ACRP Report 40
Airport Curbside and Terminal Area Roadway Operations

Appendix D

SUMMARY OF CURBSIDE ROADWAY CHARACTERISTIC SURVEYS

As part of Airport Cooperative Research Program (ACRP) Project 7-02, the research team conducted roadway traffic volume, dwell time, and vehicle classification surveys at Washington Dulles and Oakland international airports. This appendix summarizes the surveys of curbside dwell times and vehicle classifications (traffic volume data are presented in Appendix C). Additionally, the survey data used to determine the propensity to double park at two other airports (Seattle-Tacoma and Portland international airports) are summarized herein. Also, validation of the weaving module contained in the Quick Analysis Tool for Airport Roadways (QATAR) model using video captured at San Francisco International Airport is presented at the end of this appendix.

DWELL TIMES

Dwell time surveys were conducted at Washington Dulles and Oakland international airports. A summary of the data collected at these airports, as well as additional data collected by the research team through other efforts at Memphis, Austin-Bergstrom, and Portland international airports, are presented in Table D-1.

Table D-1

Summary of Dwell Time Surveys (in minutes)

	Enplaning Curbside				Deplaning Curbside			Mixed Curbside
	Washington Dulles International Airport Upper Level	Memphis International Airport Departures Level	Austin-Bergstrom International Airport Departures Level	Portland International Airport Departures Level	Washington Dulles International Airport Middle Level	Washington Dulles International Airport Lower Level	Memphis International Airport Arrivals Level	Oakland International Airport Mixed Departures and Arrivals Level
Year	2007	2007	2006	2006	2007	2007	2006	2007
Number of Observations	464	193	107	65	559	529	177	568
Private vehicle	2.40	1.68	2.03	1.57	1.60		1.53	1.21
Taxicab	1.88	1.87	1.73	1.98				0.97
Limousine	0.62		1.58		5.52			
Door-to-door van	3.71		3.10		2.72			4.50
Off Airport parking van		0.58	1.48	0.50				2.41
Airport parking bus	4.18	0.72	1.27			2.35		2.07
Employee parking bus	1.38	0.63				2.60		0.15
Hotel courtesy van	1.15	1.12	1.38	2.13	0.58	2.18		1.67
Rental car bus		0.52		0.58		3.62		2.00
Charter / tour bus								0.67
Public transit			1.08			3.49		0.42

Source: Jacobs Consultancy, December 2008

PROPENSITY TO DOUBLE PARK

To determine the propensity of drivers to double and triple park in curbside loading and unloading areas, snapshots of the number of vehicles stopped in each lane of a curbside were recorded for several time intervals throughout a peak period. The data presented below were previously collected by members of the research team at Seattle-Tacoma and Portland international airports. The average percent of vehicles double parked at Seattle-Tacoma International Airport did not change significantly based on time of day; however, at both airports, the number of vehicles double and triple parked changed frequently within short time intervals. Furthermore, the percent of vehicles double parked at Portland International Airport accounted for only 20% of vehicles stopped at the arrivals level curbside compared to 54% at Seattle-Tacoma International, indicating that this characteristic varies significantly between the airports.

Seattle-Tacoma International Airport
Departures Level Curbside - North End
June 2002
5:30am to 7:30am

Count	Lane 1	Lane 2	Lane 3	Lane 4	% double / triple parked
1	6	5	0	0	45%
2	5	5	0	0	50%
3	5	8	0	0	62%
1	2	7	0	0	78%
2	6	6	0	0	50%
3	5	5	0	0	50%
4	4	7	0	0	64%
5	4	6	0	0	60%
6	2	5	0	0	71%
7	4	8	0	0	67%
8	9	5	0	0	36%
9	6	8	0	0	57%
10	5	11	0	0	69%
11	5	8	0	0	62%
12	9	6	0	0	40%
13	5	5	0	0	50%
14	5	2	0	0	29%
15	7	3	0	0	30%
16	3	10	0	0	77%
17	4	10	0	0	71%
18	6	9	0	0	60%
19	6	7	0	0	54%
20	7	4	0	0	36%
21	8	7	0	0	47%
22	8	10	0	0	56%
23	5	9	1	0	67%
24	5	8	0	0	62%
25	7	9	1	0	59%
26	9	11	0	0	55%
				Average	**56%**

Seattle-Tacoma International Airport
Departures Level Curbside - South End
June 2002
5:30am to 7:30am

Count	Lane 1	Lane 2	Lane 3	Lane 4	% double / triple parked
1	3	9	0	0	75%
2	6	3	1	0	40%
3	5	4	0	0	44%
1	8	4	0	0	33%
2	5	3	0	0	38%
3	5	11	0	0	69%
4	6	7	1	0	57%
5	6	6	0	0	50%
6	4	5	0	0	56%
7	4	5	0	0	56%
8	6	3	0	0	33%
9	6	4	0	0	40%
10	6	4	0	0	40%
11	3	8	0	0	73%
12	4	4	0	0	50%
13	5	6	1	0	58%
14	7	7	0	0	50%
15	6	8	0	0	57%
16	5	10	0	0	67%
17	6	4	0	0	40%
18	7	8	0	0	53%
19	4	8	0	0	67%
20	7	7	0	0	50%
21	37	40	3	0	54%
22	1	3	0	0	75%
23	1	4	0	0	80%
24	2	5	0	0	71%
25	4	3	0	0	43%
				Average	**54%**

Source: Jacobs Consultancy, December 2008

Seattle-Tacoma International Airport
Arrivals Level Curbside - North End
June 2002
8:00pm to 10:00pm

Count	Lane 1	Lane 2	Lane 3	Lane 4	% double / triple parked
1	7	3	0	0	30%
2	4	4	0	0	50%
3	3	5	3	0	73%
1	1	4	1	2	83%
2	4	0	3	1	43%
3	6	5	2	0	54%
4	1	4	1	0	83%
5	7	4	2	0	46%
6	3	2	1	0	50%
7	4	4	1	0	56%
8	5	2	0	0	29%
9	1	4	2	1	86%
10	3	4	0	0	57%
11	2	3	0	0	60%
12	29	27	5	2	52%
13	3	3	0	0	52%
14	3	1	1	1	34%
15	1	1	0	0	50%
16	0	0	0	0	0%
17	2	2	0	0	50%
18	0	1	0	0	100%
19	2	0	0	0	0%
20	0	1	0	0	100%
21	1	1	0	0	50%
22	0	1	0	0	100%
23	0	1	0	0	100%
24	3	0	0	0	0%
25	3	1	0	0	25%
				Average	**54%**

Portland International Airport
Arrivals Level Curbside
October 22, 2006
8:10pm to 8:50pm

Count	Lane 1	Lane 2	Lane 3	% double / triple
1	17	0	0	0%
2	17	1	0	6%
3	18	0	0	0%
1	18	1	0	5%
2	16	2	0	11%
3	19	10	0	34%
4	15	7	0	32%
5	11	10	2	52%
6	10	8	0	44%
7	11	7	0	39%
8	7	0	0	0%
			Average	**20%**

Source: Jacobs Consultancy, December 2008

VEHICLE CLASSIFICATION SURVEYS

Vehicle classification surveys are conducted to identify 100% of the vehicular traffic on a roadway according to one of several classifications (i.e., private vehicle, taxicab, hotel shuttle bus, etc). These data were collected at the same locations as the dwell time and traffic volume surveys presented above.

Summary of Vehicle Classification Surveys

	Oakland International Airport							
	Thursday				Friday			
	12:00pm to 3:00pm		5:00pm to 8:00pm		6:00am to 9:00am		4:00pm to 7:00pm	
	Volume	Percent	Volume	Percent	Volume	Percent	Volume	Percent
Private vehicles	2740	74.2%	2996	78.2%	1828	68.6%	3151	79.9%
Taxicabs	238	6.4%	259	6.8%	210	7.9%	220	5.6%
Limousines	99	2.7%	112	2.9%	98	3.7%	89	2.3%
Door-to-door shuttle (SuperShuttle)	96	2.6%	79	2.1%	74	2.8%	89	2.3%
Off-Airport parking courtesy shuttle	120	3.2%	123	3.2%	111	4.2%	117	3.0%
Airport parking bus (Red Lot, Employee)	119	3.2%	128	3.3%	120	4.5%	116	2.9%
Hotel/motel courtesy shuttle	47	1.3%	40	1.0%	60	2.3%	42	1.1%
Rental car bus	47	1.3%	36	0.9%	42	1.6%	34	0.9%
Public buses	39	1.1%	36	0.9%	39	1.5%	40	1.0%
Charter/tour bus	7	0.2%	5	0.1%	5	0.2%	7	0.2%
Other (Airport vehicles, police, etc.)	143	3.9%	18	0.5%	76	2.9%	37	0.9%

	Washington Dulles International Airport			
	Sunday Arrivals Level		Monday Departures Level	
	1:30pm to 4:30pm		7:00am to 10:00am	
	Volume	Percent	Volume	Percent
Private vehicles	2319	70.2%	1971	84.8%
Taxicabs	396	12.0%	242	10.4%
Limousines	121	3.7%	8	0.3%
Door-to-door shuttle (SuperShuttle)	29	0.9%	19	0.8%
Off-Airport parking courtesy shuttle	82	2.5%	16	0.7%
Airport parking bus (Red Lot, Employee)	125	3.8%	0	0.0%
Hotel/motel courtesy shuttle	42	1.3%	32	1.4%
Rental car bus	32	1.0%	1	0.0%
Public buses	116	3.5%	9	0.4%
Charter/tour bus	21	0.6%	2	0.1%
Other (Airport vehicles, police, etc.)	19	0.6%	23	1.0%

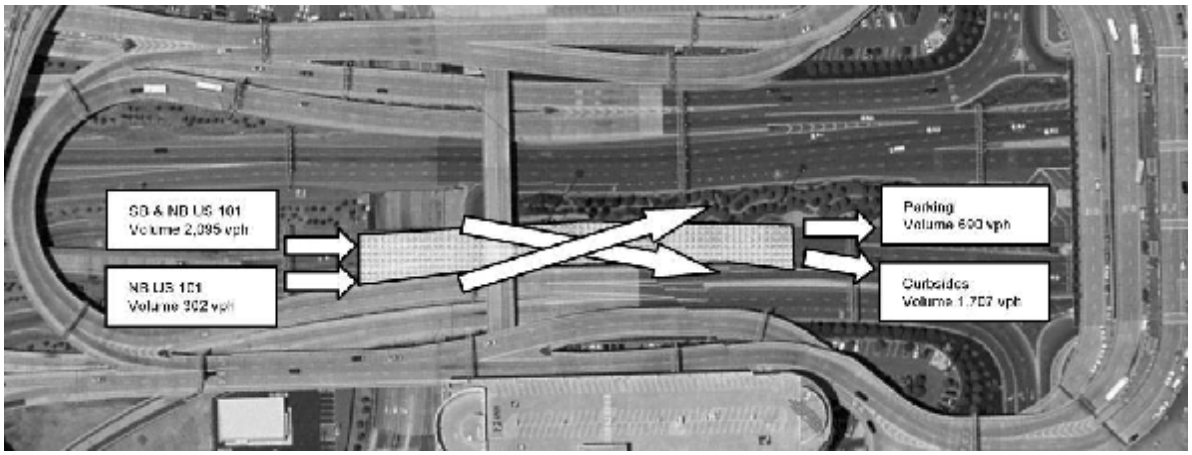
Source: Jacobs Consultany, December 2008
Traffic Surveys conducted by WILTEC Inc., July/August 2007

WEAVING MODULE VALIDATION

In addition to automated traffic recorder counts and manual traffic surveys, video was recorded at San Francisco International Airport for a weaving section on the entrance roadways during peak traffic periods. From video observed during the 15-minute period beginning at 8:45 p.m. on August 3, 2007, the vehicles weaving from northbound and southbound US 101 to parking and curbside roadways were counted (see Figure D-1). It was noted that some conflicts occurred between weaving vehicles, although this effect was slightly obscured by downstream queuing on the arrivals curbside roadway. The weaving module of the QATAR model indicates that the weaving section operated at level of service (LOS) C, which is consistent with observations in the video, thereby validating the module results.

Figure D-1

SAN FRANCISCO INTERNATIONAL AIRPORT WEAVING SECTION



NB = Northbound
SB = Southbound
vph = Vehicles per hour