Appendix D – DMACC – 1st Ave S Study

1ST AVENUE SOUTH IMPROVEMENT STUDY

Prepared for the:
Duwamish Multi-Modal Advisory Coalition

Convened by:

5509 1st Ave S, Seattle WA 98108
(206) 762-2470

Prepared by:

heffron
transportation, inc.

6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 fax: (206) 523-4949

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1. BACKGROUND

The Duwamish industrial area is experiencing an increasing mix of pedestrian, vehicle and freight traffic generated by a unique mix of economic activities vital to the South Downtown and City of Seattle. In addition, the community will be impacted by a number of major transportation construction projects slated for the Duwamish area in the next decade including the 1st Avenue S Paving projects, the Spokane Street Viaduct reconstruction, the Alaskan Way Viaduct replacement, SR 519 Phase 2, and various bridge rehabilitation projects. Over the long term the area would also be impacted by a Lander Street Overpass project and I-5 repair and repaving.

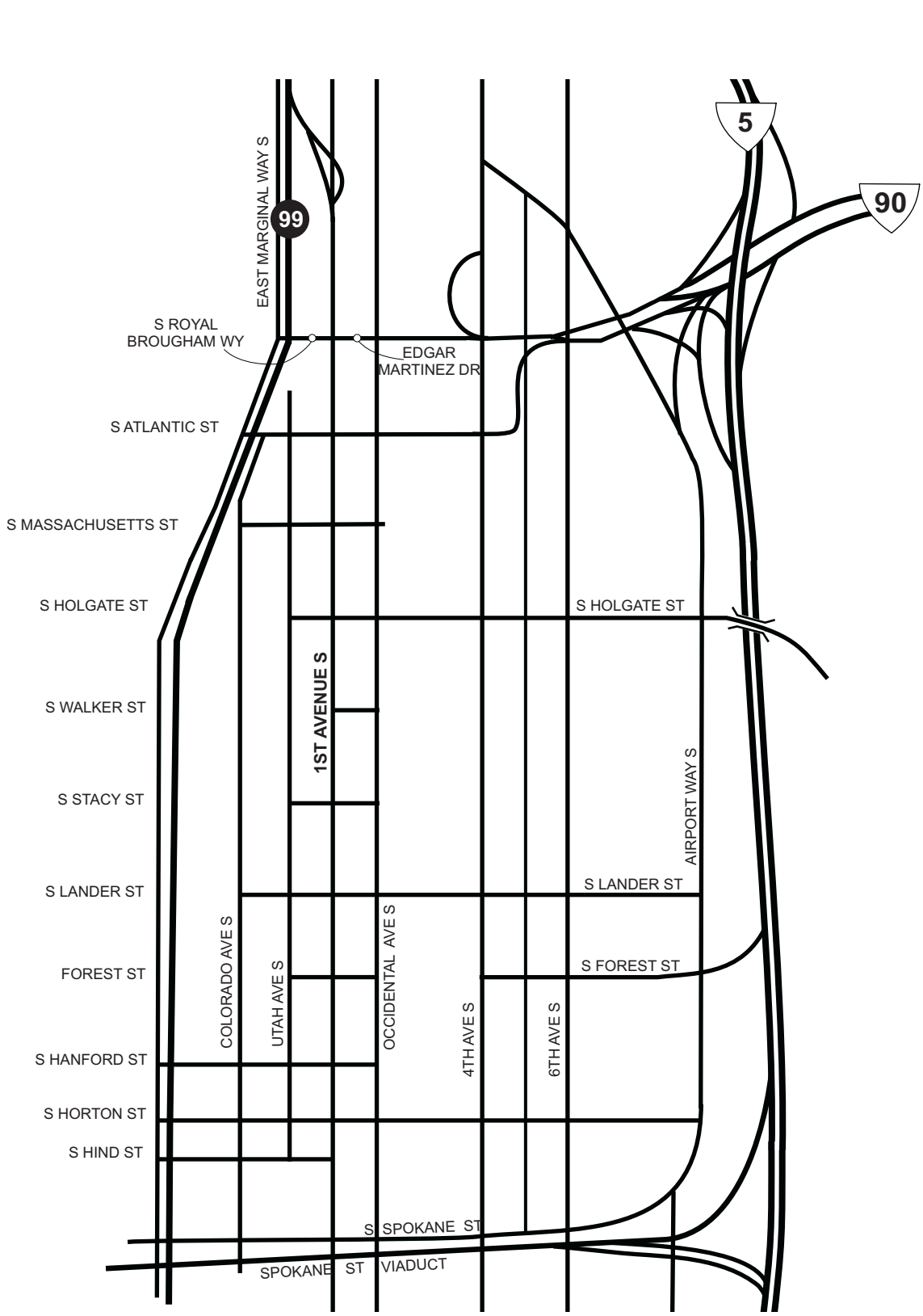
To address these critical issues, the business community formed the Duwamish Multi-Modal Advisory Coalition (DMMAC). Members of the DMMAC are listed in Appendix A. The first project undertaken by the DMMAC was to reach consensus on potential improvements for the 1st Avenue S corridor between S Spokane Street and Royal Brougham Way. Funding for this project was obtained from the Small and Simple Projects grant from the City of Seattle Neighborhood Matching Fund Program.

The DMMAC met four times during the study. The meetings followed a sequential progression in order to reach a comprehensive set of recommendations for the corridor. The primary focus of each meeting is listed below.

Meeting #1: Existing Issues and Needs (April 2008)
Meeting #2: Initial Improvement Concepts (May 2008)
Meeting #3: Preliminary Recommendations (July 2008)
Meeting #4: Final Recommendations (September 2008)

The results of both the technical information prepared for the DMMAC and the transportation issues of concern raised by the DMMAC are presented in this report. The recommendations will be delivered to the Seattle Department of Transportation (SDOT) and the Seattle City Council.

The corridor study area extends from S Spokane Street to S Royal Brougham Way and includes Utah Avenue S and Occidental Avenue S. The corridor and vicinity is shown in Figure 1.



1st AVENUE S
Improvement Study

Figure 1

Vicinity Map

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2. EXISTING CONDITIONS AND NEEDS

A detailed street inventory was prepared to facilitate discussions with the DMMAC, and therefore includes features of concern expressed by the DMMAC. Examples include the poor definition of driveways and sidewalks, the underutilized two-way left turn lane, access and loading needs for industrial and manufacturing businesses, and lack of bicycle facilities. The street inventory is presented below followed by a summary of the DMMAC issues and needs.

2.1. Street Inventory

Heffron Transportation prepared a detailed inventory of all street features and land uses along 1st Avenue S. Detailed maps for ten segments are in Appendix B of this report. The existing right-of-way on 1st Avenue S between Royal Brougham Way and S Spokane Street is 100 feet, and the curb-to-curb width is 68 feet. The inventory identified all street features within the street right-of-way such as travel lanes, parking, active and inactive driveways, landscaping, sidewalks and bus stops. Land uses include industrial, manufacturing, wholesale and retail building supplies, the Starbuck's Center, and off-street parking lots. There is curb-side parking along much of 1st Avenue S, and most of it is signed with time limits for the duration that a vehicle can park. Parking is prohibited during the PM peak period southbound, beginning just north of S Hanford Street and extending to S Spokane Street. The curb space is actively used for load/unload activities by the industrial and manufacturing businesses and building supply stores.

2.2. Issues and Needs

This section includes a summary of the transportation issues and needs discussed at the first two DMMAC meetings. Photographs with examples are presented in Figure 2.

Traffic Operations, Safety, and Mobility

- The South Downtown (SODO) area needs enough routes to satisfy all modes and therefore reduce the need for 1st Avenue S to satisfy all the volume from all modes.
- Increasing traffic volumes and the resulting congestion are reducing mobility.
- The following three intersections on 1st Avenue S were identified as high priority for improving operations and safety: at S Atlantic Street, at S Lander Street, and at Spokane Street.
- The pavement on S Stacy Street east of 1st Avenue S needs to be replaced or improved.
- Truck mobility during construction of the many major projects in the vicinity is a concern. The DMMAC has limited knowledge of mitigation plans and needs to know in order to provide feedback to protect freight mobility.
- Conditions on Colorado Avenue S are terrible (poor pavement, narrow width). This is the main access to the North SIG Yard.
- Some businesses require both customer and truck access directly from 1st Avenue to function because access behind the business is restricted.
- Better signage is needed.

Pedestrian Conditions

- Improve pedestrian environment to encourage walking.
- Improve pedestrian safety including the "perception of safety" to encourage walking.
- Pedestrian safety is a major concern at 1st Avenue South and S Lander Street. Pedestrian safety is also a concern on 1st Avenue S at S Stacy Street and S Walker Street.
- Increasing traffic volume and congestion is a detriment to the pedestrian environment and safety.

Bicycle Movement

- Need better understanding of origins and destinations and preferred routes by bicycles in order to identify the more cost effective bicycle facility investments.

Transit Service

- There is a major concern with the reliability of transit. There is currently no east-west transit service in SODO, and the rail crossing of S Lander Street prevents this route from providing a reliable connection between 1st Avenue S and 4th Avenue S. In addition, buses on 1st Avenue are frequently off-schedule.
- The origin of many employees is not well served by transit on 1st Avenue S.
- Consider strategies to shift more drivers to transit to reduce traffic volumes on 1st Avenue S. Transit service solutions are needed to capture more riders.

Parking

- There is a lot of free and unorganized parking. Free parking encourages employees to drive to work.
- Unorganized and unofficial parking on the back side of buildings (along Occidental Avenue S and Utah Avenue S), restricts truck access to businesses.
- All available parking fills up during Stadium events. Businesses cannot function and parking takes away from serving customers.
- SDOT is considering transit -only lanes on 1st Avenue S, with peak period parking eliminated. Loss of on-street loading for some businesses would be a major concern. *Postscript:* SDOT will **not** implement those lanes in the short-term as part of the 1st Avenue S repaving project. They could be implemented in the long-term if and when transit service increases to warrant them.

Figure 2. Photos of Street Conditions – 1st Avenue South

Example of poor condition of sidewalk and driveways, including driveways no longer in use.

Typical Example of Driveway no longer in use.

East side of 1st Avenue S north of S Lander Street – example of parking outside of roadway.

Example of southbound car at S Lander Street stopped in crosswalk.

Example of vehicle in crosswalk with pedestrians.

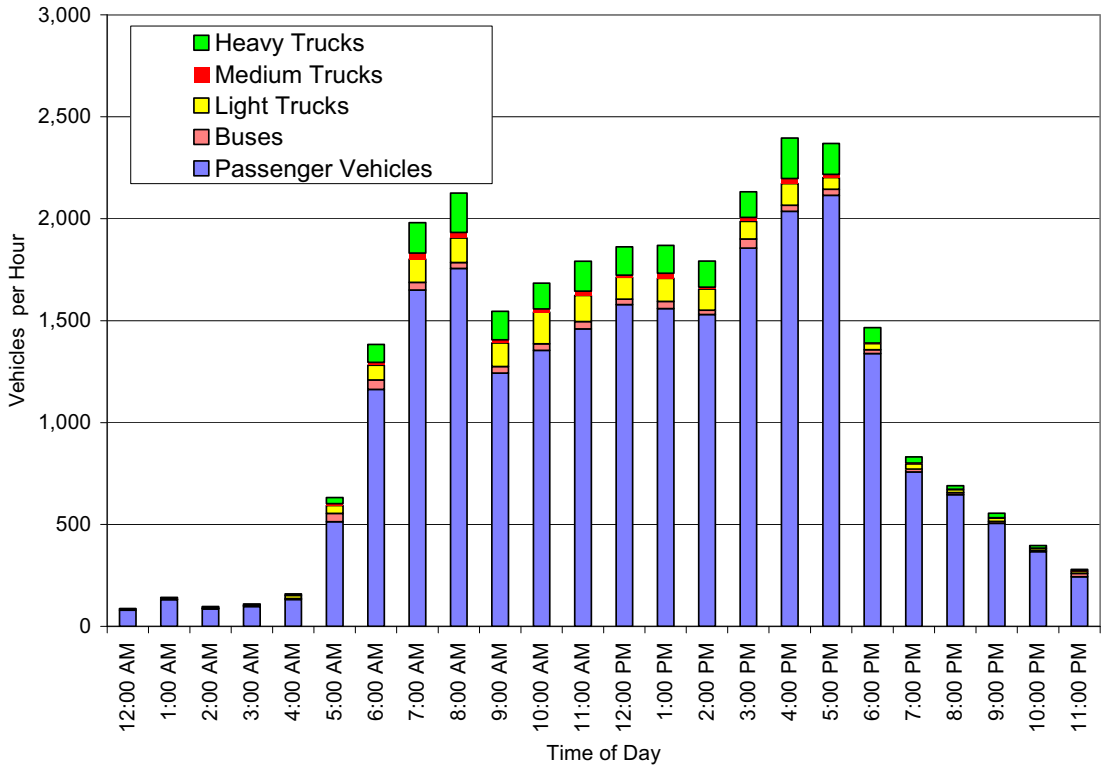
Example of side street parking on S Forest Street, west leg.

Source: Photos by Heffron Transportation, Inc., May, and July 2008.

2.3. Existing Traffic Volumes

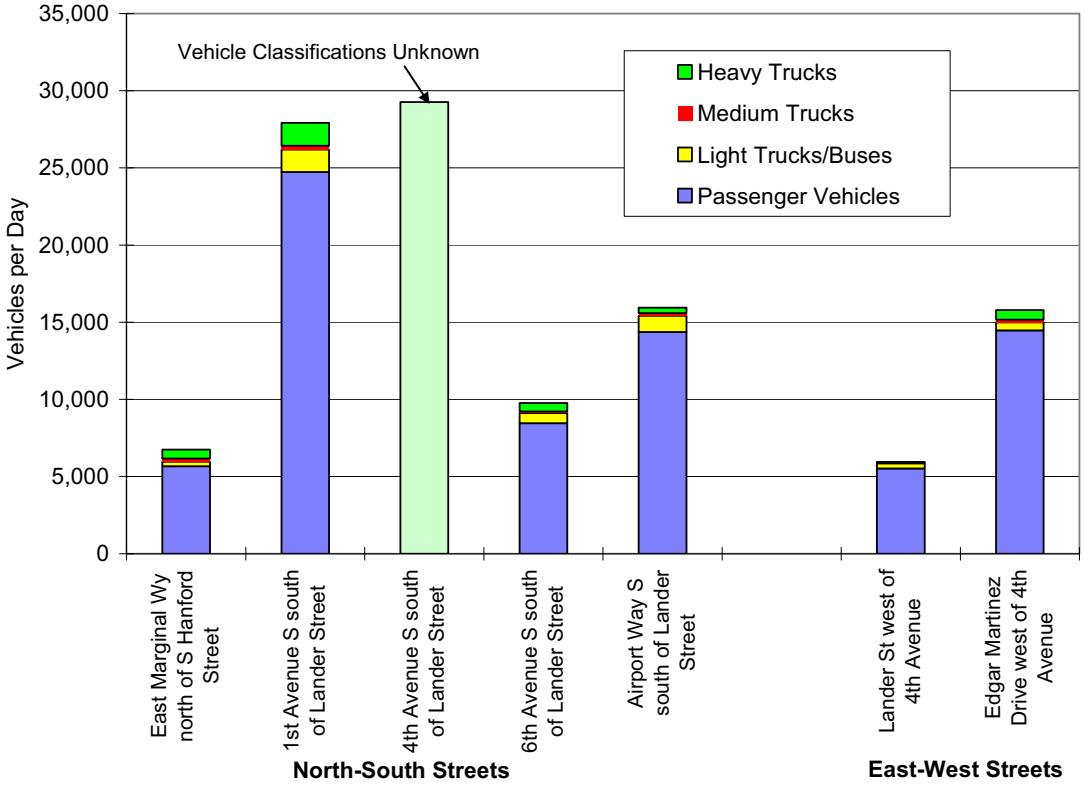
Hourly traffic volume data were obtained from SDOT on 1st Avenue S, south of S Lander Street and are presented in Figure 3. The hourly traffic volumes show both the AM and PM peak periods for commuter traffic as well as relatively high volume midday of industrial and manufacturing centers. Heavy trucks use 1st Avenue S during the both the midday and peak commute periods. Typically arterials show lower heavy vehicle volumes during peak commute periods than midday. Daily traffic volumes on 1st Avenue S relative to other streets in the vicinity are shown in Figure 4.

Figure 3. Existing (2007) Hourly Traffic Volumes on 1st Avenue S



Source: ount perfor ed by Traffic ount onsultants, Inc., May 200 . o piled by Heffron Transportation, Inc.

Figure 4. Comparison of Existing (2007) Daily Arterial Traffic Volumes

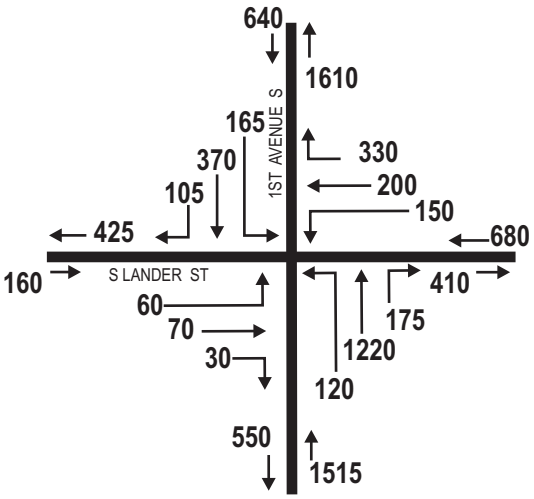


Source: ounts perfor ed by Traffic ount onsultants, Inc , May and June 200 . o piled by Heffron Transportation, Inc.

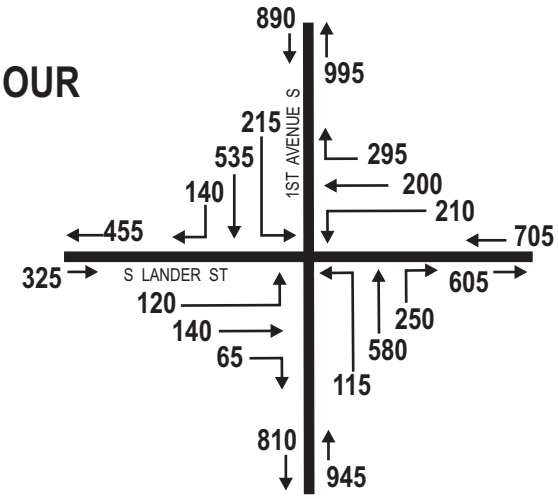
Hourly turning movement traffic volumes at the S Lander Street/1st Avenue S intersection were collected as part of the Lander Street Grade Separation project. The AM, midday, and PM peak hour traffic volumes are shown in Figure 5. This is the highest volume intersection on 1st Avenue S between S Atlantic Street and S Spokane Street. During all three peak periods, the highest conflicting movements, also called the "critical movements" at an intersection because these movements dictate the signal timing. The critical movements are the northbound through movement and the southbound left turn movement from 1st Avenue to eastbound Lander Street.

N

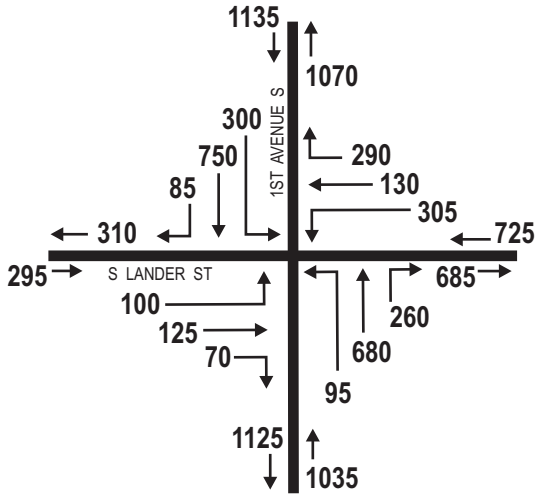
AM PEAK HOUR



MIDDAY PEAK HOUR



PM PEAK HOUR



Source: *South Lander Street Grade Separation Project, Transportation Technical Report*, Heffron Transportation, Inc., January 30, 2008.

1st AVENUE S Improvement Study

Figure 5
Existing (2007) Peak Hour Traffic Volumes at the S Lander Street/1st Avenue S Intersection

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2.4. Transit Service and Bus Stop Locations

There are nine King County Metro bus routes on 1st Avenue S. Routes 21 and 22 provide service from Roxhill and White Center to North Downtown. Route 35 provides service from Harbor Island to North Downtown via 4th Avenue S, 1st Avenue S, and S Lander Street. Routes 56 and 57 provide service from West Seattle to Downtown with Alaskan Way Viaduct express service. Routes 116, 118, and 119 provide service from Vashon Island to North downtown. Route 132 provides limited service from Des Moines and Highline Community College to North Downtown. Bus routes on 1st Avenue S carry a mix of commuters going through SODO as well as with destinations within SODO.

There are seven bus stops in each direction along this approximately 1.43-mile section, from S Spokane Street to S Royal Brougham Way. The average bus stop spacing is 0.20 miles. This compares to Metro's minimum standard that all bus stops be located such that any walk distance to a bus stop is no more than 0.25 miles. Bus stops could be up to 0.50 miles apart to meet this standard. Closely spaced bus stops result in significant delay to bus travel times.

According to model data from the Puget Sound Regional Council (PSRC), transit carries approximately 19% of all trips to SODO. Table 1 shows the split in transit versus vehicle trips.

Table 1. SODO Daily Vehicle and Transit Trips (2006)

Mode	To S D
Transit	2, 80
ehi le	0,6 0
Total	62,8 0
Per ent Transit	

Source: Pu et Sound e ional ouncil e2 Model, May 200 . Includes all daily transit trips fro in , Pierce, Snoho ish, and itsap ounties plus e ternal to these counties.

2.5. Traffic Collision History

Collision data for study area intersections and street segments on 1st Avenue S were obtained from Seattle Department of Transportation (SDOT). These data were examined to determine if there are any traffic safety conditions that could be addressed with improvements to 1st Avenue S. The City of Seattle collision data reflect the period between January 1, 2003 and March 12, 2008 (a little over five years). Intersection collision data are summarized in Table 3 and roadway segment collision data are summarized in Table 4.

Table 2. Collision Summary at Intersections (January 1, 2003 – March 12, 2008)

nterse tion ith st Avenue S	Rear End	Side-Swipe	Ri ht Turn	eft Turn	Ri ht An le	Ped Bi y list	ther[2]	Total for ears	Av ear
Signali ed ntersections									
S Royal Brou ham ay		6	0			P B	0	6	0
S Atlanti St		2		2		P		6	6 8
S ol ate St	0	2			2	PS	0		
S Sta y St	0	0	0	0	2	P			0 8
S ander St			0			2P	0	2	0
S orest St	0	0	0	0	0	0			0 2
S anford St	0		0			P	0	0	
S orton St		0	0	0	2	0			0 8
S Spo ane St westbound roadway	2	2	0	2	8	P	2		2
S Spo ane St eastbound roadway		8	0	0		0	2		0 8
nsignali ed ntersections									
S Massa husetts St			0			P	0		
S al er St	2	0	0	0		0			0 8
S inds St	0		0		0	0	0	2	0

Source: ity of Seattle epart ent of Transportation, March 2008.

. P pedestrian in cross al , bicyclist in cross al , PS pedestrian standin , P pedestrian crossin at an un ar ed cross al .

2. ther collisions includes ehicles a in ille al aneu ers, ehicles o erturnin or spun out, ehicle hittin ob ect either on or off the road ay or o in ehicle hittin a par ed car.

. t this intersection of the 8 sides ipe collisions and all of the ther collisions appear to in ol e ille al ri ht or left turns. t this intersection there are four eastbound tra el lanes. T o of the lanes ori inate fro the Spo ane Street iaduct off ra p and t o of the lanes ori inate fro the Spo ane Street south road ay.

The highest collision rate occurred on the south roadway of S Spokane Street where the number of collisions average 10.8 per year. The SDOT considers 10 collisions per year at an intersection as a high collision location. At this intersection, 15 of the 18 collisions were sideswipes and all of the other collisions appear to involve illegal right or left turns. This is likely due to the unusual lane configuration where four lanes come together: two lanes originate from the Spokane Street viaduct off-ramp and two lanes originate from the Spokane Street south roadway. On the south Spokane Street north roadway, four of the seventeen collisions involved vehicles traveling eastbound, against the one-way westbound traffic flow.

The highest number of pedestrian collisions occurred at S Royal Brougham Way, followed by S Lander Street. There was one pedestrian collision at S Massachusetts Avenue in 2006 that was a pedestrian crossing without a marked crosswalk.

Table 3. Collision Summary by Street Segment (January 1, 2003 – March 12, 2008)

Street Se ment Alon st Avenue S	ead- n	Rear-End	Side-Swipe	Ri ht Turn	eft Turn	Ri ht An le	Pedestrian or Bi y list	Par ed ehi le	b e t	ther[2]	Total for ears	Avera e Per ear
Royal Brou ham ay and S Atlanti St		2		0		2	2PS	2		2	2	6 0
S Atlanti St and S Massa husetts St	0			0			P		0			2
S Massa husetts St and S ol ate St	0		0	0			2PS R	6	2		2	0
S ol ate St and S al er St		2		0		0	0		0	0		2 6
S al er St and S Sta y St	0	6		0	0		0					2
S Sta y St and S ander St	0				0	2	0		0			6
S ander St and S orest St	0			0				0	0	0	8	
S orest St and S anford St	0	0	0	0	0	0	0		0	0		0 6
S anford St and S orton St	0	6		0	0		0		0	0	2	2
S orton St and S inds St	0		2	0		0	0	0	2	0	8	
S inds St and S Spo ane R St							PS	0	2	2	2	
Spo ane St R and Spo ane St SR	0	0		0		0	0	0		0		0 6

Source: ity of Seattle epart ent of Transportation, March 2008

. P pedestrian in cross al , bicyclist in cross al , PS pedestrian standin , PM pedestrian crossin at an un ar ed cross al , bicyclist off road.

2. ther collisions includes ehicles a in ille al aneu ers, ehicles o erturnin or spun out, or no dia ra included ith collision report.

The highest collision rate for a street segment was 6.0 collisions per year between S Royal Brougham Way and S Atlantic Street. Most of these collisions were sideswipes. The next highest rate was 5.5 collisions per year between S Hinds Street and the S Spokane Street on the north roadway. Most of these collisions were also sideswipes.

Field observations were performed at 1st Avenue S and S Landers Street during the morning commute to identify sources of vehicle/pedestrian conflict so that safety counter measures could be recommended. The following pedestrian safety concerns were observed.

- Many vehicles entered the intersection at the end of the yellow phase and were still within the intersection when the signal turned red.
- The highest volume of pedestrians was observed in the morning crossing westbound across the north leg of 1st Avenue S. This flow likely reverses to eastbound during the afternoon due to the location of the Starbucks Center.

- Most right turning vehicles made a rolling stop at all corners. Thus, many vehicles were within the crosswalk at the same time as pedestrians.

- The westbound right turning motorist attempted to complete the right as soon as possible, inching out around the westbound pedestrian and violating RCW 46.61.235.[1]

- Some pedestrians were observed crossing S Lander Street when vehicles on 1st Avenue S had a green arrow for a left turn. The pedestrians had a Do Not Cross signal, but appeared confused as to why the walk phase was not displayed when there was apparently no east-west through traffic.

3. FRAMEWORK FOR IMPROVEMENTS

Any changes to the 1st Avenue S corridor must consider a complex array of plans, programs, near term and long term projects, and transit plans. The DMMAC's recommendations fit within the framework of the City's adopted street classifications as well as King County Metro's transit plans. Both of these are described below.

The community will be impacted by a number of major transportation construction projects slated for the Duwamish area in the next decade including the 1st Avenue S Paving projects, the Spokane Street Viaduct reconstruction, the Alaskan Way Viaduct replacement, SR 519 Phase 2, and various bridge rehabilitation projects. Over the long term the area would also be impacted by a Lander Street Overpass project and I-5 repair and repaving. The DMMAC also considered the needs and potential impacts of these other projects in its recommendation.

3.1. Street Classifications

1st Avenue S is a Principal Arterial and serves both local and through traffic associated with industrial and manufacturing businesses, the Port of Seattle and supporting businesses, commuters to SODO and downtown, local retail and wholesale customers, buses, pedestrians, and bicyclists. The parallel streets of Utah Avenue S to the west and Occidental Avenue S to the east provide some local circulation function for the neighborhood, but do not serve much, if any, through traffic due to their lack of continuity north and south of the neighborhood and extremely poor condition.

There area six other north-south arterials in the SODO district. The street classification for 1st Avenue S and the other north-south arterials is summarized in Table 4. The City of Seattle's street classification systems identifies a hierarchy for each street based on the need to serve all modes of traffic.

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1. Revised Code of Washington (RCW) 46.61.235. The operator of an approaching vehicle shall stop and remain stopped to allow a pedestrian or bicycle to cross the roadway within an unmarked or marked crosswalk when the pedestrian or bicycle is upon or within one lane of the half of the roadway upon which the vehicle is traveling or onto which it is turning. For purposes of this section "half of the roadway" means all traffic lanes carrying traffic on one direction of travel, and includes the entire width of a one-way roadway.

Table 4. SODO North-South Street Designation

Arterial	Arterial lassification[1]	Freight lassification	Annual Tonnage lass	Transit lassification	urrent eak us eadways	icycle Facility ecommendation
SR	Prin ipal	Ma or Tru Street	T : 00 to ,000	Ma or Transit Street	at - minutes at 20-2 minutes at 0 mintues [a]	E istin Bi e lane overlaid with Si ned Bi e Route plus pro e t 0
East Mar inal ay	Minor	Ma or Tru Street	T : over 0,000	Minor Transit Street	none	ot lassified
st Avenue S	Prin ipal	Ma or Tru Street	T2: ,000 to 0,000	Ma or Transit Street	at 0 minutes at 60 minutes	Sharrow wide lane shared with vehi les
th Avenue S	Prin ipal	Ma or Tru Street	T : over 0,000	Prin ipal Transit Street	at 0 minutes at -20 minutes	ot lassified
E Busway	ot lassified	ot Classified	ot Classified	o al Transit Street	at - 0 minutes	E istin multi-use trail over-laid and Si ned Bi e Route[6a]
6th Avenue S	Minor	Ma or Tru Street	T : 00 to ,000	o al Transit Street north of ol ate	routes north of ol ate	Bi y le ane
Airport ay South	Prin ipal	Ma or Tru Street	T : over 0,000	Ma or Transit Street	at 0 minutes 2 at 60 minutes	urther study needed

. Seattle rterial lassifications Plannin Map, ece ber 22, 200 .

2. rei ht Mobility Strate ic ction Plan, S T, June 200 , pa e .

. nnual tonna e class per S T rei ht and oods Transportation Syste ap, oad ay 200 , ashin ton State epart ent of Transportation

. Seattle Transit lassifications ap, 200

. in ounty Metro Ser ice Plannin May 2008. a sti ated fro Metro Schedules.

. Seattle icycle Master Plan. Pro ect 2 is ac uisition of abandoned railroad ri ht of ay to continue e istin us ay Trail south bet een S orest Street and Spo ane Street.

3.2. SDOT - 1st Avenue S Paving Project

SDOT plans to repave 1st Avenue S as part of its *Bridging the Gap* program. This will be completed in three phases. The first phase, started in 2008, will repave the segment between S Dearborn and S Stacy Streets. This same phase includes paving south of S Spokane Street to East Marginal Way S. The second phase, scheduled for 2009, would repave the segment between S Stacy Street and S Horton Street. This segment requires complete reconstruction (including removal of the subsurface) to address structural, drainage, and severe crown issues. The third and final phase will repave the segment between S Horton Street and S Spokane Street. This is scheduled to occur in 2009-2011 with construction of the Spokane Street Viaduct improvements.

During the first phase of repaving, much of the work will occur at night and traffic impacts would be minimal. However, during Phase 2 when full reconstruction of the street is required, there will be severe impacts during construction with lane closures that would occur during daytime hours. It is expected that there will be two northbound lanes and one southbound lane from approximately January to July. Overall construction could last for 10 to 11 months, but SDOT is attempting to shorten construction to six months.

The repaving project will not change the curb to curb width or lane configuration on this street. The width will remain at 68 feet and lanes will be restriped as they are today. SDOT will add "sharrows" in the curb lanes to indicate that these lanes should be shared with bicyclists. SDOT did consider striping transit lanes on 1st Avenue S; however, it was determined that the existing transit volumes are not high enough to warrant such lanes. SDOT would reconsider the need for transit lanes in the future if and when transit volumes increase, or as a temporary measure to accommodate detoured transit during Alaskan Way Viaduct reconstruction. If transit lanes are striped, operation of them must consider the loading needs for businesses that front 1st Avenue S. The DMMAC noted that two businesses – O.B. Williams and Millwork Supply – have their only viable access from 1st Avenue S.

3.3. King County Metro - Transit Enhancements

King County Metro is planning to relocate and consolidate transit stops on 1st Avenue S in conjunction with both the 1st Avenue S repaving project and Spokane Street Viaduct project. In addition, service changes are being planned to coordinate with the opening of Sound Transit's Link Light Rail Transit (LINK). These elements are described below.

Bus Stop Consolidation

There are seven bus stops in each direction along this approximately 1.43-mile section, from S Spokane Street to S Royal Brougham Way. The average bus stop spacing is 0.20 miles. This compares to Metro's minimum standard that all bus stops be located such that any walk distance to a bus stop is no more than 0.25 miles. Bus stops could be up to 0.50 miles apart to meet this standard. Closely spaced bus stops result in significant delay to bus travel times due to the dwell time at each stop.

Metro has evaluated the bus stops along 1st Avenue S and proposes the following changes:

- Close the southbound stop just north of S Spokane Street when the new on-ramp from 1st Avenue S to the Spokane Street Viaduct is complete. The new ramp will extend north to S Hinds Street and be accessed from the center lane on 1st Avenue S. This particular stop is too far south to serve buses destined to West Seattle.

- Add a pair of new stops at S Hanford Street. These will better serve buses destined to West Seattle.
- Remove southbound stop south of S Forest Street. This will be replaced with new stops located north and south.
- Add a southbound stop just south of S Lander Street creating a pair of stops.
- Remove the pair of stops at S Walker Street that have very low usage.

The DMMAC noted that it is important to locate transit stops at streets that provide the east-west connections across the BNSF Railways mainline tracks. In addition, pedestrian improvements on S Lander Street, including the future grade-separation, are very important to connect the 1st Avenue S corridor with the LINK station at S Lander Street.

Link Light Rail Transit (LINK) Service Integration and Rapid Ride

Sound Transit's LINK will have station at S Royal Brougham Way and at S Lander Street. Metro will restructure routes to serve the LINK stations and increase efficiency and ridership on existing routes. The community process for service changes will begin in September 2008 with two community outreach meetings in September and October and two meetings in the winter of 2009. Service changes will occur in September 2009 and February 2010.

Metro is considering opportunities to improve east-west service from the Rainier Valley to SODO and to West Seattle. With service changes Metro can improve connections to LINK and improve service to other areas of SODO, for example Airport Way S.

Planning for the West Seattle and Ballard *Rapid Ride* service is underway. *Rapid Ride* was approved by voters in 2006 as part of King County Metro's *Transit Now* program, and is proposed to provide higher capacity and more frequent service along three major corridors: Ballard, West Seattle, and Aurora. It is likely that the West Seattle route will use the West Seattle Bridge and SR 99/Alaskan Way Viaduct to access downtown Seattle. Therefore, it would bypass SODO.

3.4. Major Construction Projects

Discussion of 1st Avenue S inevitably leads to discussion of major construction projects on the horizon. At issue are the potential impacts that construction of these other projects could have along 1st Avenue S. At the same time, project construction mitigation may also provide opportunities for improvements. The DMMAC is most concerned about the three largest projects: SR 519 Phase II, Alaskan Way Viaduct, and the Spokane Street Viaduct. These are briefly described below.

SR 519 Phase II
This project, scheduled to begin construction in 2008, would add lanes to the 1st Avenue S/Edgar Martinez Drive/Atlantic Street intersection, add an eastbound off-ramp from I-90 to Edgar Martinez Drive, and build a new grade-separated roadway on Royal Brougham Way.

Alaskan Way Viaduct
Construction of the South End improvements to the Alaskan Way Viaduct began in 2008 with utility relocation. The project will remove the Viaduct sections south of about S King Street, construct a new railroad grade-separation at S Atlantic Street, and provide a truck bypass route of the railroad tracks.

Planning for the central section of the Viaduct continues. As of September 2008, there are eight alternatives with mix-and-match components being considered by the Tri-Agency project partners: WSDOT, SDOT, and King County Metro. A preferred alternative is scheduled to be selected by the end of this year.

The removal of the viaduct also equates to a loss of 1,400 parking spaces under the Alaskan Way Viaduct, either during construction or permanently. This loss of spaces would increase parking demand in the SODO area.

4. RECOMMENDED IMPROVEMENTS

The 1st Avenue S plan includes a comprehensive package of recommendations for improved mobility of through and local traffic. The recommendations consider the complex issues associated with a multi-modal system of cars, trucks, buses, bicycles and pedestrians. Additionally, all improvements are consistent with SDOT plans and policies based on street classifications along for the 1st Avenue S corridor. Improvements on 1st Avenue S include recommendations for bus stop relocations, sidewalks, bicycle facilities, transit service, parking, and freight mobility. However, in the long term, mobility would be maximized on 1st Avenue S with improvement of the cross streets and parallel streets of Utah Avenue S and Occidental Avenue S. The improvements to these streets are also addressed below. All projects are recommended in phases – short term (within the next 5 years), medium term (5 to 10 years), and long term (10+ years). Finally, the 1st Avenue S recommendations address mobility management during construction of major project that would affect the neighborhood.

4.1. 1st Avenue S Lane Configuration

Short term (Within next 5 years):

a. Restripe lanes the same as the existing configuration when SDOT completes the 1st Avenue S paving project. The cross section has a center two-way left-turn lane with turn pockets at the intersections, two through lanes in each direction, a bicycle "sharrow," and parking lanes.

Medium term (5 to 10 years):

b. As properties redevelop along 1st Avenue S, relocate driveways to side streets or on Occidental Avenue S and Utah Avenue S. Close driveways no longer in use along 1st Avenue S, which would allow removal of the center two-way left turn lane between intersections. Widen the travel lanes when center two-way left turn lane is removed.

c. Continue to review and improve signal coordination along 1st Avenue S, providing priority to 1st Avenue S traffic and movements to major cross streets such as S Lander Street.

Long term (10+ years):

d. Reconfigure the section of 1st Avenue S between S Lander Street and S Spokane Street to include Business Access and Transit (BAT) Lanes in both directions when S Lander Street grade-separation project is complete. This would likely require removal of the center, two-way left turn lane to provide a widened transit lane through this section. These BAT lanes would serve increased transit

e. Reconfigure 1st Avenue S between S Lander Street and S Atlantic Street to include a BAT lane in both directions if and when transit volumes on 1st Avenue S north of S Lander Street increase to a level that could justify a BAT lane (estimated to be a minimum of 15 to 20 buses per hour).

4.2. 1st Avenue S Bus Stop Relocation

Short term:

a. Metro desires to consolidate and organize the bus stops along 1st Avenue S. In addition, the proposed new ramps to and from the Spokane Street Viaduct will require removal of the southbound existing bus stop located between S Hinds Street and S Spokane Street. The existing and proposed bus stop locations are shown on Figure 6.

b. Metro plans to add shelters to bus stops between S Lander Street and S Spokane Street in conjunction with bus stop consolidation.

Long term:

c. Add a stop for southbound buses on the south side of S Lander Street when the S Lander Street Grade-Separation project is complete. It is assumed that Metro would add substantial bus traffic to S Lander Street when it is grade-separated from the railroad tracks as this provides a needed east-west connection between the Spokane Street Viaduct and the LINK station at S Lander Street. The stops located just south of S Lander Street could serve routes along both 1st Avenue S as well as those that turn to S Lander Street. Because the S Lander Street Grade Separation Project includes a dual westbound left turn lane at 1st Avenue S, adding the stop south of S Lander Street would require additional right-of-way on 1st Avenue S.

4.3. Utah Avenue S

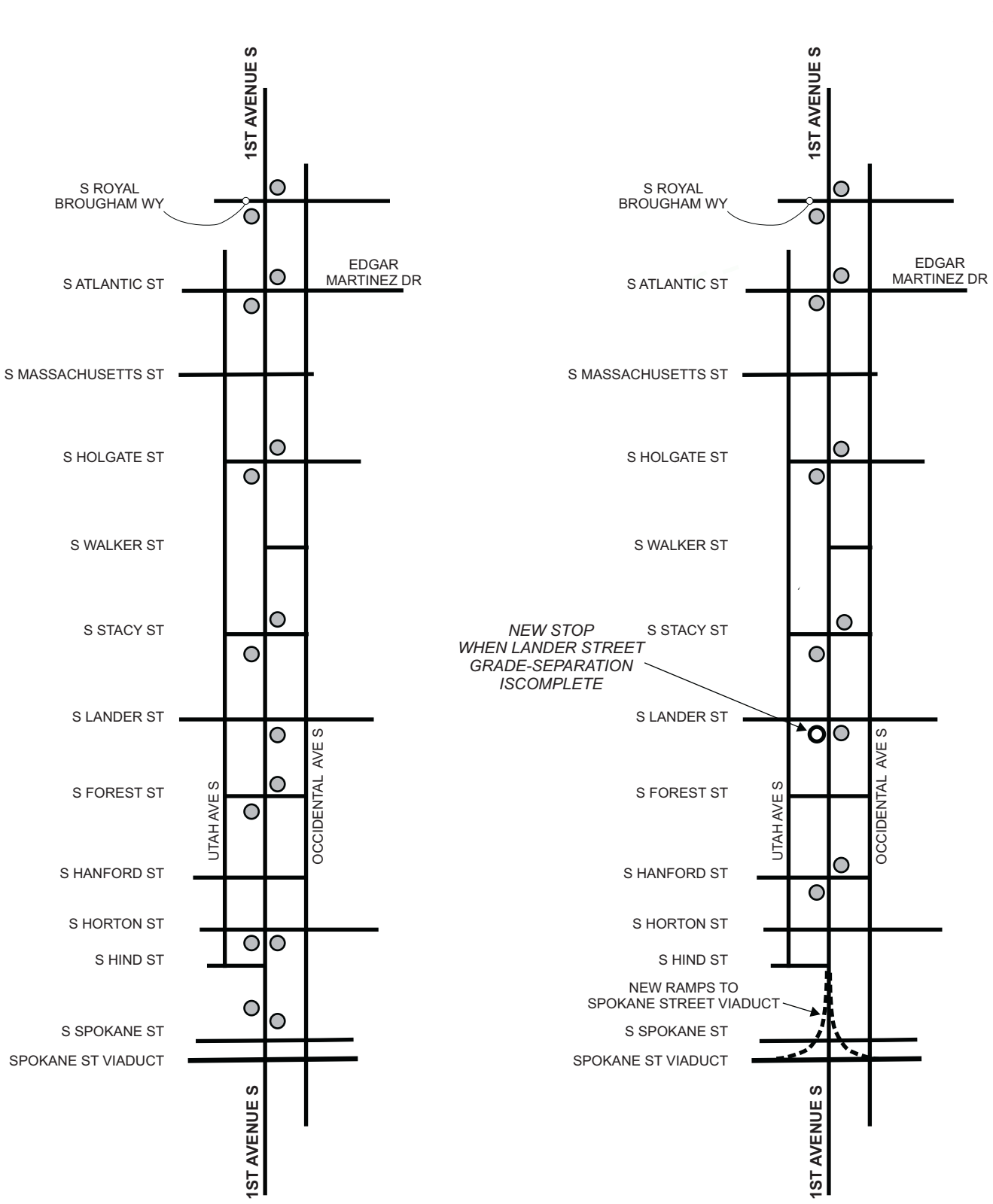
Short term:

a. Convert the section of Utah Avenue S between S Lander Street and S Forest Street from one-way (currently northbound only) to a two-way street. This one-way restriction is currently not obeyed and is unnecessary.

b. Remove abandoned rail tracks where possible. If removal is not possible, improve pavement at crossings to reduce potential "tripping" hazard for bicycles.

Medium term:

c. Prepare a street master plan for Utah Avenue S to guide improvements that could be made as properties redevelop. The master plan should establish the desired roadway cross-section, pedestrian walkway, and bicycle treatments.



1st AVENUE S Improvement Study

Figure 6
Existing and Proposed Bus Stop Locations

heffron transportation, inc.

09.24.08

d. As part of the Street Master Plan, consider Utah Avenue S as an alternative bicycle and walking route to 1st Avenue S. Much of the length of Utah Avenue S is fenced on the west side (adjacent to the BNSF Railyard). A bicycle path could be developed along the length of this fence that has no conflicts with crossing traffic. Lighting and pavement would need to be improved and parking organized to accommodate bicycles and pedestrians.

e. Organize the haphazard parking and loading areas along the street. Prohibit parking in areas where it can block access to business loading docks.

Long term:

f. Improve the street pavement.

g. Implement the street master plan as new developments occurs.

4.4. Occidental Avenue S

Short term:

a. Organize the haphazard parking and loading areas along the street. Prohibit parking in areas where it can block access to business loading docks.

b. Prepare a street master plan for Occidental Avenue S to guide improvements that could be made as properties redevelop. The master plan should establish the desired roadway cross-section and pedestrian walkway treatments.

Medium term:

c. Implement the street master plan as new developments occurs. Establish public/private partnership to extend pavement improvements beyond the project frontage limits. Consider the special needs of pedestrian traffic at the north end of the corridor near the stadiums.

Long term:

d. Improve Occidental Avenue S between S Stacy Street and S Forest Street as part of the S Lander Street Grade-Separation project. Improvements will be needed to provide access to local businesses because the S Lander Street project would eliminate the connection to Occidental Avenue S.

4.5. Side Streets

Short term:

a. Test vehicle detection loops on side streets to ensure all are functioning. If broken, the signal phase for side-street traffic will actuate for every cycle, even when vehicles are not present. Replace malfunctioning loops or install video detection equipment where needed.

Medium term:

b. Ensure that side street parking areas are preserved. Prioritize pavement rehabilitation projects on side streets to improve and encourage local circulation on Occidental Avenue S and Utah Avenue S.

Long term:

c. Do not close S Holgate Street to vehicular traffic between 1st and 4th Avenues S.

d. Improve S Stacy Street and S Forest Street between Occidental Avenue S and 1st Avenue S as part of the S Lander Street Grade-Separation project. Improvements will be needed to provide access to local businesses because the S Lander Street project would eliminate the connection to Occidental Avenue S.

e. Improve side-street parking with implementation of future BAT lanes (see Item 1.c. and 1.d.) to mitigate loss of on-street parking. Reconstruct and/or repave side streets.

4.6. Pedestrian Facilities

Short term:

a. The sidewalks on 1st Avenue S will be rehabilitated and/or reconstructed as part of the 1st Avenue S paving project.

b. Improve the pedestrian walkway and pedestrian lighting along S Lander Street, which will be the primary route to the LINK station. The walkway on the north side of the street would be the highest priority because it is proximity to the largest employment centers (Starbucks Center and the Seattle School District Headquarters). This project is needed because of the delay in the S Lander Street Grade-Separation project.

c. Improve pedestrian safety at the S Lander Street/1st Avenue S intersection with the following measures:

- Install red-light-running cameras.
- Widen sidewalk on north side of S Lander Street by narrowing the extra-wide westbound right turn lane and removing one parking space near the intersection.
- Increase enforcement of motorists that do not yield to on pedestrians in crosswalk.
- Educate drivers, including shuttle drivers to nearby businesses, regarding the law about yielding to pedestrians in a crosswalk.
- Install the sign "State Law STOP for Pedestrians within Crosswalk" (MUTCD R1-6a) to the westbound-to-northbound and southbound-to-westbound right turns.
- Consider experimental signage to educate drivers on when they must yield to pedestrians in a crosswalk.
- Move the stop bar for the westbound left turn back (to the east) to improve pedestrian visibility for motorists in the westbound right-turn-only lane.

d. Eliminate the marked crosswalk at S Massachusetts Street that is at an unsignalized intersection. This will not be repainted after the repaving project is complete.

e. Improve lighting at the S Lander Street intersection. Consider pedestrian-scale light fixtures at the intersection corners and increase brightness and coverage of overhead lighting.

f. Install pedestrian count-down signal heads.

g. Enhance pedestrian safety signage at the 1st Avenue S/S Lander Street intersection.

h. Improve pedestrian wayfinding to the LINK Station.

i. Identify and prioritize pedestrian improvements for SDOT grant programs.

Medium term:

j. Install a traffic signal at the intersection of 1st Avenue S/S Massachusetts Street with development of the Home Plate Parking site (located on west side of 1st Avenue S between S Atlantic and S Massachusetts Streets). Install crosswalks and pedestrian signals on all four legs of the intersection.

k. Consider a signal at the intersection of S Walker Street for pedestrian and vehicle traffic as new development occurs.

Long term:

l. Provide a grade-separated pedestrian crossing between 1st Avenue S and 4th Avenue S to improve pedestrian access to Sound Transit's LINK Station at S Lander Street. This could be provided by the S Lander Street Grade-Separation project.

4.7. Bicycle Facilities

Short term:

a. Improve wayfinding for bicyclists.

b. Add "sharrows" to the curb lane on 1st Avenue S. These will be added as part of the 1st Avenue S paving project. The sharrows will be located at the edge of the parking lane.

Medium term:

c. Evaluate Utah Avenue S as a bicycle corridor that could be an alternative route to 1st Avenue S. (See Item 3.c. above).

d. Designate Royal Brougham Way west of 4th Avenue S as the Mountains-to-Greenway trail route. The proposed overpass on this street, to be constructed as part of the SR 519 Phase II project, includes an extra-wide walkway for post-event traffic pedestrian surges. This could be shared with bicyclists.

4.8. Transit Service

Short term:

a. Provide east-west transit connection in the SODO neighborhood that connects the Starbucks Center to the Royal Brougham Way Sound Transit LINK Station via Edgar Martinez Drive.

b. Improve lighting at bus shelters.

c. Support Duwamish Transportation Management Association (TMA) efforts to reduce commuter trips in the neighborhood.

Medium term:

d. Consider changing the signal phasing at the intersection of 1st Avenue S/S Horton Street to provide for a southbound transit queue jump. This bus priority phase would improve the bus driver's ability to weave from the curb lane to the center lane and new ramp to the Spokane Street Viaduct.

e. Consider routing the West Seattle Rapid Ride to 1st Avenue S with a stop in the vicinity of S Lander Street.

Long term:

f. Divert transit routes to 1st Avenue S and S Lander Street to increase transit service to SODO when the S Lander Street Grade-Separation project is constructed.

4.9. Parking

Short term:

a. Study parking needs in SODO and the Duwamish Industrial Area, and determine potential parking improvements that could balance the needs of the area's employees, who need long-term parking, with retail/wholesale businesses, that need short-term customer parking. Consider new management measures that would allow long-term parking for area employees but discourage use of the area to support commuters to downtown Seattle.

Medium term:

b. When warranted, implement parking management measures along streets fronting retail uses, such as on 1st Avenue S, to increase turnover for customer parking. Potential strategies could include time limited parking (two or one-hour time limits), or installing parking pay stations to improve compliance with existing time limits.

c. When warranted, implement parking management measures in areas that are used for long-term employee parking. Consider new management measures that would allow long-term parking for area employees but discourage use of the area to support commuters to downtown Seattle. One possibility is to meter parking with a mid-term time limit (e.g., four to five hours), such as five hours, that begins later in the morning (e.g., 10:00 A.M.). Employees of traditional industrial businesses, who tend to work earlier shifts, could park for their workday, but it would not provide enough time for a downtown commuter.

d. Protect the Postal Service garage for SODO area parking by employees. Strategize mechanisms to retain this garage for public parking, and implement parking management measures that prioritize use for area employees to avoid use by commuters to downtown.

4.10. Freight Mobility

Short term:

a. Retain on-street truck loading zones on 1st Avenue S adjacent to industrial uses that have no loading alternatives. Examples include Millwork Supply and OB Williams Company.

b. SDOT will soon begin an analysis of several scenarios for the long-term operation of S Holgate Street in response to an anticipated increase in railroad traffic. The new study should evaluate the rail operating conditions to determine the growth in Amtrak and BNSF Railway traffic that would functionally close S Holgate Street, and investigate alternative switching patterns that could reduce blockages of S Holgate Street during daytime periods.

Long term:

c. Do not close S Holgate Street to vehicular traffic between 1st and 4th Avenues S.

d. Grade separate S Lander Street from the BNSF Railway's mainline tracks and spur tracks to the Allied Waste facility.

4.11. Construction Management

Short term:

a. Retain the SODO Community Liaison within Seattle Department of Transportation (SDOT) to be a "one stop shop" for troubleshooting construction-related issues for community members and businesses.

b. Complete the area-wide construction scheduling tool being developed by SDOT to track the many construction projects in the area. Conduct outreach to businesses in the neighborhood to inform about the use of this tool.

c. Extend the Traffic Management Task Force that was established for the SR 519 project. The intent is to integrate neighborhood knowledge into the construction traffic management planning. This same format should be used for other major projects such as the Viaduct South End Interchange and Spokane Street Viaduct once contractors for those projects are selected.

d. Maintain the SDOT Construction web page to include the latest construction traffic information. www.seattle.gov/transportation/sodo_construction.htm

e. Support Duwamish Transportation Management Association (TMA) efforts to reduce commuter trips in the neighborhood.

f. Promote the construction notification e-mail alerts that SDOT uses to disseminate real-time information related to construction impacts and incidents. Expand the number of businesses and individuals in the neighborhood that receive those alerts. Consolidate construction traffic information.

g. Provide alerts related to major construction closures or lane changes at least one month in advance of the occurrence. This allows businesses to plan for deliveries in the event that additional drivers or equipment are needed.

APPENDIX A
DUWAMISH MULTI-MODAL ADVISORY COMMITTEE MEMBERS

1) ***Transportation Choices Coalition*** *(non-profit representing commute alternative)*

2) ***Cascade Bicycle Club*** *(advocates for bicyclers in metropolitan Seattle)*

3) ***Feet First*** *(a non-profit pedestrian advocacy organization)*

4) ***MacMillan-Piper*** *(private business – trucking - container freight*)

5) ***Port of Seattle*** *(public agency concerned with freight movement, all modes)*

6) ***King County Department of Transportation - Metro****(transit agency – operations side)*

7) ***Starbucks Coffee*** *(large employer with HQ located at 1st & Lander)*

8) ***Western Neon*** *(small business located at 1st & Lander)*

9) ***Mariner****s (stadium large event interests)*

10) ***SODO Business Association*** *(local business organization with business representation)*

11) ***Manufacturing Industrial Council*** *(local business organization with industrial business representation)*

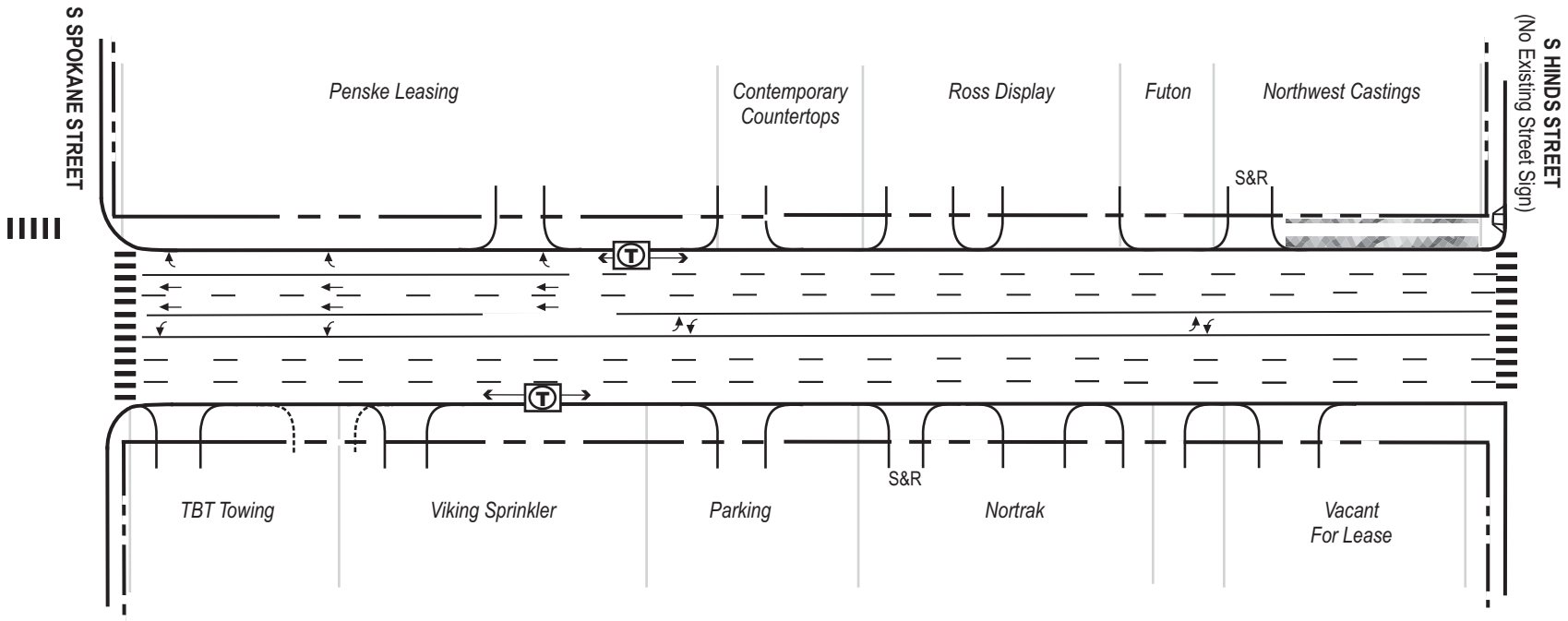
12) ***Seattle Dept of Transportation*** *– (Cristina VanValkenburgh, Policy and Plan Implementation Manager will attend)*

13) ***Qwest Field*** *(large events including trade shows w/ freight movement issues)*

14) ***SODO Retail Association*** *(retail trade and customer access to area)*

15) ***BNSF*** *(rail road operations)*

APPENDIX B
STREET INVENTORY MAPS



Notes:

- Curb to curb width is 68 feet throughout corridor.
- R-O-W width is 100 feet throughout corridor.

1. Sidewalks are in poor condition.
2. The driveway/curb definition is poor.

LEGEND

- Right-of-Way/Property Line
- Curb
- Commercial Property Line
- Landscape
- S&R — Shipping and Receiving
- Bike Rack
- Bus Stop
- Bus Stop w/Shelter
- Bus Zone
- Dwy Not-In-Use
- Dwy on Paint-Line But Does Not Exist
- P P P — Parking Unrestricted
- L/U L/U L/U — Load/Unload
- PHR PHR PHR — No Parking Between 3-7 pm
- 1P 1P 1P — 1 Hour Parking 7am To 6pm
- 2P 2P 2P — 2 Hour Parking 7am To 6pm
- 1PE 1PE 1PE or 2PE 2PE 2PE — 1 or 2 Hour Parking Except No Parking During Events

1st AVENUE S Improvement Study

Figure A

S Spokane Street to S Hinds Street

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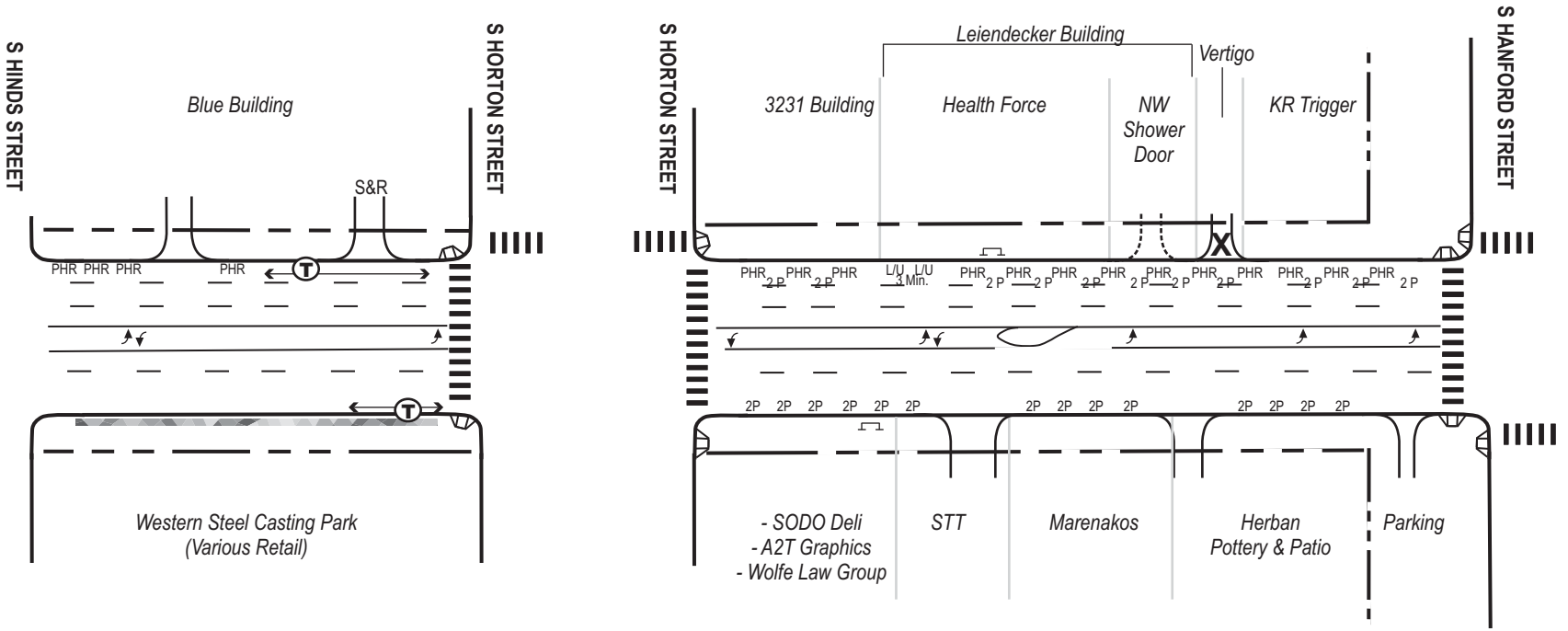
09.25.08



Notes:

1. PHR symbol combined with 2P symbol indicates restricted parking between 3-7 pm but 2 hour parking at all other times.

LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

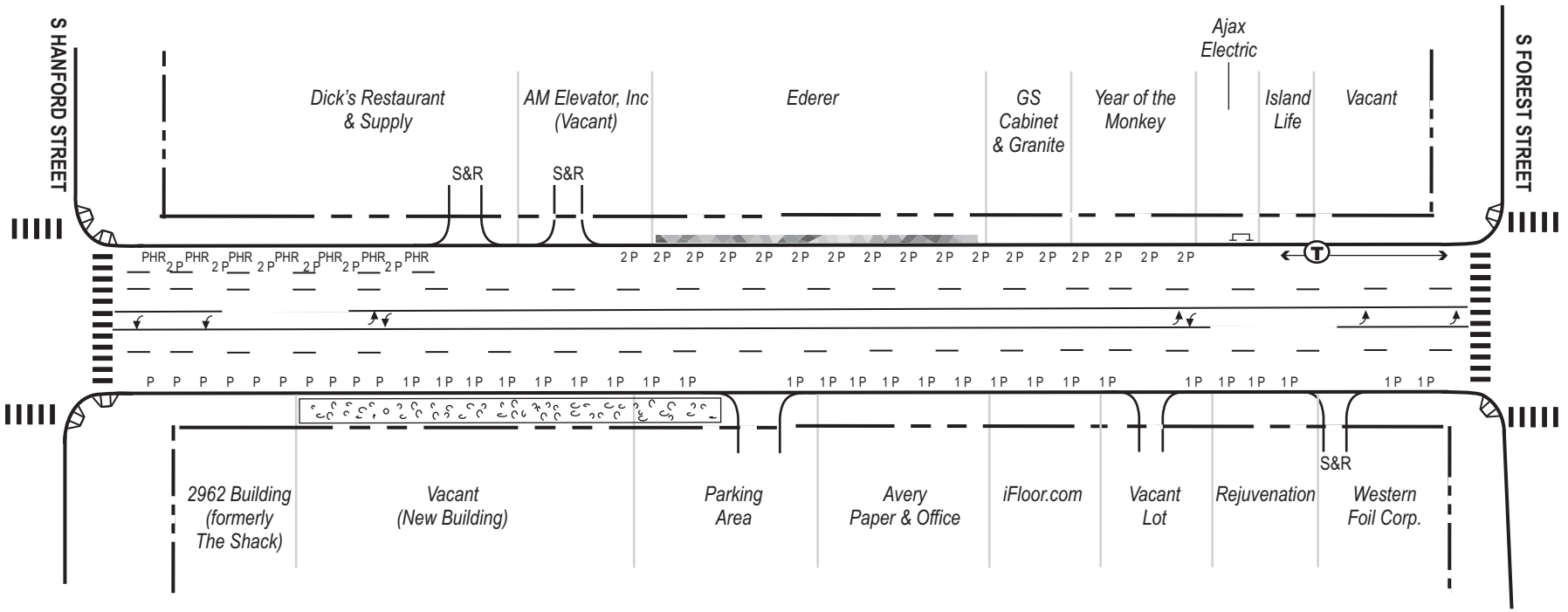
Figure B

1st AVENUE S Improvement Study

S Hinds Street to S Horton Street and
S Horton Street to S to S Hanford Street

heffron transportation, inc.

09.25.08



Notes:

1. New sidewalk along Vacant (New) Building frontage.
2. PHR symbol combined with 2P symbol indicates restricted parking between 3-7 pm but 2 hour parking at all other times.

LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

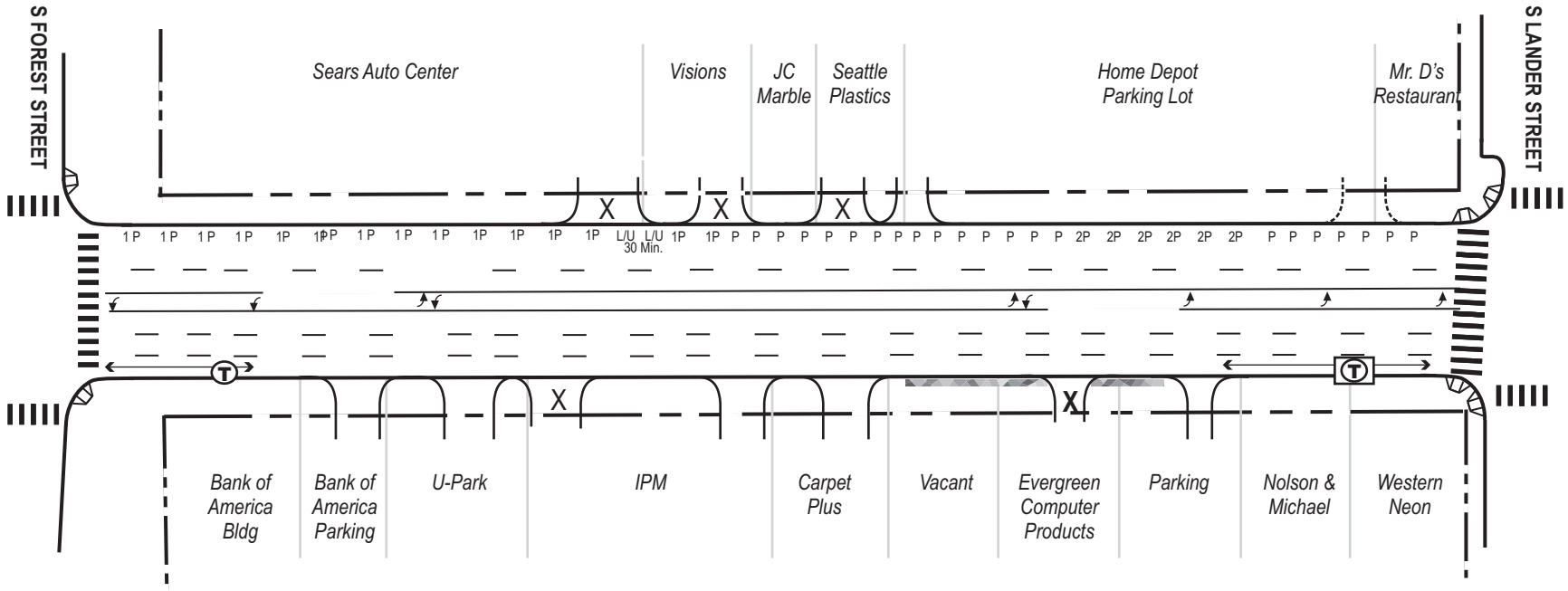
1st AVENUE S Improvement Study

Figure C

S Hanford Street to S Forest Street

heffron transportation, inc.

09.25.08



LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

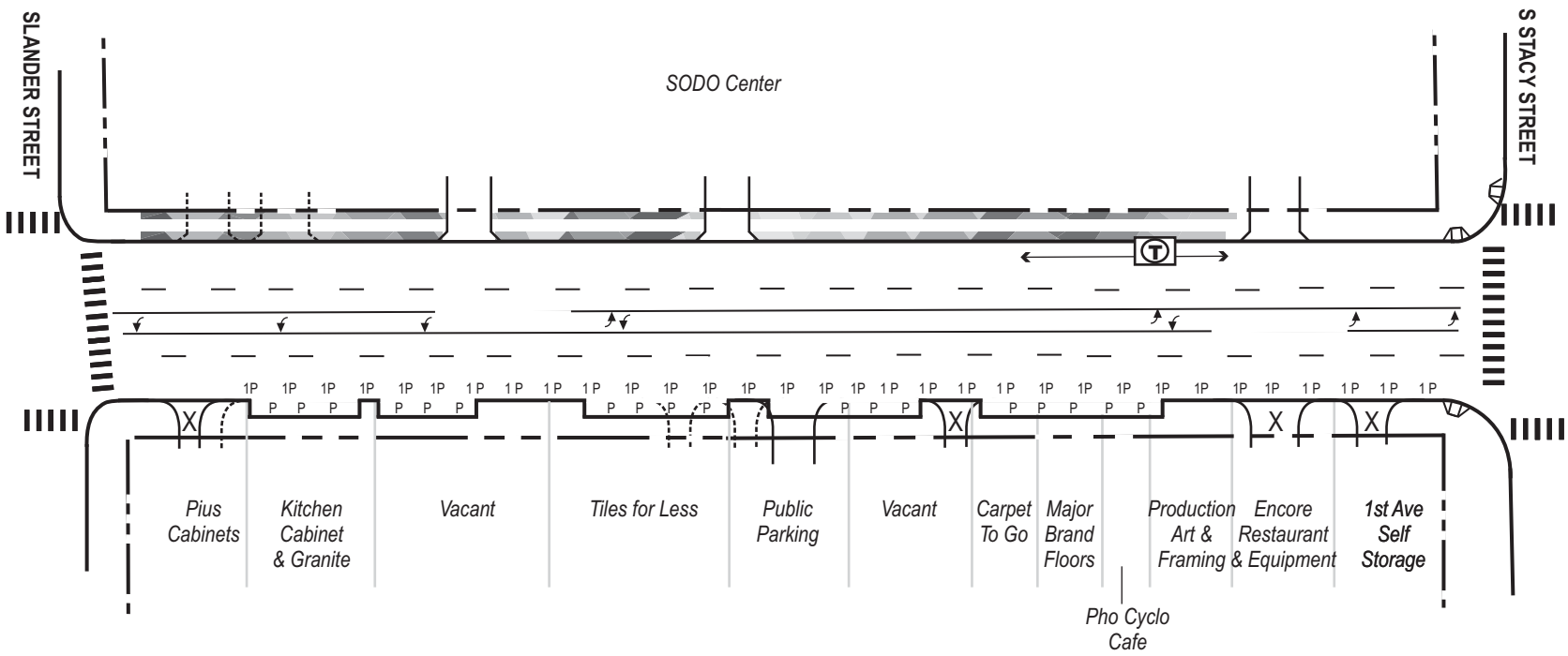
1st AVENUE S
Improvement Study

Figure D

S Forest Street to S Lander Street

heffron transportation, inc.

09.25.08



LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

1st AVENUE S Improvement Study

Figure E

S Lander Street to S Stacy Street

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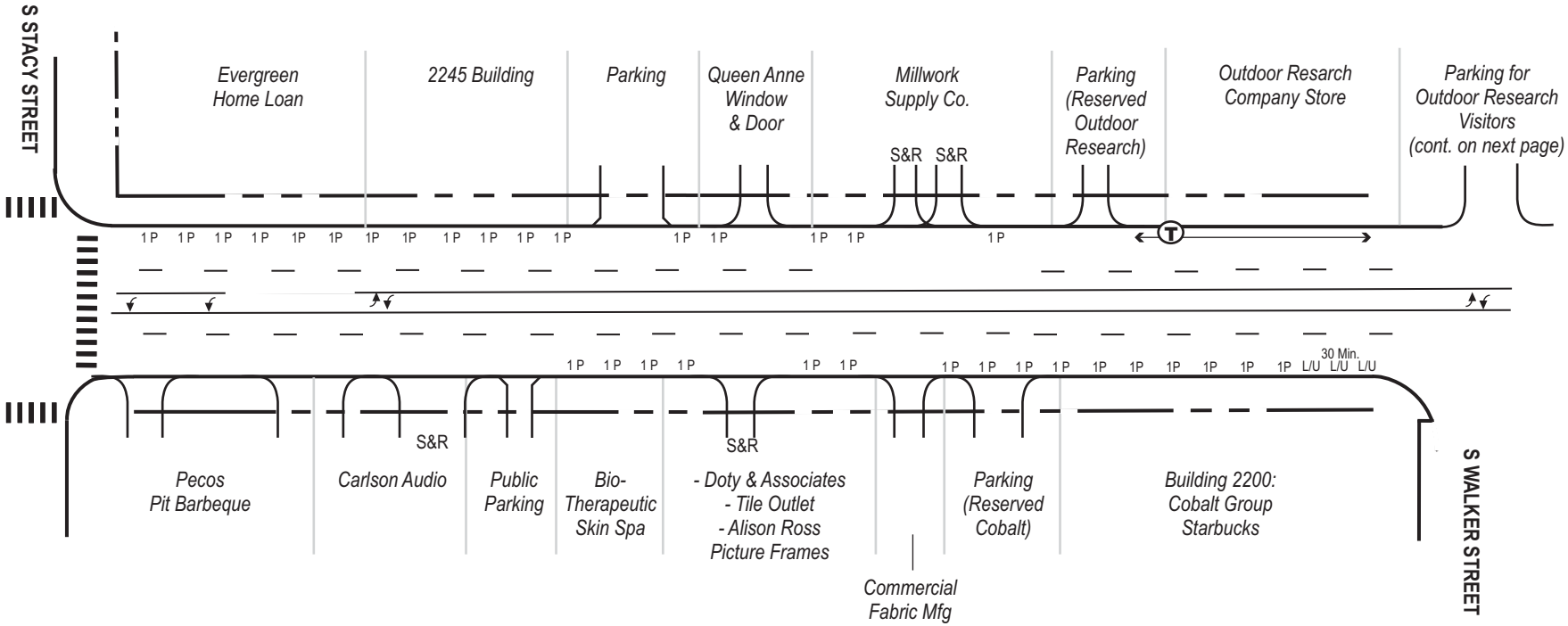


LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

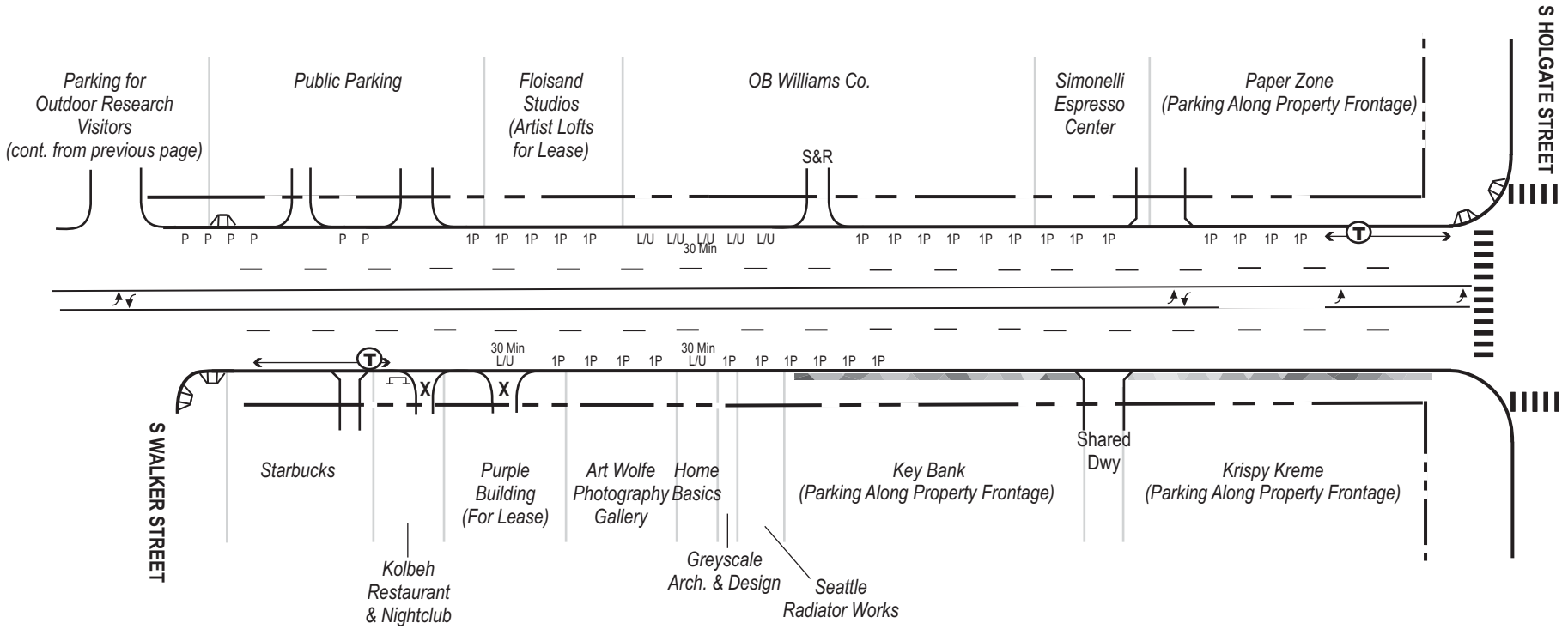
1st AVENUE S
Improvement Study

Figure F

S Stacy Street to S Walker Street

heffron transportation, inc.

09.25.08



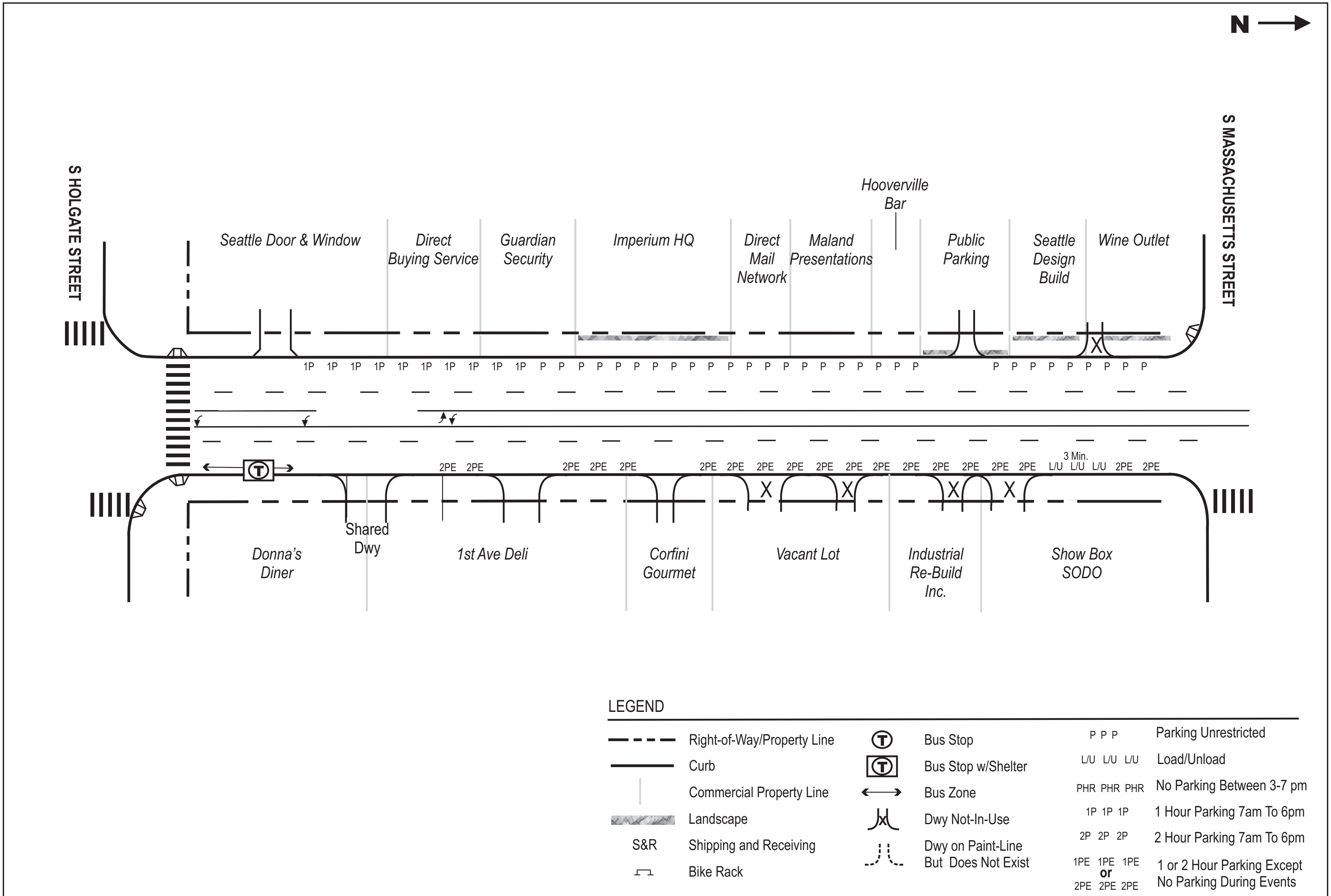
1st AVENUE S Improvement Study

Figure G

S Walker Street to S Holgate Street

heffron transportation, inc.

09.25.08



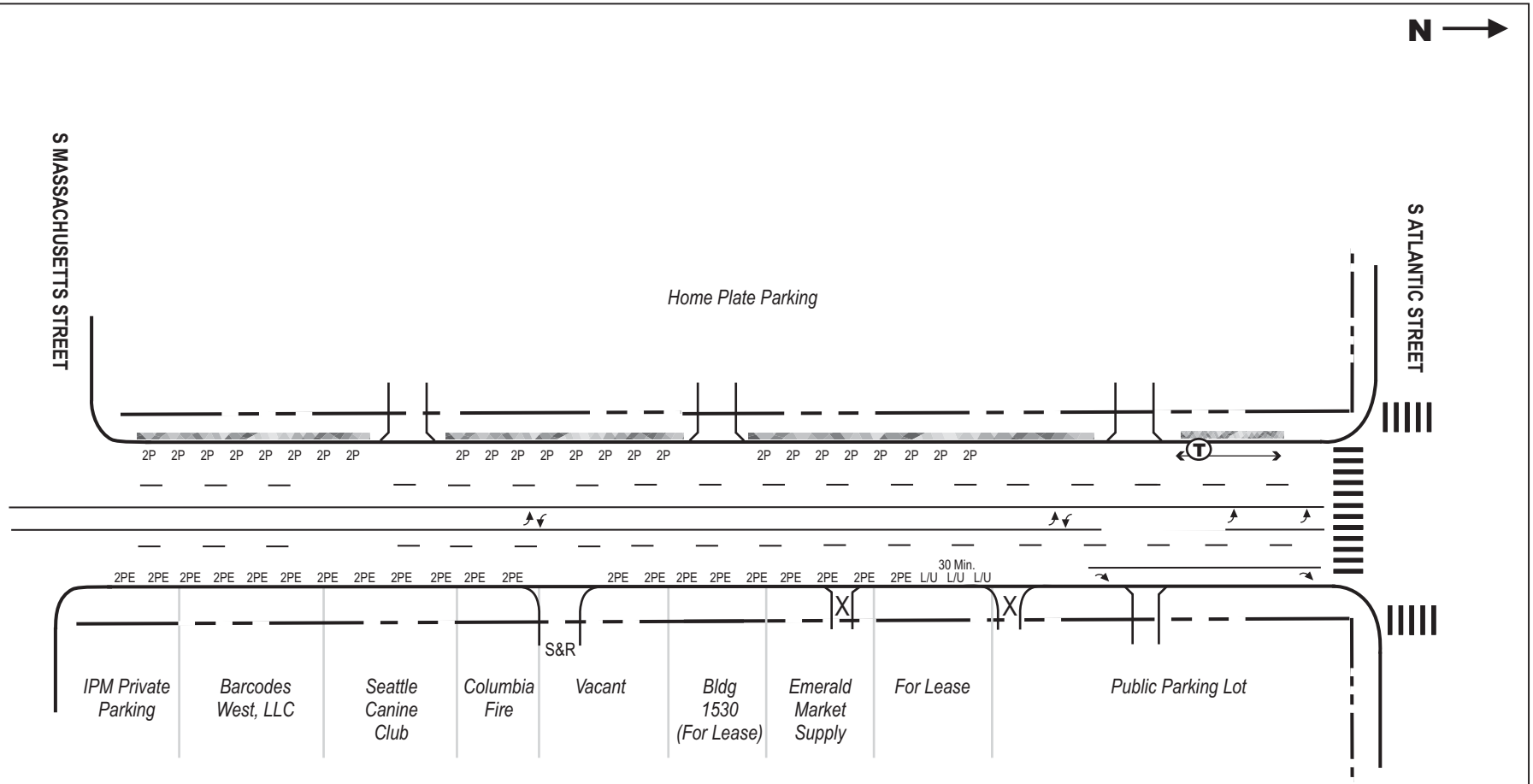
1st AVENUE S
Improvement Study

Figure H

S Holgate Street to S Massachusetts Street

heffron transportation, inc.

09.25.08



LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

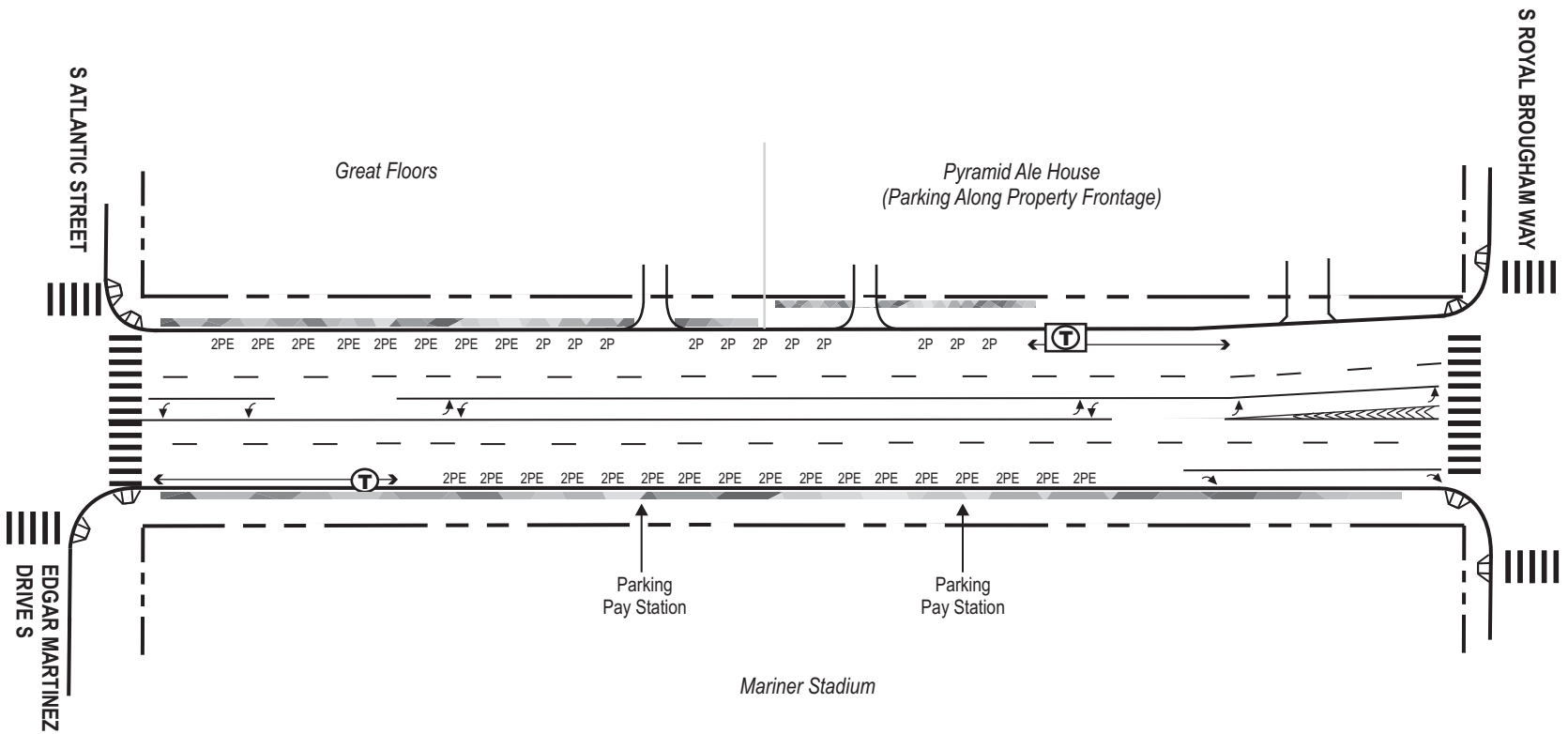
1st AVENUE S Improvement Study

Figure I

S Massachusetts Street to S Atlantic Street

heffron transportation, inc.

09.25.08



LEGEND

Right-of-Way/Property Line	Bus Stop	P P P	Parking Unrestricted
Curb	Bus Stop w/Shelter	L/U L/U L/U	Load/Unload
Commercial Property Line	Bus Zone	PHR PHR PHR	No Parking Between 3-7 pm
Landscape	Dwy Not-In-Use	1P 1P 1P	1 Hour Parking 7am To 6pm
S&R Shipping and Receiving	Dwy on Paint-Line But Does Not Exist	2P 2P 2P	2 Hour Parking 7am To 6pm
Bike Rack		1PE 1PE 1PE or 2PE 2PE 2PE	1 or 2 Hour Parking Except No Parking During Events

1st AVENUE S Improvement Study

Figure J

S Atlantic Street to Royal Brougham Way S

heffron transportation, inc.

09.25.08