North Downtown Seattle Bus Layover Project—Phase II

Final Implementation Report

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In Association with:
DKS Associates
HEARTLAND
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SDOT
Seattle Department of Transportation

King County

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Executive Summary

INTRODUCTION

The North Downtown Seattle Bus Layover Study was initiated to develop recommendations for both on- and off-street layover locations in the project area defined by Pine Street on the south, I-5 on the east, Mercer Street/ Broad Street/Denny Way on the north, and Elliott Bay on the west. The study will be used as a basis for developing an agreement between the City of Seattle Department of Transportation (SDOT) and King County Metro (KCM), which will define each agency's responsibilities in developing and maintaining layover space in the north downtown area.

Layover space is a critical component of providing transit service, providing bus drivers a place to recover upon completion of scheduled revenue service, synchronize back into scheduled operations, and take mandatory rest breaks. The study recommendations address these issues within the context of the project area's urban characteristics.

The study included the following steps:

- A design program was developed (Basis of Design).
- An approach to evaluate alternative layover locations was developed.
- Layover demand over a ten-year planning horizon was estimated (Layover Demand Analysis).
- Alternative layover locations were identified and evaluated (approximately 60 locations with about 150 layover spaces).
- Layover costs were estimated, consisting primarily of lost on-street parking revenue and additional transit operating cost to reach the new locations.
- Based on the results of these elements, an Implementation Plan was developed.

The analysis was performed by the consultant team and SDOT and KCM staff. Seven workshops were held with both a Project Management Team (PMT) and a Management Review Team. This provided an opportunity for coordination with SDOT, City of Seattle's Department of Planning and Development (DPD), KCM, and the project team to receive timely input and recommendations along the course of the project.

KEY CONCLUSIONS

The Basis of Design (BOD) recommended typical street section designs and plans for both on- and off-street layover spaces. Separate guidelines were developed to address the unique requirements of Green Streets. For on-street layover the BOD recommendations include:

- 40-foot minimum curb-to-curb for one side layover, 44-foot minimum for two side layover
- Streets constructed of portland cement concrete
- Ten-foot wide layover space
- 30-foot setback from intersection to allow right turns in front of layover spaces by general purpose traffic
- 12- to 15-foot wide adjacent travel lane preferred

Five critical evaluation factors were identified:

- Bus operational requirements
- Impact on bike facilities
- Compatibility with adjacent land uses and street frontage
- Implementation cost
- On-street parking supply impact

Layover demand estimates considered the following programs that would affect layover for the next ten years. Those programs included:

- Transit Now
- Central Link Light Rail service integration
- KCM schedule maintenance
- Link extension to Northgate

- Regional Express service increases
- Community Transit service increases
- Alaskan Way Viaduct replacement

It also included considerations for general growth and for replacement of layover space lost due to potential limitations of layover space on Green Streets.

The layover demand analysis concluded that 29 to 38 additional layover spaces would be required through 2019 in addition to the existing 80 spaces within the study area, an increase of almost 50 percent. Analysis of the above programs resulted in a need for 28 new layover spaces. Provisions for replacement of Green Street spaces could amount to an additional ten spaces using the Green Street layover limitation criteria discussed below.

Using the guidance developed in the above analyses, approximately 60 on-street layover locations providing about 150 layover spaces were identified. These locations were evaluated using the criteria and worksheets developed in the evaluation criteria phase. The top 40 sites were analyzed for impacts on parking revenue and operating cost. Over the ten-year study horizon, lost parking revenue could amount to $9.2 million and additional transit operating cost could amount to $3.5 million based on data in Table 15. These 40 proposed on-street layover spaces would meet the demand for the ten-year planning horizon.

The feasibility of jointly developing off-street layover was also considered. This analysis concluded that the best approach to developing off-street layover is to work with a real estate consultant to identify developers that might be interested in a joint development project and proceed once an agreement to pursue has been reached. The likely opportunities for this to occur will be very limited. Key triggers identified by the Management Review Team to push the development of an off-street location could include utilization of approximately 50 percent of the available inventory of on-street layover spaces, or a specific developer opportunity occurs.

Green Street impacts were considered and discussed in depth. It was concluded that a general guideline that limits bus layover space development to one space per pair of block faces would be appropriate for Green Streets, but as either development for Green Streets or bus layover occurs, this guideline should be revisited on a project-by-project basis to assess appropriateness. The guideline should also discuss limiting the density of layover spaces within a designated Green Street or Green Street area. Layover spaces on three consecutive blocks, for example, might be undesirable.

Joint accommodation of layover space and bike lanes will, at times, be problematic. The report provides a Solution Framework Decision Tree (shown in Appendix K) to assist decision-makers in determining the appropriateness of both facilities where curb-to-curb widths limit choices. The framework includes a process for allocating limited space, which includes the potential to adjust lane widths, remove lanes, adjust center turn lane location, and change curb space use to accommodate both layover space and bike lanes. It also offers an option to change the bike lane to a sharrow, and denial of the layover request. It proposes the layover advocate agency should fund review, design, and construction of the recommended changes.

RECOMMENDATIONS

Detailed recommendations for implementation of the results of this study can be found in the Implementation Plan section of this report. Recommendations are summarized below.

Basis of Design

Incorporate the BOD recommendations into the Right-of-Way Design Manual as *guidelines*. While they have not been developed to the level of standards, they should be considered in implementing right-of-way modifications.

Layover Space Demand

Over the next ten years, plan to establish approximately 40 net new layover spaces within the study area, periodically reviewing the progress of programs that influenced the layover demand analysis. If there are changes in demand, such as modifications to transit service resulting from the final Alaskan Way Viaduct alternative selection, make adjustments to the demand estimate.

On-Street Layover Space Development

Coordination with several transportation and development programs should occur as on-street layover is developed. Some of these include:

- Seattle Bike Master Plan
- Alaskan Way Viaduct replacement planning
- Green Street implementation (either by the City for street improvement projects, or by developers with projects on designated Green Streets)
- Seattle Transit Plan/Transit Master Plan

Project area Green Street development is in the formative stage. The City has framed some street guidelines for Green Streets, and this study considered how layover can be successfully accommodated on Green Streets (see BOD discussion in Background section.)

Off-Street Layover Space Development

While the review of off-street spaces suggested that opportunities for their development will be limited, it is recommended that a search for a developer for an off-street site be started in earnest when approximately 50 percent of the proposed on-street layover capacity is consumed, and 50 percent capacity is still available (could occur by 2014 or 2015) or an expression of interest by a developer in pursuing a joint development project with the City occurs.

SDOT/KCM Memorandum of Agreement

SDOT and KCM must develop an agreement that will guide the development of future layover spaces so the agencies can respond with a high (or sufficient) level of certainty to the demand generated by future transit service. The agreement should cover:

- Cost responsibility
- Triggers for implementation of new layover spaces
- Hours and days of layover operation
- Green Street/layover space implementation process
- Maintenance and/or replacement requirements of the Convention Place Station layover—there should be no net loss of off-street layover with development of a transit-oriented facility at this location
- Process to be followed for proposed changes to existing on-street layover, including developer-initiated proposals

Implementation Report

INTRODUCTION AND BACKGROUND

Introduction

The North Downtown Bus Layover Study was initiated to provide guidance in determining potential layover space in the north downtown area for coaches coming from transit routes serving south King County and for deadhead. The study also needed to provide locations for Community Transit to replace layover spaces lost due to the Stewart Street repaving and transit lane project.

The study area is defined as the area bounded by Pike Street, I-5, Mercer Street/Broad Street, and Elliott Bay, and is shown in Figure 1 below.

Figure 1 — Vicinity Map

The study considered a number of factors in providing recommendations on the location and number of layover spaces to be provided. Through the course of the project, the following five elements were developed.

- Recommendations for BOD. Existing roadway standards in the study area were reviewed and recommended sections were prepared to guide insertion of layover into existing and proposed street sections. While Green Street standards are in the formative stage, concepts were provided by the City and recommended street sections for Green Street layover locations were prepared as part of this report.
- Layover demand was estimated and recommendations for quantity of proposed layover spaces and implementation year were provided based on a ten-year planning horizon.
- Approximately 60 proposed layover locations (representing about 150 potential layover spaces) were provided and prioritized based on evaluation criteria developed jointly by the PMT and Management Review Teams.
- Bus travel times to access the top 40 highest ranked candidate on-street layover spaces were estimated.
- Transit operating cost and lost on-street parking revenue were assessed.

PROJECT TEAM

The project team consisted of the consultant staff and SDOT and KCM project guidance staff. Consultant staff included:

- Otak, Inc., responsible for project management, development of design options and potential layover locations, specific travel time analysis, and cost assessment
- DSV International, responsible for layover demand analysis
- Heartland, responsible for real estate assessment and guidance on effects and potential for off-street layover
- DKS Associates, responsible for travel time modeling along selected spine travel routes for access to layover spaces

A complete roster of City of Seattle, King County Metro, Community Transit, Sound Transit, and Otak team members is shown in Appendix A.

WORKSHOPS

The project team's work was discussed with the PMT and the Management Review Team in a series of workshops. Each workshop dealt with a specific project subject and was conducted in two sessions. The first session involved meeting with the PMT and getting their suggestions and feedback on elements of the project. The second session involved meeting with the Management Review Team, reporting to them on the activities and discussion with the PMT, and then receiving their guidance on project elements requiring decisions to move forward. The PMT session took about three hours for each workshop and the Management Review Team meeting occurred typically about a week later and took approximately one hour.

This process proved effective and provided timely, ongoing direction to the project team. Seven workshops occurred over the course of the project. The meeting schedule is shown in Table 1.

Background

BASIS OF DESIGN

General design criteria for on- and off-street layover were developed as BOD. The criteria were discussed and modified through the PMT workshop process. The BOD establishes physical dimensions and configurations for accommodating bus layover safely and with current expectations for bus operations. The criteria do not distinguish between 24/7 and Peak-Only layover.

The BOD can serve two purposes. First, it provides an initial screening of candidate streets or sites. If it appears that one or more criteria cannot be met, then the location may be considered fatally flawed. Second, criteria can serve as guidelines for street or site improvements that would result in the accommodation of bus layover.

The primary focus of the BOD is the street characteristics curb-to-curb. While there are some potential impacts to the sidewalk area itself, they are not the primary considerations. Other street improvement work undertaken as part of private development may temporarily displace existing layover. Agreements to

Table 1—Otak's 2008/2009 Workshop Process and Schedule

return the affected streets to a condition consistent with bus layover should be required, unless other arrangements are made by the project proponent. The default position should be return of layover, with any removal or relocation to be a request for departure (as with the Land Use Code) with the proponent responsible for assisting in finding and funding the relocation. Figures 2 and 3 (on the following page) show on-street layover BOD options. Table 2 shows BOD characteristics.

Green Streets—A Special Case

The City of Seattle has identified 17 Green Streets in the downtown area, with 12 located within the study area. Classification of additional Green Streets in the greater downtown area is anticipated. A Green Street is a street right-of-way that, through a variety of design and operational treatments, gives priority to pedestrian circulation and open space over other transportation uses. With two exceptions, all allow for motorized traffic. Green Streets currently provide 17 on-street layover spaces within the project area. Both Peak-Only and 24/7 bus layover spaces are provided on Green Streets. New development and the City's interest in partnering with new development to implement the Green Streets program, has raised questions about the compatibility of accommodating bus layover on Green Streets. The compatibility of in-service transit use is not in question, only the out-of-service layover time spent curbside on these streets.

Table 2
On-Street Layover Basis of Design

Elements	Location	Basis of Design
40' minimum curb-to-curb	All two-lane streets	Layover spaces one side of street
44' minimum curb-to-curb	All two-lane streets	Layover spaces both sides of street
Street pavement	Non-arterial streets	Portland cement concrete in good to excellent shape or asphalt concrete pavement in excellent shape
Street pavement	Arterial streets	Portland cement concrete in good to excellent shape
100' continuous curb length	All streets	Accommodate all coach sizes
10' wide layover space available	All streets	Keep adjacent travel or bicycle lanes unobstructed
12' preferred (11' minimum)	All streets without striped bike lane	Keep adjacent vehicle and bike traffic clear of parked bus
5' minimum clearance for striped bike lane	All streets with striped bike lane	Keep bike lane continuously unobstructed
12' min. combined sidewalk/ furnishing zone	Commercial and residential districts	Allow typical uses of street frontage without feeling crowded by bus
25' - 35' setback from intersection	All streets	Minimize impact on vehicle right-turns and sight lines
On-street parking	Commercial and residential districts	Street by street evaluation of land use parking needs, current utilization, and planned developments
Right-turn back to service path preferred	All streets	Minimize travel time delays
Street trees with 10' clearance above pavement	All layover spaces except double-decker buses	Avoid damage by buses at curbside
No street trees within layover zone	All layover spaces for double-decker buses	Avoid damage by buses at curbside

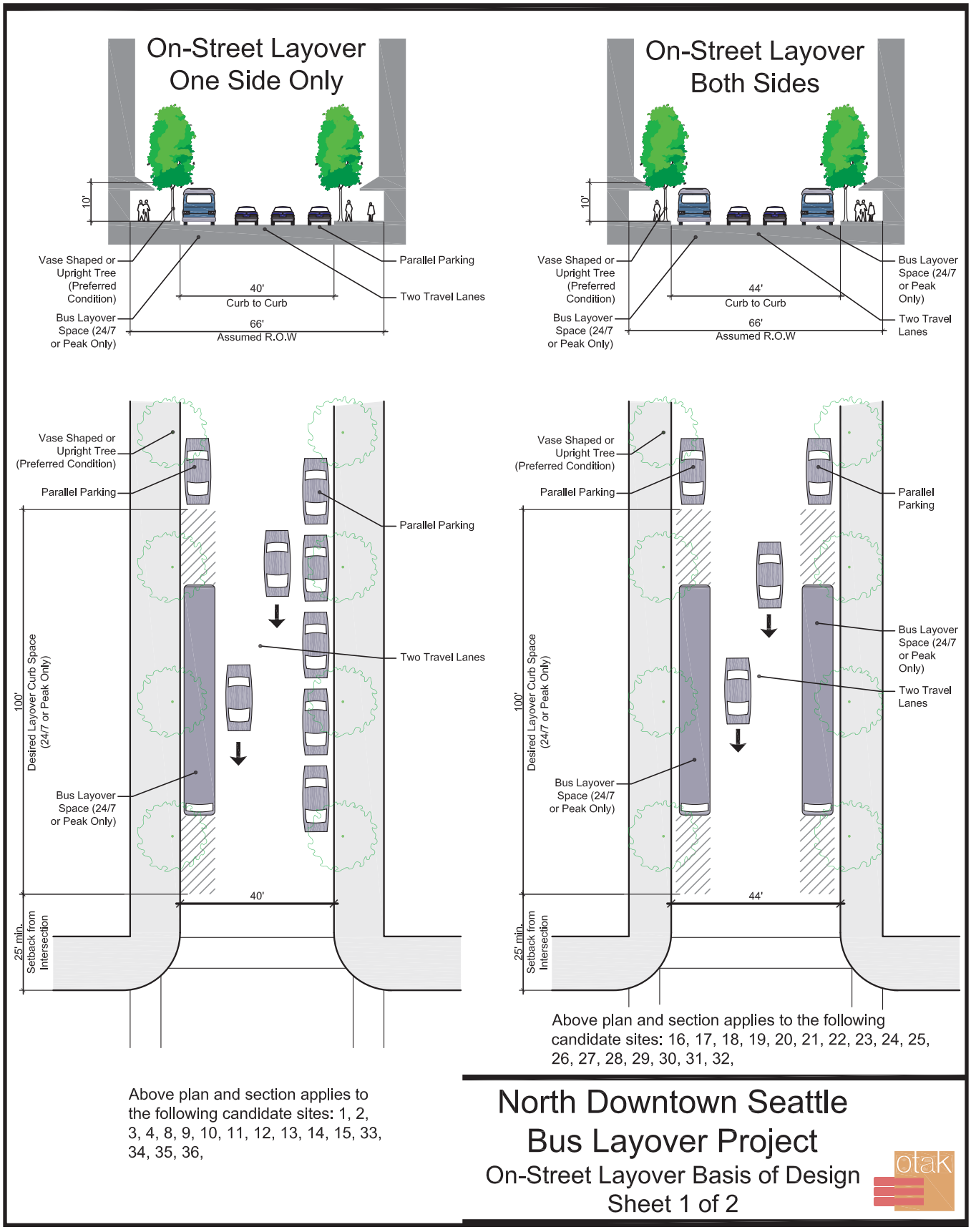
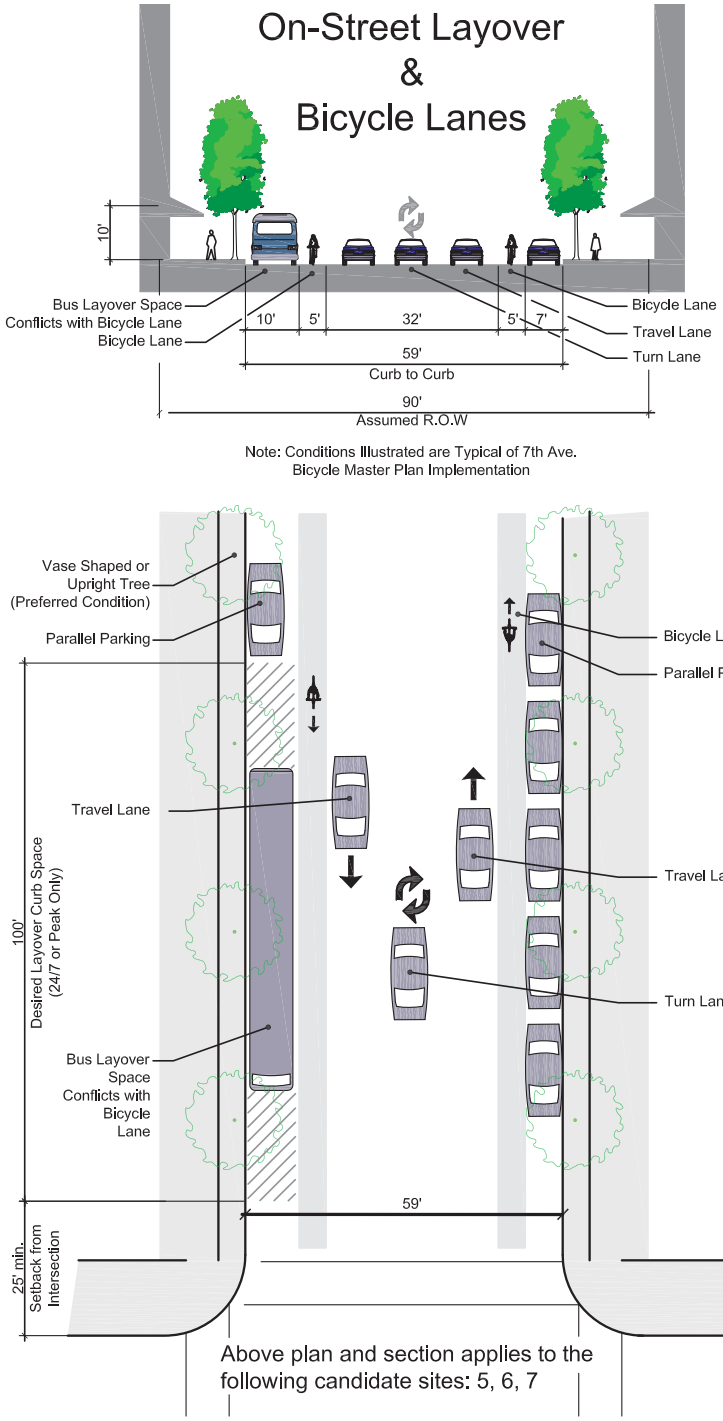

On-Street Layover
One Side Only
10'
Vase Shaped or Upright Tree (Preferred Condition)
Bus Layover Space (24/7 or Peak Only)
40' Curb to Curb
66' Assumed R.O.W
Parallel Parking
Two Travel Lanes
On-Street Layover
Both Sides
10'
Vase Shaped or Upright Tree (Preferred Condition)
Bus Layover Space (24/7 or Peak Only)
44' Curb to Curb
66' Assumed R.O.W
Bus Layover Space (24/7 or Peak Only)
Two Travel Lanes
Vase Shaped or Upright Tree (Preferred Condition)
Parallel Parking
Parallel Parking
Two Travel Lanes
100' Desired Layover Curb Space (24/7 or Peak Only)
Bus Layover Space (24/7 or Peak Only)
40'
25' min. Setback from Intersection
Above plan and section applies to the following candidate sites: 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 33, 34, 35, 36,
Vase Shaped or Upright Tree (Preferred Condition)
Parallel Parking
Parallel Parking
Bus Layover Space (24/7 or Peak Only)
Two Travel Lanes
100' Desired Layover Curb Space (24/7 or Peak Only)
Bus Layover Space (24/7 or Peak Only)
44'
25' min. Setback from Intersection
Above plan and section applies to the following candidate sites: 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32,
North Downtown Seattle
Bus Layover Project
On-Street Layover Basis of Design
Sheet 1 of 2
otak

Figure 2



North Downtown Seattle Bus Layover Project

On-Street Layover Basis of Design

Sheet 2 of 2

Figure 3

When considering the compatibility of bus layover on Green Streets, suggested BOD and evaluation of candidate spaces has assumed that Peak-Only is more compatible layover use than all-day. Green Streets are intended to maximize the pedestrian amenities and streetscape qualities and to create a unique balance between vehicular and non-vehicular uses of the street. Limiting the time a bus is parked at curbside may also reduce any perceived negative impacts to valuable curb space for parking and passenger pick-up and any compromise in pedestrian access, visibility, and comfort for retail uses.

Layover spaces that currently exist on Green Streets are among the best available in terms of minimizing travel times from the routes' current revenue service path to layover. For this reason, after discussion with the PMT and Management Review Team, it was determined that Green Streets would continue to be candidates for layover, but would be limited to one layover space per pair of block faces. Peak-hour use is preferable, but 24/7 use should not be excluded. The primary conflicts are between certain design and operational parameters for bus layover that may affect defining characteristics of the Green Street concept. There may also be a perception of land use incompatibility given the types of ground floor development desired on Green Streets. The conflict may occur over curbside uses for on-street parking and passenger drop-off areas at building entries.

With regard to on-street parking, early design concepts for Green Streets provided by the DPD and a site visit to a Green Street under construction suggested that a loss of on-street parking will be a consequence of Green Street implementation. Additional parking loss for bus layover, in addition to parking restrictions at in-service bus stops, may be received poorly by prospective developers or within the larger context of the neighborhood.

Table 3 summarizes what appear to be primary potential conflicts between bus layover and implementation of Green Street construction. The comments suggest

Table 3
Green Street Layover Analysis of Impacts

Green Street Elements	Basis of Conflict	Comments
Curb-to-Curb Distance	BOD sets a preferred 40-foot minimum curb-to-curb width, but minimum 22' based on 10' layover and 12' adjacent travel without parking	Green Street design studies resulted in distances of 34 – 38 feet
Furnishing Zone (trees, landscaping, and public art)	Green Street goals specify large tree canopy coverage, conflicting with layover requirement for vertical clearance	At layover locations, prefer columnar trees or additional tree setback
Street Corners	Enhanced and spacious street corners are important urban design elements for pedestrian priority streets	Provide layover space locations set back from street corners to provide short curb radii, curb extensions, and short pedestrian crossing distances
On-Street Parking	Green Streets concepts reduce on-street parking in favor of esplanade style sidewalks	Locate bus layover with on-street angled parking; evaluate additional parking impacts from layover to adjacent land uses and overall streetscape design and lane/ parking configuration
Layover Type	An out-of-service bus stopped and stationary within an active pedestrian environment may seem intrusive	Avoid 24/7 spaces on Green Streets and allow parking in Peak-Only layover zones

possible reconciliation of the conflicts and are supported by design study graphics shown on the following pages.

Off-Street Layover

The BOD discussed in Table 4 assumes layover would occur inside an architectural structure such as a parking garage or a municipal or privately developed building. In either scenario, bus layover would usually occur at the lowest level of building (street level or below-grade) and would have a separate entry/exit from private vehicles using the structure. For off-street selected candidate sites an additional assessment of joint development opportunities was conducted and summarized in Technical Memorandum 4 and later in this report.

An existing example of significant off-street layover is the Convention Place Station area at the north end of the bus tunnel. Convention Place provides layover for 24 coaches and layover space layout is affected by the need to connect to the bus tunnel facility. In the future when light rail becomes the exclusive use of the tunnel, it would be advantageous to consider new layouts within the Convention Place Station layover areas to increase the number of spaces. Tunnel connections and other unneeded facilities could be eliminated to provide greater layover space.

The impact of off-street layover to the pedestrian environment and neighborhood character should be minimized by providing space for compatible uses along the perimeter of the structure at street level, with adequate transparency, through appropriate design of building facades and streetscape.

Potential for Off-Street Facility Development

Off-street layover could occur on surface lots or in a structured facility that is jointly developed. Surface lot solutions are less desirable and could require long-term land ownership without a near-term exit strategy from that ownership. If leased, it could be a near-term strategy (three to five years). Transit agency funding may come from federal grants, which would require ownership of an off-street facility. Thus, local funding is conserved if federal funds are available, but the investment commitment duration is long-term.

The other solution is the potential for an achievable joint development strategy with either a private or public

Table 4
Off-Street Layover Basis of Design

Criteria	Location	Basis of Design
Eight or more coaches accommodated	All sites with layover in shared building/parking structures	Return on investment for joint development and efficient use of building footprint
Sawtooth berth design, all coaches 80' parallel berth, standard bus 100' parallel berth, articulated bus	All full-block sites	Independent arrival/departure Lower capacity
In-line berth design, two modules 14-foot wide lanes, 30-foot aisle	Narrow sites	Either dependent departure or manage arrival/departure Higher capacity
Street ingress/egress from non-arterial streets	All sites	Support access management strategies and minimize bus/car and bus/bike conflicts
Dedicated bus entry/exit	All sites with layover in shared building/parking structures	Minimize bus/car conflicts and travel time delays
Street level of joint structures	All sites with layover in shared building/parking structures	Operational efficiency and lower development costs
Operator facilities	All sites	Design program to be determined
Right-turn back to service path	All sites	Minimize travel time delays
Optional transit boarding (street level only)	Selected sites	Extend transit service into selected neighborhoods

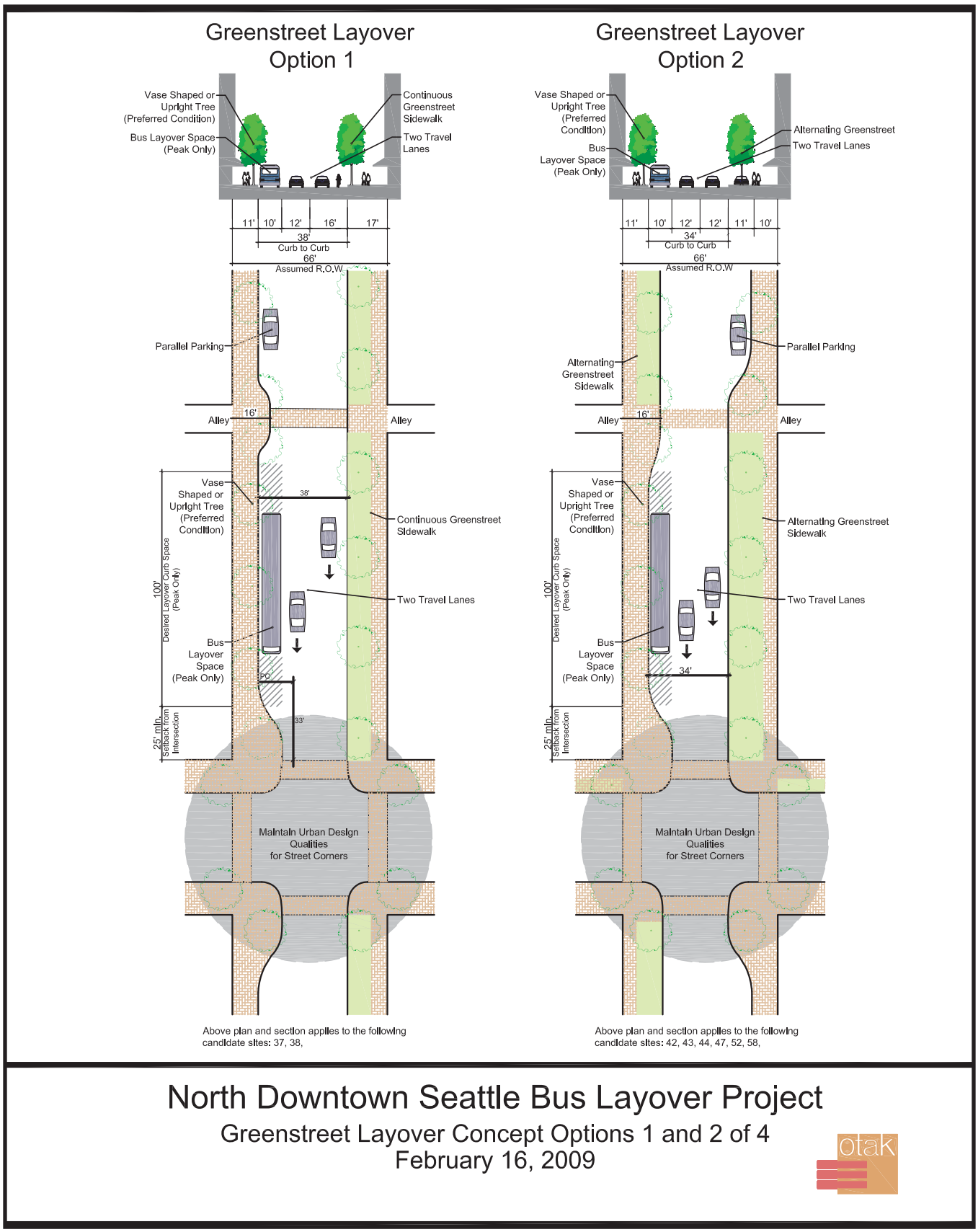
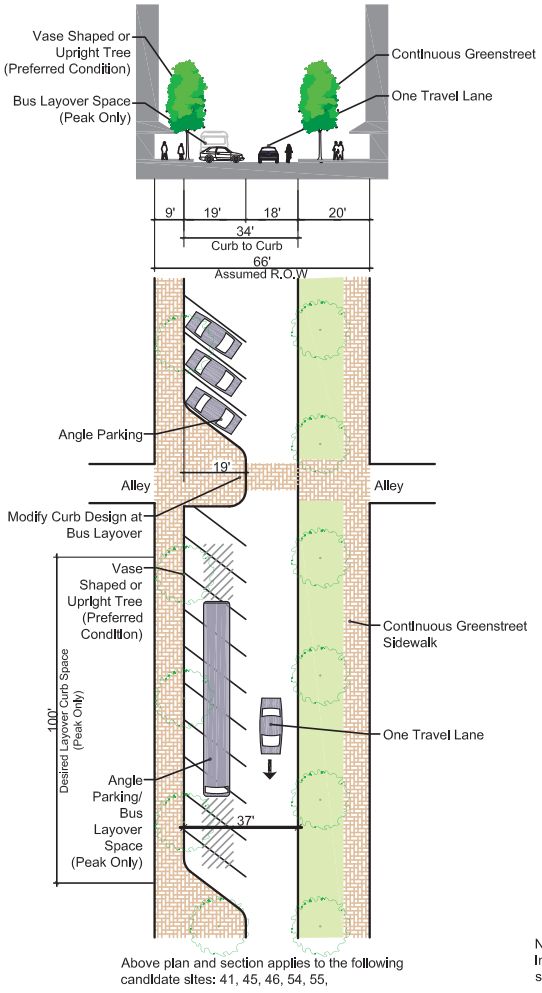

Greenstreet Layover
Option 1
Vase Shaped or Upright Tree (Preferred Condition)
Bus Layover Space (Peak Only)
Continuous Greenstreet Sidewalk
Two Travel Lanes
11'
10'
12'
16'
17'
38'
Curb to Curb
66'
Assumed R.O.W
Parallel Parking
Alley
16'
Alley
Vase Shaped or Upright Tree (Preferred Condition)
38'
Continuous Greenstreet Sidewalk
Two Travel Lanes
100'
Desired Layover Curb Space (Peak Only)
Bus Layover Space (Peak Only)
40'
33'
25' min.
Setback from Intersection
Maintain Urban Design Qualities for Street Corners
Above plan and section applies to the following candidate sites: 37, 38,
Greenstreet Layover
Option 2
Vase Shaped or Upright Tree (Preferred Condition)
Bus Layover Space (Peak Only)
Alternating Greenstreet
Two Travel Lanes
11'
10'
12'
12'
11'
10'
34'
Curb to Curb
66'
Assumed R.O.W
Alternating Greenstreet Sidewalk
Parallel Parking
Alley
16'
Alley
Vase Shaped or Upright Tree (Preferred Condition)
Alternating Greenstreet Sidewalk
Two Travel Lanes
100'
Desired Layover Curb Space (Peak Only)
Bus Layover Space (Peak Only)
34'
25' min.
Setback from Intersection
Maintain Urban Design Qualities for Street Corners
Above plan and section applies to the following candidate sites: 42, 43, 44, 47, 52, 58,
North Downtown Seattle Bus Layover Project
Greenstreet Layover Concept Options 1 and 2 of 4
February 16, 2009
otak

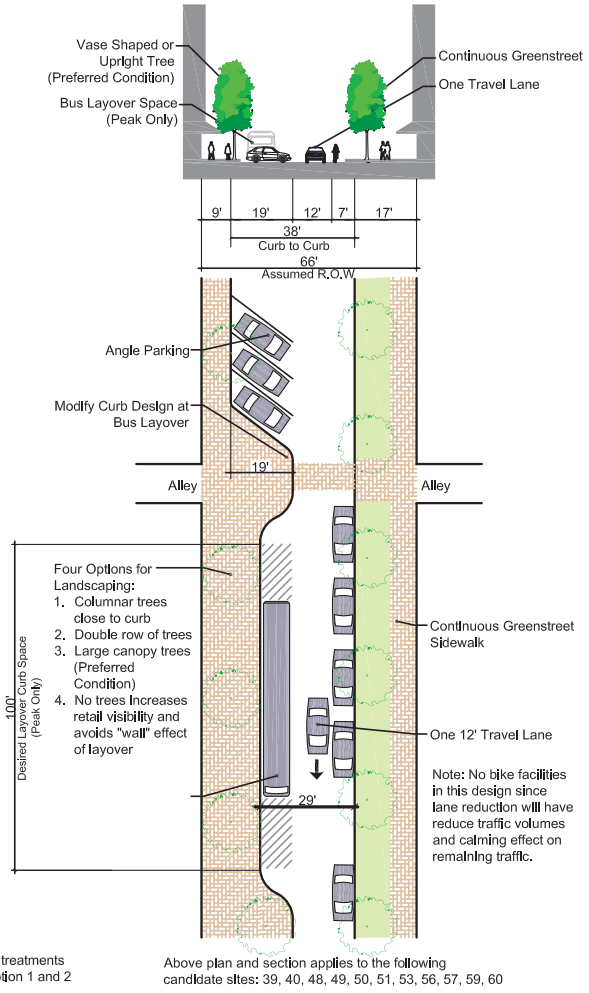
Figure 4

Greenstreet Layover Option 3



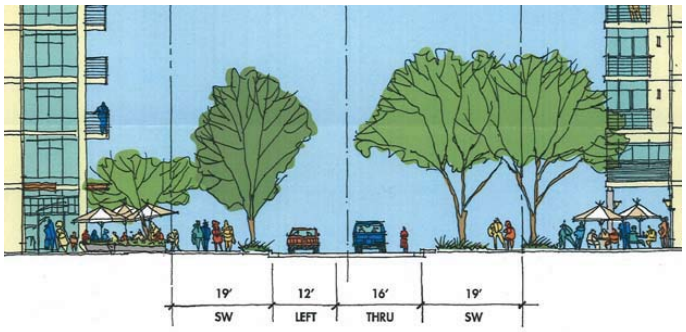
Above plan and section applies to the following candidate sites: 41, 45, 46, 54, 55,

Greenstreet Layover Option 4

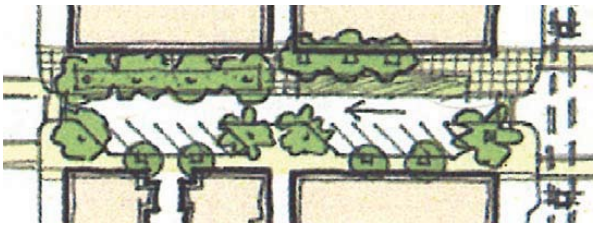


Note:
Intersection treatments similar to option 1 and 2

Above plan and section applies to the following candidate sites: 39, 40, 48, 49, 50, 51, 53, 56, 57, 59, 60



Cross Section Provided by the Department of Planning and Development



Conceptual Plan Provided by the Department of Planning and Development

North Downtown Seattle Bus Layover Project

Greenstreet Layover Concept Options 3 and 4 of 4

January 30, 2009

Figure 5

sector partner and property where bus layover could coexist with the development program. Finding a willing partner for a joint development structure may provide a long-term, build-to-suit strategy. Initial site selection and design criteria suggest such a structured layover facility would need to be approximately 120-feet wide by approximately 300-feet in length. This approximate dimension is typical of a half-block in both the South Lake Union and Denny Triangle areas. The layout concept assumes a whole- or half-block development program and structure that imposes no additional costs on the rest of the development, which would not be incurred if the floor was a typical parking garage level. Off-street transit parking is an allowed use under the current code.

In addition to a property size and configuration and a compatible development partner, other issues to consider in the build-to-suit strategy include:

- Ownership plans
- Permit status
- Projected timeline of the development partner

Heartland developed a memorandum discussing potential site development and constraints for potential off-street layover locations. They reviewed the potential for joint development on five off-street locations shown in Figure 6. Their goal in conducting the study was to provide a better understanding for the viability of creating off-street bus layover facilities in the near future in the North Downtown Study area.

The analysis was performed considering two scenarios—using a land control scenario involving the purchase or lease of a surface parking lot or using a joint development scenario involving the construction of a bus layover facility as part of a larger facility.

For the land control scenario, factors such as cost and lot configuration were examined and were considered to have the most potential to impact the viability of this strategy and assumed that there would be no need to accommodate another user. For the joint development scenario, five joint development criteria were applied to the sample sites mentioned above. These included projected cost, lot size, compatibility of uses, ownership, and time horizon for development.

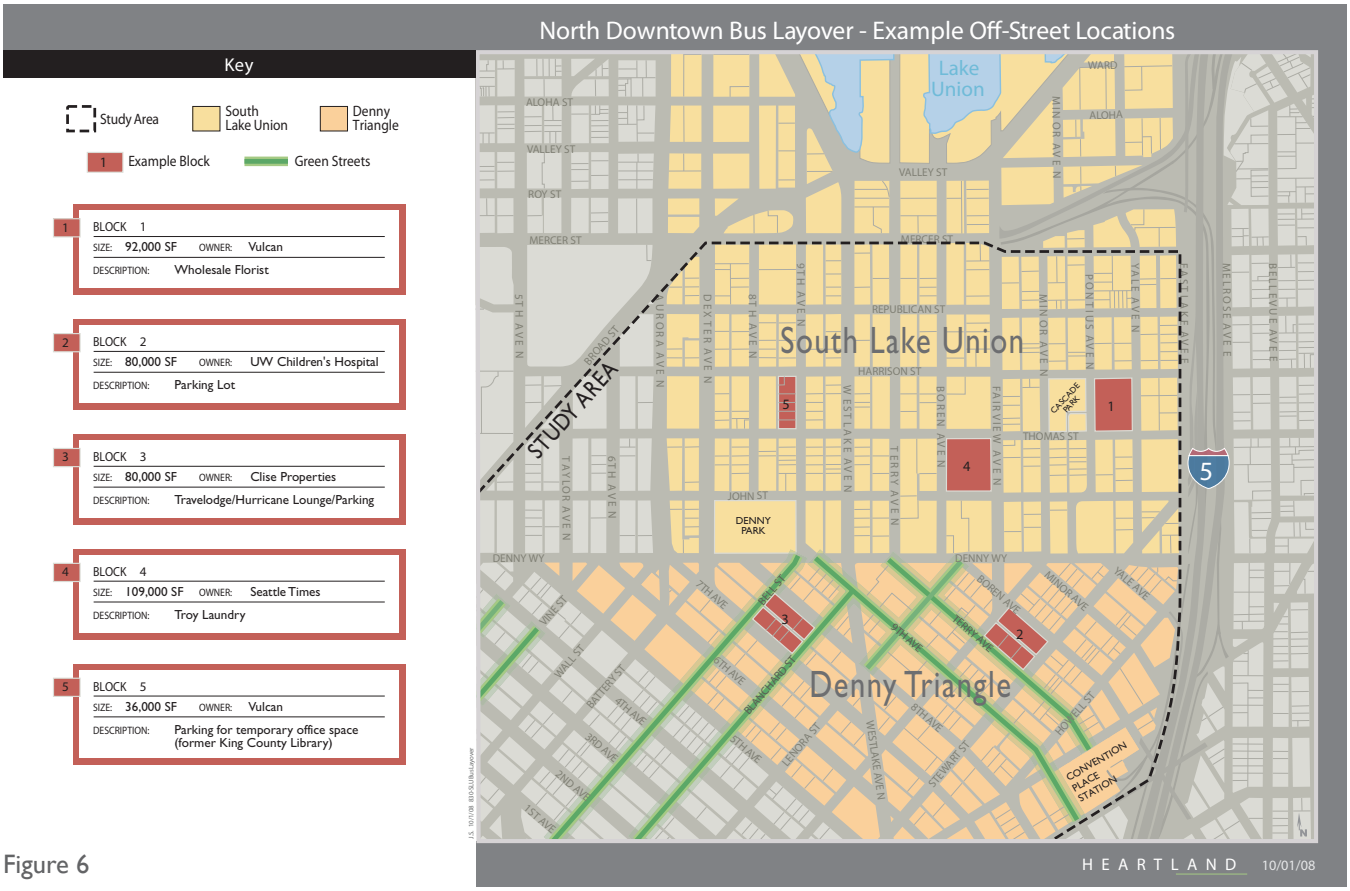


Figure 6

The land control scenario assumed that a suitable parcel would be purchased or leased and a surface layover facility would be developed. Land leases would be for three to five years and could occur where current use of the parcel is significantly less than that allowed by zoning and have little potential for development in the short- to medium-term. Table 5 shows order of magnitude costs for this option.

Under a joint development scenario, the assumption is that a public agency, either KCM or SDOT, would pursue an arrangement with a public or private joint development partner to locate a layover facility within a planned future development. One straightforward option would be to purchase a build-to-suit condominium interest in the ground floor (presumably) of a new development, or simply lease space that might otherwise be converted to parking. Evaluation of this potential should include five factors: cost, lot size, compatibility of uses, ownership, and projected time horizon of future development. A description of these factors follows.

1. **Cost**—Table 6 (on the following page) details what could be considered a best-case scenario range of costs for an off-site facility, which is unlikely to vary greatly by geography given fairly uniform site size, slopes, and base construction unit costs.

   Table 7 (on the following page) compares potential ranges of bus layover facilities costs, assuming all facilities require 36,000 SF. Should the surface layover facility require less space, the cost for the surface layover facilities would decline.

2. **Lot Size**—If a 120-foot width is required for a layover facility, such a facility would be unlikely to be accommodated in any half-block development within the study area due to market and site planning considerations. The area is predominantly mixed-use, with some amount of retail and lobby area appearing at ground level in most new developments. A 120-foot wide facility on a 120-foot wide half-block development would crowd out retail uses, complicate the location of a lobby, and make activation of the street level difficult. Creating ramping to a garage level would be problematic as well. Ideally, the facility would be at least 30 feet narrower, allowing for the facility to be wrapped by ground floor retail with reasonable bay depths. Even in that case, however, access to below grade, and potentially, above grade parking becomes constrained. Due to these factors, a full block joint development opportunity provides for much more flexibility for the developer and the public sector partner.

3. **Compatibility of Uses**—Uses that might be feasible joint venture partners include office uses that could potentially share parking with a layover facility for space that would be needed for buses only at peak times. Large format retail might also provide a similar opportunity, but there is not

Table 5
Order-of-Magnitude Cost Estimation for Land Acquisition and Land Lease Scenario

	Typical Zoning	Typical Land Value (per sf)	Land Area (half-block)	Estimated Acquisition Cost	Estimated Annual Lease Cost (Market Value) *	Estimated Annual Lease Cost ** (Income Value)
South Lake Union	SM-85 ***	$275	40,000	$11 million	$825,000	$240,000
Denny Triangle	DMC 240/290-400	$500		$20 million	$1,500,000	$345,000

* Assuming annual lease is 7.5 percent of market value of the land; escalators would have to be considered over time in a lease scenario

** Rounded; assumes half-block of 36,000 usable (non-alley) SF yields 111 parking stalls at 325 SF per stall; annual gross income per parking stall is assumed to be $3,700 in Denny Triangle and $2,800 in South Lake Union; net income to land owner is 70 percent of gross revenue; competitive premium to beat existing contract is 10 percent

*** South Lake Union's land values are subject to an ongoing up-zoning process that will likely yield higher land values over the majority of the neighborhood in the future than exists today

Table 6 Order-of-Magnitude Base Construction Cost Range Estimate	
Facility dimensions	300 feet by 120 feet
Facility size	36,000 square feet
Facility hard construction cost (per square foot)	$55 to $70
Soft costs as percentage of hard costs	30%
Developer fee (profit)	15%
Total development cost range (per square foot)	$82 to $112
Total Facility Cost Range (rounded)	**$2.8 million to $3.8 million**
▪ To the extent that parking displaces uses that could derive values greater than 115 percent of replacement costs, SDOT or KCM would have to offer a value for the bus layover facility space that would need to be competitive with higher and better uses	
▪ To the extent that a bus layover facility replaces parking that is demanded in the market, parking would have to be built elsewhere in the development, and accommodate current zoning requirements and effects on height limits	
▪ SDOT or KCM may have to offer a premium value to a joint venture partner relative to other potential ground floor uses to offset any real or perceived negative impacts from future bus operations absent any other benefits (e.g., transit service) that might be perceived as an offsetting non-monetary value to the partner	

Table 7 Cost Comparison of Potential Range of Off-Street Layover Facilities		
	Total Capital Cost	Potential Annual Cost Range
Acquisition Costs - Surface Parking *	$11 million to $20 million	$800,000 to $1.5 million
Leasing Costs - Surface Parking	N/A	$240,000 to $345,000
Development Costs - Structured Parking **	$3 million to $6 million	$220,000 to $440,000
* Assumes 5.5 percent cost of capital for bond financing, 25-year amortization		
** Assumes use of the high end of the assumed base development costs plus 30 percent additional cost for replacing below-grade parking plus 20 percent premium for nuisance factor of layover facility		

enough market support for this use in the subject area. Residential, hospitality, and smaller format retail would seem the least likely joint venture candidates.

4. **Ownership**—A range of public and private ownerships are considered in the example parcels. A key strategy for SDOT and KCM is to identify a ready and willing partner that has the interest and time to work through the development of the concept, the design of a facility, and the potential for a public process to achieve any legislative amendments that might be needed to make a deal feasible.

5. **Projected Time Horizon of Future Development**—An ideal joint development partner would be prepared to move forward in a time horizon that meets SDOT and KCM's collective planning horizon for this project, from both a planning and funding perspective. Ideally a prospective partner would be in the course of creating a development program, but not yet immersed in the permitting process.

In summary, the likelihood of having an opportunity to select multiple sites, evaluate their ranking to select the most desirable site, and then proceed to develop a joint use facility for that site is very low. Choices will likely be few, if any. The reality is that SDOT/KCM will need to search for a joint development opportunity, identify it, and pursue a partnership or lease purchase based on the joint development making sense for them. This may require a continual evaluation of opportunities until an appropriate one presents itself. Concepts for off-street layover development were included in Technical Memorandum 2—Site Evaluation and Design Criteria.

Looking ahead, SDOT or KCM may be best served through a Request for Qualifications (RFQ) process that seeks a site fitting specific development parameters

created through this planning process. An RFQ may be more time and cost effective than attempting to utilize identified criteria on a site-by-site basis when a joint venture arrangement would most likely be dependent upon the level of interest of a development partner. SDOT and KCM may want to seek feedback from several property owners to quickly verify joint development feasibility assumptions from a potential partner's perspective and identify potential legislative changes that might be needed to facilitate such a partnership.

Joint Development of Public Facilities

An early assessment of one potential public sector development site, City Light Downtown Substation, was made by Heartland as part of this Site Evaluation and Design Criteria task. Their findings are included in Appendix A—North Downtown Bus Layover Project: Land Use and Development Assessment.

Other potential joint development could be in conjunction with parks or other public utilities, such as reservoir lid structures or beneath a structured park development. Both the PMT and the Management Review Team discussed joint development of Denny Park and the potential for providing layover space beneath a rebuilt park facility. Redevelopment of Denny Park is complicated by the presence of park administration facilities and parking in the park.

More detailed discussions about off-street layover development can be found in Technical Memorandums 2 and 4 and the Heartland memorandum in the appendices.

EVALUATION CRITERIA

In addition to the physical parameters summarized as the BOD, additional site evaluation criteria were developed to compare candidate sites. A preliminary set of criteria was developed by the project team and modified through the course of two PMT and Management Review Team workshops. The final criteria are organized under five major categories that will affect transit operations and layover locations. Within each evaluation category there are multiple sub-criteria or considerations. PMT and Management Review Team members suggested relative weighting factors for each of the five categories that varied from three for most influential category to one for least influential category. The subcategory weightings were then determined to provide the weight value of each subcategory that in the aggregate approximately represented the weighting influence of the main categories.

A 0 to 2 rating scale was used to rate each alternative for each subcategory.

The initial basic criteria were used to evaluate the 60 proposed on-street locations identified. Once the top 20 locations were determined, the criteria were modified somewhat to drop some factors that were viewed less important, and to focus the evaluation of the top 25 locations (producing 38 layover spaces). More discussion about the set up and modification of the evaluation weighting is included in Technical Memorandum 4. See Table 8 on the following page.

A final table was produced that arranged candidate sites by their scores. This is discussed in the On-Street Layover Location and Evaluation section.

LAYOVER DEMAND ANALYSIS

Layover demand was developed by reviewing a number of planning documents, assessing their impact on proposed service modifications, and deriving increases in layover needs over the ten-year horizon for the analysis. Projects and on-going activities that will affect future layover demand increases were identified, including:

- King County Metro's Transit Now program
- Bus service modifications associated with the opening of the initial Link Light Rail line in 2009
- Bus service modifications associated with the extension of Link to Northgate in about 2018
- Annual KCM schedule maintenance (usually the addition of buses required to maintain the service frequency as travel time for the bus trips increase)
- Sound Transit (ST) Regional Express service increases, including those included in the ST2 program approved by voters in November 2008
- Community Transit (CT) service increases
- Alaskan Way Viaduct (AWV) replacement
- General growth not included in above
- Existing Green Street layover space loss

Information was provided by the transit agencies and was screened for changes that could impact study area layover—existing or new routes that serve the Central Business District (CBD), south end routes or north end routes that use the express lanes, and service changes

Table 8 Evaluation Criteria with Weightings		
On-Street Spaces Evaluation of Alternatives	Weight	Rating Guidance
Transit Operations	3	
Travel Time (service to layover)	3	Shorter travel time, higher score
Mix of Coaches Accommodated	3	Evaluation criteria deleted
Transit Providers Accommodated		Evaluation criteria deleted
Layover Duration Flexibility	3	24/7 higher score
Driver Facilities Available	3	Facilities within 100 feet, score 2; within 250 feet, score 1; within 1 block, score 0
Street Operations	2.1	
Street Classification	2	Higher classification, higher score
Pavement Condition	2	Excellent, score 2; fair, score 1; poor, score 0
Traffic Operation Impacts	2	Minor - 2, average - 1, major - 0
Bike Operation Impacts	1	Minor - 2, average - 1, major - 0
On-Street Parking Impacts	3	Minor - 2, average - 1, major - 0
Other Curb Use Impacts	2	Minor - 2, average - 1, major - 0
Adjacent Properties and Uses	1.9	
Ground Floor Use Compatibility	2	Retail is least compatible, 0; residential, 1; commercial, 2
Sidewalk Use Compatibility	2	Sidewalk with amenities affected is least compatible, 0
Potential Development Compatibility	2	Retail is least compatible, 0; residential, 1; commercial 2
Projected Life Cycle of Spaces	1	Evaluation criteria deleted
Planning Context	2.5	
Supports Transportation/Mobility Plans	2.5	Supports most or all, 2; supports some to most, 1; supports none to some, 0
Estimated Costs	1.3	
Street Improvement Costs	1	Low cost, 2
Shared Cost Potential	2	High potential, 2

that may impact layover, such as change in frequency or uncoupling of through-routes. A largely qualitative estimate of the change in layover needs was then made. A starting point used as a rule of thumb for layover stall needs based on service frequency is shown in Table 9.

Table 9 Layover Stall Needs	
Service Frequency (minutes)	Layover Spaces Required
15	2
20	1 or 2
30	1

The approximate needs for afternoon peak period trippers (buses that enter service from the bus base for the afternoon peak and operate a limited number of trips, often only one) and interlined/foreign trips, are one space for every three to five trips. Other considerations in the estimate are whether the route is through-routed and the typical amount of time the bus is scheduled for layover in the current bus schedules.

It should be noted that forecasting for the Alaskan Way Viaduct Replacement project impact was complicated by over 20 potential transit service packages associated with eight conceptual design options for the project that were under consideration during this analysis. The forecast shown for this element of the demand analysis is a best estimate of the impact based on averaging the various

potential programs. When the viaduct configuration and transit service package are determined, it may be appropriate to review the analysis and modify it to reflect actual expected conditions.

Results of the analysis and year-by-year forecast of demand are shown in Table 10 for total layover needs and Table 11 (on the following page) for 24/7 needs (including both peak-hour and 24/7).

ON-STREET LAYOVER LOCATION AND EVALUATION

On-Street Layover Location Candidate Site Development

Throughout the course of the project, potential sites for on-street layover have been generally identified and their merits have been discussed with the PMT and the Management Review Team in general ways. First assessments of potential locations occurred in the kickoff field trip and then further as the evaluation criteria was developed. Key considerations resulting from these discussions included:

- Avoid parking impacts in the Cascade Neighborhood
- Avoid streets where committed bicycle lanes have been or are in the current process of being developed
- Limit spaces on Green Streets
- Crossing of Denny Way will likely extend access travel times
- Streets with concrete pavement are preferred to streets with asphalt pavement
- Turning movements onto and off of candidate streets must accommodate bus operations

TABLE 10
NORTH CBD LAYOVER DEMAND—POTENTIAL CHANGES 2009-2018

Year/ Program	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	Recommended Total
Transit Now	-0.67		+2	-2		+2.33					+1.66	
Schedule Maintenance	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+1.25	+12.5	
Link Sea-Tac	-3.67 to -1.67										-1.67 to -3.67	
ST Express	+1		+1			+1			+1		+4	
Link Northgate										-2 to -4	-2 to -4	
CT		+1				+1				+1	+3	
General Growth*	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+.5 to 1	+5 to 10	
Existing * Green Street Layover Space Replacement**	+1	+1	+1	+1	+1	+1	+1	+1	+1	+10	10	
Running Total	-0.5 to +2	+2.75 to +6.25	+8.5 to +12.5	+9.25 to +13.75	+11 to +17	+18.1 to +24.5	+20.8 to +27.75	+23.6 to +31.23	+27.33 to +35.25	+27.08 to +37.03		
Recommended Running Total	-1 to 2	+3 to +7	+9 to +13	+10 to +14	+11 to +17	+18 to +25	+21 to +28	+24 to +31	+28 to +36	+28 to +38	+29 to +38	29 to 38
AWV**				**-1**	**+6**	**-3 to 2**	**-2**			**-3**		

X	Approximate timing
*	On a base of 88 layover spaces
**	There are eight major project alternatives and 20+ service packages with multiple service changes. The service packages do not apply to all of the project alternatives, resulting in many potential possibilities. These numbers are for the net results of approximately a half dozen service packages with definitive layover impacts and are shown to illustrate a possible level of magnitude or range for these changes.
***	The analysis assumes the loss of ten layover spaces currently located on Green Streets for the ten-year horizon of the study. Fewer spaces may actually be lost.

Table 11 North CBD Layover Demand—Midday (24/7) Changes from Current—DRAFT 11/20/08												
Year/Program	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total	Recommended Total
Transit Now			+2	-2		+2					+2	
Link Sea-Tac	-1										-1	
ST Express			+1								+1	
General Growth *Including Scheduled Maintenance*	+.5	+.5	+.5	+.5	+.5	+.5	+.5	+.5	+.5	+.5	+5	
Existing Green Street Layover Space Loss	0	1	1	1	2	2	2	3	3	3		
Running Total**	-.05	+1	+4.5	+3	+4.5	+7	+7.5	+9	+9.5	+10	+10	
Recommended Running Total**	**0**	**0**	**5**	**3**	**5**	**7**	**8**	**9**	**10**	**10**	**10**	**10**
AWV*				-1	+6	=3 to +2	-2			-3		

* Likely negligible

** These spaces are included in the overall demand of 27 to 36

Conflicts between demand for bike lanes and demand for layover spaces may occur in the future. The Seattle Bike Master Plan suggests locations for striped bike lanes that could be encroached upon by bus layover where the layover is located in a parallel parking lane seven or eight feet wide. While the evaluation of potential layover locations included bike lane considerations, it will be necessary for future bike lane and bus layover implementation to consider impacts on each facility and adjust to accommodate those facilities. Bike lanes may need to be eliminated for the block with layover and sharrows provided instead. Figure 7 shows a method to transition from bike lanes to sharrow and back to bike lanes. Appendix K presents a solution framework for addressing these potential conflicts.

To track the physical characteristics of each candidate location (note that a location often includes multiple candidate sites), a Layover Worksheet was developed. Layover worksheets for each proposed space/location were prepared and are included in Appendix E, Technical Memorandum 4—Alternatives Evaluation.

Sixty candidate layover locations were identified for evaluation, as shown in Figure 8. Of the 60 locations, 20 were located north of Denny Way. While these locations have a significant travel time disadvantage due to crossing Denny Way, they tend to better serve most routes coming from the South, East and North bases and would become increasingly attractive as layover

SDOT/KCM Layover Space Worksheet ID No. ___

Location: On _____ between _____ and _____

☐East Side ☐West Side ☐North Side ☐South Side

Street Width: ☐ Parking Both Sides

Designated Green Street: ☐ Parking One Side

☐ No Parking

Street Classification: Existing Zoning:

Ground Floor Use:

Length Available:

Existing LS: (describe)

Photo: (description)

PHOTO OF STREET

Sample Layover Space Worksheet

options if revenue service was extended further north from the CBD into South Lake Union. Coaches from these routes tend to use I-5 and ramps north of the CBD (Mercer, Stewart, and Roanoke/Lakeview) to access the layover locations to start their routes, and thus are not challenged to cross Denny Way to access layover, but they do cross Denny to start service.

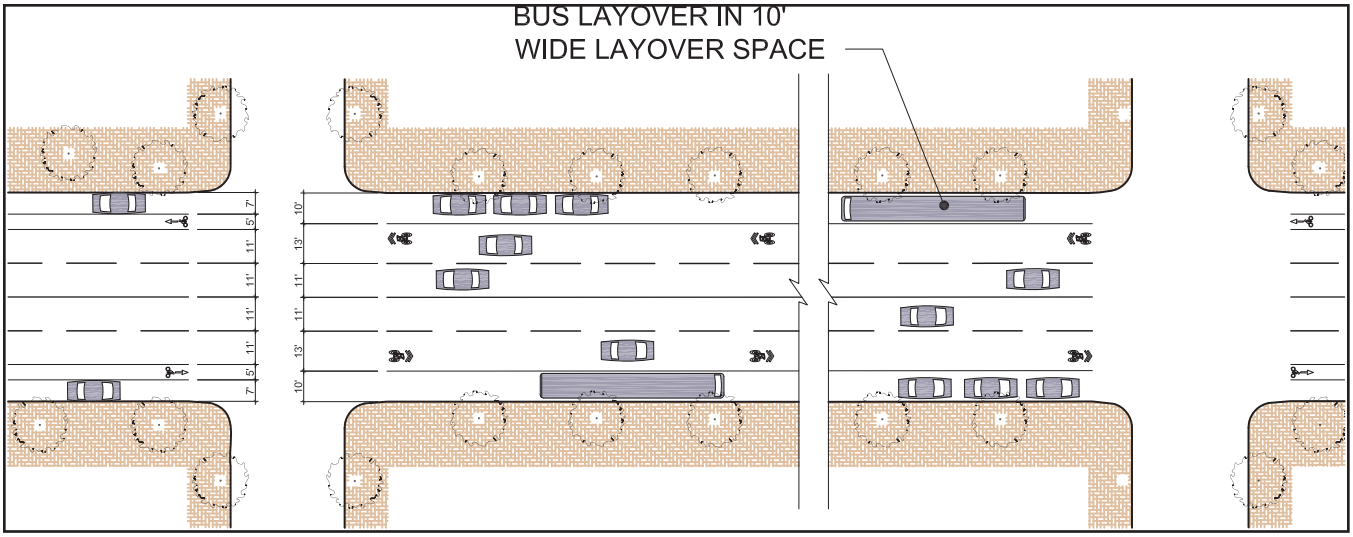


Figure 7—Bike Lane/Sharrow Transition

The locations identified could result in the capacity for approximately 150 layover spaces serving a mix of 40-foot and 60-foot coaches. It was concluded that while the potential consisted of 150 spaces, after completion of the first evaluation, the locations identified would be reduced to actual specific spaces. It was generally felt that just because a block face could accommodate six coaches, the entire block face should not necessarily be used for layover. The layover space capacity for the top 35 locations representing 59 proposed layover spaces is shown in Table 14. The remaining locations evaluated are noted and ranked in Appendix I.

TRAVEL TIME ANALYSIS

Travel time for transit coaches operating along three routes in the study area was analyzed to determine expected operating times and ultimately compute operating costs for access to the proposed layover locations. Three routes were selected to represent potential travel paths to and through the study area. Travel paths are shown on Figure 8.

DKS Associates calculated the travel time along each route for the PM peak-hour and summarized the travel time results on a block-by-block basis. Detailed travel time information is shown in Tables 1, 2, and 3 in their report in Appendix H. Travel times for each intersection include the average time for a vehicle to travel the length of the block approaching the intersection, as well as the average approach delay at the intersection.

Route A operates through 30 intersections along the travel path. This route has the benefit that outbound coaches avoid the delays associated with crossing Denny Way since it is grade separated from Eastlake. The return route is not grade separated from Denny Way.

Route B operates through 28 intersections along the travel path and is shorter than Route A but longer than Route C. It would take less time on average for both inbound and outbound vehicles to cross Denny Way along the Route B travel path than the other two routes, but the Denny Way crossing times (including delays of adjacent intersections) are still a substantial source of delay. This route also crosses the streetcar line at Fairview and Harrison and could experience additional delay up to four times per hour.

Route C operates along the shortest travel path of all three transit routes, through 20 intersections, and has the shortest travel time of the three potential transit layover routes. The travel time for Route C is approximately 5.3 minutes less than Route A and 2.9 minutes less than Route B.

The average travel times between the three layover routes are fairly comparable, which indicates that any of the proposed paths could be viable layover routes. The outbound and inbound travel times were summarized for each of the three routes and the results are shown in Table 12.

Table 12 Comparison of Inbound and Outbound Travel Times by Transit Route			
Travel Time Segment	Route A Time (minutes)	Route B Time (minutes)	Route C Time (minutes)
Outbound			
3rd Avenue to Denny Way	6.2	4.4	4.6
Denny Way to Harrison Street	0.8	1.4	0.8
Total Outbound Travel Time	**7.0**	**5.8**	**5.3**
Inbound			
Harrison Street to Denny Way	3.5	2.7	1.8
Denny Way to 3rd Avenue	4.6	4.3	2.7
Total Inbound Travel Time	**8.1**	**7.0**	**4.4**

Following the analysis of travel times over the layover travel spines, the project team calculated the travel time from the appropriate spine point to each specific layover space (Table 15). Because of this, travel time and travel cost results are not applicable to layovers for Community Transit routes which originated at 9th and Stewart. All travel times are measured to and from 3rd and Stewart. Detailed travel time analyses are provided in Appendix H.

COST ASSESSMENT

Layover space cost is composed of two elements, lost parking revenue and the difference in transit operating costs from existing layover spaces to the new spaces. Other capital costs associated with the proposed layover spaces were assumed to be negligible.

Parking Revenue Loss

Lost parking revenue is the revenue that is not collected by the City when the paid curb parking spaces are dedicated to layover and no parking is allowed. For 24-hour layover, this would consume all parking revenue for the locations that provide 24/7 layover. However, only seven projected spaces are slated for 24/7 layover, and the remainder would be for peak periods. Therefore, only a portion of the average daily revenue would be assessed as a cost of the new layover.

It is assumed that peak layover would be reserved for the 5 a.m. to 9 a.m. morning period and the 3 p.m. to 7 p.m. evening period. This results in a net loss of four hours (8 a.m. to 9 a.m. and 3 p.m. to 6 p.m.) of paid parking from the ten revenue hours between 8 a.m. and 6 p.m.

SDOT provided an estimated average daily revenue for each paid parking stall and recommended 40 percent of the average daily revenue be assigned to peak-hour revenue loss.

In order to estimate parking revenue loss for the study area, the data provided by SDOT was analyzed to determine areas where parking revenue loss was similar for certain locations. Figure 9 shows a map of the study area with parking revenue areas delineated. These areas correspond to the parking revenue loss breakdown shown in Table 13. This table shows the breakdown of lost revenue per parking spaces by analysis areas.

Table 13 Lost Revenue per Parking Space by Analysis Area				
Parking Revenue Category	24/7 Daily Revenue Loss per Space	24/7 Annual Revenue Loss per Space	Peak Period Daily Revenue Loss per Space	Peak Period Annual Revenue Loss per Space
High	$24.75	$7,425	$9.90	$2,970
Medium High	$16.50	$4,950	$6.60	$1,980
Medium	$11.50	$3,450	$4.60	$1,380
Medium Low	$8.25	$2,475	$3.30	$990
Low	$5.00	$1,500	$2.00	$600

North Downtown Bus Layover Project
Existing and Candidate Sites

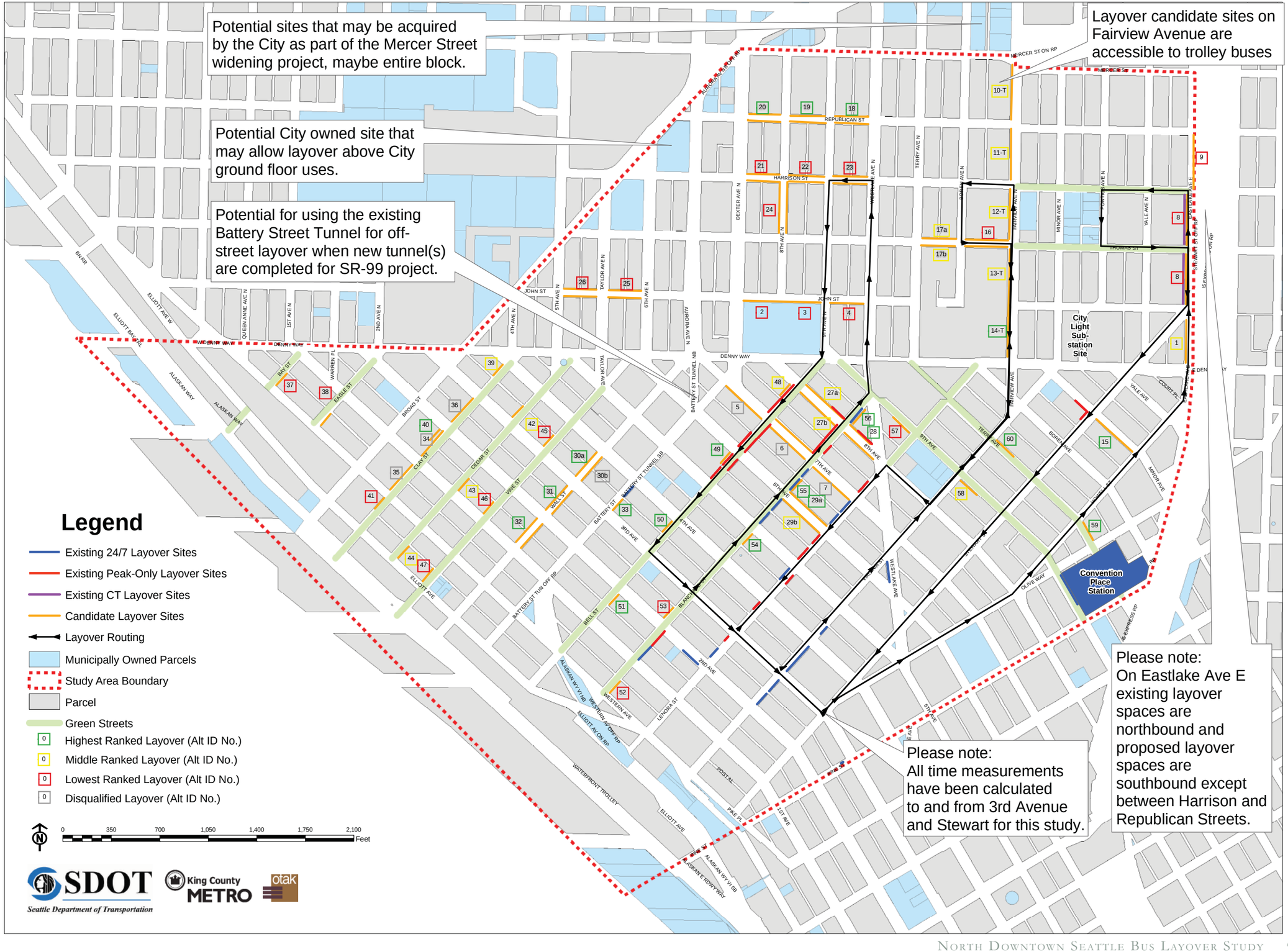


Figure 8—Compilation Map

On-Street Spaces Evaluation of Alternatives	Alt 33	Alt 30A	Alt 30B	Alt 31A	Alt 31B	Alt 32A	Alt 32B	Alt 28A	Alt 28B	Alt 55	Alt 56	Alt 50	Alt 51	Alt 60	Alt 19A	Alt 19B	Alt 20A	Alt 20B	Alt 54	Alt 15
	Battery b/t 3rd/4th (W Half)	Wall b/t 4th/3rd	Wall b/t 4th/3rd	Wall b/t 3rd/2nd	Wall b/t 3rd/2nd	Wall b/t 2nd/1st	Wall b/t 2nd/1st	8th b/t Blanch-ard/ Westlake	8th b/t Blanch-ard/ Westlake	Blanch-ard b/t 6th and 7th	Blanch-ard b/t 8th and 9th	Bell b/t 3rd and 4th	Bell b/t 1st and 2nd	Terry b/t Fairview and Stewart	Repub-lican b/t 8th/9th	Repub-lican b/t 8th/9th	Repub-lican b/t Dexter/ 8th	Repub-lican b/t Dexter/ 8th	Blanch-ard b/t 4th and 5th	Minor b/t Stewart/ Howell
Points	27	25	25	25	25	25	25	24	24	23	23	22	22	22	23	23	23	23	21	22
Weighted Points	58	53	53	53	53	53	53	51.5	51.5	50.5	49	48.5	48.5	48.5	48	48	48	48	47.5	47
Weighted Rank	**1**	**2**		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Parking Spaces Removed to Make Way for Layover Space(s)	4	10		9	9	10	10	5	12	4	4	3	4	4	6	11	10	9	4	11
Parking Revenue Loss (High=$15/day; Medium High=$10/day; Medium=$7/day; Medium Low=$5/day; Low=$3/day	Medium Low	High		Medium High	Medium High	Medium High	Medium High	Low	Low	Low	Low	Medium Low	Medium	Medium	Medium Low	Medium Low	Medium Low	Medium Low	Low	Medium
Parking Revenue Loss per day	$33	$248		$149	$149	$66	$66	$10	$24	$8	$8	$25	$46	$46	$50	$91	$83	$74	$20	$127
Annual Parking Revenue Loss	$9,900	$74,250		$44,550	$44,550	$19,800	$19,800	$2,970	$7,128	$2,376	$2,376	$7,425	$13,860	$13,860	$14,850	$27,225	$24,750	$22,275	$5,940	$38,115
Layover Spaces per Individual Site	1	2		2	2	2	2	1	2	1	1	1	1	1	1	1	2	2	1	2
Layover Spaces Cumulative	1	3		5	7	9	11	12	14	15	16	17	18	19	20	21	23	25	26	28
Layover Space Time (24/7 or Peak PM)	24/7	24/7		24/7	24/7	Peak PM	Peak PM	Peak PM	Peak PM	24/7	24/7	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM
Travel Time b/t 3rd and Stewart to Layover Space and returning to 3rd and Stewart (in seconds)	358	407		432	432	507	486	530	496	445	598	322	411	579	884	894	902	944	292	586
Travel Time differential (400 seconds existing travel time assumed)	-42	7		32	32	107	86	130	96	45	198	-78	11	179	484	494	502	544	-108	186
Annual Operating Hours Differential	-26.25	4.38		20.00	20.00	66.88	53.75	81.25	60.00	28.13	123.75	-48.75	6.88	111.88	302.50	308.75	313.75	340.00	-67.50	116.25
Annual Operating Cost Differential at 7.5 per day, 300 days per year	-$2,625	$438		$2,000	$2,000	$6,688	$5,375	$8,125	$6,000	$2,813	$12,375	-$4,875	$688	$11,188	$30,250	$30,875	$31,375	$34,000	-$6,750	$11,625
Implementation Year	1	2		2	2	3	3	3	4	5	5	5	6	6	6	6	6	6	7	7
Total Parking Revenue Loss	$9,900	$173,250		$173,250	$173,250	$215,820	$215,820	$215,820	$222,948	$235,125	$235,125	$235,125	$351,945	$351,945	$351,945	$351,945	$351,945	$351,945	$396,000	$396,000
Total Travel Cost Differential	-$2,625	$1,813		$1,813	$1,813	$22,000	$22,000	$22,000	$28,000	$38,313	$38,313	$38,313	$176,688	$176,688	$176,688	$176,688	$176,688	$176,688	$181,563	$181,563

ELIMINATED south side lane layover would require unacceptable lane shifts

On-Street Spaces Evaluation of Alternatives	Alt 36	Alt 49	Alt 59	Alt 6	Alt 7	Alt 14	Alt 40	Alt 18A	Alt 18B	Alt 29A	Alt 29B	Alt 48	Alt 5	Alt 13	Alt 58	Alt 27A	Alt 27B	Alt 39	Alt 42	Alt 43
	Clay b/t 2nd/3rd	Bell b/t 5th and 6th	Terry b/t Olive and Howell	7th b/t Bell/ Blanch-ard	7th b/t Blanch-ard/ Lenora	Fairview b/t John/ Denny	Clay b/t 1st and 2nd	Repub-lican b/t 9th/West-lake	Repub-lican b/t 9th/West-lake	6th b/t Blanch-ard/ Lenora	6th b/t Blanch-ard/ Lenora	Bell b/t 7th and 8th	7th b/t Battery/ Bell	Fairview b/t Thomas/John	9th b/t Virginia and Stewart	8th b/t Bell/ Blanch-ard	8th b/t Bell/ Blanch-ard	Clay b/t 3rd and 4th	Cedar b/t 3rd and 4th Avenue	Cedar b/t 1st and 2nd
Points	22	21	21	21	21	23	20	22	22	20	20	20	20	22	20	21	21	19	18	18
Weighted Points	47	46.5	46.5	46	46	46	46	45	45	44.5	44.5	44.5	44	44	44	43.5	43.5	43	43	43
Weighted Rank		**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
Parking Spaces Removed to Make Way for Layover Space(s)		4	4	3	3	0	4	5	7	12	15	3	4	18	4	7	3	4	4	4
Parking Revenue Loss (High=$15/day; Medium High=$10/day; Medium=$7/day; Medium Low=$5/day; Low=$3/day		Medium High	Medium	Medium Low	Medium Low	Medium Low	Low	Medium Low	Medium Low	Low	Low	Low	Medium Low	Medium Low	Medium	Low	Low	Low	Low	Low
Parking Revenue Loss per day		$26	$18	$10	$10	$0	$8	$17	$23	$24	$30	$6	$13	$59	$18	$14	$6	$8	$8	$8
Annual Parking Revenue Loss		$7,920	$5,544	$2,970	$2,970	$0	$2,376	$4,950	$6,930	$7,128	$8,910	$1,782	$3,960	$17,820	$5,544	$4,158	$1,782	$2,376	$2,376	$2,376
Layover Spaces per Individual Site		1	1	1	1	4	1	1	2	4	4	1	2	4	1	3	1	1	1	1
Layover Spaces Cumulative		29	30	31	32	36	37	38	40	44	48	49	51	55	56	59	60	61	62	63
Layover Space Time (24/7 or Peak PM)		Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM	Peak PM
Travel Time b/t 3rd and Stewart to Layover Space and returning to 3rd and Stewart (in seconds)		440	482	502	445	743	707	833	949	437	363	555	460	787	364	555	569	572	537	571
Travel Time differential (400 seconds existing travel time assumed)		40	82	62	45	343	307	433	549	37	-37	155	60	387	-36	155	169	172	137	171
Annual Operating Hours Differential		25.00	51.25	38.75	28.13	214.38	191.88	270.63	343.13	23.13	-23.13	96.88	37.50	241.88	-22.50	96.88	105.63	107.50	85.63	106.88
Annual Operating Cost Differential at 7.5 per day, 300 days per year		$2,500	$5,125	$3,875	$2,813	$21,438	$19,188	$27,063	$34,313	$2,313	-$2,313	$9,688	$3,750	$24,188	-$2,250	$9,688	$10,563	$10,750	$8,563	$10,688
Implementation Year		8	8	8	8	8	9	9	10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10	Beyond 10
Total Parking Revenue Loss		$415,404	$415,404	$415,404	$415,404	$415,404	$422,730	$422,730	$429,660	$436,788	$445,698	$447,480	$451,440	$469,260	$474,804	$478,962	$480,744	$483,120	$485,496	$487,872
Total Travel Cost Differential		$217,313	$217,313	$217,313	$217,313	$217,313	$263,563	$263,563	$297,875	$300,188	$297,875	$307,563	$311,313	$335,500	$333,250	$342,938	$353,500	$364,250	$372,813	$383,500

ELIMINATED due to Green Street Layover on adjacent blocks

Table 14

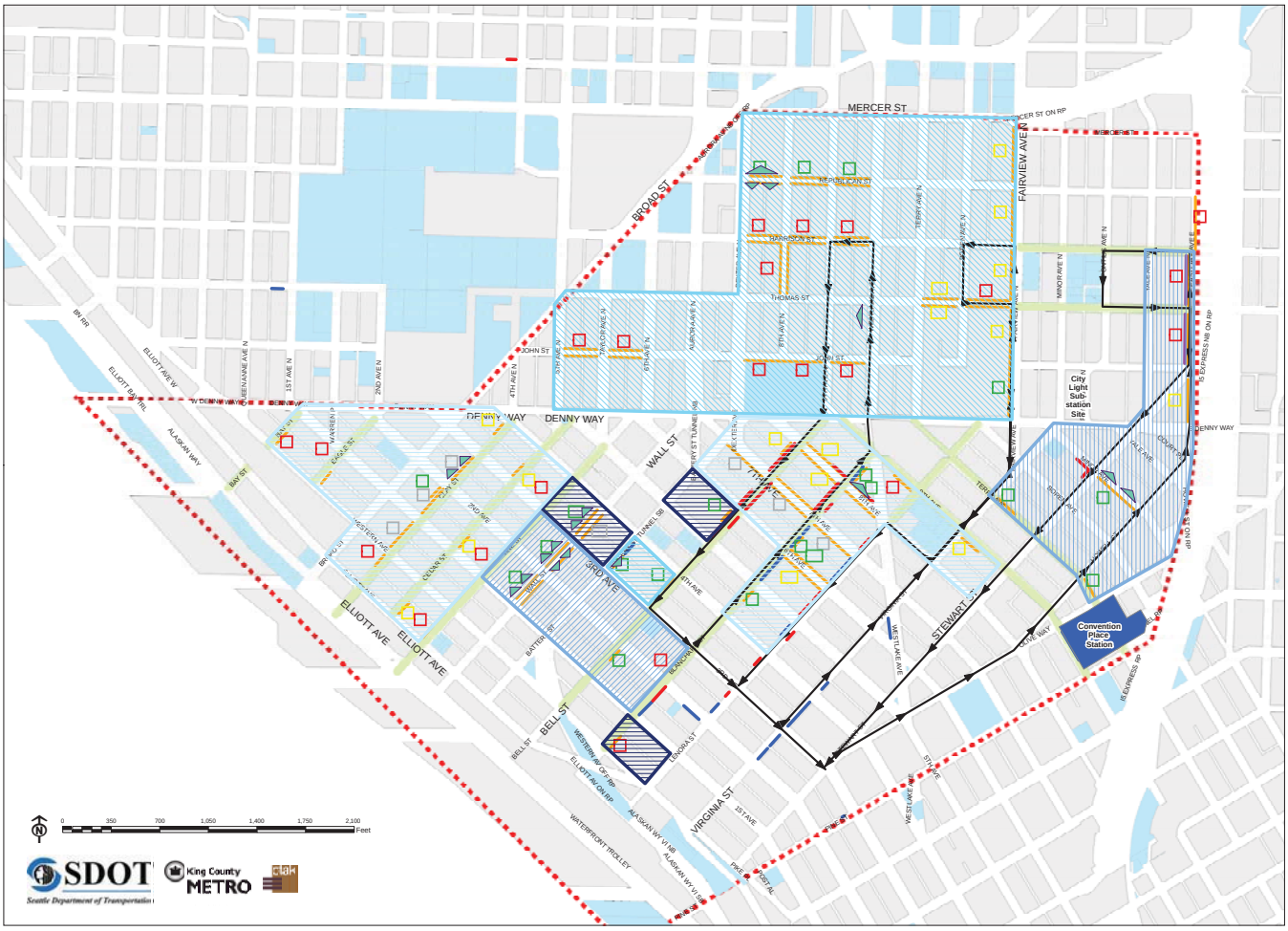


Figure 9—On-street Parking Revenue Zones

OPERATING COST ASSESSMENT

Determination of additional operating cost to access proposed layover spaces involved determining the travel time differential between existing access times in non-revenue service and comparing those times to the time to access proposed layover spaces. It also involved determining the number of times a layover space would be accessed on a daily basis. KCM Scheduling estimated a transit operating cost of $100 per hour to use in calculating the operating cost of traveling to the proposed layover locations.

To determine the travel time differential, it was necessary to determine an average travel time for buses to access existing layover. The project team determined that the average travel time to existing layover spaces in the study area required a travel time of 400 seconds to reach and return from 3rd and Stewart. Thus, all travel time differentials shown in Table 15 are based on a comparison of computed travel time to the proposed layover location and the 400-second existing travel time.

Table 15 shows the actual cost for one layover trip for each space. In order to determine the additional annual operating cost to access new layover locations, it was also necessary to determine the estimated number of daily trips that would occur to each proposed layover space.

On-Street Spaces Evaluation Alternatives		Weighted Rank	Parking Spaces Removed to Make Way for Layover Space(s)	Parking Revenue Loss [1]	Parking Revenue Loss per day	Annual Parking Revenue Loss	Layover Spaces per Individual Site	Layover Spaces Cumulative	Layover Space Time (24/7 or Peak PM)	Travel Time [2]	Travel Time differential [3]	Annual Operating Hours Differential	Annual Operating Cost Differential [4]	Implementation Year	Total Parking Revenue Loss (accumulated cost)	Total Travel Cost Differential (accumulated cost)
Alt 33	Battery b/t 3rd/4th (W Half)	1	4	Medium Low	$33	$9,900	1	1	24/7	358	-42	-26.25	-$2,625	1	$9,900	-$2,625
Alt 30A	Wall b/t 4th/3rd	2	10	High	$248	$74,250	2	3	24/7	407	7	4.38	$438	2	$173,250	-$2,188
Alt 30B	Wall b/t 4th/3rd	ELIMINATED south side lane layover would require unacceptable lane shifts														
Alt 31A	Wall b/t 3rd/2nd	3	9	Medium High	$149	$44,550	2	5	24/7	432	32	20.00	$2,000	2	$173,250	-$188
Alt 31B	Wall b/t 3rd/2nd	4	9	Medium High	$149	$44,550	2	7	24/7	432	32	20.00	$2,000	2	$173,250	$1,813
Alt 32A	Wall b/t 2nd/1st	5	10	Medium High	$66	$19,800	2	9	Peak PM	507	107	66.88	$6,688	3	$215,820	$22,000
Alt 32B	Wall b/t 2nd/1st	6	10	Medium High	$66	$19,800	2	11	Peak PM	486	86	53.75	$5,375	3	$215,820	$22,000
Alt 28A	8th b/t Blanchard/ Westlake	7	5	Low	$10	$2,970	1	12	Peak PM	530	130	81.25	$8,125	3	$215,820	$22,000
Alt 28B	8th b/t Blanchard/ Westlake	8	12	Low	$24	$7,128	2	14	Peak PM	496	96	60.00	$6,000	4	$222,948	$28,000
Alt 55	Blanchard b/t 6th and 7th	9	4	Low	$8	$2,376	1	15	24/7	445	45	28.13	$2,813	5	$235,125	$38,313
Alt 56	Blanchard b/t 8th and 9th	10	4	Low	$8	$2,376	1	16	24/7	598	198	123.75	$12,375	5	$235,125	$38,313
Alt 50	Bell b/t 3rd and 4th	11	3	Medium Low	$25	$7,425	1	17	Peak PM	322	-78	-48.75	-$4,875	5	$235,125	$38,313
Alt 51	Bell b/t 1st and 2nd	12	4	Medium	$46	$13,860	1	18	Peak PM	411	11	6.88	$688	6	$351,945	$176,688
Alt 60	Terry b/t Fairview and Stewart	13	4	Medium	$46	$13,860	1	19	Peak PM	579	179	111.88	$11,188	6	$351,945	$176,688
Alt 19A	Republican b/t 8th/9th	14	6	Medium Low	$50	$14,850	1	20	Peak PM	884	484	302.50	$30,250	6	$351,945	$176,688
Alt 19B	Republican b/t 8th/9th	15	11	Medium Low	$91	$27,225	1	21	Peak PM	894	494	308.75	$30,875	6	$351,945	$176,688
Alt 20A	Republican b/t Dexter/ 8th	16	10	Medium Low	$83	$24,750	2	23	Peak PM	902	502	313.75	$31,375	6	$351,945	$176,688
Alt 20B	Republican b/t Dexter/ 8th	17	9	Medium Low	$74	$22,275	2	25	Peak PM	944	544	340.00	$34,000	6	$351,945	$176,688
Alt 54	Blanchard b/t 4th and 5th	18	4	Low	$20	$5,940	1	26	Peak PM	292	-108	-67.50	-$6,750	7	$396,000	$181,563
Alt 15	Minor b/t Stewart/ Howell	19	11	Medium	$127	$38,115	2	28	Peak PM	586	186	116.25	$11,625	7	$396,000	$181,563
Alt 36	Clay b/t 2nd/3rd	ELIMINATED due to Green Street Layover on adjacent blocks														
Alt 49	Bell b/t 5th and 6th	20	4	Medium High	$26	$7,920	1	29	Peak PM	440	40	25.00	$2,500	8	$409,464	$210,625
Alt 59	Terry b/t Olive and Howell	21	4	Medium	$18	$5,544	1	30	Peak PM	482	82	51.25	$5,125	8	$409,464	$210,625
Alt 6	7th b/t Bell/ Blanch-ard	22	3	Medium Low	$10	$2,9701	1	31	Peak PM	502	62	30.75	$3,857	8	$415,404	$217,313

Table 15—Page 1

On-Street Spaces Evaluation Alternatives		Weighted Rank	Parking Spaces Removed to Make Way for Layover Space(s)	Parking Revenue Loss [1]	Parking Revenue Loss per day	Annual Parking Revenue Loss	Layover Spaces per Individual Site	Layover Spaces Cumulative	Layover Space Time (24/7 or Peak PM)	Travel Time [2]	Travel Time differential [3]	Annual Operating Hours Differential	Annual Operating Cost Differential [4]	Implementation Year	Total Parking Revenue Loss (accumulated cost)	Total Travel Cost Differential (accumulated cost)
Alt 7	7th b/t Blanchard/ Lenora	23	3	Medium Low	$10	$2,970	1	32	Peak PM	445	45	28.13	$2,813	8	$415.404	$217,313
Alt 14	Fairview b/t John/ Denny [5]	24	0	Medium Low	$0	$0	4	36	Peak PM	743	343	214.38	$21,438	8	$409,464	$210,625
Alt 40	Clay b/t 1st and 2nd	25	4	Low	$8	$2,376	1	37	Peak PM	707	307	191.88	$19,188	9	$416,790	$256,875
Alt 18A	Republican b/t 9th/ Westlake	26	5	Medium Low	$17	$4,950	1	38	Peak PM	833	433	270.63	$27,063	9	$416,790	$256,875
Alt 18B	Republican b/t 9th/ Westlake	27	7	Medium Low	$23	$6,930	2	40	Peak PM	949	549	313.13	$34,313	10	$423,720	$291,188
Alt 29A	6th b/t Blanchard/ Lenora	28	12	Low	$24	$7,128	4	44	Peak PM	437	37	23.13	$2,313	+10	$436,788	$380,188
Alt 29B	6th b/t Blanchard/ Lenora	29	15	Low	$30	$8,910	4	48	Peak PM	363	-37	-23.13	-$2,313	+10	$445,698	$297,875
Alt 48	Bell b/t 7th and 8th	30	3	Low	$6	1,782	1	49	Peak PM	555	155	96.88	$9,688	+10	$447,480	$307,563
Alt 5	7th b/t Battery/Bell	31	4	Medium Low	$13	$3,960	2	51	Peak PM	460	60	37.50	$3,750	+10	$451,440	$311,313
Alt 13	Fairview b/t Thomas/John	29	18	Medium Low	$59	$17,820	4	51	Peak PM	787	387	241.88	$24,188	+10	$469,260	$335,500
Alt 58	9th b/t Virginia and Stewart	30	4	Medium	$18	$5,544	1	52	Peak PM	364	-36	-22.50	-$2,250	+10	$474,804	$333,250
Alt 27A	8th b/t Bell/ Blanchard	31	7	Low	$14	$4,158	3	55	Peak PM	555	155	96.88	$9,688	+10	$478,744	$353,500
Alt 27B	8th b/t Bell/ Blanchard	32	3	Low	$6	$1,782	1	56	Peak PM	569	169	105.63	$10,563	+10	$480,744	$353,500
Alt 39	Clay b/t 3rd and 4th	33	4	Low	$8	$2,376	1	57	Peak PM	572	172	107.50	$10,750	+10	$403,120	$364,250
Alt 42	Cedar b/t 3rd and 4th Avenue	34	4	Low	$8	$2,376	1	58	Peak PM	537	137	85.63	$8,563	+10	$485,496	$372,813
Alt 43	Cedar b/t 1st and 2nd	35	4	Low	$8	$2,376	1	59	Peak PM	571	171	106.88	$10,688	+10	$487,872	$383,500

[1] High=$15/day; Medium High=$10/day; Medium=$7/day; Medium Low=$5/day; Low=$3/day

[2] Between 3rd and Stewart to Layover Space and returning to 3rd and Stewart (in seconds)

[3] 400 seconds existing travel time assumed

[4] 7.5 per day, 300 days per year

[5] Can also accommodate trolley

Table 15—Page 2

In *Technical Report #1—Existing Conditions* prepared by SDOT and KCM staff (Appendix 3) provides information that was used to determine the number of times existing layover spaces in the study area are accessed. For estimating purposes, it was assumed that for the proposed spaces, an average of 7.5 stops per day would occur in the future.

Table 15 shows cost differential between proposed layover spaces and the existing average. Differential travel times and costs don't include deadhead time from the operating base to 3rd and Stewart since this time will be the same for existing conditions and future conditions. It is also recognized that not all routes will operate through 3rd and Stewart, but using this common point provides a good basis to compare all trips going into layover for estimating purposes.

IMPLEMENTATION PLAN AND NEXT STEPS

Implementation Process

The purpose of the workshops was to develop an information base from which to develop an implementation strategy to use as new layover needs occur. The layover demand analysis, which determines the need for layover by year over the ten-year horizon for the study, is discussed in the Background, Layover Demand Analysis section. It itemizes the various actions that will cause layover needs to increase over the next ten years and amount per year this increase is expected to be. The results of the analysis are shown in Tables 10 and 11. This information was then incorporated into Table 15, which shows the evaluation ranking (based on characteristics that include a number of factors as described in the Evaluation Criteria section of this report) of the proposed layover spaces and the year of expected implementation.

Judgment will be required in the application of the table results as new layover locations are needed. Users should consider the following:

- New layover spaces may be implemented out of their ranked order depending on the characteristics of the routes heading to layover. These could include proximity to the route being serviced, need for trolley positions, or implementation of other unrelated street improvements such as pavement repair programs or Green Streets.
- Redevelopment of a neighborhood could influence the location selected.
- Quantity of spaces needed at one time may influence the selection. For some needs, a single layover space may be satisfactory. For other needs, a grouping of spaces may be preferable. The candidate layover locations contain some with single spaces available and others with multiple spaces.
- If a proposed location is designated in this report as a single space, it may be possible to make it a multiple space layover location. A more detailed look at the proposed space at time of implementation may allow extension of the proposed single space into a multiple space location.

Cost impacts from the proposed locations vary dependent on the location, number of parking spaces lost, and travel time to the layover space. Rankings of proposed layover spaces were completed prior to detailed travel time analysis and were based on qualitative assessments of travel times. The user should consider actual travel time to the specific space when selecting a proposed new space. Also, determination of parking revenue loss was based on average revenue collected for a typical area. It may be desirable to select a space that results in less revenue loss. Note that the rank of layover spaces may change as service paths and operating conditions are revised.

Review of Table 15 shows that some of the higher ranked layover spaces require longer access times and thus higher operating costs to use. As determinations are made to implement a new layover location, the decision needs to reflect a balance between the actual ranking of the space(s) and the cost of implementation, particularly with respect to parking revenue loss and additional operating cost of the non-revenue portion of service.

For most proposed locations, it appeared that few street improvements would be required (consisting primarily of signing of the new layover spaces and curb painting). However, detailed analysis of street conditions and roadway design to reach the layover was not conducted. Assessment of these factors at the time of implementation may be appropriate when comparing different layover locations for use.

Careful consideration of the operating route should also occur. For example, it has been suggested that Virginia might be changed from one-way to two-way operation. This was not considered in assessing access or travel times since the proposal was not definite at the time of the study. There is also likelihood that new Green Street classifications and other roadway changes under consideration, such as two-way 6th Avenue and two-way 8th Avenue, may occur.

Timing of implementation of proposed layover spaces will be affected by the timing of other projects, and other uncertainties, including:

- Alaskan Way Viaduct construction—during development of Technical Memorandum 3, Layover Demand Analysis, the proposed configuration and conceptual design of the Alaskan Way Viaduct replacement had not been determined. As the Alaskan Way Viaduct program is finalized, timing of needed supporting layover locations must be further assessed.
- Link Light Rail implementation—uncertainties for north Link openings
- Transit Now and Sound Transit Regional Express
- Other needs, such as schedule maintenance and general growth—as traffic in the downtown area increases, the need for more service and the impact of traffic on transit travel times will be a dynamic situation
- Current and future revenue streams for providing transit service region-wide

Implementation of layover north of Denny Way for coaches accessing these locations from south of Denny Way may require modification of signals at Denny Way crossing locations to improve bus travel time, including Transit Signal Priority (TSP) queue-jump lanes.

Suggested Policy and Land Use Code Changes

Currently, land use codes allow for parking as part of a development, or for interim use of a site pending development plans in the future. Thus, off-street layover would be an allowed use.

City of Seattle policy directives could affect location and type of layover facilities. Master planning for pedestrians and bikes will have some effect. Most notably, the Seattle Bike Master Plan has designated certain routes within the study area for bike facilities. On future bike lane streets that include proposed layover spaces, designers need to coordinate with those responsible for transit layover and decisions need to be made on a case by case basis whether bike lanes or layover should be provided, or if a combination of those can coexist. An alternative might be to include bike sharrows instead of bike lanes.

The City should also consider modifying the Right-of-Way Improvement Manual to incorporate street sections recommended in the BOD.

Off-Street Joint Development

Opportunities for joint development of off-street layover space will be limited. As noted in the Heartland memorandum, development of an off-street facility will be expensive and may not provide the kind of development envisioned for a neighborhood block. It is more desirable to jointly develop a facility with a developer as part of a mixed-use project. The drawback is that most developers would likely find inclusion of bus layover spaces in the parking portion of their development to be undesirable and adversely affect the marketability and cost of their project. Additionally, diesel coaches operating in close proximity to other parking and building features could be objectionable.

However, there may be some good candidates for this kind of partnership. Sloping sites that could provide cost-effective special entrances for bus layover would be ideal for this type of joint development. For example, a development along Eastlake, where the site slopes down to the west, could easily provide a separate entrance/exit for buses because of the topographic conditions that lend themselves to separate entry from the north and/or south sides of the site. These entrances could be completely separate from automobile entrances. On a flat site, entrance configuration becomes more complex.

Off-street layover does provide significant advantages compared to on-street layover. It is hidden from view. If the agency has purchased the space as part of the development agreement, it will be available for an extended period of time, increasing its reliability. Its biggest drawback is the difficulty in finding a partner that is willing to jointly develop.

On-street layover is much easier to locate and implement. The disadvantage of on-street layover is it can have a negative impact on adjacent developments and can block views of signing. It can also adversely affect urban design features such as pedestrian areas, particularly those that feature special pedestrian spaces next to developments. It also is subject to relocation pressure from time-to-time due to adjacent property development.

The City should consider developing code modifications that would provide incentives to developers to partner in off-street development. Incentives could include additional FAR for including layover, waiving of certain fees, and/or participation in control of curb usage on fronting streets.

Strong consideration should be given to starting the development process for an off-street facility when approximately 50 percent of the top 40-ranked layover spaces have been consumed, and nearly 50 percent of the remaining top 40-ranked spaces are still available. If fewer spaces are available because of attrition of some of those remaining candidate spaces, a greater sense of urgency should push the development effort.

Another strong stimulus to develop an off-street facility is when a developer opportunity arises where the developer expresses an interest to the City in a joint development approach.

SDOT/KCM Bus Layover Agreement Development

With the planned projects over the next ten years that will affect transit service region-wide, SDOT and KCM need to develop an agreement that sets forth the parameters for implementing and maintaining layover capacity in the North Downtown area. A similar agreement is in place for the King Street Station Area. City policy has made it clear that transit service and usage is expected to increase to offset the continuously increasing need for travel to and from downtown Seattle. Provision of layover space supports this increase in transit need and is mutually beneficial to both the City and KCM.

Additionally, it is becoming more and more difficult for transit to maintain schedule reliability because of delays experienced due to traffic conditions. Provision of layover is a key tool in maintaining reliability and predictability for transit patrons.

The agreement could address the following.

- Location and duration of layover spaces available should be defined. Table 15 could be used as the source of this definition. Figure 5, the map showing candidate layover spaces, should also be part of the agreement.
- Absorption of the cost of the layover space should be defined. Table 15 shows expected costs that would be experienced that are different from what is experienced today. Costs should include both transit operating cost and lost revenue from loss of paid parking spaces. Costs should also include street modification costs that are due solely to layover implementation.
- It should specify the hours and days of operation of the layover usage.
- Layover locations on Green Streets require special handling. The agreement should provide a process to consider layover space at these locations, which occurs during implementation of the specific Green Streets. The process should include:

    - Identification of existing layover at the development location and an alternative location for this layover, should incorporating it with the new Green Street development be unacceptable.
    - An assessment of feasibility of incorporating layover space in accordance with Green Street Options 1, 2, 3 or 4. The assessment should include tentative layouts for both sides of the street that show dimensions of sidewalks and pedestrian plazas, parking, travel lanes, and layover spaces.
    - A discussion of impacts to streets connecting to the proposed Green Street such as travel lanes lining up, lane widths at intersection approaches, and effects on turning movements.
- Costs associated with layover space relocation initiated at developer request should be borne by the developer. Developer requests should include justification for removal or relocation of the layover space and proposed location for the replacement space. It should identify any costs associated with the relocation.

- Preservation of the capability for layover at Convention Place Station or replacement of this layover should future development of the property preclude its continued location at the current site.
- The City should have the right to eliminate on-street layover at its discretion if equal off-street layover is provided.
- A timetable for providing layover should also be included. However, the agreement should include a provision that requires review and possibly re-analysis of this implementation schedule as factors influencing layover needs change.

Future Considerations

Location of future layover space in the North Downtown area will be influenced by a number of factors as time passes. A number of those have been discussed above. Other considerations include modification of existing streets and potential joint development of other government facilities with layover space.

A grade separation of Aurora/SR 99 and John Street is being considered. If this plan is adopted, it may be appropriate to review priority of some of the layover spaces north of Denny as this proposed grade separation could improve travel times in the north part of the study area.

The potential for service changes has been discussed in several sections of this report. As service changes occur, results of analysis and conclusions should be modified if appropriate to reflect the changes.

The PMT and Management Review Team both discussed the potential to combine layover space with development of other agency facilities. One potential is joint development with the Seattle City Light Substation project near John Street and Pontius Avenue, although timing may render this opportunity remote. Another project discussed was redevelopment of Denny Park including layover on a separate level. Feasibility of this is compromised somewhat by the presence of Park offices and parking for the office space on site. Should redevelopment occur in the future, layover inclusion should be considered.

Convention Place Station provides layover for 24 coaches and layover space layout is affected by the need to connect to the bus tunnel facility. In the future light rail will become the exclusive user of the tunnel. If this location is still used as bus layover and has not been displaced due to a transit-oriented development implementation, the opportunity exists to increase the number of layover spaces at this location by elimination of connections and other unneeded facilities related to the tunnel.