CHAPTER 5 FUTURE BASELINE CONDITIONS, PROJECTED PROBLEMS AND DEFICIENCIES

The Future Baseline scenario represents future conditions expected in the study area assuming year 2030 land-use, employment and housing levels currently identified by the City of Seattle and the Puget Sound Regional Council. It also assumes only limited improvements to the transportation system – typically only those that are programmed in either the Regional or the City of Seattle's Transportation Improvement Plan, and have committed funding.

Simplistically, the Future Baseline scenario reflects expected traffic and travel conditions in the SLU study area for the study horizon year (2030) with roughly the same transportation system as exists today and the projected growth in employment and housing for South Lake Union, the rest of the city and the four-county region.

This chapter summarizes analysis results of the year 2030 future baseline scenario and identifies expected problems and deficiencies associated with the transportation network. Problems and deficiencies were identified through a variety of means and sources. Existing problems and deficiencies that had been identified through the analysis of existing data, field observations, and discussion with study area stakeholders were carried forward unless specific programs had been identified that would mitigate them. Additionally, based on analysis of projected land use growth and associated travel demand, future operational issues were identified. The project team then solicited information on existing deficiencies or problems from SDOT staff, King County Metro staff, neighborhood, and stakeholder groups to ensure that the study team fully understood as many of the deficiencies and problems in the SLU neighborhood as possible.

Planned Growth

The Future Baseline scenario horizon year for this analysis is 2030. It is expected that the study area will experience significant growth by that time. Table 5.1 summarizes the projected growth in employment and housing within SLU, neighboring Denny Triangle, the city, and the region, all of which have an impact on travel within SLU.

Table 5.1: 2000 to 2030 Growth Projections

Area	Employment		Household	
	2000	**2030**	**2000**	**2030**
South Lake Union	20,300	45,400	2,800	15,500
Denny Triangle	29,730	50, 410	2,580	8,640
City of Seattle	535,860	706,550	258,500	353,130
Region	1,748,800	2,535,900	1,282,970	1,889,100

The expected growth in housing and employment in this area and surrounding areas will have a significant impact on the project area. To estimate these impacts with respect to traffic and the rest of the transportation system, the land use projections were input into the City of Seattle travel demand model to develop year 2030 travel forecasts. Analysis of these forecasts is summarized in subsequent sections of this chapter.

Roadway Network

With respect to roadways, the Year 2030 Future Baseline network was similar to the existing network within the study area. The main changes to the future baseline network were related to optimization of the signal timing splits (green time) and signal offsets (start of green) to maximize traffic flow on key arterials such as Mercer Street, Fairview Avenue, Dexter Avenue, Westlake Avenue, and Ninth Avenue N. In addition, the simulation network included the operation of the South Lake Union streetcar, but it is not reflected in the mode share forecasts.

At the regional level, the travel demand model includes transportation projects that are included in the Metropolitan Transportation Plan, *Destination 2030*. One exception to the Destination 2030 network is that the City's travel demand model network assumes that only HOV or High-Capacity-Transit lanes would be added to SR 520 across Lake Washington, whereas Destination 2030 includes additional general purpose lanes. Other projects in the future baseline network include:

- The 14-mile monorail Green Line connecting Greenwood with West Seattle
- SR-520 expansion by an additional HOV lane in each direction
- I-405 expansion by two lanes in each direction + additional HOV lane
- Sound Transit Link Light Rail line from Northgate to SeaTac Airport
- SR-167 expansion by one lane in each direction
- SR-509 extension from S 188th Street to I-5
- High Capacity Transit (HCT) crossing Lake Washington, on I-405, and on SR 99 (Bus Rapid Transit)

Figure 5.1 and 5.2 graphically display the expected intersection turning movement volumes in 2030. Table 5.2 presents the AM peak hour LOS analysis results for both the existing and future baseline. In the future baseline, the following intersections are projected to experience the greatest impacts, assuming no changes to the existing street network:

- Roy Street and 9th Avenue N. (from an existing LOS C to LOS D)
- Mercer Street and 9th Avenue (from an existing LOS B to LOS C)
- Mercer Street and Dexter Avenue (from an existing LOS D to LOS E)
- Republican Street and Fairview Avenue (from an existing LOS B to LOS C).

Another measure used to assess system-wide performance of the study area network is the total average network delay. This measures the average amount of delay each vehicle experiences as it travels through the network. The total network average delay is expected to increase from 3.8 to 7.1 minutes per vehicle by 2030. This is not unexpected, given the growth projected for this part of the City, no changes to the existing street network, and limited changes to transit service affecting this area.

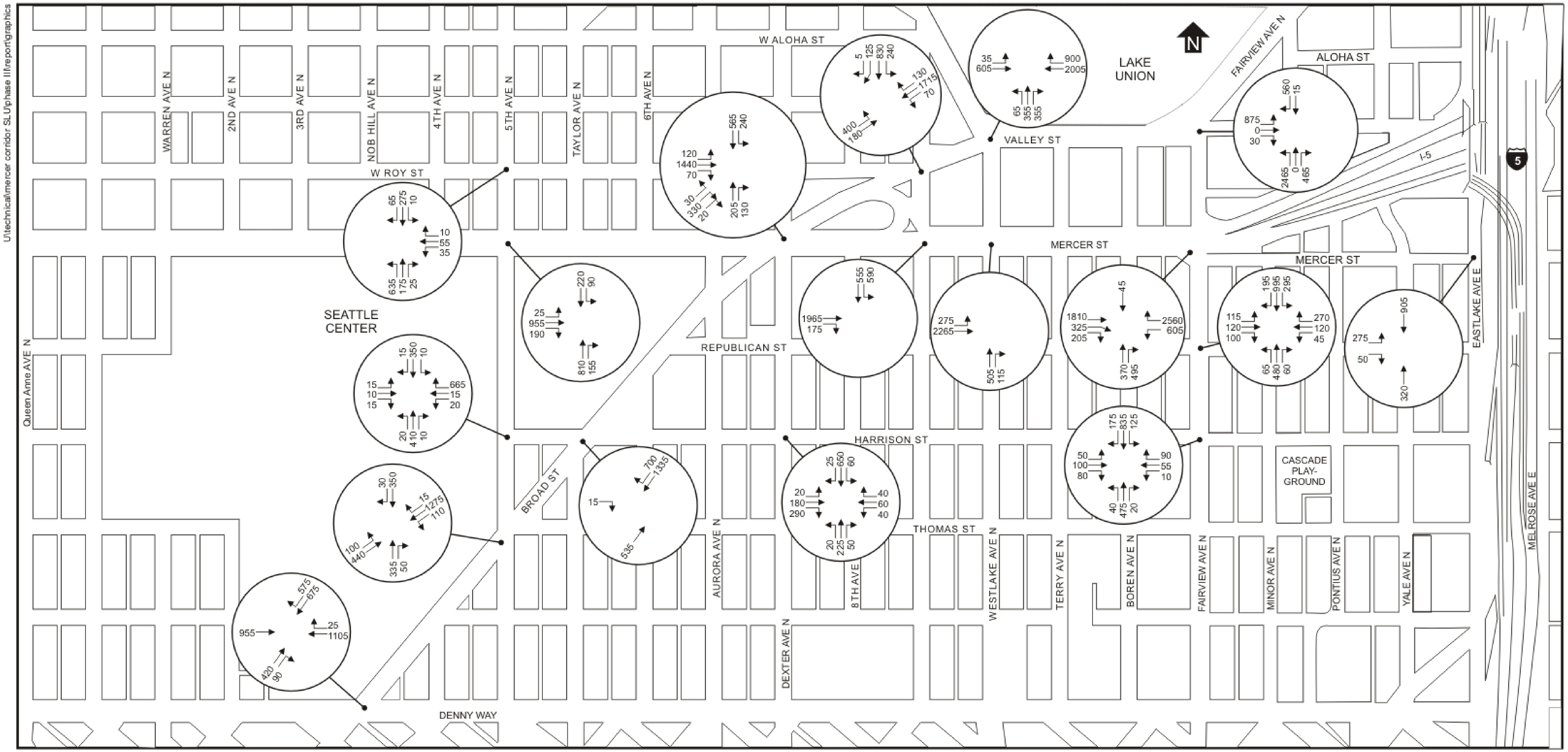

Figure 5.1: South Lake Union – 2030 Future Baseline AM Peak Hour Intersection Volumes

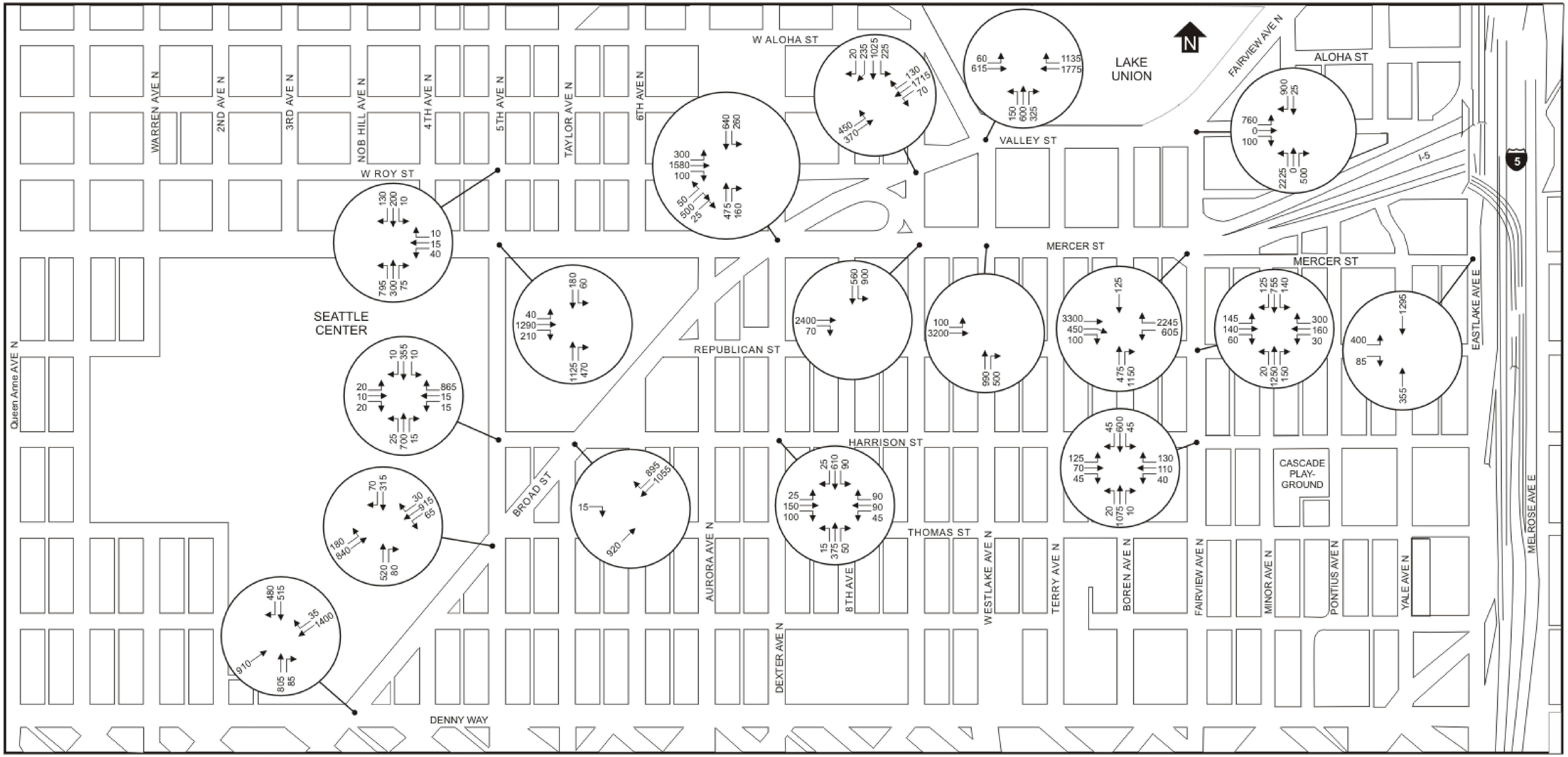

Figure 5.2: South Lake Union – 2030 Future Baseline PM Peak Hour Intersection Volumes

The results of this analysis also include a reduction in delay by 2030 for a few intersections, likely due to signal timing changes and arterial progression enhancements to optimize traffic flow (where possible). Nonetheless, the analysis results clearly indicate that the roadway system is expected to experience a substantial increase in delay and congestion.

Table 5.2: AM Peak Hour Delay and LOS Summary (Existing and 2030 No-Build at Selected Intersections)

ID	Cross Street 1	Cross Street 2	Existing AM Peak Hour		2030 No-Build AM Peak Hour	
			Delay	LOS	Delay	LOS
9	Mercer Street	Westlake Avenue	29.8	C	33.4	C
10	Broad Street	Westlake Avenue	12.0	B	12.2	B
14	Mercer Street	Fairview Avenue	56.6	E	57.9	E
17	Valley Street	Fairview Avenue	21.4	C	21.8	C
18	Fairview Avenue	I-5 Off-Ramp	4.9	A	6.6	A
27	Harrison Street	Fairview Avenue	9.1	A	13.3	B
28	5th Avenue	Broad Street	22.1	C	20.9	C
31	Roy Street	9th Avenue	28.3	C	39.3	D
32	Mercer Street	9th Avenue	17.8	B	26.7	C
36	Mercer Street	Dexter Avenue	38.8	D	59.0	E
39	Harrison Street	Dexter Avenue	26.9	C	16.1	B
57	Mercer Street	5th Avenue	23.4	C	26.1	C
58	Roy Street	5th Avenue	33.9	C	23.4	C
63	Harrison Street	Broad Street	6.8	A	7.6	A
65	Mercer Street	Eastlake Avenue	9.8	A	7.5	A
66	Denny Way	Broad Street	14.2	B	15.7	B
203	Republican Street	Fairview Avenue	15.1	B	29.8	C
Total Network Average Delay (sec/veh)			226.3		424.6	
Note: Total Network Average Delay is a weighted average delay per vehicle for all intersections in the study area (beyond those listed in the table). Delays reported from SimTraffic microsimulation analysis (Synchro/SimTraffic V5 Build 323)						

PM peak hour LOS analysis results are shown in Table 5.3 for both the existing and future baseline. In the future baseline, the following intersections are projected to experience the greatest impacts, assuming no changes to the existing street network:

- Harrison Street and Fairview Avenue (from an existing LOS B to LOS D)
- Mercer Street and Dexter Avenue (from an existing LOS E to LOS F)
- Mercer Street and 5th Avenue (from an existing LOS C to LOS D)
- Republican Street and Fairview Avenue (from an existing LOS B to LOS E).

The total network average delay for the 2030 PM peak-hour period is projected to more than double from 3.7 to 8.1 minutes per vehicle. Similar to existing conditions, the Mercer corridor shows a high concentration of traffic levels and overall congestion. By 2030, Fairview Avenue will also become considerably more congested due growth in traffic volumes and the limited capacity on Fairview to accommodate the high-demand turning movements to/from I-5 in combination with transit movements along Fairview destined for the Eastlake community (Routes 70, 71, 72, 73). Similar to the AM peak-hour scenario, the PM peak hour has a few intersections with reductions in delay by 2030, which are likely due to various signal timing changes implemented to enhance traffic circulation.

Table 5.3: PM Peak Hour Delay and LOS Summary (Existing and 2030 No-Build at Selected Intersections

ID	Cross Street 1	Cross Street 2	Existing PM Peak Hour		2030 No-Build PM Peak Hour	
			Delay	LOS	Delay	LOS
9	Mercer Street	Westlake Avenue	37.3	D	37.6	D
10	Broad Street	Westlake Avenue	13.7	B	25.5	C
14	Mercer Street	Fairview Avenue	48.3	D	53.8	D
17	Valley Street	Fairview Avenue	21.5	C	22.3	C
18	Fairview Avenue	I-5 Off-Ramp	9.5	A	10.2	B
27	Harrison Street	Fairview Avenue	10.1	B	52.6	D
28	5th Avenue	Broad Street	26.8	C	33.2	C
31	Roy Street	9th Avenue	50.0	D	43.7	D
32	Mercer Street	9th Avenue	38.1	D	29.1	C
36	Mercer Street	Dexter Avenue	80.0	E	>120	F
39	Harrison Street	Dexter Avenue	9.7	A	11.1	B
57	Mercer Street	5th Avenue	25.1	C	44.3	D
58	Roy Street	5th Avenue	14.8	B	18.2	B
62	Harrison Street	5th Avenue	10.8	B	24.3	C
63	Harrison Street	Broad Street	20.3	C	11.0	B
65	Mercer Street	Eastlake Avenue	19.0	B	16.3	B
66	Denny Way	Broad Street	20.3	C	31.2	C
203	Republican Street	Fairview Avenue	19.0	B	59.1	E
Total Network Average Delay (sec/veh)			223.2		478.5	

Note: Total Network Average Delay is a weighted average delay per vehicle for all intersections in the study area (beyond those listed in the table). Delays reported from SimTraffic microsimulation analysis (Synchro/SimTraffic V5 Build 323)

Table 5.4 presents estimated travel times for both the existing and future baseline networks during the AM peak hour. The travel times for these routes include the intersection delays summarized in Table 5.2. It is not surprising that travel times will increase by 2030 without any major improvements. The east-west routes in the study area are expected to experience the greatest increases in travel times, particularly the eastbound routes from the Seattle Center to I-5. With regard to the north-south routes, the travel time on southbound Ninth Avenue is projected to experience the greatest travel time increase (from 5.7 minutes to 7.6 minutes). Figures 5.3, and 5.4 show the identified travel paths and associated travel times.

Table 5.4: Existing and 2030 No-Build AM Peak Hour Travel Time Estimates

Path ID	Travel Path (East-West Routes)	Existing AM Travel Time	2030 No-Build AM Travel Time
	WB - I-5 to North Side Seattle Center	7.0 min	7.9 min
2	EB – North Side Seattle Center to I-5	6.8 min	8.0 min
3	WB - I-5 to South Side Seattle Center	5.3 min	6.4 min
4	EB – South Side Seattle Center to I-5	6.1 min	7.6 min
5	WB - Eastlake to North Side Seattle Center	5.4 min	6.1 min
6	EB – North Side Seattle Center to Eastlake	4.7 min	5.4 min
7	WB - I-5 to Westlake/Aloha	3.3 min	4.0 min
8	EB – Westlake/Aloha to I-5	5.7 min	7.8 min
Path ID	**Travel Path (North-South Routes)**	**Existing AM Travel Time**	**2030 No-Build AM Travel Time**
1	NB - Fairview Avenue	3.5 min	3.9 min
2	SB – Fairview Avenue	6.9 min	8.0 min
3	NB - Westlake Avenue	4.6 min	5.3 min
3a	SB - Westlake Avenue		
4	SB - 9th Avenue	5.7 min	7.6 min
4a	NB - 9th Avenue		
5	NB - Dexter Avenue	3.0 min	4.8 min
6	SB - Dexter Avenue	5.2 min	4.4 min
7	WB - Eastlake to South Side Seattle Center	3.7 min	4.6 min
8	EB – South Side Seattle Center to Eastlake	3.4 min	3.9 min
	Ramp Queue Delay at I-5 & Fairview (WB)	1.5 min	1.7 min

The queue delay at the I-5 off-ramp to Fairview Avenue is also expected to increase, although not as dramatically, from 1.5 to 1.7 minutes on average for vehicles exiting this ramp.

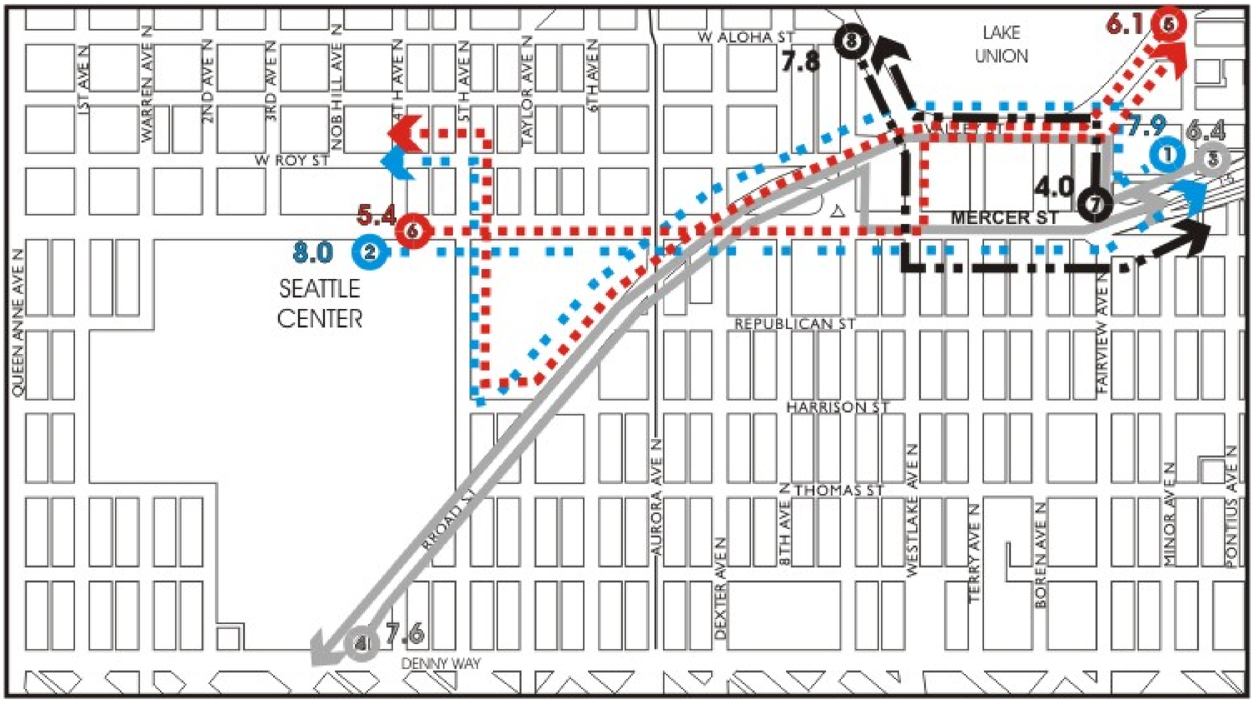

Figure 5.3: 2030 Future No-Build East/West AM Peak Travel Time Path Summaries

Figure 5.4: 2030 Future No-Build North/South AM Peak Travel Time Path Summaries

Table 5.5 summarizes the future baseline PM peak-hour travel times for key routes in the study area. As expected, travel times will increase noticeably by 2030. Based on the analysis calculations, the east-west routes in the study area will experience the greatest increases in travel times, particularly the eastbound routes from the north side of Seattle Center to I-5. In addition, the travel time on northbound Fairview Avenue will almost double by 2030. Figures 5.5, and 5.6 show the identified travel paths and associated travel times.

Table 5.5: Existing and 2030 No-Build PM Peak Hour Travel Time Estimates

Path ID	Travel Path (East-West Routes)	PM Existing Travel Time	PM 2030 No-Build Travel Time
1	WB – I-5 to North Side Seattle Center	6.4 min	8.2 min
2	EB – North Side Seattle Center to I-5	8.4 min	11.7 min
3	WB – I-5 to South Side Seattle Center	5.5 min	5.8 min.
4	EB – South Side Seattle Center to I-5	10.4 min	7.9 min
5	WB - Eastlake to North Side Seattle Center	4.9 min	6.6 min
6	EB – North Side Seattle Center to Eastlake	6.0 min	9.7 min
7	WB – I-5 to Westlake/Aloha	3.2 min	3.3 min
8	EB – Westlake/Aloha to I-5	8.1 min	11.8 min
Path ID	**Travel Path (North-South Routes)**	**PM Existing Travel Time**	**PM 2030 No-Build Travel Time**
1	NB - Fairview Avenue	4.6 min	8.5 min
2	SB - Fairview Avenue	9.2 min	10.1 min
3	NB - Westlake Avenue	4.8 min	6.8 min
3a	SB - Westlake Avenue		
4	SB - 9th Avenue	8.0 min	11.9 min
4a	NB – 9th Avenue		
5	NB - Dexter Avenue	3.0 min	3.2 min
6	SB - Dexter Avenue	4.7 min	5.3 min
7	WB - Eastlake to South Side Seattle Center	4.0 min	4.2 min
8	EB – South Side Seattle Center to Eastlake	5.6 min	5.1 min
	Ramp Queue Delay at I-5 & Fairview (WB)	1.3 min	1.4 min

Similar to the AM peak hour, delays at the I-5 off-ramp to Fairview Avenue are expected to increase slightly, from 1.3 to 1.4 minutes of average delay.

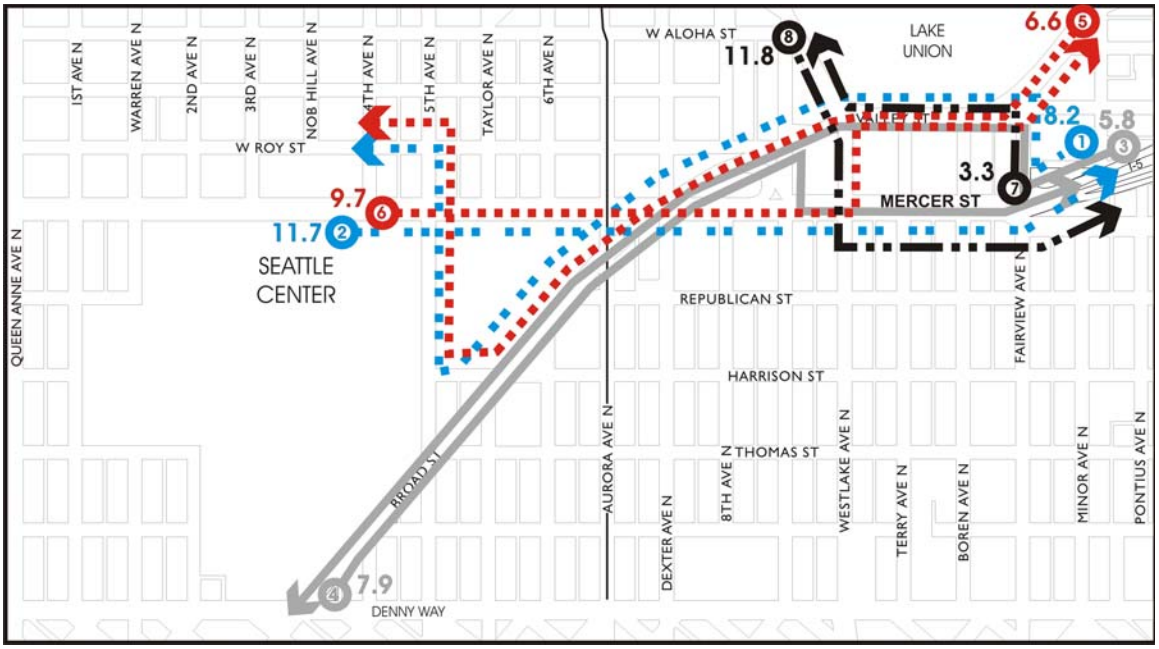

Figure 5.5 2030 Future No-Build East/West PM Peak Travel Time Path Summaries

Figure 5.6 2030 Future No-Build North/South PM Peak Travel Time Path Summaries

Identified Problems and Deficiencies in the Roadway Network

Based on the examination of the existing conditions in the South Lake Union project area and feedback from study area stakeholders, the study team identified a number of problems and deficiencies, which are listed below. Figure 5.7 also displays these issues.

- There are no direct ramp connections to SR 99 (Aurora) in the project area. All other connections require right-angle turns to and from local streets. Furthermore, some connections to/from SR 99 are practically non-existent.
- There is no direct westbound connection from I-5 to the Seattle Center, but rather a circuitous route via Fairview Avenue N., Valley Street, and Broad Street.
- The events at the Seattle Center impact traffic operations on a number of roads including: westbound Broad Street, eastbound Mercer Street, Valley Street (both directions), Fifth Avenue (both directions), southbound Ninth Avenue and Denny Way (both directions).
- Frequent southbound backups occur on Dexter Avenue at Mercer Street due to the signal timing and congestion levels on Mercer Street.
- The northbound SR 99 off-ramp to Mercer Street experiences back-ups.
- The skewed intersections along Denny Way inhibit vehicle and pedestrian flow.
- Mercer Street, Valley Street and SR 99 (Aurora Avenue) are significant barriers to pedestrians and bicyclists.
- The overall street system in the study area is not conducive to urban development.

From these issues, it was determined that the existing transportation system in the study area requires improvement to support City plans and policies, as well as planned development.

Traffic Issues

- Lack of Direct Westbound Connection From I-5 to Seattle Center
- Special Events Impact Operations On: WB Broad, EB Mercer, Valley, 5th, SB 9th and Denny
- SB Backups on Dexter Avenue at Mercer Street
- NB SR 99 Off-Ramp to Mercer Street Experiences Back-Ups
- Skewed Intersections Along Denny Way Inhibit Traffic Flow

Congested Roadways

Cross Traffic Barriers

Weaving, Limited Access and Limited Connections

High Accident Intersections

Unsignalized Intersections

Signalized Intersections

Review Signal Operations

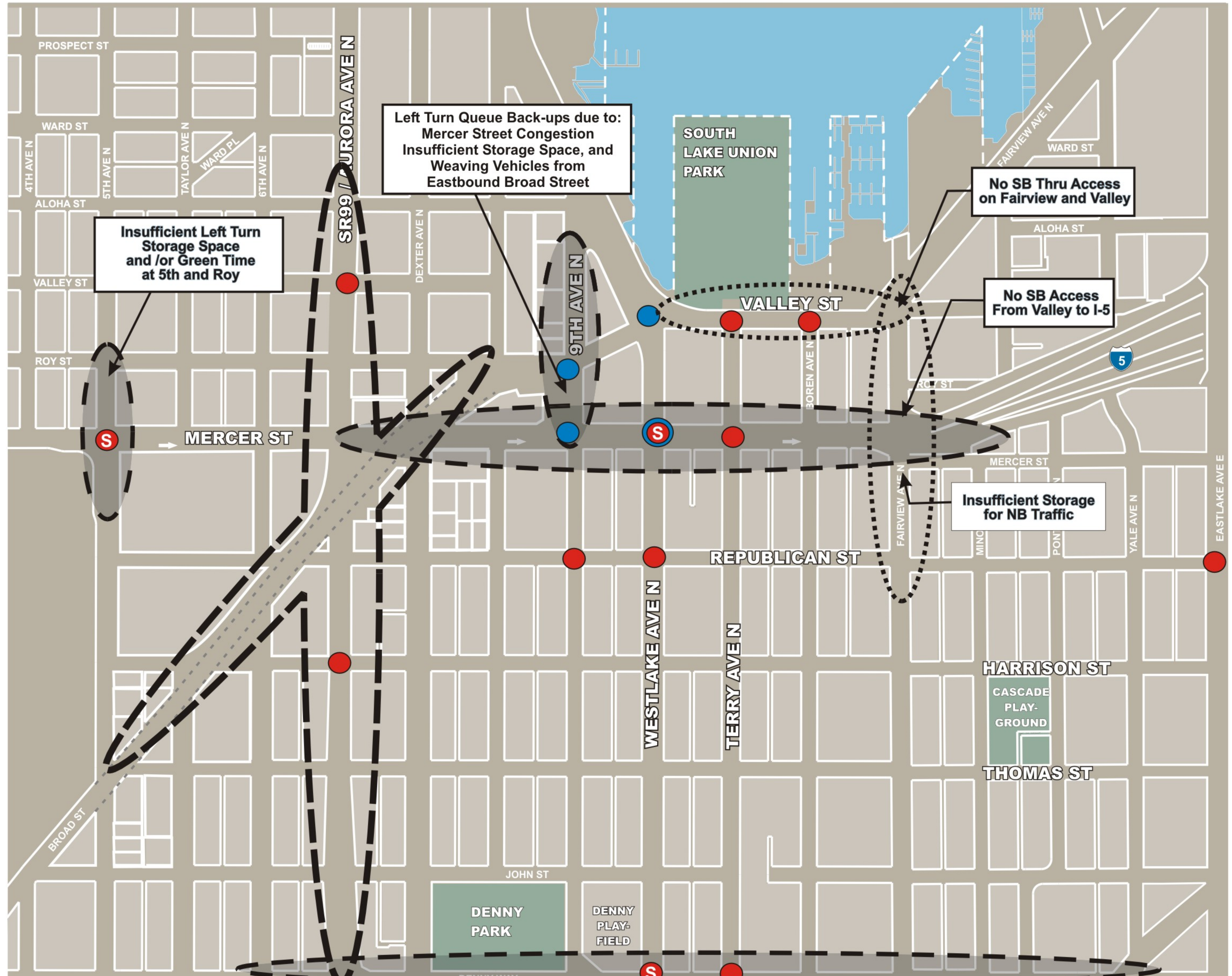

Figure 5.7: Traffic Issues in the South Lake Union Neighborhood

Transit

The year 2030 baseline model estimates the transit and HOV mode share shown in Table 5.6. Note that the travel demand model does not estimate pedestrian and bike trips, so a direct comparison to the 2000 Census data is not possible.

Table 5.6: 2030 Future Baseline Mode Share Estimates

	Mode Share	
Work Trips	**Trips to SLU Destinations**	**Trips from SLU Origins**
SOV and 2+ Carpools	78%	65%
Transit	13%	30%
3+ Carpools	9%	5%
Non-Work Trips		
SOV & Carpool	91%	88%
Transit	9%	12%

It should be noted that the PSRC Regional Demand Model (the source for mode share forecasts) assumes a three-person occupancy requirement for carpools in 2030. As a result, the mode share model estimates a lower carpool share than for 2000, where the requirement is two persons per vehicle.

The draft Comprehensive Plan update for 2004 proposes significantly higher mode share goals for the SLU and other Center City neighborhoods. The goal is that no more than 50 percent of work trips to SLU would be by SOV. The Future Baseline forecasts do no reflect this goal. However, the study recommendations presented in Chapter 8 will help us move toward that goal.

The Future Baseline model includes the 14-mile monorail Green Line connecting neighborhoods with downtown. Local transit service on existing routes is assumed to increase in the SLU area, but no additional regional service directly to the SLU area is assumed. No other specific transit improvements are assumed in the 2030 Future Baseline scenario.

Identified Problems and Deficiencies in the Transit Network

Bus service deficiencies have been identified through public meetings, stakeholder interviews, meetings with King County Metro staff, and previous studies. Following are several of the transit issues that have been identified for the SLU area:

- Need for increase transit options, reliability and ease of use
- Inadequate transit service within SLU
- Inadequate regional transit service identified to meet the needs of this growing urban village
- Streetscape is not conducive to pedestrian access to transit
- Transit vehicles are stuck in congestion at difficult intersections
- Route 70 service is perceived to be slow and overcrowded

- Some north/south transit service bypasses SLU for downtown
- There are currently limited bus shelter facilities
- There is no east/west transit service within SLU
- Some bus weaving movements are disruptive to transit and potentially unsafe (e.g., on Fairview Avenue at Mercer and Valley Streets)

Pedestrian and Bicycle

As was noted in the Existing Conditions chapter, there are a number of barriers to pedestrian and bicycle travel both within SLU and between SLU and adjacent neighborhoods. Mercer and Valley Street are difficult for pedestrians to cross and make it difficult to access the Lake Union waterfront from the rest of the neighborhood. I-5 to the east and Aurora Avenue N/SR 99 to the west present barriers to Capitol Hill and Queen Anne, respectively. There are some gaps, especially in the bicycle network, that limit the potential for these modes to serve as viable alternatives for residents, employees and others.

As can be seen in Figure 5.8, the existing non-motorized system has the following challenges:

- No east/west bicycle lanes, off-street trails, or other routes through SLU
- No north/south bike routes for cyclists from the Eastlake neighborhood and areas to the north
- Limited access to Capitol Hill, Queen Anne, and Seattle Center.
- High volumes on Mercer and Valley with no traffic control between Fairview and Dexter Avenues.
- The shared-use trail along the north side of Valley Street is in poor condition and lacks continuity.
- Long distances between signalized crossings on Denny

In addition, the general streetscape environment, while adequate, is not conducive to pedestrian travel. In particular, the narrow sidewalks and lack of landscaping along high volumes streets, like Mercer and Valley, make these streets feel unappealing and uncomfortable for pedestrians. Likewise, SR-99/Aurora Avenue and Broad Street present major barriers to pedestrian and bicycle travel by severing the street grid, accommodating high traffic volumes, and limiting access points.

As the number of people living in SLU grows, the need for a street system that facilitates safe and convenient pedestrian and bicycle circulation will become more and more important. Lack of these changes could result in a greater increase in congestion, if people continue to feel that the automobile is the only way to get around within the neighborhood.

Non-Motorized System Issues

- East Side of SLU Neighborhood Lacks a North/South Bike Facility
- No East/West Bicycle Facilities
- Very Limited and Intimidating Pedestrian Crossings of SR 99
- Difficult Pedestrian & Bicycle Environment on Valley & Mercer Streets
- Streetscape is Unfriendly for Pedestrian Travel
- Limited Access to Capitol Hill

Non-Motorized Facilities

- Bicycle Lane
- Street Commonly Used By Cyclists
- Existing Pedestrian Path
- Designated Green Street

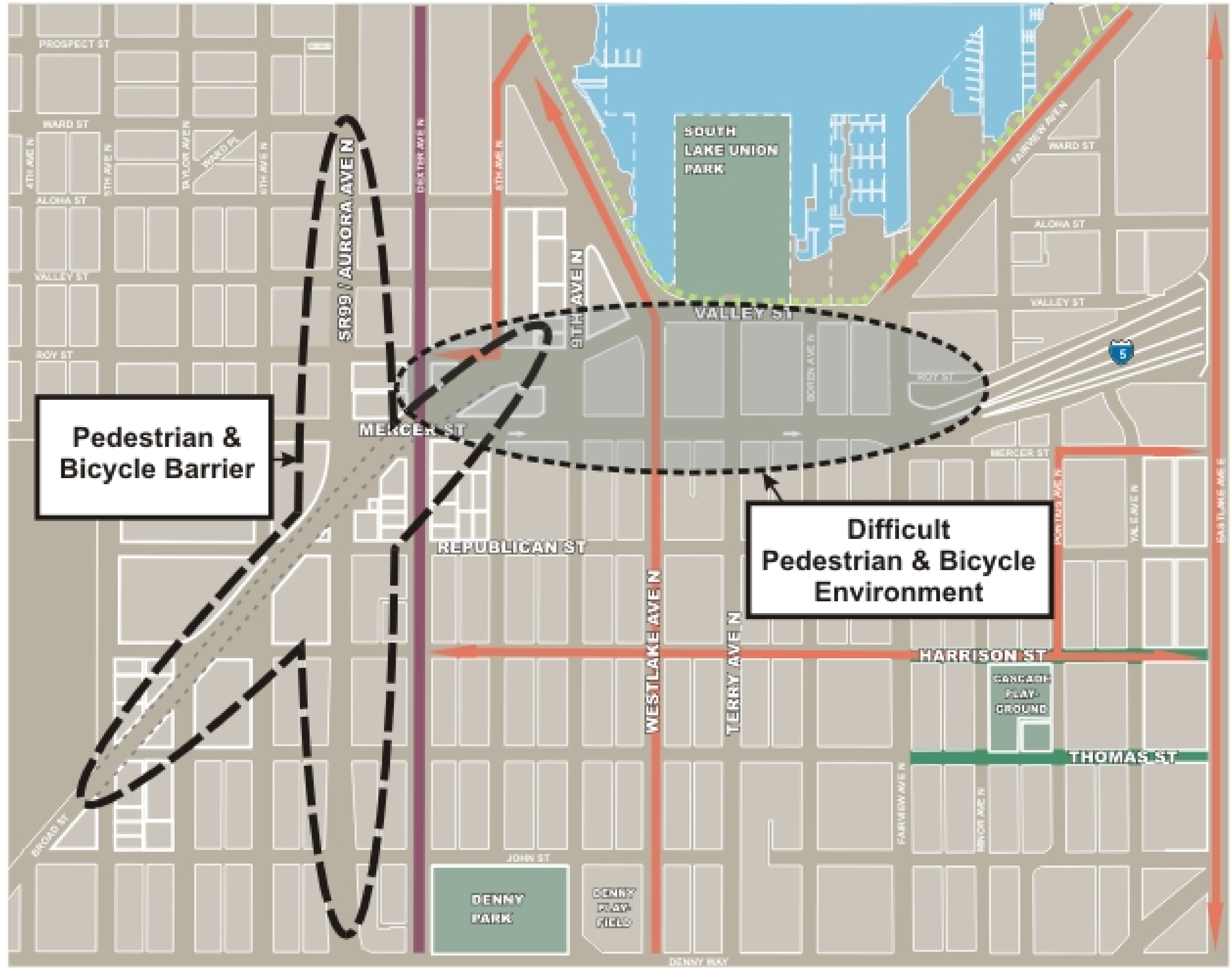

Figure 5.8: Non-Motorized Deficiencies and Areas for Improvement

Transportation Demand Management

Employment in the South Lake Union is expected to increase by over 20,000 employees by the year 2020. In addition, employment in the adjacent Denny Triangle and nearby Central Business District is expected to grow by about 40,000 jobs over the same period. Without aggressive transportation demand management this increase in employment will result in a tremendous impact on the number of vehicles traveling to and through the SLU area. This increase in activity presents a number of challenges, including impacts to the transportation system and parking.

In the year 2000 seventy-one percent (71%) of workers commuting to South Lake Union drove alone. If current commute trends continue, accommodating the transportation needs of planned growth will require nearly 11,500 new parking spaces (equivalent to about 13, eight-story garages). Providing this quantity of parking could cost private developers as much as $286 million. This estimate doesn't include the cost to replace existing surface parking that may eventually be developed, so the cost of providing parking if 71 percent of people continue to drive alone would likely be much higher. In addition to the cost of parking structures, continued use of automobiles at current rates would also significantly worsen traffic congestion for travel to and through South Lake Union. Aggressive transportation demand management will reduce these costs and impacts to manageable levels.

The Future Baseline scenario for Transportation Demand Management assumes similar TDM programs in the future as currently exist. There are several differences, however, between 2030 baseline and existing:

- The modeling analysis estimates that 13 percent of work trips to the SLU area are via transit in the future baseline network (compared to 11 percent estimated today).
- The future baseline model assumes a 1.5% per year increase in parking price.

Identified Problems and Deficiencies in the TDM Programs/Policies

The baseline scenario presented above does not reflect the type of neighborhood mode split necessary to achieve the broader goals of an accessible, sustainable, livable neighborhood. In order to achieve mode splits and travel patterns that meet the goal of a livable urban neighborhood, the City of Seattle, transit providers, developers, residents, and businesses must implement transportation strategies that differ greatly from those that inform the baseline model.

Although a number of excellent, and successful, TDM programs have been implemented in the SLU area, there are several constraints that limit the long-term goal of increasing non-SOV modes of travel in the SLU area. These include the following:

- Existing TDM programs are focused primarily on large employers (100 or more employees). Thus, these programs fail to reach employees of small companies in the area.
- Free and low cost parking is widely available in SLU. Abundant parking discourages the use of non-SOV modes.

- Parking and land use regulations permit the construction of unlimited numbers of parking spaces. This erodes the long term effectiveness of TDM.
- On-street parking is not well regulated.
- Existing transit service to SLU destinations will not support the growth in transit trips needed for effective TDM.
- The pedestrian environment is deficient in many parts of SLU. Deficiencies include physical barriers, real and perceived traffic hazards, and lack of facilities. Poor pedestrian environments discourage transit use, reduce flexibility in parking management and encourage short automobile trips.
- Bicycle conditions are poor. There is a lack of bicycle lanes, signed routes and paths through the neighborhood. There is little on-street bicycle parking. Some street surfaces are in poor condition and present obstacles to bicyclists.
- The available data regarding the supply and uses of parking is insufficient to develop an effective neighborhood parking plan.