

Valley Metro Regional Public Transportation Authority (RPTA)

2007 Origin and Destination Study *Final Report*

February 2009



206 Wild Basin Rd., Suite A-300
Austin, Texas 78746
Contact: Jesse Casas, Project Director
(512) 306-9065
Fax (512) 306-9077
www.nustats.com

Table of Contents

Executive Summary	1
Key Findings	1
1. Introduction	3
2. Survey Methods	5
Sampling Plan	5
Approach to Sampling Bus Trips	5
Bus Trip Selection	9
Surveyor Assignments	9
Survey Instrument	10
Survey Procedures	11
Overview	11
Labor Recruitment and Training	12
Survey Administration	12
In-Field Survey Editing	13
Status Reporting	14
Pilot Test	14
Valid Surveys	15
Full-Scale Data Collection Challenges and Solutions	16
Response Rates	17
Data Weighting and Expansion	17
Sample Weighting	18
Sample Expansion	19
Expansion Weight	20
Linked Trip Factor	20
3. Survey Data Analysis	21
Demographics	21
Travel Characteristics	27
Summary	33
4. Survey Data Analysis by Service Type	35
Demographics	35
Travel Characteristics	38
Summary	45
5. Comparative Data Analysis	46
Demographics	46
Travel Characteristics	49
Summary	52
Appendix A: Survey Instruments	53
Appendix B: 2007 General Population Statistics	58
Appendix C: Snapshot of Zip Code Origin/Destination Flows	60
Appendix D: Service Types	63
Appendix E: February 2007 RAPID bus and 2007 O/D Survey RAPID bus Tables (Unlinked Trips)	70
Appendix F: Activity Center Analysis	74
Purpose at Activity Center	75
Activity Center Attraction Flows by District	100
Appendix G: Maps	108

List of Tables and Figures

Table 2-1: Summary Sample Plan	6
Table 2-2: Weekday Sample Goals by Route Type	7
Table 2-3: Data Elements and Capture Method	11
Table 2-4: Response Rates by Service Type	16
Table 2-5: Response Rates by Service Type	17
Figure 3-1: Distribution of Household Size	22
Figure 3-2: Distribution of Household Income	22
Figure 3-3: Distribution of Vehicle Ownership	23
Table 3-1: Cross-Tabulation of Vehicle Ownership by Household Income	23
Figure 3-4: Distribution of Vehicle Availability	24
Table 3-2: Cross Tabulation of Vehicle Ownership by Vehicle Availability	24
Figure 3-5: Distribution of Employment Status	25
Figure 3-6: Distribution of Student Status	25
Figure 3-7: Distribution of Age	26
Figure 3-8: Distribution of Valid Driver's License Status	26
Table 3-3: Distribution of Trip Origin	27
Table 3-4: Distribution of Trip Destination	28
Table 3-5: Distribution of Trip Purpose	29
Figure 3-9: Distribution by Time of Day	29
Table 3-6: Distribution of Trip Purpose by Time of Day	30
Figure 3-10: Distribution by Access Mode	31
Figure 3-11: Distribution by Egress Mode	31
Table 3-7: Distribution of Access Mode by Time of Day	31
Table 3-8: Distribution of Egress Mode by Time of day	31
Table 3-9: Cross-Tabulation of Access by Egress Mode	32
Table 3-10: Distribution of Number of Transfers	32
Figure 3-12: Distribution of Alternate Mode of Travel	33
Figure 3-13: Distribution of Source of Bus Schedule Information	33
Table 4-1: Distribution of Household Size by Service Type	35
Table 4-2: Distribution of Household Income by Service Type	36
Table 4-3: Distribution of Vehicle Ownership by Service Type	36
Table 4-4: Distribution of Vehicle Availability by Service Type	37
Table 4-5: Distribution of Employment Status by Service Type	37
Table 4-6: Distribution of Student Status by Service Type	37
Table 4-7: Distribution of Age by Service Type	38
Table 4-8: Distribution of Valid Driver's License Status by Service Type	38
Table 4-9: Distribution of Time of Day by Service Type	39
Table 4-10: Distribution of Trip Purpose by Service Type – AM Peak Period	39
Table 4-11: Distribution of Trip Purpose by Service Type – PM Peak Period	40
Table 4-12: Distribution of Trip Purpose by Service Type	41
Table 4-13: Distribution of Access Mode by Service Type – AM Peak Period	41
Table 4-14: Distribution of Egress Mode by Service Type – AM Peak Period	42
Table 4-15: Distribution of Access Mode by Service Type – PM Peak Period	42
Table 4-16: Distribution of Egress Mode by Service Type – PM Peak Period	43
Table 4-17: Distribution of Access Mode – Mid-day and Evening Period	43
Table 4-18: Distribution of Egress Mode – Mid-day and Evening Period	44

Table 4-19: Distribution of Alternate Modes of Travel by Service Type	44
Table 4-20: Distribution of Source of Bus Schedule Information by Service Type	45
Table 5-1: Comparison of Household Size	46
Table 5-2: Distribution of Household Income – 2001 Origin and Destination Survey	47
Table 5-3: Distribution of Household Income – 2007 Origin and Destination Survey	47
Table 5-4: Distribution of Household Income – 2007 Census and 2007 ACS	47
Table 5-5: Comparison of Household Vehicle Ownership	48
Table 5-6: Comparison of Employment Status	49
Table 5-7: Comparison of Age	49
Table 5-8: Comparison of Trip Origin	50
Table 5-9: Comparison of Trip Destination	50
Table 5-10: Comparison of Number of Buses Used	51
Table 5-11: Comparison of Alternate Mode of Travel	52
Table 5-12: Comparison of Source of Bus Schedule Information	52
Figure A-1: Survey Instrument (English)	54
Figure A-2: Survey Instrument (Spanish)	56
Table B-1: Household Size (Total Households)	58
Table B-2: Household Income (Total Households)	58
Table B-3: Vehicle Ownership (Total Households)	58
Table B-4: Employment Status (Population Age 16 years or Older)	59
Table B-5: Age (Total Population)	59
Table C-1: Top 10 Origin/Destination Flows by Zip Code	60
Table C-2: Top 10 Origin/Destination Flows by Zip Code – AM Peak Period	60
Table C-3: Top 10 Origin/Destination Flows by Zip Code – Mid-Day	61
Table C-4: Top 10 Origin/Destination Flows by Zip Code – PM Peak Period	61
Table C-5: Top 10 Origin/Destination Flows by Zip Code – Evening	62
Table D-1: Local Bus Routes	63
Figure D-1: Local Bus Routes	66
Table D-2: Express Bus Routes	67
Figure D-2: Express Bus Routes	68
Table D-3: RAPID bus Routes	69
Table D-3: RAPID bus Routes	69
Table E-1: Comparison of Household Vehicle Ownership	70
Table E-2: Comparison of Household Income	70
Table E-3: Comparison of Age	71
Table E-4: Comparison of Trip Origin	71
Table E-5: Comparison of Trip Destination	72
Table E-6: Comparison of Access Mode	72
Table E-7: Comparison of Egress Mode	72
Table E-8: Comparison of Number of Buses Used	73
Table F-1: Purpose at Downtown Phoenix	75
Figure F-1: Downtown Phoenix – Trip Purpose at AM Peak	76
Figure F-2: Downtown Phoenix – Trip Purpose at Mid-Day	77
Figure F-3: Downtown Phoenix – Trip Purpose at PM Peak	78
Table F-2: Purpose at Uptown Phoenix	79
Figure F-4: Uptown Phoenix – Trip Purpose at AM Peak	80
Figure F-5: Uptown Phoenix – Trip Purpose at Mid-Day	81
Figure F-6: Uptown Phoenix – Trip Purpose at PM Peak	82

Table F-3: Purpose at Sky Harbor Airport	83
Table F-4: Purpose at ASU	84
Figure F-7: Arizona State University – Trip Purpose at AM Peak	85
Figure F-8: Arizona State University – Trip Purpose at Mid-Day	86
Figure F-9: Arizona State University – Trip Purpose at PM Peak	87
Table F-5: Purpose at Biltmore Area	88
Figure F-10: Biltmore Area – Trip Purpose at AM Peak	89
Figure F-11: Biltmore Area – Trip Purpose at Mid-Day	90
Figure F-12: Biltmore Area – Trip Purpose at PM Peak	91
Table F-6: Purpose at Metro Center	92
Figure F-13: Metro Center– Trip Purpose at AM Peak	93
Figure F-14: Metro Center – Trip Purpose at Mid-Day	94
Figure F-15: Metro Center – Trip Purpose at PM Peak	95
Table F-7: Purpose at Scottsdale Airpark	96
Figure F-16: Scottsdale Airpark – Trip Purpose at AM Peak	97
Figure F-17: Scottsdale Airpark – Trip Purpose at Mid-Day	98
Figure F-18: Scottsdale Airpark – Trip Purpose at PM Peak	99
Table F-8: Attraction Flow for Downtown Phoenix	101
Table F-9: Attraction Flow for Uptown Phoenix	102
Table F-10: Attraction Flow for Sky Harbor Airport	103
Table F-11: Attraction Flow for ASU	104
Table F-12: Attraction Flow for Biltmore Area	105
Table F-13: Attraction Flow for Metro Center	106
Table F-14: Attraction Flow for Scottsdale Airpark	107
Table H-1: List of Trip Tables	113
Map F-1: Service Area Districts	100
Map G-1: Unweighted Residential Locations of Unique Riders at Zip Code Level	109
Map G-2: Weighted Residential Locations of Unique Riders at Zip Code Level	110
Map G-3: Weighted Distribution of Trip Origins at Zip Code Level	111
Map G-4: Weighted Distribution of Trip Destinations at Zip Code Level	112

Executive Summary

In the Fall of 2007, the Valley Metro Regional Public Transportation Authority (RPTA), with consultant support, conducted an Origin and Destination survey of the Valley Metro riders. The self-administered surveys were conducted among riders of fixed-route bus service: Local, Circulator, Limited, Rural, Express, and RAPID bus. Data collection was performed from October 8 through December 18, 2007. A total of 7,600 valid surveys, as included in the final data files, were collected. The study project involved designing the survey instrument; developing a sampling plan; collecting, processing, and geocoding the collected data; weighting and expanding the data; analyzing the data; comparing the results with 2001 Origin and Destination survey data; and reporting the results. This report documents these tasks.

Key Findings

The objectives of the 2007 Origin and Destination survey analysis were two-fold: (1) Examine the demographics, and (2) Examine the travel behavior characteristics of Valley Metro riders. The survey data used for this analysis was appropriately weighted and expanded to represent the unlinked trips made by Valley Metro riders. Some important findings from the analysis of the Valley Metro riders are summarized below:

- Transit Riders are more likely to be from low-income households. Almost three in four riders belong to households earning less than \$35,000.
- About half of all transit riders are transit-dependent, i.e., they belong to households that do not own any vehicles.
- Two out of every three riders are employed.
- Riders are primarily in the 25 to 54 years of age; young riders in the age range of 18-24 form the second largest group.
- The majority of trips made by riders originate or end at home or work; 44% of riders make home-based work trips using transit, while 40% make home-based non-work trips.
- Walking is the dominant access and egress mode for all riders; more than three-fourths of the riders walk access and egress.
- Nearly two-third of riders make at least one transfer to complete their one-way trip.
- In the absence of transit service, almost one-third of the riders report that they would not make the trip.
- Bus Book is the primary source of bus schedule information used by two-third of the riders.

Further, the demographic characteristics of Valley Metro riders were compared with the general population residing in the Maricopa County. The general population statistics were obtained from 2007 American Community Survey data. The important findings from this comparison are as follows:

- Transit riders are more likely to be from larger, low-income, and zero-vehicle households.
- Riders are more likely to be employed.
- Riders are more likely to be 18 to 54 years of age.

In addition, the transit market was segmented by service type into three categories: Local, Express, and RAPID bus riders; and the demographics and travel behavior characteristics were compared across the three market segments. The key findings are summarized below:

- Compared to RAPID and Express bus riders, Local bus riders are more likely to:

- Be from larger households with five or more members.
- Be from lower income households, with an annual income less than \$35,000.
- Own fewer vehicles.
- Be employed part-time or to not be in the labor force.
- Be less than 25 years of age.
- Use transit to travel to/from destinations other than work in the AM and PM Peak period.
- Walk, rather than drive, to access the bus stop in the AM Peak period.
- Either not make the trip; or walk/bicycle, or drive with someone else to make the trip, if transit service is unavailable.
- Use the Bus Book, rather than the Valley Metro website, for schedule information.

Finally, the 2007 Origin and Destination survey data was compared with data collected on weekday trips during the first quarter of 2001. In order to compare the two surveys, only weekday trips from the 2007 Origin and Destination survey were selected for analysis. The 2001 data were appropriately weighted and expanded to represent "unlinked" trips. At the same time, the 2007 ACS data for the general population residing in Maricopa County were compared to 2000 Census to gain insights into the demographic shifts in the general population during this time period. Some important findings from the analysis of the Valley Metro riders are summarized below:

- Riders are more transit-dependent in 2007 than in 2001 as indicated by:
 - Decline in vehicle ownership.
 - Use of transit to and from a wider variety of locations in addition to home and work.
 - Increase in number of transfers per trip.
 - Increase in the riders reporting that would not have made their trip if the bus had not been available.
- Riders rely more on Valley Metro website; reliance on the Bus Book has decreased.
- Contrary to the demographic shifts in the transit rider population, there has not been any significant shift in the distribution of household size, vehicle ownership, employment status and age of the general population residing in Maricopa County since 2000, with the exception of an increase in households with an annual income of \$60,000 or higher.

The overall response rate for this study is 17.2%. Express and RAPID bus routes have a higher response rate of 42.4% and 37.1% respectively. Local bus routes, on the other hand, have a lower response rate of 15.6%.

1. Introduction

The Valley Metro Regional Public Transportation Authority (RPTA), with consultant support, conducted an Origin and Destination survey of the Valley Metro riders in the Fall of 2007. These surveys provide information about transit passenger demographics and opinions about transit services. The data collected from origin-destination surveys are also used for computer modeling and network simulation for air quality forecasting and long range planning by MAG. In the past Origin and destination surveys were conducted in 1986, 1991, 1995 and 2001. Since the 2001 study there has been significant changes in the transit service in the valley. The 2007 origin-destination survey was a system-wide study to include appropriate level of sampling to reflect all services, including the new, expanded and revised routes

The self-administered surveys were conducted among riders of fixed-route bus service: Local, Circulator, Limited, Rural, Express, and RAPID bus. Data collection was conducted on weekdays (Mon- Fri) from October 8 through December 18, 2007. A total number of 7,600 valid surveys, as included in the final data files, were collected.

Objectives of the 2007 Transit On-Board Survey

There are four objectives for this survey.

1. The first objective was to collect data on transit ridership for the Before Study as required by the Federal Transit Administration (FTA) Final Rule on Major Capital Investment Projects. The Before study requires information on transit service levels and ridership before the implementation of the METRO Light Rail project. Data collection for "before" data must be compatible with the methodology required to gather data to reflect the "after" condition. These procedures must be consistent with FTA guidelines for a Before and After Study.
2. The second objective was to update travel pattern data to be used to calibrate the computer modeling to reflect the current transit system. To meet this objective, a system-wide random sample survey of the Valley Metro fixed route system was collected to get statistically valid data.
3. The third objective was to collect data to reflect target transit markets that may have been under represented in previous surveys. To meet the third objective, the 2007 sample sizes for certain market segments were increased to improve the level of confidence in the survey results. In addition, the guidelines for survey distribution were revised to improve the survey response rate to better represent transit travel patterns by time of day.
4. The fourth and final objective is to improve the quality of the data collected for valid origin and destination trip pairs. To meet this objective, the guidelines for survey editing, address verification and address geocoding were strengthened to include additional steps for quality control. Also, a revised methodology was used to record passenger boarding and alighting counts and locations

This report summarizes the survey methods, 2007 Origin and Destination survey findings, and comparative analysis results of 2001 and 2007 Origin and Destination surveys. Chapter 2 provides a description of the sampling approach, survey instrument and procedures, project challenges and solutions, and weighting and expansion methodology. Chapter 3 provides detailed information on demographics and travel behavior characteristics of Valley Metro riders. Chapter 4 examines demographics and travel behavior characteristics of Valley Metro riders by service type, i.e., Local,

Express and RAPID riders. Chapter 5 provides a comparative analysis of comparable demographics and travel behavior characteristics of Valley Metro riders between 2001 and 2007.

Appendix A includes the English and Spanish survey instruments. Appendix B provides the overall population statistics for Maricopa County from the 2007 Census and the 2007 American Community Survey (ACS). Appendix C lists the top zip code to zip code flows. Appendix D presents the distribution of weighted boardings by route and service type. Appendix E contains weighted data frequencies of Valley Metro RAPID bus riders collected from the February 2007 RAPID bus Survey (that was conducted on February 6 and 7, 2007) and the 2007 Origin and Destination survey. Appendix F includes analysis of major activity centers in the service area. Appendix G presents the maps indicating the residence, origin, and destination locations of the riders. Appendix H presents a list of trip tables that were generated for use in the Regional Transportation Model.

2. Survey Methods

Sampling Plan

A total of 97 Valley Metro routes were sampled on weekdays covering all fixed-route bus service: Local, Circulator, Limited, Rural, Express, and RAPID. A sampling plan was designed to be statistically significant at the route level and to provide a sample size adequate for analysis of weekday bus service. The sampling plan goal was to collect 9,700 valid surveys. The survey data collection resulted in 7,600 valid surveys.

The Valley Metro on-board survey used a standard two-stage sampling approach that consisted of sampling passengers and sampling bus trips. Every passenger over the age of 11 (determined by visual estimation), who boarded the sampled bus, received a survey. If the surveyor was not able to determine whether a rider's age was over 11 by direct observation (which is the standard procedure), the surveyor asked the boarding passenger if they were over 11 years old.

Approach to Sampling Bus Trips

The RPTA consultant on this survey study, NuStats, prepared a plan to sample weekday bus trips that was statistically significant at the system and route levels. In addition, the statistical accuracy level was tiered to allow for a lower standard error level for the most productive lines, mid-level standard error level for mid-ridership level lines, and the highest standard error level for lines that do not carry enough daily riders to obtain a larger sample size and therefore a lower standard error level. The proposed sample plan was based on three main factors:

- First, the plan ensured that the sample adequately met data needs at the route level.
- Second, the plan ensured the collection of adequate samples at the various times of day. Times of the day (TOD) are defined as AM Peak (3:01 a.m.–9:00 a.m.), Mid-day (9:01 a.m.–3:30 p.m.), PM Peak (3:31 p.m.–6:00 p.m.), and Night (6:01 p.m.–3:00 a.m.).
- Third, the plan ensured that the sample was segmented by direction.

Specifically, NuStats sampled all major Valley Metro bus routes as directed by RPTA at the 95% confidence level shown in Tables 2-1 and 2-2. The sample plan was based on the average daily ridership from October 2006. The overall sampling criteria are listed in Table 2-1, followed by individual route goals in Table 2-2.

Table 2-1: Summary Sample Plan

Route Category	Average Weekday Riders	Sample Size	Confidence Level
Fixed-Route Local	185,347	7,300	95% +/- 1.5% Local
10,000+ riders (Rts Green, Red, 41)	32,006	1,200	95% +/- 5% 400 each route
7,500–9,999 riders (Rts 19,17,3)	26,753	1,200	95% +/- 5% 400 each route
5,000–7,499 (Rts 00, 07, 16, 24, 35, 50, 72)	42,948	2,100	90% +/- 5% 300 each route
2,500–4,999 (Rts 08, Blue, 10, 27, 30, 43, 44, 45, 59, 61, 81, 90, 106, 170)	50,287	1,400	95% +/- 10% 100 each route
2,000–2,499 (Rts 56, 60, 67, 77)	9,057	300	90% +/- 10% 75 each route
Routes that change with LRT but not included in previous strata (Rts 104, 15, 13, 96)	4,898	300	90% +/- 10% 75 each route
West Valley route group (Rts 51, 70, 80, 131, 138, 186)	6,354	300	90% +/- 5% 300 route group
Phoenix route group (Rts 12, 32, 52, 122)	2,661	100	95% +/- 10% 100 route group
Tempe/East Valley route group (Rts 01, 62, 65, 66, 76, 92, 108)	7,048	300	90% +/- 5% 300 route group
East Valley route group (Rts 84, 112, 114, 120, 128, 136, 156)	3,335	100	95% +/- 10% 100 route group
Circulators	11,723	575	95% +/- 5% Circulator
10,000+ riders FLASH Tempe	5,852	300	90% +/- 5% each route
2,500–7,500 riders FLASH Escalante	2,877	100	95% +/- 10% each route
1,000–2,000 riders ALEX and DASH	2,666	150	90% +/- 10% 75 each route
Less than 1,000 riders GUS	328	25	Best efforts
Limited Service Rts 7th Street, 371	355	25	Best efforts Limited
Rural Route Rts 660, 685	36	10	Best efforts Rural
Rapid and Express Rts 400, 450, 460, 480, 510, 512, 520, 521, 531, 532, 533, 540, 541, 560, 570, 571, 581, 582, 590	5,841	1,600	95% +/- 2.5% Express
Contingency— New routes introduced 2007 (Rts 154, 534, 572, 573, DUR, MARY, MERC, SNCN, SSCR, STRL)	190	Best efforts	
TOTAL SYSTEM	203,302	9,700	95% +/- 1%

Note: Route Category does not correspond with Table 2-2 Route Name.

Table 2-2: Weekday Sample Goals by Route Type

Route	Route Name	Average Daily Ridership	Retrieval Goal	Actual Retrieval	% of Goal
<i>Fixed-Route Local</i>					
Green	Avondale/Scottsdale/Phx	11,706	400	264	66%
Red	Tempe/Mesa/Phx	10,077	400	308	77%
41	Avondale/Scottsdale/Phx	10,223	400	242	61%
19	Phoenix	9,079	400	341	85%
17	Scottsdale/Phx	9,106	400	204	51%
3	Avondale/Phx/Tolleson	8,568	400	258	65%
35	Phoenix	7,457	300	332	111%
24 ¹	Glendale/Phx	6,956	300	0	--
0	Phoenix	5,899	300	132	44%
50	Scottsdale/Phx	5,842	300	184	61%
16	Phoenix	5,865	300	286	95%
7	Phoenix	5,706	300	269	90%
72	Tempe/Scottsdale/Chandler	5,223	300	373	124%
61	Tempe/Mesa/Phx	4,952	100	82	82%
45	Tempe/Mesa/Phx	4,385	100	74	74%
Blue	Phoenix	4,049	100	89	89%
27	Phoenix	4,719	100	135	135%
106	Scottsdale/Glendale/Peoria/Shea	3,812	100	91	91%
30	Tempe/Mesa/Phx	3,584	100	107	107%
10	Phoenix	2,891	100	79	79%
8	Phoenix	3,284	100	86	86%
170	Scottsdale/Glendale/Phx	3,294	100	101	101%
43	Phoenix	3,228	100	94	94%
81	Tempe/Scottsdale/Chandler	2,995	100	122	122%
44	Tempe/ParadiseValley/Phx	3,151	100	81	81%
90	Glendale/Phx	2,973	100	101	101%
59	Glendale/Phx	2,970	100	48	48%
56	Tempe/Phx/Guadalupe	2,047	75	90	120%
77	Tempe/Mesa/Phx	2,273	75	156	208%
67	Glendale/Phx	2,419	75	47	63%
60	Glendale/Phx	2,318	75	65	87%

¹ This route was discontinued.

Route	Route Name	Average Daily Ridership	Retrieval Goal	Actual Retrieval	% of Goal
104	Mesa/Chandler	1,553	75	98	131%
15	Phoenix	1,242	75	132	176%
13	Phoenix	1,286	75	53	71%
96	Mesa	817	75	74	99%
51, 70, 80, 131, 138, 186	Glendale/Phx/Avondale/Goodyear	6,354	300	417	139%
12, 32, 52, 122	Phoenix	2,661	100	101	101%
01, 62, 65, 66, 76, 92, 108	Tempe/Scottsdale/Phx/Mesa/Chandler/Gilbert	7,048	300	284	95%
84, 112, 114, 120, 128, 136, 156	Mesa/Chandler/Gilbert/Phx/Scottsdale	3,335	100	151	151%
<i>Circulators</i>					
ALEX	Phoenix	1,154	75	28	37%
DASH	Phoenix	1,512	75	24	32%
FLASH	Tempe	5,852	300	122	41%
Escalante	Tempe	2,877	100	0	--
GUS	Glendale	328	25	19	76%
<i>Limited Service</i>					
7th St, Grand Ave	Phoenix/Glendale/Peoria/Phx	355	25	29	116%
<i>Rural Routes</i>					
660, 685	Wickenburg/Ajo/Gila Bend Connector	36	10	4	40%
<i>Express Routes</i>					
510	Scottsdale/Phx	86	22	22	100%
512	Scottsdale/FountainValley/Phx	89	23	14	61%
520	Tempe/Phx	112	29	16	55%
521	Tempe/Phx	247	63	69	110%
531	Tempe/Mesa/Phx/Gilbert	241	61	64	105%
532	Tempe/Mesa/Phx	161	41	36	88%
533	Mesa/Phx	261	67	65	97%
540	Tempe/Chandler/Phx	132	34	40	118%
541	Mesa/Chandler/Phx/Tempe	330	84	91	108%
560	Avondale/Phx/Tolleson	95	24	26	108%
570	Glendale/Phx	60	15	5	33%
571	Phoenix/ Surprise	103	26	22	85%
581	Glendale/Phx	114	29	16	55%
582	Phoenix	114	29	20	69%

Route	Route Name	Average Daily Ridership	Retrieval Goal	Actual Retrieval	% of Goal
590	Phoenix	131	33	22	67%
I-10 East RAPID	Phoenix	987	252	170	67%
I-10 West RAPID	Phoenix	681	174	136	78%
I-17 RAPID	Phoenix	1,206	308	138	45%
SR-51 RAPID	Phoenix	691	176	106	60%
	Adjusted for Express (50%+ response)		110		
<i>Contingency</i>					
	Allocation for New Routes 2007		190	145	76%
	TOTAL:	203,302	9,700	7,600	78%

Note: Route Name does not correspond with Table 2-1 Route Category.

Bus Trip Selection

The number of sampled bus trips was calculated by assuming an average response rate of 20% (depending on service type and service period) of typical rider loads by trip. Thus, a route that had an average load of 500 riders and made 10 trips a day was determined to have an average rider load of 50 riders per trip. Assuming the route had a sample goal of 50 valid surveys, it was determined that five bus trips would need to be sampled to meet the requirements at an estimated 20% response rate ($500/10 = 50 \times .20 = 10$; $50/10 = 5$). The number of trips sampled was rounded up to the nearest whole number for trip selection purposes if a decimal arose in the calculation. It should be noted that Express and RAPID routes were sampled with an expected response rate of 40%, so the number of trips needed for these types of routes were calculated using 40% rather than 20%.

Bus trips were clustered by block for the purpose of efficient use of surveyor labor. The use of clusters had the further advantage of de facto stratification by direction (i.e., most runs consist of bus trips alternately traveling inbound, outbound, etc.), as well as stratification by time of day, and also by route if multiple routes were contained in a block.

Surveyor Assignments

The final sampling task was the uploading of sampled bus trips to a Web-based field management system to create surveyor assignment sheets. The selected clusters of trips were drawn based on the following parameters to produce surveyor assignments:

- Consecutive trips within the same block/run
- The cluster of trips starting and ending at the same location
- Trips within the cluster were unique to the cluster

Surveyor assignment sheets were printed from the Web-based management system and included the organized bus trips to be sampled, along with necessary information for getting to and from the assignment. The assignment sheets were also bar-coded to link them to the field management system. A sample assignment sheet is presented in Figure 2-1.

Figure 2-1: Sample Assignment Sheet

Phoenix OB ASSIGNMENT

Assignment Number: 101
Route: PHX-0032

Please Report to: 44th St & Washington St @ 7:39 AM
Returns to: South Garage @ 12:57 PM



Surveyor: _____
Counter: _____
Date: _____
iQue: _____

Questionnaires Issued: _____ to _____
and: _____ to _____
Total Recommended: _____

TRIP #	ROUTE	BLOCK PATTERN	DIRECTION	START TIME	START LOCATION	END TIME	END LOCATION	QUESTIONNAIRE START NUMBER
1	PHX-0032	106	1 NORTHBOUND	7:49 AM	44th St & Washington St	8:44 AM	Paradise Valley Community College	
2	PHX-0032	106	4 SOUTHBOUND	8:59 AM	Paradise Valley Community College	10:00 AM	44th St & Washington St	
3	PHX-0032	106	1 NORTHBOUND	10:19 AM	44th St & Washington St	11:14 AM	Paradise Valley Community College	
4	PHX-0032	106	4 SOUTHBOUND	11:29 AM	Paradise Valley Community College	12:30 PM	44th St & Washington St	

Comments

A. Was entire assignment completed? Yes No If No... Vehicle Breakdown? Surveyor Illness? Other

B. Standing passengers on all or part of trip?

C. Other

Survey Instrument

The survey instrument was designed as a self-completion survey with 18 self-coded questions. The set of data items is presented in Table 2-3. Prior to data collection, returned surveys were defined as “complete” and “usable” if applicable questions were answered up to and including the question regarding reasons for taking the routes listed in the route sequence question (Question 9). These items were: origin, destination, trip purpose, access mode, egress mode, transfers, bus routes used, and vehicle availability (see sample survey in Appendix A.)

Surveys were attractively designed in a two-sided double letter-size format and printed on heavy card stock for easy distribution and completion. Each survey contained a business reply mail permit for off-bus completion and mail-back. The form was pre-printed with a unique serial number and bar code, which linked each survey to distribution on a specific trip. Text on the survey invited passengers to register to win a monetary prize, of \$100, by providing their name, telephone number, and home address. This technique captured accurate information for home address, which for a majority of trips was either the trip origin or the trip destination. The survey was designed to obtain information in three major categories: origin/destination travel patterns, access and egress modes, and rider demographics. As noted in Table 2-3, some of the required data elements were captured by means other than a question on the survey. This approach had multiple benefits: (1) the survey was shorter to enhance response rates, and (2) data quality was improved by circumventing respondent-provided information. The survey was available in two languages, English and Spanish.

Table 2-3: Data Elements and Capture Method

Data Elements	Capture Method
Day of Travel	GPS-enhanced Palm device
Time of Travel	GPS-enhanced Palm device
Route	GPS-enhanced Palm device
Survey Language	Field Code by editor
Home Address	Survey
Origin Address	Survey
Destination Address	Survey
Bus Stop On	GPS-enhanced Palm device
Bus Stop Off	Imputed using information from other sources: Destination, Egress Mode, Distance, and GPS data on bus stops for the sampled trip
Trip Purpose	Survey
Access Mode	Survey
Egress Mode	Survey
Previous transfer information	Survey
Future transfer information	Survey
Vehicle Availability	Survey
List of buses used for trip	Survey
Alternative Travel Mode	Survey
Number of Vehicles in HH	Survey
Household Size	Survey
Passenger Age	Survey
Valid Driver's License	Survey
Student Status	Survey
Employment Status	Survey
Source of Bus Schedule Information	Survey
Household Income	Survey

Survey Procedures

Overview

At each stop, surveys were distributed by the surveyor to all boarding passengers over the age of 11. Concurrently, a "counter" counted each boarding and alighting passenger. The counters used a GPS-enhanced Palm device (see Figure 2-2).

Figure 2-2: GPS-Enhanced Palm Device for On-Board Counts



The Palm device recorded the location and time (arrival and departure) at each bus stop, and counters entered the number of passengers boarding and alighting. By entering the top survey number into the unit prior to arrival at a bus stop, this process linked a sequence of surveys directly to a bus stop (using Valley Metro digitized bus stop list). The data were uploaded daily into a Web-based field management system designed to manage surveyor assignments, provide progress reports and data summary tables, and monitor field staff performance.

Labor Recruitment and Training

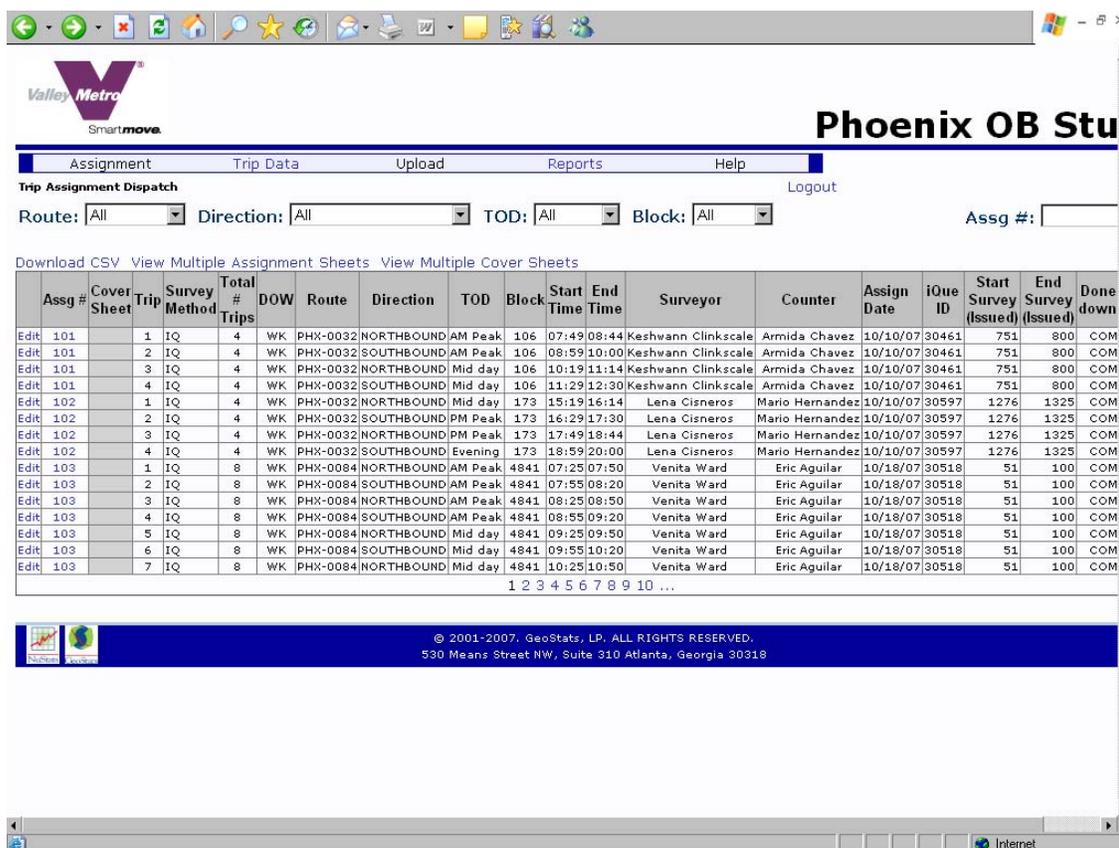
Surveyors were required to have lived in the service area and were screened to ensure they had good work habits, were personable, honest, mature, had reliable personal transportation, and paid attention to details. Surveyors were trained to read and understand assignment sheets and were taught basic survey procedures, etiquette, and how to approach riders. The training included two hours of role-playing and intensive tutoring. Counters were trained in the use of the hand-held Palm devices, the ride count program, and on-board etiquette. Following completion of initial assignments, surveyor teams were required to return to the survey command center where supervisors verified the accuracy of the surveyors' work. Assignments were then handed out for the next day.

Survey Administration

The full survey was managed by an in-field survey team comprising 1) a field manager to oversee the entire field team, 2) a surveyor assistant to manage surveyors, and 3) a counter assistant to manage the counters and provide ridership count quality assurance for uploads/downloads to the Web-based field management system. Initial trainings were conducted on October 8 and 9, 2007, prior to the start of data collection. Subsequent to these initial trainings, three additional training sessions were held on an as-needed basis to maintain sufficient surveyor levels. A surveyor manager was on site for the entire field period.

On-board data collection was conducted by teams that consisted of a surveyor and a counter. The surveyor handed out surveys, persuaded passengers to complete the surveys, assisted with questions, collected surveys, and distributed one free-ride ticket to each person who completed the survey. The counter entered the survey numbers into the hand-held unit to link surveys to a bus stop, counted the passengers boarding and alighting, ensured the unit had picked up accurate GPS location coordinates, collected surveys, and validated passenger loads after each stop. Daily surveyor assignments were distributed by the surveyor manager or by the assistants. See Figure 2-3 for a sample of the Web-based assignment screen.

Figure 2-3: Sample Assignment Management Screen



As assignments were handed out, information was updated in the Web-based field management system. When surveyors and counters returned from an assignment, the surveyor manager or assistant checked the assignment results (i.e., quickly reviewed the surveys to spot any glaring performance issues) and downloaded the passenger count data from the Palm devices. If the surveyor managers or assistants noticed errors with the assignment results (i.e., incomplete data on the surveys), those specific surveys were then pulled for in-field survey editing, and surveyors and counters were reminded to look for errors while in the field. The surveyor manager updated the assignment status in the Web-based field management system and then handed out the next assignment. Once the completed assignments were reviewed, the surveys were sent to the local editing team, Westgroup Research, for inspection and coding prior to being sent to Austin, the location of NuStats' headquarters, for scanning and verification.

In-Field Survey Editing

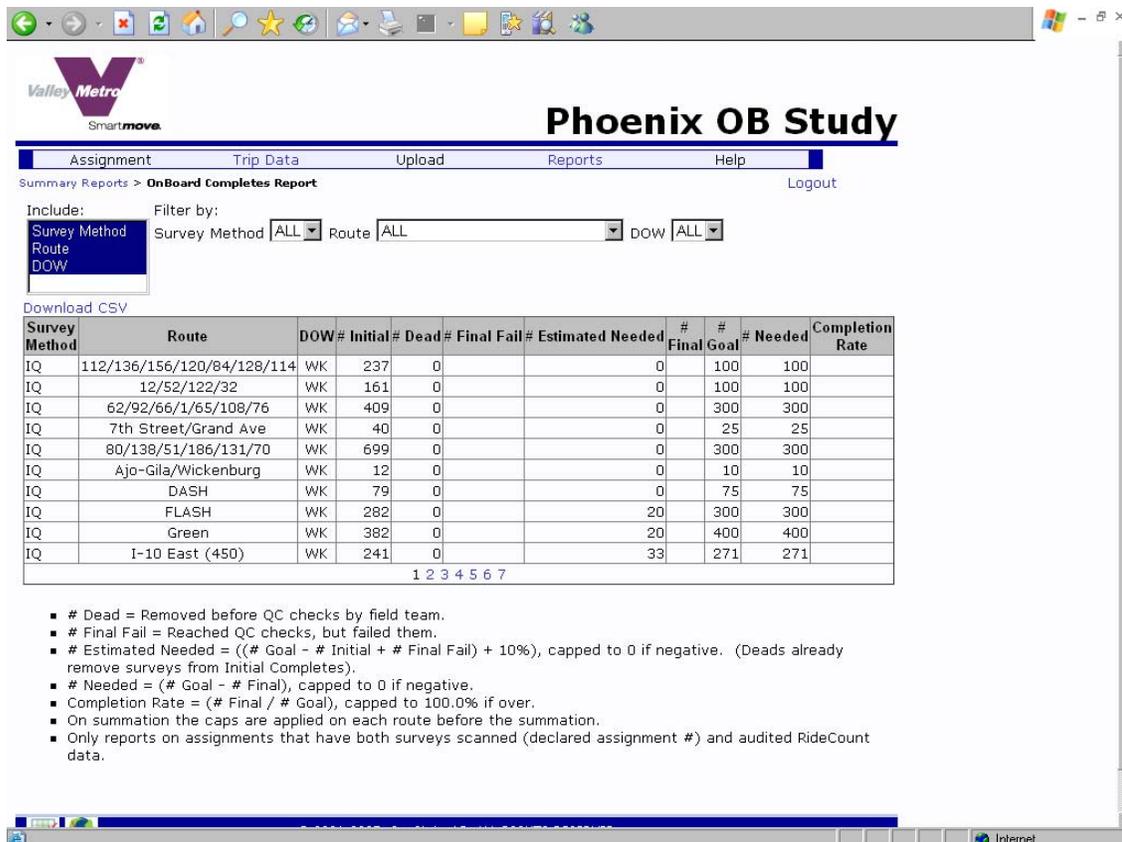
Following the surveyor check-in, completed surveys were presented to on-site data editors for editing and correction. As previously mentioned, the data editors were local employees of Westgroup Research who were familiar with the geography of the transit service area and also with Survey Research. Data editors reviewed each completed survey and used geographic resources to complete or correct address information. Because the origin and destination questions are the most difficult to collect, using these geographic resources to "clean" addresses provided a means to "save/salvage" as many surveys as possible. After each survey had been reviewed, the bar codes were scanned on the survey using a procedure that identified the survey as a "complete." This information was uploaded to the field management system as one data input for the status reports. "Complete" surveys were sent to Austin for scanning and verification. Data editors were also employed to call back riders who turned in surveys that were less than complete. The phone

number came from the survey and allowed for more partially filled out surveys to be converted to completed surveys.

Status Reporting

The surveyor manager prepared status reports from the Web-based field management system. This automated application conducted consistency checks, flagged problem records, and cleaned and purged flagged records. The surveyor manager reviewed this information for accuracy in the status, response, and performance reports to the Web-based field management system. A sample report is shown in Figure 2-4.

Figure 2-4: Sample On-Board Completes Report



Pilot Test

A pilot was conducted from August 21 through August 24 prior to the implementation of the full data collection effort to begin in October. The purpose of the pilot was to assess the training procedures and response to the survey (both from data item response and respondent participation).

Surveyor and counter training occurred on Tuesday August 21 with eight team members. The Consultant had originally planned on training twelve members, six from each temp agency, but due to the remote training location without bus access, four members from one temp agency dropped out at the last minute. Each attendee was trained on both the surveying and counting tasks to allow for optimal and efficient resource allocation for the data collection effort.

The following routes were recommended and surveyed for the pilot: 8, 77, Blue, Green, and DASH. These routes were chosen because of their unique ridership characteristics and potential difficulties (heavy and low ridership, heavily Spanish-speaking only, free service, long and short routes). These routes did prove to be difficult, resulting in a minimal response rate of only 13%. Based on previous

surveys, it was expected that a lower than typical response rate would be experienced during the pilot because of the short timeframe for data collection and the limited amount of time surveying teams could adjust to the surveying process, and because of the purposeful selection of heavy ridership and other difficult-to-survey routes. During pilot data collection, security issues were encountered (for instance, a passenger threatened a surveyor with a knife, and a fight broke out causing a counter to drop his PDA). Because of these incidences, distributed surveys and counts could not be collected and recorded respectively.

Overall, the pilot data completeness and quality appeared to be a bit low for a self-administered on-board survey. Of the surveys identified as incomplete, the following were the typical problems found:

- Origin and Destination address information given by the respondent was the same physical address, usually home to home, but there were other incidences of the same address listed twice.
- Either the Origin or the Destination was missing.

As previously stated, the pilot was a limited success with regards to the surveyor and counter training, passenger participation, and data completeness and quality. This implied that a few changes were needed before beginning the full-scale data collection in order to improve upon our pilot success:

1. In reviewing the completed surveys, the Consultant, in consultation with the RPTA project manager, decided it would be more efficient to move the intersecting streets option for the origin and destination variables directly after the full address option (after number and street and before the city variable). In several instances, intersecting streets were provided in the full address spacing only to be crossed out and rewritten later in the intersecting street section. Moving this part of the address will provide better direction for the respondent to record intersecting streets if they do not know the exact address.
2. It was decided to remove the question regarding future light rail use for the full-scale data collection. In addition, there were slight changes in question order. This allowed for additional white space and a larger font. It was thought that doing so would decrease the initial intimidation factor of the survey.
3. The Consultant attempted to increase participation from the Spanish-speaking-only riders because only two riders completed surveys. It is understood that this market is typically underrepresented due to many issues beyond the control of data collection techniques and methods. The Consultant provided surveyors with a "cheat sheet" written in Spanish containing a basic explanation of the importance of the survey.
4. Another recommendation enacted to increase Spanish-speaking-only participation was to reach out to Hispanic communities and stress the importance of this study. It was also important to recruit directly from these communities in order to minimize the intimidation factor. One idea used by the employment agencies was to advertise for surveyors in the Hispanic newspaper "La Voz" and its sub-publications.
5. It was determined that wearing purple Valley Metro purple T-shirts would also reduce potential intimidation from the surveyors, making them look more closely associated with Valley Metro rather than a random survey company.

Valid Surveys

Table 2-4 presents the distribution of valid surveys by service type. Overall, 7,600 valid surveys were collected, out of which 6,487 surveys were collected from Local riders, 563 surveys from Express bus riders, and 550 surveys from RAPID bus riders.

Table 2-4: Response Rates by Service Type

Service Type	Valid Surveys	
	Count	Percent
Local	6,487	85.3%
Express	563	7.4%
RAPID	550	7.3%
<i>Overall</i>	7,600	100.0%

Full-Scale Data Collection Challenges and Solutions

In any on-board survey, there will be challenges to overcome during data collection. While the pilot test identified some issues, NuStats encountered additional challenges in the field, and the Consultant attempted to make improvements to their data collection methods in response. The Consultant worked with RPTA on these issues during the course of the data collection effort.

The majority of the challenges were related to the attrition rate of the employees hired as surveyors and counters. Many steps were taken to maintain a sufficient labor pool. The original project plan was to train 40–45 people to start data collection. The Consultant secured the services of two employment agencies to reach this number of people, with each being responsible for providing 20–25 people. Although, each agency had over 30 people confirmed to attend, at the end of both trainings, the Consultant had a total of 40 employees set to go on their first assignment. The Consultant ultimately required three additional trainings of 10 people each and a third temp agency to provide a different pool of employees. This provided us with over 70 people trained for this data collection effort, far more than the Consultant has previously trained for an on-board survey project of this size.

A bonus structure was put in place as a means to retain employees. This structure was introduced with subsequent training sessions. All people from the original training sessions became eligible for the bonus as well. With three weeks remaining in the original data collection period, the Consultant offered a \$100 bonus for any employee that successfully completed 10 assignments in that period. If they successfully completed 15 assignments in that time (essentially working every day), they would receive an additional \$150 bonus. When data collection was extended to after Thanksgiving, these same parameters were extended through the first week of data collection after Thanksgiving, allowing 19 days of data collection in order to reach the bonus levels. Going into the second and third weeks after Thanksgiving, the Consultant began a weekly bonus structure paying \$100 to anyone who worked the full week, and \$50 to those who worked four days in the week.

Another challenge in the data collection process involved the basic set-up of the Valley Metro system for the purposes of surveying. Because geographical coverage includes a large number of square miles, the transit system is set up as a grid. This, combined with the lack of a true single Central Business District in the region, means that routes begin and end at the four geographic corners of the region. Originally, the plan to address this was to institute a “moving” command center that would start in Tempe, then move to West Phoenix, and then to North Scottsdale. As it became apparent that employees came from different parts of the region, it made more sense to keep the command center in a single location and allow the employees to work primarily in their geographic comfort zone. This method created long travel distances when checking in after an assignment for those who did not live near the command center.

Another by-product of the vast geographic spread was that owning a vehicle became almost mandatory to work on the project, unless the employee lived relatively close to the command center. The Consultant generally likes their employee pool to have a good mixture of those who rely

primarily on public transit and auto ownership to staff a project of this type. It is desirable to have bus riders because of their general comfort with the bus system and familiarity with the types of people riding. In addition, there are often starting and ending locations where parking is difficult. These assignments are handled by those who use public transit as their primary means of travel. Long travel times contributed to employee attrition.

Another data collection challenge was the nature of trips for the RAPID/Express type routes. When the original planning was conducted, it was thought that collection on these route types would not necessitate the number of assignments that were inevitably conducted. The length and peak hour nature of these trips resulted in short work assignments. The Consultant gave the employees extra time for them as an incentive in addition to bonus potential.

Response Rates

The response rate was calculated as follows. It is the number of valid surveys as a percent of the total number of adult boarding passengers. Overall, 44,261 adults boarded the surveyed routes. Approximately 21,352 surveys were handed out and 7,600 valid surveys were collected. The response rate for the study was 17.2%. Table 2-5 presents the response rates by service type. Express and RAPID bus routes have a higher response rate of 42.4% and 37.1% respectively. Local bus routes, on the other hand, have a lower response rate of 15.6%.

Table 2-5: Response Rates by Service Type

Service Type	Adult Boarding Passengers ²	Valid Surveys	Response Rate
Local	41,451	6,487	15.6%
Express	1,327	563	42.4%
RAPID	1,483	550	37.1%
<i>Overall</i>	44,261	7,600	17.2%

Data Weighting and Expansion

From a finite population sampling theory perspective, analytic weights are needed to develop estimates of population parameters and, more generally, to draw inferences about the population that was sampled. Without the use of analytic weights, population estimates are subject to biases of unknown (possibly large) magnitude.

In on-board surveys, the universe of trips operated by transit routes cannot be sampled. At the same time, all the riders who board the sampled routes cannot be surveyed due to non-response. All these factors lead to biases in the survey data. Consequently, sample weighting and expansion is critical to account and correct for these biases. In particular, sample weighting adjusts for non-response at the bus stop level and accounts for sampling trips at the route, time, and direction level (RTD). Sample expansion on the other hand, expands the weighted sample to reflect the population ridership at the system-wide level. The next section describes the sample weighting

² The adult boarding passenger counts were collected at each bus stop of the surveyed routes by counters during the survey process. The counts were collected using GPS-enhanced Palm device, as described in the Survey Procedures section in this chapter.

procedure followed by the sample expansion procedure, calculation of the final analytic weights, and calculation of linked trip factor that translates boardings (i.e., unlinked trips) to linked trips.

Sample Weighting

Sample weighting is a critical consideration to account and correct for biases in the survey data. As a simple example, one route may have 1,000 passengers per day and another, 100 passengers. If 50 surveys were collected on each route, the percentage collected would be 5 and 50%, respectively. Without weighting, the data collected on the route with 100 passengers would be over-represented in the results. Thus, weighting balances these differences and aligns the weighted sample to the known distribution of population ridership.

The sample weighting process includes calculation of two weights: (1) Response factor that corrects for non-response at the bus stop level, and (2) Vehicle factor that corrects for sampling trips at the route, time of day, and direction (RTD) level. The Boarding factor, or weight, is the product of the Response factor and Vehicle factor. Each of these factors is discussed below in detail.

Response Factor

Response factor adjusts for non-response associated with boarding passengers that do not return usable surveys³ at each bus stop where a passenger boards. In order to capture all the non-responding boarding passengers, the Response factor is calculated at the bus stop level.

In an ideal world, the Consultant would expect to get completed surveys from every bus stop where one or more adult passengers boarded the bus. However, because of the complexity of the data collection process and non-response issues, the Consultant was faced with three scenarios that had implications on the calculation of the bus stop response factor for weighting. These include (1) no completed surveys at bus stops where at least one adult boarded the bus (response issue), (2) fewer adult boardings than the number of completed surveys collected at the bus stop (counter error), and (3) unidentified bus stops.

Bus Stops with Non-Zero Boardings and Zero Completes

Of the 25,067 bus stops along surveyed routes (i.e., sampled trips in which a passenger boarded at a stop), 11,137 bus stops have non-zero boardings and zero completes. The Consultant applied a bus stop grouping methodology to these 11,137 bus stops. This bus stop grouping method was applied to the unique trips that include these bus stops of interest. Specifically, based on the sequence of the bus stops in the unique trip and the distance between bus stops, the bus stops of interest (with non-zero boardings and zero completes) were grouped with either the subsequent or the previous stop. In particular, the bus stop of interest was grouped with the closest bus stop. However, if the previous and the subsequent stops have zero boardings and zero completes, the bus stop of interest was grouped with the second previous and subsequent stop, and so on.

Bus Stops with Fewer Boardings than Completes

Of the 25,067 bus stops on surveyed routes, 1,095 bus stops have fewer boardings than completes, including 750 bus stops with zero boardings and non-zero completes. These stops were addressed in the following way: based on the sequence of the bus stops in the unique trip that includes these bus stops of interest, the Consultant grouped the bus stop of interest (with boardings less than completes) with the subsequent stops (i.e., bus stops in the direction of the trip). If a resolution was not reached by grouping with subsequent bus stops in the direction of the unique trip (i.e., total

³ Each record in the database represents a usable survey (i.e., one that has passed all quality assurance procedures).

boardings were not equal or greater than the completed surveys at the group level), the bus stop of interest was grouped with previous ungrouped bus stops (i.e., bus stops in the opposite direction of the trip). The regrouping was carried out until a resolution was reached (i.e., the boardings were at least equal to the total number of completed surveys at the group level). Following the application of this method (i.e., after grouping the bus stop of interest with all other bus stops in the unique trip), if the total boardings were less than the total completed surveys at the group level, a response factor of 1 was assigned to all the bus stops in the unique trip.

Unidentified Bus Stops

The unidentified bus stops include stops that could not be geocoded (and hence could not be identified) with missing information on either the boardings or the completed surveys. Of the 25,067 bus stops on the surveyed routes, 176 bus stops were unidentified. These stops were grouped in the following way: the boardings on the unidentified bus stops with missing information on the completed surveys were distributed to all the other bus stops and/or bus stop groups in the unique trip. For example, for a given unique trip, if the identified bus stops/bus stop groups had a total of 40 boardings, and an unidentified bus stop had 10 boardings, the response factors on all the identified bus stops/bus stop groups in this trip were multiplied by a factor of 1.25. On the other hand, unidentified bus stops with missing boarding information were assigned a response factor of 1.

Following the grouping of the bus stops of interest using the aforementioned methodology, the bus stop response factor was calculated (see formula below for Bus Stop Response Factor).

$$\text{Response Factor} = \text{Total Adult Boardings}^4 \text{ by Bus Stop} / \text{Usable Surveys by Bus Stop}$$

Vehicle Factor

Vehicle factor accounts for the non-surveyed trips at the RTD level. The times of days used in the weighting process are: AM Peak and PM Peak for Express routes; and AM Peak, Mid-day, PM Peak, and Evening for all other routes.

The total one-way trips and total sampled trips will be calculated for each RTD based on this population run cut file. For example, if Route 1 has a total of 11 trips in the AM Peak that are northbound, but only two were surveyed, its Vehicle factor is 11 divided by 2, or 5.5.

$$\text{Vehicle Factor} = \text{Total Trips per RTD} / \text{Sampled Trips per RTD}$$

Boarding Factor

Following the calculation of the three weighting factors, the Boarding factor is calculated by multiplying the Response and Vehicle factors.

$$\text{Boarding Factor} = \text{Response Factor} * \text{Vehicle Factor}$$

Sample Expansion

Sample expansion factors increase the weighted sample to the total boardings at the system-wide level. In particular, the survey data is expanded to represent 2007 average daily ridership at the

⁴ Adult Boardings are defined as boardings made by individuals over 11 years of age that qualify them for taking the survey.

route level. This information was provided by RPTA. The calculation of the Expansion factor is described below.

Expansion Factor

The Expansion factor is calculated at the route level using the formula below. As an example, assume that the weighted sample ridership for Route 731 is 7,270 and the population average daily weekday ridership for this route is 7,742. This produces an expansion factor of 1.06 (7,742 divided by 7,270).

$$\text{Expansion Factor} = \text{Population Average Daily Ridership} / \text{Ridership Weighted by Boarding Factors}$$

Expansion Weight

The final sample 'weighing and expansion' weight is referred to as the Expansion weight. In particular, the Expansion weight is calculated by multiplying the Boarding factor (i.e., weighting factor) by the Expansion factor. Following the application of the Expansion weight, the weighted data represents the population boardings (i.e., unlinked trips).

$$\text{Expansion Weight} = \text{Boarding Factor} * \text{Expansion Factor}$$

Linked Trip Factor

Linked trip factor translates boardings (i.e., unlinked trips) to linked trips. This factor accounts for the rider's transfer before or after the surveyed bus. A rider who did not transfer during the completion of a one-way transit trip would carry a linked trip factor of 1.0. A rider who transferred from another route before boarding the surveyed bus, but did not intend to transfer again, would have a weight of 0.5, as would a rider who did not transfer before boarding the surveyed bus, but who intended to transfer in order to get to the ultimate destination. A rider who transferred to and from the surveyed bus would have a weight of 0.333. The linked trip factor is calculated for every rider who completed the survey. This weight will be provided as a stand-alone weight. Following the application of this factor to the weighted data (i.e., data weighted by the Expansion weight), the information can be expressed as 'linked' trips instead of individual boardings.

Based on the methodology outlined in this section, the survey data was appropriately weighted and expanded to be representative of all the unlinked trips, i.e., individual boardings. Different trip tables were generated for use in the Regional Transportation Model. Appendix H presents a list of the trip tables.

3. Survey Data Analysis

This chapter provides detailed information on the demographics and travel behavior characteristics of the Valley Metro riders and concludes with a summary of key findings. The survey data used for analysis was appropriately weighted and expanded to be representative of all the unlinked trips, i.e., individual boardings.

Demographics

This section describes the demographics of Valley Metro riders including household size, household income, vehicle ownership, vehicle availability, employment status, student status, age, and valid driver's license status. It should be noted that the statistics vary depending on type of transit service i.e., Local, RAPID, or Express bus service, and have been discussed in detail in Chapter 4.

In addition, this section compares the demographic characteristics of Valley Metro riders with the general population residing in the Maricopa County.⁵ Specifically, the 2007 Origin and Destination survey data was compared with 2007 American Community Survey data that includes all residents of Maricopa County (refer to Appendix B). It should be noted that the comparative analysis was limited to those variables that were available from the 2007 ACS data.

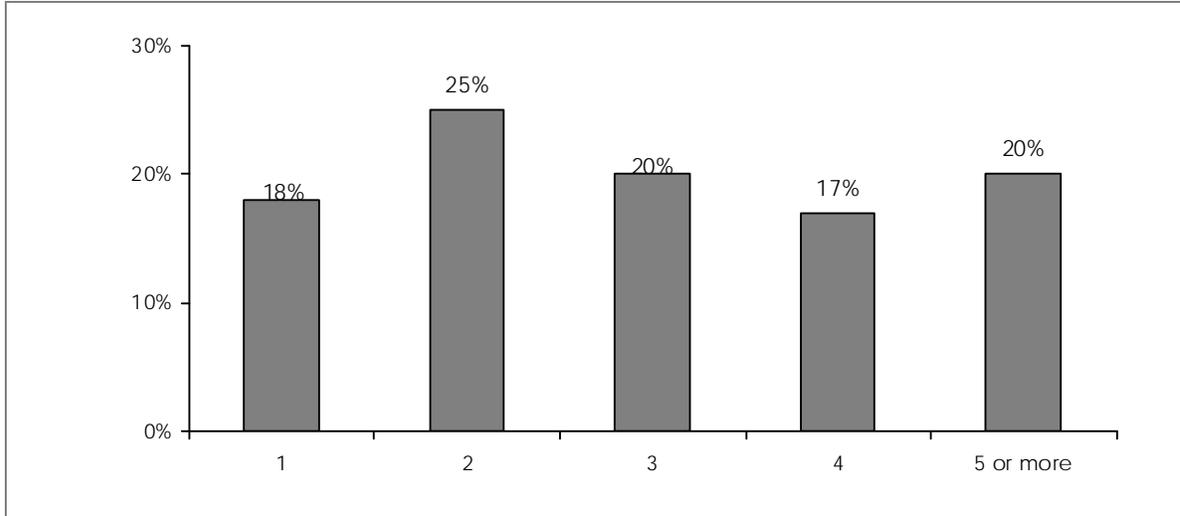
Household Size

The household size results (Figure 3-1) indicate that 80% of riders have a household size of four or fewer individuals. In particular, about 43% of riders live in one- or two-person households, while 37% live in three- or four- person households. The remaining 20% have a household size of five or more individuals.

Compared to the general population, transit riders are more likely to live in larger households (as indicated by comparison of 2007 Origin and Destination survey data with 2007 ACS data). Specifically, the general population statistics indicate that 27% of the households are single-person households, 34% are two-person households, while 39% are three or more person households (refer to Table B-1 in Appendix B).

⁵ It is important to note that due to the lack of adequate information on the general population in the transit service area (that includes Maricopa County and parts of Pinal and Yavapai County), 2007 O/D survey data was compared to the residents of Maricopa County.

Figure 3-1: Distribution of Household Size

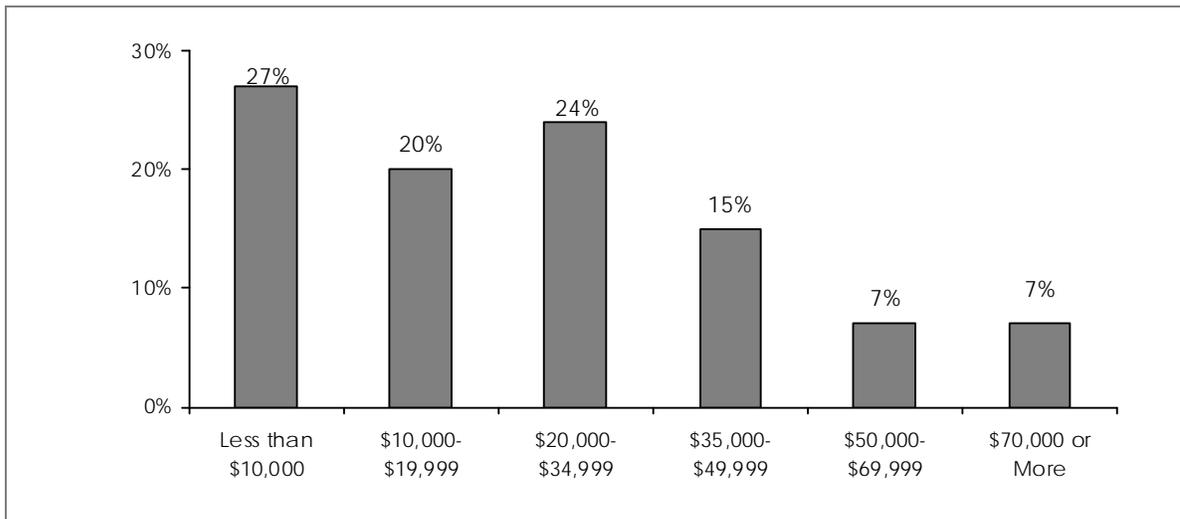


Household Income

The distribution of annual household income (Figure 3-2) shows that 71% of rider households have an annual income of less than \$35,000, with 27% earning less than \$10,000. About 22% of rider households have an income in the middle range between \$35,000 and \$70,000, while 7% have an income of \$70,000 or higher.

As expected, transit riders are more likely to be from low-income households as compared to the general population. In particular, only 31% of the households in Maricopa County have an annual income of less than \$35,000; with 6% earning less than \$10,000 (refer to Table B-2 in Appendix B). More than half of households have an annual income of \$50,000 or higher, with 38% earning \$70,000 or higher.

Figure 3-2: Distribution of Household Income



Vehicle Ownership

The vehicle ownership statistics (Figure 3-3) indicate that about 49% of rider households own at least one automobile, with 27% that own one vehicle, 15% that own two vehicles, and 7% that own three or more vehicles. More than half of riders (about 51%) are transit-dependent, i.e. they do not own any vehicles. Of these transit-dependent rider households that do not own any vehicles, 87% have an annual income of less than \$35,000.

As expected, transit riders are more likely to be from zero-vehicle households compared to the general population (refer to Table B-3 in Appendix B). Specifically, only 6% of households residing in Maricopa County do not own any vehicles. The remaining 94% households own at least one vehicle, with 37% that own one vehicle, 40% that own two vehicles, and 17% that own three or more vehicles.

Figure 3-3: Distribution of Vehicle Ownership

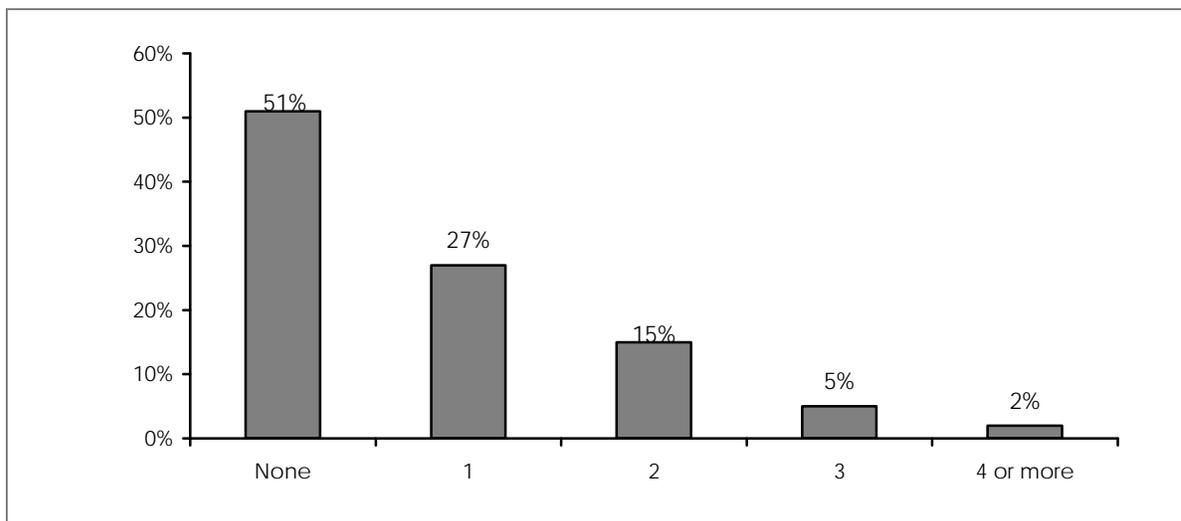


Table 3-1 presents the cross-tabulation of vehicle ownership by household income. The table indicates that nearly 70% of riders from low-income households (with income less than \$20,000) are transit-dependent, i.e., they belong to households that do not own any vehicles. In addition, the table shows an increase in vehicle ownership as the household income of rider increases.

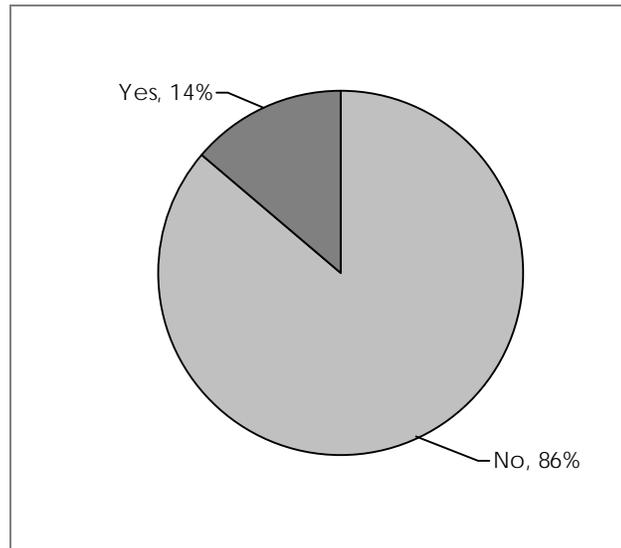
Table 3-1: Cross-Tabulation of Vehicle Ownership by Household Income

		Household Income					
		Less than \$10,000	\$10,000-\$19,999	\$20,000-\$34,999	\$35,000-\$49,999	\$50,000-\$69,999	\$70,000 or more
Vehicle Ownership	None	69%	67%	56%	33%	18%	7%
	1	20%	22%	29%	38%	40%	25%
	2	7%	8%	12%	22%	28%	35%
	3	2%	3%	3%	5%	14%	20%
	4 or more	1%	1%	1%	3%	1%	13%
<i>Total</i>		100%	100%	100%	100%	100%	100%

Vehicle Availability

Vehicle availability statistics (Figure 3-4) indicate that only 14% of rider households have a vehicle available to make the one-way trip. The remaining 86% do not have any vehicle available for the same. It should be noted that the vehicle availability varies depending on type of transit service i.e., Local, RAPID, or Express bus service, and has been discussed in detail in Chapter 4.

Figure 3-4: Distribution of Vehicle Availability



A cross-tabulation of vehicle ownership with vehicle availability (Table 3-2) indicates that more than half (60%) of riders who did not have a vehicle available to make the one-way trip are transit-dependent, i.e., from zero-vehicle households. The remaining 40% of riders have at least one vehicle available to make the one-way trip, with 24% from one-vehicle households, 11% from two-vehicle households, and 5% with three-or-more vehicle households.

Table 3-2: Cross Tabulation of Vehicle Ownership by Vehicle Availability

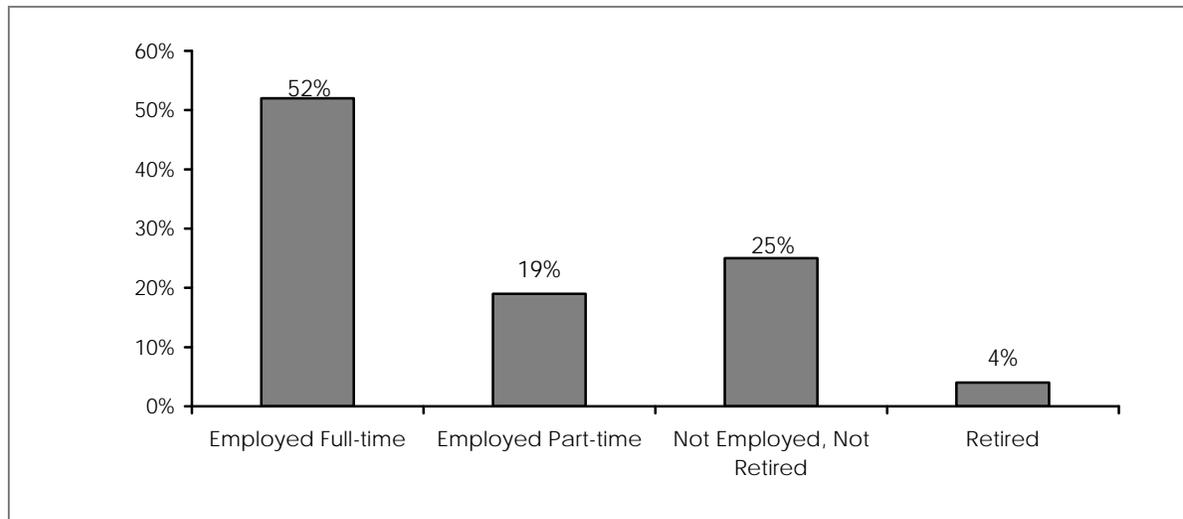
		Vehicle Availability	
		Yes	No
Vehicle Ownership	None	0%	60%
	1	46%	24%
	2	32%	11%
	3	15%	4%
	4 or more	7%	1%
Total		100%	100%

Employment Status

The survey data reveals that nearly 71% of riders are employed, with 52% working full-time and 19% working part-time (Figure 3-5). Further, 25% of riders are neither employed nor retired, while 4% are retired.

Compared to the general population, transit riders are more likely to be employed and less likely to not be in the labor force. Specifically, 63% of the general population are employed, 3% unemployed, and 34% are not in the labor force (refer to Table B-4 in Appendix B; questions are not directly comparable between 2007 Origin and Destination survey and 2007 ACS survey).

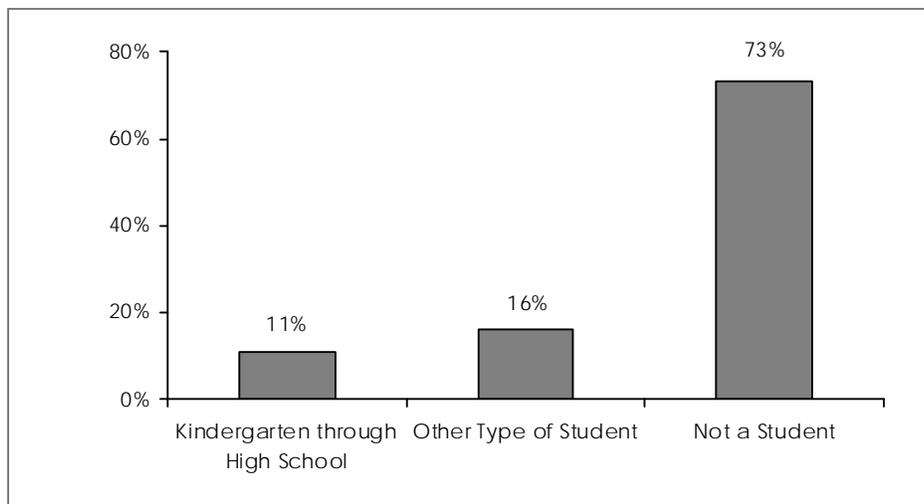
Figure 3-5: Distribution of Employment Status



Student Status

The survey data reveals that about 73% of riders are not students (Figure 3-6). The remaining 27% are students, with 11% enrolled in Kindergarten through high school and 16% studying mostly in universities or colleges. In particular, of the 16% 'other' students, 32% study in universities, 22% in community colleges, and 34% in some other college.

Figure 3-6: Distribution of Student Status

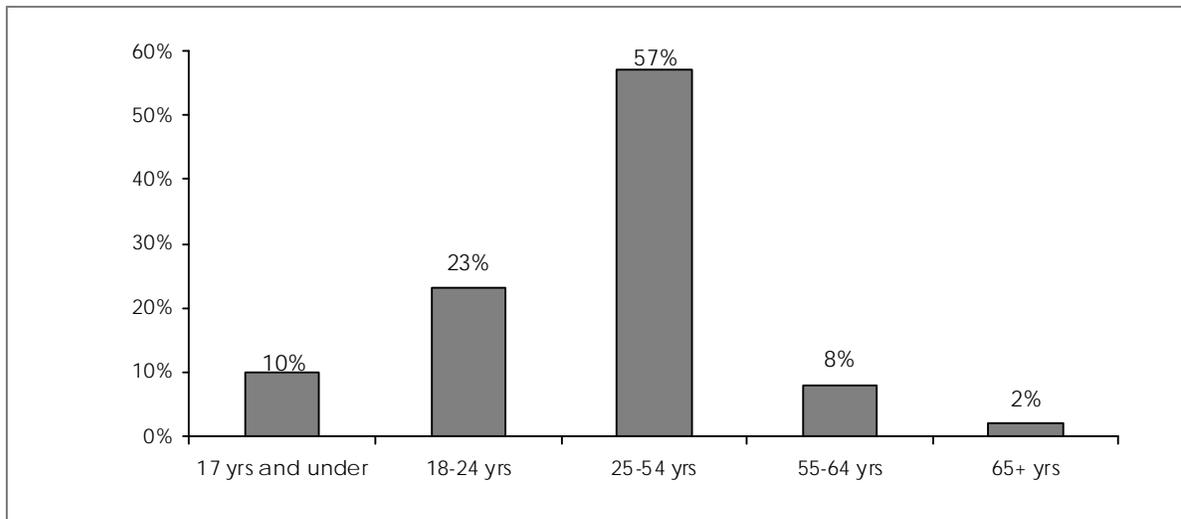


Age

Figure 3-7 provides the distribution of riders by age. The figure indicates that a majority of transit riders are between 25 to 54 years of age (57%). Young riders are the second largest group comprising about one-third of riders. Older riders (i.e., 55 years or age or older) make up about 10% of riders.

Compared to the general population, transit riders are more likely be 18 to 54 years of age. Specifically, individuals aged 18 to 54 years constitute 52% of the general population as compared to 80% of the transit rider population (refer to Table B-5 in Appendix B).

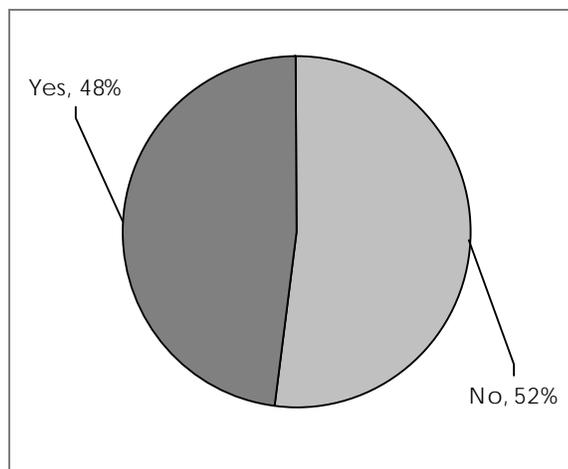
Figure 3-7: Distribution of Age



Valid Driver's License Status

Figure 3-8 provides the distribution of riders by possession of a valid driver's license. The figure indicates that nearly 48% of riders have a valid driver's license.

Figure 3-8: Distribution of Valid Driver's License Status



Travel Characteristics

This section describes the trip-making characteristics of Valley Metro riders including trip origin, trip destination, trip purpose, access and egress mode characteristics, alternate mode of travel if transit service was not available, and source of bus schedule information. It should be noted that the statistics vary depending on type of transit service i.e., Local, RAPID, or Express bus service, and have been discussed in detail in Chapter 4.

Trip Origin

The distribution of riders by trip origin indicates that the most common trip origins are home and work (Table 3-3). In particular, about 47% of riders have trips originating from home, while 25% have trips originating from work. Other trip origins include college/university (6%), K-12 school (5%), social/personal places or church (4%), shopping places (4%), recreation/sightseeing places or restaurants (2%), places for medical appointments or hospital (2%), and airport (less than 1%). About 4% of the trip origins fall in the 'other' category. Overall, nearly three-fourth of the transit trips originate at home or work.

Table 3-3: Distribution of Trip Origin

Trip Origin	Average Weekday Ridership	Percent
Home	90,826	47%
Work	48,916	25%
College/University (Student Only)	11,922	6%
School (K-12) (Student Only)	9,335	5%
Social/Personal Places or Church	7,939	4%
Shopping Places	7,802	4%
Recreation/Sightseeing Places or Restaurants	4,723	2%
Places for Medical Appointment/Hospital	4,547	2%
Airport (Air Passenger Only)	40	<1%
Other	7,752	4%
Total	193,803	100%

All percentages greater than 0% and less than 0.5% were categorized as '<1%'.

Trip Destination

The distribution of riders by trip destination indicates that the most common trip destinations are home or work (Table 3-4). In particular, about 37% riders have trips ending at home, while 27% have trips ending at work. This is similar to the results obtained for trip origin. Other trip destinations are shopping places (7%), social/personal places or church (6%), college/university (6%), places for medical appointment/hospital (4%), K-12 school (3%), and recreational/sightseeing places or restaurants (3%). Remaining riders have their trips ending at other places.

Table 3-4: Distribution of Trip Destination

Trip Destination	Average Weekday Ridership	Percent
Home	71,738	37%
Work	52,936	27%
Shopping Places	13,242	7%
Social/Personal Places or Church	12,376	6%
College/University (Student Only)	12,330	6%
Places for Medical Appointment/Hospital	8,314	4%
School (K-12) (Student Only)	6,708	3%
Recreation/Sightseeing Places or Restaurants	4,904	3%
Airport (Air Passenger Only)	272	<1%
Other	10,982	6%
Total	193,803	100%

All percentages greater than 0% and less than 0.5% were categorized as '<1%'.

Trip Purpose

Trip purpose is an important trip-making characteristic. One way of defining trip purpose is based on the origin and destination of trips. In particular, trips defined by origin and destination can be classified into (1) Home-based Work trips (2) Home-based University trips, (3) Home-based Non-Work trips, (4) Non Home-based Work trips, and (5) Non Home-based Other trips. Table 3-5 presents the distribution of riders by trip purpose.

The table indicates that 44% of riders make home-based work trips, while 40% make home-based non-work trips. This finding indicates that a significant proportion of transit trips are for non-commuting purposes. About 16% of riders make non home-based trips, with 7% non home-based work trips, and 9% non home-based other trips.

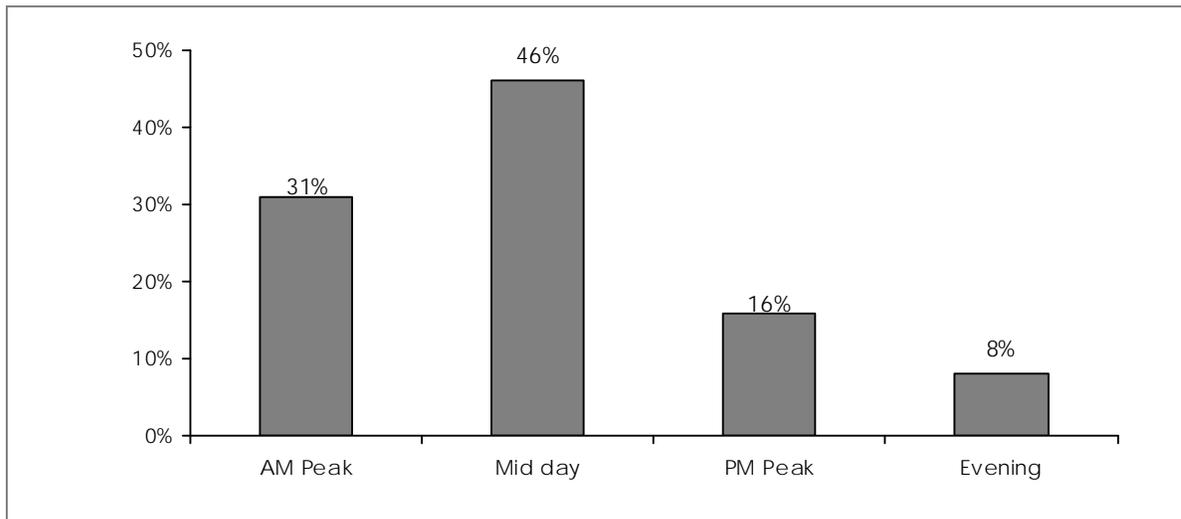
Table 3-5: Distribution of Trip Purpose⁶

Trip Purpose		Average Weekday Ridership	Percent
Home-based Work Trips	Home to Work	46,014	24%
	Work to Home	39,111	20%
Home-based University Trips	Home to University	7,213	4%
	University to Home	6,354	3%
Home-based Other Trips	Home to Other	37,599	19%
	Other to Home	26,274	14%
Non Home-based Work Trips	Work to Work	2,811	1%
	Work to Other	6,995	4%
	Other to Work	4,111	2%
Non Home-based Other Trips	Other to Other	17,323	9%
		Total	193,803
			100%

Time of Day

The distribution of riders by time of day indicates that close to half of the riders make their trip during Mid-day, while about one-third make their trip during the AM Peak period (Figure 3-9). Remaining riders make their trip during the PM Peak period (16%) and Evening (8%).

Figure 3-9: Distribution by Time of Day



A distribution of trip purpose by time of day indicates that more than three-fourths of riders make home-to-work and home-to-other trips in the AM Peak period (Table 3-6). It is reasonable to expect

⁶ Since home-based medical trips make up only 5% of all trip purposes, a separate category for home-based medical trips was not included in the table.

that the riders who commute from home to work or home to 'other destination' in the AM peak period are more likely to reverse commute during the PM Peak period. This is indicated by the distribution of riders in the PM Peak period. In particular, nearly three-fourths of riders reverse commute, i.e., make work-to-home and other-to-home, in the PM Peak period. Similar to riders in the PM Peak period, close to three-fourths of Evening riders make work-to-home and other-to-home trips.

Table 3-6: Distribution of Trip Purpose by Time of Day

Trip Purpose		Time of Day				
		AM Peak	Mid-day	PM Peak	Evening	Total
Home-based Work Trips	Home to Work	53%	15%	3%	4%	24%
	Work to Home	6%	15%	51%	46%	20%
Home-based University Trips	Home to University	7%	3%	1%	0%	4%
	University to Home	0%	5%	3%	6%	3%
Home-based Other Trips	Home to Other	24%	21%	10%	9%	19%
	Other to Home	3%	16%	21%	24%	14%
Non Home-based Work Trips	Work to Work	1%	2%	0%	0%	1%
	Work to Other	1%	5%	4%	1%	4%
	Other to Work	1%	3%	1%	0%	2%
Non Home-based Other Trips	Other to Other	3%	14%	5%	9%	9%
Total		100%	100%	100%	100%	100%

Access and Egress Mode

Figure 3-10 and 3-11 present the access mode and egress mode characteristics respectively. Statistics indicate that walk is the most dominant mode of access and egress. About 85% of riders walk to access transit. Of the riders that walk to transit, about 75% walk a maximum of two user-defined blocks, while only 1% walk more than 10 user-defined blocks to access transit. Similarly, about 90% of riders walk to their final destination after they egress transit. Of these riders that walk egress from transit, 74% walk a maximum of two user-defined blocks, while less than 1% walk more than 10 user-defined blocks to reach their final destination. In addition to walk, the commonly used access and egress modes include bicycle and riding as a passenger (i.e., getting dropped off/picked up). Overall, walk is the dominant mode of access and egress irrespective of the time period (Table 3-7 and 3-8). It should be noted that this varies based on type of transit with walk to transit being the dominant mode for local bus and drive to transit being the dominant mode for express bus.

Figure 3-10: Distribution by Access Mode

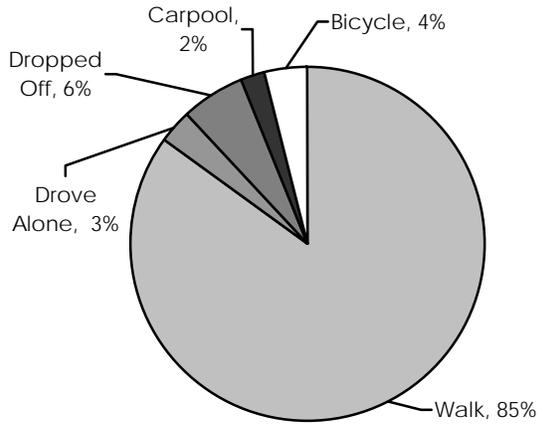


Figure 3-11: Distribution by Egress Mode

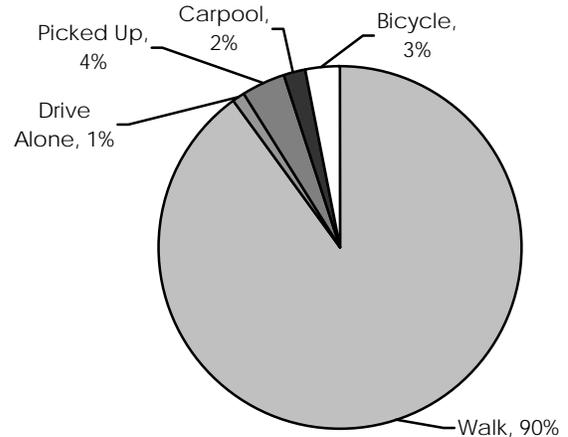


Table 3-7: Distribution of Access Mode by Time of Day

Access Mode	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening	
Bicycle	3%	4%	3%	6%	4%
Carpool	3%	2%	3%	3%	2%
Walk	80%	86%	89%	88%	85%
Dropped off	8%	5%	4%	3%	6%
Drove alone	7%	2%	1%	0%	3%
Total	100%	100%	100%	100%	100%

Table 3-8: Distribution of Egress Mode by Time of day

Egress Mode	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening	
Bicycle	2%	4%	3%	3%	3%
Carpool	1%	1%	2%	2%	2%
Walk	94%	90%	85%	91%	90%
Picked up	2%	4%	5%	3%	4%
Drove alone	0%	1%	5%	1%	1%
Total	100%	100%	100%	100%	100%

As expected, the vast majority of the riders (80%) walk to access and egress transit (Table 3-9). Other common combinations of access and egress modes used by riders are accessing the bus stop by being dropped off with walk egress (4%), drive and park to access the bus stop with walk egress (3%), and bicycle access and egress (3%).

Table 3-9: Cross-Tabulation of Access by Egress Mode

		Egress Mode					Total
		Walk	Drive and Park	Picked Up	Ride With Others	Bicycle	
Access Mode	Walk	80%	1%	2%	1%	<1%	85%
	Drive and Park	3%	<1%	<1%	<1%	<1%	3%
	Dropped Off	4%	<1%	1%	<1%	<1%	6%
	Ride With Others	2%	<1%	<1%	1%	<1%	2%
	Bicycle	1%	<1%	<1%	<1%	3%	4%
Total		90%	1%	4%	2%	3%	100%

*All percentages greater than 0% and less than 0.5% were categorized as '<1%';
All percentages in the range of 0.5 – 1% were categorized as 1%.*

Number of Transfers

The survey results (Table 3-10) show that about 63% of riders make at least one transfer to complete their one-way trip, with 44% that make one transfer, 14% that make two transfers, and 5% that make three or more transfers. More than a third of riders (about 37%) do not make any transfers to complete their one-way trip.

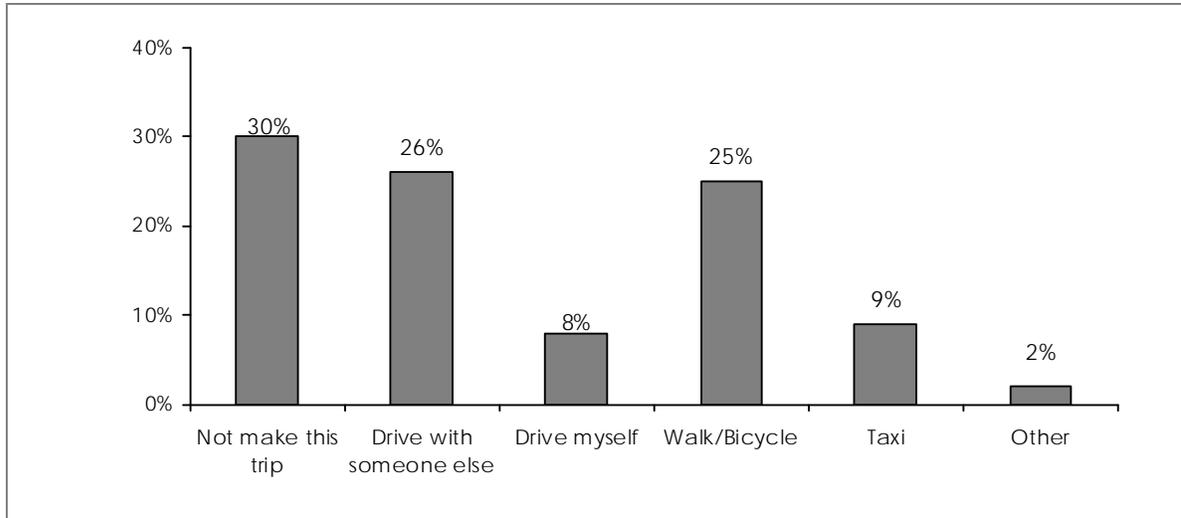
Table 3-10: Distribution of Number of Transfers

Number of Transfers	Average Weekday Ridership	Percent
Zero	71,674	37%
One	86,145	44%
Two	26,704	14%
Three or More	9,280	5%
Total	193,803	100%

Alternate Mode of Travel

The survey results (Figure 3-12) show that in the absence of transit service to make the one-way trip, 26% of riders report that they will drive with someone else, while 8% of riders will drive themselves to make this trip. Interestingly, 30% of riders report that they will not make the trip. This is clear evidence that transit serves the important role of providing mobility in the region. Of these riders that would not make the trip, more than two-thirds of riders do not own vehicles and, hence, are completely dependent on transit to meet their mobility needs. The figure further shows that 25% of riders report that they will use non-motorized modes of transportation (i.e., walk, bicycle) to complete the trip. Finally, 9% of riders report that they will use a taxi, while the remaining 2% will use another mode to complete the trip.

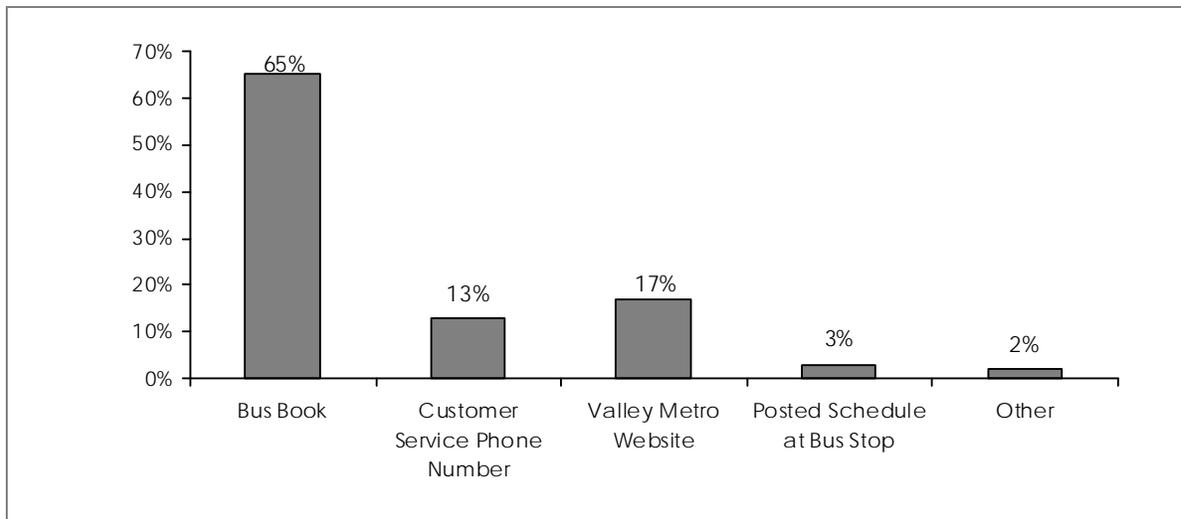
Figure 3-12: Distribution of Alternate Mode of Travel



Source of Bus Schedule Information

The survey results indicate that the primary source of bus schedule information is the Bus Book, which is used by 65% of riders (Figure 3-13). About 17% of riders use the Valley Metro website, while 13% use the customer service phone line. The remaining 5% use bus schedule information posted at the bus stop or use other sources for this.

Figure 3-13: Distribution of Source of Bus Schedule Information



Summary

This chapter presents the demographic and travel behavior characteristics of Valley Metro riders. Below are some important findings about these riders:

The demographics indicate that riders are more likely to be from low-income households; 71% of riders have an annual household income less than \$35,000. About half of all riders are transit-dependent, i.e., they are from households that do not own any vehicles. Of these transit-dependent riders, 87% are from households with an annual income less than \$35,000. Further, more than two-thirds of riders are employed, with nearly half employed full-time. In addition, the majority

of riders are between 25 years and 54 years of age, while younger riders comprise the second largest group. It should be noted that the demographic characteristics of riders vary depending on type of transit service i.e., Local, RAPID, or Express bus service.

Compared to the general population residing in Maricopa County, transit riders are more likely to be from larger, low-income, and zero-vehicle households. In addition, transit riders are more likely to be employed. Further, they are more likely to be 18 to 54 years of age, as compared to the general population.

The travel behavior characteristics of riders indicate that home and work are the most common trip origins and destinations; 44% of riders make home-based work trips using transit, while 40% make home-based non-work trips. Walk is the dominant access and egress mode for all riders. In particular, more than three-fourths of riders walk to access and egress transit, irrespective of the time period. Also, nearly two-third of riders make at least one transfer to complete their one-way trip. Furthermore, in the absence of transit service to make the one-way trip, close to one-third of riders report that they will not make the trip. Finally, the primary source of bus schedule information is the Bus Book, used by two-thirds of riders.

4. Survey Data Analysis by Service Type

This chapter provides a comparative analysis of demographics and travel behavior characteristics of Local, Express, and RAPID bus riders of Valley Metro. Appendix D presents the distribution of weighted boardings by route and service type and concludes with a summary of key findings. The survey data used for analysis were appropriately weighted and expanded to be representative of all the unlinked trips, i.e., individual boardings.

The survey data was expanded to a total of 193,803 riders that is the average weekday ridership obtained from the 2006 October Valley Metro monthly ridership report (as provided in the RFP). Of the 193,803 Valley Metro riders, 96.9% are Local bus riders, 1.2% are Express bus riders, while 1.8% are RAPID bus riders. Considering the vast majority of the Local bus riders, it is reasonable to expect that the general population reflects the characteristics of Local bus riders. Hence, this chapter compares the demographics and travel characteristics of Express and RAPID bus riders to Local bus riders.

Demographics

This section compares the demographics of Valley Metro riders across the three service types. The demographics include household size, household income, vehicle ownership, vehicle availability, employment status, student status, age, and valid driver's license status.

Household Size

The household size results indicate that Express and RAPID bus riders are more likely to be from two-person households (Table 4-1). Local bus riders, on the other hand, are more likely to be from two-or-more person households.

Table 4-1: Distribution of Household Size by Service Type

Household Size	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
One	31,909	18%	403	17%	569	16%	32,882	18%
Two	46,272	26%	897	38%	1,325	37%	48,494	26%
Three	35,459	20%	377	16%	715	20%	36,550	20%
Four	31,159	17%	476	20%	601	17%	32,235	17%
Five or More	36,354	20%	239	10%	333	9%	36,925	20%
Total	181,152	100%	2,391	100%	3,542	100%	187,086	100%

Household Income

Table 4-2 presents the distribution of household income by transit service types. The table indicates that Express and RAPID bus riders are more likely to be from households with an annual income of \$50,000 or higher, particularly from high-income households (\$70,000 or more). In comparison, Local bus riders are more likely to be from households with an annual income less than \$35,000.

Table 4-2: Distribution of Household Income by Service Type

Household Income	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Less than \$10,000	47,910	28%	32	1%	17	1%	47,959	27%
\$10,000–\$19,999	34,222	20%	21	1%	25	1%	34,268	19%
\$20,000–\$34,999	42,247	25%	266	12%	416	12%	42,928	24%
\$35,000–\$49,999	25,338	15%	429	19%	483	14%	26,250	15%
\$50,000–\$69,999	10,359	6%	501	22%	921	28%	11,781	7%
\$70,000 or More	10,485	6%	1,021	45%	1,479	44%	12,986	7%
Total	170,560	100%	2,271	100%	3,341	100%	176,172	100%

Vehicle Ownership

Table 4-3 provides the distribution of vehicle ownership by transit service types. The table indicates that Local bus riders are more likely to be transit dependent, with more than half of riders from zero-vehicle households, as compared to Express and RAPID bus riders. Furthermore, amongst the transit service types, RAPID bus riders are more likely to own two-or-more vehicles.

Table 4-3: Distribution of Vehicle Ownership by Service Type

Vehicle Ownership	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
None	96,524	53%	148	6%	90	3%	96,762	51%
One	48,806	27%	787	33%	1,085	30%	50,678	27%
Two	24,858	14%	884	37%	1,621	45%	27,364	15%
Three	8,618	5%	477	20%	652	18%	9,746	5%
Four or More	3,820	2%	99	4%	117	3%	4,036	2%
Total	182,625	100%	2,395	100%	3,565	100%	188,585	100%

Vehicle Availability

The vehicle availability statistics indicate that Express and RAPID bus riders are more likely to have a vehicle available to make their one-way trip (Table 4-4). This is expected as these riders are more likely to own at least one vehicle, as compared to Local bus riders.

Table 4-4: Distribution of Vehicle Availability by Service Type

Vehicle Availability	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Yes	21,602	12%	1,732	77%	3,005	87%	26,339	14%
No	156,436	88%	529	23%	432	13%	157,398	86%
Total	178,038	100%	2,261	100%	3,437	100%	183,736	100%

Employment Status

The employment status distribution of Local bus riders is significantly different from Express or RAPID bus riders (Table 4-5). In particular, Express and RAPID bus riders are significantly more likely to be employed full-time as compared to Local bus riders. Local bus riders, on the other hand, are more likely to be employed part-time or to not be in the labor force (i.e., not employed or retired).

Table 4-5: Distribution of Employment Status by Service Type

Employment Status	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Employed Full-time	88,365	50%	2,335	97%	3,474	98%	94,174	52%
Employed Part-time	33,914	19%	28	1%	48	1%	33,990	19%
Not Employed, Not Retired	46,247	26%	18	1%	10	0%	46,275	26%
Retired	6,745	4%	14	1%	3	0%	6,762	4%
Total	175,271	100%	2,395	100%	3,535	100%	181,201	100%

Student Status

Local bus riders are more likely to be students than Express and RAPID bus riders (Table 4-6). A closer examination of “other type of student” category indicates that RAPID bus riders are more likely to be studying in universities as compared to Local or Express bus riders.

Table 4-6: Distribution of Student Status by Service Type

Student Status	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Kindergarten - High School	20,383	12%	7	0%	10	0%	20,400	11%
Other type of student	28,781	16%	113	5%	140	4%	29,034	16%
Not a student	126,583	72%	2,241	95%	3,360	96%	132,184	73%
Total	175,747	100%	2,360	100%	3,510	100%	181,617	100%

Age

Table 4-7 provides the distribution of age by service types. The table indicates that Local bus riders are more likely to be less than 25 years of age, as compared to Express and RAPID bus riders. Furthermore, compared to Local bus riders, RAPID and Express bus riders are more likely to be between 25 to 64 years of age; however, RAPID bus riders are more likely to be 25 to 54 years of age, while Express bus riders are more likely to be older, i.e., 55 to 64 years of age.

Table 4-7: Distribution of Age by Service Type

Age	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
17 years and under	18,936	10%	14	1%	7	0%	18,958	10%
18-24 years	43,111	24%	66	3%	104	3%	43,281	23%
25-54 years	103,212	57%	1,620	68%	2,651	74%	107,483	57%
55-64 years	13,106	7%	642	27%	696	20%	14,444	8%
65+ years	3,197	2%	40	2%	106	3%	3,343	2%
Total	181,563	100%	2,381	100%	3,564	100%	187,509	100%

Valid Driver's License Status

Express and RAPID bus riders are more likely to have a valid driver's license, as compared to Local bus riders (Table 4-8). This is supported by the vehicle ownership statistics, which indicate that Express and RAPID bus rider are more likely than Local bus riders to own at least one vehicle.

Table 4-8: Distribution of Valid Driver's License Status by Service Type

Valid Driver's License Status	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Yes	84,443	47%	2,255	94%	3,404	95%	90,102	48%
No	96,975	53%	134	6%	161	5%	97,270	52%
Total	181,418	100%	2,389	100%	3,565	100%	187,372	100%

Travel Characteristics

This section compares the demographics of Valley Metro riders across the three service types. The travel characteristics include time of day, trip purpose, access mode, egress mode, alternate mode of travel if transit service was not available, and source of bus schedule information.

Time of Day

The distribution of time of day by service type indicates that more than three-fourths of Local bus riders make their trips during the AM Peak period and Mid-day (Table 4-9). The table further indicates that Express and RAPID riders make more than half of their trips during the AM Peak period.

Table 4-9: Distribution of Time of Day by Service Type

Time of Day	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
AM Peak	55,752	30%	1,442	60%	1,971	55%	59,165	31%
Mid-day	89,400	48%	0	0%	0	0%	89,400	46%
PM Peak	28,087	15%	953	40%	1,594	45%	30,634	16%
Evening	14,604	8%	0	0%	0	0%	14,604	8%
Total	187,843	100%	2,395	100%	3,565	100%	193,803	100%

Trip Purpose

AM Peak Period

Table 4-10 presents the distribution of riders that make trips during the AM Peak period by trip purpose and service types. The table indicates that Express and RAPID bus riders primarily use transit for commuting to work from home in the AM Peak period (with 93% of Express bus riders and 87% of RAPID bus riders making these trips). In comparison, Local bus riders commonly use transit to also commute from home to destinations other than work. Specifically, half of the Local bus riders make home-to-work trips, while one-fourth make home-to-other trips in the AM Peak period. Furthermore, all the home-based university and non-home-based other trips in the AM Peak period are made by Local bus riders.

Table 4-10: Distribution of Trip Purpose by Service Type – AM Peak Period

Trip Purpose		Local		Express		RAPID		Total	
		Average Weekday Ridership	Percent						
Home-based Work Trips	Home to Work	28,205	51%	1,343	93%	1,721	87%	31,270	53%
	Work to Home	3,007	5%	60	4%	225	11%	3,291	6%
Home-based University Trips	Home to University	3,976	7%	0	0%	0	0%	3,976	7%
	University to Home	116	0%	0	0%	0	0%	116	0%
Home-based Other Trips	Home to Other	14,193	25%	32	2%	14	1%	14,239	24%
	Other to Home	2,034	4%	2	0%	2	0%	2,037	3%
Non Home-based Work Trips	Work to Work	773	1%	2	0%	0	0%	775	1%
	Work to Other	727	1%	1	0%	6	0%	734	1%
	Other to Work	752	1%	2	0%	3	0%	758	1%
Non Home-based Other Trips	Other to Other	1,969	4%	0	0%	0	0%	1,969	3%
Total		55,752	100%	1,442	100%	1,971	100%	59,165	100%

PM Peak Period

Table 4-11 presents the distribution of riders that make their trip in the PM Peak period by trip purpose and service types. The table indicates that Express and RAPID bus riders primarily use transit to commute from work to home in the PM peak period (with more than 90% of Express and RAPID bus riders making these trips). In comparison, Local bus riders commonly use transit to also commute from other non-work places to home. Specifically, nearly half of the Local bus riders make work-to-home trips, while close to one-fourth make other-to-home trips in the PM Peak period.

Table 4-11: Distribution of Trip Purpose by Service Type – PM Peak Period

Trip Purpose		Local		Express		RAPID		Total	
		Average Weekday Ridership	Percent						
Home-based Work Trips	Home to Work	714	3%	41	4%	63	4%	818	3%
	Work to Home	13,365	48%	879	92%	1,452	91%	15,696	51%
Home-based University Trips	Home to University	267	1%	0	0%	0	0%	267	1%
	University to Home	865	3%	0	0%	11	1%	876	3%
Home-based Other Trips	Home to Other	3,135	11%	0	0%	2	0%	3,138	10%
	Other to Home	6,455	23%	25	3%	3	0%	6,483	21%
Non Home-based Work Trips	Work to Work	130	0%	0	0%	0	0%	130	0%
	Work to Other	1,303	5%	8	1%	63	4%	1,374	4%
	Other to Work	241	1%	0	0%	0	0%	241	1%
Non Home-based Other Trips	Other to Other	1,614	6%	0	0%	0	0%	1,614	5%
Total		28,087	100%	953	100%	1,594	100%	30,634	100%

Other Time Periods

Table 4-12 presents the distribution of Local bus riders that make their trip during the Mid-day and Evening time periods. The table indicates that the most common trips made by Local bus riders during Mid-day are home-based other trips (37%), including home-to-other (21%) and other-to-home (16%) trips, while the most common trips made by Local bus riders during Evening are work-to-home (46%) and other-to-home (24%) trips.

Table 4-12: Distribution of Trip Purpose by Service Type

Trip Purpose		Mid-day		Evening	
		Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Home-based Work Trips	Home to Work	13,272	15%	655	4%
	Work to Home	13,394	15%	6,730	46%
Home-based University Trips	Home to University	2,909	3%	61	0%
	University to Home	4,467	5%	894	6%
Home-based Other Trips	Home to Other	18,929	21%	1,293	9%
	Other to Home	14,289	16%	3,466	24%
Non Home-based Work Trips	Work to Work	1,897	2%	9	0%
	Work to Other	4,721	5%	167	1%
	Other to Work	3,108	3%	5	0%
Non Home-based Other Trips	Other to Other	12,416	14%	1,325	9%
Total		89,400	100%	14,604	100%

Access and Egress Mode

AM Peak

Walk is the dominant mode of access for Local bus riders in the AM Peak period with 84% of Local bus riders walking to access the bus stop (Table 4-13). Contrary to Local bus riders, Express and RAPID bus riders are more likely to drive, i.e., 'drive alone,' to access the bus stop in the AM Peak period. In particular, nearly half of the Express bus riders and close to three-fourths of the RAPID bus riders drive to access transit. Furthermore, Express and RAPID bus riders are more likely to be dropped off to access the bus stop than Local bus riders. This is expected as Express and RAPID bus riders are more likely to own vehicles or have vehicles available to make the one-way trip.

Table 4-13: Distribution of Access Mode by Service Type – AM Peak Period

Access Mode	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Walk	46,760	84%	359	25%	295	15%	47,414	80%
Bicycle	1,655	3%	28	2%	12	1%	1,696	3%
Carpool	1,588	3%	42	3%	45	2%	1,674	3%
Dropped off	3,948	7%	323	22%	224	11%	4,495	8%
Drove Alone	1,801	3%	690	48%	1,395	71%	3,886	7%
Total	55,752	100%	1,442	100%	1,971	100%	59,165	100%

Walk is the dominant mode of egress for all riders, irrespective of their service type, in the AM Peak period (Table 4-14). Considering that the vast majority of the riders 'walk,' 'drive alone,' or 'get dropped off' to access the bus, it is reasonable to expect that most of these riders walk to egress the bus stop.

Table 4-14: Distribution of Egress Mode by Service Type – AM Peak Period

Egress Mode	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Walk	52,289	94%	1,349	94%	1,769	90%	55,407	94%
Bicycle	1,281	2%	29	2%	12	1%	1,322	2%
Carpool	695	1%	13	1%	15	1%	723	1%
Picked up	1,419	3%	21	1%	32	2%	1,473	2%
Drove Alone	68	0%	30	2%	143	7%	240	0%
Total	55,752	100%	1,442	100%	1,971	100%	59,165	100%

PM Peak

Walk is the dominant mode of access for all riders, irrespective of their service type, in the PM Peak period as well (Table 4-15). The table further indicates that Express and RAPID bus riders are more likely to drive to access transit as compared to Local riders.

Table 4-15: Distribution of Access Mode by Service Type – PM Peak Period

Access Mode	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Walk	25,028	89%	836	88%	1,377	86%	27,241	89%
Bicycle	970	3%	19	2%	9	1%	998	3%
Carpool	822	3%	24	2%	23	1%	869	3%
Dropped off	1,182	4%	49	5%	68	4%	1,300	4%
Drove Alone	84	0%	26	3%	118	7%	228	1%
Total	28,087	100%	953	100%	1,594	100%	30,634	100%

Similar to access mode statistics, walk is the dominant mode of egress of Local bus riders from bus stops to reach their final destination (Table 4-16). Compared to Local bus riders, Express bus riders are more likely to drive to reach their final destination. This is more pronounced for RAPID bus riders. This is expected because the vast majority of Express and RAPID bus riders that drove and parked to access the bus stop in the AM Peak period are likely to be riders who drive to egress in the PM Peak period.

Table 4-16: Distribution of Egress Mode by Service Type – PM Peak Period

Egress Mode	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Walk	25,149	90%	457	48%	381	24%	25,987	85%
Bicycle	940	3%	24	3%	0	0%	964	3%
Carpool	588	2%	20	2%	103	6%	711	2%
Picked up	1,210	4%	129	14%	159	10%	1,498	5%
Drove Alone	201	1%	322	34%	952	60%	1,474	5%
Total	28,087	100%	953	100%	1,594	100%	30,634	100%

Other Time Periods

Tables 4-17 and 4-18 present the distribution of the Local bus riders by access and egress modes for Mid-day and Evening time periods respectively. The table indicates that walk is the most commonly used mode of access and egress in both time periods for Local bus riders. Overall, the access/egress mode characteristics of Local bus riders that ride during the Mid-day are similar to the Evening riders. This is evident from the similarity in the distribution of Local bus riders by access/egress modes who make their trip during Mid-day and Evening.

Table 4-17: Distribution of Access Mode – Mid-day and Evening Period

Access Mode	Mid-day		Evening	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Walk	77,165	86%	12,894	88%
Bicycle	3,844	4%	864	6%
Carpool	1,785	2%	411	3%
Dropped off	4,646	5%	420	3%
Drove Alone	1,959	2%	15	0%
Total	89,400	100%	14,604	100%

Table 4-18: Distribution of Egress Mode – Mid-day and Evening Period

Egress Mode	Mid-day		Evening	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Walk	80,584	90%	13,225	91%
Bicycle	3,270	4%	510	3%
Carpool	1,283	1%	229	2%
Picked up	3,678	4%	429	3%
Drove Alone	586	1%	210	1%
Total	89,400	100%	14,604	100%

Alternate Mode of Travel

In the absence of transit service to make the one-way trip, Local bus riders are more likely to not make the trip, walk/bicycle, or drive with someone else to make the trip (Table 4-19). Express and RAPID bus riders, on the other hand, are more likely to drive to make their trip. This is expected considering the fact that the vast majority of the Express and RAPID bus riders have a vehicle available to make their trip.

Table 4-19: Distribution of Alternate Modes of Travel by Service Type

Alternate Mode of Travel	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Not make this trip	54,023	31%	82	4%	71	2%	54,176	30%
Drive with someone else	44,698	26%	392	18%	578	18%	45,668	26%
Taxi	15,169	9%	31	1%	5	0%	15,205	9%
Walk/Bicycle	44,576	26%	14	1%	14	0%	44,604	25%
Drive myself	10,377	6%	1,545	71%	2,588	79%	14,510	8%
Other	3,739	2%	103	5%	36	1%	3,878	2%
Total	172,581	100%	2,167	100%	3,291	100%	178,040	100%

Source of Bus Schedule Information

Local bus riders are more likely to use the Bus Book as their source of bus schedule information (Table 4-20). Express and RAPID bus riders, on the other hand, are more likely to use the Valley Metro website. In particular, more than half of the Express bus riders use the website, while nearly three-fourths of RAPID bus riders use the website as a source of bus schedule information.

Table 4-20: Distribution of Source of Bus Schedule Information by Service Type

Bus Schedule Information	Local		Express		RAPID		Total	
	Average Weekday Ridership	Percent						
Bus Book	117,296	66%	1,011	42%	607	17%	118,913	65%
Customer Service Phone Number	23,862	13%	82	3%	77	2%	24,021	13%
Valley Metro Website	26,881	15%	1,257	53%	2,635	74%	30,773	17%
Posted Schedule at Bus Stop	6,087	3%	22	1%	169	5%	6,278	3%
Other	3,995	2%	22	1%	71	2%	4,087	2%
<i>Total</i>	178,121	100%	2,392	100%	3,559	100%	184,072	100%

Summary

Overall, it appears that Local bus riders are more transit-dependent than Express and RAPID bus riders. This is reflected by their socio-demographic characteristics. Specifically, Local bus riders are more likely to be from low-income (less than \$35,000), zero-vehicle households, and who will not make the trip or walk/bicycle to make the trip in the absence of transit. Their employment status indicates that they are more likely to not be in the labor force (i.e., not employed or retired); additionally, Local bus riders are more likely to be students. The other difference is that while Express and RAPID bus riders primarily make use of transit to commute to and from work, Local bus riders also use transit for commuting to and from places other than work. Furthermore, Local bus riders are more likely to walk to access or egress from bus stops; Express and RAPID bus riders, on the other hand, are more likely to drive to access in the AM Peak period and walk from egress in the PM peak period. Finally, the other notable difference is that Express and RAPID bus riders rely on the Valley Metro website more than the Bus Book for bus schedule information, as compared to Local bus riders.

5. Comparative Data Analysis

This section of the report presents a comparative analysis of the data collected in the 2007 survey with data collected in the on-board study conducted during the first quarter of 2001 by LKC Consulting Services, Inc. and WestGroup Research. The survey identified travel patterns, demographics, and opinions on the transit services provided.

In 2001, a selection of trips was chosen from the population of all bus trips to meet confidence, accuracy, and distribution requirements as defined in the 2001 sampling plan. In all, 1,025 bus trips were surveyed (853 Weekday, 90 Saturday, and 82 Sunday). However, only weekday routes were surveyed in 2007, therefore the 2001 data were re-run to reflect only weekday trips to allow for the comparative analysis presented below. In addition, the frequencies presented reflect weighted “unlinked” trips.

Demographics

This section compares the demographic characteristics of the Valley Metro riders in 2001 and 2007, including household size, household income, vehicle ownership, employment status, and age. In addition, the section compares the demographic shifts in the general population from 2001 to 2007. Due to the unavailability of 2007 census data on the general population for the transit service area, the analysis was limited to Maricopa County. In particular, 2007 ACS data and 2000 Census data was used to analyze the demographic shifts in the general population.

Household Size

Trend data regarding household size shows that the percentage of one-person households among Valley Metro riders have stayed almost the same since 2001 (Table 5-1); however, there was a shift among multiple-resident rider households. Two- to three-person households increased from 42% to 45%, while the percentage of households including four or more people decreased from 40% to 37%. In comparison, there has not been any significant change in the household size of the general population since 2000.

Table 5-1: Comparison of Household Size

Household Size	2001 Survey		2007 Survey		2000 Census		2007 ACS	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent	Count	Percent	Count	Percent
One	22,073	18%	32,882	18%	277,967	25%	355,247	27%
Two or Three	51,919	42%	85,044	45%	557,617	49%	642,843	48%
Four or More	48,254	40%	69,160	37%	297,302	26%	340,464	25%
<i>Total</i>	122,246	100%	187,086	100%	1,132,886	100%	1,338,554	100%

Household Income

Since the response categories used for income in 2007 were slightly different than those used in 2001, a direct comparison is not possible (Table 5-2 and 5-3). However, it appears that the distribution is fairly comparable, but may skew slightly lower in 2007 (46% under \$20K vs. 45% \$20K

and under in 2001). In comparison, there has been an increase in households residing in the Maricopa County with an annual income of \$60,000 or higher (Table 5-4).

Table 5-2: Distribution of Household Income – 2001 Origin and Destination Survey

Household Income	2001 Survey	
	Average Weekday Ridership	Percent
Less than \$10,000	21,125	20%
\$10,000–\$15,000	13,776	13%
\$15,000–\$20,000	13,091	12%
\$20,000–\$30,000	18,583	17%
\$30,000–\$40,000	13,153	12%
\$40,000–\$60,000	15,960	15%
\$60,000 or More	12,079	11%
<i>Total</i>	107,767	100%

Table 5-3: Distribution of Household Income – 2007 Origin and Destination Survey

Household Income	2007 Survey	
	Average Weekday Ridership	Percent
Less than \$10,000	47,959	27%
\$10,000–\$19,999	34,268	19%
\$20,000–\$34,999	42,928	24%
\$35,000–\$49,999	26,250	15%
\$50,000 or more	24,767	14%
<i>Total</i>	176,172	100%

Table 5-4: Distribution of Household Income – 2007 Census and 2007 ACS

Household Income	2000 Census		2007 ACS	
	Count	Percent	Count	Percent
Less than \$10,000	77,072	7%	77,704	6%
\$10,000–\$15,000	59,431	5%	59,028	4%
\$15,000–\$20,000	65,917	6%	64,395	5%
\$20,000–\$30,000	146,441	13%	135,077	10%
\$30,000–\$40,000	146,280	13%	142,934	11%
\$40,000–\$60,000	235,334	21%	252,420	19%
\$60,000 or More	402,573	36%	606,996	45%

Household Income	2000 Census		2007 ACS	
	Count	Percent	Count	Percent
Total	1,133,048	100%	1,338,554	100%

Vehicle Ownership

Vehicle ownership of transit riders has declined since 2001 (Table 5-5). Almost one-half of Valley Metro riders (49%) own at least one vehicle in their household in 2007, compared to 58% who reported owning at least one vehicle in 2001. In comparison, there has not been any significant change in vehicle ownership of the general population since 2000.

Table 5-5: Comparison of Household Vehicle Ownership

	2001 Survey ¹		2007 Survey		2000 Census		2007 ACS	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent	Count	Percent	Count	Percent
None	51,967	42%	96,762	51%	78,758	7%	83,609	6%
One	39,186	32%	50,678	27%	438,513	39%	491,326	37%
Two	21,928	18%	27,364	15%	454,034	40%	532,299	40%
Three	7,551	6%	9,746	5%	122,162	11%	164,986	12%
Four or More	2,941	2%	4,036	2%	39,419	3%	66,334	5%
Total	123,573	100%	188,585	100%	1,132,886	100%	1,338,554	100%

¹2001 Survey used "Running Vehicles Available to Household"

Employment Status

Full-time employment among riders declined from 55% in 2001 to 52% in 2007 (Table 5-6). As full-time employment drops, however, there was a significant increase in part-time employment, rising by eight percentage points. A comparison of the non-employed population is not possible because of differences in classifications used in the two surveys. In comparison, there has not been any significant change in the employment status of the general population since 2000.

Table 5-6: Comparison of Employment Status

Employment Status	2001 Survey		2007 Survey		2000 Census		2007 ACS	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent	Count	Percent	Count	Percent
Employed Full-Time (35+ Hours/Week)	66,526	55%	94,174	52%	1,504,252	65%	1,914,770	66%
Employed Part-Time (<35 Hour/Week)	13,967	11%	33,990	19%				
Not Currently Employed and Not Retired	6,173	5%	46,275	26%	823,423	35%	975,372	34%
Other	35,000	29%	6,762	4%				
Total	121,666	100%	181,201	100%	2,327,675	100%	2,890,142	100%

2000 and 2007 Census data has been aggregated to compare it to the survey data.

Age

The age distribution of Valley riders in 2007 was similar to 2001 (Table 5-7). The primary transit user was between 25 and 54 years old (57%). Younger riders were the second largest group to ride the bus (33% of those of age 24 or younger). Older residents were least likely to ride the bus (10% of those 55+). The table further indicates that there has been no shift in the age distribution of the general population since 2000.

Table 5-7: Comparison of Age

Age	2001 Survey		2007 Survey		2000 Census		2007 ACS	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent	Count	Percent	Count	Percent
Under 25 Years	41,504	35%	62,238	33%	1,141,368	37%	1,388,650	36%
25-54 Years	67,271	56%	107,483	57%	1,330,700	43%	1,637,767	43%
55-64 Years	7,384	6%	14,444	8%	241,102	8%	380,991	10%
65+ Years	3,097	3%	3,343	2%	358,979	12%	427,973	11%
Total	119,256	100%	187,509	100%	3,072,149	100%	3,835,381	100%

Travel Characteristics

This section compares the travel characteristics of the Valley Metro riders in 2001 and 2007, including trip origin, trip destination, number of buses used, alternate mode of travel, and source of bus schedule information.

Trip Origin

As in 2001, the most common trip origin continues to be home; however, there was a shift from 2001 to 2007 (Table 5-8). Fewer Valley riders reported to start their bus trip from their home, and increasingly more reported their bus trips originated from other locations, particularly from work, but

also from recreational sites, school, and from shopping. The percentages in 2007 more closely reflect the percentages reported in Origin and Destination studies conducted prior to 2001.⁷

Table 5-8: Comparison of Trip Origin

Trip Origin	2001 Survey ¹		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Home	95,948	69%	90,826	47%
Work	20,412	15%	48,916	25%
Recreation/Sightseeing/ Restaurant/ Social /Personal places/Church	3,613	3%	12,662	7%
College/University (Student Only)	4,441	3%	11,922	6%
School (K-12) (Student Only)	5,982	4%	9,335	5%
Shopping Places	2,557	2%	7,802	4%
Places for Medical Appointment/Hospital	1,241	1%	4,547	2%
Other	5,709	4%	7,793	4%
Total	139,903	100%	193,803	100%

¹For 2001 Survey Data, "School (K-12)" was defined as "Middle/High School"

Trip Destination

In 2007, Valley riders were more likely to report using transit to get home than in 2001, but they also were less likely to report work as a final destination (Table 5-9). Once again, data from 2007 more closely mirrors data reported in Origin and Destination studies conducted prior to 2001.⁸

Table 5-9: Comparison of Trip Destination

Trip Destination	2001 Survey ¹		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Home	34,736	25%	71,738	37%
Work	55,987	40%	52,936	27%
Recreation/Sightseeing/ Restaurant/ Social /Personal places/Church	10,524	8%	17,280	9%
Shopping Places	6,221	4%	13,242	7%
College/University (Student Only)	8,472	6%	12,330	6%
Other	8,988	6%	11,254	6%
School (K-12) (Student Only)	11,361	8%	6,708	3%

⁷ Refer to "2001 On Board Origin and Destination Survey Report, Valley Metro, July 2001."

⁸ Refer to "2001 On Board Origin and Destination Survey Report, Valley Metro, July 2001."

Trip Destination	2001 Survey ¹		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Places for Medical Appointment/Hospital	3,613	3%	8,314	4%
Total	139,902	100%	193,803	100%

¹For 2001 Survey Data, "School (K-12)" was defined as "Middle/High School"

Access and Egress Mode

The 2001 survey collected information on access and egress mode to the 'surveyed' bus. On the other hand, the 2007 Origin and Destination survey collected information on access and egress mode to the 'first' and the 'last' bus used to make the trip respectively. Due to the difference in type of information collected, these variables cannot be compared across the two surveys.

Number of Buses Used

Valley riders appear to be taking more buses to complete their trip (Table 5-10). Specifically, in 2007, there was a decrease in the percentage of riders using two buses and an increase in the percentage of those riders reporting to take three or more buses to get to their destination. This is partly reflective of the growth of the transit system which can now meet more trip needs, but also requires more transfers for trips covering multiple jurisdictions.

Table 5-10: Comparison of Number of Buses Used

Number of Buses Used	2001 Survey		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
1	47,045	37%	71,674	37%
2	61,773	48%	86,145	44%
3	13,738	11%	26,704	14%
4 or More	5,540	4%	9,280	5%
Total	128,056	100%	193,803	100%

Alternate Mode of Travel

In 2007, it appears that there are more transit dependent riders than in 2001 (Table 5-11). There was a 14-point increase in the percentage of riders who indicated they would not be able to make the trip if the bus were not available (30%). There was also an increase in those reporting that they would walk, use a bicycle, or drive with someone else. Valley transit users were less likely to indicate they would take a taxi and/or drive themselves compared to 2001.

Table 5-11: Comparison of Alternate Mode of Travel

Alternate Mode of Travel	2001 Survey		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Not Make This Trip	1,479	16%	54,176	30%
Drive With Someone Else	2,206	24%	45,668	26%
Walk/Bicycle	2,375	25%	44,604	25%
Taxi	1,390	15%	15,205	9%
Drive Myself	1,211	13%	14,510	8%
Other	703	7%	3,878	2%
Total	9,364	100%	178,040	100%

Source of Bus Schedule Information

In 2007 and 2001, the Valley Metro Bus Book was the primary source for bus schedule information (Table 5-12). However, in 2007 the percentage of Valley riders using the Bus Book declined from 79% to 65%. Riders were significantly more likely to report using the Valley Metro website for bus information than they were in 2001 (17% vs. 2%).

Table 5-12: Comparison of Source of Bus Schedule Information

Source of Bus Schedule Information	2001 Survey		2007 Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Bus Book	8,208	79%	118,913	65%
Valley Metro Website	218	2%	30,773	17%
Customer Service Telephone Number	1,300	12%	24,021	13%
Posted Schedule/Signs at Bus Stop/Transit Center	79	1%	6,278	3%
Other	642	6%	4,087	2%
Total	10,477	100%	184,072	100%

Summary

Overall, it appears Valley Metro weekday riders in 2007 are more transit dependent than they were in 2001. This is reflected in several trip attributes including: a decline in vehicle ownership, increased use of transit to and from a wider variety of locations in addition to home and work, an increase in the number of buses used per trip, and an increase in the percent of riders indicating they would not have made their trip if the bus had not been available. The demographics of the general population residing in Maricopa County indicate that, except for an increase in households with an annual income of \$60,000 or higher, there has not been any significant in the distribution of household size, vehicle ownership, employment status, and age since 2000. The other notable shift from 2001 is the decreased reliance on the Bus Book for bus schedule information and the increased reliance on the Valley Metro website.

Appendix A: Survey Instruments

Figure A-1: Survey Instrument (English)



If you have any questions about Valley Metro Public Transit services, please call:
602-253-5000
or visit our website at:
www.valleymetro.org



Smartmove.
Please take a minute to help us plan for your transit needs by filling out this survey.
Return the completed survey to the surveyor.

All personal information is confidential and WILL NOT be shared or sold.

Print letters/numbers clearly in upper case: A B C 1 2 3 Fill bubble with: ●

Fill bubble if you have already completed a survey on another trip and then continue filling out this survey.

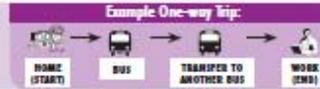
1. REGISTER TO WIN \$100! (10 winners)

Please provide your name, telephone number, and home address or where you are staying in the Phoenix area if you are just visiting.

Name _____ Telephone _____
 Street Number _____ Direction (N,S,E,W) _____ Street Name (NO P.O. BOXES PLEASE) _____ Street Type _____ Apt. # _____
 City _____ State _____ Zip _____

Example:
 ST = Street AVE = Avenue
 BLVD = Boulevard CT = Court

The following questions are about the **ONE-WAY TRIP** you are making **NOW!**



2. Did you have a motor VEHICLE AVAILABLE to make THIS ONE-WAY TRIP? (If your car is in the shop or someone else is using your car right now, then you did **NOT** have a car available for this trip and must fill in "No".)

Yes No

3. What type of place are you COMING FROM NOW? (starting place of this one-way trip) (fill one bubble only)

- Work
- College/University (student only)
- School (K-12) (student only)
- Home → If you gave your Home address in Question 1 → Go to Question 4
- Recreation/Sightseeing/Restaurant
- Medical appointment/Hospital visit
- Airport (air passenger only)
- Shopping
- Social visit/Church/Personal
- Other (specify): _____

a. What is the name of the PLACE, BUSINESS OR BUILDING you are COMING FROM NOW? Example: HISTORICAL HISTORICAL HISTORICAL

Place Name _____

b. What is the ADDRESS? Example: 1111 N 1234TH ST
(Provide the **NEAREST INTERSECTION** if you don't know the **EXACT ADDRESS**.)

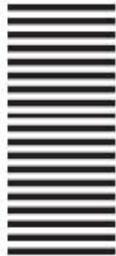
Street Number _____ Direction (N,S,E,W) _____ Street Name _____ Street Type _____
 Intersecting Street 1 _____ Street Type _____ & Intersecting Street 2 _____ Street Type _____
 City _____ State _____ Zip _____

Continue inside →

.....

Valley Metro 2007 Transit Rider Survey
 3006 BEE CAVES RD STE A-300
 AUSTIN TX 78746-8907

BUSINESS REPLY MAIL

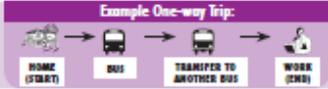


NO POSTAGE
 NECESSARY
 IF MAILED
 IN THE
 UNITED STATES



.....

Remember: The following questions are about the **ONE-WAY TRIP** you are making **NOW!**



- 4. How did you get to the VERY FIRST BUS you rode on THIS ONE-WAY TRIP? (fill one bubble only)**
- Bicycled: → # blocks?
 Walked: → # blocks?
 Drove alone & parked: → # miles?
- Rode with others: → # people?
 Dropped off
 Other (specify): _____
- 5. If you TRANSFERRED to get to THIS BUS, which ROUTE did you TRANSFER FROM?**
- I did not transfer
 Bus Route Number/Name (specify): _____
- 6. If you will TRANSFER FROM THIS BUS to get to your FINAL DESTINATION which ROUTE will you TRANSFER TO?**
- I will not transfer
 Bus Route Number/Name (specify): _____
- 7. How will you GET FROM THE VERY LAST BUS you will ride to your FINAL DESTINATION on THIS ONE-WAY TRIP? (fill one bubble only)**
- Bicycle: → # blocks?
 Walk: → # blocks?
 Drive alone: → # miles?
- Ride with others: → # people?
 Will get picked up
 Other (specify): _____
- 8. What type of place are you GOING TO NOW? (ending place of this one-way trip) (fill one bubble only)**
- Work
 Recreation/Sightseeing/Restaurant
 Shopping
- College/University (student only)
 Medical appointment/Hospital visit
 Social visit/Church/Personal
- School (K-12) (student only)
 Airport (air passenger only)
 Other (specify): _____
- Home → If you gave your Home address in Question 1 → **Go to Question 9**

a. What is the name of the PLACE, BUSINESS OR BUILDING you are GOING TO NOW?

Place Name: _____

b. What is the ADDRESS? (Provide the NEAREST INTERSECTION if you don't know the EXACT ADDRESS.)

Street Number: _____ Direction (N,S,E,W): _____ Street Name: _____ Street Type: _____

Intersecting Street 1: _____ Street Type: _____ & Intersecting Street 2: _____ Street Type: _____

City: _____ State: _____ Zip: _____

9. LIST ALL of the BUS ROUTES in the EXACT ORDER you will use to make THIS ONE-WAY TRIP:

FIRST Bus Route:
 SECOND Bus Route:
 THIRD Bus Route:
 FOURTH Bus Route:

10. If BUS SERVICE WAS NOT AVAILABLE, how would you make THIS ENTIRE ONE-WAY TRIP? (fill one bubble only)

- I would not make this trip
 Taxi
 Drive myself
- Drive with someone else
 Walk/Bicycle
 Other (specify): _____

11. How many registered CARS, TRUCKS, or MOTORCYCLES are in running condition and available to your household?

- None
 1
 2
 3
 4 or more

12. Including yourself, how many PEOPLE live in your household?

- 1
 2
 3
 4
 5 or more

13. What is your AGE?

- 17 and under
 18 - 24
 25 - 54
 55 - 64
 65 + years of age

14. Do you have a VALID DRIVER'S LICENSE?

- Yes
 No

15. Are you a STUDENT? (fill the bubble that best describes you)

- Not a student
 Yes: Kindergarten through 12th Grade
 Yes: Other (specify institution name): _____

16. Are you... (fill the bubble that best describes you)

- Employed full-time (35 hours or more per week)
 Not currently employed and not retired
- Employed part-time (less than 35 hours per week)
 Retired

17. How do you USUALLY get BUS SCHEDULE INFORMATION? (select the ONE you use most often)

- Bus schedule book
 Valley Metro website
 Other (specify): _____
- Customer service telephone number
 Posted schedule at bus stop

18. Which of the following categories best describes your TOTAL HOUSEHOLD INCOME in 2006?

- Less than \$10,000
 \$20,000 - \$34,999
 \$50,000 - \$69,999
- \$10,000 - \$19,999
 \$35,000 - \$49,999
 \$70,000 or more

Thank you!

RETURN the COMPLETED SURVEY to the SURVEYOR, OR drop it in any MAILBOX (no postage required).

Figure A-2: Survey Instrument (Spanish)

Valley Metro
Smartmove.

Si tiene alguna pregunta acerca de los servicios de Valley Metro Public Transit, por favor llame al: 602-253-5000 o visite nuestro sitio de Internet: www.valleymetro.org

Valley Metro 2007 Encuesta de Usuarios de Transporte Público

Smartmove
Por favor tome un minuto y ayúdenos a planificar sus necesidades de tránsito completando esta encuesta.

Regrese la encuesta completada al encuestador.

Toda la información personal se mantendrá en forma confidencial y NO será compartida o vendida.

Escriba las letras y números claramente en mayúsculas: A B C 1 2 3 Rellene el óvalo con: ●

○ Rellene el óvalo si ya ha completado una encuesta en otro viaje y después continúe llenando esta encuesta.

1. ¡REGÍSTRESE PARA GANAR \$100! (10 ganadores)

Por favor proporcione su nombre, número de teléfono y la dirección de su hogar o si está de visita en el área de Phoenix la dirección del lugar donde se está quedando.

Nombre _____ Teléfono _____

No. de dirección _____ Orientación (N,S,E,W) _____ Nombre de la Calle (NO PONGA P.O. BOX POR FAVOR) _____ Tipo de Calle _____ No de apt. _____

Ciudad _____ Estado _____ CP _____

Ejemplo:
ST = Street AVE = Avenida
RVD = Roadway CT = Court

¡Las siguientes preguntas son de ESTE VIAJE SENCILLO que está haciendo HACIENDO!



2. ¿Tiene un VEHICULO MOTORIZADO DISPONIBLE para realizar ESTE VIAJE SENCILLO?

(Si su auto está en el taller o alguien más está utilizando su auto ahora, entonces: NO tenía un auto disponible para este viaje de debe rellenar "No".)

○ Sí ○ No

3. ¿De qué tipo de lugar VIENE en este momento? (comienzo de este viaje sencillo en transporte público) (rellene solo un óvalo)

- Trabajo
- Recreación/Turismo/Restaurante
- Compras
- Colegio/Universidad (sólo estudiantes)
- Cita médica/Visita al hospital
- Visita social/Iglesia/Personal
- Escuela (K-12) (sólo estudiantes)
- Aeropuerto (sólo pasajeros)
- Otro (especifique): _____
- Hogar → Si ya proporcionó su dirección en la Pregunta 1 → Vaya a la pregunta 4

a. ¿Cuál es el nombre del LUGAR, NEGOCIO O EDIFICIO del que VIENE AHORA?

Ejemplo: H I T | S T | Q R | T | C | _ | H | K | R | T | A | R | E | | R | Q | W | A | R | E | _ |

Nombre del lugar _____

b. ¿Cuál es la DIRECCIÓN? (Proporcione el CRUCE MÁS CERCANO si no conoce la DIRECCIÓN EXACTA.)

Ejemplo: I 15 | N | S | I 17 | N | S | I 17

No. de dirección _____ Orientación (N,S,E,W) _____ Nombre de la Calle _____ Tipo de Calle _____

Cruce de Calle 1 _____ Tipo de Calle _____ Cruce de Calle 2 _____ Tipo de Calle _____

Ciudad _____ Estado _____ CP _____

Continúe adentro →



Valley Metro 2007 Transit Rider Survey
3006 BEE CAVES RD STE A-300
AUSTIN TX 78746-9807

BUSINESS REPLY MAIL

Si lo requiere por correo por favor adherir un sello

Recuerde: ¡Las siguientes preguntas son acerca del VIAJE SENCILLO que está realizando AHORA!



4. ¿Cómo fue que llegó al PRIMER AUTOBÚS que abordó en ESTE VIAJE SENCILLO? (rellene solo un óvalo)

Bicicleta: → # de cuatras? Camión: → # de cuatras? Conduje solo y me estacioné: → # de millas?

Viaje con otros: → # de personas? Me dejaron Otro (especifique): _____

5. Si se TRANSFIRIÓ para llegar a ESTE AUTOBÚS, ¿qué RUTA de autobús utilizó?

No me transferí Número de Ruta/Nombre (especifique): _____

6. Si se va a TRANSFERIR DE ESTE AUTOBÚS para llegar a su DESTINO FINAL, ¿qué RUTA va a utilizar?

No me voy a transferir Número de Ruta/Nombre (especifique): _____

7. ¿Cómo va a LLEGAR DEL ÚLTIMO AUTOBÚS que va a abordar hasta su DESTINO FINAL en este VIAJE SENCILLO? (rellene solo un óvalo)

Bicicleta: → # de cuatras? Caminando: → # de cuatras? Conduciendo solo: → # de millas?

Viajando con otros: → # de personas? Voy a ser recogido Otro (especifique): _____

8. ¿A qué tipo de lugar se DIRIGE AHORA? (destino de este viaje sencillo de transporte público) (rellene solo un óvalo)

Trabajo Recreación/Turismo/Restaurante Compras

Colegio/Universidad (sólo estudiantes) Cita médica/Visita al hospital Visita social/Iglesia/Personal

Escuela (K-12) (sólo estudiantes) Aeropuerto (sólo pasajeros) Otro (especifique): _____

Hogar → Si ya proporcionó su dirección en la Pregunta 1 → **Vaya a la pregunta 9**

a. ¿Cuál es el NOMBRE del LUGAR, NEGOCIO O EDIFICIO al que se DIRIGE?

Nombre del lugar: _____

b. ¿Cuál es la DIRECCIÓN? (Proporcione el CRUCE MÁS CERCANO si no conoce la DIRECCIÓN EXACTA.)

No. de dirección: _____ Orientación (N,S,E,W): _____ Nombre de la Calle: _____ Tipo de Calle: _____

Cruce de Calle 1: _____ Tipo de Calle: _____ Cruce de Calle 2: _____ Tipo de Calle: _____

Ciudad: _____ Estado: _____ CP: _____

9. ENLISTE TODAS las RUTAS DE AUTOBÚS en la ORDEN EXACTA que utilizará en este VIAJE SENCILLO:

PRIMERA Ruta de Autobús: _____

SEGUNDA Ruta de Autobús: _____

TERCERA Ruta de Autobús: _____

CUARTA Ruta de Autobús: _____

10. Si el SERVICIO DE AUTOBÚS NO ESTUVIERA DISPONIBLE, ¿cómo realizaría ESTE VIAJE SENCILLO? (rellene solo un óvalo)

No hubiera hecho el recorrido Taxi Hubiera conducido

Hubiera viajado con alguien más Caminando/Bicicleta Otro (especifique): _____

11. ¿Cuántas AUTOS, CAMIONETAS, o MOTOCICLETAS registradas se encuentran en condiciones de uso y disponibles para su hogar?

Ninguna 1 2 3 4 o más

12. Incluyéndose usted, ¿cuántas PERSONAS viven en su hogar?

1 2 3 4 5 o más

13. ¿Cuál es su EDAD?

17 o menor 18 - 24 25 - 54 55 - 64 65 años o más

14. ¿Tiene una LICENCIA DE CONDUCTOR VALIDA?

Sí No

15. ¿Es usted ESTUDIANTE? (rellene el óvalo que mejor lo describa)

No soy estudiante Estudiante: Desde preescolar hasta Doctavo Grado

Estudiante: Otro (especifique el nombre de la institución): _____

16. Es usted... (rellene el óvalo que mejor lo describa)

Empleado tiempo completo (35 horas o más por semana) Actualmente desempleado y no está retirado

Empleado medio tiempo (menos de 35 horas por semana) Retirado

17. USUALMENTE, ¿cómo obtiene usted LA INFORMACIÓN SOBRE LOS HORARIOS DE LOS AUTOBÚSES? (elija LA RESPUESTA que más utiliza)

Libro de horarios de los autobuses Sitio de Internet Valley Metro Otro (especifique): _____

Línea telefónica de servicio al cliente Horario de autobuses colocado en la parada

18. ¿Cuál de las siguientes categorías describe mejor el INGRESO TOTAL DE SU HOGAR en el 2006?

Menos de \$10,000 \$20,000 - \$34,999 \$50,000 - \$69,999

\$10,000 - \$19,999 \$35,000 - \$49,999 Más de \$70,000

¡Muchas gracias!

REGRESE la ENCUESTA COMPLETA al ENCUESTADOR o póngala en cualquier BUZÓN (sin gastos de envío).

Appendix B: 2007 General Population Statistics

2007 American Community Survey – Maricopa County

Table B-1: Household Size (Total Households)

Household Size	2007 ACS	
	Count	Percent
One	355,247	27%
Two	454,634	34%
Three	188,209	14%
Four	176,287	13%
Five or more	164,177	12%
<i>Total</i>	1,338,554	100%

Table B-2: Household Income (Total Households)

Household Income	2007 ACS	
	Count	Percent
Less than \$10,000	77,704	6%
\$10,000-\$19,999	123,423	9%
\$20,000-\$34,999	210,844	16%
\$35,000-\$49,999	199,168	15%
\$50,000-\$69,999	221,964	17%
\$70,000 or more	505,451	38%
<i>Total</i>	1,338,554	100%

Table B-3: Vehicle Ownership (Total Households)

Vehicle Ownership	2007 ACS	
	Count	Percent
None	83,609	6%
One	491,326	37%
Two	532,299	40%
Three or more	231,320	17%
<i>Total</i>	1,338,554	100%

Table B-4: Employment Status (Population Age 16 years or Older)

Employment Status	2007 ACS	
	Count	Percent
Employed	1,815,702	63%
Unemployed	99,068	3%
Not in the Labor Force	975,372	34%
<i>Total</i>	2,890,142	100%

Table B-5: Age (Total Population)

Age	2007 ACS	
	Count	Percent
17 yrs and under	1,052,778	27%
18-24 yrs	335,872	9%
25-54 yrs	1,637,767	43%
55-64 yrs	380,991	10%
65+ yrs	427,973	11%
<i>Total</i>	3,835,381	100%

Appendix C: Snapshot of Zip Code Origin/Destination Flows

The following tables provide a snapshot of the top zip code Origin/Destination flows. Not all possible combinations are presented in this Appendix. A complete Origin/Destination table with all zip codes for AM Peak, PM Peak, Midday and Evening are provided as an Excel worksheet.

Table C-1: Top 10 Origin/Destination Flows by Zip Code

Origin Zip – Destination Zip	Count	Percent
85281-85281	6,674	3%
85282-85281	1,468	1%
85281-85282	1,346	1%
85281-85201	1,022	1%
85281-85283	897	0%
85008-85009	858	0%
85016-85008	848	0%
85008-85016	819	0%
85028-85022	815	0%
85015-85014	767	0%
Total Trips	193,803	100%

Note: Not all O/D flows are listed in this table. Thus, the sum is less than the total trips.

Table C-2: Top 10 Origin/Destination Flows by Zip Code – AM Peak Period

Origin Zip – Destination Zip	Count	Percent
85281-85281	966	2%
85282-85281	598	1%
85017-85284	581	1%
85008-85016	513	1%
85281-85201	453	1%
85007-85034	444	1%
85009-85003	412	1%
85283-85041	406	1%
85017-85013	391	1%
85304-85392	364	1%
Total Trips	59,165	100%

Note: Not all O/D flows are listed in this table. Thus, the sum is less than the total trips.

Table C-3: Top 10 Origin/Destination Flows by Zip Code – Mid-Day

Origin Zip – Destination Zip	Count	Percent
85281-85281	5,136	6%
85028-85022	815	1%
85013-85015	663	1%
85008-85009	654	1%
85004-85015	554	1%
85034-85042	549	1%
85034-85015	533	1%
85282-85281	518	1%
85281-85282	495	1%
85016-85008	491	1%
Total Trips	89,400	100%

Note: Not all O/D flows are listed in this table. Thus, the sum is less than the total trips.

Table C-4: Top 10 Origin/Destination Flows by Zip Code – PM Peak Period

Origin Zip – Destination Zip	Count	Percent
85281-85281	462	2%
85206-85205	317	1%
85015-85014	305	1%
85008-85035	304	1%
85282-85282	296	1%
85282-85281	279	1%
85031-85017	264	1%
85007-85018	257	1%
85013-85014	250	1%
85009-85016	250	1%
Total Trips	30,634	100%

Note: Not all O/D flows are listed in this table. Thus, the sum is less than the total trips.

Table C-5: Top 10 Origin/Destination Flows by Zip Code – Evening

Origin Zip – Destination Zip	Count	Percent
85251-85204	479	3%
85040-85041	424	3%
85283-85007	346	2%
85202-85041	346	2%
85281-85282	318	2%
85034-85302	263	2%
85033-85035	249	2%
85033-85043	229	2%
85210-85204	213	1%
85016-85208	210	1%
Total Trips	14,604	100%

Note: Not all O/D flows are listed in this table. Thus, the sum is less than the total trips.

Appendix D: Service Types

This section presents the weighted distribution of unlinked trips by routes that fall in each service type.

Table D-1: Local Bus Routes

Local Routes	Route Name	Average Weekday Ridership
PHX-0000	Central	5899
PHX-0001	Washington/Jefferson/ASU	1000
PHX-0003	Van Buren/Avondale	8568
PHX-0007	7th Street	5706
PHX-0008	7th Avenue	3284
PHX-000B	Blue Line	4049
PHX-000G	Green Line - Thomas Road/Avondale	11706
PHX-000R	Red Line	10077
PHX-0010	Roosevelt/Grant	2891
PHX-0012	12th Street	1330
PHX-0013	Buckeye	1286
PHX-0015	15th Avenue	1242
PHX-0016	16th Street	5865
PHX-0017	McDowell/Avondale	9106
PHX-0019	19th Avenue	9079
PHX-0027	27th Avenue	4719
PHX-0030	University	3584
PHX-0032	32nd Street	25
PHX-0035	35th Avenue	7457
PHX-0041	Indian School/Avondale	10223
PHX-0043	43rd Avenue	3228
PHX-0044	44th St/Tatum	3151
PHX-0045	Broadway	4385
PHX-0050	Camelback	5842
PHX-0051	51st Avenue	1280
PHX-0056	Priest Drive	2047
PHX-0059	59th Avenue	2970
PHX-0060	Bethany Home	2318
PHX-0061	Southern	4952
PHX-0062	Hardy	1422

Local Routes	Route Name	Average Weekday Ridership
PHX-0065	Mill/Kyrene	849
PHX-0066	Mill/68th Street	1188
PHX-0067	67th Avenue	2419
PHX-0070	Glendale/24th Street	442
PHX-0072	Scottsdale/Rural	5223
PHX-0076	Miller	590
PHX-0077	Baseline	2273
PHX-0080	Northern	1619
PHX-0081	Hayden/McClintock	2995
PHX-0084	Granite Reef	84
PHX-0090	Dunlap/Cave Creek	2973
PHX-0092	48th St/Guadalupe Rd	1300
PHX-0096	Dobson	817
PHX-0104	Alma School	1553
PHX-0106	Peoria/Shea	3812
PHX-0108	Elliot Rd	699
PHX-0114	Via Linda	79
PHX-0120	Mesa Dr	342
PHX-0122	Cactus/39th Ave	390
PHX-0128	Stapley	296
PHX-0131	START	344
PHX-0136	Gilbert Road	669
PHX-0138	Thunderbird	1415
PHX-0154	Greenway	844
PHX-0156	Chandler Blvd/Williams Field Road	604
PHX-0170	Bell	3294
PHX-0186	Union Hills	1254
PHX-0371	Grand Avenue Limited	142
PHX-0DUR	Durango Shuttle	3
PHX-ALX1	Phoenix Neighborhood Circulator (ALEX)	1154
PHX-DASH	Downtown Area Shuttle (DASH)	1512
PHX-FSHB	Free Local Area Shuttle (FLASH)	5852
PHX-GUS1	Glendale Urban Shuttle (GUS)	328
PHX-MARY	Phoenix Neighborhood Circulator (MARY)	750
PHX-MERC	Tempe Orbit	340
PHX-SNCN	Scottsdale Neighborhood Circulator	31

Local Routes	Route Name	Average Weekday Ridership
PHX-SSCR	Phoenix Neighborhood Circulator (SMART)	673
<i>Total</i>		187,843

Figure D-1: Local Bus Routes

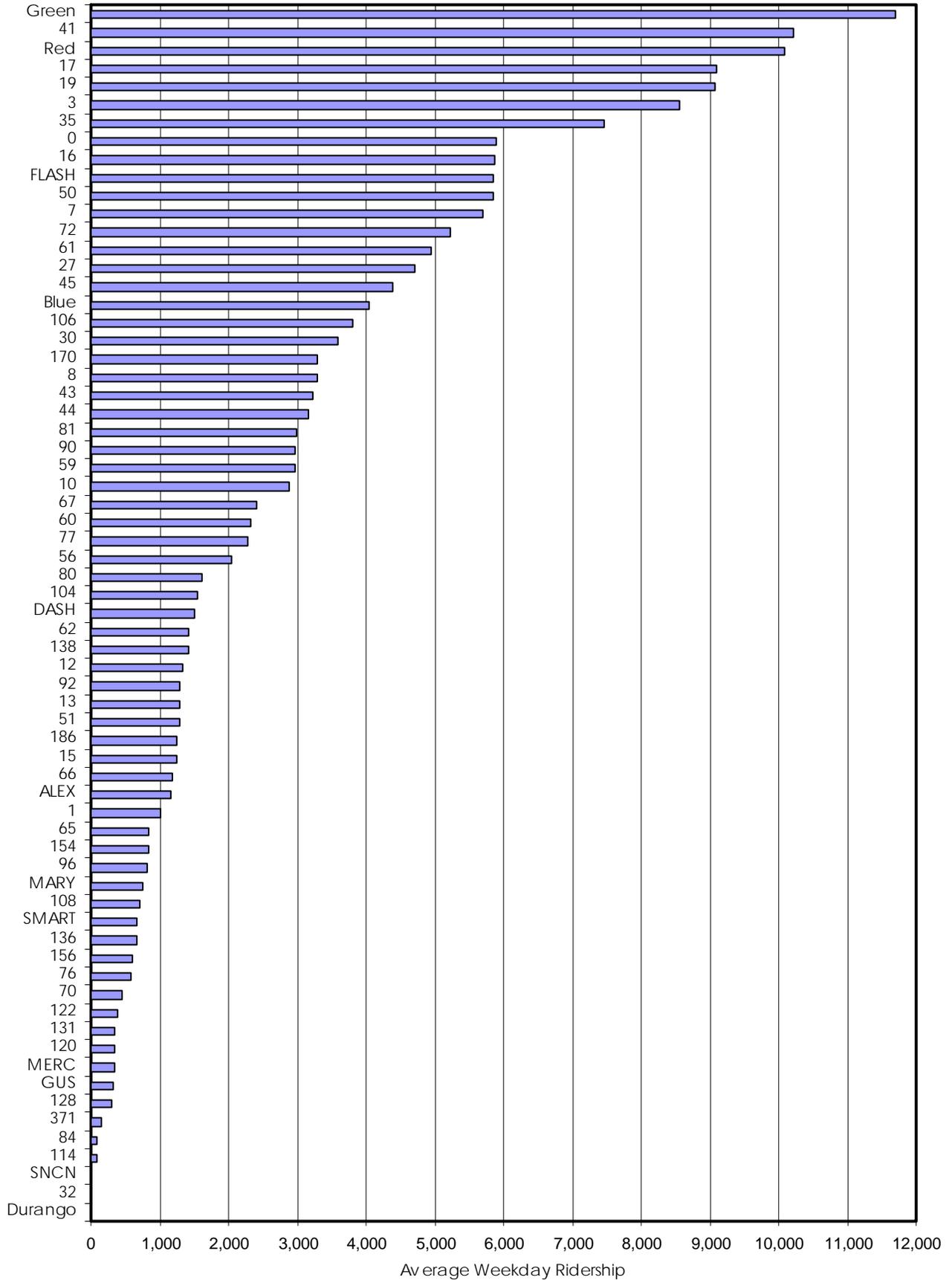


Table D-2: Express Bus Routes

Express Routes	Route Name	Average Weekday Ridership
PHX-0510	Scottsdale	86
PHX-0512	Scottsdale	89
PHX-0520	Tempe	112
PHX-0521	Tempe	247
PHX-0531	Mesa/Gilbert	241
PHX-0532	Mesa	161
PHX-0533	Mesa	261
PHX-0540	Chandler	132
PHX-0541	Chandler	330
PHX-0560	Avondale	95
PHX-0570	Glendale	60
PHX-0571	Surprise	103
PHX-0572	Surprise/Scottsdale	42
PHX-0573	Northwest Valley/Downtown	70
PHX-0581	N. Mountain	114
PHX-0582	N. Mountain	114
PHX-0590	Deer Valley	131
PHX-0660	Wickenburg Connector	7
Total		2,395

Figure D-2: Express Bus Routes

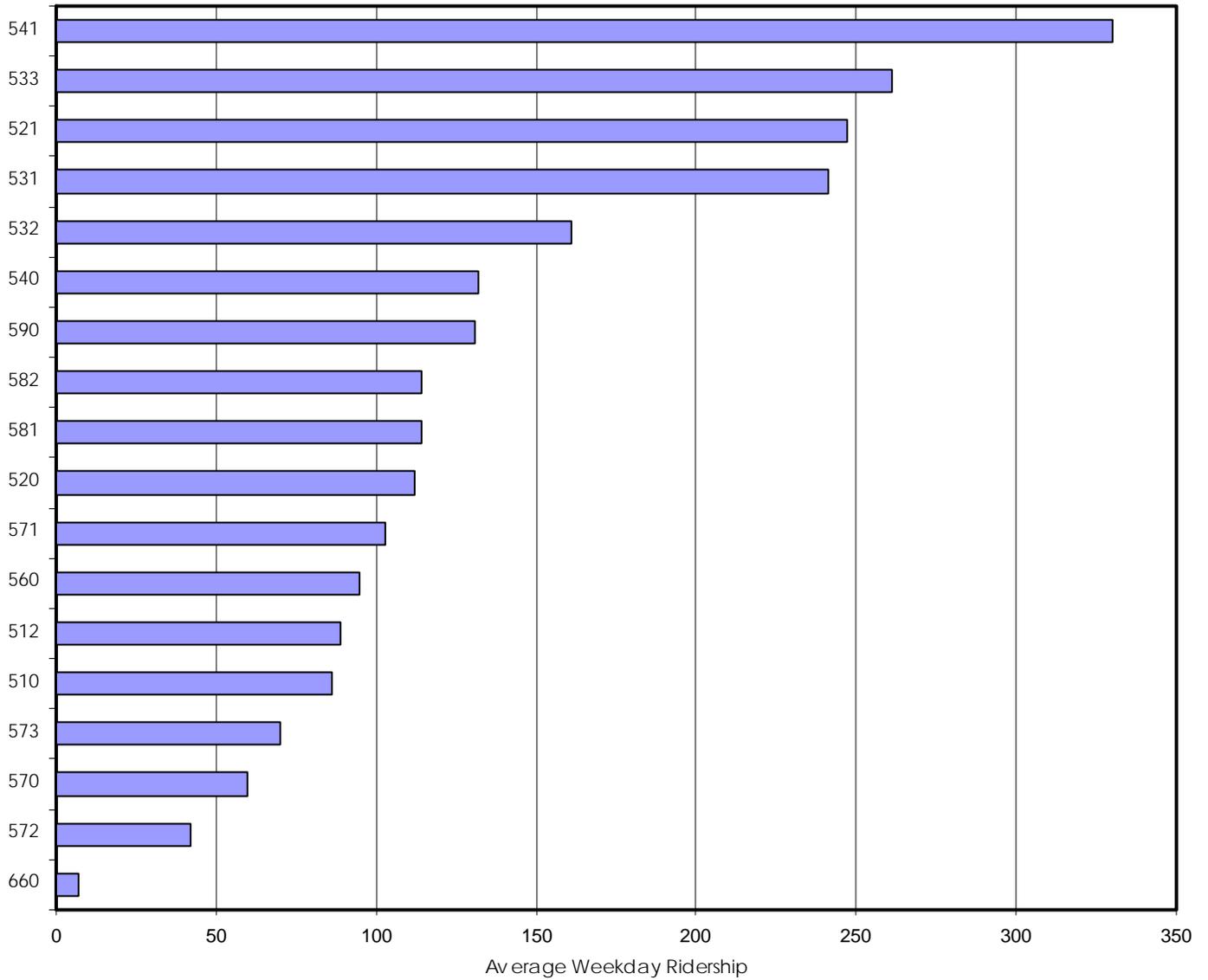
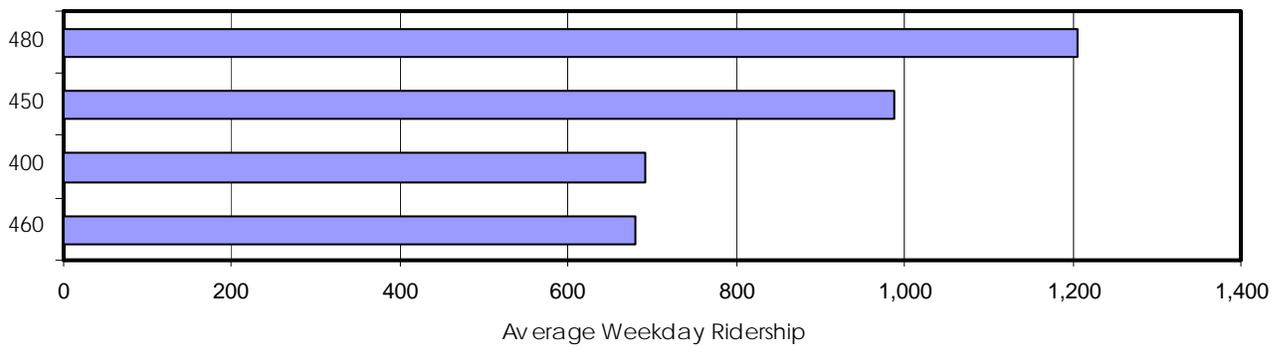


Table D-3: RAPID bus Routes

RAPID Routes	Route Name	Average Weekday Ridership
PHX-0400	SR-51 RAPID	691
PHX-0450	I-10 East	987
PHX-0460	I-10 West	681
PHX-0480	I-17 RAPID	1206
<i>Total</i>		3,565

Table D-3: RAPID bus Routes



Appendix E:

February 2007 RAPID bus and 2007 O/D Survey RAPID bus Tables (Unlinked Trips)

This section presents the weighted distribution of unlinked trips for the comparable variables between February 2007 RAPID bus survey and 2007 Origin and Destination (O/D) survey.

Table E-1: Comparison of Household Vehicle Ownership

Vehicle Ownership	2007 RAPID bus Survey ¹		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
None	56	1.6%	90	2.5%
One	876	24.7%	1,085	30.4%
Two	1,797	50.6%	1,621	45.5%
Three	560	15.8%	652	18.3%
Four or More	261	7.4%	117	3.3%
Total	3,551	100.0%	3,565	100.0%

¹2007 RAPID bus Survey defined vehicle ownership in terms of "Working Vehicles Available to Household".

Table E-2: Comparison of Household Income

Annual Household Income	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
<\$20,000	29	0.9%	43	1.3%
\$20,000-\$49,999	539	16.8%	898	26.9%
\$50,000-\$69,999	673	21.0%	921	27.6%
\$70,000 and Above	1,963	61.2%	1,479	44.3%
Total	3,204	100.0%	3,341	100.0%

Table E-3: Comparison of Age

Age	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Under 25 Years	91	2.7%	111	3.1%
25-54 Years	2,496	74.8%	2,651	74.4%
55-64 Years	676	20.3%	696	19.5%
65+ Years	75	2.3%	106	3.0%
Total	3,339	100.0%	3,564	100.0%

Table E-4: Comparison of Trip Origin

Trip Origin	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Work	1,824	51.2%	1,746	49.0%
College/University (Student Only)	33	0.9%	11	.3%
School (K-12) (Student Only) ¹	13	0.4%	2	.0%
Home	1,689	47.5%	1,801	50.5%
Other ²	0	0.0%	6	.2%
Total	3,559	100.0%	3,565	100.0%

¹For 2007 Survey Data, "School (K-12)" was defined as "Middle/High School".

²For 2007 O/D Survey Data, Other includes Other, Shopping, Medical, Recreation, Sightseeing, Personal, Church and Social places.

Table E-5: Comparison of Trip Destination

Trip Destination	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Work	1,718	48.3%	1,787	50.1%
College/University (Student Only)	35	1.0%	4	.1%
School (K-12) (Student Only) ¹	2	0.1%	5	.1%
Home	1,782	50.0%	1,693	47.5%
Recreation/Sightseeing/ Restaurant/Personal/Social Visit/Church	21	0.6%	20	.6%
Medical Appointment/Hospital Visit	0	0.0%	0	.0%
Shopping	3	0.1%	9	.2%
Other	0	0.0%	48	1.3%
Total	3,561	100.0%	3,565	100.0%

¹For 2007 Survey Data, "School (K-12)" was defined as "Middle/High School".

Table E-6: Comparison of Access Mode

Access Mode	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Walk	1,645	46.4%	1,672	46.9%
Drive (Includes Drive Alone and Carpool)	1,736	48.9%	1,580	44.3%
Dropped Off	155	4.4%	292	8.2%
Bicycle	12	0.3%	21	.6%
Total	3,548	100.0%	3,565	100.0%

Table E-7: Comparison of Egress Mode

Egress Mode	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
Walk	1,753	49.8%	2,150	60.3%
Drove Alone and Parked	1,582	44.9%	1,094	30.7%
Picked Up or Carpool	174	4.9%	309	8.7%
Bicycle	12	0.3%	12	.3%
Total	3,520	100.0%	3,565	100.0%

Table E-8: Comparison of Number of Buses Used

Number of Buses Used	2007 RAPID bus Survey		2007 O/D Survey	
	Average Weekday Ridership	Percent	Average Weekday Ridership	Percent
1	3,258	91.3%	3,232	90.6%
2	281	7.9%	274	7.7%
3	27	0.8%	54	1.5%
4 or More	0	0.0%	6	.2%
<i>Total</i>	3,566	100.0%	3,565	100.0%

Appendix F: Activity Center Analysis

This section presents summary tables and maps for different trip purposes by Time of the Day within a mile radius of the activity centers listed below. These activity centers have been identified in the MAG Regional Framework Study. The maps in this section show buffers for 1 mile, 1.5 miles and 2 miles radius. However, for the purpose of this report the data is summarized for only a mile radius.

1. Downtown Phoenix (Mile Radius of Central Station)
2. Uptown Phoenix (Mile Radius of Park Central Complex)
3. Sky Harbor Airport (3400 E Sky Harbor Blvd and 3800 E Sky Harbor Blvd)
4. Arizona State University (Mile radius of Student Health Services)
5. Biltmore Area (Mile Radius of Camelback Esplanade Mall)
6. Metro Center (Mile Radius of Metro Center Transit Station)
7. Scottsdale Airpark (Mile Radius of Scottsdale Municipal Airport)

The MAG Regional Frame Work Study grouped the Traffic Analysis Zones in the region in to 26 districts Map F-1 shows the service area by districts. Summary tables were generated to show the attraction flow from each of the districts to the activity centers listed above.

Purpose at Activity Center

Downtown Phoenix

Table F-1: Purpose at Downtown Phoenix

Purpose at Activity Center	Downtown Phoenix as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	2,664	24%	1,294	62%	1,133	23%	154	4%	83	16%
Work	4,765	43%	445	21%	1,350	27%	2,768	77%	203	38%
College/University (Student Only)	335	3%	0	0%	328	7%	7	0%	0	0%
School (K-12) (Student Only)	430	4%	41	2%	276	6%	40	1%	73	14%
Shopping Places	0	0%	0	0%	0	0%	0	0%	0	0%
Social/Personal Places or Church	693	6%	137	7%	500	10%	47	1%	10	2%
Recreation/Sightseeing/Restaurant	641	6%	0	0%	162	3%	314	9%	165	31%
Medical Appointment/Hospital	123	1%	9	0%	114	2%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	1,544	14%	174	8%	1,122	23%	248	7%	0	0%
Total Trips	11,196	100%	2,099	100%	4,986	100%	3,578	100%	533	100%

Purpose at Activity Center	Downtown Phoenix as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	2,132	17%	28	0%	1,347	25%	382	60%	374	95%
Work	5,884	47%	4,753	77%	1,043	19%	83	13%	5	1%
College/University (Student Only)	124	1%	0	0%	124	2%	0	0%	0	0%
School (K-12) (Student Only)	130	1%	130	2%	0	0%	0	0%	0	0%
Shopping Places	368	3%	68	1%	299	6%	0	0%	0	0%
Social/Personal Places or Church	421	3%	82	1%	333	6%	6	1%	0	0%
Recreation/Sightseeing/Restaurant	974	8%	144	2%	682	13%	148	23%	0	0%
Medical Appointment/Hospital	187	1%	85	1%	102	2%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	2,346	19%	864	14%	1,446	27%	22	3%	13	3%
Total Trips	12,564	100%	6,155	100%	5,376	100%	641	100%	392	100%

Figure F-1: Downtown Phoenix – Trip Purpose at AM Peak

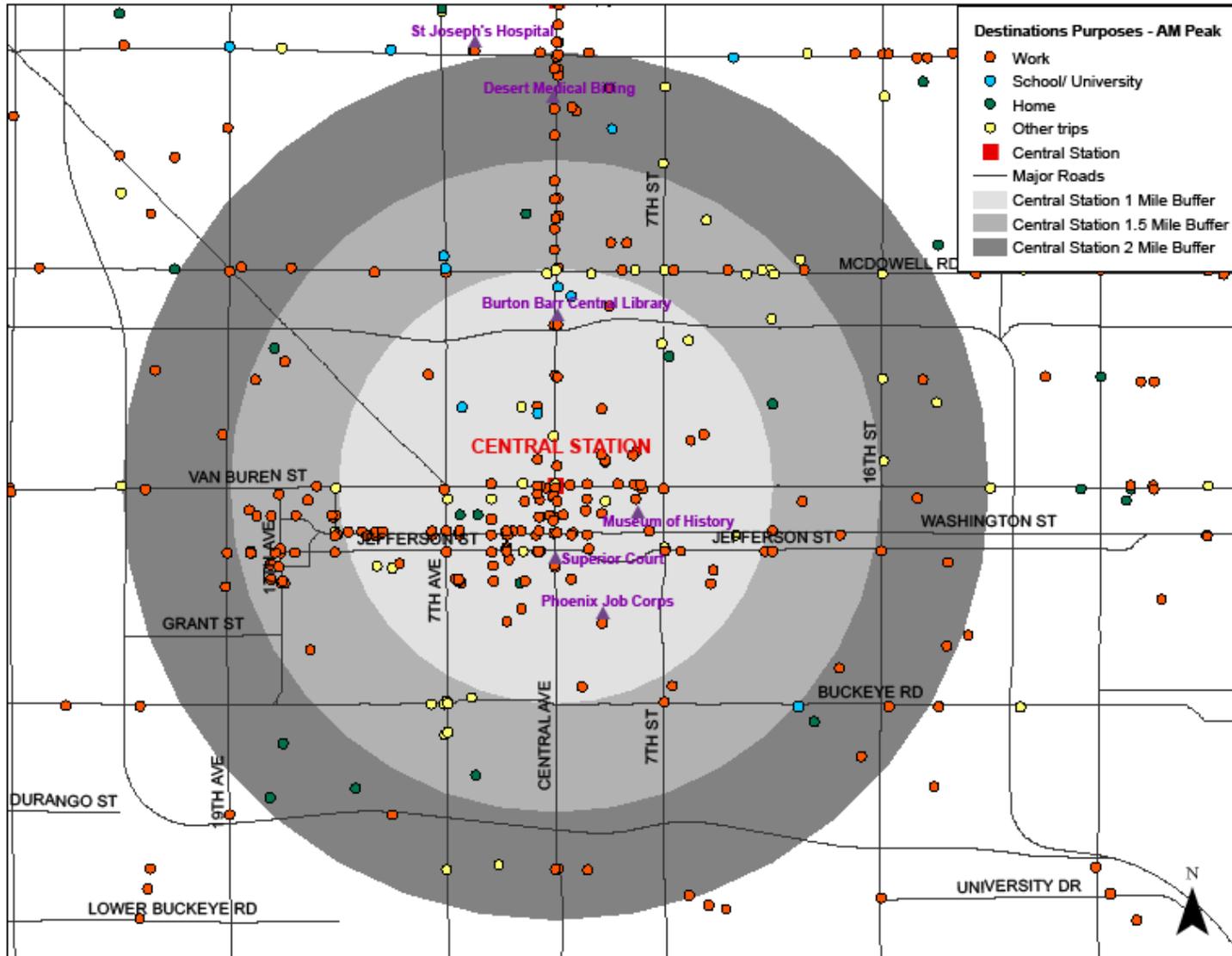


Figure F-2: Downtown Phoenix – Trip Purpose at Mid-Day

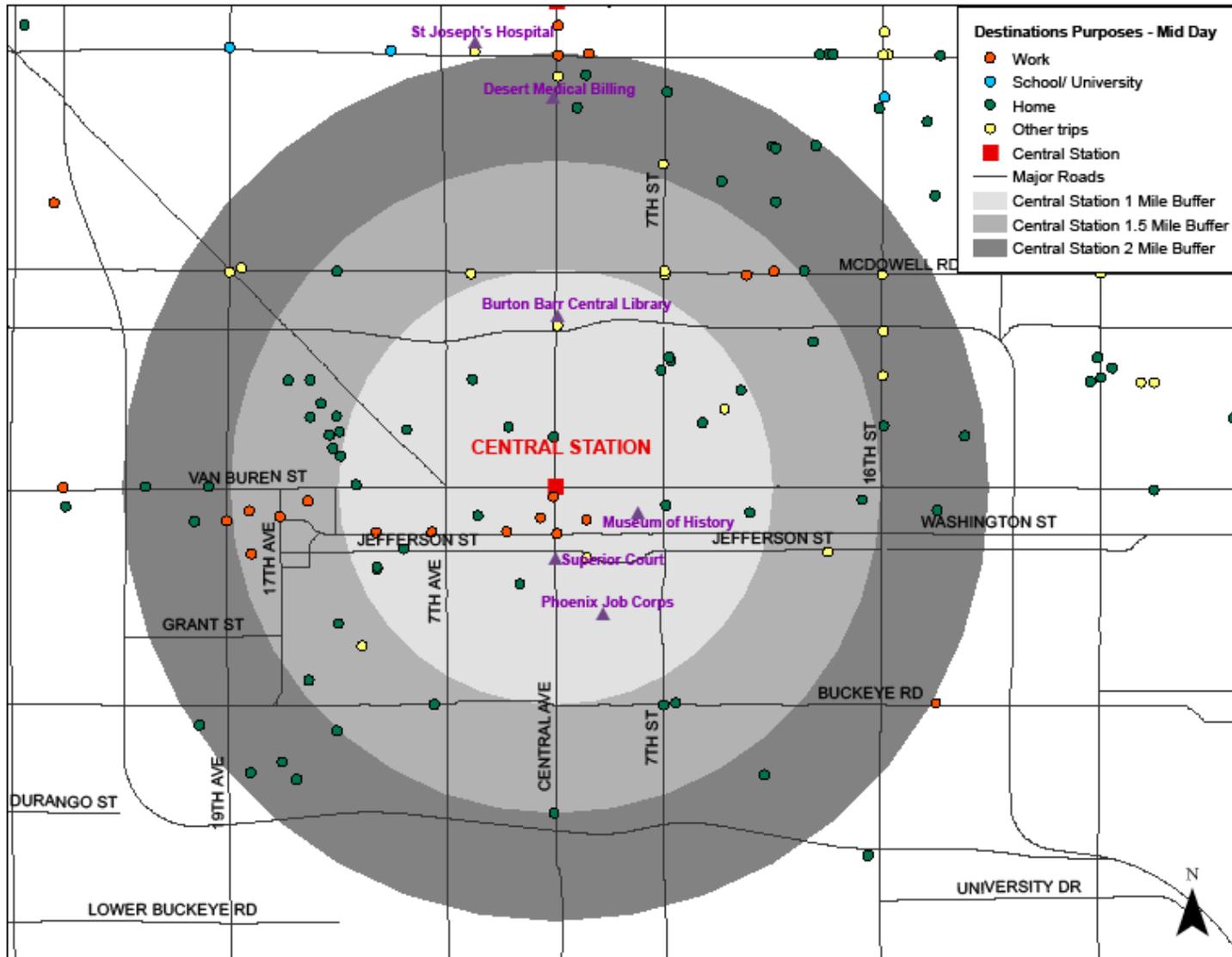
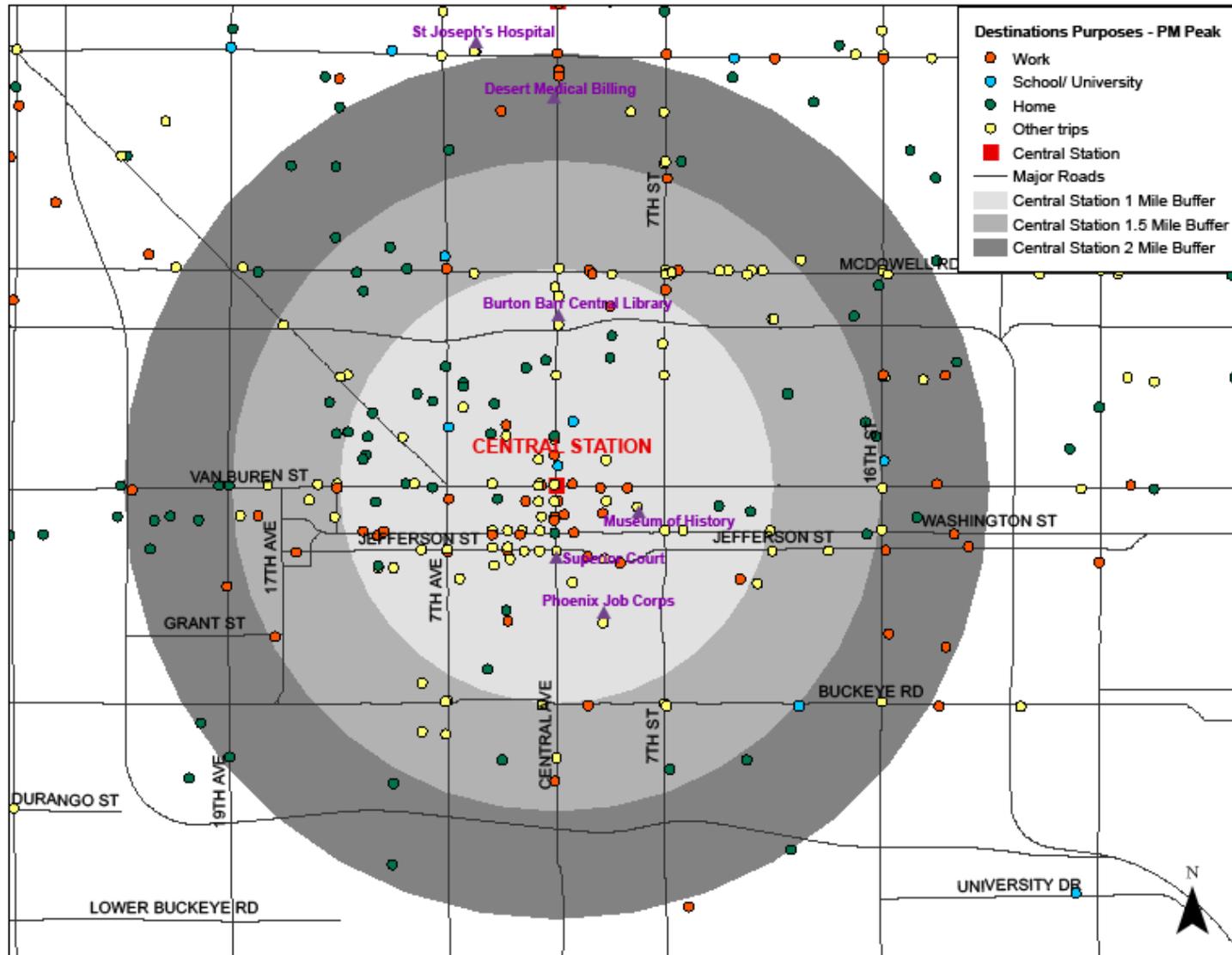


Figure F-3: Downtown Phoenix – Trip Purpose at PM Peak



Uptown Phoenix

Table F-2: Purpose at Uptown Phoenix

Purpose at Activity Center	Uptown Phoenix as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	1,799	25%	665	67%	1,023	23%	111	8%	0	0%
Work	2,879	40%	148	15%	1,361	31%	1,075	75%	294	73%
College/University (Student Only)	678	9%	8	1%	650	15%	12	1%	8	2%
School (K-12) (Student Only)	425	6%	2	0%	284	6%	53	4%	87	21%
Shopping Places	153	2%	0	0%	153	3%	0	0%	0	0%
Social/Personal Places or Church	206	3%	0	0%	124	3%	82	6%	0	0%
Recreation/Sightseeing/Restaurant	150	2%	0	0%	150	3%	0	0%	0	0%
Medical Appointment/Hospital	545	8%	165	17%	263	6%	101	7%	16	4%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	414	6%	0	0%	414	9%	0	0%	0	0%
Total Trips	7,248	100%	988	100%	4,423	100%	1,434	100%	404	100%

Purpose at Activity Center	Uptown Phoenix as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	924	12%	22	1%	612	17%	147	38%	143	70%
Work	3,584	45%	2,305	63%	1,272	34%	7	2%	0	0%
College/University (Student Only)	823	10%	314	9%	418	11%	91	24%	0	0%
School (K-12) (Student Only)	480	6%	469	13%	11	0%	0	0%	0	0%
Shopping Places	48	1%	4	0%	44	1%	0	0%	0	0%
Social/Personal Places or Church	665	8%	174	5%	404	11%	41	11%	46	23%
Recreation/Sightseeing/Restaurant	0	0%	0	0%	0	0%	0	0%	0	0%
Medical Appointment/Hospital	894	11%	249	7%	560	15%	71	18%	15	7%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	532	7%	132	4%	371	10%	28	7%	0	0%
Total Trips	7,950	100%	3,669	100%	3,692	100%	385	100%	204	100%

Figure F-4: Uptown Phoenix – Trip Purpose at AM Peak

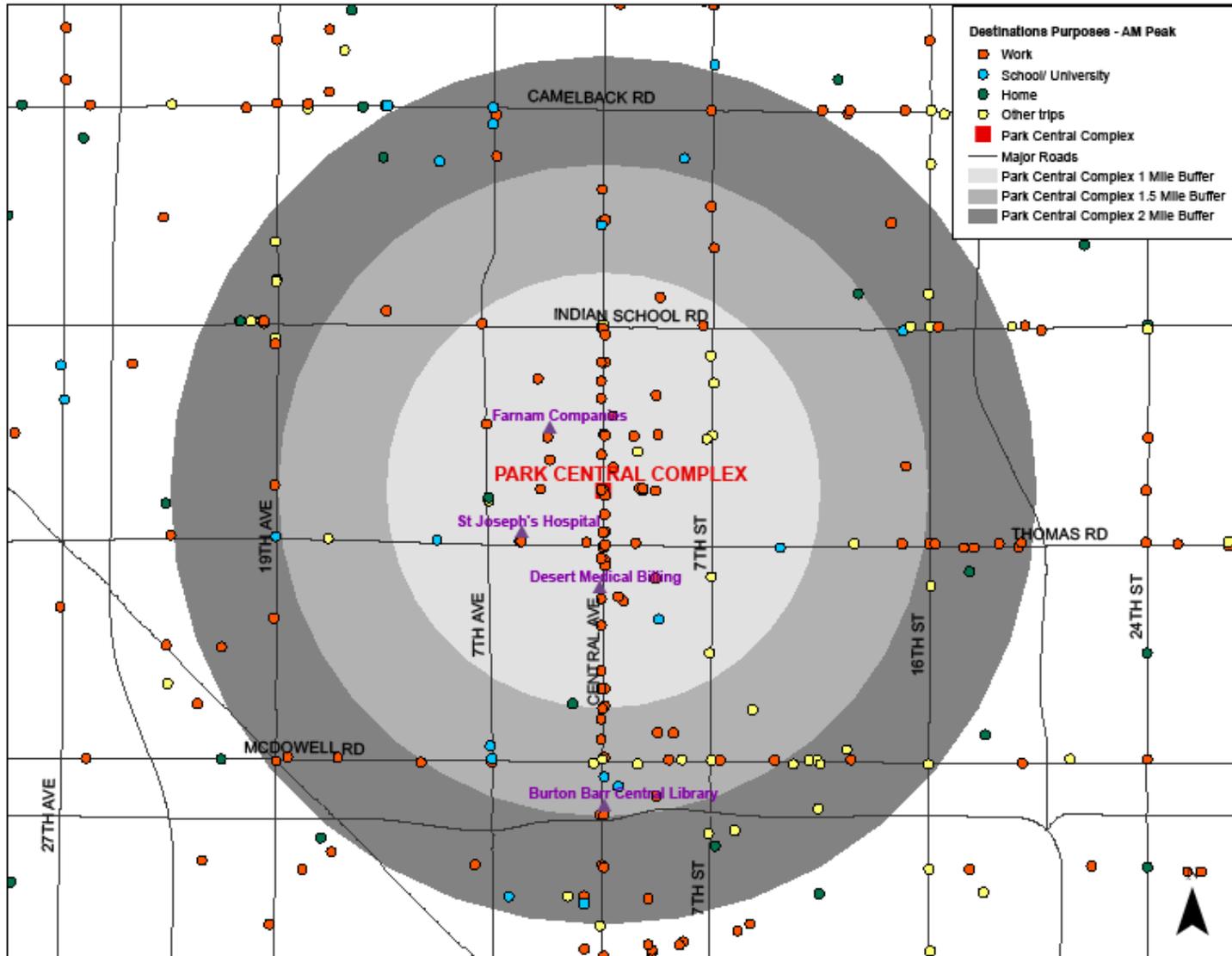


Figure F-5: Uptown Phoenix – Trip Purpose at Mid-Day

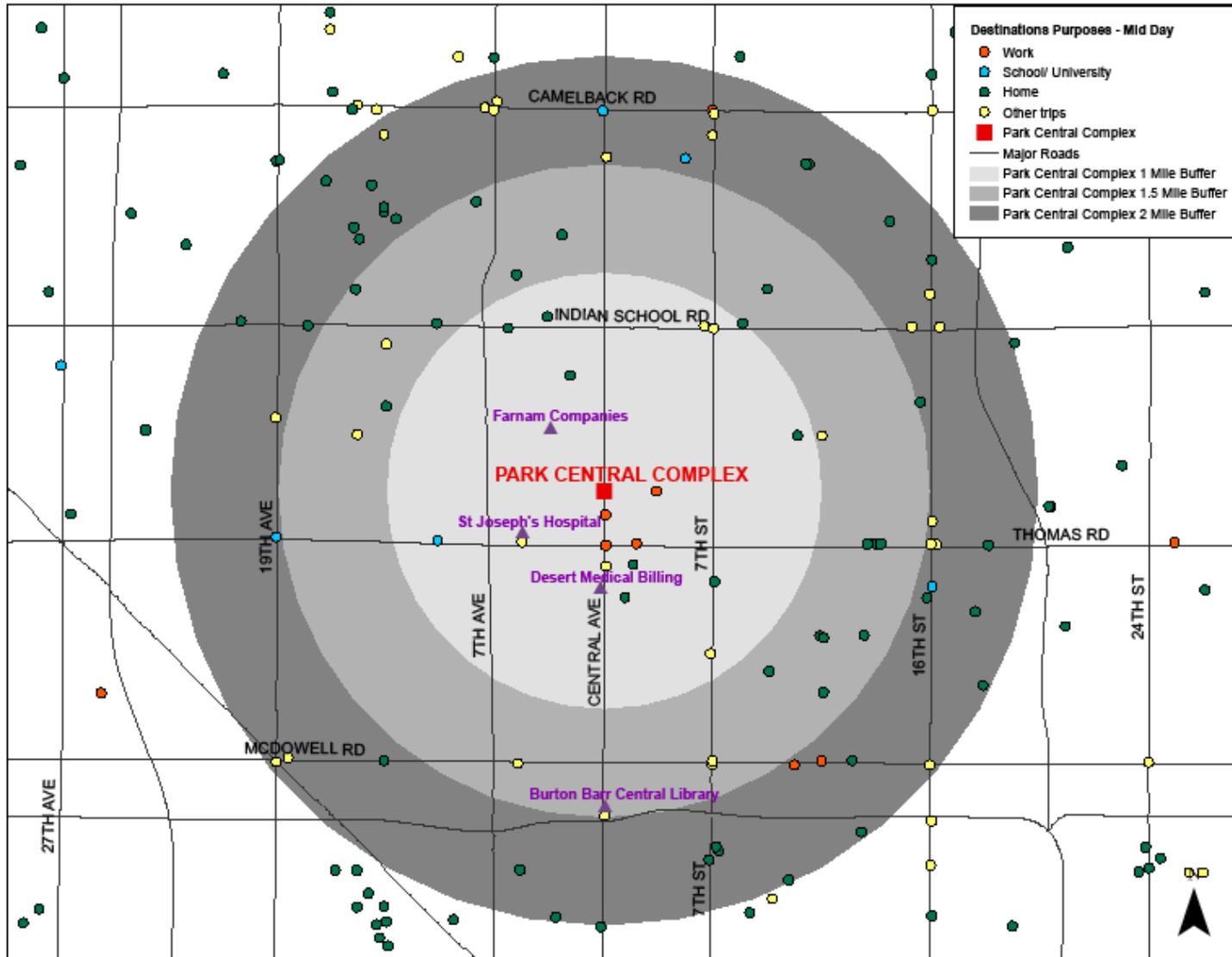
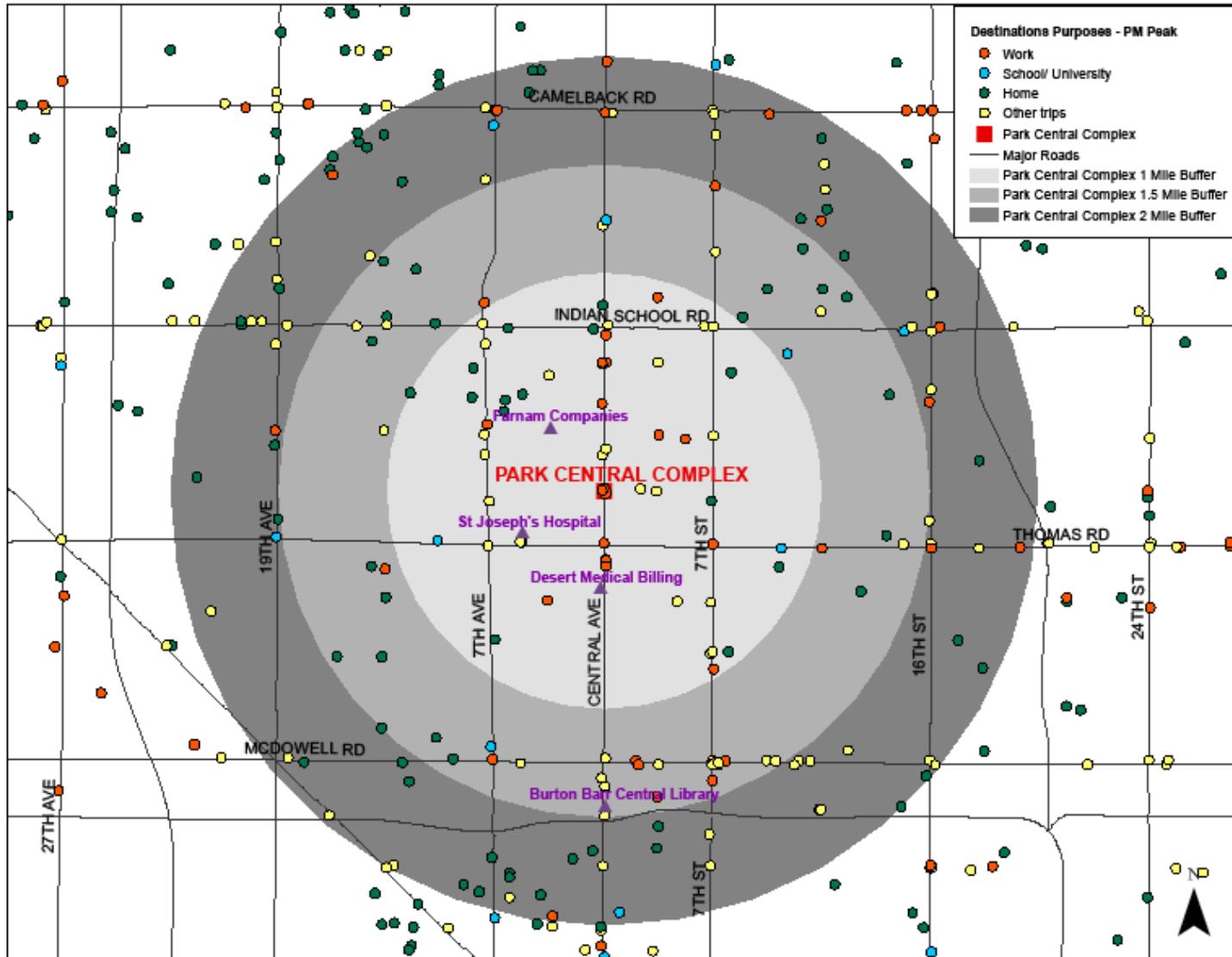


Figure F-6: Uptown Phoenix – Trip Purpose at PM Peak



Sky Harbor Airport

Sky Harbor Airport activity center is based on trips originating or ending at specific address of airport (3400 E Sky Harbor Blvd and 3800 E Sky Harbor Blvd). Thus, no maps were produced.

Table F-3: Purpose at Sky Harbor Airport

Purpose at Activity Center	Sky Harbor Airport as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	0	0%	0	0%	0	0%	0	0%	0	0%
Work	528	90%	188	100%	238	80%	6	100%	96	100%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Shopping Places	0	0%	0	0%	0	0%	0	0%	0	0%
Social/Personal Places or Church	0	0%	0	0%	0	0%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	6	1%	0	0%	6	2%	0	0%	0	0%
Medical Appointment/Hospital	0	0%	0	0%	0	0%	0	0%	0	0%
Airport (Air Passenger Only)	40	7%	0	0%	40	14%	0	0%	0	0%
Other	14	2%	0	0%	14	5%	0	0%	0	0%
Total Trips	588	100%	188	100%	298	100%	6	100%	96	100%

Purpose at Activity Center	Sky Harbor Airport as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	0	0%	0	0%	0	0%	0	0%	0	0%
Work	586	68%	336	70%	250	67%	0	0%	0	0%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Shopping Places	0	0%	0	0%	0	0%	0	0%	0	0%
Social/Personal Places or Church	0	0%	0	0%	0	0%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	0	0%	0	0%	0	0%	0	0%	0	0%
Medical Appointment/Hospital	0	0%	0	0%	0	0%	0	0%	0	0%
Airport (Air Passenger Only)	272	32%	147	30%	124	33%	0	0%	0	0%
Other	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	858	100%	484	100%	374	100%	0	0%	0	0%

Arizona State University (ASU)

Table F-4: Purpose at ASU

Purpose at Activity Center	ASU as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	1,256	13%	587	43%	480	7%	189	22%	0	0%
Work	1,222	13%	60	4%	710	10%	284	33%	168	23%
College/University (Student Only)	6,289	64%	619	46%	4,848	71%	334	38%	487	67%
School (K-12) (Student Only)	132	1%	0	0%	132	2%	0	0%	0	0%
Shopping Places	82	1%	0	0%	82	1%	0	0%	0	0%
Social/Personal Places or Church	199	2%	0	0%	181	3%	0	0%	18	3%
Recreation/Sightseeing/Restaurant	420	4%	0	0%	351	5%	16	2%	53	7%
Medical Appointment/Hospital	13	0%	0	0%	13	0%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	156	2%	83	6%	23	0%	50	6%	0	0%
Total Trips	9,769	100%	1,349	100%	6,820	100%	873	100%	727	100%

Purpose at Activity Center	ASU as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	567	5%	0	0%	331	5%	223	63%	12	31%
Work	1,675	16%	894	26%	767	11%	0	0%	13	34%
College/University (Student Only)	7,227	67%	2,516	72%	4,625	67%	87	24%	0	0%
School (K-12) (Student Only)	48	0%	19	1%	30	0%	0	0%	0	0%
Shopping Places	240	2%	6	0%	234	3%	0	0%	0	0%
Social/Personal Places or Church	276	3%	26	1%	237	3%	12	3%	0	0%
Recreation/Sightseeing/Restaurant	344	3%	16	0%	281	4%	33	9%	13	34%
Medical Appointment/Hospital	16	0%	16	0%	0	0%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	404	4%	0	0%	404	6%	0	0%	0	0%
Total Trips	10,797	100%	3,493	100%	6,909	100%	355	100%	39	100%

Figure F-7: Arizona State University – Trip Purpose at AM Peak

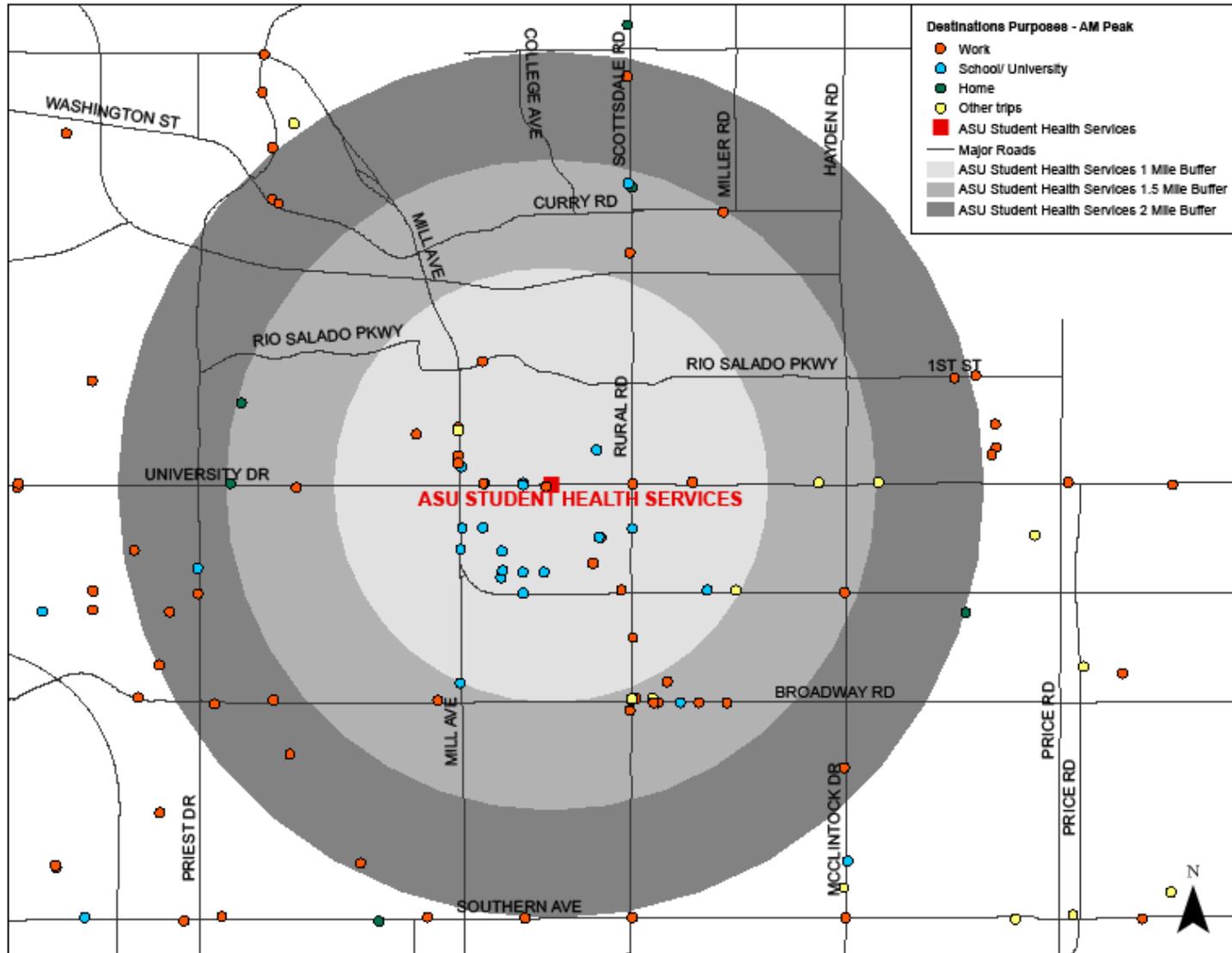


Figure F-8: Arizona State University – Trip Purpose at Mid-Day

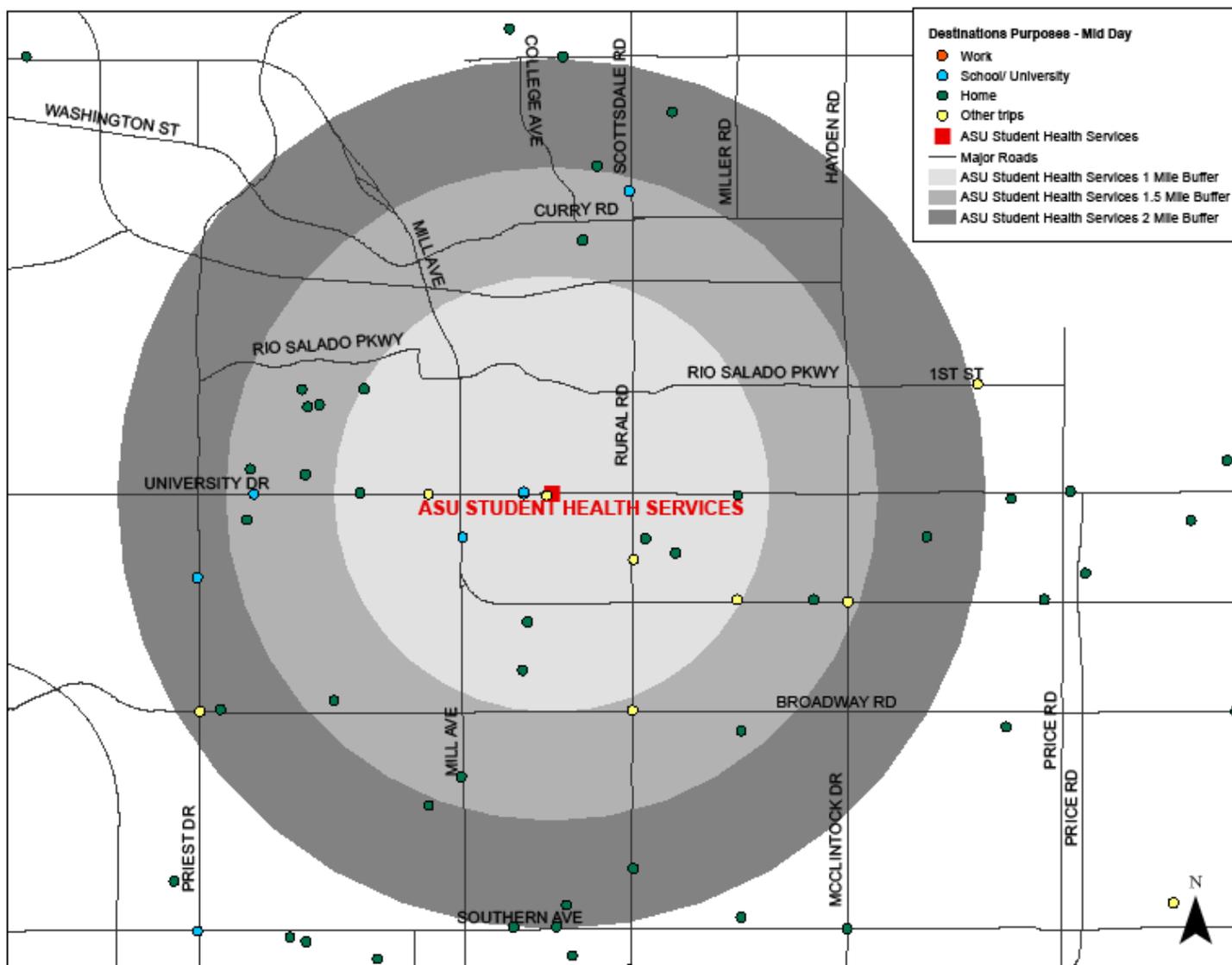
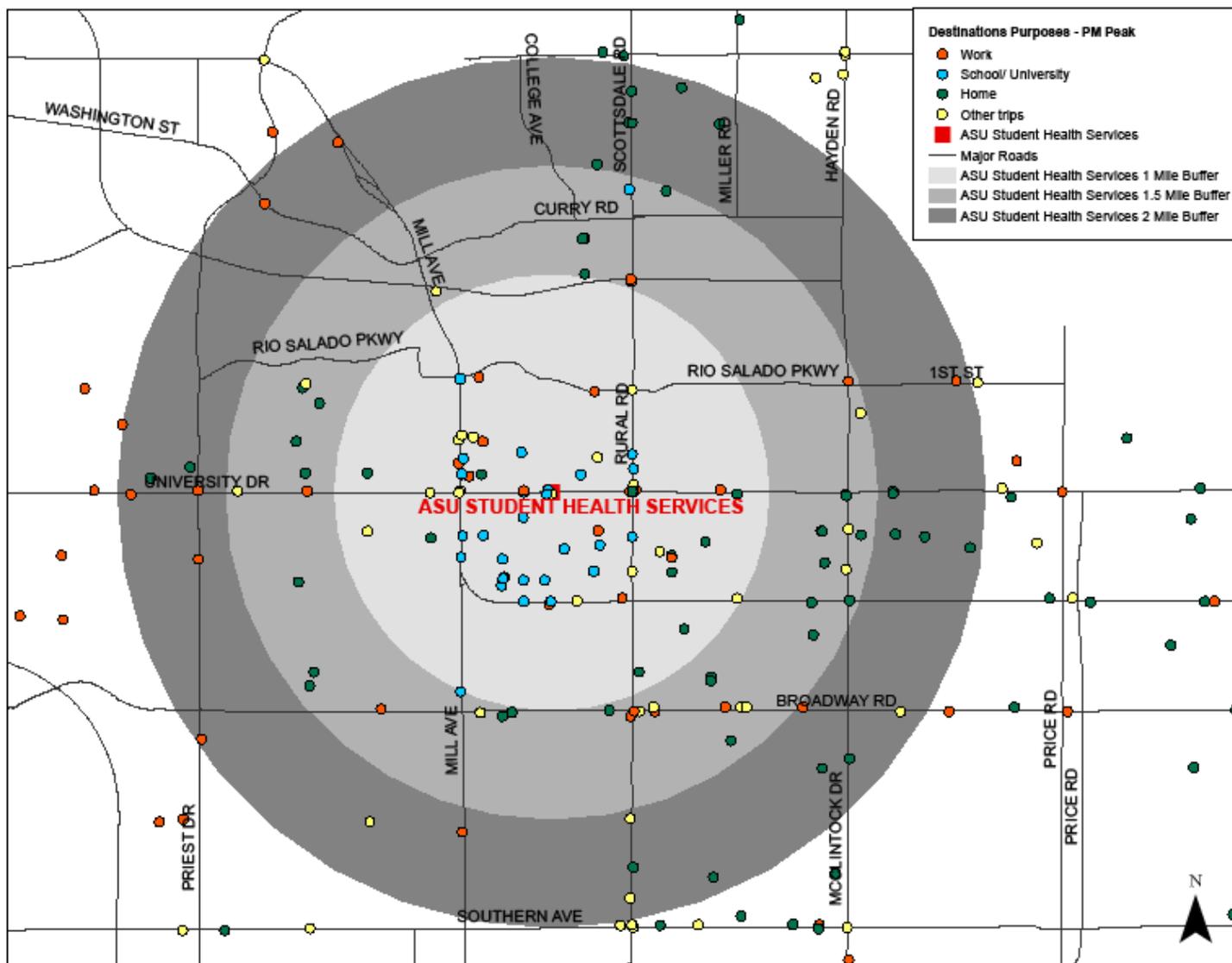


Figure F-9: Arizona State University – Trip Purpose at PM Peak



Biltmore Area

Table F-5: Purpose at Biltmore Area

Purpose at Activity Center	Biltmore Area as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	383	19%	173	28%	210	33%	0	0%	0	0%
Work	923	45%	127	21%	141	22%	122	60%	533	90%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	279	14%	186	30%	93	15%	0	0%	0	0%
Shopping Places	187	9%	0	0%	96	15%	48	24%	44	7%
Social/Personal Places or Church	0	0%	0	0%	0	0%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	80	4%	8	1%	55	9%	0	0%	17	3%
Medical Appointment/Hospital	128	6%	117	19%	0	0%	11	5%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	66	3%	8	1%	36	6%	22	11%	0	0%
Total Trips	2,046	100%	619	100%	631	100%	202	100%	594	100%

Purpose at Activity Center	Biltmore Area as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	570	15%	43	3%	210	11%	300	66%	17	21%
Work	1,678	45%	677	51%	938	50%	0	0%	63	79%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	674	18%	528	40%	146	8%	0	0%	0	0%
Shopping Places	628	17%	3	0%	473	25%	152	34%	0	0%
Social/Personal Places or Church	22	1%	0	0%	22	1%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	80	2%	68	5%	12	1%	0	0%	0	0%
Medical Appointment/Hospital	76	2%	0	0%	76	4%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	13	0%	0	0%	13	1%	0	0%	0	0%
Total Trips	3,742	100%	1,320	100%	1,890	100%	452	100%	80	100%

Figure F-10: Biltmore Area – Trip Purpose at AM Peak

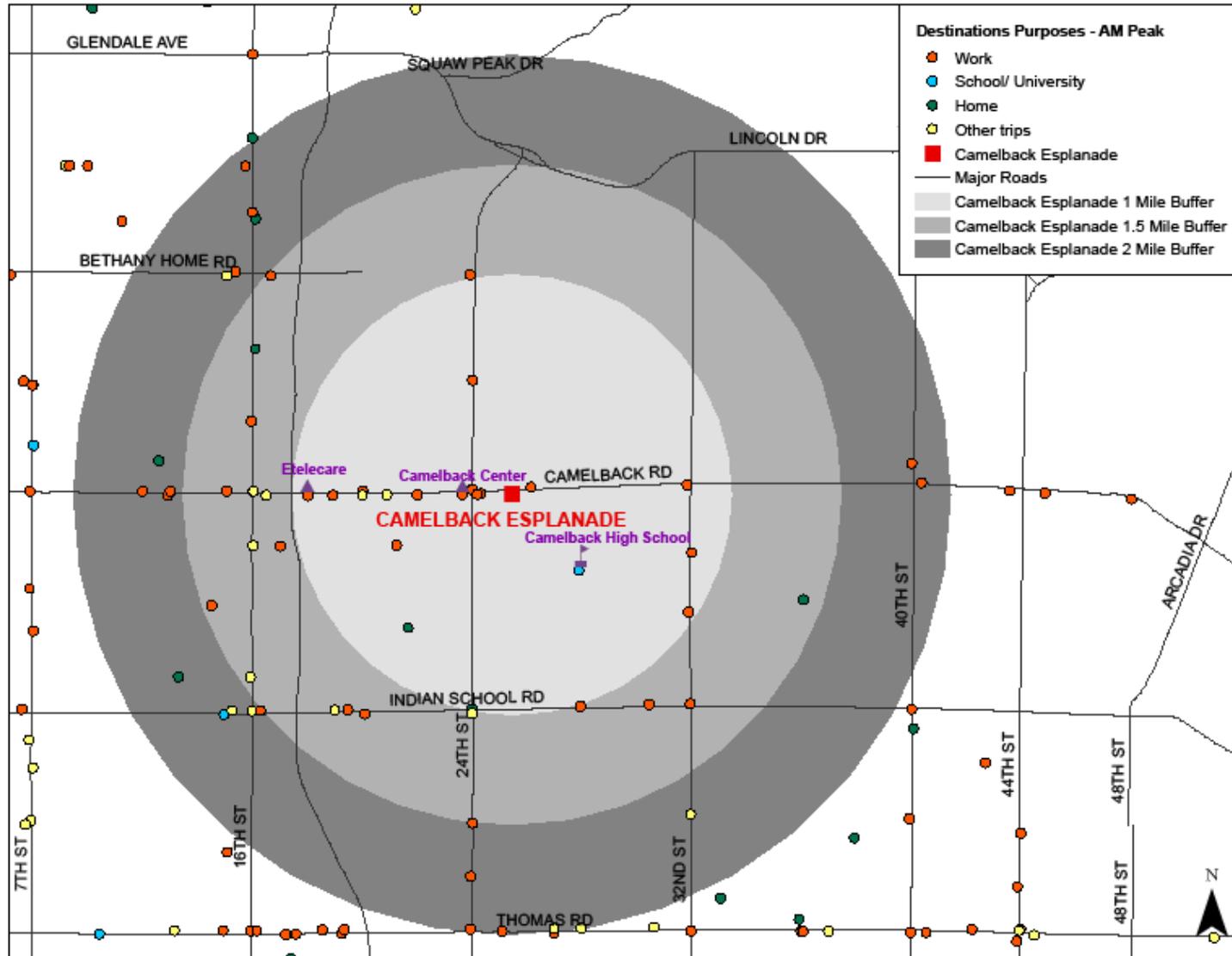


Figure F-11: Biltmore Area – Trip Purpose at Mid-Day

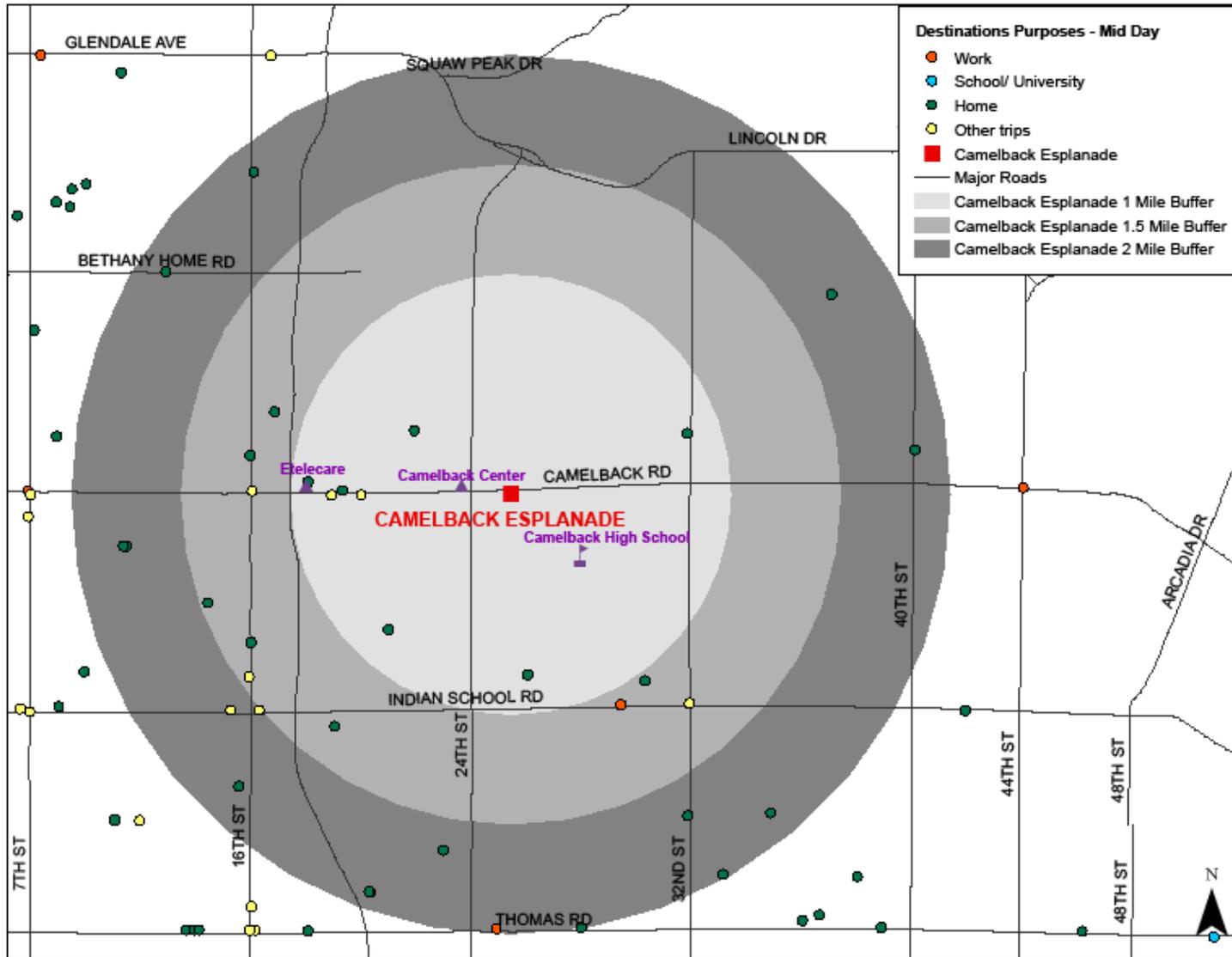
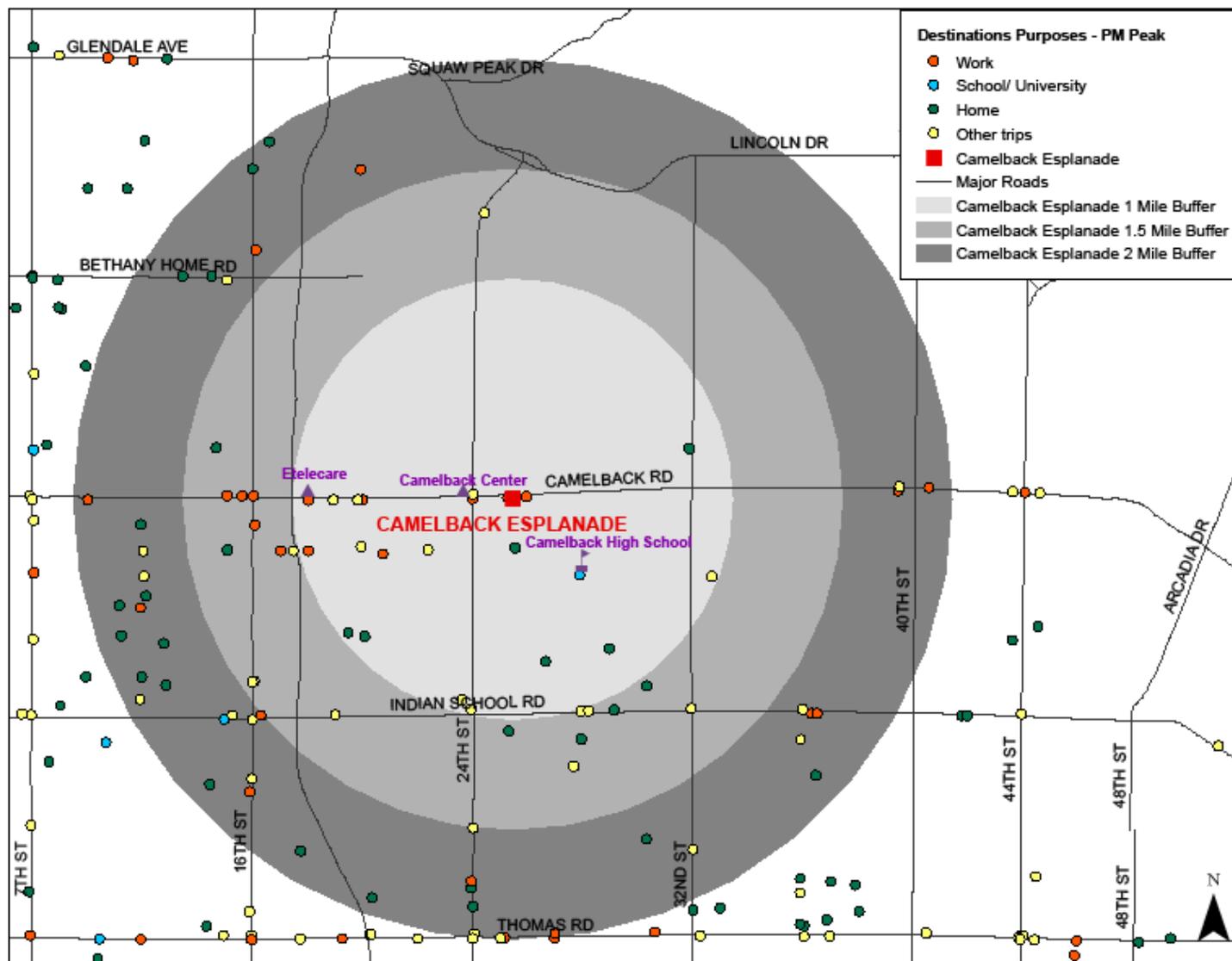


Figure F-12: Biltmore Area – Trip Purpose at PM Peak



Metro Center

Table F-6: Purpose at Metro Center

Purpose at Activity Center	Metro Center as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	855	22%	467	72%	282	12%	30	6%	77	20%
Work	819	21%	75	12%	319	14%	282	55%	142	36%
College/University (Student Only)	574	15%	0	0%	538	24%	36	7%	0	0%
School (K-12) (Student Only)	170	4%	0	0%	170	7%	0	0%	0	0%
Shopping Places	851	22%	13	2%	667	29%	9	2%	162	41%
Social/Personal Places or Church	293	8%	53	8%	191	8%	48	9%	0	0%
Recreation/Sightseeing/Restaurant	97	3%	0	0%	10	0%	87	17%	0	0%
Medical Appointment/Hospital	15	0%	0	0%	5	0%	0	0%	10	2%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	152	4%	43	7%	86	4%	24	5%	0	0%
Total Trips	3,826	100%	651	100%	2,268	100%	516	100%	391	100%

Purpose at Activity Center	Metro Center as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	766	20%	92	8%	282	14%	368	58%	25	100%
Work	1,425	37%	765	67%	654	32%	6	1%	0	0%
College/University (Student Only)	574	15%	202	18%	310	15%	62	10%	0	0%
School (K-12) (Student Only)	47	1%	24	2%	23	1%	0	0%	0	0%
Shopping Places	661	17%	0	0%	491	24%	170	27%	0	0%
Social/Personal Places or Church	25	1%	0	0%	25	1%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	103	3%	26	2%	59	3%	18	3%	0	0%
Medical Appointment/Hospital	32	1%	32	3%	0	0%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	189	5%	0	0%	179	9%	10	2%	0	0%
Total Trips	3,824	100%	1,142	100%	2,023	100%	634	100%	25	100%

Figure F-13: Metro Center- Trip Purpose at AM Peak

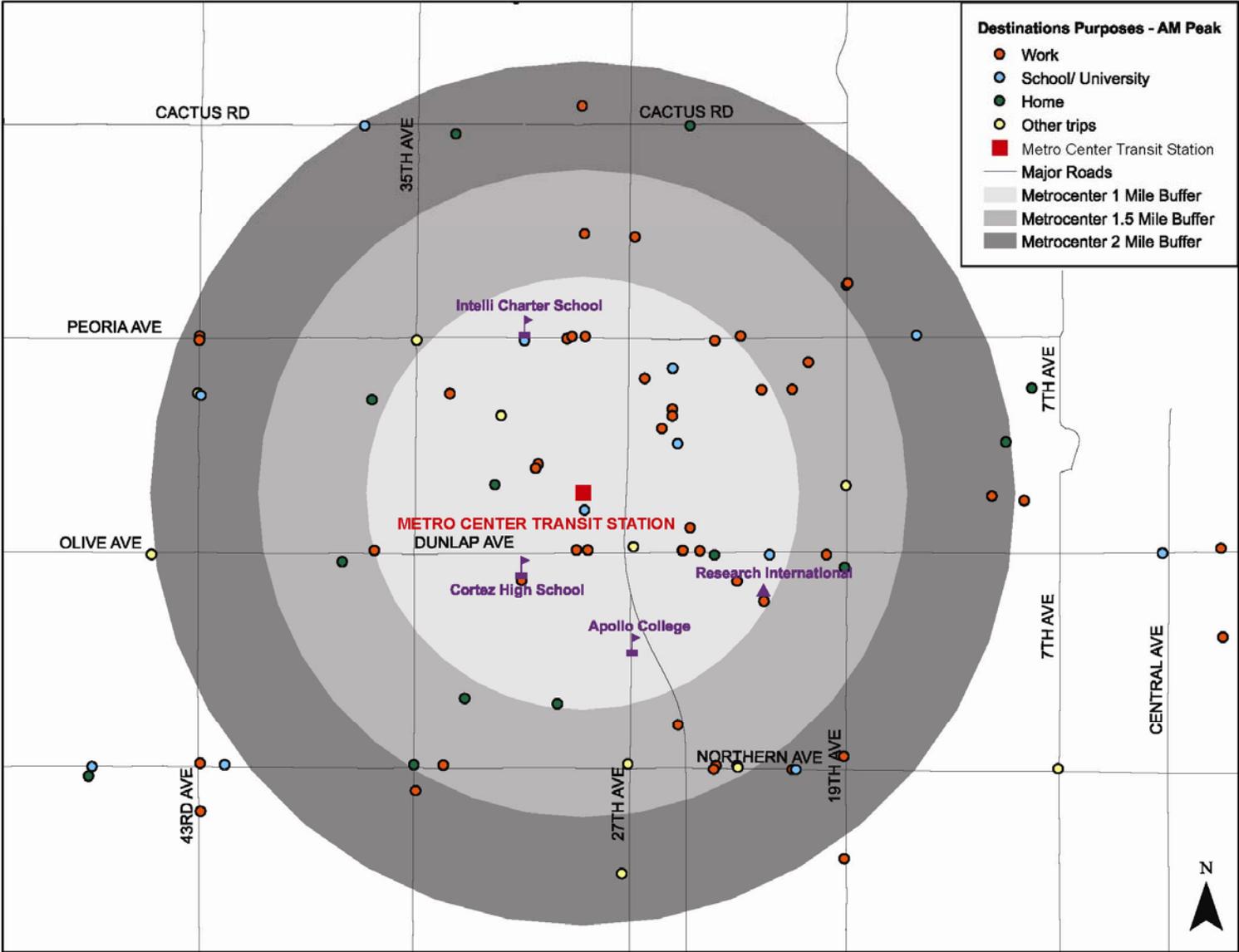


Figure F-14: Metro Center – Trip Purpose at Mid-Day

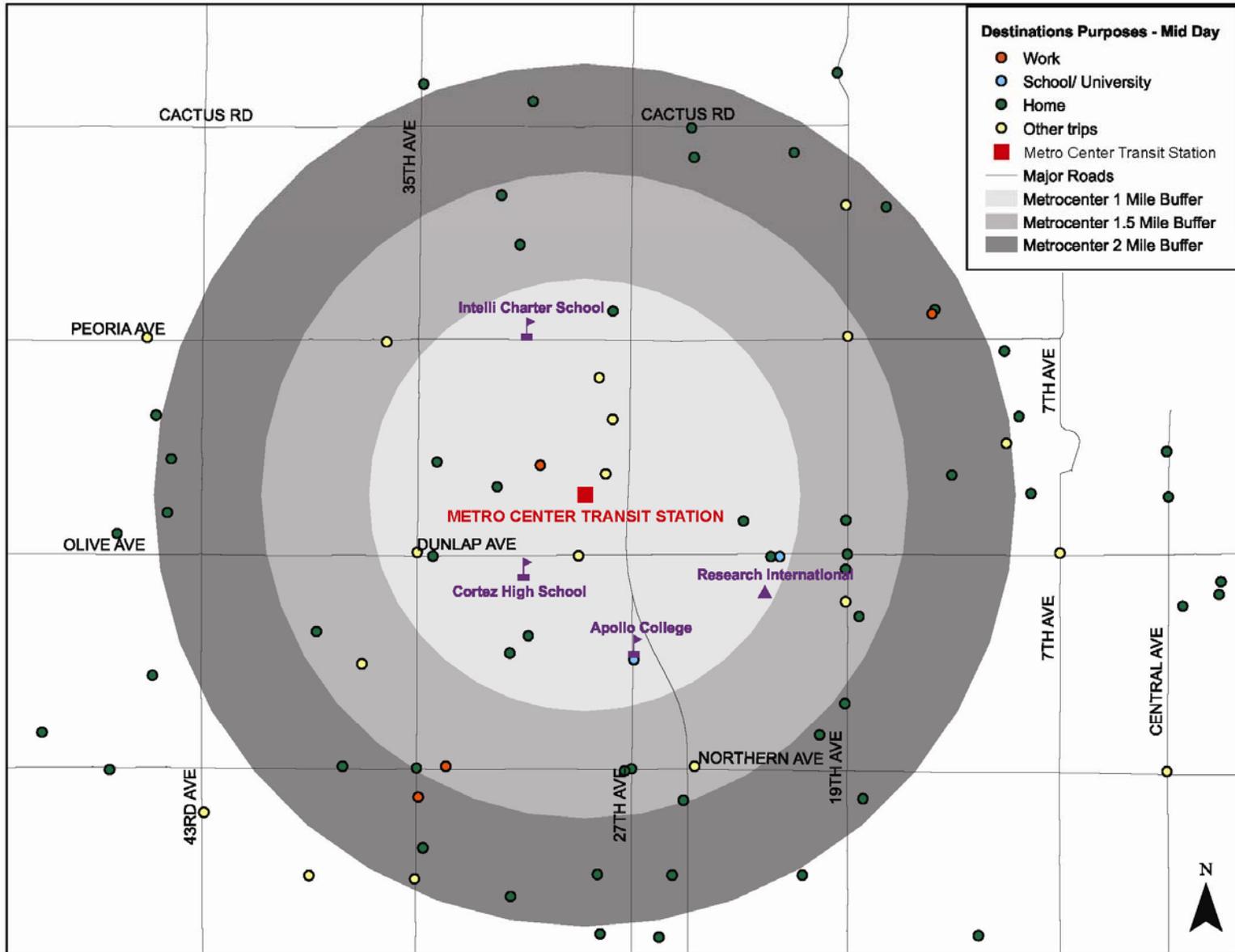
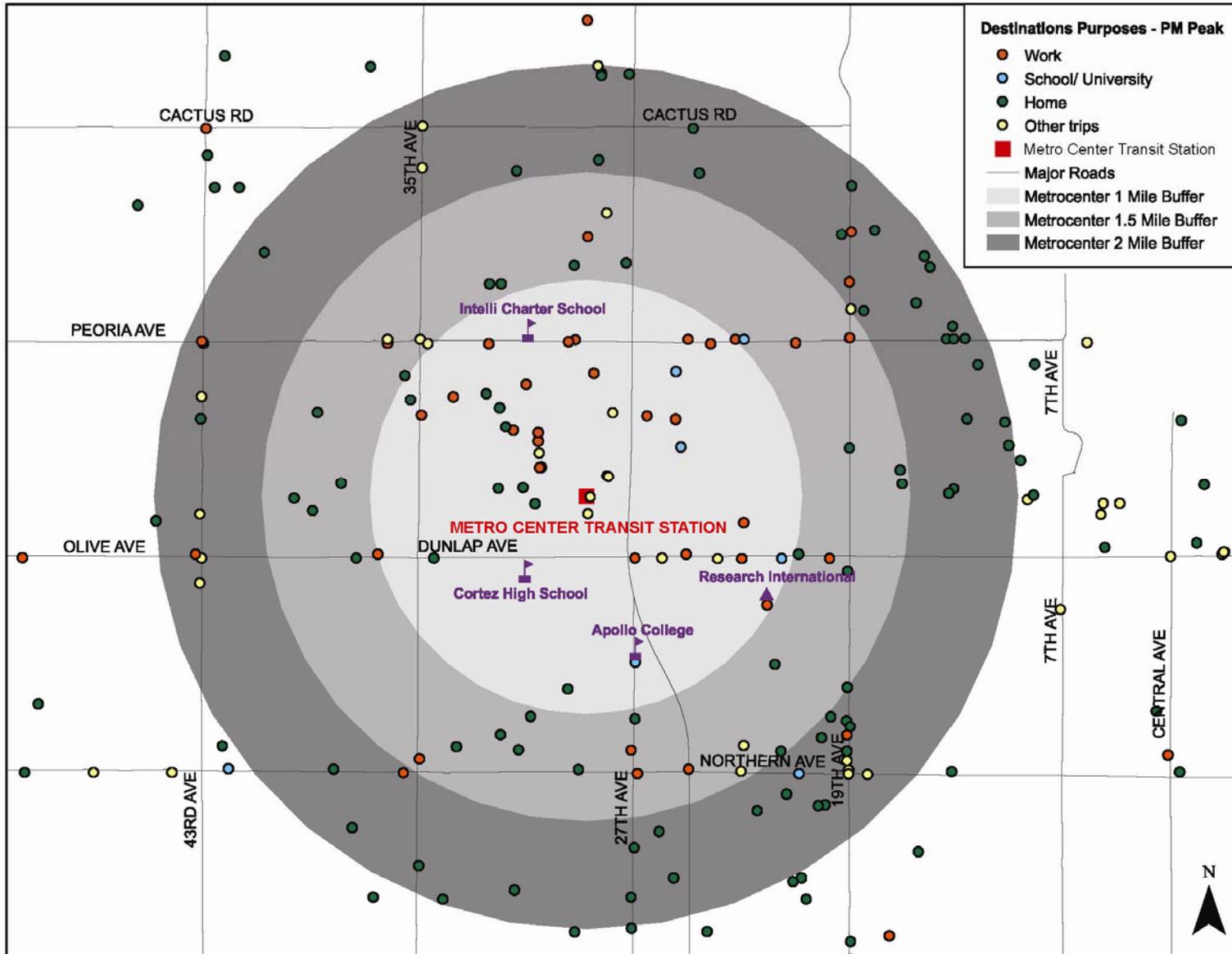


Figure F-15: Metro Center – Trip Purpose at PM Peak



Scottsdale Airpark

Table F-7: Purpose at Scottsdale Airpark

Purpose at Activity Center	Scottsdale Airpark as Origin									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	0	0%	0	0%	0	0%	0	0%	0	0%
Work	427	89%	20	100%	66	56%	164	100%	177	100%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Shopping Places	28	6%	0	0%	28	24%	0	0%	0	0%
Social/Personal Places or Church	0	0%	0	0%	0	0%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	0	0%	0	0%	0	0%	0	0%	0	0%
Medical Appointment/Hospital	24	5%	0	0%	24	20%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	479	100%	20	100%	118	100%	164	100%	177	100%

Purpose at Activity Center	Scottsdale Airpark as Destination									
	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Home	0	0%	0	0%	0	0%	0	0%	0	0%
Work	617	96%	501	100%	106	79%	0	0%	9	100%
College/University (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
School (K-12) (Student Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Shopping Places	0	0%	0	0%	0	0%	0	0%	0	0%
Social/Personal Places or Church	4	1%	0	0%	4	3%	0	0%	0	0%
Recreation/Sightseeing/Restaurant	0	0%	0	0%	0	0%	0	0%	0	0%
Medical Appointment/Hospital	0	0%	0	0%	0	0%	0	0%	0	0%
Airport (Air Passenger Only)	0	0%	0	0%	0	0%	0	0%	0	0%
Other	24	4%	0	0%	24	18%	0	0%	0	0%
Total Trips	645	100%	501	100%	134	100%	0	0%	9	100%

Figure F-16: Scottsdale Airpark – Trip Purpose at AM Peak

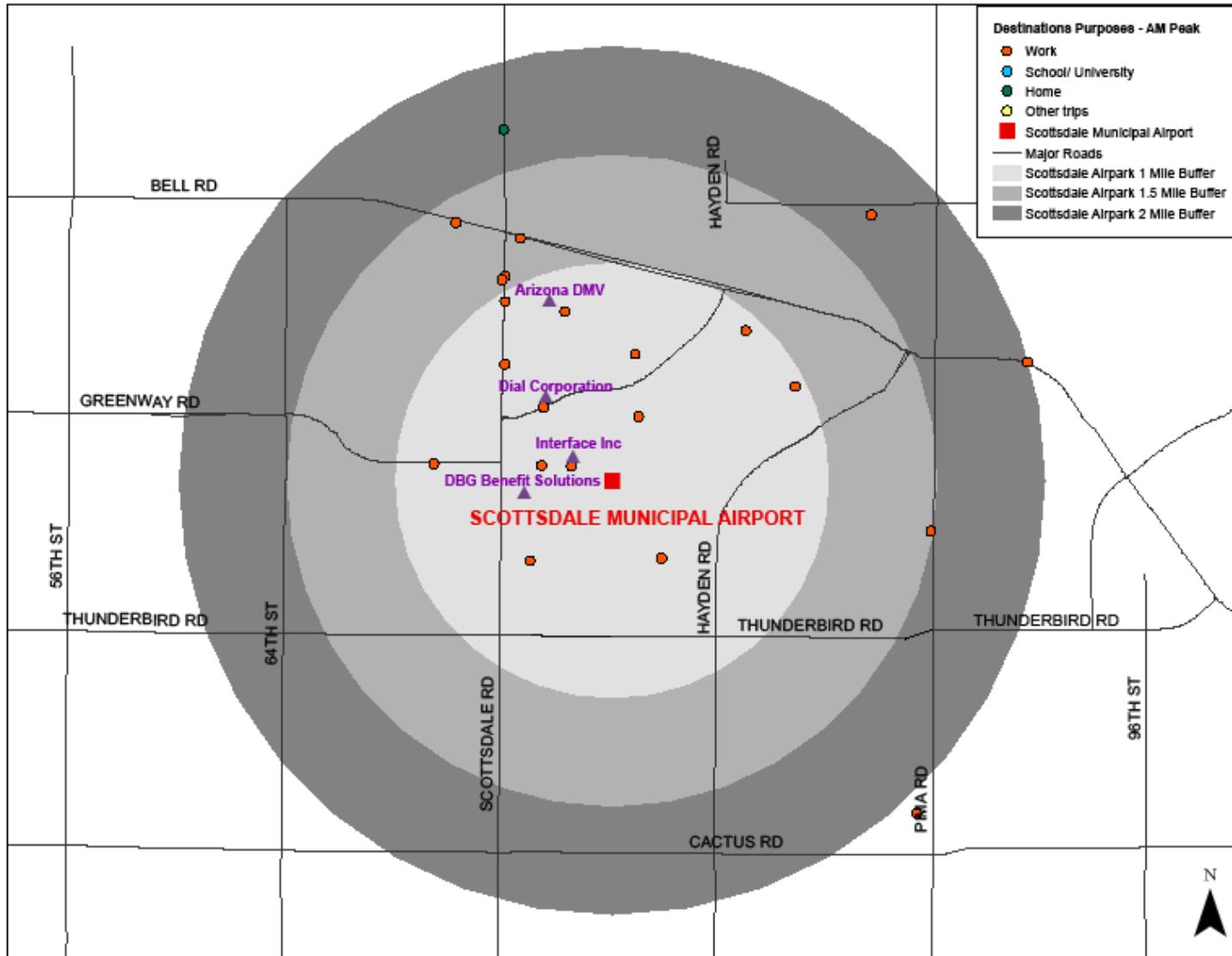


Figure F-17: Scottsdale Airpark – Trip Purpose at Mid-Day

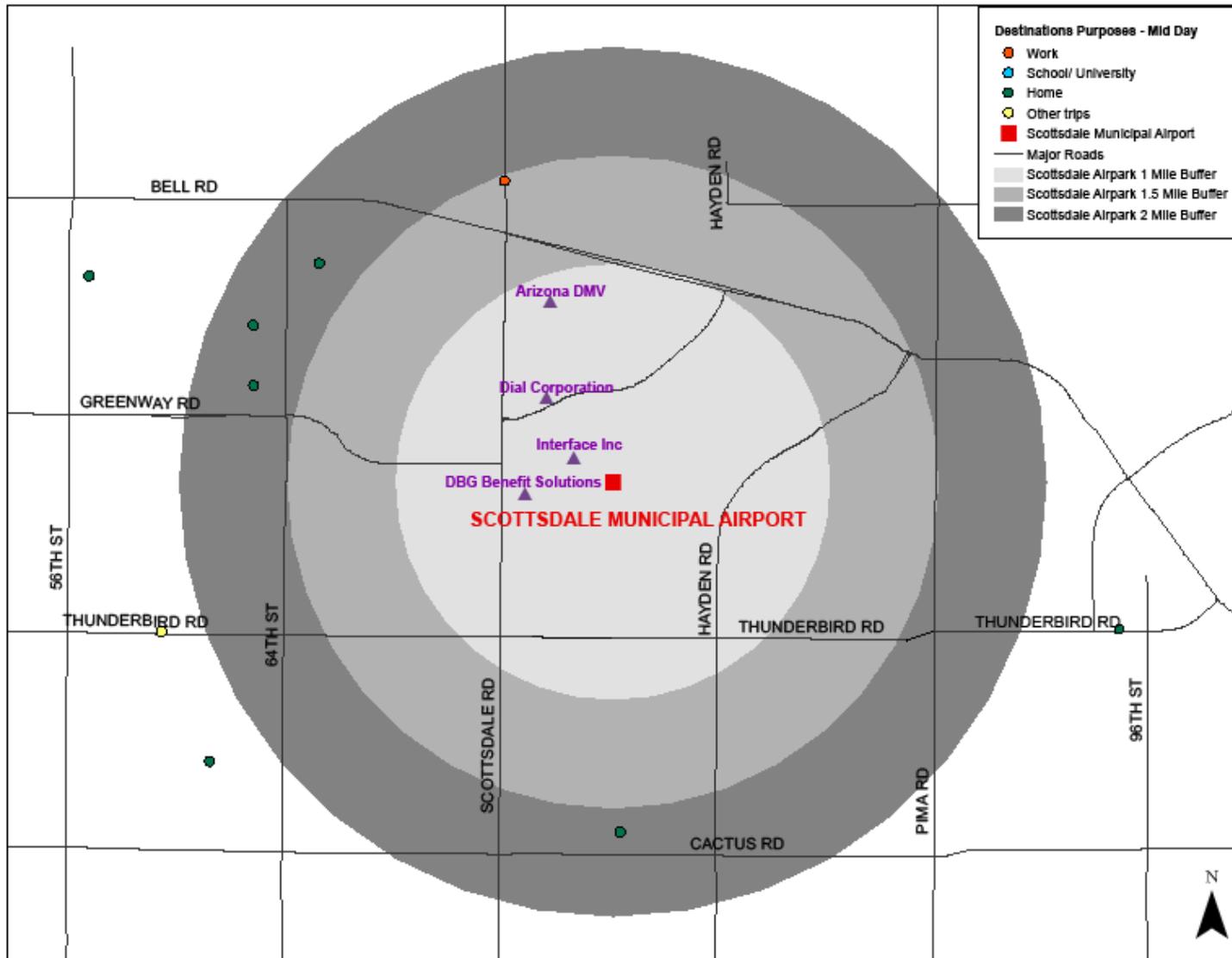
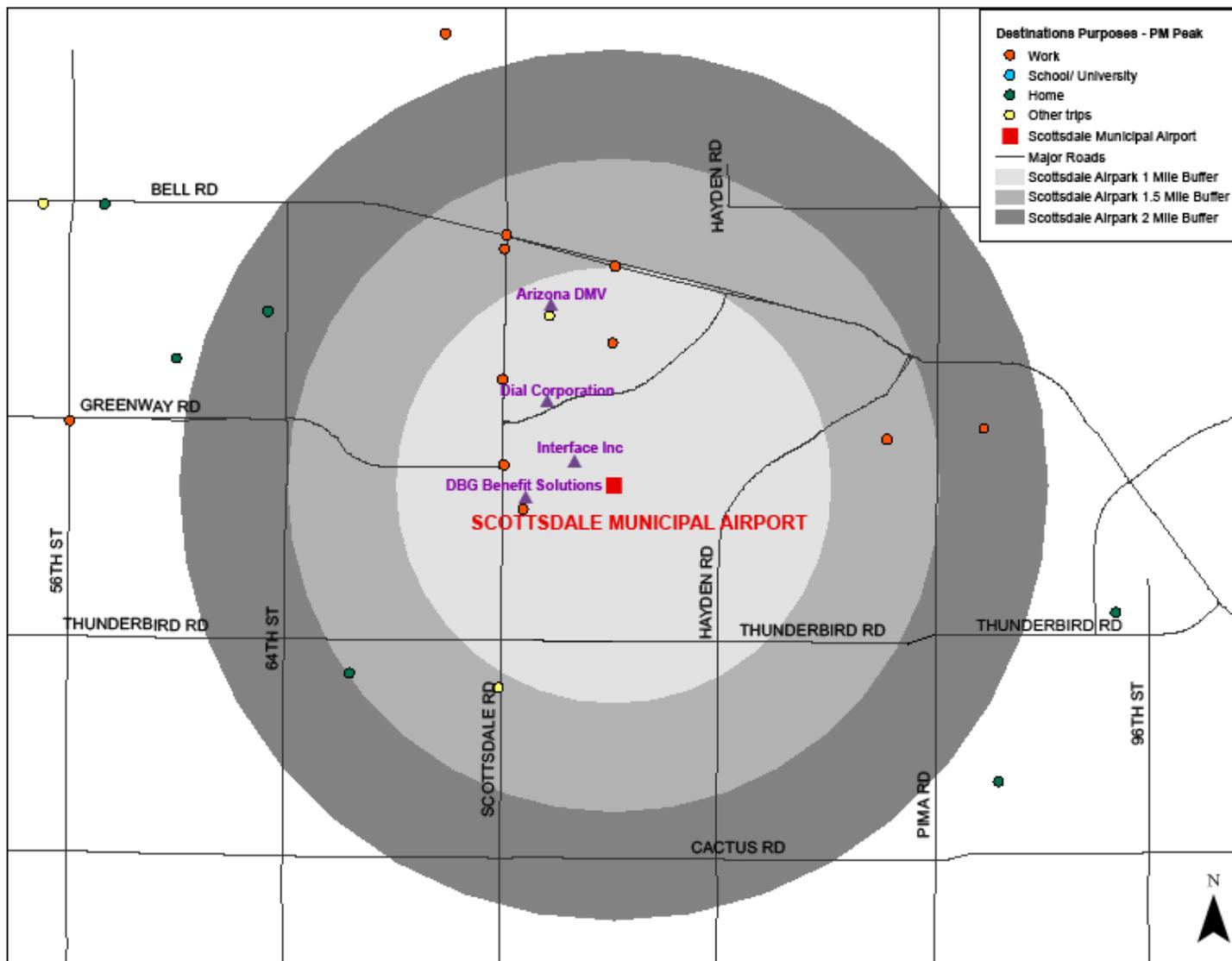


Figure F-18: Scottsdale Airpark – Trip Purpose at PM Peak



Activity Center Attraction Flows by District

Map F-1: Service Area Districts

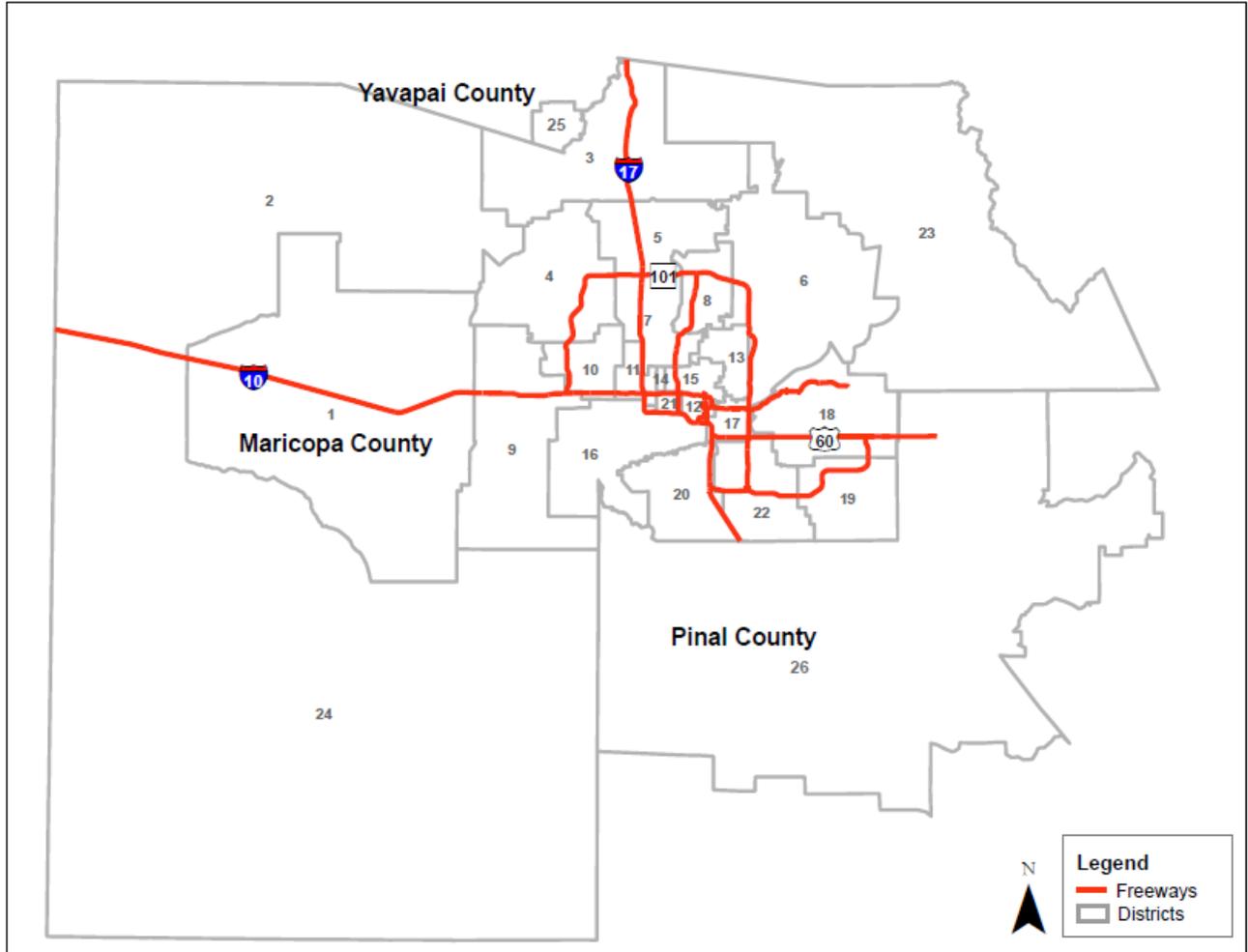


Table F-8: Attraction Flow for Downtown Phoenix

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	15	0%	15	0%	0	0%	0	0%	0	0%
District 2	1	0%	1	0%	0	0%	0	0%	0	0%
District 3	4	0%	4	0%	0	0%	0	0%	0	0%
District 4	474	4%	412	7%	62	1%	0	0%	0	0%
District 5	86	1%	86	1%	0	0%	0	0%	0	0%
District 6	66	1%	45	1%	0	0%	2	0%	19	5%
District 7	2,087	17%	868	14%	1,081	20%	44	7%	94	24%
District 8	143	1%	121	2%	0	0%	22	3%	0	0%
District 9	220	2%	211	3%	0	0%	9	1%	0	0%
District 10	1,225	10%	622	10%	510	9%	71	11%	22	6%
District 11*	2,084	17%	978	16%	965	18%	141	22%	0	0%
District 12	251	2%	188	3%	63	1%	0	0%	0	0%
District 13	228	2%	41	1%	38	1%	18	3%	131	33%
District 14	697	6%	343	6%	354	7%	0	0%	0	0%
District 15	1,098	9%	737	12%	234	4%	67	10%	60	15%
District 16	1,539	12%	506	8%	954	18%	22	3%	57	15%
District 17	144	1%	72	1%	42	1%	30	5%	0	0%
District 18	278	2%	238	4%	40	1%	0	0%	0	0%
District 19	72	1%	72	1%	0	0%	0	0%	0	0%
District 20	209	2%	205	3%	0	0%	4	1%	0	0%
District 21*	1,107	9%	45	1%	884	16%	168	26%	10	3%
District 22	529	4%	337	5%	148	3%	43	7%	0	0%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	7	0%	7	0%	0	0%	0	0%	0	0%
Total Trips	12,564	100%	6,155	100%	5,376	100%	641	100%	392	100%

* District includes activity center (Central Station) buffer zone of 1-mile radius.

Table F-9: Attraction Flow for Uptown Phoenix

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	45	1%	27	1%	18	0%	0	0%	0	0%
District 5	22	0%	22	1%	0	0%	0	0%	0	0%
District 6	44	1%	44	1%	0	0%	0	0%	0	0%
District 7	2,000	25%	694	19%	1,061	29%	199	52%	46	23%
District 8	173	2%	108	3%	5	0%	60	16%	0	0%
District 9	63	1%	62	2%	1	0%	0	0%	0	0%
District 10	1,084	14%	454	12%	630	17%	0	0%	0	0%
District 11*	951	12%	463	13%	485	13%	3	1%	0	0%
District 12	276	3%	102	3%	151	4%	23	6%	0	0%
District 13	77	1%	59	2%	0	0%	0	0%	19	9%
District 14*	212	3%	132	4%	80	2%	0	0%	0	0%
District 15*	695	9%	339	9%	348	9%	8	2%	0	0%
District 16	765	10%	288	8%	457	12%	20	5%	0	0%
District 17	315	4%	192	5%	67	2%	0	0%	56	27%
District 18	139	2%	39	1%	101	3%	0	0%	0	0%
District 19	106	1%	106	3%	0	0%	0	0%	0	0%
District 20	155	2%	155	4%	0	0%	0	0%	0	0%
District 21	616	8%	174	5%	288	8%	70	18%	84	41%
District 22	207	3%	206	6%	0	0%	1	0%	0	0%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	4	0%	4	0%	0	0%	0	0%	0	0%
Total Trips	7,950	100%	3,669	100%	3,692	100%	385	100%	204	100%

* District includes activity center (Park Central Complex) buffer zone of 1-mile radius.

Table F-10: Attraction Flow for Sky Harbor Airport

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	32	4%	32	7%	0	0%	0	0%	0	0%
District 5	0	0%	0	0%	0	0%	0	0%	0	0%
District 6	2	0%	0	0%	2	1%	0	0%	0	0%
District 7	186	22%	172	36%	14	4%	0	0%	0	0%
District 8	0	0%	0	0%	0	0%	0	0%	0	0%
District 9	0	0%	0	0%	0	0%	0	0%	0	0%
District 10	3	0%	3	1%	0	0%	0	0%	0	0%
District 11	117	14%	30	6%	87	23%	0	0%	0	0%
District 12*	3	0%	3	1%	0	0%	0	0%	0	0%
District 13	0	0%	0	0%	0	0%	0	0%	0	0%
District 14	18	2%	18	4%	0	0%	0	0%	0	0%
District 15	140	16%	29	6%	111	30%	0	0%	0	0%
District 16	120	14%	9	2%	112	30%	0	0%	0	0%
District 17	150	17%	150	31%	0	0%	0	0%	0	0%
District 18	39	5%	39	8%	0	0%	0	0%	0	0%
District 19	0	0%	0	0%	0	0%	0	0%	0	0%
District 20	0	0%	0	0%	0	0%	0	0%	0	0%
District 21	0	0%	0	0%	0	0%	0	0%	0	0%
District 22	48	6%	0	0%	48	13%	0	0%	0	0%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	858	100%	484	100%	374	100%	0	0%	0	0%

* District includes activity center (3400 E Sky Harbor Blvd and 3800 E Sky Harbor Blvd).

Table F-11: Attraction Flow for ASU

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	9	0%	9	0%	0	0%	0	0%	0	0%
District 5	31	0%	31	1%	0	0%	0	0%	0	0%
District 6	179	2%	49	1%	93	1%	37	10%	0	0%
District 7	281	3%	65	2%	210	3%	6	2%	0	0%
District 8	27	0%	27	1%	0	0%	0	0%	0	0%
District 9	29	0%	0	0%	29	0%	0	0%	0	0%
District 10	106	1%	64	2%	43	1%	0	0%	0	0%
District 11	355	3%	60	2%	279	4%	16	4%	0	0%
District 12	100	1%	78	2%	23	0%	0	0%	0	0%
District 13	308	3%	154	4%	68	1%	86	24%	0	0%
District 14	36	0%	26	1%	10	0%	0	0%	0	0%
District 15	677	6%	548	16%	120	2%	10	3%	0	0%
District 16	257	2%	82	2%	174	3%	0	0%	0	0%
District 17*	6,214	58%	1,344	38%	4,840	70%	15	4%	13	34%
District 18	500	5%	121	3%	359	5%	8	2%	12	31%
District 19	245	2%	12	0%	233	3%	0	0%	0	0%
District 20	255	2%	238	7%	17	0%	0	0%	0	0%
District 21	119	1%	0	0%	112	2%	7	2%	0	0%
District 22	1,068	10%	583	17%	301	4%	171	48%	13	34%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	10,797	100%	3,493	100%	6,909	100%	355	100%	39	100%

* District includes activity center (Student Health Center) buffer zone of 1-mile radius.

Table F-12: Attraction Flow for Biltmore Area

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	0	0%	0	0%	0	0%	0	0%	0	0%
District 5	0	0%	0	0%	0	0%	0	0%	0	0%
District 6	0	0%	0	0%	0	0%	0	0%	0	0%
District 7*	663	18%	202	15%	448	24%	14	3%	0	0%
District 8	20	1%	0	0%	14	1%	6	1%	0	0%
District 9	50	1%	0	0%	0	0%	50	11%	0	0%
District 10	666	18%	222	17%	444	23%	0	0%	0	0%
District 11	103	3%	9	1%	94	5%	0	0%	0	0%
District 12	205	5%	47	4%	6	0%	153	34%	0	0%
District 13	165	4%	43	3%	19	1%	55	12%	48	60%
District 14	133	4%	0	0%	133	7%	0	0%	0	0%
District 15*	1,160	31%	513	39%	478	25%	169	37%	0	0%
District 16	148	4%	72	5%	76	4%	0	0%	0	0%
District 17	26	1%	0	0%	26	1%	0	0%	0	0%
District 18	154	4%	139	11%	0	0%	0	0%	15	19%
District 19	0	0%	0	0%	0	0%	0	0%	0	0%
District 20	0	0%	0	0%	0	0%	0	0%	0	0%
District 21	196	5%	60	5%	130	7%	6	1%	0	0%
District 22	52	1%	12	1%	22	1%	0	0%	17	21%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	3,742	100%	1,320	100%	1,890	100%	452	100%	80	100%

* District includes activity center (Camelback Esplanade Mall) buffer zone of 1-mile radius.

Table F-13: Attraction Flow for Metro Center

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	217	6%	0	0%	154	8%	63	10%	0	0%
District 5	5	0%	0	0%	0	0%	5	1%	0	0%
District 6	0	0%	0	0%	0	0%	0	0%	0	0%
District 7*	1,392	36%	389	34%	773	38%	230	36%	0	0%
District 8	77	2%	0	0%	22	1%	30	5%	25	100%
District 9	18	0%	18	2%	0	0%	0	0%	0	0%
District 10	738	19%	385	34%	294	15%	60	9%	0	0%
District 11	500	13%	97	8%	181	9%	223	35%	0	0%
District 12	0	0%	0	0%	0	0%	0	0%	0	0%
District 13	0	0%	0	0%	0	0%	0	0%	0	0%
District 14	86	2%	15	1%	65	3%	5	1%	0	0%
District 15	418	11%	129	11%	282	14%	7	1%	0	0%
District 16	242	6%	34	3%	208	10%	0	0%	0	0%
District 17	21	1%	0	0%	21	1%	0	0%	0	0%
District 18	0	0%	0	0%	0	0%	0	0%	0	0%
District 19	0	0%	0	0%	0	0%	0	0%	0	0%
District 20	0	0%	0	0%	0	0%	0	0%	0	0%
District 21	110	3%	75	7%	24	1%	11	2%	0	0%
District 22	0	0%	0	0%	0	0%	0	0%	0	0%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	3,824	100%	1,142	100%	2,023	100%	634	100%	25	100%

* District includes activity center (Metro Center Transit Station) buffer zone of 1-mile radius.

Table F-14: Attraction Flow for Scottsdale Airpark

Origin District	Total		AM Peak		Mid-day		PM Peak		Evening	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent
District 1	0	0%	0	0%	0	0%	0	0%	0	0%
District 2	0	0%	0	0%	0	0%	0	0%	0	0%
District 3	0	0%	0	0%	0	0%	0	0%	0	0%
District 4	23	4%	23	5%	0	0%	0	0%	0	0%
District 5	0	0%	0	0%	0	0%	0	0%	0	0%
District 6*	9	1%	0	0%	9	6%	0	0%	0	0%
District 7	195	30%	175	35%	10	8%	0	0%	9	100%
District 8*	46	7%	46	9%	0	0%	0	0%	0	0%
District 9	0	0%	0	0%	0	0%	0	0%	0	0%
District 10	13	2%	13	3%	0	0%	0	0%	0	0%
District 11	18	3%	18	4%	0	0%	0	0%	0	0%
District 12	0	0%	0	0%	0	0%	0	0%	0	0%
District 13	90	14%	83	17%	8	6%	0	0%	0	0%
District 14	0	0%	0	0%	0	0%	0	0%	0	0%
District 15	101	16%	0	0%	101	75%	0	0%	0	0%
District 16	56	9%	56	11%	0	0%	0	0%	0	0%
District 17	81	13%	75	15%	7	5%	0	0%	0	0%
District 18	0	0%	0	0%	0	0%	0	0%	0	0%
District 19	0	0%	0	0%	0	0%	0	0%	0	0%
District 20	0	0%	0	0%	0	0%	0	0%	0	0%
District 21	0	0%	0	0%	0	0%	0	0%	0	0%
District 22	12	2%	12	2%	0	0%	0	0%	0	0%
District 23	0	0%	0	0%	0	0%	0	0%	0	0%
District 24	0	0%	0	0%	0	0%	0	0%	0	0%
District 25	0	0%	0	0%	0	0%	0	0%	0	0%
District 26	0	0%	0	0%	0	0%	0	0%	0	0%
Total Trips	645	100%	501	100%	134	100%	0	0%	9	100%

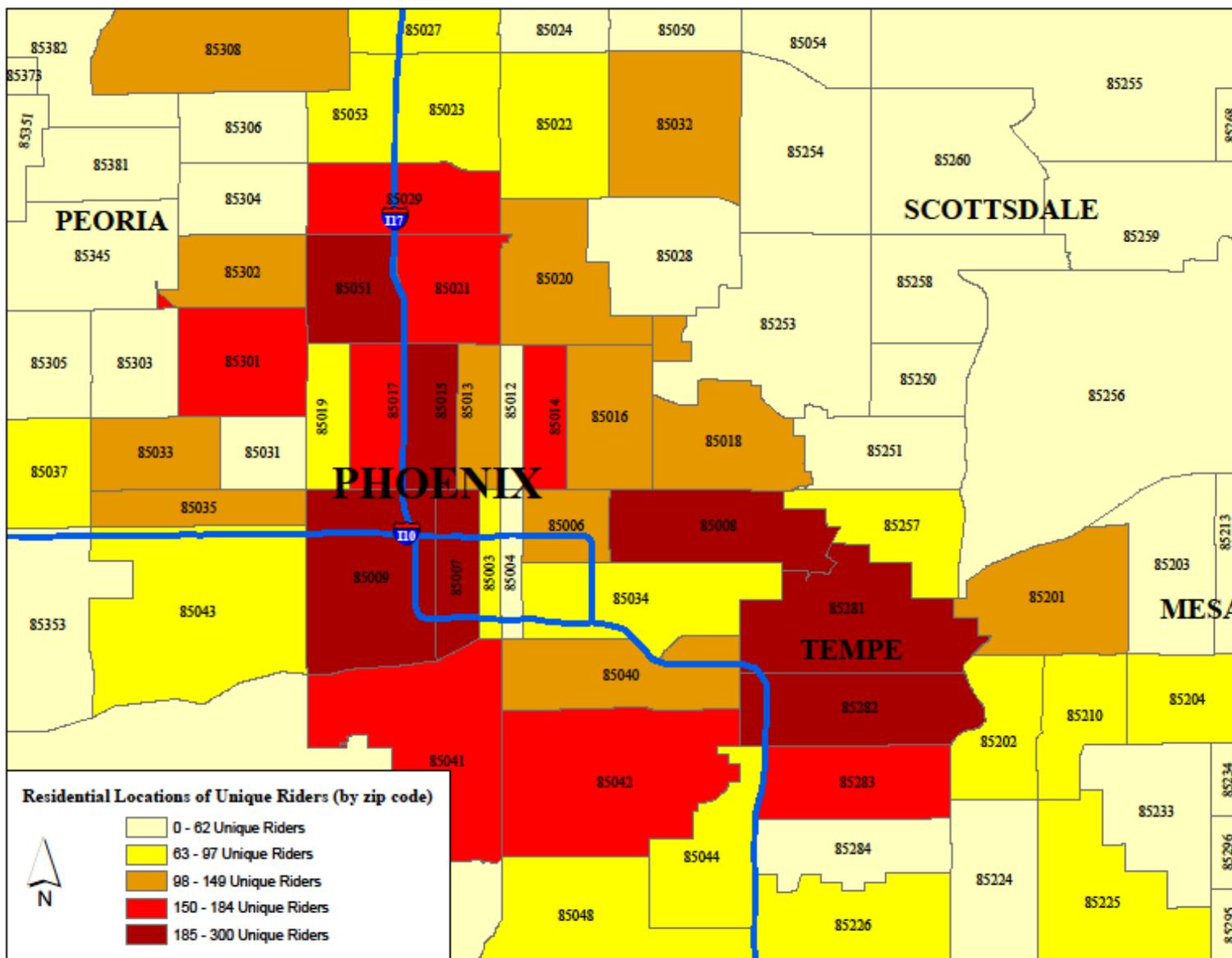
* District includes activity center (Scottsdale Municipal Airport) buffer zone of 1-mile radius

Appendix G: Maps

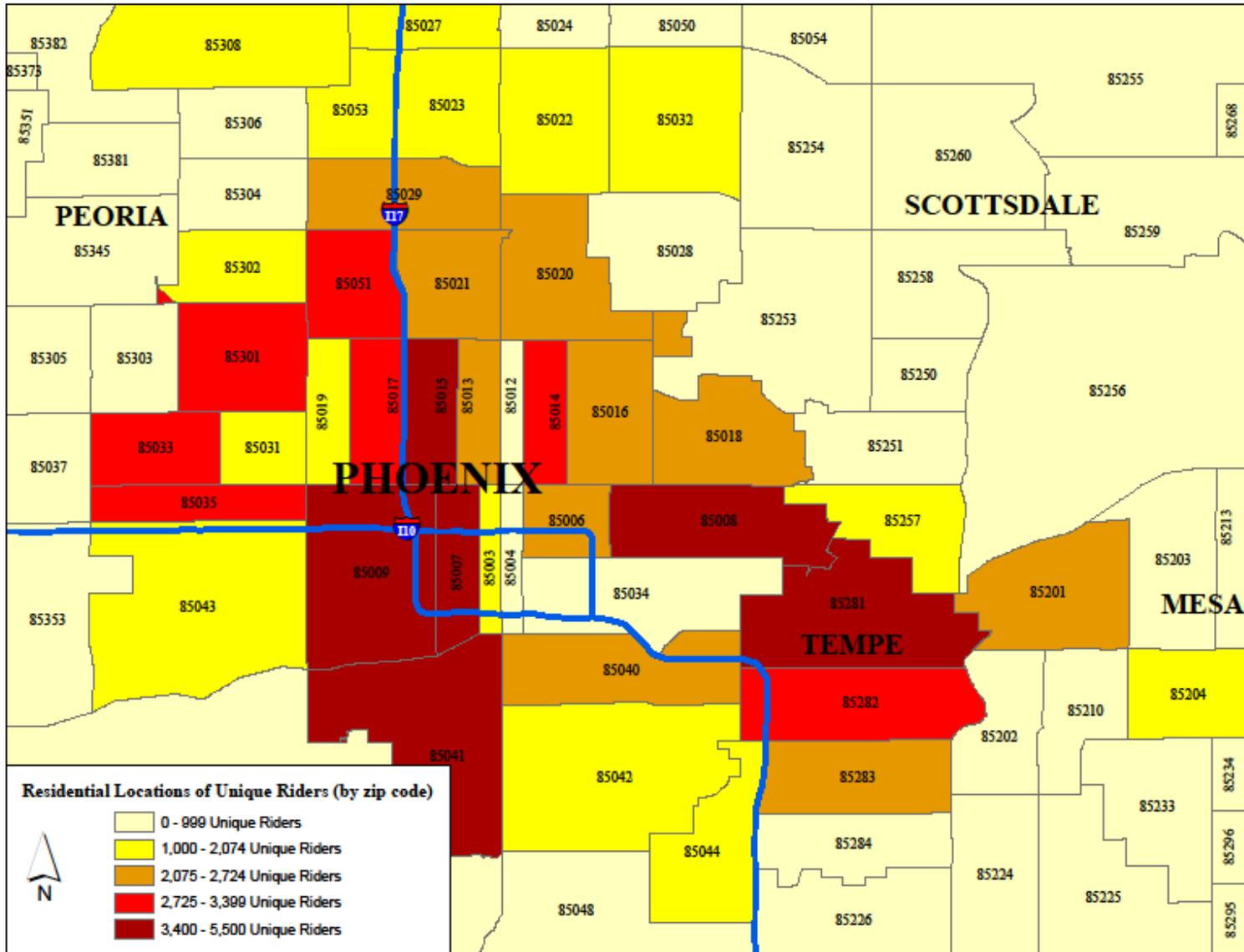
This section presents the residential location, trip origin, and trip destination maps. Maps G-1 and G-2 present the un-weighted and weighted distribution of residential locations of “unique riders” at the zip code level. It should be noted that the definition of unique riders differs from boarding passengers (also denoted as ‘riders’ for ease of use and clarity throughout this report). For instance, if a transit user rode two buses on his one-way trip, he made two unlinked trips (that translates to two boarding passengers), and one linked trip (that translates to one unique rider).

The riders were stratified into five segments to generate the maps. The cut offs for these five segments were defined by using a quintile distribution of riders such that each segment includes 20% of the riders and the top segment includes zip codes with the highest concentration of residential locations. Similar stratification based on quintile distribution of weighted trips by zip code was used to generate Maps G-3 and G-4, which present the weighted distribution of trip origins and trip destinations at the zip code level.

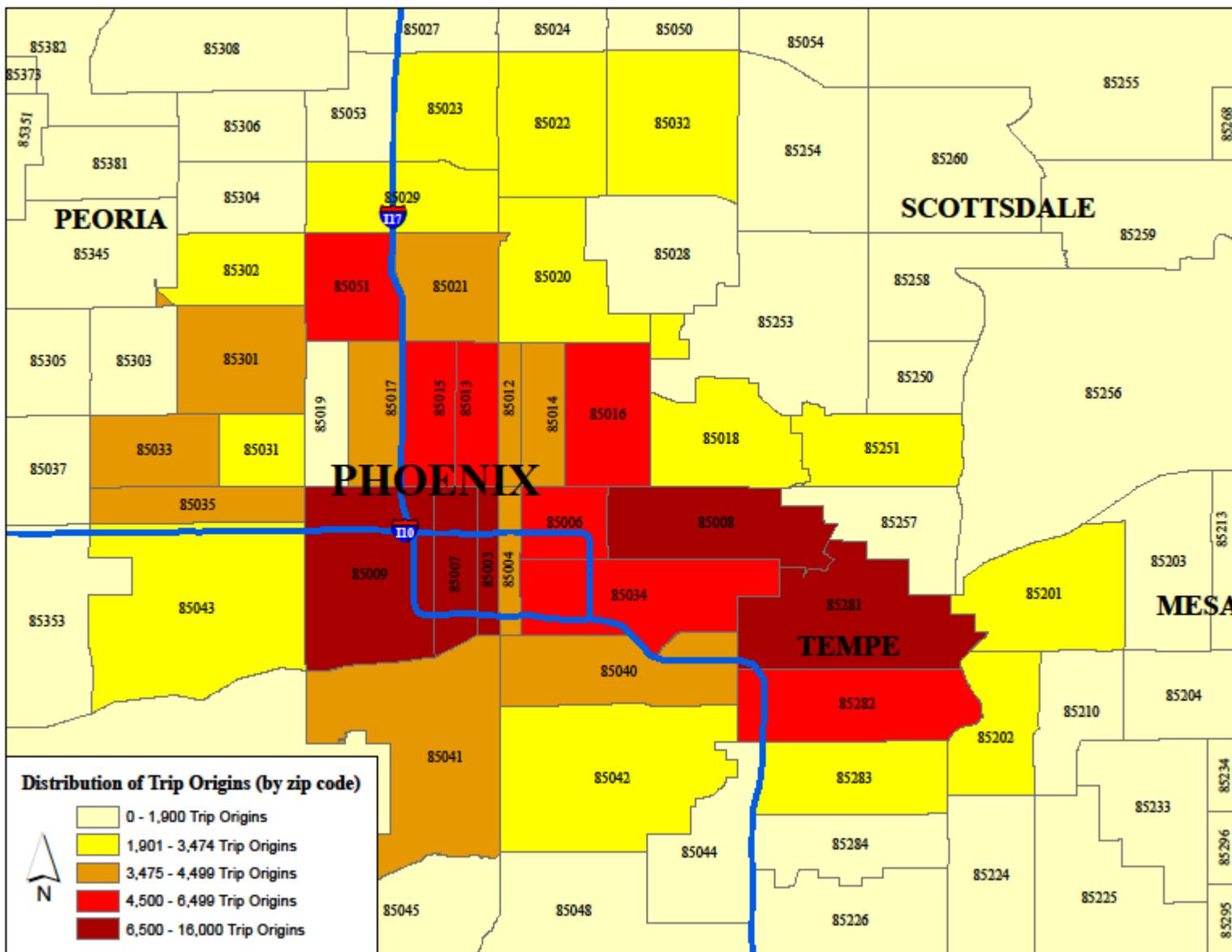
Map G-1: Unweighted Residential Locations of Unique Riders at Zip Code Level



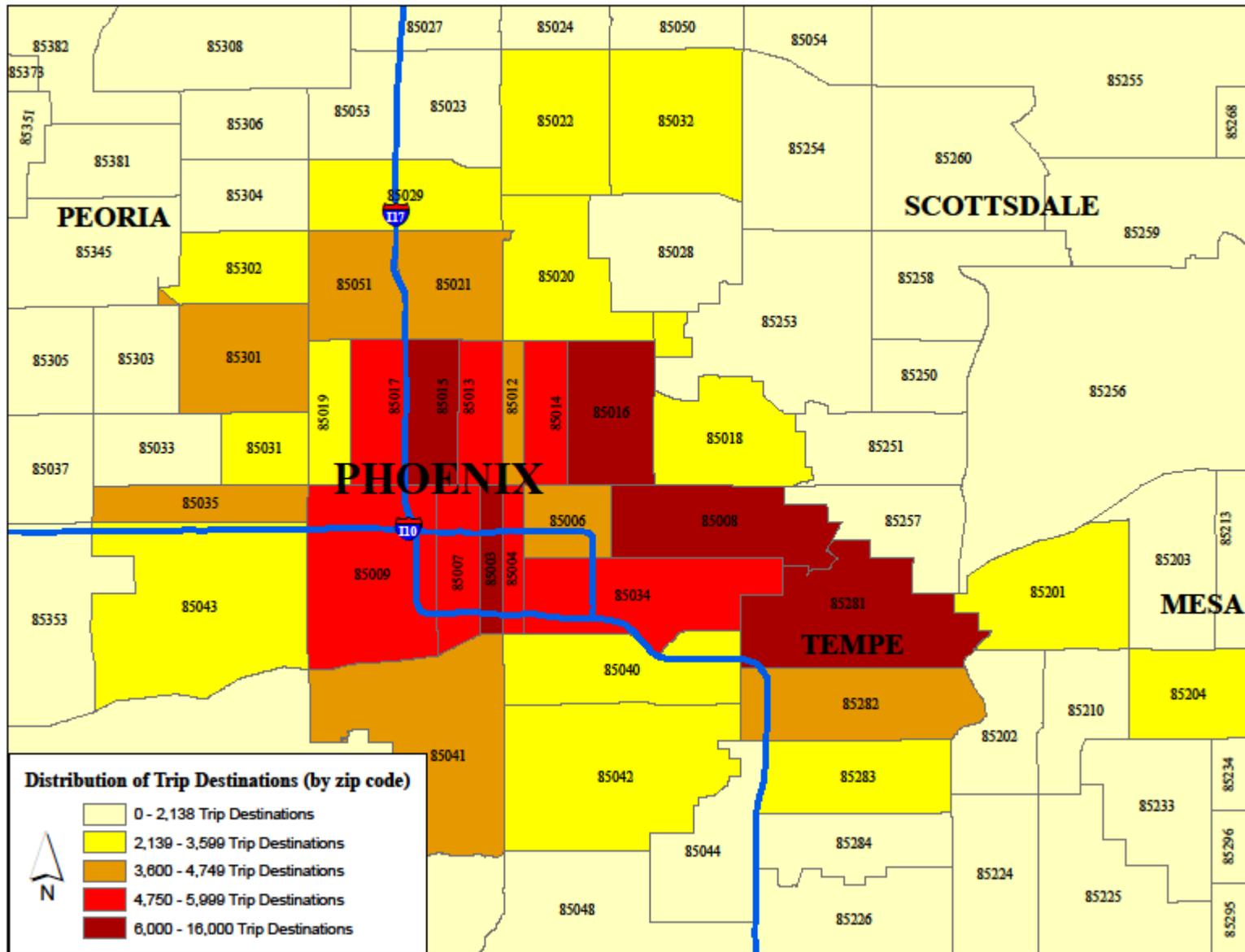
Map G-2: Weighted Residential Locations of Unique Riders at Zip Code Level



Map G-3: Weighted Distribution of Trip Origins at Zip Code Level



Map G-4: Weighted Distribution of Trip Destinations at Zip Code Level



Appendix H: Trip Tables

Table H-1: List of Trip Tables

Table No.	Trip Type	Service Type	Access Mode
001	Home-Based Work	LOCAL ROUTE	Bike
002			Walk
003			Kiss and Ride
004			Park and Ride
005		EXPRESS ROUTE	Bike
006			Walk
007			Kiss and Ride
008			Park and Ride
009		RAPID SERVICE	Bike
010			Walk
011			Kiss and Ride
012			Park and Ride
013	Home-Based University	LOCAL ROUTE	Bike
014			Walk
015			Kiss and Ride
016			Park and Ride
017		EXPRESS ROUTE	Bike
018			Walk
019			Kiss and Ride
020			Park and Ride
021		RAPID SERVICE	Bike
022			Walk
023			Kiss and Ride
024			Park and Ride
025	Home-Based Other	LOCAL ROUTE	Bike
026			Walk
027			Kiss and Ride
028			Park and Ride
029		EXPRESS ROUTE	Bike
030			Walk
031			Kiss and Ride
032			Park and Ride
033		RAPID SERVICE	Bike
034			Walk

Table No.	Trip Type	Service Type	Access Mode	
035	Non-Home-Based Work	LOCAL ROUTE	Kiss and Ride	
036			Park and Ride	
037			Bike	
038			Walk	
039		Kiss and Ride		
040		Park and Ride		
041		EXPRESS ROUTE	Bike	
042			Walk	
043			Kiss and Ride	
044			Park and Ride	
045		RAPID SERVICE	Bike	
046			Walk	
047			Kiss and Ride	
048			Park and Ride	
049		Non-Home-Based Other	LOCAL ROUTE	Bike
050				Walk
051				Kiss and Ride
052				Park and Ride
053	EXPRESS ROUTE		Bike	
054			Walk	
055			Kiss and Ride	
056			Park and Ride	
057	RAPID SERVICE		Bike	
058			Walk	
059			Kiss and Ride	
060			Park and Ride	