Chapter 3

Clarifications, Corrections and Expanded Discussion

CHAPTER 3 DRAFT EIS CHAPTER 3 CLARIFICATIONS AND CORRECTIONS

This chapter contains clarifications or corrections based on responses to comments presented in Chapter 4 of this Final Environmental Impact Statement (Final EIS) or based on City of Seattle (City) or consultant review of the Draft EIS information. The sources of the clarifications or corrections are noted for each amendment. The clarifications or corrections do not change the relative impacts of the three Draft EIS alternatives or the overall Draft EIS conclusions.

3.1 Draft EIS 3.4 Plants and Animals Clarifications or Corrections

In response to Comment #10 in Letter #5, on the mitigation strategies for the Plants and Animals element of the environment (Draft EIS Section 3.4), the underlined text below has been added to the mitigation strategy in order to recognize the range of future potential mitigation measures at the project-level of review.

City permitting of proposed development under all alternatives would generally require completion of the SEPA process, which includes an assessment of project impacts to fish and wildlife. <u>General mitigation measures could include open space for vegetation, migrating animals, and human enjoyment.</u> Other more specific mitigation requirements could include treatment of project-related stormwater, evaluation of outside lighting, installation of native plant species to reduce potential light impacts, and implementation of a "lights out" program to educate and encourage high-rise building tenants to turn off lights at night, particularly during the fall (southward) avian migration period. The City could also choose to reduce height limits on the three lots discussed above that could shade the juvenile outmigration corridor during spring mornings and evenings under Alternatives 1 and 2.

3.2 Draft EIS 3.8 Land Use Clarifications or Corrections

City of Seattle Comprehensive Plan (1994, as amended)

The City's updated *Comprehensive Plan* consists of eleven major elements – urban village, land use, transportation, housing, capital facilities, utilities, economic development, neighborhood, human development, cultural resources and environment. Each element contains goals and policies that are intended to "guide the development of the City in the context of regional growth management" for the next 20 years. The *Urban Village*, *Land Use*, *Housing*, *Transportation, Economic Development,* and *Neighborhood Planning Elements* are the most relevant elements to the proposal.

The following goals and policies from the Economic Development Element of the City's Comprehensive Plan are the most applicable to the proposed alternatives.

Economic Development Element

Goals

Goal EDG1 - Add approximately 84,000 jobs in the city over the 20-year period covered by this Plan, in order to ensure long-term economic security and social equity to all Seattle residents.

Goal EDG1.5 - Establish Seattle as a place where average wages are high and costs of living are reasonable so that the city can accommodate households at a wide range of income levels.

Goal EDG2 - Recognize that Seattle's high quality of life is one of its competitive advantages and promote economic growth that maintains and enhances this quality of life.

Goal EDG3 - Support the Urban Village Strategy by encouraging the growth of jobs in Urban Centers and Hub Urban Villages and by promoting the health of neighborhood commercial districts.

Goal EDG4 - Accommodate a broad mix of jobs, while actively seeking a greater proportion of living wage jobs that will have greater benefits to a broad cross-section of the people of the City and region.

Economic Development & the Urban Village Strategy

Policies

Policy ED1 - Strive to maintain the economic health and importance of downtown as the economic center of the city and the region and home to many of Seattle's vital professional service firms, high technology

companies, regional retail activity, as well as cultural, historic, entertainment, convention and tourist facilities.

Policy ED2 - Pursue opportunities for growth and strategic development, where appropriate, in urban centers and hub urban villages, which are planned for the greatest concentrations of jobs and job growth outside of downtown.

Policy ED3 - Strive to provide a wide range of goods and services to residents and businesses in urban centers and villages by encouraging appropriate retail development in these areas.

> Discussion: Consistent with the goals identified for the City's Economic Development Element and policies for the Urban Village Strategy, the EIS Alternatives would increase employment density within the South Lake Union Urban Center to accommodate planned levels of employment growth, which would result in a compact mixed-use area where residents of the neighborhood could live near services, employment, and transit.

City of Seattle Shoreline Master Program

The Shoreline Master Program (SMP) is mandated by the State Shoreline Management Act (SMA), and includes the goals, policies and regulations that govern land use and activities within the Seattle Shoreline District. Seattle's Shoreline District includes the Duwamish River, the Ship Canal, Lake Union, Lake Washington, Green Lake, Puget Sound, associated wetlands and floodplains, and all land within 200-ft of these water-bodies.

Seattle's SMA establishes three major policy goals that all SMPs are required to achieve:

- *Preferred Shoreline Uses*: The SMA establishes a preference for uses that are water-oriented and that are appropriate for the environmental context (such as port facilities, shoreline recreational uses, and water-dependent businesses). Single-family residences are also identified as a priority use under the Act when developed in a manner consistent with protection of the natural environment.
- *Environmental Protection*: The Act requires protections for shoreline natural resources, including "… the land and its vegetation and wildlife, and the water of the state and their aquatic life …" to ensure no net loss of ecological function.
- *Public Access*: The Act promotes public access to shorelines by mandating inclusion of a public access element in local SMPs and

requiring provisions to ensure that new development maintains public access features.

The Department of Planning and Development (DPD) is currently updating Seattle's SMP; the last comprehensive update of Seattle's SMP occurred in 1987. The SMP update process is the result of new rules governing shoreline activities and use established by the State Department of Ecology. These rules, among other things, establish new thresholds for evaluating SMPs statewide, including no further reduction in the ecological functioning of the shoreline environment.

The City's Shoreline District is divided into eleven (11) environments/designations including:

Conservancy Navigation	CN	Urban Stable	US
Conservancy Preservation	CP	Urban Harborfront	UH
Conservancy Recreation	CR	Urban Maritime	UM
Conservancy Management	CM	Urban General	UG
Conservancy Waterway	CW	Urban Industrial	UI
Urban Residential	UR		

Shoreline environments present within the South Lake Union Urban Center include:

Conservancy Management (CM) – The purpose of the CM shoreline environment is to conserve and manage areas for public purposes, recreational activities and fish migration routes. While the natural environment need not be maintained in a pure state, developments shall be designed to minimize adverse impacts to natural beaches, migratory fish routes and the surrounding community.

Conservancy Waterway (CW) – The purpose of the CW Environment is to preserve the waterways for navigation and commerce, including public access to and from water areas. Since the waterways are public ways for water transport, they are designated CW to provide navigational access to adjacent properties, access to and from land for the loading and unloading of watercraft and temporary moorage.

Urban Residential (UR) – The purpose of the UR environment is to protect residential areas.

Urban Stable (US) – The purpose of the US environment is to:

1. Provide opportunities for substantial numbers of people to enjoy the shorelines by encouraging water-dependent recreational uses

and by permitting non-water dependent commercial uses if they provide substantial public access and other public benefits;

2. Preserve and enhance views of the water from adjacent streets and upland residential areas; and
3. Support water-dependent uses by providing services such as marine-related retail and moorage.

Urban Maritime (UM) - The purpose of the UM environment is to preserve areas for water-dependent and water-related uses while still providing some views of the water from adjacent streets and upland residential streets. Public access shall be second in priority to water-dependent uses unless provided on street ends, parks or other public lands.

Development within the Shoreline District usually requires a substantial development permit1 from the city, although there are exemptions listed in the code. Each shoreline environment designation contains a listing of uses that are permitted outright on waterfront lots in each district as either principal or accessory uses. To be permitted in the Shoreline District, a use must be permitted in both the shoreline environment and the underlying land use zone in which it is located. All principal uses2 on waterfront lots must be water-dependent, water-related or non-water-dependent with public access. The SMP code also regulates conditional uses, as well as uses that are prohibited.

> Discussion: The proposed EIS Alternatives would be consistent with the Shoreline Master Program as no changes to the existing land use, zoning, or shoreline designations in the shoreline areas of South Lake Union are proposed.

Revised Flight Path

Draft EIS Section 3.8 described the Lake Union Seaport Airport flight path as it rises over the South Lake Union neighborhood. The described flight path was shown in Draft EIS Figure 3.2-1.

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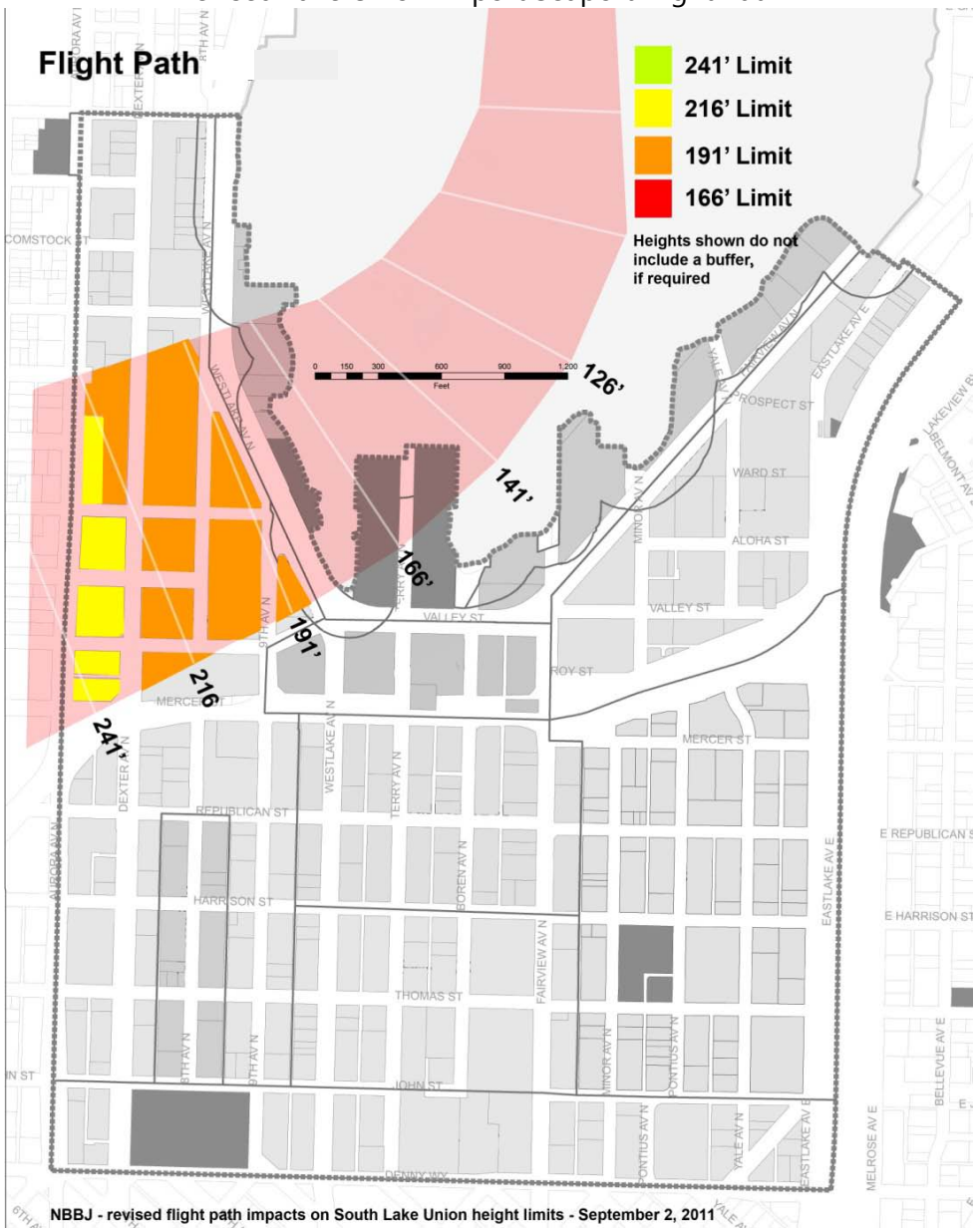
1 "Substantial development" means any development of which the total cost or fair market value exceeds $2,500, or any development which materially interferes with the normal public use of the water or shorelines of the City.

2 Principal uses are permitted in the respective shoreline environments in accordance with the lists of permitted and prohibited uses in the respective environments and subject to all applicable development standards. If a use is not identified in this chapter and is permitted in the underlying zone, it may be authorized as a conditional use by the Director in specific cases upon approval by the Department of Ecology when the criteria contained in Section 23.60.034 are satisfied.

Subsequent to issuance of the Draft EIS, additional review of the flight path was conducted (see **Appendix F**). This analysis included a review of how seaplane lanes are utilized (including runway utilization, flight tracks, and piloting techniques), an evaluation of the aircraft fleet used by floatplane operators, and documentation of the performance characteristics of the various floatplane aircraft. Several Federal Aviation Administration (FAA) and International Civil Aviation Organization (ICAO) planning documents that have applicability in the establishment of approach/departure protection boundaries for curving approach and departure procedures such as those used on Lake Union were also reviewed.

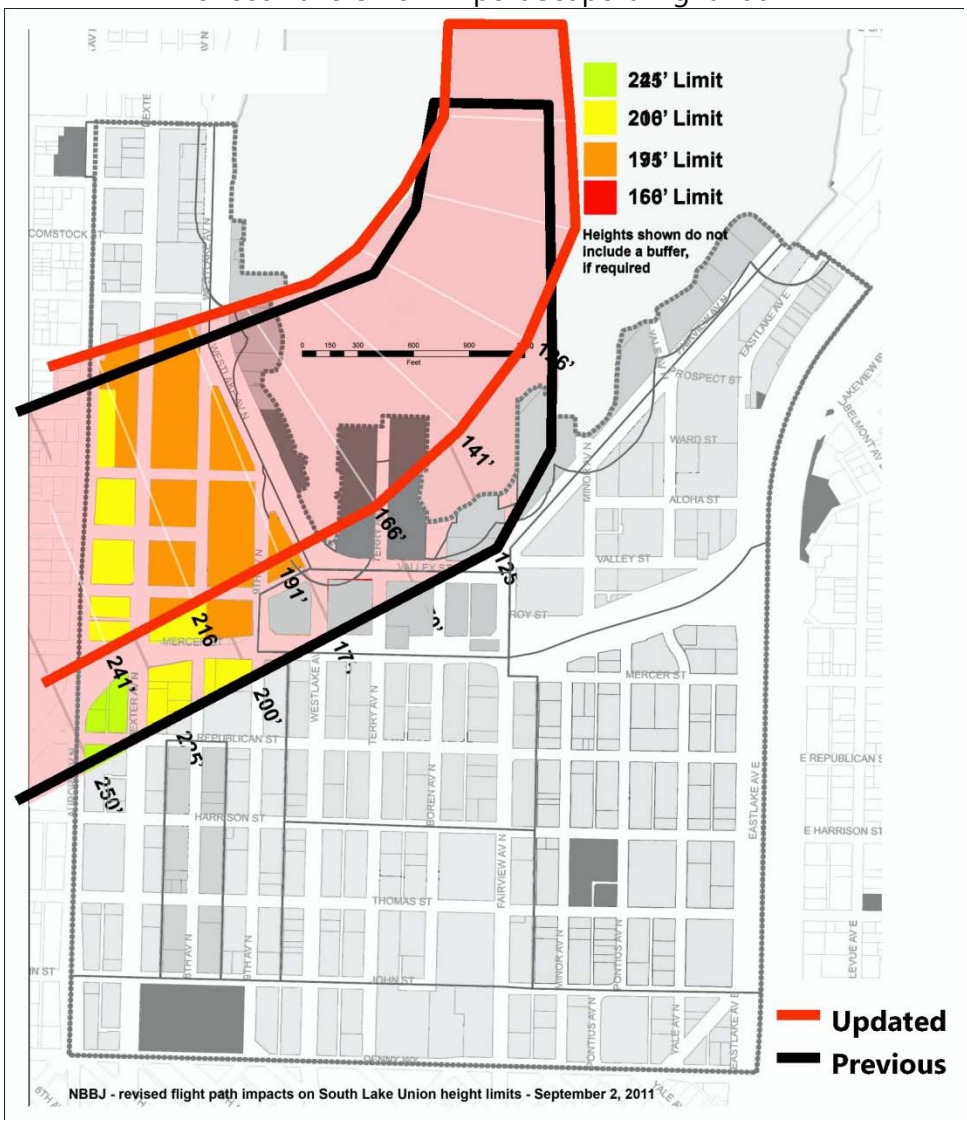
Based on this analysis, and in coordination with WSDOT Aviation, a revised flight path was identified as shown in revised **Figure 3.2-1**, below. This revised flight path differs from that shown in the Draft EIS in that portions are narrower than the previous flight path, the curvature is more gradual, and the east-west legs of the flight path have shifted slightly to the north. Specifically, the southern boundary has shifted 400-500 feet north so that the southern boundary lies north of Valley Street and is generally aligned with Broad Street. The southern boundary now crosses Aurora Avenue North at about Mercer Street. Similarly, the northern boundary of the flight path shifted 200-300 feet north, crossing the Lake Union shoreline at roughly Highland Drive and crossing Aurora Avenue just north of Ward Street. Please see **Section 3.4 Aesthetics** for revised images associated with the revised flight path.

Figure 3.2-1
Revised Lake Union Airport Seaport Flight Path



Source: Barnard Dunkelberg & Company, WSDOT (Aviation Division), NBBJ, 2010.

Figure 3.2-2
Revised Lake Union Airport Seaport Flight Path



Source: Barnard Dunkelberg & Company, WSDOT (Aviation Division), NBBJ, 2010.

Revised Mitigation Measure

In order to provide more specific direction for future project-level wind analysis at the project-level of environmental review, the following mitigation measure is recommended as a mitigation strategy in the Draft EIS Land Use element (Draft EIS Section 3.8).

Future development proposals within the flight path corridor that exceed the base height permitted in the underlying Seattle Mixed zoning should provide a wind analysis in accordance with the following methodology.

1. Construct a physical scale model of the proposed project and/or the maximum building envelope allowed at that site, with the surrounding physical context (i.e., existing buildings, topography, etc.)
2. Install the model into a boundary layer wind tunnel and measure velocities and turbulence levels along the prescribed flight path with and without the proposed project
3. Test for prevailing wind directions and/or wind directions that are expected to have an impact on the flight path
4. Present resulting data in a form to allow for quantitative comparison between existing and proposed conditions
5. Provide a written report summarizing the methodology, results and interpretation of the results against any available published aviation standards for shear layers and turbulence levels. Analysis results require an assessment of acceptability of specific results for the aircraft actually used at this location by an aviation specialist.

In addition, the City may consider requiring additional analyses to address the following questions:

- Additional review to address potential future adjacent development (i.e., a future configuration which may augment or mitigate predicted impacts in the future)
- Testing of mitigation schemes if the project results are unacceptable (i.e., the wind tunnel study could be then used to help define a height, size and location on that site that could be acceptable)

3.3 Draft EIS 3.9 Housing Clarifications or Corrections

This section of the Final EIS provides an updated inventory of housing in the South Lake Union neighborhood based on input from Comment Letter #89. Please see also response to Comment #4 in Letter #89 in Chapter 4 of this Final EIS.

Table 3.3-1 contains a listing of most of the apartment and condominium buildings within the neighborhood and the affordability associated with publicly subsidized units and number of housing units available in each.

Table 3.3-1
Multi-Family Apartment Buildings within the South Lake Union Neighborhood

Building	Housing Units % Median Income (AMI) Rent/Income Limit							Total # of Units
	30%	40%	50%	60%	70%	80%	Unrestricted	
502 Minor Avenue N							11	11
Alcyone Apts							161	161
Alley24				35			137	172
Alterra Condominiums							59	59
Amli 535							199	199
Art Stable							5	5
Bart Harvey Apts			50					50
Blue Duplex (1190 Repub.)							2	2
Borealis						50	3	53
Brewster Apts		9	26					35
The Cairns					30		70	100
Canady House	83							83
The Carlton							30	30
Carolina Court							72	72
Carolyn Manor Apts							22	22
Casa Pacifica			24	39			2	65
Cascade Shelter Project							12	12
Compass Ctr	34							34
Corazon Apts							6	6
David Colwell Bldg.	25		75	24		2		126
Denny Park Apts	20		25	5				50
Dexter Lake Union							201	201
Duplex (766 Thomas St)							2	
Grandview Apts							25	25
Harrison Apts							12	12
Jensen Block Apts	2	24	4					30
Kerner-Scott House	40							40
Lakeview Apts	20		26	13		13		59
Mercerview Apts							67	67
Mirabella						31	349	380
Nautica Condominiums							73	73
Neptune							234	234
The Pontius							14	14
Republican Street Apts							16	16
Rollin Street Flats							208	208
Triplex (417 Minor)							3	3
Union Bay Apts							73	73
Veer Lofts							99	99
TOTALS	**224**	**33**	**230**	**116**	**30**	**96**	**2,137**	**2,866**

Sources: City of Seattle, Office of Housing, 2010. Vulcan Real Estate, 2010, King County Assessor's Office, 2010.

3.4 Draft EIS 3.10 Aesthetics Clarifications or Corrections

This section illustrates and describes the physical character of the South Lake Union neighborhood and its immediate surroundings using 3-D computer modeling and photographic simulations. These simulations provide representative views of both the existing neighborhood and each of the proposed Alternatives 1 – 4. Representations include selected viewpoints inside and outside the neighborhood, shadow studies of each alternative and possible light and glare impacts. This section also includes discussion of the possible impacts of the proposed alternatives as well as recommendations for potential mitigation strategies that could be used to address these impacts.

The South Lake Union Urban Design Framework recently completed by City's Department of Planning and Development with involvement of local neighborhood stakeholder groups has been utilized as a community supported resource for many of the specific mitigation recommendations contained in this study. Wherever the term UDF appears in the document, it is specifically referencing the final version of the South Lake Union Design Framework dated December 10, 2010.

Single family residences

Multi-family residences

Office development

HEIGHT, BULK AND SCALE

3.4.1 Affected Environment

Area Context

The South Lake Union neighborhood is immediately north of Seattle's Downtown Urban Center and the Denny Triangle neighborhood, west of the Capitol Hill Urban Center and east of the City's Uptown Urban Center. Each area is urban in character and is typically dominated by mid-rise and high-rise structures (commercial, residential and institutional). The area proximate to the boundary between the Capitol Hill neighborhood and the South Lake Union neighborhood is entirely residential in character with mid-rise multi-family buildings. The Uptown and Queen Anne neighborhoods to the west and northwest are also predominantly residential in the vicinity of the South Lake Union neighborhood with mid-rise multi-family buildings being the most common building type.

Much of the Uptown Urban Center, however, is dominated by the structures and open space of Seattle Center. While not currently part of the South Lake Union neighborhood, the Uptown Triangle (formed by Broad Street, Denny Way and Aurora Avenue) will be physically re-attached to the South Lake Union neighborhood once the SR 99 Bored

Tunnel is completed and three east-west streets – John, Thomas and Harris Streets – are again reconnected across Aurora Avenue N. The existing character of the Uptown Triangle is similar to the South Lake Union neighborhood – largely commercial and light industrial, with multi-family residential development interspersed throughout.

Due to their heights, predominant features visible from the South Lake Union neighborhood are located outside the study area and include: Queen Anne Hill, the Space Needle, Capitol Hill and the Downtown Seattle Skyline. An exception is Lake Union, which is partially visible at the north-end of 5 of the neighborhood's 12 north-south streets.

Neighborhood Character

The visual character varies widely within the South Lake Union neighborhood due to substantial growth and changes in building types and uses in recent decades. Several structures or building features stand out due to their size (or the relative size of adjacent structures), unusual shape or dynamic character, including: the high-rise AGC Building on Lake Union, the former Naval Reserve Center (proposed new location for the Museum of History and Industry [MOHAI]), the consistent red brick buildings that constitute the Fred Hutchinson Cancer Research Center, the complex of new development associated with Amazon.com, the Mirabella Continuing Care Retirement Community (CCRC), the steeple of the Immanuel Lutheran Church and the domes of St. Spiridon Orthodox Cathedral, the glass enclosed REI Climbing Wall, and the digital sign atop the Pemco Insurance Headquarters.

Immanuel Lutheran Church

The variety of these building types demonstrates the changing nature of the study area. The area was predominantly light industrial and commercial in nature for most of the twentieth century with residential uses in several areas – the largest being the Cascade subarea, which occupies the eastern one-third of the study area. The Industrial Commercial (IC) and later Seattle Mixed (SM) zoning has accommodated a wide variety of commercial and light industrial uses, as well as continued multi-family residential development. Numerous underdeveloped and vacant parcels have buffered land uses from each other and kept the population density (day and night) at relatively low levels. This pattern began to change after the Seattle Commons initiative in the 1990s, when development attention turned toward this neighborhood.

Interwoven through the South Lake Union neighborhood, but largely in its eastern half, are a number of older brick structures that serve as one of the neighborhood's defining features. These structures are a combination of industrial and residential buildings from the first half of the twentieth

century. Some, but not all, of these buildings are designated Seattle Landmarks (see Draft EIS Section 3.11). The largest examples include the former Ford Motor Company Assembly Plant (now Shurgard Storage) and the multiple commercial laundry facilities (e.g., Troy Laundry, New Richmond Laundry [now incorporated into Alley 24] and the Supply Laundry, which features a tall brick smokestack). While visible only on the streets they face, smaller brick buildings, such as The Webster and Van Vorst Buildings, add to the character of their immediate surroundings and the neighborhood as a whole.

Incremental growth over time has resulted in the emergence of multiple neighborhood epicenters. These epicenters tend to be oriented around parks or boulevards. The most established is the Cascade subarea, which is distinguished by a predominantly residential character with Cascade Playground as its centerpiece. A number of half-block apartment buildings have also contributed to the neighborhood's emerging character, including the Alcyone, the Neptune, the Cairns and Union Bay Apartments.

The South Lake Union waterfront, separated from the rest of the neighborhood by heavy traffic on Mercer and Valley Streets, is dominated by restaurants and public amenities, such as the new Lake Union Park, the non-profit Center for Wooden Boats and in the immediate future MOHAI; as well as a passenger terminal for float plane operations.

A largely new commercial and institutional core has emerged along (or proximate to) the axis of Westlake Avenue. Two multi-phase projects currently under construction in the study area – the multi-block office campuses for Amazon.com and the University of Washington's School of Medicine's expanding biotechnology and medical research facility – are already altering the built character of this portion of the South Lake Union neighborhood. The largest complex under construction in the vicinity of the South Lake Union neighborhood is the Bill and Melinda Gates Foundation facility in the Uptown Triangle.

Height, Bulk and Scale

Height, bulk and scale relate to the size of buildings and their relationship to neighboring structures. The City's SEPA policies recognize that physical characteristics of buildings affect the character of neighborhoods. These policies also recognize a need to address building height, bulk and scale as a means to achieve appropriate transition from one zoning district to another.

There is currently a broad range of building types and sizes in the South Lake Union neighborhood – from single-family residences, churches and one- and two-story commercial and/or light industrial (fabrication and storage) buildings, multi-block biotech campuses, and high-rise office towers. It is a neighborhood in transition where the differences between the new and old, small and large, intimate and public, are noticeable.

With regard to the surrounding neighborhoods, there are significant differences in allowed height. Development standards in the Denny Triangle to the south allow for buildings up to 400 feet in height. Properties in the Uptown/Queen Anne area that border the South Lake Union neighborhood are zoned to allow increasingly tall structures from north to south, starting with 30 foot structures in the L-3 zones, rising to 65 foot structures in the C1-65 and SM-65 zones, and 85 foot structures in the SM 85 zones that border on Denny Way. Properties on Capitol Hill that face the study area are zoned L-3 at the north-end and MR on the south, which limits building height to 30 feet and 75 feet respectively.

The height of Queen Anne and Capitol Hills can provide territorial views for existing low-rise and mid-rise buildings – overlooking existing buildings in the South Lake Union neighborhood. This is particularly true of the buildings on Capitol Hill, which are separated from the study area by I-5.

Aside from Seattle Center, much of the Uptown Urban Center is similar in use, texture and character to the South Lake Union neighborhood. As noted previously, Seattle Center is an assemblage of rather bulky, low-rise structures – with the important exception of the iconic Space Needle. The SR 99 right-of-way has historically provided a clear separation between the South Lake Union and the Uptown neighborhoods. However, as noted earlier, plans associated with the SR 99 Bored Tunnel would involve reconnection of the east-west John, Thomas and Harrison Streets.

Focus Areas[3]

8th Avenue North Corridor

This area is currently only lightly developed with a broad range of uses and building types, including Denny Park Lutheran Church and the Unity Church of Truth, which anchor either side of 8th Avenue N where it

8th Avenue N

[3] Focus areas are subareas in the South Lake Union neighborhood that are considered in greater detail, where applicable. Please discussion and Figure 2-3 in Chapter 2.

terminates at Denny Park. Other than one two-story and another six-story apartment building midway along this corridor, 8th Avenue N is edged with surface parking lots and two-story commercial or light industrial buildings. Mature street trees line both sides of the corridor for most of its length.

Fairview Avenue Corridor

While the blocks and half-blocks that constitute the Fairview Avenue Corridor have experienced recent development at either end, for the most part, this corridor remains largely underdeveloped. There is currently a broad mix of uses along the corridor, starting at the north-end with biomedical uses associated with the Fred Hutchinson Cancer Research Center campus and the large Shurgard storage facility and anchored at the south-end by the Mirabella Continuing Care Retirement Community (CCRC) and buildings associated with the Seattle Times. In between is a mix of low-rise commercial structures with surface parking – including restaurants, professional offices and retail services. Mature street trees line both sides of this corridor for most of its length.

Seattle Times building at John Street and Fairview Avenue N

Valley/Mercer Blocks

The four east-west blocks between Valley and Mercer Streets, Westlake and Fairview Avenues are currently vacant in conjunction with the City's Mercer Corridor Project, which is under construction.

3.4.2 Environmental Impacts

This section describes changes to the aesthetic character of the built environment that could occur in conjunction with any one of the four EIS alternatives. The EIS alternatives prescribe potential zoning envelopes, but do not locate, size or architecturally define particular buildings. Therefore, for purposes of this EIS and to provide a worst-case – yet realistic scenarios – assumptions have been formulated to allow for analysis of potential aesthetic impacts. These assumptions strive to be realistic in terms of development footprints, tower dimensions and orientations, but also conservative in terms of potential build-out on each respective site.

The assumptions include the following:

- All undeveloped and under-developed sites will redevelop in the future. Under-developed sites are defined as those that contain development square footage that is 40 percent or less than currently allowed by zoning;
- Property owners with sites larger than 22,000 sf will use available zoning incentives to build the maximum gross building area

allowable, while sites with less than 22,000 sf will develop consistent with underlying zoning;

- Where individual parcels with separate ownership are contiguous and can be assembled to create a lot size of 22,000 sf or greater, a developer or property owner will do so in order to build the maximum gross building area allowable;
- Since they will not be constrained by Floor Area Ratio (FAR) [4] restrictions, the towers of new residential buildings will be built to the maximum height and footprint allowable;
- Commercial towers will be built to the maximum FAR available and footprint allowable;
- Commercial and residential projects will maximize the size and height of their podiums;
- On-site structured parking will be provided half above grade and half below grade.
- Since contemporary office buildings generally have footprints of 20,000 sf or greater, lots under 20,000 sf will generally be used for residential development;
- A mix of commercial and residential projects are expected in the future, but since residential development will typically be allowed to build greater total square footage than commercial development (which is restricted by FAR maximums), more residential than commercial development is shown in the alternatives;
- Future development on lots within the defined flight path of the Lake Union Seaplane Airport will be limited by the lowest elevation indicated in the *FAR Part 77 Study*,[5] but no additional height buffer[6] has been included in the studies for purpose of this analysis (see **Figure 3.4-1**); and
- New public open space, although a likely incentive for accessing maximum FAR, is not shown because the amount and location of open space is unknown and would be speculative.

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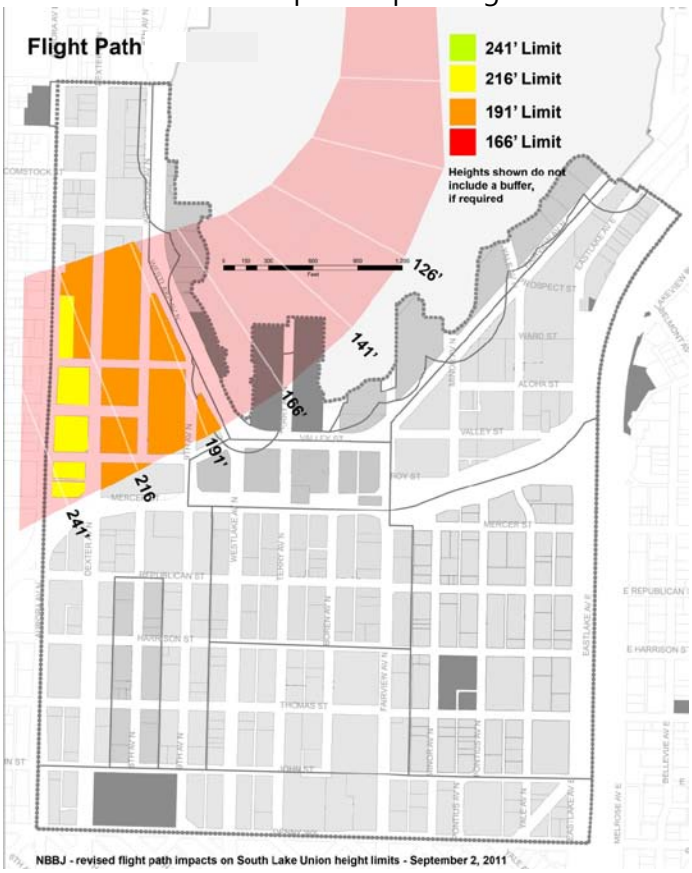
[4] "Floor area ratio" … (FAR is) … a ratio expressing the relationship between the amount of gross floor area or chargeable floor area permitted in one or more structures and the area of the lot on which the structure is, or structures are, located…" (23.84A.012).

[5] Washington State Department of Transportation, Aviation Division. Letter from Carter Timmerman, Aviation Planner. February 3, 2011.

[6] This is a vertical separation between building heights allowed by zoning and the floor or lowest height of the flight path within each block.

The Preliminary Draft of the "South Lake Urban Design Framework" document being developed by the City of Seattle has informed the study for locations of proposed uses.

Figure 3.4-1
Lake Union Seaport Airport Flight Path



Source: Barnard Dunkelberg & Company, Kenmore Air, NBBJ, 2010.

Impacts Common to All Alternatives

All the alternatives assume that every currently undeveloped or under-developed site, including surface parking lots, is built out to its maximum potential using the prescribed land use criteria. Therefore, all alternatives envision a significantly more dense urban environment.

Further, it should be noted that the assumed development pattern would result in employment and residential development that would exceed the estimated 2031 South Lake Union growth target and meet the estimated capacity described in Chapter 2 of this EIS (see tables 2-1 and 2-2). From a cumulative perspective, it is unlikely that full build-out would ever occur under any scenario. However, by assuming a full build-out scenario, this aesthetics analysis considers a development pattern under each

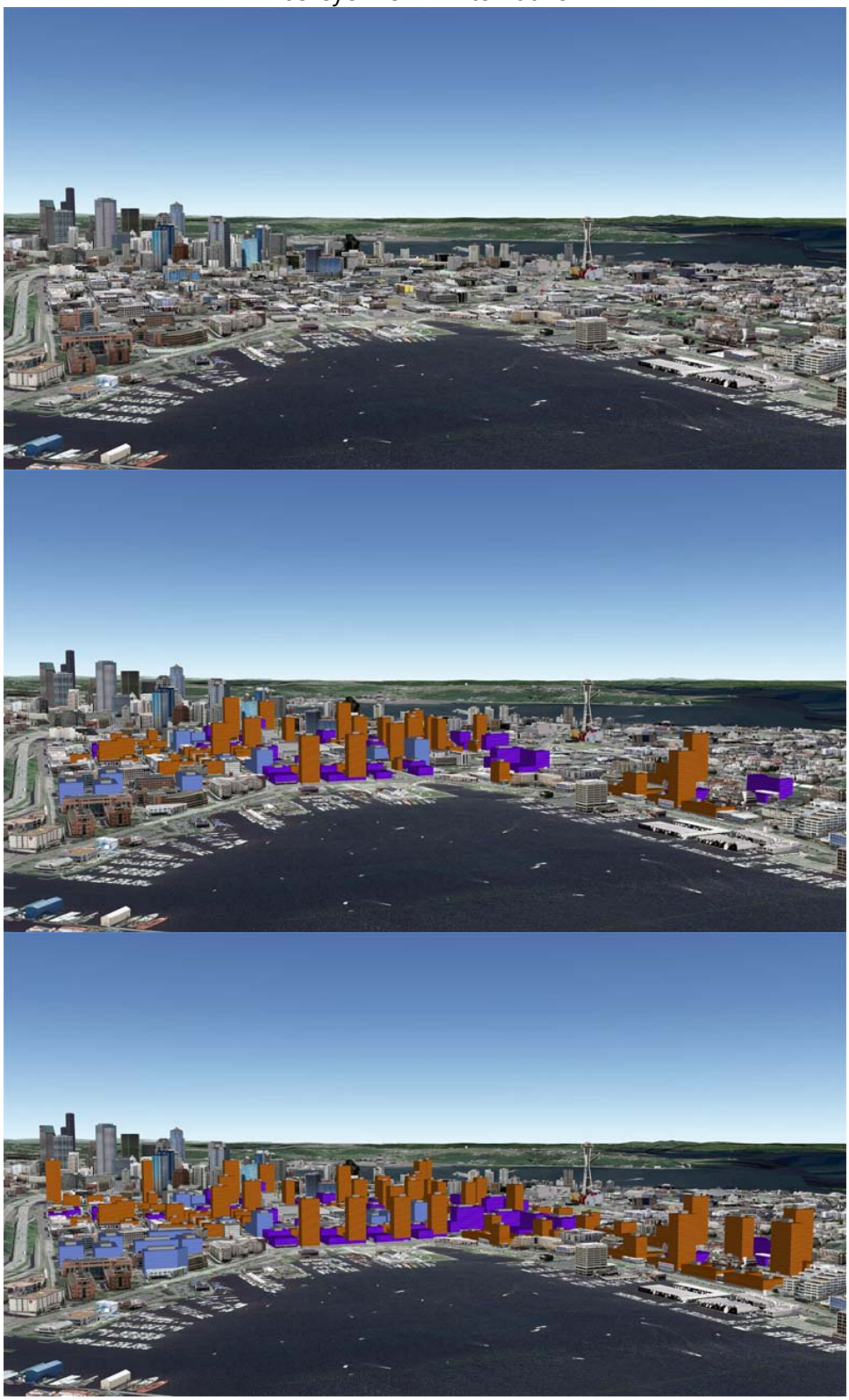
alternative that would result in the greatest possible impact on a neighborhood-wide basis.

Actual development and associated visual impacts would likely be less than those shown in this EIS. For comparative purposes, massing studies are included for both the full build-out version and one associated with the 2031 growth targets; however, the view analyses and shadow studies were all performed only using the full-build-out version.

Figures 3.4-2 through **3.4-9** illustrate multiple views of each developed alternative over the South Lake Union neighborhood. Two views are typically shown for each alternative, one is a birds-eye view looking southwest and the other approximates the view from the top of the hill in Gas Works Park at the north end of Lake Union.

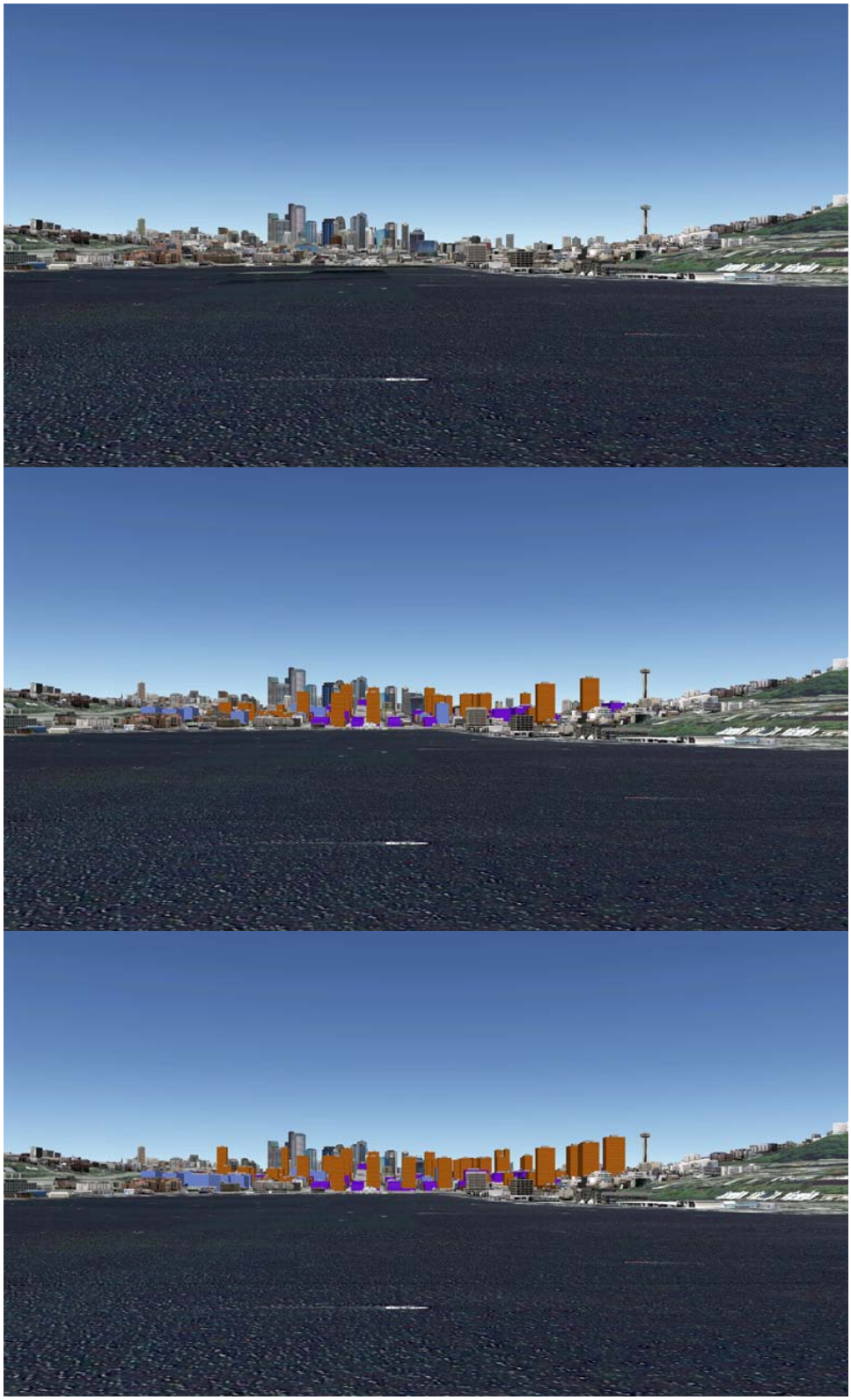
In the views for Alternatives 1 and 2, the top view shows the existing condition, the middle view portrays a 2031 growth target version and the bottom view a full build-out version. Since Alternatives 3 and 4 do not fully achieve the growth targets (times 1.25), the top view is of existing conditions and the bottom view portrays full build-out.

Figure 3.4-2
Birds-eye View – Alternative 1



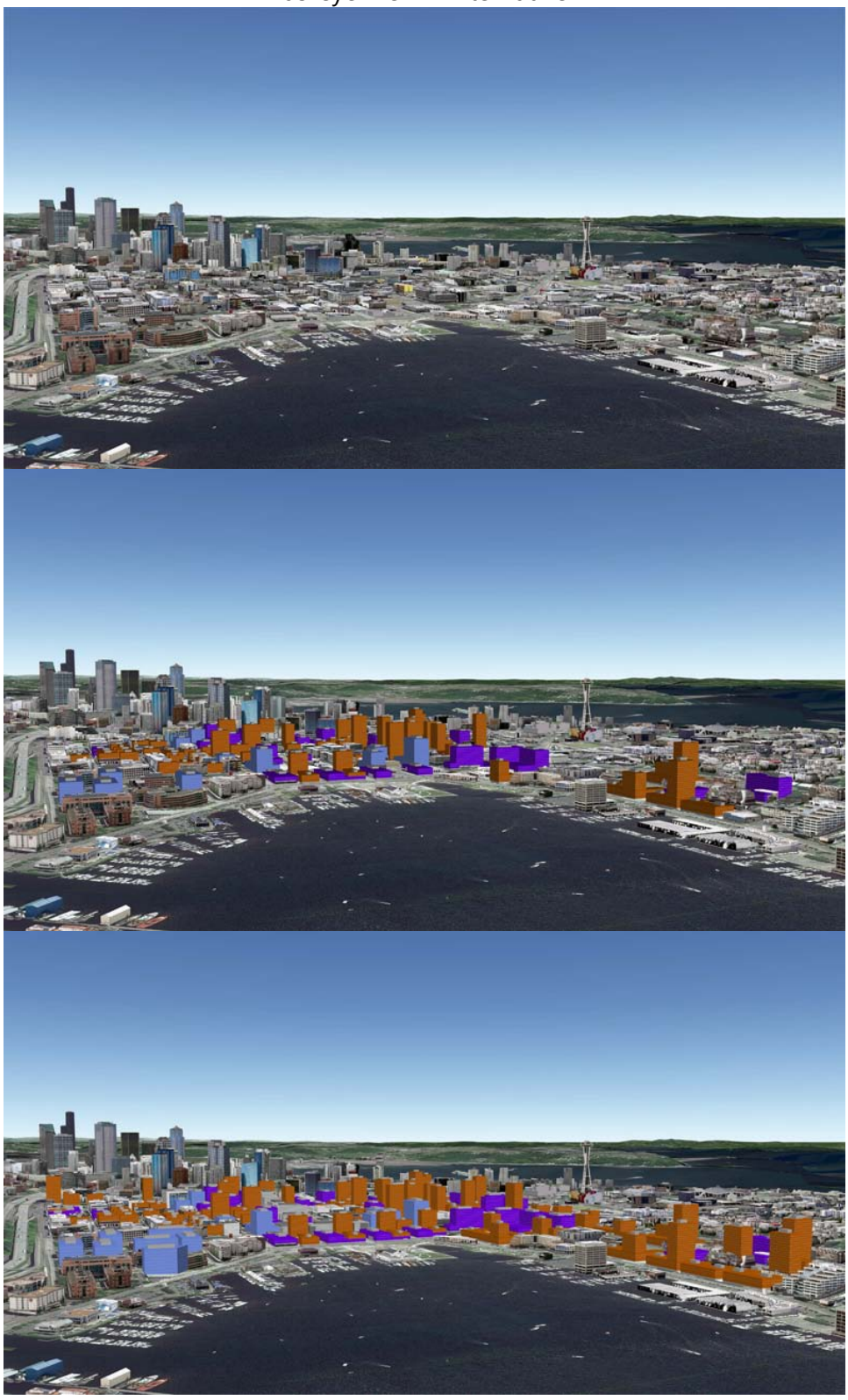
Source: NBBJ, 2010.

Figure 3.4-3
Gasworks Park View – Alternative 1



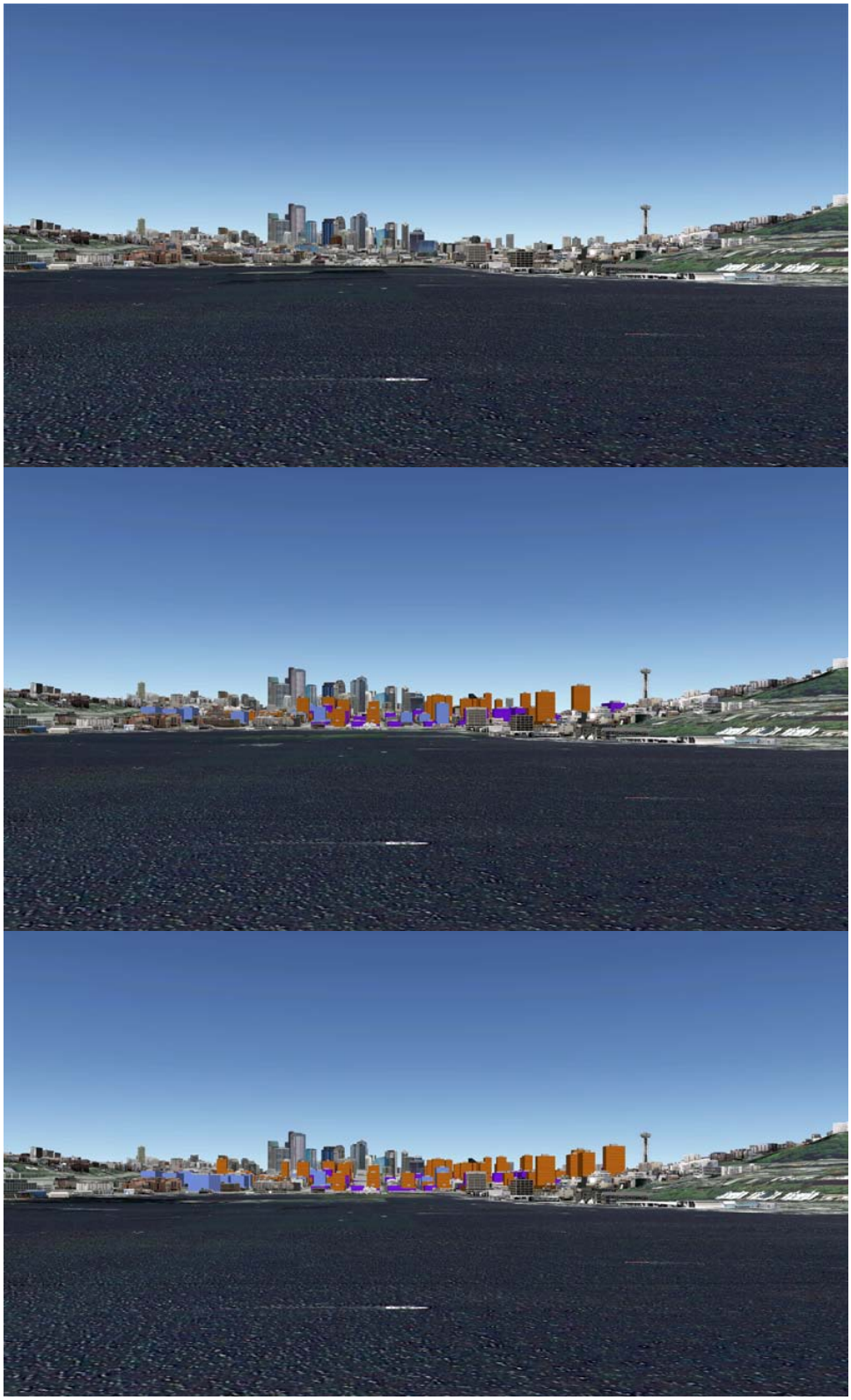
Source: NBBJ, 2010.

Figure 3.4-4
Birds-eye View – Alternative 2



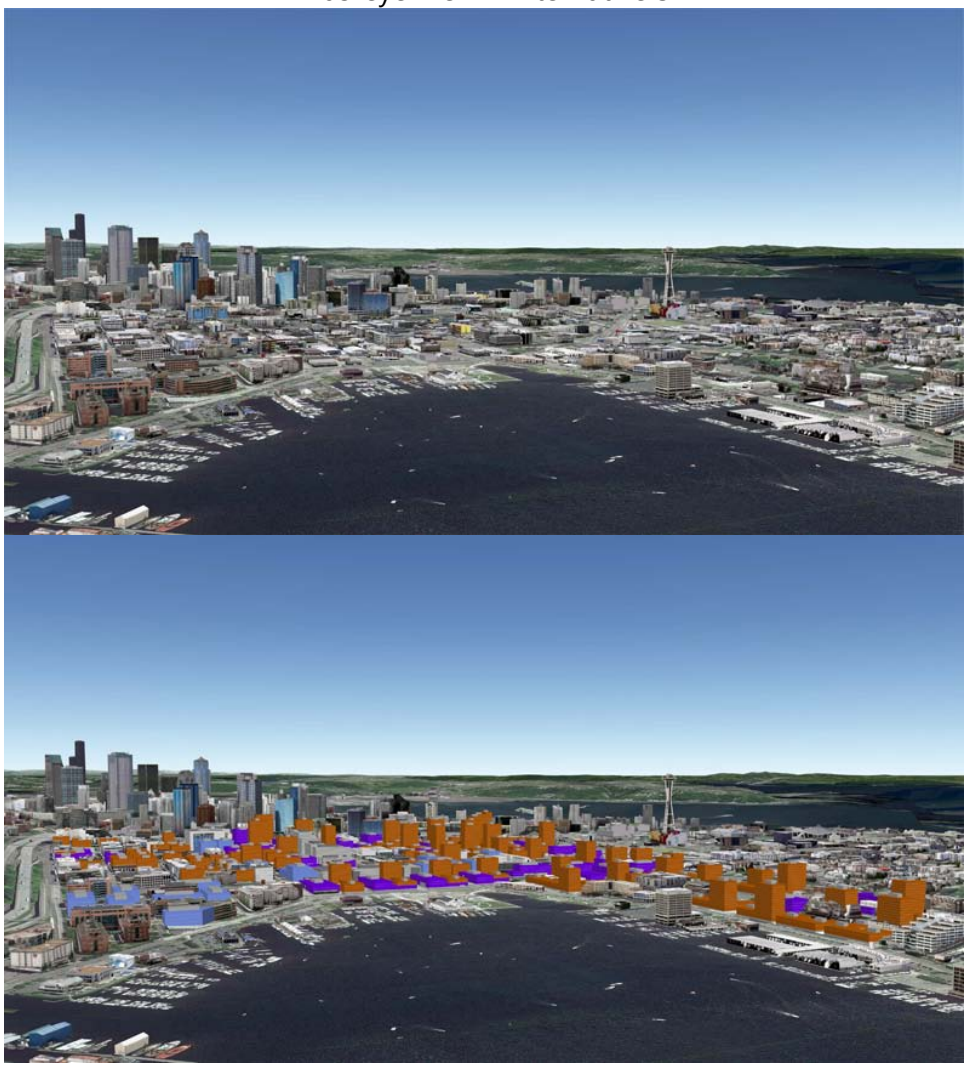
Source: NBBJ, 2010.

Figure 3.4-5
Gasworks Park View – Alternative 2



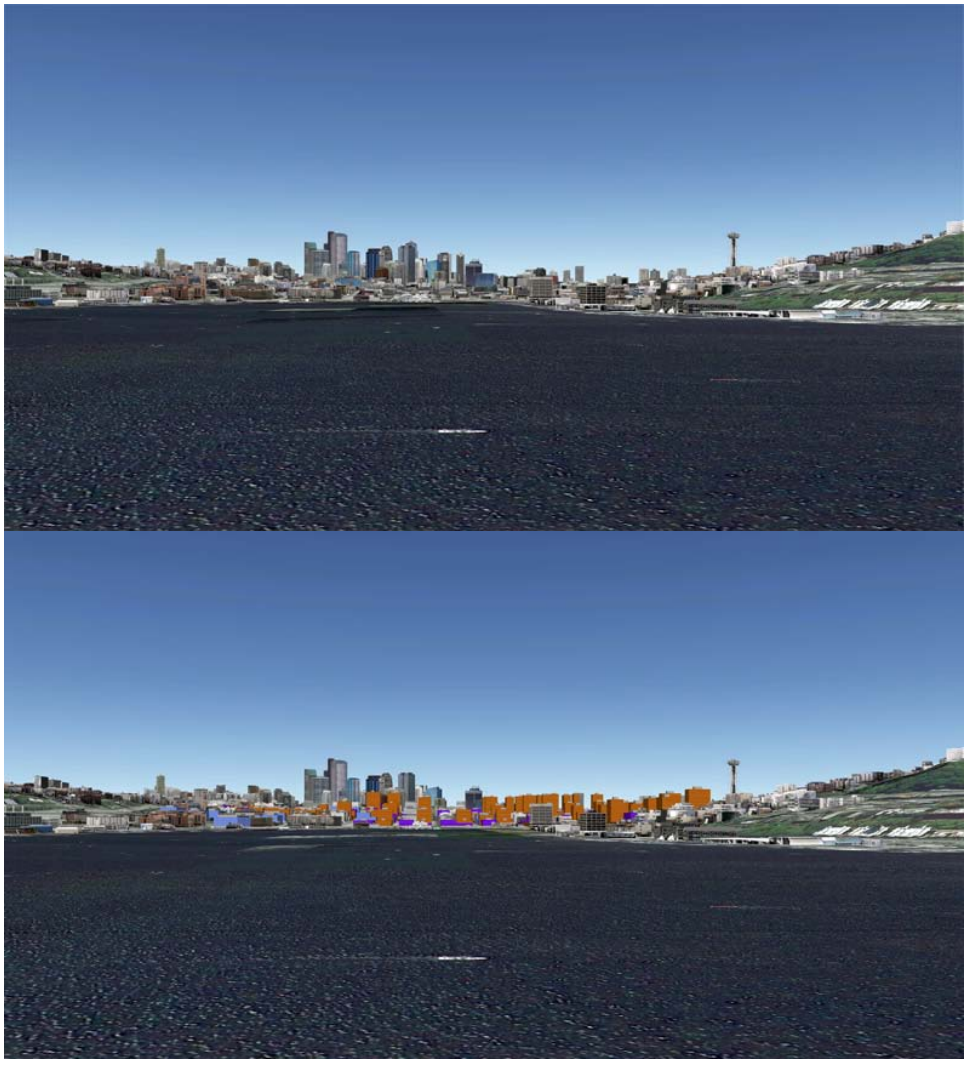
Source: NBBJ, 2010.

Figure 3.4-6
Birds-eye View – Alternative 3



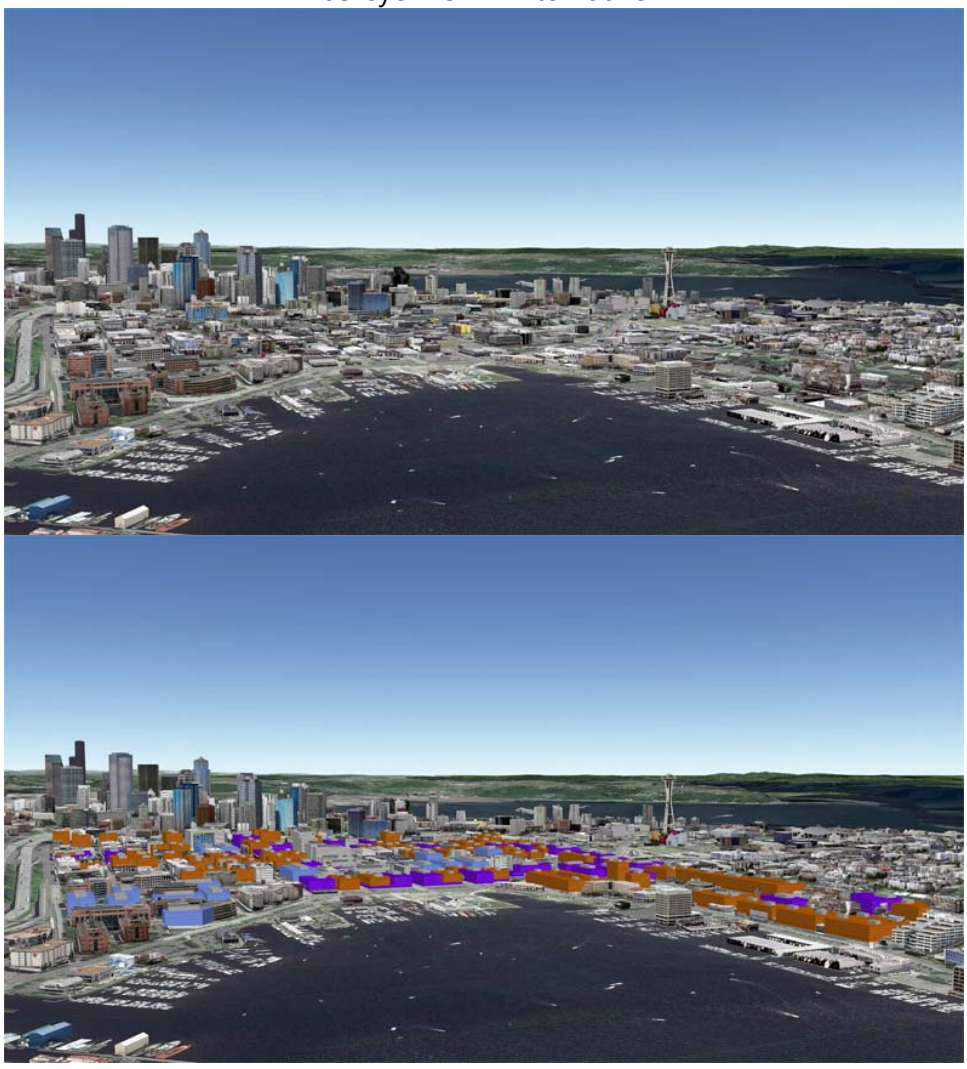
Source: NBBJ, 2010.

Figure 3.4-7
Gasworks Park View – Alternative 3



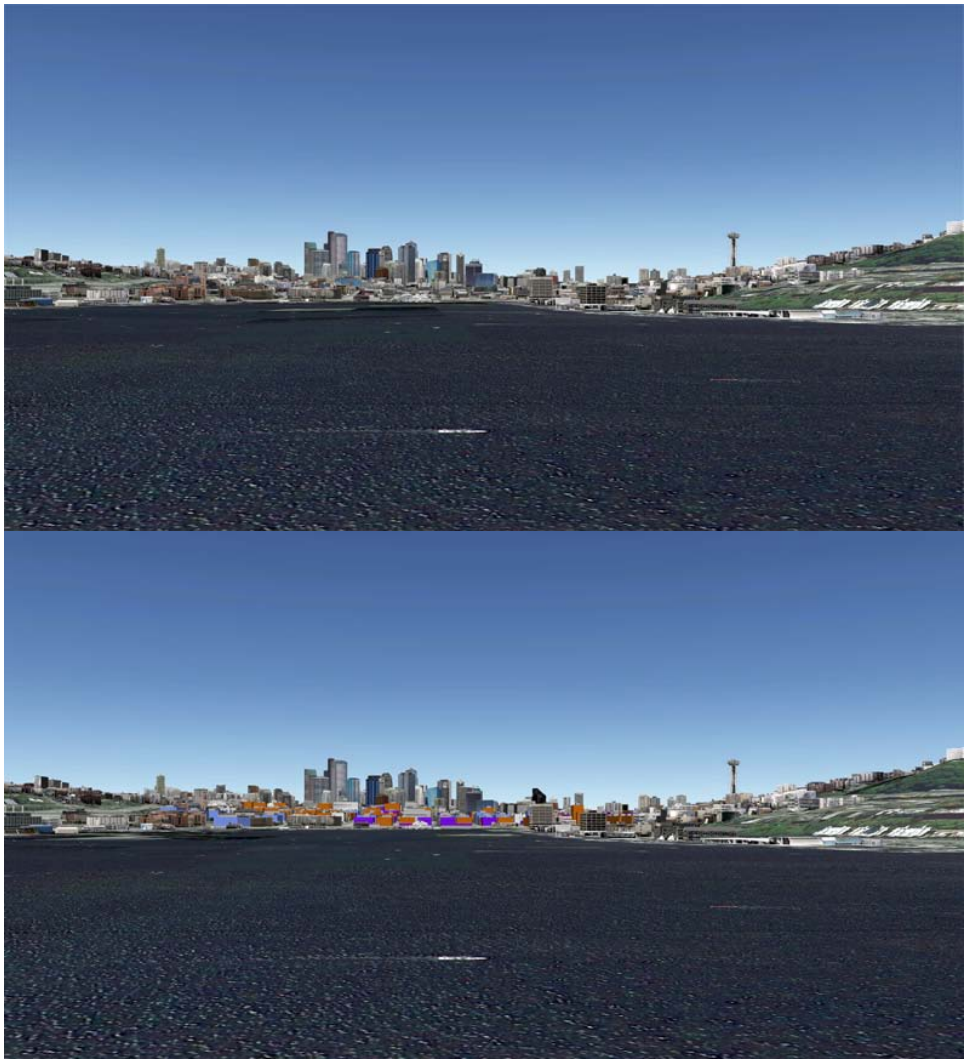
Source: NBBJ, 2010.

Figure 3.4-8
Birds-eye View – Alternative 4



Source: NBBJ, 2010.

Figure 3.4-9
Gasworks Park View – Alternative 4



Source: NBBJ, 2010.

Area Context

The difference between Alternatives 1 and 2 is largely a matter of scale. The lines between height zones are drawn almost identically to those in Alternative 1, but building heights are reduced through much of the neighborhood.

As infill occurs in both the Denny Triangle and the South Lake Union neighborhoods, the greatest aesthetic difference resulting from the development under the first three alternatives – to greater or lesser degrees determined by the allowed height and density of development – will be the visual expansion of the Downtown Seattle skyline north to the shores of Lake Union. Although higher in elevation, territorial views of residents in the surrounding neighborhoods could be affected by new high-rise buildings within the study area. This impact, however, would not occur relative to development under Alternative 4 – No Action.

Neighborhood Character

All alternatives contemplate a significantly greater amount of development, with vacant lots, surface parking lots and under-utilized properties being developed to their full economic potential. Greater density of buildings, residents and employees will create a more urban environment with a consequent increase in street-front retail, employment opportunities and housing options, as well as pedestrian and vehicular traffic.

Height, Bulk and Scale

Alternatives 1 through 3 propose a relatively new building typology for the South Lake Union neighborhood. The new building type would feature a high-rise tower with a limited floor plate area positioned atop a bulkier low-rise podium that would potentially fill the site from property line to property line. These lower podium structures are intended to provide a stepped transition between new and existing development and create a more consistent street wall.

The heights of the towers would vary with the alternatives – potentially ranging from 125 feet to 240 feet for commercial buildings and from 125 feet to 400 feet for residential buildings. Floor plate sizes of towers would be limited to 24,000 sf above the podium for commercial use and an average of 10,500 sf (maximum of 11,500 sf) for residential development. Thus, although the same building typology would apply to both commercial and residential projects, the residential towers would typically be taller and narrower compared to the commercial towers.

For the purposes of comparative analysis, the location of towers and podiums are the same for each alternative with one notable exception. The exception is the location of towers on the Mercer Blocks in Alternative 1. Intuitively, in order to limit shadowing of the new Lake Union Park, towers on the Mercer Blocks were thought to be most appropriately located as far south as possible; this was also the assumption in the UDF. However, since there was no limitation on tower placement inherent in the base alternatives, it was determined that at least one alternative should show the impact of towers located as far to the north as feasible (immediately adjacent to Valley Street rather than Mercer Street). Alternative 1 was selected as the worst case example; otherwise, towers in Alternatives 2 and 3 are located at the south end (adjacent Mercer Street).

The FAR limitation on commercial buildings would reinforce the physical difference between commercial and residential projects. Not being constrained by maximum FAR restrictions, residential development would always have the potential to build to the maximum allowed building height for the use, but commercial development would be restricted by FAR and typically not rise to the maximum allowable building height.

Podiums at the base of the towers would provide the towers with a visual base and create a clear edge along the street.

Each of the alternatives for the South Lake Union neighborhood start by gradually transitioning down in height along the neighborhood's longitudinal axis (Boren Avenue N) from south to north. However, in Alternative 1 under incentive zoning, tower heights are allowed to rise again on the blocks adjacent to the shoreline zone on the south and west shores of Lake Union. To limit the potential view and shadow impacts of towers on Lake Union, the number of towers allowed is reduced from 2 to 1 on the blocks closest to the lake. Alternative 1 would also allow buildings of similar height to the maximum allowed in the Denny Triangle – up to 400 feet – for one block of depth along its border (Denny Way) with the Denny Triangle before decreasing to 300 feet at John Street. Generally speaking, the incentive zoning Alternatives 1 – 3 also imagines greater tower heights on the study area's western border (adjacent to the Uptown Triangle) than along its eastern edge (the Cascade Neighborhood).Tower bulk (length and width) is mitigated by the limitation on the number of towers per block and the restrictions on floor plate size in the alternatives using incentive zoning. However, it is possible that two towers on the same block could be located in close proximity to one another and separated only by an alley.

In some instances, the bulk of podiums created under incentive zoning may be impactful unless appropriate restrictions are placed on their size or height – this is especially the case with the podiums in excess of 45 feet (Alternative 1 only) and the double length blocks along Dexter Avenue N between Aloha and Galer Streets where the street grid is interrupted. Podiums that are 45 feet tall or less will create a street wall lower than buildings allowed under current zoning and are intended to create an appropriate street edge while balancing the height of new towers and providing them with a visual base. In addition, it should be noted that podiums are not required and towers may be developed without a podium base.

While for purposes of this EIS maximum development has been assumed, it is possible that some property owners may not choose to maximize their full development potential. In addition, owners with properties of less than 22,000 sf would still have the option to develop projects to the standards of the underlying zoning. The typology for these buildings is well established within the neighborhood and includes (in plan view) simple rectangles, L-shapes and U- shapes that fill out their zoning envelope from property line to property line and to the maximum height allowed by zoning code, typically ranging between 65 and 85 feet (exceptions being a narrow zone along Denny Way that has a 125 foot height limit and another between Mercer and Valley that is restricted to 40 feet).

Focus Areas

The impacts of potential development in the Focus Areas are shown in conceptual massing studies for each alternative. The orientation of each of these views is described and depicted by computer modeling relative to each alternative (see Focus Area discussion within each alternative later in this section). The depictions show massing of the buildings relative to the street width and surrounding context, but do not attempt to show designs for the individual building or streetscapes.

Alternative 1

Of the development alternatives, full development under Alternative 1 could have the greatest impact on aesthetics in that this alternative would permit the greatest building heights and could result in the greatest increase in development density. The difference between this alternative and Alternative 2, however, is largely a matter of scale.

Area Context

The greatest difference to the surrounding context envisioned in Alternative 1 would be the apparent visual expansion of the Downtown

Seattle skyline to the shore of Lake Union due to the potential for new high-rise construction.

Neighborhood Character

As previously discussed, a greater density of buildings, residents and employees would create a more urban environment with consequently an increase in street-front retail, employment and housing, as well as pedestrian and vehicular access. Over time, it is anticipated that small-scale buildings would redevelop to the larger building typology permitted under the proposed zoning. Relative to the other alternatives, the South Lake Union neighborhood would likely experience the greatest change in character as a result of Alternative 1, although the difference between Alternatives 1 and 2 is incremental in nature.

Similar to Alternative 2, Alternative 1 would encourage a future residential character of the 8th Avenue corridor, through a greater emphasis on residential development compared to commercial. In this corridor, residential building heights allowed at up to 300 feet, while commercial uses in residential buildings are limited to 20 feet in height and free-standing commercial buildings are limited to a maximum of 85 feet.

Alternative 1 is the only alternative that would change the existing Seattle Mixed Residential (SMR) zoning designation in the Cascade neighborhood to Seattle Mixed (SM) and allow commercial building heights to increase from 55 to 85 feet, with potential for greater increases through use of incentive zoning. Compared to the other alternatives, this change could allow for the greatest increase in non-residential floor area and significantly impact the existing residential character of the Cascade neighborhood.

Height, Bulk and Scale

Alternative 1 would allow the greatest building heights of the alternatives under consideration – potentially ranging from 85 feet for commercial buildings in the Cascade area and within the Mercer Blocks to 240 feet for much of rest of the study area, and ranging from 160 feet for residential buildings in the Cascade subarea up to 400 feet along Denny Way. This alternative would allow future buildings that may be more than twice the height than is currently allowed by zoning in the Cascade area and three or more times the allowed height in the rest of the South Lake Union neighborhood.

The impact of these differentials in zoning may be an abrupt juxtaposition of building heights as sites within the neighborhood redevelop. Potential

impacts associated with height, bulk and scale differences between new and existing development could occur in the following situations.

- Areas where neighborhood character is more established and consistent (e.g., the Cascade area). Until recently, high-rise buildings were a rarity in the South Lake Union neighborhood and non-existent in the Cascade area. Alternative 1 would allow for substantial change in the physical scale of individual buildings, create greater differential in the neighborhood skyline and reduce the visual presence of older structures – including Landmark structures.
- Places of transition with neighboring low and mid-rise neighborhoods, such as Uptown. The border with the Uptown Urban Center has numerous available sites for high-rise towers, as well as many additional sites along Dexter Avenue N and 8th Avenue N. The impact of this scale differential could be substantial at full build-out. Given the anticipated re-connection of the Uptown and South Lake Union neighborhoods across Aurora Avenue N, it may be appropriate to address this potential issue by addressing the zoning of the Uptown Triangle and South Lake Union neighborhoods together rather than independently.
- Areas now only very lightly developed, such as the 8th Avenue Corridor and the Dexter Avenue Corridor north of Mercer Street These are areas where the density of new high-rises, if fully developed, could create a potential wall of building to the neighbors. This concern also applies to the Valley/Mercer Blocks, but to a lesser degree. Towers within the Valley/Mercer Blocks would have less impact due to limitation on the number of towers imposed, as a result of the requirement to assemble 60,000 sf of site area for each potential tower (although the relatively tall podium heights of up to 85 feet permitted by Alternative 1 in the Valley/Mercer Blocks could contribute to a more bulky appearance in this area).This impact could be mitigated by a requirement to limit building height within the flight path of the Lake Union Seaplane Airport, which restricts building height to 150 feet (or less if a height buffer is mandated). This restriction could severely constrain building height on two of the four blocks in this area (see **Figure 3.4-1**).

Focus Areas

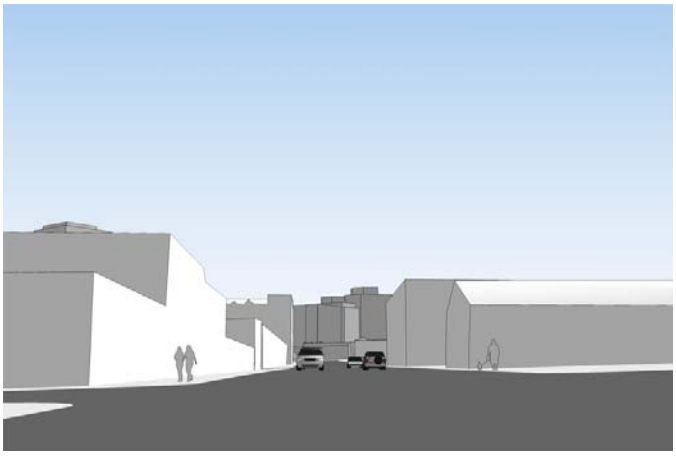
Alternative 1 would allow the greatest degree of development and could potentially result in the greatest amount of change within the designated

Focus Areas. Such changes would be particularly noticeable within the Fairview and 8th Avenue Corridors.

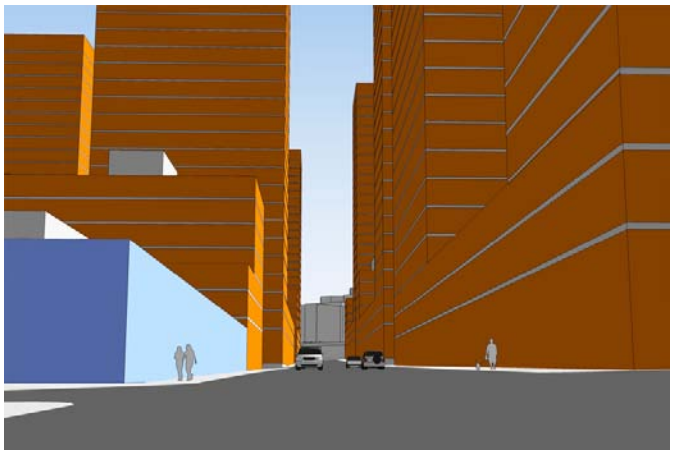
8th Avenue Corridor. **Figure 3.4-10** is a computer-generated graphic depicting the existing, as well as a developed street-level view associated with Alternative 1 along 8th Avenue N from the intersection at Republican Street. This view looks south toward Denny Park. A concentration of multi-family residential development that could be expected to occur on blocks facing onto 8th Avenue N could result in a neighborhood with one or two new towers on every block between Denny Way and Republican Street. Lower podium heights and the retention of the mature street trees that currently line both sides of this corridor could partially mitigate the building heights. Furthermore, there is a natural association between the concentration of residential buildings in this corridor with the existing open space and amenities provided by a renovated Denny Park.

Figure 3.4-10
Street-Level View: Eighth looking South – Alternative 1

Existing



Proposed

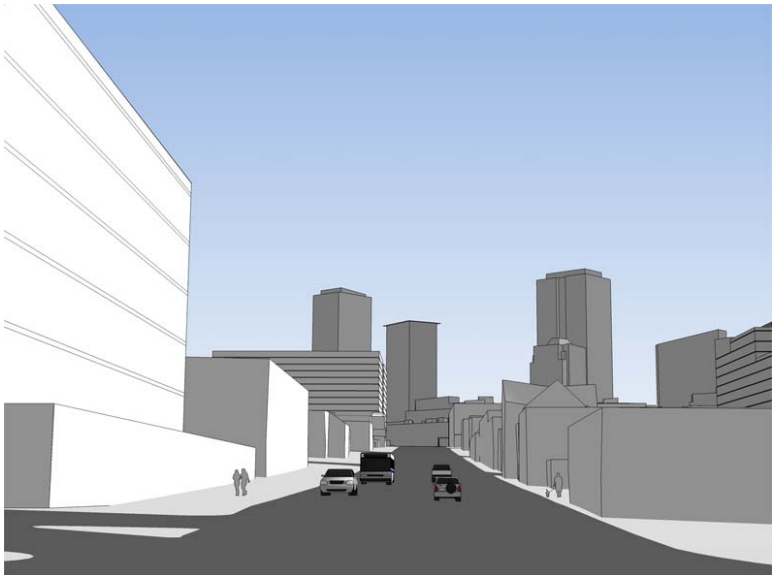


Source: NBBJ, 2010.

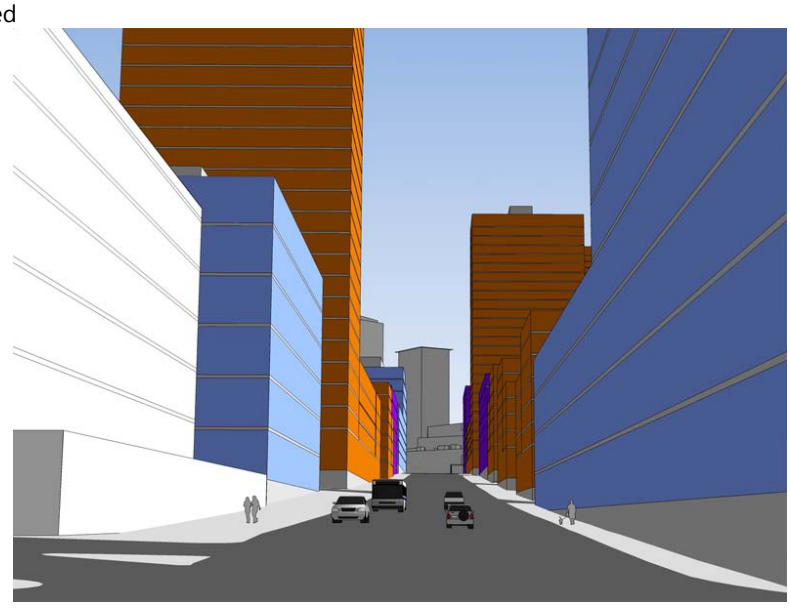
Fairview Avenue Corridor. **Figure 3.4-11** is a computer-generated graphic depicting the existing and developed view (Alternative 1) along Fairview Avenue N from the intersection with the Mercer Street ramp to I-5. This view looks south toward looks south toward Downtown Seattle. The anticipated mix of new residential towers with significantly shorter commercial structures, together with the retention of some existing (including landmark) structures would result in a neighborhood character with a great variety of building types and heights.

Figure 3.4-11
Street-Level View: Fairview Avenue N – Alternative 1

Existing



Proposed

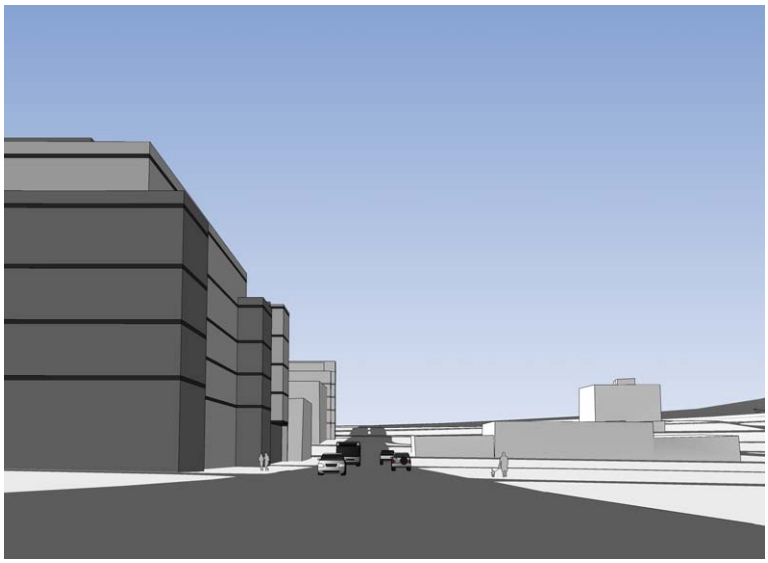


Source: NBBJ, 2010.

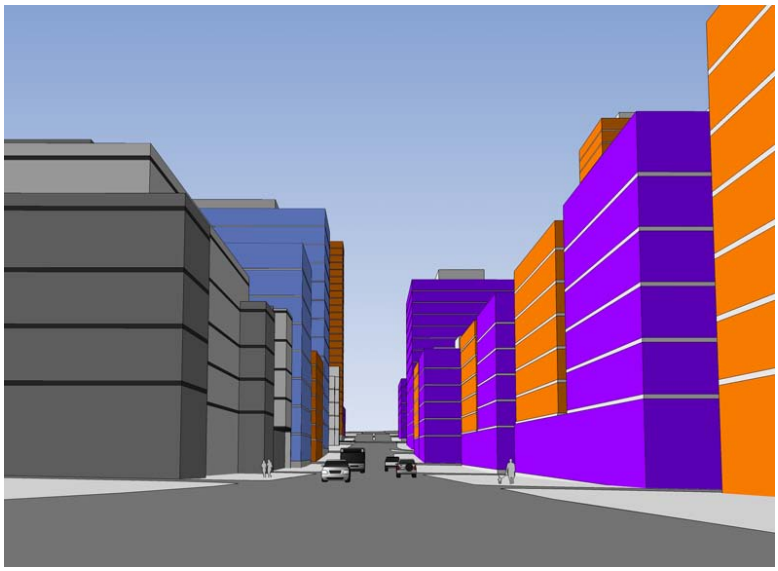
Valley/Mercer Blocks. **Figure 3.4-12** is a computer-generated graphic depicting the existing and developed view (Alternative 1) along Mercer Street from the intersection of Mercer and Boren Avenue N. The view associated with this corridor looks west toward Uptown and Queen Anne along Mercer Street. The Valley/Mercer Blocks are on the right in this view. Alternative 1 would produce less impact on the Mercer Corridor and the Valley/Mercer Blocks than on the other two Focus Areas. This is due not only to the limit of a single tower in each block on the north-side of Mercer, but also the reduction in tower height due to the air corridor study associated with the Lake Union Seaplane Airport, which would affect three of the Valley/Mercer Blocks (see **Figure 3.4-1**). Improvement of the Mercer Way corridor (presently under construction) is expected to provide an enhanced pedestrian environment and would be important to mitigating the scale of future development associated with this alternative. In particular, the addition of a new median with a row of street trees and public art should both improve conditions for all forms of mobility, but also add foreground elements that would mitigate the scale of surrounding buildings. New development also has the potential to create a synergistic relationship with the new Lake Union Park that could benefit both the public and private realms.

Figure 3.4-12
Street-Level View: Mercer Street – Alternative 1

Existing



Proposed



Source: NBBJ, 2010.

Alternative 2

The difference between Alternatives 1 and 2 is largely incremental and a matter of scale.

Area Context

The greatest difference to the surrounding context envisioned in Alternative 2, like Alternative 1, will be the visual expansion of the Seattle City skyline to the shores of Lake Union as a direct consequence of new high-rise construction. There will, however, be a more noticeable height change from neighborhoods to the south and the South Lake Union neighborhood due to the reduction in allowable building heights across Denny Way, from 400 feet in the Triangle to 240 feet in South Lake Union.

Also like the first alternative, Alternative 2 creates an abrupt transition with the Uptown neighborhood (see "Height, Bulk and Scale" below) and impacts some views from neighboring communities (see "Viewshed" later in this Chapter).

Neighborhood Character

Generally speaking, the South Lake Union neighborhood would become more urban in its physical appearance, but maintain a distinct character commensurate with its unique community of uses and the retention of its historic structures. Since this alternative would retain existing zoning in the Cascade area, Cascade would continue to stand apart with its combination of low-rise and mid-rise buildings.

As noted in Alternative 1, the 8th Avenue Corridor and Valley/Mercer Blocks Focus Areas would likely be those areas within the study area that would experience the greatest change. Both have an opportunity to create a synergistic relationship with their neighboring parks – a renovated historic Denny Park at the south end of the 8th Avenue Corridor and the new Lake Union Park adjacent the Valley/Mercer Blocks.

Similar to Alternative 1, Alternative 2 emphasizes residential development in the 8th Avenue corridor, with commercial building heights limited to 20 feet and residential development permitted at building heights of up to 240 feet. In contrast to Alternative 1, Alternative 2 would maintain the existing SMR zoning designation in the Cascade neighborhood.

Height, Bulk and Scale

In terms of height, bulk and scale, Alternative 2 would have similar, but fewer, impacts as compared to Alternative 1.

Outside of the Cascade area, building heights could potentially range from 160 feet for residential buildings on the Valley/Mercer Blocks up to 300 feet along the western border with Uptown. Although there are significant differences in the allowed maximum height for commercial buildings between alternatives, the FAR limitation would be the controlling factor and the commercial building envelopes in Alternative 2 would be largely unchanged compared to Alternative 1, except for some size reduction (approximately one floor) in the Cascade area. As noted, the Cascade area would retain its existing zoning.

The tallest buildings anticipated by Alternative 2 would be 300-foot residential towers that are proposed for the portion the study area that borders the Uptown Urban Center. Therefore, potential impacts described in Alternative 1 under 'Height, Bulk and Scale' would also apply to Alternative 2 relative to the abrupt scale transition between the two neighborhoods. As noted in Alternative 1, one approach may be to address this potential issue by addressing the zoning of the two Urban Centers together rather than independently.

Unlike Alternative 1, podium heights associated with Alternative 2 would not vary with street width, but would remain relatively consistent – typically 45 feet. This would translate to a reduced building profile at the street edge. In turn, the scale of the 'urban room' formed by street and podium – and its sense of enclosure – would also be commensurately reduced.

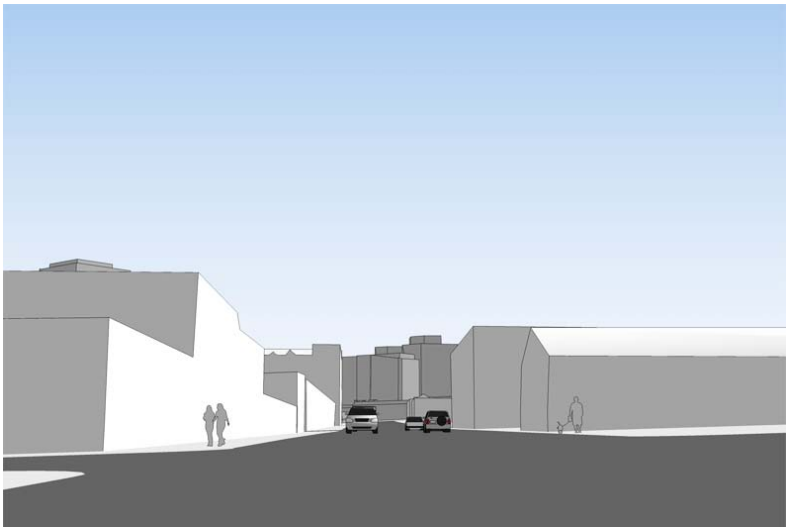
Focus Areas

For all practical purposes, the impacts of Alternative 2 would be the same as Alternative 1 within the designated Focus Areas. While a reduction in height could occur, no substantial differences in aesthetic impacts are anticipated.

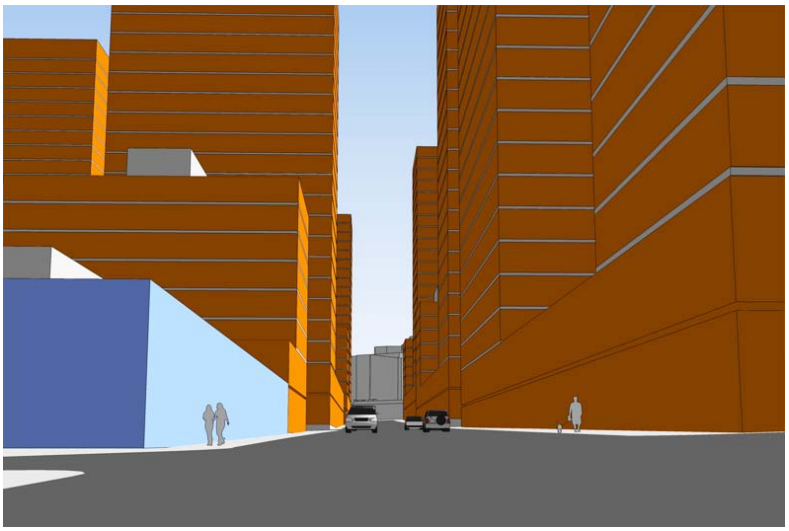
8th Avenue Corridor. See Figure **3.4-13** and the discussion under Alternative 1.

Figure 3.4-13
Street-Level View: Eighth looking South – Alternative 2

Existing



Proposed



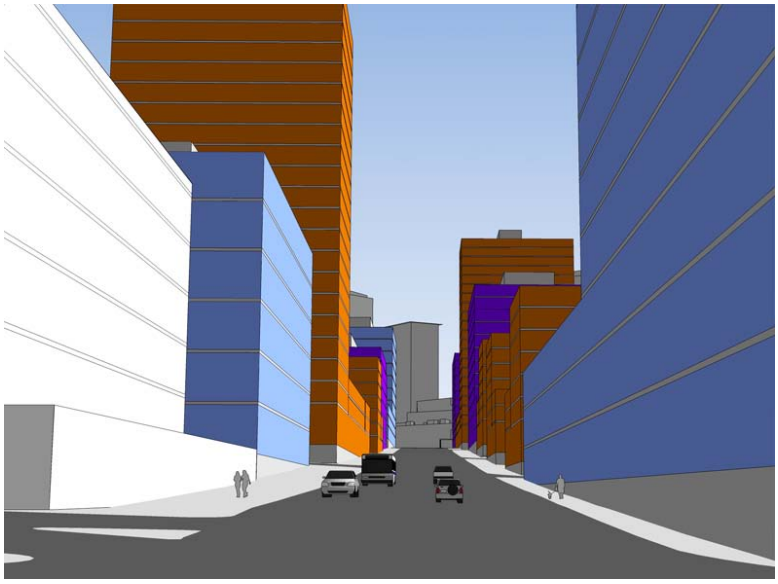
Source: NBBJ, 2010.

Fairview Avenue Corridor. See Figure **3.4-14** and the discussion under Alternative 1.

Figure 3.4-14
Street-Level View: Fairview Avenue N – Alternative 2

Existing

Proposed

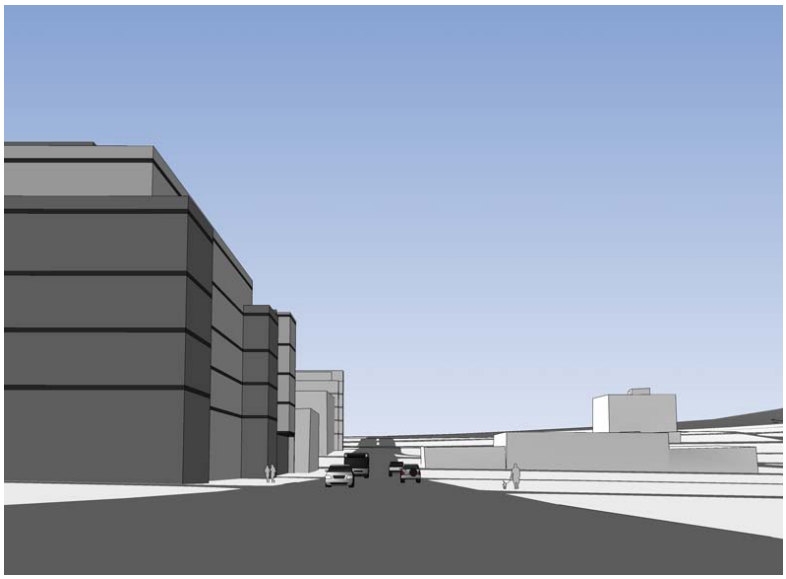


Source: NBBJ, 2010.

Valley/Mercer Blocks. See **Figure 3.4-15** and the discussion under Alternative 1.

Figure 3.4-15
Street-Level View: Mercer Street – Alternative 2

Existing



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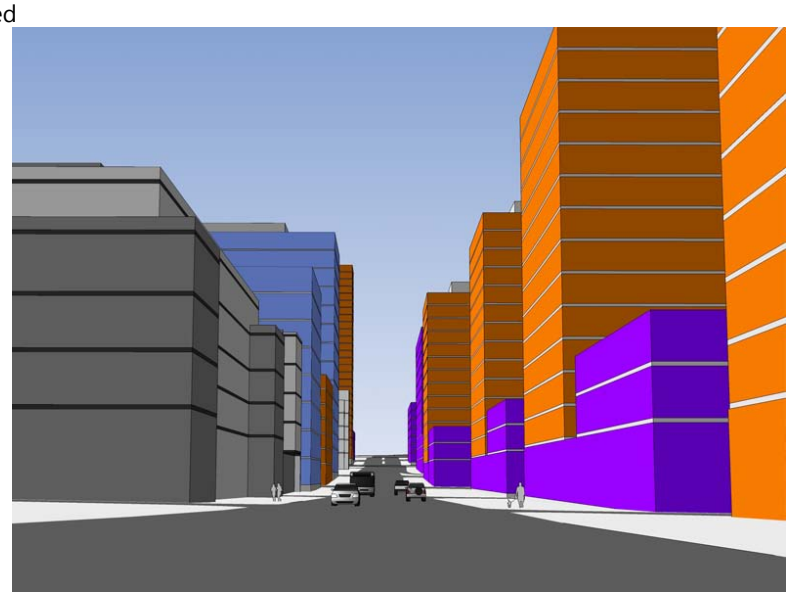


Source: NBBJ, 2010.

Alternative 3

Alternative 3 would envision a neighborhood with graduated heights from north to south – with the tallest buildings located closest to Denny Triangle and the lowest building heights proximate to Lake Union. The Cascade area would be an exception in that that area would retain existing zoning.

Area Context

The greatest difference to the surrounding context envisioned by Alternative 3 – like Alternative 1 and 2 – would be the visual expansion of the Downtown Seattle skyline to the shore of Lake Union as a result of potential new high-rise construction. As in Alternative 2, there may be a noticeable stepping down between the Denny Triangle and the South Lake Union neighborhood due to the reduction in allowable building heights north of Denny Way – from 400 feet in the Denny Triangle to 240 feet in South Lake Union. In Alternative 3, there would also be a graduated stepping down toward Lake Union that would be less abrupt than the transition between the Denny Triangle and the study area.

Also like the first and second alternative, development under Alternative 3 would create an abrupt transition with the Uptown neighborhood (see "Height, Bulk and Scale" below) and could affect some views from neighboring communities (see "Viewshed" later in this chapter).

Neighborhood Character

As is the case with Alternatives 1 and 2, the South Lake Union neighborhood would become more urban in its physical appearance with the changes envisioned by Alternative 3, but still maintain a distinct character commensurate with its unique community of uses and the retention of its historic structures. Compared to the other alternatives, future development under Alternative 3 would be lower in height and more likely to be residential in character. Since this alternative would also retain the existing SMR zoning in the Cascade area, Cascade would continue to stand apart with its combination of low-rise and mid-rise buildings and current residential character.

Similar to Alternatives 1 and 2, the 8th Avenue Corridor and Valley/Mercer Blocks Focus Areas would likely be the most changed portions of the study area. Both have an opportunity to create a more residential character with a concentration of housing synergistic relationship with their neighboring parks – a renovated historic Denny Park at the south-end of the 8th Avenue Corridor and the new Lake Union Park adjacent to the Valley/Mercer Blocks.

Height, Bulk and Scale

As in Alternative 2, the Cascade area would retains its existing zoning in this alternative. Other than that, Alternative 3 would substantially differ from Alternatives 1 and 2 in terms of the location and orientation of allowable building heights. With the exception of the Cascade area, allowable heights of residential buildings would transition down between Denny Way and South Lake Union. Except for a narrow band that would allow 125-foot buildings along a portion of Denny Way and 65-foot buildings along the north-half of the Dexter and Westlake Avenue N corridors, commercial building height would be uniformly limited to 85 feet.

Although the graduated building height would differ from Alternative 1 and 2, Alternative 3 could also have a potential impact on development within the Uptown Urban Center relative to an abrupt scale transition between the two neighborhoods (see 'Height, Bulk and Scale' in Alternative 1); the difference, however, being between 65-foot or 85-foot buildings in Uptown and potentially 160-foot or 240-foot buildings in the South Lake Union neighborhood. As noted with regard to Alternative 1, one approach may be to address this potential height differential issue by zoning the two Urban Centers together rather than independently.

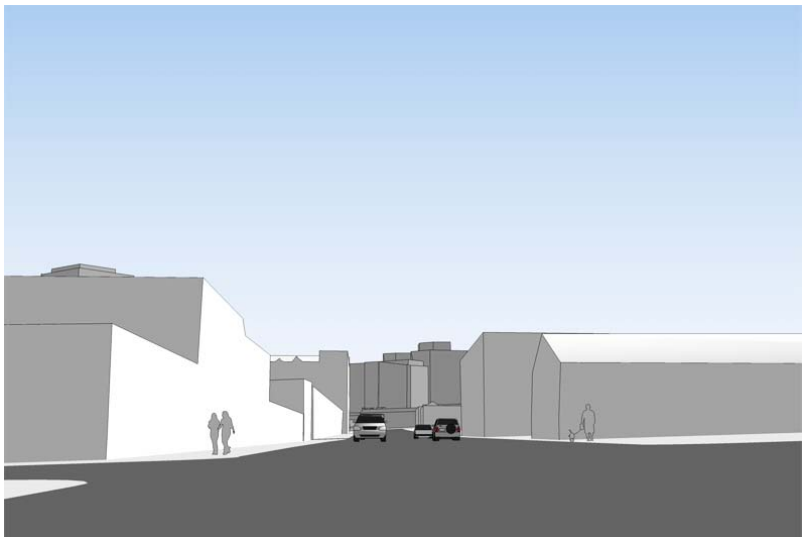
Focus Areas

For all practical purposes, the impacts of Alternative 3 would be the same as Alternative 1 within the designated Focus Areas. While a reduction in overall height would occur in conjunction with this alternative (compared to Alternative 1 and 2), the changes in aesthetic impacts are not expected to differ greatly.

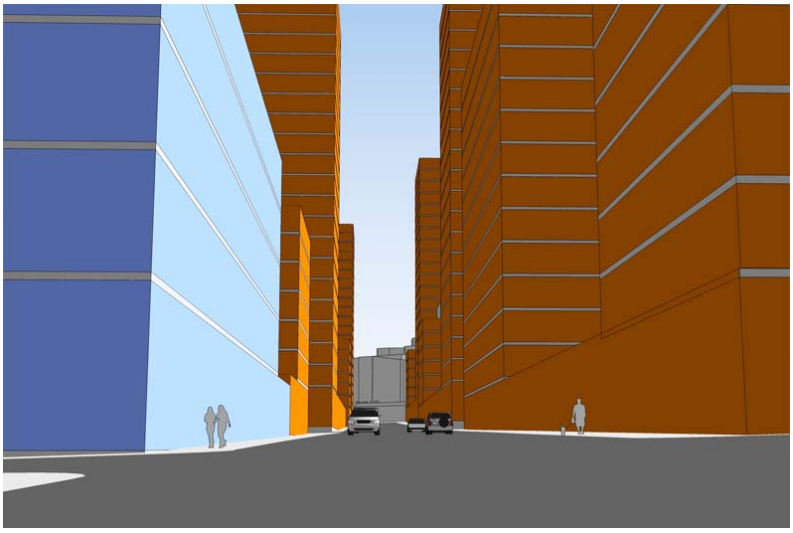
8th Avenue Corridor. See Figure **3.4-16** and discussion under Alternative 1.

Figure 3.4-16
Street-Level View: Eighth Avenue N – Alternative 3

Existing



Proposed



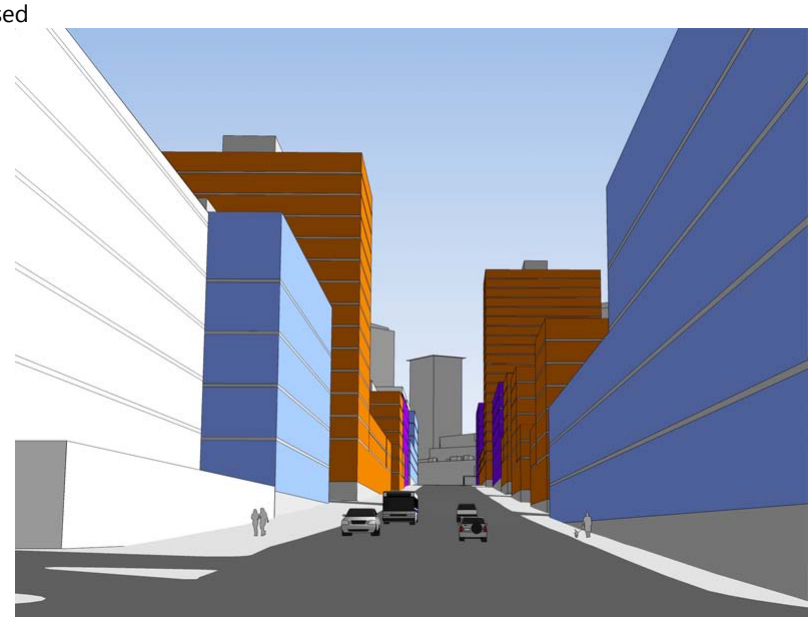
Source: NBBJ, 2010.

Fairview Avenue Corridor. See Figure **3.4-17** and discussion under Alternative 1.

Figure 3.4-17
Street-Level View: Fairview Avenue N – Alternative 3

Existing

Proposed

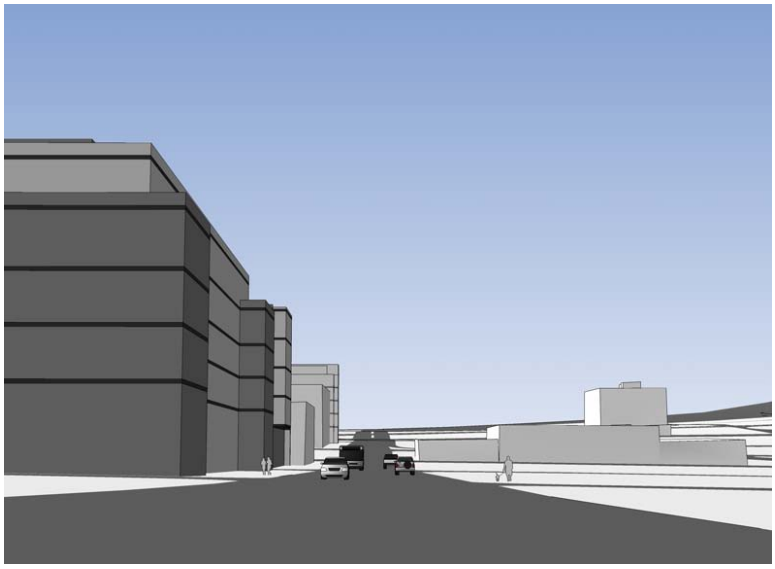


Source: NBBJ, 2010.

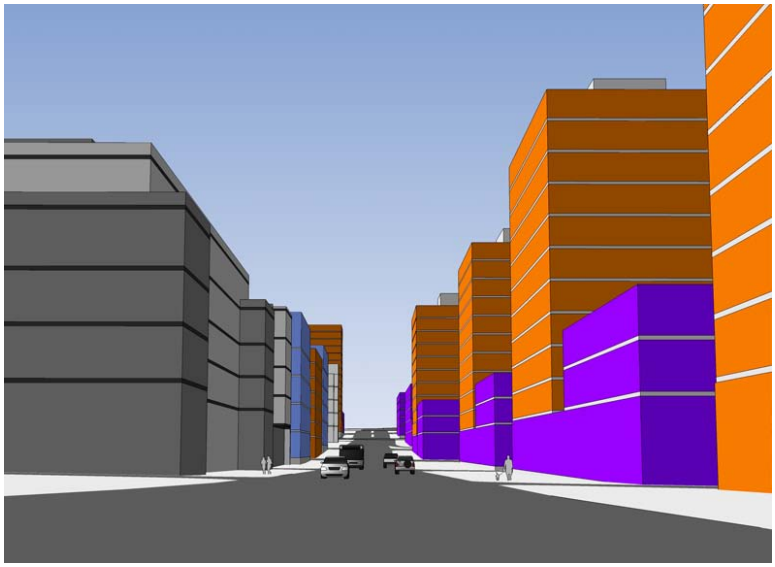
Valley/Mercer Blocks. See Figure **3.4-18** and discussion under Alternative 1.

Figure 3.4-18
Street-Level View: Mercer Street – Alternative3

Existing



Proposed



Source: NBBJ, 2010.

Alternative 4 (No Action)

Alternative 4 would retain the existing zoning for the entire South Lake Union neighborhood.

Area Context

No significant change to the area context is anticipated with regard to future development of the neighborhood under current zoning.

Neighborhood Character

No significant change to neighborhood character is anticipated with future development under current zoning. In particular, the existing Industrial Commercial (IC) zone would continue as an employment area with residential development prohibited and the residential character of the SMR zoning would maintained. Over time, the neighborhood would become more urban in character, but retain its current low- and mid-rise character.

Height, Bulk and Scale

Because the entire neighborhood would retain current zoning, Alternative 4 would have the least impact on neighboring communities compared to the other three alternatives. Heights of new buildings would be roughly equivalent to those in the Uptown Urban Center and would remain significantly less than those in Denny Triangle.

While height is not an issue with Alternative 4, bulk could be. Within the South Lake Union neighborhood, recent experience has shown that buildings built to the existing zoning typically fill their site from property line to property line and to the maximum height allowable. This has resulted in bulky buildings with a massive footprint and no mediating base or podium that would tend to dominate the immediate street environment. The best examples have carved out street level plazas and through-block connections that can significantly mitigate building bulk by introducing welcome interruptions in otherwise unrelieved street facades.

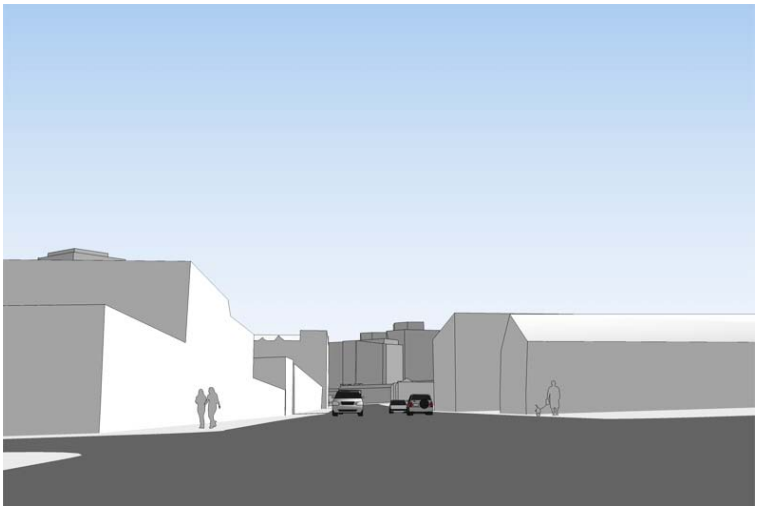
Focus Areas

Under Alternative 4, existing development regulations would be retained and no significant change to neighborhood character and height, bulk and scale are anticipated.

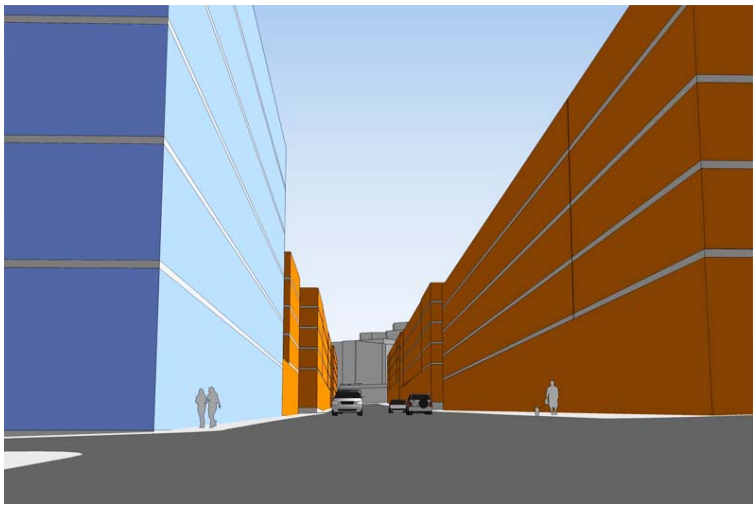
8th Avenue Corridor. See Figure **3.4-19**.

Figure 3.4-19
Street-Level View: Eighth Avenue N – Alternative 4

Existing



Proposed



Source: NBBJ, 2010.

Fairview Avenue Corridor. See Figure **3.4-20**.

Figure 3.4-20
Street-Level View: Fairview Avenue N – Alternative 4

Existing

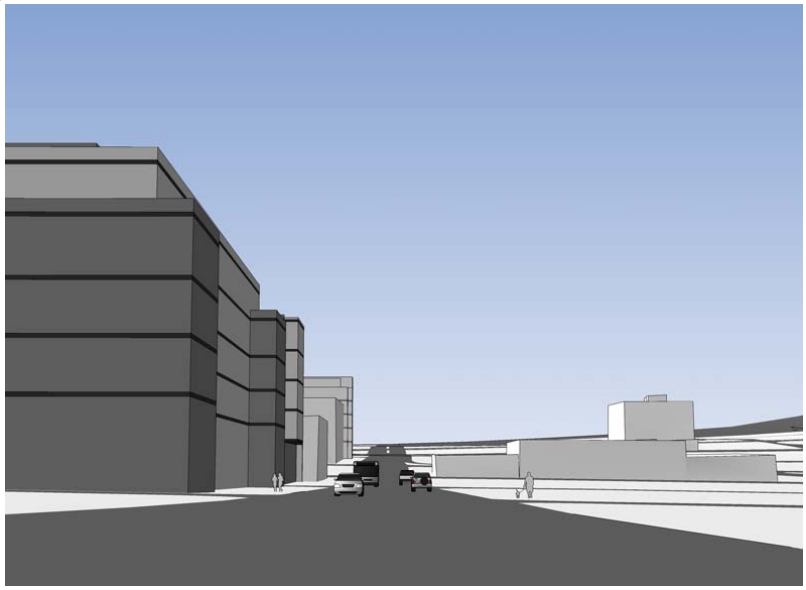
Proposed

Source: NBBJ, 2010.

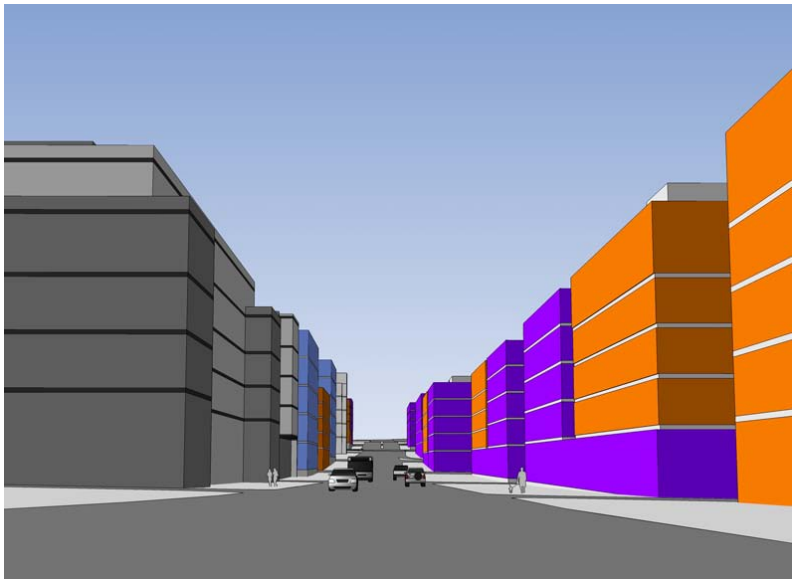
Valley/Mercer Blocks. See Figure **3.4-21**.

Figure 3.4-21
Street-Level View: Mercer Street – Alternative 4

Existing



Proposed



Source: NBBJ, 2010.

3.4.3 Mitigation Strategies

A number of potential approaches for mitigation are discussed below. See also mitigation recommendations contained in SMC 25.05.675, some of which are incorporated below.

Possible mitigation strategies to reduce the impact of height, bulk and scale that may apply to all alternatives include:

a. Either limit the height of development or create additional zones that transition building heights down more gradually.
b. Implement measures to modify the bulk of development.
c. Modify building façades or envelopes through adjustments in building modulation, finish material, color, architectural detailing or fenestration (including type or percentage of glazing).
d. Reduce, relocate or rearrange of accessory structures.
e. Modify required building setbacks.
f. Relocate buildings on-site.
g. Modify building orientation.
h. Redesign the building profile of a project.
i. Create or modify on-site view corridors.
j. Reduce or modify walls, fences, screening or landscaping.
k. Require or encourage incorporation of open space or through-block pedestrian connections as part of development projects.
l. Develop and adopt design guidelines to specifically address bulk impacts identified with each alternative.

For South Lake Union, recommendations for specific migration strategies to reduce the potential impacts of the height, bulk and scale include the following:

a. Where multi-block development is anticipated, consider development agreements to achieve cohesive design solutions and appropriate site-specific mitigations for project height, bulk and scale.
b. On sites allowing podium heights of 65 and 85 feet (Alternative 1 only) consider providing an incentive to create public open space, limit overall height and step (or otherwise modulate) the podium mass by limiting the podium area to a maximum of 3 FAR.
c. In order to maintain a pedestrian character, street level uses and positive visual expression at the podium levels, discourage

above-grade parking. Consider setting a maximum of one FAR for above-grade structured parking.

d. As inspired by the UDF (see pages 14 and 15 of Final UDF) , consider creating a sense of openness at designated street intersections by requiring a substantial percentage (i.e. 70%) of street level transparency (i.e. between 2 feet and 9 feet above street grade) for a distance of 40 feet from the corner in all directions. Proposed locations include all intersections of Dexter Avenue N, 9th Avenue N, Terry Avenue N and Fairview Avenue N. between John and Republican Streets, as well as Mercer Street between 9th and Boren Avenues N. Retail and other pedestrian-oriented uses could be encouraged in these locations through incentives (but should not be a requirement lacking an established customer base).

e. Per the UDF (see pages 18 and 19), consider incentivizing or otherwise encouraging mid-block pedestrian connections and public open space. Additional, small scale open spaces are recommended throughout the study area. Mid-block pedestrian connections should also be encouraged throughout the neighborhood, but these would be particularly beneficial on the residential blocks between Mercer and John Streets on either side of 8th Avenue N and on the west side of Yale Avenue N.

f. As suggested by the language of the UDF (see page 37, Item 20), consider allowing TDRs (Transfer of Development Rights) for the older structures within the neighborhood that do not utilize their full development potential, in order to preserve neighborhood character, protect affordable housing and maintain a variety of building scales. This strategy could be applied to all structures over a certain age (i.e. 25 years) or to specific buildings identified through an inventory of South Lake Union's character-defining structures and affordable housing.

g. Consider incentivizing ground-level housing with street setbacks (i.e. 15 feet) to create sufficient privacy separation to encourage entry at grade or near-grade (porches or stoops).

In addition to the recommended mitigation measures outlined above, the upper-level setbacks as described in the Viewshed Section under 3.4.7 Mitigation Strategies will also ameliorate the impacts of height, bulk and scale.

3.4.4 Significant Unavoidable Adverse Impacts

With recommended mitigation no significant unavoidable adverse impacts to height, bulk and scale are anticipated.

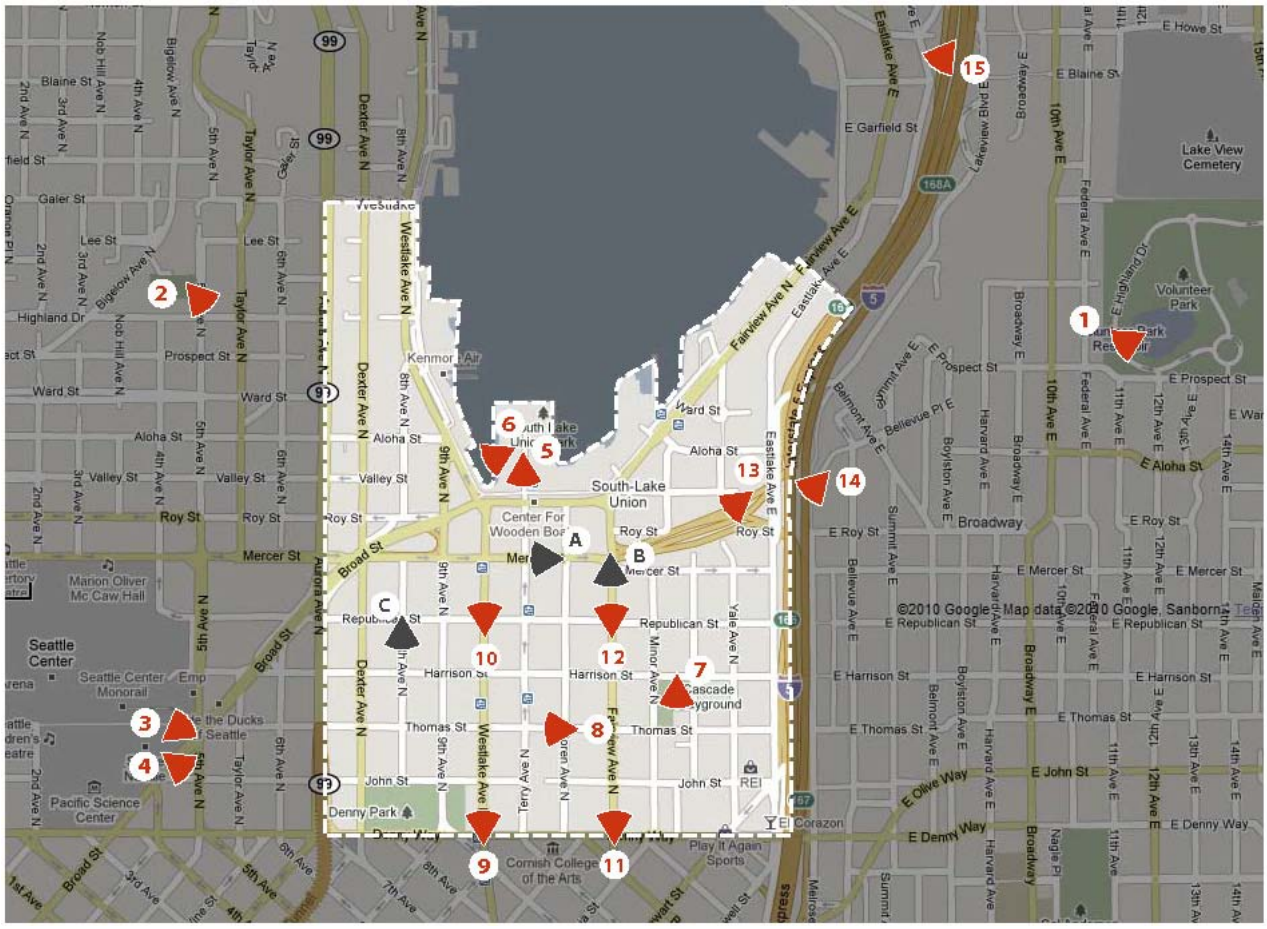
VIEWSHED

This section illustrates and describes the physical character of the South Lake Union neighborhood and its immediate surroundings using 3-D computer modeling and photographic simulations. These simulations provide representative views from selected viewpoints of both the existing neighborhood and each of the proposed alternatives.

3.4.5 Affected Environment

To evaluate the potential impact of the four alternatives relative to views, 15 viewpoints have been identified. Six of the viewpoints are officially-designated viewpoints (discussed below) and photosimulations for these are provided in this section of the Draft EIS. Photosimulations for non-designated viewpoints are contained in **Appendix D** of this Draft EIS. **Figure 3.4-22** depicts all 15 viewpoint locations; those that are color coded are included in this section of the Draft EIS.

Figure 3.4-22
Viewshed Locations



Source: NBBJ, 2010.

Each of the simulations is based on a photograph that was taken at the viewpoint. To evaluate the impact of each alternative on the viewshed, a 3-D computer model for each alternative was inserted into Google Earth and view angles were set to match the viewpoints used for the photos. Since Google Earth does not typically show the height of plant material, trees and other growth that play a prominent role in specific views were added directly from the photos using Photoshop to provide as much realism as possible.

The City of Seattle Municipal Code Section 25.05.675 P contains SEPA policies related to public view protection. Specifically, "(i)t is the City's policy to protect public views of significant natural and human-made features: Mount Rainer, the Olympic and Cascade Mountains, the downtown skyline, and major bodies of water including Puget Sound, Lake Washington, Lake Union and the Ship Canal, from public places consisting of the specified viewpoints, parks, scenic routes, and view corridors …"(SMC 25.05.675 P2a). Designated viewpoints are identified in Attachment 1 to that section of the code.

There are three City-designated **viewpoints**[7] in the vicinity of the South Lake Union neighborhood – Volunteer Park, Bhy Kracke Park and Plymouth Pillars Park (formerly known as Four Columns Park/Boren-Pine-Pike Park). Views toward the South Lake Union neighborhood from Plymouth Pillars Park were analyzed and it was determined that the majority of the neighborhood is not visible from this viewpoint. The viewpoint analysis contained in this Draft EIS, therefore, addresses Volunteer Park and Bhy Kracke Park.

While not identified as City-designated viewpoints based on Attachment 1, there are additional locations in and proximate to the South Lake Union neighborhood that provide a public (or quasi-public) view of the this neighborhood, including: Lake Union Park, the Cascade Playground, Bellevue Place, and the Space Needle. Simulations associated with these viewpoints are contained in **Appendix D** of this Draft EIS.

The following is an overview of the existing viewsheds associated with Volunteer Park and Bhy Kracke Park.

Volunteer Park

The park is located in the Capitol Hill neighborhood approximately three-quarters of a mile northeast of the South Lake Union neighborhood. The

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[7] Based on Seattle's SEPA Code 25.05.675, Attachment 1.

designated viewpoint is atop the cylindrical water tower near the reservoir in the southern portion of the park. This designated viewpoint provides southwesterly views toward the study area from the tower including views of the Space Needle, the Downtown Seattle skyline, the Olympic Mountains and Puget Sound. During part of the year, views of portions of the South Lake Union neighborhood from this location are obscured by mature deciduous and coniferous trees.

Bhy Kracke Park

This park is located on the southeast side of Queen Anne Hill, west of Lake Union (1215 - 5th Avenue N) and approximately one-half mile northwest of the South Lake Union neighborhood. This designated viewpoint provides southeasterly views toward the study area. The park is situated on a hillside and features a narrow pedestrian path that winds from the bottom to the top of the hill. From the outlook at its highest point, Bhy Kracke Park offers views of the Downtown Seattle skyline, Mount Rainier, the Space Needle and Lake Union. Only portions of the South Lake Union neighborhood are visible from the higher elevations in the park and even then, part of the view of the study area is obscured during portions of the year by mature deciduous trees.

In addition to City-designated public viewpoints of significant natural and human-made features, the City has identified 10 viewpoints from which views of the Space Needle are to be protected.8 Of these ten viewpoints, only one has a line of sight through the South Lake Union neighborhood – Volunteer Park.

City policy also protects public views of **historic landmarks** that have been officially designated by the City's Landmarks Preservation Board and, "which, because of their prominence of location or contrasts of siting, age, or scale are easily identifiable visual features of their neighborhood or the City and contribute to the distinctive quality or identity of their neighborhood or the City."[9] Nine historic structures or objects have been designated as Landmarks in the South Lake Union neighborhood.[10] Each of these is at least 25 years old and each meets one or more of the City's designation criteria.[11] These structures are not only key character defining

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8 Seattle Municipal Code Chap. 25.05.675 P2c. and Seattle DCLU, 2001,

9 Seattle Municipal Code Chap. 25.05.675 P.2.b.i.

10 The South Lake Union, Eastlake and Fremont areas are combined as part of the City's Lake Union region.

11 Refer to Seattle Municipal Code Chap. 25.12.350 for the specific standards associated with designation.

features within the neighborhood, but also serve as important visual clues for orientation. Preserving historic structures can mean preserving views as well, since older buildings are often shorter and smaller than more contemporary structures built to maximize their zoning envelope.

Lastly, City ordinances[12] identify specific **scenic routes** throughout the City from which view protection is to be encouraged. Portions of several streets within the study area are designated as scenic routes, including: Westlake Ave. N, Fairview Avenue N, the Mercer St. off-ramp from I-5, I-5 and portions of Aurora Avenue N and Dexter Avenue N.

While not identified as a City-designated scenic route, Thomas Street provides a public westerly view through the South Lake Union neighborhood toward the Space Needle. Simulations associated with this route are contained in **Appendix D** of this Draft EIS.

The following is an overview of four key scenic routes: Westlake Avenue N., Fairview Avenue N, the I-5/Mercer off-ramp, and I-5 (southbound).

Westlake Avenue N and Fairview Avenue N

Northerly views from Westlake Avenue N and Fairview Avenue N toward Lake Union improve as the viewer moves closer to the water and the view corridor widens.

Due to the fact that Seattle city blocks are typically longer in the north-south dimension, many east-west views are already obscured by buildings. However, some east–west views are still possible from these corridors in conjunction with streets that intersect Westlake Avenue N and Fairview Avenue N. Especially notable are westerly views toward the Space Needle along John and Thomas Streets (see **Appendix D**).

Dexter Avenue N and Aurora Avenue N

Portions of Aurora and Dexter Avenues north of Broad Street currently offer occasional views toward Lake Union and towards more distant scenic features such as Gas Works Park or the Cascade Mountains. Within the South Lake Union Neighborhood, however, these views are only available along the perpendicular rights-of-way or across undeveloped properties.

I-5 and the Mercer Street Off-ramp

Southbound I-5 and a segment of the Mercer Street Off-ramp are elevated and each provides scenic views of the South Lake Union area, the

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[12] Ord. #97025 (Scenic Routes Identified by the Seattle Engineering Department's Traffic Division) and Ord. #114057 (Seattle Mayor's Recommended Open Space Policies).

Space Needle, the Downtown skyline, Elliott Bay and the Olympic Mountains beyond. Views along these corridors are already partially obstructed by vegetation and existing man-made structures – including buildings (particularly those constructed closest to the highway and ramp), sound walls and other highway appurtenances.

3.4.6 Environmental Impacts

This section describes changes to the aesthetic character of the built environment relative to existing views that could be affected under the four alternatives.

Impacts Common to All Alternatives

All of the alternatives assume that every vacant or underdeveloped site is built out to its maximum potential. Therefore, all alternatives – even No Action – envision a significantly more dense urban environment.

Westlake Avenue N and Fairview Avenue N

Mature street trees and existing low-rise buildings constructed to their property lines already frame the views of the lake and shoreline looking north on Westlake and Fairview Avenues. The view studies indicate that new towers built under incentive zoning will not reduce their width any more than buildings constructed under existing zoning. Future towers will frame views of the open sky above the lake.

Dexter Avenue N and Aurora Avenue N

Under all of the alternatives, including the No-Action Alternative, views from Dexter Avenue N would continue to be available only along the perpendicular rights-of-ways (since even a low-rise structure would block street-level views). Towers built under incentive zoning east of Dexter Avenue could potentially impact views from Aurora Avenue N

The following discussion pertains to designated viewpoints and scenic routes relative to the four alternatives. As noted previously, simulations for non-designated viewpoints are contained in **Appendix D**.

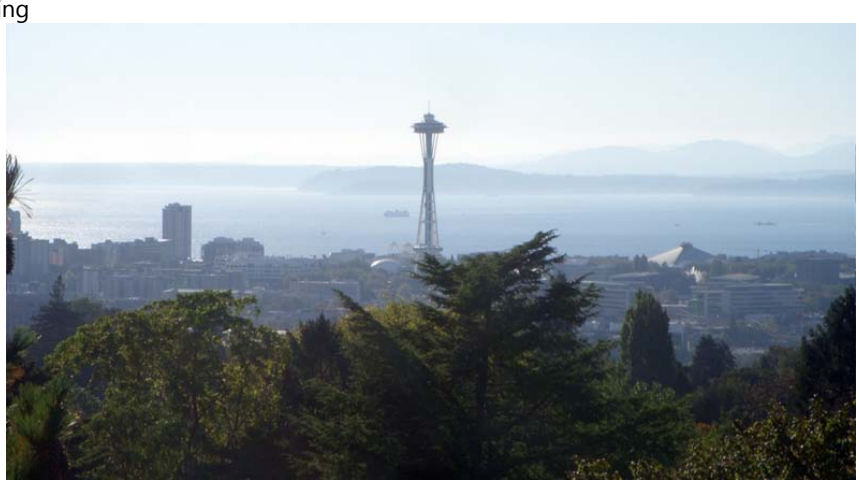
Alternative 1

A number of views inside and outside the South Lake Union neighborhood will be potentially impacted by Alternative 1 at full build-out, although none of the protected views are significantly impacted. The most significant changes are to Views #6, #8 and #13. Less significant but notable changes occur to Views #1, #5 and #14.

View #1 – Volunteer Park (**Figure 3.4-23**)
New high-rise buildings within the study area would be prominent in the view Volunteer Park. However, the Space Needle, Elliott Bay, Bainbridge Island and the Olympic Peninsula would still be visible. Conceivably, the base of the Space Needle may be screened to about one-third of the tower height. As noted previously, the view of the Space Needle from Volunteer Park is a protected view per SMC 25.05.675 P2c. Views of Elliott Bay from this location would be affected by the new high-rise buildings.

Figure 3.4-23
Volunteer Park – Alternative 1

Existing



Proposed

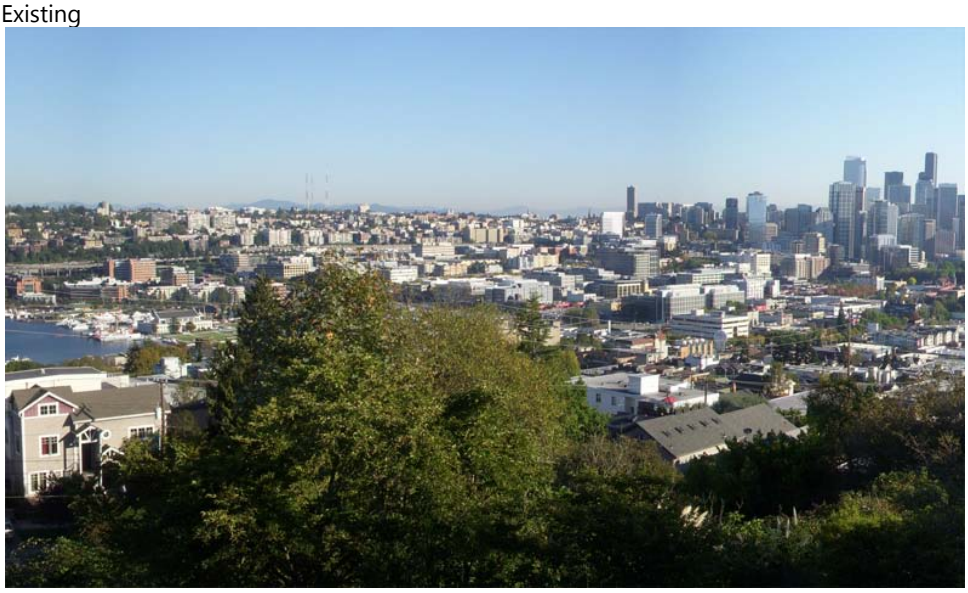
Source: NBBJ, 2010.

View #2 – Bhy Kracke Park (**Figure 3.4-24**)
New high-rise buildings within the study area would be prominent in the view from Bhy Kracke Park. Views of the Seattle Downtown skyline, the Cascade Mountains and Capitol Hill, however, would remain. Although the new buildings do not significantly change the profile of the skyline,

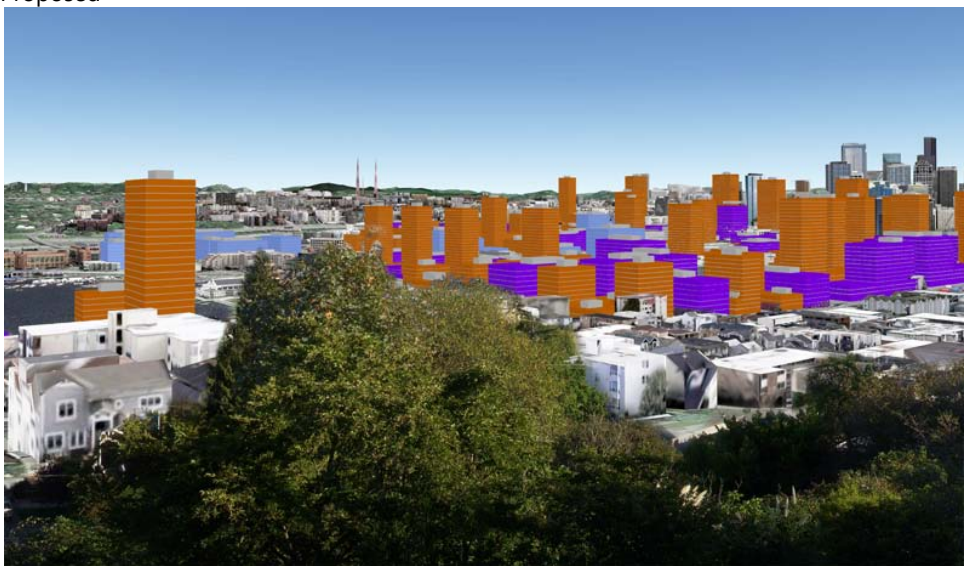
individual high-rises could obscure portions of Capitol Hill and would dominate the foreground.

Figure 3.4-24
Bhy Kracke Park – Alternative 1

Existing



Proposed



Source: NBBJ, 2010.

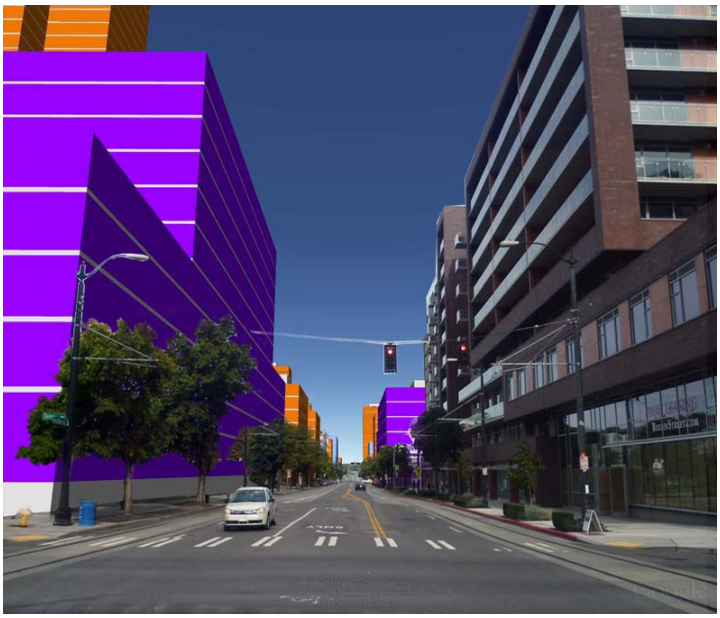
View #9 – Westlake Avenue N (**Figure 3.4-25**)

New high-rise buildings would frame the north-facing viewshed down the Westlake Avenue N view corridor from the intersection of Westlake Avenue N and Denny Way. Lake Union would remain visible in the distance and the focal point of the view. Mature street trees are prominent in the foreground and, because of perspective, would continue to be a determining factor concerning the width of the water view.

Figure 3.4-25
Westlake Avenue N – Alternative 1

Existing

Proposed



Source: NBBJ, 2010.

View #10 – Westlake Avenue N (**Figure 3.4-26**)
New high-rise buildings would frame this north-facing view down the Westlake Avenue N view corridor from the intersection of Westlake Avenue N and Republican Street. Lake Union would remain visible in the distance and the focal point of the view, but the width of the water view may be diminished by as much as 25%. However, the anticipated view reduction would be entirely the result of a new building being built to the property lines on the currently vacant Valley Mercer blocks. This view reduction would occur with development under current zoning and is, therefore, not considered significant.

Figure 3.4-26
Westlake Avenue N – Alternative 1

Existing

Proposed

Source: NBBJ, 2010.

View #11 – Fairview Avenue N (**Figure 3.4-27**)
New high-rise buildings would frame this north-facing view down the Fairview Avenue N view corridor from the intersection of Fairview Avenue and Denny Way. Lake Union would remain visible in the distance and the focal point of the view. As with Westlake Avenue N, mature street trees are prominent in the foreground and would be the determining factor concerning the width of the water view.

Figure 3.4-27
Fairview Avenue N – Alternative 1

Existing

Proposed

Source: NBBJ, 2010.

View #12 – Fairview Avenue N (**Figure 3.4-28**)
New high-rise buildings would frame the north-facing vista down the Fairview Avenue view corridor from a viewpoint at the intersection of Fairview Avenue and Republican Street. If preserved, mature street trees would remain prominent in the foreground and determine the width of the water view from this perspective. Lake Union would remain visible in the distance and the focal point of the view.

Figure 3.4-28
Fairview Avenue N – Alternative 1

Existing

Proposed

Source: NBBJ, 2010.

View #13 – Mercer Street Off-ramp (**Figure 3.4-29**)
New mid-rise and high-rise buildings in the South Lake Union neighborhood would have the potential to completely block some views of the Space Needle from the Mercer Street exit off I-5. Although the selected view offers a glimpse of the Space Needle and not an official Space Needle protected view, the changing perspective of the driver would result in the Space Needle being partially or fully obscured from other points-of-view along this off-ramp.

Figure 3.4-29
Mercer Street Off-ramp – Alternative 1

Existing

Proposed

Source: NBBJ, 2010.

View #15 – I-5 (**Figure 3.4-30**)
New high-rise buildings within the study area would dominate the view from southbound lanes of I-5 in the vicinity of Boylston Avenue E. Lake Union and the Space Needle would remain prominent, but the lower third of the Space Needle could be screened by future development. This scenic route is not an official Space Needle protected view.

Figure 3.4-30
I-5 – Alternative 1

Existing

Proposed

Source: NBBJ, 2010.

Focus Areas

Alternative 1 could result in the greatest amount of development and result in the greatest change to existing designated viewsheds. Street-level changes would be most pronounced in the Fairview Avenue N and the Eighth Avenue N Corridors. Street-level views for the Eighth Avenue N and the Mercer Street Corridors were discussed earlier in this section under Height, Bulk, and Scale. Views along Fairview Avenue, which is a City-designated scenic route, are discussed under Views 11 and 12.

Alternative 2

Although some tower heights would be reduced with this alternative, compared to those of Alternative 1, the view impacts of Alternative 2 would be very similar to those of Alternative 1. The following is a discussion of viewshed changes that could occur relative to Alternative 2.

View #1 – Volunteer Park (**Figure 3.4-31**)

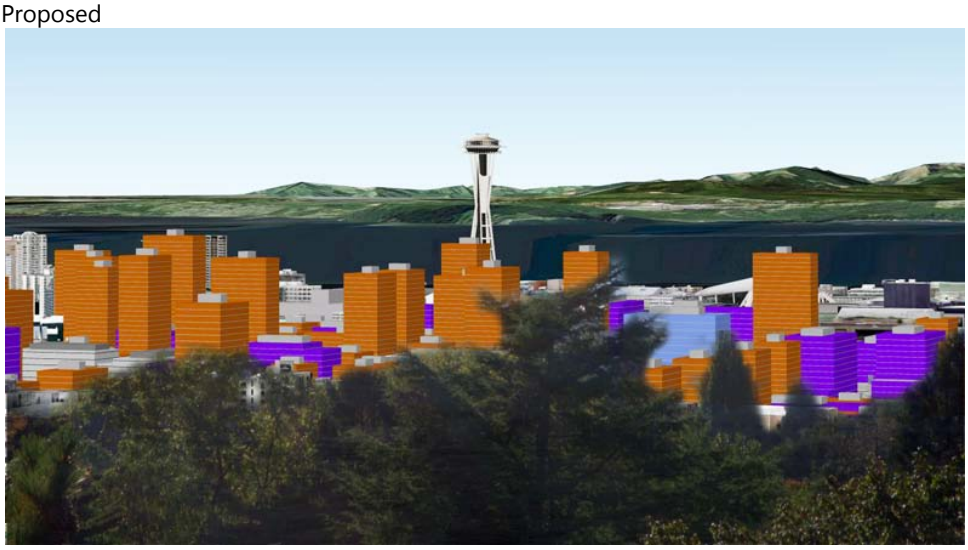
New high-rise buildings within the study area would be prominent as viewed from Volunteer Park. As noted with regard to Alternative 1, the Space Needle, Elliott Bay, Bainbridge Island and the Olympic Peninsula would still be visible. Conceivably, the base of the Space Needle may be screened to about one-third of the tower height and views of Elliott Bay would be affected by the new high-rise buildings.

Impacts from other designated viewpoints (e.g., #2, 9, 10, 11, 12 and 15) would not differ significantly from those noted with regard to Alternative 1. See **Figure 3.4-32** through **36** and **3.4-38**).

Figure 3.4-31
Volunteer Park – Alternative 2

Existing

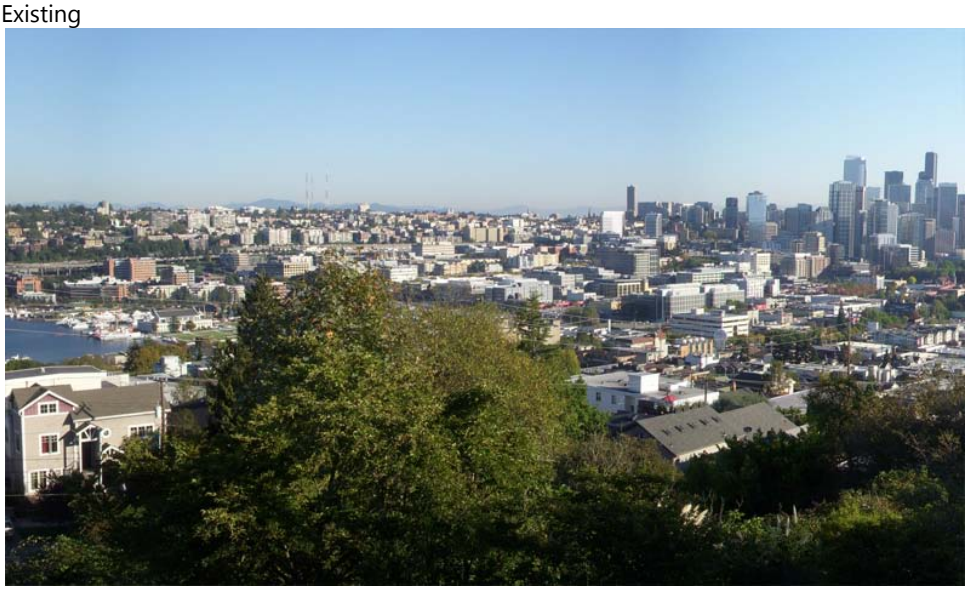
Proposed



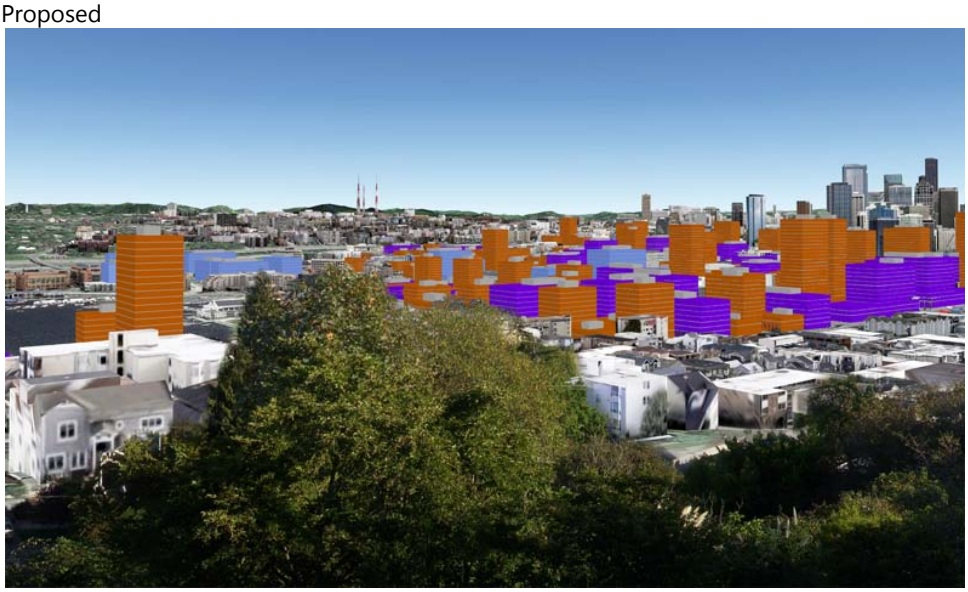
Source: NBBJ, 2010.

Figure 3.4-32
Bhy Kracke Park – Alternative 2

Existing



Proposed

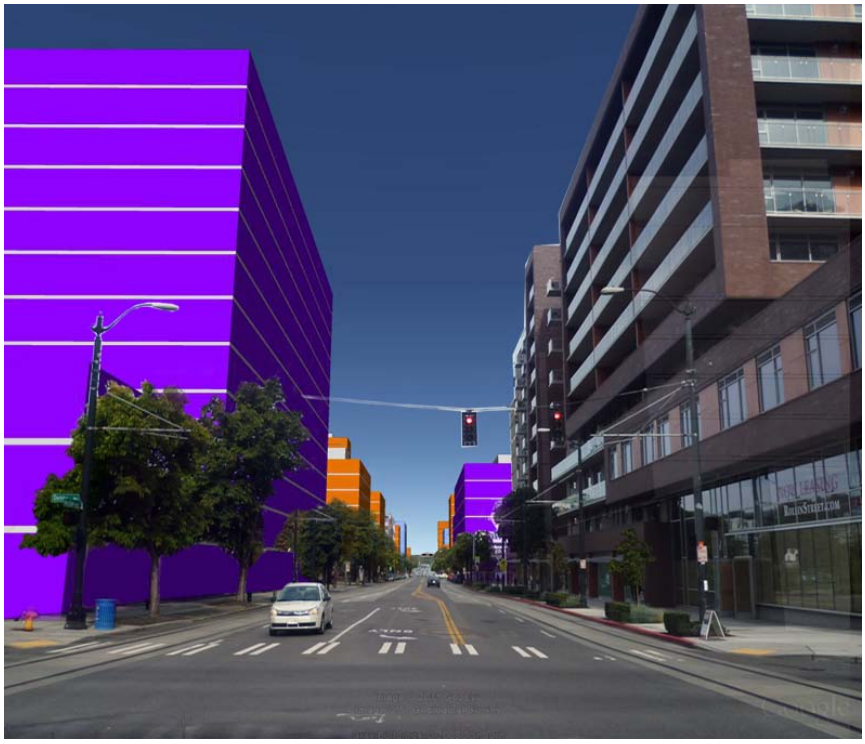


Source: NBBJ, 2010.

Figure 3.4-33
Westlake Avenue N – Alternative 2

Existing

Proposed



Source: NBBJ, 2010.

Figure 3.4-34
Westlake Avenue N – Alternative 2

Existing

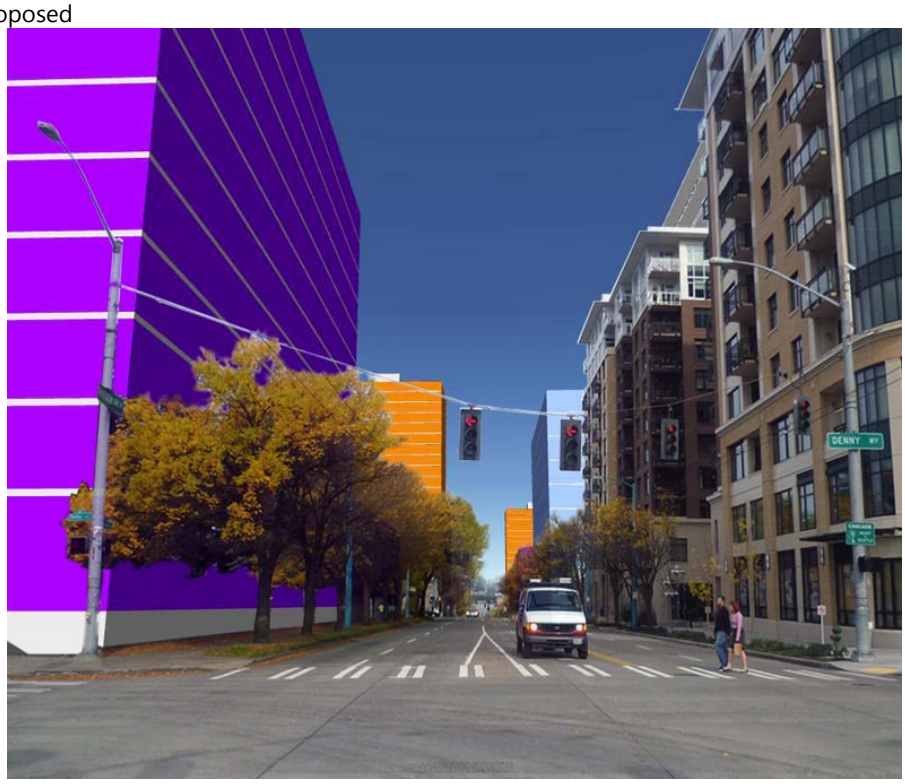
Proposed

Source: NBBJ, 2010.

Figure 3.4-35
Fairview Avenue N – Alternative 2

Existing

Proposed



Source: NBBJ, 2010.

Figure 3.4-36
Fairview Avenue N – Alternative 2

Existing

Proposed

Source: NBBJ, 2010.

View #13 – Mercer Street Off-ramp (**Figure 3.4-37**)
New mid-rise and high-rise buildings in the South Lake Union neighborhood would have the potential to completely block some views of the Space Needle from the Mercer Street Off-ramp from I-5. As noted with regard to Alternative 1, although the selected view offers a glimpse of the Space Needle and is not an official Space Needle protected view, the changing perspective of the driver would result in the Space Needle being partially or fully obscured from other points-of-view along this off-ramp.

Figure 3.4-37
Mercer Street Off-ramp – Alternative 2

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-38
I-5 – Alternative 2

Existing

Proposed

Source: NBBJ, 2010.

Focus Areas

For all practical purposes, viewshed impacts associated with Alternative 2 would the same as Alternative 1 relative to the designated Focus Areas. There would be an important reduction in overall height, but the changes are not expected to significantly change the overall street-level impacts from those identified under Alternative 1. Street-level views for the Eighth Avenue N and the Mercer Street Corridors were discussed earlier in this section under Height, Bulk, and Scale for each alternative. Views along Fairview Avenue, a City-designated scenic route, are discussed in Alternative 1 relative to Views 11 and 12.

Alternative 3

Although tower heights are further reduced with this alternative compared with Alternatives 1 and 2, the view impacts of Alternative 3 would be similar to the previous alternatives. The following is a discussion of viewshed changes that could occur relative to Alternative 3.

View #1 – Volunteer Park (**Figure 3.4-39**)

New high-rise buildings in the study area would be prominent in the view from Volunteer Park, but the Space Needle, Elliott Bay, Bainbridge Island and the Olympic Peninsula would still be visible. The base of the Space Needle may be screened slightly less than that associated with Alternative 1 and 2 – to about one-quarter of the tower height. Views of Elliott Bay would be affected by the new high-rise buildings.

Impacts from other designated viewpoints (e.g., #2, 9, 10, 11, 12 and 15) would not differ significantly from those noted with regard to Alternatives 1 and 2. See **Figure 3.4-40** through **3.4-44** and **3.4-46**).

Figure 3.4-39
Volunteer Park – Alternative 3

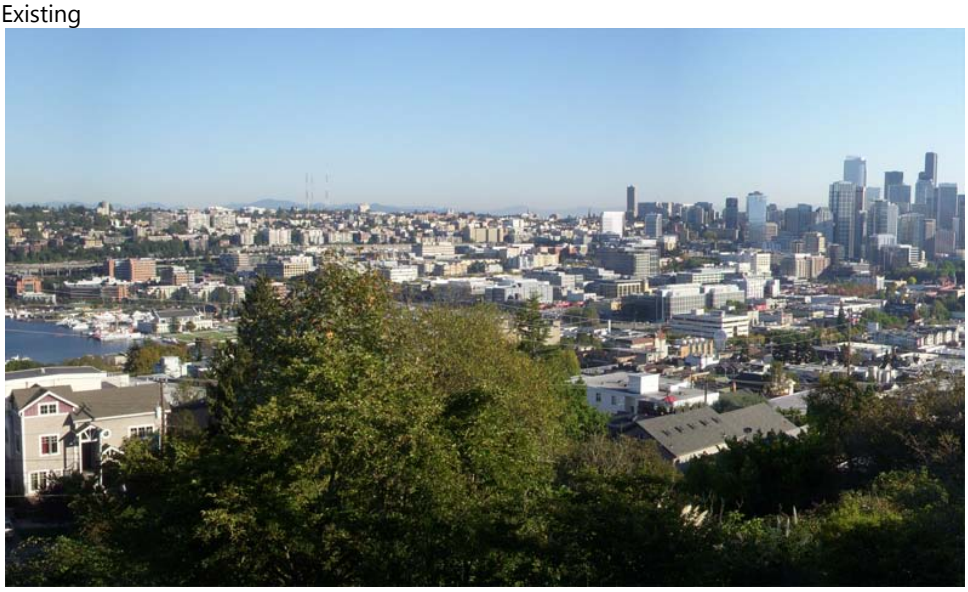
Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-40
Bhy Kracke Park – Alternative 3

Existing



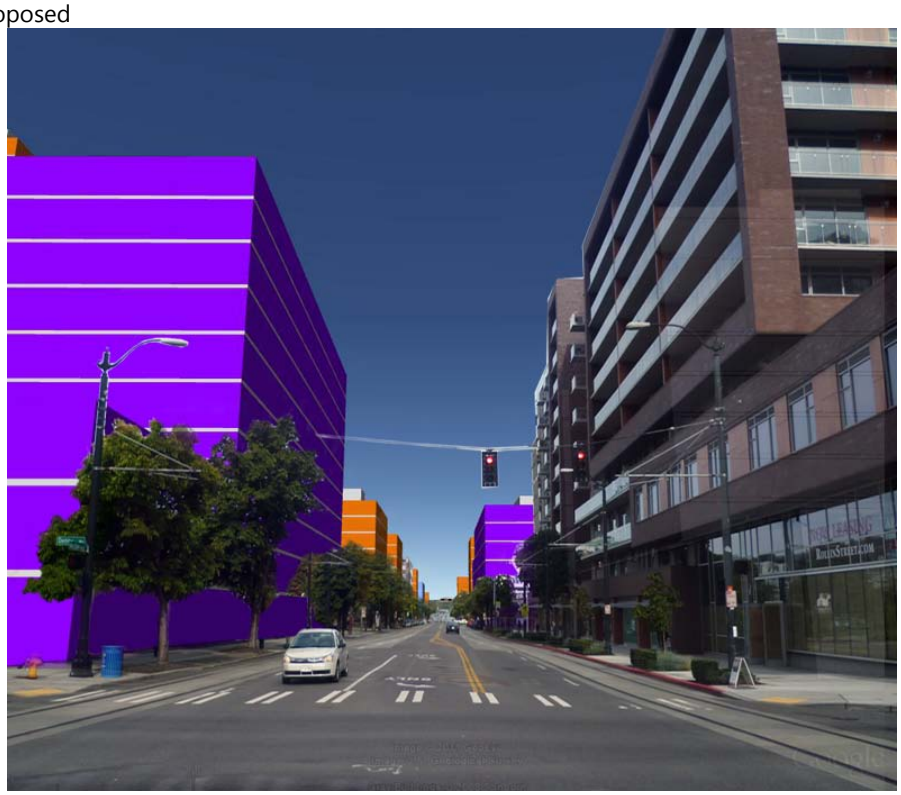
Proposed

Source: NBBJ, 2010.

Figure 3.4-41
Westlake Avenue N - Alternative 3

Existing

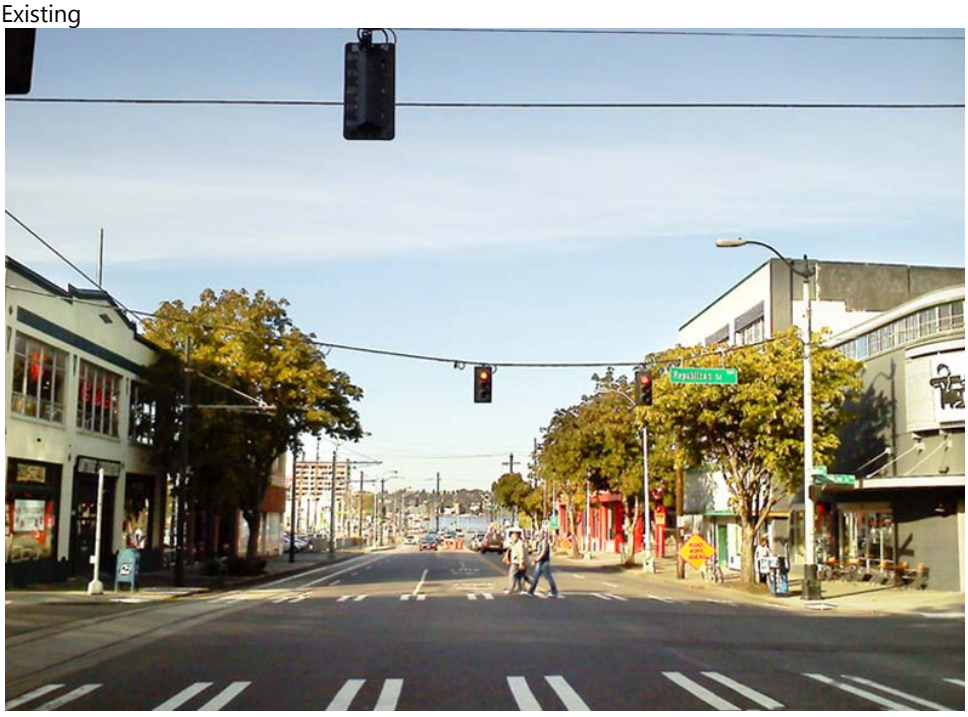
Proposed



Source: NBBJ, 2010.

Figure 3.4-42
Westlake Avenue N – Alternative 3

Existing



Proposed

Source: NBBJ, 2010.

Figure 3.4-43
Fairview Avenue N – Alternative 3

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-44
Fairview Avenue N – Alternative 3

Existing

Proposed

Source: NBBJ, 2010.

View #13 – Mercer Street Off-ramp (**Figure 3.4-45**)
New mid-rise and high-rise buildings in the South Lake Union neighborhood would have the potential to partially block some views of the Space Needle from the Mercer Street Off-ramp from I-5. As noted with regard to Alternative 1 and 2, although the selected view offers a glimpse of the Space Needle and is not an official Space Needle protected view, the changing perspective of the driver would result in the Space Needle being partially or substantially obscured from other points-of-view along this off-ramp.

Figure 3.4-45
Mercer Street Off-ramp – Alternative 3

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-46
I-5 – Alternative 3

Existing

Proposed

Source: NBBJ, 2010.

Focus Areas

Viewshed impacts associated with Alternative 3 would be the same as Alternative 1 relative to the designated Focus Areas. The reduction in building heights is not expected to result in substantially different street-level view impacts from those noted previously for Alternative 1.

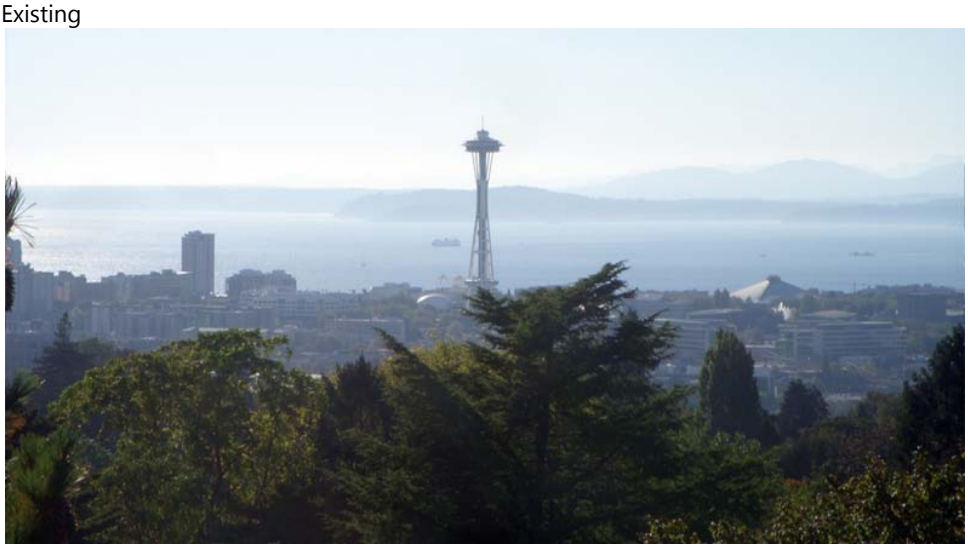
Alternative 4 (No Action)

This alternative assumes that underdeveloped properties within the study area would be developed to the extent allowed by existing zoning. As such, views could be expected to change from what currently exists.

However, no significant impacts to views are anticipated as a result of development under current zoning. Simulations associated with views from designated viewpoints are depicted in **Figures 3.4-47** through **3.4-54**).

Figure 3.4-47
Volunteer Park – Alternative 4

Existing

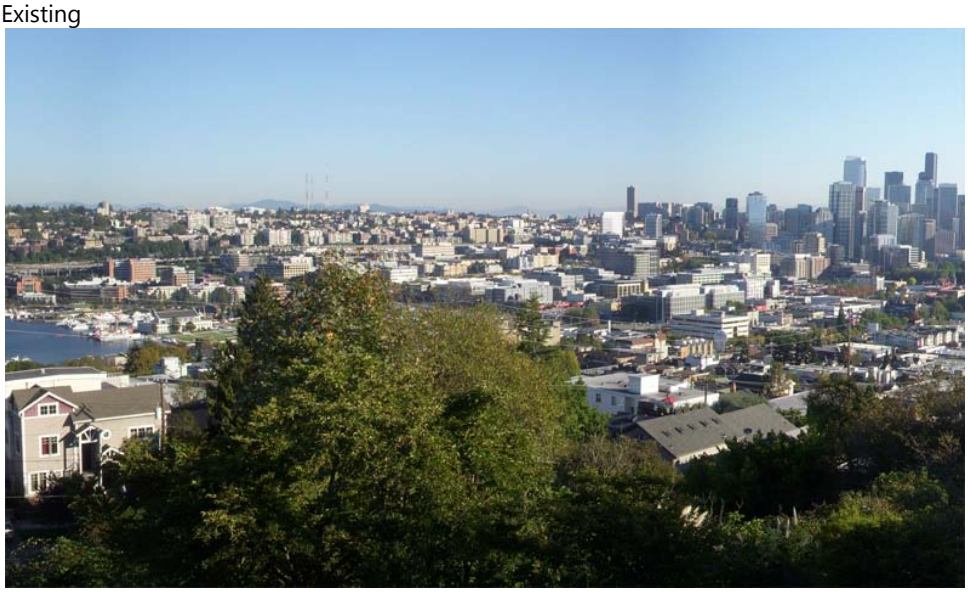


Proposed

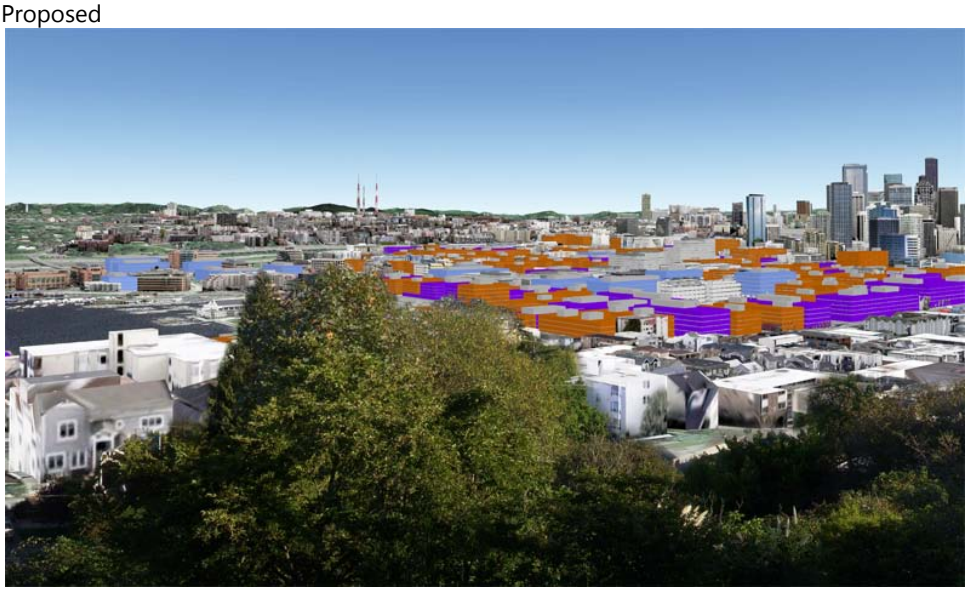
Source: NBBJ, 2010.

Figure 3.4-48
Bhy Kracke Park – Alternative 4

Existing



Proposed



Source: NBBJ, 2010.

Figure 3.4-49
Westlake Avenue N – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-50
Westlake Avenue N – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-51
Fairview Avenue N – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-52
Fairview Avenue N – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-53
Mercer Street Off-ramp – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Figure 3.4-54
I-5 – Alternative 4

Existing

Proposed

Source: NBBJ, 2010.

Changes to Private Views

The potential for future development projects in South Lake Union to change views from adjacent neighborhoods will depend on several variables:

1) The location and elevation of views from existing and potential projects in those neighborhoods;
2) The actual height, dimensions and location of future projects in South Lake Union ; and
3) The effect of tower spacing requirements, floor plate size limits, and FAR limits for future projects within South Lake Union.

As development occurs in South Lake Union, as well as in the area south of Denny Way, there are potential changes to views from Downtown and Belltown looking north to Lake Union, looking west from Capitol Hill, and looking south east from Queen Anne Hill. The tallest potential building heights studied are located between Denny Way and John Street between Eastlake Avenue and Aurora Avenue. These heights range from 160 feet to 400 feet. Projects built to these heights are likely to change views from existing and future development projects –particularly those located South of Denny Way and in Belltown. Elsewhere in South Lake Union the three action alternatives identify potential building heights ranging from 160 feet (125 feet at the lakefront) up to 240 feet. It is likely that future projects built to these heights would change views from Capitol Hill and Queen Anne hill. In light of the variables identified above it is not possible to precisely describe view changes to all locations that might experience a change of view, in the context of this non-project EIS.

The City does not prohibit development that may result in changes to private views under the City's SEPA ordinance. However, the potential for such changes is one factor taken into consideration when the City Council makes rezone decisions, according to rezone criteria pertaining to height limits in SMC 23.34.009. As part of the Council process, citizens may provide comments to the City Council regarding potential changes to private or public views that might result from the proposed zoning changes.

4.7 Mitigation Strategies

While no significant impacts have been identified relative to protected viewpoints as a result of this programmatic analysis, there are notable impacts to views valued within the neighborhood. These currently unprotected views include views toward the Space Needle from Lake Union Park, along Thomas and John Streets, and views toward the open sky above Lake Union looking north along Fairview Avenue N, Boren Avenue N and Westlake Avenue N.

These impacts can be partially mitigated by the setback provisions recommended in the Urban Design Framework (see discussion and diagram on pages 22 and 23 of Final UDF, dated December 31, 2010). In addition to the recommendations contained in the UDF, consider adding upper-level setbacks on:

a. On the east-west rights-of-way north of Aloha Street between Westlake Avenue N and Aurora Avenue N in order to open up views toward Lake Union and Lake Union Park from Queen Anne Hill and Dexter Avenue

b. On 8th Avenue N between Denny Park and Mercer Street in order to reduce shading and bring light and air to the street – and possible woonerf – targeted principally for future residential development.

At such time site-specific development occurs, detailed viewshed analysis should be performed relative to any development that would be within the view corridor between Volunteer Park and the Space Needle.

3.4.8 Significant Unavoidable Adverse Impacts

With recommended mitigation, no significant unavoidable adverse impacts to views are anticipated.

SHADOWS

3.4.9 Affected Environment

Seattle's SEPA policies aim to "minimize or prevent light blockage and the creation of shadows on open spaces most used by the public". Of particular concern is the amount and the timing of shading that occurs to key public places. Besides weather conditions, the relative amount of shadow and sun available at the pedestrian level depends upon multiple factors; the most important of these for this study area include: topography, the built environment (structures and street grid orientation) and vegetation.

In terms of topography, the South Lake Union neighborhood is shaped like half of a shallow bowl with the landform sloping downward and inward from the neighborhood boundaries on the east, south and west – with the low point being the shoreline of Lake Union. Furthermore, the surrounding neighborhoods are much higher in elevation. Portions of Capitol Hill on the east casts shadows the neighborhood in the early morning hours and portions of Queen Anne Hill on the west does the same in the late afternoon and early evening. Due to a lower sun angle, the effect of this shading is more noticeable in the winter than at other seasons. The elevation differential between the study area and the landform to the south is not significant enough to create shadows in the study area, but the shadows of a few recently constructed high-rise buildings built in the Denny Triangle neighborhood penetrate the South Lake Union neighborhood in late morning and early afternoon hours during the winter months.

Shadows cast by buildings create a striped or stepped pattern of alternating sunny and shady areas at street level. These patterns are constantly changing with the sun angle and vary according to the season.

The orientation of the street grid in the South Lake Union neighborhood closely follows the cardinal directions, so that the north-south streets typically experience full sun near midday – the specific time of day changing during the period when daylight savings time is in effect. Streets with an east-west orientation receive full sunlight in the early morning and late afternoon. At all other times of the day, both streets and avenues are affected, to varying degrees, by shadows from neighboring structures.

Generally speaking, greater building heights extend the length of the shadow cast, and increased mass (or cross-sectional width) widens the shadow cast by a building. The shadows of tall buildings extend farther from a building, but their effects on more distant locations are of shorter duration, because the sun's motion translates into faster movement of the shadow over the ground. Buildings with greater mass would create wider shadows and an increased amount of shaded area on the immediately adjacent streets and public spaces, but the reach of the shadow would be limited by the building's height.

The amount and impact of shadows cast by a group of buildings depends upon their relative location, spacing and orientation (e.g., some building arrangements may result in overlapping shadows, or cast shadows in patterns that are not detrimental to public areas where solar access is desirable).

Building height and bulk are the main factors with regard to shadow analyses, but other characteristics – such as street level and/or upper level setbacks, the location of high-rises within a block, spacing between buildings, roof overhangs, rooftop appurtenances, street level canopies and marquees – can significantly modify the total amount and pattern of sun and shadow on the streetscape.

In areas of the City outside Downtown City policy[13] indicates that the following areas are to be protected:

- Publically owned parks;
- Public schoolyards;
- Private schools which allow public use of schoolyards during non-school hours; and
- Publically owned street-ends in shoreline areas.

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13 SMC 25.05.675 Q2b

Within the South Lake Union neighborhood, the particular areas that could meet the City's criteria for minimizing or preventing light blockage and the creation of shadows include:

Denny Park

Denny Park is in the southwest corner of the South Lake Union neighborhood and is bordered by major roadways on three sides: Denny Way to the south, Dexter Avenue N on the west and 9th Avenue N on the east. John Street on the north is a less busy street, but traffic is expected to increase once John Street is reconnected across Aurora Avenue N as part of the SR 99 Bored Tunnel Project.

Dedicated in 1883, Denny Park is one of Seattle oldest public parks. The park is shaded by mature trees (both evergreen and deciduous) and features generous lawns and broad pathways leading to a central circle. A one-story Parks and Recreation Building is located on the west side of the park. In 2009, a children's playground was completed on the east side of the park.

Cascade Park and Playground

Centrally located in the Cascade subarea, Cascade Park and Playground is surrounded by relatively quiet streets on all four sides. After decades of minimal use, the park has recently undergone a major resurgence due to the surrounding growth of residential construction and a successful park renovation.

The park has a strong residential focus and features the Cascade People's Center in its southeast quadrant; an active P-Patch in the southwest quadrant, a children's play area in the northwest quadrant and permanent public restrooms in the northeast quadrant. Most of the middle of the block is occupied by a large recreational lawn area.

The park is well used during daylight hours; the playground, in particular, is activated by school and pre-school children. While not striped or set up for any particular sport, the open lawn area is used for informal recreational activities and is popular with dog owners at all hours of the day. Kickball games occur regularly during the week, including a couple of evenings and, occasionally, the weekend. The growing season sees the P-Patch well utilized by nearby residents. Both residents and office workers can be found strolling in and around the park on sunny days – regardless of season –but especially over the noon hour.

Lake Union Park

Located at the south end of Lake Union and bordering on Valley Street, this 12-acre Lake Union Park was just completed in September 2010. The

park features a lawn with sculpted land forms and boat-shaped planters, a waterfront promenade and steps, a model boat pond, interactive fountains, a beach for hand-launched boats, a tree grove, and interpretive History Trail. A new pedestrian bridge connects the east and west segments of the park.

The park is a stop on the Seattle Streetcar South Lake Union Line and is part of larger complex of public amenities that currently includes the Center for Wooden Boats. The former Naval Reserve Center, which is located at this park, is in the process of being renovated as the new home of the Museum of History and Industry (MOHAI). Other 'public' activities that occur proximate to this park include the Northwest Native Canoe Center by the United Indians of All Tribes

Lake Union Park has excellent solar exposure and is used by strollers and pet owners during all daylight hours, but especially the noon hour and at the beginning and end of the workday. Once MOHAI is complete, the most intense usage is likely to be during museum hours, but especially schools hours.

Per the Municipal Code, "(t)he analysis of sunlight blockage and shadow impacts shall include an assessment of the extent of shadows, including times of the year, hours of the day, anticipated seasonal use of open spaces, availability of other open spaces in the area, and the number of people affected" (25.05.675 Q2c).

In areas outside Downtown, if analysis indicates that a proposed project would substantially block sunlight from protected open spaces "at a time when the public most frequently uses that space, …(the City) … may condition or deny the project to mitigate the adverse impacts of sunlight blockage."

Appendix D contains 15 shadow diagrams. Collectively, they depict probable shading from each of the proposed alternatives (assuming weather conditions are conducive) for the four key solar days of the year: vernal equinox (approx. March 21st), summer solstice (approx. June 21st), autumnal equinox (approx. Sept. 21st), and winter solstice (approx. December 21st). The analysis depicts shadows cast by proposed development for three specific times during each day - 9 AM, noon, and 3 PM; shadow impacts are indicated in the right column of each shadow diagram). The maximum allowable heights and bulk including height exceptions for rooftop equipment were modeled to identify the 'worst case' impacts. In addition to shading resulting from possible development associated with each alternative, the figures also depict shadow impacts resulting from existing buildings within and proximate to the study area (shown in the left column of each figure).

These key days of the solar year and times of the day depict worst-case impacts. Shadow-related impacts, however, can also occur at other times of the day throughout the year. Because of the earth's rotation, the duration of shadow-related impacts varies for a stationary observer[14] based on season, depending upon the width of the shadow. The shadow graphics have been adjusted to compensate for topography and, in the case of vernal equinox, summer solstice and autumnal equinox, daylight savings time.[15]

3.4.10 Environmental Impacts

This section describes changes to the aesthetic character of the built environment related to shadow impacts that could occur under the four EIS alternatives.

Impacts Common to All Alternatives

Cumulative shadow impacts would result from all alternatives due to the increased amount of development in the South Lake Union neighborhood. Generally, the infill development on undeveloped or under-developed sites would increase the local shadows on streets and adjacent properties.

Shadows would generally be longest during winter mornings and afternoons when the sun is less likely to be out under clear skies. At noon on winter solstice, when the sun angle is low on the horizon, shadow impacts could extend great distances and result from each alternative. Conversely, at noon on summer solstice, when the sun is at its greatest height above the horizon shadow impacts would be shorter and would be less likely to cause impacts.

Each of the alternatives could shade portions of the water area of Lake Union in the winter morning (southeast lake shore) and in the winter afternoon (southwest lake shore) hours. See Section 3.4 for discussion of potential shadow impacts on marine habitat. As would be expected, the taller the buildings and the closer their proximity to the shoreline, the greater the overwater shading.

Comparison of the alternatives reveals some differences in the impacts to the noted public parks and SEPA protected places. The location and extent of shadows vary and are described in each alternative. Generally,

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[14] The rate of change of the sun's angle relative to the earth varies widely by season – from about 5 degrees horizontally and 2 degrees vertically every 15 minutes in June to 3 degrees horizontally and 1 degree vertically every 15 minutes in December.

[15] Pacific Daylight Savings Time (PDST) applies to shadow impacts associated with spring equinox, summer solstice and autumnal equinox.

the shadow impacts are not expected to result in significant adverse environmental impacts on the public parks – with a couple of exceptions as noted below and under Alternative 1. Except when the sun is on, or near, the axis of the street (i.e. midday on north-south avenues and early morning and evening on east-west streets), shading of sidewalks in the public rights-of-way can be expected in all alternatives when buildings are built to their property lines.

In winter, Cascade Park and Playground could be fully shaded – or very nearly so – through much of the morning and afternoon in all four alternatives. At midday in winter, the P-Patch area of the park could be shadowed. The children's playground should be shadow free at midday in all alternatives except Alternative 1.

In all three of the incentive zoning alternatives (Alternatives 1 – 3), a new tower fronting on Denny Street and the eastern edge of Denny Park could cast a significant shadow on the park in the area of the new children's play area during the mid-morning hours of all seasons. Similarly, afternoon shadows cast by a building at western edge of the park and Denny Way could shade the park and the landscaped area in front of the Parks and Recreation Building (but not the play area). The impact of new tower shadows on Denny Park is less significant since the canopies of existing trees currently shade most of the park area.

Other than the observation above, the impacts common to all alternatives are typical of an urbanizing area changing from lower intensity development to that of more intensive development.

Alternative 1

At full build-out, Alternative 1 could result in the greatest potential impact of the alternatives due to the fact this alternative would allow the tallest buildings heights and could result in the greatest increase in population (residents and employees) that may utilize the parks/open spaces.

The taller buildings along the Denny and Mercer corridors would cast the longest shadows impacting neighborhood parks at the times of the day when usage may be at its highest (e.g., noon [all seasons], summer morning and summer afternoon). At noon, shadows from new towers in the South Lake Union Neighborhood may just touch the corners of Denny Park and Cascade Park and Playground in all seasons except winter. Future high-rise buildings in the Denny Triangle could also cast potentially shadow a significant area in Denny Park. Mid-morning shadows may cover up to 20 percent of Denny Park and Cascade Park and Playground during the summer. Shadows may cover between 30 percent to approximately one-half of these parks at mid-morning during the

spring and fall. The eastern and northern portions of these parks would be most affected by the shadows of new buildings.

In addition to the potential impacts on Denny Park outlined under Impacts Common to All Alternatives above, a new tower fronting on Thomas Street and the eastern edge of Cascade Park and Playground under Alternative 1 could cast a significant shadow on the park in the area of the new children's play area as well as the recreational playfield; similarly, a new tower located on the southwest corner of the intersection of Minor Avenue N and Thomas Street could shade the P-Patch during the afternoon.

Alternative 1 demonstrates that allowing tower construction on the northern-half of the Mercer Blocks could result in significant impacts on Lake Union Park in all seasons except summer. The impact would be greatest in the morning and afternoon. Although shadows would not cover more than 20% of the park area in the spring and autumn, and would be concentrated in that portion of the park that serves as a buffer to the traffic noise on Valley Street, the shadows could extend to the model boat pond for a brief period in both morning and afternoon,

During the winter months, building shadows could cover all or a majority of the three parks in the morning and Lake Union and Cascade Parks in the afternoon. Shadows at noon in winter from buildings within the South Lake Union Neighborhood are expected to have minimal impact on Denny Park due to its location on the southern boundary of the neighborhood. Shadows at noon in winter could cover up to 50% of Lake Union Park depending on the location of towers on the Mercer Blocks; the most shading would result from two towers being in close proximity on either side of Westlake Avenue.

Shadows at noon in winter may cover up to 60 percent of Cascade Park and Playground. Although this is the season when sunlight is typically obscured by clouds/poor weather in our region, the noontime shadows could impact the children's play area on the west side of the block.

Focus Areas

Alternative 1 would allow the greatest degree of development and envisions the greatest degree of change in the designated Focus Areas. The changes would be most apparent in the Fairview and 8th Avenue Corridors; however, all four alternatives will shade the adjacent street and sidewalks during early morning and late afternoon hours if buildings or podiums are built out to their property lines (see Impacts Common to All Alternatives).

Alternative 2

Since the zoning is unchanged for the Cascade Neighborhood in Alternatives 2 – 4, the potential impact of shadows on Cascade Park and Playground are the same. The park could experience some shadow impacts in early morning and late afternoon during all seasons; otherwise, the park will be largely shadow free except in winter (see Impacts Common to All Alternatives for winter impacts).

With its assumption that future towers would be located on the southern half of the Mercer Blocks, Alternative 2 demonstrates that the impact of the tower placement relative to Lake Union Park would be significantly mitigated compared to Alternative 1. Although shadows could still cover a significant portion of the park area in the winter during the morning and afternoon, the park would be largely free of shadows at midday, except for a narrow band adjacent Valley Street. The park would be almost completely free of shadows in all other seasons from mid-morning through mid-afternoon; the exception being the possible shadowing of a small area in the western portion of the Park pan handle and existing shadows cast by the existing Naval Reserve Center.

Shadow impacts on Denny Park are described in Impacts Common to All Alternatives.

Focus Areas

For all practical purposes, the impacts of Alternative 2 would be the same as Alternative 1 on the designated Focus Areas. While this alternative would result in a reduction in overall height, the changes in shadow impacts on adjacent streets would not differ substantially from those noted with regard to Alternative 1.

Alternative 3

The shadow impacts in Alternative 3 are very similar to those in Alternative 2. Cascade Park and Playground could experience some shadow impacts in early morning and late afternoon during all seasons; otherwise, the park will be largely shadow free except in winter. Winter impacts and shadow impacts on Denny Park are described in Impacts Common to All Alternatives.

As was the case with Alternative 2, shadows cast in Alternative 3 could still cover a significant portion of Lake Union Park in the winter during the morning and afternoon, but the park would be largely free of shadows at midday, except for a narrow band adjacent Valley Street (narrower still in this alternative). The park would be almost completely free of shadows in all other seasons from mid-morning through mid-afternoon; the exception again being the possible shadowing of a small area in the

western portion of the Park panhandle and existing shadows cast by the existing Naval Reserve Center.

Focus Areas

The impacts of Alternative 3 would be the same as Alternatives 1 and 2 in the focus areas. As with Alternative 2, height reduction would occur, but the changes in shadow impacts on adjacent streets would not differ substantially from those noted with regard to Alternative 1.

Alternative 4 (No Action)

The shadow impacts on Cascade Park and Playground in Alternative 4 are very similar to those in Alternative 2 and 3; the park could experience some shadow impacts in early morning and late afternoon during all seasons; otherwise, the park will be largely shadow free except in winter. Winter morning, noon and afternoon shadows could affect all three open spaces (see Impacts Common to All Alternatives).

As was the case with Alternatives 2 and 3, shadows cast in Alternative 4 could cover a significant portion of Lake Union Park in the winter during the morning and afternoon, but the park would be largely free of shadows at midday, except for a narrow band adjacent Valley Street (narrower still in this alternative than in Alternatives 2 or 3 – almost negligible). The park would be almost completely free of shadows in all other seasons from mid-morning through mid-afternoon; the only exception being the existing shadows cast by the existing Naval Reserve Center.

Focus Areas

Alternative 4 anticipates no significant changes other than those associated with developing all the available sites under the existing zoning regulations (as described under Impacts Common to All Alternatives).

3.4.11 Mitigation Strategies

At such time site-specific development occurs, detailed shadow analysis should be performed relative to any development that could affect Denny Park, Cascade Playground or Lake Union Park with attention to times of the year and hours of the day the open space could be affected, the geographical area(s) of the open space affected, anticipated seasonal use of the open space, availability of other open spaces in the area, and the number of people affected.

SMC 25.05.675Q2e authorizes the City to employ measures to mitigate adverse shadow impacts to key open spaces, including:

a. limiting the height of development;
b. limiting the bulk of the development;
c. redesigning the profile of the development;
d. limiting or rearranging walls, fences or plant material;
e. limiting or rearranging accessory structures, i.e., towers, railings, antennae; and
f. relocating the project on the site.

Specific recommendations for limiting shading follow:

a. Throughout the study area, consider a requirement for a 60 foot separation (equivalent to a typical street separation) between a residential tower and any other high-rise tower (office or residential). This will contribute an added level of safety appropriate to the residential use, as well as improve privacy and diminish shadow impacts.
b. In order to minimize shading of Lake Union Park, consider a requirement for a half-block separation, in addition to the width of the Valley Street right-of-way, between towers on the Mercer Blocks and the park.
c. In order to minimize shading of Lake Union Park, consider a requirement for a half-block separation in the east-west dimension, in addition to the width of the north-south street, between towers on adjacent Mercer Blocks
d. On parcels bordering on the east and west edges of public parks, consider requiring that towers be located as far north as feasible within their lot lines in order to limit shadowing of the parks.

In addition to the recommended mitigation measures outlined above, the upper-level setbacks as described below will also ameliorate the impacts of shading and shadows on the public realm.

Per the UDF, consider upper level setbacks on the following streets (see also plan diagram, Fig.2-10):

a. John Street between Eastlake Avenue N and Aurora Avenue N. A 30 foot setback on the south side of the street to improve solar exposure. A progressive setback on the north side starting at 15 feet between Fairview Avenue N and 9th Avenue N, and expanding to a 30 feet between 9th Avenue N and the Aurora Avenue N in order to open up street views toward the Space Needle.

b. Thomas Street between Eastlake Avenue N and Aurora Avenue N. A progressive setback on the south side of the street starting at 30 feet between Eastlake Avenue N and 9th Avenue N, expanding to 40 feet between 9th and 8th Avenues N and then to 50 feet between 8th Avenue N and Aurora Avenues N in order to open up street views toward the Space Needle, as well as improve solar exposure to the street.

c. Fairview Avenue between John and Mercer (or Valley) Streets. A 10 foot setback on the east side of the street side to improve solar exposure as well as views to the landmarked Ford Motor Plant Building. A 30 foot setback on the west side of the street between John and Mercer Streets, plus a 50 foot setback between Mercer and Valley Streets, to improve solar exposure and views toward Lake Union.

d. Boren Avenue between John and Mercer (or Valley) Streets. A 10 foot setback on both the east and west sides of the street side to improve solar exposure as well as views toward Lake Union.

e. Westlake Avenue N between Mercer and Valley Streets. A 50 foot setback on the east side of the street to improve views toward Lake Union.

f. 8th Avenue between Denny Park and Mercer Street. A 15 foot setback on both sides of the street to allow more light and air to street-level.

g. Valley Street between Fairview Avenue N and Westlake Avenue N. A progressive setback on the south side of the street, staring with 90 feet between Fairview and Boren Avenues N, expanding to 120 feet between Boren and Terry Avenues N and once more to 150 feet between Terry and Westlake Avenues N in order to reduce shadows on Lake Union Park and improve views toward the Space Needle from the Lake Union waterfront and trail system.

h. All street bordering on the east, south and west sides of Denny Park and Cascade Park and Playground. A 15 foot setback would apply only where the streets – 9th Avenue N, Dexter Avenue N, Thomas Street, Pontius Avenue N. and Minor Avenue N. – border directly on the parks, so as to improve solar exposure and reduce shading.

i. The remaining east-west rights-of-ways north of Aloha Street (aligned with Prospect, Highland, Comstock and Lee Streets) between Aurora and Westlake Avenues N. A 15 foot setback on both sides of the street to open up views from Aurora Avenue N and Queen Anne Hill toward Lake Union and the Cascades.

All proposed upper-level setbacks would be minimum dimensions measured from the property line and would start at the top of the podium structure.

As noted in the UDF, corresponding upper level setbacks should eventually be considered as well in the Uptown Triangle in order to fully realize the view benefits of the proposed setbacks along John and Thomas Streets.

3.4.12 Significant Unavoidable Adverse Impacts

With recommended mitigation, no significant unavoidable adverse impacts to shade and shadow are anticipated.

LIGHT & GLARE

3.4.13 Affected Environment

The major sources of artificial illumination in the South Lake Union neighborhood include street lights, building lighting, vehicle headlights, signage, security lighting and other lighting typical of an urban setting.

There are no major sources of unusually bright artificial lighting, such as sports field illumination. Major arterials are particularly well lighted corridors, including Denny Way, Mercer Street, Fairview Avenue N, Westlake Avenue N, and Aurora Avenue N. The mixture of commercial and residential uses does not appear to create any significant sensitivity to nighttime light exposure.

Natural daylight is also typical of an urbanized area with expanded exposures due to the north-south orientation of the topographic basin. The rising elevations along the east side (Eastlake Avenue E and Capitol Hill) and along the west side (Aurora Avenue N and Queen Anne Hill) reduce local morning and afternoon daylight exposures respectively.

There is high visibility and light exposure of the taller buildings in South Lake Union because of the natural basin setting. The I-5 freeway extends along the eastern edge of South Lake Union and SR-99 extends along the western edge and there is high visibility and possible glare exposure as a result of vehicular traffic. While the water surface of the lake can, at times, become a potentially reflective surface, currently there are no highly reflective building surfaces that could at times present light and glare hazards to motorists or pedestrians.

Air traffic from the Lake Union Seaplane Airport generally takes off and lands facing south or south west and could be a sensitive receptor for light and glare impacts.

Focus Areas

Existing light and glare in the three focus areas is typical of an urban environment.

3.4.14 Environmental Impacts

This section describes changes to the aesthetic character of the built environment including light and glare impacts that could occur under the four EIS alternatives.

Impacts Common to All Alternatives

The increased amount of buildings would increase the cumulative level of artificial illumination in South Lake Union. The level of building and site lighting would be greater than current conditions, incrementally expanding with the density of development. The new buildings will include towers that may potentially incorporate reflective surfaces that could on occasion create glare impacts. The exposure may extend to adjacent hillsides and the freeway because of the topographic basin location.

Potential increases in building heights in this area and specular surfaces on buildings could, at times, generate increased light and glare impacts that may affect seaplane approaches to the south.

Focus Areas

Future development under any of the action alternatives would likely result in a significant increase in the cumulative level of artificial illumination in the focus areas.

Alternative 1

Glare impacts may occur from new tower development along the south and west frontages of Lake Union because of the morning and afternoon exposures to sunlight over open water. Tower glare could impact seaplane approaches to the south.

The distant visibility from Capitol Hill and Gas Works Park of artificial illumination of the towers is high because of their currently unobstructed location. Artificial illumination from new towers will be highly visible from those portions of Capitol Hill, Queen Anne Hill and Gas Works Park that currently have unobstructed views toward the study area.

Focus Areas

Because Alternative 1 allows the greatest degree of development and the potential for increased light and glare is greatest. However, light and glare would be typical of an urban environment and is not anticipated to be significantly different or greater than the rest of the neighborhood.

Alternative 2

As in Alternative 1, glare impacts may occur from tower development along the south and west frontages of Lake Union because of the morning and afternoon exposures to sunlight over open water. Tower glare could impact seaplane approaches to the south.

The towers and buildings of Alternative 2 are generally shorter than those in Alternative 1, so potential glare impacts may be slightly less because of the reduced surface area.

Artificial illumination from new towers will be highly visible from those portions of Capitol Hill, Queen Anne Hill and Gas Works Park that currently have unobstructed views toward the study area.

Focus Areas

For all practical purposes, the impacts of Alternative 2 are relatively less, but similar to Alternative 1 in the Focus Areas. Light and glare would be typical of an urban environment and is not anticipated to be significantly different or greater than the rest of the neighborhood.

Alternative 3

As in Alternatives 1 and 2, glare impacts may occur from tower development along the south and west frontages of Lake Union because of the morning and afternoon exposures to sunlight over open water. Tower glare could impact seaplane approaches to the south.

The towers and buildings of Alternative 3 are generally shorter than those in both Alternative 1 and 2 so potential glare impacts should be less because of the reduced surface area. The exposure is different – especially adjacent to Lake Union – due to the graduated concept. Artificial illumination from new towers will be highly visible from those portions of Capitol Hill, Queen Anne Hill and Gas Works Park that currently have unobstructed views toward the study area.

Focus Areas

For all practical purposes, the impacts of Alternative 3 are relatively less, but similar to Alternatives 1 and 2 in the Focus Areas. Light and glare

would be typical of an urban environment and is not anticipated to be significantly different or greater than the rest of the neighborhood.

Alternative 4 (No Action)

Glare impacts may occur from the lower scaled development along the south and west frontages of Lake Union because of the morning and afternoon exposures to sunlight over open water. With no towers, there would not be any distinctive sources for possible glare.

Artificial illumination from new buildings will still be visible from those portions of Capitol Hill, Queen Anne Hill and Gas Works Park that currently have unobstructed views toward the study area, but will be less a factor due their reduced height.

Focus Areas

Alternative 4 anticipates no significant change.

3.4.15 Mitigation Strategies

SMC 25.05.675K2d authorizes the City to employ measures to mitigate adverse light and glare impacts, including the following:

a. "limiting the reflective qualities of surface materials that can be used in the development;
b. limiting the area and intensity of illumination;
c. limiting the location or angle of illumination;
d. limiting the hours of illumination; and
e. Providing landscaping."

Other measures that may be also employed include:

f. install screening, overhangs, or shielding to minimize spillover lighting impacts – particularly near sensitive residential receivers;
g. shield exterior lighting fixtures and directing site security lighting away from nearby residential uses;
h. include pedestrian-scaled and pedestrian-oriented lighting for safety along sidewalks, parking areas, street crossings and building access points;
i. employ timers or motion sensors for lighting to reduce spillover lighting and generally reduce ambient light levels;
j. avoid large expanses of smooth, uniform, reflective building surfaces;

k. incorporate architectural relief and detail, such as exterior sun shades, deep spandrels, mullions or other features of façade articulation, that reduce reflectivity; and

l. as necessary, undertake project-specific solar impact analysis studies to determine the extent of light and/or glare impacts and to identify specific mitigation measures.

3.4.16 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts from light and glare are anticipated.

3.5 Draft EIS 3.13 Transportation Clarifications or Corrections

This section presents a multi-modal transportation analysis performed for with the proposed height and density rezone of the South Lake Union neighborhood. It presents existing transportation conditions in South Lake Union, as well as future transportation conditions (2031) under three future alternatives. Transportation impacts and potential mitigation measures are identified for each future alternative based on the policies and recommendations established in state and local plans. Below is an executive summary of impacts and potential mitigation measures.

As shown in the following table and described fully in the transportation analysis chapter, there will be impacts to the future year transportation system with any of the proposed height and density rezone alternatives.

Table 3.5-ES1
Summary of Impacts to the Transportation System

Type of Impact	Future Year Height and Density Alternative (2031)		
	Alternative 1	Alternative 2	Alternative 3
Traffic Operations (congestion)	✓	✓	✓
Transit (capacity)	✓	✓	✓
Pedestrian and Bicycle Circulation			
Parking	See note below on parking impacts		
Freight Mobility	✓	✓	✓
Traffic Safety	✓	✓	✓

Note: The analysis indicated that there could be short-term parking impacts as individual projects in South Lake Union build out. However, over time parking prices will adjust to meet demand and travelers will shift to other modes, thus reducing the demand for parking.

Source: Fehr & Peers, 2010

The table above indicates that all three alternatives have similar overall impacts on the transportation system. However, as described more fully in the transportation chapter, the magnitude of the impacts varies based on the total trip generation of the alternatives. **Table 3.5-ES2** summarizes the PM peak hour trip generation of each alternative.

Table 3.5-ES2
PM Peak Hour Trip Generation by Alternative

Alternative	Auto Trips (mode share %)	Non-auto Trips (mode share %)	
		Internal, Bicycle & Pedestrian	Transit
No Action Alternative - Current Zoning	12,648 (51.4%)	7,279 (26.9%)	6,091 (21.7%)
Alternative 1 - Maximum Increases to Height and Density	15,554 (50.5%)	9,429 (27.8%)	7,371 (21.7%)
Alternative 2 - Mid-Range Increases to Height and Density	15,548 (50.4%)	9,435 (27.8%)	7,371 (21.7%)
Alternative 3 - Moderate Increases to Height and Density	13,605 (50.3%)	8,334 (28.0%)	6,449 (21.7%)

Note: See Appendix E for details on the mode split calculation. Auto trips include both SOV and HOV trips, so the number reported is not equivalent to person-trips. The Internal, Bicycle & Pedestrian and Transit categories are person-trips.
Source: Fehr & Peers 2010

To mitigate the impacts of the three Action Alternatives, a comprehensive strategy for potential mitigation measures was developed in close coordination with the City of Seattle. Because each of the three Action Alternatives have similar impacts, a single mitigation strategy was developed that could be applied to all alternatives. The transportation chapter gives a full description of the potential mitigation strategy, however, a brief summary is provided below:

- *Improve the bicycle and pedestrian network*: Research has shown that vehicle trip generation and traffic congestion impacts can be reduced if a robust bicycle and pedestrian system is provided. Potential mitigation measures to provide this system include the implementation of bicycle and pedestrian improvements identified in plans and documents such as the *Seattle Pedestrian Master Plan*, *Bicycle Master Plan*, and *South Lake Union Urban Design Guidelines*. Specific projects include sidewalk gap closures, new bikeways, new hill-climbs, and marked/signalized pedestrian crossings.
- *Expand travel demand management strategies:* This potential mitigation measure looks to expand on the existing Commute Trip Reduction program and Transportation Management Program in

the South Lake Union area. Specifically, parking management strategies such as maximum parking limits and unbundled parking pricing have been shown by research to reduce demand for parking, vehicle trip generation, and traffic congestion. An expansion of the City's GTEC program could further support the goal to reduce vehicle trip generation and traffic congestion in the area.

- *Transit Service Expansion:* Traffic congestion, transit load factor, and transit frequency impacts could be reduced through expanded transit service in the area. The City of Seattle and King County Metro should work together to identify capital and operations funding for additional transit service and increased frequencies on key routes.
- *Roadway Capacity Enhancements:* A potential mitigation measure to reduce traffic congestion and improve freight mobility would be the implementation of the planned Mercer West Corridor Project.

The potential mitigation measures above reduce transportation impacts of the proposed Action Alternatives and no significant unavoidable impacts are expected. As shown in **Table 3.5-ES3**, the three Action Alternatives with mitigation are expected to have lower PM peak hour vehicle trip generation than the less dense No Action alternative.

Table 3.5-ES3
PM Peak Hour Trip Generation by Mitigated Alternative

Alternative	Auto Trips (mode share %)	Non-auto Trips (mode share %)	
		Internal, Bicycle & Pedestrian	Transit
No Action Alternative - Current Zoning	12,648 (51.4%)	7,279 (26.9%)	6,091 (21.7%)
Alternative 1 With Mitigation	12,244 (37.5%)	11,835 (36.2%)	8,606 (26.3%)
Alternative 2 With Mitigation	12,236 (37.4%)	11,844 (36.2%)	8,606 (26.3%)
Alternative 3 With Mitigation	10,715 (37.4%)	10,435 (36.4%)	7,526 (26.2%)

Note: See Appendix E for details on the mode share calculation. Auto trips include both SOV and HOV trips, so the number reported is not equivalent to person-trips. The Internal, Bicycle & Pedestrian and Transit categories are person-trips.
Source: Fehr & Peers 2010

3.5.1 Affected Environment

This section describes the existing conditions of the area that would be affected by the proposed height and density rezone.

The South Lake Union neighborhood is located in the center of the City of Seattle. The study area is adjacent to many neighborhoods, including Downtown, First Hill, Capitol Hill, Eastlake, and Uptown. South Lake Union is a neighborhood in transition with a mix of older industrial buildings and new medical research buildings, office buildings, and residential developments.

As shown in **Figure 3.5-1**, the South Lake Union neighborhood is bounded by Lake Union to the north, Aurora Avenue to the west, Denny Way to the south, and I-5 to the east.

Existing Transportation Network

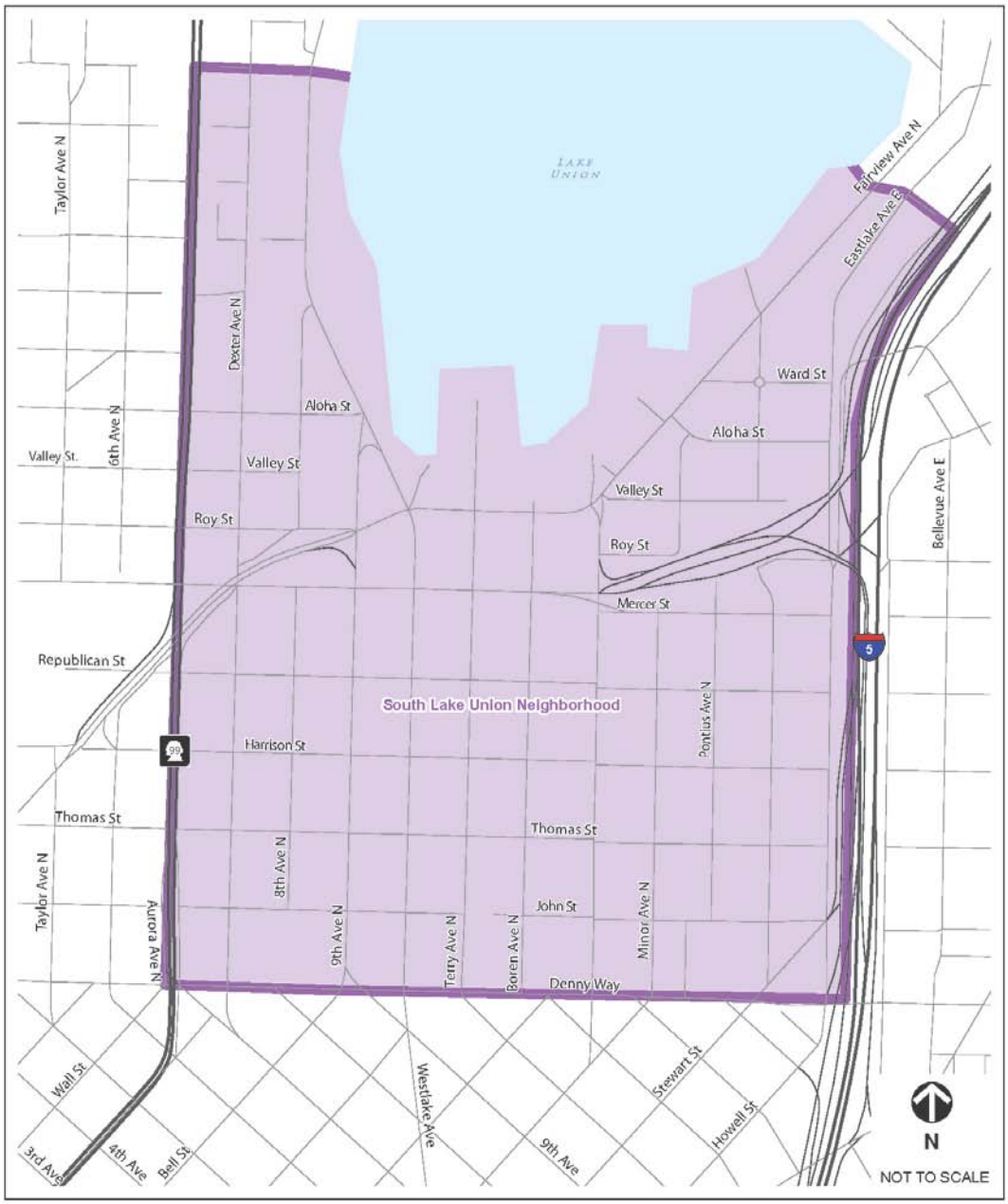
This section describes the existing transportation system in South Lake Union for all modes, including bicyclists, pedestrians, transit riders, and drivers.

Pedestrian System

Accessing the Neighborhood

Lake Union (to the north), SR 99 (to the west), and I-5 (to the east) limit pedestrian access to the study area. Listed below are specific routes that pedestrians can use to access the South Lake Union neighborhood from other parts of Seattle.

Figure 3.5-1
South Lake Union Neighborhood Map



Source: Fehr & Peers, 2010

From the west: SR 99 underpasses at Mercer and Broad Streets with sidewalks on both sides.

From the south: pedestrians and bicyclists can cross SR 99 at Denny Way.

From the north: a pedestrian bridge over SR 99 at Galer Street.

From the east: Denny Way and Lakeview Boulevard E I-5 overpasses. The Denny Way overpass over I-5 has a sidewalk on the south side only. The Lakeview Boulevard E overpass is a somewhat indirect connection because it runs parallel to I-5 for approximately one-third of a mile, but has sidewalks on both sides.

Sidewalk Facilities within South Lake Union

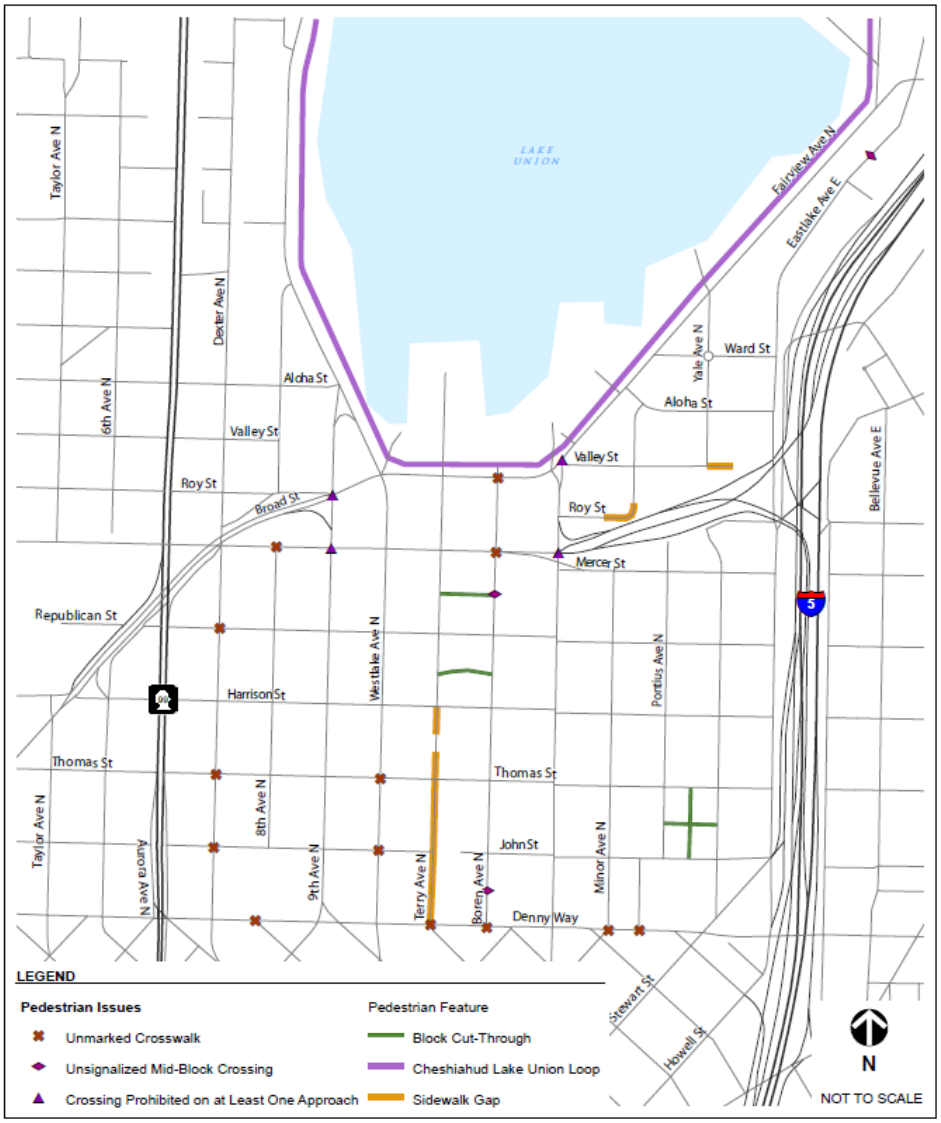
In general, sidewalk coverage in the South Lake Union neighborhood is complete, and most sidewalks are in good condition. However, there are areas where sidewalks are missing or need repair as described below. **Figure 3.5-2** shows the pedestrian facilities in the study area.

Gaps in the Pedestrian System. Terry Avenue N has no sidewalks from Denny Way to Thomas Street and limited sidewalks from Thomas Street to Harrison Street. In addition, there are gaps in the sidewalk system on Roy Street near Minor Avenue and on Valley Street near Yale Avenue.

Pedestrian Facilities in Poor Condition. There are damaged sidewalks at some locations such as on Westlake Avenue N south of Broad and Valley Streets.

Sidewalk condition varies significantly from new sidewalks at recent developments to cracked and overgrown sidewalks in older areas. The general sidewalk width tends to be 5.5 to 6 feet with wider sidewalks along some new developments. Wide planting strips along new developments provide a buffer between pedestrians and vehicles. Some newer planting strips match the width of the walkway while older planting strips are narrower: between 1.5 and 2.5 feet.

Figure 3.5-2
Pedestrian Facilities – Existing Conditions



Source: Fehr & Peers, 2010

Pedestrian Crossings

Some intersections have missing or inconveniently located marked crosswalks. For example, there is no marked crosswalk on the west side of the 9th Avenue N/Broad Street intersection. One block south, at the 9th Avenue N/Mercer Street intersection, there is no marked crosswalk across the ramp from Broad Street to Mercer Street. A pedestrian traveling along the north side of Mercer Street would have to walk a block north to reach a marked crosswalk in order to cross the curved ramp and then rejoin the sidewalk on Mercer Street. John Street does not go through the block east of Terry Avenue N so all traffic (pedestrians, bicycles, and vehicles) must travel around the block via Thomas Street or Denny Way.

There are two unsignalized mid-block crossings along Boren Avenue N; one between Mercer and Republican Streets and the other between John Street and Denny Way. Another unsignalized mid-block crossing is provided on Eastlake Avenue E north of E Nelson Place.

Multi-Use Paths

Several paths or plazas cut through city blocks in the east/west direction. Two plazas connect Terry Avenue N to Boren Avenue N in the blocks between Mercer and Republican Streets and between Republican and Harrison Streets. A path connects Yale Avenue N and Pontius Avenue N between Thomas and John Streets. On the Yale Avenue N end of the walkway, mid-block ramps are provided to access the REI store to the east, but there is no marked crosswalk. The Cheshiahud Lake Union Loop is a multi-use path that circles Lake Union and serves as a connection within South Lake Union as well as to other neighborhoods such as Fremont, Wallingford, University District, Capitol Hill, and Queen Anne. The Lake to Bay Loop is a planned multi-use connection between Elliot Bay at the Olympic Sculpture Park and South Lake Union Park. Within the South Lake Union neighborhood, the proposed Lake to Bay Loop would traverse Thomas Street, Terry Avenue, and Mercer Street.

Bicycle System

South Lake Union has three north/south bicycle routes, consisting of either striped lanes, sharrow pavement markings[1] or shared parking/bicycle lanes.

- Eastlake Avenue E has bicycle facilities throughout the South Lake Union neighborhood. From Denny Way to approximately Mercer Street, sharrows are provided, and from Mercer Street to Fairview Avenue N, bicycle lanes are provided. Field observations indicate that idling busses often occupy the outside northbound lane on Eastlake Avenue E between Stewart Street and Lakeview Boulevard E. These busses block the path of travel indicated by the sharrows, forcing cyclists to travel in the general purpose lane in this section.
- 9th Avenue N has bicycle lanes from Denny Way to approximately Republican Street.
- Dexter Avenue N has bicycle lanes from Denny Way to Mercer Street. North of Mercer Street, there are signs for the "Interurban

[1] A sharrow is a pavement marking indicating the recommended path for bicycle travel in a shared-use lane. Sharrows are often used to notify drivers about the potential for bicycles in the lane.

North" bicycle facility which is a shared parking and bicycle lane. Field observations indicate that this is a heavily traveled bicycle route.

There are no east/west bicycle facilities except for the portion of the Cheshiahud Lake Union Loop that runs along the south shore of Lake Union. The I-5 overpass at Lakeview Boulevard E, which connects South Lake Union to Capitol Hill, has a bicycle lane followed by sharrows in the north/east direction and sharrows in the south/west direction; however, the grade between South Lake Union and Capitol Hill is steep. **Figure 3.5-3** shows the bicycle facilities in the South Lake Union neighborhood.

The Seattle Bicycle Master Plan identifies existing bicycle issues in the South Lake Union neighborhood, including the need to improve bicycle facilities along Westlake Avenue N.

Existing Transit Services

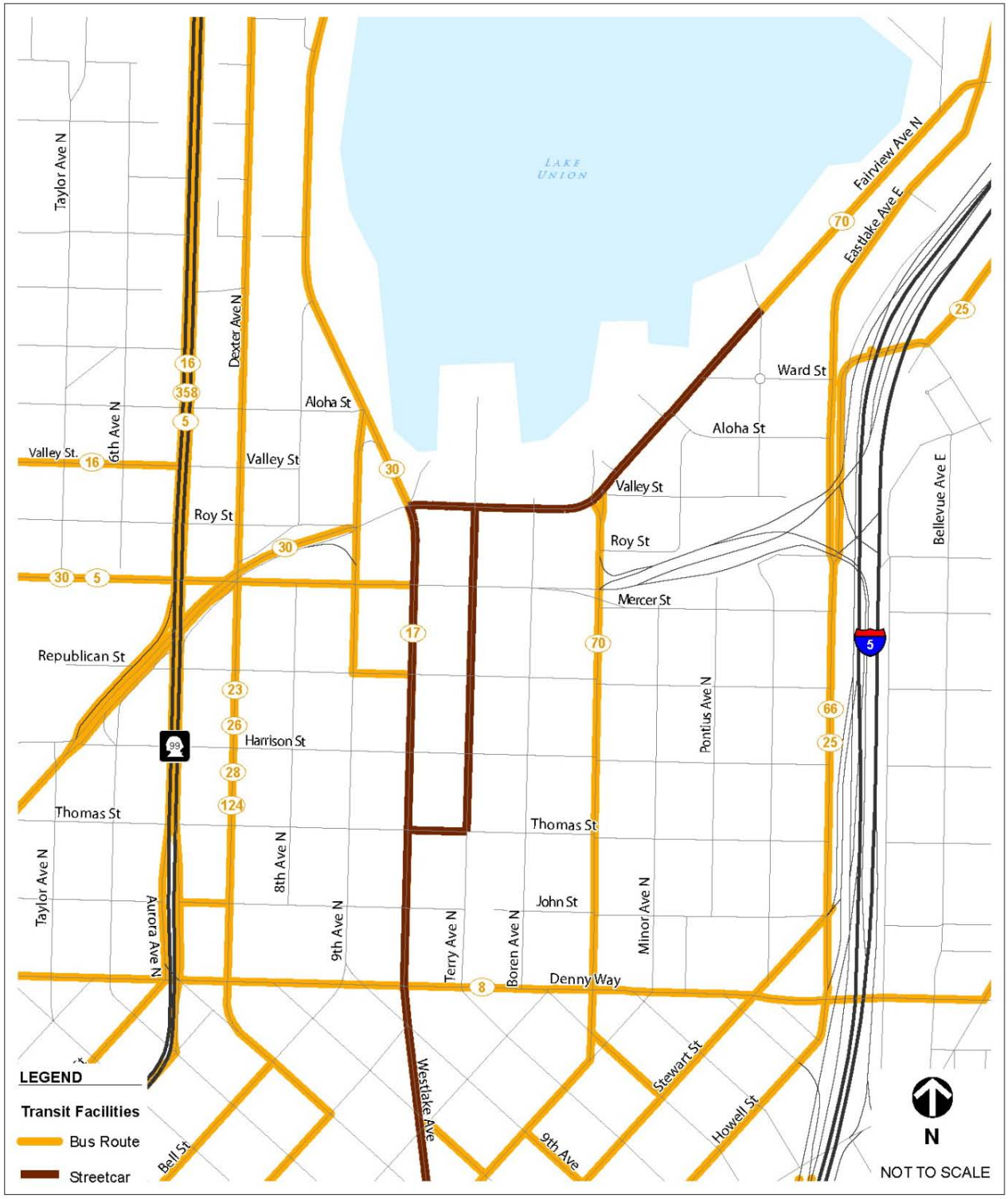
The project area is served by the South Lake Union Streetcar and several King County Metro bus routes. The streetcar runs from Westlake Center in Downtown Seattle through the South Lake Union neighborhood and terminates at the Fred Hutchinson Cancer Research Center located at Fairview Avenue N and Ward Street. Within the study area, the streetcar runs along Westlake Avenue N, Terry Avenue N, Valley Street, Fairview Avenue N, and a one-block segment of Thomas Street. Along these streets, the streetcar runs in the outside travel lane with no lane restrictions when the streetcar is not present. The primary bus connections reach north, central and southeast Seattle.

Figure 3.5-4 shows the transit routes in the South Lake Union neighborhood.

Figure 3.5-3
Bicycle Facilities – Existing Conditions

Source: Fehr & Peers, 2010

Figure 3.5-4
Transit Facilities – Existing Conditions



Source: Fehr & Peers, 2010

Table 3.5-1 summarizes the transit routes that serve the South Lake Union neighborhood. The table includes average headways for the AM peak period, PM peak period and mid-day period. The average headways were calculated as the ratio of minutes to number of busses in the period. These headways give a general indication of frequencies, but route times vary substantially on some routes. For instance, Route 17 runs anywhere from every nine to thirty minutes in the afternoon peak period.

Existing Roadway Network

Interstate 5 (I-5) and State Route (SR) 99 form the eastern and western boundaries of the South Lake Union neighborhood and also serve as the major roadways providing regional access. The local street network is a combination of one-way and two-way streets that serve multiple travel modes. Most local streets have multiple lanes, on-street parking, and sidewalks. Some arterial streets include bicycle lanes or sharrows. Arterial streets have speed limits of 30 miles per hour (mph) unless otherwise posted. Exceptions include local commercial and residential streets which generally have speed limits of 25 mph. **Figure 3.5-5** shows the roadway facilities in the South Lake Union study area.

Regional Access

I-5 is a north/south freeway that serves both local and regional traffic. Adjacent to the South Lake Union neighborhood, I-5 experiences congestion during a substantial portion of the day due to the intense land uses in Downtown Seattle, the limited crossings of the Ship Canal, and the lack of ramp capacity at the SR 520 interchange. The primary access to the South Lake Union area from I-5 is at the Mercer Street interchange.

SR 99 is a north/south highway located immediately west of the South Lake Union neighborhood. Northbound SR 99 can be accessed from various east/west streets in the project area, including Valley Street, Roy Street, Republican Street, Harrison Street, and Thomas Street. Southbound SR 99 is only accessible from the west side of the highway.

Table 3.5-1
King County Metro Routes in South Lake Union

Route	Destinations	Average Headways		
		Peak Periods (6-9 AM & 3-6 PM)		Midday (9 AM-3 PM)
		Peak Direction	Off-peak Direction	
5	Downtown Seattle, Fremont, Woodland Park Zoo, Greenwood, North Seattle Community College, Northgate Transit Center, Northgate Mall, Shoreline Community College	11	15	15
8	Rainier Beach, Rainier Beach Station, Othello Station, Columbia City Station, Rainier Valley, Mt. Baker Transit Center, Central District, Capitol Hill, Group Health Hospital, Seattle Center, Lower Queen Anne	15	15	15
16	Colman Dock-Ferry Terminal, Downtown Seattle, Seattle Center, Wallingford, East Green Lake, North Seattle Community College, Northgate Mall, Northgate Transit Center	20	23	20
17	Downtown Seattle, Westlake, Seattle Pacific University, Ballard, Sunset Hill, Loyal Heights	20	26	30
25	Downtown Seattle, Eastlake, Montlake, University Village, Children's Hospital, Laurelhurst	26	36	65
26	Downtown Seattle, Fremont, Wallingford, East Green Lake	23	30	29
28	Stadium Station, Downtown Seattle, Fremont, Ballard, Whittier Heights, Broadview	20	26	30
30	Seattle Center, Fremont, Wallingford, University District, Ravenna, Sand Point, NOAA	30	36	31
66	Colman Dock-Ferry Terminal, Downtown Seattle, Eastlake, University District, Maple Leaf, Northgate Transit Center	30	30	30
70	Downtown Seattle, Eastlake, University District	15	20	15
358	Downtown Seattle, West Green Lake, Aurora Ave N, Shoreline P&R, Aurora Village Transit Ctr	9	15	15

Figure 3.5-5
Roadway Functional Class – Existing Conditions

Source: Fehr & Peers, 2010

Arterial and Local Access

Dexter Avenue N is a north/south street classified as a minor arterial located just east of SR 99. South of Aloha Street, there are four travel lanes, parking, and sidewalks on both sides of the street. Dexter Avenue N does not have a center turn lane in this area, with the exception of a southbound left-turn lane at Denny Way. North of Aloha Street, Dexter Avenue N transitions to one through lane in each direction with a center turn lane, parking, and sidewalks. Bicycle lanes are provided from Denny Way to Mercer Street; north of Mercer Street, bicycles are allowed in the wide parking lane signed as part of the "Interurban North" trail. Dexter Avenue N is a heavily-traveled bicycle route between Downtown Seattle and the Fremont Bridge.

8th Avenue N runs north-south, but is not contiguous through the study area. 8th Avenue N has two sections, one from Mercer Street to John Street and the second from Roy Street to Westlake Avenue N. Each section has one lane in each direction, on-street parking, and sidewalks. Some intersections are stop-controlled while others are uncontrolled.

9th Avenue N is a two-way principal arterial between Broad Street and Denny Way. South of Mercer Street, 9th Avenue N has one lane in each direction with parking on one or both sides of the street. Sidewalks are provided on both sides of the street, and there are bicycle lanes southbound between Harrison Street and Denny Way and northbound between Republican Street and Denny Way. Major intersections are signalized and minor intersections are stop-controlled.

Westlake Avenue N is a two-way arterial between Broad Street and Denny Way. The street has two travel lanes in each direction, provides turn pockets at some locations, and has sidewalks on both sides. Parking is generally on one or both sides of the street although some blocks have no parking provided. The South Lake Union Streetcar travels in the outside lane southbound along Westlake Avenue N from Broad Street to Denny Way and northbound from Denny Way to Thomas Street. Major intersections are signalized and minor streets are stop-controlled at other intersections. Westlake Avenue N continues north around Lake Union, eventually connecting to the Fremont Bridge.

Terry Avenue N is a north/south street that varies between one-way and two-way operations through the study area. Terry Avenue N is a two-way street from Denny Way to Thomas Street, a one-way street from Thomas Street to Mercer Street, and transitions back to two-way operations between Mercer Street and Valley Street. Along the entire stretch of Terry Avenue N, there are two travel lanes (one lane in each direction for the

areas with two-way operations). There is generally parking on both sides of the street. Some sections of Terry Avenue N have sidewalks on both sides of the street while other sections have none. The South Lake Union Streetcar travels northbound on Terry Avenue N from Thomas Street to Valley Street. Major intersections are signalized and minor intersections are stop-controlled.

Fairview Avenue N is a two-way north/south principal arterial with one to two travel lanes in each direction. In addition, there are either turn pockets or a center left-turn lane throughout the South Lake Union neighborhood. Sidewalks are provided on both sides of Fairview Avenue N. Parking is generally allowed on both sides of the street between Mercer Street and Denny Way; however, there are restrictions during peak periods. Parking is prohibited on the east side of Fairview Avenue N (northbound direction) between 4 and 6 PM and on the west side (southbound direction) between 7 and 9 AM. The empty parking lane provides an extra travel lane in the peak direction. There is no parking provided on Fairview Avenue N north of Mercer Street. The South Lake Union Streetcar travels in both directions of Fairview Avenue N from Valley Street to Yale Avenue N.

Valley Street is a two-way east/west street stretching from Westlake Ave N to Yale Avenue N. It is a principal arterial connecting Westlake Ave N and Broad Street to the I-5 interchange at Mercer Street, and a local access street for the remaining eastern portion. Along the arterial segment, there are three westbound lanes, and two eastbound lanes with turn pockets. Intersections are signalized and no parking is provided. Sidewalks are provided on the south side of the street, while a multi-use trail is provided on the north side of the street.

Mercer Street is an east/west principal arterial with four eastbound travel lanes extending west of Fairview Avenue N. From Dexter Avenue N to 9th Avenue N, one westbound lane is also provided as a connection from Broad Street to Dexter Avenue N. Sidewalks are provided on both sides of the street; however some of the sidewalks on the southern side of the street have been temporarily closed due to building construction. Mercer Street provides the main access to I-5 at Fairview Avenue N. Mercer Street continues eastward as a two-lane one-way minor arterial to Eastlake Avenue E with parking and sidewalks on both sides. During our field visits the buildings on the north side of Mercer Street were being demolished to make way for the upcoming conversion of Mercer Street into a two-way six-lane arterial between I-5 and Broad Street.

Republican Street is a lightly traveled two-way east/west minor arterial with two travel lanes extending from SR 99 to Eastlake Avenue E. Parking and sidewalks are provided on both sides of the street.

Denny Way is a two-way principal arterial with two lanes in each direction. Sidewalks are provided on both sides, but there is no on-street parking. Major intersections are signalized and there are left-turn bays provided at the Fairview Avenue N intersection. Left turns are prohibited at all other signalized intersections in the study area. Denny Way is a major east/west connector between the Seattle Center and waterfront areas to the west, and First Hill and Capitol Hill to the east.

Parking

This section summarizes the existing on-street and off-street parking supply and utilization in South Lake Union. Most of the source data for this analysis is based on the *2006 Parking Inventory* (Puget Sound Regional Council) and the *2006 South Lake Union On-Street Parking Study* (Seattle Department of Transportation). The parking conditions are substantially different today when compared to 2006 conditions. Between 2006 and 2010 several major office buildings were completed that increased off-street supply while also increasing overall parking demand. Additionally, the City of Seattle expanded the paid parking program throughout most of South Lake Union and a Restricted Parking Zone (RPZ) program was also established in the more residential portions of the neighborhood. While more recent data from a 2010 study has also been included, this data covers a small portion of South Lake Union, and many of the findings of the 2006 surveys are still valid. More information may be found in **Appendix E**.

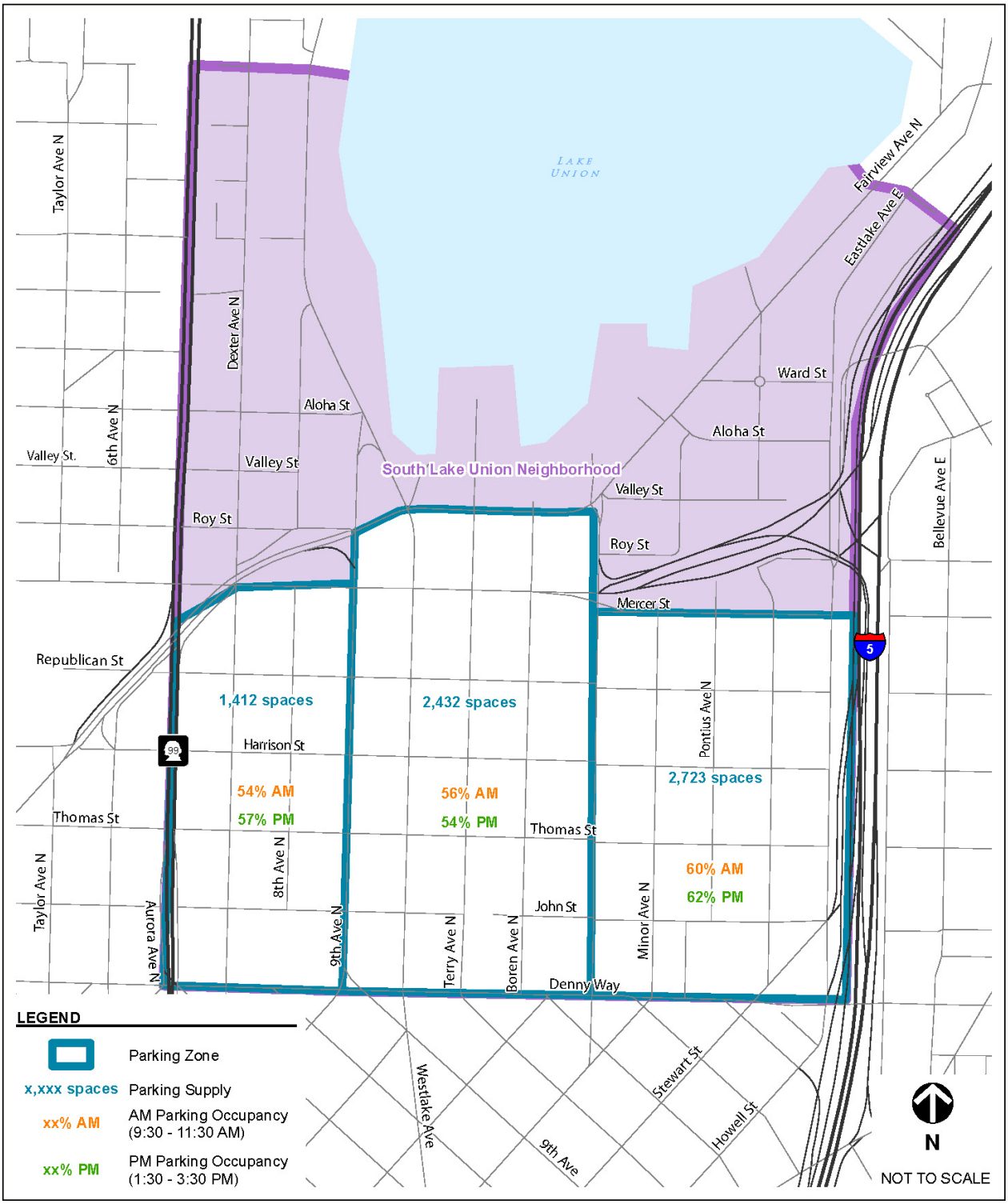
Off-Street Parking

The 2006 Puget Sound Regional Council (PSRC) off-street parking inventory included most of the study area; those areas excluded were primarily north of Mercer. Results were aggregated into three subareas:

- Denny Park area bounded by Mercer Street/Broad Street, Denny Way, 9th Avenue N, and Aurora Avenue N
- South Waterfront/Westlake area bounded by Valley Street, Denny Way, Fairview Avenue N, and 9th Avenue N
- Cascade area bounded by Mercer Street, Denny Way, I-5 and Fairview Avenue N

Figure 3.5-6 summarizes the parking supply, morning occupancy, and afternoon occupancy within each subarea in 2006.

Figure 3.5-6
Off-Street Parking Supply and Occupancy (2006)



Source: Fehr & Peers, 2010

As indicated in **Figure 3.5-6**, occupancy was relatively uniform between the morning and afternoon periods. The highest occupancies (60 percent in the morning and 62 percent in the afternoon) were observed east of Fairview Avenue N in the Cascade neighborhood where most of South Lake Union's residences are located. West of Fairview Avenue N, occupancies were slightly lower, ranging from 54 to 57 percent.

Recent field observations generally confirm the results from the 2006 PSRC study; however, discussions with property managers and field observations suggest that off-street facilities are often full in the vicinity of the Amazon headquarters along Terry and Boren Avenues.

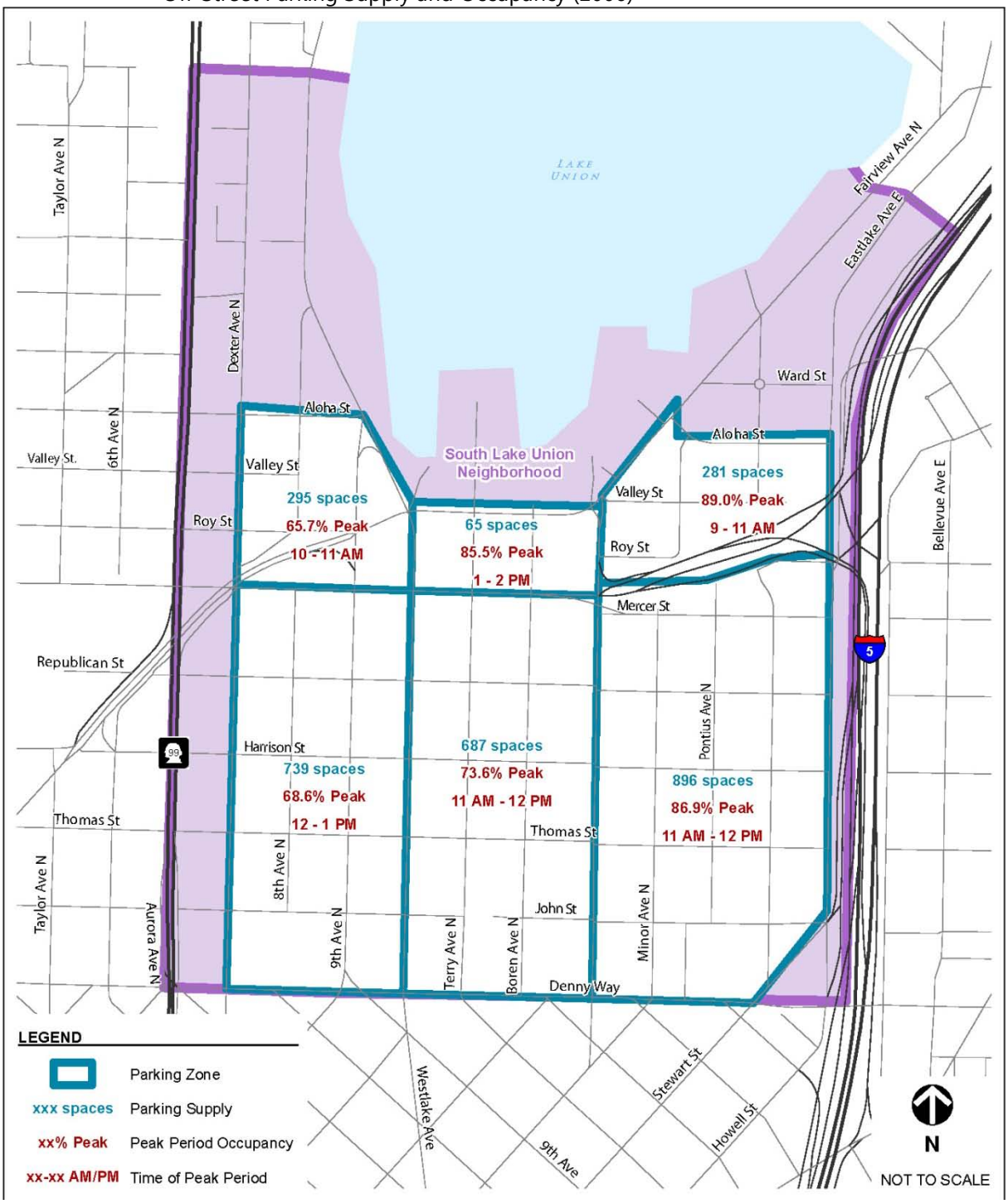
On-Street Parking

The *2006 South Lake Union On-Street Parking Study* counted nearly 3,000 on-street parking spaces in the South Lake Union neighborhood. The study provides the supply and utilization data presented in **Figure 3.5-7**. The study sampled approximately 40 percent of the spaces between the hours of 8 AM and 6 PM. Note that this study was completed when most parking spaces were unrestricted in terms of time limits, and there was no Restricted Parking Zone. When the survey was completed, only 76 spaces were metered.

Following the completion of the 2006 study, pay stations were implemented in the South Lake Union area. The time limits and prices are as follows:

- Two-hour parking at a rate of $1.50 per hour, which is geared towards higher demand areas such as along Westlake Avenue N
- Ten-hour parking at a rate of $1.25 per hour, tailored for long-term users, such as local employees

Figure 3.5-7
Off-Street Parking Supply and Occupancy (2006)



Source: Fehr & Peers, 2010

In addition, a Restricted Parking Zone (RPZ) with the following boundaries was created: Mercer Street to the north, John Street to the south, Fairview Avenue N to the west, and Eastlake Avenue E to the east. Eligible residents within these boundaries may purchase RPZ permits that allow them free parking not subject to the two-hour time limit on RPZ signed streets (not all block faces within the RPZ are subject to the restrictions). Non-permitted vehicles are prohibited from long-term parking in this RPZ (Zone 24) from 8 AM to 6 PM, Monday through Sunday.

Figure 3.5-8 shows the type of on-street parking currently available on each block within South Lake Union.

In November 2010, the Seattle Department of Transportation conducted a parking study that included parts of South Lake Union. The results are summarized in **Figure 3.5-9**. The areas included in the study were:

- The area bounded by Republican Street to the north, John Street to the south, Dexter Avenue N to the west, and Westlake Avenue to the east
- The area bounded by Republican Street to the north, John Street to the south, Fairview Avenue N to the west, and Yale Avenue N to the east

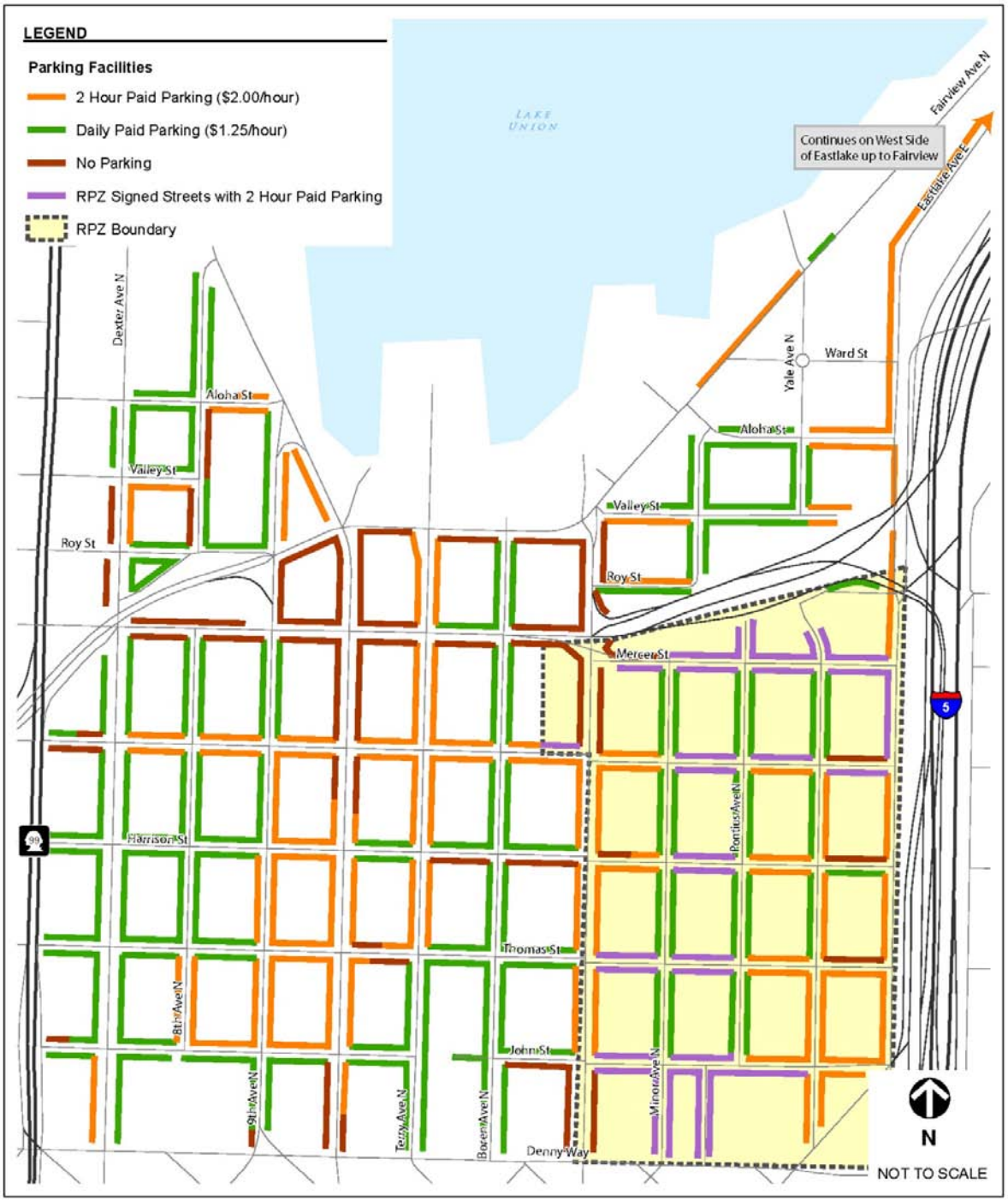
The eastern subarea, which lies within the RPZ, experienced its peak occupancy of 82 percent from 7 to 8 PM. The western subarea experienced its peak occupancy of 51 percent from 11 AM to 12 PM. Overall, the ten-hour spaces had higher occupancy rates than the two-hour spaces from 10 AM to 5 PM, after which the two-hour spaces had higher occupancy.

As was the case with off-street parking, recent field observations indicate that the ten-hour parking spaces are full in the vicinity of the Amazon headquarters along Terry and Boren Avenues. Outside of that area, there are usually 10-hour parking spaces available.

The 2006 and 2010 on-street parking studies both indicate high occupancy in the Cascade area east of Fairview Avenue N and south of the I-5 ramps, however the peak time of day differed. In 2006, the occupancy peaked at 86.9 percent between 11 AM and 12 PM, while in 2010 the occupancy peaked at 82 percent between 7 and 8 PM. The 2006 study found similarly high occupancy rates (peaking at 85.5 to 89 percent) in the area east of Westlake Avenue N and north of Mercer Street. The other area of comparison between the two studies is the southwest corner of South Lake Union. In 2006, occupancy peaked at 68.6 percent between 12 and 1 PM, but in 2010 the peak dropped to 51 percent between 11 AM

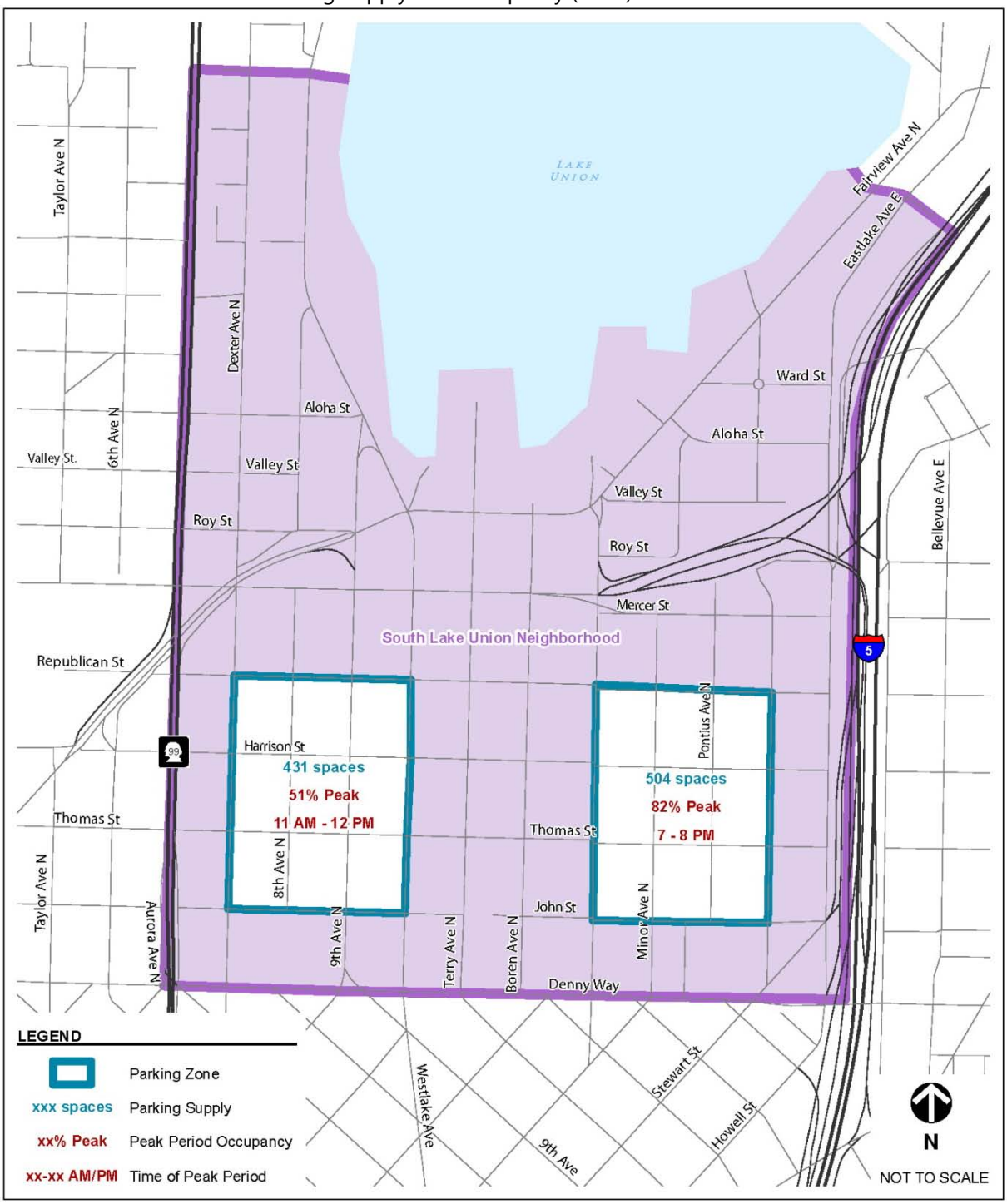
and 12 PM. These changes in occupancy may be due to different economic conditions between 2006 and 2010, and also due to the introduction of paid parking and the subsequent rate increase in 2009.

Figure 3.5-8
On-Street Parking Facilities – Existing Conditions



Source: Fehr & Peers, 2010

Figure 3.5-9
On-Street Parking Supply and Occupancy (2010)



Source: Fehr & Peers, 2010

Freight

While South Lake Union is continuing to transition from a light industrial center to a mixed-use neighborhood with service employment and

residential uses, freight movement is an important consideration in the area. In particular, Mercer Street, Valley Street, and Broad Street provide an important connection between the industrial uses in the Interbay area and I-5. Westlake Avenue N north of Mercer Street also provides an important freight connection to the Fremont neighborhood north of the Ship Canal.

While the City of Seattle allows truck traffic on all arterials in the City, a specific set of "major truck streets" has been defined to serve as primary routes focused on moving trucks through the City. Major truck streets within and in the vicinity of South Lake Union are shown in **Figure 3.5-10**.

Figure 3.5-10
Major Truck Streets – Existing Conditions

Source: Fehr & Peers, 2010

Analysis Methodology

This section describes the methodology used to analyze the existing conditions of the South Lake Union neighborhood transportation network.

Roadway Network

Level of Service

Level of Service (LOS) is a common metric used to assess the level of congestion of the roadway network and average driver delay. Historically, transportation impact analyses in the City of Seattle have used intersection LOS, which purely measures a road's performance for autos. The measure does not reflect the performance of the network for other users such as bicyclists and pedestrians.

Further, while intersection-level analysis may be appropriate for assessing the effects of individual parcels or block development, a more broad-based assessment is typical for the analysis of larger scale changes like rezones and other comprehensive planning efforts. The following reasons describe why a corridor analysis is appropriate for the South Lake Union height and density rezone analysis:

1. Single intersection analysis will not provide a systematic, area-wide impact assessment for a neighborhood like South Lake Union where complex transportation facilities and services are inter-related. A "pin map" approach might give some information about individual intersections in a vacuum, but it would not portray the effects of long queues, side-street diversions, and the spill back effect of congestion on regional roads such as I-5.
2. Intersection analysis measured purely from the driver's perspective ignores other potential effects of development; in particular, impacts on bicyclists and pedestrians. This approach is not able to effectively evaluate improvement projects (including pedestrian and bicycle projects) as mitigation measures that are not part of, or immediately adjacent to an intersection.

Measuring delay and congestion on a corridor or roadway segment basis effectively addresses the first issue. The *Highway Capacity Manual* (HCM) defines how LOS is calculated for many types of transportation facilities, including urban roadway segments and corridors.

Many agencies and departments of transportation have translated the corridor congestion levels defined above into a series of volume-to-capacity ratios. As further discussed below, this type of analysis provides

the opportunity to consider mobility in the area from a multi-modal perspective, not only the driver's perspective. One of the most commonly accepted set of thresholds is defined by the Florida Department of Transportation[2], and is summarized in **Table 3.5-2,** along with definitions for each level of service[3].

[2] In the *2009 FDOT Quality/Level of Service Handbook*, the Florida Department of Transportation applied the methodologies described in Chapter 10 of HCM for a variety of rural, suburban, and urban roadway facilities to simplify the definition of roadway segment operations.

[3] *Highway Capacity Manual 2000*, p. 10-5.

Table 3.5-2
Levels of Service

LOS	Description	Percentage of Free Flow Speed	Volume-to-Capacity Ratio[1]
A	Primarily free-flow **operations at** average travel speeds. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream and average driver delay at signalized intersections is minimal.	90	<0.40[2]
B	Reasonably unimpeded operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted and average driver delays at signalized intersections are not substantial.	70	<0.40[2]
C	Stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds.	50	<0.40[2]
D	Borders on substantial delay and decreases in travel speed. May be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors.	40	0.40-0.89
E	Characterized by major delays. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.	33	0.90-0.99[3]
F	Characterized by urban street flow at extremely low speeds. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.	<33	>1.00

Notes:
[1] Valid for one-way roads/two-way roads with turn lanes at major intersections, which is representative of the South Lake Union street network
[2] Based on the HCM definition, there is no distinction between LOS A, B, or C for urban roadway segments since speed limits are low for these streets
[3] The HCM defines roadway capacity as LOS E. Any roadway that has a volume or traffic demand that exceeds 1.0 is defined as operating at LOS F conditions

Source: Highway Capacity Manual, Transportation Research Board, 2000; 2009 FDOT Quality/Level of Service Handbook, Florida Department of Transportation, 2009.

Corridor LOS Analysis

To assess the level of vehicle congestion in the vicinity of South Lake Union, a set of study corridors were selected based primarily on the average volume of traffic and speed of the roadway and the proportion of traffic related to the South Lake Union neighborhood. All road segments within the traffic impact analysis area were considered for inclusion as a study corridor. In general, corridors satisfying both of the following conditions were selected.

- Classification as a principal or minor arterial (generally higher volume streets)
- Carries at least five percent of traffic generated within the South Lake Union neighborhood (as estimated by the City's travel model for 2031)

Ten corridors satisfied both criteria. Exceptions to the basic criteria were made to better capture the traffic operations in the traffic impact analysis area. For example, less than five percent of South Lake Union related traffic travels on E Pine Street, but of arterials accessing First Hill, it carries the highest percentage of such traffic. Therefore, E Pine Street was included as a study corridor. Likewise, the Lakeview Boulevard E and Denny Way I-5 overpasses were selected to capture the traffic impacts of the main Capitol Hill access points. Another exception was made to ensure that an east-west connection within the South Lake Union neighborhood would be studied. Thomas and Harrison Streets are study corridors despite being classified as access streets. Republican Street was not selected as a study corridor since, despite being classified as minor arterial, the traffic conditions on Thomas and Harrison Streets are similar based on existing traffic counts and any development-related impacts are expected to be similar on all three streets. Some corridors were broken into multiple segments to reflect the differing characteristics along a single route. For example, Fairview Avenue N was split at Yale Avenue N and Harrison Street to reflect the congestion that occurs on both sides of the intersection with Mercer Street. **Table 3.5-3** lists the selected study segments and **Figure 3.5-11** displays them on a map of the area.

Demand-to-Capacity Ratios. For each study segment, demand-to-capacity (d/c) ratios were calculated using traffic count data provided by the City of Seattle and roadway capacity estimates described below. D/C ratios give an indication of the level of congestion that exists today. The d/c ratios are very similar to the v/c ratios described earlier; however the d/c ratio has a slightly broader definition:

Under existing conditions, the d/c ratio is equal to the volume of traffic traveling along a segment during a set period, plus the vehicles that are waiting in a queue to traverse the segment.

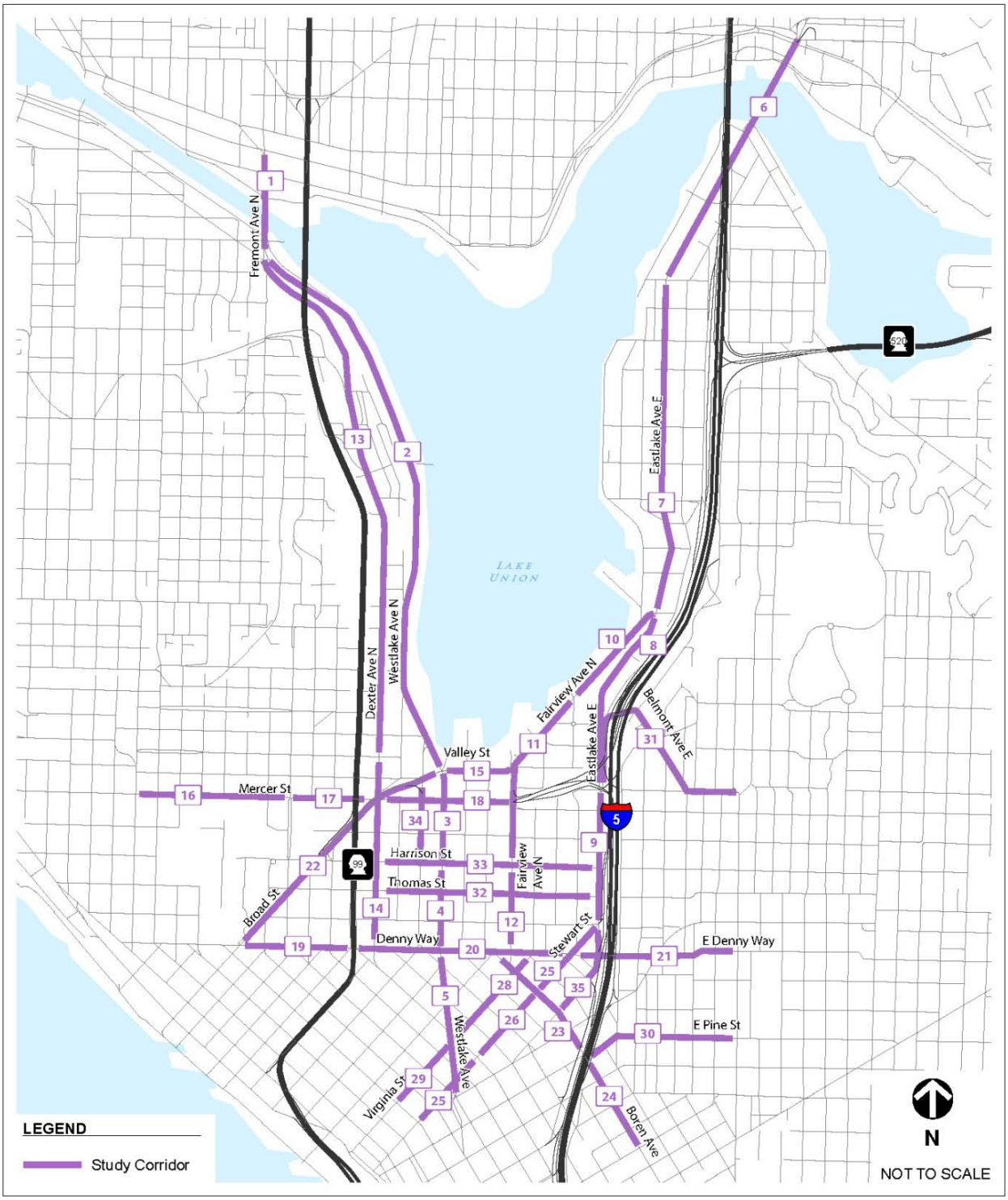
For most of the corridors in the South Lake Union neighborhood, the d/c ratio is equivalent to the v/c ratio. However for congested corridors like Mercer Street and Fairview Avenue N, the d/c ratio is higher because of the queues waiting to access these streets.

Table 3.5-3
Study Corridors

Road	Segment
Fremont Bridge	1) N 35th Street to Westlake Avenue N
Westlake Avenue N	2) Fremont Bridge to Valley Street
	3) Valley Street to Harrison Street
	4) Harrison Street to Denny Way
	5) Denny Way to Stewart Street
Eastlake Avenue E	6) N 40th Street to E Hamlin Street
	7) E Hamlin Street to Fairview Avenue N
	8) Fairview Avenue to Lakeview Blvd E
	9) Lakeview Blvd E to Stewart Street
Fairview Avenue N	10) Eastlake Avenue to Yale Avenue N
	11) Yale Avenue N to Harrison Street
	12) Harrison Street to Denny Way
Dexter Avenue N	13) Fremont Bridge to Valley Street
	14) Valley Street to Denny Way
Valley Street	15) Westlake Avenue N to Fairview Avenue N
Mercer Street	16) Queen Anne Avenue N to 5th Avenue N
	17) 5th Avenue N to Dexter Avenue N
	18) Dexter Avenue N to Fairview Avenue N
Denny Way	19) Broad Street to Aurora Avenue N
	20) Aurora Avenue N to Stewart Street
	21) Stewart Street to Broadway E
Broad Street	22) Denny Way to Westlake Avenue N
Boren Avenue	23) Denny Way to Pine Street
	24) Pine Street to University Street
Stewart Street	25) Eastlake Avenue E to Boren Avenue
	26) Boren Avenue to 7th Avenue
	27) 7th Avenue to 3rd Avenue
Virginia Street	28) Denny Way to Westlake Avenue N
	29) Westlake Avenue N to 3rd Avenue
E Pine Street	30) Boren Avenue to Broadway
Lakeview/Belmont/Roy	31) Eastlake Avenue to Broadway E
Thomas Street	32) Aurora Avenue N to Eastlake Avenue E
Harrison Street	33) Aurora Avenue N to Eastlake Avenue E
9th Avenue N	34) Roy Street to Republican Street
Howell/Eastlake	35) Stewart Street to Boren Avenue

Source: Fehr & Peers, 2010

Figure 3.5-11
Study Corridors – Existing Conditions



Source: Fehr & Peers, 2010

The d/c ratio measures the typical observed peak period queue and adds those queued vehicles to the congested segments. The advantage of this approach is that it more accurately captures the total traffic demand and the inter-related nature of the roadways in South Lake Union.

For example, Mercer Street is congested for a considerable portion of the afternoon peak period due to congestion at the Mercer Street/Fairview Avenue N intersection. Based on several field visits, the queue typically extended back from this intersection approximately a half mile. Based on this level of queuing and the location of the bottleneck, the d/c ratio of the segment of Mercer Street was calculated by adding the observed traffic counts and the estimated number of vehicles waiting in the queue. This type of calculation better captures the level of traffic congestion on the roadway network than v/c ratios, which only measure the number of vehicles that pass through the count location (which ignores the vehicles in queue due to congestion).

As described in the HCM, LOS definitions above, a d/c ratio exceeding 0.9 (corresponding to LOS E and F conditions) suggests that drivers, transit vehicles (and their passengers) likely experience undesirable delays and queues at key intersections along the corridor. Therefore, this analysis methodology speaks to both roadway and intersection congestion on the study corridors for drivers and transit passengers.

A key consideration in measuring d/c ratios was determining the lane capacity of each segment. Lane capacity is a measurement of how many vehicles per hour can travel within the travel lanes on various streets. Lane capacity was determined by starting with the assumptions in the City of Seattle travel model, which were then adjusted, based on each segment's location and operational characteristics, such as whether it was one-way or two-way or had turn pockets. In general, these capacity adjustments are consistent with those listed in the *2009 FDOT Quality/Level of Service Handbook*. Based on these considerations, the following base lane capacities were assigned.

Principal and Minor Arterials: Principal and Minor Arterials are streets that generally carry the highest number of vehicles on an average weekday.

- Downtown— lane capacity is 600 vehicles per hour (vph)
- South Lake Union—lane capacity is 700 vehicles per hour
- Outside South Lake Union and Downtown—lane capacity is 800 vehicles per hour

Non-Arterials: Non-Arterials are access roads and other streets that carry fewer vehicles per day.

- Harrison and Thomas Streets—lane capacity is 600 vehicles per hour

As shown above, the lane capacity of arterial streets is assumed to be lowest in Downtown, slightly higher in South Lake Union, and highest in areas outside of South Lake Union and Downtown. The reason for this difference in capacity has to do with how fast vehicles can travel along a stretch of roadway.

Downtown has the lowest base lane capacity since this portion of the study area has the greatest number of traffic signals per mile and the greatest level of pedestrian and transit activity. Research in the HCM indicates that closely spaced traffic signals generally degrade the vehicle capacity of roadway corridors; however, short blocks and frequent crossing opportunities are better for pedestrians. The high level of pedestrian and bus activity in Downtown reduces the lane capacity further since busses can block travel lanes when loading and heavy pedestrian traffic can block turning vehicles. We verified these lane capacities with field observations, which indicated that pedestrian activity and queue spillback between signalized intersections reduced roadway capacities in Downtown and portions South Lake Union.

Base lane capacities were increased by 20 percent for one-way streets since they operate more efficiently than two-way streets due to reduced turning conflicts and more efficient traffic signal operations. In addition, a 20 percent adjustment was made in some locations to account for turn lanes, which further increase the capacity of a street, since vehicles waiting for a gap in traffic to execute a turn are not blocking through traffic. Some additional adjustments were made at select locations to reflect actual lane capacities. For example, although E Pine Street has no turn lane, the road is wide enough to allow through traffic to pass turning cars so it was treated as if it had a turn lane. These increases in base capacity for one-way streets and streets with turn lanes is consistent with the methodology recommended by the Florida Department of Transportation (see **Appendix E**).

Certain streets have unique circumstances that affect their lane capacities. For instance, on Mercer Street there are four through lanes, but only three of them lead onto the I-5 ramps. Because the vast majority of motorists are accessing the ramps, the fourth lane is underutilized. Counting it as a full lane would overestimate the capacity of the street. In this case, the number of through lanes was adjusted to 3.5 to accurately represent the

traffic operations on Mercer Street. A similar lane adjustment was used on Westlake Avenue N where the streetcar tracks run in the outside lane. Motorists tend to avoid driving in that lane resulting in a reduced capacity. Some streets like Eastlake Avenue N have parking allowed in certain directions during portions of the day. The capacity analysis took into account the variations in the number of lanes on these streets.

Transit

Based on correspondence with King County Metro, which owns and operates the transit system, passenger load factor of bus service was selected as the key performance measure for transit in the study area. Information about transit frequency and span of service was also described, but since the Height and Density alternatives do not affect these factors, an impact analysis was not performed.

While documents like the *Urban Village Transit Network*, and the *2005 Transit Master Plan* identify transit reliability as another important service measure, reliability is difficult to measure and forecast without a detailed traffic/transit simulation model and this measure was not considered as part of this study.

Load factor is the ratio of passengers to seating capacity on a bus line during the peak hour. King County Metro provided data from Spring 2010 for routes serving the South Lake Union neighborhood. Details of the transit analysis methodology may be found in **Appendix E**.

Traffic Safety

The traffic safety analysis is based on previous transportation analyses prepared in the South Lake Union area. These earlier studies have used the concept of High Accident Locations, which the City of Seattle defines as follows:

- Signalized intersections with an average of ten or more traffic collisions per year
- Unsignalized intersections with an average of five or more collisions per year

High Accident Locations will be targeted for future safety improvements in an effort to reduce the number of collisions.

While the previous studies evaluated High Accident Locations in general, they did not specifically define any High Accident Location standards for pedestrian or bicycle collisions. Given the substantial increase in new land uses (and therefore additional demand for pedestrian and bicycle travel in the area) associated with the height and density rezone alternatives, a

pedestrian/bicycle intersection of interest is identified if *either* of the criteria below are met:

- Any intersection with an average of 1.7 or more pedestrian ***or*** bicycle collisions per year (which equates to five or more collisions in a three-year period),
- Or any intersection with average of 2.3 or more pedestrian ***and*** bicycle collisions per year (which equates to seven or more collisions in a three-year period).

The first criteria treats pedestrian and bicycle collisions separately, while the second combines the two measures.

Analysis Results

This section presents the results of the existing traffic conditions analysis.

Existing Study Corridor Demand-to-Capacity Ratios

Table 3.5-4 and **Figure 3.5-12** display the results of the d/c ratio analysis. In some instances, a road segment may operate with standing queues despite having a d/c ratio well below 1.0. Such instances are noted below with an asterisk to indicate that standing queues were observed in the field. As described earlier, the intersection of Mercer Street and Fairview Avenue N is congested and causes queue spillbacks onto adjacent streets like 9th Avenue N, Westlake Avenue N, and Fairview Avenue N. While the d/c ratio technique takes into account congestion on the street with the main bottleneck, it does not account for intersection queues on minor streets as traffic attempts to merge into the major-street queue. The following facilities have d/c ratios greater than 1.0:

- Valley Street from Westlake Avenue N to Fairview Avenue N
- Denny Way from Aurora Avenue N to Stewart Street

Table 3.5-4
Existing Condition Demand-to-Capacity Ratios of Study Corridors

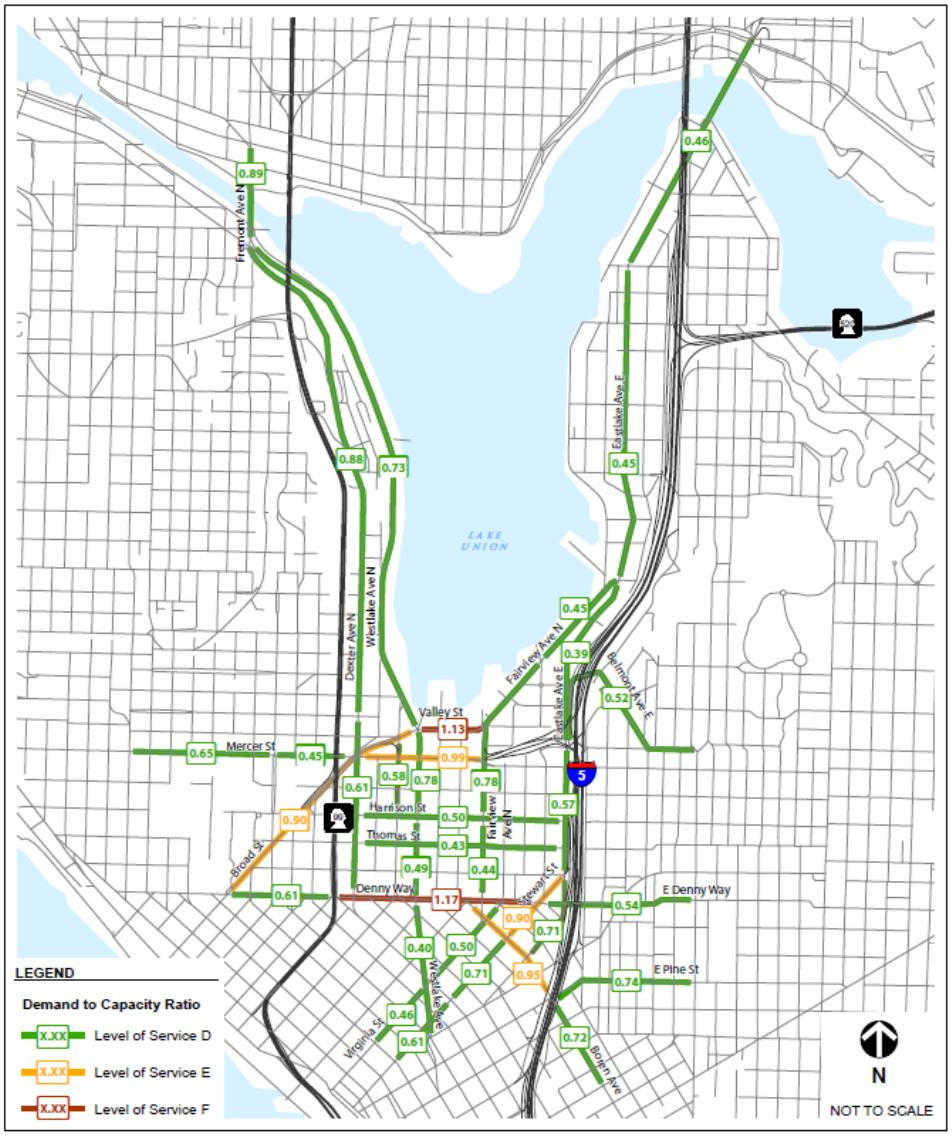
Road	Segment	Volume	Peak Hour	Peak Direction	Number of Through Lanes	Total Capacity	d/c Ratio/LOS
Fremont Bridge	1) N 35th Street to Westlake Avenue N	1,424	PM	N	2	1,600	0.89/D
Westlake Avenue N	2) Fremont Bridge to Valley Avenue	1,169	PM	N	2	1,600	0.73/D
	3) Valley Street to Harrison Street	1,093	PM	N	2	1,400	0.78*/D
	4) Harrison Street to Denny Way	685	PM	N	2	1,400	0.49/D
	5) Denny Way to Stewart Street	357	PM	N	1.5	900	0.40/D
Eastlake Avenue E	6) N 40th Street to E Hamlin Street	890	PM	NE	2	1,920	0.46/D
	7) E Hamlin Street to Fairview Avenue N	871	PM	N	2	1,920	0.45/D
	8) Fairview Avenue to Lakeview Blvd E	549	PM	S	1	700	0.78/D
	9) Lakeview Blvd E to Stewart Street	802	PM	N	2	1,400	0.57/D
Fairview Avenue N.	10) Eastlake Avenue to Yale Avenue N	479	PM	SW	1	700	0.68/D
	11) Yale Avenue N to Harrison Street	1,186	AM	S	2	1,680	0.78*/D
	12) Harrison Street to Denny Way	745	PM	N	2	1,680	0.44/D
Dexter Avenue N	13) Fremont Bridge to Valley Street	848	AM	S	1	960	0.88/D
	14) Valley Street to Denny Way	848	AM	S	2	1,400	0.61/D
Valley Street	15) Westlake Avenue N to Fairview Avenue N	2,372	PM	W	3	2,100	1.13/F
Mercer Street	16) Queen Anne Avenue N to 5th Avenue N	1,091	PM	E	2	1,680	0.65/D
	17) 5th Avenue N to Dexter Avenue N	1,445	AM	E	3.5	3,185	0.45*/D
	18) Dexter Avenue N to Fairview Avenue N	2,929	PM	E	3.5	3,185	0.99*/E
Denny Way	19) Broad Street to Aurora Avenue N	1,031	PM	W	2	1,680	0.61/D
	20) Aurora Avenue N to Stewart Street	1,233	PM	E	1.5	1,050	1.17/F
	21) Stewart Street to Broadway E	864	PM	W	2	1,600	0.54/D
Broad Street	22) Denny Way to Westlake Avenue N	1,643	PM	SW	2	1,820	0.90/E

Road	Segment	Volume	Peak Hour	Peak Direction	Number of Through Lanes	Total Capacity	d/c Ratio/LOS
Boren Avenue	23) Denny Way to Pine Street	1,136	PM	NW	2	1,200	0.95/E
	24) Pine Street to University Street	862	PM	NW	2	1,200	0.72/D
Stewart Street	25) Eastlake Avenue E to Boren Avenue	1,894	AM	SW	3.5	2,100	0.90*/E
	26) Boren Avenue to 7th Avenue	1,278	AM	SW	3	1,800	0.71/D
	27) 7th Avenue to 3rd Avenue	729	AM	SW	2	1,200	0.61/D
Virginia Street	28) Denny Way to Westlake Avenue N	603	PM	NE	2	1,200	0.50/D
	29) Westlake Avenue N to 3rd Avenue	832	PM	NE	3	1,800	0.46/D
E Pine Street	30) Boren Avenue to Broadway	530	PM	W	1	720	0.74/D
Lakeview/Belmont/ Roy	31) Eastlake Avenue to Broadway E	415	PM	E	1	800	0.52/D
Thomas Street	32) Aurora Avenue N to Eastlake Avenue E	260	PM	W	1	600	0.43/D
Harrison Street	33) Aurora Avenue N to Eastlake Avenue E	300	PM	W	1	600	0.50/D
9th Avenue N	34) Roy Street to Republican Street	1,214	PM	S	3	700	0.58/D
Howell/Eastlake	35) Stewart Street to Boren Avenue	424	AM	S	1	600	0.71/D

Source: City of Seattle count data, 2004-2010.

* Standing queues observed. As a result, actual LOS may be worse.

Figure 3.5-12
Demand to Capacity Ratios – Existing Conditions



Source: Fehr & Peers, 2010

In addition, queue spillbacks were observed on the following segments:

- 9th Avenue N from Westlake Avenue N to Mercer Street (because of the queues on Mercer Street)
- Westlake Avenue N from Valley Street to Harrison Street (because of the queues on Mercer Street)
- Fairview Avenue N from Yale Avenue N to Harrison Street (because of the queues on Mercer Street)
- Mercer Street from 5th Avenue N to Dexter Avenue N
- Mercer Street from Dexter Avenue N to Fairview Avenue N
- Stewart Street from Eastlake Avenue E to Boren Avenue

Transit

Tables 3.5-5 and 3.5-6 summarize the load factors for transit routes serving the South Lake Union neighborhood in 2010. **Table 3.5-1** summarizes the AM peak period, PM peak period, and Midday period transit frequencies for the bus lines serving the area. The AM peak hour load factor is calculated based on the highest one-hour ridership on the route between 6 to 9 AM. The PM peak hour load factor is based on the highest one-hour ridership between 3:15 to 6:30 PM. For each route, the peak hour load factors for both directions are shown.

According to King County Metro, load factor is based on the highest ridership along the route. Therefore, the maximum load does not necessarily occur in the South Lake Union neighborhood. King County Metro aims for an aggregate load factor of 0.5 to 0.8 for each peak period. A load factor below 0.5 indicates too much capacity and a load factor above 0.8 indicates that some trips will have standing passengers. As described above, since King County Metro owns and operates the transit system, their load factor criteria is used to identify impacts; a peak hour load factor exceeding 1.25 is considered by King County Metro to be deficient.

Table 3.5-5
South Lake Union Transit AM Peak Hour Load Factors

Route	Termini Locations	Peak Hour Load Factor	
		NB	SB
5/54/55	Shoreline, West Seattle	0.41	0.86
8	Uptown, Rainier Valley	0.70	0.81
16	Downtown, Northgate	0.67	0.93
17/27	Loyal Heights, Leschi	0.52	0.86
25/37	Laurelhurst, West Seattle	0.47	0.63
26/124	Green Lake, Tukwila	0.46	0.71
23/28	Broadview, White Center	0.45	0.81
30	Sandpoint, Seattle Center	0.83	0.84
66	Downtown, Northgate	0.69	1.17
70	Downtown, University District	0.73	0.89
358	Downtown, Aurora Village Transit Center	0.66	0.81

Source: King County Metro, Spring, 2010.

Table 3.5-6
South Lake Union Transit PM Peak Hour Load Factors

Route	Termini Locations	Peak Hour Load Factor	
		NB	SB
5/54/55	Shoreline, West Seattle	0.76	0.45
8	Uptown, Rainier Valley	0.56	0.97
16	Downtown, Northgate	0.80	1.08
17/27	Loyal Heights, Leschi	0.87	0.71
25/37	Laurelhurst, West Seattle	0.43	0.40
26/124	Green Lake, Tukwila	0.63	0.63
23/28	Broadview, White Center	0.70	0.55
30	Sandpoint, Seattle Center	0.96	1.08
66	Downtown, Northgate	0.83	0.63
70	Downtown, University District	0.63	0.67
358	Downtown, Aurora Village Transit Center	0.84	0.87

Source: King County Metro, Spring 2010.

Travel Demand Management

In 2004, the City Council directed the Seattle Department of Transportation to create a transportation demand management (TDM) program for South Lake Union. That report suggested strategies for the neighborhood to minimize the negative travel effects brought on by substantial growth. Those strategies included increased management of on-street and off-street parking, expansion of transit service, and the creation of a single transportation management organization that would conduct marketing and customer service to promote alternatives to driving alone.

Two types of travel demand management programs affect South Lake Union. The State's Commute Trip Reduction Law applies to larger employers. The City's Transportation Management Program applies to larger buildings (even if those buildings are occupied by small employers). Both programs are aimed at encouraging employees to reduce their drive-alone rate by implementing TDM programs and progress is monitored periodically.

Surveys are conducted every two years to measure the progress of companies affected by the State's Commute Trip Reduction Law. In a recent evaluation of these surveys, sixteen participating South Lake Union companies produced varied results. Each employer has its own mode split and VMT goals, based on a targeted reduction to its past rates. Nine companies achieved their single-occupant vehicle (SOV) mode-split goal, four reduced their SOV rate but did not reach their goal, while three increased their SOV rate. These results represent roughly 8,750 South Lake Union commuters. Of companies who have reached their mode-split goals, SOV rates range from 30 to 61 percent. The complete table may be found in **Appendix E**.

More detailed mode-split information was available for eight South Lake Union companies. That data is summarized in **Table 3.5-7**.

Table 3.5-7
Sample Mode-Split of South Lake Union CTR Participants

Company	Most Recent SOV Goal*	Mode Split (%) SOV	HOV	Transit	Bicycle	Walk
Alley 24 East & West	63	58	9	18	2	8
Gates Foundation	56	62	10	8	4	7
Group Health	47	37	14	38	2	3
Microsoft	34	37	15	23	2	14
Pemco	50	49	13	25	0	2
REI	39	39	4	20	16	5
Seattle Cancer Care Alliance	39	39	20	23	3	3
Tommy Bahama	50	45	19	25	2	5

Source: CTR Survey Reports, 2007-2010.

Freight

For the purposes of this study, the quality of freight mobility within South Lake Union will be assessed using the roadway segment d/c ratios on major truck streets. As described earlier, d/c ratios are correlated with traffic congestion and truck streets with high d/c ratios will be more difficult for trucks to navigate and have lower travel speeds, which can lead to delays.

As shown in **Table 3.5-4**, with the exception of Westlake Avenue N and Mercer Street west of Dexter Avenue N, all the major truck streets in the South Lake Union area (Mercer Street, Valley Street, and Broad Street) currently operate at LOS E or F conditions, with d/c ratios of 0.90 or greater.

Traffic Safety

The most recent (January 2007-December 2009) three-year collision records from the Seattle Department of Transportation were analyzed to determine if there were any High Accident Locations within the South Lake Union study area. The collision records identified only one High Accident Location at the intersection of Mercer Street and Taylor Avenue N. This unsignalized intersection experienced an average of five collisions per year over the last three years. A closer inspection of the collision data indicates that 40 percent of the collisions involved left turning vehicles while another 20 percent were right angle collisions. Most of the other collisions (33 percent) were sideswipes. These types of collisions are typical of unsignalized side-street intersections and often involve failure of a driver to properly yield right of way.

Previous studies in the area have identified other High Accident Locations within the South Lake Union study area, particularly at the intersections of Mercer Street and Fairview Avenue N, Mercer Street and Westlake Avenue N, Mercer Street and Dexter Avenue N, and Mercer Street and 5th Avenue N. These locations were reviewed for the average annual number of collisions over the three-year analysis period, but none of these locations met the City threshold defining a High Accident Location, with the highest collision rate of 8.7 occurring at Mercer Street and Fairview Avenue N.

The January 2007-December 2009 collision records from the Seattle Department of Transportation were also reviewed for pedestrian and bicycle collisions within the study area. Using the criteria defined in Analysis Methodology Section, the following two intersections were identified:

- Mercer Street and Dexter Avenue N – 1.7 bicycle collisions per year
- Eastlake Avenue and Fuhrman Avenue (south end of University Bridge) – 2.3 bicycle collisions per year

These two intersections correspond with intersections of major bicycle routes. Dexter Avenue N is also signed as the Interurban North bikeway and Eastlake Avenue near the University Bridge serves as a link on the Cheshiahud Lake Union Loop.

While this section identified several intersections with a relatively high number of collisions per year, the High Accident Location analysis methodology does not calculate a collision rate. Collision rates are often reported by state departments of transportation to identify locations that have a high number of collisions relative to the total traffic flow through the area.

3.5.2 Planning Scenarios Evaluated

This section describes the planning scenarios that will be evaluated in this document and presents the methodology and assumptions used to analyze the alternatives.

Four alternatives are evaluated under future year 2031conditions. These include a No Action scenario that maintains South Lake Union's current zoning and three Action alternatives, which would increase the neighborhood's height and density zoning by varying degrees. Specifically, Alternatives 1 and 2 allow for increases to both residential and commercial development. Alternative 1 has higher allowable heights and densities, and Alternative 2 has more moderate standards. Alternative

3 allows commercial height and density focused primarily on residential development.

Transportation Network and Land Use Assumptions

This chapter assesses transportation system operations under 2031 conditions for all four future year scenarios. In general, the City of Seattle travel model forecast future background vehicle and transit volumes. For the South Lake Union area, we used a more refined method to project traffic volumes.

Per the direction of the Seattle Department of Transportation, the version of the City travel model used for this analysis was developed as a part of the Alaskan Way Viaduct (AWV) Replacement study and was used for the *AWV Supplemental Draft Environmental Impact Statement* (WSDOT, FHWA, and City of Seattle, July 2006). The following is a description of some of the travel model's key features.

- Analysis Years: This version of the model has a base year of 2008 and a horizon year of 2030. 2031 transportation forecasts for South Lake Union were developed by updating the land use forecasts and trip generation rates within the study area.
- Network Representation: The highway and major street systems (Westlake Avenue N, Fairview Avenue N, Mercer Street etc.) within South Lake Union are fully represented in the model.
- Land Use: The City of Seattle developed the estimates of citywide land use (residential, commercial, and industrial) for base and horizon year conditions.
- Transit: The travel model has a full representation of the transit system under base year conditions. The horizon year transit system is based on assumptions of service from the City of Seattle and the Puget Sound Regional Council.
- Travel Costs: The model accounts for the effects of auto operating costs, parking, transit fares, and tolls (on SR 520) on travel demand.
- Travel Demand: The model predicts travel demand for seven modes of travel: drive alone, carpool (2 person), carpool (3 plus), transit, trucks, walking, and bicycling. Travel demand is estimated for five time periods, morning (6 to 9 AM), midday (9 AM to 3 PM), afternoon (3 to 6 PM), evening (6 to 10 PM), and overnight (10 PM to 6 AM).

This chapter assumes several modifications to the transportation network in the Seattle travel model to better represent 2031 conditions. These

modifications were to ensure that only "reasonably foreseeable" transportation improvement projects were included in the future year analysis. The definition of reasonably foreseeable is based on the following criteria:

- Projects that have full funding commitments
- Projects with partial funding commitments but with a well-defined strategy in place to raise the remaining funds

Figure 3.5-13 shows the reasonably foreseeable projects in the study area. The bulk of the projects are related to the Mercer East and Mercer West projects, which will convert Mercer Street to two-way operations between I-5 and 1st Avenue N. This project affects several adjacent streets. The North Portal portion of the Alaskan Way Viaduct Replacement project is also assumed. This project will affect the southwestern corner of the South Lake Union neighborhood by completing the street grid across Aurora Avenue at John, Thomas, and Harrison Streets. The north portal of the bored tunnel will also require Broad Street to be vacated between 5th and 9th Avenues N.

Note that tolls are not assumed on the SR 99 bored tunnel since tolling was uncertain at the time this analysis began and the City of Seattle travel model did not include any tolls on SR 99. If tolling was assumed in the analysis, there would higher traffic volumes exiting at the new Aurora Avenue exits (27 percent increase), although total traffic entering and exiting to South Lake Union would decrease (13 percent) since the tolls will cause some traffic to divert to other routes such as I-5, Second Avenue, and Fourth Avenue. See the Alaskan Way Viaduct Replacement EIS for more information.

Note that the WSDOT SEIS is based on a particular tolling strategy and these results will vary if the legislature chooses to implement a different approach.

Transportation projects that do not meet the definition for reasonably foreseeable are shown in **Figure 3.5-14** (roadway improvements) and **Figure 3.5-15** (pedestrian and bicycle improvements)[4]. These projects are not assumed to be completed by 2031 and were not included in the travel

[4] The PMP identifies locations where improvements are desirable, but does not identify specific projects. In those instances when it was reasonably clear what the general improvement would be, such as building a sidewalk where one was missing or adding a crosswalk, the location is shown in **Figure 3.5-15**.

model. Note that the full Mercer West project includes widening the Mercer Street underpass between Dexter Avenue N and 5th Avenue N to three lanes in each direction with left-turn lanes, wider sidewalks, and a bicycle path. Due to an expected funding shortfall, this part of the Mercer West project is not considered to be reasonably foreseeable. Instead, it is assumed that the Mercer Street underpass would operate with two lanes in each direction and no improvements to pedestrian or bicycle facilities. All other components of the Mercer West project are assumed to be reasonably foreseeable.

No changes were made to the travel model's horizon year transit network, since the region has a proven record of increasing transit service to keep up with population growth over the long-term. The current financial troubles faced by transit agencies would be speculative to assume for 2031 since there is no precedent for a long-term stagnation of transit funding.

A close review of the travel model indicated several bus route changes expected by 2031. Route 30 will no longer serve the study area[5]. The following new bus routes are expected to serve South Lake Union:

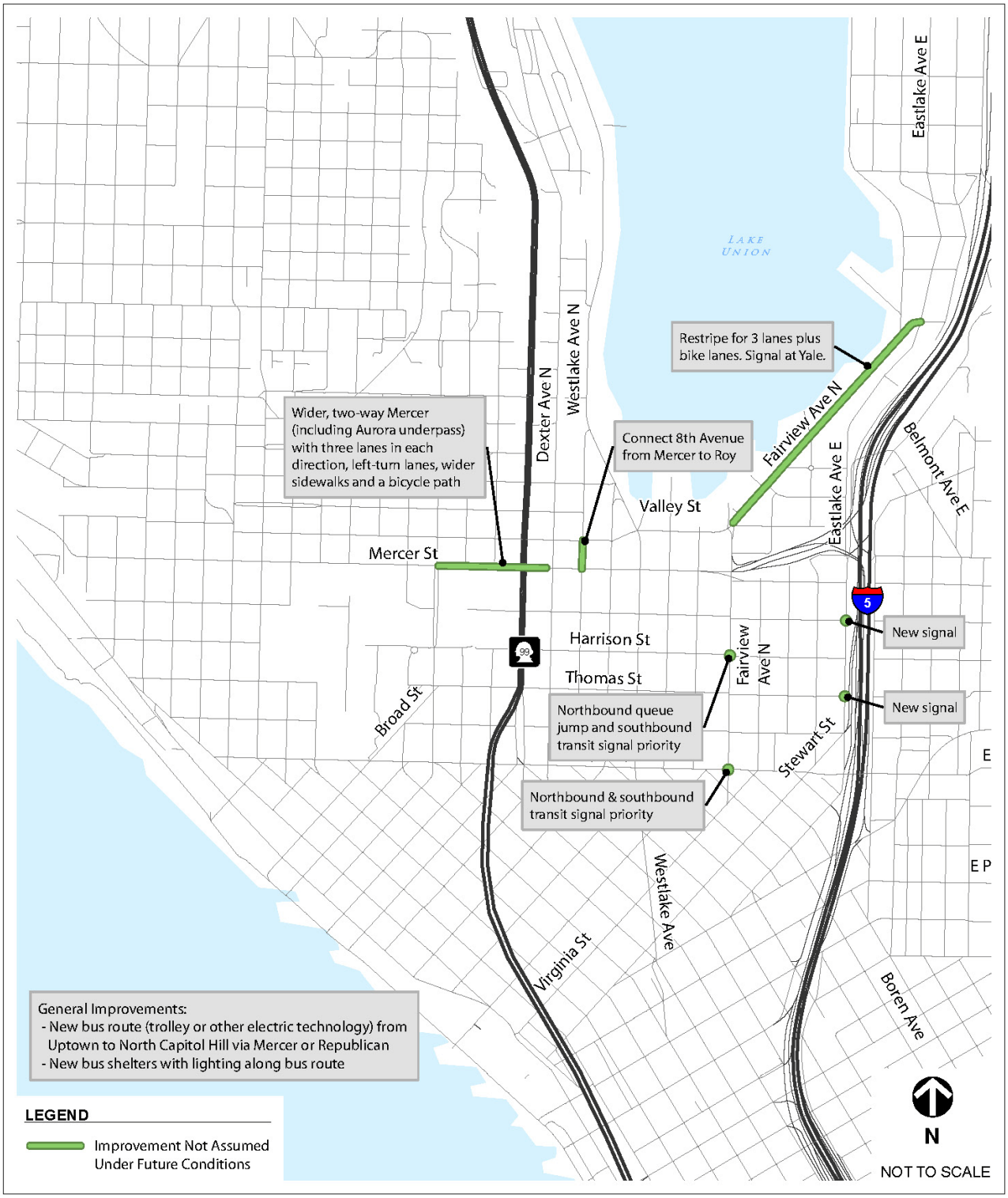
- Rapid Ride Line D: Ballard to Downtown Seattle
- Rapid Ride Line E: Aurora Avenue - Shoreline to Downtown Seattle
- Route 21: Arbor Heights to Downtown Seattle
- Route 29: Woodland Park to Downtown Seattle
- Route 56: Alki/West Seattle to South Lake Union
- Route 121: Burien to Downtown Seattle
- Route 308: Lake Forest Park to Downtown Seattle
- Route 313: Bothell to Uptown
- Route 316: Shoreline to Uptown

[5] The Seattle travel model does not describe why Route 30 would no longer serve the study area (it would run only between Sand Point and the University District rather than continuing south to South Lake Union/Lower Queen Anne). However, it is likely the southern portion of this route will be unnecessary when the University Link of Light Rail is completed.

Figure 3.5-13
Reasonably Foreseeable Transportation Improvements

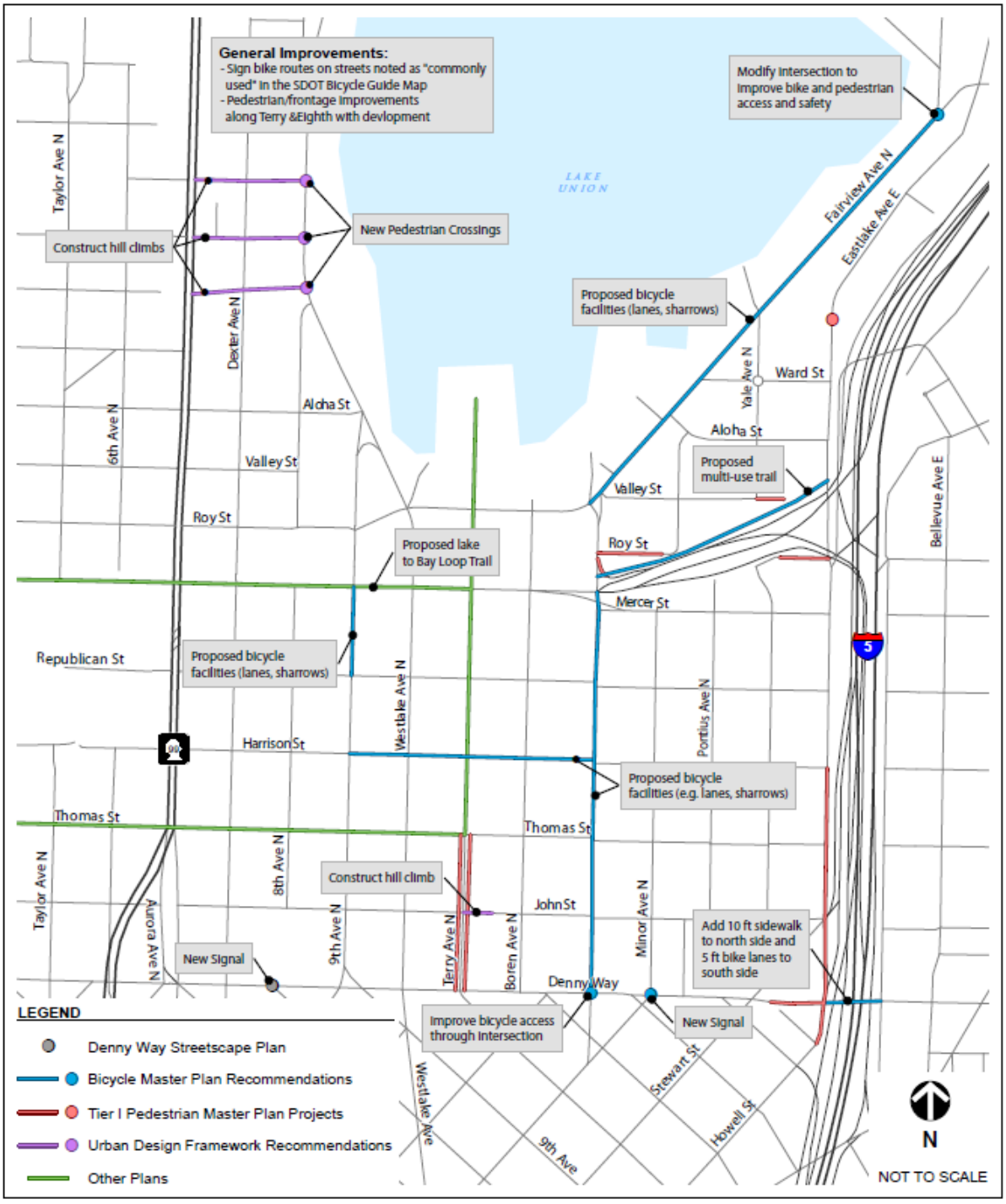
Source: Fehr & Peers, 2010

Figure 3.5-14
Roadway Improvement Not Assumed Under Future Conditions



Source: Fehr & Peers, 2010

Figure 3.5-15
Pedestrian and Bicycle Improvements Not Assumed Under Future Conditions



Source: Fehr & Peers, 2010

Trip Generation Methodology

The project team used an innovative trip generation analysis technique, known as the mixed-use development (MXD) model, to analyze the future year land use scenarios. The MXD model is based on a growing body of research, which focuses on the relationship between travel and the built environment. This method supplements conventional trip generation methods to capture effects related to built environment variables (known as the Ds) like **d**ensity, **d**iversity of land uses, **d**estinations (accessibility), **d**evelopment scale, pedestrian and bicycle **d**esign, and **d**istance to transit services, and **d**emographics. The proposed height and density alternatives in the South Lake Union area incorporate changes in a number of these variables that, in turn, would influence the neighborhood's travel characteristics. In short, projects with higher densities, a rich variety of land uses close to one another, and high quality bicycle, pedestrian, and transit environments have a lower vehicle trip generation rate. Travelers have more choices in terms of both the travel mode they choose and the distance they must travel to reach various destinations. When these projects are located in urban areas, this effect intensifies. This method avoids overestimating the number of vehicle trips that infill projects generate and provides a more reasonable picture of how travel characteristics change over time.

Traditional trip generation methodologies are not well suited to analyze the proposed height and density rezone alternatives. These methods often take trip generation estimates from the Institute of Transportation Engineers (ITE) and factor the results using mode split data from the City's travel model, US Census Bureau, or engineering judgment.

While traditional trip generation methods can account for the high share of non-auto modes in the City, they have limited ability to consider shifts in mode choice caused by major land use changes like those considered in South Lake Union for the following reasons:

- Typical mode split adjustments tend to assume continuation of current trends and have limited responsiveness to changes in the land use and the built environment (e.g., increased density, increased mix of uses) or transportation system (e.g., improved pedestrian and bicycle connectivity, improved transit service).
- Mode split data are often derived from the US Census Bureau. As time passes the, mode split estimates may not be applicable given changes in development patterns and socioeconomic conditions. This may be the case for the current study, as the Census results were ten years old at the time of this analysis.

The MXD model overcomes many of these shortcomings and explicitly accounts for how built environment variables, such as building forms, the mix of land uses (jobs/housing balance), densities, transit accessibility, and neighborhood connectivity, affect travel behavior and mode choice.

The MXD model was developed in cooperation with the US Environmental Protection Agency (EPA) and ITE. Over 200 mixed-use development sites across the United States were surveyed as part of the model development process and the model was validated using data from 16 independent mixed use sites. Additional details regarding the model development, validation, and statistical performance can be found in **Appendix E**.

Figure 3.5-16 compares the traditional trip generation methodology to the enhanced MXD model applied for this analysis.

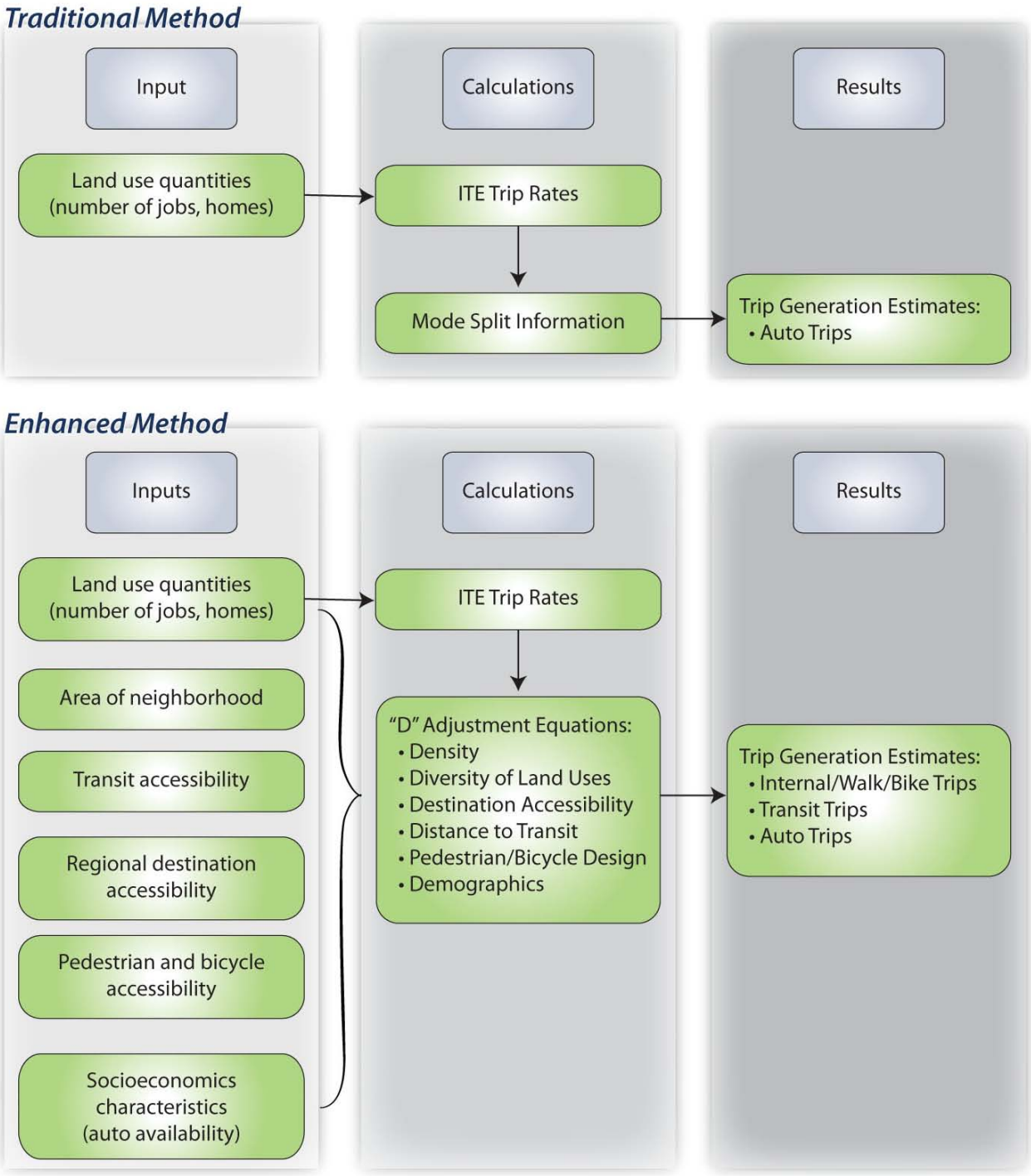
2031 South Lake Union Land Uses

The City of Seattle provided 2031 land use data (number of new housing units and jobs) for each of the four height and density alternatives:

- No Action Alternative – Development under Current Zoning
- Alternative 1 – Maximum Increases to Allowed Height and Density
- Alternative 2 – Mid-Range Increases to Allowed Height and Density
- Alternative 3 – Modest Increases to Allowed Height and Density

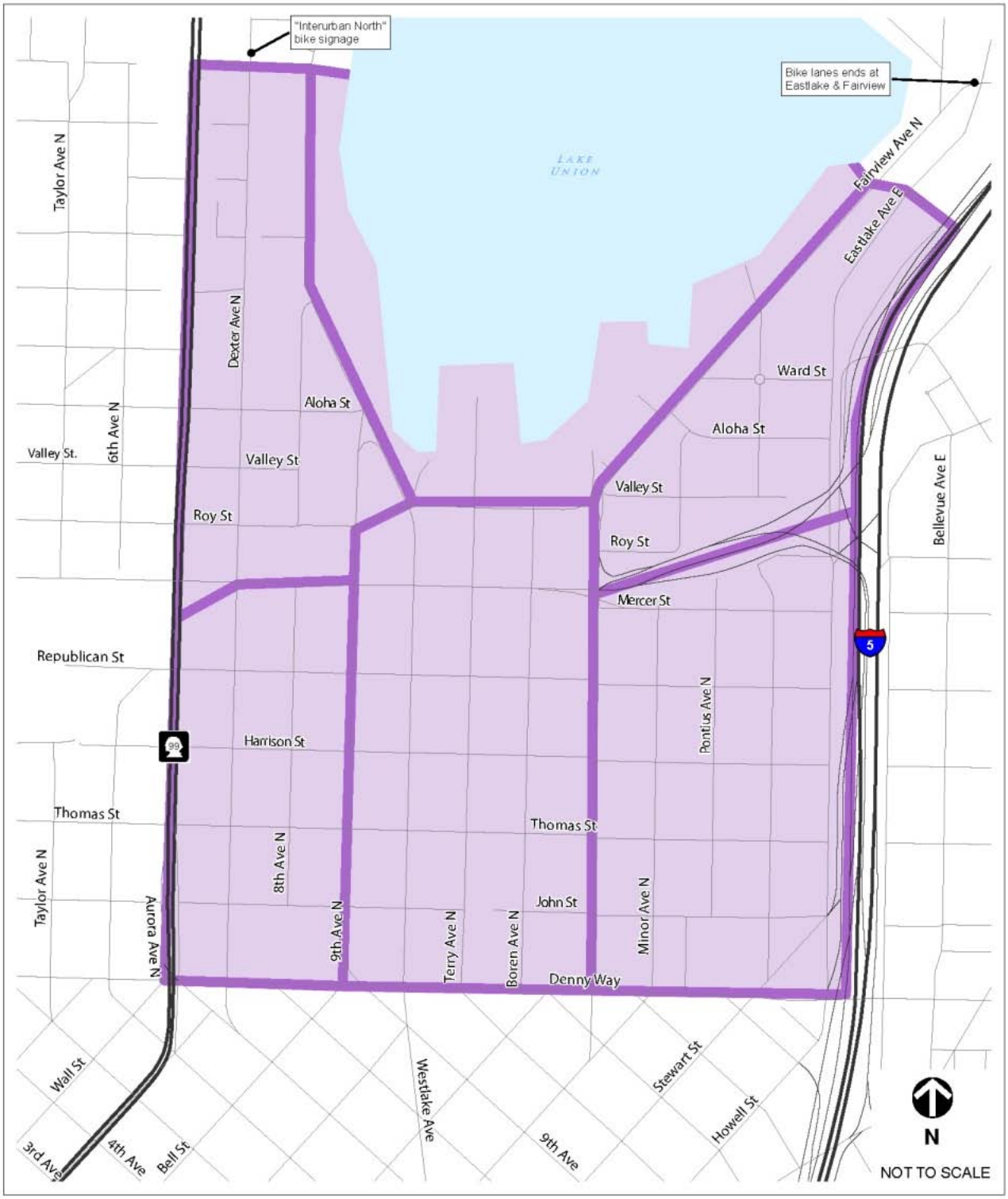
The 2031 land use data were developed according to the neighborhoods shown in **Figure 3.5-17**. The neighborhood boundaries were determined based on a number of factors, including the location of barriers (such as South Lake Union) and the clustering of land uses.

Figure 3.5-16
Comparison of Traditional and Enhanced Trip Generation Methods



Source: Fehr & Peers, 2010

Figure 3.5-17
Neighborhood Boundaries Used for Trip Generation



Source: Fehr & Peers, 2010

The chart below compares the 2031 land use totals (for housing units and jobs) for each of the height and density rezone alternatives. The totals for each alternative take into account existing uses, those that will be lost when parcels are redeveloped, and new development. For comparison purposes, the 2008 existing conditions land use totals from the latest version of the City of Seattle travel model are also summarized. The development totals shown below represent total land uses (number of households and jobs) for each of the time periods shown below and should not be confused with the growth targets or development capacities described in Chapter 2. The growth shown below is consistent with both the growth targets and development capacities.

As shown in the above chart, the No Action Alternative would have the fewest jobs and households under 2031 conditions (10,800 households and 34,047 jobs). Among the three height and density alternatives, all have the same number of households assumed under 2031 (13,500), and Alternatives 1 and 2 have the same number of jobs assumed (39,945). Alternative 3 has slightly fewer jobs assumed (36,449) since, as described earlier, this alternative has lower densities and a residential focus.

The chart above shows that Alternatives 1 and 2 have an identical level of development expected over the next 20 years despite different allowable densities and tower heights. This similarity is related to the assumption that only a limited amount (11,900 households and 21,900 jobs) of

development is expected to be built over the next 20 years, despite the differing zoning capacities. This is because Alternatives 1 and 2 will allow densities in excess of market demand for both housing and jobs. Alternative 3 will allow densities in excess of housing demand but not job demand, while the No Action Alternative will not provide enough density to meet market demand for housing or jobs.

Based on the land use totals described above, a GIS analysis was prepared for each of the future year alternatives (No Action, and Alternatives 1-3). This analysis measured key changes (as shown in **Figure 3.5-16**) such as the density of each neighborhood, the quality of the pedestrian environment (as measured by the frequency of crossing opportunities and block size), the mix of housing, retail, and employment, and other factors. **Table 3.5-8** presents the results of the trip generation estimate by mode for Daily and PM peak hour conditions. AM peak hour conditions were also calculated and those results, along with details of the calculations are presented in **Appendix E**.

As the table shows, the level of vehicle trip generation reflects the amount of land use development assumed under each future year alternative. For example, under PM peak hour conditions, Alternative 1 generates about 23 percent more vehicle trips when compared to the No Action Alternative. This result is reasonable considering that Alternative 1 contains about 25 percent more homes and 17 percent more employment than the No Action Alternative. Alternatives 1 and 2 generate about the same number of vehicle trips, and Alternative 3 generates trips at a level between Alternatives 1 and 2 and the No Action Alternative.

Table 3.5-8 also shows that the mode share predicted by the MXD model is relatively similar for each of the future year alternatives. This result is a reflection of several factors:

- The density of all the alternatives is relatively high
- The mix of land uses for all the alternatives is similar
- The roadway, pedestrian, bicycle, and transit networks are the same for all alternatives
- All the alternatives have the same proximity to major employment centers like Downtown Seattle and the University of Washington

Table 3.5-8 illustrates the gross ITE trip rates, followed by the breakdown by mode predicted by the MXD model.

Table 3.5-8
Trip Generation by Alternative

Alternative	Daily			PM Peak		
	Auto Trips (mode share %)	Non-auto Trips (mode share %)		Auto Trips (mode share %)	Non-auto Trips (mode share %)	
		Internal, Bicycle & Pedestrian	Transit		Internal, Bicycle & Pedestrian	Transit
No Action Alternative - Current Zoning	108,946 (49.4%)	70,540 (29.1%)	52,337 (21.6%)	12,648 (51.4%)	7,279 (26.9%)	6,091 (21.7%)
Alternative 1 - Maximum Increases to Height and Density	136,973 (48.3%)	93,828 (30.1%)	67,509 (21.6%)	15,554 (50.5%)	9,429 (27.8%)	7,371 (21.7%)
Alternative 2 - Mid-Range Increases to Height and Density	136,888 (48.3%)	93,908 (30.1%)	67,509 (21.6%)	15,548 (50.4%)	9,435 (27.8%)	7,371 (21.7%)
Alternative 3 - Moderate Increases to Height and Density	117,326 (48.1%)	81,403 (30.3%)	57,855 (21.6%)	13,605 (50.3%)	8,334 (28.0%)	6,449 (21.7%)

Source: Fehr & Peers, 2010.

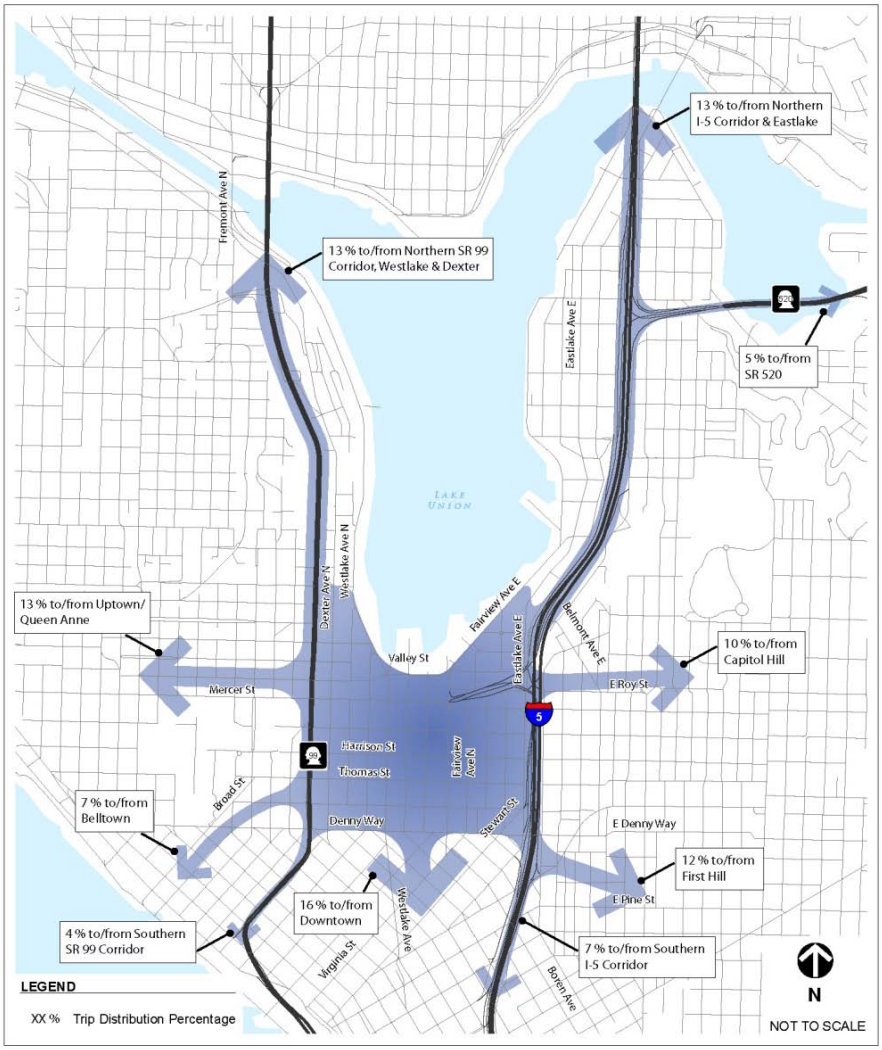
Note: See Appendix E for details on the mode share calculation. Auto trips include both SOV and HOV trips, so the number reported is not equivalent to person-trips. The Internal, Bicycle & Pedestrian and Transit categories are person-trips.

Trip Distribution

The City of Seattle model distributed the vehicle and transit trips presented in **Table 3.5-8** to the transportation system. The City of Seattle travel model indicated the following general distribution pattern for vehicle trips to and from the South Lake Union neighborhood in the PM peak period in 2031 (shown in **Figure 3.5-18**):

- 26% north via SR 99, I-5, or city streets
- 23% to Downtown/Belltown
- 22% east via city streets to Capitol Hill or First Hill
- 13% west via city streets to Queen Anne
- 11% south via SR 99 or I-5
- 5% east via SR 520

Figure 3.5-18
External Vehicle Trip Distribution



Source: Fehr & Peers, 2010

3.5.3 Environmental Deficiencies of the No Action Alternative

Analysis results and environmental deficiencies of the No Action Alternative are summarized in this section. Deficiencies are defined as:

- A study corridor operating at a d/c ratio of 0.90 or greater (LOS E or F conditions)
- A transit line operating at a load factor of 1.25 or greater
- An increase in pedestrian or vehicle traffic in an area experiencing pedestrian safety concerns
- An increase in pedestrian delay at signalized intersections
- An increase in bicycle or vehicle traffic in an area experiencing bicycle safety concerns

As defined above, deficiencies are future transportation operations that do not meet existing service standards. These deficiencies would be caused by future development and individual project-level mitigation could reduce the magnitude of the deficiency; however, this level of detail is not known and cannot be considered in this EIS. In this case, the term deficiency does not refer to an existing transportation system issue is the responsibility of the City to address.

The No Action Alternative serves as the baseline for the impact analysis. It represents the operations of the transportation system if no actions were taken by the City Council and no zoning changes are made in the South Lake Union neighborhood. As mentioned previously, all reasonably foreseeable[6] transportation improvements (see **Figure 3.5-13**) are assumed to be in place in 2031. The same transportation network is assumed for the No Action and all three height and density rezone alternatives.

AM and PM peak period traffic volume and transit ridership estimates were generated using the City's travel model. The City travel model accounts for background growth in traffic and transit ridership associated with increases in city and regional land uses anticipated over the next 20 years.

[6] As defined in Section 3.13.2, reasonably foreseeable improvements include projects that have full funding commitments and projects with partial funding commitments but with a strategy in place to raise the remaining funds.

Analysis Results

The following section describes the results of the evaluation of transportation conditions under the 2031 No Action Alternative. Transportation deficiencies are identified according to the criteria outlined in Section 3.13.4.

Study Corridors

Table 3.5-9 and **Figure 3.5-19** summarize the d/c ratios of the study corridors under the No Action Alternative. The following study corridors would operate at LOS E or F, exceeding the City's LOS standard, which constitutes a traffic operations deficiency:

- Fremont Bridge from N 35th Street to Westlake Avenue N
- Westlake Avenue N from Valley Street to Harrison Street
- Westlake Avenue N from Harrison Street to Denny Way
- Fairview Avenue N from Eastlake Avenue to Yale Avenue N
- Dexter Avenue N from Fremont Bridge to Valley Street
- Dexter Avenue N from Valley Street to Denny Way
- Mercer Street from Dexter Avenue N to Fairview Avenue N
- Denny Way from Aurora Avenue N to Stewart Street
- Boren Avenue from Denny Way to Pine Street
- Stewart Street from Eastlake Avenue E to Boren Avenue
- E Pine Street from Boren Avenue to Broadway
- Harrison Street from Aurora Avenue N to Eastlake Avenue N
- 9th Avenue N from Roy Street to Republican Street
- Howell Street/Eastlake Avenue from Stewart Street to Boren Avenue

Table 3.5-9
No Action Alternative: Demand-to-Capacity Ratios of Study Corridors

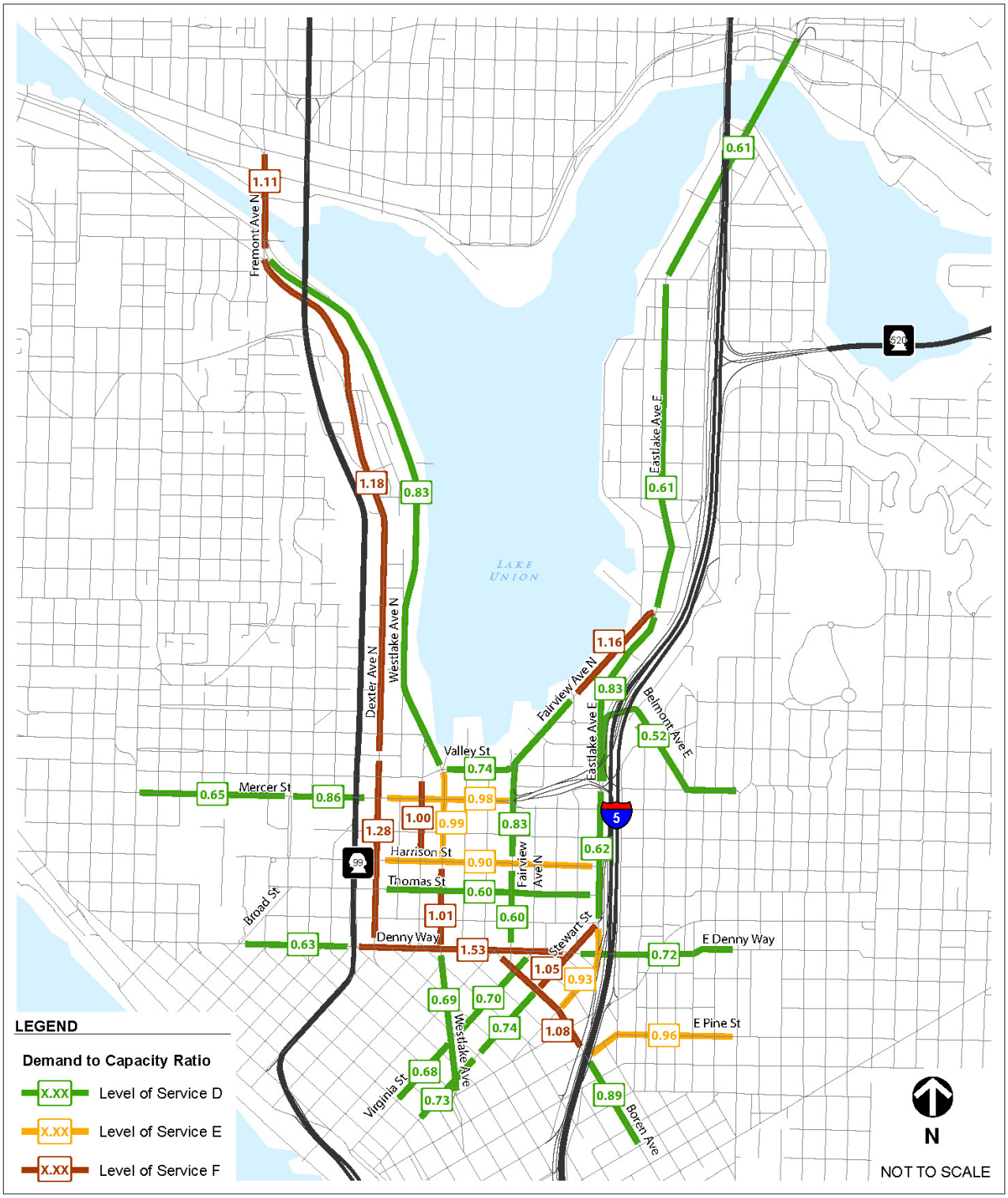
Road	Segment	Volume	Peak Hour	Peak Direction	Number of Through Lanes	Total Capacity	d/c Ratio/LOS
Fremont Bridge	**1) N 35th Street to Westlake Avenue N**	**1,768**	**PM**	**N**	**2**	**1,600**	**1.11/F**
Westlake Avenue N	2) Fremont Bridge to Valley Street	1,330	PM	N	2	1,600	0.83/D*
	3) Valley Street to Harrison Street	**1,040**	**PM**	**S**	**1.5**	**1,050**	**0.99/E**
	4) Harrison Street to Denny Way	**1,061**	**PM**	**S**	**1.5**	**1,050**	**1.01/F**
	5) Denny Way to Stewart Street	624	PM	N	1.5	900	0.69/D*
Eastlake Avenue E	6) N 40th Street to E Hamlin Street	1,166	AM	SW	2	1,920	0.61/D
	7) E Hamlin Street to Fairview Avenue N	1,163	AM	S	2	1,920	0.61/D
	8) Fairview Avenue to Lakeview Blvd E	578	AM	N	1	700	0.83/D*
	9) Lakeview Blvd E to Stewart Street	867	PM	S	2	1,400	0.62/D*
Fairview Avenue N.	**10) Eastlake Avenue to Yale Avenue N**	**810**	**AM**	**SW**	**1**	**700**	**1.16/F**
	11) Yale Avenue N to Harrison Street	1,389	PM	N	2	1,680	0.83/D
	12) Harrison Street to Denny Way	1,009	PM	N	2	1,680	0.60/D*
Dexter Avenue N	**13) Fremont Bridge to Valley Street**	**1,132**	**AM**	**S**	**1**	**960**	**1.18/F***
	14) Valley Street to Denny Way	**1,787**	**PM**	**N**	**2**	**1,400**	**1.28/F**
Valley Street	15) Westlake Avenue N to Fairview Avenue N	624	PM	E	1	840	0.74/D
Mercer Street	16) Queen Anne Avenue N to 5th Avenue N	1,091	PM	E	2	1,680	0.65/D
	17) 5th Avenue N to Dexter Avenue N	1,445	AM	E	2	1,680	0.86/D
	18) Dexter Avenue N to Fairview Avenue N	**2,057**	**AM**	**W**	**3**	**2,100**	**0.98/E**
Denny Way	19) Broad Street to Aurora Avenue N	1,053	AM	W	2	1,680	0.63/D
	20) Aurora Avenue N to Stewart Street	**1,607**	**PM**	**E**	**1.5**	**1,050**	**1.53/F***
	21) Stewart Street to Broadway E	1,151	AM	W	2	1,600	0.72/D

Road	Segment	Volume	Peak Hour	Peak Direction	Number of Through Lanes	Total Capacity	d/c Ratio/LOS
Broad Street	22) Denny Way to Westlake Avenue N	Segment does not exist under future conditions					
Boren Avenue	**23) Denny Way to Pine Street**	**1,297**	**AM**	**NW**	**2**	**1,200**	**1.08/F***
	24) Pine Street to University Street	1,068	PM	SE	2	1,200	0.89/D
Stewart Street	**25) Eastlake Avenue E to Boren Avenue**	**2,196**	**AM**	**SW**	**3.5**	**2,100**	**1.05/F**
	26) Boren Avenue to 7th Avenue	1,334	AM	SW	3	1,800	0.74/D
	27) 7th Avenue to 3rd Avenue	873	AM	SW	2	1,200	0.73/D
Virginia Street	28) Denny Way to Westlake Avenue N	839	PM	NE	2	1,200	0.70/D
	29) Westlake Avenue N to 3rd Avenue	1,215	PM	NE	3	1,800	0.68/D
E Pine Street	**30) Boren Avenue to Broadway**	**691**	**PM**	**W**	**1**	**720**	**0.96/E**
Lakeview/Belmont/Roy	31) Eastlake Avenue to Broadway E	415	PM	E	1	800	0.52/D
Thomas Street	32) Aurora Avenue N to Eastlake Avenue E	429	PM	E	1	720	0.60/D
Harrison Street	**33) Aurora Avenue N to Eastlake Avenue E**	**537**	**PM**	**E**	**1**	**600**	**0.90/E**
9th Avenue N	**34) Roy Street to Republican Street**	**698**	**PM**	**N**	**1**	**700**	**1.00/F**
Howell/Eastlake	**35) Stewart Street to Boren Avenue**	**1,113**	**PM**	**N**	**2**	**600**	**0.93/E**

Source: Fehr & Peers, 2010

Note: * These study corridors intersect or are adjacent to other study corridors that are expected to operate at LOS F conditions. Actual LOS may be worse because of queuing. Corridors that do not meet the City LOS standard are shown in bold.

Figure 3.5-19
Demand-to-Capacity Ratios – No Action Alternative



Source: Fehr & Peers, 2010

As defined by the HCM, the poor operations on the study corridors identified above can also be assumed to translate to poor intersection operations (LOS E and F) at key intersections along these corridors, such as Mercer Street/Westlake Avenue N, Mercer Street/Fairview Avenue N, Denny Way/Westlake Avenue N, and Denny Way/Boren Avenue.

Transit

As was the case under the existing conditions analysis, transit operations are assessed using load factors. Ridership, frequency, and capacity will change by 2031, so the City of Seattle travel model was used to predict future load factors. Details of the calculations and assumptions can be found in **Appendix E**.

The 2031 No Action Alternative AM peak hour load factors are shown in **Table 3.5-10**. Since the Seattle travel model does not explicitly model PM peak period transit trips (they are modeled as the reverse of the AM trips), these load factors would also apply to PM peak hour conditions.

Table 3.5-10
No Action Alternative: 2031 South Lake Union Transit AM Peak Hour Load Factors

Route	Termini Locations	Northbound	Southbound
5	Downtown, Shoreline	0.64	0.84
8	Uptown, Rainier Valley	0.89	0.88
16	Downtown, Northgate	0.53	0.77
17	Downtown, Loyal Heights	0.77	0.68
21	Downtown, Arbor Heights	1.17	-
25	Downtown, Laurelhurst	0.65	1.00
26	Downtown, Green Lake	0.83	0.77
28	Downtown, Broadview	1.19	0.84
29	**Downtown, Woodland Park**	1.19	**1.49**
56	**South Lake Union, West Seattle**	**1.38**	-
66	Downtown, Northgate	0.53	0.76
70	Downtown, University District	0.65	0.62
121	Downtown, Burien	0.67	-
308	Downtown, Lake Forest Park	-	0.97
313	Uptown, Bothell	-	0.45
316	Uptown, Shoreline	-	0.82
Rapid Ride	Downtown, Aurora Village Transit Center	0.62	0.80

Source: Fehr & Peers, 2010
Note: Dashes indicate either that the route does not serve South Lake Union or does not exist in the travel model in that direction.

Based upon the results above, two transit routes serving South Lake Union will not operate with acceptable load factors under the No Action Alternative.

- Route 29 (southbound in the AM peak hour and northbound in the PM peak hour)
- Route 56 (northbound in the AM peak hour and southbound in the PM peak hour)

Table 3.5-11 displays the estimated AM peak hour headways under 2031 conditions. Lines with headways greater than 15 minutes in at least one direction are noted in bold since they do not meet the UVTN transit frequency standards. Since the Action Alternatives themselves do not affect transit frequency, the headways in **Table 3.5-11** also apply to the Action Alternatives. The table highlights which routes do not meet the UVTN frequency goal; however, overall transit delay on these routes (caused by infrequent service) will increase with the additional ridership generated by each of 2031 development alternatives.

Based on the results, eight transit lines do not meet the UVTN frequency goal of 15 minute headways during the AM peak hour[7]. Those lines include Routes 16, 25, 28, 29, 66, 308, 313, and 316. The UVTN calls for 15 minute frequencies 18 hours of the day, every day of the week. The travel model does not provide transit information for that length of time. Therefore, the travel model's expected frequency improvements within the peak period along with current midday and weekend schedules were considered (see **Appendix E** for details). It appears likely that all routes with the exception of Aurora RapidRide would not meet the UVTN frequency goal. Although service within the weekday peak periods, as well as the midday period for many routes, would conform to the UVTN standards, it is unlikely that weekend schedules would change enough to meet the frequency goal.

[7] Since the Seattle travel model does not explicitly model PM peak hour conditions, similar conditions are also assumed in the evening peak hour.

Table 3.5-11
No Action Alternative: 2031 South Lake Union Transit AM Peak Hour Headways

Route	Termini Locations	Northbound	Southbound
5	Downtown, Shoreline	12	11
8	Uptown, Rainier Valley	7	7
16	**Downtown, Northgate**	**17**	**17**
17	Downtown, Loyal Heights	15	15
21	Downtown, Arbor Heights	9	-
25	**Downtown, Laurelhurst**	**24**	**26**
26	Downtown, Green Lake	15	12
28	**Downtown, Broadview**	**12**	**16**
29	**Downtown, Woodland Park**	**26**	**26**
56	South Lake Union, West Seattle	13	-
66	**Downtown, Northgate**	**26**	**26**
70	Downtown, University District	14	14
121	Downtown, Burien	13	-
308	**Downtown, Lake Forest Park**	**-**	**20**
313	**Uptown, Bothell**	**-**	**20**
316	**Uptown, Shoreline**	**-**	**20**
Rapid Ride	Downtown, Aurora Village Transit Center	6	6

Source: Fehr & Peers, 2010
Note: Headways were determined by applying the change between base and future year model headways to existing headways when possible. For new transit lines, the headways provided are direct model outputs. Actual headways will vary when transit lines are implemented.

Pedestrian and Bicycle System

As shown in the trip generation table (**Table 3.5-8**), the land use development anticipated to occur under the No Action Alternative will result in a substantial number of pedestrian and bicycle trips within the study area. Typically, pedestrian and bicycle travel demand-to-capacity analyses are not performed since commonly accepted analysis methodologies, like the HCM, would not identify any capacity shortages outside of exceptional cases like Manhattan or Downtown Chicago. Further, bicycle and pedestrian environments are more often measured by the quality of experience they provide rather than by their levels of congestion.

While pedestrian and bicycle demand/capacity issues are not likely, buildout under the No Action Alternative could lead to consequences such as:

- Additional pedestrian and vehicle travel at major intersections could lead to increased pedestrian delays if the City retimes traffic signals to facilitate vehicle flow.
- Additional vehicle traffic at the Mercer Street/Dexter Avenue N could increase vehicle-bicycle conflicts at this High Bicycle Accident intersection.

Parking

Although it is unknown how many off-street parking spaces will be provided by 2031, parking code requirements, typical market demand, and expected growth can give some indication of future supply, as shown in **Table 3.5-12**. A review of recently constructed commercial projects in South Lake Union indicate that many properties supply more parking than is required under the City Code; however, some of the newer properties near Denny Way provide parking at the minimum requirement. Based on this review, it was assumed that future parking would be supplied at similar ratios, which are shown in the table below.

No parking is required for multifamily residential uses in urban centers, which applies to most of the study area; however, parking is still usually provided. Again, based on actual supplied parking ratios, itwas assumed that one parking space per dwelling unit would be supplied for residential uses. The growth in households and jobs was used to estimate future additional off-street parking spaces under the No Action Alternative. Details of the calculation may be found in **Appendix E**.

Table 3.5-12
No Action Alternative: Estimated Additional Off-Street Parking Supply

Alternative	Residential	Retail	Non-Retail	Total
Assumed Supply	1 space/ dwelling unit	3 spaces /ksf	1.5 space/ksf	
No Action	9,200	3,131	7,305	19,636

Source: City of Seattle Municipal Code 23.54.015, 2010;
http://seattlecommercialpropertydirectory.com/
Note: Basic retail and office requirements published in the City Code were used for this analysis, and mirror the assumptions used in the Downtown Height & Density EIS. Residential parking was assumed to be provided based on market demand at one space per unit.

The City and King County Metro are currently considering locations to be used as bus layover areas, which has the potential to remove on-street parking from the South Lake Union neighborhood. If current parking demand trends continue as highlighted by the existing peak period parking shortages near the Amazon campus, there will likely be at least

temporary shortages for both on-street and off-street parking under the No Action Alternative, particularly around office uses. The relationship between parking supply and cost will cause prices to climb as demand approaches or exceeds supply. In turn, this will cause some travelers to switch to modes such as transit, thereby freeing up some parking.

Off-street parking shortages often result in spillover to adjacent neighborhoods, but this may not be a problem in South Lake Union. The adjacent areas in Capitol Hill, Lower Queen Anne, and Downtown are either difficult to access or offer paid parking only, making them inconvenient parking locations.

Freight

As described in the Existing Conditions analysis section, the quality of freight movement is assessed based on the d/c ratios on major truck streets. As shown in **Table 3.5-9**, traffic congestion on Mercer Street between Dexter Avenue and Fairview Avenue N would increase substantially when compared to existing conditions. This increase in traffic congestion will lead increased difficulty for trucks to maneuver and increased travel times, which could delay trucking operations. This is considered a freight mobility deficiency in the area.

Note that the increase in traffic congestion is caused by both additional development in South Lake Union and regional traffic growth. While Valley Street would operate at an acceptable level of congestion under the No Action Alternative; however, it is unlikely that this would remain a major truck street after the Mercer East Corridor project is complete.

Additionally, as the South Lake Union neighborhood develops under the No Action Alternative, there could be localized freight deficiencies related to the lack of loading areas and small curb radii that trucks cannot navigate.

The removal of Broad Street between 5th Avenue N/Thomas Street and Mercer Street will leave a gap in the City of Seattle Major Truck Street network. This gap does not constitute a freight mobility deficiency since freight traffic can use arterial streets. However, the City should update its Major Truck Street system to identify a replacement for Broad Street.

Traffic Safety

As described earlier, the City of Seattle evaluates traffic safety concerns based on the definition of High Accident Locations. Since High Accident Locations calculate the average rate of collisions per year at intersections without any regard to the traffic flow through the intersection, the

increased traffic volumes anticipated under the No Action Alternative could lead to the identification of additional High Accident Locations. While there may be more High Accident Locations under future conditions with the No Action Alternative, there is no data available to suggest that a volume-based collision rate (e.g., collisions per million entering vehicles) will increase with buildout of the No Action Alternative.

3.5.4 Impact Identification

The 2031 No Action Alternative serves as the baseline for identifying impacts to transportation facilities in 2031 caused by the Action Alternative. This section describes the methodology used to identify impacts under each of the height and density rezone alternatives.

A transportation impact is said to occur if any of the proposed rezone actions would:

- Cause an increase in traffic demand that results in a study corridor, that operates acceptably under the 2031 No Action Alternative, to operate unacceptably (d/c ratio of 0.9, which equates to LOS E or F conditions)
- Cause an increase in traffic on a study corridor that operates unacceptably (as measured by d/c ratios and LOS) under the 2031 No Action scenario that results in the d/c ratio increasing by at least .01 (increases in d/c ratios of less than .01 are less than typical daily fluctuations and are not noticeable by drivers – see **Appendix E** for clarification)
- Lead to an increase in the peak hour load factor on a transit line which exceeds King County Metro's standard of 1.25
- Increase pedestrian or vehicle traffic in an area experiencing pedestrian safety concerns
- Increase pedestrian delay at signalized intersections
- Increase bicycle or vehicle traffic in an area experiencing bicycle safety concerns

3.5.5 Environmental Impacts of Action Alternatives

This section provides the evaluation of each of the height and rezone alternatives in year 2031. Due to the similarities among the alternatives, they are all addressed in the same section to minimize redundancy. The impacts and potential mitigation measures for all alternatives are described in the following section.

Traffic volume estimates for each of the three height and density rezone alternatives uses the same methodology as described for the No Action

Alternative. See the trip generation discussion in Sections 3.13.1 and 3.13.3 for the full details.

Analysis Results

The following section describes the results of the evaluation of transportation conditions under each of the project alternatives in 2031.

Study Corridors

Table 3.5-13 and **Figures 3.5-20, 3.5-21 and 3.5-22** summarize the demand-to-capacity ratios of the study corridors under the action alternatives. Transportation operations impacts, which are based on the criteria and thresholds described in Section 3.13.4, are noted in bold and are highlighted below.

Under all three height and density alternatives, the following study corridors experience impacts to traffic operations:

- Westlake Avenue N from Valley Street to Harrison Street
- Westlake Avenue N from Harrison Street to Denny Way
- Mercer Street from Dexter Avenue N to Fairview Avenue N
- Denny Way from Aurora Avenue N to Stewart Street
- Boren Avenue from Denny Way to Pine Street
- Boren Avenue from Pine Street to University Street
- Stewart Street from Eastlake Avenue E to Boren Avenue
- Harrison Street from Aurora Avenue N to Eastlake Avenue E
- 9th Avenue N from Roy Street to Republican Street

In addition to those previously listed, the following study corridors are impacted under Alternatives 1 and 2:

- Fremont Bridge
- Eastlake Avenue E from Fairview Avenue to Lakeview Blvd E
- Dexter Avenue N from Valley Street to Denny Way
- E Pine Street from Boren Avenue to Broadway
- Howell Street/Eastlake Avenue from Stewart Street to Boren Avenue

As defined by the HCM, the poor operations on the study corridors identified above can also be assumed to translate to poor intersection operations (LOS E and F) at key intersections along these corridors, such as Mercer Street/Westlake Avenue N, Mercer Street/Fairview Avenue N, Denny Way/Westlake Avenue N, and Denny Way/Boren Avenue.

Table 3.5-13
Demand-To-Capacity Ratios of Study Corridors

Road	Segment	NO ACTION ALTERNATIVE			ALTERNATIVE 1			ALTERNATIVE 2			ALTERNATIVE 3			
		Volume	Peak Hour/ Direction	d/c Ratio/ LOS	Volume	Peak Hour/ Direction	d/c Ratio/ LOS	Volume	Peak Hour/ Direction	d/c Ratio/ LOS	Volume	Peak Hour/ Direction	d/c Ratio/ LOS	
Fremont Bridge	1) N 35th Street to Westlake Avenue N	1,768	PM/N	1.11/F	**1,813**	**PM/N**	**1.13/F**	**1,805**	**PM/N**	**1.13/F**	1,779	PM/N	1.11/F	
Westlake Avenue N	2) Fremont Bridge to Valley Street	1,330	PM/N	0.83/D	1,336	PM/N	0.84/D	1,336	PM/N	0.84/D	1,332	PM/N	0.83/D	*
	3) Valley Street to Harrison Street	1,040	PM/S	0.99/E	**1,130**	**PM/S**	**1.08/F**	**1,123**	**PM/S**	**1.07/F**	**1,071**	**PM/S**	**1.02/F**	*
	4) Harrison Street to Denny Way	1,061	PM/S	1.01/F	**1,137**	**PM/S**	**1.08/F**	**1,135**	**PM/S**	**1.08/F**	**1,090**	**PM/S**	**1.04/F**	*
	5) Denny Way to Stewart Street	624	PM/N	0.69/D	657	PM/N	0.73/D	649	PM/N	0.72/D	640	PM/N	0.71/D	*
Eastlake Avenue E	6) N 40th Street to E Hamlin Street	1,166	AM/SW	0.61/D	1,210	AM/SW	0.63/D	1,208	PM/NE	0.63/D	1,177	AM/SW	0.61/D	
	7) E Hamlin Street to Fairview Avenue N	1,163	AM/S	0.61/D	1,224	PM/N	0.64/D	1,221	PM/N	0.64/D	1,175	AM/S	0.61/D	*
	8) Fairview Avenue to Lakeview Blvd E	578	AM/N	0.83/D	**641**	**PM/N**	**0.92/E**	**628**	**PM/N**	**0.90/E**	608	PM/N	0.87/D	
	9) Lakeview Blvd E to Stewart Street	867	PM/S	0.62/D	921	PM/S	0.66/D	922	PM/S	0.66/D	888	PM/S	0.63/D	*
Fairview Avenue N.	10) Eastlake Avenue to Yale Avenue N	810	AM/SW	1.16/F	801	AM/SW	1.14/F	808	AM/SW	1.15/F	792	AM/SW	1.13/F	
	11) Yale Avenue N to Harrison Street	1,389	PM/N	0.83/D	1,392	PM/N	0.83/D	1,418	PM/N	0.84/D	1,388	PM/N	0.83/D	*
	12) Harrison Street to Denny Way	1,009	PM/N	0.60/D	1,033	PM/N	0.61/D	1,030	PM/N	0.61/D	1,014	PM/N	0.60/D	*
Dexter Avenue N	13) Fremont Bridge to Valley Street	1,132	AM/S	1.18/F	1,115	AM/S	1.16/F	1,102	AM/S	1.15/F	1,127	AM/S	1.17/F	*
	14) Valley Street to Denny Way	1,787	PM/N	1.28/F	**1,810**	**PM/N**	**1.29/F**	**1,807**	**PM/N**	**1.29/F**	1,795	PM/N	1.28/F	*
Valley Street	15) Westlake Avenue N to Fairview Avenue N	624	PM/E	0.74/D	657	PM/E	0.78/D	664	PM/E	0.79/D	646	PM/E	0.77/D	
Mercer Street	16) Queen Anne Avenue N to 5th Avenue N	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D	
	17) 5th Avenue N to Dexter Avenue N	1,445	AM/E	0.86/D	1,445	AM/E	0.86/D	1,445	AM/E	0.86/D	1,445	AM/E	0.86/D	*
	18) Dexter Avenue N to Fairview Avenue N	2,057	AM/W	0.98/E	**2,097**	**AM/W**	**1.00/F**	**2,109**	**AM/W**	**1.00/F**	**2,078**	**AM/W**	**0.99/E**	*
Denny Way	19) Broad Street to Aurora Avenue N	1,053	AM/W	0.63/D	1,058	AM/W	0.63/D	1,084	PM/E	0.65/D	1,057	AM/W	0.63/D	*
	20) Aurora Avenue N to Stewart Street	1,607	PM/E	1.53/F	**1,642**	**PM/E**	**1.56/F**	**1,648**	**PM/E**	**1.57/F**	**1,616**	**PM/E**	**1.54/F**	*
	21) Stewart Street to Broadway E	1,151	AM/W	0.72/D	1,195	AM/W	0.75/D	1,193	AM/W	0.75/D	1,161	AM/W	0.73/D	*
Broad Street	22) Denny Way to Westlake Avenue N	Segment does not exist under future conditions												
Boren Avenue	23) Denny Way to Pine Street	1,297	AM/NW	1.08/F	**1,329**	**AM/NW**	**1.11/F**	**1,333**	**AM/NW**	**1.11/F**	**1,309**	**AM/NW**	**1.09/F**	
	24) Pine Street to University Street	1,068	PM/SE	0.89/D	**1,095**	**PM/SE**	**0.91/E**	**1,097**	**PM/SE**	**0.91/E**	**1,080**	**PM/SE**	**0.90/E**	
Stewart Street	25) Eastlake Avenue E to Boren Avenue	2,196	AM/SW	1.05/F	**2,262**	**AM/SW**	**1.08/F**	**2,283**	**AM/SW**	**1.09/F**	**2,232**	**AM/SW**	**1.06/F**	*
	26) Boren Avenue to 7th Avenue	1,334	AM/SW	0.74/D	1,347	AM/SW	0.75/D	1,356	AM/SW	0.75/D	1,335	AM/SW	0.74/D	
	27) 7th Avenue to 3rd Avenue	873	AM/SW	0.73/D	898	AM/SW	0.75/D	898	AM/SW	0.75/D	884	AM/SW	0.74/D	

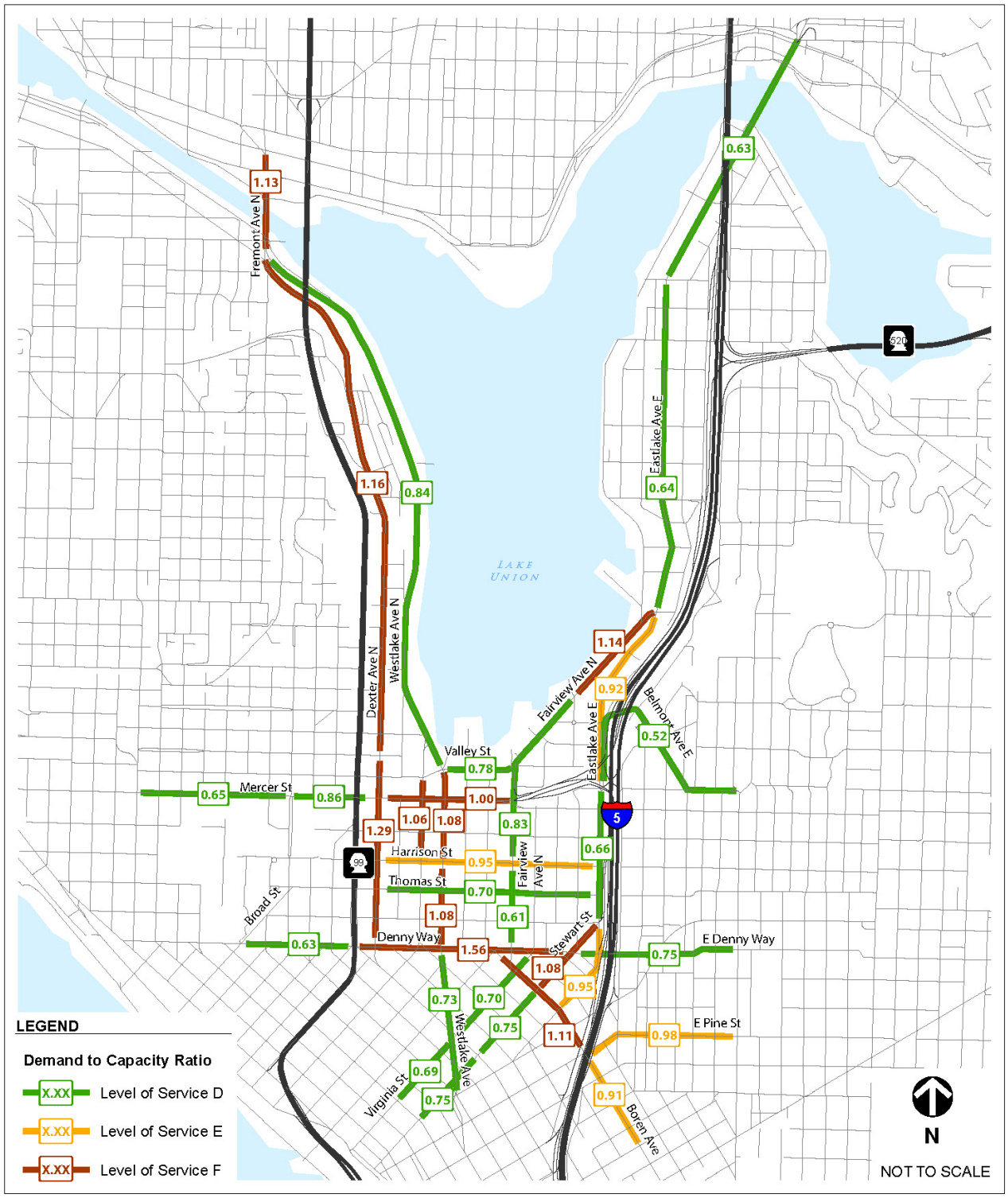
Road	Segment	NO ACTION ALTERNATIVE Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 1 Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 2 Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 3 Volume	Peak Hour/ Direction	d/c Ratio/ LOS	
Virginia Street	28) Denny Way to Westlake Avenue N	839	PM/NE	0.70/D	834	PM/NE	0.70/D	835	PM/NE	0.70/D	839	PM/NE	0.70/D	*
	29) Westlake Avenue N to 3rd Avenue	1,215	PM/NE	0.68/D	1,233	PM/NE	0.69/D	1,230	PM/NE	0.68/D	1,222	PM/NE	0.68/D	
E Pine Street	30) Boren Avenue to Broadway	691	PM/W	0.96/E	**705**	**AM/W**	**0.98/E**	**705**	**PM/W**	**0.98/E**	692	AM/W	0.96/E	
Lakeview/Belmont/Roy	31) Eastlake Avenue to Broadway E	415	PM/E	0.52/D	415	PM/E	0.52/D	415	PM/E	0.52/D	415	PM/E	0.52/D	
Thomas Street	32) Aurora Avenue N to Eastlake Avenue E	429	PM/E	0.60/D	505	PM/E	0.70/D	505	PM/E	0.70/D	459	PM/E	0.64/D	*
Harrison Street	33) Aurora Avenue N to Eastlake Avenue E	537	PM/E	0.90/E	**569**	**PM/E**	**0.95/E**	**588**	**PM/E**	**0.98/E**	**549**	**PM/E**	**0.92/E**	*
9th Avenue N	34) Roy Street to Republican Street	698	PM/N	1.00/F	**741**	**PM/N**	**1.06/F**	**753**	**PM/N**	**1.08/F**	**713**	**PM/N**	**1.02/F**	
Howell/Eastlake	35) Stewart Street to Boren Avenue	1,113	PM/N	0.93/E	**1,140**	**PM/N**	**0.95/E**	**1,130**	**PM/N**	**0.94/E**	1,115	PM/N	0.93/E	

Note: Bold text signifies a transportation operations impact.

* These study corridors intersect or are adjacent to other study corridors that are expected to operate at LOS F conditions. Actual LOS may be worse because of queuing.

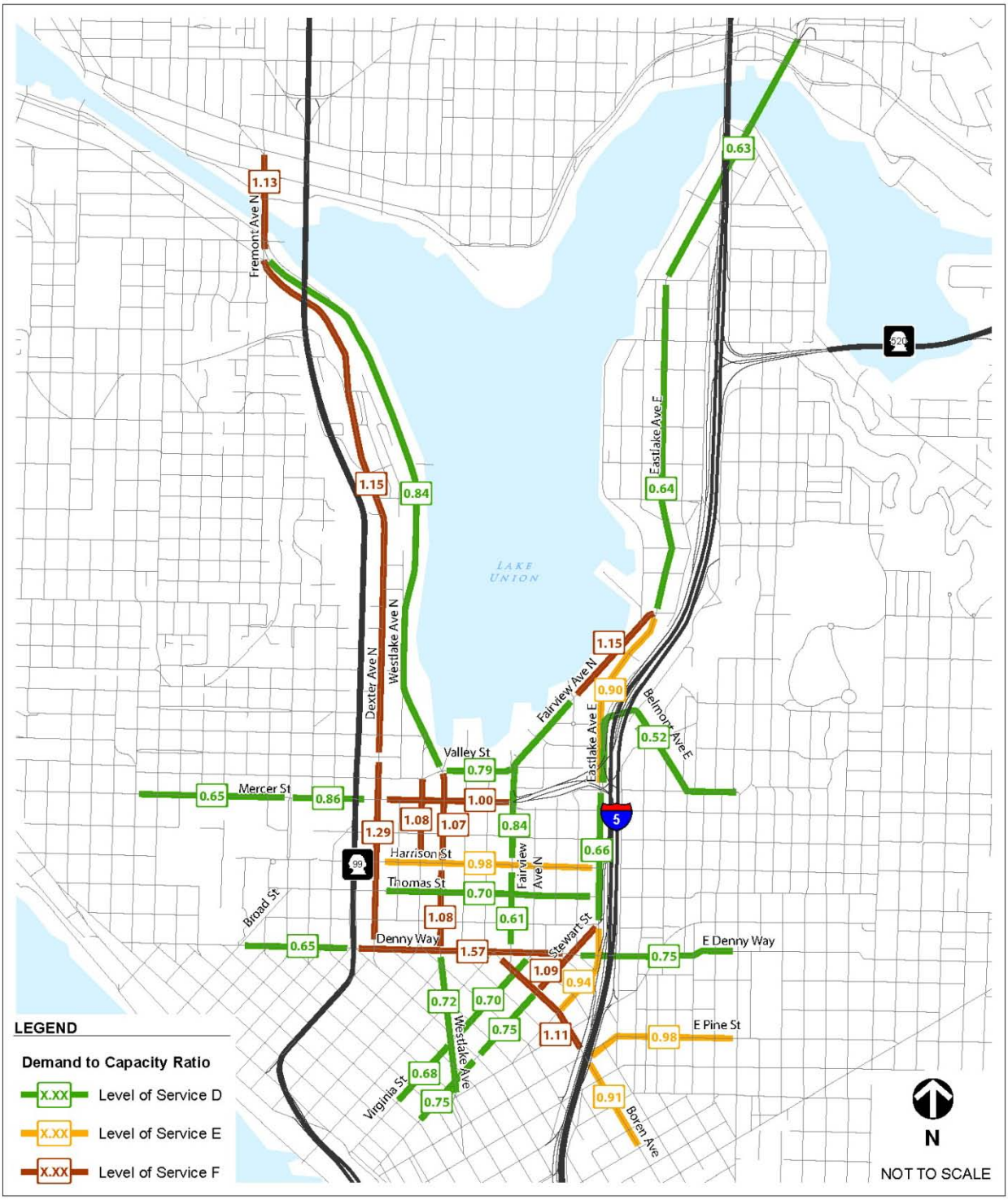
Source: Fehr & Peers, 2010

Figure 3.5-20
Demand-to-Capacity Ratios – Alternative 1



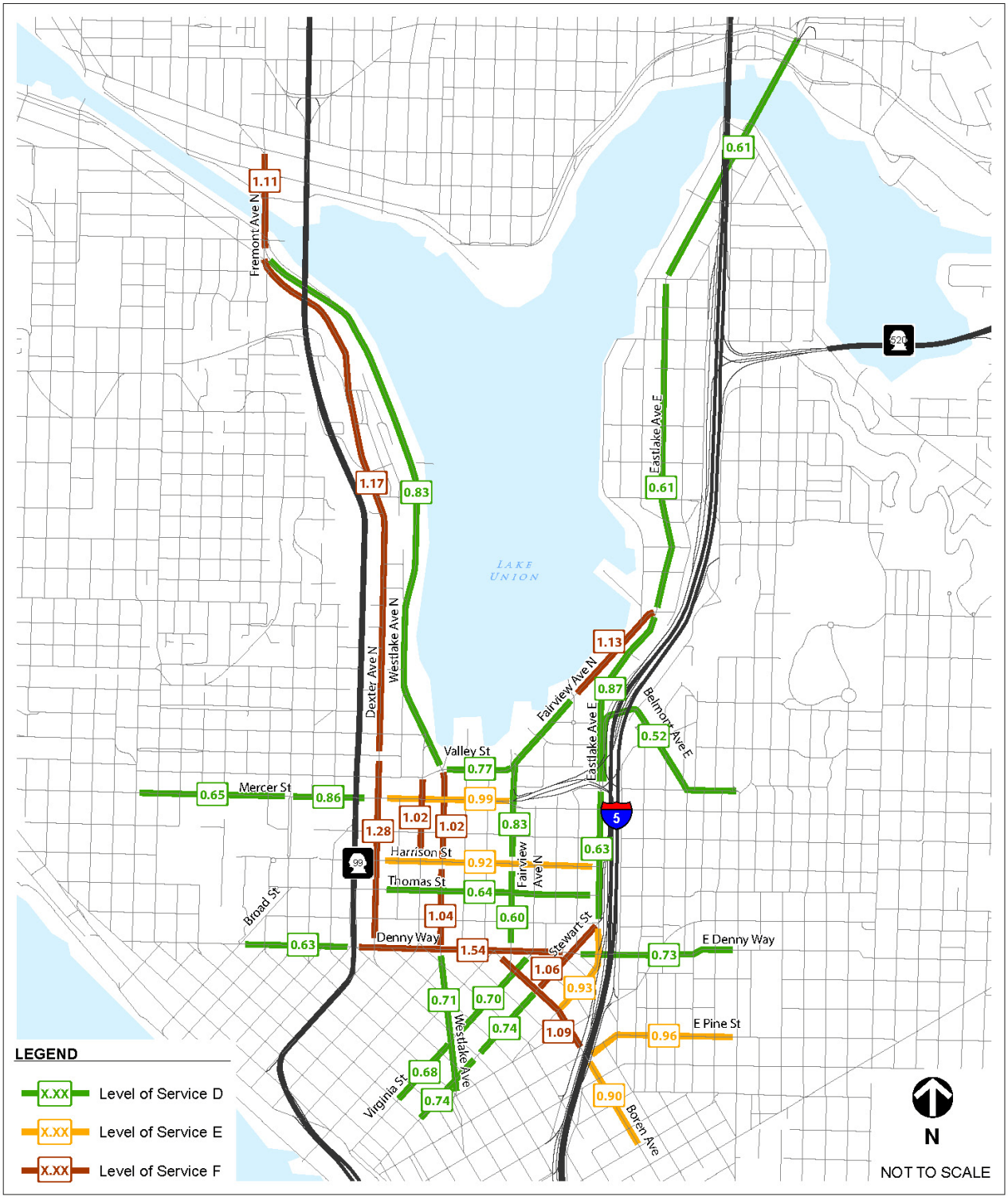
Source: Fehr & Peers, 2010

Figure 3.5-21
Demand-to-Capacity Ratios – Alternative 2



Source: Fehr & Peers, 2010

Figure 3.5-22
Demand-to-Capacity Ratios – Alternative 3



Source: Fehr & Peers, 2010

Transit

Transit ridership among the three height and density alternatives is very similar and the Action results shown in **Table 3.5-14** are representative of the load factors expected under all three height and density alternatives. The results from the No Action Alternative are included for comparison.

Table 3.5-14
Action and No Action Comparison: 2031 South Lake Union Transit Route AM Load Factors

Route	Termini Locations	No Action		Action	
		NB	SB	NB	SB
5	Downtown, Shoreline	0.64	0.84	0.68	0.84
8	Uptown, Rainier Valley	0.89	0.88	1.01	0.95
16	Downtown, Northgate	0.53	0.77	0.53	0.77
17	Downtown, Loyal Heights	0.77	0.68	0.93	0.86
21	**Downtown, Arbor Heights**	1.17	-	**1.35**	-
25	**Downtown, Laurelhurst**	1.19	0.84	0.65	1.19
26	Downtown, Green Lake	0.65	1.00	1.04	0.88
28	**Downtown, Broadview**	0.83	0.77	**1.40**	0.97
29	**Downtown, Woodland Park**	1.19	**1.49**	**1.49**	**1.79**
56	**South Lake Union, West Seattle**	**1.38**	-	**1.53**	-
66	Downtown, Northgate	0.53	0.76	0.53	0.76
70	Downtown, University District	0.65	0.62	0.81	0.92
121	Downtown, Burien	0.67	-	0.87	-
308	Downtown, Lake Forest Park	-	0.97	-	1.05
313	Uptown, Bothell	-	0.45	-	0.60
316	Uptown, Shoreline	-	0.82	-	0.93
Rapid Ride	Downtown, Aurora Village Transit Center	0.62	0.80	0.68	0.80

Source: Fehr & Peers, 2010

Note: Dashes indicate either that the route does not serve South Lake Union or does not exist in the travel model in that direction.

Transit lines that would operate unacceptably under the Action Alternatives include:

- Route 21 (northbound AM and southbound PM)
- Route 28 (northbound AM and southbound PM)
- Route 29 in both directions (AM and PM peak hours)
- Route 56 (northbound AM and southbound PM)

The transit lines above are considered to be impacted by the three height and density alternatives.

The load factor of the South Lake Union Streetcar was also analyzed. The streetcar seats 29, but has a total capacity of 140. Ridership data from 2010 indicates the current load factor is 0.27 (assuming total capacity rather than seating capacity). The City of Seattle travel model assumes headways will decrease from 15 minutes to 10 minutes by 2031[8], resulting in a 50 percent increase in capacity. This capacity increase will keep pace with the future ridership estimates from the City's travel model, causing the load factor to remain at 0.27 in 2031.

Since the Action Alternatives do not include any changes to transit headways in the area, transit frequency is the same as under the No Action Alternatives (see **Table 3.5-11**). As described in the previous section, only the Aurora Rapid Ride Line is expected to meet the frequency goals outlined in the UVTN.

Pedestrian and Bicycle System

As described in the No Action Alternative analysis, the increased land uses associated with the height and density alternatives will lead to a substantial increase in the number of bicycle and pedestrian trips within the study area. However, because of the exceptional levels of pedestrian and bicycle activity required to trigger poor LOS conditions as defined by the HCM, no pedestrian or bicycle demand/capacity impacts are anticipated under the three height and density alternatives.

While no bicycle or pedestrian demand/capacity impacts are anticipated, there are several adverse impacts to the pedestrian and bicycle system based on the impact identification criteria listed in Section 3.13.4:

[8] This reduction in headways assumes that a fourth car is purchased.

- The increased heights and densities associated with each of the alternatives will lead to additional traffic demand on area roadways, which could result in longer traffic signal cycle lengths. Longer cycle lengths are associated with increased pedestrian delay, which discourages pedestrian travel. Any increases in pedestrian delay at intersections would be an impact to pedestrian mobility.
- Additional vehicle traffic at the Mercer Street/Dexter Avenue N could increase vehicle-bicycle conflicts at this High Bicycle Accident intersection.

Parking

The growth in households and jobs for each action alternative was used to estimate future additional parking spaces given current parking code requirements for commercial uses. Despite no minimum requirements for multifamily residential uses in the study area, parking is usually provided. The assumption for this analysis is that one parking space per dwelling unit would be built, as shown in **Table 3.5-15**. Details of the calculation may be found in **Appendix E**.

Table 3.5-15
No Action and Action Alternatives Comparison: Estimated Additional Parking Supply

Alternative	Residential	Retail	Non-Retail	Total
Assumed Supply	1 space/ dwelling unit	3 spaces /ksf	1.5 space/ksf	
No Action	9,200	3,131	7,305	19,636
Alternative 1	11,900	4,284	9,996	26,180
Alternative 2	11,900	4,284	9,996	26,180
Alternative 3	11,900	3,600	8,400	23,900

Source: City of Seattle Municipal Code 23.54.015, 2010, http://seattlecommercialpropertydirectory.com/
Note: Parking codes vary depending on specific use. Basic retail and office requirements were used for this analysis, and mirror the assumptions used in the Downtown Height & Density EIS.

As was noted in the No Action Alternative parking discussion, if current parking demand trends continue as highlighted by the existing peak period parking shortages near the Amazon campus, there will likely be shortages of both on-street and off-street parking in the future particularly around office uses. The level of impact will vary depending on the intensity of land use. The balance between parking supply, parking cost, and alternative mode use will cause some travelers to change

modes. Therefore, the parking impact may not be long-term since travelers will shift to other modes in response to limited parking supply and higher parking cost.

Although Alternatives 1 and 2 would have the most demand, they would also provide more supply based on market trends and the City's existing minimum parking requirements. Likewise, the No Action Alternative would have less demand, but also less supply. Because of the relationship between development intensity, parking supply, and parking demand, all Action alternatives are expected to have short-term parking impacts.

Parking shortages typically result in spillover to adjacent neighborhoods, but this may not be a problem in South Lake Union. The adjacent areas in Capitol Hill, Lower Queen Anne, and Downtown are either difficult to access or offer only paid parking, making them unattractive places to park.

Freight

As shown in **Table 3.5-13**, d/c ratios on Mercer Street between Dexter Avenue and Fairview Avenue N would increase under the three height and density alternatives. This increase in traffic will exacerbate LOS E and F conditions, which will increase delay and reduce mobility for freight vehicles on these routes. This is considered an impact to freight mobility.

As was the case under the No Project Alternative, the increase in traffic congestion along the Major Truck Streets is caused by both additional development in South Lake Union and regional traffic growth. Also, with the removal of Broad Street between 5th Avenue N/Thomas Street and Mercer Street to accommodate the SR 99 bored tunnel, the City should update its Major Truck Street system to identify a replacement route.

In addition to the area-wide issues described above, there are also potential localized freight impacts that could occur as the South Lake Union neighborhood develops. As was the case under the No Action Alternative, impacts to freight mobility could be caused by lack of loading areas and small curb radii that cannot be navigated by trucks.

Traffic Safety

As described under the No Action Alternative analysis, while it is likely that the total number of vehicle collisions will increase proportionally with the increase in traffic in the South Lake Union area, there is nothing to suggest that the volume-based rate of vehicle-to-vehicle collisions will increase with the implementation of the height and density rezone alternatives. Therefore, no significant traffic safety impacts are anticipated.

3.5.6 Mitigation Strategies

This section identifies potential mitigation measures that could be implemented to lessen the magnitude of the impacts identified in the previous section.

Mitigation strategies to address traffic impacts can take one of two approaches: increase the supply of facilities, which usually takes the form of projects that increase roadway capacity, or decrease the demand for roadway capacity by reducing the number of vehicle trips. The MXD trip generation measures the reduction in demand that results from improving the bicycle, transit, and pedestrian environment. Other proven strategies to decrease vehicle demand include incentives to take transit (such as employer-subsidized transit passes) and disincentives to drive (such as parking management strategies). From both a policy and feasibility perspective, increasing roadway capacity is undesirable and cost-prohibitive. Therefore, the mitigation strategy for South Lake Union focused on methods to decrease the number of vehicle trips and maximize the number of bicycle, pedestrian, and transit trips, in order to impact mode splits.

Given the large scale of the height and density alternatives, the mitigation strategy focused on four main themes:

1. Improving the pedestrian and bicycle network. Projects listed in various plans/documents including the *Pedestrian Master Plan*[9], *Bicycle Master Plan*, and *South Lake Union Urban Design Framework* were considered as mitigation measures to address roadway corridor impacts and pedestrian and bicycle safety impacts. As described earlier, there is a well documented link between improved bicycle and pedestrian accessibility and reduced demand for vehicle travel.
2. Expanding travel demand management strategies. Given cost, right-of-way, and environmental constraints, it was deemed infeasible to provide additional roadway and intersection capacity beyond what is currently planned to reduce impacts to traffic congestion and freight mobility. Therefore managing demand for auto travel is a critical element to reducing traffic congestion and

[9] The Pedestrian Master Plan identifies locations where sidewalk or crossing improvements are desirable, but does not propose specific solutions. The project team assumed sidewalks and crossings would be added where it was reasonably clear that was the relevant improvement.

freight impacts. The City has well established Commute Trip Reduction and Transportation Management Programs in the area. This mitigation strategy looks to expand on the travel demand management strategies proposed as part of the CTR and TMP programs to include new parking-related strategies.

3. City of Seattle and King County Metro should work together to identify capital and operational funding options to support increased transit service. Provide capital improvement funding support for new transit vehicles to reduce headways and decrease the passenger load on key routes and to free resources for other potential transit service expansion.
4. Increasing roadway capacity through limited roadway and intersection improvement projects identified in existing plans. No currently unplanned roadway or intersection widening projects were considered because of limited right-of-way and "induced vehicle travel[10]" impacts that are counter to the mode share goals in the *Seattle Comprehensive Plan* and the *South Lake Union Neighborhood Plan*. Moreover, City policies limit the ability to consider additional capacity expansion that is not in existing plans.

Using the framework described above, four packages of potential mitigation measures were developed to lessen the transportation impacts in the South Lake Union area. The packages are: bicycle and pedestrian system improvements, travel demand management measures, transit system enhancements, and roadway capacity enhancements. This packaged approach is different from the mitigation strategy that is typically used for smaller block or parcel-sized development projects. For smaller projects, discrete mitigation measures are typically identified for each impact. Because of the widespread land use changes associated with the height and density rezone alternatives, a larger-scale mitigation approach aimed at reducing the demand for roadway capacity is appropriate in this case. For example, implementation of Alternative 1 will cause traffic operations impacts to many study roadway corridors. This impact can be lessened by implementing a well connected and integrated bicycle and pedestrian network, which will encourage some travelers to switch modes. An isolated signalized crossing or bicycle lane will not

[10] Induced travel is a well documented phenomenon where the addition of roadway capacity leads to a temporary reduction in travel congestion on a route. The decreased congestion attracts other drivers to the route that would have otherwise used a different mode, traveled at a different time, or not made the trip. Induced travel has the effect of encouraging more driving and increasing the mode share of automobiles.

substantially improve the pedestrian and bicycle environment at a level that will encourage travelers to consider other modes. A robust, well-connected network is necessary to the mitigation strategy.

The four potential mitigation packages are listed below; many of the potential individual mitigation measures are also shown in **Figure 3.5-23**.

It is important to note that the baseline condition already includes major roadway projects like the Mercer East and Bored Tunnel projects, increased transit frequency on several bus routes and the Aurora and Ballard Rapid Ride services per the Seattle travel demand model. The baseline condition also already includes the employer-based travel demand management programs (required by the CTR Law and TMP program) currently in place in South Lake Union[11].

[11] The City of Seattle travel demand model has built in trip generation and mode-split assumptions that are consistent with the existing level of implementation of CTR/TMP programs in South Lake Union. The model does not forecast that the CTR/TMP program will be more or less effective under 2031 conditions.

Figure 3.5-23
Mitigation Measures

Source: Fehr & Peers, 2010

Bicycle and Pedestrian System

Research has shown that vehicle trip generation and traffic congestion impacts can be reduced if a robust pedestrian system is provided.

Based on a review of the Pedestrian Master Plan, several improvements could be implemented in South Lake Union. Some of the improvements related to Tier 1 Pedestrian mobility issues in the South Lake Union neighborhood include, but are not limited to:

- Complete missing sidewalks along Terry Avenue consistent with the *Terry Avenue Street Design Guidelines*
- Add sidewalk to north side of Denny Way between Stewart Street and Melrose Avenue consistent with the proposed *Denny Way Streetscape Concept Plan*[12]
- Add sidewalk along the east side of Eastlake Avenue from Denny Way to Harrison Street and add a signalized[13] crossing at the Eastlake Avenue/Republican Street intersection
- Close pedestrian system gaps on Roy Street between Fairview Avenue and Minor Avenue and on Valley Street between Minor Avenue and Yale Avenue

The Bicycle Master Plan identifies the following relevant actions in the South Lake Union neighborhood including but not limited to:

- Add bikeways along Fairview Avenue from Valley Street to Eastlake Avenue E to connect to facilities provided as part of Mercer East and West projects on Valley and Roy Streets
- Add bikeways along Harrison or Thomas street between Fifth N and Eastlake and along Fairview Avenue between Denny Way and Valley Street
- Improve bicycle access through the Fairview Avenue/Denny Way intersection
- Signalize intersection at Minor Avenue N and Denny Way consistent with the *Denny Way Streetscape Concept Plan*

All Bicycle Master Plan improvements were considered for this analysis. However, before implementation, SDOT would review the projects during the design stage to address any potential concerns, such as safety. Other pedestrian and bicycle network projects include the following:

- Implement the planned Lake to Bay Loop
- Repair facilities in poor condition

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[12] *The Denny Way Streetscape Concept Plan* has not yet been adopted.

[13] To be implemented, a signal must meet warrants and be approved by SDOT.

- Require that projects which develop above the "base height" implement the mid-block connector concept consistent with the South Lake Union Urban Design Framework
- Provide additional signalized crossings on Thomas Street at the Dexter Avenue, 9th Avenue, and Westlake Avenue N intersections[14]
- Provide additional signalized crossings on John Street at the Dexter Avenue and Westlake Avenue N intersections[15]
- Evaluate opportunity to provide enhanced, marked crossing locations across Westlake Avenue N, between Galer Street and 9th Avenue N[16], and implement improvement as appropriate
- Implement the hill climbs defined in the Urban Design Framework
- Improve street lighting and way finding

Travel Demand Management and Parking Strategies

Implement best management practices for travel demand management including maximum parking limits and unbundled parking costs for residential and commercial properties. Research by the California Air Pollution Control Officers Association (CAPCOA), which is composed of air quality management districts in that state has shown that implementation of travel demand management programs can substantially reduce vehicle trip generation (see **Appendix E** for details), which, in turn, reduces traffic congestion impacts. Parking maximums would limit the number of parking spaces which can be built with new development. Unbundled parking separates parking costs from total property cost, allowing buyers or tenants to forego buying or leasing parking spaces. These types of potential mitigation measures would tend to reduce the number of work-based commute trips and all types of home-based trips. Shopping-based trips would also decrease, but at a lower level since these types of trips are less sensitive to parking costs and limited supply for short-term use.

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[14] Given the multi-lane nature of these streets, a pedestrian signal or half-signal is necessary to provide a safe crossing. The signal is required because of the adjacent land uses and likely pedestrian desire lines.

[15] To be implemented, a signal must meet warrants and be approved by SDOT..

[16] The frequency of marked crossings is a key component of the pedestrian network. The exact location of each crossing is not known at this time. In the future, the City would evaluate pedestrian desire lines to determine the precise location and treatment for each crossing.

The parking-based travel demand management strategies described above could be further supported by implementing the car sharing incentives identified in the Seattle Municipal Code[17] and through the development of a parking management program like the recently deployed e-park system in Downtown Seattle to better utilize private parking resources.

Note that the parking analysis in the previous sections identified potential short-term parking impacts related to an imbalance between supply and demand. Any reductions to the parking supply in the South Lake Union area would exacerbate this short-term impact. However, as described in the previous sections, while reduced supply will create a short-term shortage in parking spaces, over time prices will adjust and some drivers will switch to other modes. This shift to other modes is the primary goal of the potential travel demand management mitigation measures since it will reduce the impacts to traffic congestion and freight mobility.

In addition to the parking management strategies described above, the City of Seattle could also seek to expand the Downtown Growth and Transportation Efficiency Center (GTEC) program to include the South Lake Union area, or institute a separate GTEC for South Lake Union. As described in *Growth and Transportation Efficiency Center Program 2009 Report to the Legislature*, WSDOT describes the GTEC program as an extension of the existing CTR program. The GTEC program engages employers of all sizes in vehicle trip reduction programs through an area-wide approach. GTECs must also include an evaluation of transportation and land use policies to determine the extent to which they complement and support trip reduction goals. The South Lake Union Height and Density land use changes along with the potential mitigation packages conform well to the general goals of the GTEC program.

Transit Service Expansion

Impacts to transit load factors could be reduced and frequencies could increase by providing capital and/or operational support existing and planned transit service between Uptown and Capitol Hill. King County Metro should consider options to increase the frequency and capacity on the impacted routes by running additional busses or rerouting downtown-bound buses through South Lake Union to serve the new ridership demand in the area. A South Lake Union shuttle service connecting destinations along Eastlake, the streetcar line, and the Aurora

[17] SMC – 23.54.020.J

Rapid Ride line would provide additional transit service opportunities in the area, while supporting the shift to other modes caused by the potential travel demand management mitigation measures.

Additional improvements to the transit network are shown on **Figure 3.5-23**, including transit signal priority at the Fairview Avenue N./Denny Way intersection, and a northbound queue jump lane and southbound transit signal priority at the Fairview Avenue N./Harrison Street intersection.

Roadway Capacity Enhancements

Impacts to traffic congestion and freight mobility along the Mercer Street corridor could be reduced by the completion of the Mercer West Corridor Project. The roadway changes include:

- Widen the Mercer Street underpass between Dexter and 5th Avenues N to include three lanes in each direction, left-turn lanes, wider sidewalks, and a bicycle path
- Connect 8th Avenue N between Mercer and Roy Streets
- Consider separating southbound left turn phase at 9th Avenue/Denny Way/Bell Street intersection

Potential Mitigation Measure Implementation

Implementation of the potential mitigation measures described above is anticipated to be achieved through an update of the South Lake Union Voluntary Impact Fee Program and updates to the City Code to support the potential travel demand management/parking mitigation measures. As the South Lake Union neighborhood builds out, the Seattle Department of Transportation will monitor the transportation system, prioritize projects, and use the fees collected to construct projects, much as the current Voluntary Impact Fee Program is operated.

Projects that develop within the South Lake Union neighborhood may pay the voluntary mitigation fee in order to receive a Master Use Permit. Alternatively, if a project applicant does not wish to pay the voluntary impact fee, project applicants must perform a supplemental environmental analysis to determine transportation impacts and appropriate measures to mitigate project impacts.

Some of these mitigation measures may be implemented through the City's street or alley vacation process. If proposed projects within the South Lake Union Urban Center include street or alley vacations, the city may require contributions to the above mitigation measures as part of the public benefit required for approval of petitions to vacate public rights-

of-way, where such contribution would exceed the projects mitigation obligations and provide amenities that are identified as public benefits.

Specific Mitigation Measures

This section summarizes each impact along with potential mitigation measures.

Impact 1: Under all three alternatives, there will be impacts to study corridor traffic operations.

Potential Mitigation 1: The Roadway Capacity Enhancement mitigation measure, which includes the completion of the Mercer West Corridor Project, will reduce the impact on Mercer Street corridor and improve overall pedestrian and bicycle circulation in the area by implementing a key section of the Lake to Bay Loop.

Since no other roadway capacity expansion projects are planned or considered feasible, many of the remaining impacts can be lessened by implementing the Bicycle and Pedestrian System and Travel Demand Management mitigation measures, as described below.

Based on the output from the MXD model, the Bicycle and Pedestrian System mitigation measures will reduce vehicle trip generation by approximately 7 percent (for PM peak hour trips, see **Appendix E** for other time periods). The MXD trip generation tool predicts mode share based primarily on land use and demographic information, and does not take additional travel demand management into account. To estimate the reduction in trips prompted by travel demand management programs, research summarized by CAPCOA[18] was consulted. According to this research, the travel demand management strategies will reduce vehicle trip generation by 15 percent[19]. Combined, these two measures would reduce overall PM vehicle trip generation by about 21 percent for all three

[18] *Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from GHG Mitigation Measures,* CAPCOA, August, 2010.

[19] 15 percent reduction in trip generation assumes that the maximum parking limits reduce parking supply (on a per square foot/dwelling unit basis) by 25 percent compared to the No Action alternative. Unbundled parking is assumed to cost an average of $100 per month per space.

height and density alternatives[20]. Additional information regarding these calculations and the CAPCOA research are available in **Appendix E**.

As shown in **Table 3.5-16**, these trip generation rates would be lower than what is anticipated under the No Action Alternative and the impact on many study roadway segments would be reduced. However, because the change in traffic congestion would affect drivers' behavior, some roadway segments would continue to operate poorly.

The Transit Service Expansion mitigation measure is also recommended. Based on the CAPCOA research, providing capital support that would lead to increased transit frequency would lead to an additional two percent reduction in vehicle trip generation. CAPCOA estimates an additional five percent reduction in vehicle trip generation could be achieved by providing new transit service (e.g., new service between Queen Anne, South Lake Union, and Capitol Hill via Mercer Street; South Lake Union shuttle service connecting the neighborhood with the Streetcar and the Aurora Rapid Ride, rerouted downtown buses through South Lake Union). However, additional studies would need to be conducted to determine the exact level of ridership on new transit lines.

Any additional transit would also support and enhance the pedestrian, bicycle, and travel demand management mitigation measures described above. However, since the background modeling already assumed a level of transit service improvement (as described on page 3.5-151) and since the City of Seattle does not own and operate the transit service in South Lake Union, there is no guarantee that further expanded transit service will occur. Therefore, this mitigation measure was not assumed when reporting the results with mitigation in **Table 3.5-17**.

Impact 2: Under all three height and density alternatives, there will be impacts to bicycle and pedestrian mobility.

Potential Mitigation 2: It is recommended that the Bicycle and Pedestrian System mitigation measures be implemented.

Impact 3: Under all three height and density alternatives, freight mobility is impacted.

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[20] As noted in Appendix E, the combined effects of two trip reduction strategies are not additive since there are diminishing returns when multiple strategies are implemented.

Potential Mitigation 3: As discussed, the Roadway Capacity Enhancements will not address congestion on Mercer Street between Dexter Avenue and Fairview Avenue N. Therefore it is recommended that the Bicycle and Pedestrian System and Travel Demand Management mitigation measures also be implemented to reduce the automobile trip generation from residents and employees of South Lake Union. These measures will free up more capacity on the Mercer Street corridor for freight traffic.

It is also recommended that the City update the Major Truck Street network to identify a replacement for Broad Street. Further, improvements to major truck streets and arterials expected to carry heavy vehicles on a regular basis will continue to be considered pursuant to the City's adopted Complete Streets policy which guiding principle is to design, operate and maintain Seattle's streets to promote safe and convenient access and travel for all users. For example, the need for wider corner radii to accommodate turning trucks must be balanced with the need to shorten pedestrian crossings and slow regular passenger vehicles. The City will evaluate these trade-offs on a case-by-case basis.

Also, as specific projects seek a Master Use Permit, the City should review the applications to ensure that adequate loading and truck circulation facilities are provided based on the proposed use.

Impact 4: Under all three height and density alternatives, there will be impacts to transit in terms of load factors.

Potential Mitigation 4: To lessen the extent of this impact, it is recommended that the City of Seattle work with King County Metro to increase the frequency and capacity on the impacted routes by running additional busses.

Impact 5: Under all three height and density alternatives, there will be short-term impacts to parking. The impacts would be felt by employees who must pay more for parking, and building owners who must maintain active TDM programs to accommodate all the tenants.

Potential Mitigation 5: To reduce the extent of this impact, it is recommended that the Bicycle and Pedestrian System, Travel Demand Management, and Transit Service Expansion mitigation measures be implemented. There is a strong relationship between parking supply, parking cost, and mode share. Although there may be short-term impacts as individual developments are completed (causing parking demand to exceed supply), over the long-term the situation will reach equilibrium as drivers shift to other modes.

The City may have to review its on-street parking policies and consider implementing variable parking pricing to maintain supply. The shift from driving to transit may also require more transit service from King County Metro. The parking maximum limits suggested as mitigation for Impact 1 would also reduce supply and shift travelers to other modes.

Mitigation Results

The potential mitigation measures were taken into account and analysis was repeated on the three height and density rezone alternatives. The Pedestrian and Bicycle System and Travel Demand Management mitigation packages were factored in at the trip generation level. The Roadway Capacity Enhancement mitigation measures were integrated into the travel model. The trip generation results of the mitigated height and density alternatives are summarized in **Table 3.5-16** (more details may be found in **Appendix E**). The d/c ratios of the three action alternatives with mitigation are shown in **Table 3.5-17**, along with the No Action Alternative for comparison. As described above, the net impact of the pedestrian, bicycle, and transportation demand management strategies is a reduction in vehicle trip generation of approximately 21 percent for the three action alternatives. As shown in **Table 3.5-16**, this level of trip generation reduction would lead to fewer vehicle trips generated than under the No Action Alternative.

Given the current fiscal environment, funding for additional capital improvements is more uncertain than ever. Therefore, it is conceivable that some of the roadway capacity and bicycle and pedestrian mitigation measures described above could be delayed or deferred. Under this scenario, transportation demand management strategies could still be implemented to reduce vehicle trip generation; however, these strategies are much more successful in conjunction with additional transit service.

Assuming that the background levels of transit service included in the City of Seattle travel model are not implemented, then the transportation demand management strategies described above could still be implemented. As described earlier, it is anticipated that these strategies would reduce the total vehicle trip generation by approximately 15 percent. This level of vehicle trip generation reduction would result in a net increase in total vehicle trips generated for Alternatives 1 and 2 and would result in overall worse traffic congestion levels when compared to the No Action alternative. Alternative 3 with the transportation demand management alternative would still result in a net decrease in vehicle trip generation when compared to the No Action Alternative.

If the transit expansion assumptions included in the City of Seattle travel model are optimistic and little new transit service is added in the next 20 years, then the effectiveness of the transportation demand management program will be reduced. While it is difficult to quantify the level of reduction, it is reasonable to assume that all three Action Alternatives would result in a net increase in vehicle trip generation and thus traffic operations and freight impacts when compared to the No Action Alternative.

Table 3.5-16
PM Peak Hour Trip Generation with and without Mitigation

Alternative	No Mitigation			Mitigation		
		Non-auto Trips (mode share %)			Non-auto Trips (mode share %)	
	Auto Trips (mode share %)	Internal, Bicycle & Pedestrian	Transit	Auto Trips (mode share %)	Internal, Bicycle & Pedestrian	Transit
No Action Alternative - Current Zoning (Mitigation Not Applicable)	12,648 (51.4%)	7,279 (26.9%)	6,091 (21.7%)	12,648 (51.4%)	7,279 (26.9%)	5,871 (21.7%)
Alternative 1 - Maximum Increases to Height and Density	15,554 (50.5%)	9,429 (27.8%)	7,371 (21.7%)	12,244 (39.7%)	11,835 (34.9%)	8,606 (25.4%)
Alternative 2 - Mid-Range Increases to Height and Density	15,548 (50.4%)	9,435 (27.8%)	7,371 (21.7%)	12,236 (39.7%)	11,844 (34.9%)	8,606 (25.4%)
Alternative 3 - Moderate Increases to Height and Density	13,605 (50.3%)	8,334 (28.0%)	6,449 (21.7%)	10,715 (39.6%)	10,435 (35.1%)	7,526 (25.3%)

Source: Fehr & Peers, 2010

Note: See Appendix E for details on the mode share calculation. Auto trips include both SOV and HOV trips, so the number reported is not equivalent to person-trips. The Internal, Bicycle & Pedestrian and Transit categories are person-trips.

Table 3.5-17
Mitigated Action Alternatives: Demand-To-Capacity Ratios Of Study Corridors

		NO ACTION ALTERNATIVE			ALTERNATIVE 1			ALTERNATIVE 2			ALTERNATIVE 3		
Road	**Segment**	**Volume**	**Peak Hour/ Direction**	**d/c Ratio/ LOS**	**Volume**	**Peak Hour/ Direction**	**d/c Ratio/ LOS**	**Volume**	**Peak Hour/ Direction**	**d/c Ratio/ LOS**	**Volume**	**Peak Hour/ Direction**	**d/c Ratio/ LOS**
Fremont Bridge	1) N 35th Street to Westlake Avenue N	1,768	PM/N	1.11/F	1,754	PM/N	1.10/F	1,755	PM/N	1.10/F	1,733	PM/N	1.08/F
Westlake Avenue N	2) Fremont Bridge to Valley Street	1,330	PM/N	0.83/D	1,316	PM/N	0.82/D	1,316	PM/N	0.82/D	1,320	PM/N	0.83/D
	3) Valley Street to Harrison Street	1,040	PM/S	0.99/E	988	PM/S	0.94/E	991	PM/S	0.94/E	946	PM/S	0.90/E
	4) Harrison Street to Denny Way	1,061	PM/S	1.01/F	1,029	PM/S	0.98/E	1,030	PM/S	0.98/E	994	PM/S	0.95/E
	5) Denny Way to Stewart Street	624	PM/N	0.69/D	610	PM/N	0.68/D	616	PM/N	0.68/D	598	PM/N	0.66/D
Eastlake Avenue E	6) N 40th Street to E Hamlin Street	1,166	AM/SW	0.61/D	1,130	AM/SW	0.59/D	1,129	PM/NE	0.59/D	1,108	AM/SW	0.58/D
	7) E Hamlin Street to Fairview Avenue N	1,163	AM/S	0.61/D	1,130	AM/S	0.59/D	1,127	AM/S	0.59/D	1,109	AM/S	0.58/D
	8) Fairview Avenue to Lakeview Blvd E	578	AM/N	0.83/D	547	PM/N	0.78/D	544	PM/N	0.78/D	549	PM/S	0.78/D
	9) Lakeview Blvd E to Stewart Street	867	PM/S	0.62/D	849	PM/N	0.61/D	851	PM/N	0.61/D	858	PM/N	0.61/D
Fairview Avenue N.	10) Eastlake Avenue to Yale Avenue N	810	AM/SW	1.16/F	781	AM/SW	1.12/F	766	AM/SW	1.09/F	774	AM/SW	1.11/F
	11) Yale Avenue N to Harrison Street	1,389	PM/N	0.83/D	1,381	PM/N	0.82/D	1,384	PM/N	0.82/D	1,396	PM/N	0.83/D
	12) Harrison Street to Denny Way	1,009	PM/N	0.60/D	1,000	PM/N	0.60/D	1,000	PM/N	0.60/D	985	PM/N	0.59/D
Dexter Avenue N	13) Fremont Bridge to Valley Street	1,132	AM/S	1.18/F	**1,140**	**AM/S**	**1.19/F**	1,134	AM/S	1.18/F	**1,151**	**AM/S**	**1.20/F**
	14) Valley Street to Denny Way	1,787	PM/N	1.28/F	1,737	PM/N	1.24/F	1,734	PM/N	1.24/F	1,709	PM/N	1.22/F
Valley Street	15) Westlake Avenue N to Fairview Avenue N	624	PM/E	0.74/D	636	PM/E	0.76/D	633	PM/E	0.75/D	611	PM/E	0.73/D
Mercer Street	16) Queen Anne Avenue N to 5th Avenue N	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D	1,091	PM/E	0.65/D
	17) 5th Avenue N to Dexter Avenue N	1,445	AM/E	0.86/D	1,980	PM/W	0.79/D	1,983	PM/W	0.79/D	1,970	AM/W	0.78/D
	18) Dexter Avenue N to Fairview Avenue N	2,057	AM/W	0.98/E	2,054	AM/W	0.98/E	**2,072**	**AM/W**	**0.99/E**	2,040	AM/W	0.97/E
Denny Way	19) Broad Street to Aurora Avenue N	1,053	AM/W	0.63/D	1,031	PM/W	0.61/D	1,031	PM/W	0.61/D	1,032	AM/W	0.61/D
	20) Aurora Avenue N to Stewart Street	1,607	PM/E	1.53/F	1,591	PM/E	1.52/F	1,586	PM/E	1.51/F	1,573	PM/E	1.50/F
	21) Stewart Street to Broadway E	1,151	AM/W	0.72/D	1,126	AM/W	0.70/D	1,122	PM/W	0.70/D	1,102	AM/W	0.69/D
Broad Street	22) Denny Way to Westlake Avenue N	Segment does not exist under future conditions											
Boren Avenue	23) Denny Way to Pine Street	1,297	AM/NW	1.08/F	1,289	AM/NW	1.07/F	1,282	AM/NW	1.07/F	1,270	AM/NW	1.06/F
	24) Pine Street to University Street	1,068	PM/SE	0.89/D	1,063	PM/SE	0.89/D	1,068	PM/SE	0.89/D	1,051	PM/SE	0.88/D
Stewart Street	25) Eastlake Avenue E to Boren Avenue	2,196	AM/SW	1.05/F	2,194	AM/SW	1.04/F	2,208	AM/SW	1.05/F	2,163	AM/SW	1.03/F
	26) Boren Avenue to 7th Avenue	1,334	AM/SW	0.74/D	1,344	AM/SW	0.75/D	1,347	AM/SW	0.75/D	1,340	AM/SW	0.74/D
	27) 7th Avenue to 3rd Avenue	873	AM/SW	0.73/D	860	AM/SW	0.72/D	862	AM/SW	0.72/D	840	AM/SW	0.70/D
Virginia Street	28) Denny Way to Westlake Avenue N	839	PM/NE	0.70/D	854	PM/NE	0.71/D	851	PM/NE	0.71/D	856	PM/NE	0.71/D
	29) Westlake Avenue N to 3rd Avenue	1,215	PM/NE	0.68/D	1,195	PM/NE	0.66/D	1,203	PM/NE	0.67/D	1,177	PM/NE	0.65/D
E Pine Street	30) Boren Avenue to Broadway	691	PM/W	0.96/E	676	AM/W	0.94/E	689	PM/W	0.96/E	678	AM/W	0.94/E
Lakeview/Belmont/Roy	31) Eastlake Avenue to Broadway E	415	PM/E	0.52/D	415	PM/E	0.52/D	415	PM/E	0.52/D	415	PM/E	0.52/D

Road	Segment	NO ACTION ALTERNATIVE Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 1 Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 2 Volume	Peak Hour/ Direction	d/c Ratio/ LOS	ALTERNATIVE 3 Volume	Peak Hour/ Direction	d/c Ratio/ LOS
Thomas Street	32) Aurora Avenue N to Eastlake Avenue E	429	PM/E	0.60/D	419	PM/E	0.58/D	436	PM/E	0.61/D	390	PM/E	0.54/D
Harrison Street	33) Aurora Avenue N to Eastlake Avenue E	537	PM/E	0.90/E	522	PM/E	0.87/D	515	PM/E	0.86/D	502	PM/E	0.84/D
9th Avenue N	34) Roy Street to Republican Street	698	PM/N	1.00/F	661	PM/N	0.94/E	667	PM/N	0.95/E	648	PM/N	0.93/E
Howell/Eastlake	35) Stewart Street to Boren Avenue	1,113	PM/N	0.93/F	1,099	PM/N	0.92/E	1,093	PM/N	0.91/E	1,095	PM/N	0.91/E

Source: Fehr & Peers, 2010

Note: Bold text signifies an impact.

* These study corridors intersect or are adjacent to other study corridors that are expected to operate at LOS F conditions. Actual LOS may be worse because of queuing.

Potential transit mitigation calculations were completed independently of the other potential mitigation measures. **Table 3.518** shows the number of additional busses that would need to run during the peak hour to reduce the load factor to acceptable levels. Details of the calculations may be found in **Appendix E**.

Table 3.5-18
South Lake Union Peak Hour Transit Mitigation

Route	Termini Locations	No Action Load Factor	Action Load Factor	Peak Hour Ridership	Additional busses required	Mitigated Load Factor
21 NB	Downtown, Arbor Heights	1.17	1.35	520	1	1.18
28 NB	Downtown, Broadview	1.19	1.40	240	1	1.06
29 NB	Downtown, Woodland Park	1.19	1.49	120	1	1.04
29 SB	Downtown, Woodland Park	1.49	1.79	144	1	1.25
56 NB	South Lake Union, West Seattle	1.38	1.53	396	2	1.07

Source: Fehr & Peers, 2010

3.5.7 Significant Unavoidable Adverse Impacts

With the mitigation measures described above resulting in an overall net decrease in vehicle trip generation for the three Action Alternatives compared to the No Action Alternative, no significant unavoidable adverse transportation impacts are expected as a result of the height and density increase.

3.6 Draft EIS 3.14 Public Services Clarifications or Corrections

This section of the Final EIS includes additional information and analysis on public services that was not included in the Draft EIS, specifically public schools. Included in this section is a description of the existing status of Seattle Public Schools, including schools that provide service to the South Lake Union Neighborhood, and an evaluation of the impacts of added demand on schools from redevelopment under the alternatives.

3.6.1 Affected Environment

Public Schools

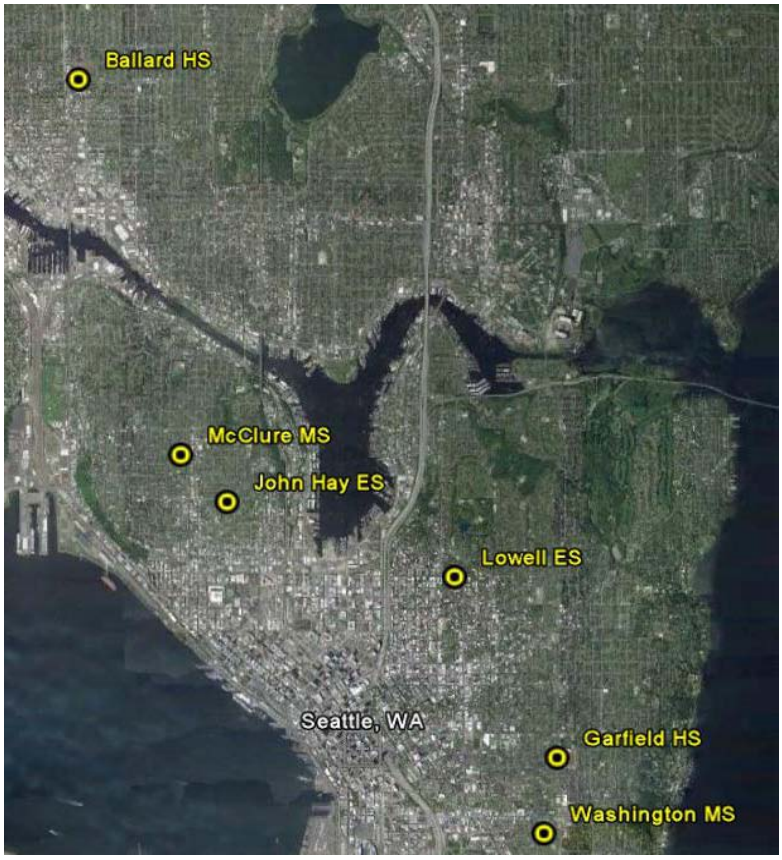
The Seattle School District provides public school services for the City of Seattle, including the South Lake Union Neighborhood. The Seattle School District operates approximately 90 schools/programs, including 52 elementary schools (kindergarten through fifth grade), 10 kindergarten through eighth grade schools, nine middle schools (sixth through eighth grade), 12 high schools (ninth through twelfth grade) and seven alternative schools/programs.

In 2009, the Seattle School District adopted a new method of assigning students to schools based on attendance area boundaries. Each school within the district is designated a geographic boundary (attendance area) and students who live within the boundary are assigned to that school.

The South Lake Union Neighborhood is generally located within the attendance area boundaries of John Hay Elementary School (kindergarten through fifth grade) and McClure Middle School (sixth through eighth grade). A small portion in the northeastern corner of the South Lake Union Neighborhood (north of the 1100 block on Fairview Avenue) is located within the attendance area boundary of Lowell Elementary School (kindergarten through fifth grade) and Washington Middle School (sixth through eighth grade).

Two high school attendance area boundaries are located in the South Lake Union Neighborhood, including Ballard High School (ninth through twelfth grade), and Garfield High School (ninth through twelfth grade). Within this South Lake Union Neighborhood, Ballard High School generally serves students located on the west side of Lake Union and north of Broad Street, while Garfield High School generally serves the remaining portion of the South Lake Union Neighborhood. See **Figure 3.6-1** for the location of the schools serving the South Lake Union Neighborhood.

Figure 3.6-1
Seattle Public School Locations



Source: Seattle School District, 2011.

Existing Enrollment. In 2009, the Seattle School District had an enrollment of approximately 45,900 students (kindergarten through twelfth grade). The total enrollment included approximately 23,300 elementary school students, 9,400 middle school students, and 13,200 high school students.

Table 3.6-1 provides a summary of the total enrollment in the Seattle School District from 2004-2009. Enrollment has held relatively steady over the past six years, with fluctuations of less than one percent each year.

Table 3.6-1
Seattle School District Total Enrollment – 2004-2009

Year	Enrollment	Change in Enrollment from Previous Year	Percent Change from Previous Year
2004	46,416		
2005	46,200	-216	-0.5%
2006	45,933	-267	-0.6%
2007	45,276	-657	-1.4%
2008	45,572	296	0.7%
2009	45,944	372	0.8%

Source: Seattle School District, 2010.

Table 3.6-2 summarizes the total student enrollment for the South Lake Union Neighborhood attendance area schools for the 2009-2010 school year.

Table 3.6-2
Attendance Area School Enrollment – 2009-2010

School	2009-2010 Enrollment
John Hay Elementary	467
Lowell Elementary	441
McClure Middle School	552
Washington Middle School	1,019
Ballard High School	1,632
Garfield High School	1,642

Source: Seattle School District Reports for 2009-2010 School Year, 2010.

Projected Enrollment. In 2009, the Seattle School District developed enrollment projections for 2015 based on the assumed functional capacity of schools under the established attendance area boundaries. Functional capacity, as defined by the Seattle School District, is the number of students a building can accommodate based on several factors, including: consistent accounting of classrooms, offices and other spaces in the building; consistent assumptions about space usage for various program needs; information on a school's student population; programmatic needs of those students; and, the location of space for specialized programs.

Table 3.6-3 illustrates the projected enrollment for 2015 for the Seattle School District and the attendance area schools that serve the South Lake Union Neighborhood.

Table 3.6-3
Projected Seattle School District Functional Capacity and Enrollment – 2015

	Forecasted Functional Capacity	Forecasted Enrollment	Forecasted Available Functional Capacity
Seattle School District			
Elementary	23,317	22,482	835
Middle School	8,983	8,258	725
High School	12,676	11,169	1,507
Total	**44,976**	**41,909**	**3,067**
Attendance Area Schools			
John Hay ES	420	425	-5
Lowell ES	545	506	39
McClure MS	768	493	275
Washington MS	1,119	1,044	75
Ballard HS	1,581	1,487	94
Garfield HS	1,598	1,624	-26
Total	**6,031**	**5,579**	**452**

Source: Seattle School District, 2010.

Enrollment projections indicate that District-wide enrollment would be anticipated to decline from 45,944 students in 2009 to 41,909 students in 2015. Enrollment at attendance area schools for the South Lake Union Neighborhood is also anticipated to decline at John Hay ES, McClure MS, Ballard HS, and Garfield HS; however, enrollment is anticipated to increase at Lowell ES and Washington MS by 2015.

As shown in **Table 3.6-3**, the Seattle School District is anticipated have sufficient functional capacity to accommodate the projected enrollment within the District in 2015. In addition, the majority of the attendance areas schools for the South Lake Union Neighborhood would also have sufficient capacity to accommodate the projected enrollment, with the exception of John Hay ES and Garfield HS.

School District Planning. According the Seattle School District's Capacity Management Policy, the District will annually evaluate enrollment and capacity management issues. As described in the Capacity Management Policy, the District could take any of the following actions to match capacity and enrollment, depending on the needs in a particular area:

- Adding, relocating, or removing programs;
- Adjusting school boundaries;

- Adjusting geographic zones for option schools;
- Adding or removing portables;
- Adding to or renovating buildings; or,
- Opening, reconstituting or closing buildings

8th Avenue Corridor

The 8th Avenue Corridor is located within the attendance areas of John Hay Elementary School, McClure Middle School, and Garfield High School.

Fairview Avenue Corridor

The Fairview Avenue Corridor is located within the attendance areas of John Hay Elementary School, McClure Middle School, and Garfield High School.

Valley/Mercer Blocks

The Valley/Mercer Blocks are located within the attendance areas of John Hay Elementary School, McClure Middle School, and Garfield High School.

3.6.2 Environmental Impacts

The proposed action would adopt new or maintain existing zoning regulations. By itself, this action would not directly result in impacts to the public schools in the Seattle School District. However, zoning regulations would allow for potential future development at increased heights and densities and an associated increase in population, which could result in a subsequent impact to public schools. The impacts described below relate to the development that could result from the adoption of any of the proposed zoning alternatives.

Impacts Common to All Alternatives

Public Schools. Potential increases in population in the South Lake Union Neighborhood would be incremental and would be accompanied by subsequent incremental increases in demand for public schools.

For the purposes of this analysis, potential impacts to public schools were projected for the South Lake Union Neighborhood based on data from the 2010 US Census for the census tract areas that generally comprise the Neighborhood area (census tract 66, 67, 72 and 73). Based on the number of housing units assumed for the Action Alternatives and No Action Alternative (11,900 units and 8,000 units respectively) and the average household size for the South Lake Union Neighborhood (1.47 persons per unit[16]), the total projected increase in population was estimated to be

[16] *2010 US Census data average household size for Census Tract 66, 67, 72 and 73.*

approximately 17,520 for the Action Alternatives and 11,780 for the No Action Alternative.

2010 Census data indicates that approximately four percent of the population in the South Lake Union Neighborhood would be school age children (ages 5 to 19 years). This percentage was used in conjunction with the projected population total, to project the potential number of school age children that could be located in the South Lake Union Neighborhood under the Action Alternatives and the No Action Alternative.

Table 3.6-4 provides a summary of the projected number of new students that could be generated in the South Lake Union Neighborhood under the Action Alternatives and No Action Alternatives.

Table 3.6-4
Projected Student Generation for the South Lake Union Neighborhood

	Action Alternatives	No Action Alternative
Elementary School[1]	175	118
Middle School[2]	123	82
High School[3]	399	268
Total Students	**697**	**468**

Source: EA\|Blumen, 2011.

[1] Approximately 1 percent of the total population (2010 US Census for tracts 66, 67, 71 and 72).
[2] Approximately 0.7 percent of the total population (2010 US Census for tracts 66, 67, 71 and 72).
[3] Approximately 2.3 percent of the total population (2010 US Census for tracts 66, 67, 71 and 72).

Residential development under the Action Alternatives would generate additional student enrollment at the South Lake Union Neighborhood attendance area schools. Under the Action Alternatives, approximately 697 students would be generated by potential development at full buildout. It is estimated that new students would include approximately 175 elementary students, 123 middle school students, and 399 high school students.

Under the No Action Alternative, fewer students (approximately 468 students) would be generated by potential development in the South Lake Union Neighborhood. Approximately 118 elementary students, 82 middle school students, and 268 high school students would be generated under this alternative.

Table 3.6-5 provides a comparison of projected student generation under the Action Alternatives to the available forecasted functional capacity for the Seattle School District and the South Lake Union Neighborhood attendance area schools.

Table 3.6-5
Projected Student Generation and Forecasted Functional Capacity – Action Alternatives

	Projected Student Generation	Available Functional Capacity in the School District	Functional Capacity in District After Action Alternatives	Available Functional Capacity in Attendance Area Schools	Functional Capacity in Attendance Area Schools After Action Alternatives
Elementary School	175	835	660	34[1]	-141
Middle School	123	725	602	350[2]	227
High School	399	1,507	1,108	68[3]	-331
Total	**697**	**3,067**	**2,370**	**452**	**-245**

Source: EA\|Blumen, 2011.
[1] Includes John Hay ES and Lowell ES
[2] Includes McClure MS and Washington MS
[3] Includes Ballard HS and Garfield HS

As shown in **Table 3.6-5**, excess functional capacity is anticipated to be available at all school levels within the Seattle School District to serve the projected students that would be generated under the Action Alternatives. Attendance area middle schools (McClure MS and Washington MS) are also anticipated to have excess functional capacity to serve the projected students.

However, projected elementary student and high school student generation is anticipated to exceed the available functional capacity at the elementary (John Hay ES and Lowell ES) and high school (Ballard and Garfield) level. It is anticipated that a portion of these students would need to be accommodated at other schools outside of the existing attendance area boundary. This could result in the need for the District to adjust the attendance area boundaries, provide transportation service for the students, and/or other measures to accommodate the number of students in excess of the forecasted functional capacity.

Table 3.6-6 provides a comparison of projected student generation under the No Action Alternative to the available forecasted functional capacity for the Seattle School District and the South Lake Union Neighborhood attendance area schools.

Table 3.6-6
Projected Student Generation and Forecasted Functional Capacity – No Action Alternative

	Projected Student Generation	Available Functional Capacity in the School District	Functional Capacity in District After Action Alternatives	Available Functional Capacity in Attendance Area Schools	Functional Capacity in Attendance Area Schools After Action Alternatives
Elementary School	118	835	717	34[1]	-84
Middle School	82	725	643	350[2]	268
High School	268	1,507	1,239	68[3]	-200
Total	**468**	**3,067**	**2,599**	**452**	**-16**

Source: EA\|Blumen, 2011.

[1] Includes John Hay ES and Lowell ES
[2] Includes McClure MS and Washington MS
[3] Includes Ballard HS and Garfield HS

As illustrated in **Table 3.6-6**, functional capacity is anticipated to be available at all school levels within the Seattle School District to serve the projected students that would be generated under the No Action Alternative. Attendance area middle schools (McClure MS and Washington MS) are also anticipated to have excess functional capacity to serve the projected students.

Similar to the Action Alternatives projected student generation under the No Action Alternative is anticipated to exceed the available functional capacity at the elementary school and high school level. However, the number of elementary and high school students would be lower under the No Action Alternative. These students would need to be accommodated at other schools outside of the existing attendance area boundary, which could result in the need for the District to adjust the attendance area boundaries, provide transportation service for the students, and/or other measures to accommodate the number of students in excess of the forecasted functional capacity.

3.6.3 Mitigation Strategies

Future population increases associated with potential residential development in the South Lake Union Neighborhood under the Action Alternatives and No Action Alternative (Alternatives 1-4) would be incremental and would result in associated incremental increases in demand for public schools in the area. As noted above, the South Lake Union Neighborhood attendance area schools may not have the functional capacity to accommodate the projected number of students that could be generated by the Action Alternatives and No Action

Alternative. These potential impacts could be addressed through the following mitigation measures.

1. A portion of the tax revenue generated from potential redevelopment in the Neighborhood – including construction sales tax, business and operation tax, property tax and other fees, licenses and permits – would accrue to the City of Seattle and Seattle School District and could help offset demand for services from the District.

2. It is anticipated that increases in student population over the buildout period would be addressed through the Seattle School District capital facilities capacity planning process (policy H13.00) to insure that no significant impacts would occur as a result of redevelopment in the South Lake Union Neighborhood. As stated previously, the Seattle School District could take any or a combination of the following actions to match capacity and enrollment as buildout occurs in the South Lake Union Neighborhood:

    - Adding, relocating or removing programs;
    - Adjusting school boundaries;
    - Adjusting geographic zones for option schools;
    - Adding or removing portables;
    - Adding to or renovating buildings; and/or,
    - Opening, reconstituting or closing buildings.

3.6.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to public schools are anticipated.

3.7 Draft EIS 3.15 Utilities Clarifications or Corrections

Discussion of electrical power requirements based on Seattle City Light input and Comment #44 in Comment Letter 5, pending further City direction.