TECHNICAL REPORT

LINK Light Rail Stations
ON-STREET PARKING STUDY

Prepared by:

heffron transportation, inc.
6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 ◆ fax: (206) 523-4949

JANUARY 31, 2009

Table of Contents

Tables

Figures

1. INTRODUCTION

Sound Transit's LINK light rail service will begin in summer 2009, and there are seven light rail stations located in Seattle, south of downtown. Light rail stations may generate an increase in local area parking demand from commuters and other transit users. Using Sound Transit and City of Seattle funding, the Seattle Department of Transportation (SDOT) commissioned this study to establish a baseline inventory of existing parking and existing demand in proximity of these stations. The baseline inventory and parking demand will enable SDOT to monitor changes in parking and determine impacts to local area businesses and residents relative to conditions before light rail operations. The data could also be used to evaluate parking management solutions to issues such as hide-and-ride parking.

This report presents the methodology for the parking inventory and data collection. Additionally, concise summaries of the existing baseline parking utilization by station area are included. Detailed data collected for this study are available in external databases and spreadsheets (see Section 1.2).

1.1. Study Area

The seven light rail station areas south of downtown are listed below. Figure 1 shows the location of these stations:

- Stadium
- SODO
- Beacon Hill
- Mount Baker
- Columbia City
- Othello
- Rainier Beach

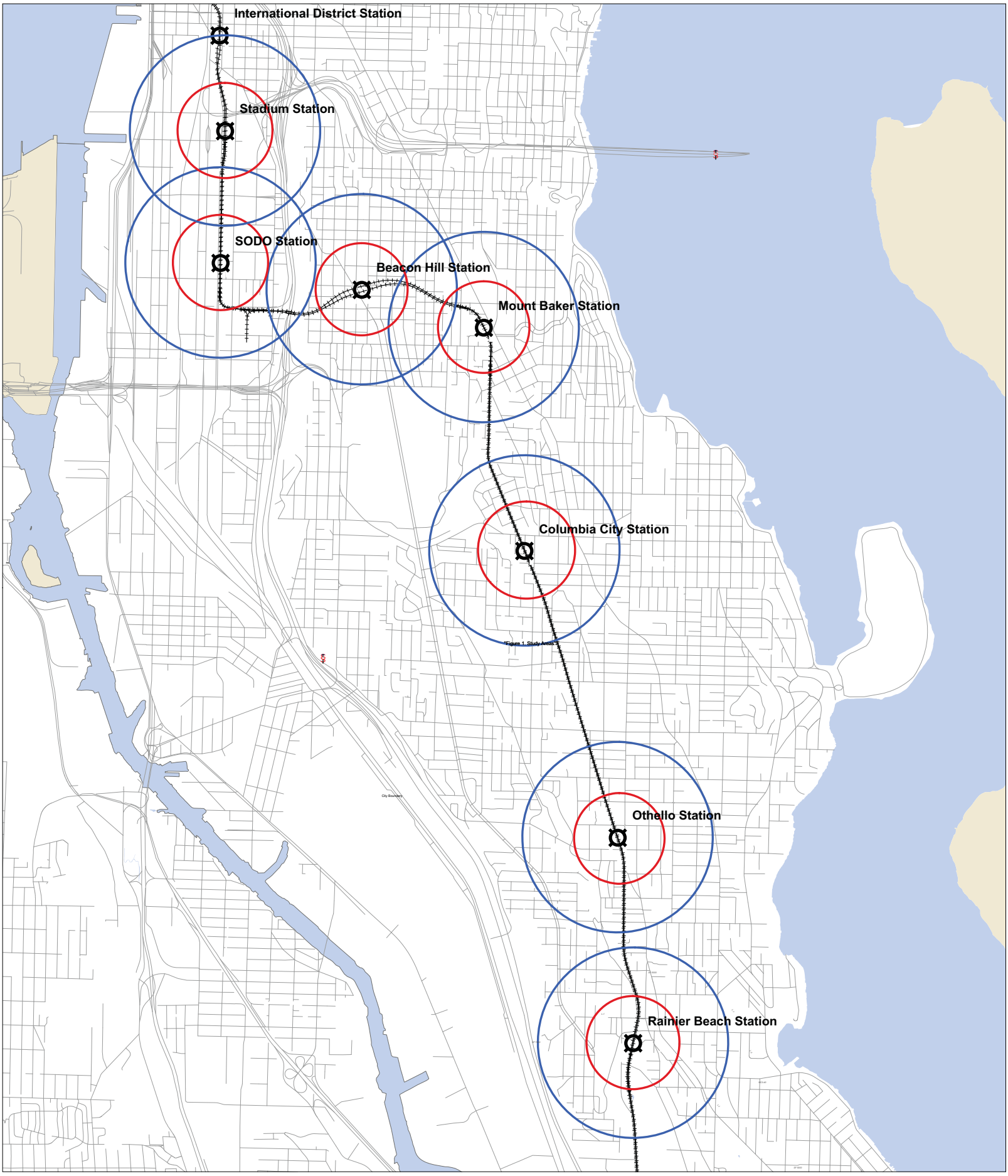
For each station, the data collection was conducted within one-quarter mile of the station and then from one-quarter to one-half mile from the station. Inventory and demand data were collected on all streets within the one-quarter mile study area regardless of street slope or pedestrian connectivity to the station. For the study area between one-quarter and one-half mile from the station, data were collected except where streets did not provide pedestrian connectivity to the station, or where the street slope may affect pedestrian use.

The study areas overlap for three of the stations. For the Stadium/SODO overlap, the study area was divided by S Holgate Street. S Holgate Street and all streets north of S Holgate Street were included in the Stadium inventory. For the SODO/Beacon Hill overlap, all streets were included with SODO station because the slope and street connectivity created a natural dividing point along the SODO one-half mile boundary. For the Beacon Hill/Mount Baker overlap the streets outside the one-quarter mile boundary were defined by connectivity and the slope of the streets.

1.2. Database Resources

Detailed parking inventory and demand data collected for this study have been entered into the City of Seattle's Geographic Information System (GIS) data base. Data are also available in Excel spreadsheets, which have been transmitted to SDOT. The file is named:

Station Area Parking Utilization Analysis - 011609.xls.



Key:

1/4 Mile Area

1/2 Mile Area

Figure 1. Study Areas

2. STUDY METHODOLOGY

2.1. On-Street Parking Inventory

The parking inventory was prepared using aerial photographs to determine curb usage and an analysis of parking supply on each block face. Aerial photographs were provided from the City of Seattle's Geographic Information System (GIS) data base (ArcInfo, December 2008). The GIS data used for this analysis included curb lengths, existing city sign records, fire hydrant locations, and parcel boundaries. The GIS aerial photograph information was supplemented with Visidata 2007, a SDOT video tool with street views of arterials in the City. Web-based aerial maps including Maps.Live.com and Google Earth Street View provided additional information to complete the inventory.

Each block face was analyzed to determine the number of available on-street parking spaces. A block face consists of one side of a street between two cross-streets. The on-street parking supply was estimated based on each street's curb length and street features where parking is prohibited. The following clearance distances to various street features were assumed:

- Driveways – five feet on each side
- Alleys – five feet on each side
- Fire hydrants – 15 feet on each side,
- Marked intersection (signalized or stop-sign controlled) –30 feet
- Unmarked intersection – 20 feet

Following the exclusion of curb space for street features, the remaining unobstructed curb space was converted to parking spaces. Recent parking studies conducted by SDOT indicate that the average curb length occupied by parked vehicles is 17.5 feet. This length was used to determine the parking supply.

On some block faces adjustments to the inventory were made based on observation during parking demand counts. Inventory was adjusted to reflect actual demand on streets with a demand greater than the estimated supply. This adjustment was made where vehicles parked in spaces smaller than 17.5 feet, but not where vehicles were improperly parked.

2.2. Parking Demand Data Collection

Data collection occurred for carefully selected time periods to maximize geographic coverage (number of stations and study areas), and to address time periods specific to the parking issues that may occur in residential, business, and mixed-use areas. All weekday data collection occurred mid-week to ensure the most typical parking activity was being recorded. Table 1 summarizes the data collection periods.

Table 1. Survey Time Periods

	Weekday			Saturday		Sunday
	5:00 A.M.	10:00 A.M.	2:00 P.M.	10:0 A.M.	2:00 P.M.	2:00 P.M.
Residential						
¼ Mile Area	X	X	X	X	X	X
½ Mile Area	X	X	X			
Commercial						
¼ Mile Area		X	X	X	X	X
½ Mile Area		X	X			

For all but the Stadium and SODO Stations, Sunday counts were conducted on a day with a Seahawks game. It is anticipated that light rail may be a good mode of travel to access Seahawks' games in the future, and this approach allows the impact of that use to be measured. However, in the Stadium and SODO Station areas, the Sunday counts were performed when there was no Seahawks game. This is because the parking in the Stadium and SODO Station areas is full during a Seahawks game, and it is expected that little additional parking impact will be attributed to the light rail stations in these areas on game days.

3. STATION AREA UTILIZATION

Parking utilization rates were calculated for four areas: 1) each block face, 2) within one-quarter mile of the station, 3) between one-quarter and one-half mile, and 4) for the entire study area. Parking utilization is defined as the average number of on-street parked vehicles divided by the number of legal on-street parking spaces for a block face or study area. Parking demand data were not included for block faces where parking was prohibited or restricted during the inventory times (i.e., peak period restrictions, school load zones). Parking demand data and utilization by block face and study areas are in the Excel spreadsheets, submitted to SDOT with this report. Results for each of the seven stations are presented below.

3.1. Stadium Station

The Stadium Station study area is characterized by commercial or mixed land uses. The inventory for this area was conducted during the summer of 2008 by Heffron Transportation, Inc. This inventory was conducted in the field and was thus considered more precise than an inventory conducted by the aerial method. With the field inventory the supply was not adjusted if demand exceeded supply, it was assumed that vehicles squeezed into parking spaces of less than 17.5 feet.

There were some street changes between the time of the inventory and the time of the demand counts. The following streets were closed during all demand count days. Data for these streets were not included in the analysis.

- S Plummer Street between Maynard Avenue S and 7th Avenue S
- 7th Avenue S between S Charles St and S Plummer Street
- South side of S Charles Street between Maynard Avenue S and 7th Avenue S

- 1st Avenue S between Atlantic and Massachusetts (west side)
- S Atlantic Street between Utah Avenue S and 1st Avenue S (north side)

Additionally, data were not included along Alaskan Way S under the Alaskan Way Viaduct since construction of the Alaskan Way Viaduct Southend Interchange project, which is scheduled to begin this year, will remove all parking in that area.

Table 2 summarizes parking utilization in the Stadium Station study area.

Table 2. Parking Utilization Rates – Stadium Station

Study Area	Parking Supply	Weekdays [1] 5:00 am	Weekdays [1] 10:00 am	Weekdays [1] 2:00 pm	Weekend [2] Saturday 10:00 am	Weekend [2] Saturday 2:00 pm	Weekend [2] Sunday 2:00 pm
¼ Mile							
Residential	NA[3]	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	560	NA	81%	85%	24%	48%	28%
¼ to ½ Mile							
Residential	NA	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	1,361	NA	61%	72%	NA[4]	NA	NA
Entire Study Area							
Residential	NA	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	1,921	NA	67%	76%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Thursday 10/09/08, Wednesday 12/03/08, Thursday 12/04/08, and Wednesday 12/10/08.*
2. *Data collection on Saturday 10/25/08 and Sunday 10/26/08.*
3. *Not applicable because study area was all commercial.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts.*

Within ¼ mile of the Stadium Station the parking utilization was above 75% at 10:00 A.M. and reaches 85% at 2:00 P.M. Between ¼ mile and ½ mile of the station, the utilization was less than 75%.

3.2. SODO Station

The SODO Station study area is characterized by all commercial land uses, most of which are industrial. As such, there were many businesses with open driveways onto the streets and limited curb definition. Thus, boundaries between private and public were very difficult to discern for many locations. On some streets, parking adjacent to buildings was indicated as public. If the building had loading docks, these were not included in the inventory. However, if the parking demand indicated that non-freight vehicles were parked in front of the loading docks, then the supply inventory was adjusted to include these locations as available parking spaces.

Many of the dead-end streets in the area 'feel' private because the public right-of-way is being used for storage or other activities. Some of this activity could be authorized by a Street-Use Permit, but these records were not researched for this effort. Streets included in the study include those to the east of Airport Way S, S Walker Street at the north end of the study area and S Hanford Street at the south end of the study area. A few dead-end streets that were parked with trucks, dumpsters and/or materials were not included in the inventory or demand counts. Table 3 summarizes the parking utilization in the SODO Station study area.

Table 3. Parking Utilization Rates – SODO Station

Study Area	Parking Supply	Weekdays [1] 5:00 am	Weekdays [1] 10:00 am	Weekdays [1] 2:00 pm	Weekend [2] Saturday 10:00 am	Weekend [2] Saturday 2:00 pm	Weekend [2] Sunday 2:00 pm
Within ¼ mile							
Residential	NA[3]	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	903	NA	71%	68%	10%	12%	8%
¼ to ½ Mile							
Residential	NA	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	1635	NA	70%	76%	NA[4]	NA	NA
Entire Study Area							
Residential	NA	NA	NA	NA	NA	NA	NA
Commercial/Mixed-Use	2538	NA	70%	73%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Wednesday 10/08/08, Wednesday 12/03/08, Thursday 12/04/08, and Tuesday 12/09/08.*
2. *Data collection on Saturday 10/25/08 and Sunday 10/26/08.*
3. *Not applicable because study area was all commercial.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts.*

Within one-quarter mile of the SODO Station the parking utilization was slightly less than 75% at 10:00 A.M. and 2:00 P.M. Between one-quarter and one-half mile of the station, the utilization was 70% and 75%, respectively.

3.3. Beacon Hill Station

The Beacon Hill Station area is primarily residential with a commercial area extending along Beacon Avenue S between 14th Avenue S and S Hinds Street. There are also commercial land uses along 15th Avenue S between Beacon Ave S and S McClellan Street and along S Lander Street and S McClellan Street between 15th Avenue S and Beacon Avenue S. On Beacon Avenue S between S Stevens Street and S Hinds Street, there are both residential and commercial uses on the same block face. The blocks were categorized by the predominant land use on each block. Table 4 summarizes the parking utilization in the Beacon Hill Station study area.

Table 4. Parking Utilization Rates – Beacon Hill Station

		Weekdays [1]			Weekend [2]		
Study Area	Parking Supply	5:00 am	10:00 am	2:00 pm	Saturday 10:00 am	Saturday 2:00 pm	Sunday 2:00 pm
Within ¼ Mile							
Residential	1,451	43%	40%	37%	43%	42%	39%
Commercial/Mixed-Use	134	NA[3]	47%	55%	62%	51%	46%
¼ to ½ Mile							
Residential	1,877	37%	33%	26%	NA[4]	NA	NA
Commercial/Mixed-Use	45	NA	63%	43%	NA	NA	NA
Entire Study Area							
Residential	3,328	40%	36%	31%	NA	NA	NA
Commercial/Mixed-Use	175	NA	51%	52%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Wednesday 11/05/08, Thursday 11/06/08, and Wednesday 12/10/08.*
2. *Data collection on Saturday 11/01/08 and Sunday 11/02/08.*
3. *Not applicable because 5:00 am counts were not conducted in commercial areas.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts.*

The utilization rates in Table 3 indicate that parking utilization in the commercial areas average approximately 50% during the weekdays and weekends. In the residential areas the utilization rates were highest in the early morning and decrease during the day when people leave for work and other daily activities. There was a range of parking utilization rates for residential and commercial throughout the study area.

3.4. Mount Baker Station

The Mount Baker Station study area is primarily residential. Commercial land uses are located along the two main north-south roads in the study area: Martin Luther King Jr. Way (MLK Way) and Rainier Avenue S. Other commercial land uses are located along S Bayview Street between 24th Ave S and MLK Way, 24th Avenue S between S College Street and S Bayview Street, S McClellan Street between 25th Avenue S and 29th Avenue S, S Hanford Street between MLK Way and Rainier Avenue S, Walden Street between Claremont Avenue S and Wetmore Avenue S.

Due to light rail construction, there were several road closures during the data collection. Parking data for the following closed streets were not included in the analysis.

- 25th Avenue S between S McClellan Street and S Hanford Street (partial closure)
- 26th Avenue S between S McClellan Street and S Forest Street
- 27th Avenue S between S Forest Street and S Stevens Street
- 27th Avenue S between S Winthrop Street and S Hanford Street
- Cheasty Boulevard between S Winthrop Street and S Della Street (partial closure)
- S Forest Street between 26th Avenue S and 27th Avenue S
- S Stevens Street between 27th Avenue S and Rainier Avenue S
- S Winthrop Street between Cheasty Boulevard S and MLK Way

S Forest Street between 27th Avenue S and Rainier Avenue S was open but it was unclear if parking was related to construction or nearby businesses; thus, the data was not included for this study. Table 5 summarizes the parking utilization in the Mount Baker Station study area.

Table 5. Parking Utilization Rates – Mount Baker Station

Study Area	Parking Supply	Weekdays[1]			Weekend [2]		
		5:00 am	10:00 am	2:00 pm	Saturday 10:00 am	Saturday 2:00 pm	Sunday 2:00 pm
Within ¼ Mile							
Residential	582	41%	46%	26%	42%	44%	32%
Commercial/Mixed-Use	26	NA[3]	12%	8%	8%	0%	8%
¼ to ½ Mile							
Residential	709	37%	52%	40%	NA[4]	NA	NA
Commercial/Mixed-Use	140	NA	34%	30%	NA	NA	NA
Entire Study Area							
Residential	1,291	39%	49%	34%	NA	NA	NA
Commercial/Mixed-Use	166	NA	31%	27%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Tuesday 12/28/08, Wednesday 10/29/08,Wednesday 12/03/08, Thursday 12/04/08, and Tuesday 12/09/08.*
2. *Data collection on Saturday 11/15/08 and Sunday 11/16/08.*
3. *Not applicable because 5:00 am counts were not conducted in commercial areas.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts*

The residential utilization rates were influenced by Franklin High School at 3013 S Mount Baker Boulevard. Parking utilization for the entire area peaked mid-morning when school was in session. The peak demand was 52% or less.

3.5. Columbia City Station

The Columbia City Station study area is primarily residential. The commercial area is located in the eastern portion of the study area along Rainier Avenue S between S Oregon Street and 39th Avenue S. Additionally there are commercial uses on either side of Rainier Avenue S along the following cross-streets: S Alaska Street, S Edmunds Street, S Ferdinand Street and S Hudson Street. Along MLK Way south of S Alaska Street, most of land use is residential. There are a few small commercial retail developments, such as auto-body shops, interspersed among the residences along this stretch of road. There was no on-street parking along this section of roadway.

To the north of S Alaska Street along MLK Way, there is new development. From S Genesee Street to S Alaska Street, New Rainier Vista is a recently developed Seattle Housing Authority project on the west side of the road. It contains a small mix of commercial land uses, SHA apartments and market-rate housing. Residential uses in New Rainier Vista characterize the west side of the street between S Genesee Street and S Dakota Street, which is the north boundary of the study area. On the east side there is commercial development between S Snoqualmie Street and S Columbian Way, including the Rainier Vista Boys and Girls Club. The area north of S Columbian Way was still under development into the next phase of New Rainier Vista at the time of the surveys. For this analysis, it was assumed that the future land use on the east side would be similar to the corresponding land use on the west side of the road. Table 5 summarizes the parking utilization in the Columbia City Station study area.

Table 6. Parking Utilization Rates – Columbia City Station

Study Area	Parking Supply	Weekdays[1] 5:00 am	Weekdays[1] 10:00 am	Weekdays[1] 2:00 pm	Weekend[2] Saturday 10:00 am	Weekend[2] Saturday 2:00 pm	Weekend[2] Sunday 2:00 pm
Within ¼ Mile							
Residential	1,108	37%	34%	35%	34%	32%	33%
Commercial/Mixed-Use	40	NA[3]	28%	33%	25%	33%	3%
¼ to ½ Mile							
Residential	1,508	43%	37%	35%	NA[4]	NA	NA
Commercial/Mixed-Use	258	NA	55%	59%	NA	NA	NA
Entire Study Area							
Residential	2,916	41%	36%	35%	NA	NA	NA
Commercial/Mixed-Use	298	NA	51%	55%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Tuesday, 10/28/08, Wednesday 10/29/08, Wednesday 12/03/08, Thursday 12/04/08, and Tuesday 12/09/08.*
2. *Data collection on Saturday, 11/15/08 and Sunday 11/16/08.*
3. *Not applicable because 5:00 am counts were not conducted in commercial areas.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts*

Table 6 shows that the residential parking utilization was slightly higher in the early morning than later in the day. This reflects the expected pattern of a decrease in demand when people leave for work and other activities during the day. During data collection it was observed that the mixed-use/commercial developments along MLK Way were recently constructed and it was likely that they were not fully occupied. It should also be noted that some of the vehicles parked along MLK Way north of S Alaska Street may be related to the current construction activity. Average parking utilization was 55% or less throughout the study area. There was a large supply of residential parking and a relatively small supply of commercial parking.

3.6. Othello Station

The Othello Station study area is primarily residential. Commercial land uses are located along MLK Way from S Angel Place to S Holly Park Drive. Along this stretch of roadway, the cross-streets on either side of MLK Way also serve commercial uses. Table 7 summarizes the parking utilization in the Othello Station study area.

Table 7. Parking Utilization Rates – Othello Station

Study Area	Parking Supply	Weekdays[1]			Weekend [2]		
		5:00 am	10:00 am	2:00 pm	Saturday 10:00 am	Saturday 2:00 pm	Sunday 2:00 pm
Within ¼ Mile							
Residential	703	26%	31%	28%	25%	28%	25%
Commercial/Mixed-Use	195	NA[3]	50%	46%	28%	46%	34%
¼ to ½ Mile							
Residential	2,303	30%	27%	24%	NA[4]	NA	NA
Commercial/Mixed-Use	54	NA	33%	30%	NA	NA	NA
Entire Study Area							
Residential	3,006	29%	28%	25%	NA	NA	NA
Commercial/Mixed-Use	249	NA	47%	43%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Tuesday 10/21/08, Wednesday 12/03/08, Thursday 12/04/08, and Tuesday 12/00/08.*
2. *Data collection on Saturday 11/15/08 and Sunday 11/16/08.*
3. *Not applicable because 5:00 am counts were not conducted in commercial areas.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts*

Table 7 shows that the residential parking utilization was slightly higher in the early morning than later in the day. This reflects the expected pattern of a decrease in demand when people leave for work and other activities during the day. Overall, the parking was less than 50% utilized throughout the study area.

3.7. Rainier Beach Station

The Rainier Beach Station study area is primarily residential. The commercial uses are located along Rainier Avenue S between S Cloverdale Street and 51st Avenue S, Renton Avenue S between S Trenton Street and S Barton Street and along MLK Way between S Trenton Street and Merton Way S.

In the Rainier Beach study area, there were several locations within the quarter mile area where streets were not easily accessible. As mentioned previously, for this project all streets within the ¼ mile area are included in the study regardless of pedestrian accessibility to the station. However, it is important to note these areas because the low utilization rates do not necessarily indicate that available spaces would be utilized by light rail riders. The area in the south east quadrant of the ¼ mile circle including Spear Place S, S Barton Street, S Shell Street, S Benefit Street and 45th Avenue S do not have direct public street access to the Rainier Beach light rail station. There is a gravel road through a wooded area from Spear Place S and there is an asphalt foot path from S Barton Street (west of 45th Avenue S). Neither of these connections are lit and both are sloped. There is no direct street access to Rainier Beach Station from streets west of 39th Avenue S. There appears to be dirt foot paths from 39th Avenue S to Beacon Avenue S and 41st Avenue S as viewed from the aerial photographs and field visit. However, these paths are sloped, and not lit, which diminishes pedestrian accessibility between the light rail station and this residential area.

Table 8. Parking Utilization Rates – Rainier Beach Station

Study Area	Parking Supply	Weekdays [1] 5:00 am	Weekdays [1] 10:00 am	Weekdays [1] 2:00 pm	Weekend [2] Saturday 10:00 am	Weekend [2] Saturday 2:00 pm	Weekend [2] Sunday 2:00 pm
Within ¼ Mile							
Residential	499	26%	22%	17%	22%	20%	20%
Commercial/Mixed-Use	137	NA[3]	2%	2%	1%	3%	9%
¼ to ½ Mile							
Residential	1,012	26%	24%	21%	NA[4]	NA	NA
Commercial/Mixed-Use	42	NA	5%	7%	NA	NA	NA
Entire Study Area							
Residential	1511	26%	23%	20%	NA	NA	NA
Commercial/Mixed-Use	179	NA	3%	3%	NA	NA	NA

Source: Heffron Transportation, Inc., 2008.

1. *Data collection on Wednesday 11/05/08, Thursday 11/06/08, Wednesday 12/03/08, Thursday 12/04/08, and Tuesday 12/09/08.*
2. *Data collection on Saturday 11/15/08 and Sunday, 11/16/08.*
3. *Not applicable because 5:00 am counts were not conducted in commercial areas.*
4. *Not applicable because ¼ to ½ mile was not included for weekend counts*

As shown in Table 7, the parking utilization in the commercial areas was less than 10%. Of the total 137 commercial parking spaces within ¼ mile from the station, approximately 36 spaces, or 26%, were on 42nd Avenue S between Beacon Avenue S and Merton Way S, and approximately 72 spaces, or 53%, were on Renton Ave S between S Henderson Street and S Barton Street. Industrial businesses along 42nd Avenue S have off-street parking, and do not appear to use on-street parking in the area. Renton Avenue S is a tree-lined road with dirt foot paths on both sides. Since there is no direct access to commercial businesses (except at the north end of the road) or residences along this section of the roadway, there was no existing demand. Overall, average parking utilization was 26% or less throughout the study area.