, Policies and Regulations**, for further discussion). Possible mitigation measures could be implemented to further enhance the aesthetic character of the development and achieve consistency with the COR zoning and SMP provisions (see the Mitigation Measures in this section for details).

Parking would be provided within structured parking garages beneath each of the new buildings. Additional parking would be provided in a surface parking lot located in the northeast corner of the Main Property under Alternative 1, and in two surface parking lots in the northwest and southwest corners of the property and two parking decks located in the northeast and southeast corners of the property under Alternative 2. Several parking spaces would also be provided along and at the terminus of Street "B." Surface parking lots in the northwest corner of the property under Alternative 2 and at the terminus of Street "B" under Alternatives 1 and 2 are located within approximately 50 feet of the OHWM of Lake Washington. These parking areas could potentially be relocated to other areas of the site to enhance the aesthetic character of the development in relation to the shore area. The proposed surface parking areas would include landscaping to minimize potential visual impacts. Some of the street-level, under-building parking areas would be concealed from pedestrian and vehicular traffic on adjacent sidewalks and roadways by retail and offices uses, particularly along Street "B". Other street-level, under-building parking would extend to the exterior of the buildings and could be visible to pedestrian and vehicular traffic (i.e. along Streets "A" and "C" and along the lake side of the development. Building elements, such as architectural façade components, trellises, berms and landscaping, are proposed to screen these parking structures. Alternatively, the amount of required parking could be reduced (i.e. though implementation of a transportation demand management program) so that additional areas of the street-level, under-building parking could be setback from the exterior of the building. This would allow other uses, including retail, restaurant, commercial and residential uses, and plaza areas to occupy these areas and potentially enhance the aesthetic character at the ground level.

New landscaping would be provided throughout the Quendall Terminals Main Property under Alternatives 1 and 2 that is intended to enhance the visual appeal of the development. Landscaping would include new trees, shrubs and groundcovers of various sizes and species. Landscaping would be provided between the buildings as landscaped courtyards. Street trees and street landscaping would be planted along the new roadways onsite; surface parking areas would also include landscaping, as required by City of Renton regulations. As mentioned above, under-building parking would be screened by landscaping. A landscaped edge along the north and south boundaries of the site would provide a buffer and partial visual screen between the on-site development and adjacent properties (see **Figure 2-7** for the Alternative 1 – Preliminary Landscape Plan).

The shoreline restoration area created along Lake Washington during site cleanup/remediation would be retained under Alternatives 1 and 2. As part of redevelopment, a trail would be constructed along the Lake Washington shoreline during cleanup/remediation. This trail would be available to the general public during reasonable hours (anticipated to be from 10 AM to dusk). Two interpretive wetland viewpoints would be incorporated into the design of the trail.

View corridors and viewing areas are proposed on the Quendall Terminals site consistent with City of Renton Comprehensive Plan Policies. View corridors would be provided along the main east/west public roadway (Street "B") and along the private driveways at the north and south ends of the site to provide views across the site towards Lake Washington. Landscaping, street trees and new buildings would flank the main east/west roadway on both sides to frame the view corridor. At this point, it is unclear how much of a view corridor would be provided by Street "B." In particular, parking located at the terminus of Street "B" could block views toward the lake. This parking could be relocated onsite to enhance the view corridor. Views of the lake could be further enhanced by providing additional building modulation, building setbacks and/or by reducing building heights, particularly along the shoreline.

Additional views towards Lake Washington would be provided for project residents in the semi-private courtyards between the buildings. Residents and employees onsite would also have views of the lake from certain portions of the proposed buildings. As stated above, the proposed trail would also include viewing areas toward Lake Washington for the residents, employees and the community (see Section 3.6, **Relationship to Plans and Policies and Regulations**, for details on the relationship of the project to the City of Renton Comprehensive Plan).

No new development or changes to the aesthetic character would occur on the Quendall Terminals Isolated Property site under Alternatives 1 or 2.

Visual Analysis

Following is a description of the existing views to the site from the ten viewpoints selected for the visual analysis (see **Figure 3.7-1** for the locations of the viewpoints). Descriptions of the views from these viewpoints with redevelopment under Alternatives 1 and 2 are also provided.

Viewpoint 1

From Viewpoint 1 – Clarke Beach Park – City of Mercer Island (**Figure 3.7-2**), the existing view includes Lake Washington in the foreground and mid-ground, and the Quendall Terminals site, Seahawks Headquarters and Training Facility, and Barbee Mill residential development in the background. Additional views of residential development and forested areas in the Kennydale Neighborhood and the City of Newcastle are available in the background, on the hillside beyond the Quendall Terminals site.

Existing

Alternative 1

Alternative 2

Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 3.7-2**
		Viewpoint Location #1

Under Alternative 1, the developed view would include new seven-story mixed-use buildings on the Quendall Terminals site. New development would be located in the central portion of the background view and would be lower in height, but greater in overall scale than the adjacent Seahawks Headquarters and Training Facility and greater in height and scale than the Barbee Mill residential development. Views of the Kennydale Neighborhood and City of Newcastle would remain in the background. The visual character from this viewpoint would reflect a continuation of development along the shoreline area and a more densely developed environment.

Under Alternative 2, development on the Quendall Terminals site would continue to be the focal point of the background view. New development would be greater in height and scale than the Barbee Mill residential development; however, proposed building heights and densities would be less than Alternative 1. The character of this viewpoint would reflect an increase in development density, but buildings would be setback further from adjacent development at the Seahawks Headquarters and Training Facility and Barbee Mill residential development.

Viewpoint 2

From Viewpoint 2 – Residential Neighborhood East of I-405 – City of Newcastle (**Figure 3.7-3**), the current view includes SE 76th Street, residences, trees and other vegetation in the foreground. A portion of the Quendall Terminals site is located in the mid-ground view, surrounded by existing trees and vegetation. Views of Lake Washington, Mercer Island and the City of Renton are available in the background.

Under Alternative 1, new development on the Quendall Terminals site would be located in the mid-ground view; existing trees in the surrounding area would block portions of the site from this location. Background views of Lake Washington, Mercer Island and City of Renton would remain from this viewpoint. The visual character of this viewpoint would reflect a more densely developed environment.

Under Alternative 2, the visual character from this location would be similar to Alternative 1; however, development on the site would reflect lower building heights and density. Background views of Lake Washington, Mercer Island and the City of Renton would continue to remain from this location as well.

Viewpoint 3

From Viewpoint 3 – Railroad Corridor/Future Planned Trail (**Figure 3.7-4**), the existing view contains railroad tracks (the site of a possible future rails to trails project), a utility pole and existing vegetation in the foreground view. Existing trees and vegetation on the Quendall Terminals site are located in the mid-ground view. Partial views of Mercer Island are available in the background between the trees from this location.

Under Alternative 1, new seven-story mixed-use buildings and associated roadways on the Quendall Terminals site would be prominently featured in the field of view. The character of this viewpoint would change from a predominantly vacant, vegetated landscape to a more densely developed mixed-use area. New development on the site would block the partial background view of Mercer Island from this location. As a possible mitigation measure, additional building modulation could be provided in order to retain partial views of the water.

Existing

Alternative 1

Alternative 2

Source: *The Portico Group,* 2010.

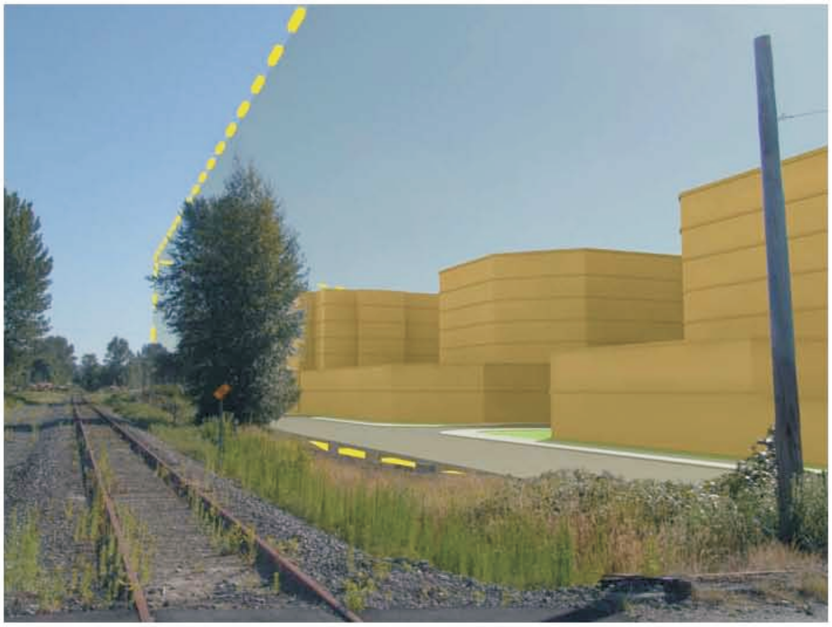
BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-3

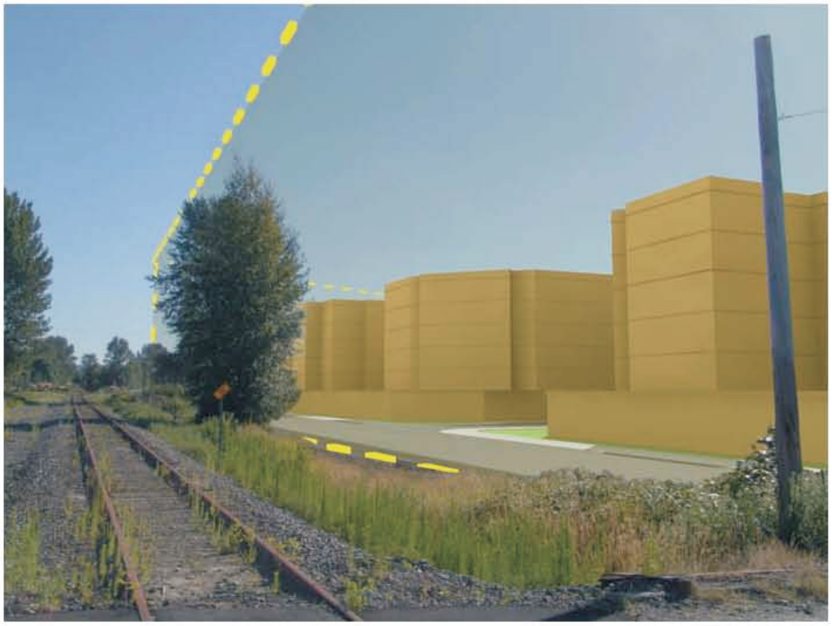
Viewpoint Location #2

Existing



Alternative 1

Alternative 2



Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-4

Viewpoint Location #3

Under Alternative 2, the visual character from this location would be similar to Alternative 1; however, development on the site would reflect lower building heights and density. Partial background views of Mercer Island would also be eliminated from this location due to new development.

Viewpoint 4

From Viewpoint 4 – Southbound I-405 Off-Ramp (**Figure 3.7-5**), the existing view includes Ripley Lane N, existing vegetation in the City of Renton right-of-way, Railroad tracks, and existing trees and vegetation on the Quendall Terminals site. Views of Mercer Island and partial views of Lake Washington are also available in the background from this location.

Under Alternative 1, new seven-story mixed-use buildings, associated roadways, landscaping, and landscaped courtyards on the Quendall Terminals site would alter the existing view. The character of this viewpoint would change from predominantly open, vegetated landscape to a more densely developed mixed-use area. A portion of the existing views of Mercer Island and Lake Washington would be blocked by new development; however, view corridors would be provided through the site to continue to allow for peek views of Mercer Island and Lake Washington.

Under Alternative 2, the visual character from this location would be similar to Alternative 1; however, development on the site would reflect lower building heights and density. Views towards Mercer Island and Lake Washington would essentially be blocked by new buildings.

Viewpoint 5

From Viewpoint 5 – Ripley Lane N/NE 44th Street Intersection (**Figure 3.7-6**), the current view contains Ripley Lane N and associated sidewalk/shoulder area, existing vegetation in the City of Renton right-of-way area, existing utility lines and existing trees and vegetation on the Quendall Terminals site in the foreground and mid-ground. Partial views of the Seahawks Headquarters and Training Facility, Lake Washington, and Mercer Island are available in the background between the trees; buildings in the downtown Bellevue skyline are also located further in the background.

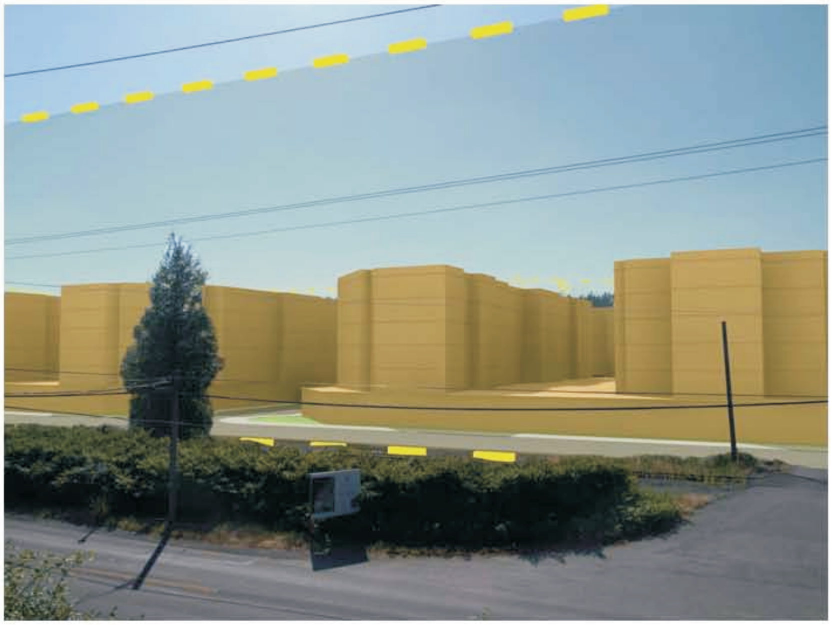
Under Alternative 1, new seven-story mixed-use buildings on the northern portion of the Quendall Terminals site would be visible in the mid-ground view; existing trees would obstruct a portion of the new buildings. Views of Mercer Island and a portion of Lake Washington would be blocked by new development; however, the Seahawks Headquarters and Training Facility, Lake Washington, and the downtown Bellevue skyline would remain in the field of view from this location.

Under Alternative 2, mixed-use development on the northern portion of the site would be similar to Alternative 1, but with lower building heights. Viewshed conditions from this location would be similar to Alternative 1.

Existing

Alternative 1

Alternative 2



Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-5

Viewpoint Location #4

Existing

Alternative 1

Alternative 2

Source: *The Portico Group*, 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 3.7-6**
		Viewpoint Location #5

Viewpoint 6

From Viewpoint 6 – Northbound I-405 (**Figure 3.7-7**), the existing view includes northbound and southbound I-405, buildings on the Pan Abode site, existing trees, and the NE 44th Street overpass. Existing trees on the Quendall Terminals site and surrounding area are located in the background view; partial views of Mercer Island are also available beyond the trees.

Under Alternative 1, new mixed-used development on the Quendall Terminals site would be located in the background and would be partially obstructed by existing trees in the site vicinity. From this location, new development on the site would generally appear as a continuation of existing development in the field of view. A portion of the view towards Mercer Island would be blocked by new development; however, partial views of Mercer Island would remain through the trees.

Under Alternative 2, mixed-use development on the Quendall Terminals site would be similar to Alternative 1, but with lower building heights. Viewshed conditions from this location would be similar to Alternative 1.

Viewpoint 7

From Viewpoint 7 – Lake Washington Boulevard (**Figure 3.7-8**), the existing view contains vegetation in the City of Renton right-of-way adjacent to Lake Washington Boulevard, the existing Railroad tracks, a residence located in the Barbee Mill residential development, and a street light pole in the foreground and mid-ground. Existing trees on the Quendall Terminals site are located in the background, beyond the Barbee Mill residential development.

Under Alternative 1, seven-story buildings on the Quendall Terminals site would be located prominently in the field of view and would alter the visual character from a predominantly open site to a densely developed area. New buildings would be located in proximity to existing Barbee Mill residential development (ranging from approximately 42 to 95 feet from the property line) and would be substantially greater in height and density than the existing adjacent residential buildings. As a possible mitigation measure, additional building modulation could be provided to retain views of Lake Washington.

Under Alternative 2, the visual character from this location would be similar to Alternative 1; however, development on the site would reflect lower building heights and density. New buildings on the Quendall Terminals site under Alternative 2 would be set back further from the adjacent Barbee Mill residential development than under Alternative 1 (ranging from approximately 95 to 380 feet from the property line) and would provide a larger buffer area between existing off-site development and new development on the Quendall Terminals site.

Existing

Alternative 1

Alternative 2

Source: *The Portico Group,* 2010.

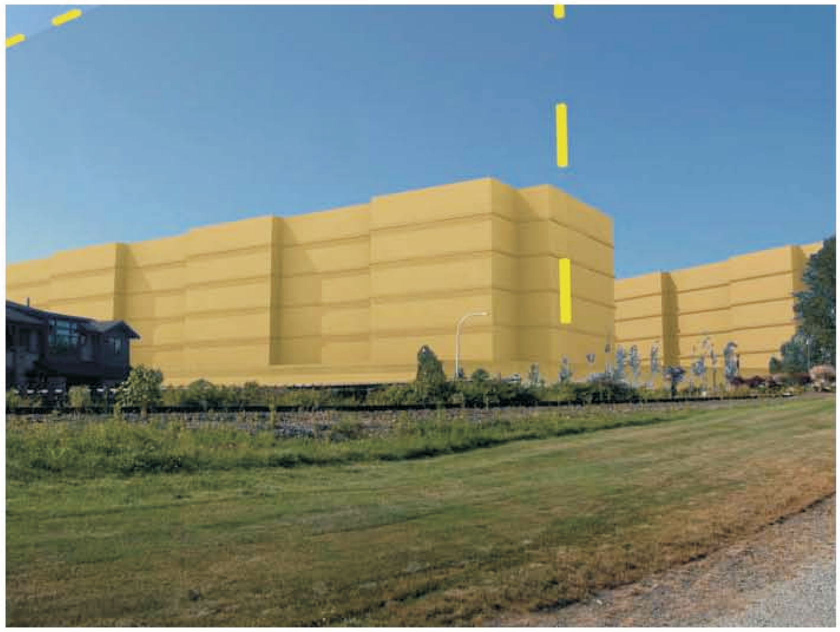
BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-7

Viewpoint Location #6

Existing



Alternative 1

Alternative 2

Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 3.7-8
		Viewpoint Location #7

Viewpoint 8

From Viewpoint 8 – Barbee Mill Residential Development – Looking Northwest (**Figure 3.7-9**), the existing view includes a vacant lot associated with the Barbee Mill residential development, street light poles, and sidewalks are located in the foreground and mid-ground. Residences in the Barbee Mill development are located in the background; existing trees on the Quendall Terminals site and partial views of Mercer Island are located further in the background, beyond the existing residences.

Under Alternative 1, new seven-story development on the Quendall Terminals site would become a focal point of the mid-ground view and would change the visual character to a more densely developed environment. New buildings would be proximate to existing residential development at the Barbee Mill site. New development on the Quendall Terminals site would also obstruct a majority of the view towards Mercer Island; a portion of the view would remain between the Quendall Terminals and Barbee Mill sites. As possible mitigation measures, additional building modulation and building setbacks could be provided in order to maintain views of Lake Washington.

Under Alternative 2, a small portion of new development on the Quendall Terminals site would be within the field of view from this location. A larger buffer area would be provided between new development and the Barbee Mill site when compared to Alternative 1. Clear views towards Mercer Island would be provided under Alternative 2 and would represent an enhanced view when compared to existing conditions due to the removal of existing trees on the Quendall Terminals site.

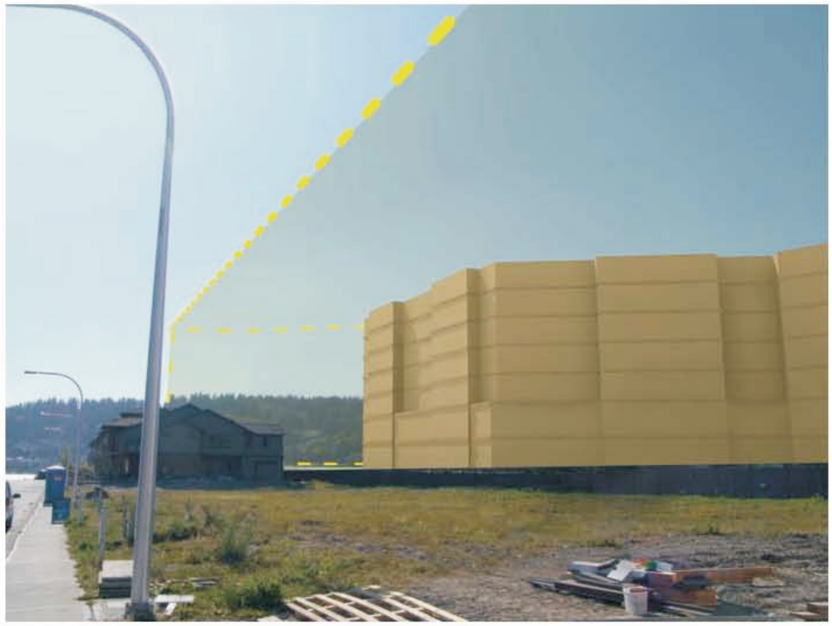
Viewpoint 9

From Viewpoint 9 – Barbee Mill Residential Development – Looking North (**Figure 3.7-10**), the current view is comprised of the Barbee Mill residential development access roadway, sidewalks, street light poles, and a current vacant lot at the Barbee Mill site in the foreground and mid-ground. In the background is a fence/wall located on the existing property line and existing trees on the Quendall Terminals site; partial views of Mercer Island are available in the background between the existing trees.

Under Alternative 1, new mixed-use development on the Quendall Terminals site would dominate the field of view from this location. New development would change the character of this viewpoint and would reflect an increase in development density. New buildings would be located in proximity to the Barbee Mill site. Partial views of Mercer Island would be eliminated from this location.

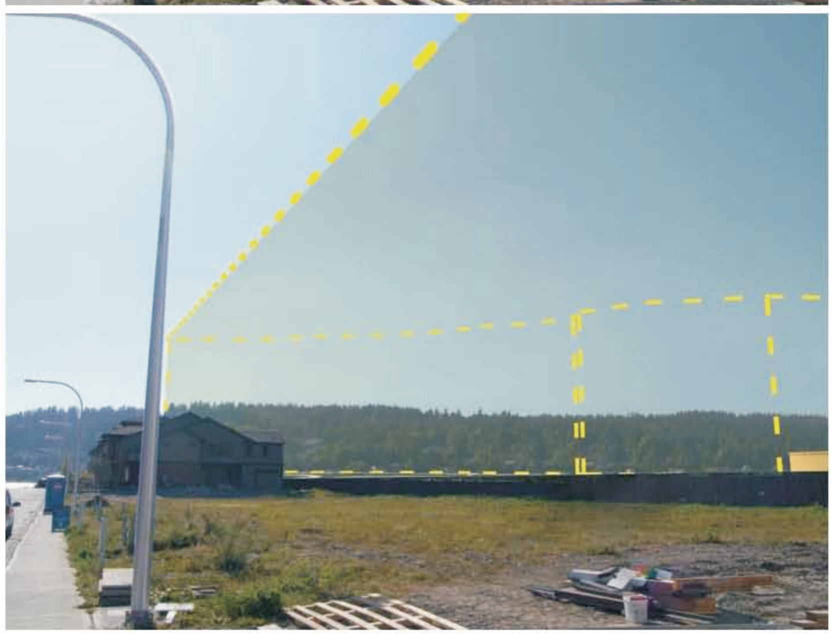
Under Alternative 2, new development would be the focal point of the field of view, similar to Alternative 1. However, new development on the site would feature lower building heights and density. In addition, the proposed buildings would be set back further from the property line to provide a buffer between proposed development and existing adjacent development. Partial background views of Mercer Island would continue to be provided from this location as well.

Existing



Alternative 1

Alternative 2



Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-9

Viewpoint Location #8

Existing

Alternative 1

Alternative 2

Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 3.7-10**
		Viewpoint Location #9

Viewpoint 10

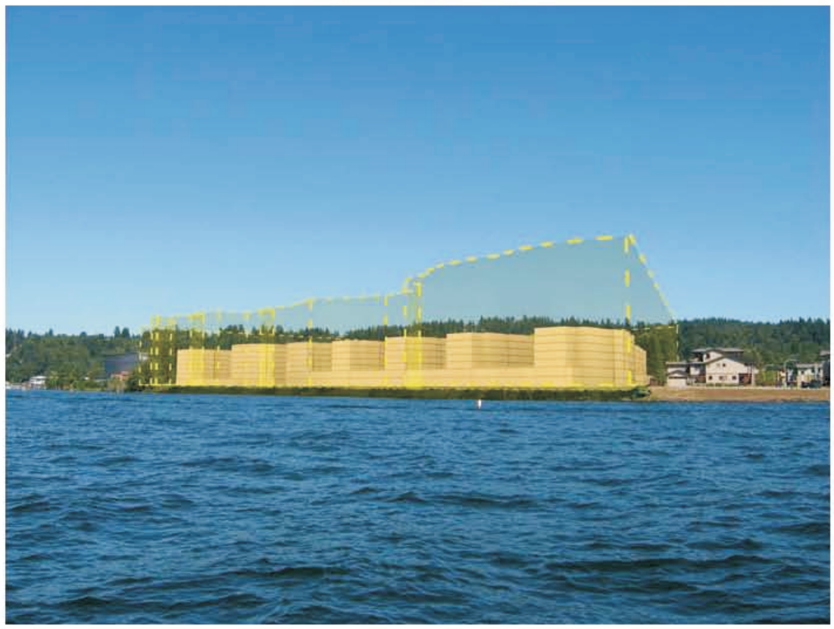
Viewpoint 10 – Lake Washington (**Figure 3.7-11**), illustrates the potential views that would be experienced from users of Lake Washington (via boat or other recreational watercraft). The view from this location includes Lake Washington, the Quendall Terminals site, and portions of the Barbee Mill residential development and Seahawks Headquarters and Training Facility site in the foreground and mid-ground. Additional views of residential development and forested areas in the Kennydale Neighborhood and the City of Newcastle are available in the background, on the hillside beyond the Quendall Terminals site.

Under Alternative 1, the developed view would include new seven-story mixed-use buildings on the Quendall Terminals site. New development would be located in the central portion of the view and would be lower in height and scale than the adjacent Seahawks Headquarters and Training Facility and greater in height and scale than the Barbee Mill residential development. New buildings would be located proximate to the Barbee Mill site and Seahawks site. A majority of the background views of the Kennydale Neighborhood and City of Newcastle would be obstructed by new development. The visual character from this viewpoint would reflect a continuation of development along the shoreline area and a more densely developed environment. As a possible mitigation measure, additional building modulation could be provided along the shoreline to enhance views of the water.

Under Alternative 2, new development on the Quendall Terminals site would appear as a continuation of development along the shoreline area and would continue to be the focal point of the viewshed. New development on the site would be greater than the Barbee Mill residential development; however, proposed building heights and densities would be less than Alternative 1. New buildings would also be set back further from the property lines than under Alternative 1 to provide an increased buffer between new development and adjacent uses. A portion of the background views of the Kennydale Neighborhood and City of Newcastle would remain under this alternative.

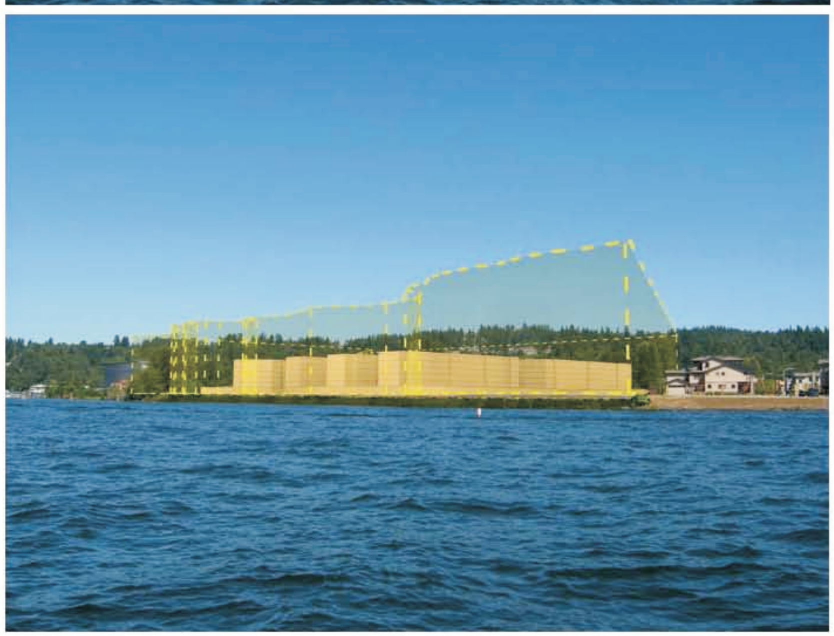
In conclusion, redevelopment under Alternatives 1 and 2 would block or partially block views toward Lake Washington from certain viewpoints. View corridors are proposed onsite to enable views through the site by east/west roadways (in particular Street "B") and open space/setbacks. Larger view corridors would be provided on the north and south property lines under Alternative 2 than under Alternative 1. Both Alternatives 1 and 2 would represent a continuation of the development along the shoreline area and a more densely developed environment. The overall visual impacts under Alternative 2 would be less than under Alternative 1. Possible mitigation measures could be implemented to enhance views across the site towards Lake Washington, including additional building modulation and building setbacks, and lowering building heights, particularly along the shoreline area.

Existing



Alternative 1

Alternative 2



Source: *The Portico Group,* 2010.

BLUMEN CONSULTING GROUP, INC

Quendall Terminals

Figure 3.7-11

Viewpoint Location #10

Light, Glare and Shadows

Redevelopment on the Quendall Terminals Main Property under Alternatives 1 and 2 would add a variety of new sources of light and glare to the site. Due to the existing, vacant condition of the site, development associated with Alternatives 1 and 2 would result in an overall increase in light and glare when compared to existing conditions. General light sources and lighting types would be similar under both alternatives; however, it is assumed that Alternative 1 would result in more light and glare on the site due to the greater amount of development proposed.

In general, new mixed-use development would result in new light sources on the site, including: interior and exterior building lighting, street lighting, walkway lighting, parking lot lighting, open space and gathering space lighting, and vehicular traffic. Lighting levels would be generally higher in the evenings and during the winter months when there are more hours of darkness during the day.

New light sources associated with development under Alternatives 1 and 2 would generally be similar to existing light sources at the adjacent Barbee Mill residential development and Seahawks Headquarters and Training Facility, including interior and exterior building lighting, street lighting, parking lot lighting, walkway lighting, and vehicular lighting. General lighting levels on the Quendall Terminals site would likely be higher than those found on the adjacent Barbee Mill and Seahawks sites, however. From the west (i.e. from Mercer Island), lighting on the Quendall Terminals site would generally appear as a continuation of urban lighting associated with the City of Renton. Exterior building lighting, parking lot lighting and pedestrian lighting could be directed downward and away from surrounding buildings and adjacent properties to minimize the impacts to adjacent uses.

Under Alternatives 1 and 2, new sources of glare on the Quendall Terminals site could include reflection from building façades and windows, and reflections from vehicle traffic. Specific glare impacts would depend upon the degree of reflective surfaces (glass, windows, metal) used for building construction. Reflectivity of glazing materials, as well as the use of shading devices, could be considered as part of the façade design in order to minimize the potential glare impacts to surrounding uses.

The lighting levels and amount of glare generated from the development would be typical of an urban environment and significant adverse impacts would not be anticipated.

As described under Affected Environment, off-site buildings would not be expected to cast shadows onto the site. The mature trees located in the southern and western portions of the Main Property would be removed with the cleanup/remediation activities onsite, and would no longer cast shadows. The proposed buildings onsite would cast shadows onto surrounding areas to the north (the PSE easement and Seahawks training fields), east (the Railroad right-of-way, Ripley Lane N and Lake Washington Boulevard) and west (Lake Washington). Significant shadow impacts from the proposed development on off-site areas would not be expected. The proposed buildings would also cast shadows onto certain outdoor areas within the site, such as the semi-private courtyard areas between the buildings and the plazas and sidewalk areas along Street “B,” which could affect the desirability of these areas for passive recreation.

No Action Alternative

Under the No Action Alternative, no development would occur on the site at this time and the site would remain in its existing open, partially vegetated condition. The visual character, and light, glare and shadow conditions on the site would remain as described under existing conditions and no new light, glare and shadow sources would be introduced on the site.

3.7.3 Mitigation Measures

Required/Proposed Mitigation Measures

- Building design would include a variety of details and materials that are intended to create a human scale and provide a visually interesting streetscape and façade, such as horizontal plan modulation, projecting vertical elements, and alternating façade materials and details.

- Street-level, under-building parking areas would be concealed from sidewalks and streets by retail and offices uses along certain façades. Where this parking extends to the exterior of the building, elements, such as architectural façade components, trellises, berms and landscaping, would be used for screening.

- Public view corridors toward Lake Washington are proposed along the main east/west roadway onsite (Street ”B”) and along the private driveways at the north and south ends of the site. Public views of the lake would also be possible from the publically accessible trail in the shoreline restoration area in the western portion of the Main Property. Additional views of the lake would be provided for project residents from semi-private landscaped courtyard areas between the new buildings onsite.

- New landscaping would be provided in the upland area of the Main Property that is intended to enhance the visual character of the site. Landscaping would include new trees, shrubs and groundcovers of various sizes and species.

- A landscaped edge along the north and south boundaries of the site would provide a buffer and partial visual screen between new development on the site and adjacent properties.

- The natural vegetation in shoreline restoration areas on the Main Property and on the Isolated Property would be retained with proposed site development.

Other Possible Mitigation Measures

- The amount of required parking could be reduced, relocated, or redesigned (i.e. though implementation of transportation demand management measures or other means) so that additional areas of the street-level, under-building parking could be setback from the exterior of the building, particularly along Streets “A”, “C” and the lake side of the development. This would allow other uses, including retail, restaurant, commercial and residential uses, and plaza areas to occupy these areas and potentially enhance the aesthetic character at the ground level.

- Exterior building lighting, parking lot lighting and pedestrian lighting could be directed downward and away from surrounding buildings and properties to minimize the impacts to adjacent uses.

- Reflectivity of glazing materials, as well as the use of shading devices, could be considered as part of the façade design in order to minimize the potential glare impacts to surrounding uses.

- Building modulation or design treatments such as tiering/tapering or stepping the building back as the height increases, and/or building setbacks could be provided, particularly along the shoreline, to enhance the aesthetic character of development and retain views of Lake Washington.

- Building heights along the shoreline could be reduced to maintain views of Lake Washington.

- The surface parking located adjacent to the shoreline under Alternative 2 and the parking at the terminus of Street "B" could be relocated on the site to enhance the aesthetic character of development, particularly from the shoreline trail.

- Design features such as: public art, special landscape treatment, additional open space/plazas, landmark building form, special paving/pedestrian scale lighting, or prominent architectural features could be provided as part of development to further enhance the gateway/landmark features on the site.

3.7.4 Significant Unavoidable Adverse Impacts

Development of the Quendall Terminals site under Alternatives 1 and 2 would change the site from its existing open, partially vegetated condition to a new mixed-use development. The proposed development would represent a continuation of urban development along the Lake Washington shoreline. The proposed building height and bulk would be generally similar to surrounding uses (i.e. the Seahawks Headquarters and Training Facility and the planned Hawk's Landing Hotel) and greater than other uses in the area (i.e. the Barbee Mill residential development). Certain views across the site towards Lake Washington and Mercer Island would be obstructed with the proposed development; however, view corridors towards Lake Washington and Mercer Island would be established and new viewing areas along the lake would also be provided.

No significant light, glare or shadow impacts would be anticipated.

3.8 PARKS AND RECREATION

3.8.1 Affected Environment

Parks and Recreation Facilities on the Site

As described in **Chapter 2** of this DEIS, the Quendall Terminals site is currently vacant and undeveloped, and contains no parks or recreation facilities, including shoreline access.

Parks and Recreation Facilities in the Site Vicinity

The City of Renton is the primarily provider of park and recreation services within the City, and presently owns and operates: 29 public parks including two lake-front beaches and a public boat launch totaling 327 acres; eight miles of trails; 666 acres of public open space; and, 193 acres of special use parks, including an 18-hole public golf course. City park facilities include 21 neighborhood parks, seven community parks, one regional park, nine open space areas, three trails, and seven special use parks and facilities.[1]

For park and recreation planning purposes, the City of Renton is divided into ten planning areas that are defined by natural and built boundaries. The Quendall Terminals site is located at the north end of the Kennydale Community Planning Area (see the *City of Renton Comprehensive Plan* (2009), Community Planning Element, for a map showing the planning areas). Existing park and open space areas which are provided by the City within this planning area are described in **Table 3.8-1**.

Table 3.8-1
KENNYDALE COMMUNITY PLANNING AREA: EXISTING PARKS AND OPEN SPACE AREAS[1]

Name	Type	Type/Facilities/Use	Acres	Approximate Distance and Direction from Site
Kennydale Beach Park[2, 3]	Neighborhood Park	Play equipment, picnic tables, swimming beach.	1.8	0.6 miles southwest
Kennydale Lions Park	Neighborhood Park	Activity building, ball field, basketball court, multi-use field, picnic areas, play equipment	5.6	1.3 miles southeast
May Creek Greenway	Open Space Area	Open space	39	0.5 miles southeast

Source: 2010 Park and Open Space Classification, City of Renton Parks Planning and Natural Resources Dept.

[1] The City's planning areas have changed since the *2003 Park, Recreation, and Open Space Implementation Plan* was completed. The park and open space areas identified in this table are based on the planning areas identified in the City's Comprehensive Plan (2009).

[2] The majority of Kennydale Beach Park is underwater; there are approximately 0.6 acres of dry land at this park.

[3] Kennydale Beach Park is the only park within a ½ mile service radius of the Quendall Terminals site.

[1] City of Renton. Parks and Trails. http://rentonwa.gov/living/default.aspx?id=65.

The City's *2003 Park, Recreation, and Open Space Implementation Plan* defines various types of park and open space areas as follows:

- Neighborhood Parks – Small, 2 to 10-acre parks used for passive activities and unstructured play. These often contain an open space for field sports, playgrounds, multi-purpose paved area, a picnic area and a trail system. The adopted service radius for Neighborhood Parks is ½ mile.[2]
- Community Parks – Larger, 10 to 25-acre parks that can accommodate organized play and contain a wider range of facilities and active use space. Community Parks may contain sport fields or other major use facilities. Community Parks may also serve the neighborhood park function. The adopted service radius for Community Parks is 1-2 miles.
- Regional Parks – Large park areas that serve geographical areas that stretch beyond the community. Regional Parks may serve a single purpose or offer a wide range of facilities and activities; many also contain large areas of undeveloped open space. The adopted service radius for Regional Parks is the entire community or region.
- Linear Parks – Elongated parks that follow stream corridors, utility easements, etc. Linear parks are usually passive in nature, but may be highly developed. The adopted service radius for Linear Parks is local or community-wide.
- General Open Space Area – General open space, trail systems and other undeveloped natural areas that include stream corridors, ravines, easements, steep hillsides or wetlands. The adopted service radius for Open Space areas is community- wide.
- Special Use Area – Specialized parks and facilities, including areas that generally restrict public access to certain times of the day or to specific recreation activities. The adopted service radius for Special Use Areas is community-wide.

In addition to the park and open space areas listed in **Table 3.8-1**, the following public schools are located within approximately one mile of the site that also contain play areas and open space/playfields which may be used by the public for active and passive recreation (all school facilities listed below are separated from the project site via manmade barriers such as I-405).

- Kennydale Elementary – this elementary school is located approximately one mile to the southeast of the site and is operated by the Renton School District. The school facilities include outdoor play areas.
- Hazelwood Elementary – this elementary school is located approximately 0.8 mile to the northeast of the site and is operated by the Renton School District. The school facilities include outdoor play areas.
- Renton Academy – this K-12 school is located approximately 0.9 mile to the northeast of the site and is operated by the Renton School District. The school facilities include outdoor play areas.

Water recreation and boating activities also occur on Lake Washington to the west of the site. The nearest public boat launch access point to the site is located at Gene Coulon Park, approximately one mile to the south.

The adjacent Barbee Mill residential development to the south of the site contains a public access connection to the shoreline along May Creek from Lake Washington Boulevard. The

[2] The adopted service radius excludes geographic and/or manmade barriers.

Seahawks Headquarters and Training Facility to the north of the site also provides public access to the shoreline, via a connection at the north end of the property.

Two parks in the site vicinity, Gene Coulon Memorial Park and Kennydale Beach Park, are already at or exceeding visitor capacity in the summer. Beyond these two parks, there are few active recreation-oriented parks within a three mile radius of the site. Following are those parks within this 3 mile radius, all of which are located on the east side of I-405:

- <u>Kennydale Lions Park</u> (1 1/3 miles) – contains one softball field. This neighborhood park is outside the ½ mile service radius for the Quenall Terminals site;
- <u>North Highlands Neighborhood Center</u> (two miles) – contains one tennis court and one small basketball court. This neighborhood park is not in the Kennydale Community Planning Area and is outside the ½ mile service radius for the site; and,
- <u>Highlands Community Center</u> (three miles) – contains two tennis courts and two basketball courts and one softball field. This community park is not in the Kennydale Community Panning Area and is outside the 1-2 mile service radius for the site.

Parks Level of Service Standards

The City of Renton's *2003 Park, Recreation and Open Space Implementation Plan* and the 2009 *City of Renton Comprehensive Plan*, Capital Facilities Element address open space, parks and recreation services in the City for a 6-year time frame. These plans present level of service (LOS) standards for park and recreation facilities in the City, as shown in **Table 3.8-2**. In general, the LOS standards in **Table 3.8-2** represent overall levels of facilities that the City seeks to achieve on a city-wide basis and are not necessarily intended to be implemented on a project-specific basis. **Table 3.8-2** also contains an inventory of the City's current (2010) park and recreation facilities; the current LOS provided in the City (based on the City's population of 86,230; and, a calculation of current surpluses or shortfalls of these facilities, based on the adopted LOS standards. As shown in **Table 3.8-2**, the City currently has a total park and open space deficit of 414.12 acres, as well as needs for all types of active recreation facilities, except swimming pools. The existing (2010) total park land LOS is 13.77 acres per 1,000 population. The adopted park/land LOS standard identified in the *Comprehensive Park, Recreation and Open Space Plan* (1993) is 18.58 total acres per 1,000 population. Therefore, there is a shortage of parks and open space land based on the LOS standards. The Comprehensive Plan (Capital Facilities Element) notes that as residential growth continues within Renton, continued park and open space lands acquisition will be needed to serve the population.

Table 3.8-2
PARKS AND RECREATION FACILITIES LEVEL OF SERVICE (LOS) – CITY OF RENTON

	Renton's Adopted LOS Standard	Renton's 2010 Inventory	Actual LOS Rate Provided in 2010	Surplus/(Shortfall)
Neighborhood Parks	1.2 acres per 1,000 pop.	141.93 acres	1.64 acres per 1,000 pop.	38.45 acres
Community Parks	2.5 acres per 1,000 pop.	129.54 acres	1.50 acres per 1,000 pop.	(86.04 acres)
Regional Parks	1.08 acres per 1,000 pop.	57 acres	0.66 acres per 1,000 pop.	(36.13 acres)
Special Use Areas	0.8 acres per 1,000 pop.	193.25 acres	2.24 acres per 1,000 pop.	124.27 acres
Open Space Areas	12.7 acres per 1,000 pop.	666.31 acres	7.73 acres per 1,000 pop.	(428.81 acres)
Total Park Land	**18.58 acres per 1,000**	**1,188.03 acres**	**13.77 acres per 1,000 population**	**(414.12 acres)**
Baseball/Softball Fields	1 field per 2,250 pop.	13 City 25 School	.99 field per 2,250 pop.	(.32 fields)
Football/Soccer	1 field per 3,000 pop.	8 City 12 School	0.7 field per 3,000 pop.	(8.74 fields)
Tennis Courts	1 court per 2,500 pop.	17 City[1]	0.5 court per 2,500 pop.	(17.49)
Swimming Pools	1 pool per 40,000 pop.	1 City Outdoor Aquatic Facility & 2 School Indoor Pools	1.38 pool per 40,000 pop.	.84 pools
Walking/Hiking Trails	0.2 mile per 1,000 pop.	8.25 miles[2]	0.1 mile per 1,000 pop.	(9 miles)

Source: 2003 Park, Recreation, and Open Space Implementation Plan, and 2010 Parks/Open Space Classification. City of Renton.

[1] There are also 15 tennis courts located on school grounds; however, only the City tennis courts are included for this calculation.

[2] Trails only include paved and soft surface trails outside of right-of-way areas.

Parks Planning

In June 2003, the City of Renton adopted its *2003 Park, Recreation and Open Space Implementation Plan*. This Plan describes existing park and recreation facilities and services within the Renton area; and, analyzes the supply, demand and need for additional park and recreation facilities. The Plan also identifies expected funding strategies, park design standards and specific park and open space recommendations (i.e. acquisitions, development) by geographic planning areas. Within the North Planning Area (the Quendall Terminals site was previously located in the North Planning Area, but is now located in the Kennydale Planning Area), nine specific project recommendations are identified. The three highest priority projects include replacing the North Highlands Park Neighborhood Center (Quendall Terminals does not currently fall within this park's service area); acquiring land for additional park parking at Gene Coulon Memorial Beach Park; and, acquiring land for the Duvall/Glencoe neighborhood park in the east section of the North Planning Area. (Quendall Terminals does not currently fall within this park's proposed service area). None of these three projects has occurred to date. Identified park projects of medium priority that have a service area including the Quendall Terminals site include Kennydale Beach Park property acquisition and May Creek Open Space Acquisition. Acquisition along the May Creek corridor has occurred since 2003.

The City of Renton is in the process of updating the *2003 Park, Recreation and Open Space Implementation Plan.* The new document will be a Long Range Parks, Recreation, Open Space and Natural Resources Plan, and will provide a 20-year vision for the City's park system. The Long Range Plan will provide guidance and direction for the City in the form of long-term goals and objectives, implementation strategies, capital improvements and investment programs for the City's parks and open space. The Long Range Parks, Recreation, Open Space and Natural Resources Plan is anticipated to be completed in September 2011.

Renton Trails and Bicycle Master Plan

In 2009, the City adopted the *Renton Trails and Bicycle Master Plan*. This Master Plan includes a vision statement, goals and objectives, and a policy review of the City's trails and bicycle facilities. It also describes existing conditions of the City's non-motorized system, identifies new destinations and their service areas, and identifies new projects and routes that are incomplete. An inventory of non-motorized routes and resources are provided based on the planning geographies established in the *2003 Park, Recreation and Open Space Implementation Plan*. The North and East Planning Areas are grouped together due to the connectivity of these areas, and the following are existing routes used by bicycles and pedestrians in these areas:

- Lake Washington Loop Trail and Lake Washington Boulevard bike/pedestrian facilities
- Cedar River Trail (developed)
- May Creek Trail (gaps in ownership and not developed)
- Honey Creek Trail (not fully developed)
- Edmonds, Monroe, Union, Duvall Avenues NE (not developed)
- Sunset Boulevard NE (SR 900) (not developed)
- NE 3rd/4th Streets/SE 128th Street (not developed)
- NE 12th Street (not developed)
- 148th SE (connects to May Valley Road, May Valley Park, Hazen High School and Apollo Elementary) (not developed)

Overall, the Master Plan indicates the City has an ample supply of existing walking trails that are soft surface or rough (undeveloped) along the City's numerous creeks and utility corridors. However, bike lanes (developed facilities) are limited and mostly discontinuous.

Bike and Pedestrian Facilities in the Site Vicinity

Roadways near the site that would be used to access the Quendall Terminals development include Lake Washington Boulevard, NE 44th Street and Ripley Lane N. Lake Washington

Boulevard contains bike lanes on both sides of the street, and a paved 4-foot shoulder on the west side of the street, which is designated for pedestrians. NE 44th Street has paved shoulders on both sides of the street which could be used by pedestrians, but are not formally designated for this use. Ripley Lane N contains a paved 5-foot shoulder on the west side of the street, which could be used by pedestrians, but is not formally designated for this use. Ripley Lane N connects to the Lake Washington Loop Trail via a paved multi-use trail on the west side of I-405.

Two new proposed trail and bike routes are identified in the *Renton Trails and Bicycle Master Plan*, which serve the Quendall Terminals site. These include: 1) a future rails-trails corridor, which would be located on the Railroad right-of-way, which runs parallel to Lake Washington Boulevard commencing at the north end of Gene Coulon Memorial Beach Park and extending north; and, 2) a pedestrian-only trail that would be located to the south of the Barbee Mill housing development and would link to the May Creek Greenway to the east for a continuous trail connection from Lake Washington to Cougar Mountain Regional Park.

Shoreline Master Program Regulations

The Shoreline Management Act (SMA) of 1971 (RCW 90.58) is intended to protect the public interest associated with shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. The primary implementing tool of the SMA is the adoption by local jurisdictions of Shoreline Master Programs (SMP) which are intended to comprehensively guide the management of shorelines that are under the jurisdiction of the local government. The regulatory provisions of the City of Renton's currently adopted SMP are contained within the Renton Municipal Code (4-3-090). Numerous regulations within the SMP relate to public access along the shoreline and encourage leaving space for trails, non-motorized bike paths and/or other means of public use to provide greater shoreline utilization. At present, no public access to the Lake Washington shoreline is provided on the Quendall Terminals site; shoreline access is provided on the adjacent properties to the north and south of the site (see Section 3.6, **Relationship to Plans, Policies and Regulations**, for additional information on the adopted SMP and on the update to the SMP that is currently underway).

3.8.2 Impacts of the Alternatives

This section evaluates the probable significant impacts on parks and recreation facilities in the vicinity of the site with redevelopment under Alternatives 1 and 2. The public open space and recreation resources which would be provided under the alternatives and would help offset the project's impacts on the City's parks and recreation facilities are also described.

Alternatives 1 and 2

Construction Impacts

Construction activities associated with development of the Quendall Terminals site would result in periodic increases in dust and noise levels as a result of construction of new site infrastructure (including roadways, utilities and paved areas) and buildings. These activities would not be anticipated to result in impacts at the parks and recreation facilities closest to the site due to the distance to these areas and intervening land uses and roads. The closest parks to the site include May Creek Greenway (located approximately 0.5 mile to the southeast and southwest of the site) and Kennydale Beach Park (located approximately 0.6 mile to the southwest of the site). May Creek Greenway is buffered from the Quendall Terminals site by Lake Washington Boulevard and I-405, and Kennydale Beach Park is buffered from the site by the Barbee Mill housing development and other roadways. However, impacts to the Lake Washington Loop Trail and the Ripley Lane Trail would be anticipated during construction of frontage improvements and site access driveways. Such impacts could include physical blockage of the trails and increased truck traffic, which may impede use of the trail and result in safety concerns. Signage, potential detours and safety measures to ensure safe travel would be required to address these impacts.

Operational Impacts

Increases in the on-site population from proposed residential uses, as well as on-site employees from proposed office, retail and restaurant uses, would increase demands on neighborhood and regional parks and recreation facilities. Recreation facilities most likely to receive increased demand would include facilities near the site, such as: May Creek Greenway, Kennydale Beach Park and Gene Coulon Memorial Park.

In particular, Gene Coulon Memorial Park would likely experience a substantial number of visitors from the Quendall Terminals Redevelopment Project, because it is easily accessible by automobile, bicycle or walking via the Lake Washington Loop Trail. This park is already at or exceeding park capacity on warm days; the residents of the proposed project would contribute to the capacity issues at this park. Kennydale Beach Park would also likely experience a significant increase in visitors from the project. On warm days, this park is also already at capacity, and residents of the project would contribute to the capacity issues at this park.

Table 3.8-3 shows the amount of park and open space facilities that would be needed in the City of Renton based on the City's LOS standards and the projected residential population under Alternatives 1 and 2. For this analysis, it is assumed that the residential population onsite would consist entirely of new residents to the City of Renton, with no residents moving to the development from other areas within the City of Renton. Employees onsite could also potentially contribute to some increased use of nearby park and recreation facilities, but would not be expected to use these facilities at substantial levels and are not included in the analysis. As shown in **Table 3.8-3**, additional park and recreation facilities could be needed in the City based on the City's LOS standards and the increased on-site residential population under Alternative 1 and Alternative 2. As mentioned previously, the *City of Renton Comprehensive Plan* (Capital Facilities Element), notes that as residential growth continues within Renton, continued park and open space lands acquisition will be needed to serve the population.

Table 3.8-3
PARK AND RECREATION IMPACTS – ALTERNATIVES 1 AND 2

	Renton's LOS Standard	Alternative 1 (1,300 residents)	Alternative 2 (1,132 residents)
Neighborhood Parks	1.2 acres per 1,000 pop.	1.56 acres	1.36 acres
Community Parks	2.5 acres per 1,000 pop.	3.25 acres	2.83 acres
Regional Parks	1.08 acres per 1,000 pop.	1.40 acres	1.22 acres
Linear Parks	0.3 acres per 1,000 pop.	0.39 acres	0.34 acres
Special Use Areas	0.8 acres per 1,000 pop.	1.04 acres	0.91 acres
Open Space Areas	12.7 acres per 1,000 pop.	16.51 acres	14.38 acres
Baseball/Softball Fields	1 field per 2,250 pop.	0.57 field	0.50 field
Football/Soccer	1 field per 3,000 pop.	0.43 field	0.38 field
Tennis Courts	1 court per 2,500 pop.	0.52 court	0.45 court
Swimming Pools	1 pool per 40,000 pop.	0.033 pool	0.028 pool
Walking/Hiking Trails	0.2 mile per 1,000 pop.	0.26 miles	0.23 miles

Source: City of Renton Comprehensive Plan (2009) and EA/Blumen, 2010.

Table 3.8-4 provides a comparison of the proposed public open space and other areas that would be included under Alternatives 1 and 2 (see **Appendix G** for a depiction of these areas). The redevelopment alternatives would provide increased public passive recreation opportunities on the site in the form of a new publically accessible shoreline trail, open space acreage along the shoreline where the trail is located and the potential for improved connections from the proposed shoreline trail to Lake Washington Boulevard.[3] Improved access for private residents include sidewalks and plazas and other visually accessible open space in the development. Semi-private landscaped courtyards would feature shared open space for residents of the site in courtyard areas on top of the parking garages. Additional information on the open space and related areas under Alternatives 1 and 2 is provided in the following section.

[3] Hours of public access would need to meet park standards of sunrise to sunset to count toward public recreation.

Table 3.8-4
ON-SITE OPEN SPACE AND RELATED AREAS[1] – ALTERNATIVES 1 AND 2

	Alternative 1	Alternative 2
Natural Public Open Space Areas (Proposed Public Recreation Access)		
Natural Areas Along Shoreline Trail[2]	3.2 acres	3.2 acres
Shoreline Trail [2]	0.2 acres	0.3 acres
SUB-TOTAL	3.4 acres	3.5 acres
Other Areas		
Street-Level Landscaping - *in proposed dedicated right-of-way* - *not in proposed dedicated right-of-way*	 0.3 acres 1.4 acres	 0.3 acres 1.8 acres
Landscaped Courtyards	4.3 acres	4.1 acres
Sidewalks: - *in proposed dedicated right-of-way* - *not in proposed dedicated right-of-way*	 0.6 acres 0.3 acres	 0.6 acres 0.2 acres
Paved Plazas - *in proposed dedicated right-of-way* - *not in proposed dedicated right-of-way*	 0. acres 0.2 acres	 0 acres 0.1 acres
Other – Isolated Property	1.2 acres	1.2 acres
SUB-TOTAL	8.3 acres	8.3 acres
TOTAL	**11.7 acres**	**11.8 acres**

Source: Lance Mueller, 2010.
[1] These open space and other areas may or may not meet the City's standards, regulations and procedures for open space.
[2] Hours of public access would need to meet park standards of sunrise to sunset to count toward public recreation.

Private residential balconies would be provided for individual units. It is also possible that shared (semi-private) roof gardens and semi-private indoor amenity space (i.e. gyms, common rooms, etc.) could be included as part of the redevelopment alternatives. The extent of such amenities would be determined during design permitting of the project. The open space and other related areas that would be provided onsite are described further below under the redevelopment alternatives, and could help to meet the demand for passive recreation facilities from project residents and employees.

Alternative 1 – Application

Increases in the on-site population due to permanent residents, as well as on-site employees under Alternative 1 would increase demands on neighborhood and regional parks, open space, trails and recreation facilities. Proposed residential uses are anticipated to generate approximately 1,300 residents; proposed office, retail and restaurant uses are anticipated to generate approximately 1,050 employees at full buildout (assumed to occur in 2015). It is assumed that many of the project's residents and employees would visit Gene Coulon Memorial Park, approximately one mile to the south and Kennydale Beach Park, approximately 0.6 mile to the southwest. These parks are already at or exceeding capacity during warm days and the project would contribute to these capacity issues.

Alternative 1 would provide public open space and related areas on the site that would help to meet the demand for passive recreation facilities from project residents and employees.[4] However, the demand for active recreation facilities would not be satisfied onsite. As a possible mitigation measure, additional open space area could be provided onsite for active recreation (i.e. frisbee, softball). As shown in **Table 3.8-5**, approximately 11.7 acres of total open space and related areas would be provided under Alternative 1, including 3.4 acres of natural open space areas that would be visually and physically accessible to the general public at certain times of the day (i.e., the natural shoreline area and the shoreline trail, respectively). These open space and related areas may or may not meet the City's standards, regulations and procedures for open space. Alternative 1 would increase the publicly accessible open space onsite relative to existing conditions (the site is currently undeveloped and contains no publically accessible open space). Below is further description of the proposed public open space and other related areas under Alternative 1.

Proposed Public Open Space and Related Areas

- **Public Natural Area Along the Shoreline Trail:** The Quendall Terminals site includes approximately 1,583 feet of shoreline along Lake Washington. With redevelopment under Alternative 1, a shoreline setback would be maintained on the site, which would range from 41 to 215 feet wide, and would average 90 feet wide. Within the shoreline setback area, approximately 3.2 acres of natural open space area would be provided which would be visually accessible to the public via the shoreline trail. This natural open space area would contain wetlands that will be re-established/expanded and riparian habitat that will be restored/enhanced as part of the Shoreline Restoration Plan that will be implemented with site cleanup/remediation (see Section 3.2, **Critical Areas**, and **Appendix E** for additional information).

- **Other - Isolated Property:** The approximately 1.2-acre Isolated Property to the east of Ripley Lane N will be maintained and enhanced as a wetland and wetland buffer area as part of Shoreline Restoration Plan. This area would not be accessible/usable area for the public or residents/employees of the site.

- **Public Shoreline Trail:** As part of redevelopment, an approximately 0.2-acre pedestrian trail will be constructed along the Lake Washington shoreline during shoreline restoration (see **Chapter 2** for details on the likely properties of this trail – width, surface, etc.). This trail would traverse the western boundary of the site along the Lake Washington shoreline and would pass within approximately 10 feet of proposed buildings and parking at the closest points (see Section 3.6, **Relationship to Plans, Policies and Regulations**, and Section 3.7, **Aesthetics**, for a discussion of the relationship of the trail to the development). The public trail would provide passive recreation opportunities (i.e. opportunities for walking and viewing of wetlands and the lake) that would be available to the general public during reasonable hours, anticipated to be from 10 AM to dusk. Based on these hours of operation, the trail would be considered a semi-private facility.

[4] Ibid.

In order to provide additional opportunities for public use of the trail, the hours of allowed use of the trail could be extended to sunrise to sunset, consistent with other City of Renton parks.

The shoreline trail would link to the on-site, upland pedestrian circulation system (sidewalks along the private driveways at the southern and northern boundaries of the site) which connects to Lake Washington Boulevard, where existing pedestrian and bike facilities are present. This connection could be enhanced for use by the public by providing wider sidewalks onsite (i.e. 12-foot wide) that are part of public right-of-way. Frontage improvements (including sidewalks) are proposed along the west side of Lake Washington Boulevard and Ripley Lane N. These improvements would provide a connection to the May Creek trail to the southeast via the sidewalks on Lake Washington Boulevard adjacent to the Barbee Mill development.

The shoreline trail could also link to the future rails-trails corridor if it is developed, via connections to the site's internal circulation system. As discussed under Affected Environment, rails-trails is a proposed trail identified in the *Renton Trails and Bicycle Master Plan*, which could be established in the Railroad corridor right-of-way running parallel to Lake Washington Boulevard, directly to the east of the site. See Section 3.7, **Aesthetics/Views**, for a viewshed simulation from the location of this proposed future trail.

Public parking for the shoreline trail would likely be provided in the same general areas as the retail/restaurant parking. The applicant would specifically identify this parking at the site plan stage.[5]

- **Landscaped Courtyards:** Approximately 4.3 acres of landscaped courtyards would be provided for site residents over the residential parking garages. These courtyard areas would provide opportunities for semi-private passive recreation and would feature landscape planters and pavers for color, texture and pattern, and could potentially incorporate small water features.

- **Street-Level Landscaping:** Approximately 1.7 acres of landscaping would be provided along sidewalks and streets, and along the north and south boundaries of the site to enhance the pedestrian experience and buffer between the site and adjacent properties. Of this, approximately 0.3 acres would be publically accessible landscaping located in proposed dedicated right-of-way, and 1.4 acres would be semi-private landscaping located outside of a dedicated right-of-way.

- **Sidewalks:** Approximately 0.9 acres of sidewalks would be provided along the site's internal streets. Of this, approximately 0.6 acres would be publically accessible sidewalk located in dedicated right-of-way, and 0.3 acres would be semi-private sidewalk located outside of dedicated right-of-way.

- **Plazas:** Approximately 0.2 acres of semi-private paved plazas would be provided for gathering and socializing, all of which would be located outside of dedicated right-of-way.

[5] Ibid.

Consistency with SMA Regulations

The provision of a publically accessible trail within the natural open space area along the shoreline as part of the proposed Quendall Terminals redevelopment would be consistent with the City's SMA regulations which call for space and right-of-way to be left available for trails where possible, to provide for greater shoreline utilization. Access to this shoreline is proposed to be limited to reasonable daytime hours (10 AM to dusk) in order to limit conflicts with residents of the development (see Section 3.6, **Relationship to Plans, Policies and Regulations**, for additional information).[6]

Parks Mitigation/Impact Fees

In order to help offset the impacts of new residential development on park and recreation facilities, open space and trails, the City of Renton has a mitigation/impact fee program. The project applicant will be required to pay the mitigation/impact fee that is in place at the time of building permit issuance.

Alternative 2 – Lower Density Alternative

Similar to Alternative 1, increases in the on-site population due to permanent residents, as well as on-site employees under Alternative 2 would increase demands on neighborhood and regional parks and recreation facilities. Proposed residential uses are anticipated to generate approximately 1,132 residents; proposed retail and restaurant uses are anticipated to generate approximately 50 employees at full buildout (assumed to occur in 2015). As a result, the demand on area parks and recreation facilities would be less than under Alternative 1. Similar to Alternative 1, it is assumed that many of the site's residents would visit Gene Coulon Memorial Park and Kennydale Beach Park. These parks are already at or exceeding capacity during warm days and the project would contribute to these capacity issues.

Similar to Alternative 1, Alternative 2 would provide public open space and related areas on the site that would help to meet the demand for passive recreation facilities from project residents and employees. However, the demand for active recreation facilities would not be satisfied onsite, and as a possible mitigation measure, additional open space area could be provided onsite for active recreation. As shown in **Table 3.8-4**, approximately 11.8 acres of total open space area and related areas would be provided onsite under Alternative 2, including 3.5 acres of natural open space that would be visually and physically accessible to the general public (i.e. the natural shoreline area and the shoreline trail, respectively). This open space and related areas may or may not meet the City's standards, regulations and procedures to be considered open space. Alternative 2 would increase the publicly accessible open space onsite relative to existing conditions. Below is further description of the proposed open space and other related areas under Alternative 2.

Proposed Open Space and Related Areas

- **Public Natural Area Along the Shoreline Trail:** With redevelopment under Alternative 2, a shoreline setback would be maintained on the site. Within the shoreline setback

[6] Ibid.

area, approximately 3.2 acres of natural open space area would be provided, generally as described for Alternative 1.[7]

- **Other - Isolated Property:** The approximately 1.2-acre Isolated Property to the east of Ripley Lane N would be maintained and enhanced as a wetland and wetland buffer area the same as under Alternative 1.

- **Public Shoreline Trail:**[8] As part of redevelopment, an approximately 0.3-acre pedestrian trail would be constructed along the Lake Washington shoreline during shoreline restoration similar to under Alternative 1. This trail would traverse the western boundary of the site along the Lake Washington Shoreline, and would pass within approximately 10 feet of proposed buildings and parking at the closest points. The public trail would provide passive recreation opportunities that would be available to the public during reasonable hours, anticipated to be from 10 AM to dusk. These hours could be extended to provide additional opportunities for public use of the trail.

  The shoreline trail would link to the on-site upland pedestrian circulation system (sidewalks along the private driveways at the southern and northern boundaries of the site) which connects to Lake Washington Boulevard, where existing pedestrian and bike facilities are present. This connection could be enhanced for use by the public by widening the on-site sidewalks. Frontage improvements including sidewalks would be provided on the west sides of Lake Washington Boulevard and Ripley Lane N.

  Public parking for the shoreline trail would likely be provided as described for Alternative 1, in the same general area as the retail/restaurant parking.

- **Landscaped Courtyard:** Under Alternative 2, approximately 4.1 acres of semi-private open space would be provided for site residents in landscaped courtyards over the residential parking garages, and would include features similar to those described for Alternative 1.

- **Street-Level Landscaping:** Under Alternative 2, approximately 2.1 acres of landscaping would be provided along sidewalks and streets, and along the north and south boundaries of the site, similar to under Alternative 1. Of this, 0.3 acres would be publically accessible landscaping located in proposed dedicated right-of-way, and 1.8 acres would be semi-private landscaping located outside of dedicated right-of-way.

- **Sidewalks:** Under Alternative 2, approximately 0.8 acres in sidewalks would be provided along the site's internal streets. Of this, 0.6 acres would be publically accessible sidewalk located in dedicated right-of-way, and 0.2 acres would be semi-private sidewalk located outside of dedicated right-of-way.

- **Plazas:** Under Alternative 2, approximately 0.1 acres of semi-private paved plazas would be provided for gathering and socializing, all of which would be located outside of dedicated right-of-way.

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[7] Ibid.
[8] Ibid.

Consistency with SMA Regulations

As described for Alternative 1, the provision of a publically accessible trail within the natural open space area along the shoreline as part of the proposed Quendall Terminals redevelopment would be consistent with the City's SMA regulations which call for space and right-of-way to be left available for trails where possible, to provide for greater shoreline utilization. Access to this shoreline would be limited to reasonable daytime hours (10 AM to dusk) in order to limit conflicts with residents of the site (see Section 3.6, **Relationship to Plans, Policies and Regulations**, for additional information).[9]

Parks Mitigation/Impact Fees

In order to help offset the impacts of new residential development on park and recreation facilities, open space and trails, the City of Renton has a mitigation/impact fee program. The project applicant will be required to pay the mitigation/impact fee that is in place at the time of building permit issuance.

No Action Alternative

Under the No Action Alternative, no new mixed-use development would occur on the Quendall Terminals site at this time. As such, there would be no additional demand for parks and recreation facilities from residents and employees. Cleanup/remediation activities in association with the site's status as a Superfund site by the Environmental Protection Agency (EPA) will occur as part of the separate EPA process. However, no publically accessible shoreline trail would be built in conjunction with remediation.

3.8.3 Mitigation Measures

Required/Proposed Mitigation Measures

Public Open Space and Related Areas/Fees[10]

- A parks mitigation/impact fee would be paid for each multifamily unit in the proposed development at the time of building permit issuance to help offset the impacts of the project on City parks and recreation facilities.

- 3.4 acres (Alternative1)/3.5 acres (Alternative 2) of public open space and related areas would be provided on the site that would be visually and physically accessible to the public, including the shoreline trail and natural open space areas along the shoreline.

- Frontage improvements, including sidewalks, would be provided along the west side of Lake Washington Boulevard and Ripley Lane N along the site. These sidewalks could connect to sidewalks to the north and south, which connect to other pedestrian facilities in the area.

[9] Ibid.
[10] Ibid.

- Public parking for the shoreline trail would likely be provided in the same general area as the retail/restaurant parking; the applicant would specifically identify this parking prior to site plan approval.

- Signage, detours and safety measures would be put in place to detour bicyclist utilizing the Lake Washington Loop trail at time of construction.

Measures to Improve Semi-Private Recreation Access for Residents

- Semi-private landscaped courtyards on top of the parking garages would be provided as shared open space for residents of the site. These areas would help to meet the demand for passive recreation facilities from project residents.

- Street level landscaping, plazas and sidewalks would be provided. These areas would help meet the project's demand for passive recreation facilities.

Other Possible Mitigation Measures

Public Open Space and Related Areas[11]

- The hours of use of the shoreline trail could be extended to sunrise to sunset, consistent with other City of Renton parks, in order to meet the requirements for public access.

- The connection between the shoreline trail and Lake Washington Boulevard could be enhanced by providing wider sidewalks (i.e. 12-foot wide) that are part of public rights-of-way.

- Additional open space could be provided onsite for active recreation (i.e. frisbee, softball, etc.).

- A crosswalk across Lake Washington Boulevard could be provided in order to connect to the May Creek Trail on the east side of the Boulevard.

Measures to Improve Semi-Private Recreation Access for Residents

- Shared roof gardens and indoor amenity space (i.e. gyms, common rooms, etc.) could be provided as part of the project.

3.8.4 Significant Unavoidable Adverse Impacts

Residents of the proposed development would use nearby parks and recreation facilities, including Gene Coulon Memorial Park and Kennydale Beach Park, which are already at or exceeding capacity in the summer. Demand from project residents would contribute to the existing capacity issues at these parks.

[11] Ibid.

3.9 TRANSPORTATION

This section describes existing transportation systems and traffic operations in the Quendall Terminal site vicinity, and evaluates potential impacts from redevelopment under the EIS alternatives. This section is based on the *Quendall Terminals Transportation Impact Study* (December 2010) prepared by Transportation Engineering NorthWest (see **Appendix H** to this DEIS**)**.

3.9.1 Affected Environment

This section describes existing transportation system and traffic conditions in the study area and includes an inventory of: existing roadway conditions, intersection traffic control, traffic volumes, intersection levels of service, public transportation services, non-motorized transportation facilities and planned roadway improvements.

Roadway Conditions

Lake Washington Boulevard, NE 44th Street and Ripley Lane N would be used for access to and from the Quendall Terminals site with redevelopment under Alternatives 1 and 2. Roadway characteristics, including facility type, number of lanes, posted speed limits, shoulder types and widths are described in **Appendix H**.

Intersection Traffic Control and Channelization

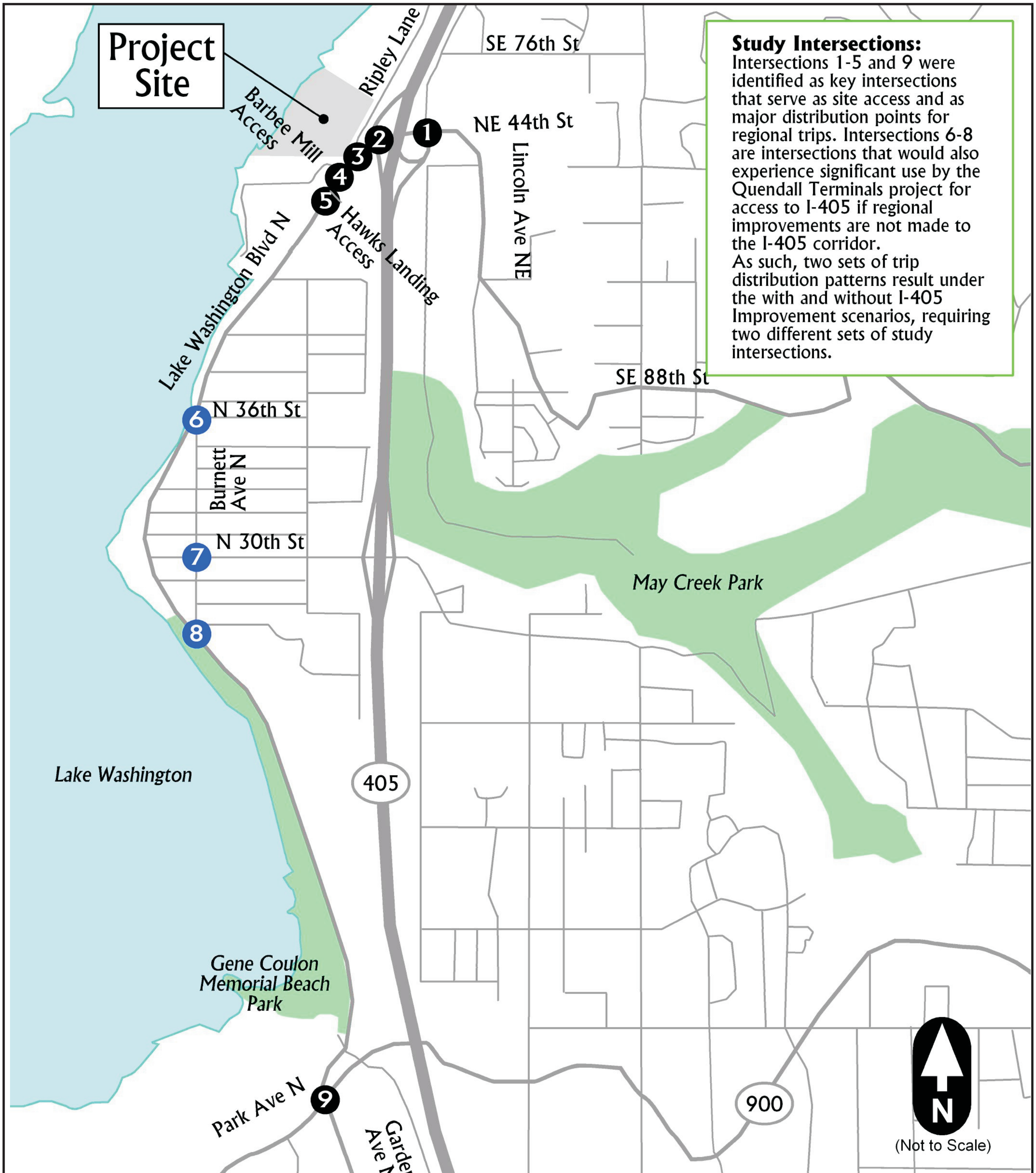
Nine study intersections were analyzed for the transportation analysis, including:

1. Lake Washington Boulevard (I-405 NB ramps) / NE 44th Street
2. I-405 SB ramps / NE 44th Street
3. Lake Washington Boulevard / Ripley Lane N
4. Lake Washington Boulevard / Barbee Mill Access (N 43rd Street)
5. Lake Washington Boulevard / Hawk's Landing Access (future intersection)
6. Lake Washington Boulevard / N 36th Street / Burnett Avenue N
7. N 30th Street / Burnett Avenue N (without I-405 Improvements Scenario only)
8. Lake Washington Boulevard / Burnett Avenue N (without I-405 Improvements Scenario only)
9. Lake Washington Boulevard / Park Avenue N / Garden Avenue N

See **Figure 3.9-1** for an illustration of the locations of the nine off-site study intersections, and **Appendix H** for the existing intersection channelization and control.

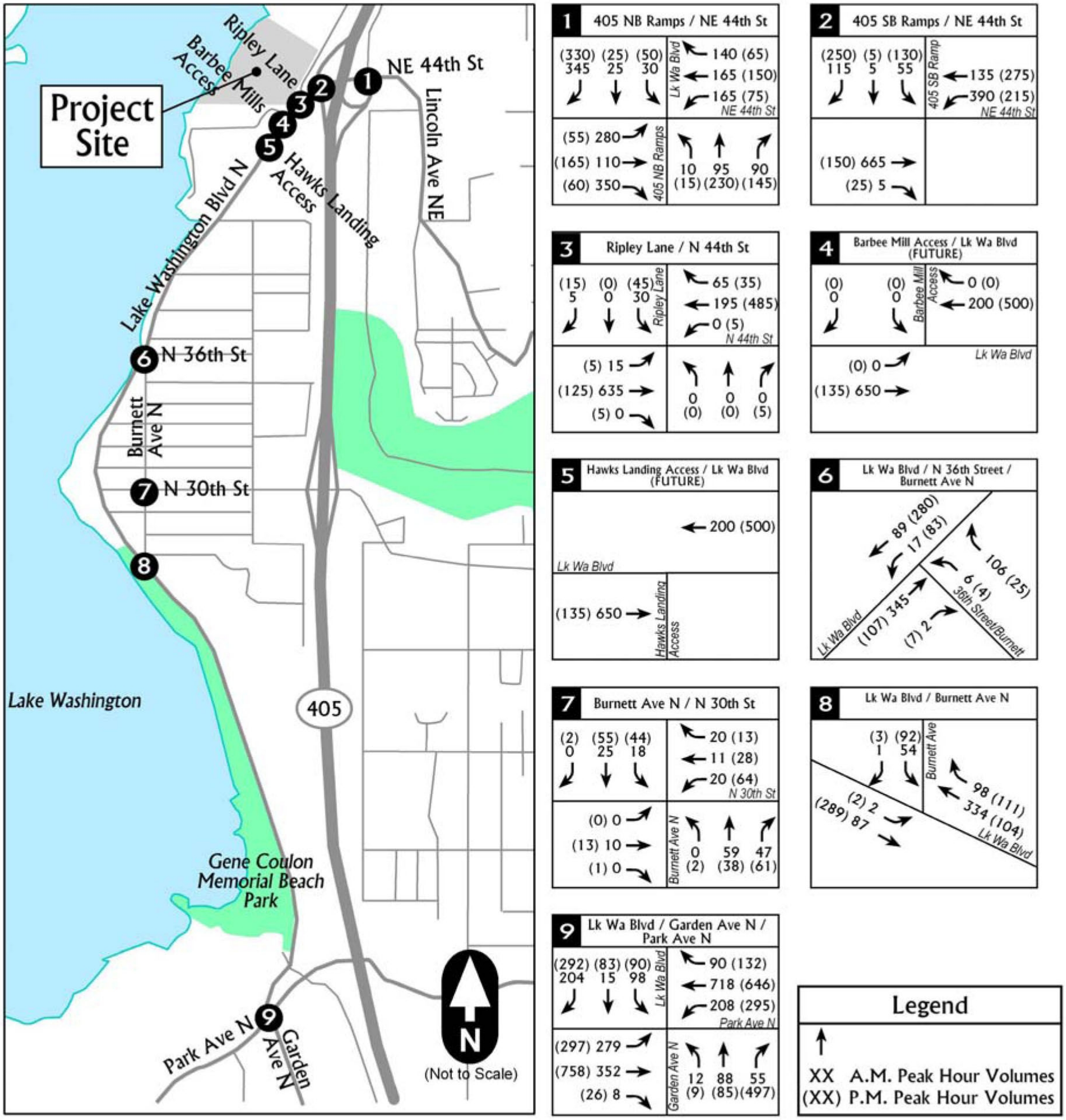
Existing Traffic Volumes

Peak hour traffic volumes represent the highest hourly volume of vehicles passing through an intersection during a typical 7-9 AM and 4-6 PM weekday peak periods. Peak period turning movement counts at study intersections were conducted in 2009 and 2010 (see **Figure 3.9-2** for the 2009-2010 existing AM and PM peak period turning movements at all study intersections.



Source: *Transportation Engineering NorthWest*, 2010.

BLUMEN CONSULTING GROUP, INC	Quendall Terminals	Figure 3.9-1
		Study Intersection Locations



Source: *Transportation Engineering NorthWest,* 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 3.9-2** **Existing Peak Hour Traffic Volumes**

Intersection Level of Service

Level of service (LOS) is an indicator of the quality of traffic flow at an intersection or road segment. The LOS grading ranges from A to F. LOS A indicates that minimal delays are present and low volumes are experienced; LOS F indicates that long delays, heavy volumes, and increased traffic congestion (see Table 1 in **Appendix H** for a summary of the criteria for the delay range for each level of service at signalized and unsignalized intersections). The methods used to calculate the levels of service are described in the updated *2000 Highway Capacity Manual* (Special Report 209, Transportation Research Board).

LOS for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, and increased travel time. The delay experienced by a motorist is made up of a number of factors that relate to traffic control, geometries, traffic demand, and incidents. Total control delay is the difference between the travel time actually experienced and the reference travel time that would result during base conditions (i.e. the absence of traffic control, geometric delay, any incidents or as a result other vehicles). The City of Renton does not have a formally adopted LOS standard, but measures LOS on a travel time basis. For the purposes of the traffic impact analysis, LOS E was assumed as the threshold of acceptable service.

For unsignalized intersections, an LOS and estimate of average control delay was determined for each minor or controlled movement, based upon a sequential analysis of gaps in the major traffic streams and conflicting traffic movements. In addition, given that unsignalized intersections create different driver expectations and congestion levels than signalized intersections, their delay criteria are lower. Control delay at unsignalized intersections include deceleration delay, queue move-up time, stopped delay in waiting for an adequate gap in flows through the intersection and final acceleration delay.

Synchro 6, Traffic Signal Coordination Software program was used to develop network scenarios for evaluating LOS at the study intersections. Signal cycle lengths and splits were optimized to assume adjustments in optimum performance over time. Use of the *Synchro 6* software program is consistent with the *2000 Highway Capacity Manual.*

Table 3.9-1 presents existing 2009/2010 AM and PM peak hour LOS at the study area intersections. During the AM peak hour, Intersection #1 – Lake Washington Boulevard (I-405 NB ramps) / NE 44th Street operates at LOS E and the southbound movement at Intersection #2 – I-405 SB ramps / NE 44th Street operates at LOS F. During the PM peak hour, all intersections operate at LOS D or better. Detailed LOS summary sheets are provided in **Appendix H**.

Table 3.9-1
EXISTING 2009-2010 PEAK HOUR INTERSECTION LEVEL OF SERVICE

Int.#	Unsignalized Intersections	LOS	Delay	V/C
AM Peak Hour				
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	E	48	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	2.32
3	Ripley Lane N/NE 44th Street	SB-D	26	0.20
6	Lk Wa Blvd/N 36th Street	B	11	-
7	N 30th Street/Burnett Ave N	A	8	-
8	Lk Wa Blvd/Burnett Ave N	B	13	-
Int.#	**Signalized Intersections**	**LOS**	**Delay**	**V/C**
9	Lake Wa Blvd-Garden Ave N/Park Ave N	C	26	0.71
PM Peak Hour				
Int.#	**Unsignalized Intersections**	**LOS**	**Delay**	**V/C**
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	C	21	-
2	I-405 SB Ramps/NE 44th Street	SB-C	22	0.60
3	Ripley Lane N/NE 44th Street	SB-C	16	0.16
6	Lk Wa Blvd/N 36th Street	A	10	-
7	N 30th Street/Burnett Ave N	A	8	-
8	Lk Wa Blvd/Burnett Ave N	A	10	-
Int.#	**Signalized Intersections**	**LOS**	**Delay**	**V/C**
9	Lake Wa Blvd (Garden Ave N)/Park Ave N	D	39	0.84

Source: TENW, 2010.
Note: Analysis based on Synchro results using HCM 2000 control delays and LOS.
Unsignalized intersections show LOS and control delays for the worst directional movement.

Public Transportation Services

No public transit service is currently provided to the Quendall Terminals site. The closest transit service in the site area is provided via a dial-a-ride service area fixed route service in the vicinity of the NE 30th Street interchange and I-405. Future potential public transportation in the site vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT, with a flyer stop at the I-405/NE 44th Street interchange.

Non-motorized Transportation Facilities

There are currently no non-motorized transportation facilities on the Quendall Terminals site. Non-motorized transportation facilities in the area include striped bike lanes on Lake Washington Boulevard; a paved four- to five-foot shoulder on the west side of the street is also provided for pedestrians. The existing Railroad corridor to the east of the site was recently purchased by the Port of Seattle and is identified in the City of Renton *Trails and Bicycle Master Plan* (2009) as a future "rails to trails" planned trail.

Planned Transportation Improvements

The City of Renton and Washington State Department of Transportation (WSDOT) have identified future planned transportation improvements in the vicinity of the Quendall Terminals site that would be affected by trips generated from development on the site. While these improvements are identified as "planned", they have yet to receive full funding and, therefore, the timing of such improvements is unknown at this time. The City of Renton's *2010-2015 Transportation Improvement Program* (TIP) identified the following transportation improvement in the site vicinity:

- **TIP No. 38: Lake Washington Boulevard - Park Avenue N to Gene Coulon Memorial Park** – This project includes road widening, traffic signal installation, construction of railroad crossing, installation of appropriate drainage and curb/gutters/sidewalks on Lake Washington Boulevard from Park Avenue N to Coulon Park. This project will serve the Southport development adjacent to Coulon Park and improve access to the park.

WSDOT has identified improvements to the I-405/NE 44th Street interchange as part of the *I-405 Renton to Bellevue Project (SR-169 to I-90)*. . The improvements to the I-405/NE 44th Street interchange include the following:

- Reconfiguring the NE 44th Street interchange into a tight-diamond configuration.
- Relocating both NB and SB ramps with additional through and turn-lanes.
- Addition of traffic signals at both NB and SB ramp intersections.
- Addition of a traffic signal at the Ripley Lane N/Lake Washington Boulevard intersection (While the widening of NE 44th Street west of Ripley Lane N is identified as part of the I-405 Improvements, this widening is assumed to extend approximately 100 feet west of Ripley Lane N and, therefore, no channelization capacity was assumed to occur at this intersection in the transportation analysis).

3.9.2 Impacts

Alternatives 1 and 2

The following section describes transportation impacts of Alternatives 1 and 2 at buildout in 2015 on the surrounding arterial network. All proposed redevelopment would occur on the Main Property; no new development would occur on the Isolated Property and no associated vehicle trips or transportation impacts would result from the Isolated Property. This analysis includes: baseline transportation network assumptions, baseline travel demand forecasts, new trips generated by the redevelopment alternatives, distribution and assignment of new project trips, review of intersection level of service impacts, an evaluation of site access and circulation issues, and an analysis of public transportation and non-motorized transportation impacts. The land use breakdown associated with Alternative 1 was used in the analysis as a conservative, "worst-case" scenario due to the fact that this alternative would include higher density development (more residential units and office space) and would generate more vehicular trips than Alternative 2.

Baseline Transportation Network Assumptions

The baseline in the transportation analysis is the future 2015 condition without traffic from the proposed Quendall Terminals redevelopment. The future baseline transportation networks reflect planned infrastructure in the study area. Two future 2015 baseline transportation networks were included in the analysis: with and without the Washington State Department of Transportation (WSDOT) Interchange/I-405 Improvements (I-405 Improvements).

Baseline Travel Demand Forecasts

Baseline travel demand forecasts were prepared for 2015 using land use and travel demand forecasting information from the City of Renton. The most appropriate travel demand forecasting tool available is the City of Renton *2015 EMME Travel Model*. The City's model was recently completed in May 2010 and calibrated to 2008 existing conditions. The model contains the most up to date information on land use forecasts for the site area, the City of Renton and surrounding vicinity and evaluated future networks with and without I-405 Improvements. The *2015 EMME Travel Model* was refined for the transportation analysis to account for project-specific details and future development projects that are planned or in the pipeline (see **Appendix H** for details on the methodology for this analysis and assumed pipeline projects).

Trip Generation of Development

Project trip generation was estimated for Alternative 1 and Alternative 2. Trip generation rates compiled by the Institute of Transportation Engineers (ITE) *Trip Generation,* 8th Edition, 2008, were used to estimate daily, AM and PM peak hour vehicular trip generation with redevelopment of the site. In response to comments received during EIS scoping, trip rates generated by residential uses were increased by 10 percent to account for no existing public transit services or commercial businesses in the immediate site vicinity. As such, the trip generation assumptions presented below should be considered conservative.

In addition, average pass-by rates for the proposed retail uses identified in the ITE *Trip Generation Handbook 2nd Edition*, June 2004 were used. Reductions from the gross trip generation of the proposed uses were taken into account for internal captured trips within the site. Internal trips are made by people making multiple stops within a development without generating new trips onto the adjacent street system. The internal trip reductions were based on the methodology established in the ITE *Trip Generation Handbook*.

It is estimated that a net total of approximately 9,000 daily, 865 AM peak hour (445 entering, 420 exiting), and 950 PM peak hour vehicular trips (440 entering and 510 exiting) would be generated at 2015 full buildout conditions under Alternative 1. A net total of approximately 5,800 daily, 445 AM peak hour (105 entering, 340 exiting), and 540 PM peak hour vehicular trips (350 entering and 190 exiting) would be generated at 2015 full buildout conditions under Alternative 2 (see **Appendix H** for details on the assumptions and methodologies used to estimate trip generation).

Trip Distribution and Assignment

At buildout in 2015, Alternative 1 without I-405 Improvements, project trip distribution was based upon a review of a select zone assignment from the City of Renton *EMME Travel Model*. Peak hour traffic volumes generated by Alternative 1 would generally be distributed as follows (see **Appendix H** for figures illustrating the trip distribution without I-405 Improvements and peak hour project-generated trip assignment):

- 20 percent to the south on I-405 via Lake Washington Boulevard, Burnett Ave N, N 30th Street.
- 45 percent to the north on I-405 via NE 44th Street.
- 15 percent to the south on Lake Washington Boulevard (south of Burnett Ave N).
- 10 percent to the north on Lake Washington Boulevard (north of NE 44th Street).

- 10 percent to the east via Lincoln Avenue NE.

Given significant freeway/interchange congestion forecasted at the I-405/NE 44th Street interchange without I-405 Improvements, traffic assignments to and from the south of the site are not forecasted to utilize the adjacent interchange, but instead would access I-405 at NE 30th Street and travel on other parallel corridors.

At buildout in 2015, Alternative 1 with I-405 Improvements, trip distribution was also based upon a review of a select zone assignment from the City of Renton *EMME Travel Demand Model*. With I-405 Improvements, significant congestion relief is forecasted to occur on I-405 and parallel routes, shifting site-generated traffic back onto the I-405 corridor and the NE 44th Street interchange. Previous diversions of site-generated traffic to both parallel north-south arterials and corridors east of the freeway would be reduced to only those origin destination pairs estimated to occur on the Coal Creek Parkway corridor, Newcastle and east Renton. Thus, peak hour traffic volumes generated by Alternative 1 would generally be distributed as follows (see **Appendix H** for figures illustrating trip distribution with I-405 Improvements and peak hour project-generated trip assignment shown):

- 30 percent to the south on I-405 via NE 44th Street.
- 45 percent to the north on I-405 via NE 44th Street.
- 15 percent to the south on Lake Washington Boulevard (south of project site).
- 5 percent to the north on Lake Washington Boulevard (north of NE 44th Street).
- 5 percent to the east via Lincoln Avenue NE.

As a result of the above-described trip distribution, two intersections are analyzed for the "Without I-405 Improvements" scenario that are not analyzed for the "With I-405 Improvements" scenario: #7 - N 30th Street/Burnett Avenue N and #8 - Lake Washington Boulevard/Burnett Avenue intersections.

Intersection Level of Service Impacts

This section summarizes LOS impacts under Alternative 1 and the baseline condition (No Action Alternative). In addition, a sensitivity analysis was conducted of LOS impacts under Alternative 2 to determine if reduced development would result in the need for different transportation improvements. Given existing and future baseline transportation needs of the I-405/NE 44th Street interchange and vicinity (i.e. limited infrastructure to support new development), baseline transportation improvements and mitigation needs of site redevelopment under either Alternative 1 or Alternative 2 were determined to be the same.

Alternative 1

Table 3.9-2 summarizes LOS impacts under Alternative 1 at buildout in 2015 without I-405 Improvements. **Figures 3.9-3** and **3.9-4** illustrate peak hour traffic volumes under the baseline condition and Alternative 1, respectively, in 2015 without the I-405 Improvements. The following four intersections are expected to operate at LOS E/F under 2015 conditions without I-405 Improvements:

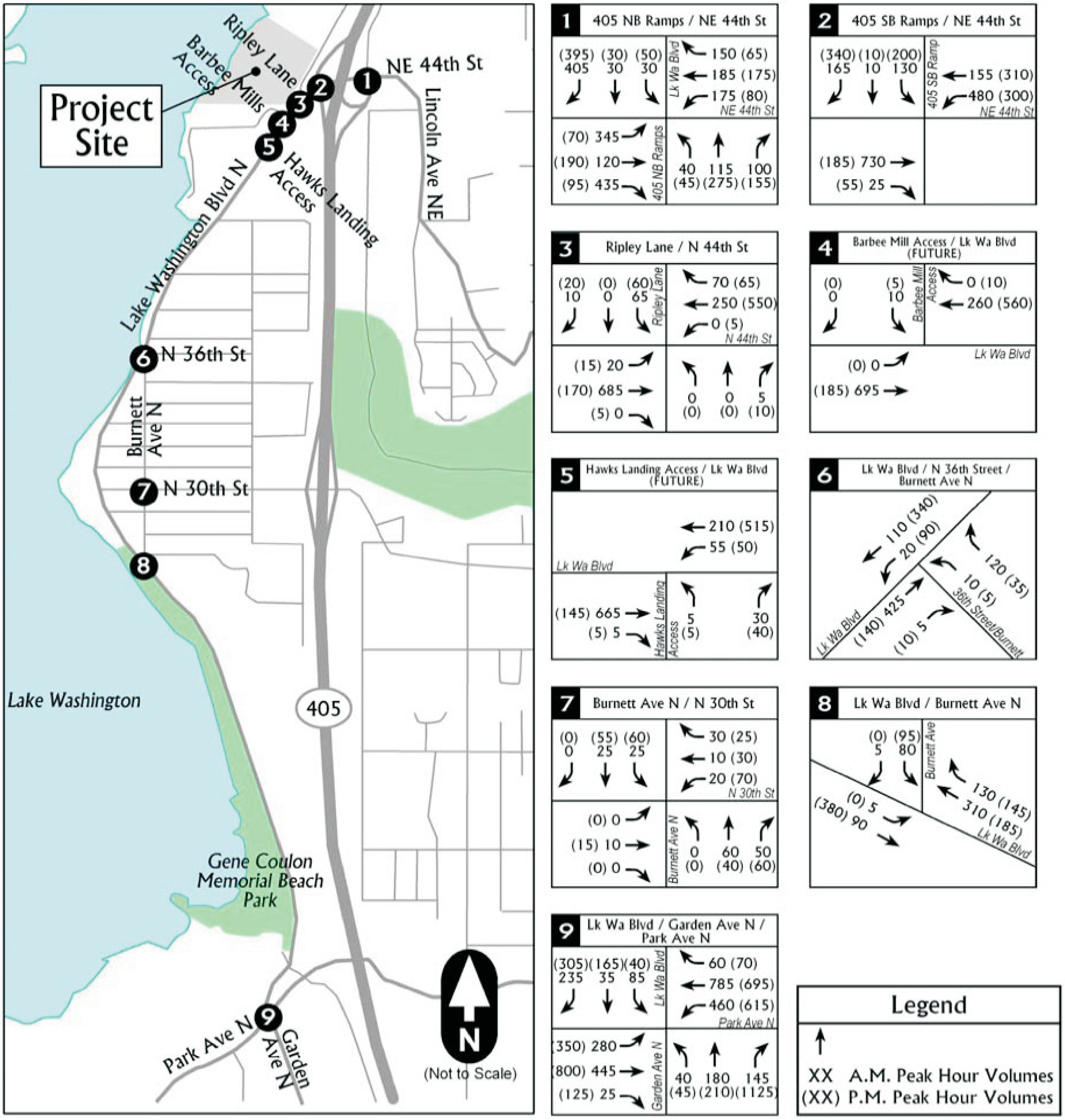
- Intersection #1 – Lake Washington Boulevard (I-405 NB Ramps) at NE 44th Street (LOS F with or without the development during AM and PM peak hours).

- Intersection #2 – I-405 SB Ramps at NE 44th Street (southbound movement at LOS F with or without the development during AM and PM peak hours).
- Intersection #3 – Ripley Lane N/Lake Washington Boulevard (southbound movement: LOS E/F with or without the project during the AM peak hour, LOS F with the project only during the PM peak hour).
- Intersection #9 – Lake Washington Boulevard (Garden Avenue) at Park Avenue N (LOS F with or without the development during the PM peak hour).

Table 3.9-2
2015 INTERSECTION LEVEL OF SERVICE IMPACTS - BASELINE AND ALTERNATIVE 1 (WITHOUT I-405 IMPROVEMENTS)

Int. #	Intersection	2015 Without Project (Baseline/No Action)			2015 With Alternative 1 (The Application)		
		LOS	Delay	V/C	LOS	Delay	V/C
AM Peak Hour							
Unsignalized Intersections							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	F	86	-	F	>100	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	7.55	SB-F	>100	23.9
3	Ripley Lane N/NE 44th Street	SB-E	36	0.42	SB-F	>100	2.69
4	Lake Wa Blvd/Barbee Mill Access	SB-C	20	0.04	SB-D	28	0.59
5	Lake Wa Blvd/Hawks Landing Access	NB-C	16	0.10	NB-C	19	0.13
6	Lk Wa Blvd/N 36th Street	B	12	-	C	18	-
7	N 30th Street/Burnett Ave N	A	8	-	A	8	-
8	Lk Wa Blvd/Burnett Ave N	B	11	-	B	13	-
Signalized Intersection							
9	Lake Wa Blvd-Garden Ave N/Park Ave N	D	38	0.81	D	46	0.88
PM Peak Hour							
Unsignalized Intersections							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	F	53	-	F	>100	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	1.74	SB-F	>100	3.97
3	Ripley Lane N/NE 44th Street	SB-C	20	0.26	SB-F	>100	1.84
4	Lake Wa Blvd/Barbee Mill Access	SB-B	15	0.01	SB-C	25	0.57
5	Lake Wa Blvd/Hawks Landing Access	NB-B	10	0.06	NB-B	12	0.08
6	Lk Wa Blvd/N 36th Street	B	11	-	C	21	-
7	N 30th Street/Burnett Ave N	A	8	-	A	9	-
8	Lk Wa Blvd/Burnett Ave N	B	12	-	B	14	-
Signalized Intersection							
9	Lake Wa Blvd-Garden Ave N/Park Ave N	F	171	1.41	F	176	1.44

Source: TENW, 2010.
Notes:
1. Analysis based on Synchro results using HCM 2000 control delays and LOS with optimized phasing/timing systems for signalized intersections.
2. Lake Washington Boulevard and NE 44th Street assumed to be east-west.



Source: *Transportation Engineering NorthWest*, 2010.

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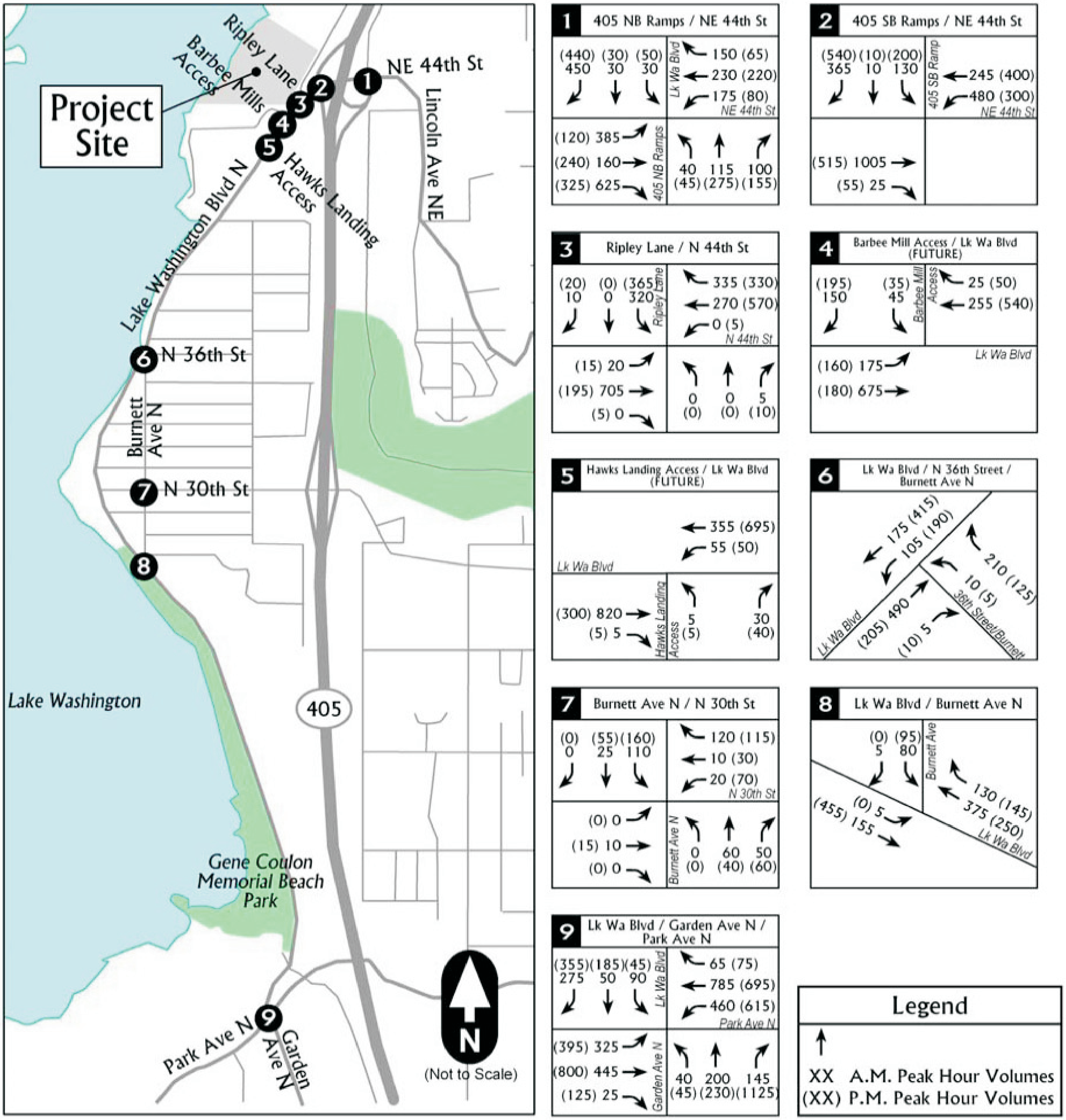
Quendall Terminals

Figure 3.9-3

2015 Baseline Peak Hour Traffic Volumes (without I-405 Improvements)



Source: *Transportation Engineering NorthWest,* 2010.

BLUMEN CONSULTING GROUP, INC	**Quendall Terminals**	**Figure 3.9-4** **2015 Alternative 1 Peak Hour Traffic Volumes (without I-405 Improvements)**

Table 3.9-3 summarizes level of service impacts under Alternative 1 at buildout in 2015 with I-405 Improvements. **Figures 3.9-5** and **3.9-6** illustrate peak hour traffic volumes under the baseline condition and under Alternative 1 in 2015 with I-405 Improvements. The following intersection is expected to operate at LOS E/F under 2015 conditions:

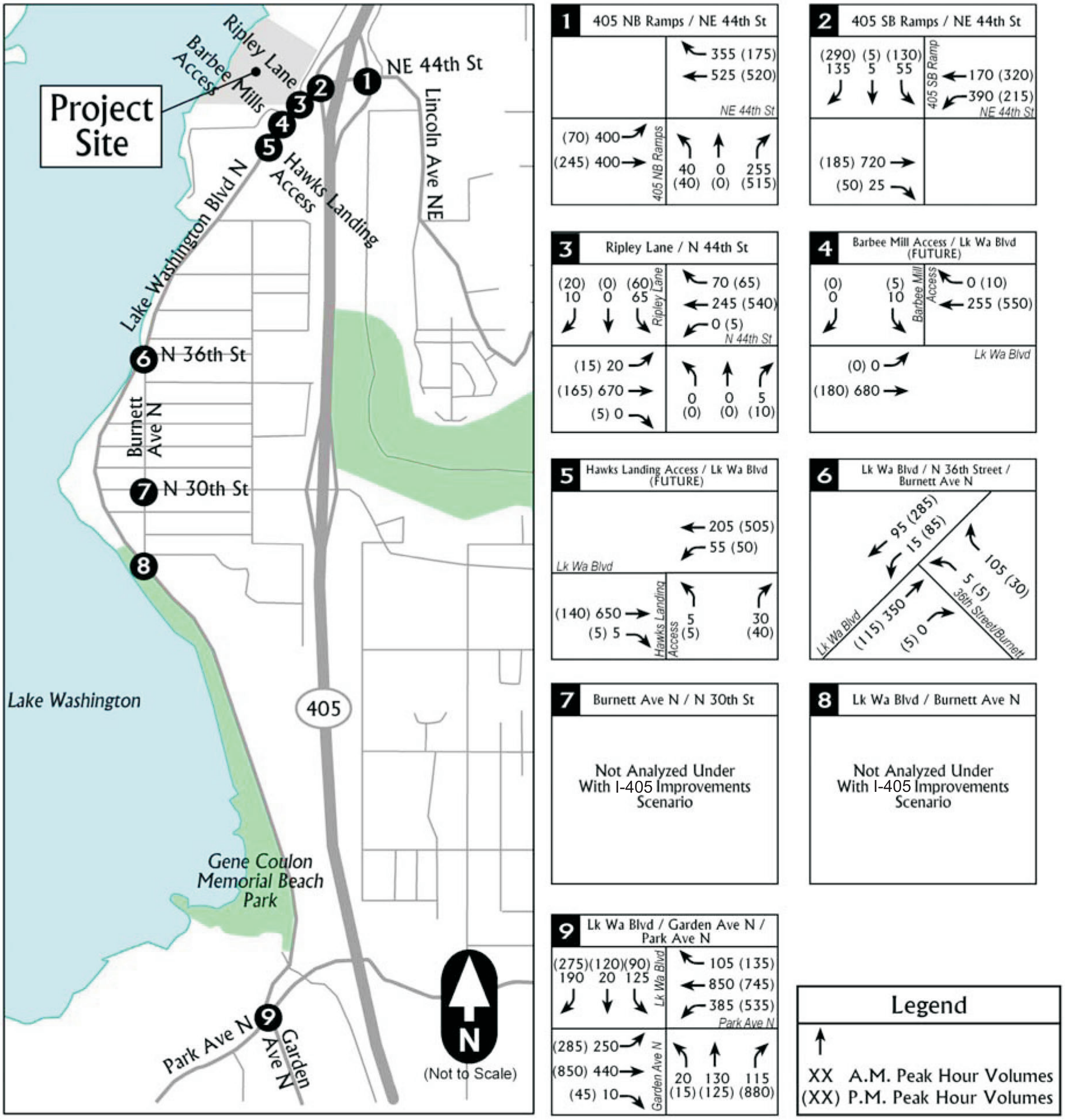
- Intersection #9 – Lake Washington Boulevard (Garden Avenue) at Park Avenue N (LOS F during the PM peak hour with or without the development).

Table 3.9-3
2015 INTERSECTION LEVEL OF SERVICE IMPACTS - BASELINE AND ALTERNATIVE 1 (WITH I-405 IMPROVEMENTS)

Int. #	Intersection	2015 Without Project (Baseline/No Action)			2015 With Alternative 1 (The Application)		
		LOS	Delay	V/C	LOS	Delay	V/C
AM Peak Hour							
Unsignalized Intersections							
4	Lake Wa Blvd/Barbee Mill Access	SB-C	16	0.02	SB-D	32	0.53
5	Lake Wa Blvd/Hawks Landing Access	NB-C	21	0.02	NB-D	25	0.03
6	Lk Wa Blvd/N 36th Street	A	10	-	B	11	-
7	N 30th Street/Burnett Ave N	Not Analyzed Under With I-405 Improvements Scenario					
8	Lk Wa Blvd/Burnett Ave N						
Signalized Intersection							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	A	10	0.40	B	14	0.57
2	I-405 SB Ramps/NE 44th Street	B	13	0.38	C	27	0.50
3	Ripley Lane N/NE 44th Street	B	20	0.61	D	49	0.88
9	Lake Wa Blvd-Garden Ave N/Park Ave N	C	30	0.77	D	40	0.82
PM Peak Hour							
Unsignalized Intersections							
4	Lake Wa Blvd/Barbee Mill Access	SB-C	16	0.02	SB-D	29	0.52
5	Lake Wa Blvd/Hawks Landing Access	NB-C	17	0.02	NB-C	22	0.02
6	Lk Wa Blvd/N 36th Street	A	10	-	B	11	-
7	N 30th Street/Burnett Ave N	Not Analyzed Under With I-405 Improvements Scenario					
8	Lk Wa Blvd/Burnett Ave N						
Signalized Intersection							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	B	13	0.21	B	16	0.40
2	I-405 SB Ramps/NE 44th Street	B	12	0.19	B	18	0.44
3	Ripley Lane N/NE 44th Street	B	14	0.48	C	27	0.79
9	Lake Wa Blvd-Garden Ave N/Park Ave N	F	106	1.16	F	110	1.18

Source: TENW, 2010.

1. Analysis based on Synchro results using HCM 2000 control delays and LOS with optimized phasing/timing systems for signalized intersections.
2. Lake Washington Boulevard and NE 44th Street assumed to be east-west.



Source: *Transportation Engineering NorthWest,* 2010.

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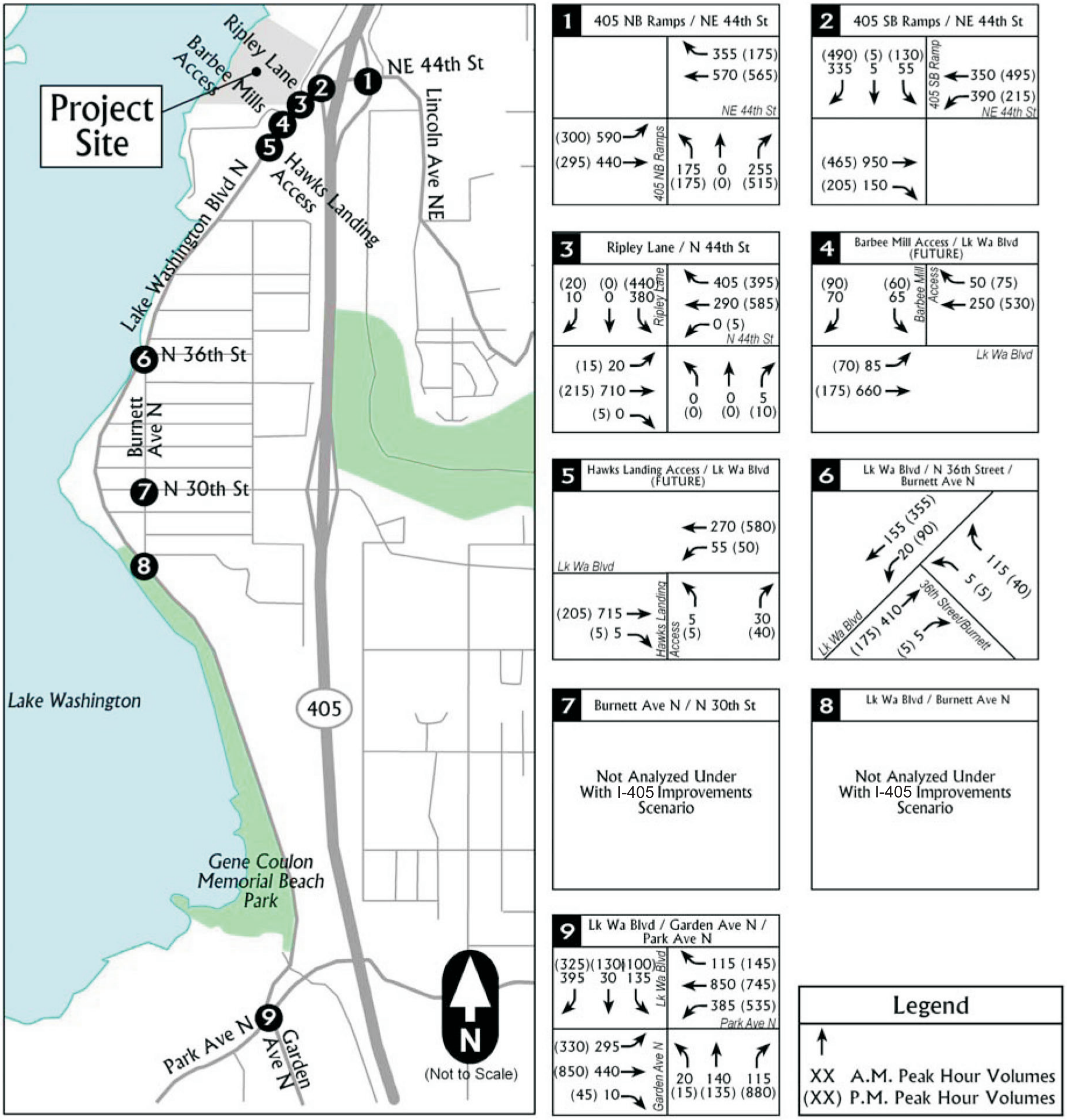
Quendall Terminals

Figure 3.9-5

2015 Baseline Peak Hour Traffic Volumes (with I-405 Improvements)



Source: *Transportation Engineering NorthWest,* 2010.

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Quendall Terminals

Figure 3.9-6

2015 Alternative 1 Peak Hour Traffic Volumes (with I-405 Improvements)

Queuing Analysis

A queuing analysis was completed along Lake Washington Boulevard between the I-405 SB ramps (Intersection #2) and the proposed Hawk's Landing site access (Intersection #5). The queuing analysis included 2015 conditions with Alternative 1 both with and without I-405 Improvements. The reported queue lengths are 95th percentile queues (queuing conditions that cover 95 percent of reported conditions) based on results from the *Synchro 6* and *HCS 2000* traffic software packages. **Tables 3.9-4** and **3.9-5** summarize 2015 queues without and with I-405 Improvements.

As shown in **Table 3.9-4**, excessive southbound queues (in the range of 700 to 800 feet that would block key site access intersections) would be expected at the stop-controlled Lake Washington Boulevard/Ripley Lane N intersection under the without I-405 Improvements scenario during the AM and PM peak hours. However, no queuing conflicts are expected on Lake Washington Boulevard.

Table 3.9-4
2015 QUEUES WITHOUT I-405 IMPROVEMENTS - ALTERNATIVE 1

		95th Percentile Queue (ft)	
Intersection	**Movement**	**AM**	**PM**
Ripley Lane / Lake Washington Blvd.			
	EB Left	25	25
	SB Left/Right	700	800
Barbee Mill Access (NE 43rd St) / Lake Washington Blvd.			
	EB Left	25	25
	SB Thru	100	75
Hawks Landing Access / Lake Washington Blvd.			
	WB Left	25	25

Source: TENW, 2010.

As shown in **Table 3.9-5**, with I-405 Improvements, excessive southbound queues would still be expected at the Lake Washington Boulevard/Ripley Lane N intersection (signalized) during the AM and PM peak hours. In addition, queues on Lake Washington Boulevard are expected to extend beyond adjacent intersections.

Table 3.9-5
2015 QUEUES WITH I-405 IMPROVEMENTS - ALTERNATIVE 1

Intersection	Movement	95th Percentile Queue (ft) AM	PM
I-405 SB Ramps / Lake Washington Blvd.			
	EB Thru	100	100
Ripley Lane / Lake Washington Blvd.			
	EB Left	25	25
	EB Thru	625	125
	WB Thru	100	425
	WB Rt	350	25
	SB Left/Right	425	375
Barbee Mill Access (NE 43rd St) / Lake Washington Blvd.			
	EB Left	25	25
	SB Thru	50	50
Hawks Landing Access / Lake Washington Blvd.			
	WB Left	25	25

Source: TENW, 2010.

Site Access and Circulation

Vehicular access to the *Quendall Terminals* site would be provided via a new access drive onto Ripley Lane N and the extension of NE 43rd Street (existing Barbee Mill access). Certain of the proposed roadways onsite do not currently meet City of Renton requirements for fire access (see **Chapter 2** for details). As part of the site access and circulation analysis, the two intersections on Lake Washington Boulevard that would provide access to the site (Barbee Mill Access (N 43rd Street) and Ripley Lane N) were analyzed in terms of LOS and queuing. The analysis assumed two scenarios: without and with I-405 Improvements.

2015 Without I-405 Improvements Operations/Queuing

The without I-405 Improvements scenario assumed existing channelization at both the Ripley Lane N/Lake Washington Boulevard and the Barbee Mill access (NE 43rd Street)/Lake Washington Boulevard intersections.

Intersection #3 – Ripley Lane N/Lake Washington Boulevard. Under Alternative 1, the site access intersection #3 – Ripley Lane N at Lake Washington Boulevard, the 95th percentile queue for the southbound left/right movements are estimated at approximately 700 to 800 feet during the AM and PM peak hours. Queues on Lake Washington Boulevard for vehicles entering the site are not expected to conflict with adjacent intersections. The LOS for the stop-controlled southbound approach would be expected to be LOS F.

Intersection #4 – Barbee Mill Access (NE 43rd Street)/Lake Washington Boulevard. Under Alternative 1, the site access intersection #4 – Barbee Mill Access (NE 43rd Street) at Lake Washington Boulevard, the 95th percentile queue for the southbound through movement is estimated at approximately 75 to 100 feet during the AM and PM peak hours. The LOS for the stop controlled southbound movement is expected to be LOS C/D. This determination is predicated on the assumption that balance for left turn demand from the site would occur between this egress and the signalized intersection at Ripley Lane N onto Lake Washington

Boulevard. Restriction of left turns from this driveway could be necessary to force all demand to I-405 leaving the site to exit via the Ripley Lane N signalized intersection with Lake Washington Boulevard.

Queues on Lake Washington Boulevard for vehicles entering the site are not forecasted to conflict with adjacent intersections; however, given demand for northbound left turns from Lake Washington Boulevard into the Barbee Mill access (NE 43rd Street), a separate left turn lane would be warranted for safety reasons. Given close proximity to the Hawk's Landing access of roughly 125 feet south of the existing Barbee Mill access (NE 43rd Street), a continuous two-way left turn lane would be warranted that extends from the left turn lane at Ripley Lane N south of the Hawk's Landing access driveway. Alternatively, the construction of additional through lanes on Lake Washington Boulevard could be installed to resolve the LOS issues along this roadway segment and mitigate this potential conflict. Ultimately, the City of Renton will determine the best configuration, given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way), and adjacent private development.

2015 With I-405 Improvements Operations/Queuing

Under the with I-405 Improvements scenario, the Ripley Lane N/Lake Washington Boulevard intersection was assumed to be signalized and the Barbee Mill access (NE 43rd Street)/Lake Washington Boulevard was assumed to include existing channelization.

Intersection #3 – Ripley Lane N/Lake Washington Boulevard. Under Alternative 1, the site access intersection #3 – Ripley Lane N at Lake Washington Boulevard, the 95th percentile queue for the westbound through movement is estimated at approximately 425 feet during PM peak hour and the eastbound through queue is estimated to be approximately 625 feet during the AM peak hour. Both estimated queues on Lake Washington Boulevard would likely extend through adjacent intersections. In addition, the southbound queue on Ripley Lane N is estimated to be 425 feet during the AM peak hour and 375 feet during the PM peak hour. The LOS for the signalized intersection is expected to be LOS C/D.

Intersection #4 – Barbee Mill Access (NE 43rd Street)/Lake Washington Boulevard. Under Alternative 1, the site access intersection #4 – Barbee Mill Access (NE 43rd Street) at Lake Washington Boulevard, the 95th percentile queue for the southbound through movement is estimated at approximately 50 feet during the AM and PM peak hours. The LOS for the stop-controlled southbound movement is expected to be LOS D. This determination is predicated on the assumption that balance for left turn demand from the site would occur between this egress and the signalized intersection at Ripley Lane N onto Lake Washington Boulevard. Restriction of left turns from this driveway would be necessary to force all demand to I-405 leaving the site to exit via the Ripley Lane N un-signalized intersection with Lake Washington Boulevard.

Queues on Lake Washington Boulevard for vehicles entering the site are not forecasted to conflict with adjacent intersections; however, given demand for left turns from Lake Washington Boulevard into the Barbee Mill access (NE 43rd Street), a separate left turn lane would be warranted for safety reasons. Given close proximity to the Hawk's Landing access of roughly 125 feet south of the existing Barbee Mill access (NE 43rd Street), a continuous two-way left turn lane would be warranted that extends from the left turn lane at Ripley Lane N south of the Hawk's Landing access driveway. Alternatively, the construction of additional through lanes on Lake Washington Boulevard could be installed to resolve level of service issues along this roadway segment and mitigate this conflict potential. Ultimately, the City of Renton will determine the best configuration, given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way), and adjacent private development.

Public Transportation Impacts

It is assumed that the proposed redevelopment would be occupied by residents and employees who rely primarily on personal automobiles for their means of transportation, based on its location near the outer edge of the urbanized area. However, since the City of Renton is growing at a relatively rapid pace, and in order to promote a multimodal transportation network, the applicant could work with King County Metro Transit and Sound Transit to provide for site amenities and access to future transit zones on Lake Washington Boulevard and at the I-405/NE 44th Street interchange to encourage and accommodate public transportation access in the future. As mentioned previously, future potential public transportation in the vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT with a flyer stop at the I-405/NE 44th Street interchange.

Non-motorized Transportation Impacts

Increases in population on the site would increase the use of non-motorized facilities within the site and vicinity. Infrastructure improvements within the site would include full curbs, gutters, and sidewalks, as well as frontage improvements (curb, gutters and sidewalks) along the west side of Lake Washington Boulevard and Ripley Lane N in front of the project site. A pedestrian trail is also proposed along the shoreline that would be accessible to the public at certain times of the day. A paved bike lane could be provided along the east side of Ripley Lane N to mitigate potential conflicts between bicycles and the site access point on Ripley Lane N.

Parking Impacts

A total of 2,153 parking stalls and 1,362 parking stalls would be required under City code for Alternatives 1 and 2, respectively. Given proposed construction of 2,171 and 1,364 stalls, respectively, proposed parking supply by the applicant would meet the minimum City of Renton requirements (see **Appendix H** for details on the minimum off-street requirements based on the City of Renton Municipal Code).

A parking demand analysis was completed in November 2009, for Alternative 1 using ITE's Parking Generation, 3rd Edition (2004). According to this analysis, peak demand for parking onsite is estimated to be approximately 2,107 stalls on a typical weekday and 1,251 on a typical weekend, assuming that all uses have peak demands at the same time. However, parking demand for each land use typically peaks at different times throughout the day. For example, peak demand for residential parking typically occurs during overnight hours when most residents are onsite, while other daytime uses can peak at various times throughout daylight hours (proposed commercial uses, typically peak around noon on a typical day). As such, shared parking could occur between residential and commercial uses resulting in parking demand that would be approximately 350 stalls less on a typical weekday and 281 stalls less on a weekend. This demand would range between 20 percent and 55 percent less than proposed supply on a weekday and weekend. Similar parking relationships would occur under Alternative 2 (see to **Appendix H** for further details on the parking demand analysis).

Bicycle parking would be provided on the Quendall Terminals site in accordance with City of Renton requirements (RMC 4-4-080 F11). Per the City's requirements, office, retail, and restaurant development would be required to provide bicycle parking that would be equivalent to a minimum of 10 percent of the required off-street parking spaces for these uses. Residential development would be required to provide one-half (0.5) bicycle parking space per dwelling unit. The location and access to bicycle parking would be consistent with City of Renton standards.

No Action Alternative

Under the No Action Alternative no new development would occur on the Quendall Terminals site at this time. No new vehicular trips would be generated. Transportation systems and traffic operations would be equivalent to the 2015 No Action/Baseline Condition. There would be no impacts to public transportation or non-motorized transportation systems under this alternative. No publically accessible public trail would be provided along the shoreline.

3.9.3 Mitigation Measures

Based upon the results of the transportation analysis of future intersection operations, general key findings include:

- There exists today and will be in the future a moderate to high level of background traffic that travels in the vicinity of the site area, given approved and other planned pipeline projects.

- The existing transportation network with and without I-405 Improvements would adequately accommodate Alternatives 1 and 2 at full buildout in 2015 (i.e. intersections would operate at LOS E or better), with the additional required/proposed transportation improvements (listed below)

Required/Proposed Mitigation Measures

Level of Service / Queuing

With I-405 Improvements – Alternative 1 and Alternative 2

The following improvements (in addition to the planned I-405 Improvements) would be necessary under Alternative 1 and Alternative 2 to mitigate off-site impacts:

- **Lake Washington Boulevard (between Barbee Mill Access (NE 43rd Street) and Ripley Lane N.** Extend the planned eastbound and westbound through lanes by WSDOT beyond and through the Barbee Mill access intersection. This would result in two through lanes in each direction on Lake Washington Boulevard from the I-405 interchange past the Barbee Mill access (NE 43rd Street). Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way), and adjacent private development.

- **Intersection #3 – Ripley Lane N/Lake Washington Boulevard.** Construct a southbound left-turn lane at this signalized intersection (signal assumed as an I-405 Improvement).

Without I-405 Improvements – Alternative 1 and Alternative 2

Without the planned I-405 Improvements, the following improvements would be necessary under Alternative 1 and Alternative 2 to mitigate off-site impacts:

- **Install Traffic Signals.** Install traffic signals at the intersections of the I-405 NB and SB ramp intersections, as well as at the intersection of Ripley Lane N/Lake Washington Boulevard.

- **Intersection #1 - I-405 NB Ramps/NE 44th Street.** Widen the southbound and northbound approaches so that a separate left turn lane and shared thru-right turn lane is provided on both legs of the intersection.

- **Intersection #3 - Ripley Lane N/Lake Washington Boulevard.** Widen the westbound approach to include a separate right turn-only lane.

- **Lake Washington Boulevard (between Barbee Mill Access (NE 43rd Street) and I-405 SB Ramps.** Construct additional channelization improvements between the Barbee Mill access and the I-405 SB ramps. Alternatively, additional eastbound and westbound lanes could be constructed to provide additional queue storage created by the traffic signals required at the SB ramp and Ripley Lane N along Lake Washington Boulevard. Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (owner of the vicinity rail right-of-way) and adjacent private development.

See **Appendix H** for detailed level of service worksheets for the mitigation measures outlined above to meet the City of Renton and WSDOT standards.

Non-Motorized Transportation

- Infrastructure improvements within the site would include full curbs, gutters and sidewalks, as well as frontage improvements (curb, gutter and sidewalk) along the west side of Lake Washington Boulevard and Ripley Lane N in front of the project site. Provisions for safe pedestrian circulation could encourage future transit usage when planned public transit becomes available.

- A pedestrian trail would be provided onsite along the shoreline that would be accessible to the public and would connect to Lake Washington Boulevard through the internal sidewalk system.

City of Renton Mitigation/Impact Fees

- In addition to the project-specific mitigation measures described above, a traffic mitigation/impact fee would be paid for the proposed development at the time of building permit issuance to help offset the impacts of the project on the City's roadways.

Parking

- The proposed parking supply under Alternatives 1 and 2 would meet the minimum off-street parking requirements of the City of Renton.

Other Possible Mitigation Measures

Level of Service/Queuing

- Implementation of Transportation Demand Management (TDM) measures could reduce the number of vehicle trips and thus provide some benefit to improving LOS and queuing impacts at study intersections.

Public Transportation

- In order to promote a multimodal transportation network, redevelopment on the Quendall Terminals site could include site amenities (i.e. planting strip, street lighting, etc.) and access to future transit zones on Lake Washington Boulevard and at the I-405/NE 44th Street interchange to encourage and accommodate public transportation access in the future (future potential public transportation in the vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT with a flyer stop at the I-405/NE 44th Street interchange).

Non-Motorized Transportation

- A paved bicycle lane could be provided along the east side of Ripley Lane to mitigate potential conflicts between bicycles and the Quendall Terminals site access point on Ripley Lane.

Parking

- Shared parking agreements between on-site uses and implementation of transportation demand management (TDM) measures for proposed office and residential uses could be implemented to potentially reduce parking demand during peak periods, thereby reducing the necessary parking supply.

Fire Apparatus Access

- Fire access would be provided per Renton Municipal Code, or City approved alternative fire protection measures could be proposed by the applicant.

3.9.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse transportation impacts would be anticipated.

SECTION IV

REFERENCES

References

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APPENDICES

APPENDIX A

DRAFT EIS DISTRIBUTION LIST

DISTRIBUTION LIST

Quendall Terminals – Draft EIS

Federal Agencies

U.S. Army Corps of Engineers, Seattle District Office, Attn: SEPA Reviewer
Environmental Protection Agency, Attn: Linda Priddy, Project Manager
National Oceanic and Atmospheric Administration (NOAA) Fisheries
U.S. Department of Fish and Wildlife, Attn: Roger Tabor

Tribes

Muckleshoot Indian Tribe, Fisheries Department, Attn: Karen Walter or SEPA Reviewer
Muckleshoot Cultural Resources Program, Attn: Ms. Melissa Calvert
Duwamish Tribal Office

State Agencies

Department of Ecology, Environmental Review Section
Department of Fish and Wildlife (WDFW), Attn: Larry Fisher
Department of Transportation (WSDOT) Northwest Region, Attn: Ramin Pazooki
Department of Archaeology and Historic Preservation, Attn: Gretchen Kaehler
Department of Natural Resources, Attn: Boyd Powers

Regional Agencies

Puget Sound Clean Air Agency, Attn: SEPA Coordinator
Puget Sound Regional Council, Attn: Rick Olson, Director, Government Relations & Comm.

Local Agencies

King County Wastewater Treatment Division, Environmental Planning –OAP
King County Department of Transportation, Attn: Harold S. Taniguchi, Director
King County Development and Environmental Services, Attn: SEPA Section
Metro Transit, Attn: Gary Kriedt, Senior Environmental Planner
City of Newcastle, Attn: Steve Roberge, Director of Community Development
City of Kent, Attn: Mr. Fred Satterstrom, Acting Community Development Director
City of Tukwila, Attn: Steve Lancaster, Responsible Official
City of Bellevue, Planning and Community Development, Attn: Janna Steedman
City of Mercer Island, Attn: Tim Stewart, Development Services Director
Metro Transit, Attn: Gary Kriedt, Senior Environmental Planner
Puget Sound Energy, Attn: Cody Olson, Municipal Liaison Manager
Seattle Public Utilities, Attn: SEPA Coordinator

Newspapers

Seattle Times
Puget Sound Business Journal

Parties of Record

The following individuals will receive a copy of the DEIS Notice of Availability.

Altino Properties, In. & JH Baxter & Co.
Spencer Alpert
Ricardo & Maria Antezana
Laurie Baker
Paul & Mary Becker
Bob & Mary Becker
Larry & Linda Boregson
Charlie Conner
Laura & James Counsell
Ryan Durkin
Roy & JoAnn Francis
Jim Hanken
John Hansen
Kevin Iden
Lance Lopes
Bruce & Mimi MacCaul
Campbell Mathewson
Dan Mitzel
John Murphy
Ronald & Sachi Nicol
Ross & Ava Ohash
Paul & Susan Siegmund
Anne Simpson
c/o Brad Nicholson, SEGB
Winnie & Yuri Sihon
Steve Van Til
Rich Wagner
Jessica Winter
Patty Witt

APPENDIX B

EIS SCOPING SUMMARY

Environmental Impact Statement –

Summary of the Public Scoping Process

QUENDALL TERMINALS

Prepared by:
BLUMEN CONSULTING GROUP, INC.

Prepared for:
City of Renton

May 19, 2010

Project Overview

Century Pacific, the project applicant, is requesting Master Plan, Binding Site Plan and Shoreline Substantial Development Permit approval for the Quendall Terminals mixed-use development on an approximately 21-acre site in the City of Renton. Under the proposal, the site would be divided into 7 lots; 4 would contain six 7-story mixed-use buildings with 800 residential units, 245,000 sq. ft. of office, 21,600 sq. ft. of retail and 9,000 sq. ft. of restaurant uses. Surface and structured parking for 2,171 vehicles would be provided. The site has received a Superfund designation from the U.S. Environmental Protection Agency (EPA) and the property owners are currently working on a remediation plan with EPA. Remediation of the site would be completed before any potential redevelopment of the property occurs.

EIS Scoping Process

For purposes of the Quendall Terminals project, the City of Renton is responsible for performing the duties of a lead agency, as required by the State Environmental Policy Act (SEPA). The City's Environmental Review Committee is serving as the Responsible Official for the SEPA review. The lead agency has determined that the proposed project may result in probable significant impacts. As such, an environmental impact statement (EIS) is required under RCW 43.21C.030(2)(c) and will be prepared consistent with WAC 197-11-400 through 460. The EIS will evaluate potential impacts at the site from the proposed redevelopment.

On February 19, 2010, the City of Renton initiated the EIS scoping process for the Quendall Terminals project by issuing a Determination of Significance (DS) and Request for Comments on the Scope of the EIS. The DS indicated that a public meeting would be held to provide an opportunity for the public to learn more about the proposed action and to provide input into the environmental review process, and that the scoping period would end on March 12, 2010. However, the scoping period ended before the public scoping meeting could be held. As a result, a second scoping period was opened in order to accommodate a public meeting (this scoping period ended on April 30, 2010). The two scoping periods comprise expanded EIS scoping[1] during which the City of Renton carried out the following actions:

- Mailed copies of the DS/Request for Comments to numerous agencies and organizations, as well as property owners within a 1,000-foot radius of the site (versus the 300-foot radius required by City of Renton regulations);
- Published notice of the DS/Request for Comments in the WA Department of Ecology's SEPA Register;
- Published notice of the DS/Request for Comments on the City of Renton's Current Land Use Applications List;
- Published notice of the DS/Request for comments in the following newspaper: *Renton Reporter*; and
- Posted *Notice of Proposed Land Use Action* signs at the site.

The EIS Scoping notification actions comply with applicable noticing requirements. See **Appendix A** to this EIS Scoping Summary, as well as the City of Renton's website at http://rentonwa.gov/business/default.aspx?id=5458 for copies of the DS/Request for Comments.

[1] SEPA requires a 21-day public scoping period, which can be extended at the discretion of the lead agency.

An EIS Public Scoping meeting was held on April 27, 2010, to provide the public with opportunities to comment on the range of environmental issues, alternatives and actions that should be considered in the EIS. The meeting included an introduction to the project and EIS process provided by City of Renton staff. During the EIS Scoping meeting, the public was encouraged to provide both written and/or oral comments on the scope of the EIS. A total of 9 people signed in and a total of 4 people spoke at the public meeting. The meeting was held from 6 PM to close of comments.

During the EIS scoping comment period, a total of five comment letters/emails were received, including: two comment letters from agencies (Washington State Department of Transportation and King County), one comment letter from the Muckleshoot Indian Tribe, and two comment letters from an individual. All of the comment letters/emails are available for review at City of Renton Department of Community and Economic Development.

For the DS, the City of Renton *preliminarily* determined that the following elements of the environment should be analyzed in the Draft EIS:

- **Earth;**
- **Aesthetics/Views;**
- **Critical Areas;**
- **Land and Shoreline Use;**
- **Recreation/Public Shoreline Access;**
- **Public Services;**
- **Utilities;**
- **Vegetation; and,**
- **Transportation/Traffic.**

The City also *preliminarily* determined that the proposal, one redevelopment alternative and the No Action Alternative should be evaluated in the Draft EIS.

Summary of EIS Scoping Comments

The following summary highlights the major issues that were raised during the scoping process and is organized by elements of the environment headings. This summary does not reflect every individual comment received and recorded, but rather is intended to address the primary subjects of concern. In some cases, several people offered similar comments on a given subject, or one individual repeated the same comment several times.

Earth

No comments focused on earth-related issues other than to state that the EIS alternatives should be compatible with potential remediation options.

Aesthetics/Views

Several comments expressed concern about how the proposed development would change existing views of Lake Washington from nearby private property and roadways. The quality of shoreline views within the proposed development was another issue that was raised. Specific comments included:

- Building heights should step up as they move back from the lake. Seven-story buildings adjacent to the lake are too tall for this location. Lakefront buildings should be kept at 3 to 4 stories, then step up to 7 or more stories on the east side of the site. This would improve the overall appearance of the development, from both the lake and from landside, while providing better views for the residents in the taller buildings in the east portion of the site.
- More open space should be provided, particularly on the lakefront side, where two large U-shaped buildings would completely cut off views towards the lake, from the east.
- The large surface parking lot to the south should be moved towards the center of the site, or broken it into two smaller lots, to improve views and lessen the single large expanse of asphalt.

Critical Areas

Specific wetlands and riparian habitat-related comments included:

- The EIS should identify which wetlands will be modified due to remediation requirements and which wetlands will be modified as a result of the redevelopment proposal.
- The proposed mitigation swale to be constructed as part of Wetland A should be described, including how stranding of fish will be avoided and water quality preserved in the swale. Other mitigation that could be more beneficial for juvenile Chinook salmon should also be discussed, including but not limited to improving shoreline substrate along the project site, adding native in-water species, such as bulrush, and improving the mouths of nearby Gypsy and May Creeks.
- Potential impacts to Wetlands I and J that may occur due to the widening of I-405 as part of the Renton to Bellevue improvements should be discussed.
- If a trail is to be constructed along the shoreline, it should be located outside of all mitigation areas and sensitive shorelines and avoid adversely affecting lakeshore buffer restoration options.

Land and Shoreline Use/ Relationship to Plans, Policies and Regulations

Specific land and shoreline use scoping comments included:

- Anxious to see something onsite
- Any impacts to the shoreline as a result of a trail or other public access should be described, and appropriate mitigation identified, in accordance with City code.
- How public access could be enhanced to fulfill policies, including those required by the City, should be analyzed.
- The Quendall Terminals project will be the City's last opportunity to create some public access or lakefront parkland on Lake Washington in the next 30 years or more.

Recreation/Public Shoreline Access

Numerous comments related to recreation/public shoreline access were conveyed during scoping. Several individuals stated that they would like the development to include a public dock, and provide public access/amenities to the Lake Washington shoreline (also see the comments on Land and Shoreline Use above). Another individual disagreed on the need for public access to be provided from private property. Other specific comments included:

- It is the City of Renton's duty to make sure any development on the property includes full access and significant public amenities along the lakefront, to serve the NW Renton neighborhoods and all of the citizens of Renton.
- There is very limited public access to Lake Washington in proximity to the site, and there will be limited opportunities to provide additional public access areas in the future, due to the extent of current development along the shoreline.
- The potential for a trail within the outer edge of the 100-foot shoreline buffer should be considered.
- The potential for overwater or lake access structures should be discussed.
- Since mixed-use development including restaurant and retail uses is proposed onsite, a public access dock should be provided where boaters can pull up and access these businesses.
- This is private property; there is no need for more public access, Renton already has over a mile of public access at Coulon Park and public access at Kennydale.
- The City should partner with the developer to put in a dock so boaters from all over the lake can access and enjoy the property.

Public Services

No public comments were received on this element of the environment.

Utilities

Utilities comments were mainly keyed to stormwater issues. Specific comments included the following:

- The EIS should discuss in detail how stormwater routed onto the site and stormwater generated by the redevelopment proposal will be managed. Stormwater discharges cannot jeopardize the remediation work or cause adverse impacts to fisheries resources.
- The King County Eastside Interceptor and South Mercer Forcemain wastewater facility is located within or near the proposed project. To protect this facility, the City should submit construction drawings to King County for review, so that potential impacts from the project can be assessed.

Vegetation

Specific scoping comments related to vegetation primarily related to wetlands (see the Critical Areas section above for details).

Transportation/Traffic

The Washington State Department of Transportation (WSDOT) was the only agency that provided comments on transportation/traffic-related issues. Their comments focused on the transportation analysis methodology. They requested that electronic traffic simulation models and queuing analysis be provided, and that worst traffic movement for AWSC intersections and Level of Service (LOS) reporting tables be included in the analysis. WSDOT also observed that cumulative transportation impacts should only evaluate planned projects that would be completed by the time the Quendall Terminals project is fully developed. Finally, they indicated that potential impacts of the project on the existing I-405/NE 44th Street interchange should be analyzed, and mitigation identified in order to maintain interchange operations at or above the applicable LOS threshold. Additional specific comments included the following:

- The potential I-405/NE 44th St. interchange improvements project is not funded, and is not likely to be funded in the foreseeable future; the transportation analysis should not assume that this project is complete or will occur
- Higher than average rates for estimating AM and PM peak trips should be used to calculate the project's impacts on streets in the site vicinity, since the project is not located within walking distance of other businesses, and no public transit connection is proposed.
- The current configuration of the NE 44th Street interchange is not sufficient to handle the additional traffic that would be generated by the proposed project. Longer delays will result on NE 44th Street and also the I-405 northbound and southbound off-ramps. Delays during peak hours could create off-ramp queues extending to the I-405 northbound and southbound mainline, which is unacceptable from an operations and safety standpoint.
- Channelization of access streets providing access to the Quendall Terminals project will need to be carefully designed due to proximity of the project access to the interchange intersections.

Conclusions/Revisions to the DEIS Scope

The majority of the comments that were received during the public scoping period for the Quendall Terminals EIS related to **Recreation/Public Shoreline Access, Utilities (stormwater control)**, **Critical Areas,** and **Transportation/Traffic.** Agencies and individuals did not identify any new elements to be added to the EIS in their scoping comments. However, based on WA State Department of Ecology requirements, the lead agency has determined that a **Greenhouse Gases** (GHG) analysis should be added to the EIS.

Appendix A

City of Renton

NOTICE

OF ENVIRONMENTAL DETERMINATION

ISSUANCE OF A DETERMINATION OF SIGNIFICANCE (DS)

POSTED TO NOTIFY INTERESTED PERSONS OF AN ENVIRONMENTAL ACTION

PROJECT NAME: **Quendall Terminals**
PROJECT NUMBER: **LUA09-151, EIS, ECF, BSP, SM, SA-M**
LOCATION: **4350 Lake Washington Blvd N**
DESCRIPTION: **The applicant is requesting Master Plan Review, Binding Site Plan, Shoreline Substantial Development Permit and Environmental (SEPA) Review for a mixed-use development. The site is 21.46 acres and is zoned Commercial/Office/Residential (COR) and located within the Urban Shoreline designation. The 21.46-acre site would be divided into 7 lots of which 4 would contain six - 7 story mixed-use buildings. Overall, the development would consist of 800 residential units (resulting in a net residential density of 46.4 units/acre), 245,000 square feet of office, 21,600 square feet of retail and 9,000 square feet of restaurant. The applicant has proposed to dedicate 3.65 acres for public right-of-way, which would provide access to the 7 proposed lots. Surface and structured parking would be provided for 2,171 vehicles. The site contains approximately 0.81 acres of wetlands and 1,583 linear feet of shoreline along Lake Washington. The subject site has received a Superfund designation from the U.S. Environmental Protection Agency (EPA) and the property owners are currently working on a remediation plan with EPA. Proposed improvements include remediation of existing contamination, stormwater and sewer improvements.**

THE CITY OF RENTON ENVIRONMENTAL REVIEW COMMITTEE (ERC) HAS DETERMINED THAT THE PROPOSED ACTION MAY HAVE A SIGNIFICANT ADVERSE IMPACT ON THE ENVIRONMENT.

The lead agency has determined this proposal is likely to have a significant impact on the environment. An Environmental Impact Statement (EIS) is required under RCS 43.21C.030(2)(c) and will be prepared. An environmental checklist, or other materials indicating likely environmental impacts, are available for viewing in the lead agency's office.

LEAD AGENCY: **City of Renton**
Environmental Review Committee

THE LEAD AGENCY HAS INITIALLY IDENTIFIED THE FOLLOWING AREAS FOR DISCUSSION IN THE EIS:

Earth, Aesthetics/Views, Critical Areas, Land and Shoreline Use, Recreation/Public Shoreline Access, Public Services Utilities, Vegetation, and Transportation/Traffic.

ALTERNATIVES: This is a proposal for a private project. The applicant may study reasonable alternatives that could feasibly attain or approximate the proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation. In this case, the alternatives will include the no-action alternative. A lower density alternative, with fewer residential units and less commercial development, may also be included.

SCOPING: Agencies, affected tribes, and members of the public are invited to comment on the scope of the EIS. You may comment on alternatives, mitigation measures, probable significant adverse impacts, and licenses or other approvals that may be required. Your comments must be submitted in writing and received before 5:00 p.m. on March 12, 2010. All written EIS scoping comments must be sent to Vanessa Dolbee, Senior Planner at the address noted below.

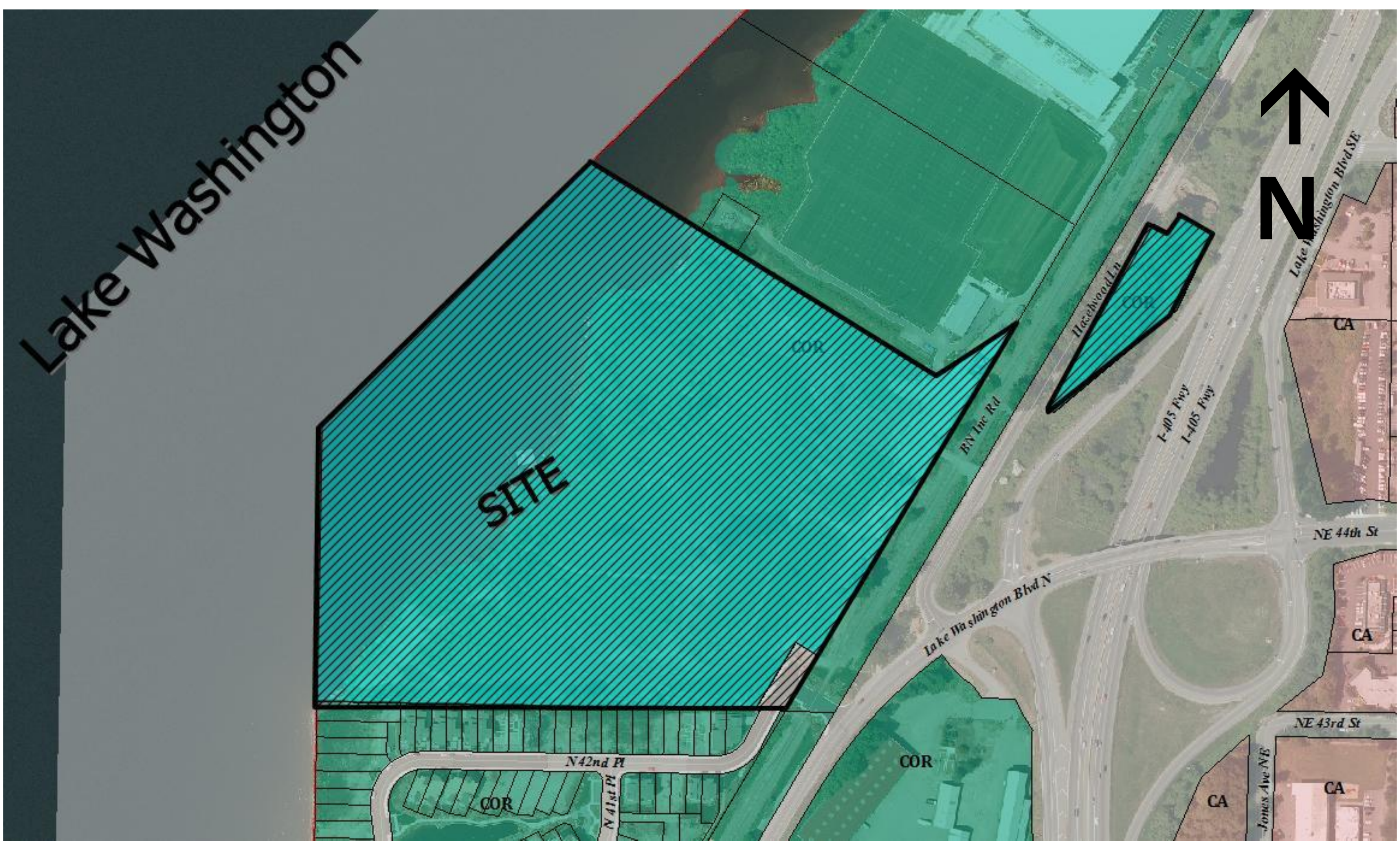
PUBLIC MEETING/OPEN HOUSE: A public EIS scoping meeting/open house will be held to provide an opportunity for the public to learn more about the proposed actions and to provide input into the environmental review process. An EIS public scoping meeting will be held at Renton City Hall at a date and time to be determined, additional notice will be provided of the meeting date and time.

PROJECT PROPONENT: **Campbell Mathewson, Century Pacific, L.P.**

RESPONSIBLE OFFICIAL:	**City of Renton** **Environmental Review Committee** **Department of Community & Economic Development** **Planning Division** **1055 S Grady Way** **Renton, WA 98057**
SEND COMMENTS TO:	**Vanessa Dolbee, Senior Planner** **Department of Community & Economic Development** **Planning Division** **1055 S Grady Way** **Renton, WA 98057** **Phone: (425) 430-7314**

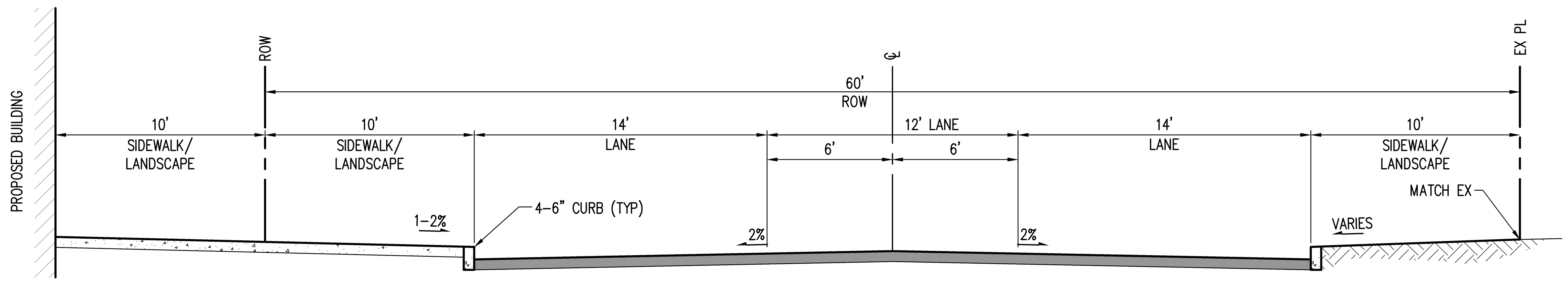
To appeal this Determination, you must file your appeal document with the Hearing Examiner within fourteen (14) days of the date the Determination of Significance (DS) has been published in the official city newspaper. See City Code Section 4-8-110.E, RCW 43.21C.075 and WAC 197-11-680 for further details. There shall be only one appeal of the Determination of Significance and if an appeal has already been filed, your appeal may be joined with the prior appeal for hearing or may be dismissed if the other appeal has already been heard. You should be prepared to make specific factual objections. Contact the above office to read or ask about the procedures for SEPA appeals.

Appeals of the environmental determination must be filed in writing on or before 5:00 p.m. on March 5, 2010. Appeals must be filed in writing together with the required fee with: Hearing Examiner, City of Renton, 1055 South Grady Way, Renton, WA 98057. Appeals to the Examiner are governed by City of Renton Municipal Code Section 4-8-110.B. Additional information regarding the appeal process may be obtained from the Renton City Clerk's Office, (425) 430-6510.



APPENDIX C

ROAD CROSS SECTIONS



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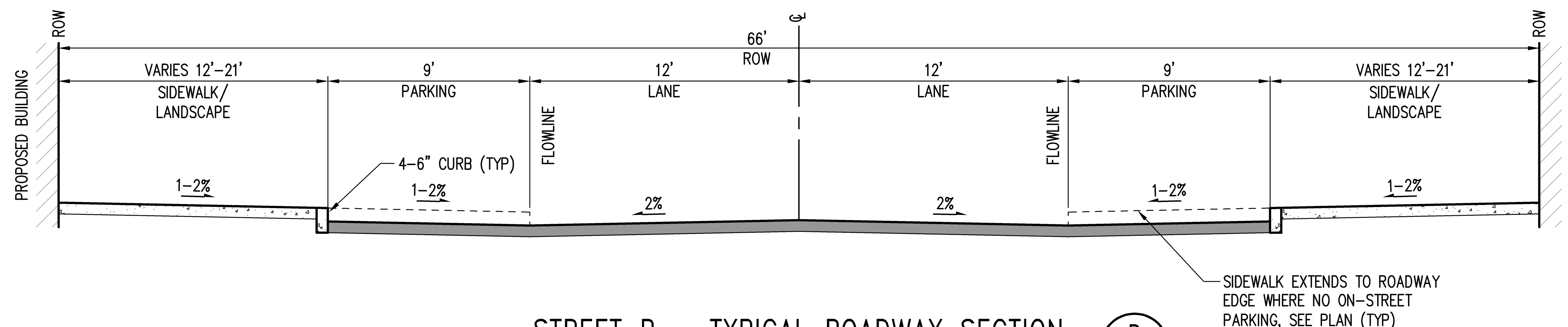

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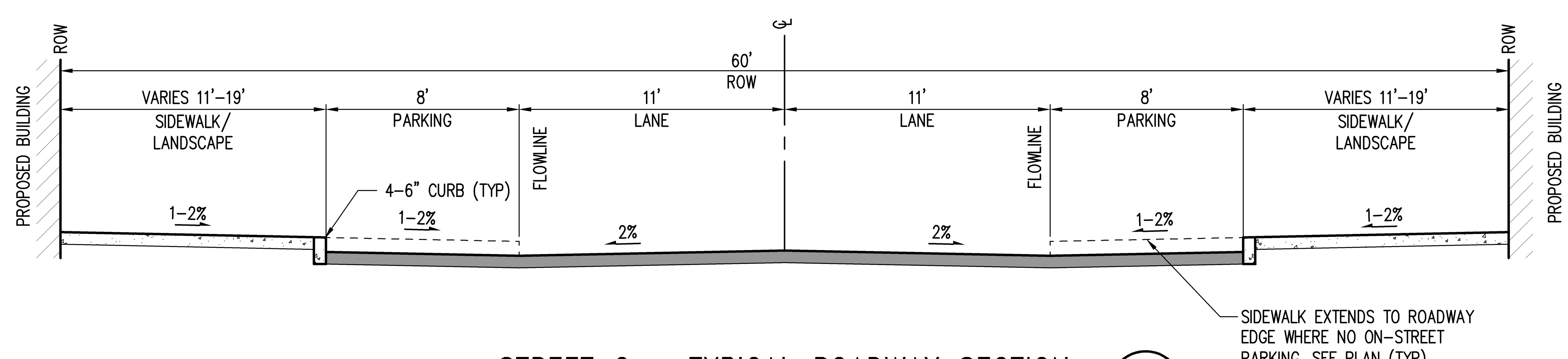


STREET C – TYPICAL ROADWAY SECTION (C / –)

SCALE: 1" = 4'

NOT FOR CONSTRUCTION

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY SMB — DESIGNED BY KPK

CHECKED BY WTJ — APPROVED BY MAV

DATE NOV 16, 2009

JOB No. :109118

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555

SCALE: AS NOTED

kpff Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101–3665
(206) 622–5822 Fax (206) 622–8130

MARK A. VELDEE — STATE OF WASHINGTON — 24711 — REGISTERED PROFESSIONAL ENGINEER

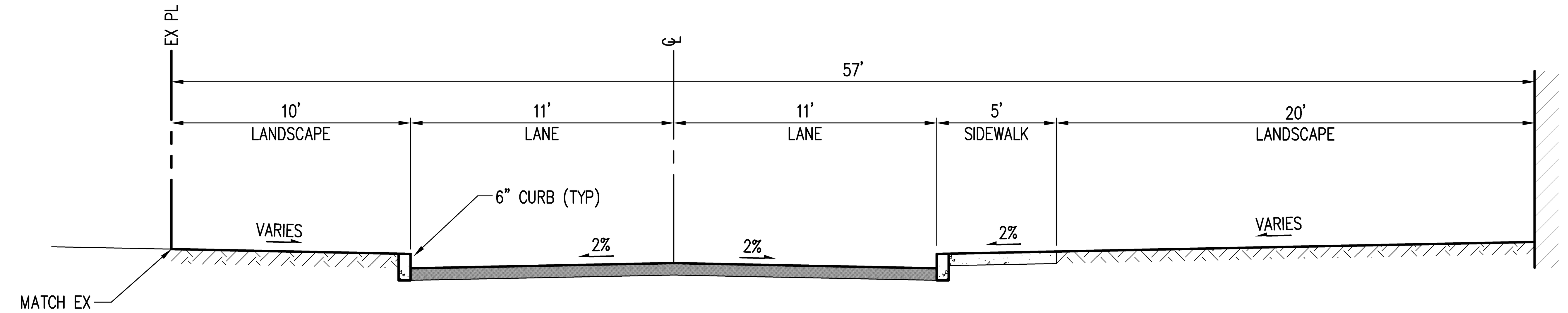
QUENDALL TERMINALS

4350 LAKE WASHINGTON BOULEVARD, RENTON, WASHINGTON

LAND USE, SHORELINE & MASTER PLAN PERMIT APPLICATION
ROADWAY SECTIONS

SHEET C302

Nov 18, 2009 – 5:15pm soniab X:\109000–109250\109118 (Quendall Terminals)\CADD\Design\07–C302–SC.dwg



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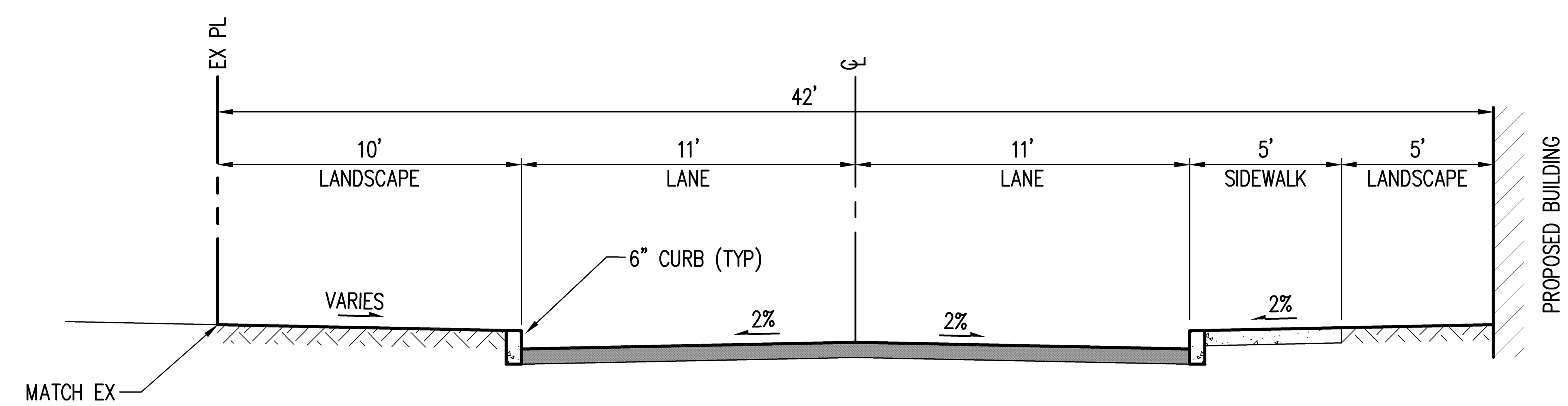

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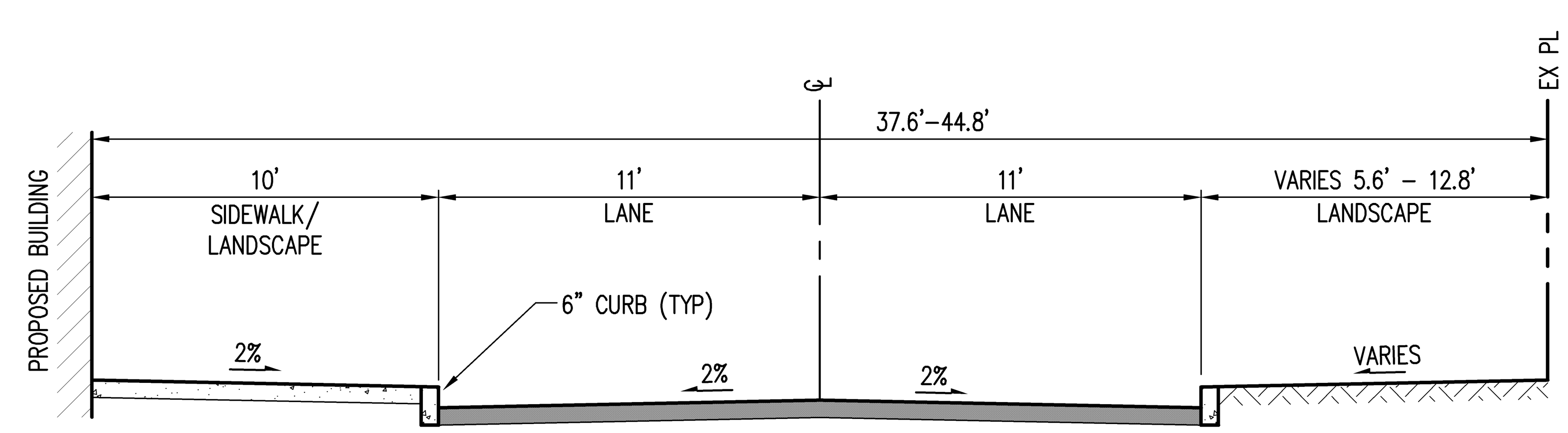

STREET F – TYPICAL PRIVATE DRIVE SECTION (F/–)

SCALE: 1" = 4'

NOT FOR CONSTRUCTION

NO.	DATE	BY	CHD.	APPR.	REVISION

DRAWN BY SMB | DESIGNED BY KPK | CHECKED BY WTJ | APPROVED BY MAV | DATE NOV 16, 2009 | JOB No. :109118

CALL TWO BUSINESS DAYS BEFORE YOU DIG 1-800-424-5555

SCALE: AS NOTED

kpff Consulting Engineers
1601 Fifth Avenue, Suite 1600
Seattle, Washington 98101-3665
(206) 622-5822 Fax (206) 622-8130

MARK A. VELDEE, STATE OF WASHINGTON, 24711 REGISTERED PROFESSIONAL ENGINEER

QUENDALL TERMINALS
4350 LAKE WASHINGTON BOULEVARD, RENTON, WASHINGTON

LAND USE, SHORELINE & MASTER PLAN PERMIT APPLICATION
ROADWAY SECTIONS

SHEET C303

Nov 18, 2009 – 5:14pm soniab X:\109000-109250\109118 (Quendall Terminals)\CADD\Design\07-C302-SC.dwg

APPENDIX D

TECHNICAL REPORT: GEOLOGY, GROUNDWATER AND SOILS

Technical Report:
Geology, Ground Water, and Soils

QUENDALL TERMINALS ENVIRONMENTAL IMPACT STATEMENT

Renton, Washington

Prepared for

Blumen Consulting Group, Inc.

Project No. KH100147A
November 1, 2010

DRAFT TECHNICAL REPORT:
GEOLOGY, GROUND WATER, AND SOILS

QUENDALL TERMINALS
ENVIRONMENTAL IMPACT STATEMENT

Renton, Washington

Prepared for:
Blumen Consulting Group, Inc.
600 108th Avenue NE, Suite 1002
Bellevue, Washington 98004

Prepared by:
Associated Earth Sciences, Inc.
911 5th Avenue, Suite 100
Kirkland, Washington 98033
425-827-7701
Fax: 425-827-5424

November 1, 2010
Project No. KH100147A

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1.0 INTRODUCTION

1.1 Purpose and Scope

Associated Earth Sciences, Inc. (AESI) completed an evaluation of the existing geologic, hydrogeologic, and environmental health related conditions in the site area that included the Quendall Terminals property and the surrounding area. Our study was completed in support of the Environmental Impact Statement (EIS) being completed for the site. The EIS is being completed to address the potential impacts from redevelopment identified under two development alternatives for all or portions of the site. The site consists of the 21.5-acre Quendall Terminals property that includes 20.3 acres adjacent to Lake Washington and 1.2 acres located east of Lake Washington Boulevard, east of the main parcel.

Two redevelopment alternatives (Alternatives 1 and 2) and a No Action Alternative have been identified for the Quendall Terminals property. Alternative 1 consists of the 2009 Master Plan application that includes nine 7-story, mixed-use buildings with 800 residential units, retail, restaurants, and associated parking. Alternative 2 consists of a lower density alternative that includes nine 6-story buildings with 708 residential units, retail, restaurants, and associated parking. All parking would be above grade. The No Action Alternative would leave the property undeveloped after completion of the remedial activities performed under CERCLA. The alternatives are described in greater detail in Section 1.3 below.

The purpose of our study was to document: 1) existing soils, geology, geologic hazards, and ground water conditions at and in the vicinity of the site; 2) geotechnical issues regarding mass grading, suitability of the reuse of fill soils, and placement of pile foundations; and 3) locations within the site area with known ground water and/or soil contamination. Our review and analysis of available information was used to identify potential impacts to the affected environment under the two redevelopment alternatives, and to evaluate and recommend appropriate mitigations.

It is our understanding that this study will be used to address technical information for the earth and environmental health sections of the EIS prepared for the identified redevelopment alternatives within the site area. The specific scope of services completed for this study is listed below.

1. Review and analyze existing geologic, hydrogeologic, and soil conditions at and in the vicinity of the site area.

2. Determine and evaluate potential geologic hazards at the site area. An evaluation of seismic hazards included liquefaction potential and lateral spreading potential. This analysis incorporated the most current fault line projections in the vicinity of the site.
3. Evaluate potential slope stability and landslide issues and erosion and sedimentation hazards for the site.

4. Document ground water levels and direction of ground water flow at the site and immediate adjacent properties.

5. Evaluate potential impacts to ground water recharge and flow direction under the two redevelopment alternatives.

6. Identify potential impacts to the ground water beneath the site area from possible construction methods and placement of piles.

7. Describe anticipated building construction methods associated with redevelopment of the site.

8. Identify potential limitations of the soils in the site area for grading and structural support, impacts of mass grading, and reuse of existing fill.

9. Evaluate construction-related impacts associated with placement of pile foundations.

10. Discuss possible mitigation options for identified geotechnical impacts at the site area.

11. Describe the remediation action performed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) at the site whose final completion represents the existing condition for the proposed development alternatives.

12. Summarize existing contamination within the site based on publicly available information. Soil and ground water contaminant areas and sources and the contaminant levels that are known at the site are identified.

13. Evaluate the environmental health related impacts with redevelopment of the site.

1.2 General Site Area Conditions

The site is located on the east side of Lake Washington in Renton, Washington, as shown in the "Vicinity Map" presented as Figure 1. The site area is located in portions of Sections 29 and 32, Township 24 North, Range 5 East. The EIS study area is approximately 21.5 acres, which includes approximately 20.3 acres between Lake Washington Boulevard and Lake Washington and a little over 1 acre between Lake Washington Boulevard and Interstate 405.

The site is bordered by Lake Washington to the west, the Conner Homes (formerly Barbee Mill) property to the south, the Football Northwest (formerly J.H. Baxter) property to the north and Lake Washington Boulevard to the east. The site is shown on Figure 2.

The subject property was utilized as a creosote manufacturing facility from about 1917 to 1969, after which tanks on the property were used to store Bunker C, waste oil, and lard until around

1983. From 1975 to 2009 the site was also used as a log storage and sorting yard. Currently, most structures from the previous facilities have been removed from the site with the exception of several small buildings along the east side of the property.

1.3 Proposed Actions

1.3.1 Alternative 1: Preferred Alternative

Under Alternative 1, the main 20.3-acre parcel adjacent to Lake Washington would be developed with a mixed use complex consistent with the current Commercial/Office/Retail (COR) zoning. The small approximately 1-acre parcel east of Lake Washington Boulevard would remain a wetland with the existing wetlands re-established and the expansion of existing and re-established wetland area.

Under Alternative 1, development would consist of nine buildings comprised of 800 residential units, 245,000 square feet of office space, 21,600 square feet of retail, and 9,000 square feet of restaurants. Parking would be provided by 2,171 spaces with the majority of the spaces in structured parking areas within the building footprints (one surface lot would be located in the northeast quadrant of the site). All development would occur east of a shoreline set back from Lake Washington with the shoreline buffer enhanced/restored with additional wetlands and riparian habitat.

1.3.2 Alternative 2: Lower Density Development

Under Alternative 2 the main 20.3-acre parcel adjacent to Lake Washington would be developed with a mixed use complex consistent with the current Commercial/Office/Retail (COR) zoning. The small approximately 1-acre parcel east of Lake Washington Boulevard would remain a wetland with the existing wetlands restored and the creation of new wetland area and enhancement.

Under Alternative 2, development would consist of 9 buildings comprised of 708 residential units, no office space, 21,600 square feet of retail and 9,000 square feet of restaurants. Parking would be provided by 1,364 spaces with surface parking in the southwest and northwest quadrants, deck parking in the southeast and northeast quadrants, and the remaining structured parking areas located within the building footprints. All development would occur east of a shoreline set back from Lake Washington with the shoreline buffer enhanced/restored with additional wetlands and riparian habitat.

1.3.3 No Action

If No Action is implemented, once the CERCLA remedial activities are complete, the site would remain undeveloped. Remedial activities would include removal of soil from discrete areas of the shoreline and upland areas, placement of soil caps on the upland and shoreline areas and re-establishment/expansion of shoreline wetland areas and the approximately 1-acre wetland area east of Lake Washington Boulevard.

2.0 METHODOLOGY

2.1 Data Review

AESI reviewed available soil, hydrogeologic, geologic, geotechnical, and environmental reports to evaluate existing conditions at and in the vicinity of the site area. Our review of available information included published regional geology and ground water reports, City of Renton geologic hazards maps, and private consulting reports specific to the Quendall Terminal, Conner Homes, and Football Northwest properties. No reconnaissance or subsurface explorations were performed by AESI for this study at the Quendall Terminal property. A brief field visit was made by AESI at the Quendall Terminal Property.

3.0 AFFECTED ENVIRONMENT: GEOLOGY

3.1 Regional Geology

3.1.1 General

The site area is located in the low-lying region between the Cascade and Olympic Mountains referred to as the Puget Lowland. During glacial periods, the southwestern margin of the Cordilleran ice sheet advanced southeastward from British Columbia into the Puget Lowland (Blunt, et al., 1987). The most recent continental glacial advance has been mapped as the Vashon Stade of the Fraser Glaciation (12,500 to 15,000 years before present). Depositional and erosional processes occurring during the Vashon Stade shaped the present day topography in the Puget Lowland.

Vashon lodgment till and advance outwash deposits are widely exposed at the ground surface in the uplands surrounding the Renton area. Vashon deposits in the Renton area are underlain by older glacial and nonglacial deposits and Tertiary age bedrock at depth. Surface exposures of undifferentiated pre-Vashon glacial and nonglacial deposits and bedrock are generally limited to erosional features and slopes extending from the valley floor to the uplands.

As the Vashon ice sheet receded north from the Puget Lowland region, Lake Washington, the Duwamish Valley, and the Renton area were flooded. Alluvium carried by local rivers and streams was deposited as these waters entered the flooded lowland near the city of Renton and around the shores of Lake Washington. These sediments formed deltas with the coarsest-grained sediments deposited near the mouth of the river or stream and fine-grained sediments deposited outward from the mouth toward the present day shoreline of Lake Washington. Alluvium from May Creek accumulated across the area of the Quendall Terminals property and intermixed with lacustrine sediments from Lake Washington. In 1916, Lake Washington was connected to the Puget Sound in the Seattle area via the ship canal, and water levels in Lake Washington were lowered approximately 8 to 10 feet (Weston, 2001). In about 1936, May Creek was diverted to the south and no longer flowed across the southern end of the site.

The geologic units in the vicinity of the site area are described below from oldest in age to youngest. A regional geologic map of the area is presented on Figure 3 and a regional geologic cross section is presented on Figure 4.

3.1.2 Bedrock Geology

The bedrock underlying the Renton area and adjacent uplands is Tertiary age (about 40 million years old) and consists of marine and estuarine sandstone, shale, conglomerate, basalt, andesite, and volcaniclastic rocks (Galster and Laprade, 1991). Bedrock is exposed at ground surface in portions of the Newcastle Hills east of the Renton area on Renton's west hill, in isolated areas of the Cedar and Green River valleys to the south, and to the northwest along the shore of Lake

Washington (Yount, et al., 1985). Bedding orientations in the exposed bedrock outcrops surrounding the Renton area indicate the Tertiary bedrock has been deformed by regional mountain building and subduction processes. The regional deformation of the Tertiary bedrock resulted in major upwarps and downwarps with axes 10 miles or more apart and numerous smaller folds and faults (Mullineaux, 1970). Details of the depth of the bedrock beneath the quaternary glacial and nonglacial deposits have been estimated from geophysical data, projections of surface exposures, and deep borings in which bedrock was encountered. The depth to bedrock beneath the valley fill in the low-lying Renton area is estimated to be approximately 300 to 400 feet below ground surface (bgs) (Yount, et al., 1985).

3.1.3 Quaternary Geology (Glacial/Nonglacial Deposits)

The Quaternary sediments in the Puget Lowland were deposited during multiple continental glacial advances and associated episodes of nonglacial deposition occurring in the Puget Lowland over the last 2½ million years and can be up to 3,700 feet thick (Galster and Laprade, 1991).

The mapped surficial geologic units in the upland areas east of the Quendall Terminals property consist of Vashon age lodgement till and advance outwash deposits where the till has been eroded. Undifferentiated pre-Vashon glacial and nonglacial deposits underlying the Vashon deposits are also exposed in till windows, where the advance outwash is absent, and in the base of the upland slopes in some locations.

The quaternary deposits underlying the vicinity of the site area include the deltaic deposits formed when May Creek flowed into the once flooded Renton area and lacustrine deposits with organics (peat).

3.1.3.1 Pre-Vashon Glacial/Nonglacial Deposits

Pre-Vashon glacial and nonglacial deposits overlie the Tertiary age bedrock. These sediments consist of alluvial, lacustrine, and glacial deposits related to multiple glacial and nonglacial periods prior to the Vashon Glaciation.

3.1.3.2 Vashon Advance Outwash

Vashon advance outwash deposits consist of sediment deposited by meltwater streams that emanated from the glacial ice during the advance of the Puget Lobe of the Cordilleran ice sheet during the Vashon Stade. These sediments typically consist of medium to coarse sand with gravel and interbeds of gravel and fine sand or silty fine sand. Advance outwash deposits have been consolidated by the weight of the overlying ice.

3.1.3.3 Vashon Lodgement Till

Geologic maps of the area indicate Vashon lodgement till is the primary geologic unit present at ground surface in the upland areas adjacent to the site (Figure 3). Vashon lodgement till typically consists of a very dense, unsorted mixture of sand, gravel, and cobbles in a silt/clay matrix. These sediments were deposited beneath the advancing ice sheet. The high density of the lodgement till is the result of compaction by the weight of the overriding glacial ice.

3.1.3.4 Vashon Recessional Outwash

In some upland locations recessional outwash deposits overlie the Vashon lodgement till. Vashon recessional outwash typically consists of sand, gravel, and silt/clay deposited during rapid deglaciation. Recessional outwash deposits were deposited by meltwater streams emanating from the retreating ice mass and have not been glacially consolidated.

3.1.4 Holocene Deposits

3.1.4.1 Deltaic Deposits

The deltaic deposits beneath the City of Renton are comprised of alluvium deposited by the Cedar River, and the deposits beneath the Quendall Terminals site are comprised of alluvium deposited by May Creek, as these waters flowed into the once flooded waters in the Renton area after the recession of the Vashon glacial advance. The deltaic deposits underlying the City of Renton are comprised of coarse sand, gravel, and cobbles in the southern portion of the delta complex, near the mouth of the Cedar River, grading outward to fine sand and silt (Weston, 2001).

3.1.4.2 Lacustrine Deposits

Lacustrine deposits comprised of silt are interfingered with fine-grained deltaic deposits beneath the western portion of the site. Peat layers of variable thickness have been documented within the lacustrine deposits beneath the site.

3.1.5 Fill

Portions of the shoreline area along Lake Washington are underlain by fill soils. The fill soils were placed along the new shoreline of Lake Washington after the lake was lowered in order to create land for development (Weston, 2001).

3.2 Site Geology

Geologic conditions at the site were evaluated using published geologic studies and subsurface conditions documented in site-specific reports. Geologic units identified at the site include alluvium and lacustrine deposits overlain by fill soils. Generalized geologic cross sections (locations shown on Figure 2) of the soils beneath the site are presented on Figures 5, 6, and 7. The soils beneath the site are discussed below from the shallowest (youngest) to the deepest (oldest).

3.2.1 Fill Soil

Fill ranging from approximately 1 to 10 feet thick is found across the entire site. The fill is thinnest along the southern and eastern boundaries of the site and thickest in the northwest quarter of the site (Anchor QEA and Aspect, 2010). The fill generally consists of a mixture of silt, sand, gravel, and wood debris with scattered foundry slag and brick and metal fragments. Initial filling began after the lowering of Lake Washington following completion of the Lake Washington Ship Canal in 1916. Initial filling occurred west of the former, pre-1916 shoreline shown on Figure 2. Additional filling occurred between 1920 and 1936 when May Creek was diverted to the south and the former creek channel was backfilled. Foundry slag from PACCAR was reportedly also placed at the site and approximately 3 feet of sawdust and soil fill was placed over the entire site by Quendall Terminals in 1983.

3.2.2 Alluvium Deposits

Alluvium are those soils deposited by rivers and streams. Alluvium deposits beneath the site are divided into two units: the Shallow Alluvium and the Deep Alluvium.

3.2.2.1 Shallow Alluvium

The Shallow Alluvium at the site is part of the May Creek delta and typically consists of interbedded sand, silt, clayey silt, organic silt, and peat. The Shallow Alluvium lies under the fill and generally occurs to depths ranging between 25 and 40 feet with thinning to the southeast portion of the site. Saturated conditions typically occur at depths ranging from 2 to 10 feet below existing site grade (prior to placement of the remedial soil cap). Due to the nature of their deposition, the shallow alluvium deltaic sediments consist of very loose to soft, alternating fine and coarse grained (interbedded), discontinuous soils and peat. The interpreted, discontinuous nature of the deposition is shown on the geologic cross section on Figure 8.

3.2.2.2 Deep Alluvium

The Deep Alluvium at the site likely represents an older channel deposit of the May Creek delta and typically consists of medium dense to dense sand and gravel. The Deep Alluvium underlies the Shallow Alluvium and ranges from approximately 87 to over 107 feet in thickness and generally occurs from depths of between 30 and 40 feet to 127 and 135 feet or more beneath the site.

3.2.3 Lacustrine Deposits

The deepest soil identified beneath the site is interpreted to be lacustrine deposits possibly associated with older deposition from Lake Washington. The lacustrine deposits underlie the Deeper Alluvium at depths ranging from approximately 90 to 135 feet below existing site grades. These older lacustrine sediments typically consist of very soft to medium stiff silty clay.

Younger lacustrine sediments are also found at the shoreline of Lake Washington and blanketing the face of the Shallow Alluvium deposits on the front of the former delta below lake level (Figure 8). These deposits result from recent deposition from Lake Washington and generally consist of organic sandy silt.

3.3 Geologic Hazards

The City of Renton defines and identifies geologic hazard areas in its Critical Areas Regulations (Section 4-3-050) and on available maps. Areas identified and mapped include steep slopes, landslide hazards, erosion hazards, seismic hazards, and coal mining hazards (City of Renton, 2002). The site does not meet the criteria for and is not located in mapped landslide, erosion, or coal mining hazard areas. Based on its soil and ground water characteristics (soft, loose density and/or fill with shallow ground water), the entire site area has been mapped in an area of high seismic hazard and moderate to high liquefaction hazard.

As part of this study, the erosion, landslide, and seismic hazard potential at the site for existing conditions and redeveloped conditions was assessed to determine potential impacts and mitigations. Geologic hazard conditions for existing site conditions are discussed below.

3.3.1 Landslide Hazards

No evidence of landslide activity has been documented at the site area in regional studies or previous site-specific investigations. Due to the nearly level topography at the site area, the risk of surficial landslides under existing conditions is considered to be extremely low. Some risk of subaqueous landsliding on the delta face may exist during a large seismic event.

3.3.2 Erosion Hazards

Erosion of soil begins by a process called gross erosion which includes sheet erosion and channel erosion. Sheet erosion occurs when precipitation is conveyed downslope as shallow “sheets” of water flowing over the land surface which dislodges and transports soil particles. Sheet flow rarely moves as a uniform sheet for more than a few feet before concentrating in surface irregularities resulting in rill erosion which continues to erode and transport additional soil. If the rills become more than a few inches deep it is termed gully erosion under which the concentrated water flow can transport large quantities of sediment during a single storm event; this usually occurs on slopes steeper than 20 percent.

Slope gradients and vegetation are key elements in evaluating potential erosional impacts. In general, steeper slopes have a higher susceptibility to erosion because surface water has the capability of achieving higher velocities and more energy is available to erode and transport sediments. Vegetation reduces the potential development of concentrated flows by dispersing rainfall, impeding surface water flow, and reducing surface water velocities.

Based on the existing land use, sediment characteristics, and low-slope gradients, the potential for sheet and channel erosion at the site area under existing conditions is considered low. Post remediation, cover measures would be established in the disturbed areas to prevent erosion. No evidence of erosion issues has been documented in previous studies. Where bare soils are exposed at the site area, slope gradients are extremely low, and erosion and sediment transport would be limited.

3.3.3 Seismic Hazards

Earthquakes occur in the Puget Lowland with great regularity. Most seismic events in the Puget Sound area are low magnitude earthquakes and usually not felt by people. Three types of earthquakes typically occur in the Pacific Northwest: (1) subduction zone earthquakes; (2) deep intraplate or subduction zone ruptures; and (3) shallow crustal earthquakes in faults in the North American plate.

The subduction of the Juan de Fuca plate beneath the North American plate creates friction between the two plates. When the friction stress cannot be relieved by subduction of the Juan de Fuca plate the stress is released in the form of a sharp movement resulting in deep intraplate earthquakes. Three large intraplate earthquakes have been recorded by seismic monitoring equipment in western Washington: the recent 2001 Nisqually earthquake (magnitude 6.8 [M]), the 1965 earthquake (M~6.5), and the 1949 (M~7.1) earthquake. These events were deep intraplate earthquakes (25 to 100 kilometers bgs). There is evidence that six such earthquakes have occurred in the Puget Sound region with estimated magnitudes greater than 6.0 since 1870 (Walsh, et al., 2002). The recurrence interval for this magnitude earthquake has been estimated at approximately 20 to 40 years, based on the historic event record.

Deep intraplate ruptures in the subduction zone between the Juan de Fuca plate and the North American plate also result in earthquakes. Records provided by buried soil layers, dead trees, and deep-sea deposits indicate that a rupture in the subduction zone caused an earthquake in the year 1700 with a magnitude of approximately 8.9. Evidence of a tsunami in Japan has been correlated to the 1700 earthquake. A recurrence interval of 500 to 600 years is estimated for earthquakes resulting from ruptures in the Juan de Fuca and North American plate subduction zone (Haugerud, et al., 1999).

The third type of earthquake is a shallow, crustal earthquake occurring within the North American plate. Several mapped shallow surficial faults in the Puget Sound region form the Seattle Fault Zone. The Seattle Fault Zone is a 4- to 6-kilometer-wide zone of south-dipping thrust or reverse faults. Johnson, et al. (1999) mapped the east to west trending fault zone in waterways from Dyes Inlet to Lake Washington. The EIS site area is located approximately on the southern boundary of Johnson, et al.'s (1994) mapped location of the fault zone as shown on Figure 9.

A shallow crustal fault in the Seattle Fault Zone was exposed in an excavation in Bellevue approximately 1.5 miles east of the site. This is the easternmost exposure found in the fault zone; however, the fault is projected to continue east to the Cascade Range. The Bellevue exposure of the fault shows surface displacement of approximately 6 feet. Researchers estimate that an earthquake of M 6.8 occurring approximately 3,500 to 11,000 years ago caused the offset documented at the Bellevue exposure (Margeson, 2002).

A large earthquake event (M>7) occurred on the Seattle Fault approximately 1,100 years ago and produced 15 to 21 feet uplift at Restoration Point and in the Duwamish River valley (Johnson, et al., 1999). This earthquake was accompanied by a tsunami in Puget Sound (Atwater and Moore, 1992), landslides in Lake Washington (Jacoby, et al., 1992; Karlin and Abella, 1992, 1996), and rock avalanches in the Olympic Mountains (Schuster, et al., 1992). Since 1970 the largest two earthquakes associated with the Seattle Fault are an M 5.0 event beneath Point Robinson and a M 4.9 event beneath southwestern Bainbridge Island. Slip rates across the Seattle Fault Zone are estimated at 0.7 to 1.1 millimeters per year, but no information on recurrence interval is available at this time (Johnson, et al., 1999).

No evidence of faulting (surficial ground rupture) has been documented at the site or the immediate surrounding area at the time of this study. Although no evidence of surface faults or associated ground rupture was observed at the site, there are several active crustal faults in western Washington that may pose significant seismic hazards at the site and in the site vicinity.
Five types of potential geologic hazards are usually associated with seismic events: (1) ground rupture along a surficial fault zone; (2) ground motion response; (3) liquefaction; (4) seismically induced landslides; and (5) lateral spreading.

3.3.3.1 Ground Rupture

No evidence of surficial ground rupture (faults) has been documented at the site in published regional or site-specific studies. Therefore, the potential for surficial ground rupture at the site area is considered low.

3.3.3.2 Ground Motion Response

Ground motion from an earthquake is caused by shear, pressure, and surface waves propagating through the earth's crust from the earthquake's hypocenter. The ground motion caused by these waves is the shaking felt during an earthquake. The intensity of the shaking at a given location during and immediately after an earthquake is a result of several variables including: (1) the magnitude of the earthquake; (2) distance from the epicenter; (3) depth of the epicenter; (4) the type of bedrock and unconsolidated sediments underlying a given site; and (5) attenuation of the seismic energy between the epicenter and a given location. The seismically induced loss of soil strength can result in failure of the ground surface and can be expressed as landslides or lateral spreads, surface cracks and settlement, and/or sand boils.

The Nisqually 2001 earthquake provided direct observation of ground motion during a large regional earthquake. The University of Washington's Pacific Northwest Seismograph Network created a "shake map" of peak acceleration and velocity from wave forms collected from the earthquake. Peak acceleration is the maximum acceleration experienced by a particle at the earth's surface during the course of the earthquake motion. Shaking from the event (located between Olympia and Tacoma, 32.6 miles deep, and approximately 40 miles from the site) showed strong shaking (peak acceleration of approximately 5 to 10% of the acceleration of gravity [g, 9.8 meters per second per second]) in the vicinity of the site (University of Washington Earth and Space Sciences, 2003).

The guidelines presented in the 2009 *International Building Code* (IBC) Section 1613 should be used in the seismic design of the project. Based on the explorations performed at the site, we interpret the subsurface conditions to correspond to a Site Class "F" as defined by Table 1613.5.2 of the 2009 IBC due to the potential for liquefiable soils. We anticipate that the fundamental period of vibration of the structure will be less than 0.5 second, which should be confirmed by the structural engineer. If the period of vibration for the buildings is less than 0.5 seconds, the site soils could be classified as Site Class "E" per the Site Class F exception in Section 20.3.1 of ASCE 7.

The U.S. Geological Survey (USGS) Earthquake Hazards Program web site (http://earthquake.usgs.gov/hazmaps/) can be used to determine interpolated probabilistic ground motion values in percent of gravity (g) for an event with a return period of 2 percent exceedance in 50 years. Using the web site, the project site was submitted using latitude and longitude to determine mapped spectral accelerations of S_s = 1.473 for short periods (0.2 seconds) and S_1 = 0.505 for a 1-second period for Site Class B. Design guidelines for mitigating earthquake damage to structures based on anticipated ground motions for a specific region are included in the IBC. The structural engineer should correct the Site Class B values for Site Class E.

Unconsolidated deposits may amplify ground motion. Ground motions in areas underlain by unconsolidated deposits will likely be more intense than predicted for hard rock sites. As described previously, the site area is underlain by approximately 40 to 135 feet of loose alluvium and fill. The spectral accelerations presented above would be greater when corrected for Site Class E.

3.3.3.3 Liquefaction

Shaking during an earthquake can cause an increase in pore water pressure in the soil and decrease the soil shear strength. The loss of shear strength can cause the soils to temporarily behave as a liquid. Soils are considered to liquefy when nearly all of the weight of the soil is supported by the pore water pressure. Seismically induced liquefaction typically occurs in loose, saturated, non-cohesive sandy and silty soils.

Evidence of liquefaction including sand boils, cracking/joint separations, and settlement (up to 9 inches) was observed in the vicinity of the King County Airport (Boeing Field) located approximately 2¼ miles south of the site (University of Washington, 2003).

Based on the presence of fine-grained loose deltaic deposits, alluvium, and fill soils underlying the site area, and our understanding of the regional seismicity, it is our opinion that the potential for liquefaction at the site area is high. A preliminary geotechnical engineering report prepared for the site (Aspect, 2009) estimates that liquefaction induced settlement could range from 12 to 30 inches across the site.

3.3.3.4 Seismically Induced Landslides

Earthquake vibration can cause landslides which result from failures along existing planes of weakness within bedrock (such as bedding planes or fault planes) or within unconsolidated material. The USGS documented numerous earthquake-induced landslides throughout the Puget Lowland that occurred during the 2001 Nisqually quake. Several researchers have correlated subaqueous landslides in Lake Washington from an earthquake believed to have occurred approximately 1,100 years ago on the Seattle Fault (Jacoby, et al., 1992; Karlin and Abella, 1992, 1996). No evidence of seismically induced surficial landslides has been documented at the site. Based on the documentation of mass movements in Lake Washington (subaqueous) and the geometry of the deltaic/lacustrine deposits underlying the site area, it is our opinion that the potential for seismically induced subaqueous landslides does exist in the deltaic deposits in Lake Washington adjacent to the site.

3.3.3.5 Lateral Spreading

Lateral spreading refers to rapid fluid-like lateral ground movements that occur on relatively gentle slopes. Because the sediments underlying the site area are highly susceptible to liquefaction, the potential for lateral spreading is also high for a design level seismic event (2.475 year return period). A preliminary geotechnical engineering report prepared for the site (Aspect 2009) estimates horizontal displacements due to lateral spreading could range from 8 to 13 feet near the shoreline and 1 to 3 feet at the eastern edge of the site.

Recent studies (Aspect, 2010) have also looked at the potential for lateral spreading under smaller magnitude, but higher probability seismic events (108 year return period). Under the smaller magnitude seismic event, the magnitude of lateral spreading ranged from approximately 0 to 0.5 inches on the central and eastern portions of the site to 3.5 to 15.5 inches along the western edge of the site.

4.0 AFFECTED ENVIRONMENT: GROUND WATER

4.1 Regional Hydrogeology

The Quendall Terminal property area is located in the May Creek hydrologic basin. Ground water in this portion of the May Creek basin is present in glacial and nonglacial sediments in the upland areas and relatively coarse-grained deltaic deposits in and at the mouth of the May Creek (Aspect, 2010). The ground water in the upland glacial and nonglacial deposits and direct precipitation onto the flatter nearshore areas flows downgradient and provides recharge to the May Creek deltaic deposits. These flows ultimately discharge to May Creek then Lake Washington, or discharge directly into Lake Washington. A conceptual hydrogeologic cross section showing recharge and discharge areas and ground water flow is presented on Figure 4.

4.1.1 Upland Aquifer

Based on review of well logs filed with the Washington State Department of Ecology (Ecology), Vashon advance outwash deposits are the main upland aquifer unit with scattered upland wells within the May Creek basin utilizing this deposit for domestic water supply. Ground water is also withdrawn from scattered wells completed in the older glacial and nonglacial deposits underlying the advance outwash. Recharge to the upland aquifer is from infiltration of precipitation through till surfaces and windows in the till that expose advance outwash deposits. Ground water in the advance outwash unit likely moves laterally downgradient towards May Creek or Lake Washington and vertically downward to the underlying pre-Vashon glacial and nonglacial deposits. Ground water in the upland aquifer ultimately discharges to Lake Washington or alluvial deposits and pre-Vashon glacial/nonglacial deposits underlying Lake Washington.

4.1.2 May Creek Alluvial Aquifer

May Creek occupies a narrow drainage basin that extends from Lake Washington east to Highway 900 west of Squak Mountain. Geologic maps of the Issaquah (Booth, et al., in review) and Maple Valley (Booth, 1995) Quadrangles show that the May Creek stream valley is underlain by recessional outwash sand and gravel terraces on the flanks and wetland and alluvium around the stream channel. The wetland and alluvium is described as being "intermittently wet annually". The May Creek Alluvial Aquifer is recharged by direct precipitation, surface water runoff from the surrounding uplands and springs or seeps where the Upland Aquifer discharges into the May Creek stream valley.

4.2 Site Hydrogeology

Based on previous work completed at the site (Anchor QEA and Aspect, 2010), three aquifer zones have been identified beneath the Quendall Terminals property. The three aquifer zones are: 1) the Shallow Aquifer, 2) the Deep Aquifer and, 3) the Artesian Aquifer. These are discussed in more detail below. Due to the placement of a soil cap during remediation activities, the depth of the site aquifers will be approximately 2 feet greater beneath post remediation grade than the depths cited from previous site characterization reports.

4.2.1 The Shallow Aquifer

The Shallow Aquifer is located in fill and alluvium deposits (Shallow Alluvium) consisting of interbedded peat, silt, and sand from near ground surface to a depth of approximately 35 feet below original site grade. The depth to water in the Shallow Aquifer is typically encountered at 2 to 10 feet below original site grade. The Shallow Aquifer flows to the west towards Lake Washington (Figure 10) with an average hydraulic gradient of 0.005 that steepens near the shoreline to 0.01. Hydraulic conductivity in the Shallow Aquifer ranges from $1x10^{-2}$ to $1x10^{-4}$ centimeters per second (cm/s). Complex interbedding within the Shallow Alluvium is assumed to result in high anisotropy with respect to hydraulic conductivity in the Shallow Aquifer that likely results in preferential, near horizontal ground water flow and impedance of vertical ground water movement. Recharge to the Shallow Aquifer is predominantly through direct precipitation and surface water flow from the upland to the east.

4.2.2 The Deep Aquifer

The Deep Aquifer is located in the coarser grained alluvium (Deep Alluvium) consisting of medium dense sand and gravel from a depth of about 35 feet to a depth of 140 feet below original site grade. The Deep Aquifer flows to the west towards Lake Washington with hydraulic gradients varying seasonally from 0.002 to 0.04. Hydraulic conductivity in the Deep Aquifer has been measured at 2x10-2 cm/s (Anchor QEA and Aspect, 2010). Recharge to the Deep Aquifer is likely from underflow originating east of the site and downward migration of water from the Shallow Aquifer in the east part of the property. Consistent downward gradients ranging from between -0.01 and -0.12 were recorded from shallow/deep well pairs located from the center of the site eastward. The highest downward gradients have been measured in the winter months when recharge is the greatest.

4.2.3 The Artesian Aquifer

The presence of a deep, confined aquifer beneath the Deep Aquifer has been postulated based on information collected from the former creosote plant water supply well. This well was reportedly 180 feet deep (Hart Crowser, 1994) and exhibited artesian flow when the cap was removed from the well. This is the only well drilled to that depth at the site.

5.0 AFFECTED ENVIRONMENT: HAZARDOUS SUBSTANCES

5.1 Current Status of the Quendall Terminals Site Remediation Process Under Federal Superfund

From about 1916 to 2008, various industrial site activities including creosote manufacturing, petroleum product storage and log sorting/storage have resulted in the release of various contaminants to the soil and ground water at the subject site. Until 2006, Ecology was the lead regulatory agency responsible for overseeing remediation of the site. Under Ecology's guidance, a Remedial Investigation report (Hart Crowser, 1997) and a draft Risk Assessment/Focused Feasibility Study were completed. In May 2005, Ecology requested that the United States Environmental Protection Agency (EPA) assume responsibility for directing and overseeing remediation of the site and the site was added to EPA's Superfund National Priorities List (NPL) in 2006. In September 2006, two of the site's responsible parties (Altino Properties and J.H. Baxter & Company) entered into an Administrative Order on Consent (AOC) with EPA that requires the responsible parties to complete a remedial investigation (RI) and feasibility study (FS). The RI/FS will review various remediation options from which EPA will choose a preferred cleanup remedy and, following public comment, a final cleanup remedy. Currently, the responsible parties have completed a Draft RI (Anchor QES and Aspect Consulting, 2010) that is currently under review by EPA and are in the process of preparing a Draft FS. EPA expects the RI/FS to be completed by Summer 2011. For the purpose of this EIS document, the proponent's preferred remedial action consisting of capping the site with limited soil removal and possibly a "treatment" wall along some portion of the shoreline to allow passive remediation of ground water prior to entry into Lake Washington is the assumed final remedial action and the baseline (no action) condition of the site (it is unlikely that the treatment wall will run the entire length of the shoreline).

5.2 Results of the Remedial Investigation

The responsible parties have completed a Draft RI (Anchor QES and Aspect Consulting, 2010) for the site that summarizes the history of the property and past industrial activities, summarizes past site characterization data, identifies and fills data gaps, identifies contaminants of interest, and documents the extent of contamination in site media (soil, ground water and sediment). Results of the Draft RI are discussed below.

5.2.1 History of the Site

Early homesteaders sold the property to Mr. Peter Reilly in 1916 who began Republic Creosoting in 1917. The site was used for creosote manufacturing for more than 50 years until 1969. The company distilled coal and oil-gas tar residues (coal tar) obtained from local coal gasification plants. Tar feedstock was typically transported to the facility and unloaded from tankers or barges at a T-Dock that extended out into Lake Washington and at a shorter, near-shore pier. The feedstock was unloaded into two 2-million gallon, above ground storage tanks. Above ground pipes transferred the feedstock from the tanks to the manufacturing facilities.

Once distilled, several fractions were stored in tanks (light distillates and creosote) or below-grade pitch bays (heavy distillates) prior to being transported off-site for various uses. Light distillates were used for chemical manufacturing feedstock, middle distillates (creosote) were used for wood preservation, and heavy (bottom) distillates (pitch) were used for applications such as roofing tar (Hart Crowser, 1994). At the peak of its productivity, the facility reportedly produced about 500,000 gallons of tar per month (CH2M Hill, 1983). Wastes produced by the manufacturing processes were disposed of on-site: solid wastes placed near the shoreline and liquid wastes discharged to two sumps. In addition to site produced wastes, it has been reported that foundry slag from PACCAR was used as fill at the site.

Quendall Terminals purchased the site in 1971. From 1971 until 1983 Quendall Terminals leased the above ground tanks that remained from the creosote facility for the storage of Bunker C, waste oil, diesel, and lard. From 1975 until 2009, Quendall Terminals used the site for log sorting and storage.

5.2.2 Chemicals of Potential Concern

The typical, primary constituents of creosote and coal tar are listed in Table 1. In general, creosote contains approximately 85 percent polynuclear aromatic hydrocarbons (PAHs), 10 percent phenolic compounds (e.g., cresol), and 5 percent heterocyclic hydrocarbons (e.g., furan) (EPA, 1995). Coal tar is similar in composition, but also contains up to 5 percent light aromatic hydrocarbons (e.g., BTEX). Pitch is also similar to creosote in that it does not contain light aromatic hydrocarbons, but does contain more higher-weight PAHs. One purpose of the recent RI was to identify hazardous chemicals associated with past site use that potentially pose a risk to human health and the environment. The chemicals of potential concern are listed in Table 2.

5.2.3 Nature and Extent of Contamination

Under the two re-development alternatives and if no action occurs, only limited soil removal will occur with possibly passive treatment of ground water prior to its entry into Lake Washington. Most contamination will be isolated and contained on-site. Site contamination consists of chemicals of potential concern that are adhered to soil particles, dissolved into water or concentrated as dense, non-aqueous phase liquid (DNAPL) in the subsurface. The approximate extent of contamination is presented in Figures 11 through 17. The figures have been compiled from draft feasibility study data provided by Aspect Consulting and Anchor QEA. The figures depict areas of contamination in various media where contaminants of potential concern (COPC) have been detected at concentrations above various method detection and reporting limits in past site characterization studies. Areas where COPC were below various method detection and reporting limits have not been included on the figures. However, it should be understood that some of the past method detection and reporting limits may be greater than the proposed site remediation goals. Some samples identified as non-detected in the database may exceed the proposed site remediation goals.

5.2.3.1 Extent of DNAPL

The DNAPL represents actual liquid product that has leaked into the ground. Because DNAPL has a higher density than water it will tend to sink below the water table to accumulate in the higher permeability portions of the subsurface soils. The approximate extent/locations of DNAPL in the subsurface are shown on Figure 11.

5.2.3.2 Extent of Soil Contamination

The approximate extent of soil contamination is shown on Figures 12 and 13. Figure 12 depicts areas of potentially contaminated fill soils that cover the surface of the site. Along the southern and eastern boundaries, the fill ranges from about 1 to 2 feet thick, while in other areas the fill ranges to more than 10 feet thick (Aspect, 2009).

Figure 13 depicts the areas of soil contamination including both fill and native soils. The areas shown represent a compilation of analytical data to a depth of greater than 25 feet below the pre-remediation cap grade. Larger areas of contamination are located on the east side of the site around the former manufacturing facility and railroad siding and at the east end of the former T-Dock pier.

5.2.3.3 Extent of Ground Water Contamination

The approximate extent of ground water contamination is shown on Figures 14 and 15. Figure 14 depicts the approximate extent of contamination in the Shallow Aquifer. The Shallow Aquifer extends from near the ground surface to a depth of about 35 feet below pre-remediation cap grade (Anchor QEA and Aspect, 2010). Contamination in the Shallow Aquifer underlies most of the Quendall Terminals property.

The approximate extent of contamination in the Deep Aquifer is shown on Figure 15. The Deep Aquifer occurs within the coarser alluvium from a depth of about 35 feet to a depth of approximately 140 feet below pre-remediation cap grade (Anchor QEA and Aspect, 2010). Contamination in the Deep Aquifer mostly exists under the western portion of the Quendall Terminals property, generally centered along the shoreline of Lake Washington.

5.2.3.4 Extent of Sediment Contamination

The approximate extent of contamination in the sediment underlying Lake Washington is shown on Figures 16 and 17. Figure 16 shows the extent of contamination derived from the analyses of bulk sediment samples. The contamination is generally centered around the former T-Dock pier. Figure 17 shows the extent of contamination based on the analysis of sediment pore water samples. The contamination is generally centered around the former T-Dock pier and east of the Quendall Property boundary.

5.3 Results of the Feasibility Study

The purpose of the Feasibility Study is to evaluate appropriate remedial alternatives and select a preferred alternative for the site.

Various remedial alternatives have been evaluated in the FS process and the proponent's preferred remedial action (and the remedial action assumed in this EIS) consists of the following elements:

- Placement of a 2-foot-thick sand cap over the upland portion of the main property.
- Placement of a 2- to 3-foot-thick layered cap consisting of organoclay, sand, gravel, and topsoil over most of the shoreline area.
- Excavation of shoreline soil to accommodate the shoreline cap.
- Filling of certain site wetlands, re-establishing former wetlands, and expansion of re-established and existing wetlands.
- Localized soil removal in the former railroad loading area and in planned utility corridors.
- Possibly installation of a permeable shoreline ground water treatment wall adjacent to portions of the lake shoreline.
- Implementation of institutional controls to prevent alteration of the cap without EPA approval and to prevent the use of on-site ground water for any purpose.
- Implementation of an Operations, Maintenance and Monitoring Plan (OMMP) that would present a process for obtaining EPA approval if future excavations, utility installations, or other site disturbances are necessary after implementation of the final remedial action.

6.0 POTENTIAL IMPACTS AND MITIGATION MEASURES: GEOLOGIC HAZARDS

Potential impacts, mitigation measures, and unavoidable adverse impacts related to geologic hazards at the site resulting from redevelopment identified in the two alternatives are described in this section of the report. The impacts, mitigation measures, and unavoidable adverse impacts described for each identified geologic hazard apply to both of the redevelopment alternatives.

6.1 Landslide Hazards

6.1.1 Impacts of the Redevelopment Alternatives

The upland portion of the site is essentially level, and the risk of landslides is considered low under existing conditions. In our opinion, redevelopment of the site will not increase the existing low landslide hazard risks on the upland portion of the site provided no unengineered cut or fill slopes are constructed. Appropriate mitigation measures should be implemented to reduce the risk of sidewall cave-ins during excavation of utility trenches.

Due to the low density and saturated nature of the near offshore sediments, some risk of subaqueous landsliding on the May Creek delta face exists during a large seismic event.

6.1.2 Landslide Mitigation Measures

In our opinion, redevelopment at the site identified under the proposed redevelopment alternatives will not increase the existing low level of landslide hazards on the upland portion of the site or the moderate risk of subaqueous landsliding on the offshore portion of the site. No additional landslide mitigation measures are required under any of the redevelopment alternatives.

6.1.3 Unavoidable Adverse Impacts

The risk of subaqueous landslides on the offshore portion of the site is moderate and is an unavoidable adverse impact with or without the Quendall Terminals redevelopment. The potential for these landslides is infrequent due to the long recurrence interval for large seismic events.

6.2 Erosion Hazards

6.2.1 Impacts of the Redevelopment Alternatives

The erosion hazard potential for the site is considered to be low under existing conditions. The most significant erosion hazard impact to the site area will occur during the construction phase when earthwork activities are performed. Clearing and grading operations during construction may increase the erosion potential at the site through the removal of the existing vegetation, which would temporarily expose soil directly to precipitation and runoff. Under both of the redevelopment alternatives surface water runoff will be tightlined into a storm drain and treatment system which will discharge into Lake Washington at three 24-inch-diameter, submerged outfalls located on the west side of the property (KPFF, 2009). Mitigation measures should be employed during construction to reduce the risk of sediment transport to these water resources during construction.

Under both of the redevelopment alternatives, the amount of impervious surface areas would increase compared to the existing conditions and erosion hazard risks could increase at the proposed storm water outfalls. Mitigation measures such as energy dissipation structures or flow diffusers should be implemented to reduce the risk of erosion and sediment transport at the outfalls for treated stormwater.

6.2.2 Erosion Mitigation Measures

Proper control of surface water runoff will be important in alleviating potential erosion and sediment transport hazards during and after construction. To mitigate and reduce the erosion hazards and transport of sediment from redevelopment, Best Management Practices from the 2009 *King County Surface Water Design Manual* (KCSWDM) can be used which include:

- All temporary and/or permanent devices used to collect surface runoff should be directed into tightlined systems that discharge into an approved stormwater facility.

- Soils to be reused at the site during construction should be stockpiled or stored in such a manner to minimize erosion from the stockpile. Protective measures may include covering with plastic sheeting and the use of silt fences around pile perimeters. Additional erosion control measures may be required.

- The majority of the site will be covered with impervious surfaces under the redevelopment alternatives. Source control mitigation measures should be conducted for the minor cleared areas. All exposed unpaved areas should be seeded, covered with plastic sheeting, or otherwise protected during inclement weather or the wetter, winter months.
- During construction, silt fences or other methods such as straw bales should be placed along surface water runoff collection areas in proximity to Lake Washington and the adjacent wetlands to reduce the potential of sediment discharge into these waters. In addition, rock check dams should be established along roadways during construction.

- Temporary sedimentation traps or detention facilities should be installed to provide erosion and sediment transport control during construction.

- Offshore outfall locations for stormwater discharge from the permanent stormwater control system should be equipped with energy dissipation structures or other devices to prevent erosion of the lake bottom.

- It is recommended that a geotechnical engineer review the grading, erosion, and drainage plans prior to final plan design to further assist in mitigating erosion and sediment transport hazards during and after redevelopment. Additional erosion mitigation measures may be offered at that time in response to specific design plans.

6.2.3 Unavoidable Adverse Impacts

Unavoidable erosion impacts as a result of redevelopment of the site area would likely result in some soil loss during construction. However, provided the mitigation measures offered in this report and a Temporary Erosion and Sediment Control (TESC) plan are properly followed, it is anticipated that sediment transport would be contained within the redevelopment area, and no significant adverse impacts to the adjacent water features or off-site areas are anticipated.

6.3 Seismic Hazards

6.3.1 Ground Rupture Hazards

No evidence of surficial ground rupture has been documented at the site area in the previous studies performed for the property. It is our opinion that based on the current data, the potential of a ground surface rupture impacting the site area as a result of seismic activity is low.

6.3.2 Ground Rupture Mitigations

The potential for surface ground rupture at the site area is considered low, and no mitigation measures are required.

6.3.3 Ground Motion Hazards

Earthquakes with magnitudes of up to 7.2 have been recorded in the Puget Sound in the past, but these large earthquakes are generally considered to have a recurrence interval of more than 100 years in the Puget Sound region. Therefore, all structures should be designed in accordance with applicable building codes to mitigate the effects of seismic events and to reduce the potential impacts of ground motion on redevelopment.

6.3.4 Ground Motion Mitigations

Based on the site area stratigraphy, it is our opinion that potential earthquake damage to structures founded on a suitable bearing strata and following the geotechnical engineer's recommendations could be caused by the intensity and acceleration associated with the event.

Structural design of buildings following current codes should take into consideration stress caused by seismically induced earth shaking.

6.3.5 Liquefaction Hazards

The deltaic deposits and fill soils beneath the site area are considered to be highly susceptible to liquefaction. Mitigation measures will be required for redevelopment to reduce the risk of settlement or deformation of structures due to potential liquefaction events.

6.3.6 Liquefaction Mitigations

Mitigation measures would be required to reduce the impact of potential liquefaction on development of the site area. Proper foundation and utility designs should be utilized as discussed under the following "Geotechnical Considerations" section of this report.

6.3.7 Seismically Induced Landslides

The upland area of the site is essentially level, and the risk of seismically induced landslides is considered to be extremely low and not significant for that portion of the site.

The near offshore areas are underlain by loose, saturated alluvial deltaic deposits that may be prone to subaqueous landsliding caused by a large seismic event with or without the Quendall Terminals redevelopment.

6.3.8 Seismically Induced Landslide Mitigations

In our opinion, redevelopment at the site identified under the proposed redevelopment alternatives will not increase the existing low level of landslide hazards on the upland portion of the site or the moderate risk of subaqueous landsliding on the offshore portion of the site. No additional landslide mitigation measures are required under any of the redevelopment alternatives.

6.3.9 Unavoidable Adverse Impacts

The risk of subaqueous landslides on the offshore portion of the site is moderate and is an unavoidable adverse impact. The potential for such landslides is infrequent due to the long return interval for large seismic events.

6.3.10 Lateral Spreading

The sediments beneath the site area are considered to have a high potential for lateral spreading and mitigation measures will be necessary. The preliminary geotechnical engineering report prepared for the project (Aspect, 2009) estimates that during a large, long return period earthquake horizontal displacements due to lateral spreading could range from 8 to 13 feet near the shoreline and 1 to 3 feet at the eastern edge of the site. Additional studies (Aspect, 2010) have estimated that during a smaller, higher probability seismic event the magnitude of later spreading could range from 0 to 0.5 inches on the central and eastern portions of the site and from 3.5 to 15.5 inches on the western portion of the site.

6.3.11 Lateral Spreading Mitigations

Mitigation measures would be required to reduce the potential impact of lateral spreading hazards. Foundation design should follow the "Geotechnical Considerations" section of this report.

6.3.12 Unavoidable Adverse Impacts

Based on the findings from the previous studies and our professional experience, it is our opinion that structure damage from seismic hazards would likely be caused by the intensity and acceleration associated with the event, provided recommended measures are properly followed.

7.0 POTENTIAL IMPACTS AND MITIGATION MEASURES: GROUND WATER

7.1 Site Ground Water Impacts

7.1.1 Impacts

7.1.1.1 Recharge

Recharge to the aquifer beneath the site from direct precipitation is considered minimal with the majority of recharge originating from off-site areas. No planned infiltration will occur within the redeveloped site area and stormwater will continue to be conveyed off-site. Under the two redevelopment alternatives, most of the site will be covered with impervious surface area. While this will substantially reduce the recharge to the Shallow Alluvial aquifer due to direct precipitation on-site, the amount of recharge contributed by direct precipitation is considered to be small when compared to the off-site sources of recharge. The potential for adverse impacts to the recharge from the two redevelopment alternatives is considered to be low and not significant.

7.1.1.2 Dewatering

The ground water table can occur as shallow as 2 to 10 feet below site grade and dewatering may be necessary for the construction of new utilities. If ground water levels are significantly decreased, ground settlement could result in impact to nearby building, road, or parking areas.

7.1.2 Mitigation Measures

The potential impacts to recharge of the shallow water table aquifer at the site area are considered low and no mitigation measures are required.

Ground water may be encountered during excavation of utility trenches. If necessary, dewatering should be conducted in a manner that would minimize potential impacts due to settlement. The quantity of water removed may be reduced along with the magnitude of the potential resulting settlement through proper design of the dewatering system and construction sequencing. Construction techniques such as reducing the length of trench open at one time may be required. The location, extent, and depth of utilities will dictate dewatering design and the quantity of water that must be removed. Specific recommendations should be developed during the design phase once plans are finalized. In addition, proper disposal of dewatering effluent should be stipulated in the design specifications for the placement of new utilities. The impact of new utility construction during development can be significantly reduced if the main utility corridors are constructed prior to development during implementation of the remedial action.

7.1.3 Unavoidable Adverse Impacts

No unavoidable adverse impacts from the two development alternatives were identified.

7.2 Off-Site Area Ground Water Impacts

7.2.1 Impacts

The site is located at a discharge point for the ground water flow system related to the May Creek drainage. Under the current conditions, ground water flowing down the May Creek valley discharges through the alluvial deltaic sediments and into Lake Washington. Under the two redevelopment alternatives, ground water from the May Creek drainage would still discharge in this manner. Therefore, no impact to the regional ground water system has been identified.

7.2.2 Mitigation Measures

No mitigations for off-site ground water impacts are warranted.

7.2.3 Unavoidable Adverse Impacts

No unavoidable impacts to the off-site ground water system have been identified.

8.0 POTENTIAL IMPACTS AND MITIGATION MEASURES: HAZARDOUS SUBSTANCES

8.1 Proposed Remedial Action and Its Relationship to Development and Land Uses

Prior to the start of the proposed development, the subject site will have undergone the remedial action described in Section 5.3 above that will have capped the site to prevent direct contact with contaminants, re-established/expanded selected wetlands and shoreline function, possibly installed a passive shoreline ground water treatment wall, and enacted institutional controls to prevent the excavation of soils without EPA approval and to prevent the use of site ground water. Part of the planned remedial action could include the installation of planned utilities for the proposed development at the time the remedial action is performed so that this earthwork would not have to been done as part of the site development.

Under the No Action Alternative, the site would remain undeveloped after completion of the planned remedial action. Under the proposed redevelopment alternatives, some mitigations would likely result in disturbance of the installed cap or generation of contaminated soil that would have to be handled according to the OMMP. Proposed development options may also have to increase protections against direct contact or exposure to vapor due to the presence of full-time residents on the site.

8.2 Impacts and Mitigation Measures Under Alternatives 1 and 2

8.2.1 Impacts

In both of the proposed redevelopment alternatives, the majority of the site outside of the shoreline setback will be developed with parking, drives, and buildings. Due to the soft and loose nature of the natural subsurface soils, construction of these features could result in settlement of the site due to loads imposed by foundations, utilities, and traffic. The proposed redevelopment alternatives do not include below grade excavations for parking or basements. It is also assumed that the main utility corridors required for the proposed development could be installed during the chosen remedial action. It is possible that limited utility excavation could be required to connect specific buildings to the main corridors and this excavation may require dewatering. It is also likely that buildings will require deep foundation support (Aspect, 2009). Utility excavation or the construction of deep foundations could generate contaminated soil or ground water that would require special personal protection requirements for workers and special handling and disposal.

The proponents preferred remedial alternative will leave contaminated soil, ground water, sediments, and DNAPL in place beneath the site. There is the potential for volatile contaminants in the subsurface to generate vapors that could intrude into utility trenches and above-grade structures.

8.2.2 Mitigation Measures

The redevelopment would be coordinated with the cleanup/remediation process under the oversight of EPA. Mitigation measures for potential future impacts triggered by specific redevelopment application(s) for relevant uses within the site could include:

- Use of lightweight fill materials;
- Special capping requirements;
- Use of personal protection equipment by workers during construction;
- Proper handling and disposal of contaminated soil and water;
- Planned utilities could be installed as part of the remedial action so that disturbance of the soil cap would not be necessary;
- Institutional controls to prevent alteration of the soil cap or use of site ground water without EPA approval;
- Implementation of an Operations, Maintenance, and Monitoring Plan to provide guidelines for the excavation of soil or other site disturbances, if approved by EPA; and
- Other engineering control measures to ensure that future land uses do not result in unacceptable exposures from contaminated soils and ground water or from vapors accumulating within buildings or utility corridors.

8.2.3 Unavoidable Adverse Impacts

No unavoidable adverse impacts from redevelopment are expected.

9.0 GEOTECHNICAL CONSIDERATIONS

Several geotechnical issues have been identified at the site. These issues are specific to the site, as opposed to being specific to the various redevelopment alternatives. The main issues identified and discussed below include:

- Foundations: Presence of soft and loose subgrade soils to depths of approximately 40 feet bgs.
- Liquefaction: Presence of potentially liquefaction susceptible, saturated granular soils to depths of approximately 80 feet bgs.
- Lateral Spreading: Lateral movement of soil above the liquefiable zone toward the shoreline.

Potential geotechnical impacts can be mitigated through characterization of surface and subsurface conditions, geotechnical engineering, structural design, and proper construction implementation of the design. As specific building permit applications are submitted, site-specific impacts and associated mitigation measures can be applied to the site.

9.1 Site Preparation

As described in Section 3.2 of this study, the site area soils are highly variable and generally consist of fill soils overlying alluvial deposits to estimated depths of about 87 to 107 feet. The Shallow Alluvium soils to depths of about 40 feet are generally considered to be both compressible and moisture-sensitive. The shallow ground water table occurs at a depth of approximately 2 to 10 feet below the ground surface.

It is anticipated that minimal grading will be required for the proposed redevelopment. Some fill would be required to achieve the proposed site grades and it is assumed that the fill material would be imported from an approved location. Some cut/fill would be required for installation of utilities. Installation of certain utilities could be coordinated with the cleanup/remediation effort. The applicant estimates that approximately 16.45 acres of the 21 acre property would require fill ranging from 2 to 5 feet thick. The volume of fill required could range from 53,000 cubic yards to 133,000 cubic yards.

Prior to placing any fills, constructing new buildings, or developing infrastructure, some degree of site area preparation would be necessary. This would include removing old foundations, floor slabs, utilities or other structures related to past site use presently on the site, as applicable, and if not previously accomplished during site remediation activities. Any active buried utilities should be removed or relocated if they are under proposed building areas. The resulting depressions would be backfilled with structural fill, as discussed in Section 9.2.

Preparation of proposed building and road/parking areas would include removal of any trees, brush, debris, and any other deleterious material that has accumulated since the end of the remedial activities. Care would have to be exercised to avoid disturbing the soil cap installed during site remediation. The scope of specific site area preparations will depend upon the actual proposed use of a given area (roads, open space, building sites, etc.) and the construction method used (deep foundations, ground improvement, overexcavation, etc.).

9.1.1 Temporary Excavations

Excavations may be necessary for installation of new infrastructure, which will likely include new/upgraded underground utilities. New infrastructure will be required for each of the alternatives. Temporary, unsupported cut slopes in the fill and upper alluvial site soils will typically require temporary slopes of 1.0H:1V to 1.5H:1V (Horizontal:Vertical) for excavations above the ground water table. Deep excavations will likely encounter ground water. Where ground water is encountered, the temporary excavation slopes may have to be inclined at a shallower angle. Alternatively, various forms of temporary shoring such as trench boxes, soldier piling, sheet piling, or ground freezing may be used.

Excavation dewatering may also be necessary. Dewatering methods will depend on the depth of the excavation, the location of the excavation, and the subsurface conditions at a particular location.

9.1.2 Site Disturbance

The upper site soils (soil cap) may contain fine-grained material (smaller than the No. 200 sieve), which makes them moisture-sensitive and subject to disturbance when wet. Site preparation and construction site work can cause disturbance/softening of these soils, particularly during wet seasons (typically October 31 through April 1). Site disturbance can result in increased siltation and require additional quantities of earthwork to remove and replace unsuitable soils. Temporary surfacings such as crushed rock or asphalt treated base (ATB) may be used to mitigate site disturbance at construction entrances or along construction access roads. As per the 2009 KCSWDM, additional measures could include silt fence around the construction perimeter and cover measures such as plastic sheeting, straw, mulch, or hydroseed to protect exposed soil.

9.2 Structural Fill

The site area has relatively level topography with approximately 15 feet to 19 feet of grade difference (1 to 1½ percent slope) across the 22-acre area. Upland elevations range from about 35 feet on the east side of the site to about 20 feet at the shoreline. At the shoreline, the slope increases to about 20 percent for about 20 feet in elevation to the lake level (Aspect, 2009). Anticipated grading activities would include backfill around new structures including backfill within utility trenches (if cut and cover installation), and backfill beneath parking and road areas.

Proper subgrade preparation and drainage control will be necessary prior to placing any structural fill. Geotextile fabric, admixture treatment of the subgrade, or placing imported crushed rock may be necessary to support the structural fill body. The type of subgrade preparation for fill will be dependent on the specific soil type, weather conditions, and performance requirements.

Structural fill may consist of imported soils/aggregate or lightweight fill. In some cases, import soils may be treated with admixtures to achieve optimum moisture conditions for compaction, increase strength, and reduce the quantity of import material required. Structural fill will require compaction in uniform layers using static or vibratory compaction equipment.

9.2.1 Reuse of Site Materials

Due to the contaminated nature of the site and the requirement to maintain the soil cap, we do not anticipate the reuse of site materials for fill.

9.2.2 Impacts Due to Fill Placement

It is not anticipated that large amounts of fill would be required for the two redevelopment alternatives. Large amounts of fill placed at the site could induce settlement in the underlying sediments.

Ground subsidence impacts can be mitigated by careful design of fills to control adjacent settlements, and monitoring of adjacent structures/surfaces to verify that no significant movement occurs. The impact of fill induced settlement on the soil cap and mobilization of contaminants in the subsurface would have to be carefully evaluated before placing large amounts of fill.

9.3 Foundations

The existing site soils have a low possibility of being suitable for providing shallow foundation support. This is due to the potential for the soils to liquefy during seismic events (see Section 3.4), and due to the loose density/soft consistency of the soil. Site-specific studies would be required at the time building permit applications are submitted for review and approval to identify areas that may provide suitable support for some lightly loaded secondary structures. The site is underlain by loose to soft alluvium soils that have been classified as compressible soils. These soils are also prone to liquefaction and lateral spreading during a seismic event, as discussed in Section 3.3.3, "Seismic Hazards." A deep foundation system or ground improvement would likely be required to mitigate the potential damage to new structures resulting from settlement/consolidation/spreading of the loose/soft soils or from liquefaction.

9.3.1 Deep Foundations

Deep foundations have been recommended in many of the previous geotechnical studies for support of the existing buildings at the site area. Various types of piles may be used, including driven piles or drilled piles. The use of piles at the site would have to demonstrate that the integrity of the soil cap would not be affected and that pile installation would not transmit contamination to areas beneath the site that are currently uncontaminated.

The potential for construction of deep foundation systems to transmit contamination could be mitigated by several techniques including: installing surface casing through contaminated zones, installing piles composed of impermeable materials (e.g. steel) using soil displacement methods, using pointed tip piles to prevent carry down of contamination, and/or use of ground improvement technologies such as in situ densification or compaction grouting in certain areas.

9.3.1.1 Driven Piles

Driven piles would likely consist of either open-ended or closed-end steel pipe or driven cast-in-place concrete piles that displace the soil rather than remove the soil for pile construction. Other types of driven piles such as timber or pre-stressed, pre-cast concrete piles are limited by depth of installation. Timber piles are currently difficult to acquire and typically are limited to lengths less than 60 feet. Once fabricated, pre-stressed, pre-cast concrete piles are difficult to splice to adjust for field conditions and are typically limited to lengths less than 80 feet.

Steel pipe piles are typically driven to a refusal criteria based on the number of blows it takes to drive the pile a specified distance, usually one foot (blows/foot). The steel pipes can be hollow and accept a column of soil driven through the center of the pile or closed-ended where the bottom of the pile is sealed and the pile interior remains empty. Closed-end piles can subsequently be filled with concrete to provide a stiffer pile.

Driven cast-in-place concrete piles are constructed by driving a heavy steel casing (mandrel) to the desired depth of bearing. The mandrel is then slowly withdrawn as concrete is pumped under pressure through the casing to fill the shaft created by the mandrel. The process results in a concrete pile that is constructed without generating large quantities of soil cuttings at ground surface.

Hammers that are typically used to drive steel pipe or mandrels consist of either percussion hammers or vibratory hammers. Percussion hammers mechanically drive the pipe into the ground with a heavy weight typically powered by either diesel fuel or compressed air. Vibratory hammers vibrate the pile using hydraulic motors connected to eccentric weights to mobilize the soil particles around the pile tip and shaft and cause soil displacement at the tip of the pile as it is inserted.

Pile driving can cause local ground vibration and percussion noise. In areas characterized by loose/soft soils, which underlie the site area, pile-driving vibrations can cause settlement- and vibration-related damage to the nearby structures, particularly if structures are not supported on deep foundations. The actual severity of vibrations caused by pile driving is affected by many variables including pile and pile-driving hammer size, soil type and density, ground water level, and other factors. The potential vibration damage can be mitigated by:

- Vibration monitoring during test pile and production pile installation.

- Selecting pile and pile hammer types that are matched to the subsurface conditions to achieve the required penetrations with minimal effort.

Percussion noise can be mitigated by:

- Using suitable hammer and pile cushion types for the specific conditions.

- Limiting pile installation activities to regulated construction hours.

9.3.1.2 Drilled Piles

Drilled piles generally do not create the ground vibrations associated with driven piles. However, they do generate excess soil. Based on reported subsurface conditions, the soil cuttings should be expected to be saturated and contaminated and would likely not be reusable. Excess material generated during installation of drilled piles would likely require off-site disposal at a facility licensed to handle contaminated soil.

9.3.1.3 Duration of Pile Installation

The duration of the pile installation will be dependent upon the type of pile constructed, the depth of pile penetration and the number of buildings under construction at any time. The Preferred Alternative includes the construction of 9 buildings with approximate 19,000 square feet footprints. A rough estimate of the duration of pile installation activities would be 2 to 3 weeks per building.

9.3.2 Ground Improvement

An alternative for structural support would be to prepare the building pads for construction by installation of aggregate piers. Aggregate piers are constructed by creating a drilled cavity in the matrix soil, and filling the cavity with aggregate that is densely compacted in thin lifts. The compaction typically induces densification in the surrounding matrix soil. Aggregate piers are installed along continuous foundation bearing walls and at spread foundation locations, and may be installed beneath slab-on-grade floor areas, if needed. Following installation of aggregate piers, the site area would be finish-graded and conventional foundations would be constructed.

As with the drilled piles described above, the installation of aggregate piers will generate excess soil that may require special handling and disposal due to contamination.

9.4 Underground Utilities

Installation of underground utilities will be required for each of the alternatives. Various installation methods may be used for construction, depending on the location and depth and type of the utility.

9.4.1 Conventional Trenching

Traditional cut and cover excavation methods may be used to install new underground utilities. Temporary cut slopes are described above in Section 9.1.1. If ground water is encountered, dewatering may be necessary. Dewatering may be accomplished by pumping from sumps if low ground water flow rates are encountered. Moderate to high ground water flow rates may necessitate a site-specific dewatering plan.

9.4.2 Jack and Bore/Microtunneling/Directional Drilling

Some underground utilities may require installation by jack and bore, microtunneling, or directional drilling methods. These methods would entail excavating access and receiving pits with the utility installed between the pits by pushing or drilling. Depending upon the depth of the utility, shoring and dewatering may be necessary for construction of the access and receiving pits. In addition, working in excavations may require the use of personal protection equipment to prevent worker exposure to contamination.

9.4.3 Utility Damage

Flexible utility connections will be necessary to mitigate the risk of damage due to differential settlement between structures that are pile-supported and underground utilities serving the structures.

10.0 SUMMARY

Based on the findings from this study, it is our opinion, from a geologic, hydrogeologic, and environmental health related standpoint, that potential impacts from redevelopment at the site, under the two redevelopment alternatives, could be mitigated provided the recommendations outlined in this report are followed. As the design of the alternatives is finalized or should the redevelopment alternatives change, the recommendations and conclusions presented in this report should be reviewed and verified, as necessary. A summary of the impacts and mitigations are presented in Table 3.

Precipitation falling on the site area likely provides a very small amount of recharge to the underlying aquifer. Therefore, the potential impacts to the ground water system as a result of redevelopment are considered to be very low and not significant.

The existing erosion and static landslide hazards at the site area are considered low due to the low slope gradients. The highest risk of erosion will occur during construction when earthwork activities commence and additional bare soils are exposed. The risk of subaqueous landslides into Lake Washington during a large seismic event is considered to be moderate, but unavoidable given the existing site conditions with or without redevelopment of the Quendall Terminals site. The majority of the site area surface water runoff will be directed into Lake Washington via the stormwater system. Provided the erosion mitigation measures outlined in this report are properly followed, the potential of erosion during construction could be reduced to a low level. Unavoidable erosion impacts as a result of redevelopment would include some increase in soil loss during construction. However, with the implementation of the erosion control measures during construction and installation of a permanent stormwater control system per the 2009 *King County Stormwater Control Manual*, sediment transport should be controlled and no significant impacts are anticipated.

Based on the findings from review of publicly available environmental investigation and remediation documents, it is our opinion that potential impacts from redevelopment in the site area could be mitigated. No unavoidable adverse impacts have been identified.

Under the assumed redevelopment scenarios, there is potential for contaminated soil and ground water to be generated due to site construction activities. Personal protection equipment and specially trained workers may be required when excavating at the site and contaminated soil generated by site activities will require special handling and disposal. The proponent’s preferred remedial action will also leave contaminated soil, water, and DNAPL in the subsurface beneath the proposed development. It is likely that the implementation of institutional controls and engineered protective measures will be required to protect human health and the environment.

11.0 LIMITATIONS

We have prepared this report for the City of Renton and prime contractor Blumen Consulting Group, Inc. to use in completing an EIS for the Quendall Terminals project. The conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface or environmental conditions. Available data has shown complex geologic conditions in the subsurface beneath the site area. Inconsistent conditions can occur between explorations that may not be detected in a limited subsurface study.

Within the limitations of scope, schedule, and budget, Associated Earth Sciences, Inc. attempted to execute these services in accordance with generally accepted professional principles and practices in the fields of engineering geology, hydrogeology, and geotechnical engineering at the time this report was prepared. The level of quantified analysis for evaluation of impacts could not exceed the level of quantification provided in the site area description and support documents for the two redevelopment alternatives. No warranty, express or implied, is made.

We trust that the information presented in this draft technical report will meet your current project needs. If you should have any questions or require additional information, please feel free to contact our office.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Jon N. Sondergaard, L.G., L.E.G.
Principal Engineering Geologist

Curtis J. Koger, L.G., L.E.G., L.Hg.
Principal Geologist/Hydrogeologist

Bruce L. Blyton, P.E.
Principal Engineer

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Table 1
Quendall Terminals
Primary Constituents of Creosote and Coal Tar

	Creosote		**Coal Tar**		**Aqueous Solubility of Pure Compound (mg/L)**
	Commercial Creosote (USEPA 1990)	**U.S. Creosote (USDA 1980)**	**Coal Tar (GRI 1987)**	**U.S. Coal Tar (USDA 1980)**	
Volatile Aromatics					
Benzene			0.001	0.0012	1780
Toluene				0.0002	152
Ethylbenzene			0.002	0.0025	515
Xylenes			0.01	0.0014	200
Styrene				0.0002	300
Base/Neutrals (PAH)					
Naphthalene	0.17	0.03	0.109	0.088	32
Methylnapthalenes	0.1	0.021	0.024	0.019	25
Dimethylnaphtalenes			0.033		2
Biphenyl	0.019	0.008			7
Acenaphthene	0.078	0.09	0.013	0.0106	3
Fluorene	0.06	0.1	0.016	0.0084	2
Phenanthrene	0.194	0.241	0.04	0.0266	1
Anthracene	0.025	0.02	0.011	0.0075	0.07
Fluoranthene	0.118	0.1			0.3
Pyrene	0.084	0.085			0.1
Chrysene	0.042	0.03			0.002
Methylanthracene		0.04			0.04
Acid Extractables					
Phenol			0.007	0.0061	82000
Cresols			0.011	0.0097	24000
Xylenols			0.002	0.0036	5000
N,S,O-Heterocyclics					
Carbazole	0.051	0.02	0.011	0.006	
Pitch (See Note 1)			0.62	0.635	

Note: 1. Pitch is a general term for the mixture of very low solubility, high-molecular weight hydrocarbons.
Data is tabulated by Cohen and Mercer (1993). Original references as follows:
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Table 2
Human Health Chemicals of Potential Concern

	COPC										
COI	**Soil**		**Groundwater**		**Vapor**		**Surface Water**		**Sediment**		**Sed Bioaccum**
1,1,2-Trichloroethane	NA	Not a soil COI	N	Max detect > SL; < 5% detect	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	
2,4-Dimethylphenol	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	NA	Not a SW COI	NA	Not a sed COI	
2-Methylnaphthalene	Y	Max detect > SL; sub	Y	Max detect > SL	Y	COPC in soil and GW	N	Max detect < SL	Y	HH GW COPC	
2-Methylphenol (o-Cresol)	NA	Not a soil COI	Y	Max detect > SL	Y	COPC in GW	NA	Not a SW COI	NA	Not a sed COI	
4-Methylphenol (p-Cresol)	NA	Not a soil COI	Y	Max detect > SL	Y	COPC in GW	NA	Not a SW COI	Y	HH GW COPC	
Acenaphthene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	N	Max detect < SL	Y	HH GW COPC	Y
Acenaphthylene	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW COI	NA	Not a SW COI	Y	Eco sed COPC	Y
Anthracene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	N	Max detect < SL	Y	HH GW COPC	Y
Arsenic	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Benzene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	Y	Max detect > SL	NA	Not a sed COI	
Benzo(a)anthracene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Benzo(a)pyrene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Benzo(b)fluoranthene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	NA	Not a sed COI	Y
Benzo(g,h,i)perylene	Y	SL not available	NA	Not a GW COI	Y	COPC in soil	NA	Not a SW COI	Y	HH soil COPC	Y
Benzo(k)fluoranthene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	NA	Not a sed COI	Y
Bis(2-ethylhexyl) phthalate	NA	Not a soil COI	Y	Max detect > SL	Y	COPC in GW	NA	Not a SW COI	NA	Not a sed COI	
Cadmium	N	Max detect < SL	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	N	Not a HH or eco COPC	Y
Carbon disulfide	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW COI	NA	Not a SW COI	N	Not a HH or eco COPC	
Chloroform	NA	Not a soil COI	Y	DL > SL	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	
Chromium	N	QA1- Max detect < SL	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	Y	Eco sed COPC QA1	
Chrysene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Copper	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW COI	NA	Not a SW COI	Y	Eco sed COPC QA1	Y
Dibenzo(a,h)anthracene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Dibenzofuran	Y	Max detect > SL; sub	Y	Max detect > SL	Y	COPC in soil and GW	NA	Not a SW COI	Y	HH soil and GW COPC	
Dibromochloromethane	NA	Not a soil COI	N	SL not available; <5% detect	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	

Table 2 (Continued)
Human Health Chemicals of Potential Concern

	COPC										
COI	Soil		Groundwater		Vapor		Surface Water		Sediment		Sed Bioaccum
Ethylbenzene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	N	Max detect < SL	N	Not a HH or eco COPC	
Fluoranthene	Y	Max detect > SL; sub	Y	Max detect > SL	Y	COPC in soil and GW	N	Max detect < SL	Y	HH GW COPC	Y
Fluorene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	N	Max detect < SL	Y	HH GW COPC	Y
Indeno(1,2,3-c,d)pyrene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Lead	Y	Max detect > SL	NA	Not a GW COI	Y	COPC in soil	NA	Not a SW COI	N	HH soil COPC; QA1- in sed	Y
m,p-Xylene	N	Max detect < SL	N	Max detect < SL	N	Not a COPC in soil or GW	Y	SL not available	NA	Not a sed COI	
Mercury	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW COI	NA	Not a SW COI	N	Not a HH or eco COPC	Y
Naphthalene	Y	Max detect > SL; sub	Y	Max detect > SL	Y	COPC in soil and GW	N	Max detect < SL	Y	HH GW COPC	
Nickel	N	Max detect < SL	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	N	Not a HH or eco COPC	Y
N-Nitrosodiphenylamine	N	DL < SL	N	DL < SL	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	
o-Xylene	N	Max detect < SL	N	Max detect < SL	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	
Pentachlorophenol	Y	All ND; DL > SL	Y	DL > SL	Y	COPC in soil and GW	NA	Not a SW COI	NA	Not a sed COI	Y
Phenanthrene	Y	SL not available	Y	SL not available	Y	COPC in soil and GW	Y	SL not available	Y	HH all media COPC	Y
Phenol	NA	Not a soil COI	N	Max detect < SL	N	Not a COPC in soil or GW	NA	Not a SW COI	NA	Not a sed COI	Y
Pyrene	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	N	Max detect < SL	Y	HH GW and sw COPC	Y
Styrene	NA	Not a soil COI	Y	Max detect > SL	Y	COPC in GW	NA	Not a SW COI	NA	Not a sed COI	
Sulfide	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW CDI	NA	Not a SW COI	N	Not a HH or eco COPC	
Toluene	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	N	Max detect < SL	NA	Not a sed COI	
Total 10 of 16 HPAH (U = 1/2)	N	via cPAH	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	N	via cPAH	Y
Total 16 PAH (U = 1/2)	NA	Not a soil COI	NA	Not a GW COI	NA	Not a soil or GW COI	NA	Not a SW COI	N	via cPAH	Y
Total 6 of 16 LPAH (U = 1/2)	N	via cPAH	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	N	via cPAH	Y
Total PCBs (U=1/2)	Y	All ND; QA1- DL > SL	N	QA0 COI	Y	COPC in soil	NA	Not a SW COI	NA	Not a sed COI	Y
Total cPAH TEF (7 minimum) (U = 1/2)	Y	Max detect > SL	Y	Max detect > SL	Y	COPC in soil and GW	Y	Max detect > SL	Y	HH all media COPC	Y
Total Xylene (U = 1/2)	N	Max detect < SL	Y	Max detect > SL	Y	COPC in GW	Y	SL not available	NA	Not a sed COI	
Zinc	N	Max detect < SL	NA	Not a GW COI	N	Not a COPC in soil or GW	NA	Not a SW COI	N	Not a HH or eco COPC	Y

Notes: NA – Not COI for medium.
sub – Soil COPC due to max detect in subsurface soil data >SL; max detect in surface soil data <SL.

Table 3
Summary of Potential Impacts and Mitigations

Hazard	Potential Impact	Proposed Mitigation Measures and Additional Measures	Unavoidable Adverse Impacts
Hydrogeology Ground Water	X Ground water table encountered during excavation operations.	X Majority of recharge to aquifer occurs from off-site areas. X Proper design of dewatering system and construction sequencing.	X None.
Erosion	X Low under existing conditions. X Potential off-site sediment transport during construction.	X Control stormwater runoff. X Control water from dewatering activities. X Implement source control measures (hydroseeding, plastic sheeting). X Silt fences installed along Lake Washington during construction. X Utilize sediment traps/temporary detention facilities during construction. X Construct rock check dams along roads during construction. X Properly store and protect fill soils. X Geotechnical engineer to review grading, erosion, and drainage plans.	X Not significant with implementation of mitigation measures.
Landslide	X Extremely low risk.	X Proper placement of cuts and fills per geotechnical engineer's recommendations.	X None.
Seismic	X Low risk of surficial rupture. X Extremely low risk of seismically induced upland landslides. X Site area sediments susceptible to liquefaction and lateral spreading X Moderate risk of offshore, subaqueous landslides during large seismic event X Ground motion impacts would be dependent on intensity and acceleration of an earthquake.	X No evidence of faulting identified at the site area. X Proper placement of fill soils and cuts to reduce any landslide risks during and after construction. X Utilize deepened foundation (piles) for structures. Construction of other site area improvements per geotechnical engineer's recommendations. X Structural design of buildings should follow design codes currently in effect at time of construction.	X Ground motion impacts depending on intensity and acceleration of earthquake (see also geotechnical discussion below). X Subaqueous offshore landslides infrequent due to long return interval of large seismic event.
Geotechnical	X Settlement of sediments beneath structures. X Failure of structural fill soils due to improper placement and compaction.	X Foundations to be supported by piles. X Floor slabs sensitive to settlement impacts to be supported by piles. X Proper site preparation for roadways, utilities, and structural fill bodies. X Proper placement and compaction of structural fill per geotechnical engineer's recommendations. X Pile vibration analysis and potential vibration monitoring study during pile installation. X Geotechnical review of design plans. X Construction monitoring.	X Potential maintenance of non-pile-supported elements, particularly after earthquake. X Additional geotechnical measures depending on final design plans.
Hazardous Substances Alternatives 1 & 2	X Potential for generation of vapors from volatile contaminants that remain in the subsurface. X Generation of contaminated soil and ground water during construction.	X Design and construction activities to address extra excavation, special capping requirements, vapor barriers, and other engineering control measures, as warranted. X Personal protection equipment for workers. X Proper disposal of contaminated media.	X None.

APPENDIX E

CRITICAL AREAS REPORT

WETLAND AND HABITAT ASSESSMENT

Quendall Terminals Redevelopment Project
Renton, Washington

Draft EIS Report

October 29, 2010

RAEDEKE ASSOCIATES, INC.

Raedeke
Associates, Inc.

Wetland Science
Wildlife Biolog
Landscape Architecture

Report To: City of Renton
c/o Ms. Gretchen Brunner
Blumen Consulting Group
720 Sixth Street South
Kirkland, WA 98033

Title: Wetland and Habitat Assessment
Quendall Terminals Redevelopment Project
Renton, Washington

Project Number: 2010-014-002

Prepared By: RAEDEKE ASSOCIATES, INC.
5711 Northeast 63rd Street
Seattle, Washington 98115
(206) 525-8122

Date: October 29, 2010

Draft EIS Report

Project Manager: Richard W. Lundquist, M.S.
Vice President / Wildlife Biologist

Current Project Personnel: Duane Dietz, ASLA, LEED AP
Landscape Architect

Elizabeth K. Day, B.S.
Wetland Biologist

5711 NE 63RD Street Seattle, Washington 98115 206-525-8122 www.raedeke.com

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1.0 INTRODUCTION

1.1 STATEMENT OF PURPOSE

This report documents the results of our assessment of the wetland and riparian habitat on the Quendall Terminals project site (hereafter referred to as the "study site," or "project site") in the City of Renton, King County, Washington (Figure 1). The objective of our study is to review baseline biological information on the existing conditions of the wetland and riparian habitat conditions, based on previously prepared documents (Anchor QEA, LLC. 2009), and assess the probable impacts of the proposed redevelopment of the project site, in support of an Environmental Impact Statement (EIS).

1.2 PROJECT LOCATION

The project site, which totals approximately 21.5 acres in size, is situated along the eastern shore of Lake Washington, at 4350 Lake Washington Boulevard, near its intersection with Interstate Highway 405 (Exit 7; Figure 1). The property consists of tax Parcel No. 2924059002, situated in Section 29, Township 24 North, Range 5 East, W.M., within the City of Renton, Washington. The tax parcel includes two separate areas, with the main portion of the site west of Lake Washington Blvd. and a smaller (1.2-acre) isolated area east of the boulevard and west of I-405. A map showing the project site and proposed redevelopment project areas, prepared by Anchor QEA, LLC., was obtained from the City of Renton's files and provided by Blumen Consulting Group in March 2010.

2.0 METHODS

In preparation for our assessment, we reviewed available documentation for the project, including the wetland assessment, lake study, habitat data report, and conceptual shoreline restoration plan (Anchor QEA, LLC. 2009), the drainage report (KPFF 2009a), and the draft remedial investigation (Aspect Consulting 2010; sections 1 through 3 only). We also reviewed resource information available through King County's (2010) iMap database on-line for an overview of site conditions and mapped resources (Table 1).

No detailed field investigation was conducted for this assessment. Pre-remediation conditions of the site are provided in detail by Anchor QEA, LLC (2009) in their wetland report and by Aspect Consulting (2010) in their draft remedial investigation. For purposes of the project EIS, existing/baseline conditions of the site assume completion of site cleanup/remediation under the direction of the United States Environmental Protection Agency (EPA). The cleanup/remediation work is being conducted as part of a separate action under an Administrative Settlement Agreement and Order on Consent with EPA, under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; i.e., "Superfund"). Based on the documentation and analysis to date, for purposes of the EIS, we assume that the remediation will include placement of fill material on the entire property west of Lake Washington Blvd. to cap it. This process will involve filling of the existing wetlands and riparian and other habitat on the main portion of the site. A shoreline restoration plan would be implemented to address the impacts to wetlands and riparian habitat. Portions of two wetlands would be re-established and wetlands created to mitigate for wetland impacts.

3.0 EXISTING CONDITIONS

3.1 SITE HISTORY

According to available documents (Anchor QEA, LLC 2009; Aspect Consulting 2010), the project site has been used for a variety of purposes over the years since the lowering of Lake Washington in 1916 to construct the Lake Washington Ship Canal. Initially, the site, including newly exposed portions of the former May Creek delta, was developed into a creosote manufacturing facility, until 1969. From 1969 to approximately 1977, some of the aboveground tanks at the site were used intermittently for crude oil, waste oil, and diesel storage. From 1977 to 2008, the site was used primarily for log sorting and storage. Aquatic lands adjacent to the facility, managed by the Washington Department of Natural Resources (WDNR), were historically leased for log rafting and vessel storage, but those leases were terminated in the 1990s. The site is currently vacant.

3.2 BACKGROUND AND PRE-REMEDIATION CONDITIONS

The Quendall Terminals project site main property is bordered on the north by the Football Northwest (Seattle Seahawks) training facility and on the south by a Conner Homes residential development (formerly the Barbee Mill site). Lake Washington borders the western part of the property. Lake Washington Blvd., along with the railroad tracks, separate the main property from the isolated property, with I-405 bordering the easternmost portion of the isolated property.

Generally, the site is nearly flat and slopes gently down to the west toward Lake Washington. It ranges in elevation from approximately 35 feet above sea level at the east end to approximately 20 feet at the lake shore. The site has been modified by filling and grading activities since the lowering of Lake Washington. Fill material from various past activities covers the entire site, ranging in depth from 1 to 2 feet along the southern and eastern boundaries to up to 6 to 10 feet in the northern portions. The fill typically includes a mix of silt, sand, gravel, and wood debris (Anchor QEA, LLC 2009; Aspect Consulting 2010). The surface of the site is covered either by wood debris or by a layer of imported gravel and organic muck up to one foot thick from log sorting equipment. A network of roads used during sorting and storage of logs crosses through the site as well. The site soils contain contaminants that remain from past uses, including creosote manufacturing and oil and diesel storage.

Since abandonment of the log sorting activities, vegetation has developed on the site to include trees, shrubs, and grasses and other herbaceous plants. Most of the site consists of grasses and herbs in disturbed areas most heavily used during log sorting activities. Shrub and forested areas occur in the western portions of the site, including the shoreline. These typically include riparian forest and scrub-shrub vegetation associated with wetland features and the shore of Lake Washington. The young forest and shrub areas typically consist of trees such as black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), red alder (*Alnus rubra*), and Pacific willow (*Salix lucida*), interspersed with shrub cover of red-osier dogwood (*Cornus sericea*), Indian plum (*Oemleria cerasiformis*), as well as invasive species such as Japanese knotweed (*Polygonum cuspidatum*), Himalayan blackberry (*Rubus armeniacus*), and reed canarygrass (*Phalaris arundinacea*). According to a tree survey prepared by KPFF Consulting Engineers (2009b) for the Master Plan application, the main part of the property contains over 450 trees that range from 6 inches to 32 inches diameter at breast height (dbh). The riparian habitat, including the wetland and buffer areas, contains features such as snags and down woody debris. Together with areas of dense cover, these provide habitat for a variety of species, including cavity-nesting birds, small mammals, and waterfowl.

During their site investigations to identify and delineate wetlands and other aquatic features, Anchor QEA, LLC (2009) delineated 10 wetlands, labeled A through J and totaling 0.89 acres, on the site (Figure 2). Eight of the delineated wetlands (A through H) occur within the main part of the site west of Lake Washington Blvd, primarily in the western part of the site near and along the shores of Lake Washington. Four of these wetlands (A, D, F, and H) are slope and/or lake-fringe wetlands associated with Lake Washington. Of these, Wetlands A, D, and F derive their hydrologic conditions largely from Lake Washington. Wetland D also has an upper arm that extends farther from the lake and likely collects some surface runoff from surrounding uplands. Wetland H was excavated in 2006 to convey stormwater into the lake from a ditch along the south boundary, while trapping silt and wood debris in several check dams. The other four wetlands on the main part of the site (B, C, E, and G) are depressional wetlands not associated with other surface waters. These were constructed as stormwater features to collect surface runoff from the surrounding upland areas and prevent silt, wood debris, or contaminants from flowing into Lake Washington. These were observed to contain standing water (Anchor QEA 2009). Wetland G is narrower than the others and more ditch-like, and at one time was connected to Wetland B (Anchor QEA 2009).

Two wetlands (I and J) occur on the isolated portion of the site east of Lake Washington Blvd (Figure 2). Wetland I is a depressional wetland, and Wetland J is a depressional and slope wetland that flows to an adjacent stream.

Several stormwater features were constructed in the past to collect and convey much of the stormwater on site to Lake Washington. Given the composition and compaction of fill material on the site, topographic low areas also collect seasonal stormwater. These features remain on site and still appear to convey and collect seasonal stormwater. The wetlands on site that correspond to constructed stormwater features include Wetlands B, C, E, G, and H (Anchor QEA, LLC 2009).

The wetlands typically consist of forest and scrub-shrub or scrub-shrub and emergent vegetation, or combinations of all three cover types. Anchor QEA, LLC (2009) rated the wetlands according to the Washington Department of Ecology (WDOE) rating system (Hruby 2004) as well as the City of Renton (2010) Critical Areas Regulations. Except for Wetland D (Category II) and Wetlands C and H (Category IV), all the wetlands met the criteria as Category III wetlands according to the WDOE rating system. Based on the City's wetland rating criteria, two wetlands (B and E) were rated as Category 1, three (A, D, and F) were rated as Category 2, and the rest were rated as Category 3.

May Creek empties into Lake Washington approximately 1,300 feet south of the southern property boundary of the Quendall Terminals site. May Creek comes within approximately 400 feet of the southeastern portion of the Quendall Terminals property when it passes under Lake Washington Blvd, but no runoff from the Quendall site (or Seahawks site) drains to May Creek. Any protective buffers associated with May Creek do not extend onto the Quendall Terminals property. The wetland located on the Seahawk's property to the north was restored in 2003. As part of the restoration effort, a 50 foot wetland buffer was also established. This wetland buffer does not extend beyond the property line onto the Quendall Terminals site.

As discussed in the Anchor QEA, LLC (2009) report, the WDFW (2009) PHS and HRTG databases map shows no priority habitats within the project area. Priority wetland habitat occurs just south and east (within approximately 500 feet) of the site along May Creek and its tributaries. Priority fish species, including coho, fall Chinook, and sockeye salmon, as well as resident cutthroat trout and winter steelhead, are documented in May Creek. These species, as well as Dolly Varden/bull trout, are also documented within Lake Washington.

3.3 Post-Remediation Existing Conditions

As stated above, the assumed existing/baseline condition for purposes of this analysis is post-remediation. Based on the project information to date (e.g., Anchor QEA, LLC 2009, Aspect Consulting 2010), this is anticipated to include capping of the entire portion of the site west of Lake Washington Blvd. and re-establishment/expansion of some wetland and upland habitat along the shoreline of the lake. This portion of the site would be cleared of existing vegetation. A two-foot thick sand cap would be placed on the upland, non-riparian portion of this property, and a two- to three-foot thick sediment cap consisting of organoclay, sand, gravel, and topsoil would be placed across most of the site shoreline area. These caps are intended to confine contaminants and prevent their transport or discharge into the lake. Thus, the majority of the site is expected to consist of bare soil, except along the Lake Washington shore, where a shoreline restoration plan will be implemented. The upland portion of the main property could be temporarily re-vegetated via seeding of herbaceous species following remediation to prevent erosion and sedimentation, depending on the anticipated timing of redevelopment.

As part of the remediation, the wetlands on the main part of the site would be filled or excavated and capped as necessary for cleanup. Three of the wetlands along the lake shore (A, D, and H) would be re-established, and two of these (A and D) would be expanded to mitigate for wetland fill on the remainder of the site. The conceptual shoreline restoration plan includes construction of a small, continuous wave-attenuation berm composed of permeable material such as sand and gravel between the Wetland D restoration/creation area and the lake to protect the wetland from wave energy and minimize erosion and associated habitat disturbance. A similar, but discontinuous berm will be constructed along the lake for portions of Wetland A. The water level and hydrology of the re-established/expanded Wetlands A and D will be controlled by the water surface elevation of Lake Washington, but surface water connection will only be present between the lake and portions of Wetland A. The continuous wave attenuation berm that will separate all of Wetland D from the lake will be controlled by Lake Washington elevations via a groundwater connection. As a result, while both Wetlands A and D will be "associated" with the shoreline, Wetland D will not be contiguous with the lake, and the OHWM in this area will follow the attenuation berm (the western boundary of the expanded Wetland D in this case). With the discontinuous wave attenuation berm to be constructed along portions of Wetland A, the OHWM in the Wetland A area will follow the re-established/expanded wetland boundary (the eastern wetland boundary in this case).

The two wetlands (I and J) identified on the isolated eastern part of the site, east of Lake Washington Blvd., would not be impacted by the remediation and retained, as no capping is proposed in that area. Wetland J would be expanded as part of the mitigation for wetland impacts associated with site remediation (Anchor QEA, LLC. 2009).

Subject to EPA approval, impacts to on-site wetlands would likely be mitigated at a 1.5:1 ratio, except for those that are exempt from critical area regulation (e.g., Wetland G) per City of Renton (2010) critical areas regulations (RMC 4-3-050.C.5(f)) due to small size and physical isolation, which would be mitigated at a 1:1 ratio. Based on the draft conceptual plan, the overall compensatory wetland creation/expansion (at Wetlands A, D, and J) would total approximately 31,800 square feet. The wetlands reestablished or expanded along the Lake Washington shore following remediation will be classified as Category 2wetlands per the City of Renton (2010) Municipal Code, which require a 50-foot buffer. The expanded Wetland J in the eastern portion of the property will remain as a Category 3 wetland, which requires a 25-foot buffer under the City of Renton (2010) Municipal Code. Wetland buffers associated with the Quendall Terminals wetland restoration will not extend beyond the property line onto adjacent properties. The current City of Renton Shoreline Master Program (1983) requires a 25-foot setback from the ordinary high water mark (OHWM) of the lake for residential buildings and a 50-foot setback from the OHWM of the lake for commercial buildings.

The reestablished/expanded wetlands along Lake Washington (A, D, and H) would include emergent, scrub-shrub, and forested components to mitigate for the losses of similar cover types along the shore. These would also include open water components, and large woody debris to diversify habitat conditions along the shore. The expansion of Wetland J would similarly include a mix of emergent, scrub-shrub, and forested habitats. This is intended to compensate for remediation impacts to on-site wetlands not associated with Lake Washington (B, C, E, and G) and is expected to diversify and improve wetland habitat on this part of the site over the current mix of invasive species, primarily Himalayan blackberry and reed canarygrass.

Following restoration, newly planted wetland vegetation is expected to establish within the first growing season. Generally, after the first growing season, 80% to 90% of tree and shrub species plantings can be expected to survive, and emergent wetland plantings can be expected to provide 10% to 15% cover. As the tree and shrub species continue to grow, they will continue to provide more cover and structural diversity in the restored wetland and buffer areas. Functional habitat will be provided immediately following establishment of new plantings, but will continue to improve as the wetland matures. Fully functioning habitat is generally provided after three to five growing seasons, when total cover of tree and shrub plantings is on the order of 30% to 40%, and cover of emergent wetland plantings is on the order of 50% to 75%.

Wetland/riparian buffer areas would be revegetated along the Lake Washington shore following remediation. The buffer area planted may vary somewhat depending on the redevelopment alternatives (see the sections below), but for purposes of this analysis, the baseline condition assumes revegetation of at least the minimum required 50-foot wetland buffer areas under the City of Renton (2010) regulations. The wetland/riparian buffers would likely consist of a variety of cover types, including shrub habitat of willows and other water-tolerant shrubs, as well as both deciduous and coniferous forest cover types.

A 25-foot buffer, at a minimum, would remain on the expanded Wetland J and on the retained Wetland I within the isolated portion of the site east of Lake Washington Blvd. Thus, for purposes of this analysis, the baseline condition of this part the site is assumed to consist of Wetland I and its buffer and an expanded and diversified Wetland J and its buffer.

The City has plans showing WSDOT's intention to use the Isolated Property in the future I-405 widening and NE 44th Street interchange improvement project. However, there is no final design for this project, and WSDOT would be responsible for providing compensation for any wetland/buffer impacts.

4.0 IMPACTS

This discussion of probable impacts of the alternatives for the Quendall Terminals Redevelopment Project EIS is based on review of available literature, as well as information provided by the applicant, the City of Renton, and project consultants. The project EIS addresses the proposed action and identified alternatives, as follows:

- ***Alternative 1 (Application).*** Alternative 1 would involve redevelopment of the site with a mix of residential (approximately 800 units), retail/commercial (approximately 30,600 square feet), and office (approximately 245,000 square feet) uses, and associated parking, access drives, and landscaping. The natural open space along the shoreline of Lake Washington, consisting of a revegetated riparian zone that includes reestablished/expanded wetland areas, averaged wetland buffers, and restored upland riparian habitat, would total more than 137,400 square feet (3.16 acres). The conceptual shoreline restoration plan includes a public trail along the shoreline, with educational wetland viewpoints. No development would occur on the isolated part of the site that lies east of Lake Washington Blvd.

- ***Alternative 2 (Lower Density Alternative).*** Alternative 2 would involve similar redevelopment of the site as Alternative 1 with a mix of residential (approximately 708 units), retail/commercial (approximately 30,600 square feet) uses , and associated parking, access drives, and landscaping. No office space would be included. The natural open space along the shoreline of Lake Washington, consisting of a revegetated riparian zone that includes reestablished/expanded wetland areas, averaged wetland buffers, and restored upland riparian habitat, would total more than 138,500 square feet (3.18 acres). This alternative also includes a public trail with educational viewpoints, as in Alternative 1. No development would occur on the isolated part of the site that lies east of Lake Washington Blvd.

- ***No Action Alternative.*** No redevelopment would occur under the No Action Alternative. The site would remain in a post-remediation condition, with a cap over the entire main portion of the site, and reestablished/expanded wetlands along the shores of Lake Washington. The reestablished/expanded and re-vegetated portions of the site along the lake are assumed to include fully revegetated 50-foot buffers. No trail would be provided along the shoreline. No development would occur on the isolated eastern portion of the site (east of Lake Washington Blvd.).

Detailed descriptions of each alternative may be found in Chapter 2 of the DEIS. The probable impacts of each of these alternatives on the critical areas (wetlands and riparian habitat) of the property are discussed in the following sections.

4.1 ALTERNATIVE 1

4.1.1 Direct Impacts

Under Alternative 1, no direct impacts to the retained/expanded wetlands (Wetlands I and J) and reestablished/expanded wetlands (Wetlands A, D and H) would occur. The wetlands along the Lake Washington shoreline (Wetlands A, D, and H) would be retained within a revegetated riparian zone. Similarly, Wetlands I and J would be retained within natural open space on the eastern isolated portion of the site.

Under Alternative 1, a portion of the buffer on Wetland D would be reduced to 25 feet, and other portions of the buffer expanded to provide compensatory area, as allowed by the buffer averaging provisions in the City of Renton (2010) Municipal Code. The area of buffer expansion (nearly 6,000 square feet) would exceed the area of buffer reduction (approximately 5,400 square feet) so that more total buffer area would be provided with the proposed buffer averaging, consistent with buffer averaging provisions in the Renton Municipal Code. A publically accessible, unpaved pedestrian trail is also proposed within the restored riparian habitat. The trail would cross through the outer portions of the averaged 50-foot buffer of Wetland D and through the outer portions of the buffer of Wetland A. Elsewhere, the trail would be located well outside the 50-foot buffers. Wetland A would be provided with a minimum 50-foot buffer, plus additional upland riparian habitat within the re-vegetated riparian zone. Thus, the buffer width along Wetland A would range from 50 feet to well over 100 feet. Wetland H would be protected with a 50-foot buffer on site, which exceeds the required 25-foot minimum buffer based on its classification (Anchor QEA 2009).

As noted above, the buffer of the restored wetland on the Seahawks property to the north does not extend onto the Quendall Terminals site. Consequently, the proposed development of the Quendall Terminals site would not adversely affect the buffer of that wetland.

At least a minimum 50-foot shoreline setback would be maintained within the revegetated riparian area under Alternative 1, as measured from the eastern edge of Wetland A, from the continuous shoreline attenuation berm/western edge of Wetland D, and from the ordinary high water mark of Lake Washington elsewhere. The revegetated riparian area encompasses the minimum shoreline setback such that the revegetated area extends well beyond the required setback in several locations.

In addition, stormwater outfalls would be constructed within the shoreline area in three locations to convey treated stormwater from the developed areas to Lake Washington. These outfalls would be located to avoid direct impacts to the reestablished/expanded wetland areas and designed with energy dissipation to prevent erosion. Together with the proposed trail, these are relatively minor encroachments that are not expected to adversely affect the integrity of the Lake Washington shoreline.

4.1.2 Indirect Impacts

The proposed redevelopment under Alternative 1 has the potential to cause indirect impacts to the reestablished/expanded wetlands relating to hydrologic conditions and potential for sediment deposition. Grading and construction of impervious surfaces and operation of the permanent stormwater collection and treatment facilities would modify the surface hydrologic conditions of the site, and thus potentially could affect hydrologic conditions of the wetlands. In addition to the fill cap at the site placed as part of the remediation, some grading is expected in order to establish elevations appropriate for the redevelopment. This may include trenching for utilities and construction of stormwater outfalls.

Based on the available site information and conceptual remediation plan (Anchor QEA LLC 2009; Aspect Consulting 2010) the reestablished/expanded wetlands (A, D, and H) along the lake shore derive their hydrology from the lake, rather than surface water runoff, both prior to and after remediation. In addition, the proposed stormwater drainage plan (KPFF Consulting Engineers 2009a), prepared in accordance with the King County (2009) Surface Water Design Manual, as required by City of Renton, includes water quality treatment facilities to collect and treat stormwater runoff from pollution-generating surfaces (i.e. roadways and surface parking areas) and discharge treated stormwater directly to Lake Washington. Roof runoff (considered to be non-pollution generating) would be collected and discharged directly to the lake separately. Thus, we do not expect changes in surface drainage from site grading and development to affect the hydrologic conditions of the wetlands along the lake shore. The wetlands on the isolated eastern part of the site east of Lake Washington Blvd. would not be affected, as no development is proposed there.

Clearing and grading activities associated with the proposed development would expose erodible soils on the site. The potential for erosion and delivery of sediments to the wetlands along the shoreline and to the lake would be greatest during the construction period and depends on the construction season, soil types, the amount of exposed soils, slopes, surface drainage patterns, and mitigation measures employed. Sediment transport and deposition, particularly during construction, can adversely impact plant and animal communities of the wetlands and the lake by affecting water quality (increased turbidity, suspended and settleable solids, temperature, pollutants), which could adversely affect the suitability of aquatic habitats for various forms of vertebrate and invertebrate wildlife.

The project would include implementation of a temporary erosion and sediment control plan during construction, prepared by a professional engineer in accordance with the King County (2009) Surface Water Design Manual (as required by the City of Renton), to limit or prevent erosion or sediment deposition into natural open space areas (KPFF Consulting Engineers 2009a). The proposed permanent stormwater control system would be designed to contain and convey the 25-year peak flow from developed conditions for on-site tributary areas. No upstream tributary area drains to the project site or the proposed stormwater drainage system. Thus, no severe flooding or erosion problem is expected from potential overflow from a 100-year runoff event. In addition, the outfalls to the lake from the stormwater conveyance systems would be designed to prevent erosion (KPFF Consulting Engineers 2009a).

Proper implementation of these stormwater control and treatment features and protective measures would greatly limit the potential for erosion and sedimentation impacts to reestablished/expanded on-site wetlands along the lake shore or to the lake itself. Some sediment deposition could occur within the wetland buffers, and potentially the wetlands, especially during construction. Proposed buffers range from 50 to well over 100 feet on Wetland A and from 25 feet to over 100 feet on Wetland D. With appropriate erosion control measures (e.g., silt fences), and to the extent that vegetation is established within the buffers as a part of site remediation, and slopes are relatively gentle, the potential for sediment deposition into the wetlands should be very limited. Following construction, as the site would be covered in buildings, paved areas and landscaping and less soil is exposed, much less sediment would typically be generated. Based on these factors, together with the lack of direct stormwater discharge to the remaining wetlands, we do not expect substantial impacts to the wetlands or the lakeshore habitat from erosion or sediment deposition, either during or after construction.

4.1.3 Wildlife Habitat Impacts

With respect to wildlife habitat, after completion of the remediation measures, most of the main property would be left as bare soil, except the revegetated shoreline habitat, including the reestablished/expanded wetland areas (the upland portion of the main property could be temporarily re-vegetated via seeding of herbaceous species following remediation to prevent erosion and sedimentation, depending on the anticipated timing of redevelopment). Consequently, redevelopment of the upland areas is not expected to remove significant habitat features or displace wildlife from these upland areas. Some disturbance of the revegetated shoreline habitat from human and construction activity may occur during construction. However, this vegetation would likely be relatively recently established and initially provide limited habitat during this period.

After redevelopment, some wildlife species adapted to urban environments (e.g., starlings, house sparrows, American robins, various swallows, American crows, raccoons) would likely come to use the site over time and utlilize the developing native vegetation within the riparian zone and landscaped upland areas. Given the urban context of the site, including both on-site and adjacent properties, some of these urban-adapted species (e.g., starlings, crows) may limit use of the revegetated shoreline habitats by other native species, such as cavity-nesting birds and songbirds.

Public use of the proposed trail within the revegetated riparian zone would likely cause some noise and disturbance of wildlife in the vicinity of the trail. The trail itself would also form a break in native vegetation within the area and maintain some fragmentation of the developing habitat over time. On the other hand, the trail would limit access to the riparian area, and prevent human use and degradation of the revegetated shoreline area.

The proposed redevelopment under Alternative 1 is not expected to adversely impact terrestrial priority species, as none are known to occur on site. A variety of fish species, including both salmonid fish, several of which are federal or state-listed species, are known to use nearshore habitats within Lake Washington (Anchor QEA LLC 2009, Aspect Consulting 2010). Following completion of remediation activities, during which some disturbance of nearshore habitats may occur, the site conditions are expected to recover and improve over pre-remediation conditions. Some limited additional disturbance of nearshore habitat may occur during construction of the stormwater outfalls along the lakeshore. However, this disturbance is expected to be confined to very limited areas, and following completion of construction should constitute no significant impact on habitat for aquatic species.

4.2 ALTERNATIVE 2

Under Alternative 2, a similar mixed-use development to that under Alternative 1 would be constructed on the project site, with somewhat fewer residential units, essentially the same area for commercial/retail uses, and no office space. The shoreline restoration area, encompassing the re-established/expanded wetlands and their buffers along the lake shore, would be provided, encompassing only slightly more area than under Alternative 1 (by approximately 1,400 square feet).

As under Alternative 1, no direct wetland impacts would occur under Alternative 2. The wetlands along the lake would be reestablished/expanded within a similar shoreline restoration area. No development would occur within the isolated eastern part of the site east of Lake Washington Blvd., thus no impacts would occur to Wetlands I and J, as under Alternative 1.

The same buffer averaging for Wetland D would be applied under Alternative 2, such that the minimum buffer would be 25 feet and additional compensatory buffer area would be provided. Wetland A would be provided with essentially the same buffer as under Alternative 1, ranging from a minimum of 50 feet wide to well over 100 feet wide.

Alternative 2 is assumed to include similar temporary and permanent storm drainage systems and erosion control features as Alternative 1. Thus, we would not expect substantial indirect impacts to on-site wetlands and the lake under Alternative 2 from stormwater runoff during construction and operation of the project,, as with Alternative 1.

With a similar development footprint and site features such as the public trail, the redevelopment under Alternative 2 is expected to result in essentially the same impacts to wildlife habitat as under Alternative 1. With fewer residential units and no office development, human activity levels and noise may be slightly less than under Alternative

1. Given the urban context, however, impacts from disturbance and noise would not likely be significantly different from those under Alternative 1.

4.3 NO ACTION ALTERNATIVE

For purposes of the EIS, the No Action alternative assumes that no redevelopment would occur on the project site at this time. The site would remain in a post-remediation condition, with a cap over the entire main part of the site and re-established and expanded wetlands along the lake shore and an expanded wetland (Wetland J) in the isolated eastern part of the site. The restored and revegetated areas along the lake are assumed to include fully-revegetated 50-foot buffers of Wetlands A and D, as part of the remediation required by EPA. No additional riparian habitat restoration area is assumed to be established that would connect Wetlands A and D. No buffer averaging would occur on Wetland D. No publically accessible trail with educational wetland viewpoints would be provided in the shoreline restoration area. The remainder of the site could be developed at some time in the future, but would require a separate environmental review. If no redevelopment were to occur in the foreseeable future, it is anticipated that the upland portions of the site would be seeded with some kind of cover crop to provide temporary revegetation.

Under the No Action Alternative, no direct or indirect impacts would occur to the wetlands along the lake shore or on the isolated eastern part of the property. Less area along the lake shore would be revegetated to establish riparian habitat than under Alternatives 1 and 2. We assume that vegetation would gradually become established over time along the lake shore between the re-established wetlands and their buffers.

The process of natural succession would occur under the No Action Alternative, as long as the site is not redeveloped. Vegetation in the restored areas would grow and develop over time. Given enough time and lack of a major disturbance (such as fire or harvest), the seeded upland areas would gradually revegetate as well, as occurred after cessation of log sorting activities previously. This vegetation would likely consist of a combination of native (e.g., red alder, black cottonwood, willow) and exotic invasive species (e.g., Himalayan blackberry, Japanese knotweed) adapted to disturbed areas, as was the case following cessation of log sorting and storage in the past.

5.0 MITIGATION

Mitigation has been defined by the State Environmental Policy Act (SEPA) (WAC 197-11-768; cf. Cooper 1987), and more recently in a Memorandum of Agreement between the Environmental Protection Agency and the U.S. Army Corps of Engineers (Anonymous 1989). In order of desirability, mitigation may include:

1. ***Avoidance*** - avoiding impacts by not taking action or parts of an action;

2. ***Minimization*** - minimizing impacts by limiting the degree or magnitude of the action and its implementation;

3. ***Compensation*** - which may involve:

    a) repairing, rehabilitating, or restoring the affected environment;

    b) replacing or creating substitute resources or environments;

    c) mitigation banking.

5.1 PROPOSED MITIGATION

Alternatives 1 and 2 would incorporate several mitigating measures that would avoid or reduce impacts to wetlands and riparian areas on-site.

- The proposed site plan would avoid direct impacts to the retained/reestablished/expanded wetlands on site.
- Reestablished/expanded wetlands would be retained in an open space tract that includes required buffers and a riparian habitat enhancement area.
- With the shoreline restoration plan, vegetated buffer area would meet or exceed the minimum City-required buffer area on Wetlands A, D, and H, with the requirement for Wetland D attained through buffer averaging. On the isolated eastern part of the site, Wetland I and the expanded Wetland J would also be provided with buffers that meet or exceed City requirements.
- A permanent stormwater drainage system would be installed consistent with the requirements of the King County (2009) Surface Water Design Manual adopted by City of Renton. The system would collect and convey stormwater runoff to Lake Washington. Water quality treatment would be provided for runoff from pollution-generating surfaces.
- A temporary erosion and sediment control plan consistent with the requirements of the King County (2009) Surface Water Design Manual adopted by City of

Renton would be prepared and implemented prior to construction to prevent or limit impacts from erosion and sediment deposition on wetlands and the lake.

- Introduction of noxious weeds or invasive species would be avoided to the extent practicable in areas revegetated as part of the proposed redevelopment. Together with the native species planted, this would help limit the unnecessary spread of invasive species that can adversely affect the suitability of open space habitats on site and in the vicinity for wildlife.
- A publicly accessible, unpaved trail would be provided through the shoreline area that would include educational wetland viewpoints.
- Native plant species would be included within landscaping in the redevelopment area to the extent feasible, which would provide some limited habitat benefits to native wildlife species.

5.2 OTHER POTENTIAL MITIGATION MEASURES

- Trenching for utilities and stormwater outfalls could be incorporated into site grading associated with remediation efforts to limit or prevent later disturbance of re-vegetated areas.
- The upland portion of the main property could be temporarily re-vegetated via seeding of herbaceous species following remediation to prevent erosion and sedimentation, depending on the anticipated timing of redevelopment

6.0 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Given that the proposed site plan would avoid reestablished/expanded on site wetlands and retain them within open space tracts that include restored buffers, the project is not expected to result in significant unavoidable adverse impacts to on-site wetlands or their functioning or to restored riparian habitat. Similarly, the project is not expected to result in significant unavoidable adverse impacts to wildlife or their habitat, including listed or other priority species.

7.0 LIMITATIONS

We have prepared this report for the exclusive use of the City of Renton and their consultants. No other person or agency may rely on the information, analysis, or conclusions contained herein without permission from the City of Renton.

The determination of ecological system classifications, functions, values, and boundaries is an inexact science, and different individuals and agencies may reach different conclusions. We cannot guarantee the outcome of such agency determinations. Therefore, the conclusions of this report should be reviewed by the appropriate regulatory agencies prior to any detailed site planning or construction activities.

We warrant that the work performed conforms to standards generally accepted in our field, and has been prepared substantially in accordance with then-current technical guidelines and criteria. The conclusions of this report represent the results of our analysis of the information provided by the project proponents and their consultants, together with information gathered in the course of this study. No other warranty, expressed or implied, is made.

8.0 LITERATURE CITED

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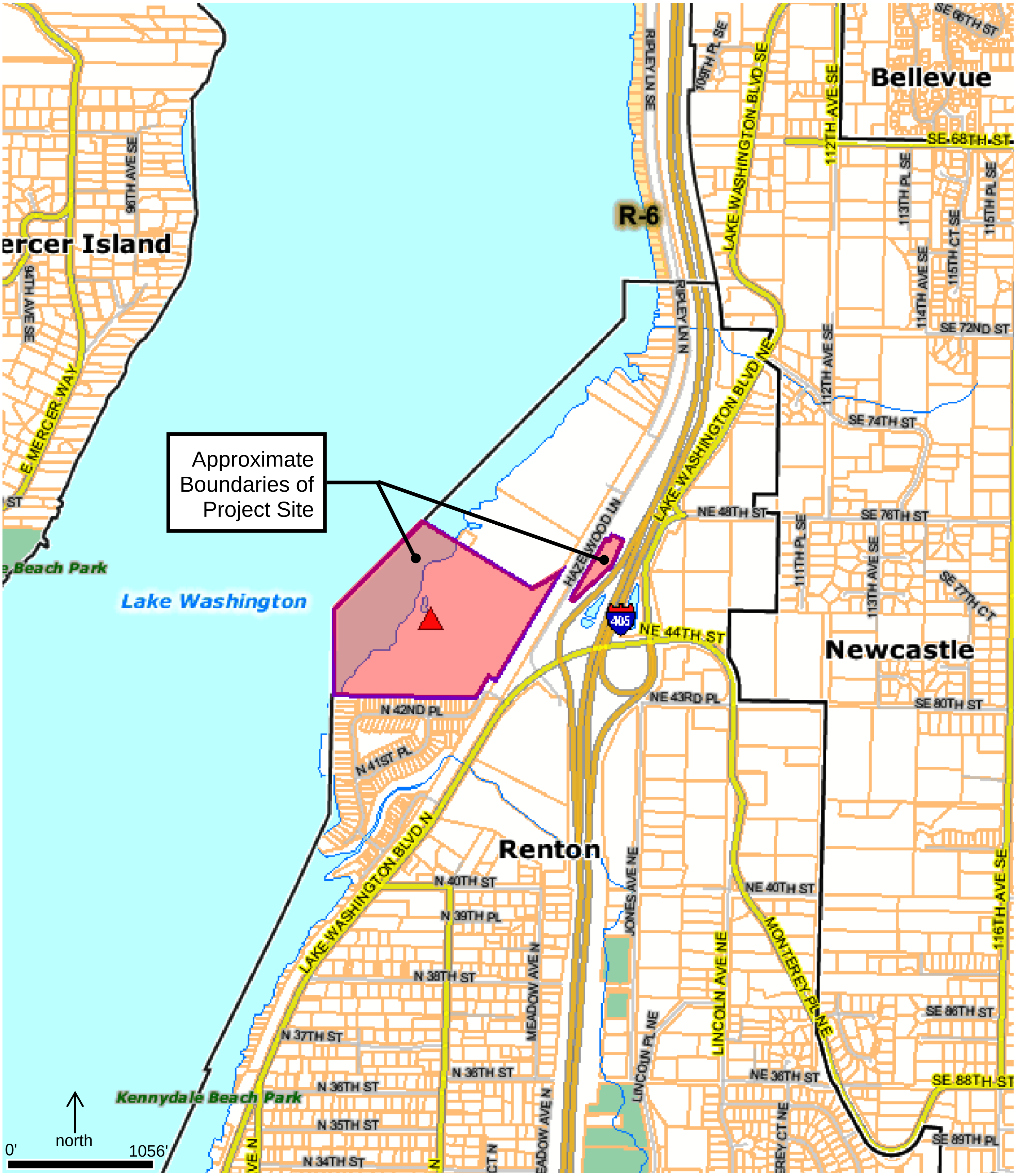
FIGURES AND TABLES



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MAP SOURCE: King County IMAP website

Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 1
Vicinity Map
Port Quendall Terminal
Redevelopment Draft EIS

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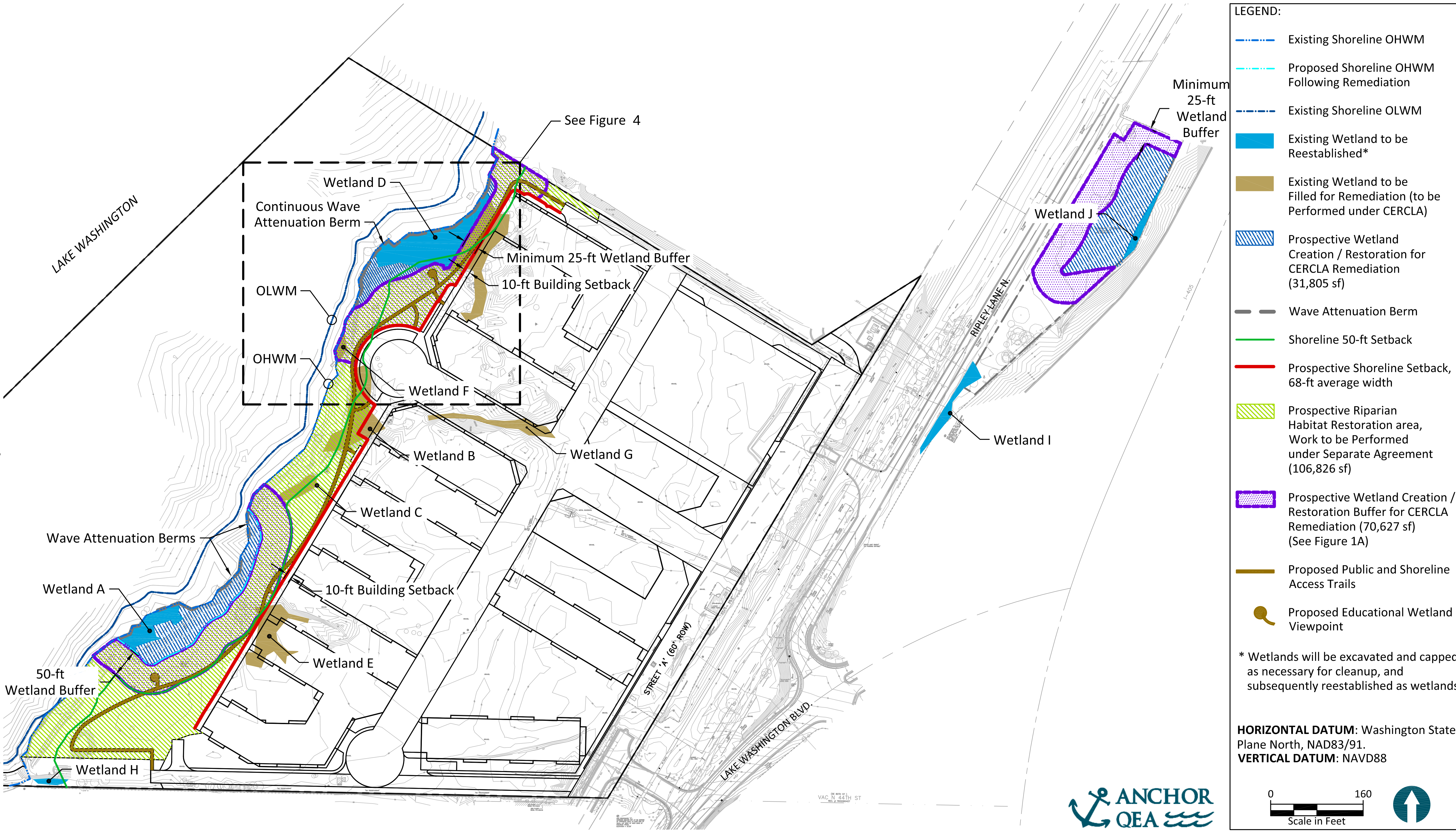
Sep 08, 2009 10:12am cdavidson K:\Jobs\060059-QUENDALL\06005901\06005901-RP-004.dwg FIG 7

MAP SOURCE: ANCHOR QEA

Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 2
Pre-Remediation Wetland and OHWM Delineation
Port Quendall Terminal Redevelopment Draft EIS



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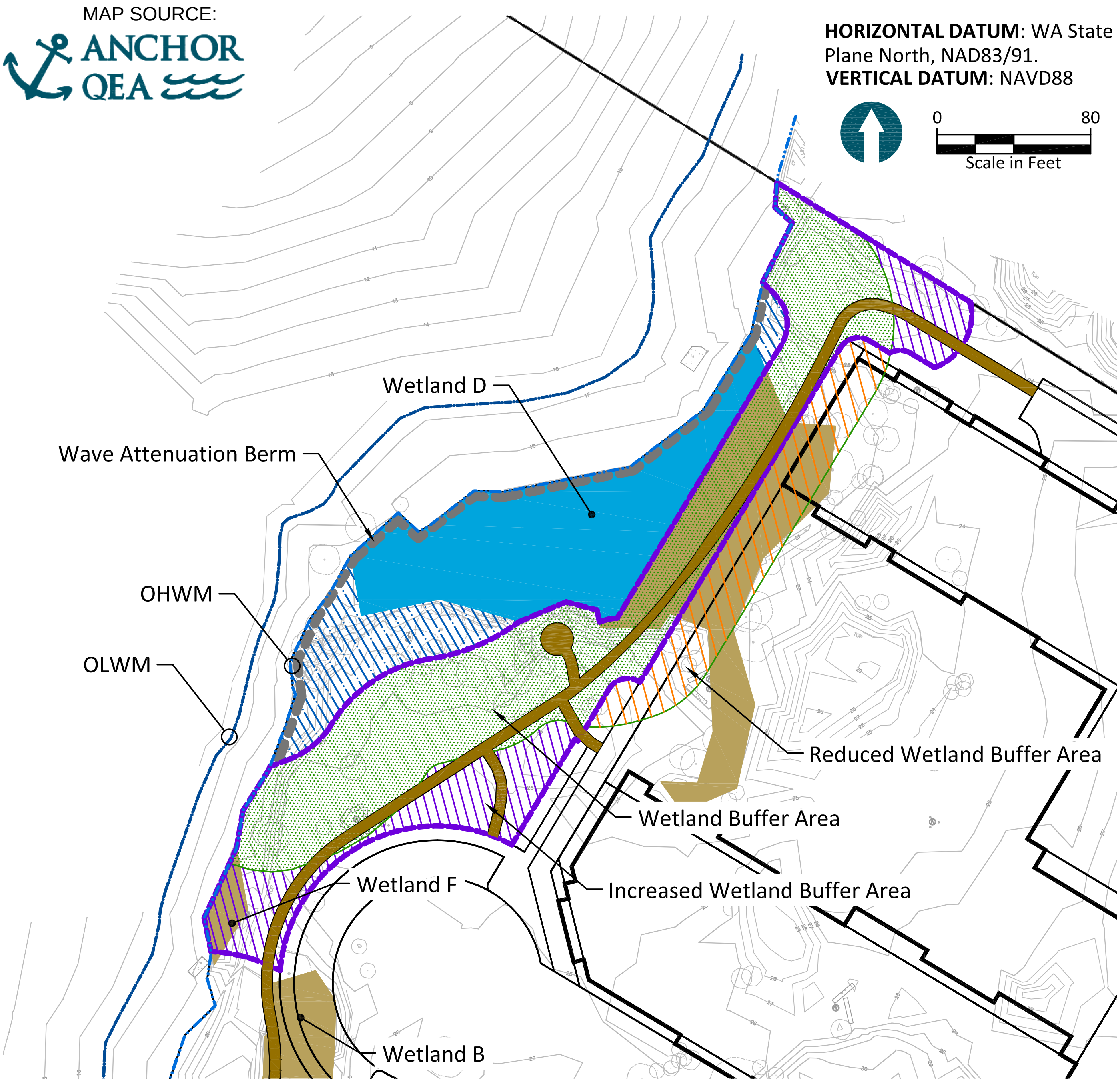
MAP SOURCE: ANCHOR QEA

Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 3
Alternative 1
Shoreline Restoration Conceptual Design
Port Quendall Redevelopment Draft EIS



LEGEND:

- Existing Shoreline OHWM
- Existing Shoreline OLWM
- Existing Wetland to be Reestablished
- Existing Wetland to be Filled for Remediation (to be Performed under CERCLA)
- Wave Attenuation Berm
- Prospective Wetland Creation / Restoration for CERCLA Remediation (31,739 sf)
- Prospective 50-ft Wetland Buffer for CERCLA Remediation
- Prospective Reduced Buffer Width (5400 sf)
- Prospective Increased Buffer Width (5994 sf)

NOTES: Wetland D (Category 2 Wetland) achieves a 50-ft buffer with Buffer Width Averaging. The buffer associated with Wetland D is narrowest at 25-ft and widest at 95-ft . The overall buffer area is equal to a continuous 50-ft buffer.

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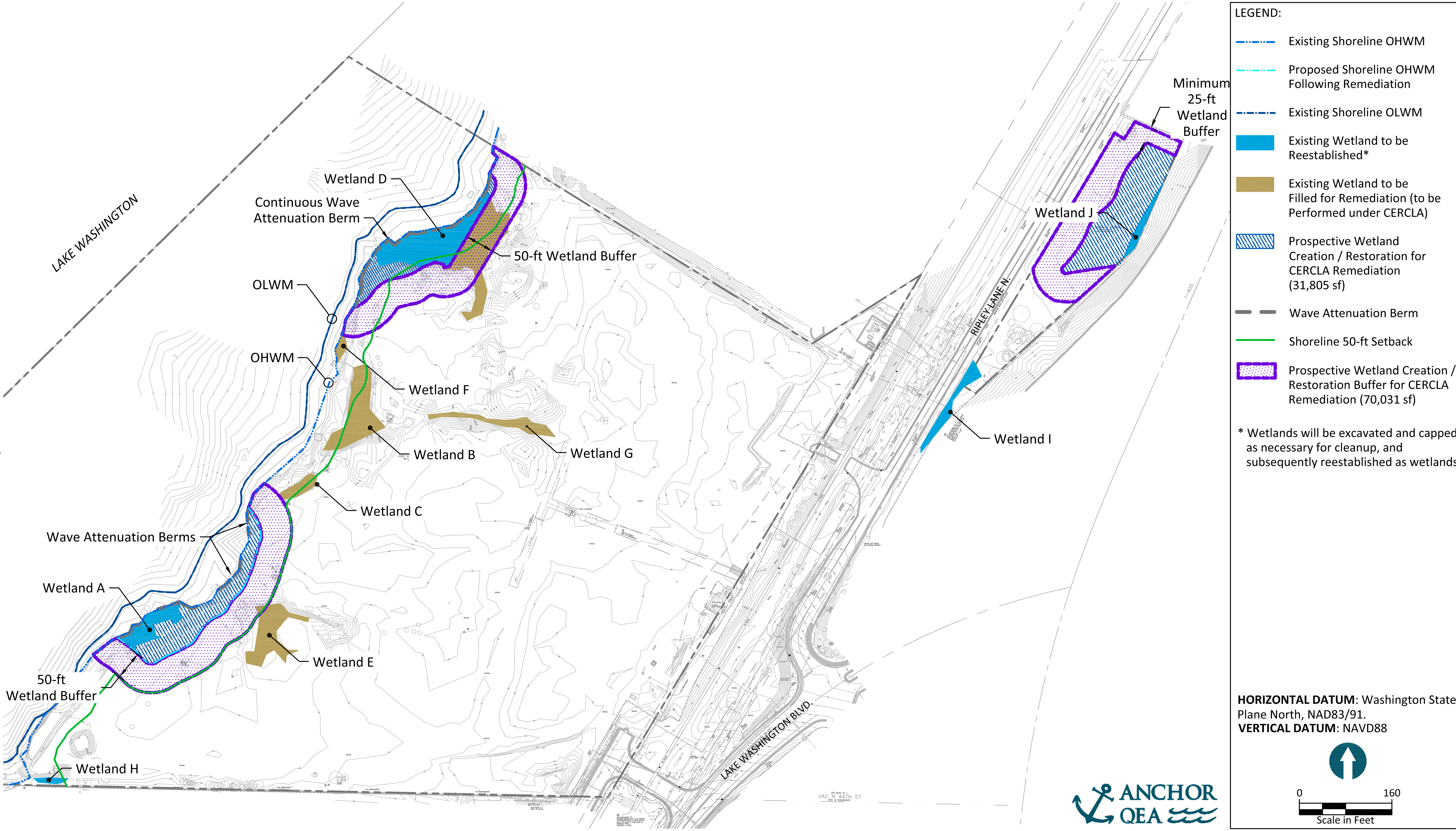
Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 4
Alternative 1
Wetland D Buffer Width Averaging
Port Quendall Terminal Redevelopment Draft EIS

MAP SOURCE: ANCHOR QEA

Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 5
Alternative 2
Shoreline Restoration Conceptual Design
Port Quendall Terminal Redevelopment Draft EIS



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MAP SOURCE: ANCHOR QEA

Raedeke Associates, Inc.
5711 N.E. 63rd Street 206.525.8122 PHONE
Seattle, WA 98115 206.526.2880 FAX

Figure 6
No Action Alternative
Shoreline Restoration Conceptual Design
Port Quendall Terminal Redevelopment Draft EIS

Table 1. List of aerial photographs used in the study.

Agency	Date	Type [1]	Scale
King County GIS Center (iMAP)	1936	B&W	varies
King County GIS Center (iMAP)	1998	B&W	varies
King County GIS Center (iMAP)	2000	Color	varies
King County GIS Center (iMAP)	2002	Color	varies
King County GIS Center (iMAP)	2005	Color	varies
King County GIS Center (iMAP)	2007	Color	varies

1 B&W = black and white photograph
CIR = color infra-red photograph
Color = full color photograph

APPENDIX F

GREENHOUSE GAS EMISSIONS WORKSHEETS

Quendall Terminals - Alternative 1

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	Lifespan Emissions (MTCO2e)
Single-Family Home............................	0		98	672	792	**0**
Multi-Family Unit in Large Building	800		33	357	766	**924556**
Multi-Family Unit in Small Building	0		54	681	766	**0**
Mobile Home.......................................	0		41	475	709	**0**
Education		0.0	39	646	361	**0**
Food Sales		0.0	39	1,541	282	**0**
Food Service		9.0	39	1,994	561	**23344**
Health Care Inpatient		0.0	39	1,938	582	**0**
Health Care Outpatient		0.0	39	737	571	**0**
Lodging		0.0	39	777	117	**0**
Retail (Other Than Mall)......................		21.6	39	577	247	**18636**
Office		245.0	39	723	588	**330590**
Public Assembly		0.0	39	733	150	**0**
Public Order and Safety		0.0	39	899	374	**0**
Religious Worship		0.0	39	339	129	**0**
Service		0.0	39	599	266	**0**
Warehouse and Storage		0.0	39	352	181	**0**
Other		0.0	39	1,278	257	**0**
Vacant		0.0	39	162	47	**0**

Section II: Pavement.........................

Pavement..		0.00				**0**

Total Project Emissions: **1297125**

Quendall Terminals - Alternative 2

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# Units	Square Feet (in thousands of square feet)	Emissions Per Unit or Per Thousand Square Feet (MTCO2e) Embodied	Energy	Transportation	Lifespan Emissions (MTCO2e)
Single-Family Home............................	0		98	672	792	0
Multi-Family Unit in Large Building	708		33	357	766	818232
Multi-Family Unit in Small Building	0		54	681	766	0
Mobile Home.......................................	0		41	475	709	0
Education		0.0	39	646	361	0
Food Sales		0.0	39	1,541	282	0
Food Service		9.0	39	1,994	561	23344
Health Care Inpatient		0.0	39	1,938	582	0
Health Care Outpatient		0.0	39	737	571	0
Lodging		0.0	39	777	117	0
Retail (Other Than Mall)......................		21.6	39	577	247	18636
Office		0.0	39	723	588	0
Public Assembly		0.0	39	733	150	0
Public Order and Safety		0.0	39	899	374	0
Religious Worship		0.0	39	339	129	0
Service		0.0	39	599	266	0
Warehouse and Storage		0.0	39	352	181	0
Other		0.0	39	1,278	257	0
Vacant		0.0	39	162	47	0

Section II: Pavement.........................

Pavement..		0.00				0

Total Project Emissions: **860211**

City of Seattle Department of Planning and Development
SEPA GHG Emissions Worksheet
Version 1.7 12/26/07

Introduction
The Washington State Environmental Policy Act (SEPA) requires environmental review of development proposals that may have a significant adverse impact on the environment. If a proposed development is subject to SEPA, the project proponent is required to complete the SEPA Checklist. The Checklist includes questions relating to the development's air emissions. The emissions that have traditionally been considered cover smoke, dust, and industrial and automobile emissions. With our understanding of the climate change impacts of GHG emissions, the City of Seattle requires the applicant to also estimate these emissions.

Emissions created by Development
GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction and disposal of materials and landscape disturbance (Embodied Emissions)
- Energy demands created by the development after it is completed (Energy Emissions)
- Transportation demands created by the development after it is completed (Transportation Emissions)

GHG Emissions Worksheet
This GHG Emissions Worksheet has been developed to assist applicants in answering the SEPA Checklist question relating to GHG emissions. The worksheet was originally developed by King County, but the City of Seattle and King County are working together on future updates to maintain consistency of methodologies across jurisdictions.

The SEPA GHG Emissions worksheet estimates all GHG emissions that will be created over the life span of a project. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during a buildings operation, and transportation by building occupants.

Using the Worksheet
1. Descriptions of the different residential and commercial building types can be found on the second tabbed worksheet ("Definition of Building Types"). If a development proposal consists of multiple projects, e.g. both single family and multi-family residential structures or a commercial development that consists of more than on type of commercial activity, the appropriate information should be estimated for each type of building or activity.

2. For paving, estimate the total amount of paving (in thousands of square feet) of the project.

3. The Worksheet will calculate the amount of GHG emissions associated with the project and display the amount in the "Total Emissions" column on the worksheet. The applicant should use this information when completing the SEPA checklist.

4. The last three worksheets in the Excel file provide the background information that is used to calculate the total GHG emissions.

5. The methodology of creating the estimates is transparent; if there is reason to believe that a better estimate can be obtained by changing specific values, this can and should be done. Changes to the values should be documented with an explanation of why and the sources relied upon.

6. Print out the “Total Emissions” worksheet and attach it to the SEPA checklist. If the applicant has made changes to the calculations or the values, the documentation supporting those changes should also be attached to the SEPA checklist.

Definition of Building Types

Type (Residential) or Principal Activity (Commercial)	**Description**
Single-Family Home................................	Unless otherwise specified, this includes both attached and detached buildings
Multi-Family Unit in Large Building	Apartments in buildings with more than 5 units
Multi-Family Unit in Small Building	Apartments in building with 2-4 units
Mobile Home..	
Education	Buildings used for academic or technical classroom instruction, such as elementary, middle, or high schools, and classroom buildings on college or university campuses. Buildings on education campuses for which the main use is not classroom are included in the category relating to their use. For example, administration buildings are part of "Office," dormitories are "Lodging," and libraries are "Public Assembly."
Food Sales	Buildings used for retail or wholesale of food.
Food Service	Buildings used for preparation and sale of food and beverages for consumption.
Health Care Inpatient	Buildings used as diagnostic and treatment facilities for inpatient care.
Health Care Outpatient	Buildings used as diagnostic and treatment facilities for outpatient care. Doctor's or dentist's office are included here if they use any type of diagnostic medical equipment (if they do not, they are categorized as an office building).
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Retail (Other Than Mall)............................	Buildings used for the sale and display of goods other than food.
Office	Buildings used for general office space, professional office, or administrative offices. Doctor's or dentist's office are included here if they do not use any type of diagnostic medical equipment (if they do, they are categorized as an outpatient health care building).
Public Assembly	Buildings in which people gather for social or recreational activities, whether in private or non-private meeting halls.
Public Order and Safety	Buildings used for the preservation of law and order or public safety.
Religious Worship	Buildings in which people gather for religious activities, (such as chapels, churches, mosques, synagogues, and temples).
Service	Buildings in which some type of service is provided, other than food service or retail sales of goods
Warehouse and Storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as self-storage).
Other	Buildings that are industrial or agricultural with some retail space; buildings having several different commercial activities that, together, comprise 50 percent or more of the floorspace, but whose largest single activity is agricultural, industrial/ manufacturing, or residential; and all other miscellaneous buildings that do not fit into any other category.
Vacant	Buildings in which more floorspace was vacant than was used for any single commercial activity at the time of interview. Therefore, a vacant building may have some occupied floorspace.

Sources: ....

Residential 2001 Residential Energy Consumption Survey
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Commercial Commercial Buildings Energy Consumption Survey (CBECS),
Description of CBECS Building Types
http://www.eia.doe.gov/emeu/cbecs/pba99/bldgtypes.html

Embodied Emissions Worksheet

Section I: Buildings

Type (Residential) or Principal Activity (Commercial)	# thousand sq feet/ unit or building	Life span related embodied GHG missions (MTCO2e/ unit)	Life span related embodied GHG missions (MTCO2e/ thousand square feet) - See calculations in table below
Single-Family Home..................................	2.53	98	39
Multi-Family Unit in Large Building	0.85	33	39
Multi-Family Unit in Small Building	1.39	54	39
Mobile Home..	1.06	41	39
Education	25.6	991	39
Food Sales	5.6	217	39
Food Service	5.6	217	39
Health Care Inpatient	241.4	9,346	39
Health Care Outpatient	10.4	403	39
Lodging	35.8	1,386	39
Retail (Other Than Mall)...........................	9.7	376	39
Office	14.8	573	39
Public Assembly	14.2	550	39
Public Order and Safety	15.5	600	39
Religious Worship	10.1	391	39
Service	6.5	252	39
Warehouse and Storage	16.9	654	39
Other	21.9	848	39
Vacant	14.1	546	39

Section II: Pavement..............................

All Types of Pavement.............................			50

	Columns and Beams	Intermediate Floors	Exterior Walls	Windows	Interior Walls	Roofs	Total Embodied Emissions (MTCO2e)	Total Embodied Emissions (MTCO2e/ thousand sq feet)
Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building	5.3	7.8	19.1	51.2	5.7	21.3		
Average Materials in a 2,272-square foot single family home	0.0	2269.0	3206.0	285.0	6050.0	3103.0		
MTCO2e	0.0	8.0	27.8	6.6	15.6	30.0	88.0	38.7

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Residential floorspace per unit — 2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

Floorspace per building — EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Average GWP (lbs CO2e/sq ft): Vancouver, Low Rise Building — Athena EcoCalculator
Athena Assembly Evaluation Tool v2.3- Vancouver Low Rise Building
Assembly Average GWP (kg) per square meter
http://www.athenasmi.ca/tools/ecoCalculator/index.html
Lbs per kg 2.20
Square feet per square meter 10.76

Average Materials in a 2,272-square foot single family home — Buildings Energy Data Book: 7.3 Typical/Average Household
Materials Used in the Construction of a 2,272-Square-Foot Single-Family Home, 2000
http://buildingsdatabook.eren.doe.gov/?id=view_book_table&TableID=2036&t=xls
See also: NAHB, 2004 Housing Facts, Figures and Trends, Feb. 2004, p. 7.

Average window size — Energy Information Administration/Housing Characteristics 1993
Appendix B, Quality of the Data. Pg. 5.
ftp://ftp.eia.doe.gov/pub/consumption/residential/rx93hcf.pdf

Pavement Emissions Factors
MTCO2e/thousand square feet of asphalt
or concrete pavement | 50 (see below)

Embodied GHG Emissions……………………Worksheet Background Information

Buildings
Embodied GHG emissions are emissions that are created through the extraction, processing, transportation, construction and disposal of building materials as well as emissions created through landscape disturbance (by both soil disturbance and changes in above ground biomass).

Estimating embodied GHG emissions is new field of analysis; the estimates are rapidly improving and becoming more inclusive of all elements of construction and development.

The estimate included in this worksheet is calculated using average values for the main construction materials that are used to create a typical family home. In 2004, the National Association of Home Builders calculated the average materials that are used in a typical 2,272 square foot single-family household. The quantity of materials used is then multiplied by the average GHG emissions associated with the life-cycle GHG emissions for each material.

This estimate is a rough and conservative estimate; the actual embodied emissions for a project are likely to be higher. For example, at this stage, due to a lack of comprehensive data, the estimate does not include important factors such as landscape disturbance or the emissions associated with the interior components of a building (such as furniture).

King County realizes that the calculations for embodied emissions in this worksheet are rough. For example, the emissions associated with building 1,000 square feet of a residential building will not be the same as 1,000 square feet of a commercial building. However, discussions with the construction community indicate that while there are significant differences between the different types of structures, this method of estimation is reasonable; it will be improved as more data become available.

Additionally, if more specific information about the project is known, King County recommends two online embodied emissions calculators that can be used to obtain a more tailored estimate for embodied emissions: www.buildcarbonneutral.org and www.athenasmi.ca/tools/ecoCalculator/.

Pavement
Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle. For specifics, see the worksheet.

Special Section: Estimating the Embodied Emissions for Pavement

Four recent life cycle assessments of the environmental impacts of roads form the basis for the per unit embodied emissions of pavement. Each study is constructed in slightly different ways; however, the aggregate results of the reports represent a reasonable estimate of the GHG emissions that are created from the manufacture of paving materials, construction related emissions, and maintenance of the pavement over its expected life cycle.

The results of the studies are presented in different units and measures; considerable effort was undertaken to be able to compare the results of the studies in a reasonable way. For more details about the below methodology, contact matt.kuharic@kingcounty.gov.

The four studies, Meil (2001), Park (2003), Stripple (2001) and Treolar (2001) produced total GHG emissions of 4-34 MTCO2e per thousand square feet of finished paving (for similar asphalt and concrete based pavements). This estimate does not including downstream maintenance and repair of the highway. The average (for all concrete and asphalt pavements in the studies, assuming each study gets one data point) is ~17 MTCO2e/thousand square feet.

Three of the studies attempted to thoroughly account for the emissions associated with long term maintenance (40 years) of the roads. Stripple (2001), Park et al. (2003) and Treolar (2001) report 17, 81, and 68 MTCO2e/thousand square feet, respectively, after accounting for maintenance of the roads.

Based on the above discussion, King County makes the conservative estimate that 50 MTCO2e/thousand square feet of pavement (over the development's life cycle) will be used as the embodied emission factor for pavement until better estimates can be obtained. This is roughly equivalent to 3,500 MTCO2e per lane mile of road (assuming the lane is 13 feet wide).

It is important to note that these studies estimate the embodied emissions for roads. Paving that does not need to stand up to the rigors of heavy use (such as parking lots or driveways) would likely use less materials and hence have lower embodied emissions.

Sources:
Meil, J. A Life Cycle Perspective on Concrete and Asphalt Roadways: Embodied Primary Energy and Global Warming Potential. 2006. Available: http://www.cement.ca/cement.nsf/eee9ec7bbd630126852566c40052107b/6ec79dc8ae03a782852572b90061b914/$FILE/ATTK0WE3/athena%20report%20Feb.%202%202007.pdf

Park, K, Hwang, Y., Seo, S., M.ASCE, and Seo, H. , "Quantitative Assessment of Environmental Impacts on Life Cycle of Highways," Journal of Construction Engineering and Management , Vol 129, January/February 2003, pp 25-31, (DOI: 10.1061/(ASCE)0733-9364(2003)129:1(25)).

Stripple, H. Life Cycle Assessment of Road. A Pilot Study for Inventory Analysis. Second Revised Edition. IVL Swedish Environmental Research Institute Ltd. 2001. Available: http://www.ivl.se/rapporter/pdf/B1210E.pdf

Treloar, G., Love, P.E.D., and Crawford, R.H. Hybrid Life-Cycle Inventory for Road Construction and Use. Journal of Construction Engineering and Management. P. 43-49. January/February 2004.

Energy Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	Energy consumption per building per year (million Btu)	Carbon Coefficient for Buildings	MTCO2e per building per year	Floorspace per Building (thousand square feet)	MTCE per thousand square feet per year	MTCO2e per thousand square feet per year	Average Building Life Span	Lifespan Energy Related MTCO2e emissions per unit	Lifespan Energy Related MTCO2e emissions per thousand square feet
Single-Family Home.............................	107.3	0.108	11.61	2.53	4.6	16.8	57.9	672	266
Multi-Family Unit in Large Building	41.0	0.108	4.44	0.85	5.2	19.2	80.5	357	422
Multi-Family Unit in Small Building	78.1	0.108	8.45	1.39	6.1	22.2	80.5	681	489
Mobile Home..	75.9	0.108	8.21	1.06	7.7	28.4	57.9	475	448
Education	2,125.0	0.124	264.2	25.6	10.3	37.8	62.5	16,526	646
Food Sales	1,110.0	0.124	138.0	5.6	24.6	90.4	62.5	8,632	1,541
Food Service	1,436.0	0.124	178.5	5.6	31.9	116.9	62.5	11,168	1,994
Health Care Inpatient	60,152.0	0.124	7,479.1	241.4	31.0	113.6	62.5	467,794	1,938
Health Care Outpatient	985.0	0.124	122.5	10.4	11.8	43.2	62.5	7,660	737
Lodging	3,578.0	0.124	444.9	35.8	12.4	45.6	62.5	27,826	777
Retail (Other Than Mall)........................	720.0	0.124	89.5	9.7	9.2	33.8	62.5	5,599	577
Office	1,376.0	0.124	171.1	14.8	11.6	42.4	62.5	10,701	723
Public Assembly	1,338.0	0.124	166.4	14.2	11.7	43.0	62.5	10,405	733
Public Order and Safety	1,791.0	0.124	222.7	15.5	14.4	52.7	62.5	13,928	899
Religious Worship	440.0	0.124	54.7	10.1	5.4	19.9	62.5	3,422	339
Service	501.0	0.124	62.3	6.5	9.6	35.1	62.5	3,896	599
Warehouse and Storage	764.0	0.124	95.0	16.9	5.6	20.6	62.5	5,942	352
Other	3,600.0	0.124	447.6	21.9	20.4	74.9	62.5	27,997	1,278
Vacant	294.0	0.124	36.6	14.1	2.6	9.5	62.5	2,286	162

Sources

All data in black text — King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov

Energy consumption for residential buildings — 2007 Buildings Energy Data Book: 6.1 Quad Definitions and Comparisons (National Average, 2001)
Table 6.1.4: Average Annual Carbon Dioxide Emissions for Various Functions
http://buildingsdatabook.eren.doe.gov/
Data also at: http://www.eia.doe.gov/emeu/recs/recs2001_ce/ce1-4c_housingunits2001.html

Energy consumption for commercial buildings and Floorspace per building — EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

Note: Data in plum color is found in both of the above sources (buildings energy data book and commercial buildings energy consumption survey).

Carbon Coefficient for Buildings — Buildings Energy Data Book (National average, 2005)
Table 3.1.7. 2005 Carbon Dioxide Emission Coefficients for Buildings (MMTCE per Quadrillion Btu)
http://buildingsdatabook.eere.energy.gov/?id=view_book_table&TableID=2057
Note: Carbon coefficient in the Energy Data book is in MTCE per Quadrillion Btu.
To convert to MTCO2e per million Btu, this factor was divided by 1000 and multiplied by 44/12.

Residential floorspace per unit — 2001 Residential Energy Consumption Survey (National Average, 2001)
Square footage measurements and comparisons
http://www.eia.doe.gov/emeu/recs/sqft-measure.html

average lief span of buildings, estimated by replacement time method

	Single Family Homes	Multi-Family Units in Large and Small Buildings	All Residential Buildings	
New Housing Construction, 2001	1,273,000	329,000	1,602,000	
Existing Housing Stock, 2001	73,700,000	26,500,000	100,200,000	
Replacement time:	57.9	80.5	62.5	(national average, 2001)

Note: Single family homes calculation is used for mobile homes as a best estimate life span.
Note: At this time, KC staff could find no reliable data for the average life span of commercial buildings.
Therefore, the average life span of residential buildings is being used until a better approximation can be ascertained.

Sources:

New Housing Construction, 2001 **Quarterly Starts and Completions by Purpose and Design - US and Regions (Excel)**
http://www.census.gov/const/quarterly_starts_completions_cust.xls
See also: http://www.census.gov/const/www/newresconstindex.html

Existing Housing Stock, 2001 **Residential Energy Consumption Survey (RECS) 2001**
Tables HC1:Housing Unit Characteristics, Million U.S. Households 2001
Table HC1-4a. Housing Unit Characteristics by Type of Housing Unit, Million U.S. Households, 2001
Million U.S. Households, 2001
http://www.eia.doe.gov/emeu/recs/recs2001/hc_pdf/housunits/hc1-4a_housingunits2001.pdf

Transportation Emissions Worksheet

Type (Residential) or Principal Activity (Commercial)	# people/ unit or building	# thousand sq feet/ unit or building	# people or employees/ thousand square feet	vehicle related GHG emissions (metric tonnes CO2e per person per year)	MTCO2e/ year/ unit	MTCO2e/ year/ thousand square feet	Average Building Life Span	Life span transportation related GHG emissions (MTCO2e/ per unit)	Life span transportation related GHG emissions (MTCO2e/ thousand sq feet)
Single-Family Home...................................	2.8	2.53	1.1	4.9	13.7	5.4	57.9	792	313
Multi-Family Unit in Large Building	1.9	0.85	2.3	4.9	9.5	11.2	80.5	766	904
Multi-Family Unit in Small Building	1.9	1.39	1.4	4.9	9.5	6.8	80.5	766	550
Mobile Home...	2.5	1.06	2.3	4.9	12.2	11.5	57.9	709	668
Education	30.0	25.6	1.2	4.9	147.8	5.8	62.5	9247	361
Food Sales	5.1	5.6	0.9	4.9	25.2	4.5	62.5	1579	282
Food Service	10.2	5.6	1.8	4.9	50.2	9.0	62.5	3141	561
Health Care Inpatient	455.5	241.4	1.9	4.9	2246.4	9.3	62.5	140506	582
Health Care Outpatient	19.3	10.4	1.9	4.9	95.0	9.1	62.5	5941	571
Lodging	13.6	35.8	0.4	4.9	67.1	1.9	62.5	4194	117
Retail (Other Than Mall).............................	7.8	9.7	0.8	4.9	38.3	3.9	62.5	2394	247
Office	28.2	14.8	1.9	4.9	139.0	9.4	62.5	8696	588
Public Assembly	6.9	14.2	0.5	4.9	34.2	2.4	62.5	2137	150
Public Order and Safety	18.8	15.5	1.2	4.9	92.7	6.0	62.5	5796	374
Religious Worship	4.2	10.1	0.4	4.9	20.8	2.1	62.5	1298	129
Service	5.6	6.5	0.9	4.9	27.6	4.3	62.5	1729	266
Warehouse and Storage	9.9	16.9	0.6	4.9	49.0	2.9	62.5	3067	181
Other	18.3	21.9	0.8	4.9	90.0	4.1	62.5	5630	257
Vacant	2.1	14.1	0.2	4.9	10.5	0.7	62.5	657	47

Sources

All data in black text	King County, DNRP. Contact: Matt Kuharic, matt.kuharic@kingcounty.gov
# people/ unit	Estimating Household Size for Use in Population Estimates (WA state, 2000 average) Washington State Office of Financial Management Kimpel, T. and Lowe, T. Research Brief No. 47. August 2007 http://www.ofm.wa.gov/researchbriefs/brief047.pdf Note: This analysis combines Multi Unit Structures in both large and small units into one category; the average is used in this case although there is likely a difference
Residential floorspace per unit	2001 Residential Energy Consumption Survey (National Average, 2001) Square footage measurements and comparisons http://www.eia.doe.gov/emeu/recs/sqft-measure.html
# employees/thousand square feet	Commercial Buildings Energy Consumption Survey commercial energy uses and costs (National Median, 2003) Table B2 Totals and Medians of Floorspace, Number of Workers, and Hours of Operation for Non-Mall Buildings, 2003 http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set1/2003excel/b2.xls Note: Data for # employees/thousand square feet is presented by CBECS as square feet/employee. In this analysis employees/thousand square feet is calculated by taking the inverse of the CBECS number and multiplying by 1000.

vehicle related GHG emissions

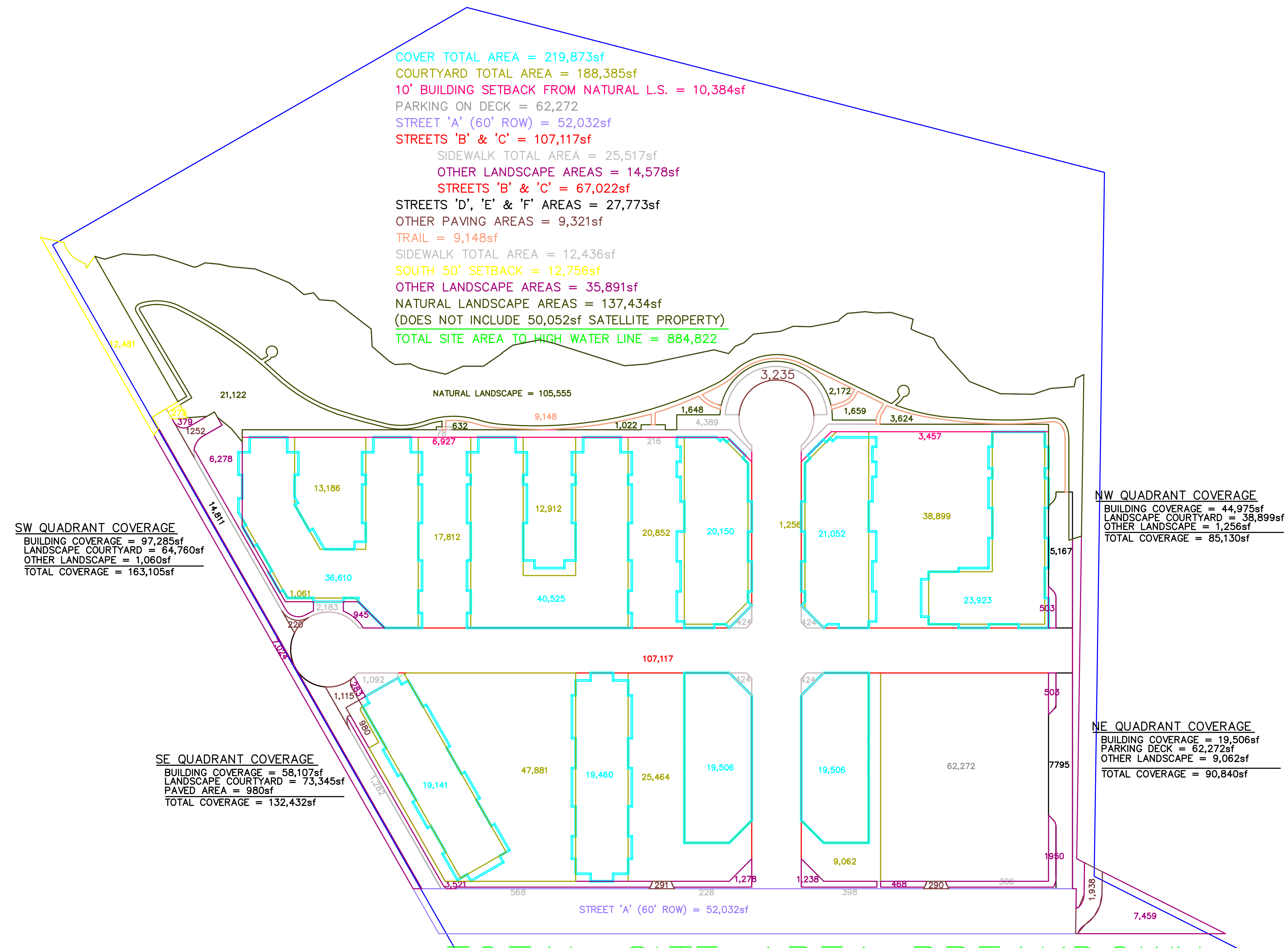
Estimate calculated as follows (Washington state, 2006)_

56,531,930,000	2006 Annual WA State Vehicle Miles Traveled	
		Data was daily VMT. Annual VMT was 365*daily VMT.
		http://www.wsdot.wa.gov/mapsdata/tdo/annualmileage.htm
6,395,798	2006 WA state population	
		http://quickfacts.census.gov/qfd/states/53000.html
8839	vehicle miles per person per year	
0.0506	gallon gasoline/mile	
		This is the weighted national average fuel efficiency for all cars and 2 axle, 4 wheel light trucks in 2005. This includes pickup trucks, vans and SUVs. The 0.051 gallons/mile used here is the inverse of the more commonly known term "miles/per gallon" (which is 19.75 for these cars and light trucks).
		Transportation Energy Data Book. 26th Edition. 2006. Chapter 4: Light Vehicles and Characteristics. Calculations based on weighted average MPG efficiency of cars and light trucks.
		http://cta.ornl.gov/data/tedb26/Edition26_Chapter04.pdf
		Note: This report states that in 2005, 92.3% of all highway VMT were driven by the above described vehicles.
		http://cta.ornl.gov/data/tedb26/Spreadsheets/Table3_04.xls
24.3	lbs CO2e/gallon gasoline	
		The CO2 emissions estimates for gasoline and diesel include the extraction, transport, and refinement of petroleum as well as their combustion.
		Life-Cycle CO2 Emissions for Various New Vehicles. RENew Northfield.
		Available: http://renewnorthfield.org/wpcontent/uploads/2006/04/CO2%20emissions.pdf
		Note: This is a conservative estimate of emissions by fuel consumption because diesel fuel,
2205		with a emissions factor of 26.55 lbs CO2e/gallon was not estimated.
4.93	lbs/metric tonne	
	vehicle related GHG emissions (metric tonnes CO2e per person per year)	

average lief span of buildings, estimated by replacement time method	See Energy Emissions Worksheet for Calculations
Commercial floorspace per unit	EIA, 2003 Commercial Buildings Energy Consumption Survey (National Average, 2003)
	Table C3. Consumption and Gross Energy Intensity for Sum of Major Fuels for Non-Mall Buildings, 2003
	http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/2003set9/2003excel/c3.xls

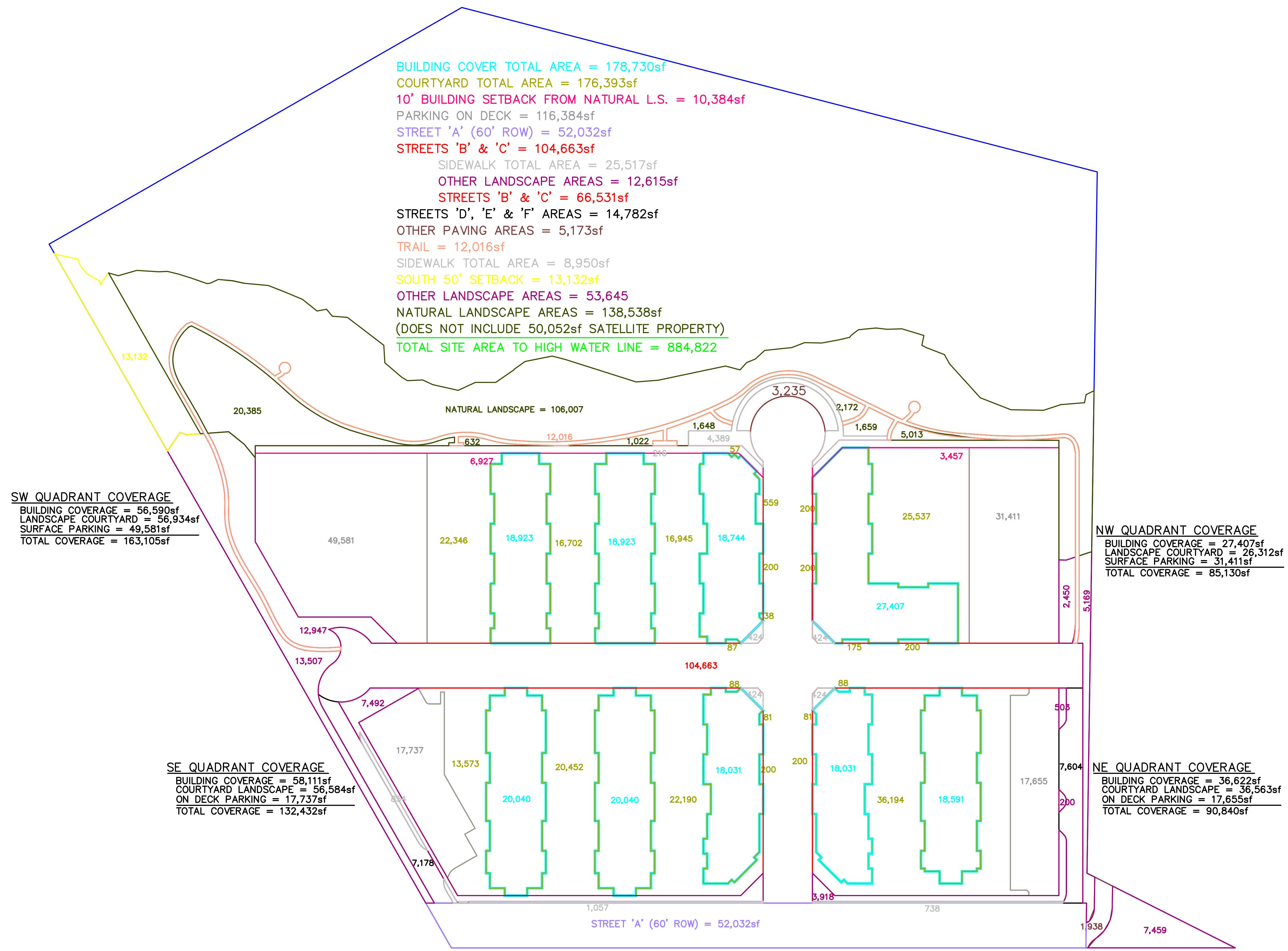
APPENDIX G

SITE AREA BREAKDOWNS



TOTAL SITE AREA BREAKDOWN

QUENDALL TERMINALS - ALTERNATE #1



TOTAL SITE AREA BREAKDOWN

QUENDALL TERMINALS - ALTERNATE #2

APPENDIX H

TRANSPORTATION TECHNICAL REPORT

Quendall Terminals
DRAFT Environmental Impact Statement
Renton, WA

Transportation Impact Study

December 2, 2010

Prepared for:

Blumen Consulting Group, Inc.
600 - 108th Avenue NE, Suite 1002
Bellevue, Washington 98004

Prepared by:

Transportation Engineering NorthWest, LLC

Transportation Engineering/Operations ♦ Impact Studies ♦ Design Services ♦ Transportation Planning/Forecasting

Seattle Office: PO Box 65254 ♦ Seattle, WA 98155 ♦ Office/Fax (206) 361-7333 ♦ Toll Free (888) 220-7333

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EXECUTIVE SUMMARY

This report documents an evaluation of transportation impacts associated with development of the *Quendall Terminals* site in Renton, WA. The proposed development would consist of the following:

- **2015 Alternative 1 (The Application)** includes the construction of 800 multifamily units, 21,600 square feet of retail, 245,000 square feet of office, 9,000 square feet of restaurant space and parking for 2,171 vehicles. Vehicular access would be provided via a new access drive onto Ripley Lane and the extension of NE 43rd Street (existing Barbee Mill access).

In addition to the 2015 Alternative 1 above, the following alternatives were analyzed as part of this project:

- **2015 Alternative 2 (Lower Density Alternative)** includes the construction of 708 multifamily units, 21,600 square feet of retail, 9,000 square feet of restaurant space and parking for 1,362 vehicles. Vehicular access would be provided via a new access drive onto Ripley Lane and the extension of NE 43rd Street (existing Barbee Mill access).
- **2015 Alternative 3 (No Action Alternative, No Development).** This is the Baseline Alternative with no development on-site.

The development alternatives were tested under a future transportation network in 2015 with and without the planned I-405 improvements at the I-405/NE 44th Street interchange. The I-405 Improvements assumed in this analysis included:

- Reconfiguring the NE 44th Street interchange into a tight-diamond configuration.
- Relocating both NB and SB ramps with additional through and turn-lanes.
- Addition of traffic signals at both NB and SB ramp intersections.
- Addition of a traffic signal at the Ripley Lane/Lake Washington Boulevard intersection.

Detailed trip generation estimates of development and transportation forecasts throughout the study area were prepared for future baseline conditions without the proposed development and with the proposed development in 2015 (the assumed year of buildout). Impacts were evaluated at 9 off-site study intersections under the without I-405 Improvements future scenario and 7 off-site study intersections under the with I-405 Improvements future scenario.

Conclusions

There exists today and will be in the future a moderate to high level of background traffic that travels in the vicinity of the site. With the existing transportation network and I-405 Improvements by 2015, the development alternatives could be accommodated; however, implementation of some additional site access transportation improvements would be necessary. Without I-405 Improvements by 2015, additional interchange ramp improvements would be needed to support the development alternatives as well as site access improvements.

Additional baseline transportation improvements and project mitigation measures are identified in the *Mitigation Measures* section of this report.

INTRODUCTION

This study summarizes transportation impacts associated with the proposed *Quendall Terminals* site. The study documents transportation impacts associated with development alternatives of this site, including:

- Assessment of existing conditions through field reconnaissance and review of existing planning documents.
- Estimation of weekday vehicular a.m. and p.m. peak hour trips and daily trips generated by the alternatives.
- Assignment of weekday a.m. and p.m. peak hour project trips onto the existing roadway network in the immediate vicinity.
- Evaluation of a.m. and p.m. peak level of service (LOS) impacts at 9 off-site study intersections.
- Assessment of site access and circulation issues.
- Analysis of public transportation and nonmotorized transportation impacts.
- Identification of mitigation measures to maintain acceptable levels of mobility and safety

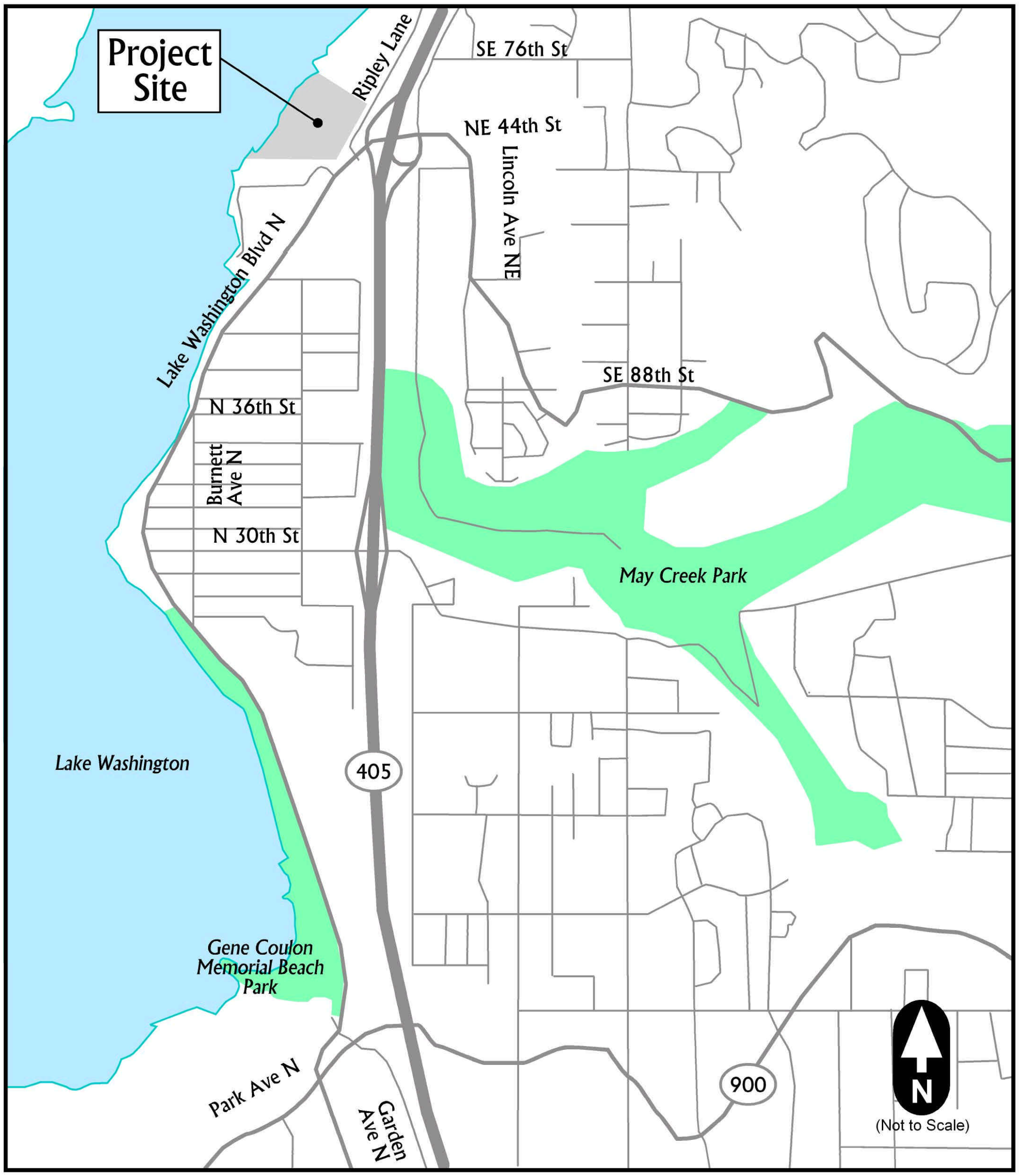
Project Description

The project site is generally bounded by Ripley Lane to the east, Lake Washington Boulevard to the southeast, and Lake Washington to the west. A project site vicinity map is shown in **Figure 1**. The proposed development would consist of the following (conceptual site plan for Alternative 1 is provided in **Figure 2**):

- **2015 Alternative 1 (The Application)** includes the construction of 800 multifamily units, 21,600 square feet of retail, 245,000 square feet of office, 9,000 square feet of restaurant space and parking for 2,171 vehicles. Vehicular access would be provided via a new access drive onto Ripley Lane and the extension of NE 43rd Street (existing Barbee Mill access).

In addition to the 2015 Alternative 1 described above, the following alternatives were analyzed as part of this project:

- **2015 Alternative 2 (Lower Density Alternative)** includes the construction of 708 multifamily units, 21,600 square feet of retail, 9,000 square feet of restaurant space and parking for 1,362 vehicles. Vehicular access would be provided via a new access drive onto Ripley Lane and the existing Barbee Mill access on Lake Washington Boulevard, similar to Alternative 1.
- **2015 (No Action Alternative, No Development).** This is the Baseline Alternative with no development assumed on-site at this time.

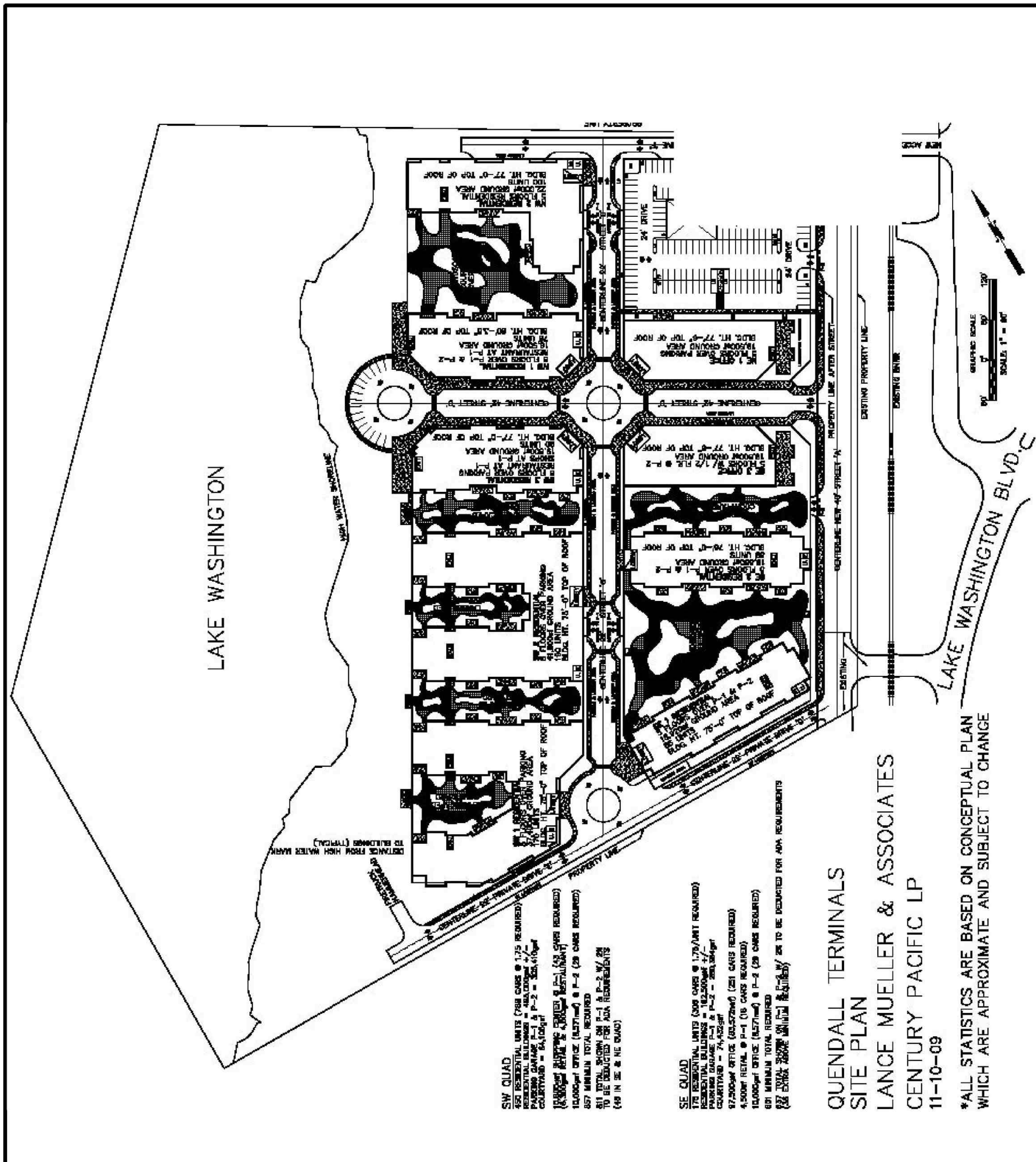


Transportation Engineering NorthWest, LLC

Figure 1
Project Site Vicinity

Quendall Terminals DEIS
Renton, WA

July 16, 2010



Transportation Engineering NorthWest, LLC	Figure 2 Alternative 1 Site Plan	Quendall Terminals DEIS Renton, WA July 16, 2010

EXISTING CONDITIONS

This section describes existing transportation system conditions in the study area. It includes an inventory of existing roadway conditions, intersection traffic control, traffic volumes, intersection levels of service, public transportation services, nonmotorized transportation facilities, and planned roadway improvements.

Roadway Conditions

The following paragraphs describe existing arterial roadways that would be used as major routes for site access. Roadway characteristics are described in terms of facility type, number of lanes, posted speed limits and shoulder types and widths.

Lake Washington Boulevard is classified as a collector arterial between N Park Drive and I-405. Travel lanes are 11 feet in width with 5-foot bike lanes on both side of the street. A paved 4-foot shoulder exists on the west side of the street and is designated for pedestrians. No parking is allowed on either side of the street. The posted speed limit is 25 mph.

NE 44th Street between the NB and SB I-405 ramp intersections is classified as a collector arterial. Travel lanes are 13-14 feet in width. On the approaches to the I-405 overpass paved shoulders exists on both sides of the street. No parking is allowed on either side of the street.

Ripley Lane is a local access street with two 11 foot travel lanes in each direction. A paved 5 foot shoulder exists on the west side of the street. No parking is allowed on either side of the street. The posted speed limit is 25 mph.

Intersection Traffic Control and Channelization

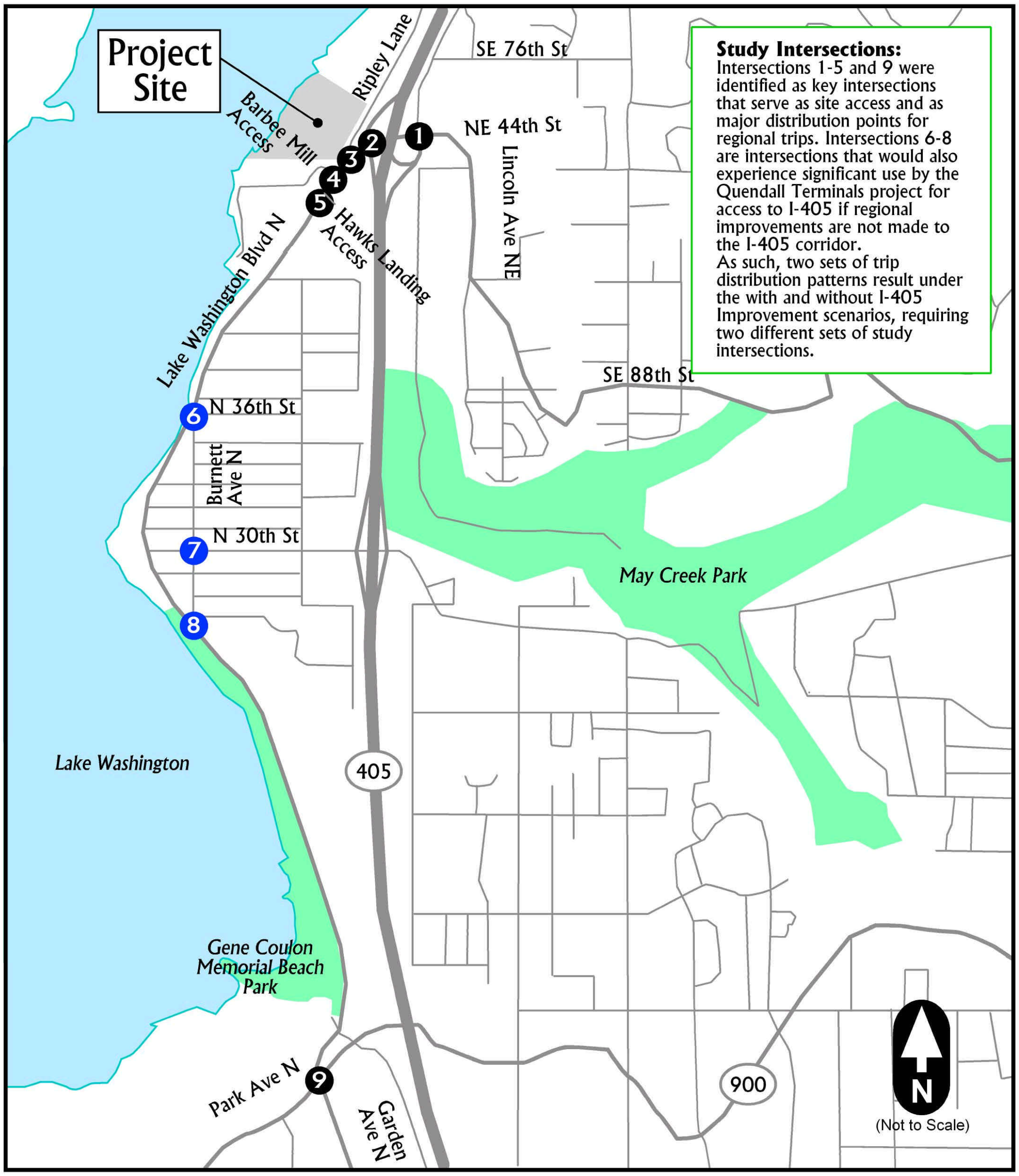
Based on estimated trip distribution under the 2015 year network scenarios (with and without I-405 Improvements), up to nine study intersections were analyzed, including:

1. Lake Washington Boulevard (I-405 NB ramps) / NE 44th Street
2. I-405 SB ramps / NE 44th Street
3. Lake Washington Boulevard / Ripley Lane
4. Lake Washington Boulevard / Barbee Mill Access (N 43rd Street)
5. Lake Washington Boulevard / Hawks Landing Access (future intersection)
6. Lake Washington Boulevard / N 36th Street / Burnett Avenue N
7. N 30th Street / Burnett Ave N (without I-405 Improvements Scenario only)
8. Lk Wa Blvd / Burnett Ave N (without I-405 Improvements Scenario only)
9. Lk Wa Blvd / Park Ave N / Garden Ave N

Figure 3 identifies the locations of the 9 off-site study intersections. Existing intersection channelization and traffic control are illustrated in **Figure 4** for all study intersections.

Existing Traffic Volumes

Peak hour traffic volumes represent the highest hourly volume of vehicles passing through an intersection during a typical 7-9 a.m. and 4-6 p.m. weekday peak periods. Peak period turning movement counts at study intersections were conduced in 2009 and 2010. **Figure 5** summarizes the 2009-2010 existing a.m. and p.m. peak period turning movements at all study intersections.



Transportation Engineering NorthWest, LLC

Figure 3
Study Intersection Locations

Quendall Terminals DEIS
Renton, WA

November 22, 2010

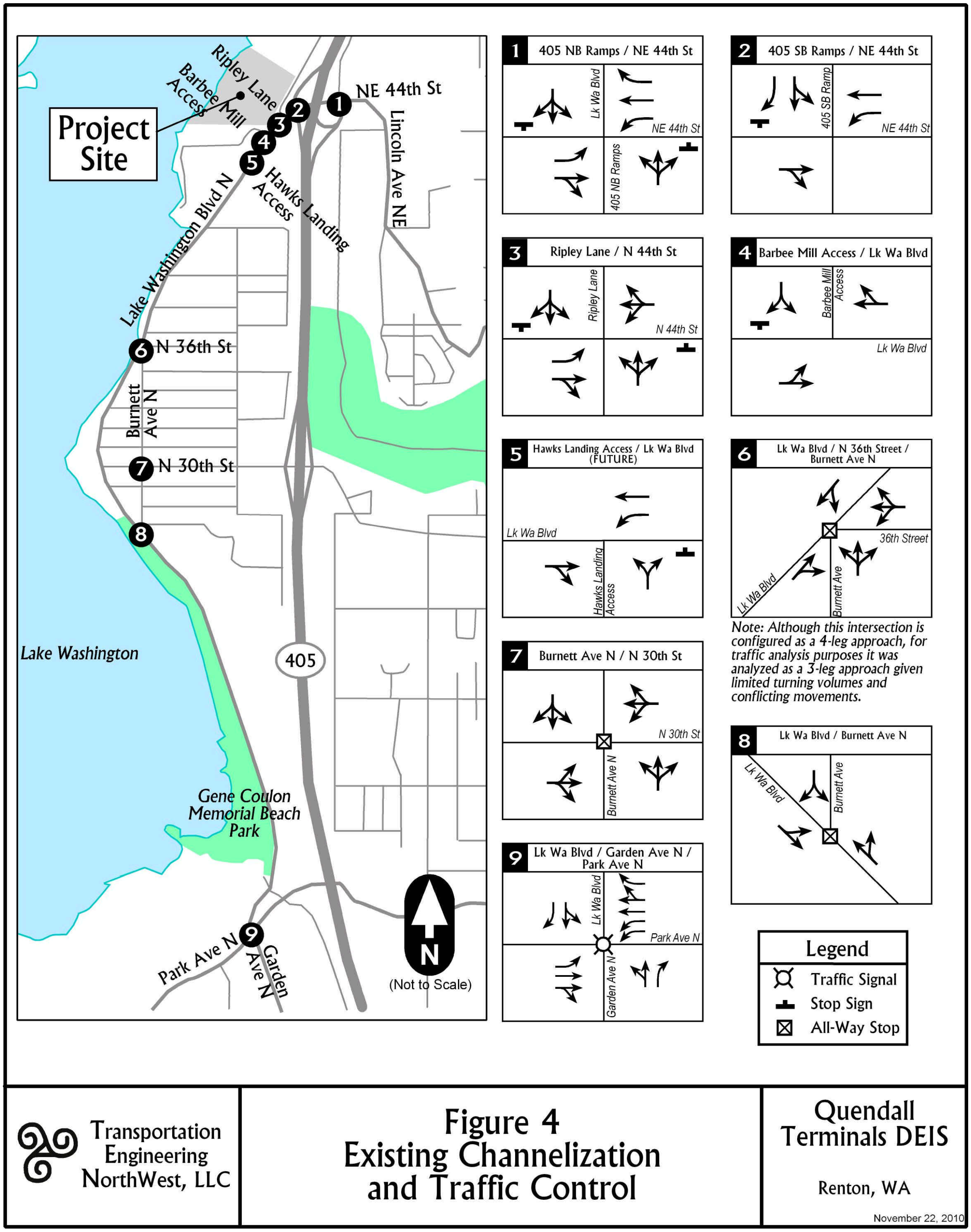
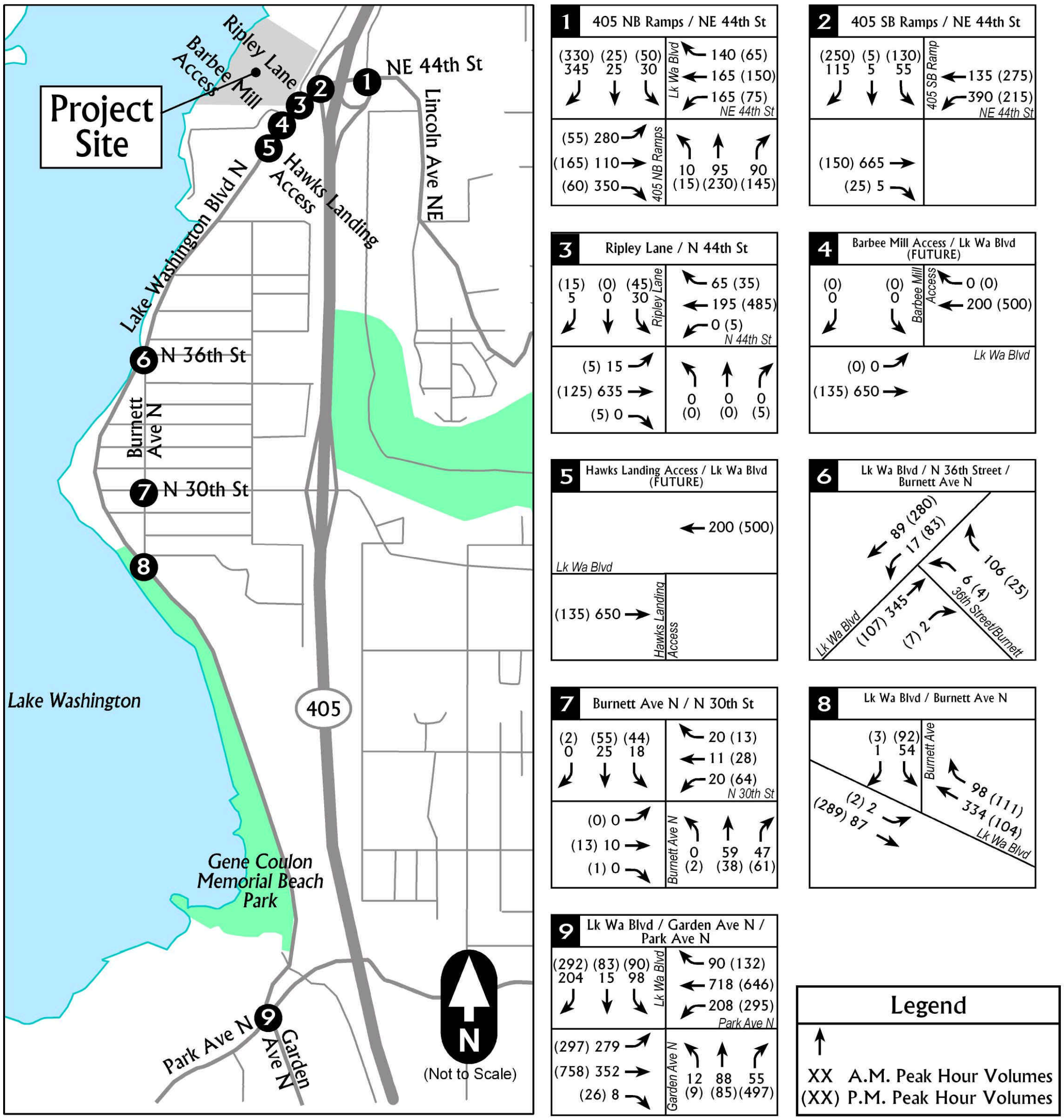


Figure 4
Existing Channelization and Traffic Control



Transportation Engineering NorthWest, LLC

Figure 5
Existing Peak Hour Traffic Volumes

Quendall Terminals DEIS

Renton, WA

November 22, 2010

Existing traffic counts at study intersections 1-5 were obtained from the *Quendall Terminals Traffic Impact Analysis* dated November 2009. The existing traffic counts at study intersections 6-9 were conducted in June 2010 by All Traffic Data (ATD).

Intersection Level of Service

Level of service (LOS) serves as an indicator of the quality of traffic flow at an intersection or road segment. The LOS grading ranges from A to F, such that LOS A is assigned when minimal delays are present and low volumes are experienced. LOS F indicates long delays, heavy volumes, and increased traffic congestion. **Table 1** summarizes the criteria for the delay range for each level of service at signalized and unsignalized intersections. The methods used to calculate the levels of service are described in the updated *2000 Highway Capacity Manual* (Special Report 209, Transportation Research Board). The measure of effectiveness for signalized intersections is average control delay, defined as the total time vehicles are stopped at an intersection approach during a specified time period divided by the number of vehicles departing from the approach in the same time period.

Level of service for signalized intersections is defined in terms of control delay, which is a measure of driver discomfort, frustration, and increased travel time. The delay experienced by a motorist is made of up a number of factors that relate to traffic control, geometries, traffic demand, and incidents. Total control delay is the difference between the travel time actually experienced and the *reference travel time* that would result during base conditions (i.e., the absence of traffic control, geometric delay, any incidents, or as a result other vehicles). LOS F at signalized intersections is often considered unacceptable to most drivers, but does not automatically imply that the intersection is over capacity. Jammed conditions could occur on one or all approaches, with periods of long delays and drivers waiting for multiple signal cycles to progress through the intersection. The City of Renton does not have a formally adopted level of service standard, but measures level of service on a travel time basis. For the purposes of the traffic impact analysis, LOS E was assumed as the threshold.

For unsignalized intersections, a level of service and estimate of average control delay is determined for each minor or controlled movement based upon a sequential analysis of gaps in the major traffic streams and conflicting traffic movements. In addition, given that unsignalized intersections create different driver expectations and congestion levels than signalized intersections, their delay criteria are lower. Control delay at unsignalized intersections include deceleration delay, queue move-up time, stopped delay in waiting for an adequate gap in flows through the intersection, and final acceleration delay.

Table 1: Level of Service Criteria for Signalized and Unsignalized Intersections

	Signalized Intersection	*Unsignalized Intersection*
Level of Service	**Delay Range (sec)**	**Delay Range (sec)**
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", Special Report 209, Transportation Research Board, 2000, Update.

Synchro 6, Traffic Signal Coordination Software program was used to develop network scenarios in evaluating level of service analysis at the study intersections. Signal cycle lengths and splits were optimized to assume adjustments in optimum performance over time. Use of the *Synchro 6* software program was consistent with the *2000 Highway Capacity Manual.*

Table 2 highlights existing 2009/2010 a.m. and p.m. peak hour levels of service at study area intersections. During the a.m. peak hour, Intersection #1 – Lk Wa Blvd (I-405 NB ramps) / NE 44th Street operates at LOS E and the southbound movement at Intersection #2 – I-405 SB ramps / NE 44th Street operates at LOS F. During the p.m. peak hour, all intersections operate at LOS D or better. Detailed level of service summary sheets are provided in **Appendix A**.

Table 2: Existing 2009-2010 Peak Hour Intersection Level of Service

A.M. Peak Hour				
Int.#	**Unsignalized Intersections**	**LOS**	**Delay**	**V/C**
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	E	48	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	2.32
3	Ripley Lane/NE 44th Street	SB-D	26	0.20
6	Lk Wa Blvd/N 36th Street	B	11	-
7	N 30th Street/Burnett Ave N	A	8	-
8	Lk Wa Blvd/Burnett Ave N	B	13	-
Int.#	**Signalized Intersections**	**LOS**	**Delay**	**V/C**
9	Lake Wa Blvd-Garden Ave N/Park Ave N	C	26	0.71
P.M. Peak Hour				
Int.#	**Unsignalized Intersections**	**LOS**	**Delay**	**V/C**
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	C	21	-
2	I-405 SB Ramps/NE 44th Street	SB-C	22	0.60
3	Ripley Lane/NE 44th Street	SB-C	16	0.16
6	Lk Wa Blvd/N 36th Street	A	10	-
7	N 30th Street/Burnett Ave N	A	8	-
8	Lk Wa Blvd/Burnett Ave N	A	10	-
Int.#	**Signalized Intersections**	**LOS**	**Delay**	**V/C**
9	Lake Wa Blvd (Garden Ave N)/Park Ave N	D	39	0.84

Note: Analysis based on Synchro results using HCM 2000 control delays and LOS.
Unsignalized intersections show LOS and control delays for the worst directional movement.

Public Transportation Services

No public transit service is currently provided in the project vicinity. The closest transit service in the vicinity is provided via a dial-a-ride service area and fixed route service in the vicinity of the NE 30th Street interchange and I-405.

Nonmotorized Transportation Facilities

Nonmotorized transportation facilities in the area include striped bike lanes on Lake Washington Boulevard. Lake Washington Boulevard also includes a paved 4-5 foot shoulder on the west side of the street designated for pedestrians. There are no nonmotorized transportation facilities on the project site. The existing railroad corridor to the east of the site was recently purchased by the Port of Seattle. The City's recently adopted *Renton Trails and Bicycle Master Plan, 2009* identifies this rail corridor near this site as a future "rails to trails" planned trail.

Planned Transportation Improvements

The section identifies planned transportation improvements for roadways and intersections that would be impacted by trips generated by the proposed development. They have been identified in planning documents for the City of Renton and WSDOT. While these improvements are identified as "planned", they have yet to receive full funding and therefore, timing of such improvements is unknown at this time.

The City of Renton's *2010-2015 Transportation Improvement Program (TIP)* identified the following transportation improvement in the study area:

- **TIP No. 38: Lake Washington Blvd. – Park Ave N to Gene Coulon Memorial Park.** This project includes road widening, traffic signal installation, construction of railroad crossings, installing appropriate drainage, curb, gutters, and sidewalks on Lake Washington Boulevard North from Park Avenue North to Coulon Park. This project will serve the Southport development adjacent to Coulon Park and improve access to the park.

WSDOT has identified improvements to the I-405/NE 44th interchange as part of the *I-405 Renton to Bellevue Project (SR 169 to I-90)*. The improvements to the I-405/NE 44th interchange include:

- Reconfiguring the NE 44th Street interchange into a tight-diamond configuration.
- Relocating both NB and SB ramps with additional through and turn-lanes.
- Addition of traffic signals at both NB and SB ramp intersections.
- Addition of a traffic signal at Ripley Lane/Lake Washington Boulevard. *While widening of NE 44th Street west of Ripley Lane is identified in the latest I-405 IMPROVEMENTS drawing, this widening assumes it extends approximately 100 feet west of Ripley Lane and therefore, no channelization capacity was assumed to occur at this intersection.*

TRANSPORTATION IMPACTS

The following section describes transportation impacts of the 2015 buildout alternatives of the *Quenall Terminals* site on the surrounding arterial network. The discussion includes baseline transportation network assumptions, baseline travel demand forecasts, new trips generated by the alternatives, distribution and assignment of new project trips, review of intersection level of service impacts, an evaluation of site access and circulation issues, and an analysis of public transportation and nonmotorized transportation impacts. As a worst case scenario, the land use associated with Alternative 1 was used in the analysis as this alternative generates the highest number of vehicle trips.

Baseline Transportation Network Assumptions

The future baseline transportation networks were based upon consistency with planned infrastructure in the study area. Two future 2015 baseline transportation networks were included in the analysis. The two future baseline evaluation scenarios included with and without planned improvements at the I-405/NE 44th Street interchange.

Baseline Travel Demand Forecasts

Baseline travel demand forecasts were prepared for 2015 using land use and travel demand forecasting information from the City of Renton. The following paragraphs outline, in further detail the transportation forecast and refinement process used for the *Quendall Terminals* DEIS.

City of Renton 2015 EMME Model

The most appropriate travel demand forecasting tool available at the time of the study was the City of Renton 2015 EMME Travel Model. The City's model was recently completed in May 2010 and calibrated to 2008 existing conditions. The model contained the most up to date information on land use forecasts for the study area, the City of Renton, and surrounding vicinity, and evaluated future networks with and without I-405 Improvements.

Model Refinement and Manual Forecast Adjustments

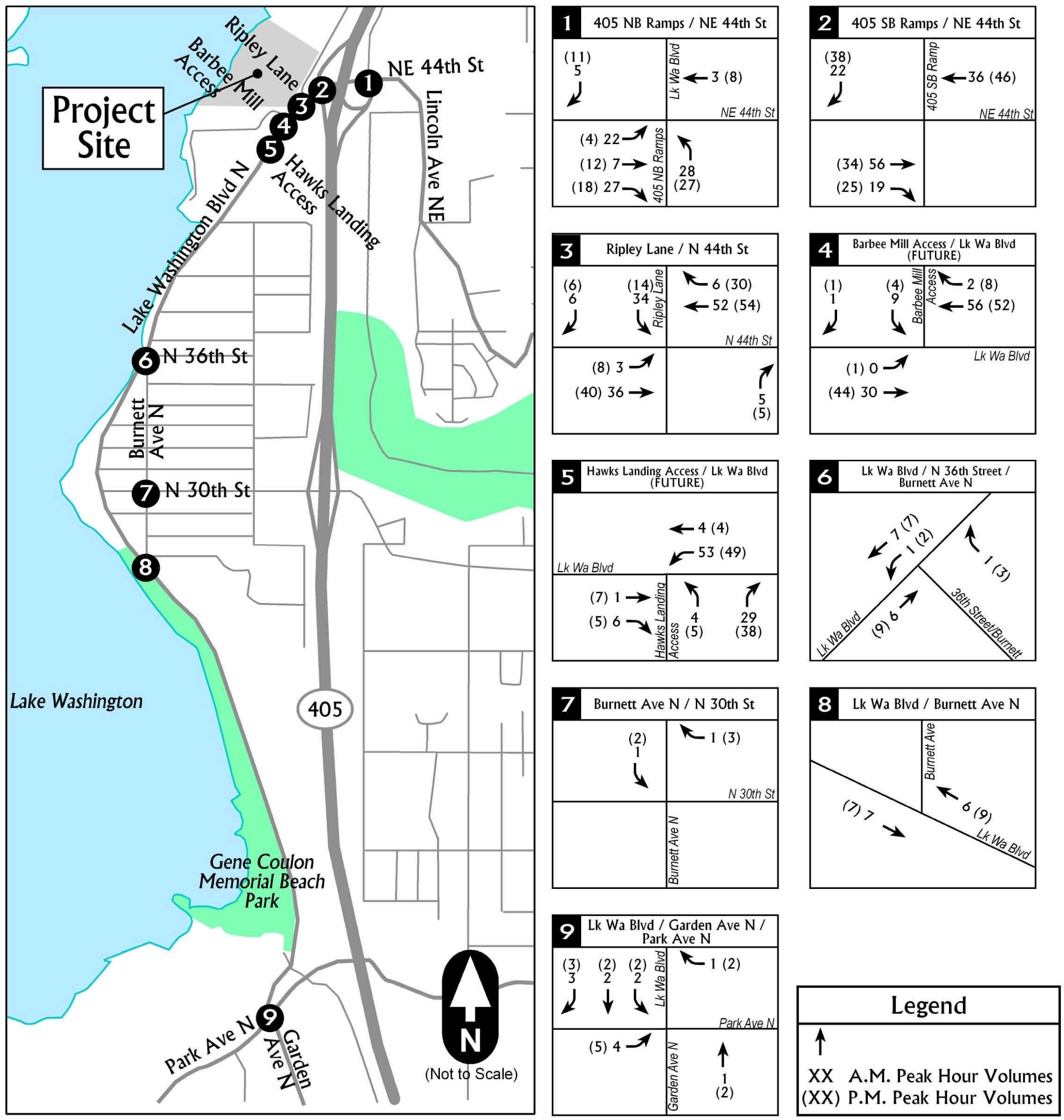
Two future year forecast scenarios were reviewed by TENW as generated by the City of Renton 2015 EMME Travel Model. The specific transportation analysis zone (TAZ) for *Quendall Terminals* within the City's EMME model accounted for a majority of trips assigned to the roadway network. This TAZ consisted of the following future development projects that are planned or in the pipeline:

- Quendall Terminals,
- Barbee Mill,
- Hawks Landing, and
- Other vicinity background traffic growth.

Note: The background growth accounted for 15 percent of all trips assigned to this TAZ (which assumes a 2 to 3 percent annual background growth rate between 2009/2010 to 2015).

Under both future scenarios (with and without the I-405 Improvement projects), all trips from the City's EMME model were removed from the roadway network except for trips under the Without I-405 Improvements scenario, which assumed the 15 percent background growth. Turning movements for project trips from Barbee Mill and Hawks Landing were added back into the roadway network at each off-site study intersection under both future scenarios to determine 2015 baseline forecasts as projected in original traffic studies prepared for these entitled developments. **Figures 6 and 7** illustrate the trip distribution assumptions associated with this new pipeline development without and with I-405 Improvements.

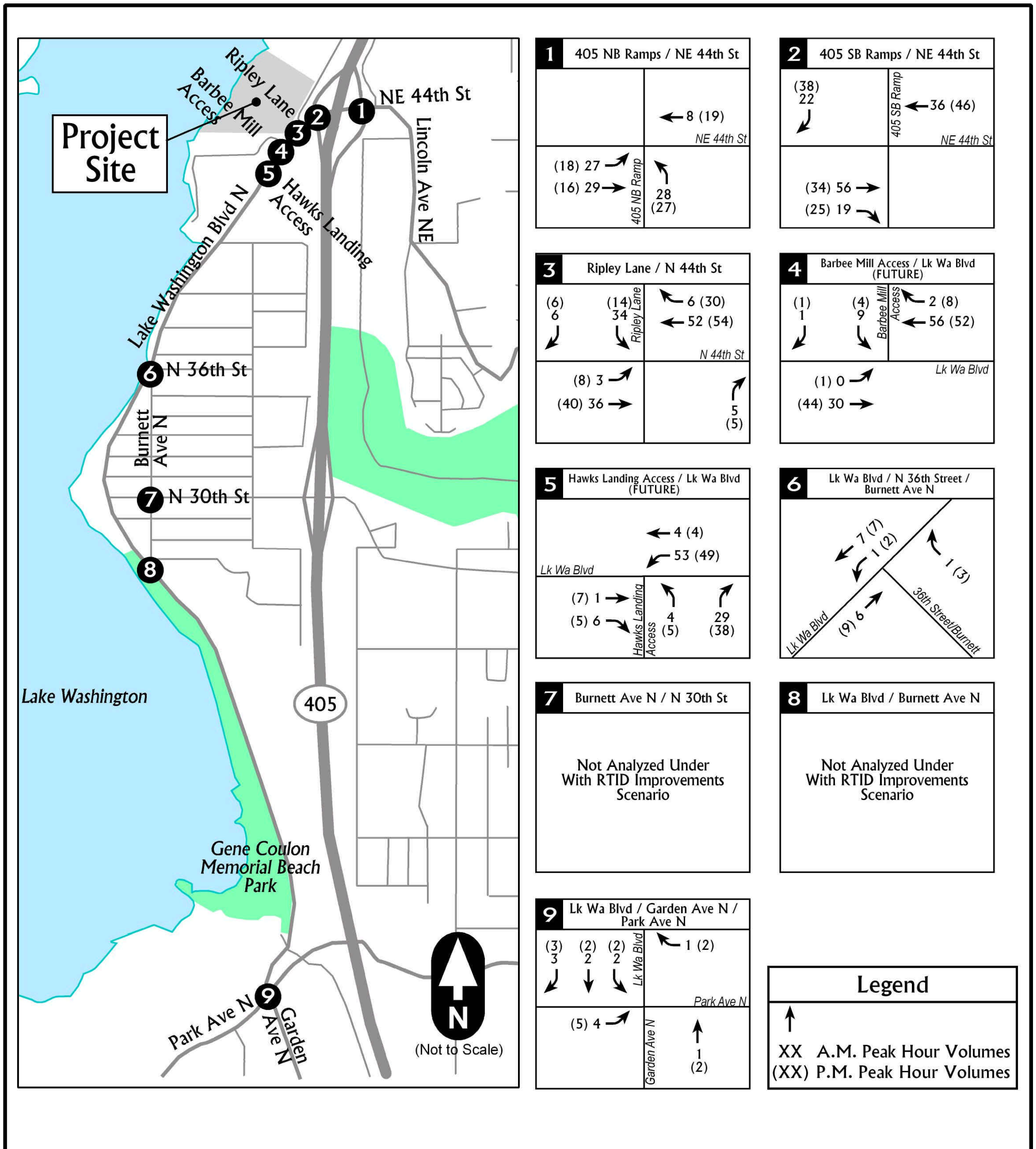
For *Quendall Terminals*, existing turning movement counts conducted at all off-site study intersections during p.m. peak hours were used as "existing 2009 or 2010 conditions." Comparing the 2008 and 2015 assignments from the City's EMME model assuming two future network scenarios (Without and With Regional I-405 Improvements), Fratar approximation factors were developed, applied, and calibrated into a Fratar spreadsheet model. The Fratar model was then used to adjust traffic forecasts associated with the two future networks to estimate the redistribution of future background traffic level associated with intersection and arterial improvements. 2015 baseline forecasts under the With I-405 Improvements scenario determined that a negative or stabilized growth between existing conditions and baseline forecasts with a majority of traffic utilizing I-405 and traffic diminishing or stabilizing on side streets.



Transportation Engineering NorthWest, LLC

Figure 6
Pipeline Development Peak Hour Traffic Volumes (Without I-405 Improvments)

Quendall Terminals DEIS
Renton, WA
November 22, 2010



Transportation Engineering NorthWest, LLC

Figure 7
Pipeline Development Peak Hour Traffic Volumes (With I-405 Improvments)

Quendall Terminals DEIS

Renton, WA

November 22, 2010

Given the shift in background traffic levels forecasted to occur on Lake Washington Boulevard and other vicinity arterial streets with and without I-405 Improvements, no adjustments to original traffic assignments for pipeline projects were made as regional shifts are forecast to be significant and account for any fluctuations in distribution from these minor pipeline projects.

Intersection-Level Baseline Traffic Forecasts

At the intersection level, a Fratar growth factoring process using successive approximations was used to forecast future interchange intersection turning movements[1]. First published in the 1954 *Highway Research Board Proceedings*, by Thomas J. Fratar, this forecasting distribution method is recognized by the transportation planning/engineering industry as an accepted practice and has been applied successfully on many transportation planning and engineering projects. Originally developed to distribute interzonal vehicular trips at a regional or subarea level, the process was later adapted for use in forecasting intersection turning movements. The objective of the successive approximation method is to determine the most logical distribution of vehicle trips expected through an intersection, given future conditions of regional development or redistribution of traffic related to infrastructure investment.

The procedure is not concerned with the specific techniques and processes used in regional land use and travel demand estimation, which must be prepared regardless of the method used for estimating future trip distributions through an intersection. The procedure does require that arterial-level regional or local forecasts be available to factor the relative changes in traffic entering and leaving a particular intersection or interchange system in a future forecast year.

Steps used to estimate the distribution of forecast trips include the following:

1. Identify relative growth factors between existing and future year conditions for all entering and exiting approaches of an intersection.
2. Distribute the total trips from each entering/exiting approach among the various movements in proportion to the attractiveness of each movement as indicated by variations in growth factors of each intersection leg.
3. The first distribution step produces two tentative results for each intersection turning movement. These tentative pairs are averaged to obtain the first approximation.
4. For each intersection approach, the sum of the first approximation volume is divided into the total volume of each intersection leg to obtain a first approximation growth factor, which will be used in the computation of a second approximation process.
5. The original movements for each intersection leg are then distributed into turning movements again in proportion to the turning movements and growth factors obtained in the first approximation process. These volumes are then averaged again, and the process is repeated until conformity or an intersection balance is reached often around 3 or 4 successive distribution estimations are completed. However, to ensure uniformity, the spreadsheet model developed to forecast turning movements uses 10 successive distribution runs prior to generation of a final turning movement estimate.

The resultant a.m. and p.m. peak hour turning movement forecasts at all study intersections in 2015 are provided in **Appendix B**.

[1] *Forecasting Distribution of Interzonal Vehicular Trips by Successive Approximations*, Highway Research Board Proceedings, Thomas J, Fratar, 1954, pages 376-384.

Trip Generation of Development

Project trip generation was estimated for Alternative 1 and Alternative 2. Trip generation rates compiled by the Institute of Transportation Engineers (ITE) *Trip Generation*, 8th Edition, 2008, were used to estimate daily, a.m. and p.m. peak hour vehicular trip generation with redevelopment of the site. In response to scoping comments, the City requested that trip rates generated by residential uses be factored by 10 percent to account for no existing public transit services or commercial businesses in the immediate site vicinity. As such, the trip generation assumptions presented below should be considered conservative.

In addition, average pass-by rates for the proposed retail uses identified in the ITE *Trip Generation Handbook 2nd Edition*, June 2004 were used. Reductions from the gross trip generation of the proposed uses were taken to account for internal captured trips within the site. Internal trips are made by people making multiple stops within a development without generating new trips onto the adjacent street system. The internal trip reductions were based on the methodology established in the ITE *Trip Generation Handbook*. Specific assumptions and methodologies for each build alternative are summarized below.

2015 Alternative 1 –The Application

2015 Alternative 1 (The Application) would include the construction of 800 multifamily units, 21,600 square feet of retail, 245,000 square feet of office, 9,000 square feet of restaurant space and parking for 2,171 vehicles. For trip generation estimation, the proposed multifamily residential units would likely include both rental apartments and condominiums. As the breakdown of these units is unknown at this time, the trip generation rate associated with Apartments was used as this represents a conservative trip generation rate. As such, average trip rates for Apartments (ITE land use code 220), Shopping Center (ITE land use code 820), General Office Building (ITE Land use code 710), and High-Turnover (Sit-Down) Restaurant were used as the basis for estimating vehicular trips.

As shown in **Table 3**, a net total of approximately 9,000 daily, 865 a.m. peak hour (445 entering, 420 exiting), and 950 p.m. peak hour vehicular trips (440 entering and 510 exiting) would be generated at 2015 full buildout conditions under Alternative 1.

Table 3: 2015 Alternative 1 (The Application) Project Trip Generation

Land Use	ITE Land Use Code [1]	Size [2]	A.M. Peak			P.M. Peak			Daily Trip Generation
			Enter	Exit	Total	Enter	Exit	Total	
Apartments	220	800 DU	82	326	408	322	174	496	5,320
10% Factor on Residential Uses			*8*	*32*	*40*	*32*	*16*	*48*	*536*
Retail	820	21,600 square feet GLA	13	9	22	40	41	81	928
Office	710	245,000 square feet GFA	334	46	380	62	303	365	2,697
Restaurant	932	9,000 square feet GFA	54	50	104	59	41	100	1,144
2015 Full Buildout Gross Trip Generation			**491**	**463**	**954**	**515**	**575**	**1,090**	**10,625**
Less Internal Trips [3]			*-22*	*-22*	*-44*	*-45*	*-45*	*-90*	*-1,152*
Less Pass-By Trips [3]			*-24*	*-20*	*-44*	*-28*	*-21*	*-49*	*-491*
2015 Full Buildout Net Trip Generation			**445**	**421**	**866**	**442**	**509**	**951**	**8,982**

1. Trip rates based on ITE *Trip Generation Manual*, 8th Edition, 2008.
2. DU is Dwelling Unit, GFA is Gross Floor Area, and GLA is Gross Leasable Area.
3. Internal and pass-by determined based upon documented average rates from ITE Trip Generation Handbook, June 2004.

2015 Alternative 2 – Lower Density Alternative

2015 Alternative 2 (Lower Density Alternative) would include the construction of 708 multifamily units, 21,600 square feet of retail, 9,000 square feet of restaurant space and parking for 1,362 vehicles. Average trip rates for Apartments (ITE land use code 220), Shopping Center (ITE land use code 820), and High-Turnover (Sit-Down) Restaurant were used as the basis for estimating vehicular trips.

As shown in **Table 4**, a net total of approximately 5,800 daily, 445 a.m. peak hour (105 entering, 340 exiting), and 540 p.m. peak hour vehicular trips (350 entering and 190 exiting) would be generated at 2015 full buildout conditions under Alternative 2.

Table 4: 2015 Alternative 2 (Lower Density Alternative) Project Trip Generation

Land Use	ITE Land Use Code [1]	Size [2]	A.M. Peak			P.M. Peak			Daily Trip Generation
			Enter	Exit	Total	Enter	Exit	Total	
Apartments	220	708 DU	72	289	361	285	154	439	4,708
10% Factor on Residential Uses			*7*	*28*	*35*	*28*	*14*	*42*	*475*
Retail	820	21,600 square feet GLA	13	9	22	40	41	81	928
Restaurant	932	9,000 square feet GFA	54	50	104	59	41	100	1,144
2015 Partial Buildout Gross Trip Generation			**146**	**376**	**522**	**412**	**250**	**662**	**7,255**
Less Internal Trips [3]			*-18*	*-18*	*-36*	*-35*	*-35*	*-70*	*-952*
Less Pass-By Trips [3]			*-23*	*-20*	*-43*	*-29*	*-22*	*-51*	*-519*
2015 Partial Buildout Net Trip Generation			**105**	**338**	**443**	**348**	**193**	**541**	**5,784**

1. Trip rates based on ITE *Trip Generation Manual*, 8th Edition, 2008.
2. DU is Dwelling Unit, GFA is Gross Floor Area, and GLA is Gross Leasable Area.
3. Internal and pass-by determined based upon documented average rates from ITE Trip Generation Handbook, June 2004.

2015 Alternative 3 – No Action Alternative Trip Generation

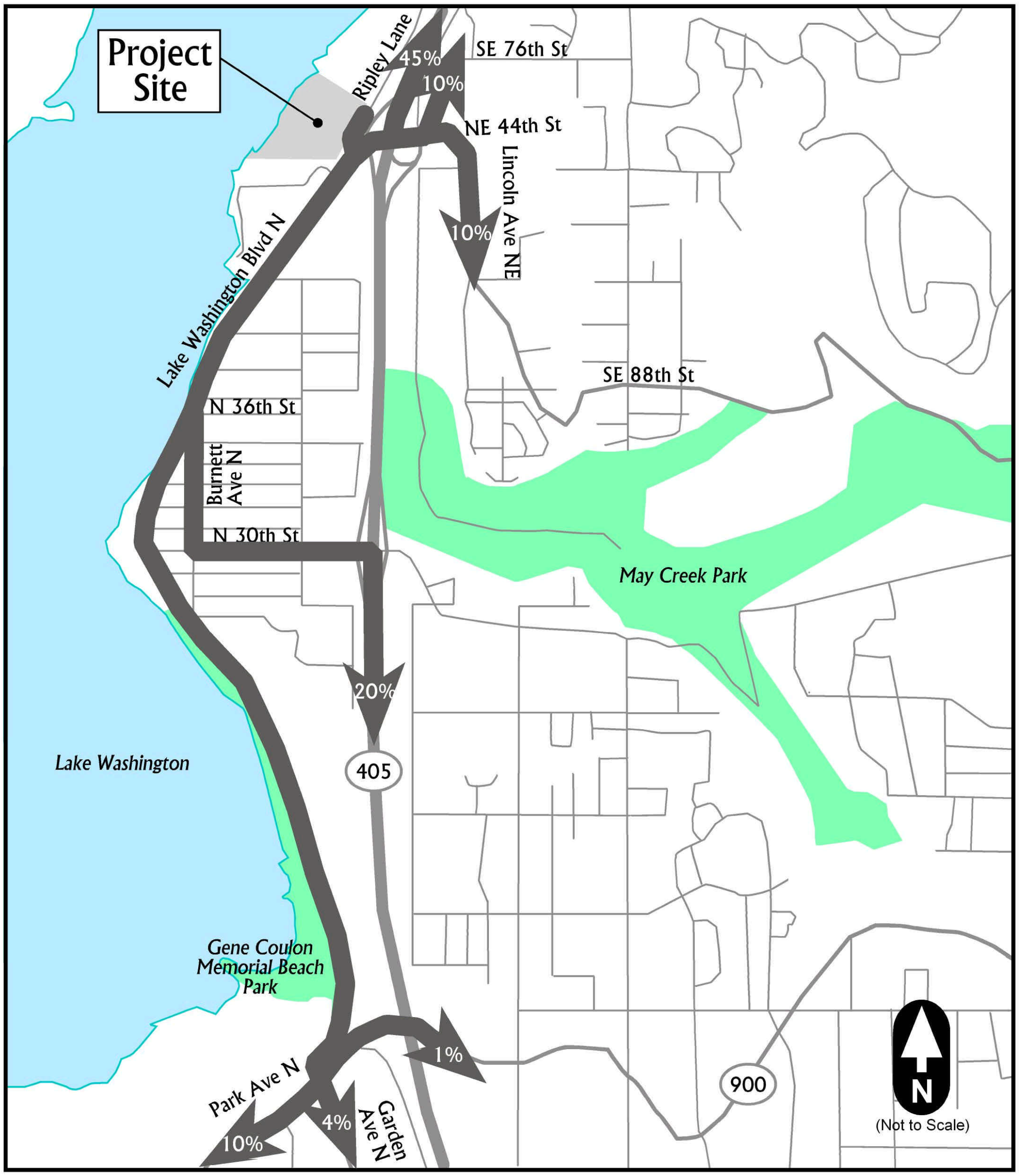
Alternative 3 (No Action) assumes no new development on the site would occur. No trip generation adjustments or assumptions were made for Alternative 3. Alternative 3 reflects the 2015 No Action Baseline Condition.

Trip Distribution and Assignment

For the 2015 Alternative 1 without I-405 Improvements, project trip distribution was based upon a review of a select zone assignment from the City of Renton EMME Model. Thus, peak hour traffic volumes generated by Alternative 1 would be generally distributed as follows (distribution shown in **Figure 8** and project-generated trip assignments shown in **Figure 9**):

- 20 percent to the south on I-405 via Lake Washington Blvd, Burnett Ave N, N 30th Street.
- 45 percent to the north on I-405 via NE 44th Street
- 15 percent to the south on Lake Washington Blvd (south of Burnett Ave N).
- 10 percent to the north on Lake Washington Blvd (north of NE 44th Street)
- 10 percent to the east via Lincoln Ave NE.

Given significant freeway/interchange congestion forecasted at the I-405/NE 44th Street interchange without I-405 Improvements, traffic assignments to/from the south of the site are not forecasted to utilize the adjacent interchange instead access I-405 at NE 30th Street and travel on other parallel corridors.



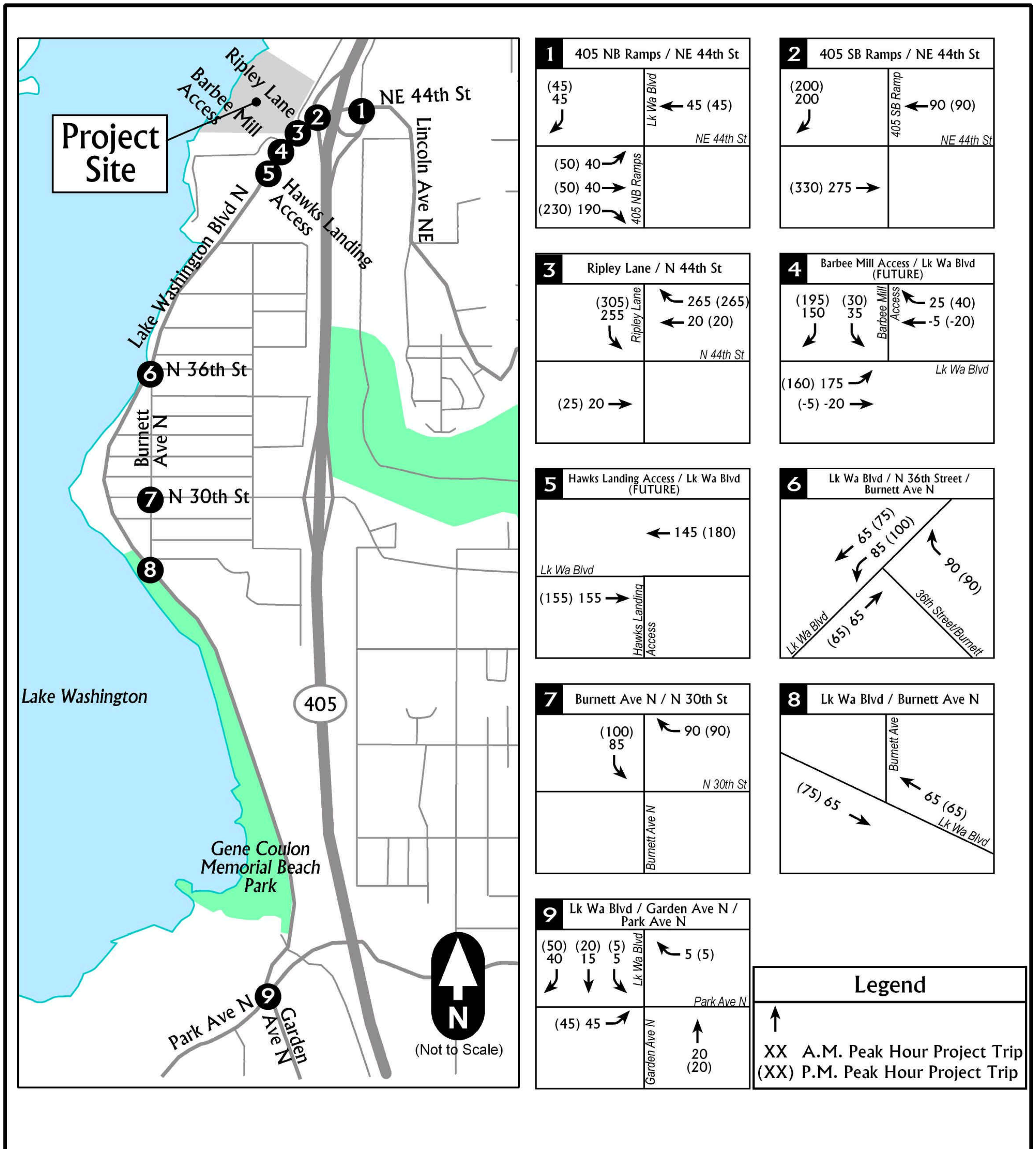
Transportation Engineering NorthWest, LLC

Figure 8
Project Trip Distribution Without I-405 Improvements

Quendall Terminals DEIS

Renton, WA

November 22, 2010



Transportation Engineering NorthWest, LLC

Figure 9
Project Trip Assignment (Without I-405 Improvments)

Quendall Terminals DEIS

Renton, WA

November 22, 2010

For the 2015 Alternative 1 with I-405 Improvements, trip distribution was also based upon a review of a select zone assignment from the City of Renton EMME Travel Demand Model. With I-405 improvements, significant congestion relief is forecasted to occur on I-405 and parallel routes, shifting site-generated traffic back onto the I-405 corridor and the NE 44th Street interchange. Previous diversions of site-generated traffic to both parallel north-south arterials and corridors east of the freeway are reduced to only those origin-destination pairs estimated to occur to the Coal Creek Parkway corridor, Newcastle, and east Renton. Thus, peak hour traffic volumes generated by Alternative 1 would be generally distributed as follows (distribution shown in **Figure 10** and peak hour project-generated trip assignment shown in **Figure 11**):

- 30 percent to the south on I-405 via NE 44th Street.
- 45 percent to the north on I-405 via NE 44th Street.
- 15 percent to the south on Lake Washington Blvd (south of project site).
- 5 percent to the north on Lake Washington Blvd (north of NE 44th Street).
- 5 percent to the east via Lincoln Ave NE.

As a result of the above-described trip distribution, Intersection #7 - N 30th Street/Burnett Avenue N and #8 - Lake Washington Boulevard/Burnett Avenue are analyzed for the "Without I-405 Improvements" scenario.

Intersection Level of Service Impacts

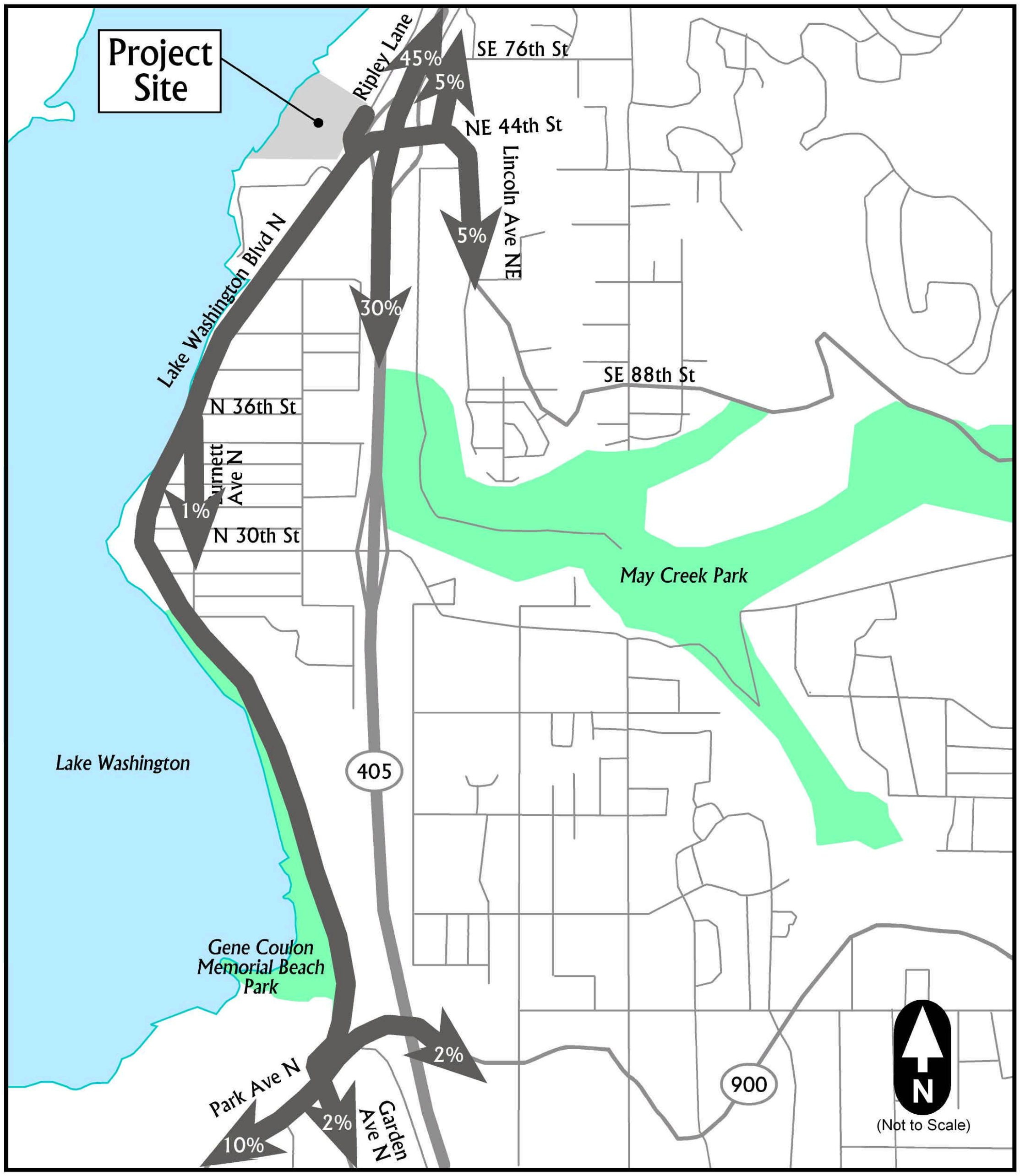
This section summarizes level of service impacts under Alternative 1 (The Application) and the Baseline Condition (No Action Alternative). In addition, a sensitivity analysis was conducted under Alternative 2 (Lower Density Alternative) to determine if under reduced development different transportation improvements were needed. Given existing and future baseline transportation needs of the I-405/NE 44th Street interchange and vicinity (i.e., limited infrastructure to support new development), baseline transportation improvements and mitigation needs of site development under either Alternative would be the same.

Alternative 1 (The Application) LOS Impacts

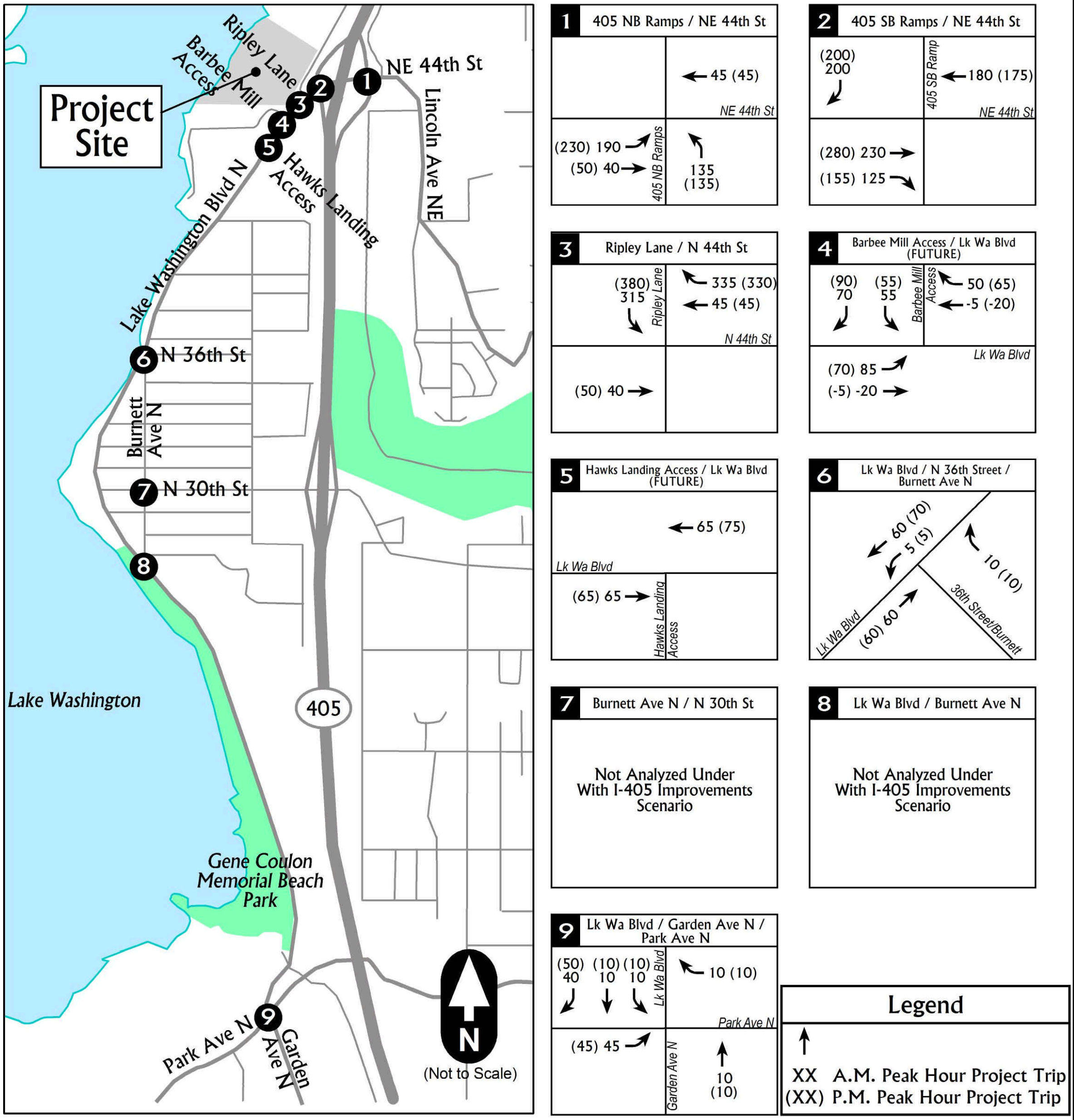
Table 5 summarizes level of service impacts under 2015 Alternative 1 without I-405 improvements. **Figures 12** and **13** summarize peak hour traffic volumes without (Baseline/No Action) and with the The Application (Alternative 1) in 2015 without I-405 improvements used in the LOS analysis. The following four intersections are expected to operate at LOS E/F under 2015 conditions without I-405 improvements:

- Intersection #1 – Lake Washington Blvd (I-405 NB Ramps) at NE 44th Street (LOS F with or without the development during a.m. and p.m. peak hours).
- Intersection #2 – I-405 SB Ramps) at NE 44th Street (southbound movement at LOS F with or without the development during a.m. and p.m. peak hours).
- Intersection #3 – Ripley Lane / Lake Washington Blvd (southbound movement: LOS E/F with or without the project during the a.m. peak hour, LOS F with the project only during the p.m. peak hour).
- Intersection #9 – Lake Washington Blvd (Garden Ave) at Park Ave N (LOS F with or without the development during the p.m. peak hour).

Detailed level of service summary sheets are provided in **Appendix A** for all 2015 scenarios.



Transportation Engineering NorthWest, LLC	Figure 10 Project Trip Distribution With I-405 Improvements	Quendall Terminals DEIS Renton, WA November 22, 2010



Transportation Engineering NorthWest, LLC

Figure 11
Project Trip Assignment (With I-405 Improvments)

Quendall Terminals DEIS

Renton, WA

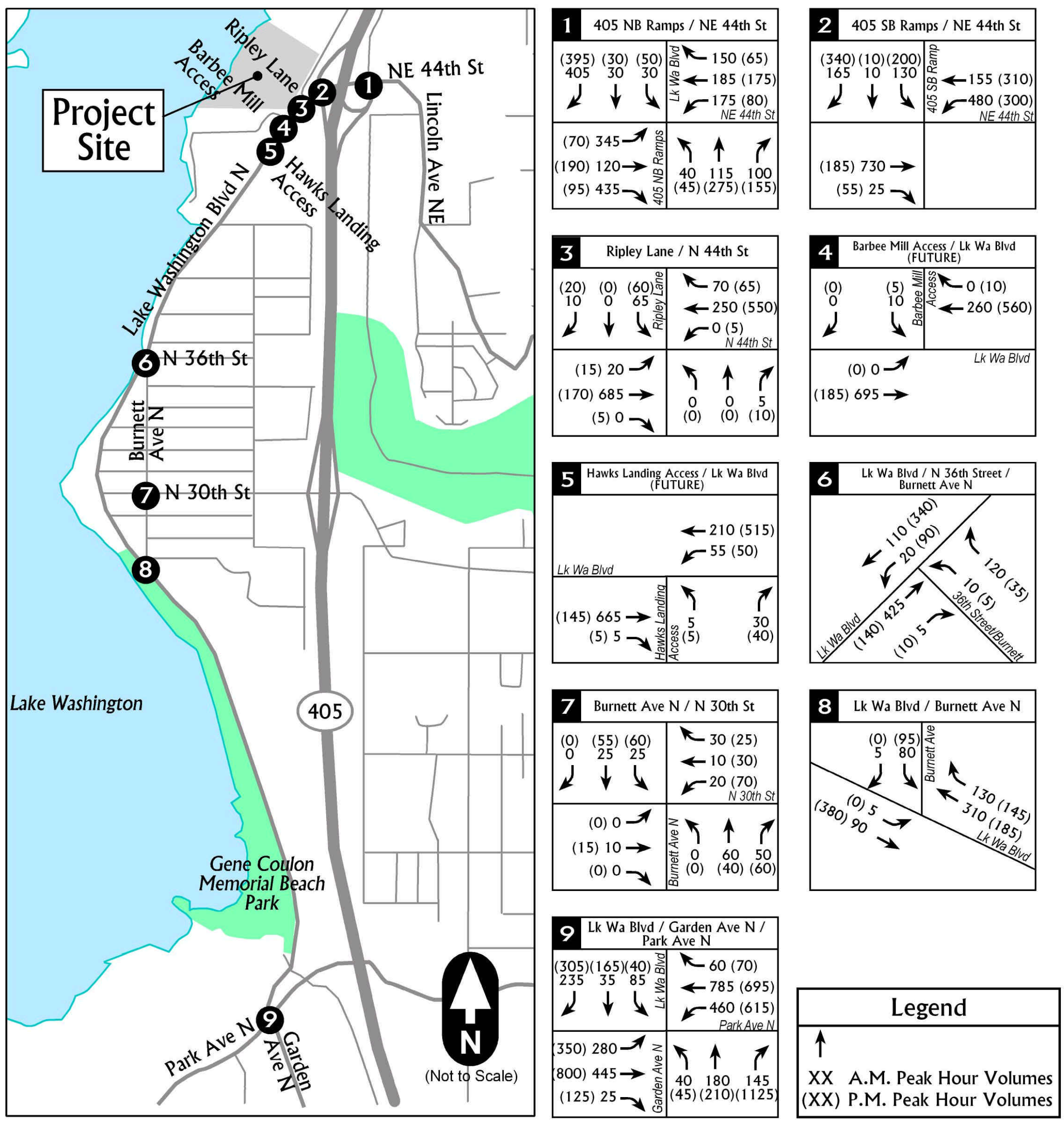
November 22, 2010

Table 5: 2015 Intersection Level of Service Impacts with Alternative 1 (Without I-405 Improvements)

Int.#	Intersection	2015 Without Project (Baseline/No Action)			2015 With Alternative 1 (The Application)		
		LOS	Delay	V/C	LOS	Delay	V/C
A.M. Peak Hour							
Unsignalized Intersections							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	F	86	-	F	>100	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	7.55	SB-F	>100	23.9
3	Ripley Lane/NE 44th Street	SB-E	36	0.42	SB-F	>100	2.69
4	Lake Wa Blvd/Barbee Mill Access	SB-C	20	0.04	SB-D	28	0.59
5	Lake Wa Blvd/Hawks Landing Access	NB-C	16	0.10	NB-C	19	0.13
6	Lk Wa Blvd/N 36th Street	B	12	-	C	18	-
7	N 30th Street/Burnett Ave N	A	8	-	A	8	-
8	Lk Wa Blvd/Burnett Ave N	B	11	-	B	13	-
Signalized Intersection							
9	Lake Wa Blvd-Garden Ave N/Park Ave N	D	38	0.81	D	46	0.88
P.M. Peak Hour							
Unsignalized Intersections							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	F	53	-	F	>100	-
2	I-405 SB Ramps/NE 44th Street	SB-F	>100	1.74	SB-F	>100	3.97
3	Ripley Lane/NE 44th Street	SB-C	20	0.26	SB-F	>100	1.84
4	Lake Wa Blvd/Barbee Mill Access	SB-B	15	0.01	SB-C	25	0.57
5	Lake Wa Blvd/Hawks Landing Access	NB-B	10	0.06	NB-B	12	0.08
6	Lk Wa Blvd/N 36th Street	B	11	-	C	21	-
7	N 30th Street/Burnett Ave N	A	8	-	A	9	-
8	Lk Wa Blvd/Burnett Ave N	B	12	-	B	14	-
Signalized Intersection							
9	Lake Wa Blvd-Garden Ave N/Park Ave N	F	171	1.41	F	176	1.44

Notes:

1. Analysis based on Synchro results using HCM 2000 control delays and LOS with optimized phasing/ timing systems for signalized intersections.
2. Lake Washington Blvd and NE 44th Street assumed to be east-west.



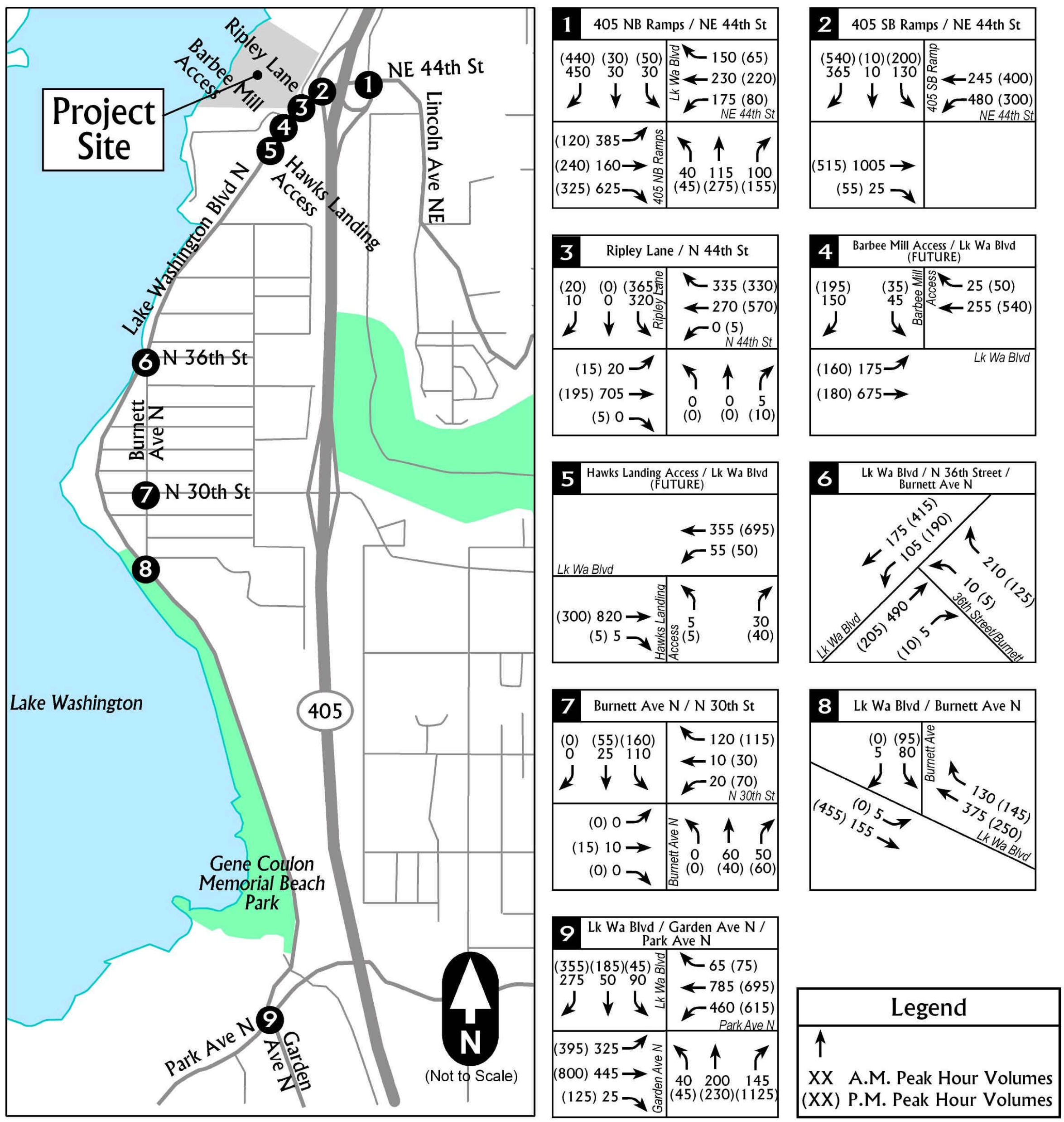
Transportation Engineering NorthWest, LLC

Figure 12
2015 Baseline/No Action Peak Hour Traffic Volumes (Without I-405 Improvements)

Quendall Terminals DEIS

Renton, WA

November 22, 2010



Transportation Engineering NorthWest, LLC

Figure 13
2015 Alternative 1 Peak Hour Traffic Volumes (Without I-405 Improvements)

Quendall Terminals DEIS
Renton, WA
November 22, 2010

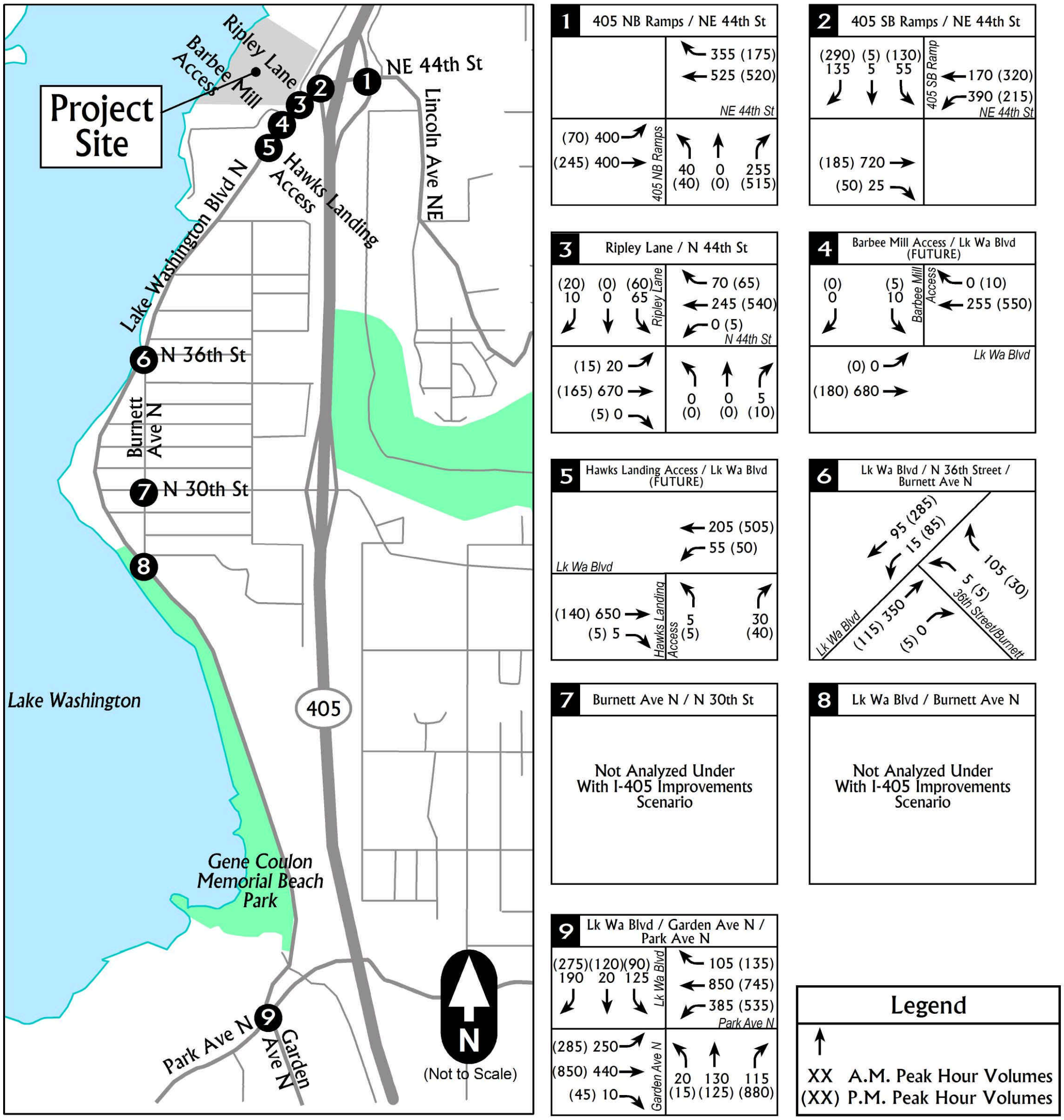
Table 6 summarizes level of service impacts under 2015 full buildout conditions with I-405 Improvements. **Figures 14** and **15** summarize peak hour traffic volumes used in the LOS analysis without and with the proposed development in 2015 with I-405 Improvements. The following intersection is expected to operate at LOS E/F under 2015 conditions:

- Intersection #9 – Lake Washington Blvd (Garden Ave) at Park Ave N (LOS F during the p.m. peak hour with or without the development).

Table 6: 2015 Intersection Level of Service Impacts With Alternative 1 With I-405 Improvements

Int.#	Intersection	2015 Without Project (Baseline/No Action)			2015 With Alternative 1 (The Application)		
		LOS	Delay	V/C	LOS	Delay	V/C
A.M. Peak Hour							
Unsignalized Intersections							
4	Lake Wa Blvd/Barbee Mill Access	SB-C	16	0.02	SB-D	32	0.53
5	Lake Wa Blvd/Hawks Landing Access	NB-C	21	0.02	NB-D	25	0.03
6	Lk Wa Blvd/N 36th Street	A	10	-	B	11	-
7	N 30th Street/Burnett Ave N	Not Analyzed Under With I-405 Improvements Scenario					
8	Lk Wa Blvd/Burnett Ave N						
Signalized Intersection							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	A	10	0.40	B	14	0.57
2	I-405 SB Ramps/NE 44th Street	B	13	0.38	C	27	0.50
3	Ripley Lane/NE 44th Street	B	20	0.61	D	49	0.88
9	Lake Wa Blvd-Garden Ave N/Park Ave N	C	30	0.77	D	40	0.82
P.M. Peak Hour							
Unsignalized Intersections							
4	Lake Wa Blvd/Barbee Mill Access	SB-C	16	0.02	SB-D	29	0.52
5	Lake Wa Blvd/Hawks Landing Access	NB-C	17	0.02	NB-C	22	0.02
6	Lk Wa Blvd/N 36th Street	A	10	-	B	11	-
7	N 30th Street/Burnett Ave N	Not Analyzed Under With I-405 IMPROVEMENTS Scenario					
8	Lk Wa Blvd/Burnett Ave N						
Signalized Intersection							
1	Lake Wa Blvd (I-405 NB Ramps)/NE 44th St	B	13	0.21	B	16	0.40
2	I-405 SB Ramps/NE 44th Street	B	12	0.19	B	18	0.44
3	Ripley Lane/NE 44th Street	B	14	0.48	C	27	0.79
9	Lake Wa Blvd-Garden Ave N/Park Ave N	F	106	1.16	F	110	1.18

Notes:
1. Analysis based on Synchro results using HCM 2000 control delays and LOS with optimized phasing/ timing systems for signalized intersections.
2. Lake Washington Blvd and NE 44th Street assumed to be east-west.



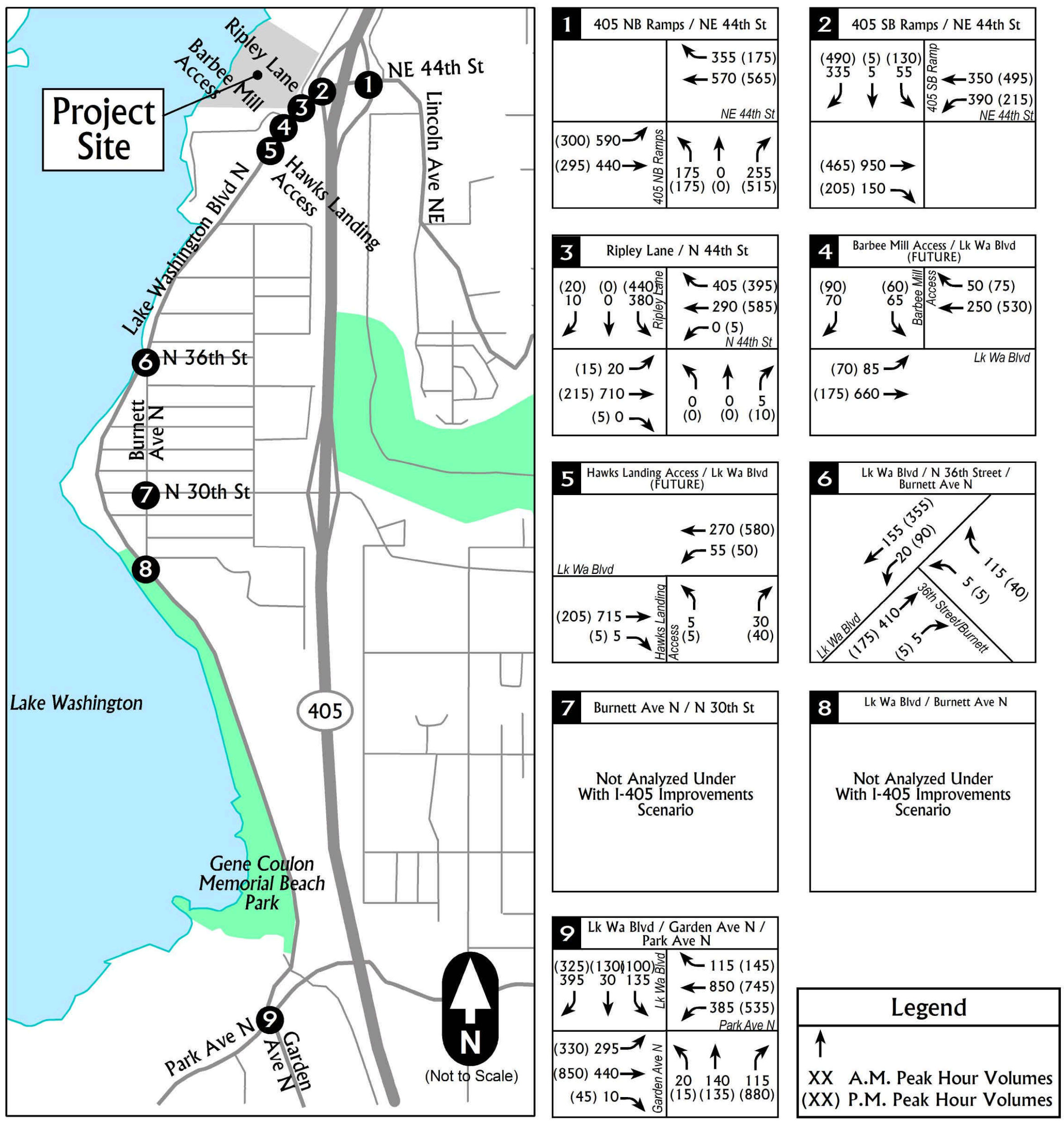
Transportation Engineering NorthWest, LLC

Figure 14
2015 Baseline/No Action Peak Hour Traffic Volumes (With I-405 Improvements)

Quendall Terminals DEIS

Renton, WA

November 22, 2010



Transportation Engineering NorthWest, LLC

Figure 15
2015 Alternative 1 Peak Hour Traffic Volumes (With I-405 Improvements)

Quendall Terminals DEIS
Renton, WA
November 22, 2010

Queuing Analysis

A queuing analysis was completed along Lake Washington Boulevard between the I-405 SB ramps (Intersection #2) and the proposed Hawks Landing site access (Intersection #5). The queue analysis included 2015 conditions with Alternative #1 (The Application) for both with and without I-405 Improvements. The reported queue lengths are 95th percentile queues (queuing conditions that cover 95 percent of reported conditions) based on results from the *Synchro 6* and *HCS 2000* traffic software packages. The following **Tables (7** and **8)** summarize 2015 queues without and with I-405 Improvements.

As shown in **Table 7**, excessive southbound queues (in the range of 700 to 800 feet that would block key site access intersections) are expected at the stop controlled Ripley Lane intersection under the without I-405 Improvements scenario during the a.m. and p.m. peak hours. However, no queuing conflicts are expected on Lake Washington Boulevard.

Table 7: 2015 Queues Without I-405 Improvements - Alternative 1 (The Application)

		95th Percentile Queue (ft)	
Intersection	**Movement**	**AM**	**PM**
Ripley Lane / Lake Washington Blvd.			
	EB Left	25	25
	SB Left/Right	700	800
Barbee Mill Access (NE 43rd St) / Lake Washington Blvd.			
	EB Left	25	25
	SB Thru	100	75
Hawks Landing Access / Lake Washington Blvd.			
	WB Left	25	25

As shown in **Table 8**, with I-405 Improvements excessive southbound queues would still be expected at the Ripley Lane intersection (signalized) during the a.m. and p.m. peak hours. In addition, queues on Lake Washington Blvd at the Ripley Lane intersection are expected to extend beyond adjacent intersections.

Table 8: 2015 Queues With I-405 Improvements - Alternative 1 (The Application)

		95th Percentile Queue (ft)	
Intersection	**Movement**	**AM**	**PM**
I-405 SB Ramps / Lake Washington Blvd.			
	EB Thru	100	100
Ripley Lane / Lake Washington Blvd.			
	EB Left	25	25
	EB Thru	625	125
	WB Thru	100	425
	WB Rt	350	25
	SB Left/Right	425	375
Barbee Mill Access (NE 43rd St) / Lake Washington Blvd.			
	EB Left	25	25
	SB Thru	50	50
Hawks Landing Access / Lake Washington Blvd.			
	WB Left	25	25

Site Access and Circulation

Vehicular access to the *Quendall Terminals* site would be provided via a new access drive onto Ripley Lane and the extension of NE 43rd Street (existing Barbee Mill access). As part of the site access and circulation analysis, the two intersections on Lake Washington Boulevard that would provide access to the site (Barbee Mill Access (N 43rd Street) and Ripley Lane) were analyzed in terms of LOS and queuing. The analysis assumed two scenarios: without and with I-405 Improvements.

2015 Without I-405 Improvements Operations/Queuing

The without I-405 Improvements scenario assumed existing channelization at both the Ripley Lane/Lake Washington Blvd and the Barbee Mill access (NE 43rd Street)/Lake Washington Boulevard intersections.

Intersection #3 - Ripley Lane/Lake Washington Blvd

Under the Alternative 1 (The Application) scenario, the site access intersection of #3 – Ripley Lane at Lake Washington Blvd, the 95th percentile queue for the southbound left/right movements are estimated at approximately 700 to 800 feet during the a.m. and p.m. peak hours. Queues on Lake Washington Boulevard for vehicles entering the site are not expected to conflict with adjacent intersections. The LOS for the stop controlled southbound approach is expected to be LOS F.

Intersection #4 – Barbee Mill Access (N 43rd Street)/Lake Washington Blvd

Under the Alternative 1 (The Application) scenario, the site access intersection of #4 – Barbee Mill Access (NE 43rd Street) at Lake Washington Blvd, the 95th percentile queue for the southbound through movement is estimated at approximately 75 to 100 feet during the a.m. and p.m. peak hours. The LOS for the stop controlled southbound movement is expected to be LOS C/D. This determination is predicated on the assumption that balance for left turn demand from the site would occur between this egress and the signalized intersection at Ripley Lane onto Lake Washington Boulevard. Restriction of left turns from this driveway may be necessary to force all demand to I-405 leaving the site to exit via the Ripley Lane signalized intersection with Lake Washington Boulevard.

Queues on Lake Washington Boulevard for vehicles entering the site are not forecasted to conflict with adjacent intersections; however, given demand for northbound left turns from Lake Washington Boulevard into the Barbee Mill Access (NE 43rd Street), a separate left turn lane would be warranted for safety reasons. Given close proximity to the Hawks Landing access of roughly 125 feet south of the existing Barbee Mill Access (NE 43rd Street), a continuous two-way left turn lane would be warranted that extends from the left turn lane at Ripley Lane south of the Hawks Landing access driveway. Alternatively, the construction of additional through lanes on Lake Washington Boulevard could be installed to resolve level of service issues along this roadway segment and mitigate this conflict potential. Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (the owner of the vicinity rail right-of-way), and adjacent private development.

2015 With I-405 Improvements Operations/Queuing

Under the with I-405 Improvements scenario, the Ripley Lane/Lake Washington Blvd intersection was assumed to be signalized and the Barbee Mill access (N 43rd Street)/Lake Washington Boulevard assumed existing channelization.

Intersection #3 - Ripley Lane/Lake Washington Blvd

Under the Alternative 1 (The Application) scenario, the site access intersection of #3 – Ripley Lane at Lake Washington Blvd, the 95th percentile queue for the westbound through movement is estimated at approximately 425 feet during p.m. peak hour and the eastbound through queue is estimated to be approximately 625 feet during the a.m. peak hour. Both estimated queues on Lake Washington Blvd would likely extend through adjacent intersections. In addition, the southbound queue on Ripley Lane is estimated to be 425 feet during the a.m. peak hour and 375 feet during the p.m. peak hour. The LOS for the signalized intersection is expected to be LOS C/D.

Intersection #4 – Barbee Mill Access (NE 43rd Street)/Lake Washington Blvd

Under the Alternative 1 (The Application) scenario, the site access intersection of #4 – Barbee Mill Access (NE 43rd Street) at Lake Washington Blvd, the 95th percentile queue for the southbound through movement is estimated at approximately 50 feet during the a.m. and p.m. peak hours. The LOS for the stop controlled southbound movement is expected to be LOS D. This determination is predicated on the assumption that balance for left turn demand from the site would occur between this egress and the signalized intersection at Ripley Lane onto Lake Washington Boulevard. Restriction of left turns from this driveway may be necessary to force all demand to I-405 leaving the site to exit via the Ripley Lane unsignalized intersection with Lake Washington Boulevard.

Queues on Lake Washington Boulevard for vehicles entering the site are not forecasted to conflict with adjacent intersections; however, given demand for left turns from Lake Washington Boulevard into the Barbee Mill Access (NE 43rd Street), a separate left turn lane would be warranted for safety reasons. Given close proximity to the Hawks Landing access of roughly 125 feet south of the existing Barbee Mill Access (NE 43rd Street), a continuous two-way left turn lane would be warranted that extends from the left turn lane at Ripley Lane south of the Hawks Landing access driveway. Alternatively, the construction of additional through lanes on Lake Washington Boulevard could be installed to resolve level of service issues along this roadway segment and mitigate this conflict potential. Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (the owner of the vicinity rail right-of-way), and adjacent private development.

Public Transportation Impacts

It is assumed that the proposed development would be occupied by residents and employees who rely primarily on personal automobiles for their means of transportation, based on its location near the outer edge of the urbanized area. However, since the City of Renton is growing at a relatively rapid pace, and in order to promote a multimodal transportation network, the proponent may wish to work with King County Metro Transit and Sound Transit to provide for site amenities and access to future transit zones on Lake Washington Boulevard and at the I-

405/NE 44th Street Interchange to encourage and accommodate public transportation access. Future potential public transportation in the vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT with a flyer stop at the I-405/NE 44th Street Interchange.

Nonmotorized Transportation Impacts

Increases in population on the site would increase the use of nonmotorized facilities within the site and vicinity. Infrastructure improvements within the site would include full curbs, gutters, and sidewalks as well as frontage improvements along the west side of Lake Washington Boulevard and Ripley Lane in front of the development site. A pedestrian trail is also proposed along the shoreline that would be accessible to the public.

Parking Impacts

Table 9 summarizes minimum off-street parking requirements based on City of Renton Municipal Code for the proposed mix of land uses. As shown, a total of 2,153 stalls and 1,362 stalls, respectively, under Alternatives 1 and 2 would be required under City code. Given proposed construction of 2,171 and 1,362 stalls, respectively, proposed parking supply by the applicant would meet minimum City code.

Table 9: Parking Code Requirements

Land Use	Size	Code Rate	Required Off-Street Parking (stalls)
Alternative 1			
Retail	21,600 sf	4 stalls/1,000 sf	87
Multifamily Residential	800 units	1.75 stalls/DU	1,400
Restaurant	9,000 sf	4 stalls/1,000 sf	36
Office[1]	210,000	3 stalls/1,000 sf (net)	630
		Total	**2,153 stalls**
		Proposed	2,171 stalls
		Surplus/(Deficit)	+18 stalls
Alternative 2			
Retail	21,600 sf	4 stalls/1,000 sf	87
Multifamily Residential	708 units	1.75 stalls/DU	1,239
Restaurant	9,000 sf	4 stalls/1,000 sf	36
		Total	**1,362 stalls**
		Proposed	1,362 stalls
		Surplus/(Deficit)	0 stalls

DU – Dwelling unit.
sf – square- feet.
1 – Parking code requirements for office is based on net leasable area not gross square footage of Office use.

In addition to review of minimum City code requirements, a parking demand analysis was completed of Alternative 1 using ITE's *Parking Generation, 3rd Edition*, (2004). As shown in **Appendix C**, peak demand for parking on-site is estimated at 2,107 stalls on a typical weekday and 1,251 stalls on a typical weekend assuming all uses have peak demands at the same time. Parking demand for each land use however, typically peaks at different times throughout the day. For example, peak demand for residential parking occurs during overnight hours when most residents are on-site, while other daytime uses can peak at various times throughout daylight hours (proposed commercial uses typically all peak around noon on a typical day). As such, shared parking could occur between residential and commercial uses resulting in parking demand between 350 stalls and 281 stalls less on a typical weekday and weekend day, respectively. This demand would range between 20 percent and 55 percent less than proposed supply on a weekday and weekend day, respectively. Similar parking relationships would occur under the Alternative 2 buildout scenario.

MITIGATION MEASURES

The analysis conducted for the EIS studied vehicular trip generation, impacts on levels of service at nine off-site study intersections, public transportation services, nonmotorized transportation facilities, and site access, safety, and circulation issues. The following measures have been identified in order to mitigate project traffic impacts to the vicinity arterial roadway network and provide adequate levels of circulation and mobility to the project site:

Based upon the results of the comprehensive analysis of future intersection operations, general key findings include:

- There exists today and will be in the future a moderate to high level of background traffic that travels in the vicinity of the site area given approved and other planned pipeline projects.
- The existing transportation network with I-405 Improvements would adequately accommodate the 2015 full buildout development alternative; however additional transportation improvements (noted below) would be necessary. Under the without I-405 Improvements scenario, the 2015 full buildout development alternative could also be accommodated with additional transportation improvements (noted below).

Level of Service/Queuing

<u>With I-405 Improvements - 2015 Alternative 1 (The Application) or 2015 Alternative 2 (Lower Density Alternative)</u>

The following improvements (in addition to the planned I-405 Improvements) would be necessary under the 2015 Alternative 1 (The Application) or 2015 Alternative 2 (Lower Density Alternative) to mitigate off-site impacts:

- **Lake Washington Blvd (between Barbee Mill Access (NE 43rd Street) and Ripley Lane.** Extend the planned eastbound and westbound through lanes by WSDOT beyond and through the Barbee Mill Access intersection. This would result in two through lanes in each direction on Lake Washington Blvd from the I-405 interchange past the Barbee Mill Access (NE 43rd Street). Ultimately however, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (the owner of the vicinity rail right-of-way), and adjacent private development.
- **Intersection #3 – Ripley Lane / Lake Washington Blvd.** Construct a southbound left-turn lane at this signalized intersection (signal assumed as an I-405 Improvement).

<u>Without I-405 Improvements - 2015 Alternative 1 (The Application) or 2015 Alternative 2 (Lower Density Alternative)</u>

Without the planned I-405 Improvements, the following improvements would be necessary under the 2015 Alternative 1 (The Application) or 2015 Alternative 2 (Lower Density Alternative) to mitigate off-site impacts:

- **Install Traffic Signals.** Install traffic signals at the intersections of the I-405 NB and SB ramp intersections as well as at the intersection of Ripley Lane/Lake Washington Blvd.
- **Intersection #1 - I-405 NB Ramps/NE 44th Street.** Widen the southbound and northbound approaches so that a separate left turn lane and shared thru-right turn lane is provided on both legs of the intersection.
- **Intersection #3 - Ripley Lane / Lake Washington Blvd.** Widen the westbound approach to include a separate right turn-only lane.
- **Lake Washington Blvd (between Barbee Mill Access (NE 43rd Street) and I-405 SB Ramps.** Construct additional channelization improvements between the Barbee Mill Access and the I-405 SB ramps. Alternatively additional eastbound and westbound lanes could be constructed to provide addition queue storage created by the traffic signals required at the SB ramp and Ripley Lane along Lake Washington Boulevard. Ultimately, the City of Renton will determine the best configuration given ongoing coordination with WSDOT on the adjacent interchange design, the Port of Seattle (the owner of the vicinity rail right-of-way), and adjacent private development.

Appendix B contains detailed level of service worksheets of the mitigation elements outline above to meet City of Renton and WSDOT standards.

Nonmotorized/Frontage Improvements

Infrastructure improvements within the site would include full curbs, gutters, and sidewalks as well as frontage improvements along the west side of Lake Washington Boulevard and Ripley Lane in front of the development site. A pedestrian trial is also proposed along the shoreline that would be accessible to the public. Provision for safe pedestrian circulation could encourage future transit usage when planned pubic transit becomes available.

Public Transportation

Since the City of Renton is growing at a relatively rapid pace, and in order to promote a multimodal transportation network, the proponent may wish to work with King County Metro Transit and Sound Transit to provide for site amenities and access to future transit zones on Lake Washington Boulevard and at the I-405/NE 44th Street Interchange to encourage and accommodate public transportation access. Future potential public transportation in the vicinity could include Bus Rapid Transit on I-405 planned by Sound Transit and WSDOT with a flyer stop at the I-405/NE 44th Street Interchange.

Parking Impacts

Proposed parking supply would meet minimum off-street requirements per City code under either Alternative 1 or Alternative 2. Shared parking agreements between on-site uses and implementation of transportation demand management (TDM) measures (for proposed office and residential uses under the land use alternatives that were considered) have the potential to reduce parking demand during peak periods, thereby reducing the necessary parking supply.

City of Renton Impact Fees

In addition, to project specific mitigation outlined above, the project proponent would pay Transportation Impact Fees (Per Renton Resolution No. 3100) at the time of building permit issuance to contribute its proportional share towards transportation system improvement needs in Renton. As an example, the future identified level of service deficiency at the Lake Washington Boulevard/Garden Avenue N and Park Avenue N intersection would operate at LOS F with or without the project in the future. Development at *Quendall Terminals* would add only an incremental increase in traffic volume and future delay at this intersection significant intersection. Traffic impact fees paid by development would be used to proportional mitigate this project's traffic impacts at this location as well as other planned transportation improvements in the vicinity. Implementation of TDM measures could also reduce the number of vehicle trips and thus provide some benefit to improving LOS and queuing impacts at study intersections.

Significant Unavoidable Adverse Impacts

There would be no significant unavoidable adverse transportation impacts with the proposed development evaluated on the *Quendall Terminals* site. Transportation improvements identified above are expected to mitigate project traffic impacts to the vicinity arterial roadway and intersection network.

Appendix A

Intersection Level of Service Summary Sheets

Existing Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	280	110	350	165	165	140	10	95	90	30	25	345
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	318	125	398	188	188	159	11	108	102	34	28	392

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	318	523	188	188	159	222	455
Volume Left (vph)	318	0	188	0	0	11	34
Volume Right (vph)	0	398	0	0	159	102	392
Hadj (s)	0.53	-0.50	0.53	0.03	-0.67	-0.10	-0.47
Departure Headway (s)	8.8	7.7	9.1	8.6	3.2	8.4	7.2
Degree Utilization, x	0.78	1.12	0.48	0.45	0.14	0.52	0.91
Capacity (veh/h)	403	470	373	392	1121	404	485
Control Delay (s)	34.9	103.3	19.0	17.3	5.5	20.1	47.8
Approach Delay (s)	77.4		14.4			20.1	47.8
Approach LOS	F		B			C	E

Intersection Summary			
Delay	48.2		
HCM Level of Service	E		
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	665	5	390	135	0	0	0	0	55	5	115
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	782	6	459	159	0	0	0	0	65	6	135
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	159			788			1932	1862	785	1862	1865	159
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	159			788			1932	1862	785	1862	1865	159
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			45			100	100	100	0	82	85
cM capacity (veh/h)	1427			831			21	33	396	31	32	884

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	788	459	159	206
Volume Left	0	459	0	65
Volume Right	6	0	0	135
cSH	1700	831	1700	89
Volume to Capacity	0.46	0.55	0.09	2.32
Queue Length 95th (ft)	0	86	0	469
Control Delay (s)	0.0	14.5	0.0	705.5
Lane LOS		B		F
Approach Delay (s)	0.0	10.8		705.5
Approach LOS				F

Intersection Summary			
Average Delay	94.3		
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	15	635	0	0	195	65	0	0	0	30	0	5
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	18	765	0	0	235	78	0	0	0	36	0	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	313			765			1081	1114	765	1075	1075	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	313			765			1081	1114	765	1075	1075	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.1	3.4
p0 queue free %	99			100			100	100	100	81	100	99
cM capacity (veh/h)	1247			853			193	207	406	187	208	744

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	18	765	313	0	42
Volume Left	18	0	0	0	36
Volume Right	0	0	78	0	6
cSH	1247	1700	1700	1700	210
Volume to Capacity	0.01	0.45	0.18	0.00	0.20
Queue Length 95th (ft)	1	0	0	0	18
Control Delay (s)	7.9	0.0	0.0	0.0	26.4
Lane LOS	A			A	D
Approach Delay (s)	0.2		0.0	0.0	26.4
Approach LOS				A	D

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	345	2	17	89	6	106
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	421	2	21	109	7	129

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	423	129	137
Volume Left (vph)	0	21	7
Volume Right (vph)	2	0	129
Hadj (s)	0.05	0.10	-0.54
Departure Headway (s)	4.4	4.8	4.6
Degree Utilization, x	0.52	0.17	0.18
Capacity (veh/h)	784	709	693
Control Delay (s)	12.2	8.8	8.6
Approach Delay (s)	12.2	8.8	8.6
Approach LOS	B	A	A

Intersection Summary			
Delay	10.9		
HCM Level of Service	B		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	10	0	20	11	20	0	59	47	18	25	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	0	12	0	25	14	25	0	73	58	22	31	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	12	63	131	53
Volume Left (vph)	0	25	0	22
Volume Right (vph)	0	25	58	0
Hadj (s)	0.00	-0.12	-0.18	0.17
Departure Headway (s)	4.4	4.2	3.9	4.4
Degree Utilization, x	0.01	0.07	0.14	0.06
Capacity (veh/h)	784	821	886	804
Control Delay (s)	7.4	7.5	7.6	7.7
Approach Delay (s)	7.4	7.5	7.6	7.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	54	1	334	98	2	87
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	69	1	428	126	3	112

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	71	554	114
Volume Left (vph)	69	0	3
Volume Right (vph)	1	126	0
Hadj (s)	0.25	-0.09	0.04
Departure Headway (s)	5.6	4.2	4.7
Degree Utilization, x	0.11	0.64	0.15
Capacity (veh/h)	573	855	729
Control Delay (s)	9.3	14.2	8.5
Approach Delay (s)	9.3	14.2	8.5
Approach LOS	A	B	A

Intersection Summary			
Delay	12.9		
HCM Level of Service	B		
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	1687	3362		3400	3357	1427		1782	1524		1803	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	1687	3362		3400	3357	1427		1782	1524		1803	1599
Volume (vph)	279	352	8	208	718	90	12	88	55	98	15	204
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	303	383	9	226	780	98	13	96	60	107	16	222
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	190
Lane Group Flow (vph)	303	392	0	226	780	98	0	109	60	0	123	32
Heavy Vehicles (%)	7%	7%	7%	3%	3%	3%	6%	6%	6%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	15.3	24.9		9.8	19.4	68.6		8.0	9.8		9.9	9.9
Effective Green, g (s)	15.3	24.9		9.8	19.4	68.6		8.0	9.8		9.9	9.9
Actuated g/C Ratio	0.22	0.36		0.14	0.28	1.00		0.12	0.14		0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	376	1220		486	949	1427		208	218		260	231
v/s Ratio Prot	c0.18	0.12		0.07	c0.23			c0.06	0.04		c0.07	
v/s Ratio Perm						0.07						0.02
v/c Ratio	0.81	0.32		0.47	0.82	0.07		0.52	0.28		0.47	0.14
Uniform Delay, d1	25.2	15.8		27.0	23.0	0.0		28.5	26.2		27.0	25.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	11.9	0.2		0.7	5.8	0.1		2.4	0.7		1.4	0.3
Delay (s)	37.1	15.9		27.7	28.8	0.1		30.9	26.9		28.3	25.9
Level of Service	D	B		C	C	A		C	C		C	C
Approach Delay (s)		25.2			26.0			29.5			26.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	55	165	60	75	150	65	15	230	145	50	25	330
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	57	172	62	78	156	68	16	240	151	52	26	344

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	57	234	78	156	68	406	422
Volume Left (vph)	57	0	78	0	0	16	52
Volume Right (vph)	0	63	0	0	68	151	344
Hadj (s)	0.52	-0.17	0.53	0.03	-0.67	-0.20	-0.45
Departure Headway (s)	8.4	7.7	8.6	8.0	3.2	6.5	6.3
Degree Utilization, x	0.13	0.50	0.19	0.35	0.06	0.74	0.74
Capacity (veh/h)	391	424	363	392	1121	528	544
Control Delay (s)	11.5	16.9	12.3	14.1	5.2	25.8	24.9
Approach Delay (s)	15.8		11.6			25.8	24.9
Approach LOS	C		B			D	C

Intersection Summary			
Delay	20.5		
HCM Level of Service	C		
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	150	25	215	275	0	0	0	0	130	5	250
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	155	26	222	284	0	0	0	0	134	5	258
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	284			180			1026	894	168	894	907	284
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284			180			1026	894	168	894	907	284
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			84			100	100	100	42	98	66
cM capacity (veh/h)	1290			1401			123	238	882	232	234	760

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	180	222	284	397
Volume Left	0	222	0	134
Volume Right	26	0	0	258
cSH	1700	1401	1700	661
Volume to Capacity	0.11	0.16	0.17	0.60
Queue Length 95th (ft)	0	14	0	100
Control Delay (s)	0.0	8.1	0.0	22.4
Lane LOS		A		C
Approach Delay (s)	0.0	3.5		22.4
Approach LOS				C

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	125	5	5	485	35	0	0	5	45	0	15
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	5	129	5	5	500	36	0	0	5	46	0	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	536			134			686	688	131	673	673	518
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536			134			686	688	131	673	673	518
tC, single (s)	4.1			4.1			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	87	100	97
cM capacity (veh/h)	1042			1444			331	348	879	363	372	556

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	5	134	541	5	62
Volume Left	5	0	5	0	46
Volume Right	0	5	36	5	15
cSH	1042	1700	1444	879	398
Volume to Capacity	0.00	0.08	0.00	0.01	0.16
Queue Length 95th (ft)	0	0	0	0	14
Control Delay (s)	8.5	0.0	0.1	9.1	15.7
Lane LOS	A		A	A	C
Approach Delay (s)	0.3		0.1	9.1	15.7
Approach LOS				A	C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	107	7	83	280	4	25
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	113	7	87	295	4	26

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	115	5	382	31
Volume Left (vph)	0	0	87	4
Volume Right (vph)	2	5	0	26
Hadj (s)	-0.01	-0.70	0.06	-0.49
Departure Headway (s)	4.8	4.1	4.3	4.5
Degree Utilization, x	0.15	0.01	0.45	0.04
Capacity (veh/h)	733	847	827	716
Control Delay (s)	7.5	5.9	10.8	7.7
Approach Delay (s)	7.4		10.8	7.7
Approach LOS	A		B	A

Intersection Summary			
Delay	9.8		
HCM Level of Service	A		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	13	1	64	28	13	2	38	61	44	55	2
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	14	1	69	30	14	2	41	66	47	59	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	15	113	109	109
Volume Left (vph)	0	69	2	47
Volume Right (vph)	1	14	66	2
Hadj (s)	-0.04	0.05	-0.36	0.09
Departure Headway (s)	4.5	4.4	4.0	4.4
Degree Utilization, x	0.02	0.14	0.12	0.13
Capacity (veh/h)	758	764	868	779
Control Delay (s)	7.6	8.2	7.5	8.1
Approach Delay (s)	7.6	8.2	7.5	8.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.9		
HCM Level of Service	A		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	2	289	104	111	92	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	318	114	122	101	3

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	320	236	104
Volume Left (vph)	2	0	101
Volume Right (vph)	0	122	3
Hadj (s)	0.00	-0.31	0.17
Departure Headway (s)	4.4	4.2	5.3
Degree Utilization, x	0.40	0.28	0.15
Capacity (veh/h)	788	813	619
Control Delay (s)	10.3	8.9	9.3
Approach Delay (s)	10.3	8.9	9.3
Approach LOS	B	A	A

Intersection Summary			
Delay	9.6		
HCM Level of Service	A		
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00		0.97	1.00
Satd. Flow (prot)	1770	3521		3433	3390	1441		1873	1599		1834	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00		0.97	1.00
Satd. Flow (perm)	1770	3521		3433	3390	1441		1873	1599		1834	1599
Volume (vph)	297	758	26	295	646	132	9	85	497	90	83	292
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	306	781	27	304	666	136	9	88	512	93	86	301
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	238
Lane Group Flow (vph)	306	808	0	304	666	136	0	97	512	0	179	63
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	32.0	23.3		32.4	23.7	93.9		8.6	32.4		13.6	13.6
Effective Green, g (s)	32.0	23.3		32.4	23.7	93.9		8.6	32.4		13.6	13.6
Actuated g/C Ratio	0.34	0.25		0.35	0.25	1.00		0.09	0.35		0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	603	874		1185	856	1441		172	552		266	232
v/s Ratio Prot	0.17	c0.23		0.09	0.20			c0.05	c0.32		c0.10	
v/s Ratio Perm						0.09						0.04
v/c Ratio	0.51	0.92		0.26	0.78	0.09		0.56	0.93		0.67	0.27
Uniform Delay, d1	24.7	34.4		22.1	32.7	0.0		40.9	29.6		38.0	35.7
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	15.2		0.1	4.5	0.1		4.2	21.8		6.6	0.6
Delay (s)	25.3	49.6		22.2	37.2	0.1		45.0	51.4		44.6	36.4
Level of Service	C	D		C	D	A		D	D		D	D
Approach Delay (s)		43.0			28.5			50.4			39.4	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	39.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	93.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2015 Without Project (Without RTID Improvements)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	345	120	435	175	185	150	40	115	100	30	30	405
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	375	130	473	190	201	163	43	125	109	33	33	440

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	375	603	190	201	163	277	505
Volume Left (vph)	375	0	190	0	0	43	33
Volume Right (vph)	0	473	0	0	163	109	440
Hadj (s)	0.53	-0.51	0.53	0.03	-0.67	-0.03	-0.48
Departure Headway (s)	9.1	8.0	9.6	9.1	3.2	8.8	7.6
Degree Utilization, x	0.94	1.34	0.50	0.51	0.14	0.67	1.07
Capacity (veh/h)	375	457	363	382	1121	400	467
Control Delay (s)	61.4	190.8	20.7	19.8	5.5	28.1	89.5
Approach Delay (s)	141.2		15.9			28.1	89.5
Approach LOS	F		C			D	F

Intersection Summary			
Delay	86.4		
HCM Level of Service	F		
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	730	25	480	155	0	0	0	0	130	10	165
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	793	27	522	168	0	0	0	0	141	11	179
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	168			821			2114	2019	807	2019	2033	168
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			821			2114	2019	807	2019	2033	168
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			35			100	100	100	0	46	79
cM capacity (veh/h)	1415			808			9	21	385	21	20	873

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	821	522	168	332
Volume Left	0	522	0	141
Volume Right	27	0	0	179
cSH	1700	808	1700	44
Volume to Capacity	0.48	0.65	0.10	7.55
Queue Length 95th (ft)	0	120	0	Err
Control Delay (s)	0.0	17.2	0.0	Err
Lane LOS		C		F
Approach Delay (s)	0.0	13.0		Err
Approach LOS				F

Intersection Summary			
Average Delay	1804.1		
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	20	685	0	0	250	70	0	0	5	65	0	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	745	0	0	272	76	0	0	5	71	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	348			745			1109	1136	745	1103	1098	310
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	348			745			1109	1136	745	1103	1098	310
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.1	3.4
p0 queue free %	98			100			100	100	99	60	100	98
cM capacity (veh/h)	1211			868			183	200	418	176	201	710

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	22	745	348	5	82
Volume Left	22	0	0	0	71
Volume Right	0	0	76	5	11
cSH	1211	1700	1700	418	196
Volume to Capacity	0.02	0.44	0.20	0.01	0.42
Queue Length 95th (ft)	1	0	0	1	47
Control Delay (s)	8.0	0.0	0.0	13.7	35.8
Lane LOS	A			B	E
Approach Delay (s)	0.2		0.0	13.7	35.8
Approach LOS				B	E

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	695	260	0	10	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	755	283	0	11	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	283				1038	283
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	283				1038	283
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1280				258	761

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	755	283	11
Volume Left	0	0	11
Volume Right	0	0	0
cSH	1280	1700	258
Volume to Capacity	0.00	0.17	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	0.0	19.6
Lane LOS			C
Approach Delay (s)	0.0	0.0	19.6
Approach LOS			C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	665	5	55	210	5	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	723	5	60	228	5	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			728		1073	726
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			728		1073	726
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		98	92
cM capacity (veh/h)			880		229	428

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	728	60	228	38
Volume Left	0	60	0	5
Volume Right	5	0	0	33
cSH	1700	880	1700	381
Volume to Capacity	0.43	0.07	0.13	0.10
Queue Length 95th (ft)	0	5	0	8
Control Delay (s)	0.0	9.4	0.0	15.5
Lane LOS		A		C
Approach Delay (s)	0.0	1.9		15.5
Approach LOS				C

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	425	5	20	110	10	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	462	5	22	120	11	130

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	467	141	141
Volume Left (vph)	0	22	11
Volume Right (vph)	5	0	130
Hadj (s)	0.04	0.10	-0.52
Departure Headway (s)	4.5	4.9	4.8
Degree Utilization, x	0.58	0.19	0.19
Capacity (veh/h)	779	697	669
Control Delay (s)	13.5	9.0	8.9
Approach Delay (s)	13.5	9.0	8.9
Approach LOS	B	A	A

Intersection Summary			
Delay	11.8		
HCM Level of Service	B		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	10	0	20	10	30	0	60	50	25	25	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	0	22	11	33	0	65	54	27	27	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	11	65	120	54
Volume Left (vph)	0	22	0	27
Volume Right (vph)	0	33	54	0
Hadj (s)	0.00	-0.20	-0.19	0.19
Departure Headway (s)	4.3	4.1	3.9	4.4
Degree Utilization, x	0.01	0.07	0.13	0.07
Capacity (veh/h)	789	842	887	803
Control Delay (s)	7.4	7.4	7.5	7.7
Approach Delay (s)	7.4	7.4	7.5	7.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.5		
HCM Level of Service	A		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	80	5	310	130	5	90
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	5	337	141	5	98

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	92	478	103
Volume Left (vph)	87	0	5
Volume Right (vph)	5	141	0
Hadj (s)	0.22	-0.13	0.04
Departure Headway (s)	5.4	4.2	4.7
Degree Utilization, x	0.14	0.55	0.13
Capacity (veh/h)	603	850	728
Control Delay (s)	9.3	12.2	8.4
Approach Delay (s)	9.3	12.2	8.4
Approach LOS	A	B	A

Intersection Summary			
Delay	11.2		
HCM Level of Service	B		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	1.00
Satd. Flow (prot)	1687	3347		3400	3357	1427		1776	1524		1817	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	1.00
Satd. Flow (perm)	1687	3347		3400	3357	1427		1776	1524		1817	1599
Volume (vph)	280	445	25	460	785	60	40	180	145	85	35	235
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	484	27	500	853	65	43	196	158	92	38	255
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	219
Lane Group Flow (vph)	304	511	0	500	853	65	0	239	158	0	130	36
Heavy Vehicles (%)	7%	7%	7%	3%	3%	3%	6%	6%	6%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	14.1	19.7		14.6	20.2	75.0		14.0	14.6		10.7	10.7
Effective Green, g (s)	14.1	19.7		14.6	20.2	75.0		14.0	14.6		10.7	10.7
Actuated g/C Ratio	0.19	0.26		0.19	0.27	1.00		0.19	0.19		0.14	0.14
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	317	879		662	904	1427		332	297		259	228
v/s Ratio Prot	c0.18	0.15		0.15	c0.25			c0.13	0.10		c0.07	
v/s Ratio Perm						0.05						0.02
v/c Ratio	0.96	0.58		0.76	0.94	0.05		0.72	0.53		0.50	0.16
Uniform Delay, d1	30.2	24.1		28.5	26.8	0.0		28.7	27.1		29.7	28.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	39.1	1.0		4.9	17.7	0.1		7.3	1.8		1.5	0.3
Delay (s)	69.3	25.0		33.4	44.6	0.1		36.0	29.0		31.2	28.5
Level of Service	E	C		C	D	A		D	C		C	C
Approach Delay (s)		41.6			38.6			33.2			29.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	37.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	70	190	95	80	175	65	45	275	155	50	30	395
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	73	198	99	83	182	68	47	286	161	52	31	411

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	73	297	83	182	68	495	495
Volume Left (vph)	73	0	83	0	0	47	52
Volume Right (vph)	0	99	0	0	68	161	411
Hadj (s)	0.52	-0.22	0.53	0.03	-0.67	-0.16	-0.46
Departure Headway (s)	9.3	8.5	9.6	9.1	3.2	7.6	7.3
Degree Utilization, x	0.19	0.70	0.22	0.46	0.06	1.05	1.01
Capacity (veh/h)	382	412	364	377	1121	478	495
Control Delay (s)	13.2	28.3	14.2	18.6	5.2	82.3	69.6
Approach Delay (s)	25.3		14.8			82.3	69.6
Approach LOS	D		B			F	F

Intersection Summary			
Delay	52.8		
HCM Level of Service	F		
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	185	55	300	310	0	0	0	0	200	10	340
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	191	57	309	320	0	0	0	0	206	10	351
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	320			247			1338	1157	219	1157	1186	320
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	320			247			1338	1157	219	1157	1186	320
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			77			100	100	100	0	93	52
cM capacity (veh/h)	1252			1324			53	152	826	143	146	726

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	247	309	320	567
Volume Left	0	309	0	206
Volume Right	57	0	0	351
cSH	1700	1324	1700	326
Volume to Capacity	0.15	0.23	0.19	1.74
Queue Length 95th (ft)	0	23	0	901
Control Delay (s)	0.0	8.5	0.0	373.6
Lane LOS		A		F
Approach Delay (s)	0.0	4.2		373.6
Approach LOS				F

Intersection Summary			
Average Delay	148.6		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	15	170	5	5	550	65	0	0	10	60	0	20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	175	5	5	567	67	0	0	10	62	0	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	634			180			840	853	178	827	822	601
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	634			180			840	853	178	827	822	601
tC, single (s)	4.1			4.1			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	98			100			100	100	99	78	100	96
cM capacity (veh/h)	959			1389			253	275	828	281	302	499

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	15	180	639	10	82
Volume Left	15	0	5	0	62
Volume Right	0	5	67	10	21
cSH	959	1700	1389	828	316
Volume to Capacity	0.02	0.11	0.00	0.01	0.26
Queue Length 95th (ft)	1	0	0	1	26
Control Delay (s)	8.8	0.0	0.1	9.4	20.4
Lane LOS	A		A	A	C
Approach Delay (s)	0.7		0.1	9.4	20.4
Approach LOS				A	C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	185	560	10	5	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	191	577	10	5	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	588				773	582
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	588				773	582
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	100
cM capacity (veh/h)	997				370	516

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	191	588	5
Volume Left	0	0	5
Volume Right	0	10	0
cSH	997	1700	370
Volume to Capacity	0.00	0.35	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	14.9
Lane LOS			B
Approach Delay (s)	0.0	0.0	14.9
Approach LOS			B

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	145	5	50	515	5	40
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	149	5	52	531	5	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			155		786	152
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			155		786	152
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		99	95
cM capacity (veh/h)			1420		351	899

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	155	52	531	46
Volume Left	0	52	0	5
Volume Right	5	0	0	41
cSH	1700	1420	1700	766
Volume to Capacity	0.09	0.04	0.31	0.06
Queue Length 95th (ft)	0	3	0	5
Control Delay (s)	0.0	7.6	0.0	10.0
Lane LOS		A		B
Approach Delay (s)	0.0	0.7		10.0
Approach LOS				B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	140	10	90	340	5	35
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	147	11	95	358	5	37

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	151	7	453	42
Volume Left (vph)	0	0	95	5
Volume Right (vph)	4	7	0	37
Hadj (s)	-0.02	-0.70	0.06	-0.50
Departure Headway (s)	4.9	4.2	4.3	4.7
Degree Utilization, x	0.21	0.01	0.55	0.06
Capacity (veh/h)	718	826	814	670
Control Delay (s)	8.0	6.1	12.4	8.0
Approach Delay (s)	7.9		12.4	8.0
Approach LOS	A		B	A

Intersection Summary			
Delay	11.1		
HCM Level of Service	B		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	15	0	70	30	25	0	40	60	60	55	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	16	0	75	32	27	0	43	65	65	59	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	16	134	108	124
Volume Left (vph)	0	75	0	65
Volume Right (vph)	0	27	65	0
Hadj (s)	0.00	-0.01	-0.36	0.12
Departure Headway (s)	4.6	4.4	4.0	4.5
Degree Utilization, x	0.02	0.17	0.12	0.15
Capacity (veh/h)	727	765	849	763
Control Delay (s)	7.7	8.3	7.6	8.3
Approach Delay (s)	7.7	8.3	7.6	8.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.1		
HCM Level of Service	A		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	0	380	185	145	95	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	413	201	158	103	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	413	359	103
Volume Left (vph)	0	0	103
Volume Right (vph)	0	158	0
Hadj (s)	0.00	-0.26	0.20
Departure Headway (s)	4.6	4.4	5.8
Degree Utilization, x	0.53	0.44	0.17
Capacity (veh/h)	752	784	545
Control Delay (s)	12.7	10.9	10.0
Approach Delay (s)	12.7	10.9	10.0
Approach LOS	B	B	A

Intersection Summary			
Delay	11.6		
HCM Level of Service	B		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.99	1.00
Satd. Flow (prot)	1770	3467		3433	3390	1441		1865	1599		1863	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.99	1.00
Satd. Flow (perm)	1770	3467		3433	3390	1441		1865	1599		1863	1599
Volume (vph)	350	800	125	615	695	70	45	210	1125	40	165	305
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	361	825	129	634	716	72	46	216	1160	41	170	314
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	148
Lane Group Flow (vph)	361	954	0	634	716	72	0	262	1160	0	211	166
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	58.9	28.0		64.0	33.1	144.8		19.0	64.0		17.8	17.8
Effective Green, g (s)	58.9	28.0		64.0	33.1	144.8		19.0	64.0		17.8	17.8
Actuated g/C Ratio	0.41	0.19		0.44	0.23	1.00		0.13	0.44		0.12	0.12
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	720	670		1517	775	1441		245	707		229	197
v/s Ratio Prot	0.20	c0.28		0.18	0.21			c0.14	c0.73		c0.11	
v/s Ratio Perm						0.05						0.10
v/c Ratio	0.50	1.42		0.42	0.92	0.05		1.07	1.64		0.92	0.84
Uniform Delay, d1	32.0	58.4		27.7	54.6	0.0		62.9	40.4		62.8	62.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	199.4		0.2	16.6	0.1		77.1	294.7		38.5	26.4
Delay (s)	32.6	257.8		27.8	71.2	0.1		140.0	335.1		101.3	88.5
Level of Service	C	F		C	E	A		F	F		F	F
Approach Delay (s)		196.0			48.3			299.2			93.6	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	171.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.41		
Actuated Cycle Length (s)	144.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

2015 With Alternative 1 (Without RTID Improvements)

HCM Unsignalized Intersection Capacity Analysis
1: NE 44th St & Lake WA Blvd SE

7/15/2010

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	385	160	625	175	230	150	40	115	100	30	30	450
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	418	174	679	190	250	163	43	125	109	33	33	489

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	418	853	190	250	163	277	554
Volume Left (vph)	418	0	190	0	0	43	33
Volume Right (vph)	0	679	0	0	163	109	489
Hadj (s)	0.53	-0.52	0.53	0.03	-0.67	-0.03	-0.48
Departure Headway (s)	9.2	8.2	9.6	9.1	3.2	9.0	7.9
Degree Utilization, x	1.07	1.93	0.51	0.63	0.14	0.69	1.21
Capacity (veh/h)	389	448	361	384	1121	390	452
Control Delay (s)	95.4	446.5	21.0	25.4	5.5	30.0	139.2
Approach Delay (s)	330.9		18.6			30.0	139.2
Approach LOS	F		C			D	F

Intersection Summary			
Delay	191.2		
HCM Level of Service	F		
Intersection Capacity Utilization	101.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	1005	25	480	245	0	0	0	0	130	10	365
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1092	27	522	266	0	0	0	0	141	11	397
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	266			1120			2620	2416	1106	2416	2429	266
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	266			1120			2620	2416	1106	2416	2429	266
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			16			0	100	100	0	0	48
cM capacity (veh/h)	1303			624			0	5	258	7	5	770

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	1120	522	266	549
Volume Left	0	522	0	141
Volume Right	27	0	0	397
cSH	1700	624	1700	23
Volume to Capacity	0.66	0.84	0.16	23.92
Queue Length 95th (ft)	0	225	0	Err
Control Delay (s)	0.0	33.3	0.0	Err
Lane LOS		D		F
Approach Delay (s)	0.0	22.1		Err
Approach LOS				F

Intersection Summary			
Average Delay	2241.4		
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	20	705	0	0	270	335	0	0	5	320	0	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	766	0	0	293	364	0	0	5	348	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	658			766			1296	1467	766	1291	1285	476
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	658			766			1296	1467	766	1291	1285	476
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.1	3.4
p0 queue free %	98			100			100	100	99	0	100	98
cM capacity (veh/h)	930			852			135	126	406	130	154	571

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	22	766	658	5	359
Volume Left	22	0	0	0	348
Volume Right	0	0	364	5	11
cSH	930	1700	1700	406	133
Volume to Capacity	0.02	0.45	0.39	0.01	2.69
Queue Length 95th (ft)	2	0	0	1	809
Control Delay (s)	9.0	0.0	0.0	14.0	834.6
Lane LOS	A			B	F
Approach Delay (s)	0.2		0.0	14.0	834.6
Approach LOS				B	F

Intersection Summary			
Average Delay	165.6		
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	175	675	255	25	45	150
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	734	277	27	49	163
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	304				1405	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	304				1405	291
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				63	78
cM capacity (veh/h)	1256				132	753

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	924	304	212
Volume Left	190	0	49
Volume Right	0	27	163
cSH	1256	1700	361
Volume to Capacity	0.15	0.18	0.59
Queue Length 95th (ft)	13	0	90
Control Delay (s)	3.5	0.0	28.3
Lane LOS	A		D
Approach Delay (s)	3.5	0.0	28.3
Approach LOS			D

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	820	5	55	355	5	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	891	5	60	386	5	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			897		1399	894
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			897		1399	894
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		96	90
cM capacity (veh/h)			761		144	343

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	897	60	386	38
Volume Left	0	60	0	5
Volume Right	5	0	0	33
cSH	1700	761	1700	286
Volume to Capacity	0.53	0.08	0.23	0.13
Queue Length 95th (ft)	0	6	0	11
Control Delay (s)	0.0	10.1	0.0	19.5
Lane LOS		B		C
Approach Delay (s)	0.0	1.4		19.5
Approach LOS				C

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	490	5	105	175	10	210
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	533	5	114	190	11	228

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	538	304	239
Volume Left (vph)	0	114	11
Volume Right (vph)	5	0	228
Hadj (s)	0.04	0.14	-0.55
Departure Headway (s)	5.1	5.5	5.5
Degree Utilization, x	0.76	0.47	0.36
Capacity (veh/h)	538	623	592
Control Delay (s)	22.6	13.2	11.6
Approach Delay (s)	22.6	13.2	11.6
Approach LOS	C	B	B

Intersection Summary			
Delay	17.5		
HCM Level of Service	C		
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	10	0	20	10	120	0	60	50	110	25	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	0	22	11	130	0	65	54	120	27	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	11	163	120	147
Volume Left (vph)	0	22	0	120
Volume Right (vph)	0	130	54	0
Hadj (s)	0.00	-0.42	-0.19	0.25
Departure Headway (s)	4.7	4.1	4.3	4.7
Degree Utilization, x	0.01	0.19	0.14	0.19
Capacity (veh/h)	701	817	800	733
Control Delay (s)	7.8	8.1	8.0	8.8
Approach Delay (s)	7.8	8.1	8.0	8.8
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.3		
HCM Level of Service	A		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	80	5	375	130	5	155
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	5	408	141	5	168

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	92	549	174
Volume Left (vph)	87	0	5
Volume Right (vph)	5	141	0
Hadj (s)	0.22	-0.10	0.04
Departure Headway (s)	5.7	4.3	4.8
Degree Utilization, x	0.15	0.65	0.23
Capacity (veh/h)	561	827	715
Control Delay (s)	9.7	15.0	9.2
Approach Delay (s)	9.7	15.0	9.2
Approach LOS	A	B	A

Intersection Summary			
Delay	13.2		
HCM Level of Service	B		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	1.00
Satd. Flow (prot)	1687	3347		3400	3357	1427		1778	1524		1822	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.97	1.00
Satd. Flow (perm)	1687	3347		3400	3357	1427		1778	1524		1822	1599
Volume (vph)	325	445	25	460	785	65	40	200	145	90	50	275
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	353	484	27	500	853	71	43	217	158	98	54	299
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	253
Lane Group Flow (vph)	353	511	0	500	853	71	0	260	158	0	152	46
Heavy Vehicles (%)	7%	7%	7%	3%	3%	3%	6%	6%	6%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	14.2	19.6		14.7	20.1	76.8		14.8	14.7		11.7	11.7
Effective Green, g (s)	14.2	19.6		14.7	20.1	76.8		14.8	14.7		11.7	11.7
Actuated g/C Ratio	0.18	0.26		0.19	0.26	1.00		0.19	0.19		0.15	0.15
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	312	854		651	879	1427		343	292		278	244
v/s Ratio Prot	c0.21	0.15		0.15	c0.25			c0.15	0.10		c0.08	
v/s Ratio Perm						0.05						0.03
v/c Ratio	1.13	0.60		0.77	0.97	0.05		0.76	0.54		0.55	0.19
Uniform Delay, d1	31.3	25.1		29.4	28.1	0.0		29.3	28.0		30.1	28.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	91.3	1.1		5.4	23.3	0.1		9.2	2.0		2.2	0.4
Delay (s)	122.6	26.3		34.9	51.3	0.1		38.6	30.1		32.3	28.8
Level of Service	F	C		C	D	A		D	C		C	C
Approach Delay (s)		65.6			43.0			35.3			30.0	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	46.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	120	240	325	80	220	65	45	275	155	50	30	440
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	125	250	339	83	229	68	47	286	161	52	31	458

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1
Volume Total (vph)	125	589	83	229	68	495	542
Volume Left (vph)	125	0	83	0	0	47	52
Volume Right (vph)	0	339	0	0	68	161	458
Hadj (s)	0.52	-0.39	0.53	0.03	-0.67	-0.16	-0.47
Departure Headway (s)	9.5	8.6	10.2	9.7	3.2	8.5	8.2
Degree Utilization, x	0.33	1.41	0.24	0.62	0.06	1.17	1.24
Capacity (veh/h)	374	428	350	364	1121	427	445
Control Delay (s)	15.9	220.6	15.1	25.7	5.2	127.3	150.3
Approach Delay (s)	184.7		19.7			127.3	150.3
Approach LOS	F		C			F	F

Intersection Summary			
Delay	133.2		
HCM Level of Service	F		
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	515	55	300	400	0	0	0	0	200	10	540
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	531	57	309	412	0	0	0	0	206	10	557
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												9
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	412			588			1874	1590	559	1590	1619	412
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	412			588			1874	1590	559	1590	1619	412
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			69			100	100	100	0	86	14
cM capacity (veh/h)	1157			992			5	75	532	67	72	644

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	588	309	412	773
Volume Left	0	309	0	206
Volume Right	57	0	0	557
cSH	1700	992	1700	195
Volume to Capacity	0.35	0.31	0.24	3.97
Queue Length 95th (ft)	0	33	0	Err
Control Delay (s)	0.0	10.3	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	4.4		Err
Approach LOS				F

Intersection Summary			
Average Delay	3714.0		
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	15	195	5	5	570	330	0	0	10	365	0	20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	201	5	5	588	340	0	0	10	376	0	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	928			206			1023	1173	204	1010	1005	758
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	928			206			1023	1173	204	1010	1005	758
tC, single (s)	4.1			4.1			7.3	6.7	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.7	4.2	3.5	3.5	4.0	3.3
p0 queue free %	98			100			100	100	99	0	100	95
cM capacity (veh/h)	745			1359			187	176	800	211	235	405

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total	15	206	933	10	397
Volume Left	15	0	5	0	376
Volume Right	0	5	340	10	21
cSH	745	1700	1359	800	216
Volume to Capacity	0.02	0.12	0.00	0.01	1.84
Queue Length 95th (ft)	2	0	0	1	699
Control Delay (s)	9.9	0.0	0.1	9.6	432.2
Lane LOS	A		A	A	F
Approach Delay (s)	0.7		0.1	9.6	432.2
Approach LOS				A	F

Intersection Summary			
Average Delay	110.1		
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	160	180	540	50	35	195
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	165	186	557	52	36	201
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	608				1098	582
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	608				1098	582
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				82	61
cM capacity (veh/h)	980				198	516

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	351	608	237
Volume Left	165	0	36
Volume Right	0	52	201
cSH	980	1700	415
Volume to Capacity	0.17	0.36	0.57
Queue Length 95th (ft)	15	0	87
Control Delay (s)	5.4	0.0	24.7
Lane LOS	A		C
Approach Delay (s)	5.4	0.0	24.7
Approach LOS			C

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	300	5	50	695	5	40
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	309	5	52	716	5	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			314		1131	312
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			314		1131	312
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		98	94
cM capacity (veh/h)			1240		217	733

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	314	52	716	46
Volume Left	0	52	0	5
Volume Right	5	0	0	41
cSH	1700	1240	1700	580
Volume to Capacity	0.18	0.04	0.42	0.08
Queue Length 95th (ft)	0	3	0	6
Control Delay (s)	0.0	8.0	0.0	11.7
Lane LOS		A		B
Approach Delay (s)	0.0	0.5		11.7
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	205	10	190	415	5	125
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	216	11	200	437	5	132

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	219	7	637	137
Volume Left (vph)	0	0	200	5
Volume Right (vph)	4	7	0	132
Hadj (s)	-0.01	-0.70	0.08	-0.57
Departure Headway (s)	5.5	4.8	4.8	5.4
Degree Utilization, x	0.33	0.01	0.84	0.20
Capacity (veh/h)	627	717	743	621
Control Delay (s)	9.9	6.6	28.0	9.7
Approach Delay (s)	9.8		28.0	9.7
Approach LOS	A		D	A

Intersection Summary			
Delay	21.4		
HCM Level of Service	C		
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	15	0	70	30	115	0	40	60	160	55	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	0	16	0	75	32	124	0	43	65	172	59	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	16	231	108	231
Volume Left (vph)	0	75	0	172
Volume Right (vph)	0	124	65	0
Hadj (s)	0.00	-0.26	-0.36	0.17
Departure Headway (s)	5.0	4.5	4.4	4.8
Degree Utilization, x	0.02	0.29	0.13	0.31
Capacity (veh/h)	644	750	757	712
Control Delay (s)	8.1	9.3	8.1	9.9
Approach Delay (s)	8.1	9.3	8.1	9.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay	9.3		
HCM Level of Service	A		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	0	455	250	145	95	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	495	272	158	103	0

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	495	429	103
Volume Left (vph)	0	0	103
Volume Right (vph)	0	158	0
Hadj (s)	0.00	-0.22	0.20
Departure Headway (s)	4.7	4.6	6.2
Degree Utilization, x	0.65	0.55	0.18
Capacity (veh/h)	737	759	509
Control Delay (s)	16.2	13.1	10.5
Approach Delay (s)	16.2	13.1	10.5
Approach LOS	C	B	B

Intersection Summary			
Delay	14.3		
HCM Level of Service	B		
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.99	1.00
Satd. Flow (prot)	1770	3467		3433	3390	1441		1866	1599		1863	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.99	1.00
Satd. Flow (perm)	1770	3467		3433	3390	1441		1866	1599		1863	1599
Volume (vph)	395	800	125	615	695	75	45	230	1125	45	185	355
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	407	825	129	634	716	77	46	237	1160	46	191	366
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	153
Lane Group Flow (vph)	407	954	0	634	716	77	0	283	1160	0	237	213
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	58.9	28.0		64.0	33.1	145.0		19.0	64.0		18.0	18.0
Effective Green, g (s)	58.9	28.0		64.0	33.1	145.0		19.0	64.0		18.0	18.0
Actuated g/C Ratio	0.41	0.19		0.44	0.23	1.00		0.13	0.44		0.12	0.12
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	719	669		1515	774	1441		245	706		231	198
v/s Ratio Prot	0.23	c0.28		0.18	0.21			c0.15	c0.73		0.13	
v/s Ratio Perm						0.05						c0.13
v/c Ratio	0.57	1.43		0.42	0.93	0.05		1.16	1.64		1.03	1.07
Uniform Delay, d1	33.2	58.5		27.7	54.7	0.0		63.0	40.5		63.5	63.5
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	200.3		0.2	16.7	0.1		105.9	295.8		66.1	85.1
Delay (s)	34.2	258.8		27.9	71.5	0.1		168.9	336.3		129.6	148.6
Level of Service	C	F		C	E	A		F	F		F	F
Approach Delay (s)		191.7			48.3			303.4			141.1	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	176.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

2015 With Alternative 1 with Mitigation

(Without RTID Improvements)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.88		1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1640		1770	1863	1583	1641	1607		1770	1601	
Flt Permitted	0.58	1.00		0.17	1.00	1.00	0.11	1.00		0.48	1.00	
Satd. Flow (perm)	1071	1640		311	1863	1583	197	1607		900	1601	
Volume (vph)	385	160	625	175	230	150	40	115	100	30	30	450
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	418	174	679	190	250	163	43	125	109	33	33	489
RTOR Reduction (vph)	0	124	0	0	0	63	0	25	0	0	332	0
Lane Group Flow (vph)	418	729	0	190	250	100	43	209	0	33	190	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	73.4	73.4		73.4	73.4	73.4	38.6	38.6		38.6	38.6	
Effective Green, g (s)	73.4	73.4		73.4	73.4	73.4	38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.61	0.61		0.61	0.61	0.61	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	655	1003		190	1140	968	63	517		290	515	
v/s Ratio Prot		0.44			0.13			0.13			0.12	
v/s Ratio Perm	0.39			c0.61		0.06	c0.22			0.04		
v/c Ratio	0.64	0.73		1.00	0.22	0.10	0.68	0.40		0.11	0.37	
Uniform Delay, d1	14.8	16.3		23.3	10.4	9.7	35.4	31.7		28.7	31.3	
Progression Factor	0.34	0.35		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2		65.3	0.1	0.0	46.4	2.3		0.8	2.0	
Delay (s)	5.2	6.0		88.6	10.5	9.7	81.7	34.1		29.5	33.4	
Level of Service	A	A		F	B	A	F	C		C	C	
Approach Delay (s)		5.7			34.9			41.5			33.1	
Approach LOS		A			C			D			C	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frt		1.00		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.96	1.00
Satd. Flow (prot)		1875		1770	1863						1763	1568
Flt Permitted		1.00		0.06	1.00						0.96	1.00
Satd. Flow (perm)		1875		106	1863						1763	1568
Volume (vph)	0	1005	25	480	245	0	0	0	0	130	10	365
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1092	27	522	266	0	0	0	0	141	11	397
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	0	349
Lane Group Flow (vph)	0	1118	0	522	266	0	0	0	0	0	152	48
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	3%	3%	3%
Turn Type				pm+pt						Perm		Perm
Protected Phases		4		3	8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		66.6		97.6	97.6						14.4	14.4
Effective Green, g (s)		66.6		97.6	97.6						14.4	14.4
Actuated g/C Ratio		0.55		0.81	0.81						0.12	0.12
Clearance Time (s)		4.0		4.0	4.0						4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1041		461	1515						212	188
v/s Ratio Prot		0.60		c0.26	0.14							
v/s Ratio Perm				c0.67							0.09	0.03
v/c Ratio		1.07		1.13	0.18						0.72	0.25
Uniform Delay, d1		26.7		43.2	2.4						50.8	47.9
Progression Factor		0.76		1.14	1.30						1.00	1.00
Incremental Delay, d2		43.6		81.2	0.0						18.7	3.2
Delay (s)		64.0		130.4	3.2						69.6	51.1
Level of Service		E		F	A						E	D
Approach Delay (s)		64.0			87.5			0.0			56.2	
Approach LOS		E			F			A			E	

Intersection Summary			
HCM Average Control Delay	69.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			1.00	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (prot)	1770	1863			1881	1599		1644			1626	
Flt Permitted	0.48	1.00			1.00	1.00		1.00			0.73	
Satd. Flow (perm)	893	1863			1881	1599		1644			1244	
Volume (vph)	20	705	0	0	270	335	0	0	5	320	0	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	766	0	0	293	364	0	0	5	348	0	11
RTOR Reduction (vph)	0	0	0	0	0	205	0	3	0	0	1	0
Lane Group Flow (vph)	22	766	0	0	293	159	0	2	0	0	358	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	11%	11%	11%
Turn Type	Perm					Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4					8	2			6		
Actuated Green, G (s)	52.4	52.4			52.4	52.4		59.6			59.6	
Effective Green, g (s)	52.4	52.4			52.4	52.4		59.6			59.6	
Actuated g/C Ratio	0.44	0.44			0.44	0.44		0.50			0.50	
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	390	814			821	698		817			618	
v/s Ratio Prot		c0.41			0.16			0.00				
v/s Ratio Perm	0.02					0.10					c0.29	
v/c Ratio	0.06	0.94			0.36	0.23		0.00			0.58	
Uniform Delay, d1	19.5	32.3			22.6	21.1		15.2			21.3	
Progression Factor	1.00	1.00			0.91	0.28		1.00			1.00	
Incremental Delay, d2	0.1	18.7			0.2	0.1		0.0			3.9	
Delay (s)	19.6	51.0			20.7	6.1		15.2			25.3	
Level of Service	B	D			C	A		B			C	
Approach Delay (s)		50.2			12.6			15.2			25.3	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	1.00	0.85	1.00	0.95		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1719		1770	1863	1583	1787	1780		1787	1617	
Flt Permitted	0.56	1.00		0.16	1.00	1.00	0.36	1.00		0.40	1.00	
Satd. Flow (perm)	1060	1719		304	1863	1583	678	1780		745	1617	
Volume (vph)	120	240	325	80	220	65	45	275	155	50	30	440
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	125	250	339	83	229	68	47	286	161	52	31	458
RTOR Reduction (vph)	0	86	0	0	0	42	0	23	0	0	228	0
Lane Group Flow (vph)	125	503	0	83	229	26	47	424	0	52	261	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	26.9	26.9		26.9	26.9	26.9	35.1	35.1		35.1	35.1	
Effective Green, g (s)	26.9	26.9		26.9	26.9	26.9	35.1	35.1		35.1	35.1	
Actuated g/C Ratio	0.38	0.38		0.38	0.38	0.38	0.50	0.50		0.50	0.50	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	407	661		117	716	608	340	893		374	811	
v/s Ratio Prot		c0.29			0.12			c0.24			0.16	
v/s Ratio Perm	0.12			0.27		0.02	0.07			0.07		
v/c Ratio	0.31	0.76		0.71	0.32	0.04	0.14	0.47		0.14	0.32	
Uniform Delay, d1	15.0	18.8		18.2	15.1	13.5	9.3	11.4		9.4	10.4	
Progression Factor	0.84	0.91		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	4.7		17.8	0.3	0.0	0.8	1.8		0.8	1.0	
Delay (s)	13.1	21.7		36.1	15.4	13.5	10.2	13.2		10.1	11.4	
Level of Service	B	C		D	B	B	B	B		B	B	
Approach Delay (s)		20.2			19.6			12.9			11.3	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frt		0.99		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1875		1787	1881						1814	1615
Flt Permitted		1.00		0.32	1.00						0.95	1.00
Satd. Flow (perm)		1875		608	1881						1814	1615
Volume (vph)	0	515	55	300	400	0	0	0	0	200	10	540
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	531	57	309	412	0	0	0	0	206	10	557
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	326
Lane Group Flow (vph)	0	585	0	309	412	0	0	0	0	0	216	231
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type				Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		84.7		84.7	84.7						47.3	47.3
Effective Green, g (s)		84.7		84.7	84.7						47.3	47.3
Actuated g/C Ratio		0.61		0.61	0.61						0.34	0.34
Clearance Time (s)		4.0		4.0	4.0						4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		1134		368	1138						613	546
v/s Ratio Prot		0.31			0.22							
v/s Ratio Perm				c0.51							0.12	c0.14
v/c Ratio		0.52		0.84	0.36						0.35	0.42
Uniform Delay, d1		15.9		22.2	14.0						34.8	35.8
Progression Factor		1.12		1.01	1.02						1.00	1.00
Incremental Delay, d2		0.4		14.5	0.2						1.6	2.4
Delay (s)		18.2		37.0	14.4						36.4	38.2
Level of Service		B		D	B						D	D
Approach Delay (s)		18.2			24.1			0.0			37.7	
Approach LOS		B			C			A			D	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			0.99	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (prot)	1805	1893			1844	1568		1405			1749	
Flt Permitted	0.13	1.00			1.00	1.00		1.00			0.73	
Satd. Flow (perm)	246	1893			1841	1568		1405			1338	
Volume (vph)	15	195	5	5	570	330	0	0	10	365	0	20
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	15	201	5	5	588	340	0	0	10	376	0	21
RTOR Reduction (vph)	0	1	0	0	0	209	0	4	0	0	1	0
Lane Group Flow (vph)	15	205	0	0	593	131	0	6	0	0	396	0
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	17%	17%	17%	3%	3%	3%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	54.1	54.1			54.1	54.1		77.9			77.9	
Effective Green, g (s)	54.1	54.1			54.1	54.1		77.9			77.9	
Actuated g/C Ratio	0.39	0.39			0.39	0.39		0.56			0.56	
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	95	732			711	606		782			745	
v/s Ratio Prot		0.11						0.00				
v/s Ratio Perm	0.06				c0.32	0.08					c0.30	
v/c Ratio	0.16	0.28			0.83	0.22		0.01			0.53	
Uniform Delay, d1	28.1	29.5			38.9	28.8		13.8			19.6	
Progression Factor	1.00	1.00			1.04	3.21		1.00			1.00	
Incremental Delay, d2	0.8	0.2			7.3	0.2		0.0			2.7	
Delay (s)	28.8	29.8			47.6	92.6		13.8			22.3	
Level of Service	C	C			D	F		B			C	
Approach Delay (s)		29.7			64.0			13.8			22.3	
Approach LOS		C			E			B			C	

Intersection Summary			
HCM Average Control Delay	48.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

2015 Without Project (With RTID Improvements)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	0.97	0.95			0.91		1.00	0.95	0.95			
Frt	1.00	1.00			0.94		1.00	0.85	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	3433	3539			4778		1641	1395	1395			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	3433	3539			4778		1641	1395	1395			
Volume (vph)	400	400	0	0	525	355	40	0	255	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	435	435	0	0	571	386	43	0	277	0	0	0
RTOR Reduction (vph)	0	0	0	0	163	0	0	117	118	0	0	0
Lane Group Flow (vph)	435	435	0	0	794	0	43	21	21	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Turn Type	Prot						Split		Perm			
Protected Phases	7	4			8		2	2				
Permitted Phases									2			
Actuated Green, G (s)	14.0	42.8			24.8		9.2	9.2	9.2			
Effective Green, g (s)	14.0	42.8			24.8		9.2	9.2	9.2			
Actuated g/C Ratio	0.23	0.71			0.41		0.15	0.15	0.15			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	801	2524			1975		252	214	214			
v/s Ratio Prot	c0.13	0.12			c0.17		c0.03	0.02				
v/s Ratio Perm									0.02			
v/c Ratio	0.54	0.17			0.40		0.17	0.10	0.10			
Uniform Delay, d1	20.2	2.8			12.4		22.1	21.8	21.8			
Progression Factor	0.52	0.09			0.59		1.00	1.00	1.00			
Incremental Delay, d2	2.6	0.1			0.5		0.3	0.2	0.2			
Delay (s)	13.1	0.4			7.8		22.4	22.0	22.0			
Level of Service	B	A			A		C	C	C			
Approach Delay (s)		6.8			7.8			22.1			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.99		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5110		3433	3539					1665	1681	1568
Flt Permitted		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5110		3433	3539					1665	1681	1568
Volume (vph)	0	720	25	390	170	0	0	0	0	55	5	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	783	27	424	185	0	0	0	0	60	5	147
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	121
Lane Group Flow (vph)	0	804	0	424	185	0	0	0	0	32	33	26
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	3%	3%	3%
Turn Type				Prot						Split		Prot
Protected Phases		4		3	8					6	6	6
Permitted Phases												
Actuated Green, G (s)		28.4		9.0	31.8					10.6	10.6	10.6
Effective Green, g (s)		28.4		9.0	31.8					10.6	10.6	10.6
Actuated g/C Ratio		0.47		0.15	0.53					0.18	0.18	0.18
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2419		515	1876					294	297	277
v/s Ratio Prot		c0.16		c0.12	0.05					0.02	c0.02	0.02
v/s Ratio Perm												
v/c Ratio		0.33		0.82	0.10					0.11	0.11	0.09
Uniform Delay, d1		9.9		24.7	7.0					20.7	20.7	20.7
Progression Factor		0.37		0.67	0.28					1.00	1.00	1.00
Incremental Delay, d2		0.3		12.9	0.1					0.2	0.2	0.1
Delay (s)		3.9		29.4	2.1					20.9	20.9	20.8
Level of Service		A		C	A					C	C	C
Approach Delay (s)		3.9			21.1			0.0			20.9	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			0.98	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.96	
Satd. Flow (prot)	1770	1863			1881	1599		1644			1611	
Flt Permitted	0.95	1.00			1.00	1.00		1.00			0.96	
Satd. Flow (perm)	1770	1863			1881	1599		1644			1611	
Volume (vph)	20	670	0	0	245	70	0	0	5	65	0	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	728	0	0	266	76	0	0	5	71	0	11
RTOR Reduction (vph)	0	0	0	0	0	76	0	5	0	0	9	0
Lane Group Flow (vph)	22	728	0	0	266	0	0	0	0	0	73	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	11%	11%	11%
Turn Type	Prot					NA	Split			Split		
Protected Phases	7	4			8		1	1		2	2	
Permitted Phases												
Actuated Green, G (s)	5.6	28.4			31.8	0.0		0.8			5.8	
Effective Green, g (s)	5.6	28.4			31.8	0.0		0.8			5.8	
Actuated g/C Ratio	0.09	0.47			0.53	0.00		0.01			0.10	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	165	882			997	0		22			156	
v/s Ratio Prot	0.01	c0.39			c0.14			c0.00			c0.05	
v/s Ratio Perm												
v/c Ratio	0.13	0.83			0.27	0.00		0.00			0.47	
Uniform Delay, d1	25.0	13.7			7.7	30.0		29.2			25.6	
Progression Factor	1.00	1.00			0.73	1.00		1.00			1.00	
Incremental Delay, d2	0.4	8.7			0.6	0.0		0.1			2.2	
Delay (s)	25.3	22.3			6.3	30.0		29.3			27.8	
Level of Service	C	C			A	C		C			C	
Approach Delay (s)		22.4			11.5			29.3			27.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	180	550	10	5	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	186	567	10	5	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			236			
pX, platoon unblocked	0.77				0.77	0.77
vC, conflicting volume	577				758	572
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448				684	441
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	860				320	475

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	186	577	5
Volume Left	0	0	5
Volume Right	0	10	0
cSH	860	1700	320
Volume to Capacity	0.00	0.34	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	16.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.4
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	650	5	55	205	5	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	707	5	60	223	5	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				355		
pX, platoon unblocked					0.98	
vC, conflicting volume			712		1052	709
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			712		1053	709
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		98	93
cM capacity (veh/h)			892		231	437

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	712	60	223	5	33
Volume Left	0	60	0	5	0
Volume Right	5	0	0	0	33
cSH	1700	892	1700	231	437
Volume to Capacity	0.42	0.07	0.13	0.02	0.07
Queue Length 95th (ft)	0	5	0	2	6
Control Delay (s)	0.0	9.3	0.0	21.0	13.9
Lane LOS		A		C	B
Approach Delay (s)	0.0	2.0		14.9	
Approach LOS				B	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	350	0	15	95	5	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	380	0	16	103	5	114

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	380	120	120
Volume Left (vph)	0	16	5
Volume Right (vph)	0	0	114
Hadj (s)	0.00	0.04	-0.56
Departure Headway (s)	4.3	4.6	4.5
Degree Utilization, x	0.46	0.15	0.15
Capacity (veh/h)	814	737	733
Control Delay (s)	10.9	8.5	8.2
Approach Delay (s)	10.9	8.5	8.2
Approach LOS	B	A	A

Intersection Summary			
Delay	9.9		
HCM Level of Service	A		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	1770	3527		3433	3390	1441		1869	1599		1804	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	1770	3527		3433	3390	1441		1869	1599		1804	1599
Volume (vph)	250	440	10	385	850	105	20	130	115	125	20	190
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	272	478	11	418	924	114	22	141	125	136	22	207
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	174
Lane Group Flow (vph)	272	489	0	418	924	114	0	163	125	0	158	33
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	12.3	21.8		13.1	22.6	71.9		9.6	13.1		11.4	11.4
Effective Green, g (s)	12.3	21.8		13.1	22.6	71.9		9.6	13.1		11.4	11.4
Actuated g/C Ratio	0.17	0.30		0.18	0.31	1.00		0.13	0.18		0.16	0.16
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	303	1069		625	1066	1441		250	291		286	254
v/s Ratio Prot	c0.15	0.14		0.12	c0.27			c0.09	0.08		c0.09	
v/s Ratio Perm						0.08						0.02
v/c Ratio	0.90	0.46		0.67	0.87	0.08		0.65	0.43		0.55	0.13
Uniform Delay, d1	29.2	20.3		27.4	23.2	0.0		29.6	26.1		27.9	26.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	27.1	0.3		2.7	7.6	0.1		6.0	1.0		2.3	0.2
Delay (s)	56.2	20.6		30.1	30.8	0.1		35.5	27.1		30.2	26.2
Level of Service	E	C		C	C	A		D	C		C	C
Approach Delay (s)		33.3			28.2			31.9			27.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	0.97	0.95			0.91		1.00	0.95	0.95			
Frt	1.00	1.00			0.96		1.00	0.85	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	3467	3574			4894		1787	1519	1519			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	3467	3574			4894		1787	1519	1519			
Volume (vph)	70	245	0	0	520	175	40	0	515	0	0	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	73	255	0	0	542	182	42	0	536	0	0	0
RTOR Reduction (vph)	0	0	0	0	79	0	0	227	227	0	0	0
Lane Group Flow (vph)	73	255	0	0	645	0	42	41	41	0	0	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type	Prot						Split		Perm			
Protected Phases	7	4			8		2	2				
Permitted Phases									2			
Actuated Green, G (s)	13.0	42.8			25.8		9.2	9.2	9.2			
Effective Green, g (s)	13.0	42.8			25.8		9.2	9.2	9.2			
Actuated g/C Ratio	0.22	0.71			0.43		0.15	0.15	0.15			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	751	2549			2104		274	233	233			
v/s Ratio Prot	0.02	c0.07			c0.13		0.02	c0.03				
v/s Ratio Perm									0.03			
v/c Ratio	0.10	0.10			0.31		0.15	0.18	0.18			
Uniform Delay, d1	18.8	2.7			11.2		22.0	22.1	22.1			
Progression Factor	1.27	0.80			0.64		1.00	1.00	1.00			
Incremental Delay, d2	0.3	0.1			0.3		0.3	0.4	0.4			
Delay (s)	24.2	2.2			7.5		22.3	22.5	22.5			
Level of Service	C	A			A		C	C	C			
Approach Delay (s)		7.1			7.5			22.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.97		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5021		3467	3574					1715	1725	1615
Flt Permitted		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5021		3467	3574					1715	1725	1615
Volume (vph)	0	185	50	215	320	0	0	0	0	130	5	290
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	191	52	222	330	0	0	0	0	134	5	299
RTOR Reduction (vph)	0	41	0	0	0	0	0	0	0	0	0	236
Lane Group Flow (vph)	0	202	0	222	330	0	0	0	0	68	71	63
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type				Prot						Split		Prot
Protected Phases		4		3	8					6	6	6
Permitted Phases												
Actuated Green, G (s)		12.8		22.6	29.3					12.6	12.6	12.6
Effective Green, g (s)		12.8		22.6	29.3					12.6	12.6	12.6
Actuated g/C Ratio		0.21		0.38	0.49					0.21	0.21	0.21
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1071		1306	1745					360	362	339
v/s Ratio Prot		0.04		c0.06	c0.09					0.04	c0.04	0.04
v/s Ratio Perm												
v/c Ratio		0.19		0.17	0.19					0.19	0.20	0.19
Uniform Delay, d1		19.3		12.5	8.7					19.5	19.5	19.5
Progression Factor		0.52		0.34	0.99					1.00	1.00	1.00
Incremental Delay, d2		0.4		0.3	0.2					0.3	0.3	0.3
Delay (s)		10.4		4.5	8.8					19.8	19.8	19.7
Level of Service		B		A	A					B	B	B
Approach Delay (s)		10.4			7.1			0.0			19.8	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			0.97	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.96	
Satd. Flow (prot)	1805	1892			1844	1568		1405			1718	
Flt Permitted	0.95	1.00			1.00	1.00		1.00			0.96	
Satd. Flow (perm)	1805	1892			1841	1568		1405			1718	
Volume (vph)	15	165	5	5	540	65	0	0	10	60	0	20
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	15	170	5	5	557	67	0	0	10	62	0	21
RTOR Reduction (vph)	0	2	0	0	0	34	0	10	0	0	18	0
Lane Group Flow (vph)	15	173	0	0	562	33	0	0	0	0	65	0
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	17%	17%	17%	3%	3%	3%
Turn Type	Prot			Perm		Perm	Split			Split		
Protected Phases	7	4			8		1	1		2	2	
Permitted Phases				8		8						
Actuated Green, G (s)	6.1	12.8			29.3	29.3		0.8			7.8	
Effective Green, g (s)	6.1	12.8			29.3	29.3		0.8			7.8	
Actuated g/C Ratio	0.10	0.21			0.49	0.49		0.01			0.13	
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	184	404			899	766		19			223	
v/s Ratio Prot	c0.01	0.09						c0.00			c0.04	
v/s Ratio Perm					c0.31	0.02						
v/c Ratio	0.08	0.43			0.63	0.04		0.01			0.29	
Uniform Delay, d1	24.4	20.4			11.3	8.0		29.2			23.6	
Progression Factor	1.00	1.00			0.62	0.42		1.00			1.00	
Incremental Delay, d2	0.2	3.3			3.1	0.1		0.1			0.7	
Delay (s)	24.6	23.7			10.1	3.4		29.4			24.3	
Level of Service	C	C			B	A		C			C	
Approach Delay (s)		23.8			9.4			29.4			24.3	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	180	550	10	5	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	186	567	10	5	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			236			
pX, platoon unblocked	0.77				0.77	0.77
vC, conflicting volume	577				758	572
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448				684	441
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	860				320	475

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	186	577	5
Volume Left	0	0	5
Volume Right	0	10	0
cSH	860	1700	320
Volume to Capacity	0.00	0.34	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	16.4
Lane LOS			C
Approach Delay (s)	0.0	0.0	16.4
Approach LOS			C

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	140	5	50	505	5	40
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	144	5	52	521	5	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				355		
pX, platoon unblocked					0.78	
vC, conflicting volume			149		771	147
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			149		708	147
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		98	95
cM capacity (veh/h)			1426		306	905

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	149	52	521	5	41
Volume Left	0	52	0	5	0
Volume Right	5	0	0	0	41
cSH	1700	1426	1700	306	905
Volume to Capacity	0.09	0.04	0.31	0.02	0.05
Queue Length 95th (ft)	0	3	0	1	4
Control Delay (s)	0.0	7.6	0.0	17.0	9.2
Lane LOS		A		C	A
Approach Delay (s)	0.0	0.7		10.0	
Approach LOS				B	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	115	5	85	285	5	30
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	121	5	89	300	5	32

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	126	389	37
Volume Left (vph)	0	89	5
Volume Right (vph)	5	0	32
Hadj (s)	0.01	0.08	-0.49
Departure Headway (s)	4.4	4.2	4.5
Degree Utilization, x	0.15	0.45	0.05
Capacity (veh/h)	799	838	712
Control Delay (s)	8.2	10.7	7.8
Approach Delay (s)	8.2	10.7	7.8
Approach LOS	A	B	A

Intersection Summary			
Delay	9.9		
HCM Level of Service	A		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.98	1.00
Satd. Flow (prot)	1770	3513		3433	3390	1441		1853	1583		1824	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.98	1.00
Satd. Flow (perm)	1770	3513		3433	3390	1441		1853	1583		1824	1583
Volume (vph)	285	850	45	535	745	135	15	125	880	90	120	275
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	294	876	46	552	768	139	15	129	907	93	124	284
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	129
Lane Group Flow (vph)	294	922	0	552	768	139	0	144	907	0	217	155
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	58.6	31.1		63.0	35.5	143.0		14.9	63.0		18.0	18.0
Effective Green, g (s)	58.6	31.1		63.0	35.5	143.0		14.9	63.0		18.0	18.0
Actuated g/C Ratio	0.41	0.22		0.44	0.25	1.00		0.10	0.44		0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	725	764		1512	842	1441		193	697		230	199
v/s Ratio Prot	0.17	c0.26		0.16	0.23			c0.08	c0.57		c0.12	
v/s Ratio Perm						0.10						0.10
v/c Ratio	0.41	1.21		0.37	0.91	0.10		0.75	1.30		0.94	0.78
Uniform Delay, d1	29.9	56.0		26.7	52.2	0.0		62.2	40.0		62.0	60.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	105.2		0.2	14.0	0.1		14.5	145.9		43.5	17.2
Delay (s)	30.2	161.2		26.8	66.3	0.1		76.7	185.9		105.5	77.7
Level of Service	C	F		C	E	A		E	F		F	E
Approach Delay (s)		129.5			45.0			171.0			89.8	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	106.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	143.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2015 With Alternative 1 (With RTID Improvements)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	0.97	0.95			0.91		1.00	0.95	0.95			
Frt	1.00	1.00			0.94		1.00	0.85	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	3433	3539			4793		1641	1395	1395			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	3433	3539			4793		1641	1395	1395			
Volume (vph)	590	440	0	0	570	355	175	0	255	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	641	478	0	0	620	386	190	0	277	0	0	0
RTOR Reduction (vph)	0	0	0	0	119	0	0	114	115	0	0	0
Lane Group Flow (vph)	641	478	0	0	887	0	190	24	24	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	10%	10%	10%	2%	2%	2%
Turn Type	Prot						Split		Perm			
Protected Phases	7	4			8		2	2				
Permitted Phases									2			
Actuated Green, G (s)	24.0	57.9			29.9		14.1	14.1	14.1			
Effective Green, g (s)	24.0	57.9			29.9		14.1	14.1	14.1			
Actuated g/C Ratio	0.30	0.72			0.37		0.18	0.18	0.18			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	1030	2561			1791		289	246	246			
v/s Ratio Prot	c0.19	0.14			c0.19		c0.12	0.02				
v/s Ratio Perm									0.02			
v/c Ratio	0.62	0.19			0.50		0.66	0.10	0.10			
Uniform Delay, d1	24.1	3.5			19.3		30.7	27.6	27.6			
Progression Factor	0.48	0.11			0.57		1.00	1.00	1.00			
Incremental Delay, d2	2.6	0.1			0.8		5.3	0.2	0.2			
Delay (s)	14.2	0.5			11.8		36.0	27.8	27.8			
Level of Service	B	A			B		D	C	C			
Approach Delay (s)		8.3			11.8			31.1			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.98		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5031		3433	3539					1665	1681	1568
Flt Permitted		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5031		3433	3539					1665	1681	1568
Volume (vph)	0	950	150	390	350	0	0	0	0	55	5	335
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1033	163	424	380	0	0	0	0	60	5	364
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	0	256
Lane Group Flow (vph)	0	1171	0	424	380	0	0	0	0	32	33	108
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	3%	3%	3%
Turn Type				Prot						Split		Prot
Protected Phases		4		3	8					6	6	6
Permitted Phases												
Actuated Green, G (s)		35.2		9.0	40.2					23.8	23.8	23.8
Effective Green, g (s)		35.2		9.0	40.2					23.8	23.8	23.8
Actuated g/C Ratio		0.44		0.11	0.50					0.30	0.30	0.30
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		2214		386	1778					495	500	466
v/s Ratio Prot		c0.23		c0.12	0.11					0.02	0.02	c0.07
v/s Ratio Perm												
v/c Ratio		0.53		1.10	0.21					0.06	0.07	0.23
Uniform Delay, d1		16.4		35.5	11.1					20.1	20.1	21.2
Progression Factor		0.52		0.94	0.25					1.00	1.00	1.00
Incremental Delay, d2		0.3		71.4	0.2					0.1	0.1	0.3
Delay (s)		8.9		104.7	3.0					20.2	20.2	21.5
Level of Service		A		F	A					C	C	C
Approach Delay (s)		8.9			56.6			0.0			21.3	
Approach LOS		A			E			A			C	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			1.00	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (prot)	1770	1863			1881	1599		1644			1627	
Flt Permitted	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (perm)	1770	1863			1881	1599		1644			1627	
Volume (vph)	20	710	0	0	290	405	0	0	5	380	0	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	772	0	0	315	440	0	0	5	413	0	11
RTOR Reduction (vph)	0	0	0	0	0	440	0	5	0	0	2	0
Lane Group Flow (vph)	22	772	0	0	315	0	0	0	0	0	422	0
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	0%	0%	0%	11%	11%	11%
Turn Type	Prot					NA	Split			Split		
Protected Phases	7	4			8		1	1		2	2	
Permitted Phases												
Actuated Green, G (s)	4.0	35.2			40.2	0.0		0.8			19.0	
Effective Green, g (s)	4.0	35.2			40.2	0.0		0.8			19.0	
Actuated g/C Ratio	0.05	0.44			0.50	0.00		0.01			0.24	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)	89	820			945	0		16			386	
v/s Ratio Prot	c0.01	c0.41			c0.17			c0.00			c0.26	
v/s Ratio Perm												
v/c Ratio	0.25	0.94			0.33	0.00		0.00			1.09	
Uniform Delay, d1	36.6	21.4			11.9	40.0		39.2			30.5	
Progression Factor	1.00	1.00			0.54	1.00		1.00			1.00	
Incremental Delay, d2	1.5	20.0			0.9	0.0		0.1			73.7	
Delay (s)	38.0	41.5			7.3	40.0		39.3			104.2	
Level of Service	D	D			A	D		D			F	
Approach Delay (s)		41.4			26.4			39.3			104.2	
Approach LOS		D			C			D			F	

Intersection Summary			
HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	85	660	250	50	65	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	717	272	54	71	76
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			236			
pX, platoon unblocked	0.90				0.90	0.90
vC, conflicting volume	326				1201	299
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	251				1224	220
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				57	90
cM capacity (veh/h)	1182				166	741

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	810	326	147
Volume Left	92	0	71
Volume Right	0	54	76
cSH	1182	1700	277
Volume to Capacity	0.08	0.19	0.53
Queue Length 95th (ft)	6	0	72
Control Delay (s)	1.9	0.0	31.7
Lane LOS	A		D
Approach Delay (s)	1.9	0.0	31.7
Approach LOS			D

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	715	5	55	270	5	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	777	5	60	293	5	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				355		
pX, platoon unblocked					0.95	
vC, conflicting volume			783		1193	780
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			783		1203	780
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		97	92
cM capacity (veh/h)			840		182	399

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	783	60	293	5	33
Volume Left	0	60	0	5	0
Volume Right	5	0	0	0	33
cSH	1700	840	1700	182	399
Volume to Capacity	0.46	0.07	0.17	0.03	0.08
Queue Length 95th (ft)	0	6	0	2	7
Control Delay (s)	0.0	9.6	0.0	25.4	14.8
Lane LOS		A		D	B
Approach Delay (s)	0.0	1.6		16.3	
Approach LOS				C	

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	410	0	20	155	5	115
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	446	0	22	168	5	125

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	446	190	130
Volume Left (vph)	0	22	5
Volume Right (vph)	0	0	125
Hadj (s)	0.00	0.04	-0.57
Departure Headway (s)	4.5	4.8	4.8
Degree Utilization, x	0.55	0.25	0.17
Capacity (veh/h)	781	718	664
Control Delay (s)	12.8	9.4	8.8
Approach Delay (s)	12.8	9.4	8.8
Approach LOS	B	A	A

Intersection Summary			
Delay	11.3		
HCM Level of Service	B		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (prot)	1770	3527		3433	3390	1441		1869	1599		1807	1599
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.99	1.00		0.96	1.00
Satd. Flow (perm)	1770	3527		3433	3390	1441		1869	1599		1807	1599
Volume (vph)	295	440	10	385	850	115	20	140	115	135	30	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	321	478	11	418	924	125	22	152	125	147	33	250
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	208
Lane Group Flow (vph)	321	489	0	418	924	125	0	174	125	0	180	42
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	12.1	20.9		13.4	22.2	74.6		11.9	13.4		12.4	12.4
Effective Green, g (s)	12.1	20.9		13.4	22.2	74.6		11.9	13.4		12.4	12.4
Actuated g/C Ratio	0.16	0.28		0.18	0.30	1.00		0.16	0.18		0.17	0.17
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	287	988		617	1009	1441		298	287		300	266
v/s Ratio Prot	c0.18	0.14		0.12	c0.27			c0.09	0.08		c0.10	
v/s Ratio Perm						0.09						0.03
v/c Ratio	1.12	0.49		0.68	0.92	0.09		0.58	0.44		0.60	0.16
Uniform Delay, d1	31.2	22.4		28.6	25.3	0.0		29.1	27.2		28.8	26.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	88.8	0.4		3.0	12.5	0.1		2.9	1.1		3.2	0.3
Delay (s)	120.1	22.8		31.5	37.8	0.1		32.0	28.3		32.0	26.9
Level of Service	F	C		C	D	A		C	C		C	C
Approach Delay (s)		61.4			32.8			30.4			29.0	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM Average Control Delay	39.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	74.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Lane Util. Factor	0.97	0.95			0.91		1.00	0.95	0.95			
Frt	1.00	1.00			0.96		1.00	0.85	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	3467	3574			4905		1787	1519	1519			
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	3467	3574			4905		1787	1519	1519			
Volume (vph)	300	295	0	0	565	175	175	0	515	0	0	0
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	312	307	0	0	589	182	182	0	536	0	0	0
RTOR Reduction (vph)	0	0	0	0	80	0	0	215	215	0	0	0
Lane Group Flow (vph)	312	307	0	0	691	0	182	53	53	0	0	0
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Turn Type	Prot						Split		Perm			
Protected Phases	7	4			8		2	2				
Permitted Phases									2			
Actuated Green, G (s)	25.2	48.2			19.0		13.8	13.8	13.8			
Effective Green, g (s)	25.2	48.2			19.0		13.8	13.8	13.8			
Actuated g/C Ratio	0.36	0.69			0.27		0.20	0.20	0.20			
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Lane Grp Cap (vph)	1248	2461			1331		352	299	299			
v/s Ratio Prot	c0.09	0.09			c0.14		c0.10	0.03				
v/s Ratio Perm									0.03			
v/c Ratio	0.25	0.12			0.52		0.52	0.18	0.18			
Uniform Delay, d1	15.8	3.7			21.6		25.1	23.4	23.4			
Progression Factor	0.69	0.42			0.73		1.00	1.00	1.00			
Incremental Delay, d2	0.5	0.1			1.3		1.3	0.3	0.3			
Delay (s)	11.3	1.6			17.0		26.4	23.7	23.7			
Level of Service	B	A			B		C	C	C			
Approach Delay (s)		6.5			17.0			24.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Lane Util. Factor		0.91		0.97	0.95					0.95	0.95	1.00
Frt		0.95		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		4949		3467	3574					1715	1725	1615
Flt Permitted		1.00		0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		4949		3467	3574					1715	1725	1615
Volume (vph)	0	465	205	215	495	0	0	0	0	130	5	490
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	479	211	222	510	0	0	0	0	134	5	505
RTOR Reduction (vph)	0	122	0	0	0	0	0	0	0	0	0	187
Lane Group Flow (vph)	0	568	0	222	510	0	0	0	0	68	71	318
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Turn Type				Prot						Split		Prot
Protected Phases		4		3	8					6	6	6
Permitted Phases												
Actuated Green, G (s)		18.8		10.1	24.3					29.1	29.1	29.1
Effective Green, g (s)		18.8		10.1	24.3					29.1	29.1	29.1
Actuated g/C Ratio		0.27		0.14	0.35					0.42	0.42	0.42
Clearance Time (s)		4.0		4.0	4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1329		500	1241					713	717	671
v/s Ratio Prot		0.11		c0.06	c0.14					0.04	0.04	c0.20
v/s Ratio Perm												
v/c Ratio		0.43		0.44	0.41					0.10	0.10	0.47
Uniform Delay, d1		21.2		27.4	17.4					12.4	12.5	14.9
Progression Factor		1.17		0.67	0.55					1.00	1.00	1.00
Incremental Delay, d2		0.8		2.4	0.9					0.1	0.1	0.5
Delay (s)		25.6		20.8	10.4					12.5	12.5	15.4
Level of Service		C		C	B					B	B	B
Approach Delay (s)		25.6			13.6			0.0			14.8	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.86			0.99	
Flt Protected	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (prot)	1805	1894			1844	1568		1405			1750	
Flt Permitted	0.95	1.00			1.00	1.00		1.00			0.95	
Satd. Flow (perm)	1805	1894			1841	1568		1405			1750	
Volume (vph)	15	215	5	5	585	395	0	0	10	440	0	20
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	15	222	5	5	603	407	0	0	10	454	0	21
RTOR Reduction (vph)	0	1	0	0	0	266	0	10	0	0	2	0
Lane Group Flow (vph)	15	226	0	0	608	141	0	0	0	0	473	0
Heavy Vehicles (%)	0%	0%	0%	3%	3%	3%	17%	17%	17%	3%	3%	3%
Turn Type	Prot			Perm		Perm	Split			Split		
Protected Phases	7	4			8		1	1		2	2	
Permitted Phases				8		8						
Actuated Green, G (s)	4.6	18.8			24.3	24.3		0.8			24.3	
Effective Green, g (s)	4.6	18.8			24.3	24.3		0.8			24.3	
Actuated g/C Ratio	0.07	0.27			0.35	0.35		0.01			0.35	
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0			4.0	
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	119	509			639	544		16			608	
v/s Ratio Prot	c0.01	0.12						c0.00			c0.27	
v/s Ratio Perm					c0.33	0.09						
v/c Ratio	0.13	0.44			0.95	0.26		0.01			0.78	
Uniform Delay, d1	30.8	21.3			22.3	16.4		34.2			20.4	
Progression Factor	1.00	1.00			0.65	0.55		1.00			1.00	
Incremental Delay, d2	0.5	2.8			23.5	1.0		0.2			6.2	
Delay (s)	31.3	24.0			38.0	10.1		34.4			26.7	
Level of Service	C	C			D	B		C			C	
Approach Delay (s)		24.5			26.8			34.4			26.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	70	175	530	75	60	90
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	72	180	546	77	62	93
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			236			
pX, platoon unblocked	0.67				0.67	0.67
vC, conflicting volume	624				910	585
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442				866	385
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	91				69	79
cM capacity (veh/h)	761				199	450

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	253	624	155
Volume Left	72	0	62
Volume Right	0	77	93
cSH	761	1700	299
Volume to Capacity	0.09	0.37	0.52
Queue Length 95th (ft)	8	0	69
Control Delay (s)	3.7	0.0	29.2
Lane LOS	A		D
Approach Delay (s)	3.7	0.0	29.2
Approach LOS			D

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	205	5	50	580	5	40
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	211	5	52	598	5	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)				355		
pX, platoon unblocked					0.70	
vC, conflicting volume			216		915	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			216		879	214
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		98	95
cM capacity (veh/h)			1347		217	831

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	216	52	598	5	41
Volume Left	0	52	0	5	0
Volume Right	5	0	0	0	41
cSH	1700	1347	1700	217	831
Volume to Capacity	0.13	0.04	0.35	0.02	0.05
Queue Length 95th (ft)	0	3	0	2	4
Control Delay (s)	0.0	7.8	0.0	22.0	9.6
Lane LOS		A		C	A
Approach Delay (s)	0.0	0.6		10.9	
Approach LOS				B	

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	175	5	90	355	5	40
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	184	5	95	374	5	42

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total (vph)	189	468	47
Volume Left (vph)	0	95	5
Volume Right (vph)	5	0	42
Hadj (s)	0.02	0.07	-0.51
Departure Headway (s)	4.5	4.3	4.8
Degree Utilization, x	0.24	0.56	0.06
Capacity (veh/h)	773	820	656
Control Delay (s)	8.9	12.6	8.2
Approach Delay (s)	8.9	12.6	8.2
Approach LOS	A	B	A

Intersection Summary			
Delay	11.3		
HCM Level of Service	B		
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00	1.00		0.98	1.00
Satd. Flow (prot)	1770	3513		3433	3390	1441		1854	1583		1823	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00	1.00		0.98	1.00
Satd. Flow (perm)	1770	3513		3433	3390	1441		1854	1583		1823	1583
Volume (vph)	330	850	45	535	745	145	15	135	880	100	130	325
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	340	876	46	552	768	149	15	139	907	103	134	335
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	140
Lane Group Flow (vph)	340	922	0	552	768	149	0	154	907	0	237	195
Turn Type	Prot			Prot		Free	Split		Over	Split		Perm
Protected Phases	7	4		3	8		2	2	3	6	6	
Permitted Phases						Free						6
Actuated Green, G (s)	58.5	31.1		63.0	35.6	143.5		15.4	63.0		18.0	18.0
Effective Green, g (s)	58.5	31.1		63.0	35.6	143.5		15.4	63.0		18.0	18.0
Actuated g/C Ratio	0.41	0.22		0.44	0.25	1.00		0.11	0.44		0.13	0.13
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	722	761		1507	841	1441		199	695		229	199
v/s Ratio Prot	0.19	c0.26		0.16	0.23			c0.08	c0.57		c0.13	
v/s Ratio Perm						0.10						0.12
v/c Ratio	0.47	1.21		0.37	0.91	0.10		0.77	1.31		1.03	0.98
Uniform Delay, d1	31.2	56.2		26.9	52.4	0.0		62.4	40.2		62.8	62.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	107.2		0.2	14.1	0.1		16.9	147.6		68.9	57.9
Delay (s)	31.6	163.4		27.1	66.6	0.1		79.3	187.8		131.6	120.4
Level of Service	C	F		C	E	A		E	F		F	F
Approach Delay (s)		127.9			45.0			172.1			125.1	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM Average Control Delay	110.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	143.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Appendix B

Traffic Volume Forecasts

AM Peak Hour Without RTID Improvements

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

	Enter	Exit	Total
Quendall Project Vols	445	421	866
Quendall Passby Vols	24	20	44

Alternative 1 (incudes 10% increase in apartment trips)

Intersection: I-405 NB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak
Intersection Code: 1
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	625	485	1,110				114	126	240				420	161	581				308	695	1,003			
2015 Baseline Forecast Year	375	327	702				114	145	259				271	277	548				290	300	590			
Fratar Approximation Factor			1.15						1.07						1.15						1.15			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	30	25	345	400	515	915	165	165	140	470	230	700	10	95	90	195	540	735	280	110	350	740	520	1,260
2015 Baseline Year	30	30	400	460	590	1,050	175	180	150	505	245	750	10	115	100	225	615	840	325	115	410	850	590	1,440
Barbee Mills			3					1					0						21	5	16			
Hawks Landing			2					2					28						1	2	11			
Pipeline Projects-Subtotal	0	0	5	5	22	27	0	3	0	3	7	10	28	0	0	28	27	55	22	7	27	56	36	92
2015 Adjusted Baseline with Pipeline	**30**	**30**	**405**	**465**	**610**	**1,075**	**175**	**185**	**150**	**510**	**250**	**760**	**40**	**115**	**100**	**255**	**640**	**895**	**345**	**120**	**435**	**900**	**630**	**1,530**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			10%	10%	10%	20%		10%		10%	10%	20%				0%	45%	45%	10%	10%	45%	65%	20%	85%
Project Traffic Volumes			45	45	40	85		45		45	40	85				0	190	190	40	40	190	270	90	360
2015 with Full Buildout	**30**	**30**	**450**	**510**	**650**	**1,160**	**175**	**230**	**150**	**555**	**290**	**845**	**40**	**115**	**100**	**255**	**830**	**1,085**	**385**	**160**	**625**	**1,170**	**720**	**1,890**

Intersection: I-405 SB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak
Intersection Code: 2
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	502	0	502				695	308	1,003				0	607	607				293	575	868			
2015 Baseline Forecast Year	863	0	863				300	290	590				0	555	555				283	600	883			
Fratar Approximation Factor			1.62						1.15						1.15						1.01			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	55	5	115	175	0	175	390	135	0	525	720	1,245	0	0	0	0	400	400	0	665	5	670	250	920
2015 Baseline Year	130	10	145	285	0	285	480	120	0	600	805	1,405	0	0	0	0	495	495	0	675	5	680	265	945
Barbee Mills			4					4												42	1			
Hawks Landing			18					32												14	18			
Pipeline Projects-Subtotal	0	0	22	22	0	22	0	36	0	36	56	92	0	0	0	0	19	19	0	56	19	75	58	133
2015 Adjusted Baseline with Pipeline	**130**	**10**	**165**	**305**	**0**	**305**	**480**	**155**	**0**	**635**	**860**	**1,495**	**0**	**0**	**0**	**0**	**515**	**515**	**0**	**730**	**25**	**755**	**320**	**1,075**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			45%	45%	0%	45%		20%		20%	65%	85%				0%	0%	0%		65%		65%	65%	130%
Project Traffic Volumes			200	200	0	200		90		90	275	365				0	0	0		275		275	290	565
2015 with Full Buildout	**130**	**10**	**365**	**505**	**0**	**505**	**480**	**245**	**0**	**725**	**1,135**	**1,860**	**0**	**0**	**0**	**0**	**515**	**515**	**0**	**1,005**	**25**	**1,030**	**610**	**1,640**

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Ripley Lane / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 3
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				575	293	868				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				600	283	883				1	1	2				283	601	884			
Fratar Approximation Factor			1.00			FLAG			1.01						1.00			FLAG			1.02			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	30	0	5	35	80	115	0	195	65	260	665	925	0	0	0	0	0	0	15	635	0	650	200	850
2015 Baseline Year	30	0	5	35	80	115	0	200	65	265	680	945	0	0	0	0	0	0	15	650	0	665	205	870
Barbee Mills	34		3					2	6										1	9				
Hawks Landing			3					50							5				2	27				
Pipeline Projects-Subtotal	34	0	6	40	9	49	0	52	6	58	75	133	0	0	5	5	0	5	3	36	0	39	58	97
2015 Adjusted Baseline with Pipeline	**65**	**0**	**10**	**75**	**90**	**165**	**0**	**250**	**70**	**320**	**755**	**1,075**	**0**	**0**	**5**	**5**	**0**	**5**	**20**	**685**	**0**	**705**	**260**	**965**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%	0%			0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0	0	0		0	0	0
Project Trip Distribution	60%		0%	60%	60%	120%		5%	60%	65%	65%	130%				0%	0%	0%	0%	5%		5%	5%	10%
Project Traffic Volumes	255		0	255	265	520		20	265	285	275	560				0	0	0	0	20		20	20	40
2015 with Full Buildout	**320**	**0**	**10**	**330**	**355**	**685**	**0**	**270**	**335**	**605**	**1,030**	**1,635**	**0**	**0**	**5**	**5**	**0**	**5**	**20**	**705**	**0**	**725**	**280**	**1,005**

Intersection: Lake Washington Blvd / Barbee Mills Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 4
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				601	283	884				1	1	2				283	601	884			
Fratar Approximation Factor			1.00			FLAG			1.02						1.00			FLAG			1.02			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
2015 Baseline Year	0	0	0	0	0	0	0	205	0	205	665	870	0	0	0	0	0	0	0	665	0	665	205	870
Barbee Mills	9		1					3	2										0	1				
Hawks Landing								53												29				
Pipeline Projects-Subtotal	9	0	1	10	2	12	0	56	2	58	39	97	0	0	0	0	0	0	0	30	0	30	57	87
2015 Adjusted Baseline with Pipeline	**10**	**0**	**0**	**10**	**0**	**10**	**0**	**260**	**0**	**260**	**705**	**965**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**695**	**0**	**695**	**260**	**955**
Passby Distribution	75%		25%	100%	100%	200%			25%	25%	75%	100%				0%	0%	0%	75%			75%	25%	100%
Passby Traffic Volumes	15		5	20	25	45		-5	5	0	-5	-5				0	0	0	20	-20		0	0	0
Project Trip Distribution	5%		35%	40%	40%	80%			5%	5%	5%	10%				0%	0%	0%	35%			35%	35%	70%
Project Traffic Volumes	20		145	165	175	340			20	20	20	40				0	0	0	155			155	145	300
2015 with Full Buildout	**45**	**0**	**150**	**195**	**200**	**395**	**0**	**255**	**25**	**280**	**720**	**1,000**	**0**	**0**	**0**	**0**	**0**	**0**	**175**	**675**	**0**	**850**	**405**	**1,255**

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Lake Washington Blvd / Hawks Landing Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 5
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				601	283	884				1	1	2				283	601	884			
Fratar Approximation Factor			1.02						1.02						1.00			FLAG			1.02			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
2015 Baseline Year	0	0	0	0	0	0	0	205	0	205	665	870	0	0	0	0	0	0	0	665	0	665	205	870
Barbee Mills								4												1				
Hawks Landing							53						4		29						6			
Pipeline Projects-Subtotal	0	0	0	0	0	0	53	4	0	57	30	87	4	0	29	33	59	92	0	1	6	7	8	15
2015 Adjusted Baseline with Pipeline	**0**	**0**	**0**	**0**	**0**	**0**	**55**	**210**	**0**	**265**	**695**	**960**	**5**	**0**	**30**	**35**	**60**	**95**	**0**	**665**	**5**	**670**	**215**	**885**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%		35%		35%	35%	70%				0%	0%	0%		35%		35%	35%	70%
Project Traffic Volumes				0	0	0		145		145	155	300				0	0	0		155		155	145	300
2015 with Full Buildout	**0**	**0**	**0**	**0**	**0**	**0**	**55**	**355**	**0**	**410**	**850**	**1,260**	**5**	**0**	**30**	**35**	**60**	**95**	**0**	**820**	**5**	**825**	**360**	**1,185**

Intersection: N 36th St / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 6
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				324	217	541				71	250	321				223	317	540			
2015 Baseline Forecast Year	1	1	2				432	216	648				67	169	236				241	439	680			
Fratar Approximation Factor			1.00			FLAG			1.17						1.15						1.22			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	0	0	0	0	0	0	17	89	0	106	451	557	6	0	106	112	19	131	0	345	2	347	95	442
2015 Baseline Year	0	0	0	0	0	0	20	105	0	125	540	665	10	0	120	130	25	155	0	420	5	425	115	540
Barbee Mills							0	4							0					1				
Hawks Landing							1	3							1					5				
Pipeline Projects-Subtotal	0	0	0	0	0	0	1	7	0	8	7	15	0	0	1	1	1	2	0	6	0	6	7	13
2015 Adjusted Baseline with Pipeline	**0**	**0**	**5**	**5**	**5**	**10**	**20**	**110**	**0**	**130**	**545**	**675**	**10**	**0**	**120**	**130**	**25**	**155**	**5**	**425**	**5**	**435**	**125**	**560**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%	20%	15%		35%	35%	70%			20%	20%	20%	40%		15%		15%	15%	30%
Project Traffic Volumes				0	0	0	85	65		150	155	305			90	90	85	175		65		65	65	130
2015 with Full Buildout	**0**	**0**	**5**	**5**	**5**	**10**	**105**	**175**	**0**	**280**	**700**	**980**	**10**	**0**	**210**	**220**	**110**	**330**	**5**	**490**	**5**	**500**	**190**	**690**

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: N 30th St / Burnett Ave **Intersection Code:** 7 **Count Source:** ATDS - 6/8/2010 Count
Scenario: Master Use Plan **Analyst:** JGT **2015 to 2010 Factor:** 0.7143
Analysis Year: 2015 **Checked by:** MJR
Time Period: AM Peak **Date of Completion:** 6/14/2010

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	216	114	330				148	226	374				52	81	133				1	1	2			
2015 Baseline Forecast Year	95	76	171				77	101	178				67	67	134				1	1	2			
Fratar Approximation Factor			1.15						1.15						1.01						1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	18	25	0	43	79	122	20	11	20	51	75	126	0	59	47	106	45	151	0	10	0	10	11	21
2015 Baseline Year	25	25	0	50	90	140	20	10	30	60	85	145	0	60	50	110	45	155	0	10	0	10	10	20
Barbee Mills																								
Hawks Landing	1								1															
Pipeline Projects-Subtotal	1	0	0	1	1	2	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	25	25	0	50	90	140	20	10	30	60	85	145	0	60	50	110	45	155	0	10	0	10	10	20
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution	20%			20%	20%	40%			20%	20%	20%	40%				0%	0%	0%				0%	0%	0%
Project Traffic Volumes	85			85	90	175			90	90	85	175				0	0	0				0	0	0
2015 with Full Buildout	110	25	0	135	180	315	20	10	120	150	170	320	0	60	50	110	45	155	0	10	0	10	10	20

Intersection: Lake Washington Blvd / Burnett Ave **Intersection Code:** 8 **Count Source:** ATDS - 6/8/2010 Count
Scenario: Master Use Plan **Analyst:** JGT **2015 to 2010 Factor:** 0.7143
Analysis Year: 2015 **Checked by:** MJR
Time Period: AM Peak **Date of Completion:** 6/14/2010

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	81	52	133				283	323	606				1	1	2				322	283	605			
2015 Baseline Forecast Year	67	67	134				421	521	942				1	1	2				477	339	816			
Fratar Approximation Factor			1.01						1.48						1.00			FLAG			1.30			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	2	87	0	89	335	424	54	0	1	55	100	155	0	334	98	432	141	573	0	0	0	0	0	0
2015 Baseline Year	5	85	0	90	310	400	80	0	5	85	135	220	0	305	130	435	165	600	0	0	0	0	0	0
Barbee Mills		4												1										
Hawks Landing		3												5										
Pipeline Projects-Subtotal	0	7	0	7	6	13	0	0	0	0	0	0	0	6	0	6	7	13	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	5	90	0	95	315	410	80	0	5	85	135	220	0	310	130	440	170	610	0	0	0	0	0	0
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution		15%		15%	15%	30%				0%	0%	0%		15%		15%	15%	30%				0%	0%	0%
Project Traffic Volumes		65		65	65	130				0	0	0		65		65	65	130				0	0	0
2015 with Full Buildout	5	155	0	160	380	540	80	0	5	85	135	220	0	375	130	505	235	740	0	0	0	0	0	0

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Lake Washington Blvd / Garden Ave N / Park Ave N
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 9
Analyst: JGT
Checked by: MJR
Date of Completion: #######

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	710	683	1,393				1,291	1,726	3,017				329	209	538				1,562	1,274	2,836			
2015 Baseline Forecast Year	945	601	1,546				1,615	2,412	4,027				805	576	1,381				1,862	1,540	3,402			
Fratar Approximation Factor			1.09						1.29						2.34						1.17			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	98	15	204	317	457	774	208	718	90	1,016	505	1,521	12	88	55	155	231	386	279	352	8	639	934	1,573
2015 Baseline Year	85	35	230	350	515	865	460	785	60	1,305	675	1,980	40	180	145	365	520	885	275	445	25	745	1,055	1,800
Barbee Mills	1	1	2																1					
Hawks Landing	1	1	1						1					1					3					
Pipeline Projects-Subtotal	2	2	3	7	6	13	0	0	1	1	2	3	0	1	0	1	2	3	4	0	0	4	3	7
2015 Adjusted Baseline with Pipeline	**85**	**35**	**235**	**355**	**520**	**875**	**460**	**785**	**60**	**1,305**	**675**	**1,980**	**40**	**180**	**145**	**365**	**520**	**885**	**280**	**445**	**25**	**750**	**1,060**	**1,810**
Passby Distribution				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**
Passby Traffic Volumes				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**
Project Trip Distribution	1%	4%	10%	**15%**	**15%**	**30%**			1%	**1%**	**1%**	**2%**		4%		**4%**	**4%**	**8%**	10%			**10%**	**10%**	**20%**
Project Traffic Volumes	5	15	40	**60**	**70**	**130**			5	**5**	**5**	**10**		20		**20**	**15**	**35**	45			**45**	**40**	**85**
2015 with Full Buildout	**90**	**50**	**275**	**415**	**590**	**1,005**	**460**	**785**	**65**	**1,310**	**680**	**1,990**	**40**	**200**	**145**	**385**	**535**	**920**	**325**	**445**	**25**	**795**	**1,100**	**1,895**

PM Peak Hour Without RTID Improvements

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

	Enter	Exit	Total
Quendall Project Vols	442	509	951
Quendall Passby Vols	28	21	49

Alternative 1 (incudes 10% increase in apartment trips)

Intersection: I-405 NB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 1
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	625	485	1,110				114	126	240				420	161	581				308	695	1,003				
2015 Baseline Forecast Year	375	327	702				114	145	259				271	277	548				290	300	590				
Fratar Approximation Factor			1.15						1.07						1.15						1.15				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2009 Existing Conditions	50	25	330	405	350	755	75	150	65	290	360	650	15	230	145	390	160	550	55	165	60	280	495	775	1,365
2015 Baseline Year	50	30	385	465	405	870	80	165	65	310	385	695	20	275	155	450	185	635	65	180	75	320	570	890	1,545
Barbee Mills			9					6					1						3	10	3				32
Hawks Landing			2					2					26						1	2	15				48
Pipeline Projects-Subtotal	0	0	11	11	4	15	0	8	0	8	12	20	27	0	0	27	18	45	4	12	18	34	46	80	80
2015 Adjusted Baseline with Pipeline	50	30	395	475	410	885	80	175	65	320	395	715	45	275	155	475	205	680	70	190	95	355	615	970	1,625
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution			10%	10%	10%	20%		10%		10%	10%	20%				0%	45%	45%	10%	10%	45%	65%	20%	85%	1
Project Traffic Volumes			45	45	50	95		45		45	50	95				0	230	230	50	50	230	330	90	420	420
2015 with Full Buildout	50	30	440	520	460	980	80	220	65	365	445	810	45	275	155	475	435	910	120	240	325	685	705	1,390	2,045

Intersection: I-405 SB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 2
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	502	0	502				695	308	1,003				0	607	607				293	575	868				
2015 Baseline Forecast Year	863	0	863				300	290	590				0	555	555				283	600	883				
Fratar Approximation Factor			1.31						1.15						1.15						1.01				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2009 Existing Conditions	130	5	250	385	0	385	215	275	0	490	280	770	0	0	0	0	245	245	0	150	25	175	525	700	1,050
2015 Baseline Year	200	5	300	505	0	505	275	285	0	560	355	915	0	0	0	0	305	305	0	155	25	180	585	765	1,245
Barbee Mills			22					16												16	2				56
Hawks Landing			16					30												18	23				87
Pipeline Projects-Subtotal	0	0	38	38	0	38	0	46	0	46	34	80	0	0	0	0	25	25	0	34	25	59	84	143	143
2015 Adjusted Baseline with Pipeline	200	5	340	545	0	545	275	330	0	605	390	995	0	0	0	0	330	330	0	190	50	240	670	910	1,390
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution			45%	45%	0%	45%		20%		20%	65%	85%				0%	0%	0%		65%		65%	65%	130%	1
Project Traffic Volumes			200	200	0	200		90		90	330	420				0	0	0		330		330	290	620	620
2015 with Full Buildout	200	5	540	745	0	745	275	420	0	695	720	1,415	0	0	0	0	330	330	0	520	50	570	960	1,530	2,010

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Ripley Lane / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 3
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	1	1	2				575	293	868				1	1	2				287	574	861				
2015 Baseline Forecast Year	1	1	2				600	283	883				1	1	2				283	601	884				
Fratar Approximation Factor				1.00		FLAG				1.01						1.00		FLAG				1.02			
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2009 Existing Conditions	45	0	15	60	40	100	5	485	35	525	175	700	0	0	5	5	10	15	5	125	5	135	500	635	725
2015 Baseline Year	45	0	15	60	40	100	5	495	35	535	180	715	0	0	5	5	10	15	5	130	5	140	510	650	740
Barbee Mills	14		3					8	30										6	4					65
Hawks Landing			3					46							5				2	36					92
Pipeline Projects-Subtotal	14	0	6	20	38	58	0	54	30	84	59	143	0	0	5	5	0	5	8	40	0	48	60	108	157
2015 Adjusted Baseline with Pipeline	60	0	20	80	80	160	5	550	65	620	240	860	0	0	10	10	10	20	15	170	5	190	570	760	900
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution	60%		0%	60%	60%	120%		5%	60%	65%	65%	130%				0%	0%	0%	0%	5%		5%	5%	10%	1
Project Traffic Volumes	305		0	305	265	570		20	265	285	330	615				0	0	0	0	25		25	20	45	615
2015 with Full Buildout	365	0	20	385	345	730	5	570	330	905	570	1,475	0	0	10	10	10	20	15	195	5	215	590	805	1,515

Intersection: Lake Washington Blvd / Barbee Mills Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 4
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861				
2015 Baseline Forecast Year	1	1	2				601	283	884				1	1	2				283	601	884				
Fratar Approximation Factor				1.00		FLAG				1.02						1.00		FLAG				1.02			
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2009 Existing Conditions	0	0	0	0	0	0	0	500	0	500	135	635	0	0	0	0	0	0	0	135	0	135	500	635	636
2015 Baseline Year	0	0	0	0	0	0	0	510	0	510	140	650	0	0	0	0	0	0	0	140	0	140	510	650	650
Barbee Mills	4		1					3	8										1	6					23
Hawks Landing								49												38					87
Pipeline Projects-Subtotal	4	0	1	5	9	14	0	52	8	60	48	108	0	0	0	0	0	0	1	44	0	45	53	98	110
2015 Adjusted Baseline with Pipeline	5	0	0	5	10	15	0	560	10	570	190	760	0	0	0	0	0	0	0	185	0	185	560	745	760
Passby Distribution	25%		75%	100%	100%	200%			75%	75%	25%	100%				0%	0%	0%	25%			25%	75%	100%	2
Passby Traffic Volumes	5		15	20	25	45		-20	20	0	0	0				0	0	0	5	-5		0	-5	-5	20
Project Trip Distribution	5%		35%	40%	40%	80%			5%	5%	5%	10%				0%	0%	0%	35%			35%	35%	70%	1
Project Traffic Volumes	25		180	205	175	380			20	20	25	45				0	0	0	155			155	180	335	380
2015 with Full Buildout	35	0	195	230	210	440	0	540	50	590	215	805	0	0	0	0	0	0	160	180	0	340	735	1,075	1,160

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Lake Washington Blvd / Hawks Landing Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 5
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861				
2015 Baseline Forecast Year	1	1	2				601	283	884				1	1	2				283	601	884				
Fratar Approximation Factor			1.02						1.02						1.00			FLAG			1.02				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2009 Existing Conditions	0	0	0	0	0	0	0	500	0	500	135	635	0	0	0	0	0	0	0	135	0	135	500	635	636
2015 Baseline Year	0	0	0	0	0	0	0	510	0	510	140	650	0	0	0	0	0	0	0	140	0	140	510	650	650
Barbee Mills								4												7					11
Hawks Landing							49						5		38						5				97
Pipeline Projects-Subtotal	0	0	0	0	0	0	49	4	0	53	45	98	5	0	38	43	54	97	0	7	5	12	9	21	108
2015 Adjusted Baseline with Pipeline	**0**	**0**	**0**	**0**	**0**	**0**	**50**	**515**	**0**	**565**	**185**	**750**	**5**	**0**	**40**	**45**	**55**	**100**	**0**	**145**	**5**	**150**	**520**	**670**	**760**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution				0%	0%	0%		35%		35%	35%	70%				0%	0%	0%		35%		35%	35%	70%	1
Project Traffic Volumes				0	0	0		180		180	155	335				0	0	0		155		155	180	335	335
2015 with Full Buildout	**0**	**0**	**0**	**0**	**0**	**0**	**50**	**695**	**0**	**745**	**340**	**1,085**	**5**	**0**	**40**	**45**	**55**	**100**	**0**	**300**	**5**	**305**	**700**	**1,005**	**1,095**

Intersection: N 36th St / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 6
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	1	1	2				324	217	541				71	250	321				223	317	540				
2015 Baseline Forecast Year	1	1	2				432	216	648				67	169	236				241	439	680				
Fratar Approximation Factor			1.00			FLAG			1.17						1.15						1.22				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2010 Existing Conditions	0	0	0	0	0	0	83	280	0	363	132	495	4	0	25	29	90	119	0	107	7	114	284	398	506
2015 Baseline Year	0	0	0	0	0	0	90	335	0	425	160	585	5	0	30	35	100	135	0	130	10	140	340	480	600
Barbee Mills							1	3							2					5					11
Hawks Landing							1	4							1					4					10
Pipeline Projects-Subtotal	0	0	0	0	0	0	2	7	0	9	12	21	0	0	3	3	2	5	0	9	0	9	7	16	21
2015 Adjusted Baseline with Pipeline	**0**	**0**	**0**	**0**	**0**	**0**	**90**	**340**	**0**	**430**	**175**	**605**	**5**	**0**	**35**	**40**	**100**	**140**	**0**	**140**	**10**	**150**	**345**	**495**	**620**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution				0%	0%	0%	20%	15%		35%	35%	70%			20%	20%	20%	40%		15%		15%	15%	30%	1
Project Traffic Volumes				0	0	0	100	75		175	155	330			90	90	100	190		65		65	75	140	330
2015 with Full Buildout	**0**	**0**	**0**	**0**	**0**	**0**	**190**	**415**	**0**	**605**	**330**	**935**	**5**	**0**	**125**	**130**	**200**	**330**	**0**	**205**	**10**	**215**	**420**	**635**	**950**

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: N 30th St / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 7
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	216	114	330				148	226	374				52	81	133				1	1	2				
2015 Baseline Forecast Year	95	76	171				77	101	178				67	67	134				1	1	2				
Fratar Approximation Factor			1.15						1.15						1.01						1.00			FLAG	
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2010 Existing Conditions	44	55	2	101	51	152	64	28	13	105	118	223	2	38	61	101	120	221	0	13	1	14	32	46	321
2015 Baseline Year	60	55	0	115	60	175	70	30	20	120	135	255	0	40	60	100	125	225	0	15	0	15	30	45	350
Barbee Mills	1								2																3
Hawks Landing	1								1																2
Pipeline Projects-Subtotal	2	0	0	2	3	5	0	0	3	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	5
2015 Adjusted Baseline with Pipeline	60	55	0	115	65	180	70	30	25	125	135	260	0	40	60	100	125	225	0	15	0	15	30	45	355
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution	20%			20%	20%	40%			20%	20%	20%	40%				0%	0%	0%				0%	0%	0%	0
Project Traffic Volumes	100			100	90	190			90	90	100	190				0	0	0				0	0	0	190
2015 with Full Buildout	160	55	0	215	155	370	70	30	115	215	235	450	0	40	60	100	125	225	0	15	0	15	30	45	545

Intersection: Lake Washington Blvd / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 8
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	81	52	133				283	323	606				1	1	2				322	283	605				
2015 Baseline Forecast Year	67	67	134				421	521	942				1	1	2				477	339	816				
Fratar Approximation Factor			1.01						1.48						1.00			FLAG			1.30				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2010 Existing Conditions	92	0	3	95	113	208	0	104	111	215	381	596	0	0	0	0	0	0	2	289	0	291	107	398	601
2015 Baseline Year	95	0	0	95	145	240	0	175	145	320	470	790	0	0	0	0	0	0	0	375	0	375	175	550	790
Barbee Mills								5												3					8
Hawks Landing								4												4					8
Pipeline Projects-Subtotal	0	0	0	0	0	0	0	9	0	9	7	16	0	0	0	0	0	0	0	7	0	7	9	16	16
2015 Adjusted Baseline with Pipeline	95	0	0	95	145	240	0	185	145	330	475	805	0	0	0	0	0	0	0	380	0	380	185	565	805
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution				0%	0%	0%		15%		15%	15%	30%				0%	0%	0%		15%		15%	15%	30%	0
Project Traffic Volumes				0	0	0		65		65	75	140				0	0	0		75		75	65	140	140
2015 with Full Buildout	95	0	0	95	145	240	0	250	145	395	550	945	0	0	0	0	0	0	0	455	0	455	250	705	945

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
Without RTID I-405 Improvements

Intersection: Lake Washington Blvd / Garden Ave N / Park Ave N
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 9
Analyst: JGT
Checked by: MJR
Date of Completion: #######

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound						
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit					
2008 Calibration Year	710	683	1,393				1,291	1,726	3,017				329	209	538				1,562	1,274	2,836				
2015 Baseline Forecast Year	945	601	1,546				1,615	2,412	4,027				805	576	1,381				1,862	1,540	3,402				
Fratar Approximation Factor			1.09						1.29						2.34						1.17				
	North Approach						East Approach						South Approach						West Approach						
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	
2010 Existing Conditions	90	83	292	465	514	979	295	646	132	1,073	1,345	2,418	9	85	497	591	404	995	297	758	26	1,081	947	2,028	3,210
2015 Baseline Year	40	165	300	505	625	1,130	615	695	70	1,380	1,965	3,345	45	210	1,125	1,380	905	2,285	345	800	125	1,270	1,040	2,310	4,535
Barbee Mills	1	1	1						1					1					3						8
Hawks Landing	1	1	2						1					1					2						8
Pipeline Projects-Subtotal	2	2	3	7	9	16	0	0	2	2	2	4	0	2	0	2	2	4	5	0	0	5	3	8	16
2015 Adjusted Baseline with Pipeline	**40**	**165**	**305**	**510**	**630**	**1,140**	**615**	**695**	**70**	**1,380**	**1,965**	**3,345**	**45**	**210**	**1,125**	**1,380**	**905**	**2,285**	**350**	**800**	**125**	**1,275**	**1,045**	**2,320**	**4,545**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%	0
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0	0
Project Trip Distribution	1%	4%	10%	15%	15%	30%			1%	1%	1%	2%		4%		4%	4%	8%	10%			10%	10%	20%	0
Project Traffic Volumes	5	20	50	75	70	145			5	5	5	10		20		20	20	40	45			45	50	95	145
2015 with Full Buildout	**45**	**185**	**355**	**585**	**700**	**1,285**	**615**	**695**	**75**	**1,385**	**1,970**	**3,355**	**45**	**230**	**1,125**	**1,400**	**925**	**2,325**	**395**	**800**	**125**	**1,320**	**1,095**	**2,415**	**4,690**

AM Peak Hour With RTID Improvements

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

	Enter	Exit	Total
Quendall Project Vols	445	421	866
Quendall Passby Vols	24	20	44

Alternative 1 (incudes 10% increase in apartment trips)

Intersection: I-405 NB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak
Intersection Code: 1
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	625	485	1,110				114	126	240				420	161	581				308	695	1,003			
2015 Baseline Forecast Year	550	587	1,137				137	253	390				683	134	817				160	558	718			
Fratar Approximation Factor			1.02						1.54						1.35						1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	30	25	345	400	515	915	165	165	140	470	230	700	10	95	90	195	540	735	280	110	350	740	520	1,260
2015 Baseline Year	0	0	0	0	730	730	0	515	355	870	625	1,495	10	0	255	265	0	265	375	370	0	745	525	1,270
Barbee Mills			0					4					0						16	26	0			
Hawks Landing			0					4					28						11	3	0			
Pipeline Projects-Subtotal	0	0	0	0	27	27	0	8	0	8	29	37	28	0	0	28	0	28	27	29	0	56	36	92
2015 Adjusted Baseline with Pipeline	0	0	0	0	755	755	0	525	355	880	655	1,535	40	0	255	295	0	295	400	400	0	800	565	1,365
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			0%	0%	45%	45%		10%		10%	10%	20%	30%			30%	0%	30%	45%	10%	0%	55%	40%	95%
Project Traffic Volumes			0	0	190	190		45		45	40	85	135			135	0	135	190	40	0	230	180	410
2015 with Full Buildout	0	0	0	0	945	945	0	570	355	925	695	1,620	175	0	255	430	0	430	590	440	0	1,030	745	1,775

Intersection: I-405 SB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak
Intersection Code: 2
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	502	0	502				695	308	1,003				0	607	607				293	575	868			
2015 Baseline Forecast Year	279	0	279				558	160	718				0	538	538				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	55	5	115	175	0	175	390	135	0	525	720	1,245	0	0	0	0	400	400	0	665	5	670	250	920
2015 Baseline Year	55	5	115	175	0	175	390	135	0	525	720	1,245	0	0	0	0	400	400	0	665	5	670	250	920
Barbee Mills			4					4												42	1			
Hawks Landing			18					32												14	18			
Pipeline Projects-Subtotal	0	0	22	22	0	22	0	36	0	36	56	92	0	0	0	0	19	19	0	56	19	75	58	133
2015 Adjusted Baseline with Pipeline	55	5	135	195	0	195	390	170	0	560	775	1,335	0	0	0	0	420	420	0	720	25	745	305	1,050
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			45%	45%	0%	45%		40%		40%	55%	95%				0%	30%	30%		55%	30%	85%	85%	170%
Project Traffic Volumes			200	200	0	200		180		180	230	410				0	125	125		230	125	355	380	735
2015 with Full Buildout	55	5	335	395	0	395	390	350	0	740	1,005	1,745	0	0	0	0	545	545	0	950	150	1,100	685	1,785

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Ripley Lane / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 3
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				575	293	868				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				169	30	199				1	1	2				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	30	0	5	35	80	115	0	195	65	260	665	925	0	0	0	0	0	0	15	635	0	650	200	850
2015 Baseline Year	30	0	5	35	80	115	0	195	65	260	665	925	0	0	0	0	0	0	15	635	0	650	200	850
Barbee Mills	34		3					2	6										1	9				
Hawks Landing			3					50							5				2	27				
Pipeline Projects-Subtotal	34	0	6	40	9	49	0	52	6	58	75	133	0	0	5	5	0	5	3	36	0	39	58	97
2015 Adjusted Baseline with Pipeline	**65**	**0**	**10**	**75**	**90**	**165**	**0**	**245**	**70**	**315**	**740**	**1,055**	**0**	**0**	**5**	**5**	**0**	**5**	**20**	**670**	**0**	**690**	**255**	**945**
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%	0%			0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0	0	0		0	0	0
Project Trip Distribution	75%			75%	75%	150%		10%	75%	85%	85%	170%				0%	0%	0%	0%	10%		10%	10%	20%
Project Traffic Volumes	315			315	335	650		45	335	380	355	735				0	0	0	0	40		40	45	85
2015 with Full Buildout	**380**	**0**	**10**	**390**	**425**	**815**	**0**	**290**	**405**	**695**	**1,095**	**1,790**	**0**	**0**	**5**	**5**	**0**	**5**	**20**	**710**	**0**	**730**	**300**	**1,030**

Intersection: Lake Washington Blvd / Barbee Mills Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 4
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				169	30	199				1	1	2				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
2015 Baseline Year	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
Barbee Mills	9		1					3	2										0	1				
Hawks Landing								53												29				
Pipeline Projects-Subtotal	9	0	1	10	2	12	0	56	2	58	39	97	0	0	0	0	0	0	0	30	0	30	57	87
2015 Adjusted Baseline with Pipeline	**10**	**0**	**0**	**10**	**0**	**10**	**0**	**255**	**0**	**255**	**690**	**945**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**680**	**0**	**680**	**255**	**935**
Passby Distribution	75%		25%	100%	100%	200%			25%	25%	75%	100%				0%	0%	0%	75%			75%	25%	100%
Passby Traffic Volumes	15		5	20	25	45		-5	5	0	-5	-5				0	0	0	20	-20		0	0	0
Project Trip Distribution	10%		15%	25%	25%	50%			10%	10%	10%	20%				0%	0%	0%	15%			15%	15%	30%
Project Traffic Volumes	40		65	105	110	215			45	45	40	85				0	0	0	65			65	65	130
2015 with Full Buildout	**65**	**0**	**70**	**135**	**135**	**270**	**0**	**250**	**50**	**300**	**725**	**1,025**	**0**	**0**	**0**	**0**	**0**	**0**	**85**	**660**	**0**	**745**	**320**	**1,065**

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Lake Washington Blvd / Hawks Landing Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 5
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				169	30	199				1	1	2				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
2015 Baseline Year	0	0	0	0	0	0	0	200	0	200	650	850	0	0	0	0	0	0	0	650	0	650	200	850
Barbee Mills								4												1				
Hawks Landing							53						4		29						6			
Pipeline Projects-Subtotal	0	0	0	0	0	0	53	4	0	57	30	87	4	0	29	33	59	92	0	1	6	7	8	15
2015 Adjusted Baseline with Pipeline	0	0	0	0	0	0	55	205	0	260	680	940	5	0	30	35	60	95	0	650	5	655	210	865
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%		15%		15%	15%	30%				0%	0%	0%		15%		15%	15%	30%
Project Traffic Volumes				0	0	0		65		65	65	130				0	0	0		65		65	65	130
2015 with Full Buildout	0	0	0	0	0	0	55	270	0	325	745	1,070	5	0	30	35	60	95	0	715	5	720	275	995

Intersection: N 36th St / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 6
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				324	217	541				71	250	321				223	317	540			
2015 Baseline Forecast Year	1	1	2				130	16	146				13	39	52				23	103	126			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	0	0	0	0	0	0	17	89	0	106	451	557	6	0	106	112	19	131	0	345	2	347	95	442
2015 Baseline Year	0	0	0	0	0	0	15	90	0	105	450	555	5	0	105	110	15	125	0	345	0	345	95	440
Barbee Mills							0	4							0					1				
Hawks Landing							1	3							1					5				
Pipeline Projects-Subtotal	0	0	0	0	0	0	1	7	0	8	7	15	0	0	1	1	1	2	0	6	0	6	7	13
2015 Adjusted Baseline with Pipeline	0	0	5	5	5	10	15	95	0	110	455	565	5	0	105	110	15	125	5	350	0	355	105	460
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%	1%	14%		15%	16%	31%			2%	2%	1%	3%		14%		14%	14%	28%
Project Traffic Volumes				0	0	0	5	60		65	70	135			10	10	5	15		60		60	60	120
2015 with Full Buildout	0	0	5	5	5	10	20	155	0	175	525	700	5	0	115	120	20	140	5	410	0	415	165	580

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: N 30th St / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 7
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	216	114	330				148	226	374				52	81	133				1	1	2			
2015 Baseline Forecast Year	90	76	166				146	144	290				58	73	131				1	1	2			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	18	25	0	43	79	122	20	11	20	51	75	126	0	59	47	106	45	151	0	10	0	10	11	21
2015 Baseline Year	20	25	0	45	80	125	20	10	20	50	75	125	0	60	45	105	45	150	0	10	0	10	10	20
Barbee Mills																								
Hawks Landing	1								1															
Pipeline Projects-Subtotal	1	0	0	1	1	2	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	20	25	0	45	80	125	20	10	20	50	75	125	0	60	45	105	45	150	0	10	0	10	10	20
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution	1%			1%	1%	2%			1%	1%	1%	2%				0%	0%	0%				0%	0%	0%
Project Traffic Volumes	5			5	5	10			5	5	5	10				0	0	0				0	0	0
2015 with Full Buildout	25	25	0	50	85	135	20	10	25	55	80	135	0	60	45	105	45	150	0	10	0	10	10	20

Intersection: Lake Washington Blvd / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 8
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	81	52	133				283	323	606				1	1	2				322	283	605			
2015 Baseline Forecast Year	73	58	131				77	75	152				1	1	2				76	77	153			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	2	87	0	89	335	424	54	0	1	55	100	155	0	334	98	432	141	573	0	0	0	0	0	0
2015 Baseline Year	0	85	0	85	335	420	55	0	0	55	100	155	0	335	100	435	140	575	0	0	0	0	0	0
Barbee Mills		4												1										
Hawks Landing		3												5										
Pipeline Projects-Subtotal	0	7	0	7	6	13	0	0	0	0	0	0	0	6	0	6	7	13	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	0	90	0	90	340	430	55	0	0	55	100	155	0	340	100	440	145	585	0	0	0	0	0	0
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution		14%		14%	14%	28%				0%	0%	0%		14%		14%	14%	28%				0%	0%	0%
Project Traffic Volumes		60		60	60	120				0	0	0		60		60	60	120				0	0	0
2015 with Full Buildout	0	150	0	150	400	550	55	0	0	55	100	155	0	400	100	500	205	705	0	0	0	0	0	0

Quendall Terminals
2015 AM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Lake Washington Blvd / Garden Ave N / Park Ave N
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: AM Peak

Intersection Code: 9
Analyst: JGT
Checked by: MJR
Date of Completion: #######

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	710	683	1,393				1,291	1,726	3,017				329	209	538				1,562	1,274	2,836			
2015 Baseline Forecast Year	882	567	1,449				1,520	2,616	4,136				704	291	995				1,744	1,375	3,119			
Fratar Approximation Factor			1.03						1.32						1.73						1.09			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	98	15	204	317	457	774	208	718	90	1,016	505	1,521	12	88	55	155	231	386	279	352	8	639	934	1,573
2015 Baseline Year	125	20	185	330	480	810	385	850	105	1,340	680	2,020	20	130	115	265	415	680	245	440	10	695	1,055	1,750
Barbee Mills	1	1	2																1					
Hawks Landing	1	1	1						1					1					3					
Pipeline Projects-Subtotal	2	2	3	7	6	13	0	0	1	1	2	3	0	1	0	1	2	3	4	0	0	4	3	7
2015 Adjusted Baseline with Pipeline	**125**	**20**	**190**	**335**	**485**	**820**	**385**	**850**	**105**	**1,340**	**680**	**2,020**	**20**	**130**	**115**	**265**	**415**	**680**	**250**	**440**	**10**	**700**	**1,060**	**1,760**
Passby Distribution				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**
Passby Traffic Volumes				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**
Project Trip Distribution	2%	2%	10%	**14%**	**14%**	**28%**			2%	**2%**	**2%**	**4%**		2%		**2%**	**2%**	**4%**	10%			**10%**	**10%**	**20%**
Project Traffic Volumes	10	10	40	**60**	**65**	**125**			10	**10**	**10**	**20**		10		**10**	**10**	**20**	45			**45**	**40**	**85**
2015 with Full Buildout	**135**	**30**	**230**	**395**	**550**	**945**	**385**	**850**	**115**	**1,350**	**690**	**2,040**	**20**	**140**	**115**	**275**	**425**	**700**	**295**	**440**	**10**	**745**	**1,100**	**1,845**

PM Peak Hour With RTID Improvements

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

	Enter	Exit	Total
Quendall Project Vols	442	509	951
Quendall Passby Vols	28	21	49

Alternative 1 (incudes 10% increase in apartment trips)

Intersection: I-405 NB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak
Intersection Code: 1
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	625	485	1,110				114	126	240				420	161	581				308	695	1,003			
2015 Baseline Forecast Year	550	587	1,137				137	253	390				683	134	817				160	558	718			
Fratar Approximation Factor			1.02						1.54						1.35						1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	50	25	330	405	350	755	75	150	65	290	360	650	15	230	145	390	160	550	55	165	60	280	495	775
2015 Baseline Year	0	0	0	0	225	225	0	500	175	675	745	1,420	15	0	515	530	0	530	50	230	0	280	515	795
Barbee Mills			0					15					1						3	13	0			
Hawks Landing			0					4					26						15	3	0			
Pipeline Projects-Subtotal	0	0	0	0	18	18	0	19	0	19	16	35	27	0	0	27	0	27	18	16	0	34	46	80
2015 Adjusted Baseline with Pipeline	0	0	0	0	245	245	0	520	175	695	760	1,455	40	0	515	555	0	555	70	245	0	315	560	875
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			0%	0%	45%	45%		10%		10%	10%	20%	30%			30%	0%	30%	45%	10%	0%	55%	40%	95%
Project Traffic Volumes			0	0	230	230		45		45	50	95	135			135	0	135	230	50	0	280	180	460
2015 with Full Buildout	0	0	0	0	475	475	0	565	175	740	810	1,550	175	0	515	690	0	690	300	295	0	595	740	1,335

Intersection: I-405 SB Ramps / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak
Intersection Code: 2
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	502	0	502				695	308	1,003				0	607	607				293	575	868			
2015 Baseline Forecast Year	279	0	279				558	160	718				0	538	538				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	130	5	250	385	0	385	215	275	0	490	280	770	0	0	0	0	245	245	0	150	25	175	525	700
2015 Baseline Year	130	5	250	385	0	385	215	275	0	490	280	770	0	0	0	0	245	245	0	150	25	175	525	700
Barbee Mills			22					16												16	2			
Hawks Landing			16					30												18	23			
Pipeline Projects-Subtotal	0	0	38	38	0	38	0	46	0	46	34	80	0	0	0	0	25	25	0	34	25	59	84	143
2015 Adjusted Baseline with Pipeline	130	5	290	425	0	425	215	320	0	535	315	850	0	0	0	0	270	270	0	185	50	235	610	845
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution			45%	45%	0%	45%		40%		40%	55%	95%				0%	30%	30%		55%	30%	85%	85%	170%
Project Traffic Volumes			200	200	0	200		175		175	280	455				0	155	155		280	155	435	375	810
2015 with Full Buildout	130	5	490	625	0	625	215	495	0	710	595	1,305	0	0	0	0	425	425	0	465	205	670	985	1,655

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Ripley Lane / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 3
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound					
	Enter	Exit	Total			
2008 Calibration Year	1	1	2			
2015 Baseline Forecast Year	1	1	2			
Fratar Approximation Factor			1.00			FLAG
	North Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	45	0	15	60	40	100
2015 Baseline Year	45	0	15	60	40	100
Barbee Mills	14		3			
Hawks Landing			3			
Pipeline Projects-Subtotal	14	0	6	20	38	58
2015 Adjusted Baseline with Pipeline	60	0	20	80	80	160
Passby Distribution				0%	0%	0%
Passby Traffic Volumes				0	0	0
Project Trip Distribution	75%			75%	75%	150%
Project Traffic Volumes	380			380	330	710
2015 with Full Buildout	440	0	20	460	410	870

Notes	Westbound					
	Enter	Exit				
2008 Calibration Year	575	293	868			
2015 Baseline Forecast Year	169	30	199			
Fratar Approximation Factor			1.00			FLAG
	East Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	5	485	35	525	175	700
2015 Baseline Year	5	485	35	525	175	700
Barbee Mills		8	30			
Hawks Landing		46				
Pipeline Projects-Subtotal	0	54	30	84	59	143
2015 Adjusted Baseline with Pipeline	5	540	65	610	235	845
Passby Distribution				0%	0%	0%
Passby Traffic Volumes				0	0	0
Project Trip Distribution		10%	75%	85%	85%	170%
Project Traffic Volumes		45	330	375	430	805
2015 with Full Buildout	5	585	395	985	665	1,650

Notes	Northbound					
	Enter	Exit				
2008 Calibration Year	1	1	2			
2015 Baseline Forecast Year	1	1	2			
Fratar Approximation Factor			1.00			FLAG
	South Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	5	5	10	15
2015 Baseline Year	0	0	5	5	10	15
Barbee Mills						
Hawks Landing			5			
Pipeline Projects-Subtotal	0	0	5	5	0	5
2015 Adjusted Baseline with Pipeline	0	0	10	10	10	20
Passby Distribution				0%	0%	0%
Passby Traffic Volumes				0	0	0
Project Trip Distribution				0%	0%	0%
Project Traffic Volumes				0	0	0
2015 with Full Buildout	0	0	10	10	10	20

Notes	Eastbound					
	Enter	Exit				
2008 Calibration Year	287	574	861			
2015 Baseline Forecast Year	30	169	199			
Fratar Approximation Factor			1.00			FLAG
	West Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	5	125	5	135	500	635
2015 Baseline Year	5	125	5	135	500	635
Barbee Mills	6	4				
Hawks Landing	2	36				
Pipeline Projects-Subtotal	8	40	0	48	60	108
2015 Adjusted Baseline with Pipeline	15	165	5	185	560	745
Passby Distribution				0%	0%	0%
Passby Traffic Volumes				0	0	0
Project Trip Distribution	0%	10%		10%	10%	20%
Project Traffic Volumes	0	50		50	45	95
2015 with Full Buildout	15	215	5	235	605	840

Intersection: Lake Washington Blvd / Barbee Mills Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 4
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound					
	Enter	Exit	Total			
2008 Calibration Year	1	1	2			
2015 Baseline Forecast Year	1	1	2			
Fratar Approximation Factor			1.00			FLAG
	North Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0
2015 Baseline Year	0	0	0	0	0	0
Barbee Mills	4		1			
Hawks Landing						
Pipeline Projects-Subtotal	4	0	1	5	9	14
2015 Adjusted Baseline with Pipeline	5	0	0	5	10	15
Passby Distribution	25%		75%	100%	100%	200%
Passby Traffic Volumes	5		15	20	25	45
Project Trip Distribution	10%		15%	25%	25%	50%
Project Traffic Volumes	50		75	125	110	235
2015 with Full Buildout	60	0	90	150	145	295

Notes	Westbound					
	Enter	Exit				
2008 Calibration Year	574	287	861			
2015 Baseline Forecast Year	169	30	199			
Fratar Approximation Factor			1.00			FLAG
	East Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	500	0	500	135	635
2015 Baseline Year	0	500	0	500	135	635
Barbee Mills		3	8			
Hawks Landing		49				
Pipeline Projects-Subtotal	0	52	8	60	48	108
2015 Adjusted Baseline with Pipeline	0	550	10	560	185	745
Passby Distribution			75%	75%	25%	100%
Passby Traffic Volumes		-20	20	0	0	0
Project Trip Distribution			10%	10%	10%	20%
Project Traffic Volumes			45	45	50	95
2015 with Full Buildout	0	530	75	605	235	840

Notes	Northbound					
	Enter	Exit				
2008 Calibration Year	1	1	2			
2015 Baseline Forecast Year	1	1	2			
Fratar Approximation Factor			1.00			FLAG
	South Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0
2015 Baseline Year	0	0	0	0	0	0
Barbee Mills						
Hawks Landing						
Pipeline Projects-Subtotal	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	0	0	0	0	0	0
Passby Distribution				0%	0%	0%
Passby Traffic Volumes				0	0	0
Project Trip Distribution				0%	0%	0%
Project Traffic Volumes				0	0	0
2015 with Full Buildout	0	0	0	0	0	0

Notes	Eastbound					
	Enter	Exit				
2008 Calibration Year	287	574	861			
2015 Baseline Forecast Year	30	169	199			
Fratar Approximation Factor			1.00			FLAG
	West Approach					
	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	135	0	135	500	635
2015 Baseline Year	0	135	0	135	500	635
Barbee Mills	1	6				
Hawks Landing		38				
Pipeline Projects-Subtotal	1	44	0	45	53	98
2015 Adjusted Baseline with Pipeline	0	180	0	180	550	730
Passby Distribution	25%			25%	75%	100%
Passby Traffic Volumes	5	-5		0	-5	-5
Project Trip Distribution	15%			15%	15%	30%
Project Traffic Volumes	65			65	75	140
2015 with Full Buildout	70	175	0	245	620	865

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Lake Washington Blvd / Hawks Landing Access
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 5
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: TIA
2015 to 2009 Factor: 0.8571

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				574	287	861				1	1	2				287	574	861			
2015 Baseline Forecast Year	1	1	2				169	30	199				1	1	2				30	169	199			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2009 Existing Conditions	0	0	0	0	0	0	0	500	0	500	135	635	0	0	0	0	0	0	0	135	0	135	500	635
2015 Baseline Year	0	0	0	0	0	0	0	500	0	500	135	635	0	0	0	0	0	0	0	135	0	135	500	635
Barbee Mills								4												7				
Hawks Landing							49						5		38						5			
Pipeline Projects-Subtotal	0	0	0	0	0	0	49	4	0	53	45	98	5	0	38	43	54	97	0	7	5	12	9	21
2015 Adjusted Baseline with Pipeline	0	0	0	0	0	0	50	505	0	555	180	735	5	0	40	45	55	100	0	140	5	145	510	655
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%		15%		15%	15%	30%				0%	0%	0%		15%		15%	15%	30%
Project Traffic Volumes				0	0	0		75		75	65	140				0	0	0		65		65	75	140
2015 with Full Buildout	0	0	0	0	0	0	50	580	0	630	245	875	5	0	40	45	55	100	0	205	5	210	585	795

Intersection: N 36th St / Lake Washington Blvd
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 6
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	1	1	2				324	217	541				71	250	321				223	317	540			
2015 Baseline Forecast Year	1	1	2				130	16	146				13	39	52				23	103	126			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	0	0	0	0	0	0	83	280	0	363	132	495	4	0	25	29	90	119	0	107	7	114	284	398
2015 Baseline Year	0	0	0	0	0	0	85	280	0	365	130	495	5	0	25	30	90	120	0	105	5	110	285	395
Barbee Mills							1	3							2					5				
Hawks Landing							1	4							1					4				
Pipeline Projects-Subtotal	0	0	0	0	0	0	2	7	0	9	12	21	0	0	3	3	2	5	0	9	0	9	7	16
2015 Adjusted Baseline with Pipeline	0	0	0	0	0	0	85	285	0	370	145	515	5	0	30	35	90	125	0	115	5	120	290	410
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%	1%	14%		15%	16%	31%			2%	2%	1%	3%		14%		14%	14%	28%
Project Traffic Volumes				0	0	0	5	70		75	70	145			10	10	5	15		60		60	70	130
2015 with Full Buildout	0	0	0	0	0	0	90	355	0	445	215	660	5	0	40	45	95	140	0	175	5	180	360	540

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: N 30th St / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak
Intersection Code: 7
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	216	114	330				148	226	374				52	81	133				1	1	2			
2015 Baseline Forecast Year	90	76	166				146	144	290				58	73	131				1	1	2			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	44	55	2	101	51	152	64	28	13	105	118	223	2	38	61	101	120	221	0	13	1	14	32	46
2015 Baseline Year	45	55	0	100	55	155	65	30	15	110	120	230	0	40	60	100	120	220	0	15	0	15	30	45
Barbee Mills	1								2															
Hawks Landing	1								1															
Pipeline Projects-Subtotal	2	0	0	2	3	5	0	0	3	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0
2015 Adjusted Baseline with Pipeline	45	55	0	100	60	160	65	30	20	115	120	235	0	40	60	100	120	220	0	15	0	15	30	45
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution	1%			1%	1%	2%			1%	1%	1%	2%				0%	0%	0%				0%	0%	0%
Project Traffic Volumes	5			5	5	10			5	5	5	10				0	0	0				0	0	0
2015 with Full Buildout	50	55	0	105	65	170	65	30	25	120	125	245	0	40	60	100	120	220	0	15	0	15	30	45

Intersection: Lake Washington Blvd / Burnett Ave
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak
Intersection Code: 8
Analyst: JGT
Checked by: MJR
Date of Completion: 6/14/2010
Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	81	52	133				283	323	606				1	1	2				322	283	605			
2015 Baseline Forecast Year	73	58	131				77	75	152				1	1	2				76	77	153			
Fratar Approximation Factor			1.00			FLAG			1.00			FLAG			1.00			FLAG			1.00			FLAG
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	92	0	3	95	113	208	0	104	111	215	381	596	0	0	0	0	0	0	2	289	0	291	107	398
2015 Baseline Year	90	0	5	95	110	205	0	105	110	215	380	595	0	0	0	0	0	0	0	290	0	290	110	400
Barbee Mills								5												3				
Hawks Landing								4												4				
Pipeline Projects-Subtotal	0	0	0	0	0	0	0	9	0	9	7	16	0	0	0	0	0	0	0	7	0	7	9	16
2015 Adjusted Baseline with Pipeline	90	0	5	95	110	205	0	115	110	225	385	610	0	0	0	0	0	0	0	295	0	295	120	415
Passby Distribution				0%	0%	0%				0%	0%	0%				0%	0%	0%				0%	0%	0%
Passby Traffic Volumes				0	0	0				0	0	0				0	0	0				0	0	0
Project Trip Distribution				0%	0%	0%		14%		14%	14%	28%				0%	0%	0%		14%		14%	14%	28%
Project Traffic Volumes				0	0	0		60		60	70	130				0	0	0		70		70	60	130
2015 with Full Buildout	90	0	5	95	110	205	0	175	110	285	455	740	0	0	0	0	0	0	0	365	0	365	180	545

Quendall Terminals
2015 PM Peak Hour Traffic Volume Forecasts
With RTID I-405 Improvements

Intersection: Lake Washington Blvd / Garden Ave N / Park Ave N
Scenario: Master Use Plan
Analysis Year: 2015
Time Period: PM Peak

Intersection Code: 9
Analyst: JGT
Checked by: MJR
Date of Completion: #######

Count Source: ATDS - 6/8/2010 Count
2015 to 2010 Factor: 0.7143

Notes	Southbound						Westbound						Northbound						Eastbound					
	Enter	Exit	Total				Enter	Exit					Enter	Exit					Enter	Exit				
2008 Calibration Year	710	683	1,393				1,291	1,726	3,017				329	209	538				1,562	1,274	2,836			
2015 Baseline Forecast Year	882	567	1,449				1,520	2,616	4,136				704	291	995				1,744	1,375	3,119			
Fratar Approximation Factor			1.03						1.32						1.73						1.09			
	North Approach						East Approach						South Approach						West Approach					
	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total	Left	Thru	Right	In	Out	Total
2010 Existing Conditions	90	83	292	465	514	979	295	646	132	1,073	1,345	2,418	9	85	497	591	404	995	297	758	26	1,081	947	2,028
2015 Baseline Year	90	120	270	480	540	1,020	535	745	135	1,415	1,820	3,235	15	125	880	1,020	700	1,720	280	850	45	1,175	1,030	2,205
Barbee Mills	1	1	1						1					1					3					
Hawks Landing	1	1	2						1					1					2					
Pipeline Projects-Subtotal	2	2	3	7	9	16	0	0	2	2	2	4	0	2	0	2	2	4	5	0	0	5	3	8
2015 Adjusted Baseline with Pipeline	**90**	**120**	**275**	**485**	**545**	**1,030**	**535**	**745**	**135**	**1,415**	**1,820**	**3,235**	**15**	**125**	**880**	**1,020**	**700**	**1,720**	**285**	**850**	**45**	**1,180**	**1,035**	**2,215**
Passby Distribution				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**				**0%**	**0%**	**0%**
Passby Traffic Volumes				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**				**0**	**0**	**0**
Project Trip Distribution	2%	2%	10%	**14%**	**14%**	**28%**			2%	**2%**	**2%**	**4%**		2%		**2%**	**2%**	**4%**	10%			**10%**	**10%**	**20%**
Project Traffic Volumes	10	10	50	**70**	**65**	**135**			10	**10**	**10**	**20**		10		**10**	**10**	**20**	45			**45**	**50**	**95**
2015 with Full Buildout	**100**	**130**	**325**	**555**	**610**	**1,165**	**535**	**745**	**145**	**1,425**	**1,830**	**3,255**	**15**	**135**	**880**	**1,030**	**710**	**1,740**	**330**	**850**	**45**	**1,225**	**1,085**	**2,310**

Appendix C

Parking Demand Analysis

Parking Demand Forecasts - Quendall Terminals

Alternative 1

Weekday Peak Parking Demand (ITE Rates)

Forecast Weekday Peak Parking Demand (ITE Rates)

LU	Size	ITE Parking Rate[1]	Demand
Office	210,000	3.44	722
Restaurant (High-Turn Over Sit-Down)	9,000	16.1	145
Mid-Rise Apt	800	1.46	1,168
Retail	21,600	3.35	72
			2,107
Proposed Supply			2,171
Surplus or (Deficit)			64
Shared Analysis - Available space from residential units is assumed at 30% of peak evening demand per ULI, Shared Parking, 2nd Edition, 2005.			*350*
Surplus or (Deficit) with Shared Parking Consideration			414

Weekend Peak Parking Demand (ITE Rates)

Forecast Weekend Peak Parking Demand (ITE Rates)

LU	Size	ITE Parking Rate[1]	Demand
Office[2]	210,000	0.25	53
Restaurant (High-Turn Over Sit-Down)	9,000	20.6	185
Mid-Rise Apt	800	1.17	936
Retail	21,600	3.56	77
			1,251
			2,171
			920
			281
			1,201

1 - Parking Generation, 3rd Edition, ITE, 2004.

2 - For Office uses on a weekend, no surveys were reported by ITE. However, some level of parking demand occurs at office uses on weekend periods, albeit on a signficiantly reduced level. As such, a nominal demand for parking was assumed for these uses on a weekend period that would coincide with other peak commercial and residential uses.