TECHNICAL REPORT

DENNY TRIANGLE
ON-STREET PARKING STUDY

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1. Introduction

This technical report presents the findings of the April 30, 2008 parking survey for the Denny Triangle area. The purpose of this study is to document how often and for how long parking spaces are used in the area on a typical day. The data and analysis will help the Seattle Department of Transportation (SDOT) determine if changes in parking management techniques are needed. The study determined:

- the characteristics of existing two hour spaces regulated by meters, pay stations, and by signage only,
- the quantity, location, and utilization of unregulated spaces, and
- the location and occupancy of parking spaces with time limits under two hours.

The study area inventory was provided by the Seattle Department of Transportation (SDOT) on maps prepared by the Geographic Information System (GIS) workteam. Inconsistencies found in the field were reported to SDOT. Field observations noted that some meters were so old that the time regulations on the meter were illegible.

The study area and the block faces included in the data collection for the Denny Triangle are shown on Figure 1. Block numbers are for reference. There are 58 block faces included in the study. Six block faces had construction activity and temporarily prohibited parking. These block faces are also shown in Figure 1. Two block faces were restricted to police-only parking by covering the meters with hoods.

2. Study Methodology

Data Collection

The parking inventory, including location of on-street spaces and their current parking regulations, was provided by SDOT. The parking data collection for the Denny Triangle was performed by Operations Management Group (OMG), Inc. Data were collected on Wednesday, April 30, 2008. The data collectors passed by each block face three times, beginning at 10:00 A.M., at 12:00 P.M. and at 2:00 P.M. These hours were selected because it is when peak parking related to downtown office employment occurs, and also captures additional parking activity during the lunch hour that may be related to area restaurants or retail uses.

Parking space occupancy data were collected by OMG using their hand-held electronic data collection tool. A sequence number was assigned to every parking space within each map segment to ensure consistency in the data collection. The inventory and sequence numbers included all parking spaces by type, and all "gaps" such as bus zones, hydrants and other locations where parking is not allowed. In addition to recording vehicles parked in legally-designated spaces, the data collected included "squeeze vehicles" on each street segment, which represent motorists who created their own space between other vehicles, at the end of the block, or in no parking zones. The presence of these "squeeze-in" vehicles reflects the demand for parking. Parking utilization by time of day was determined for two-hour and unrestricted spaces. Two-hour spaces include those regulated by pay stations, meters, and time-limit signs.

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Figure 1

Study Area

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Parking duration was calculated by counting the two-hour time periods occupied by the same vehicle. The first three letters or numbers of the vehicle license plate were recorded into the hand-held electronic device during each two-hour interval. This technique provided block-specific and area-wide utilization data in two-hour increments. Vacant spaces were noted in the manual count.

Parking compliance was evaluated for two-hour spaces. For two-hour spaces, all vehicles parked for less than two hours are compliant and all vehicles parked for two or more hours are noncompliant. The duration data can reveal if there is unusual activity, such as numerous all-day parking in front of restaurants and retail, or a large number of vehicles non-compliant with the parking restriction type.

Parking Capacity

The practical capacity for on-street parking is typically defined at 85% utilization. At this level of utilization, the next arriving customer or visitor is able to quickly find a reasonably convenient parking space. When occupancy exceeds the practical capacity, drivers will experience delays and frustration while searching for a parking space, as well as contribute to area traffic congestion while circling the block looking for parking. Practical capacity is used to determine the adequacy of a parking system. SDOT considers utilization rates above about 75% to be the threshold where additional parking management techniques should be explored through a comprehensive study of parking management measures. That way measures can be put in place before parking reaches capacity. SDOT also uses parking management measures to support the goal of reducing automobile trips, particularly for commuting. Short-term parking limits that favor retail and restaurant use are preferred to long-term parking that could be used by commuters.

3. Parking Space Inventory

The parking space inventory reflects the midday parking regulations. For the most part, changes in restriction type occur at 6:00 P.M. when restricted spaces become unrestricted spaces. There is little change in restriction type during the day and so the restriction type at 1:00 P.M. was used in the daytime analysis. One exception is on 9th Avenue between Lenora Street and Virginia Street, on the southwest block face. On that block face there are 13 carpool spaces. The carpool restriction is from 7:00 A.M. to 10:00 A.M. After 10:00 A.M. the spaces are unrestricted. There was one block face that became No Parking at 2:00 P.M. This does not show up in the data base because the last pass-by to collect data occurred at 2:00 P.M.

The parking space inventory and the number of spaces occupied at 10:00 A.M., 12:00 P.M., and 2:00 P.M. are summarized in Table 1. Carpool spaces are included in the unrestricted spaces and foot-noted. Block faces affected by construction and covered with hoods by the police station were removed from the inventory and occupancy summary. There are a wide variety of parking types and parking restrictions in the study area, yet some very small amounts of some parking types. For example, as shown in Table 1, there is one 3-minute meter and two 15-minute meters in the study area, and also one 15-minute time-limited space.

Table 1. Denny Triangle Daytime Parking Inventory and Occupancy

		Number Occupied Spaces[2]		
Parking Type	Inventory[1]	10:00 AM	12:00 PM	2:00 PM
Pay Station Parking				
30-minute Pay Station	8	5	3	0
2-hour Pay Station	76	48	54	44
Meter Parking				
3-minute Meter	1	0	1	1
15-minute Meter	2	1	1	0
30-minute Meter	8	4	3	6
2-hour Meter	233	49	64	79
Signed Parking Time Limits				
3-minute Signed Limit	22	7	6	5
15-minute Signed Limit	1	0	1	0
30-minute Signed Limit	17	7	6	2
1-hour Signed Limit	20	13	14	16
2-hour Signed Limit	41	34	34	32
Unrestricted	40 [3]	20	21	18
TOTAL	469	188	208	203
Other Spaces				
Signed No Parking		4	0	1

1. *Source: SDOT GIS maps. Parking Inventory at 12:00 P.M. reflecting daytime hours. Some parking restrictions change after 12:00 P.M.; most restrictions end at 6:00 P.M.*
2. *Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.*
3. *Includes 13 Carpool spaces signed "Carpool Only from 7:00 A.M. to 10:00 A.M. Spaces are unrestricted beginning 10:00 A.M.*

4. Parking Utilization

Parking Utilization for Two-Hour Limits and Unrestricted Spaces

Parking utilization was calculated for each block face for all two-hour spaces and unrestricted spaces. Parking utilization equals the total number of occupied spaces counted for the three survey periods divided by the number of parking opportunities. The number of parking opportunities equals three times the number of spaces because the data collection occurred three times. The results are presented in Figure 2.

On average, parking utilization for two-hour and unrestricted spaces is relatively low as summarized in Table 2. Two-hour pay station parking spaces showed the highest utilization, which may be due to the location of the pay stations. In general, they have been installed in areas that are closest to the downtown retail core and adjacent to new developments, many of which include ground floor retail uses. The occupancy of the two-hour meter spaces increase throughout the day while the occupancy of two-hour pay station and signed time-limit spaces remained constant.

Table 2. Denny Triangle Parking Utilization for Two-hour and Unrestricted Spaces

Parking Type	Inventory[1]	Utilization[2]
2-hour Pay Station	76	64%
2-hour Meter	233	27%
2-hour Signed Time-Limit	41	82%
Unrestricted	40 [3]	49%
TOTAL	390	43%

1. *Source: SDOT GIS maps. Parking Inventory at 12:00 P.M. reflecting daytime hours. Some parking restrictions change after 12:00 P.M.; most restrictions end at 6:00 P.M.*
2. *Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.*
3. *Includes 13 Carpool spaces signed "Carpool Only from 7:00 A.M. to 10:00 A.M. Spaces are unrestricted beginning 10:00 A.M.*

Eight block faces have only one or two unrestricted spaces that were unused during the survey. These unrestricted spaced are identified on Figure 2 with a code "1U." Several are located on blocks where the remaining parking is regulated with traditional meters, so it is unlikely that signs have simply been removed at those spaces. We speculate that these spaces remain unused because motorists are unsure about parking in these isolated spaces since the rest of the block has no parking. One block face included a group of four unrestricted spaces with a utilization of 33%, one block face include eight unrestricted spaces with 83% utilization and the 13 carpool spaces were at 92% utilization. The carpool restrictions were in place until 10:00 A.M. After that time, any motorist can park in these spaces and the utilization survey did not distinguish whether the vehicle was a permitted carpool or not.

Parking Occupancy for Spaces with time limits less than two-hours

Parking occupancy was calculated for all spaces with time-limits less than two-hours for each study-area block face. The data collectors passed by each space three times in two hour increments so if the occupancy of a 15-minute space is two, then the data collectors recorded vehicles in the space two times. Interpretation of the occupied spaces is limited. If the occupancy is zero, or low, it simply means that there was no parked car when the surveyors passed by, but there may still be demand for the short-term load/unload space on that block face. The inventory and occupancy of parking spaces with less than a two-hour time-limit are presented in Figure 3. (Study area occupancy was summarized by parking type in Table 1.) The study area block faces with no inventory of spaces under a two-hour limit, are shown on Figure 3 with the number zero.

LEGEND

#M - Meter
P - Paystation
S - Signed 2 Hr
U - Unrestricted
C - Carpool by Permit 7-10AM

Police Only (meters hooded)
Construction, (no parking)

Not to Scale

Data Collection: April 30,2008

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Figure 2
Inventory and Occupancy of Parking Spaces With a Time Limit of Two or More Hours

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Figure 3

Inventory and Occupancy of Parking Spaces With Less Than a 2-Hour Time Limit

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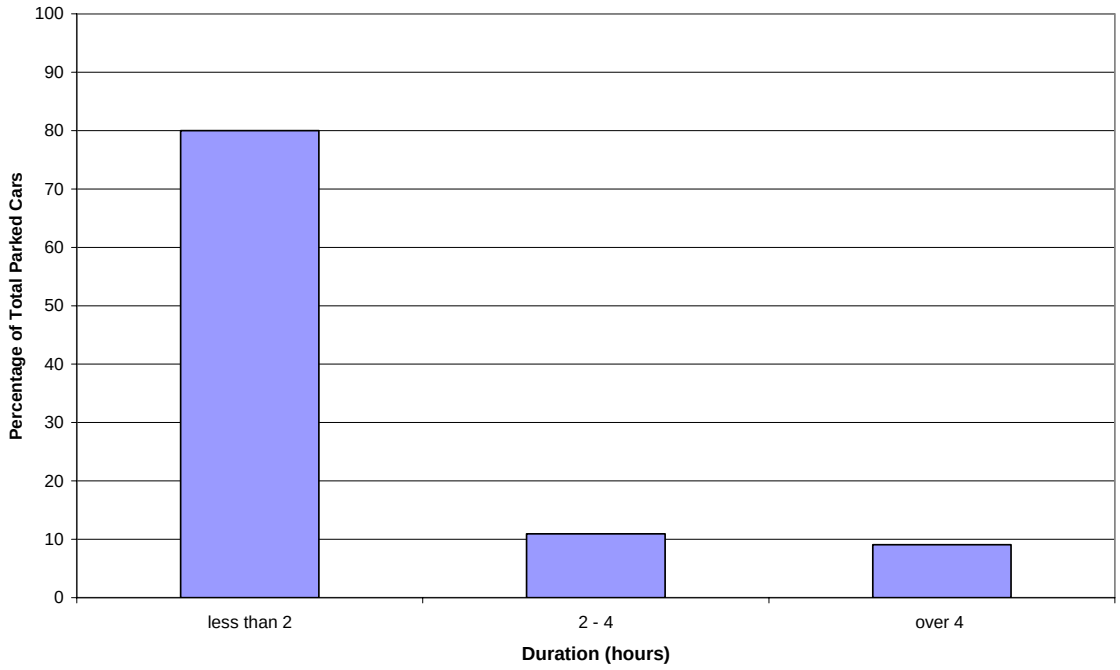
5. Parking Duration

Parking duration and the resulting compliance rates were calculated for two-hour spaces and unrestricted spaces. The number of cars parked for less than two hours, two to four hours, and greater than four hours is reported for parking spaces with less than a two-hour time-limit.

Two-Hour Parking

There are approximately 352 two-hour parking spaces in the study area, of which 244 are meter spaces, 77 are pay station spaces and 31 are signed with a two-hour time-limit restriction. Parking duration for the two-hour spaces is presented in Figure 4. Data collection occurred in two-hour intervals, which means that if the same parked car was seen twice, it was parked for at least two hours. There were a total of 420 unique parked cars counted over the three passes by data collectors. Parking compliance was 80% within the study area for two-hour spaces. There were 11% vehicles non-compliant, parking from 4 to 6 hours and 9% parking of vehicles parking longer than four hours in the two-hour time-limit spaces.

Figure 4. Parking Duration for Two-hour Spaces



Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.

Parking duration and compliance rates for pay stations, metered spaces and signed two-hour time-limits are summarized in Table 3. There is little difference in the compliance rate for the different two-hour spaces in the Denny Triangle study area. There was no pattern related to where parking of various durations occurred throughout the neighborhood. Parking of durations longer than two or four hours occurred throughout the area.

Table 3. Denny Triangle Parking Duration and Compliance for Two-Hour Time-Limit Spaces

		Duration			
Parking Type	Inventory[1]	Less than 2 hours	2 – 4 hours	Over 4 hours	Compliance Rate
2-hour Pay Station	76	104	18	13	77%
2-hour Meter	233	171	20	16	83%
2-hour Signed Limit	41	61	8	9	78%
TOTAL	350	232	28	25	80%

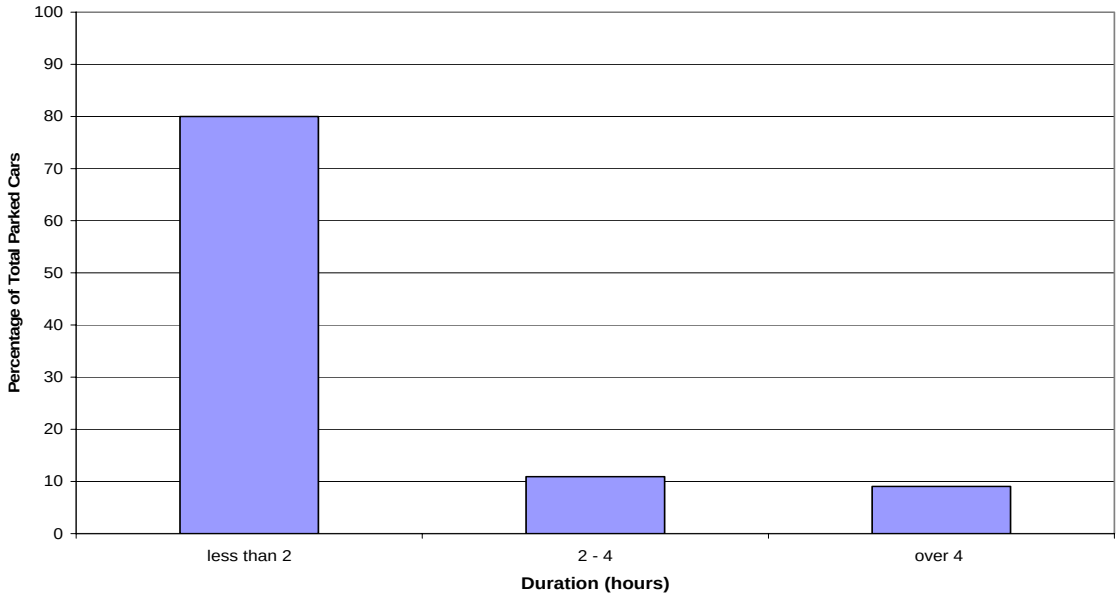
1. *Source: SDOT GIS maps. Parking Inventory at 12:00 P.M. reflecting daytime hours. Some parking restrictions change after 12:00 P.M.; most restrictions end at 6:00 P.M.*
2. *Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.*

Unrestricted Parking

There are approximately 47 unrestricted parking spaces in the study area, not including the carpool spaces. (Carpool spaces were not included in the duration data.). Parking duration for the unrestricted spaces is presented in Figure 5. Data collection occurred in two-hour intervals, which means that if the same parked car was seen twice, it was parked for at least two hours. There were only 14 unique parked cars counted over the three passes by data collectors. Parking utilization is low in the unrestricted spaces (not including carpool on 9th Avenue). Of the observed vehicles, 57% were parked less than two hours, 21% parked from four to six hours, and 21% parked for longer than four hours.

The unrestricted parking spaces in the vicinity of the Cornish Institute (near Denny Way and Lenora Street) were more highly utilized than other areas (83% to 95%). Pay station parking in this same area around Cornish was less than 40% utilized.

Figure 5. Parking Duration for Unrestricted Parking Spaces



Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.

Spaces Restricted to Less Than Two Hours

Parking duration for spaces restricted to less than two hours is summarized in Table 4. A calculated compliance rate was not meaningful for these spaces due to the data collection interval of two hours. The data in Table 4 show that there are very few cars parked for durations greater than two hours in these short term spaces.

Table 4. Denny Triangle Parking Duration for Spaces less than Two Hours

		Duration [2]			
Parking Type	Inventory[1]	Less than 2 hours	2 – 4 hours	Over 4 hours	Number Parked Cars
3-minute Parking					
3-minute Meter	1	10	1	1	1
3-minute Signed Time-Limit	22	10	1	1	12
15-minute Parking					
15-minute Meter	2	2			2
15-minute Signed Time-Limit	1	1			1
30-minute Parking					
30-minute Pay Station	8	3	1	2	9
30-minute Meter	8	7	1	1	9
30-minute Signed Time-Limit	17	11	2	0	13
1-hour Parking					
1-hour Signed Limit	20	26	8	2	36
TOTAL	79	70	14	7	83

1. *Source: SDOT GIS maps. Parking Inventory at 12:00 P.M. reflecting daytime hours. Some parking restrictions change after 12:00 P.M.; most restrictions end at 6:00 P.M.*
2. *Source: Operations Management Group, data collection on April 30, 2008. Compiled by Heffron Transportation, Inc.*

6. Findings

There is a wide variety of parking restriction types within this relatively small study area. Most of the parking is metered parking, and many of the meters are so old that the restriction type is illegible. Some meters have green or yellow posts, likely meaning that some of these meters could be short-term parking, but it is unclear how they were coded as inventory and it is unclear how the public uses these meters.

The study area has utilization rates low enough such that there is flexibility within the area to select parking management measures that best meet the needs of the adjacent land use with minimal impact. Major findings are summarized below.

- Overall parking utilization of two-hour and unrestricted spaces was low at 43%. The two-hour signed time-limit spaces have a utilization rate of 82%; pay stations are 64%; and two-hour meters are 27%.

- Almost 60% of the parking spaces in the survey area have traditional two-hour meters. Many of these meters are impossible to read, even at close distance, because the window has clouded. Some of the meters have faded color posts, which were once used in Seattle to denote the allowed time at a meter. However, it is unlikely that motorists know what the colors mean.

- The compliance rate of two-hour spaces is 80% with little difference between pay stations, parking meters and time-limit signs.

- There are many different types of parking restrictions in the area. In addition to the various two-hour restrictions, there are 3-minute meters, 15-minute meters, 30-minute meters, 1-hour meters, and signed parking limits with all of those time limits.

- There are twelve block faces with only one unrestricted spaces on each block face. There were no vehicles parked in these spaces during the three passes conducted at 10:00 A.M., 12:00 P.M., and 2:00 P.M.

- Twenty-one block faces have no short-term parking spaces (less than two hour limits). This is illustrated by the blocks showing "0" on Figure 3. Depending on the adjacent land uses, there may be a need for short-term passenger or commercial vehicle loading on blocks.

- Vehicles with disabled permits occupied 15% of the spaces in the survey area.

- Parking meters on 8th Avenue and on Virginia Street adjacent to the police station are hooded.

- Construction activities removed parking on six block faces of the 58 designated for data collection. These spaces were not included in the analysis.

7. Parking Management Strategies

Based on the survey findings, the Denny Triangle area would benefit from implementation of additional parking management measures. The wide variety of existing parking restrictions and relatively low utilization is an opportunity to increase efficiency of curb space. Potential parking management strategies that the City could consider include:

1. Replace all existing one-hour and two-hour meters with pay stations. The traditional meters in the area have become unreadable. Eliminate the one-hour metered time limit.

2. Convert all existing signed one-hour and two-hour time-limited parking to pay stations.

3. Convert all unrestricted parking to pay stations with time-limits to meet the turnover needs of adjacent businesses.

4. Consider longer time limits for pay station spaces to increase the utilization in this area. Areas that have existing signed restrictions of up to two hours could have pay station time limits of up to three or four hours. Even longer time limits could be possible for spaces that are now unrestricted (six to eight hours). Pay stations make such time limits enforceable. Utilization of the longer-term spaces should be monitored to make sure that the time limits are reasonable as new land uses are developed in the area. Two-hour time limits should be used on blocks adjacent to retail uses.

5. Eliminate the 3-minute and 15-minute meter spaces. There are few, adding to complexity in enforcement and signage. Convert these short-term spaces to 30-minute pay station spaces, some of which could also be restricted to Commercial Vehicle Only.

6. Change the parking on the 12 block faces that have only one unrestricted space (that were not observed to be utilized during the survey). Consider converting these spaces to the predominant parking regulation on the block, load zones or 30-minute spaces regulated by pay stations. Alternatively, along blocks where the remaining block is used for transit, consider eliminating the parking spaces altogether and extending the transit zone.

7. Add a two-hour pay station to the 13 carpool spaces on 9th Avenue between Lenora Street and Virginia Street. The carpool only restriction is from 7:00 to 10:00 a.m. and after 10:00 a.m. these spaces are unrestricted. This would make management of these spaces consistent with the carpool spaces on Lenora Street between 9th Avenue and Terry Avenue.

8. Review the 21 block faces that have no short-term parking to determine if Commercial and/or Passenger Load Zones are needed given any recent or future changes in adjacent land use.

9. Increase enforcement of disabled permit parking because 15% of the spaces surveyed were estimated to be occupied by vehicles with a permit. Consider changes in City law that would allow time limits to apply to permit holders.

10. Investigate parking needs around the West Precinct Police Station at 9th Avenue and Virginia Street to design curbspace regulations that service police vehicles and Precinct visitors.