

Central City Parking Analysis

Portland, Oregon

November 2008



KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Leclerc

Report of Findings

Central City Parking Analysis

Portland, Oregon

Prepared For:
Portland Office of Transportation
1120 SW Fifth Avenue
Portland, OR 97204
(503) 823-5185

Prepared By:
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland, OR 97205
(503) 228-5230

Project Manager: Judith Gray
Project Analyst: Matthew Bell
Project Principal: Julia Kuhn, P.E.

Project No. 9363

November 2008



Table of Contents

Section 1 Executive Summary.....	2
Section 2 Introduction	6
Section 3 User Survey	10
Section 4 On-Street Parking Conditions.....	17
Section 5 Off-Street Parking Conditions.....	29
Section 6 Parking & Trip Generation	35
Section 7 Key Findings.....	40
Section 8 References	44

Appendices

Appendix A User Survey Instrument and Response Profiles	
Appendix B Lloyd District Study	
Appendix C Central Eastside Study	
Appendix D On-Street Utilization Profiles	
Appendix E On-Street Duration of Stay Profiles	
Appendix F Off-Street (Smart Park) and Commercial Parking Utilization Profiles	
Appendix G Off-Street (Smart Park) and Commercial Parking Duration of Stay Profiles	
Appendix H Parking and Trip Generation Information	

List of Figures

Figure 1	Study Area	7
Figure 2	Intercept Survey Locations.....	11
Figure 3	On-Street Parking Data Collection Routes	18
Figure 4	Mid-day On-Street Utilization.....	22
Figure 5	Evening On-Street Utilization.....	23
Figure 6	Off-Street Parking Facilities	30

List of Tables

Table 1	Trip Purpose.....	10
Table 2	Top Three Factors Influencing Travel Choice.....	13
Table 3	Parking Convenience	14
Table 4	Peak Hour Occupancy by Study Area	24
Table 5	Area Wide On-Street Duration of Stay/Turnover	25
Table 6	Lloyd and Central Eastside Duration and Turnover Findings	25
Table 7	On-Street Parking Operations, 1988 vs. 2008.....	26
Table 8	Off-Street Peak Hour Utilization	31
Table 9	Off-Street Duration & Turnover.....	32
Table 10	Off-Street Parking Operations, 1988 vs. 2008.....	33
Table 11	Weekday Peak Hour Trip Generation by Parking Type - Trips per 100 Spaces	38

List of Charts

Chart 1	Travel Mode Choice	12
Chart 2	Preferred and Actual Parking Facility Type.....	14
Chart 3	Area-wide On-Street Parking Weekday Utilization Profile.....	20
Chart 4	Comparison of Local vs. National Average Parking Profiles, Residential	35
Chart 5	Comparison of Local vs. National Average Parking Profiles, Office.....	36
Chart 6	Comparison of Local vs. National Average Parking Profiles, Customer/Visitor	37
Chart 7	Comparison of Local vs. National Average Parking Profiles, University.....	37

Section 1
Executive Summary

Executive Summary

The purpose of the report is to provide technical analysis in support of the update of the *Central City Plan* and the *Central City Transportation Management Plan*.

The study included an intercept survey conducted at locations throughout the Central City. The survey identifies the purposes, transportation choices, and perceptions of parking and access in the Central City.

In addition to the survey, a detailed data collection and analysis effort was undertaken to evaluate the on-street and off-street parking systems. The analyses focuses on parking that is available for use by the general public, including on-street parking and the City's Smart Park garages, as well as commercial facilities.

There is also a targeted study of residential parking garages, which can be used only by residents of the specific properties. The residential parking study was used in combination with the other parking data to identify parking and trip generation characteristics for specific parking user groups. Such data are provided in national reference manuals, but this study provides an opportunity to examine conditions specific to the Portland Central City.

KEY FINDINGS

The data collection and analysis, supplemented by the review of past parking studies, resulted in the key findings listed below.

User Survey

While the survey is not intended to provide a statistically representative sample of people in the central city, it does offer a good cross section of downtown user groups and travel modes. The survey resulted in the following key findings:

- Most individuals in the Central City engage in multiple types of activities. Approximately 52 percent of respondents will engage in work activities and 47 percent will shop and dine while in the Central City. Only 13 percent indicated no secondary activities.
- Transit and private auto (Drive Alone or Carpool) were the dominant mode choices for the overall respondents, representing approximately 70 percent of overall respondents. Among commuters, these modes represent 75 percent. Commuters were considerably more likely to Drive Alone when compared to respondents as a whole.
- Walk and Bike modes represented approximately one-fourth of the survey respondents. Approximately 22 percent of the overall respondents walked, which is twice the proportion of commuters who walked. However, commuters show a higher tendency for bicycling.

- The majority of survey respondents rank convenience and cost as important determinants in selecting mode choice. Only private vehicle commuters selected Travel Time as a significant factor. Transit Users, walkers and bicyclists also cite health considerations.
- Under current parking conditions, drivers are able to find convenient parking with relative ease. More than three-quarters of respondents were able to park within two blocks of their ultimate destination and two-thirds spent less than one minute searching for parking. Approximately seven percent reported spending more than five minutes.
- Drivers indicate minimal negative impacts from current parking pricing, but also limited interest in paying more for premium locations. This is probably because most drivers are able to park within two blocks of their destinations, and therefore they may perceive little room for improvement.

On-Street Parking

- The on-street parking system approaches capacity during the midday and evening peak hours. The overall study area has a mid-day peak hour (noon to 1 p.m.) with 77 percent utilization and an evening peak hour (7 to 8 p.m.) with 83 percent utilization.
- Parking demand during the study (Spring 2008) was somewhat lower than a 2004 study of on-street parking in the downtown. The reduced utilization may reflect differences in the study areas, as well as numerous construction activities and rising gas prices.
- The highest utilization was in areas around West Burnside, especially in the Entertainment District and in the Pearl South. Goose Hollow had high utilization in the evening, due to residential demand and PGE Park activities.
- Duration and turnover analyses show that the on-street system operates very efficiently, with most short-term spaces serving four to five vehicles over the course of the day.
- A review of past studies in comparison to the 2008 data indicates the Broadway/Weidler couplet in the Lloyd District continues to have efficient operations of its on-street parking. However, the Central Eastside shows a very high degree of time stay violations.

Smart Park & Commercial Parking

- Most of the public and commercial parking facilities are operating at or near capacity during the midday peak. These utilization levels do not indicate considerable room for increased peak hour demand at most facilities, with the exception of the Station Place garage.
- All of the Smart Park and commercial parking facilities experience peak hour utilization during the mid-day whereas the on-street system has the highest demand in the evening. This is probably because there are no fees for parking on the street after 7 p.m. making curb parking more attractive.
- The SW 1st & Jefferson Smart Park garage has the highest utilization (100 percent); Station Place has the lowest (60 percent).

- The 1,250-space Brewery Blocks garage had a peak utilization of 93 percent. The garage is located in the South Pearl district, which had among the highest utilization levels for on-street parking. Similarly, the 938-space PSU garage was 93 percent full during its peak hour.
- Most of the Daily parkers in the Smart Park garages reflected short-term demand (less than four hours) compared to the Leased parkers which reflect commuter demand (approximately eight hours). Exceptions were the SW 4th & Yamhill garage, where Leased vehicles parked for just over four hours; and the Old Town and Station Place garages, where Daily spaces were occupied for approximately eight hours.

Parking Generation

- Parking demand for residential uses in the Central City reaches its lowest point at around 2 p.m. when demand is approximately 68 percent of the peak hour. This compares to national average data which indicates that residential parking demand reaches a low point of approximately 30 percent of the peak hour. This gives an indication of the extent to which Portland residents are likely to leave their vehicle at home during the day, compared to national averages.

CONCLUSION

In general, the findings of this study indicate that parking conditions in the Central City operate with a high degree of efficiency.

- The parking experience is marked by considerable ease and convenience in finding parking. Most people are satisfied with their parking choices and are able to park in their preferred locations.
- The on-street parking supply is well utilized and has high turnover throughout the study areas and in the Lloyd District. Conversely, on-street parking in the Central Eastside shows a high degree of time stay violations.
- Most of the public and commercial parking facilities are operating at or near capacity during the midday peak hours. These utilization levels do not indicate considerable room for increased peak hour demand at most facilities, with the exception of the Station Place garage. Real-time electronic signage that directs drivers to vacant parking spaces could be a way of increasing utilization at the existing facilities while improving customer access.

Section 2

Introduction

Introduction

The purpose of the report is to provide technical analysis in support of the updated *Central City Plan* and *Central City Transportation Management Plan*. This report begins with a summary of findings from a questionnaire conducted concurrent to the parking analysis. The survey identifies the purposes, transportation choices, and perceptions of parking and access in the Central City.

The report summarizes a detailed analysis of parking conditions within the Central City. The analyses focuses on parking that is available for use by the general public, including on-street parking and the City's Smart Park garages, as well as commercial facilities. Where applicable, findings from the current study area are compared to conditions reported two decades ago in the 1988 *Portland Downtown Parking Plan and Circulation Update*.

There is also a targeted study of residential parking garages, which can be used only by residents of the specific property. The residential parking study was used in combination with the other parking data to identify parking and trip generation characteristics for specific parking user groups. Such data are provided in national reference manuals, but this study provides an opportunity to examine conditions specific to the Portland Central City.

This report addresses the following main topics:

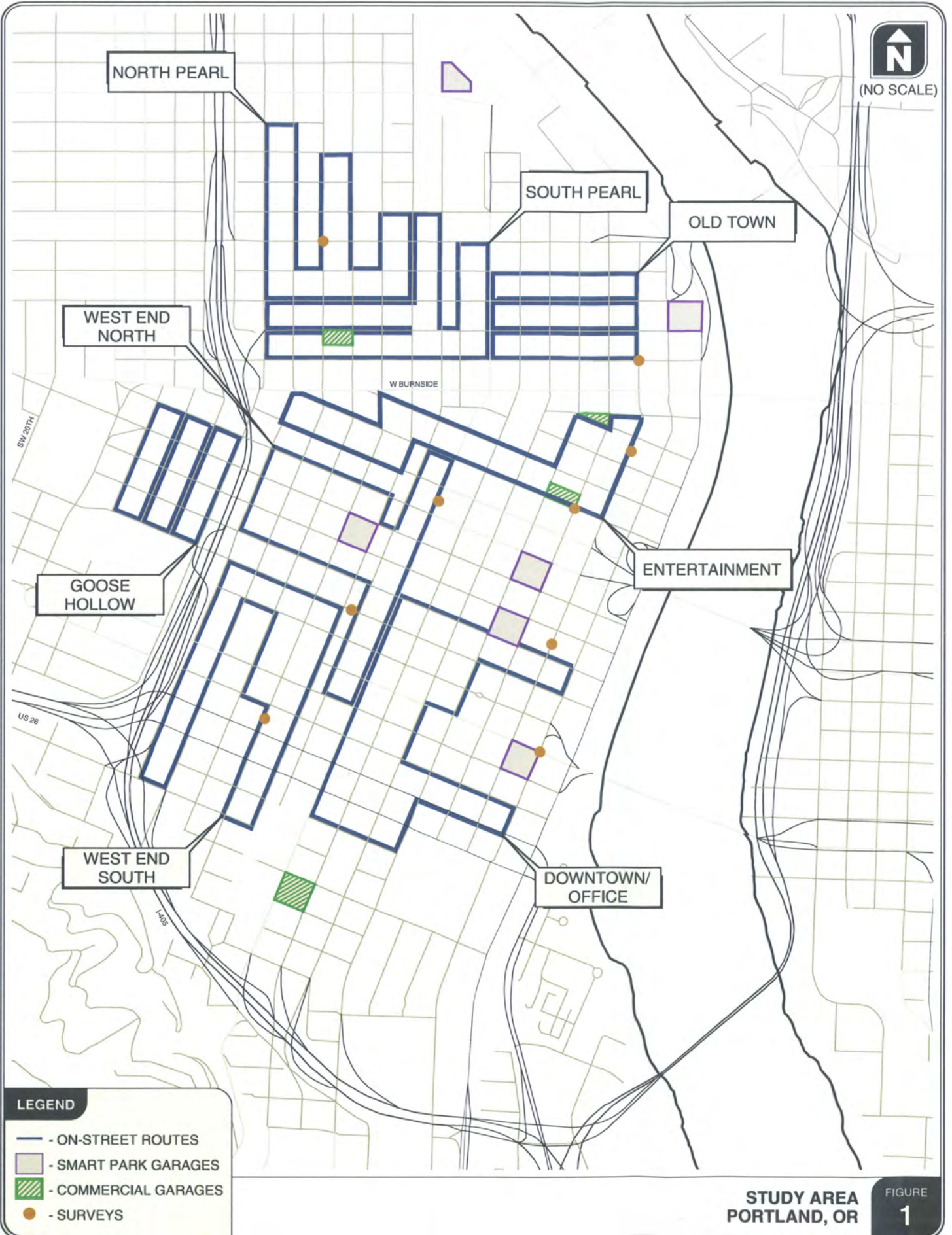
- User survey of parking and access conditions in the Central City;
- On-street parking conditions in each of the study areas, including hourly utilization, peak hour occupancy, parking duration, and turnover of parking stalls;
- Off-street parking operations for facilities available to the general public, including the City's Smart Park garages and a sample of commercial parking facilities; and,
- An examination of parking and trip generation characteristics related to specific land uses and/or user groups.

STUDY AREAS

The study area is shown in Figure 1. For the purpose of data collection and analysis, the following "sub areas" were defined:

- Goose Hollow
- North Pearl
- South Pearl
- West End North
- West End South
- Old Town
- Entertainment District
- Downtown/Office District

H:\profile\9363 - Portland CCTMP Update\dwgs\design\9363\jmap3.dwg Nov 05, 2008 - 9:05am - mbell Layout Tab: Fig01



All data collection activities were conducted to capture the peak period(s) during a typical weekday, with the exception of limited Friday evening data collection in the vicinity of the Old Town and Entertainment Districts. The data collection for this study was conducted in May and June 2008 and was scheduled to avoid the Portland Rose Festival and other major events. Study areas south of Burnside were evaluated while classes were still in session at Portland State University (PSU); and, Goose Hollow counts were scheduled during a typical event at the PGE Park. Additional measures were taken to avoid any potential conflicts associated with the redevelopment of the bus mall; such as the light-rail construction along SW 5th and 6th Avenues and the rerouting of the bus routes along SW 3rd and 4th Avenues.

The data collection and analysis described above was supplemented by key findings from parking recent studies conducted in the Lloyd and Central Eastside Districts.

Section 3

User Survey

User Survey

Intercept surveys were conducted in the Central City aimed at understanding the experiences, choices, and perceptions regarding parking and other access. The surveys were conducted in nine locations throughout the study area between 7 a.m. and 9 p.m. over the course of five weeks. A total of 406 surveys were completed. Figure 2 shows the locations and times where the surveys were conducted. These surveys do not reflect a statistical representation of the Central City community; rather they provide a "snapshot" perspective from a cross section of the public.

The survey questions are provided in the inset. The questions generally break down into the following categories: Trip Purpose (questions 1 and 2); Travel Mode (questions 3 and 4); Parking Preferences & Experience (questions 5 through 10). A summary of findings from the survey are summarized below. *Details of the survey responses are provided in Appendix A.*

Survey Questions

1. What is your main purpose for coming downtown today?
2. While you are in downtown today, will you also be engaging in other activities?
3. How did you get downtown?
4. Please indicate the top three factors influencing your travel mode choice today.

The remaining questions are for Private Vehicle respondents only

5. Where did you park today?
6. How would you complete the following statement? "When I park downtown, I typically prefer to park: On the Street; In a Smart Park garage; Other off-street parking facility.
7. How close were you able to park to your intended destination?
8. How long did you look before finding a parking space?
9. On-street parking in downtown is currently \$1.25/hour. Would it be worth paying a premium to park very close to your destination?
10. How does the price of parking affect your trip downtown?

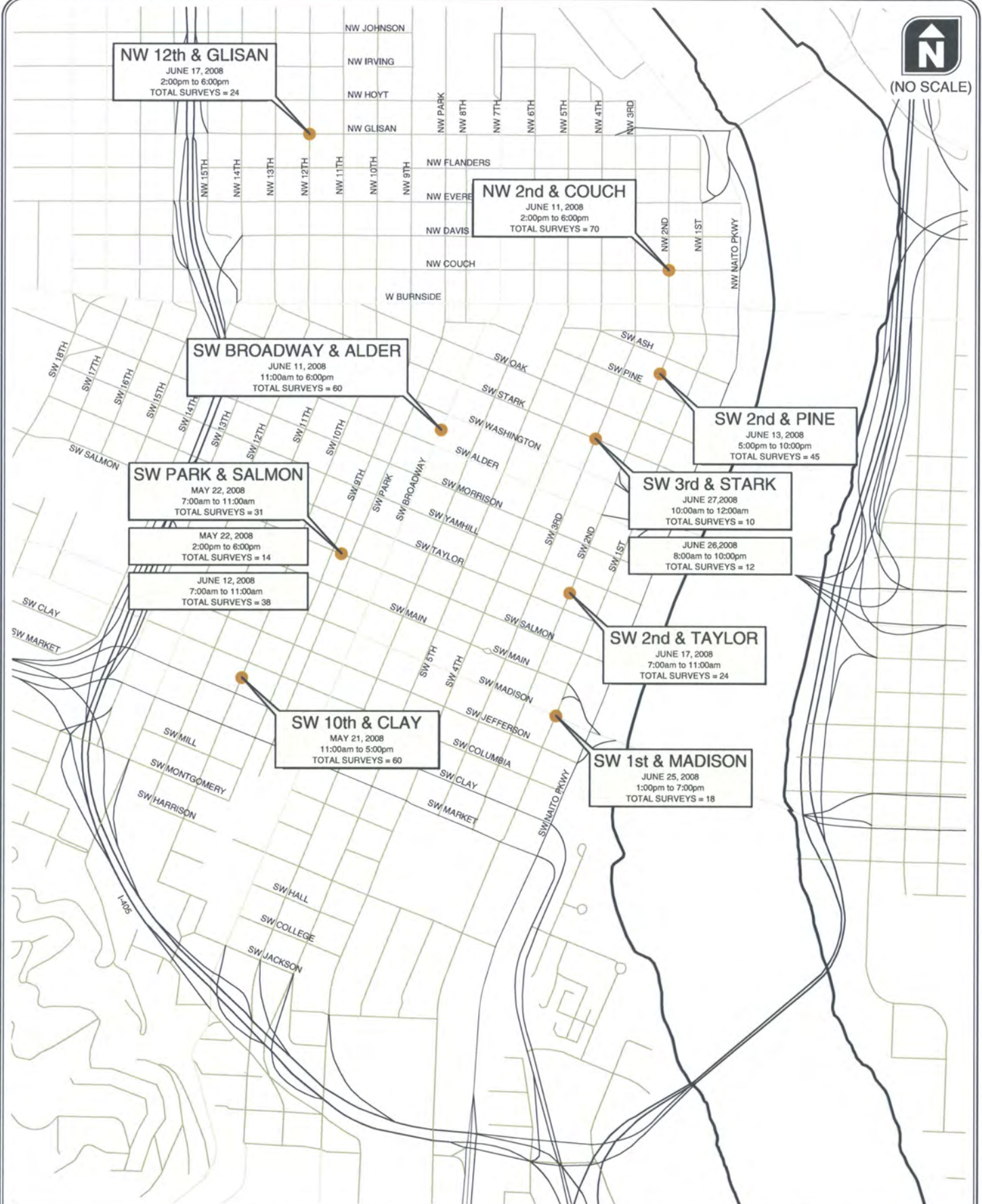
Trip Purpose

The first two questions of the survey identified the primary purpose for being in the central city, as well as any secondary activities. The top three responses to these questions are shown in Table 1.

The table shows that work is the most common primary trip purpose, followed by those who live in the area. While relatively few individuals cited shopping/dining as their primary trip purpose, more than one-third intended to shop or dine as a secondary activity. In summary, approximately 52 percent of respondents will engage in work activities and 47 percent will engage shop/dine activities while in the Central City. Only 13 percent indicated no secondary activities.

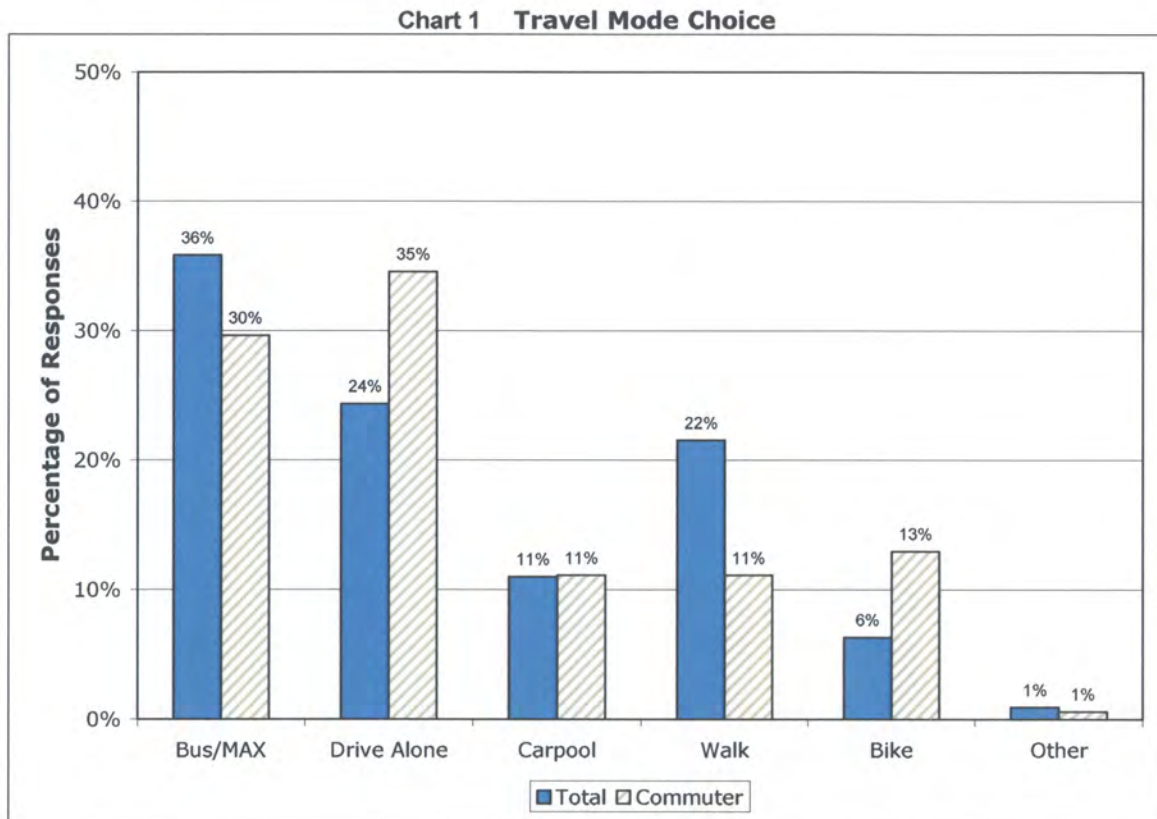
Table 1 Trip Purpose

Question	Top Response		Second Response		Third Response	
Main Purpose of Trip	Work	40%	Home	15%	Shop/Dine	11%
Secondary Activities	Shop/Dine	36%	None	13%	Recreation/Tourism	12%
					Work	12%

INTERCEPT SURVEY LOCATIONS
PORTLAND, ORFIGURE
2

Travel Mode

Survey responders were asked what travel mode they had used on the day of the survey. The mode split information is shown in Chart 1. The chart shows the Travel Mode Choice for the overall survey, and also for those with Work as their primary trip purpose.



The survey revealed that transit and private auto (Drive Alone or Carpool) were the dominant mode choices for the overall respondents, representing approximately 70 percent of overall respondents. This was generally consistent with findings specific to commuter travel, with 75 percent traveling by private car or transit; however, commuters were considerably more likely to Drive Alone when compared to respondents as a whole.

Walk and bike modes represented approximately one-fourth of the survey respondents. Among overall respondents, 22 percent identified walk mode, which is twice the proportion of commuters who walked. However, commuters show a higher tendency for bicycling.

Factors Influencing Travel Mode

Respondents were asked to identify the top three factors affecting their choice in travel mode. The surveys listed several options and also allowed respondents to fill in additional factors. The top three responses are summarized in Table 2. The table summarizes the responses in aggregate, and also by travel mode.

Table 2 Top Three Factors Influencing Travel Choice

Mode Choice of Respondent	Top Response		Second Response		Third Response	
Overall	Convenience	67%	Cost	47%	Travel Time	26%
Responses by Travel Mode						
Drive Alone/Carpool	Convenience	87%	Travel Time	46%	Cost	15%
Transit	Cost	71%	Convenience	51%	Health	15%
Walk/Bike	Convenience	65%	Cost	54%	Health	27%

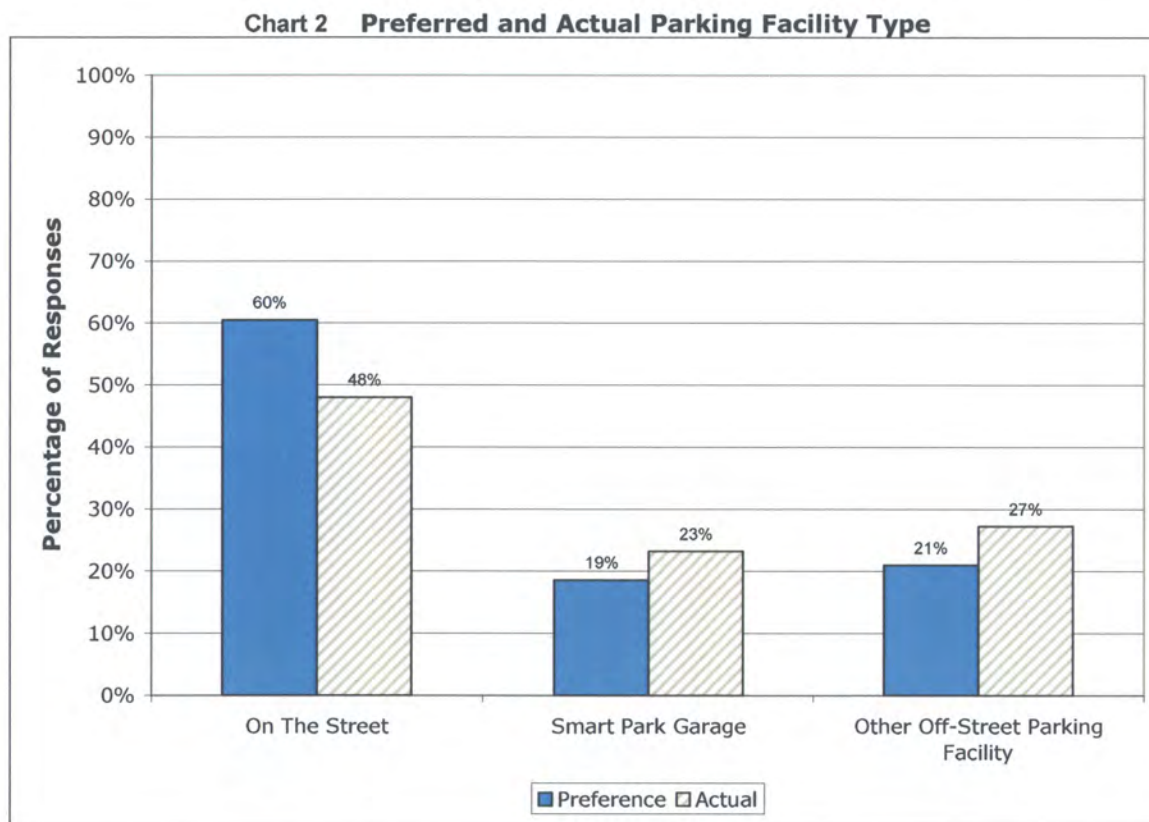
As Table 2 shows, convenience was the most common response, representing two-thirds of overall respondents, and an even higher proportion of Drive Alone/Carpool users. Only Drive Alone and Carpool responders selected Travel Time as a significant factor. All other responders also listed cost and health considerations as key factors.

Parking Preferences & Experience

The remaining questions were asked only of respondents who arrived by private automobile. These questions address the respondents' preferred and actual parking facility type; the difficulty finding parking and distance to ultimate destination; and how the price of parking affects their parking choices.

Parking Facility Types

Questions 5 and 6 asked respondents to identify their preferred parking locations (On-Street, Smart Park, or Other Off-Street) as well as the actual location where they parked on that day. As Chart 2 shows, there appears to be a high correlation between an individual's parking preference and actual parking location. On-street parking was the preferred parking location for most responders (60 percent); nearly half of respondents were able to park on the street.



Parking Convenience

Questions 7 and 8 asked respondents about the distance they parked from their ultimate destination, as well as the time spent looking for parking. The responses are shown in Table 3.

Table 3 Parking Convenience

Question	<1 Minute/ <1 Block	1-5 Minutes/ 1-2 Block	5-10 Minutes/ 3-4 Blocks	> 10 Minutes/ >4 Blocks
Time Looking for Parking	65%	28%	5%	2%
Distance from Destination	42%	35%	14%	9%

The vast majority of respondents (93 percent) reported spending no more than five minutes looking for parking; of these, 65 percent were able to find parking with less than one minute dedicated to searching. Overall, more than three-quarters of respondents (77 percent) parked within two blocks of their destination, yielding an average distance of approximately 1.9 blocks. It is interesting to note that this average distance is shorter than was reported in the 1988 *Downtown Parking and Circulation*. Survey respondents at that time reported an average walking distance of nearly 2.5 blocks (Reference 1).

The apparent ease and convenience with which most drivers are able to find parking bodes well for traffic as well as parking conditions. Difficulty in finding parking contributes directly to traffic congestion in the Central City with no real economic benefit gained from the added trips on

congested roadways and intersections. These difficulties can also contribute to a lower quality of experience provided to downtown visitors, also affecting economic development. Through Portland's actual parking availability as well as effective way-finding and signage, the system appears to be accommodating demand for parking access in the Central City.

Price of Parking

Two questions were asked regarding the price of parking. Question 9 was aimed at identifying the willingness to pay for "premium location" on-street parking. Only 24 percent of the respondents indicated such a willingness. However, as was revealed above, approximately 77 percent of parkers were able to park within two blocks of their destinations and therefore may not perceive much potential value from an "improved" location.

When asked about the effect that the price of parking has on the decision to come to the Central City (Question 10), most respondents (62 percent) indicated no effect. However, seventeen percent indicated that parking prices may shorten their visit. Only ten percent indicated that high parking charges might cause them to change travel mode. These results support the findings from Question 4 regarding factors affecting mode choice. Only fifteen percent of those who traveled by private automobile identified cost as a significant factor affecting their travel mode choice. In fact, it is worth noting that as a group, the survey respondents already chose to drive downtown and pay for parking; as such, they may already have a higher willingness to pay for parking than the general population.

Section 4
On-Street Parking
Conditions

On-Street Parking Conditions

On-street parking is considered by many to be the most convenient, highest priority parking in a downtown area. Among parkers, the preference for on-street spaces is supported by the findings of the user survey, in which sixty percent of respondents identified the curb parking as their preferred location.

Within Portland's Central City, all on-street parking has time-stay restrictions favoring short-term parking. There are some exceptions, such as designated carpool spaces which allow all-day parking for vehicles displaying carpool hang tags. Paid parking is enforced from 7 a.m. until 7 p.m. Mondays through Saturdays.

STUDY SCOPE

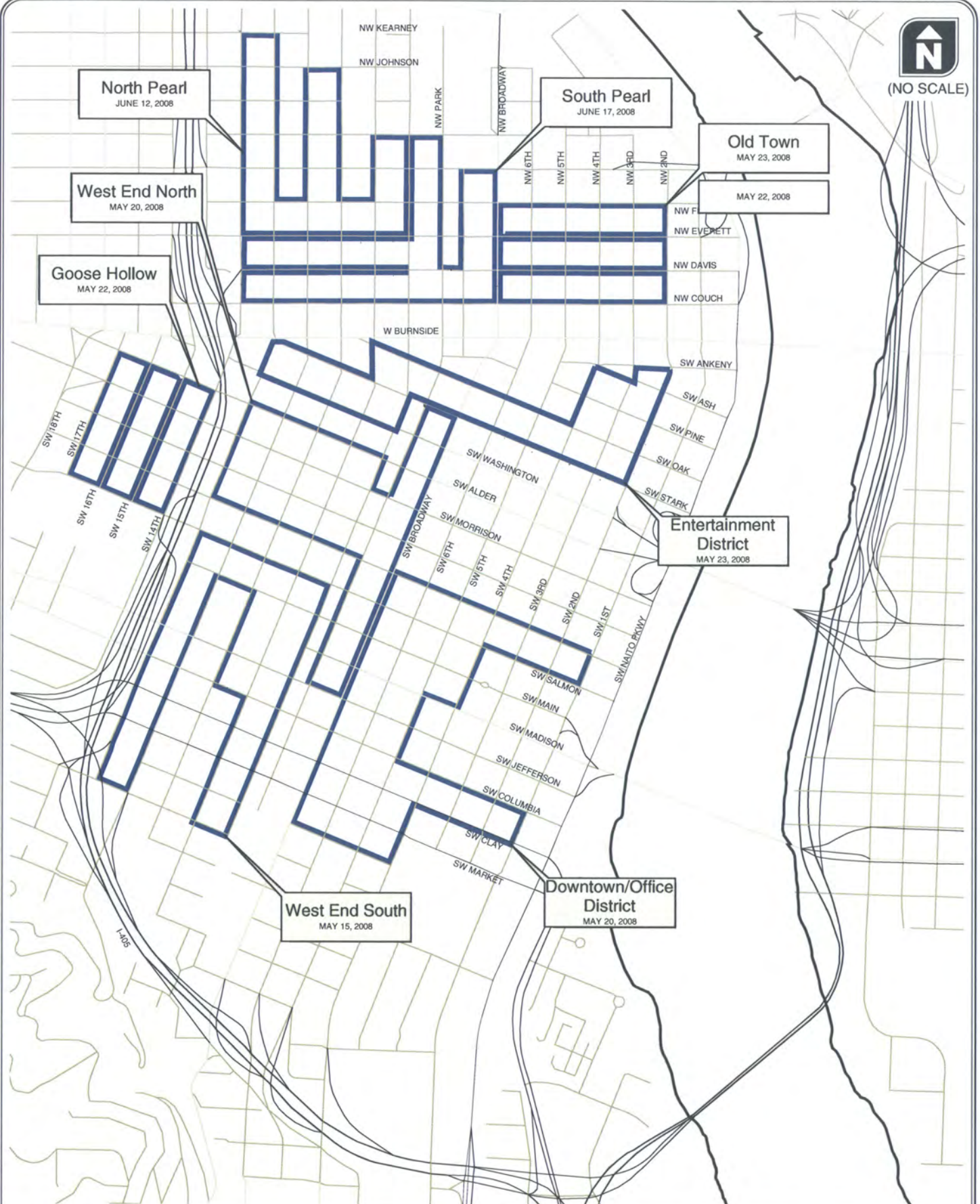
The on-street parking analysis was based on hourly license plate surveys conducted in the eight sample study areas. These sample study areas are shown in Figure 3. The parking counts were conducted for 16-hour study periods, which are shown below.

<u>Sample Study Area</u>	<u>Data Collection Period</u>
West End North	6 AM – 10 PM
West End South	6 AM – 10 PM
Downtown Office District	6 AM – 10 PM
Goose Hollow	6 AM – 10 PM
Pearl North	8 AM – Midnight
Pearl South	8 AM – Midnight
Old Town	8 AM – Midnight
Entertainment District	8 AM – Midnight

The sixteen-hour duration of the study periods captures parking conditions during the most active hours in the Central City. The data collection in the study areas south of Burnside was determined to include the earlier arrival and departure patterns associated with downtown offices and residential uses. The study periods for the areas north of and in the immediate vicinity of Burnside Street were shifted to later hours (8 a.m. until midnight) in order to capture activities associated with the numerous restaurants, bars, and nightclubs in the vicinity.



(NO SCALE)



ON-STREET PARKING DATA COLLECTION ROUTES
PORTLAND, OR

FIGURE
3

This report also summarizes findings from two recent parking studies in the Lloyd and Central Eastside Districts.

Lloyd District

In January 2005, Kittelson & Associates, Inc. (KAI) provided a memorandum summarizing findings of a parking analysis conducted in the Lloyd District (Reference 2). The study was limited to the NE Broadway, Weidler, and Schuyler Streets between NE 6th and 17th Avenues. NE Schuyler Street has mostly residential land uses and the parking is unrestricted. The NE Broadway/Weidler Street couplet serves primarily commercial activities; most of the parking has signed time limits for stays of up to two hours. There is currently no paid curb parking in this study area. *A copy of the study is provided in Appendix B.*

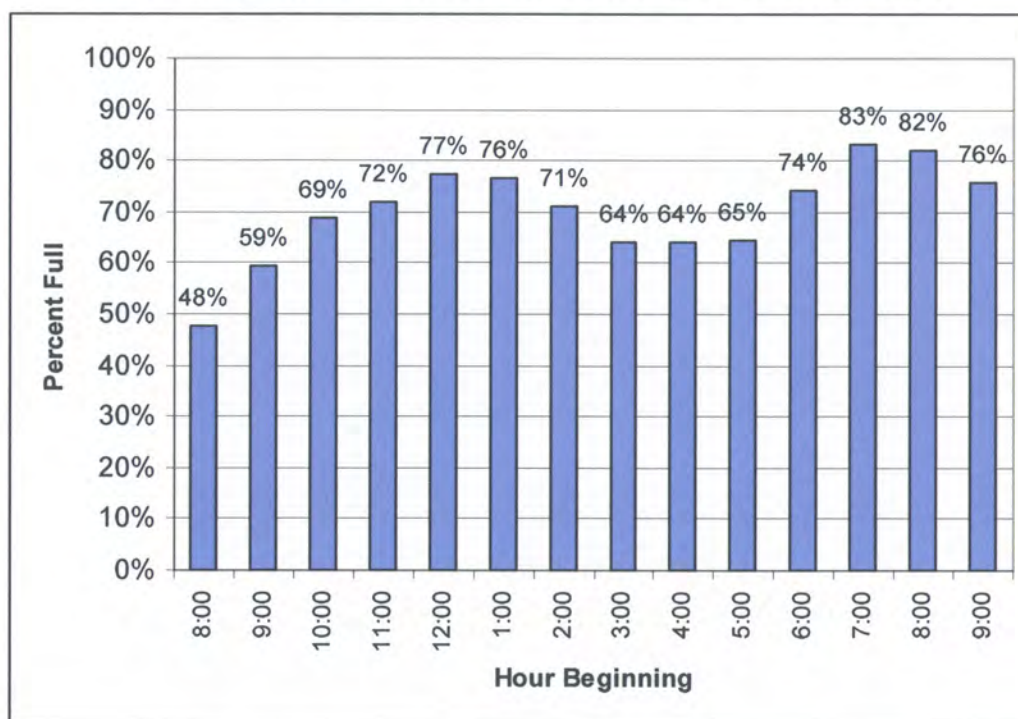
Central Eastside District

In October 2007, Rick Williams Consulting provided a report (Reference 3) summarizing the findings of an analysis of on-street parking in the northern Central Eastside District. The study area was limited to the area bounded by I-84 (north), SE 2nd Avenue (west), SE 9th Avenue (east), and SE Oak Street (south). This area serves primarily industrial uses and there is significant related employee demand. There are also numerous retail and restaurant establishments, especially along Martin Luther King Boulevard and Grand Avenue. *A copy of the study is provided in Appendix C.*

ON-STREET PARKING UTILIZATION

Parking utilization refers to the percentage of parking spaces that are occupied at a point in time. In most cases a downtown parking system is considered to be full, or has reached its effective capacity, when it reaches 85-percent utilization. Beyond this level, drivers can have difficulty locating the few available spaces. The hourly utilization profile for the combined study areas is summarized in Chart 3.

Chart 3 Area-wide On-Street Parking Weekday Utilization Profile



As Chart 3 shows, the overall study area has a mid-day peak hour between noon and 1 p.m., with 77 percent utilization; and, an evening peak hour from 7 to 8 p.m., with 83 percent utilization. This general pattern, with mid-day and evening peak periods, is fairly typical of downtowns particularly where the mix of land uses draws dining, entertainment, and residential activities in the evenings. The peak utilization levels for mid-day and evening peak hours indicate that the overall system is approaching its effective capacity during the peak hours.

The peak hour utilization levels shown in Chart 3 are somewhat lower than observed in a 2004 analysis of parking conditions (Reference 4). In the 2004 study overall occupancy was found to be 94 percent during the peak hour, which occurred between 7 and 8 p.m. (the 2004 study did not include daytime conditions). The difference in findings may be due in part to differences in data collection areas, as well as considerable construction activities in 2008 associated with the light rail expansion on SW 5th and 6th Avenues.

In addition to the construction activities, the 2008 data collection effort took place while the country was experiencing rapidly rising prices for gasoline. At the beginning of 2008, gas prices in Oregon were just over \$3.00 per gallon. By June, when this data collection was in full swing, average gas prices in Oregon exceeded \$4.25 per gallon (Reference 5). Not surprisingly, the rise in fuel prices was accompanied by sharp increases in transit ridership. TriMet reported a nearly five-percent increase in ridership in June 2008 compared to the prior June (Reference 6). Similarly, increases in bicycle commuting were evidenced on downtown bicycle lanes and bicycle parking facilities.

Block Face Peak Hour Parking Utilization

For a closer examination of peak hour conditions, Figures 4 and 5 display the on-street utilization by block face during the mid-day and evening peak hours. For each block that was included in the study, the figures show the level of parking occupancy during the hour. All those blocks with utilization of 85 percent or higher are shown in red.

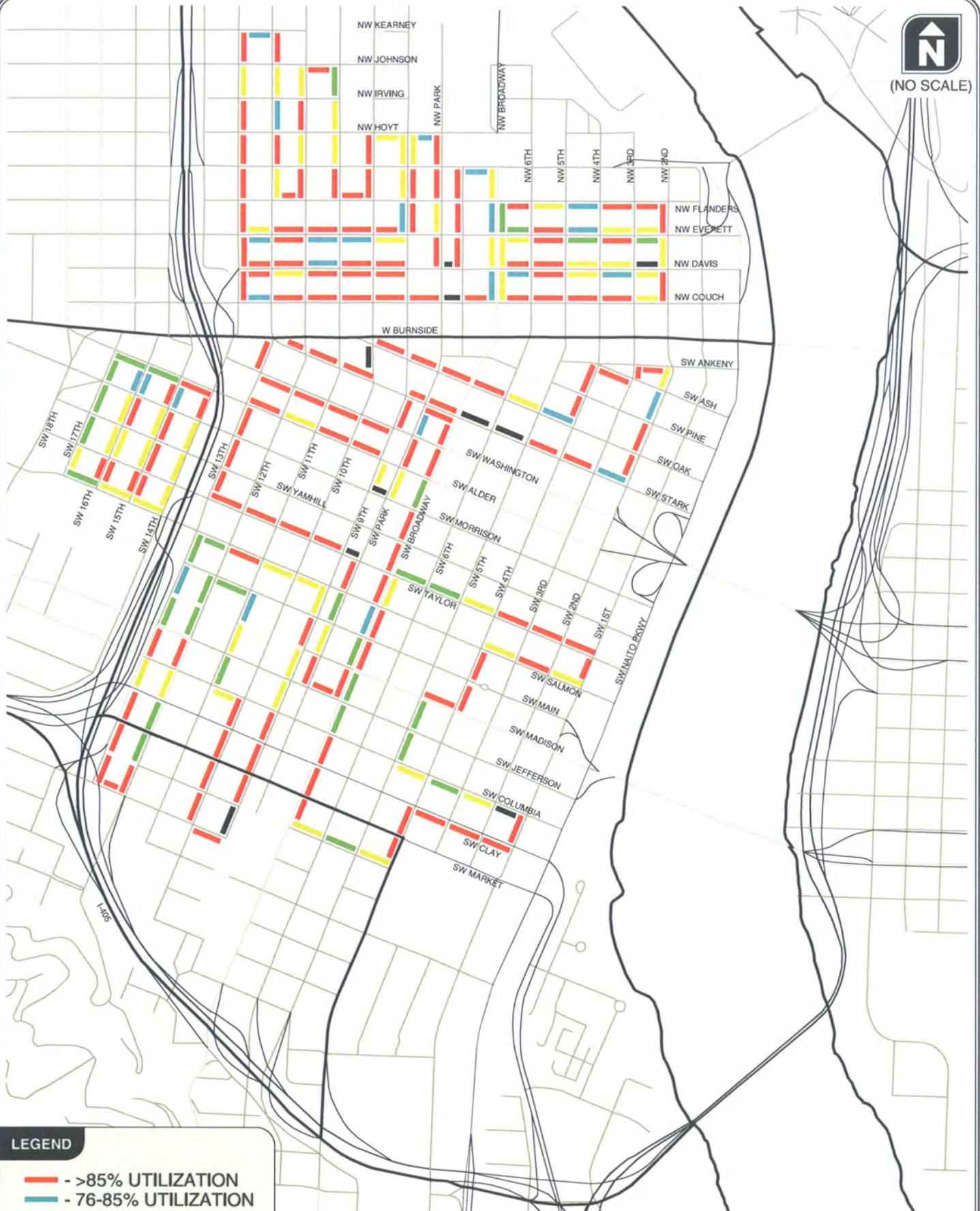
As the figures show, the parking demand was generally well distributed, which likely contributed to the relative ease in finding parking that was revealed in the survey. However, there are some locations, such as the South Pearl where nearly every block face is at its effective capacity.

SubArea Analysis

In general, the individual subareas display utilization profiles with mid-day and evening peak periods, consistent with the overall study area. The specific peak periods and occupancy levels for each study area are shown in Table 4. The table also shows utilization findings reported in recent studies conducted for the Central Eastside and Lloyd Districts.



(NO SCALE)



LEGEND

- - >85% UTILIZATION
- - 76-85% UTILIZATION
- - 50-75% UTILIZATION
- - <50% UTILIZATION
- - NO PARKING

**MID-DAY ON-STREET UTILIZATION
12:00PM-1:00PM PEAK HOUR
PORTLAND, OR**

FIGURE

4

H:\profile\9363 - Portland CCTMP Update\dwgs\design\9363gismap4.dwg Nov 05, 2008 - 9:07am - mbell Layout Tab: Fig05



Table 4 Peak Hour Occupancy by Study Area

Study Area	Mid Day Peak		Evening Peak	
	Time	Occupancy	Time	Occupancy
West End North	noon-1pm	83%	7pm-8pm	76%
West End South	11am-12pm	82%	7pm-8pm	85%
Downtown/Office District	1pm-2pm	81%	7pm-8pm	78%
Goose Hollow	noon-2pm	69%	8pm-9pm	92%
Pearl North	noon-1pm	85%	7pm-8pm	87%
Pearl South	noon-2pm	90%	8pm-9pm	90%
Old Town	1pm-2pm	78%	9pm-10pm	90%
Entertainment District	Noon-1pm	89%	7pm-8pm	94%
Overall	Noon-1pm	79%	7pm-8pm	84%
Related Findings from Other Districts				
North Central Eastside (2007)	1pm-2pm	75%	n/a	n/a
Lloyd District (2005) - Broadway/Weidler Corridor	Noon-1pm	83%	n/a	n/a

As Table 4 shows, peak parking occupancy reaches or exceeds effective capacity during both peak periods in the South and North Pearl District and the Entertainment District. This likely reflects the particular mix of land uses, which includes residential, entertainment, and employment, thereby creating demand throughout the day. Conversely, Goose Hollow, which is strongly residential, shows relatively low use during the mid-day, but has high utilization (92 percent) in the evening peak hour. This also reflects parking demand associated with PGE Park. *The on-street utilization profiles for each of the study areas are provided in Appendix D.*

Table 4 also shows the midday peak hour findings for the North Central Eastside District (CED) and the Broadway-Weidler corridor of the Lloyd District. Overall, peak hour conditions in the Northern CED indicate some remaining capacity, with 75 percent utilization. The Broadway-Weidler corridor of the Lloyd District was nearly at its effective capacity in the mid-day.

ON-STREET PARKING DURATION & TURNOVER

Like *utilization*, *parking duration* and *turnover* are critical metrics for defining the operations of a parking system. The average duration of stay reveals the types of parkers being served. Typically, customers and other short-term visitors occupy a parking space for less than four hours, while employees or residents are indicated by parking stays of four hours or longer. Parking turnover indicates the number of vehicles that use a given space over the course of the study period. The average duration and turnover findings for the on-street spaces are summarized in Table 5.

Table 5
Area Wide On-Street Duration of Stay/Turnover

Type of Space	Number of Spaces	Total Vehicles	Average Duration of Stay	Average Turnover*
1 Hour	113	483	1 Hour 26 Min	4.3
90 Min	615	3,056	1 Hour 42 Min	5.0
2 Hour	69	338	1 Hour 34 Min	4.9
3 Hour	568	2,238	2 Hours 15 Min	3.9
5 Hour	253	741	2 Hours 50 Min	2.9
Overall	1,618	6,856	2 Hour 3 Min	4.2
Note: Turnover and duration analyses are based on 8:00 a.m. to 7:00 p.m. data. *Average Turnover = Vehicles per Space per Study Period				

The average duration of stay summarized in Table 5 shows that there is relative uniformity in the duration of stay among the three shorter-term designated spaces. Among the one-hour, 90-minute, and two-hour spaces, the average duration was just about 1.5 hours. This duration indicates a highly efficient system for short-term visitor parking observed.

Turnover was also fairly consistent among the shorter time limited spaces, ranging from 4.3 vehicles to 5.0 vehicles served per space over the twelve-hour day. The three-hour and five-hour spaces both operate with average stays of less than three hours, but with turnover rates of nearly three and four vehicles per day.

Overall, these turnover numbers show very efficient operations for the system with each space serving between three and five vehicles during the twelve-hour study period. *The on-street duration and turnover analyses for each of the study areas are provided in Appendix E.*

The duration and turnover findings from the Broadway/Weidler corridor in the Lloyd District and CED studies are summarized in Table 6.

Table 6 Lloyd and Central Eastside Duration and Turnover Findings

Type	Average Duration	Average Turnover*
Lloyd District – Broadway/Weidler Corridor		
No Restriction	3 hours 30 min	2.1
Various, maximum 2 hours	1 hour 48 min	3.8
Central Eastside North		
1 hour	2 hours 9 min	n/a
2 hour	3 hours 23 min	n/a
No Restriction	4 hours 37 min	n/a
Average	3 hours 53 min	2.27

* Turnover studies for the Lloyd District reflect a 10-hour study period; for the Central Eastside district, the turnover study reflects an 8-hour study period.

As Table 6 shows, the time restricted spaces in the Broadway/Weidler corridor had average parking durations of approximately 1.75 hours, with nearly four vehicles served over the 10-hour study period. This is generally consistent with the short-term spaces in the other study areas (shown in Table 5).

Conversely, parking duration in the CED show considerably longer durations. Parking durations appear to be consistently in violation of the 1- and 2-hour time stay restrictions. The study did not report turnover for each category of parking. However, overall parking turnover was measured at 2.27.

It should be noted that the turnover rates for the CED and the Lloyd District studies cannot be compared directly to the areas summarized in Table 5 due to the different study periods. In particular, the CED study included only eight hours of data, compared to the study areas in Table 5 which included eleven hours of observations. The longer study period allows more opportunity for the parking stalls to turn over.

COMPARISON TO 1988 ON-STREET PARKING OPERATIONS

The overall parking operations measures from the 1988 *Portland Downtown Parking Plan and Circulation Update*. There are meaningful differences in the 1988 and 2008 studies that should be considered when comparing the findings. Most important, the 1988 study includes more than twice the number of on-street parking spaces, but offers very little information regarding any time limits, pricing, or other restrictions. Also, the 1988 study does not explain the methodology in detail. Nevertheless, a review of the overall findings can provide an indication of trends over the last two decades. The peak hour utilization and the duration and turnover findings for the overall study areas are shown in Table 7. Note that the 1988 study reported the *median* duration of stay (midpoint of all observations) but did not report the average.

Table 7
On-Street Parking Operations, 1988 vs. 2008

Operating Measure	1988	2008
Peak Hour Utilization	82%	84%
Turnover	4.5	4.2
Median Duration of Stay	3 hours 30 min	Approximately 1 hour
Average Duration of Stay	Not provided	1 hours 57 min

As Table 7 shows, both the peak hour utilization and the turnover of the on-street parking system from the 1998 study were very near the most recent findings. According to the 1988 report, the turnover rate was slightly higher in 1988. The report indicates that turnover rates were as high as 6.5 and 7.3 vehicles per day in the downtown core, which generally corresponding to the Entertainment and Downtown/Office study areas. This high turnover appears to contradict the reported *median* duration of stay for the 1988 study. The relatively long median duration of 3 hours

30 minutes would suggest a turnover rate in the range of 2.0 to 3.0 for the twelve-hour study period. The detailed data needed to explain this apparent incongruity were not available.

Section 5
Off-Street Parking
Conditions

Off-Street Parking Conditions

The off-street parking conditions analysis consists of an evaluation of public (Smart Park) and Commercial parking facilities in the study area. Commercial facilities are privately owned but are available to the general public for a fee. While most people consider on-street parking to be the most convenient, off-street public and commercial facilities can offer a convenient alternative. Further, most off-street spaces are not subject to the short time-stay restrictions of curb parking. Therefore, the off-street parking facilities are good options for employees or others needing to park for relatively long durations. The off-street facilities included in the analysis include:

- Smart Park: SW 1st & SW Jefferson
- Smart Park: SW 3rd & SW Alder
- Smart Park: SW 4th & SW Yamhill
- Smart Park: SW 10th & SW Yamhill
- Smart Park: SW Naito & SW Davis
- Smart Park: Station Place
- Brewery Blocks
- Portland State University Garage
- SW 3rd & SW Ash Surface Lot
- SW 3rd & SW Stark Surface Lot

The locations of the off-street facilities are shown in Figure 6. At the Smart Park and Brewery Blocks garages, the data were obtained from the access control system operating the garage gates. It also separates the data into two primary user groups: Daily customers, who pay an hourly or daily fee; and Leased customers, who have contracts for monthly parking and have an automated access card for entry and exit. The SW 1st /SW Jefferson and the SW Naito/SW Davis garages operate with generally balanced numbers of Leased and Daily customers, whereas the customers at the other Smart Park garages are 95 percent Daily users due to limits on the number of leases sold. The system provides parking entry and exit data, as well as duration of stay data.

Data for the PSU garage and for the two surface lots were collected in the field between 8:00 a.m. and 10:00 p.m. on a mid-week day.

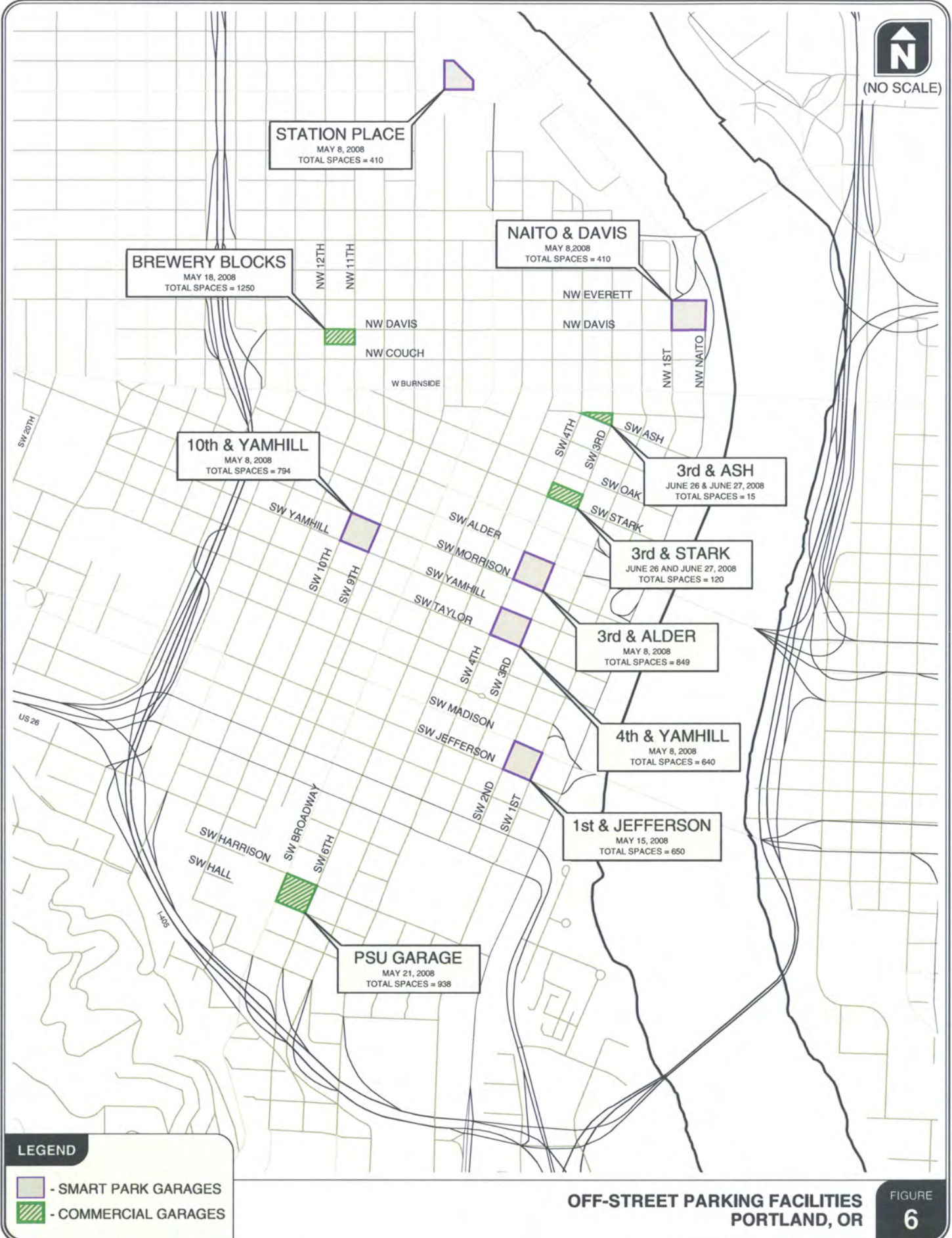
Smart Park and Commercial Parking Utilization

For each garage studied, the number of spaces, the peak hour, and the peak hour utilization are summarized in Table 8. In the table, the peak hour Daily and Leased vehicles are identified separately in order to illustrate the primary user group served by each garage.



(NO SCALE)

H:\profile\9363 - Portland CCTMP Update\dwgs\design\9363gismap3.dwg Nov 05, 2008 - 9:05am - mbell Layout Tab: Fig06



FIGURE

Table 8
Off-Street Peak Hour Utilization

Location	Spaces	Peak Hour	Peak Hour Utilization	Peak Hour Vehicles		
				Daily	Leased	Total
Public (Smart Park) Garages						
SW 1st & SW Jefferson	650	11 a.m. – 12 p.m.	>100%	323	363	686
SW 3rd & SW Alder	849	12 p.m. – 1 p.m.	85%	686	35	721
SW 4th & SW Yamhill	640	12 p.m. – 1 p.m.	81%	516	2	518
SW 10th & SW Yamhill	794	12 p.m. – 1 p.m.	92%	680	47	727
SW Naito & SW Davis	410	9 a.m. to 3 p.m.*	~85%	173	180	353
Station Place	410	12 p.m. – 1 p.m.	60%	89	157	246
Commercial Facilities						
Brewery Blocks	1,250	1 p.m. – 2 p.m.	93%	508	659	1,167
PSU Garage	938	12 p.m. – 1 p.m.	93%	NA	NA	872
SW 3 rd & SW Ash Surface Lot	15	1 p.m. – 2 p.m.	93%	NA	NA	14
SW 3 rd & SW Stark Surface Lot	120	11 a.m. – 12 p.m.	97%	NA	NA	116

*Parking occupancy reaches approximately 85 percent early in the day and remains fairly stable for several hours.

As shown in Table 8, all of the Smart Park and Commercial parking facilities experience their peak hour utilization during the mid-day, compared to the on-street system which had the highest demand in the evening. This is probably because there are no fees for parking on street after 7 p.m. making curb parking more attractive.

The Smart Park garages operate with peak hour utilization ranging from 60 percent at Station Place to 100 percent at the SW 1st/SW Jefferson Smart Park garage. According to Smart Park managers, the reported utilization at this facility sometimes exceeds 100 percent due in part to vehicles circulating throughout the garage during the time period, though there may be some reporting errors in the software. However, it is accepted that this garage experiences the highest utilization among those studied. The overall demand at this garage also includes approximately 150 to 200 City of Portland fleet vehicles.

All of the commercial facilities operate with utilization higher than 90 percent during the peak period. This is especially significant at the 1,250-space Brewery Blocks garage shows exceptionally high parking demand. When viewed in light of the on-street parking utilization for the South Pearl and Entertainment District, the study shows very high parking demand in the vicinity of West Burnside Street. The PSU garage, with 938 spaces, also shows high demand with 93 percent peak occupancy. *The utilization analysis for the Smart Park and Commercial parking facilities are provided in Appendix F.*

In general, it should be observed that most of the public and commercial parking facilities are operating at or near capacity during the peak hours. These utilization levels do not indicate

considerable room for increased demand at most facilities, with the exception of the Station Place garage. For the facilities operating near the 85-percent threshold, real-time electronic signage that directs drivers to vacant parking spaces could be a way of achieving higher utilization while improving customer access.

Off-Street Parking Duration & Turnover

The duration and turnover analysis for the Smart Park and Commercial facilities were evaluated for the eleven-hour period of 8 a.m. to 7 p.m. (except for the Brewery Blocks garage, which is for the period from 6 a.m. to 5 p.m.), which is consistent with the hours of enforcement for on-street time limits. The findings are summarized in Table 9.

Table 9 Off-Street Duration & Turnover

Location	Spaces	Turnover*	Vehicles Served	Average Duration of Stay	
				Daily	Leased
Smart Park Garages					
1st & Jefferson	650	1.7	1,097	3 Hours 53 Min	7 hours 24 Min
3 rd & Alder	849	1.9	1,611	3 Hours 23 Min	7 Hours 41 Min
4 th & Yamhill	640	1.9	1,223	3 Hours 30 Min	4 Hours 15 Min
10th & Yamhill	794	1.8	1,434	3 Hours 23 Min	8 Hours 29 Min
Naito & Davis	410	1.0	429	7 Hours 1 Min	7 Hours 38 Min
Station Place	410	0.6	224	8 Hours 42 Min	8 Hours 28 Min
Commercial Parking					
Brewery Blocks	1,250	1.4	1,773	3 hours 31 Min	8 Hours 55 Min
PSU Garage	938	2.0	1,841	4 hours 27 Min	NA
SW 3 rd & SW Ash Surface Lot	15	2.4	36	3 Hours 8 Min	NA
SW 3 rd & SW Stark Surface Lot	120	2.7	320	3 Hours	NA

*Turnover = Vehicles per Space

As Table 9 shows, the garages had much lower turnover rates when compared to the on-street data. The Station Place garage had a turnover rate of 0.60 vehicles per space. This reflects the low peak hour utilization reported in Table 8. The SW Naito/SW Davis and Station Place garages show the longest durations of stay, with little difference between Daily and Leased users of these facilities. It appears that most Daily users at these facilities are commuters rather than customers and short-term visitors.

For most facilities, duration of stay was shorter when analyzed for Daily customers separately. The remaining Smart Park garages primarily serve Daily customers and they show average durations of less than four hours. Smart Park employs a pricing structure that charges lower hourly rates for stays of up to four hours in order to serve customer and visitor parking needs.

The commercial facilities show wide ranging durations of stay. However, the Brewery Blocks garage shows the longest of all of the off-street facilities except for Station Place. This garage serves a broad mix of customers. It appears to serve considerable employee demand, as it is the largest commercial facility in the vicinity of the Pearl District. *The duration and turnover analysis for all of the Smart Park and Commercial parking facilities are provided in Appendix G.*

COMPARISON TO 1988 OFF-STREET PARKING OPERATIONS

The overall parking operations measures from the 1988 *Portland Downtown Parking Plan and Circulation Update* for the off-street system. As noted for the comparison of the on-street analysis, the scope for the two studies are not exactly the same and some caution should be used in making direct comparisons. The 1988 study included nearly 24,000 off-street parking spaces, compared to just over 6,000 spaces in the current study, which emphasized public access facilities. The 1988 study does not describe the selection of the study garages and surface lots, nor the methodology for data collection and analysis. The overall peak hour utilization and the duration and turnover findings are shown in Table 10.

Table 10 Off-Street Parking Operations, 1988 vs. 2008

Operating Measure	1988	2008
Peak Hour Utilization	80%	88%
Duration	8 hours 10 minutes	5 hours 43 minutes
Turnover	1.4 vpd	1.7 vpd

As Table 10 shows, under 2008 parking conditions the peak hour utilization has increased approximately ten percent since 1988. The average duration of stay has shortened from more than eight hours to just under six hours. The eight-hour duration from 1988 is consistent with the durations reported for Leased parkers in 2008. This suggests that nearly all of the off-street parkers in the 1988 study were commuters. With the availability of short-term parking in the Smart Park garages, turnover has increased slightly from 1.4 to 1.7 vehicles per day.

Section 6

Parking & Trip Generation Characteristics

Parking & Trip Generation

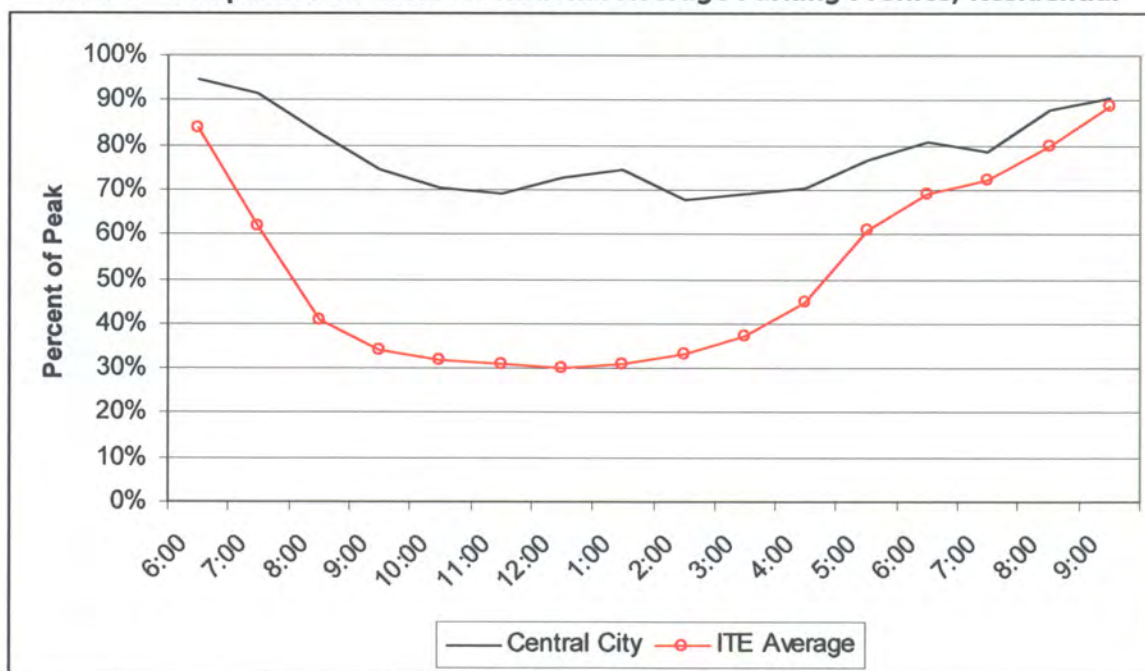
This section identifies observed parking demand and trip generating characteristics of parking facilities in the Portland Central City. Standard reference manuals such as the *Parking Generation Manual* and the *Trip Generation* manual, both published by the Institute of Transportation Engineers (ITE) generally reflect suburban conditions with ample “free” parking. While the data provided in this report are limited in the number of observations, they may be a useful indication of parking and trip generation characteristics reflecting downtown Portland conditions. *The parking and trip generation data are provided in Appendix H.*

PARKING OCCUPANCY PROFILE

In planning for new developments it is frequently necessary to estimate parking demand and trip generating characteristics, including peak demand and hourly demand profiles. Parking conditions in downtown Portland differ significantly from typical suburban conditions that are reflected in standard reference manuals. Dense development patterns and mixed land uses promote walking trips among multiple activities. Also, parking is generally priced according to market conditions, compared to suburban areas where there is usually no charge for parking. In order to provide a predictive basis for downtown Portland developments, parking occupancy data for specific land uses have been summarized to show the regular fluctuations in parking demand over the course of a typical weekday.

To illustrate, Chart 4 shows the Residential parking occupancy profiles for the Portland Central City as well as for data provided in the ITE *Parking Generation Manual*. The profiles show the hourly parking demand as a percent of the peak hour, which is set to 100 percent.

Chart 4 Comparison of Local vs. National Average Parking Profiles, Residential



As Chart 4 shows, the parking demand profile for Residential uses in the Central City is considerably flatter than its suburban counterparts. The Portland Central City profile indicates that parking demand reaches its lowest point at around 2 p.m. when demand is approximately 68 percent of the peak hour. Similar information provided in the *ITE Parking Generation Manual* indicates that residential parking demand reaches a low point of approximately 30 percent of the peak hour¹. This suggests that residents in the Portland Central City are more likely to leave their vehicle at home during the day.

The hourly demand profiles for Office, Customer/Visitor, and University parkers are shown in Charts 5, 6, and 7, respectively. These charts show similar overall demand patterns when comparing the Portland Central City with the national averages reported by ITE, though there are some specific changes. Specific differences include the noon hour demand for Office/Commuter parking (Chart 5); the ITE average shows a dip in the mid day just when the Portland data show a peak. This is probably because suburban office employees will more likely drive to lunch. The PSU/University demand (Chart 7) shows considerably higher demand in the evening, when compared to ITE data. However, the PSU garage is open for public use but the University also has numerous evening classes and other events. The evening demand may reflect a combination of general public and PSU activities.



11/5/2008

¹ The hourly parking demand rate is for Rental Townhomes, the ITE category with the most substantial data set.

Chart 6 Comparison of Local vs. National Average Parking Profiles, Customer/Visitor

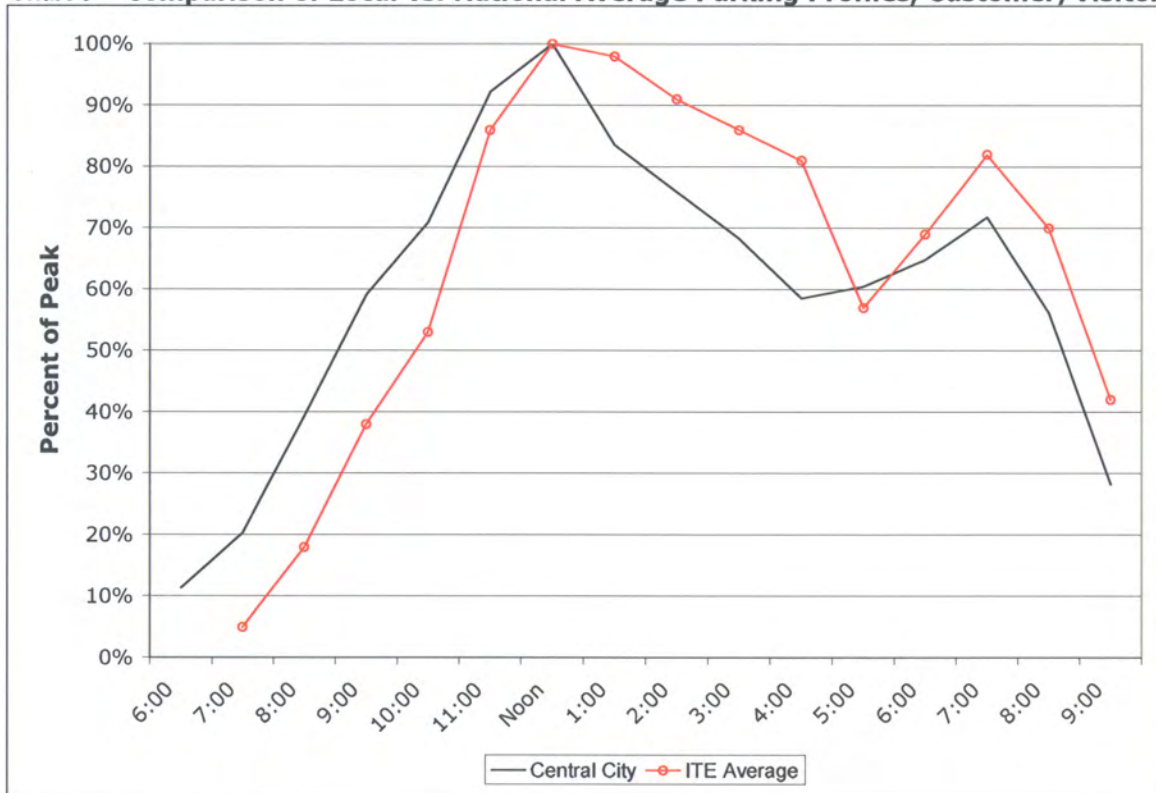


Chart 7 Comparison of Local vs. National Average Parking Profiles, University



TRIP GENERATION

Parking facilities do not in and of themselves generate traffic. Rather, trips are generated by adjacent activities such as employment, shopping, and dining. Parking facilities that serve these trips influence traffic distribution (to the facility) and hourly traffic generating patterns. When a new parking garage is constructed to provide parking for other nearby activities, it is helpful to know about the trip generating patterns for specific user groups. The ingress/egress data for several parking garages under review were analyzed in order to develop peak hour trip generation estimates for downtown Portland.

These are summarized in Table 11. The trip generation rates have been expressed in terms of "trips per 100 spaces" for easy application to other facilities. The table includes the weekday trip generation rate for the street system a.m. and p.m. peak hours, and also shows the peak trip generation for each specific land use (generator).

Table 11 Weekday Peak Hour Trip Generation by Parking Type - Trips per 100 Spaces

Critical Time Period	Residential			Commuter			Customer/ Visitor			University		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
AM Peak Hour of the Adjacent Street	4	12	16	40	2	42	27	3	30	-	-	-
Peak Hour of the Generator	12	5	17	5	31	36	22	24	46	23	22	45
PM Peak Hour of the Adjacent Street	12	5	17	5	31	36	16	24	40	23	22	45

Peak Hours of the Generators Occurred:

Residential (4-5 p.m.); Commuter (4-5 p.m.); Customer/Visitor (11-noon); University (5-6 p.m.)

The data in Table 11 provide trip generation rates that can be applied to parking facilities for Residential, Commuter, Visitor, or University users in the Portland Central City. Because of the limited data set, it may still be valuable to obtain additional data if possible. However, these trip generation rates provide a reasonable basis for estimating trip generation for Central City parking facilities during the a.m. peak period, the p.m. peak period, and the peak periods for the generators.

Section 7

Key Findings

Key Findings

The data collection and analysis, supplemented by the review of past parking studies, resulted in the key findings listed below.

User Survey

While the survey is not intended to provide a statistically representative sample of people in the central city, it does offer a good cross section of downtown user groups and travel modes. The survey resulted in the following key findings:

- Most individuals in the Central City engage in multiple types of activities. Approximately 52 percent of respondents will engage in work activities and 47 percent will shop and dine while in the Central City. Only 13 percent indicated no secondary activities.
- Transit and private auto (Drive Alone or Carpool) were the dominant mode choices for the overall respondents, representing approximately 70 percent of overall respondents. Among commuters, these modes represent 75 percent. Commuters were considerably more likely to Drive Alone when compared to respondents as a whole.
- Walk and Bike modes represented approximately one-fourth of the survey respondents. Approximately 22 percent of the overall respondents walked, which is twice the proportion of commuters who walked. However, commuters show a higher tendency for bicycling.
- The majority of survey respondents rank convenience and cost as important determinants in selecting mode choice. Only private vehicle commuters selected Travel Time as a significant factor. Transit Users, walkers and bicyclists also cite health considerations.
- Under current parking conditions, drivers are able to find convenient parking with relative ease. More than three-quarters of respondents were able to park within two blocks of their ultimate destination and two-thirds spent less than one minute searching for parking. Approximately seven percent reported spending more than five minutes.
- Drivers indicate minimal negative impacts from current parking pricing, but also limited interest in paying more for premium locations. This is probably because most drivers are able to park within two blocks of their destinations, and therefore they may perceive little room for improvement.

On-Street Parking

- The on-street parking system approaches capacity during the midday and evening peak hours. The overall study area has a mid-day peak hour (noon to 1 p.m.) with 77 percent utilization and an evening peak hour (7 to 8 p.m.) with 83 percent utilization.

- Parking demand during the study (Spring 2008) was somewhat lower than a 2004 study of on-street parking in the downtown. The reduced utilization may reflect differences in the study areas, as well as numerous construction activities and rising gas prices.
- The highest utilization was in areas around West Burnside, especially in the Entertainment District and in the Pearl South. Goose Hollow had high utilization in the evening, due to residential demand and PGE Park activities.
- Duration and turnover analyses show that the on-street system operates very efficiently, with most short-term spaces serving four to five vehicles over the course of the day.
- A review of past studies in comparison to the 2008 data indicates the Lloyd District continues to have efficient operations of its on-street parking. However, the Central Eastside shows a very high degree of time stay violations.

Smart Park & Commercial Parking

- Most of the public and commercial parking facilities are operating at or near capacity during the midday peak. These utilization levels do not indicate considerable room for increased peak hour demand at most facilities, with the exception of the Station Place garage.
- All of the Smart Park and commercial parking facilities experience peak hour utilization during the mid-day whereas the on-street system has the highest demand in the evening. This is probably because there are no fees for parking on the street after 7 p.m. making curb parking more attractive.
- The SW 1st & Jefferson Smart Park garage has the highest utilization (100 percent); Station Place has the lowest (60 percent).
- The 1,250-space Brewery Blocks garage had a peak utilization of 93 percent. The garage is located in the South Pearl district, which had among the highest utilization levels for on-street parking. Similarly, the 938-space PSU garage was 93 percent full during its peak hour.
- Most of the parkers in the Smart Park garages reflected short-term demand (less than four hours) compared to the Leased parkers which reflect commuter demand (approximately eight hours). Exceptions were the SW 4th & Yamhill garage, where Leased vehicles parked for just over four hours; and the Old Town and Station Place garages, where Daily spaces were occupied for approximately eight hours.

Parking Generation

- Parking demand for residential uses in the Central City reaches its lowest point at around 2 p.m. when demand is approximately 68 percent of the peak hour. This compares to national average data which indicates that residential parking demand reaches a low point of approximately 30 percent of the peak hour. This gives an indication of the extent to which Portland residents are likely to leave their vehicle at home during the day, compared to national averages.

CONCLUSIONS

In general, the findings of this study indicate that parking conditions in the Central City operate with a high degree of efficiency.

- The parking experience is marked by considerable ease and convenience in finding parking. Most people are satisfied with their parking choices and are able to park in their preferred locations.
- The on-street parking supply is well utilized and has high turnover throughout the study areas and in the Lloyd District. Conversely, on-street parking in the Central Eastside shows a high degree of time stay violations.
- Most of the public and commercial parking facilities are operating at or near capacity during the midday peak hours. These utilization levels do not suggest considerable room for increased peak hour demand at most facilities, with the exception of the Station Place garage. Real-time electronic signage that directs drivers to vacant parking spaces could be a way of increasing utilization at the existing facilities while improving customer access.

Section 8

References

References

1. TDA, Inc. *Portland Downtown Parking Plan and Circulation Update*, October 1988.
2. Kittelson & Associates, Inc. *Downtown Portland On-Street Parking Study*, Lloyd District Analysis. January 12, 2005.
3. Rick Williams Consulting, *Parking Management Concepts – Eastside*, October 31, 2007.
4. Kittelson & Associates, Inc. *Downtown Portland On-Street Parking Study*, August 3, 2004.
5. <http://www.gasbuddy.com>, accessed September 16, 2008.
6. http://trimet.org/news/releases/july11_ridership.htm, downloaded September 16, 2008.
7. Institute of Transportation Engineers, *Parking Generation Manual*, 3rd Edition.

Appendix A

User Survey Instrument and Response Profiles

Appendix A

Survey Instrument

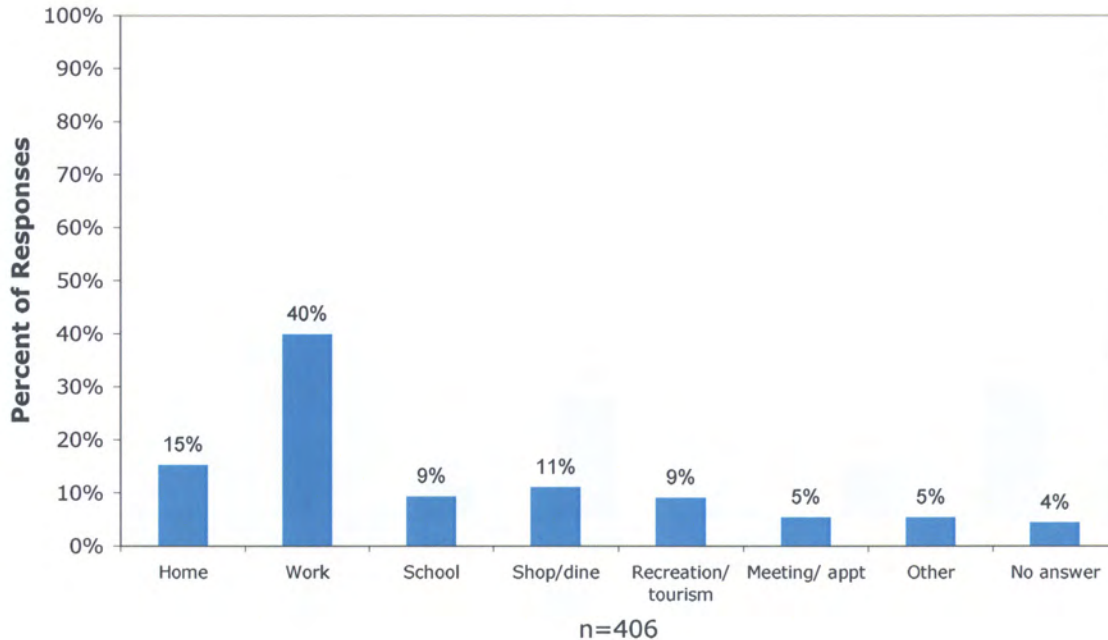
	Time: ____ Date: ____ Location: _____
Proposed for Sidewalk Questionnaire May 20, 2008	
1. What is your main purpose for coming downtown today? (Check only one)	
☐ Home	☐ Recreation/Tourism
☐ Work	☐ Meeting/Appointment
☐ School	☐ Other
☐ Shop/dine	
2. While you are in downtown today, will you also be engaging in other activities? (Check ALL that apply)	
☐ Work	☐ Recreation/Tourism
☐ School	☐ Meeting/Appointment
☐ Shop/dine	☐ Other
3. How did you get downtown?	
☐ Private vehicle	
o How many people were in the car, including yourself _____	
☐ Walked	
☐ Biked	
☐ Bus/Max	
☐ Other: _____	
4. Please indicate the TOP THREE factors influencing your travel mode choice today:	
☐ Cost of parking	☐ Convenience
☐ Cost of gas	☐ Travel time
☐ Cost of transit	☐ Bicycle ownership
☐ Cost of auto ownership	☐ _____
☐ Health considerations	☐ _____
For Walk, Bike, Transit modes, Thank you for your time.	
The remaining questions are for Private Vehicle respondents only	

Survey Instrument (cont)

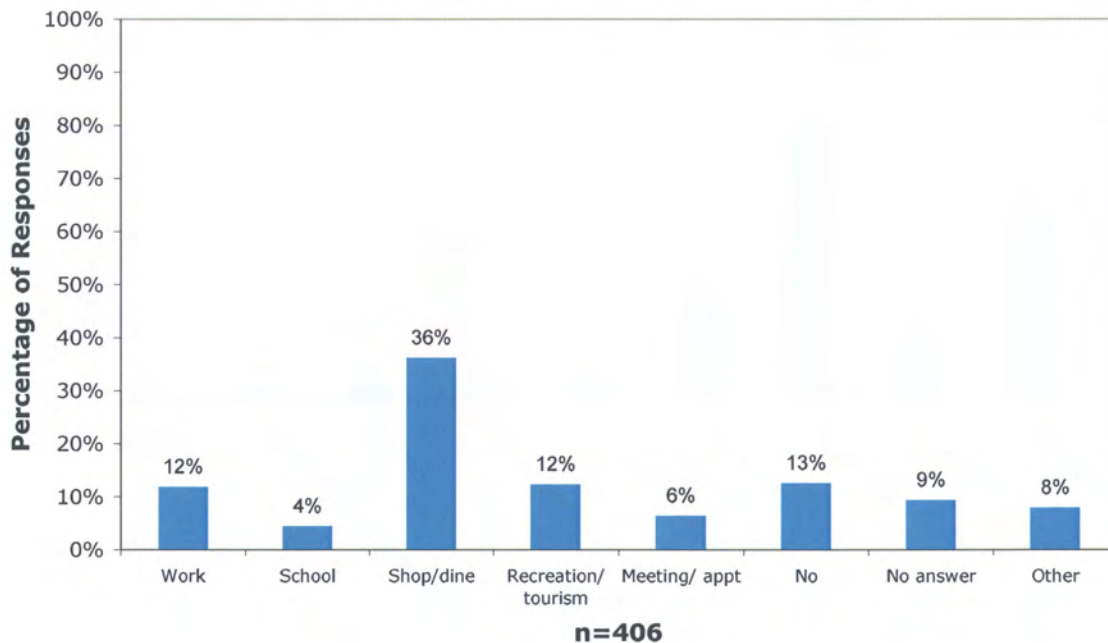
5. Where did you park today?
- ☐ On the street
 - ☐ In a Smart Park garage
 - ☐ Other off-street parking facility
6. How would you complete the following statement?
"When I park downtown, I typically prefer to park:
- ☐ On the street"
 - ☐ In a Smart Park garage"
 - ☐ Other off-street parking facility"
7. How close were you able to park to your intended destination?
- ☐ Less than 1 block
 - ☐ 1 to 2 blocks
 - ☐ 3 or 4 blocks
 - ☐ More than 4 blocks
8. How long did you look before finding a parking space (including time in garage)?
- ☐ Less than 1 minute
 - ☐ One to five minutes
 - ☐ Five to ten minutes
 - ☐ More than ten minutes
9. On-street parking in downtown is currently \$1.25/hour. Would it be worth paying extra to park on-street very close to your destination?
- ☐ NO (\$1.25/hour)
 - ☐ Yes - \$1.50
 - ☐ Yes - \$1.75
 - ☐ Yes - \$2.00
 - ☐ Yes - More than \$2.00
10. How does the price of parking affect your trip downtown? *(Multiple selections permitted)*
- ☐ No effect
 - ☐ Limits my visit duration
 - ☐ I park outside of downtown
 - ☐ Affects my choice of destination
 - ☐ I choose another travel mode (i.e., bus, bike, etc.)
 - ☐ I avoid downtown (whenever possible).

Intercept Survey Profiles

**Question 1: What is your main Purpose for coming downtown today?
(Check only one)**

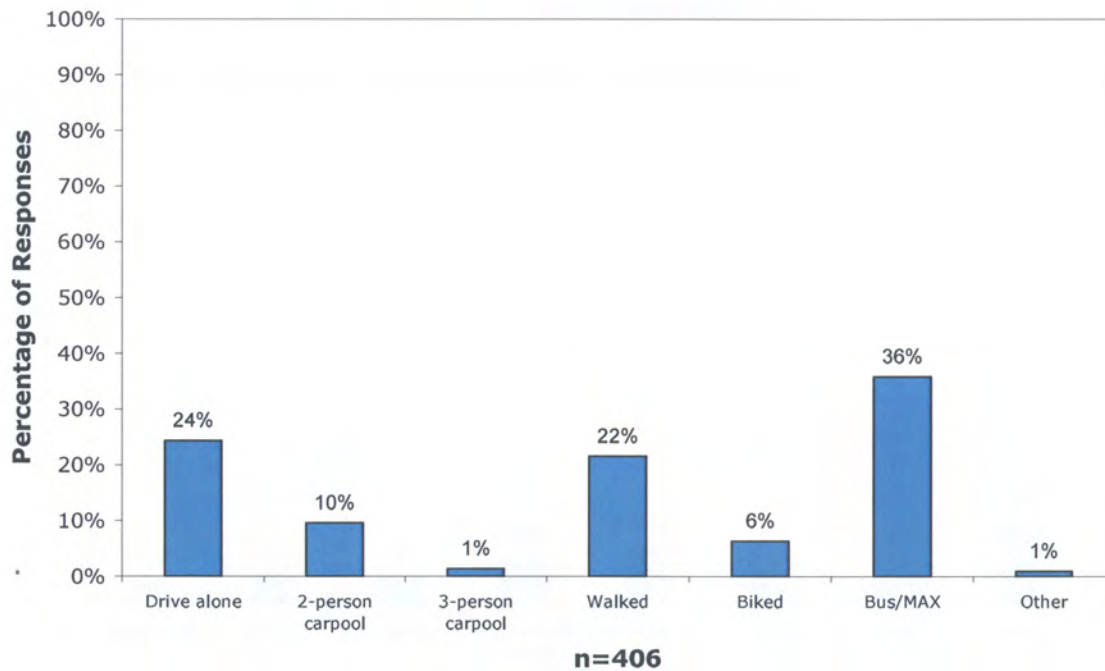


**Question 2: While you are in downtown today, will you also be
engaging in other activities? (Check ALL that apply)**

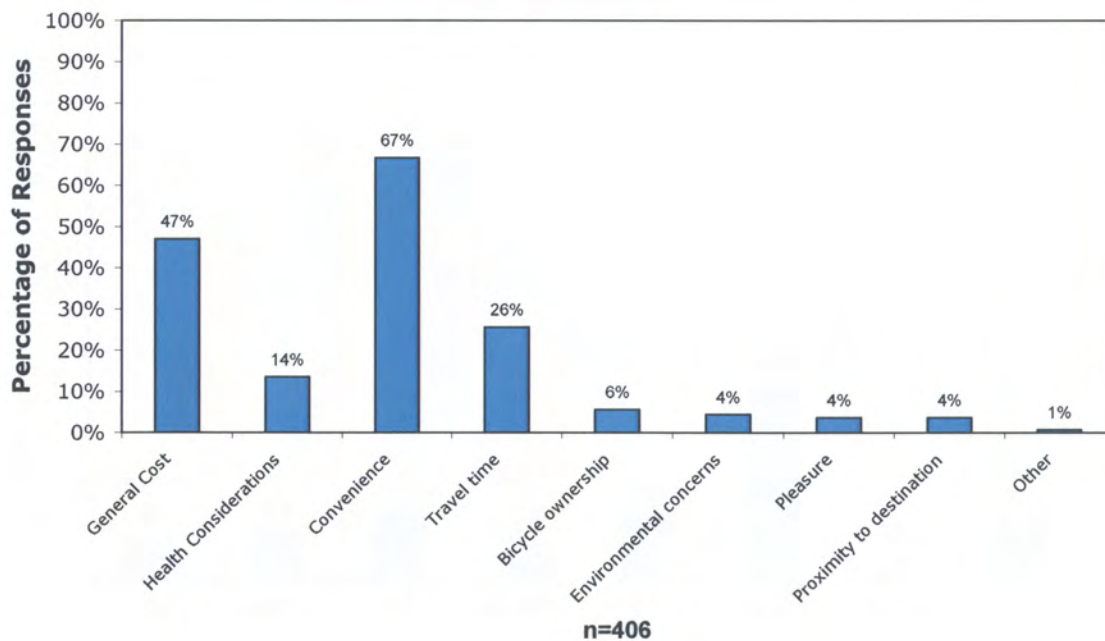


Intercept Survey Profiles (cont)

Question 3: How did you get downtown?

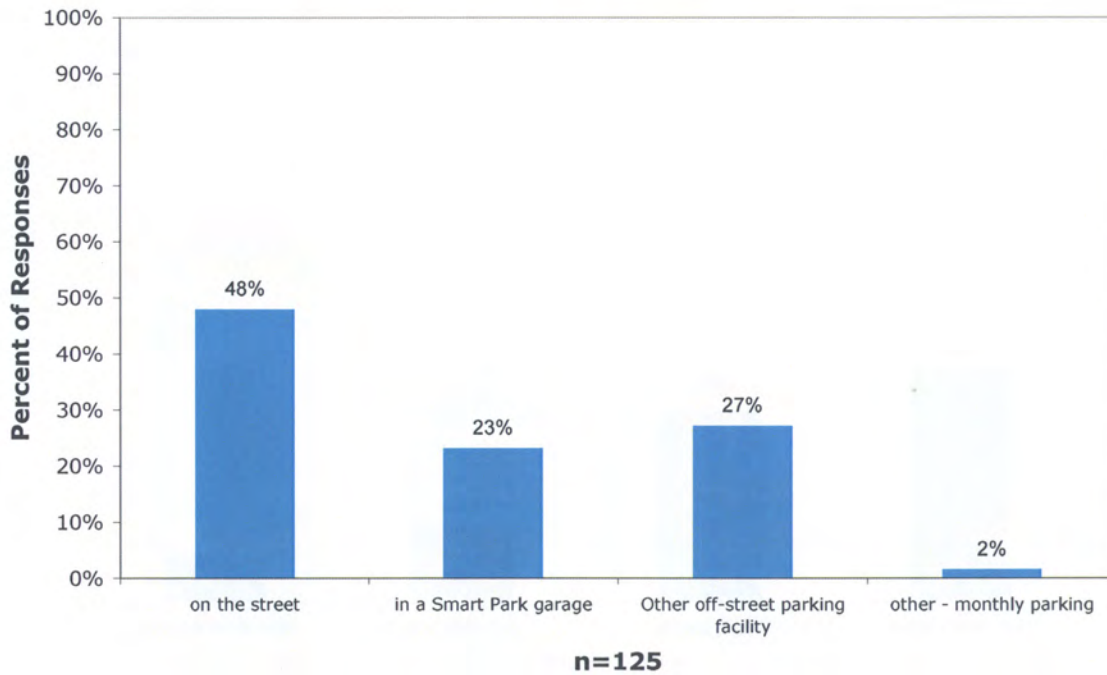


Question 4: Please indicate the TOP THREE factors influencing your travel choice today

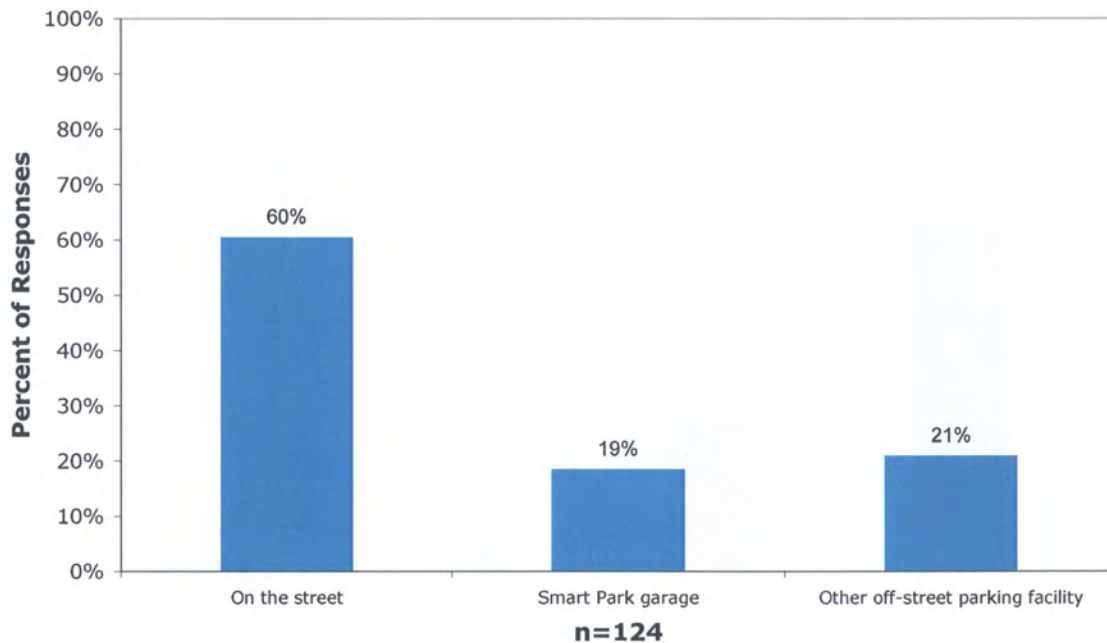


Intercept Survey Profiles (cont)

Question 5: Where did you park today?

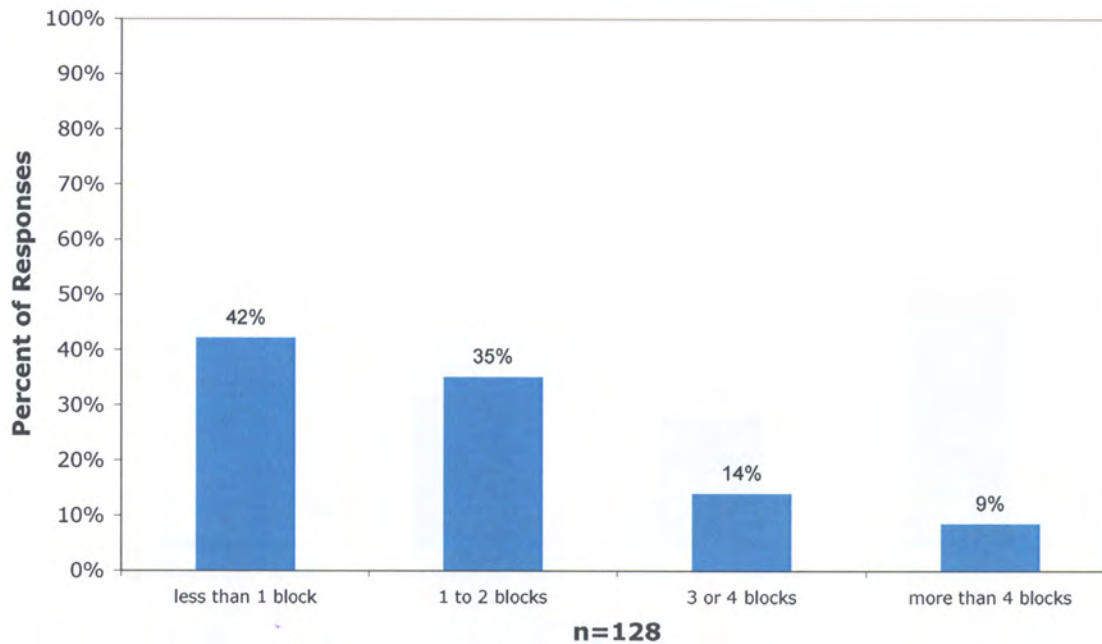


Question 6: How would you complete the following statement? "When I park downtown, I typically prefer to park: "

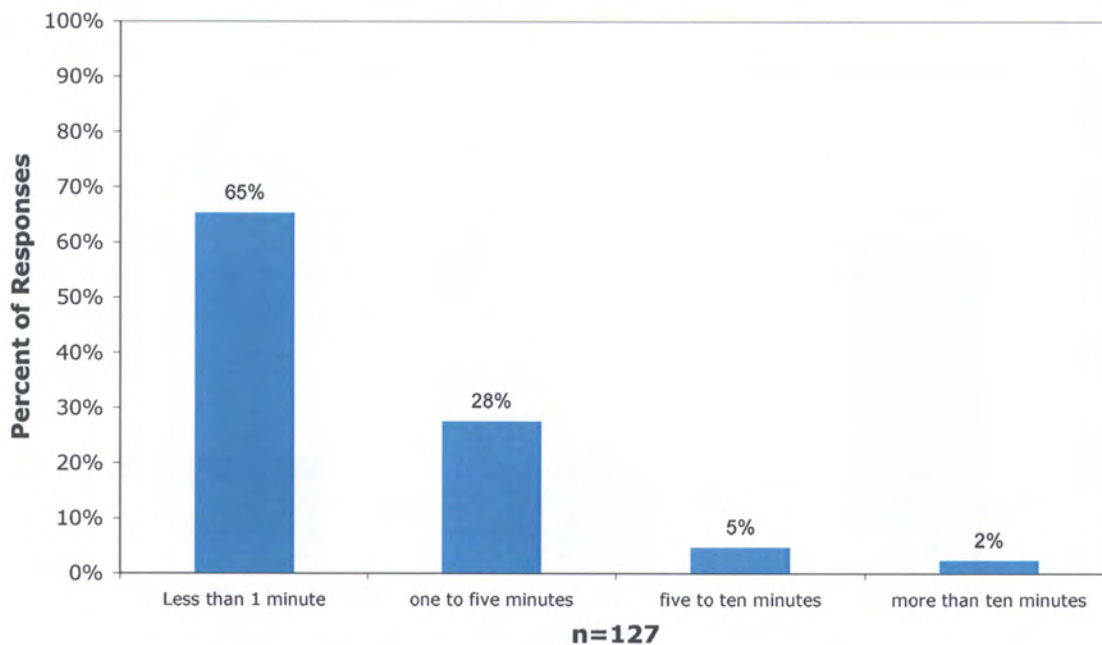


Intercept Survey Profiles (cont)

Question 7: How close were you able to park to your intended destination?

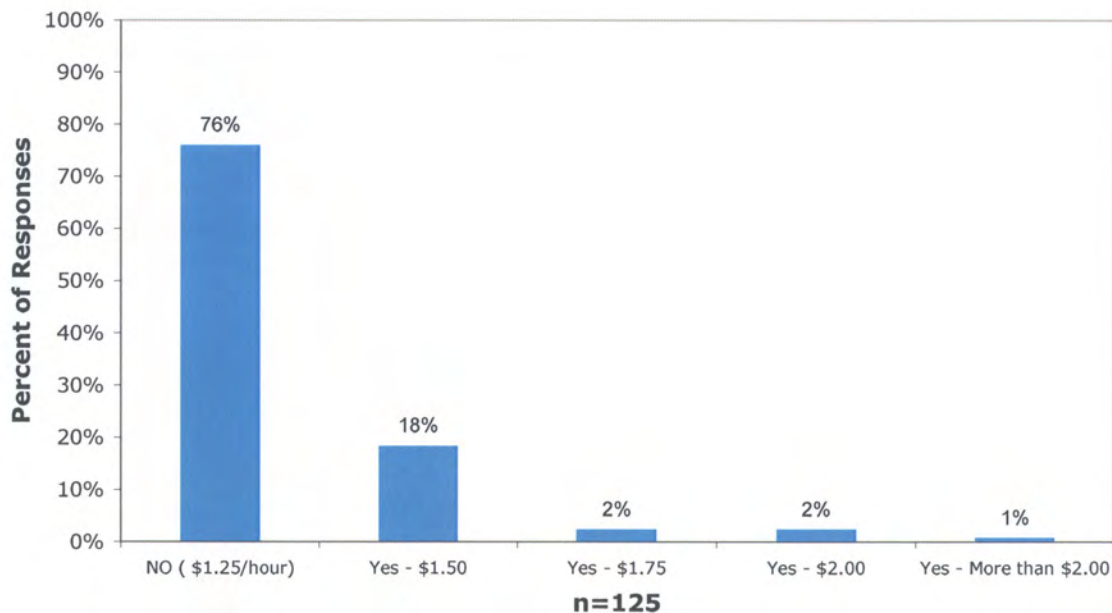


Question 8: How long did you look before finding a parking space (including time in garage)?

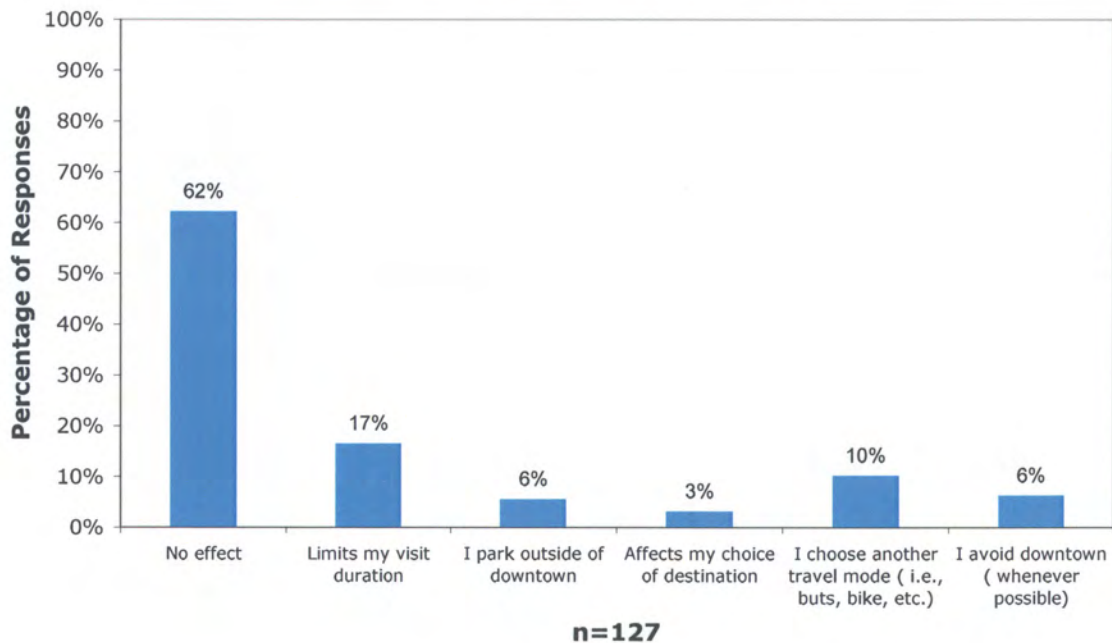


Intercept Survey Profiles (cont)

Question 9: On-street parking in downtown is currently \$1.25/hour. Would it be worth paying extra to park on-street very close to your destination?



Question 10: How does the price of parking affect your trip downtown (multiple selections permitted)?



Appendix B
Lloyd District Study

**KITTELSON & ASSOCIATES, INC.****TRANSPORTATION PLANNING/TRAFFIC ENGINEERING**

610 SW ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

MEMORANDUM

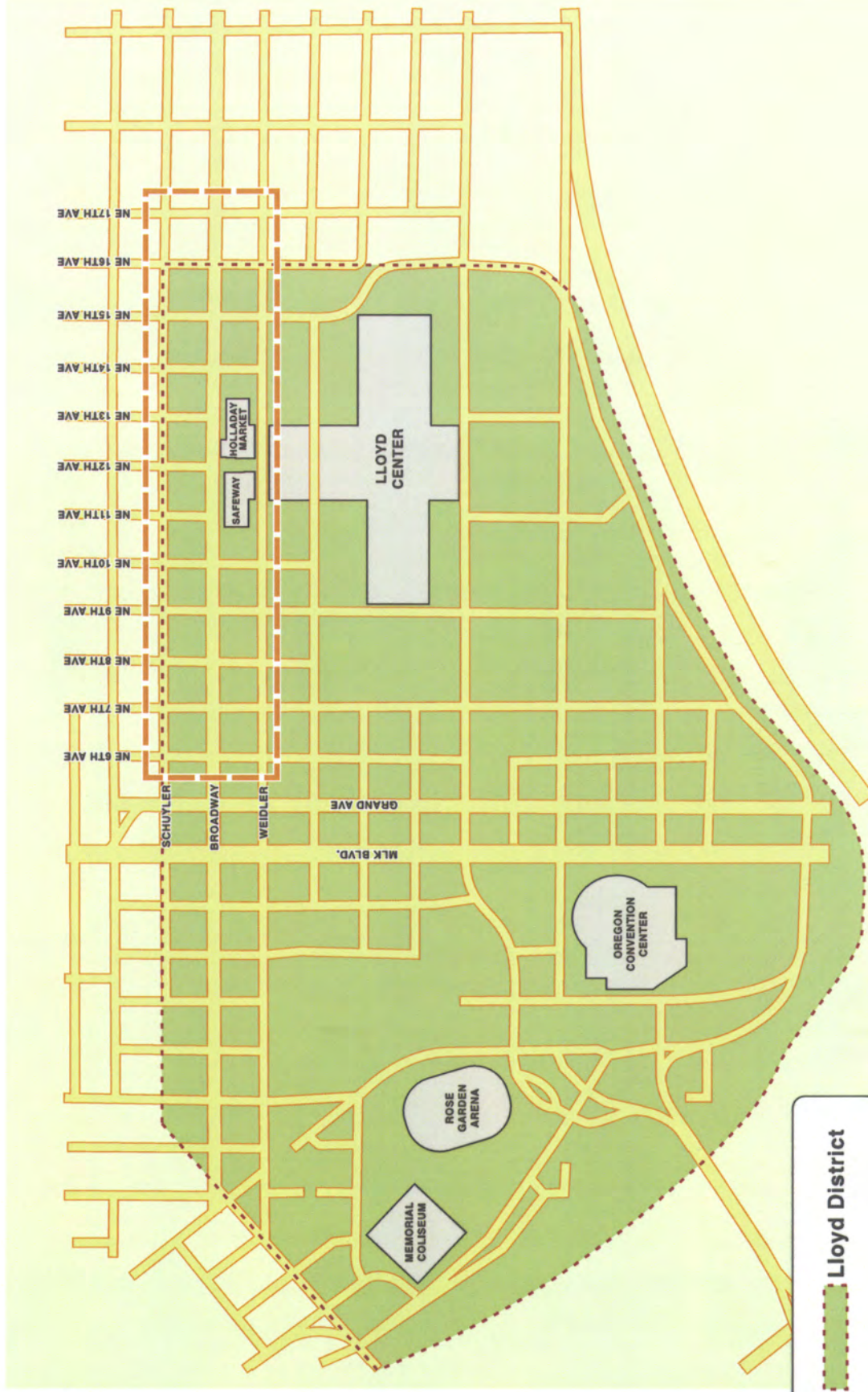
Date: January 12, 2005**Project #:** 6755**To:** Ellis McCoy, PDOT**From:** Judith Gray**Project:** Downtown Portland On-street Parking Study**cc:** Julia Kuhn, Kittelson & Associates, Inc.**Subject:** Lloyd District Analysis

Kittelson & Associates, Inc. evaluated the on-street parking system in sections of the Lloyd District of Portland. The purpose of the study is to assess parking conditions with respect to current system operations. In addition to identifying current operating characteristics, the findings of these analyses will provide a basis for comparison after anticipated changes are implemented in the on-street parking system.

Figure 1 shows the study area included in the analysis as well as the Lloyd District boundaries. The study focused on NE Weidler, NE Broadway, and NE Schuyler Streets between NE 6th and 17th Avenues. The study area extends beyond the limits of the Lloyd District in order to assess potential spill-over effects of changes in parking management within the district. In particular, the city is interested in identifying impacts on NE Schuyler if paid on-street parking is implemented on NE Broadway and Weidler Streets. On-street parking in the study area includes some unrestricted spaces and signed time restrictions, whereas the majority of the Lloyd District is priced using either individual parking meters or recently installed pay stations.

Study Period

An hourly license plate survey was conducted on Thursday November 4, 2004 between 10 a.m. and 8 p.m. The study period was defined to capture the peak parking demand period for commercial activities (typically mid-day) and include the evening transition from employee parking to residential parking demand on NE Schuyler Street.



LEGEND

- Lloyd District
- Study Area

On-Street Parking Inventory

Approximately 700 parking spaces were included in the Lloyd District study area. In the analysis, loading zones, bus stops, and other restricted parking areas were not included as legal parking capacity. However, if private passenger cars were observed illegally parked in a no-parking location, the vehicle was included in the demand estimate. Where individual parking spaces are not striped, the number of spaces was estimated by assuming 22 to 25 feet per space or by observed capacity based on the number of vehicles present. The parking inventory that was included in the analysis is summarized in Table 1. Numbers of spaces are rounded to the nearest five spaces.

**TABLE 1
ON-STREET PARKING INVENTORY**

Type	Spaces*
Uncontrolled	355
< 1 hour	70
1-hour	250
2-hour	25
Total	700

*Assumes 22-25 feet per space where not marked.

As Table 1 shows, approximately half of the spaces in the study area are uncontrolled. The majority (approximately 260) are located along NE Schuyler Street or on the side streets between NE Schuyler and Broadway Streets. Figure 2 identifies the locations of types of parking in the study area. The figure also shows locations where on-street spaces are closed due to construction. Approximately 35 parking spaces were closed due to construction.

Parking Demand Analysis

Three key measures were used in the evaluation the on-street parking system.

Utilization reflects the overall occupancy level of parking at a given point in time. The effective capacity of an on-street parking system is generally considered to be approximately 85% of the total supply. This buffer allows for vehicle circulation in looking for parking and is especially important when parking spaces are spread over a large area as opposed to a single parking lot or structure. When parking occupancy is 85% to 90% full, customers will begin to perceive the system as being full.

Duration analysis identifies the average length of time that vehicles occupy an individual parking space. Duration analysis can be an effective tool for identifying the type of user that is parked. Customers and other visitors typically park for less than four hours, while durations of more than four generally indicate employee or residential parking.



LEGEND

- 2 Hour 1 Hour Uncontrolled < 1 Hour
- NP = No Parking

ON-STREET PARKING TYPES
FIGURE 2

Turnover analysis reveals the number of vehicles that are served by an individual parking space over the length of the study period. When utilization is very high for most of the study period, turnover and duration will have a strong degree of inverse relationship (i.e., long duration will correspond to low turnover, and vice versa).

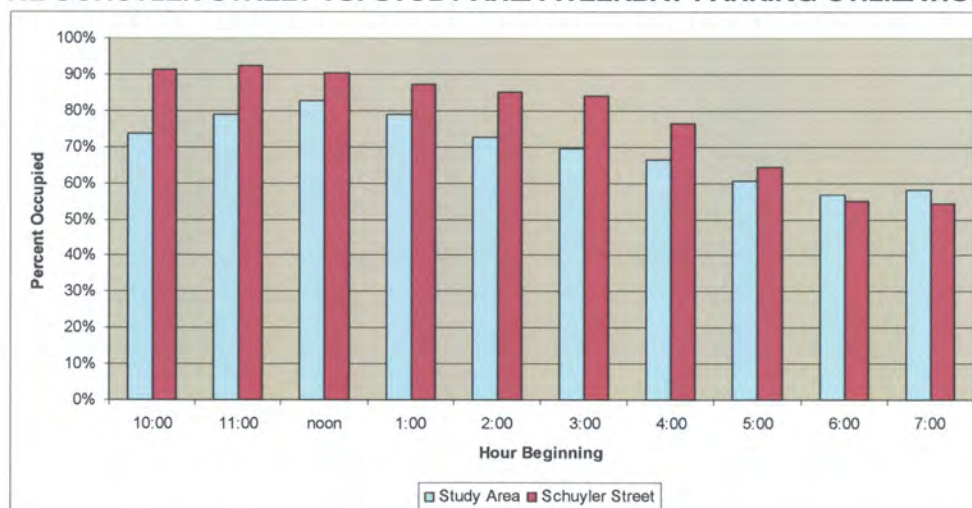
Hourly Utilization

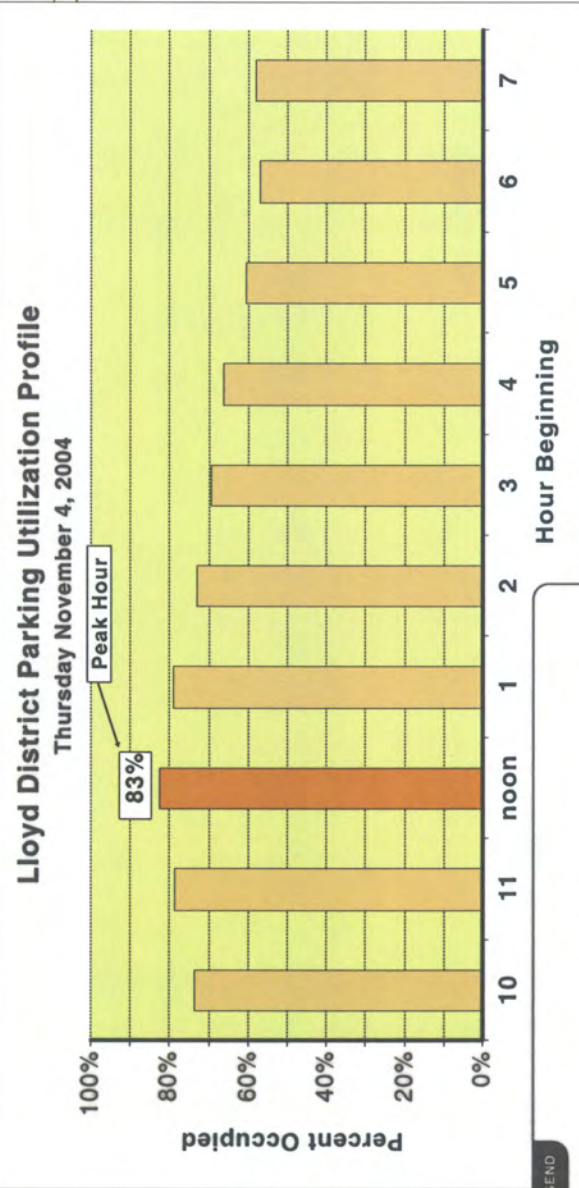
The utilization analysis for the study area is summarized in Figure 3. The hourly utilization profile for the study area shows that peak utilization occurred between noon and 1 p.m. During this time, the on-street system was 83% full, with approximately 580 vehicles parked on-street in the area. The map in Figure 3 shows parking utilization on each block face during the peak hour. Block faces are identified by levels of occupancy. The map shows that during the peak hour, parking on NE Schuyler Street was effectively full on most blocks of the study area, with only a few locations at lower than 85% utilization. At the same time, there were pockets of under-utilized parking elsewhere, notably along NE Broadway and Weidler Streets near the Safeway and Holladay Market. Although located in the center of the retail district, retail uses along this section tend to be oriented toward relatively large off-street parking facilities rather than toward the street. Low parking utilization was also observed at the western edge of the study area near NE 6th and 7th Avenues, where retail activity is relatively lower.

Schuyler Avenue Analysis

As was noted earlier, parking on NE Schuyler Street does not have any time restrictions. As a result, some employees park on street and then walk to work or transit. A detailed analysis of parking conditions on NE Schuyler Street was conducted in order to assess overall parking conditions and to identify the degree of employee parking on the street. Chart 1 shows the hourly parking utilization profiles for the overall study area (700 spaces) and for NE Schuyler Street (275 spaces).

CHART 1
NE SCHUYLER STREET VS. STUDY AREA WEEKDAY PARKING UTILIZATION





SCHUYLER STREET PEAK HOUR AND EVENING PARKING UTILIZATION

As Chart 1 shows, the parking utilization was consistently higher on NE Schuyler Street than the overall study area until the evening hours and was effectively full throughout most of the day. This is indicative of daily employee use rather than residential use.

Figure 4 shows the parking utilization for each block face along NE Schuyler Street during the noon hour (peak of the study area) for comparison to the evening hours starting at 5:00, 6:00, and 7:00 p.m. The figure shows that the reduced parking utilization is distributed relatively evenly throughout the street, with most areas having parking lower than 85% within a block. This shows that while employee parking is heavy during the day, there is available parking for residents in the evening.

Duration & Turnover Analyses

Duration and turnover analyses of the on-street system were conducted to compare the demand characteristics of the uncontrolled parking along NE Schuyler Street with the parking in the remainder of the study area. Chart 2 shows the distribution of vehicles served in terms of duration of stay. Parking in the remainder of the study area tends to be for much shorter durations, although approximately 15% of the vehicles were parked for three or more hours.

CHART 2
PARKING DURATION ANALYSIS

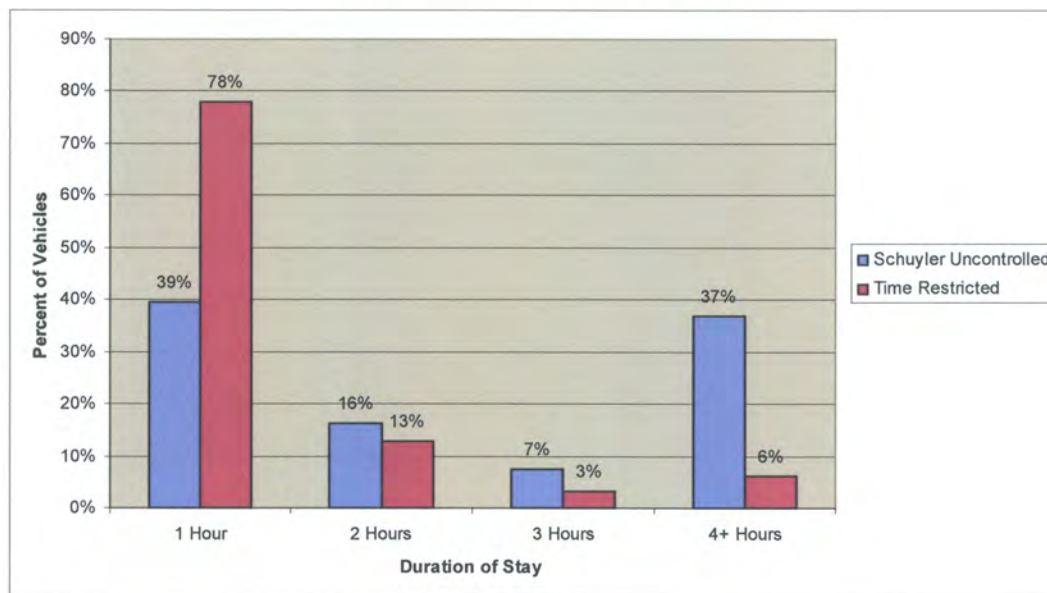


Chart 2 summarizes the distribution of long-term and short-term parking durations. The chart compares parking duration on NE Schuyler Street, which generally do not have time restrictions, with the time-restricted spaces in the study area. As the chart shows, Schuyler Street had a large proportion of vehicles parked for four or more hours, reflecting a high degree of employee parking on NE Schuyler.



Schuyler Street Peak Hour and Evening Parking Utilization

Noon — 1:00 pm (Peak Hour)



5:00 — 6:00 pm



6:00 — 7:00 pm



7:00 — 8:00 pm



LEGEND

- ≤ 50% Full (Under Utilized) ■
- 51 - 85% Full (Moderately Full) ■
- > 85% Full (At Capacity) ■

Schuyler Street Parking Utilization Profile

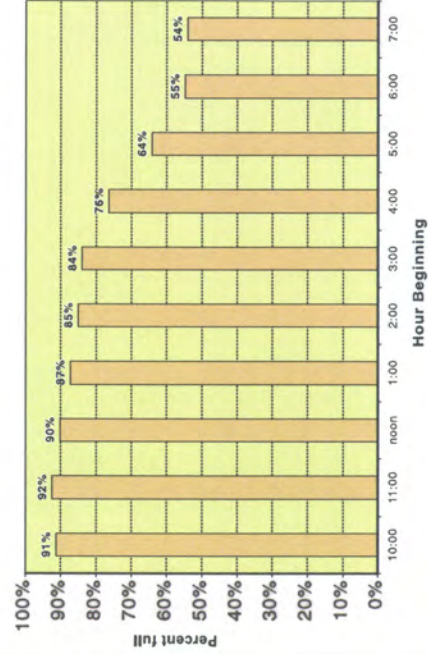


TABLE 2 DURATION & TURNOVER ANALYSES

Area	Vehicles Served	Average Duration	Average Turnover*
Schuyler	580	3.5 hours	2.1 vpd
Broadway-Weidler	1,620	1.8 hours	3.8 vpd

*vpd=vehicles per day

As Table 2 shows, the average duration of stay on NE Schuyler Street is nearly twice that of the remainder of the study area. On average, spaces along Broadway Weidler served almost four vehicles per day. These conditions are consistent with the current signed time limits on the street and show that overall, on-street parking in the study area is operating as intended.

The analysis shows that the on-street parking in the study area is operating primarily with short-term use other than NE Schuyler Street. As such, if paid parking is introduced on NE Broadway and Weidler Streets, it would not have significant impact on employee parking. A shift in customer parking to NE Schuyler Street would not be expected because the on-street system is effectively full during the daytime hours when parking fees are charged.

KEY FINDINGS

The analysis described in this memorandum revealed the following key findings:

- There are approximately 700 on-street parking spaces in the study area, about half of which are uncontrolled. The majority of the uncontrolled spaces are located along NE Schuyler Street or on the side streets between NE Schuyler and Broadway Streets.
- Overall, the on-street parking system is nearly at its effective capacity during the peak hour (noon to 1 p.m.). Pockets of under-utilized parking were observed on NE Broadway and Weidler Streets near the Safeway and Holladay Market, where retail uses tend to be oriented toward large off-street parking facilities rather than toward the street.
- Utilization is consistently highest along Schuyler Street during the day, mostly due to employees who park in uncontrolled spaces and walk to work or transit. In the evenings, parking capacity opens up throughout the street, making parking available for residents.
- The distribution of long-term and short-term parking corresponds to the intended use of the system. Specifically, NE Broadway and Weidler Streets experience higher turnover and shorter durations, consistent with locations of parking time restrictions.
- If paid parking is introduced on NE Broadway and Weidler Streets, it would not have significant impact on employee parking. Neither would a shift in customer parking to NE Schuyler Street be expected because the on-street system is effectively full during the daytime hours when parking fees are charged.

We trust this memorandum addresses your questions about the on-street parking system. If you have any questions, please contact us at (503) 228-5230.

Appendix C
Central Eastside Study

DRAFT [2] - Central Eastside (North Zone) Parking Inventory Analysis – Existing Conditions – DRAFT [2]

In every business district the issue of parking is central to the City and its stakeholders as they plan for, and anticipate, the area's on-going economic success. The need to understand both the perception *and* reality of parking is essential if a comprehensive, effective and successful parking management strategy is to be developed and implemented. This report focuses on establishment of a clear understanding of the reality of current parking dynamics in the northern end of Portland's Central Eastside Industrial District.

Our goal is to present data for this study area as a precursor to discussions with the City and stakeholders on potential programs and strategies to maximize the parking supply and plan for the future.

I. STUDY AREA

The parking inventory study area was determined in the initial project scoping process and in consultation with the Portland Streetcar Loop technical team and the City of Portland. The "North Zone" study area is actually one of four potential "parking management zones" described for the Central Eastside in a previous study.¹ The north zone was selected for a capacity and utilization analysis given (a) its proximity to new development projected in the Lloyd District, (b) near term projected jobs and housing activity targeted to the zone and (c) the potential impacts of new development associated with the Burnside Bridgehead.

Figure A provides a graphic map of the study area.

Figure A: CES North Study Zone



The study zone focuses on all on-street parking in the area. The zone is comprised of the area bounded by 184 (on the north), SE Oak Street (on the south), SE 2nd Avenue (on the west) and SE 9th Avenue (on the east). This area contains 1,347 on-street parking stalls.

II. PURPOSE OF THE PARKING INVENTORY ANALYSIS

The purpose of a parking utilization study is to derive a comprehensive and detailed understanding of actual use dynamics and access characteristics associated with parking in the CES North Zone. Important elements of this section include:

- (1) Development of a data template for all parking in the study area, denoting all parking stalls, by time stay type for on-street facilities in public control.

¹ See Rick Williams Consulting, *Portland's Inner Eastside: Parking Management Concepts* (August 2007)

(2) A complete survey of on-street parking use on a "typical day" -- a single Wednesday on August 8, 2007.

(3) Analysis of parking utilization and turnover that included:

- a. Quantification of total study area parking inventory.
- b. Hourly occupancy counts (9 a.m. – 5 p.m.).
- c. Parking turnover analysis (on-street).
- d. Parking duration of stay analysis (on-street).

(4) Identification of surpluses and constraints within the parking supply.

In short, the purpose of the parking utilization study was to produce a succinct analysis of existing parking dynamics in the CES North Zone that can be employed over time to support and inform decision-making related to development and parking.

III. METHODOLOGY

Rick Williams Consulting (RWC) conducted the on-street capacity/utilization and turnover inventory on Wednesday, August 8, 2007. The survey day was selected in consultation with the Portland Streetcar Loop Study project team and was reflective of the initial scoping process. Overall, the survey day was sunny (mid to high 80 degrees) with brisk parking activity within the survey zone. The Wednesday parking inventory was conducted between 9:00 a.m. and 5:00 p.m.

For the on-street survey, the project teams' methodological approach to gathering utilization/capacity/turnover data began with a physical compilation of all public on-street parking assets within the study area. This physical assessment was conducted in advance of the survey day and documented all parking by location and type. This was used to create a data template necessary to conduct the utilization assessment.

The Wednesday survey involved an hourly count of each occupied on-street parking stall in the study area using the last four digits of the parked vehicle's license plate. Surveyors collected license plate data at each on-street parking stall located in the study area for every hour over an eight-hour period (9:00 a.m. – 5:00 p.m.). A total of 910 of 1,347 on street stalls (70% sample) were physically surveyed.

IV. GENERAL CHARACTERISTICS OF THE INVENTORY - STUDY AREA

A. Supply

A total of **1,347** parking stalls were documented in the study zone. Of that total **910** were surveyed on the study day. The surveyed supply included the entire MLK/Grand Corridor, from 184 to SE Oak Street and the north/south (and cross streets) two blocks to either side of the corridor.² On-street parking in the CES North Zone is provided in the form of free parking.

Table 1 presents a breakout of all on-street parking supply in the CES North Zone.

² For purposes of this study handicap/disabled and loading zone stalls were removed from the study results, based on the assumption that such stalls are not readily available to general parking demand. The project team believes that if these stalls were included the study results would artificially overstate surplus supply.

Table 1
Central Eastside Parking Inventory – Stalls Surveyed

Study Area Parking Stall Breakout		
<i>On-Street Stalls by Type</i>	Number of Stalls	% of Total On-Street Stalls
10 minutes	6	<1%
15 minutes	7	<1%
20 minutes	13	1.4%
30 minutes	42	4.6%
1 hour	217	23.8%
2 hours	115	12.6%
No Limit	510	56.0%
Total Surveyed On-Street Stalls	910	100%
Non-Surveyed On-Street Stalls	437	
Total On-Street Parking Supply	1,347	

As **Table 1** indicates, the study zone maintains a high percentage of No Limit parking stalls, with a majority of on-street supply (56%) made up of this type of stall. One-hour time zones comprise 23.8% of the on-street supply and 2-hour stalls comprise another 12.6%. The remainder of the on-street supply is made up of a small number of 10, 15, 20 and 30 minute spaces (combined total of about 6%).

B. Peak Hour and General Occupancies

Peak hour occupancy for an area is the period during the business day where the parking system experiences the highest utilization of parking stalls. This analysis attempts to determine that point in the day at which the greatest numbers of vehicles are parked on-street in the CES Zone. In the analysis that follows occupancies for all stalls in the on street system are summarized.

1. On-Street Parking Summary – Combined Study Zone

The peak hour for the on-street inventory is between 1:00 and 2:00 p.m. for the combined on-street system (i.e. all stalls, all use types). At this hour, 76.6% of the surveyed stalls in the study area were occupied. **Table 2**, below summarizes occupancies, peak hour and average length of stay for the combined supply. **Table 2** also provides an estimate of total empty stalls if the survey sample were extrapolated to the total supply of on-street parking in the study zone. **Table 3** provides a breakout of occupancy and duration of stay by type of stall.

Figure B, below, illustrates occupancies for each hour of the 8-hour survey day.

Table 2

On-Street Parking Summary				
Type of Stall # of Stalls	Peak Hour	Peak Occupancy	Stalls Available (empty)	Average Length of Stay
On-Street Stalls (910 stalls)	1 – 2 pm	74.9%	228	3 hr/32 min.
Extrapolated Supply (1,347 stalls)	1 – 2 p.m.	74.9%	338	3 hr/32 min.

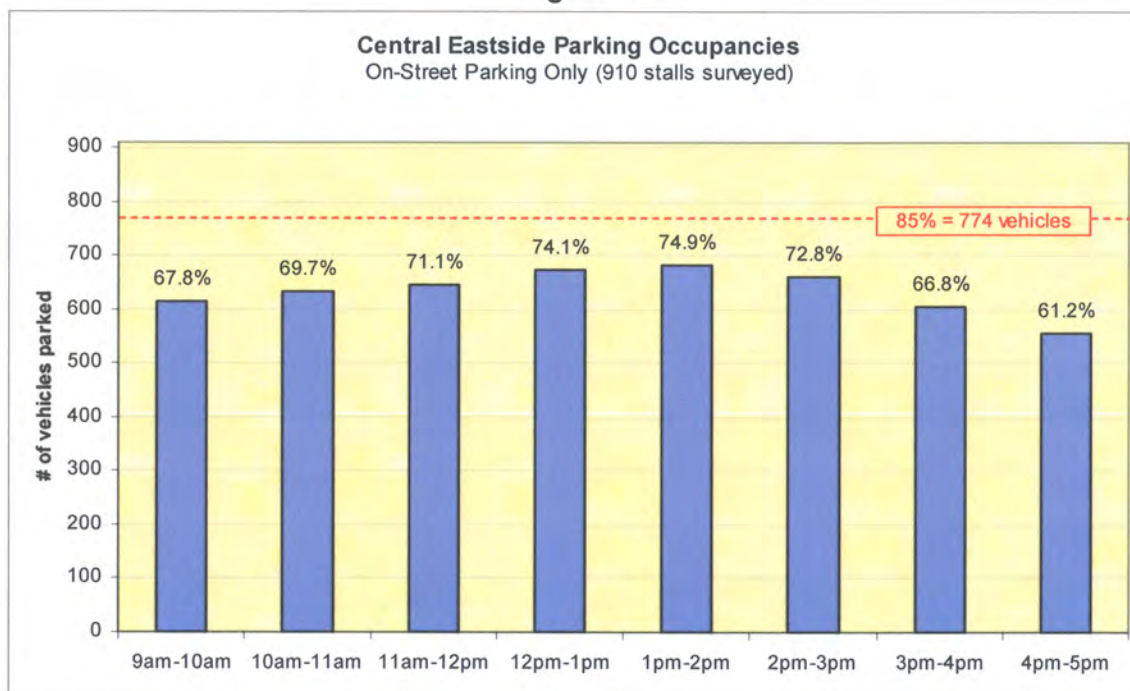
Table 3
Peak Occupancy by Stall Type

Type of Stall	# of Stalls	Peak Hour	Peak Occupancy	Stalls Available (empty)	Average Length of Stay
On-Street Stalls (Surveyed)	910 stalls	1 – 2 pm	74.9%	228	3 hr/32 min.
10 minute	6	10 am – 1 pm	50.0%	3	N/A
15 minute	7	12 – 1 pm	85.7%	1	N/A
20 minute	13	12 – 2 pm	38.5%	8	N/A
30 minutes	42	2 – 3 pm	50.0%	21	N/A
1 hour	217	1 – 2 pm	60.4%	86	2 hr/9 min.
2 hours	115	1 – 2 pm	66.1%	39	3 hr/23 min.
No limit	509	11 – 12 pm	87.6%	63	4 hr/37 min.

From **Tables 2 & 3**, the following conclusions can be derived:

- During the 1:00 p.m. – 2:00 p.m. peak hour, 682 stalls were occupied within the sampled supply, leaving 228 empty stalls available.
- If this trend were extrapolated to the larger study area, 1,009 would be assumed to be occupied with 338 stalls empty and available within the entire study area.
- The highest area of use is within stalls designated as No Limit, which achieve peak hour occupancy of 87.6% between 11:00 a.m. and noon. These are likely employees attracted to parking that allows an all day, No Limit stay.
- The average duration of stay in an on street parking stall is relatively high at over 3 hours per stall (*regardless of the time stay designation*). Though the time stay at No Limit stalls is over four hours, those in 1 and 2 hour stalls significantly exceed the posted limit.

Figure B



2. *On-street: Usage Characteristics (Turnover, Duration of Stay, Volume and Exceeding Time Stays)*

The on-street parking supply is a relatively low turnover system. Several usage characteristics derived from the data underscore this conclusion. A summary of these findings are included in **Table 3**, below:

a. Duration of Stay

As one might suspect, with the majority of the on-street supply made up of No Limit stalls (i.e., 56%), the average time stay at on-street spaces would be fairly long.

- The average stay in CES North for all on-street parking stalls is 3 hours and 32 minutes (or 3.53 hours).
- The longest duration of stay is at No Limit stalls where vehicles are staying an average of 4 hours/37 minutes (or 4.62 hours). 2-Hour timed stalls follow at 3 hours/23 minutes (or 3.38 hours).

Table 3
General Characteristics of Use – On-Street Parking Stalls

Category	Surveyed 910 Stalls	Extrapolated 1,347 Stalls
Average Duration of Stay	3.53 hours	3.53 hours
Average Parking Stall Turnover per 8 hour period	2.27 turns	N/A
Number of Unique Vehicles	1,487	2,201
Number of Vehicle Hours Parked	5,180	7,668
Percentage of violations/unique vehicles in <u>time designated</u> stalls	35.7%	N/A
Percentage of hours in violation/vehicle hours parked in <u>time designated</u> stalls	51.6%	N/A

b. Turnover: Efficiency of the Parking System

In most cities, the primary time limit will allow for calculation of an *intended turnover rate*. For example, if the intended use for a customer stall is two hours, then the stall should be expected to turn 4 times over an 8-hour period. As such, if turnover were demonstrated to be at a rate of less than 4, the system would be deemed inefficient. A rate in excess of 4 would indicate a system that is operating efficiently.

Given the average stay of 3.53 hours, over the course of a typical day, an on-street stall in the CES North Zone will turn 2.27 times (8 hour day/3.53 hours duration = 2.27 turns). From this perspective, the on-street system within the zone is not turning over at an optimum rate. However, the CES North is within the Eastside Industrial Sanctuary and lower turnover may be the desired outcome of stakeholders in the area. Nonetheless, turnover at this rate is not efficient, particularly if additional retail and commercial uses are desired along the MLK/Grand corridor. To reiterate, with a turnover rate of 2.29, CES North would not be considered operating at an efficient level. The CES North turnover rate is more commensurate with an urban off-street parking structure, intended for longer-term stays.

Longer average time stays are often a reflection of the type of user. Typically the on-street system is intended and formatted to serve shorter-term parking for customers and visitors to a business area. The data suggests that CES North has a higher ratio of employees to customers using on-street parking than is reflective of the average for comparable cities. As demand for on-street space increases in the future, area stakeholders and the City will need to discuss options for moving employees into off-street locations and/or alternative modes to assure convenient on-street access to visiting customers. Again, this will be particularly important along MLK and Grand Avenue.

c. Volume

On the survey day, 1,487 unique license plate numbers were recorded parking in the on-street system between the hours of 9:00 a.m. and 5:00 p.m.³ If extrapolated to the entire zone, it would be assumed that approximately 2,201 unique vehicles accessed the on-street system within the district.

d. Vehicle Hours Parked

Vehicle hours parked is an important data point, given that it shows the number of actual hours all vehicles used the parking system. In the future, such information can be used to forecast and evaluate the impact of rates for parking. Within the sampled supply a total of 5,180 hours of parking were used on the study day. If extrapolated to the larger area, a typical day generates approximately 7,668 hours of parking in the zone.

e. Exceeding time stays

Approximately 36% of unique vehicles parked in time stay designated on-street stalls exceed the posted time stay. When correlated to actual hours parked in violation, the rate for time designated stalls jumps to 51.6%. This is an exceedingly high number of violations, particularly in stalls designated as 1 or 2 hours (whose intent would be for customers/visitors) as opposed to No Limit stalls where there is not a possibility of violation. Interestingly, 55 unique vehicles parked in excess of 5 hours in signed one hour spaces (or 14% of all unique vehicles using 1 hour stalls) and an additional 54 unique vehicles parked in excess of 5 hours in two hour stalls (or 33% of vehicles using these stalls).

VI. SUMMARY

Overall the data analysis of the CES North Zone parking inventory indicates that the system is operating at a low level of capacity, with slow turnover and a moderate amount of available supply in convenient walking distance of most destinations. No Limit stalls are the most heavily parked, likely the result on employees of both the Central Eastside and the downtown. Duration of stay and violations of time stays are extremely high at both 1 and 2 hour stalls.

³ It is important to note that this does not represent all vehicles in the downtown on June 19, 2007, as license plate numbers were not recorded in off-street facilities. The unique vehicle total allows us to calculate turnover.

VII. NEXT STEPS

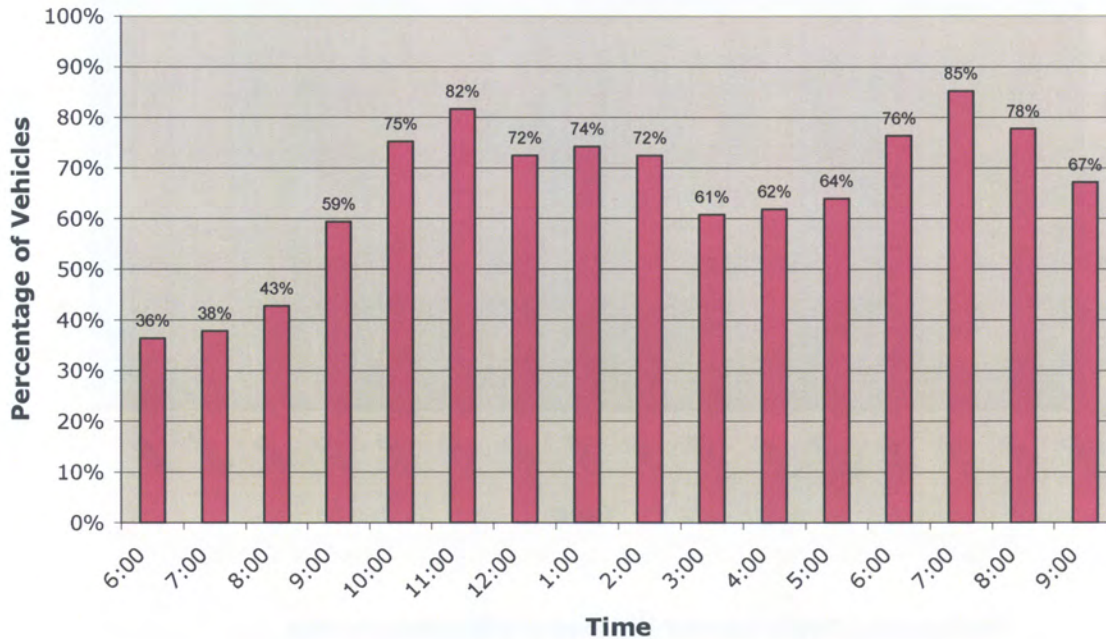
Additional work with the City and stakeholders will proceed to ensure that there is an awareness and understanding of the data findings, which will result in development of recommended programs and strategies for improving the existing system and moving toward future new supply.

Appendix D
On-Street Utilization
Profiles

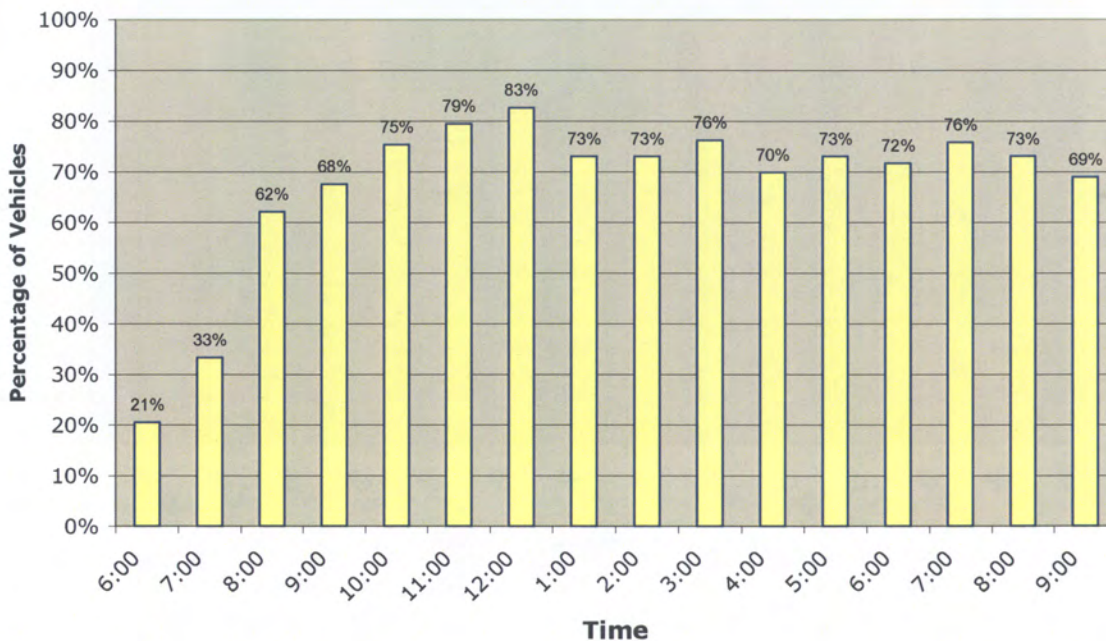
Appendix D

On-Street Utilization Profiles

**West End South On-Street Utilization Profile
Thursday May 15, 2008**

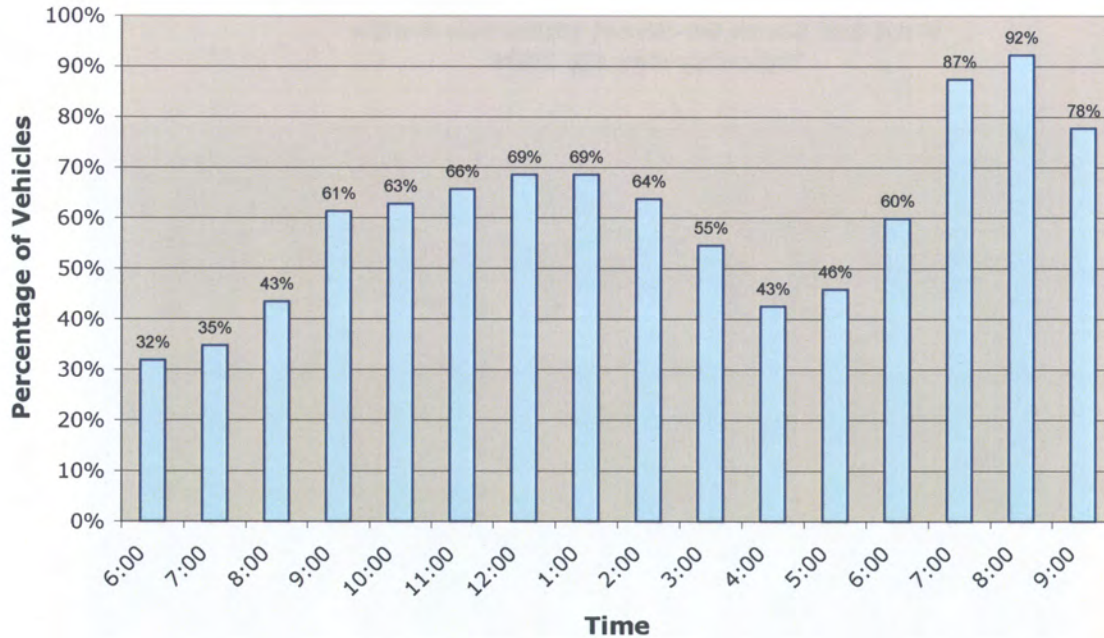


**West End North On-Street Utilization Profile
Tuesday May 20, 2008**

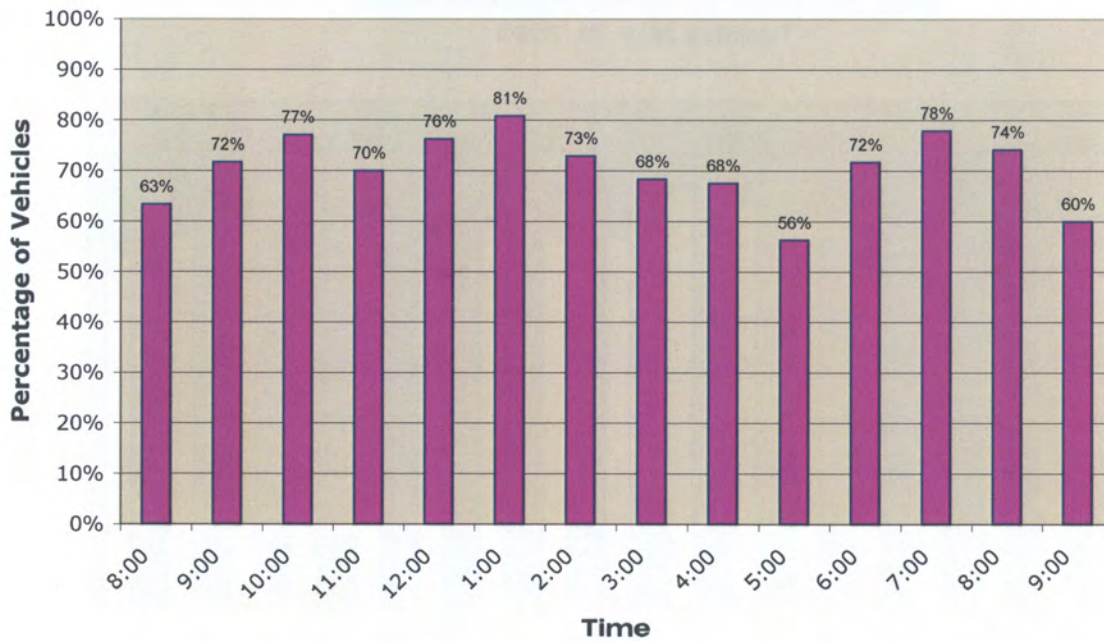


On-Street Utilization Profiles (cont)

**Goose Hollow On-Street Utilization Profile
Thursday May 22, 2008**

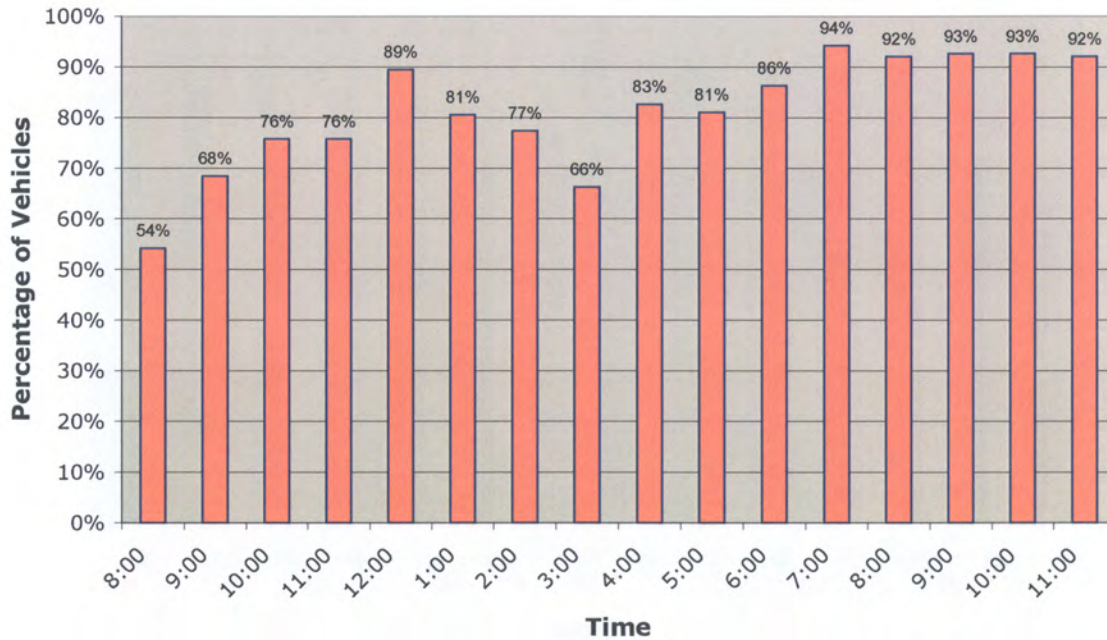


**Downtown/Office District On-Street Utilization Profile
Tuesday May 20, 2008**

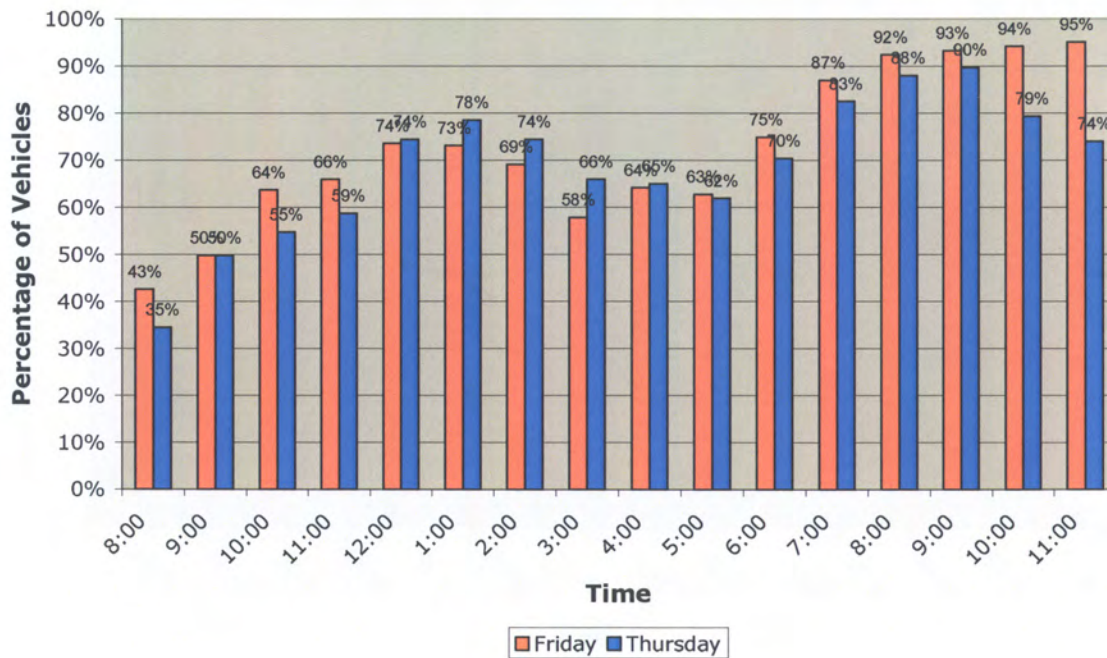


On-Street Utilization Profiles (cont)

**Entertainment District On-Street Utilization Profile
Friday May 23, 2008**

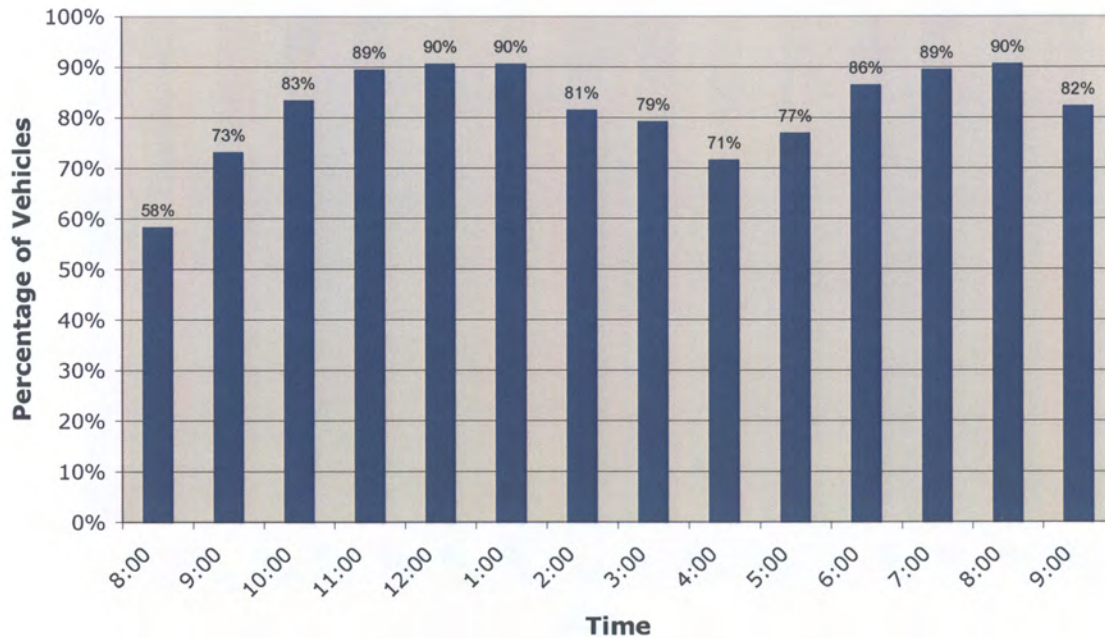


**Old Town On-Street Utilization Profile
Thursday May 22, & Friday May 23, 2008**

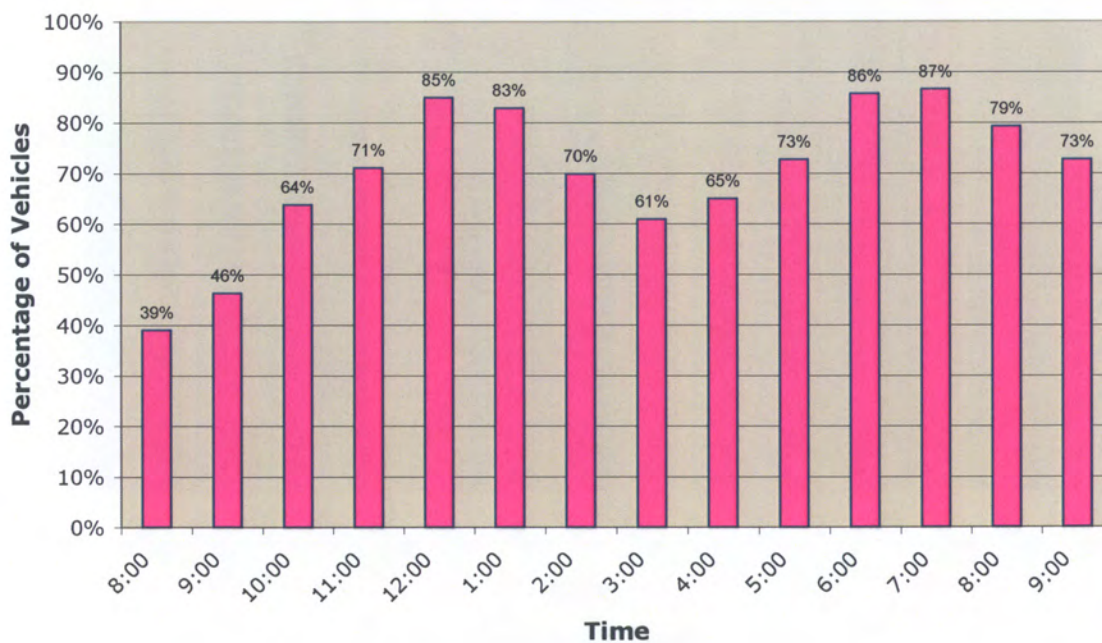


On-Street Utilization Profiles (cont)

**South Pearl On-Street Utilization Profile
Tuesday June 17, 2008**



**North Pearl On-Street Utilization Profile
Thursday June 12, 2008**

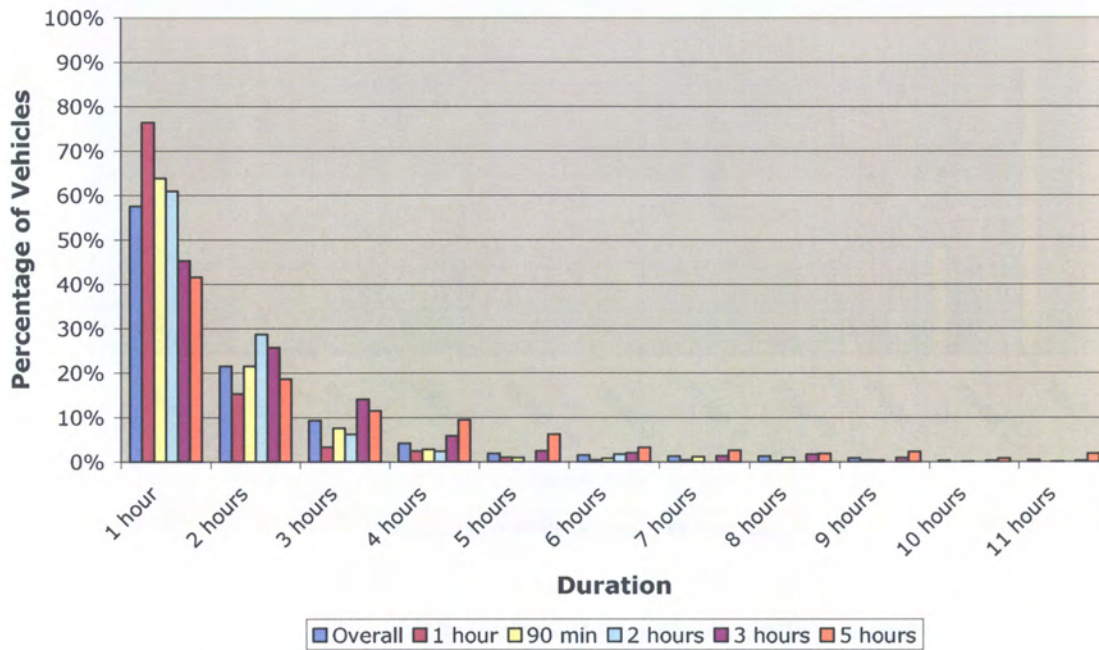


Appendix E
On-Street Duration of
Stay Profiles

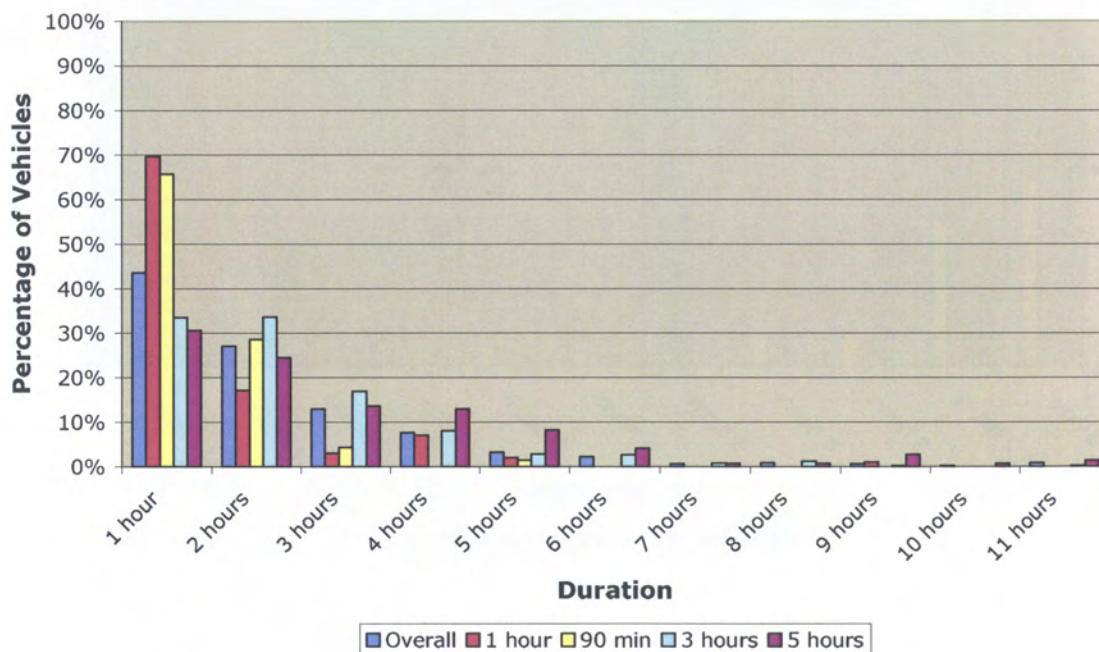
Appendix E

On-Street Duration of Stay Profiles

**Overall On-Street Duration of Stay
(8am-7pm)**

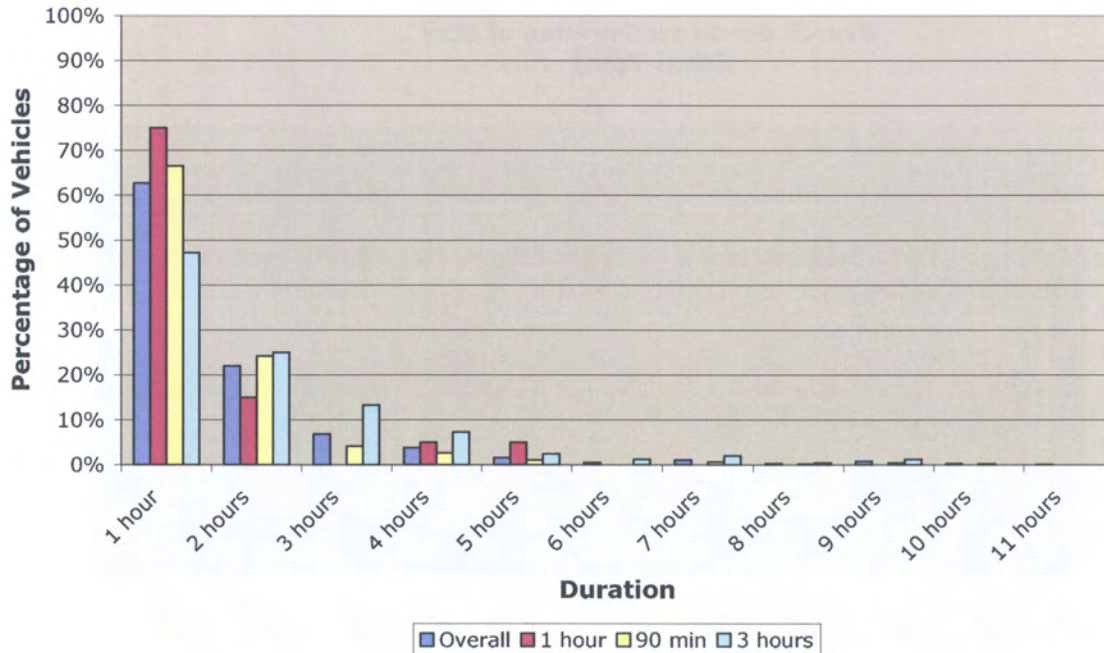


**West End South On-Street Duration of Stay
Thursday May 15, 2008 (8am-7pm)**

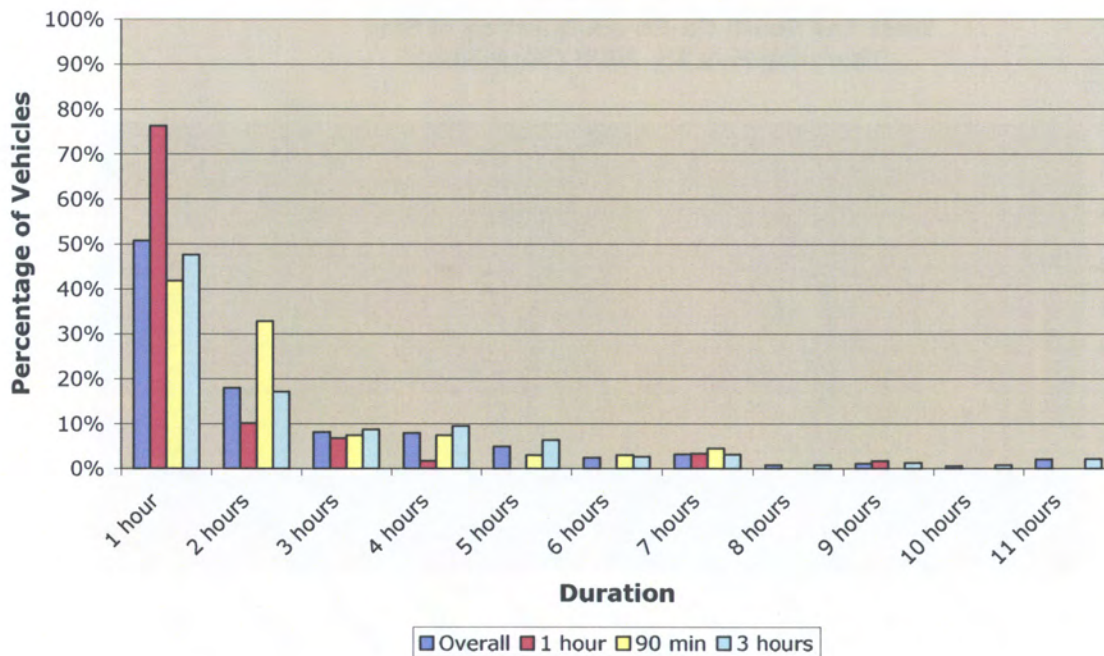


On-Street Duration of Stay Profiles (cont)

**West End North On-Street Duration of Stay
Tuesday May 20, 2008 (8am-7pm)**

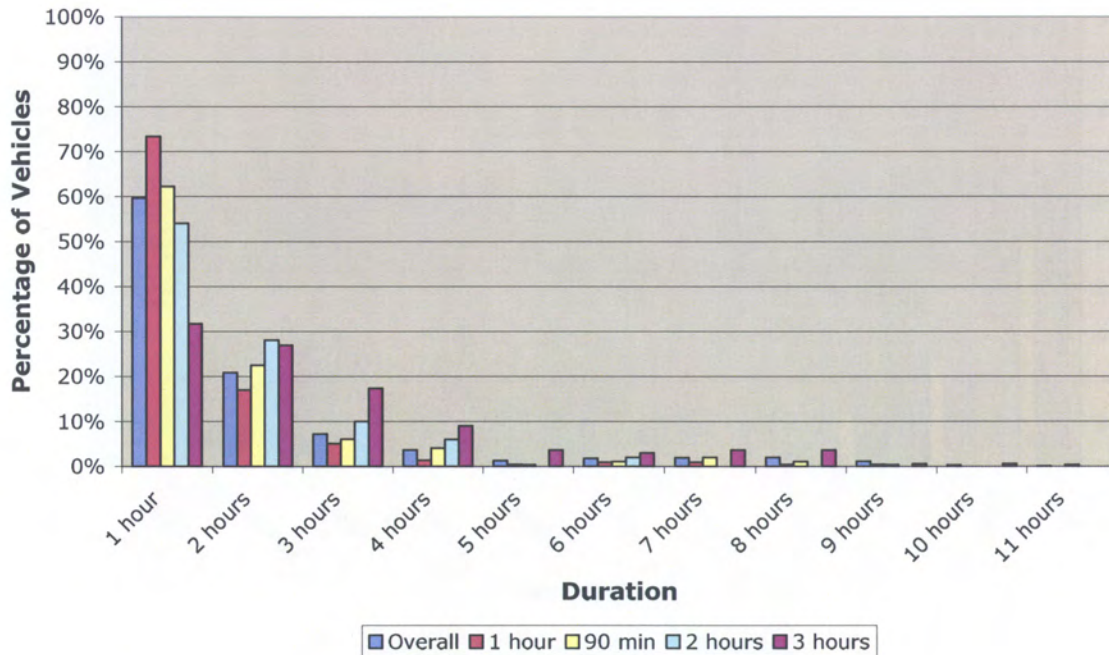


**Goose Hollow On-Street Duration of Stay
Thursday May 22, 2008 (8am-7pm)**

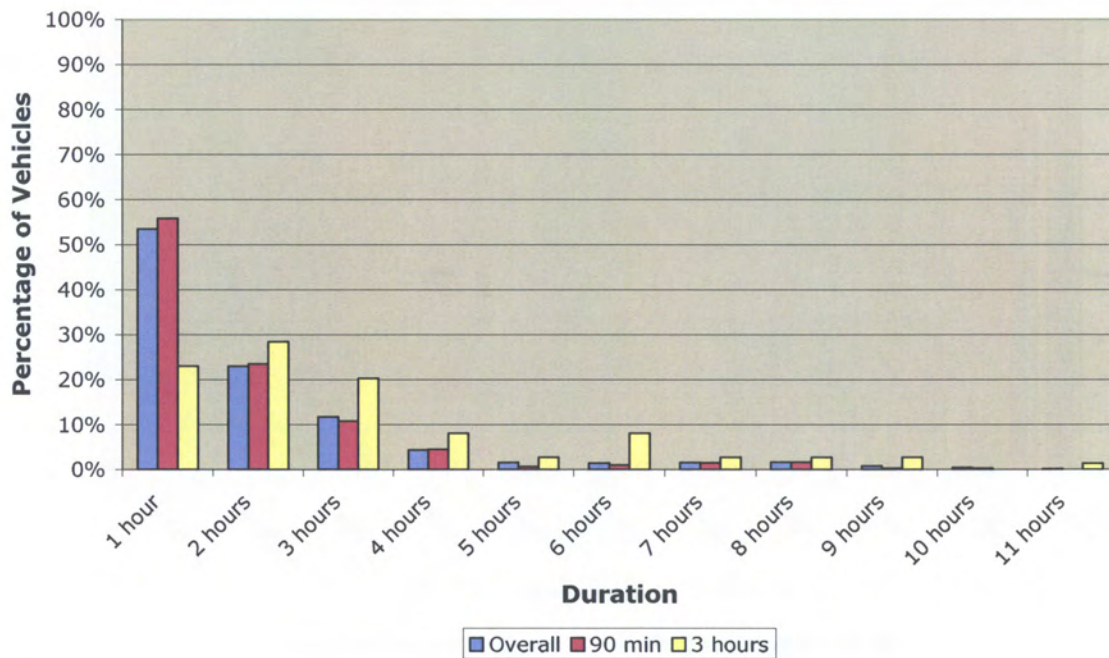


On-Street Duration of Stay Profiles (cont)

**Downtown/Office District On-Street Duration of Stay Profile
 Tuesday May 20, 2008 (8am to 7pm)**

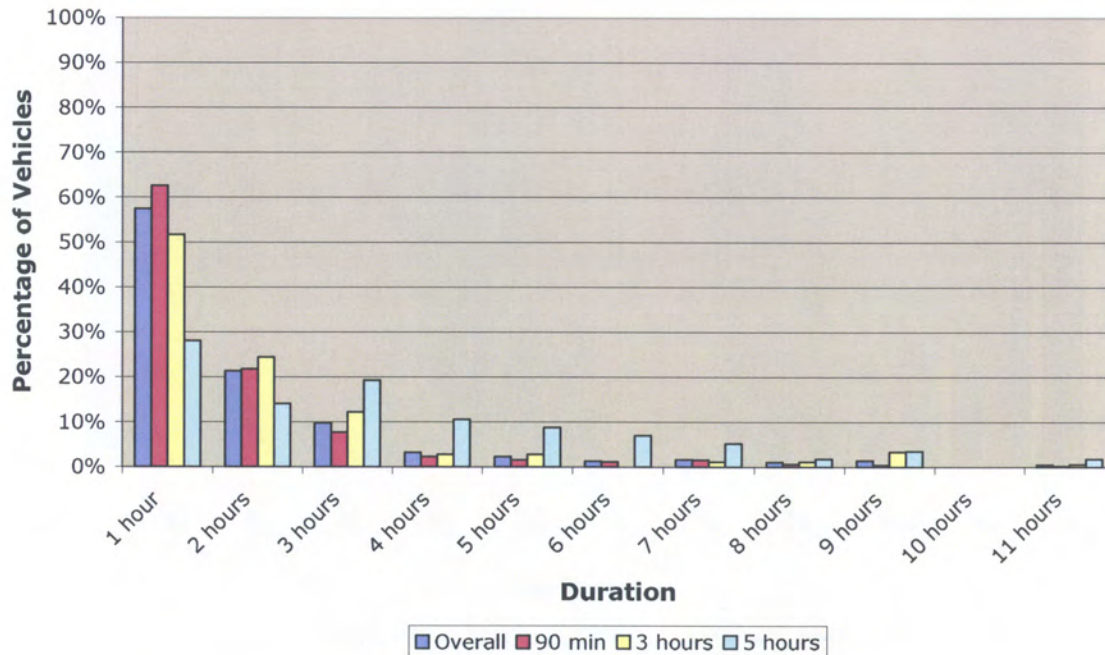


**Entertainment District On-Street Duration of Stay Profile
 Friday May 23, 2008 (8am-7pm)**

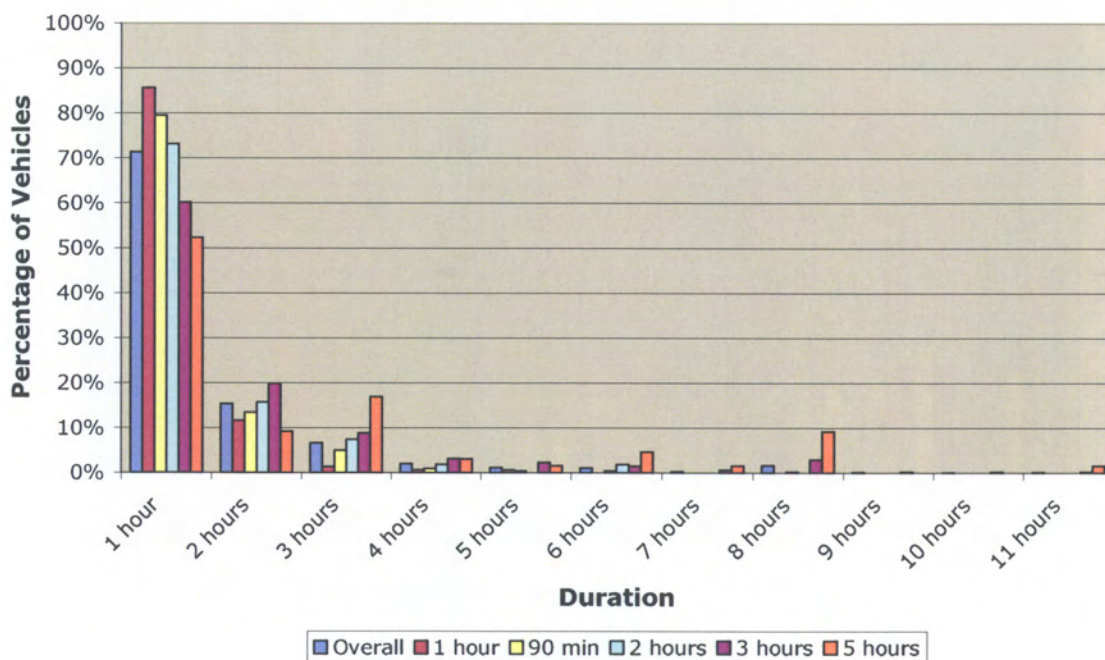


On-Street Duration of Stay Profiles (cont)

**Old Town On-Street Duration of Stay Profile
Friday May 23, 2008 (8am-7pm)**

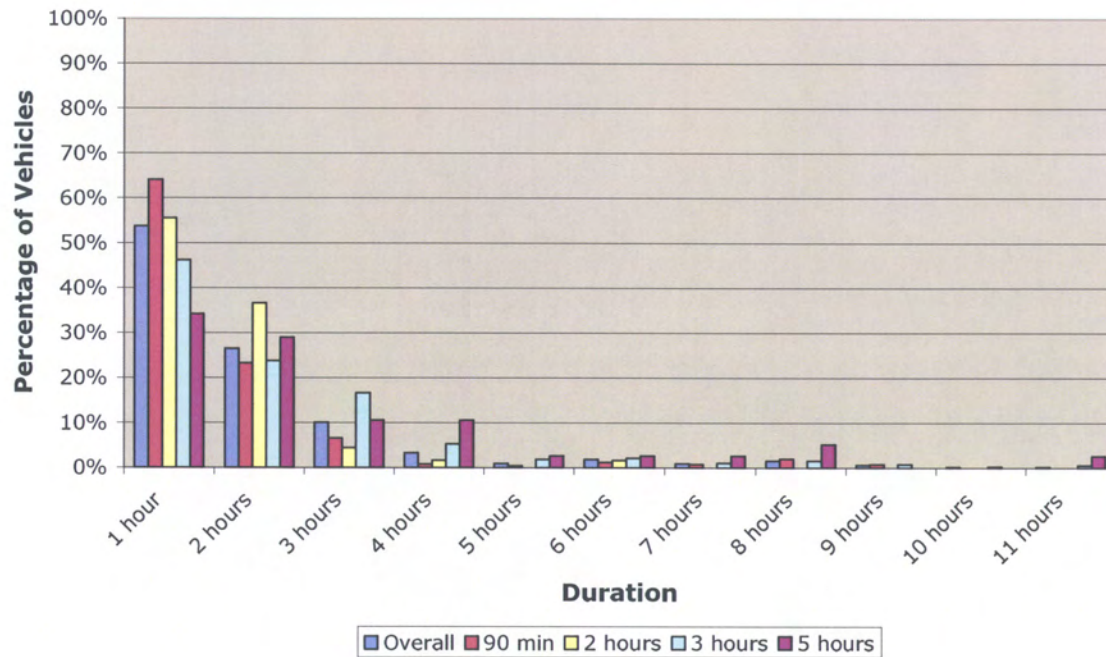


**South Pearl On-Street Duration of Stay
Tuesday May 17, 2008 (8am-7pm)**



On-Street Duration of Stay Profiles (cont)

**North Pearl On-Street Duration of Stay
Thursday June 12, 2008 (8am-7pm)**

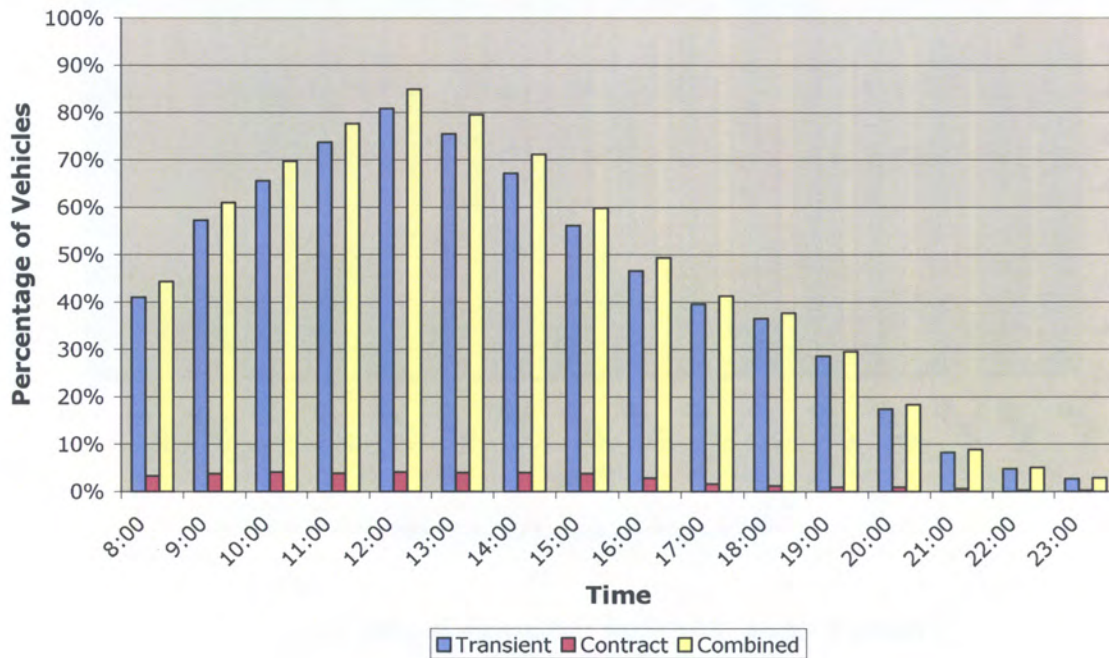


Appendix F
Off-Street (Smart Park)
and Commercial Parking
Utilization Profiles

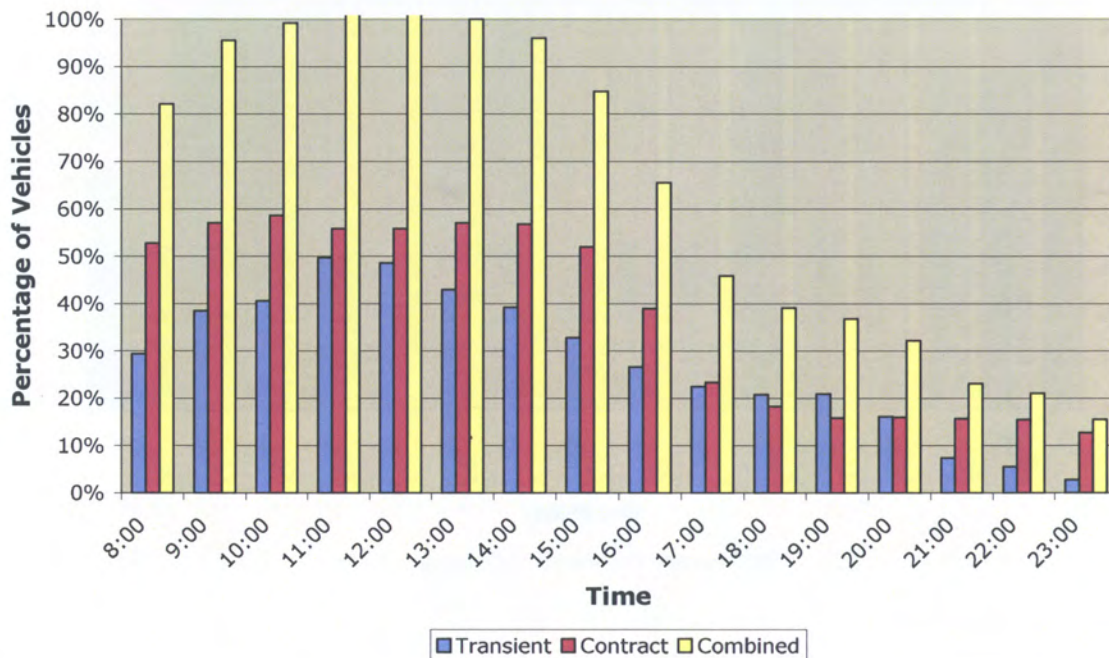
Appendix F

Off-Street (Smart Park) Utilization Profiles

**3rd & Alder Off-Street Utilization Profile
Thursday May 8, 2008**

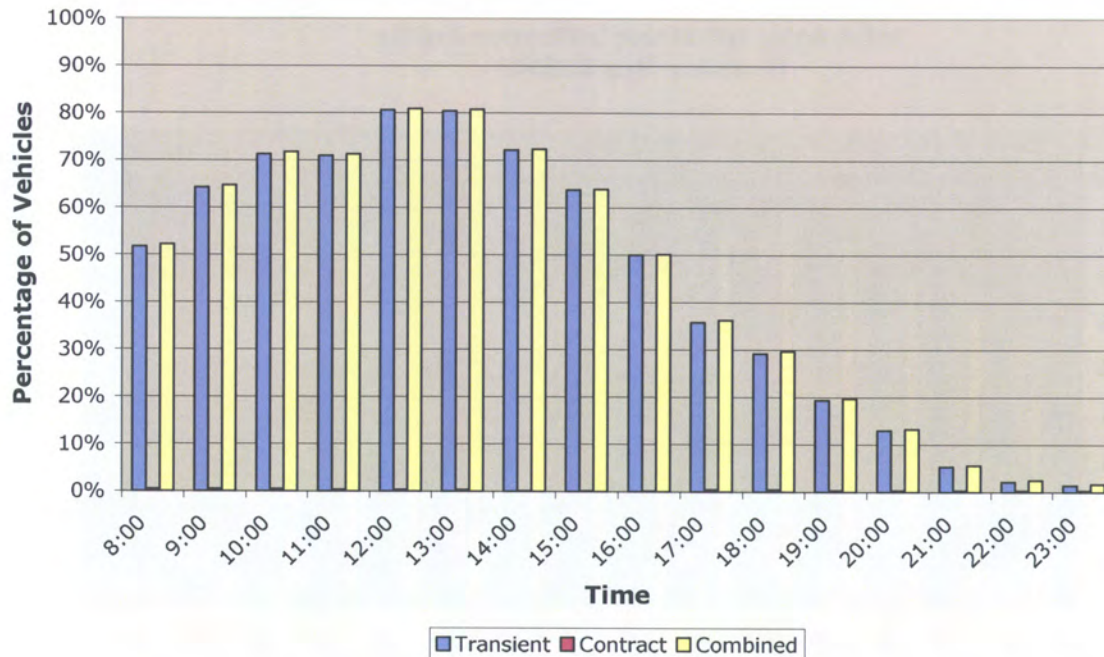


**1st & Jefferson Off-Street Utilization Profile
Thursday May 8, 2008**

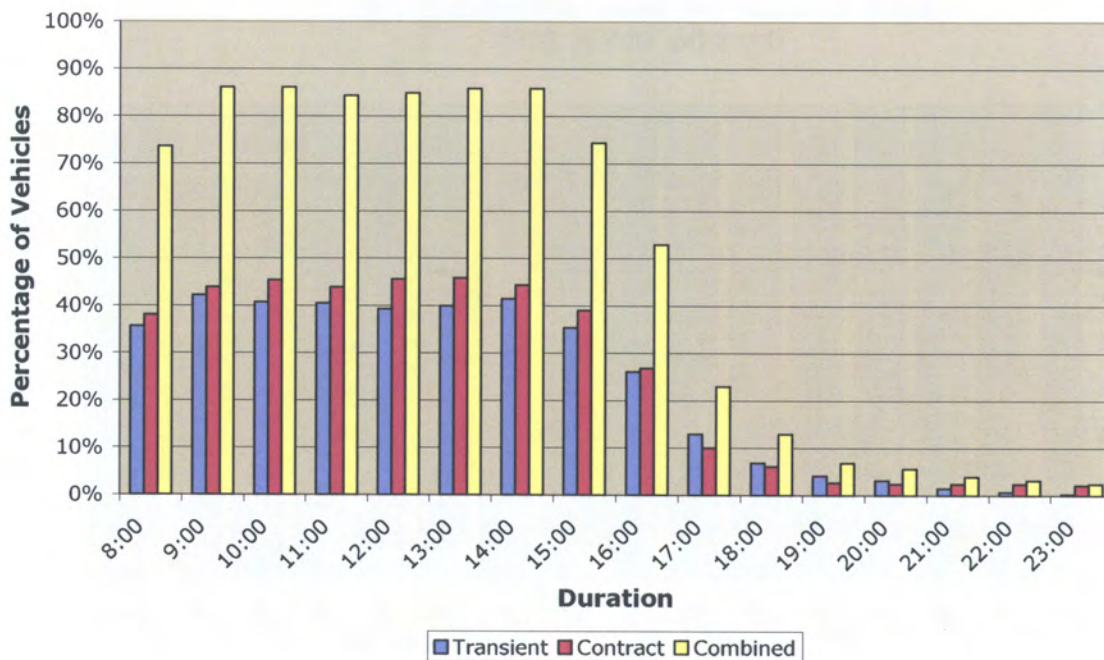


Off-Street (Smart Park) Utilization Profiles (cont)

4th & Yamhill Off-Street Utilization Profile
Thursday May 8, 2008

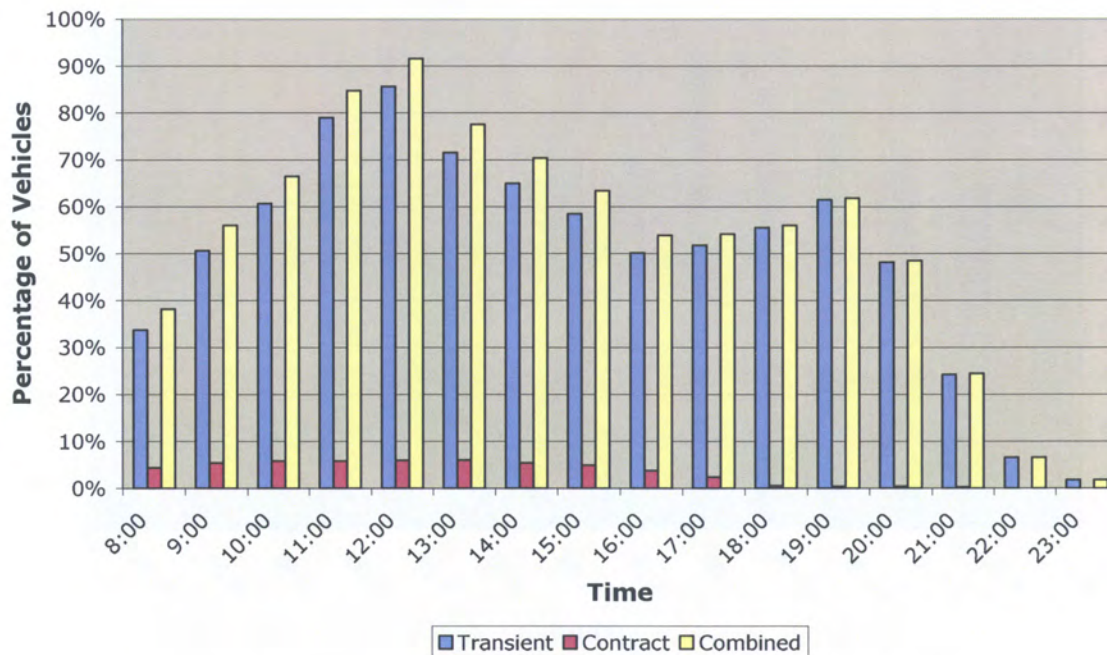


Naito & Davis Off-Street Utilization Profile
Thursday May 8, 2008

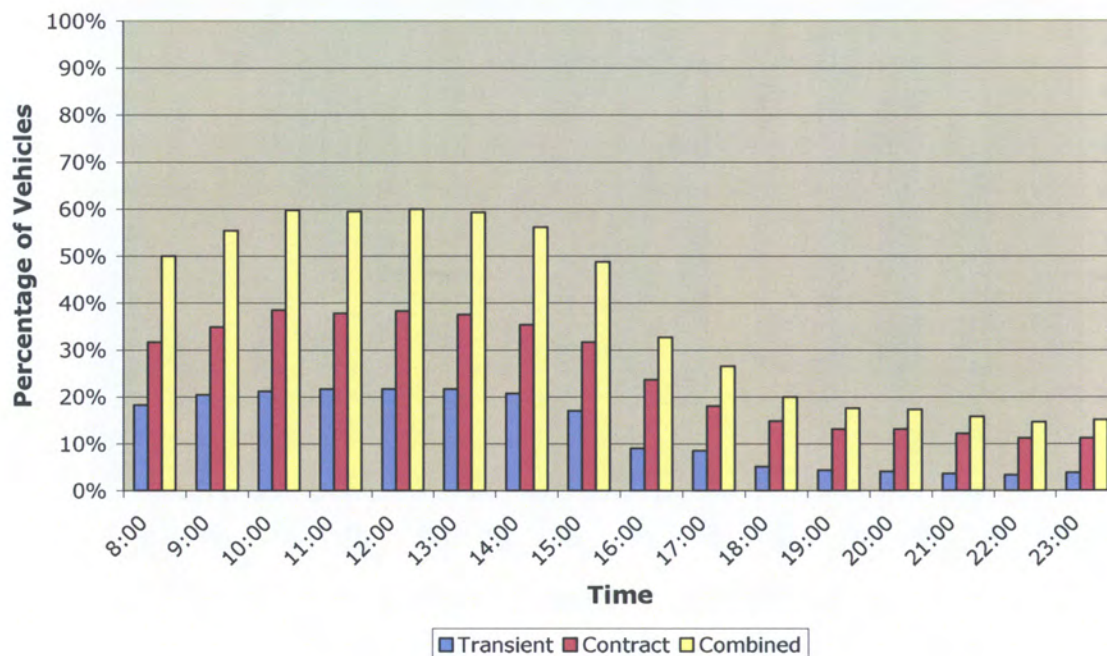


Off-Street (Smart Park) Utilization Profiles (cont)

**10th & Yamhill Off-Street Utilization Profile
Thursday May 8, 2008**

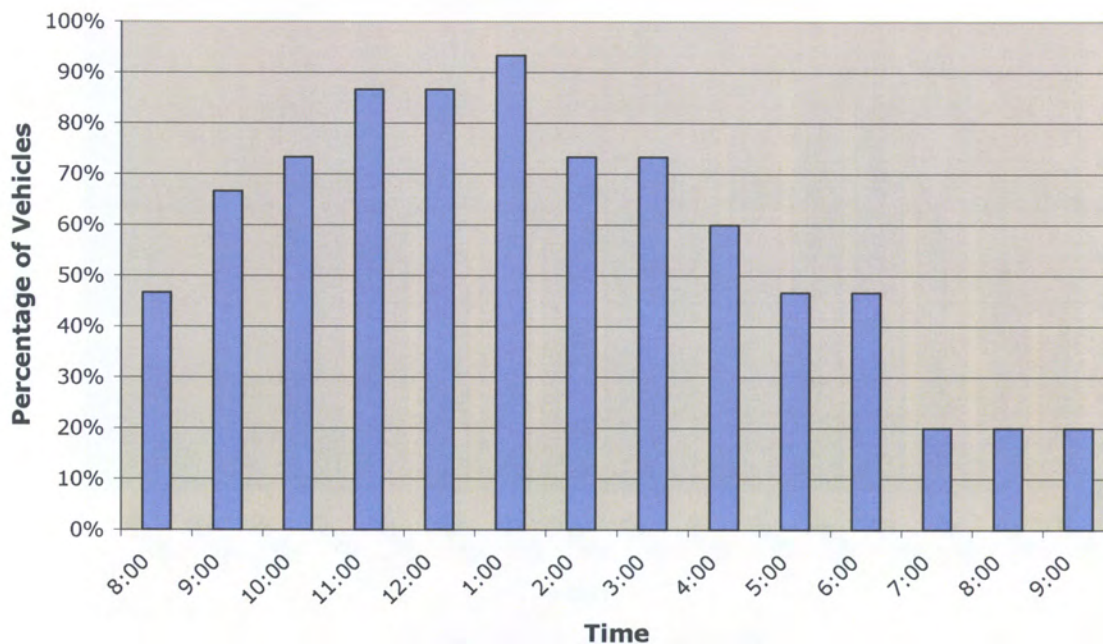


**Station Place Off-Street Utilization Profile
Thursday May 8, 2008**

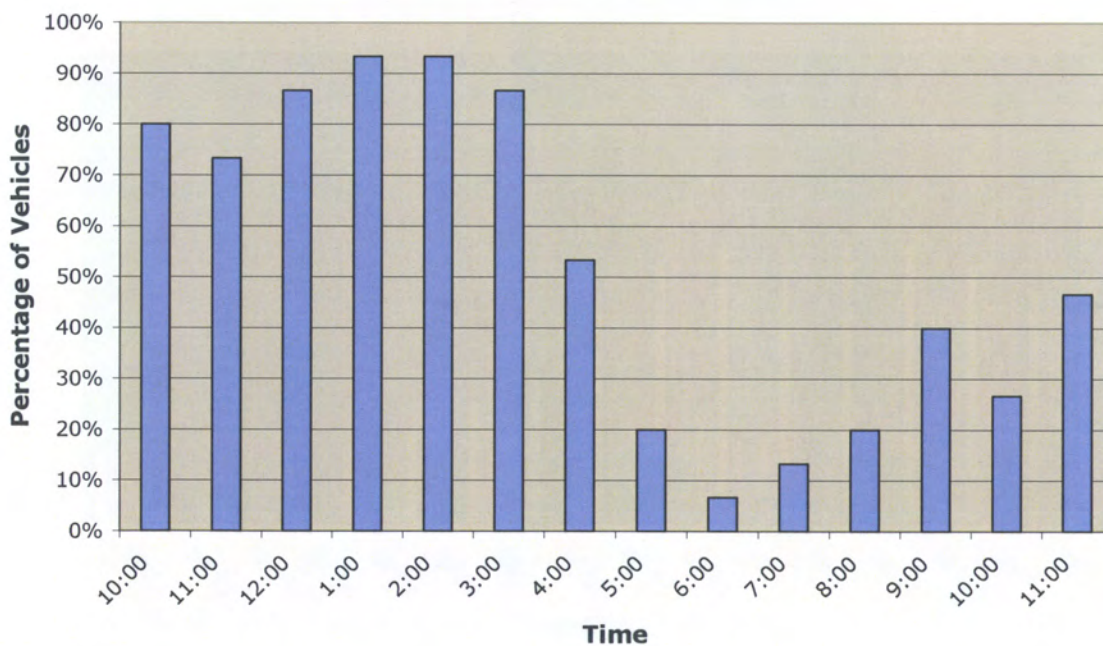


Off-Street Commercial Parking Utilization Profiles

**3rd & Ash Utilization Profile
Thursday June 26, 2008**

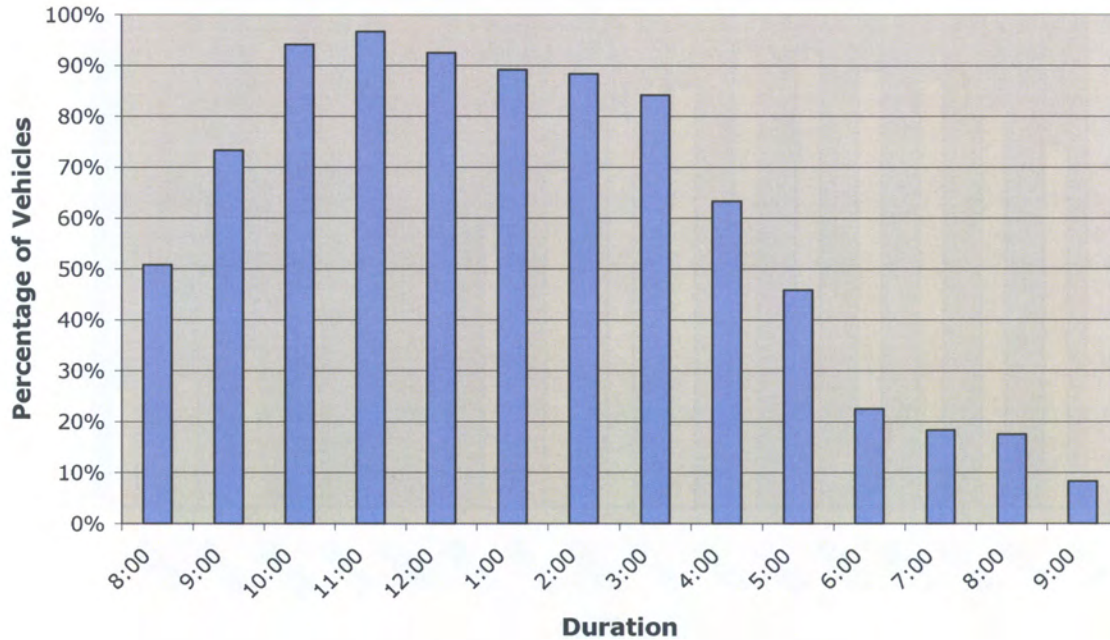


**3rd & Ash Utilization Profile
Friday June 27, 2008**

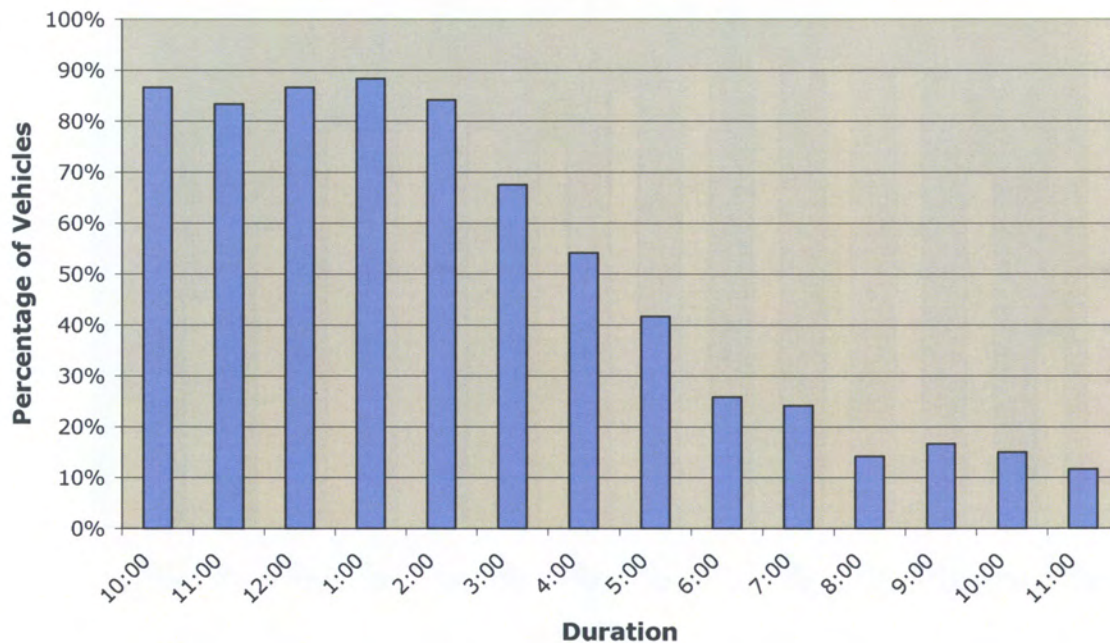


Off-Street Commercial Parking Utilization Profiles (cont)

**3rd & Stark Utilization Profile
Thursday June 26, 2008**

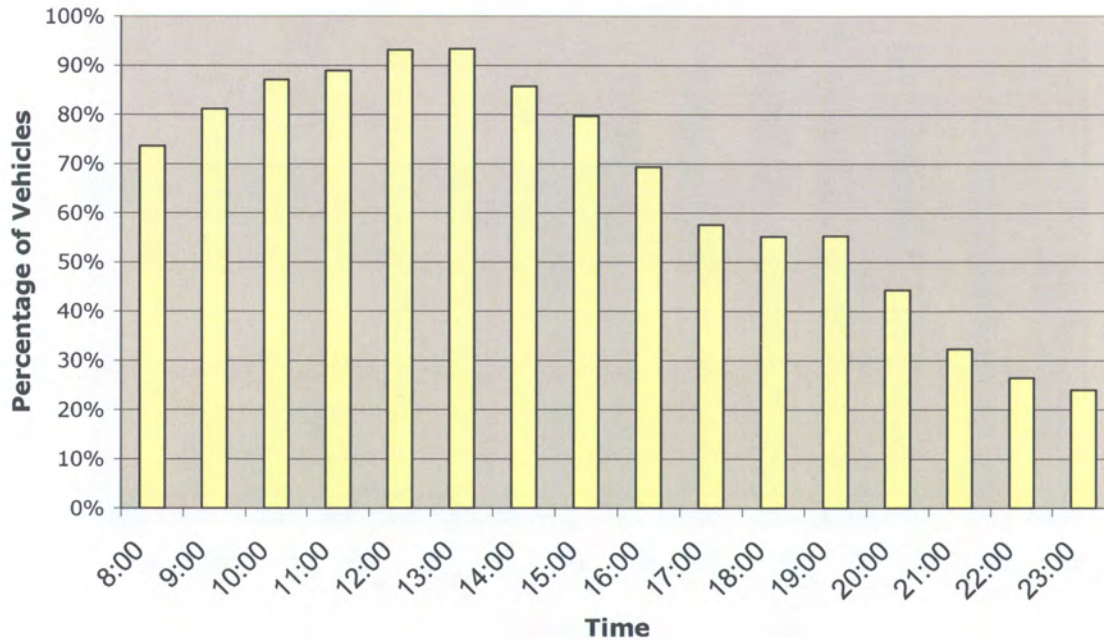


**3rd & Stark Utilization Profile
Friday June 27, 2008**

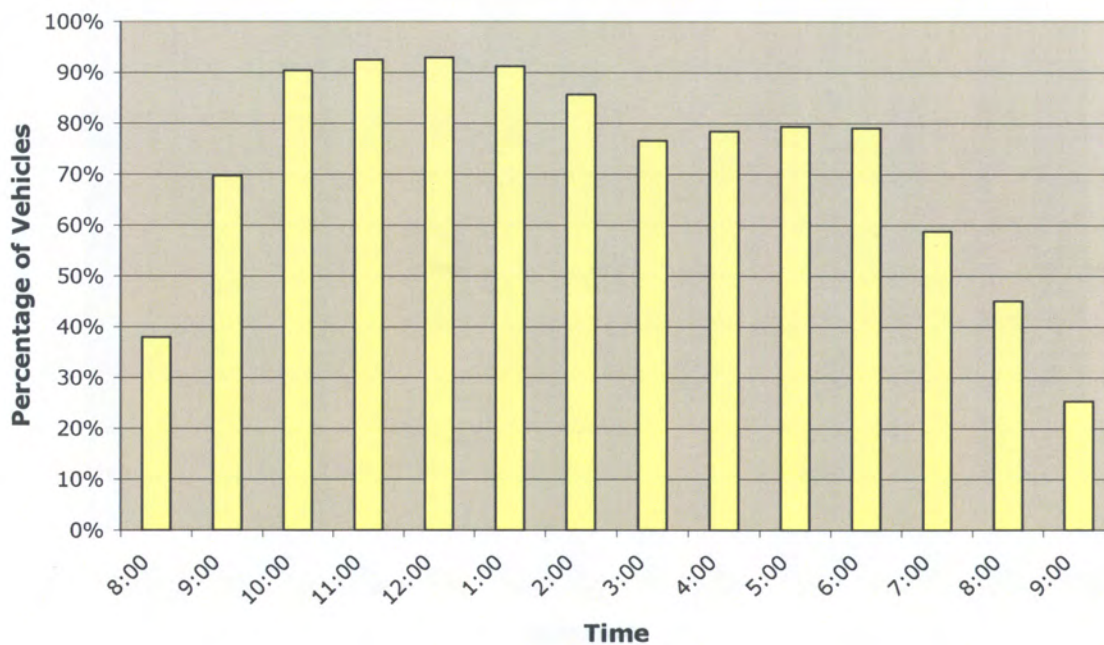


Off-Street Commercial Parking Utilization Profiles (cont)

**Brewery Blocks Utilization Profile
Thursday May 22, 2008**



**PSU Garage Utilization Profile
Wednesday May 21, 2008**

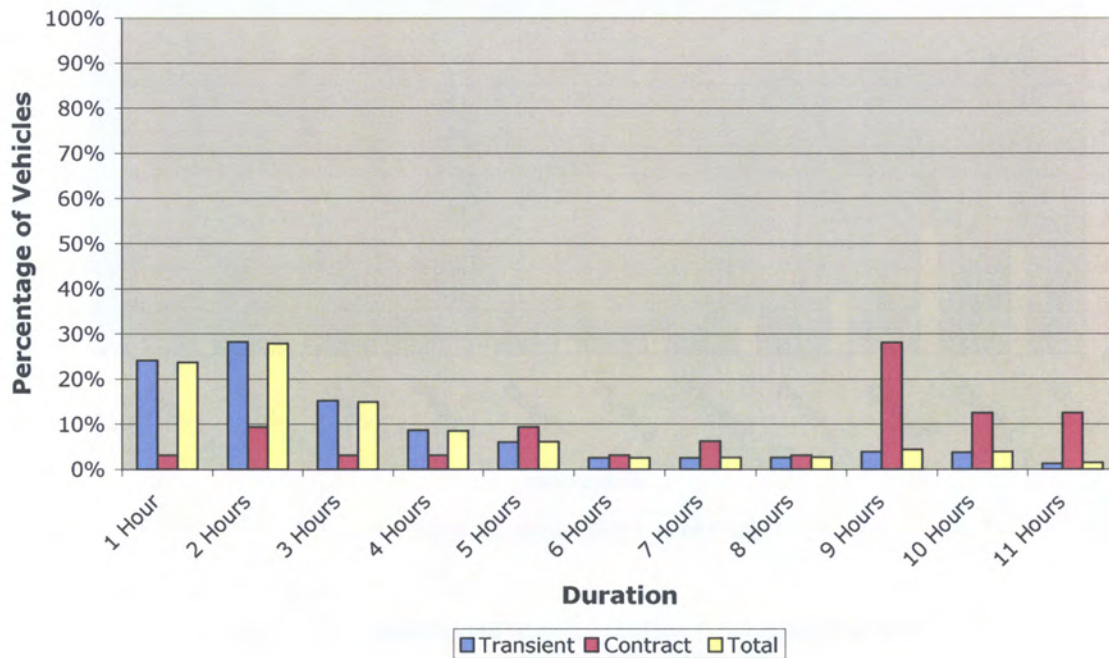


Appendix G
Off-Street (Smart Park)
and Commercial Parking
Duration of Stay Profiles

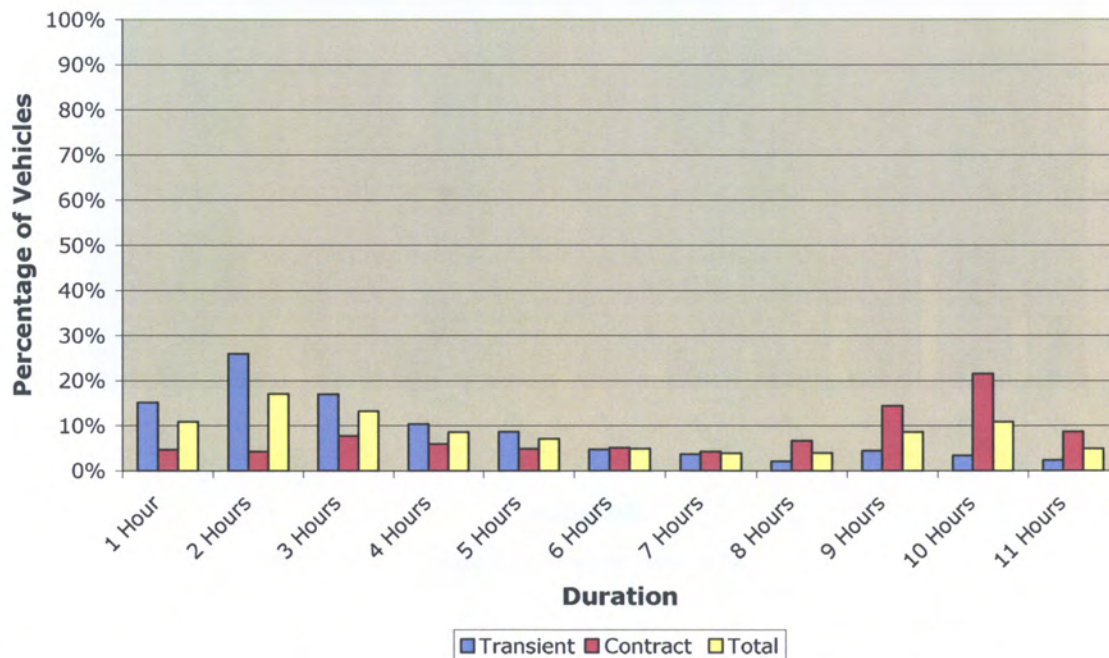
Appendix G

Off-Street (Smart Park) Duration of Stay Profiles

**3rd & Alder Off-Street Duration of Stay Profile
 Thursday May 8, 2008 (8am to 7pm)**

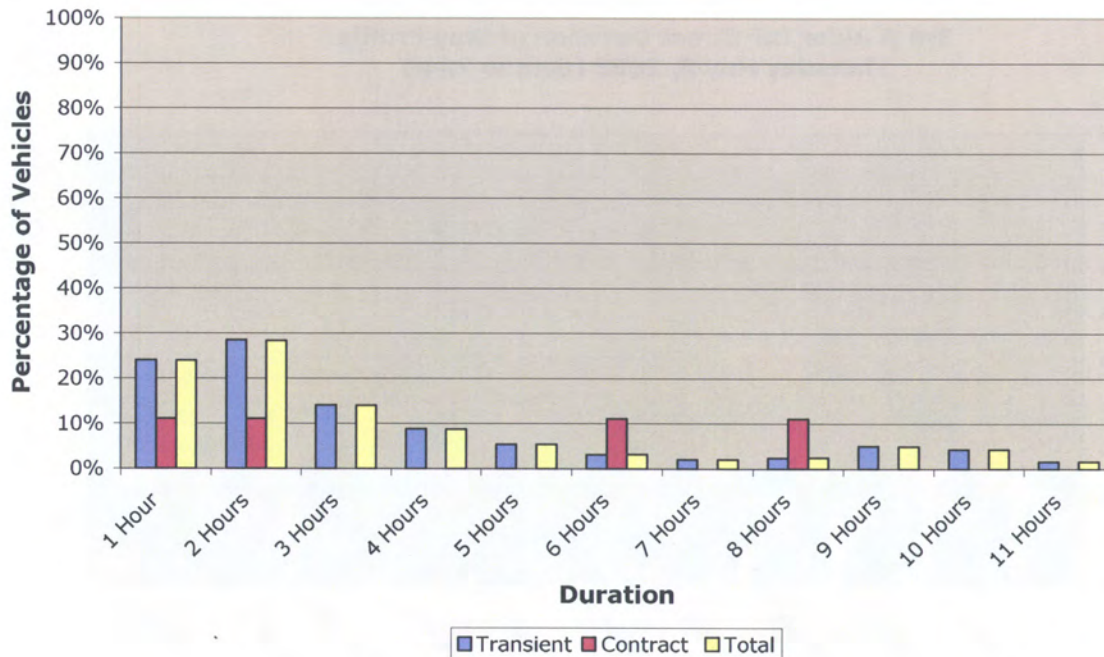


**1st & Jefferson Off-Street Duration of Stay Profile
 Thursday May 8, 2008 (8am to 7pm)**

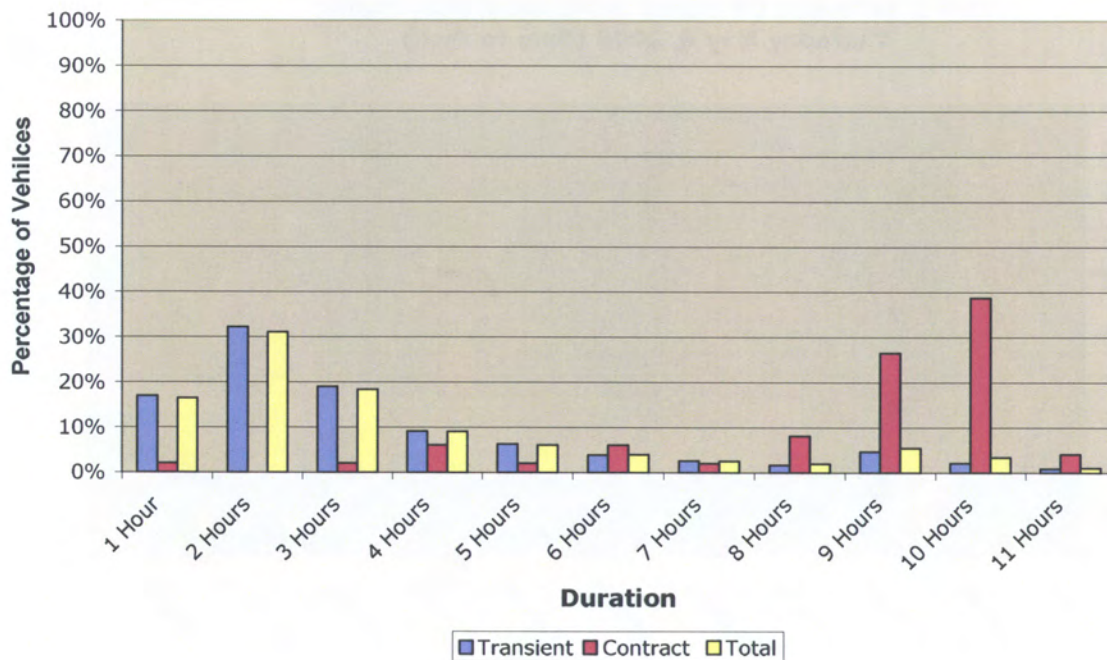


Off-Street (Smart Park) Duration of Stay Profiles (cont)

**4th & Yamhill Off-Street Duration of Stay Profile
Thursday May 8, 2008 (8am to 7pm)**

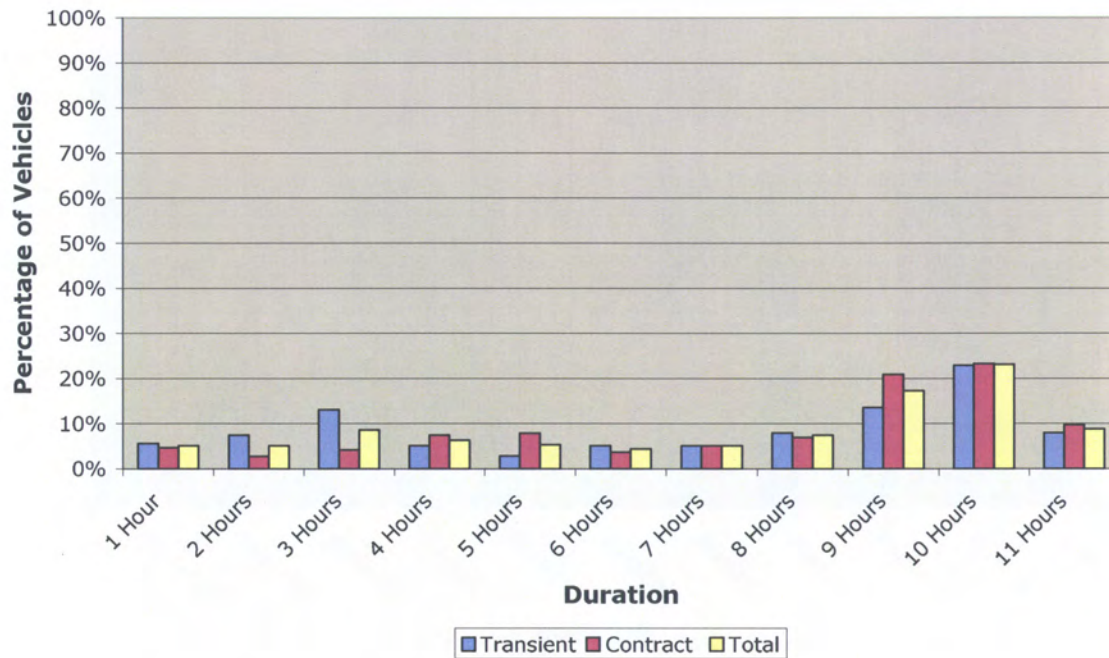


**10th & Yamhill Off-Street Duration of Stay Profile
Thursday, May 8, 2008**

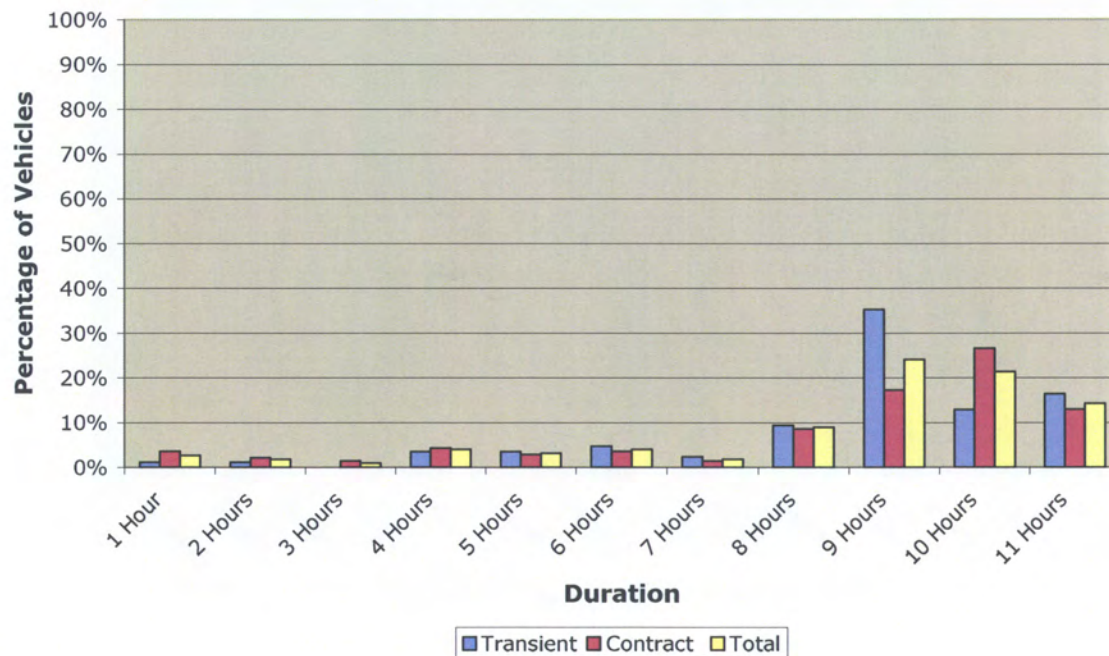


Off-Street (Smart Park) Duration of Stay Profiles (cont)

**Naito & Davis Off-Street Duration of Stay Profile
Thursday May 8, 2008 (8am to 7pm)**

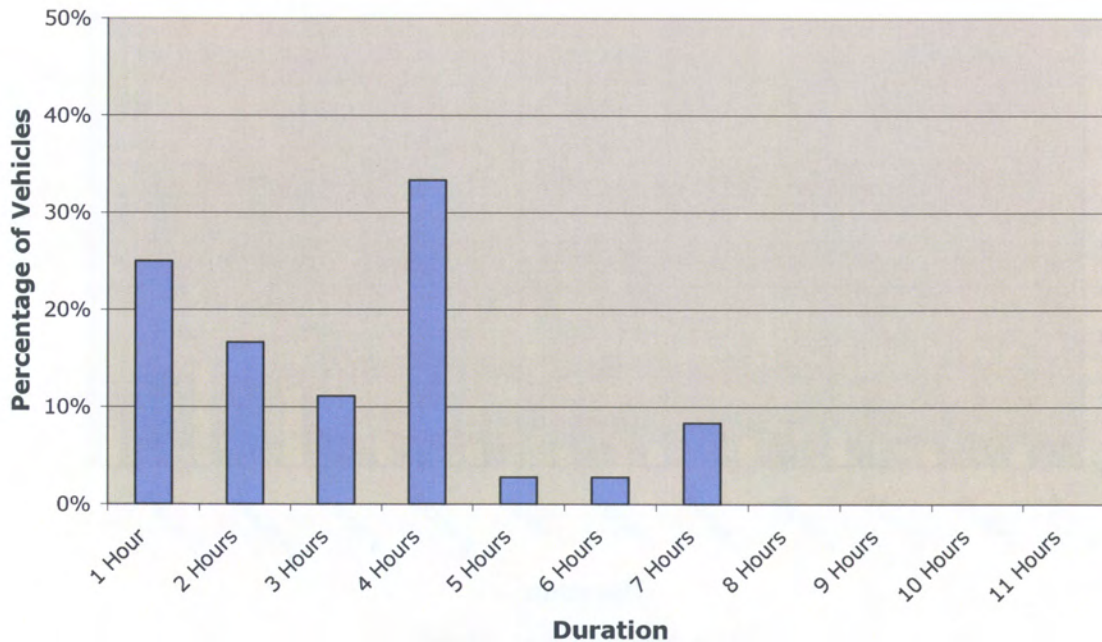


**Station Place Off-Street Duration of Stay Profile
Thursday May 8, 2008 (8am to 7pm)**

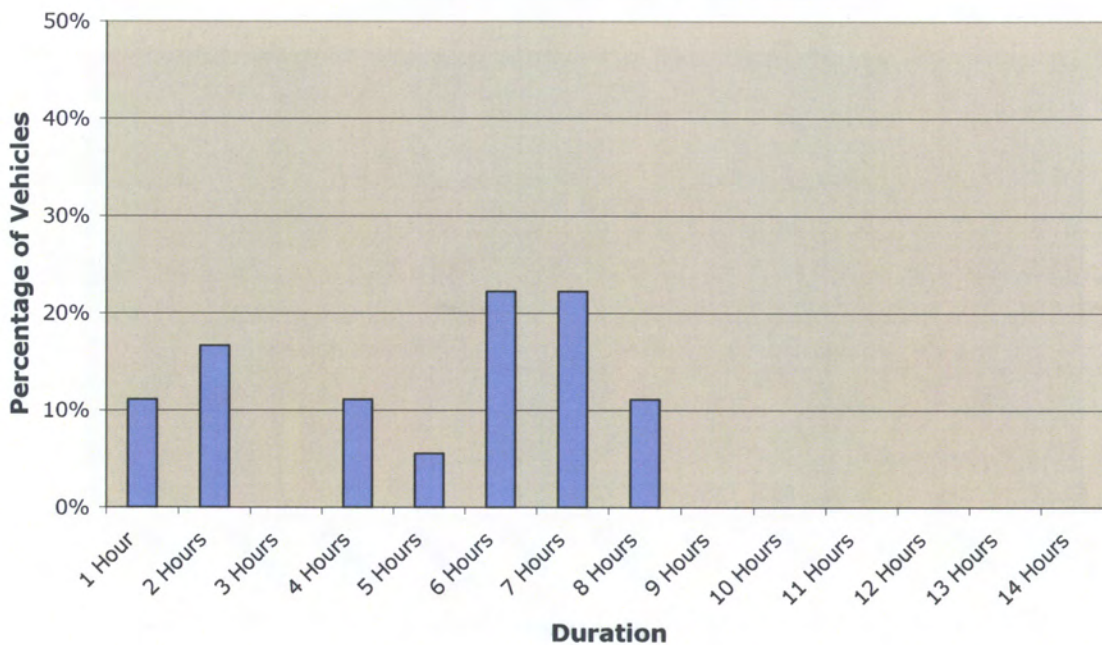


Off-Street Commercial Parking Duration of Stay Profiles

**3rd & Ash Duration of Stay Profile
Thursday June 26, 2008 (8am to 7pm)**

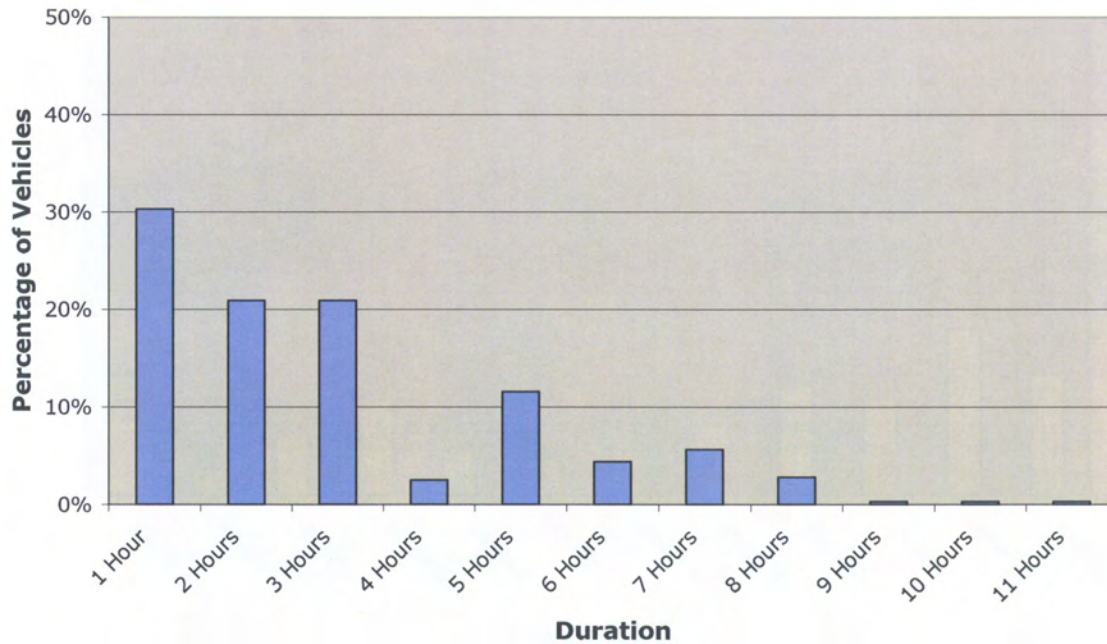


**3rd & Ash Duration of Stay Profile
Friday June 27, 2008 (10am to 7pm)**

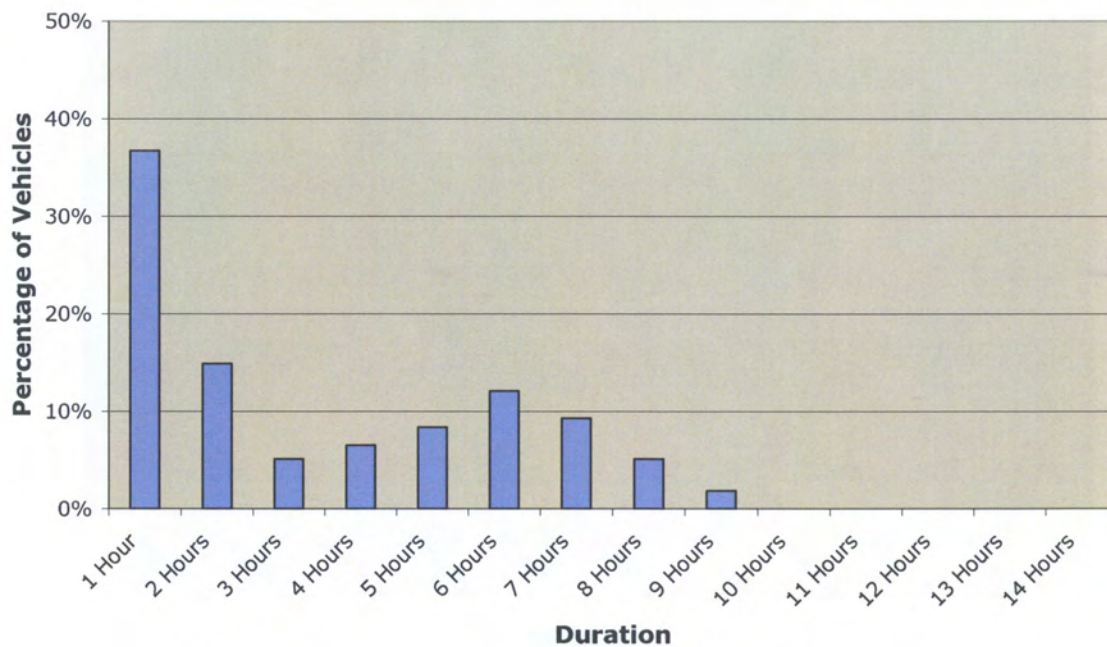


Off-Street Commercial Parking Duration of Stay Profiles (cont)

**3rd & Stark Duration of Stay Profile
Thursday June 26, 2008 (8am to 7pm)**

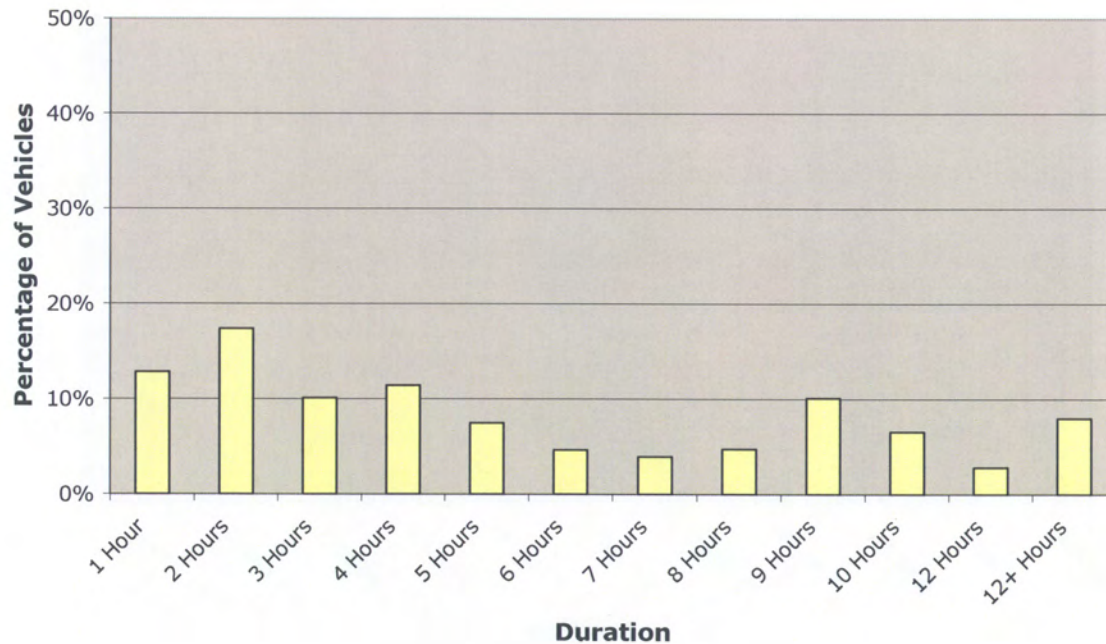


**3rd & Stark Duration of Stay Profile
Friday June 27, 2008 (10am to 7pm)**

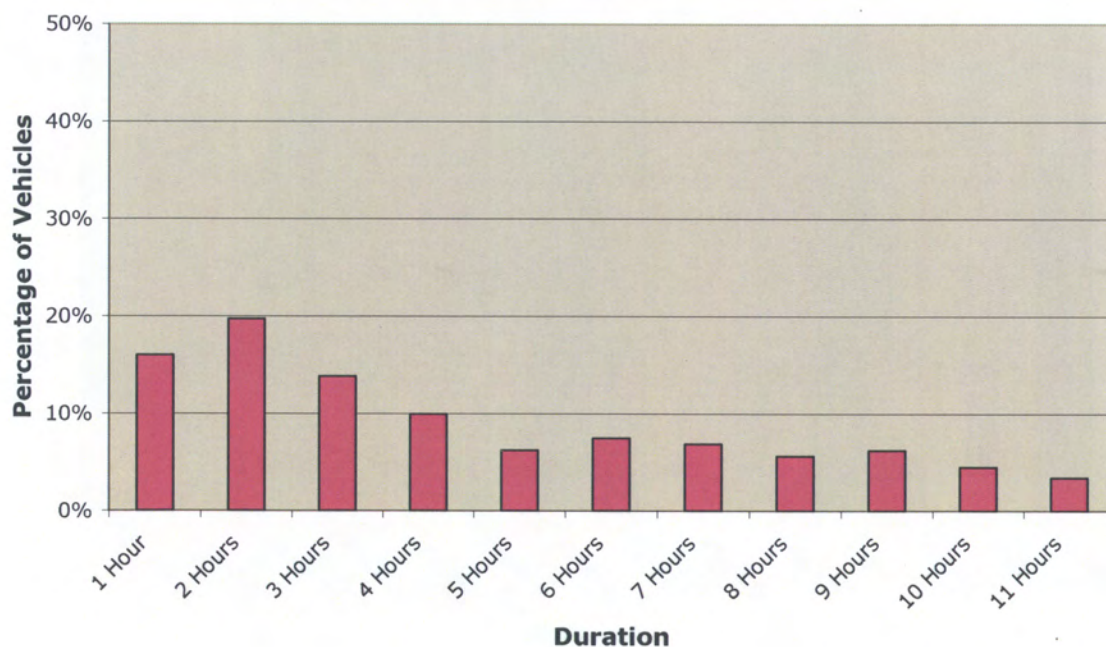


Off-Street Commercial Parking Duration of Stay Profiles (cont)

**Brewery Blocks Duration of Stay
Thursday May 22, 2008**



**PSU Garage Duration of Stay Profile
Wednesday May 21, 2008 (8am to 7pm)**



Appendix H
Parking and Trip
Generation Information

Appendix H

Parking and Trip Generation Information

Weekday Hourly Parking Occupancy Profile by User Type

Hour	¹ Residential	² Commuter	² Customer/ Visitor	³ Entertainment	⁴ University
6-7 a.m.	95%	24%	20%	-	-
7-8 a.m.	91%	38%	36%	-	-
8-9 a.m.	83%	44%	42%	51%	38%
9-10 a.m.	74%	45%	41%	73%	70%
10-11 a.m.	70%	44%	40%	94%	90v
11-12 p.m.	69%	46%	39%	97%	93%
12-1 p.m.	72%	46%	40%	93%	93%
1-2 p.m.	74%	44%	42%	89%	91%
2-3 p.m.	68%	39%	35%	88%	86%
3-4 p.m.	69%	27%	26%	84%	77%
4-5 p.m.	70%	10%	13%	63%	78%
5-6 p.m.	77%	6%	7%	46%	79%
6-7 p.m.	81%	3%	4%	23%	79%
7-8 p.m.	79%	2%	3%	18%	59%
8-9 p.m.	88%	2%	1%	18%	45%
9-10 p.m.	91%	2%	1%	8%	25%

1 The residential profile is based on observations at The Eliot parking garage; the starting occupancy was assumed to be 95% at 6 a.m.

2 The commuter and customer/visitor profiles are based on an evaluation of data received for the Smart Park parking garage at Naito & Davis. The percentages are based on the availability of parking as a whole.

3 The entertainment profile is based on observations at the Star Park surface parking lot at SW 3rd & Stark.

4 The university profile is based on observations at the Portland State University parking garage at SW Harrison & Broadway.

Parking and Trip Generation Information (cont)

Weekday Trip Generation by Parking Type - Trips per 100 Spaces*

Hour	¹ Residential			² Commuter			² Customer/ Visitor			³ University		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
6-7 a.m.	0	2	2	25	1	26	11	0	11	-	-	-
AM Peak Period: 7 to 9 a.m.												
7-8 a.m.	3	10	13	40	2	42	20	1	21	-	-	-
8-9 a.m.	4	12	16	27	7	34	27	3	30	-	-	-
Mid-Day: 9 a.m. to 4 p.m.												
9-10 a.m.	4	8	12	13	5	18	27	9	36	33	1	35
10-11 a.m.	4	6	10	7	4	11	20	16	36	24	4	28
11-12 p.m.	6	5	11	2	8	10	32	14	46	7	5	13
12-1 p.m.	5	5	10	7	7	14	22	24	46	12	11	23
1-2 p.m.	3	8	11	10	7	17	17	28	45	12	13	25
2-3 p.m.	6	4	10	9	10	19	19	26	45	8	13	21
3-4 p.m.	6	5	11	8	18	26	9	22	31	10	19	29
PM Peak Period: 4 to 6 p.m.												
4-5 p.m.	12	5	17	5	31	36	12	24	36	18	16	33
5-6 p.m.	8	6	14	1	32	33	16	24	40	23	22	45
Evening: 6 p.m. to 10 p.m.												
6-7 p.m.	10	7	17	1	11	12	6	10	16	12	13	25
7-8 p.m.	3	2	5	0	5	5	3	2	5	12	32	45
8-9 p.m.	8	2	10	1	1	2	0	10	10	2	16	18
9-10 p.m.	2	1	3	1	1	2	1	19	20	-	-	-

* Trip rates are based on the assumption of 100% full at maximum occupancy.

1 The residential profile is based on observations at The Eliot parking garage.

2 The commuter and customer/visitor profiles are based on an evaluation of data received for the Smart Park parking garage at 1st & Jefferson.



www.kittelson.com