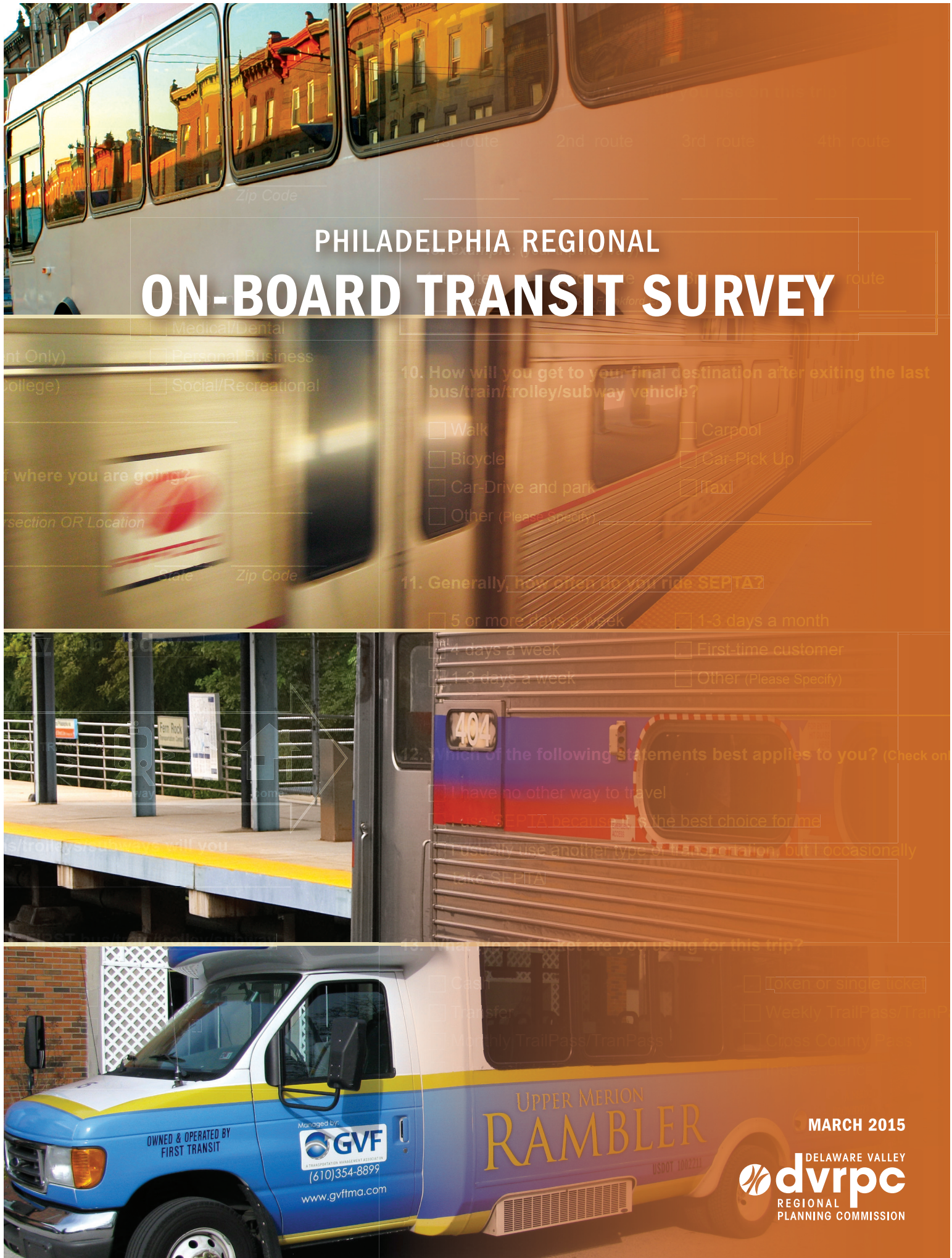


PHILADELPHIA REGIONAL ON-BOARD TRANSIT SURVEY



10. How will you get to your final destination after exiting the last bus/train/rolley/subway vehicle?

- ☐ Walk
- ☐ Bicycle
- ☐ Car-Drive and park
- ☐ Other (Please Specify) _____
- ☐ Carpool
- ☐ Car-Pick Up
- ☐ Taxi

11. Generally, how often do you ride SEPTA?

- ☐ 5 or more days a week
- ☐ 4 days a week
- ☐ 3 days a week
- ☐ 1-3 days a month
- ☐ First-time customer
- ☐ Other (Please Specify) _____

12. Which of the following statements best applies to you? (Check one)

- ☐ I have no other way to travel
- ☐ I use SEPTA because it is the best choice for me
- ☐ I usually use another type of transportation, but I occasionally take SEPTA

13. What type of ticket are you using for this trip?

- ☐ Cash
- ☐ Transfer
- ☐ Monthly TrailPass/TranPass
- ☐ Token or single ticket
- ☐ Weekly TrailPass/TranPass
- ☐ Cross County

MARCH 2015

DELAWARE VALLEY

dvrpc
REGIONAL
PLANNING COMMISSION



The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy.

We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.



The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

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Executive Summary

The Delaware Valley Regional Planning Commission (DVRPC) recognizes that its plans and recommendations are only as valid as the underlying data and assumptions on which they are based. The last comprehensive on-board survey of transit passengers in the Philadelphia urban area occurred over twenty years ago, in 1990. Much has changed in the intervening twenty years, and the 1990 data no longer reflects the typical passenger's characteristics and travel behavior.

DVRPC decided to update the 1990 data by conducting a new on-board transit survey during 2010 and 2011. All Southeastern Pennsylvania Transportation Authority (SEPTA), Port Authority Transit Corporation (PATCO), and Pennsylvania Transportation Management Association (TMA) transit routes within the DVRPC region were surveyed (New Jersey Transit bus and rail routes were surveyed separately in 2008, 2009, and 2010). The main purpose of the survey was to gather current data on how the transit system was being used in 2010. The survey asked passengers a series of questions about their household characteristics and the trip that they were making on the day of the survey.

The survey was conducted in three phases between December 2010 and December 2011. Close to 1.1 million unlinked trips are made on an average weekday on all 140 routes systemwide. Approximately 160,000 surveys were handed out to passengers, and 21,580 completed surveys were returned, for an overall return rate of 13.5 percent. In terms of ridership, the 21,580 returned surveys are 2.0 percent of average daily unlinked trips.

The survey results suggest several different populations of users. At the low end of the economic spectrum are passengers who really have no other option beside public transit as a way to get around. There is also a group of passengers that appear to be somewhat better off financially. They could be categorized as middle-income households, and many of them may actually have other options for transportation. But they choose to take public transit because it makes sense for them from a financial or time-savings standpoint. Finally, there may be a smaller group of passengers who may live and work downtown in relatively high-paying positions. These passengers can afford to take a taxi, but choose to ride transit because of its convenience.

The household data about the different users groups can be combined with the trip information to identify which routes are being used by which groups. For example, many of the routes that are serving the economically disadvantaged areas of the region need to do more than simply transport people to and from work. In many cases, these routes are their only means of transportation, and must also serve trips for shopping or medical needs. This information, along with the comments and suggestions received from the passengers, will be used by planners and engineers to make improvements to specific existing routes, identify any gaps in the existing system, and to plan new services.

Finally, the data will also be used by DVRPC planners and engineers to calibrate and validate the regional travel demand model. For example, the survey data provides information on the number of transit trips that are made every day between different parts of the region, e.g., the flow of transit passengers. The model's estimate of these flows can be compared to the survey data and if needed, the model can be adjusted to more closely match the actual data. Through this process, the model is kept up to date and the accuracy of its forecasts is improved.

Introduction

The last systemwide ridership survey of SEPTA passengers was conducted in 1990. A lot has changed in the intervening years between 1990 and 2010. In particular, in terms of land use, during much of this twenty year time frame, there was a continuation of out-migration from the urban core that has relatively high levels of transit accessibility, to suburban and rural areas that are more auto-oriented and auto-dependent. And the transportation data during this time frame reflects these land use changes. Between 1990 and 2000, vehicle miles traveled (VMT) regionwide increased by 11 percent, while SEPTA ridership decreased by 11 percent¹.

However, since 2000, many of these trends have moderated or reversed. Transit ridership has rebounded in the Philadelphia urban area due to several factors. The real price of gas increased from approximately \$1.89 per gallon in May 1990 to \$3.08 in May 2010². Younger generations increasingly appear to be interested in living and working in the more urban and pedestrian and transit accessible parts of the region. And the Great Recession, between December 2007 and June 2009, had a profound economic impact on the region. The unemployment rate in the Philadelphia urban area doubled, from 4.4 to 8.9 percent³.

Given the magnitude of these changes, DVRPC recognized the need for more up-to-date information on who is currently using the transit system, how they are using it, and to what extent it is (or is not) meeting their transportation needs. An on-board transit passenger survey was conducted from December 2010 through December 2011. DVRPC staff rode the buses and trains and distributed questionnaires to riders. The questionnaire's postage was prepaid, enabling those passengers who were unable to complete the survey during their trip to take it home and mail it back. From this survey, an updated demographic profile of Regional transit ridership was created.

The survey was conducted in three phases, as shown below in Table 1.

The first chapter of this report outlines the methods that were used to conduct the survey. The second chapter provides summary results for each survey question. The third chapter provides insight, analysis, and key findings from the survey.

¹ Delaware Valley Regional Planning Commission. *Connections 2040 – Tracking Progress*. March 2013.

² U.S. Energy Information Administration. *Weekly Central Atlantic (PADD 1B) All Grades All Formulation Retail Gasoline Prices*. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPM0_PTE_R1Y_DPG&f=W
<http://www.eia.gov/forecasts/steo/realprices/>

³ Bureau of Labor Statistics. Philadelphia-Camden-Wilmington, PA-NJ-DE Local Area Unemployment Statistics.

Table 1: Survey Phases

Phase	Time frame	Operators Surveyed	Service	Routes
1	December 2010 – January 2011	PATCO	PATCO High Speed Line	PATCO High Speed Line
2	March – April 2011	SEPTA	SEPTA Regional Rail	Airport Line (AIR) Chestnut Hill East (CHE) Chestnut Hill West (CHW) Cynwyd Line (CYN) Doylestown / Lansdale Line (DOY / LAN) Elwyn Line (ELW) Fox Chase Line (FOX) Newark / Wilmington, Delaware (NWK / WIL) Norristown Line (NOR) Thorndale / Paoli Line (THO / PAO) Trenton Line (TRE) Warminster Line (WAR) West Trenton Line (WTR)
		SEPTA	SEPTA High Speed Line	Norristown High Speed Line (NHSL)
		SEPTA	SEPTA Bus	55, 92, 94, 96, 99, 123, 124, 125,132,134, and 139
3	Fall 2011	SEPTA	SEPTA Subway	Market-Frankford Elevated Line (MFL) Broad Street Subway Surface Line (BSS and BSL)
		SEPTA	SEPTA Light Rail Transit (LRT)	101, 102
		SEPTA	SEPTA Trolley	10, 11, 13, 15, 34, 36
		SEPTA	SEPTA Bus	1, 2, 3, 5, 6, 7, 8, 9, 12, 14, 17 – 33, 35, 37 – 40, 42, 43, 44, 46, 47, 48, 50, 52, 53, 54, 56, 57 – 61, 64 – 68, 70, 71, 73, 75, 77, 79, 84, 88, 89, 90, 95, 97, 98, 103 – 115, 117 – 120, 123 – 131, 150, 201, 204, 206, 310, 314, C, G, H, J, K, L, LUCY, R, XH
		Transportation Management Associations (TMA’s)	TMA Bus	Upper Merion Township Rambler Day 1 and Day 2 Krapf’s “A” Route Coatesville Link Chester County (TMACC), South Chester County Organization on Transportation (SCCOOT) bus routes TMACC Beeline Bucks County (BCTMA) Rushbus (Bristol, Richboro / Warminster, Street Road, and Newtown) Pottstown Area Rapid Transit (PART) (High Street, North End Loop, Coventry Mall, Beech Street, Pottstown Center, and Philadelphia Premium Outlets)

Source: Delaware Valley Regional Planning Commission, 2014

1. Survey Methods

SAMPLING PLAN

DVRPC developed a sampling plan based on recent experience conducting on-board transit surveys for New Jersey Transit (NJT), as well as guidance from the Federal Transit Administration (FTA) and other transit and planning agencies from across the U.S. Recent on-board transit surveys conducted by DVRPC⁴ for NJT indicated that the expected “take rate”, e.g., the percentage of passengers that are offered a survey who actually take one, can range from close to 100 percent on some of the regional commuter rail lines, to a low of 10 percent on some of the local bus routes. The expected “return rate” for good and usable surveys would be somewhere between 20 and 25 percent of all the surveys that are taken by passengers. Therefore, if there are 100 passengers on a train, and a survey is offered to all 100, approximately 50 might actually take a survey, and of these, 10 will return a good and usable survey.

DVRPC wanted to collect a statistically valid sample at the system and route level. The focus of the survey was primarily on weekdays, during the AM peak ridership hours (e.g., 6:00 AM to 10:00 AM), and every route was surveyed during this time period. Almost all of the routes were also surveyed during the midday (10:00 AM to 3:00 PM). There was also a desire to collect some data during the PM peak (3:00 PM to 7:00 PM) and evening (7:00 PM to 6:00 AM) time periods, but only selected routes were also surveyed during these other time periods. It was felt that this approach would provide sufficient information during the days and times when the vast majority of transit passengers are using the system and yield a statistically valid and representative sample. In terms of returned surveys, approximately 60 percent are from the AM peak, 31 percent are from midday, six percent are from the PM peak, and three percent are from evening. Given time and cost constraints, it was decided not to survey during weekends, when far fewer passengers are riding the trains and buses.

Guidance from FTA and recently completed on-board surveys administered by other agencies suggests an appropriate target accuracy of at least a 90 percent confidence interval and an error rate less than or equal to ± 10 percent. Systemwide ridership, including both SEPTA and PATCO, was approximately 1.1 million unlinked passengers per weekday in 2010. Based on this, to achieve a 90 percent confidence level and a 10 percent sample error, it was determined that DVRPC would need to hand out (and have passengers take) approximately 47,500 surveys in order to collect a sample size of 9,500.

The sampling plan also took into account several low ridership routes that operate in the more rural parts of the region. For example, the Upper Merion Rambler only carries approximately 17,000 passengers per year, or 65 per day, on average. In an effort to ensure a representative sample, DVRPC tried to get more than a single response on these low ridership routes.

⁴ These include recent on-board surveys by DVRPC of the following New Jersey Transit rail and bus routes:

New Jersey Transit Riverline Survey,	Publication No. 11057,	March 2013
New Jersey Transit Burlington County Bus Survey,	Publication No. 11018,	April 2011
New Jersey Transit Camden County Bus Survey,	Publication No. 10034,	October 2010
New Jersey Transit Mercer County Bus Survey Results,	Publication No. 09052,	December 2009
New Jersey Transit South Jersey Bus Survey,	Publication No. 08065,	November 2009
New Jersey Transit Customer Survey,	Publication No. 08064,	August 2009

During Phase 1 of the survey, DVRPC surveyed the PATCO High Speed Line in December 2010. Approximately 11,000 surveys were handed out, and 2,100 surveys were returned, for a return rate of 19 percent.

During Phase 2, conducted during the spring of 2011, the goal was to survey one-third of the total service runs per line (more on the lower ridership routes, and less on the higher ridership routes). A run corresponds to a one-way, end-to-end journey on a selected route. For example, one of the runs on SEPTA Bus Route 123 during the AM peak leaves the King of Prussia Plaza Transit Center at 8:25 AM and travels inbound to the 69th Street Transportation Center, arriving at 9:02 AM. A total of 588 runs were surveyed (321 SEPTA regional rail, 185 SEPTA bus routes, and 82 Norristown High Speed Line (NHSL)) during Phase 2. As shown in Table 2, the total “take rate” during Phase 2 was 51 percent, e.g., 54,601 surveys were brought on board, and 27,789 were taken by passengers (23,157 on SEPTA regional rail lines, 2,483 on SEPTA bus, and 2,149 on NHSL). As shown in Figure 1, the Chestnut Hill West and the Cynwyd regional rail lines both had the highest take rates (73 percent), while Bus Route 125 had the lowest (26 percent). Figure 2 shows the take rate for the regional rail lines by time of day. For all of the routes surveyed during Phase 2, those surveyed during midday had the highest average take rate of 59 percent, followed by 54 percent for AM peak runs, 43 percent for the PM peak, and 39 percent for evening runs, respectively. In terms of overall return rate, 9,128 of the 27,789 surveys taken during Phase 2 were returned, for an actual return rate of 33 percent.

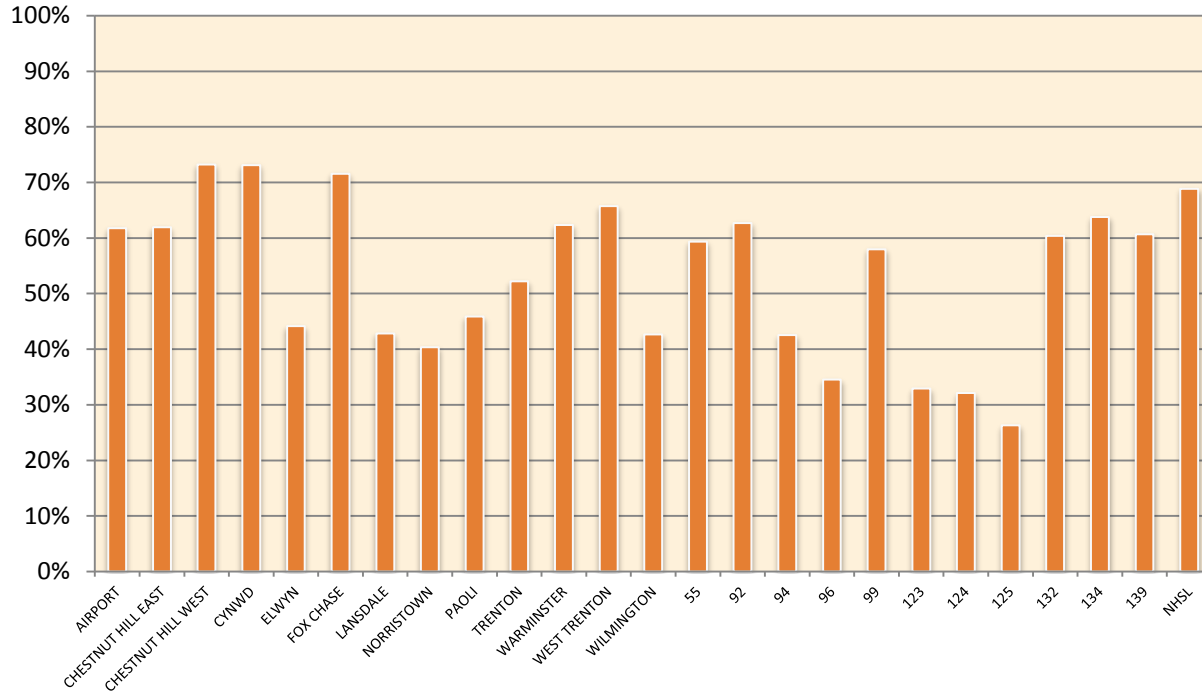
The bulk of the survey was conducted during Phase 3 in the fall of 2011. During this phase, DVRPC surveyed 101 SEPTA bus routes, six SEPTA trolley routes, the Broad Street and Market-Frankford subway lines, two light rail routes, and three TMA local routes (Upper Merion Rambler, Krapf’s A route, and the Bristol Rushbus). Also, some of the Phase 2 routes were resampled during Phase 3. Approximately 120,000 surveys were handed out, and 10,355 surveys were returned and useable, for a return rate of nine percent.

Table 2: Phase 2 Take and Return Rate

Route	Mode	Daily Ridership (2010)	Target Handed Out	Actually Handed Out	Take Rate	Returned & Useable	Return Rate
55	Bus	5,090	1,112	660	59%	165	25%
92	Bus	185	134	84	63%	22	26%
94	Bus	670	289	123	43%	29	24%
96	Bus	1,172	570	197	35%	26	13%
99	Bus	1,409	219	127	58%	63	50%
123	Bus	1,188	1,000	391	39%	86	22%
124	Bus	1,383	763	245	32%	149	61%
125	Bus	1,600	1,459	384	26%	175	46%
132	Bus	343	270	163	60%	17	10%
134	Bus	161	69	44	64%	17	39%
139	Bus	340	154	90	58%	55	61%
Bus Subtotal		13,541	6,039	2,508	42%	804	32%
NHSL	High Speed Line	8,801	3,122	2,149	69%	393	18%
AIR	Regional Rail	6,907	2,100	1,297	62%	294	23%
CHE	Regional Rail	5,852	1,770	1,096	62%	447	41%
CHW	Regional Rail	5,626	1,960	1,435	73%	531	37%
CYN	Regional Rail	638	160	117	73%	75	64%
DOY / LAN	Regional Rail	15,487	7,761	3,326	43%	1,103	33%
ELW	Regional Rail	10,384	3,360	1,483	44%	821	55%
FOX	Regional Rail	5,299	2,280	1,631	72%	448	27%
NOR	Regional Rail	10,360	5,340	2,156	40%	488	23%
PAO	Regional Rail	20,805	9,170	4,206	46%	1,464	35%
TRE	Regional Rail	10,387	2,835	1,480	52%	420	28%
WAR	Regional Rail	9,139	2,180	1,359	62%	511	38%
WIL	Regional Rail	9,274	3,180	1,356	43%	517	38%
WTR	Regional Rail	11,774	3,370	2,215	66%	807	36%
Regional Rail Subtotal		121,932	45,466	23,157	51%	7,926	34%
TOTAL		144,274	54,627	27,814	51%	9,123	33%

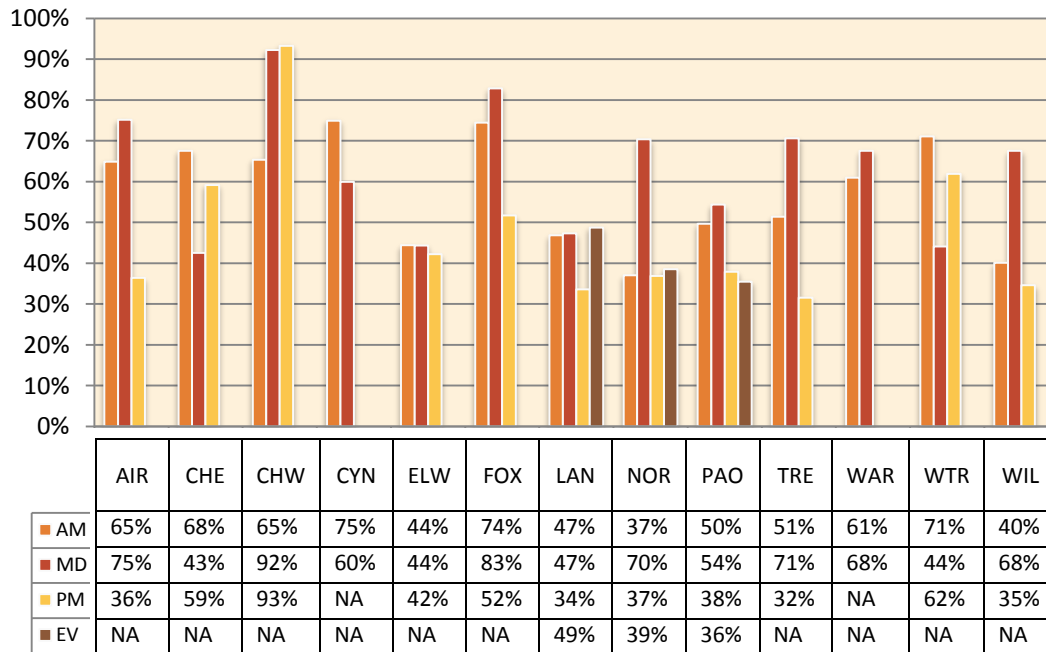
Source: Delaware Valley Regional Planning Commission, 2014

Figure 1: Phase 2 Total Take Rate by Line



Source: Delaware Valley Regional Planning Commission, 2014

Figure 2: Phase 2 Regional Rail Take Rate by Line and Time of Day



Source: Delaware Valley Regional Planning Commission, 2014

Table 3: Surveys Distributed by Transit Service and Survey Phase

Transit Agency	Transit Service	Phase Surveyed	Average Daily Weekday Ridership (2010)	Surveys Handed-Out / Distributed	Completed & Returned	Return Rate	
						As % of Handed Out	As % of Daily Ridership
SEPTA	Bus	2 and 3	512,101	70,839	7,215	10.2%	1.4%
	Trolley	3	91,986	11,571	1,659	14.3%	1.8%
	Light Rail	3	7,707	1,081	129	11.9%	1.7%
	Subway	3	316,710	39,113	2,151	5.5%	0.7%
	Regional Commuter Rail	2	121,932	23,157	7,926	34.2%	6.5%
	NHSL High Speed Rail Line	2	8,801	2,149	393	18.3%	4.5%
PATCO	High Speed Rail Line	1	33,783	11,000	2,100	19.1%	6.2%
Pennsylvania TMAs	Upper Merion Rambler	3	65	50	2	4.0%	3.1%
	Krapf's "A" Route	3	760	600	2	0.3%	0.3%
	Bristol Rushbus	3	100	60	1	1.7%	1.0%
	TOTAL TMA's		925	710	5	0.7%	0.5%
TOTAL			1,093,945	159,620	21,578	13.5%	2.0%

Source: Delaware Valley Regional Planning Commission, 2014

Notes:

Return Rate as percentage of handed out = the percentage of taken surveys that are returned completed and usable.

Return Rate as percentage of daily ridership = completed and usable surveys as a percentage of the daily ridership for each route.

SURVEY INSTRUMENT / QUESTIONNAIRE

The survey instrument is shown in Appendix A. It was printed on 80-pound white matte legal size paper and trifolded. The instrument contained a vertical glue strip used by survey respondents to seal the survey before mailing it back to DVRPC. Each survey was individually numbered.

The survey has twenty questions, requiring a combination of open- and closed-ended responses. Thirteen of the questions refer to the passenger's transit trip on the day of the survey. Five questions refer to the passenger's household. The remaining two questions ask for the passenger's contact information and any comments they have.

SURVEY ADMINISTRATION

During Phase 1 the survey was administered by DVRPC and PATCO staff. Phase 2 of the survey was administered by DVRPC and SEPTA staff. For Phase 3, DVRPC hired and trained twenty-five temporary workers. The temporary workers assisted DVRPC and SEPTA staff with administration of the last phase of the survey.

DATA PROCESSING AND QUALITY ASSURANCE

The data processing and quality assurance process involved three separate stages: pre-data entry, data entry, and post-data entry, as described below.

Pre-Data Entry: Upon receipt of a returned survey, DVRPC staff opened and hand checked the response to each question. In some cases, unclear or incomplete responses were corrected with red pen. See Appendix C for a description of the types of corrections that were made. The corrected surveys were then unfolded, stacked, and delivered to a data entry firm.

Data Entry: DVRPC hired a data entry subcontractor to scan and enter each completed survey into an electronic database. One of the biggest issues with automated data input systems is data errors. To guard against this, the sub-contractor used a double-key verify method. Essentially, this involved having two people enter the same data into separate electronic files. The two data sets were then compared, differences were examined, and any needed corrections were made.

All surveys were manually verified to ensure that 98 percent of the surveys were entered without errors. That is, a maximum of one out of 50 surveys were permitted to have discrepancies between the original paper version and the electronic version, as entered into the database file.

Post-Data Entry: After entry and error checking, the subcontractor created data files in an electronic format easily loadable into Microsoft Access. The scans of each survey instrument were also returned to DVRPC in PDF format, with each survey's unique ID number included in the file name to allow linking to the database. The subcontractor posted all data and pdf files on their FTP site for download by DVRPC staff.

Upon receipt of the data from the subcontractor, DVRPC first reviewed each survey for completeness and tried to fill in any missing information. For example, if the respondent failed to write down their boarding location, the DVRPC staff person would use the respondent's origin, and their first bus or train route to try and figure out the nearest bus stop or train station. In the event that key information (origin, destination) was missing and there were no other clues that could be used to impute the missing information, the survey record was considered unsalvageable and deleted.

DVRPC staff also conducted several logic checks of returned surveys. For example, given the respondent's origin, their boarding location, the bus or train route(s) they used, their final bus stop or train station, and their ultimate destination:

- The sequence of stops and routes was checked to make sure it really is possible to travel between these points, at the time of day the respondent was traveling.
- If they indicated they walked to the bus stop, the distance between their origin and their boarding location was checked to make sure it doesn't exceed a reasonable and realistic walking distance.

Finally, DVRPC staff prepared the data for the next step in the process. For Geocoding programs to work, they need to be able to match a survey respondent's address with an actual address in a GIS database. To facilitate this matching, the spelling of all origin and destination addresses was manually checked and if necessary corrected.

GEOCODING

DVRPC staff used ArcGIS ArcMap's geocoding routine to match respondent's responses to the origin and destination ends of each transit trip. At the origin end, the survey form asked passengers for the address where they were coming from and the location where they first boarded the bus or train. At the destination end of the trip, the survey form asked passengers for the address where they were going. DVRPC was able to successfully match 91 percent of the responses to the origin location to an actual street address, 100 percent of the first board locations⁵, and 96 percent of the destination locations.

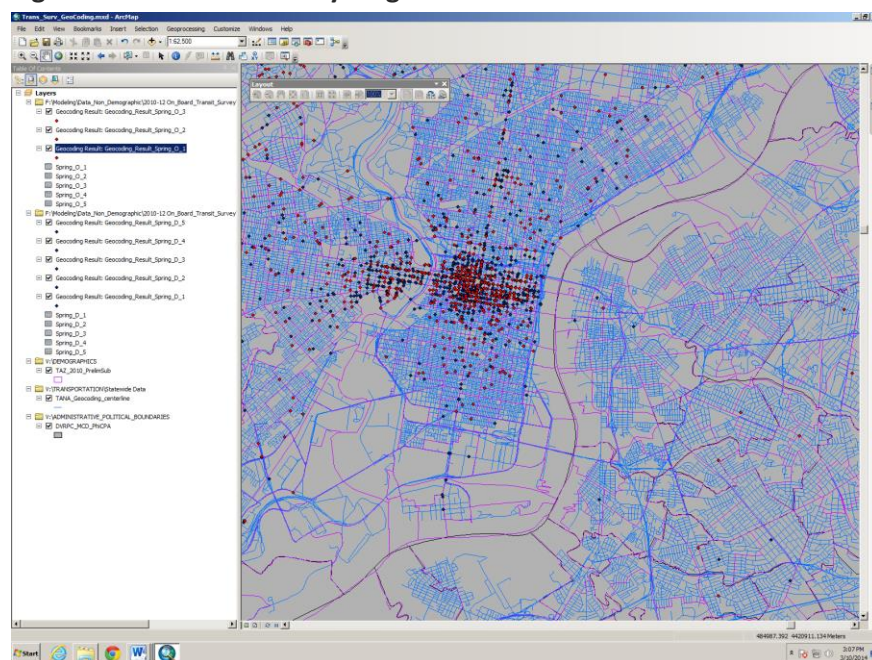
Table 4: Geocoding Match Rates

Location Type	Matched	Unmatched	Total	Matched Percent
Origin	19,720	1,852	21,572	91.41%
Boarding	21,492	80	21,572	99.63%
Destination	20,688	884	21,572	95.90%

Source: Delaware Valley Regional Planning Commission, 2014

The survey did not explicitly ask passengers for the location of their last bus stop or train station at the destination end of their trip. However, DVRPC developed a program to determine this location based on the passengers' responses to other questions. One of the survey questions asked passengers to list each bus or train they took as part of their trip. For example, a person may have first boarded the SEPTA Route 47 bus, and then transferred to the Market-Frankford subway line on their way to work. Given the last route and the respondent's destination address, DVRPC was able to determine which Market-Frankford subway station was closest to their work.

Figure 3: Geocoded Survey Origins and Destinations



Source: Delaware Valley Regional Planning Commission, 2014

⁵ In the event that the response on the survey form was unclear, the boarding location was imputed based on the home address, the bus or train route, and the destination.

SURVEY WEIGHTING AND EXPANSION

The on-board survey was expanded to match the 2010 SEPTA ridership, as determined by SEPTA's 2010 Route Operating Ratio (ROR) Report. The RORs are used to report expenses and passenger revenue, and are available for every transit line. They are assumed to be the most accurate source of average daily ridership since they cover an entire year. They do not, however, provide ridership by time of day. Daily distributions of ridership throughout the day were estimated using several other data sources in order to match DVRPC's TIM 2.0 travel model's four time periods: AM peak (6:00 to 10:00 am), midday (10:00 am to 3:00 pm), PM peak (3:00 to 7:00 pm), and evening (7:00 pm to 6:00 am).

For the regional rail lines, the most recent available regional rail census (2011) was used to determine station boardings by TIM 2.0 time periods. The rail census provides station boardings for each individual train run. Each run was assigned to one of the travel model's four time periods. For most other SEPTA lines, 2012 automatic passenger counts (APCs) were available and provided stop-level boardings by hour, which were aggregated to the TIM 2.0 time periods. Of SEPTA's 140 surveyed transit lines, 11 did not have APC data⁶. For these lines, a time of day distribution was estimated from the nearest comparable line with available data. Both the rail census and APC data are snapshots of passenger activity for one, or, at most, several days. Therefore, the time-period totals were factored to match the 2010 ROR daily ridership by line.

For the purposes of survey expansion, only those survey records with complete origin, boarding station, alighting station, and destination data were used. In total, there were 21,583 "clean" surveys. Each of these survey records was assigned to a TIM 2.0 time period.

DVRPC's survey emphasized the morning and midday hours, although some afternoon and evening surveys were also conducted. As a result, there were several lines without any valid surveys in the PM and/or evening time periods. For these lines, the survey was expanded to match a partial, not a whole, day's ridership, e.g., if we only received surveys for a particular route during the AM and midday, then that particular route was expanded to match the AM and midday ridership, not the daily ridership.

The clean survey records represent 1.97 percent of SEPTA and PATCO's combined 1,093,945 daily boardings for the lines and time periods with survey data. While each survey, on average, represented 51 riders, this varied significantly by time of day. By TIM 2.0 time period, each survey represented 25, 44, 206, and 216 riders for the AM, midday, PM, and evening time periods, respectively.

Each survey record was assigned two expansion factors: one for "unlinked trips" and one for "linked trips." An unlinked trip represents a single boarding and alighting, while a linked trip accounts for transfers between two or more transit lines and represents a single trip from beginning to end. The expansion factors were calculated as follows:

$$\text{unlinked expansion factor} = \frac{\text{total boardings per line and time period}}{\text{clean surveys per line and time period}}$$

⁶ The SEPTA route 134 bus time of day distribution came from 2009 "ride check" data. The other lines without APC data were the 15, 31, 71, 101, 102, 204, 310, 314, H, and XH. Their closest comparable lines with time of day data were the 13, 32, 68, NHSL, NHSL, 139, 139, 139, C, and C, respectively.

$$\text{linked expansion factor} = \frac{\text{unlinked expansion factor}}{\text{number of transit lines used}}$$

The expansion factor calculations described above are only applicable to the transit lines that were surveyed. A small number of SEPTA lines were unable to be surveyed or did not have any valid returned surveys. Also, New Jersey Transit completed an on-board survey of most of its lines prior to the SEPTA survey, so these lines were not surveyed by DVRPC. The unlinked expansion factors by transit line are displayed in Appendix D.

For travel model calibration and validation, aggregate ridership statistics calculated from the survey, such as trips by purpose (or activity) and number of transfers, were factored to account for the ridership on the missing transit lines. This factor, 15.9 percent, was calculated from the total boardings of all lines and the total boardings of the expanded survey (using the unlinked expansion factors).

CONCLUSION

Given the budget and schedule constraints, DVRPC was aiming for a 3.5 to 4.0 percent return rate as a percentage of daily ridership, and approximately 40,000 returned surveys. It was hard to estimate what a reasonable response rate would be, since it had been twenty years since the last major on-board survey was conducted in Philadelphia. The actual results were an overall two percent return rate, and 21,500 returned surveys. In terms of accuracy, the goal was ± 10 percent accuracy at a 90 percent confidence level. As shown in Appendix E, approximately 44 percent of the routes surveyed met this goal. A handful of routes (MFL, PATCO, and several of the Regional Rail routes) exceeded this level of accuracy. For example, the error rates for MFL and PATCO are ± 2.6 percent accuracy at a 95 percent confidence level, and ± 2.7 percent accuracy at a 99 percent confidence level, respectively.

But the results varied considerably between the different phases, modes, and routes. Both Phase 1 and 2 exceeded the target return rate. For Phase 2, 33 percent of the surveys that were taken were returned (approximately 6 percent of daily ridership). But for Phase 3, only nine percent of the surveys that were taken were returned (approximately 1 percent of daily ridership). DVRPC was able to collect sufficient sample sizes on all of the major routes carrying five thousand or more passengers per day to achieve ± 10 percent accuracy at a 90 percent confidence level. However, at the opposite extreme were several bus routes with fewer than ten returned surveys. The error rate for these routes exceeded ± 20 percent at a 90 percent confidence level.

In hindsight, there were several factors that contributed to the different return rates. Probably the most important was the ability and willingness of the passengers to participate in the survey. In general, the highest return rates, as shown in Table 3, were achieved on Regional Commuter Rail, PATCO, and the Norristown High Speed Line. The passengers on these routes tend to be professionals commuting from the suburbs to jobs in the urban area. Several of the surveyors said that riders on these routes tended to be more engaged and appeared to buy into the survey in terms of believing that their effort would actually help improve the service.

Unfortunately, the same could not be said for passengers on the urban and rural TMA bus routes. Overall, they seemed far less interested in participating and as a result, there was limited response on these routes. In particular, this is true for the rural TMA bus routes that were surveyed during Phase 3. The error rate for these routes exceeded ± 50 percent at a 90 percent confidence level. These routes do not carry many passengers and only account for less than 0.1 percent of total daily systemwide ridership.

2. Survey Results

The expanded results of the survey are compiled in Tables 5 through 29 and Figures 4 through 38 below. Results are shown for twelve of the twenty questions that appear on the survey form in Appendix A. A note to the reader: for the purposes of the discussion of the results, the questions as they are presented in this and the following section have been re-numbered, and do not correspond to their number or sequence as they appeared on the actual survey form.

Also, the results presented here are by no means an exhaustive exploration of the data. Rather, the figures and tables represent answers to some of the more immediate questions. But many more cross-tabulations are possible.

Survey questions 1 through 7 asked passengers for information on the trip that they were taking. Survey question 1 asked passengers for the location of the origin of their trip. For example, for a passenger traveling from home to work during the morning commute, this would be the location of their residence.

Survey question 2 asked how passengers traveled from their origin to the bus stop or train station where they first boarded. Many passengers who live close to transit walk, while those who live further away may drive their car to the station, e.g., park and ride.

Survey question 3 asked passengers where they were going. The options included work, school, shopping, medical visit, social or recreational, personal business, or home.

Survey question 4 asked passengers how many buses or trains they were going to take to reach their final destination. For example, a passenger who was traveling from the residential neighborhood surrounding Haverford High School to Independence Mall in downtown Philadelphia would walk to the Beechwood Brookline Station and take the Norristown High Speed Line (NHSL) to the 69th Street Transportation Center, and then transfer to the Market-Frankford subway line, and take that to the 5th Street Station. Therefore, they would use two trains.

Survey question 5 asked passengers how they would travel from their last transit stop to their final destination. Continuing with the previous example, a passenger who disembarked at the 5th Street Station would be close enough to Independence Mall (two city blocks, or 0.3 miles) to walk.

Survey question 6 asked passengers how frequently they ride public transit. Options included five or more days per week, four days per week, one to three days per week, one to three days per month, or if this was their first time ever riding the bus.

Survey question 7 asked passengers if they had other travel options to public transit. There were three response options: no other travel options, they have other options but consider riding the bus or train to be their best choice, or they have other options (driving, carpool) and usually prefer to do something else.

Survey questions 8 through 12 pertained to the passenger's household. Survey question 8 asked passengers for the number of people, including themselves, that were in their household. Survey question 9 asked for the number of people in the household that were currently employed. Survey

question 10 asked for the number of vehicles that were owned by the household and available for transportation (e.g., in working order). Survey question 11 asked for the approximate income of the household. Survey question 12 asked the passenger what they did for a living.

Finally, Table 29 and Figure 38 display the trips by activity and by transit service used. There are seven activities:

- Home-based work (HBW) refers to trips where a passenger travels between home and work. For example, this would include a person who is traveling from home to work during the morning, or traveling from work back to home in the afternoon.
- Home-based shopping (HBSH) refers to trips where a passenger travels between home and a store. For example, this would include a person who makes a trip to their local supermarket to buy groceries.
- Home-based school (HBSchool) is a trip by a student who is traveling between home and a K-12 school.
- Home-based university (HBU) is a trip by a student who is traveling between home and a college or university.
- Home-based other (HBO) is a trip between home and some other activity. For example, this would include a person who is traveling between home and a doctor's office.
- Non-home-based work (NHBW) includes trips with a work location at one end of the trip and a non-home location at the other end of the trip. For example, this could include a college student who, after his or her last class is done in the afternoon, travels to a part-time job.
- Non-home-based non-work (NHBO) includes trips that do not have home or work locations at either end of the trip. Continuing with the previous example, these could include a trip by a college student to a doctor's office.

Appendix C provides detailed information on DVRPC's efforts to fill in any missing information on incomplete surveys, or to correct wrong answers. In some cases, this could be done using basic logic checks. For example, if a survey had a board time of 15:37 AM, and the passenger rode the Paoli regional rail line, then this passenger really meant 3:37 PM. The Paoli line does not operate between 1:30 AM and 5:00 AM.

In those instances where it was not possible to fill in the missing information for a survey question, it was recorded as non-response. For questions 1 through 12, non-response rates varied from a low of 0.0 percent for survey question 4 (number of buses or trains the respondent took) to a high of 10.5 percent for survey question 11 (household income).

The larger issue with non-response has more to do with the passengers who were handed a survey on the bus or train, but who for whatever reason chose not to answer any questions, and/or never returned their survey. As mentioned above, the surveyors noticed that certain groups of passengers on certain routes simply did not want to participate. In particular, this was noticed on some of the urban

and rural bus routes. These passengers either left the blank surveys on the bus, or took them with them but never returned them.

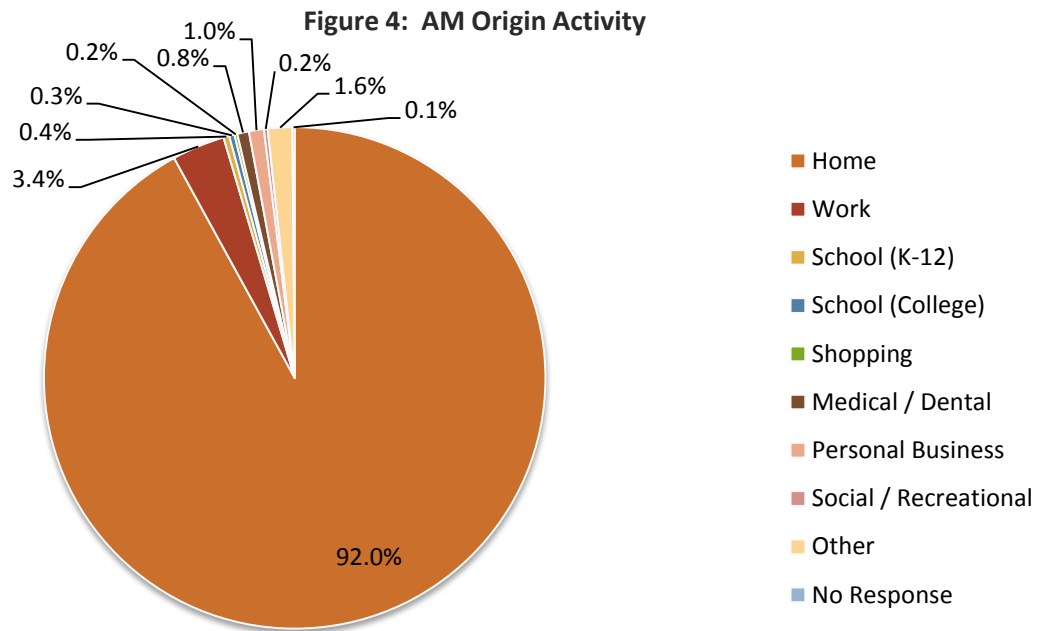
The question is whether an entire segment of passengers are absent from the survey results, and hence the results are biased. This may be true for the rural TMA bus routes such as Krapf's A Route, the Upper Merion Rambler, and the Bristol Rushbus. As shown in Appendix E, a total of only 5 surveys were returned for these three routes.

But the same cannot be said for the inner city urban bus routes. For example, City bus routes 5, 23, 29, 47, 59, and 75 travel through some of the most economically disadvantaged areas in the region. Although not great, the actual return rates for these routes ranges between 1 to 2 percent of daily ridership. At the 90 percent confidence level, the actual sample error rates for these routes range from ± 6.7 percent to ± 12.1 percent. This suggests that there were enough people, on enough routes to counteract those who did want to participate. Therefore, although the survey may suffer from an absence of responses from riders of the rural routes, that does not appear to be the case for the inner city routes that travel through disadvantaged areas.

Survey Question 1: Where are you coming from?

Table 5: AM Origin Activity

Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
92.0%	3.4%	0.4%	0.3%	0.2%	0.8%	1.0%	0.2%	1.6%	0.1%	100%

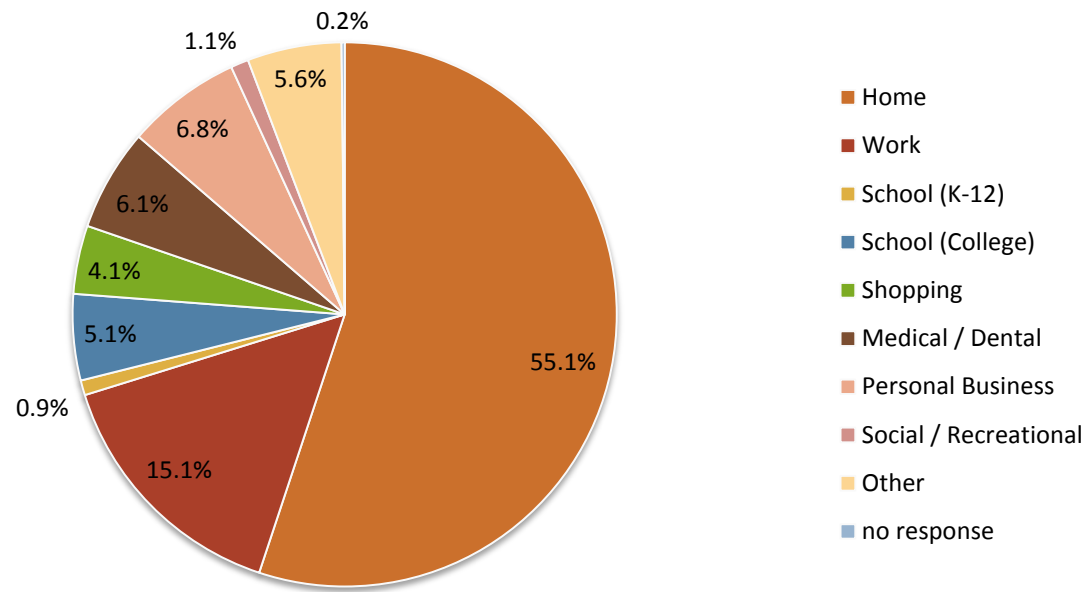


Source: Delaware Valley Regional Planning Commission, 2014

Table 6: Midday Origin Activity

Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
55.1%	15.1%	0.9%	5.1%	4.1%	6.1%	6.8%	1.1%	5.6%	0.2%	100%

Figure 5: Midday Origin Activity

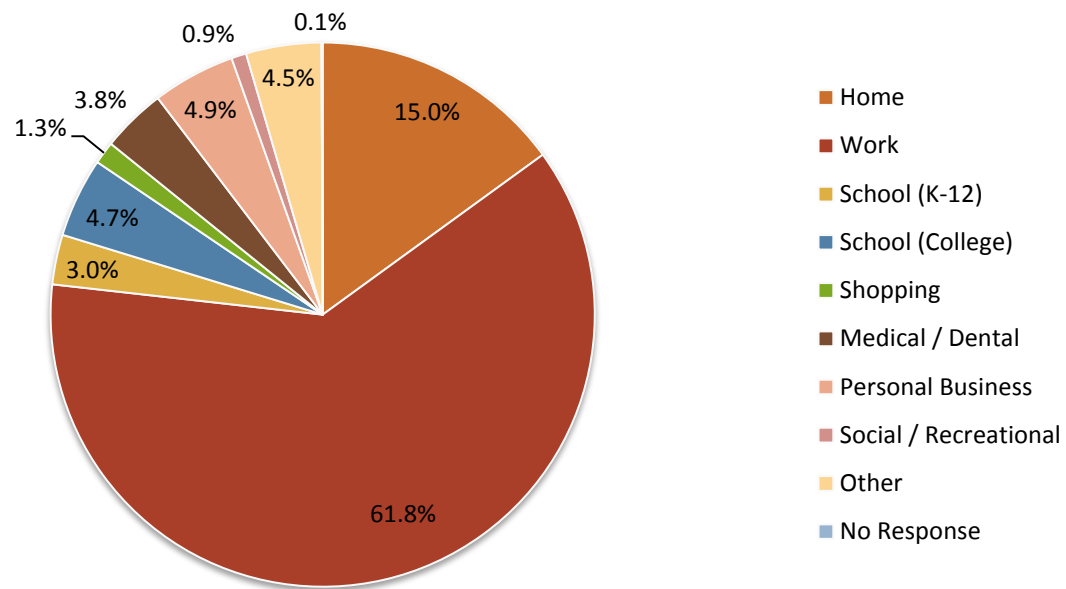


Source: Delaware Valley Regional Planning Commission, 2014

Table 7: PM Origin Activity

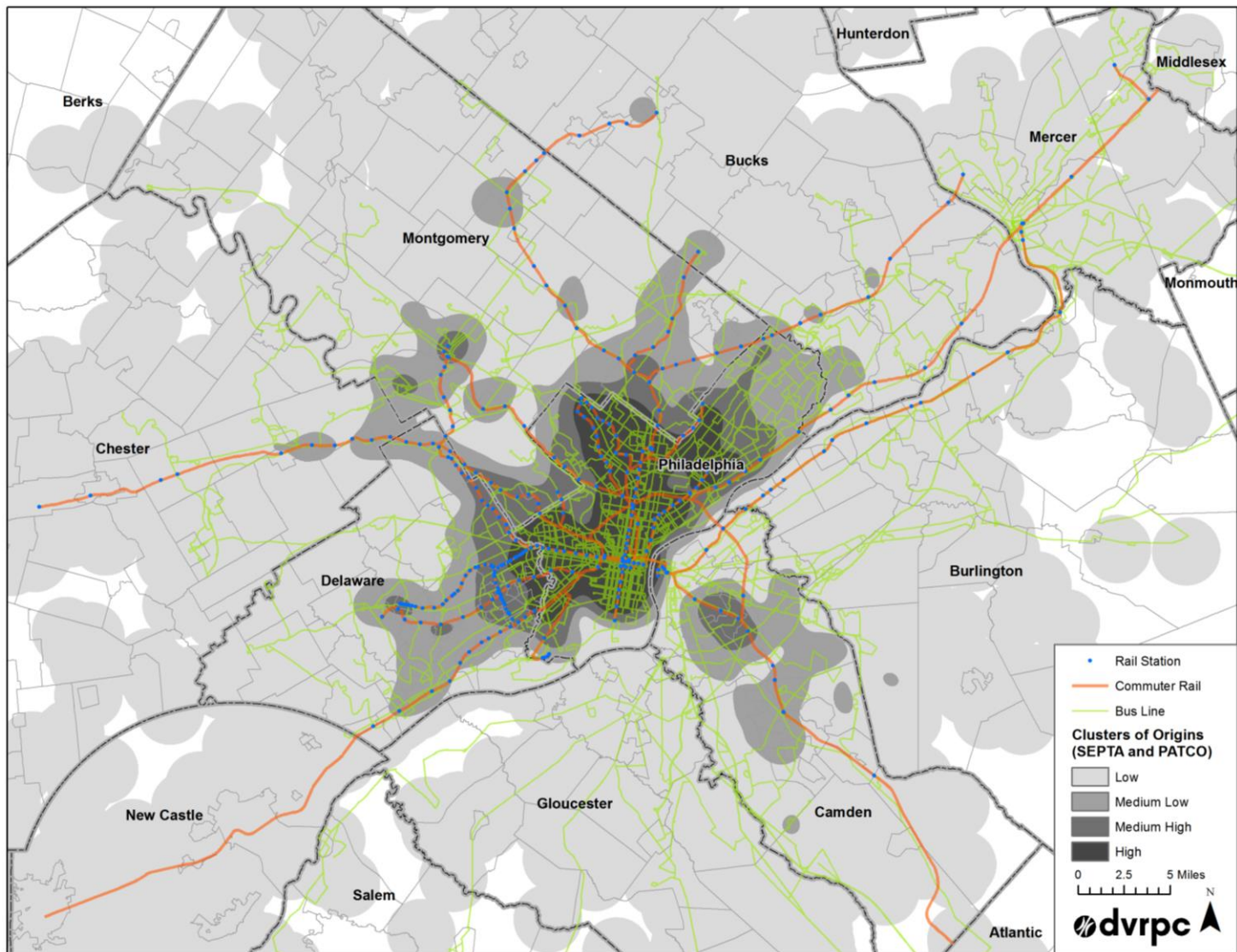
Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
15.0%	61.8%	3.0%	4.7%	1.3%	3.8%	4.9%	0.9%	4.5%	0.1%	100%

Figure 6: PM Origin Activity



Source: Delaware Valley Regional Planning Commission, 2014

Figure 7: Density of Transit Rider Origins (Daily)



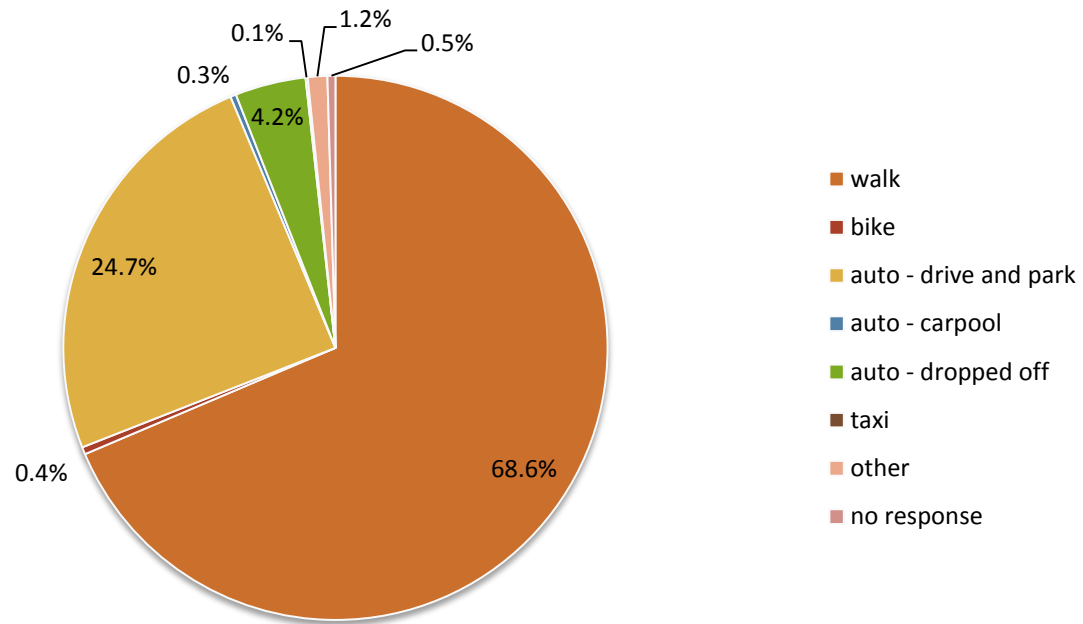
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 2: How did you get to your first bus or train?

Table 8: AM Access

Walk	Bicycle	Auto – Drive and Park	Auto - Carpool	Auto - Dropped-off	Taxi	Other	No Response	Total
68.6%	0.4%	24.7%	0.3%	4.2%	0.1%	1.2%	0.5%	100%

Figure 8: AM Access

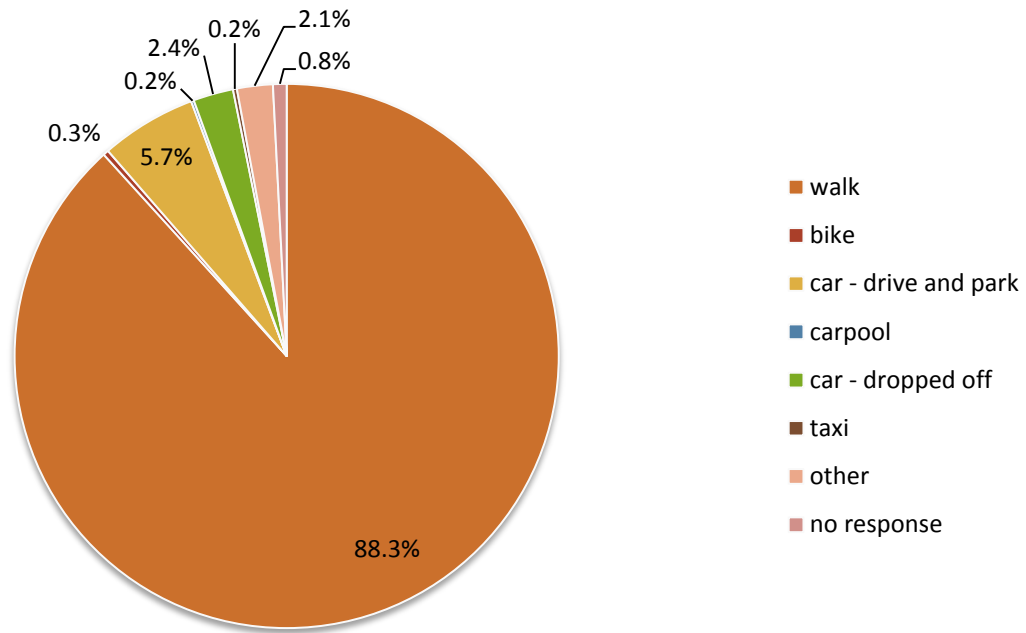


Source: Delaware Valley Regional Planning Commission, 2014

Table 9: Midday Access

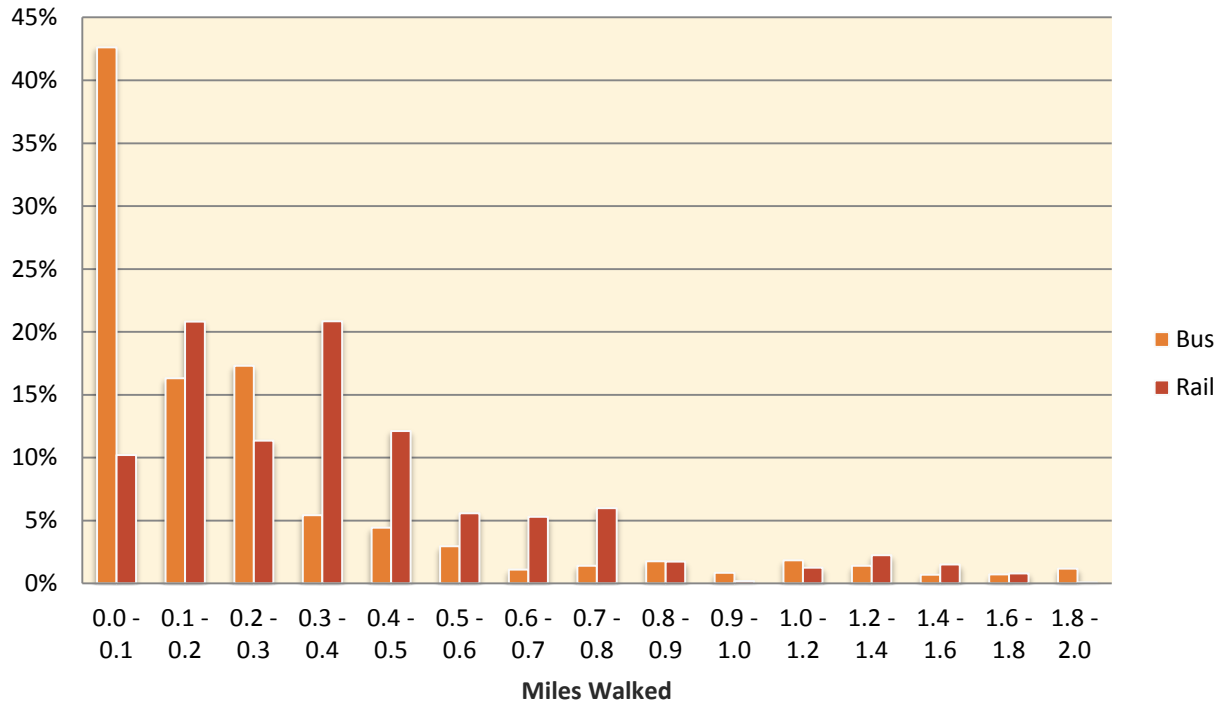
Walk	Bicycle	Auto – Drive and Park	Auto - Carpool	Auto - Dropped-off	Taxi	Other	No Response	Total
88.3%	0.3%	5.7%	0.2%	2.4%	0.2%	2.1%	0.8%	100%

Figure 9: Midday Access



Source: Delaware Valley Regional Planning Commission, 2014

Figure 10: Walk Distance to Terminal Stations by Transit Mode (Daily Trips)



Source: Delaware Valley Regional Planning Commission, 2014

Notes:

Bus includes all bus routes and the trolley routes (10, 11, 13, 15, 34, and 36)

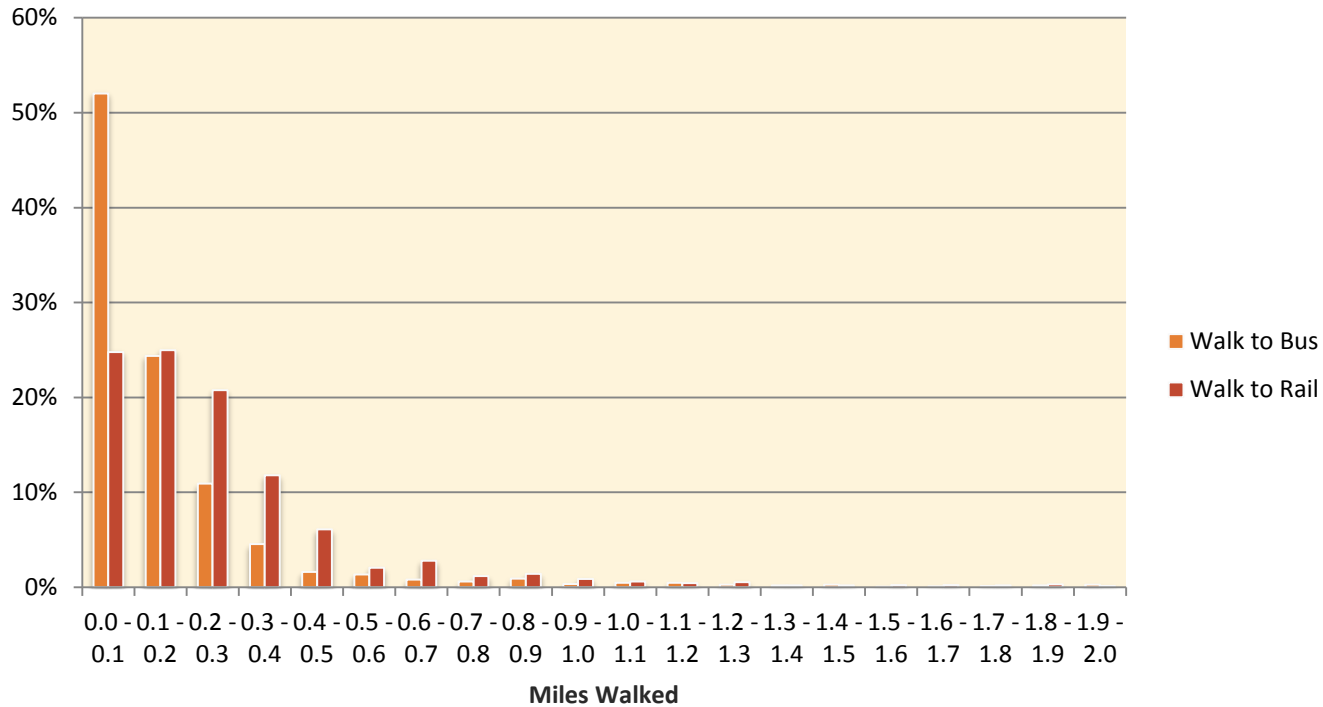
Rail includes light rail routes (101, 102), subway (MFL, BSS), regional rail, NHSL, and PATCO.

Table 10: Mean and Median Walk Distance to Terminal Station

Walk to	Mean Distance	Median Distance
Bus	0.26	0.17
Rail	0.40	0.32

Source: Delaware Valley Regional Planning Commission, 2014

Figure 11: Walk Distance to Non-Terminal Station by Transit Mode (Daily Trips)



Source: Delaware Valley Regional Planning Commission, 2014

Notes:

Bus includes all bus routes and the trolley routes (10, 11, 13, 15, 34, and 36)

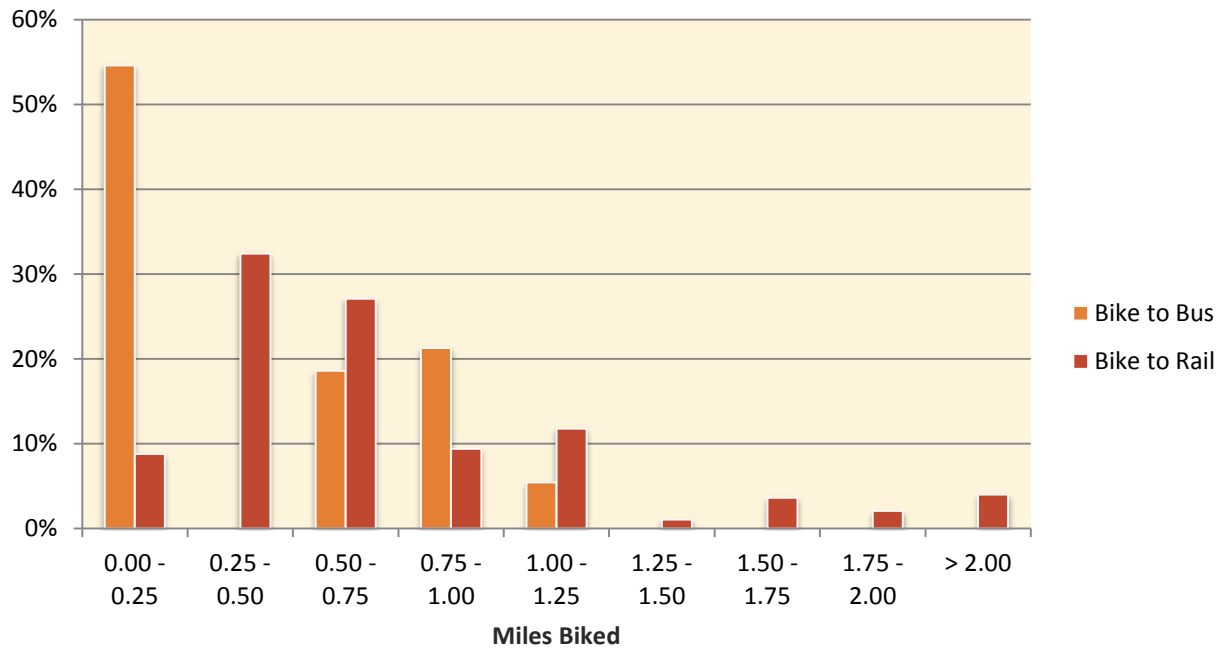
Rail includes light rail routes (101, 102), subway (MFL, BSS), regional rail, NHSL, and PATCO.

Table 11: Mean and Median Walk Distance to Non-Terminal Station

Walk to	Mean Distance	Median Distance
Bus	0.16	0.09
Rail	0.27	0.25

Source: Delaware Valley Regional Planning Commission, 2014

Figure 12: Bike Distance to Terminal Station by Transit Mode (Daily Trips)



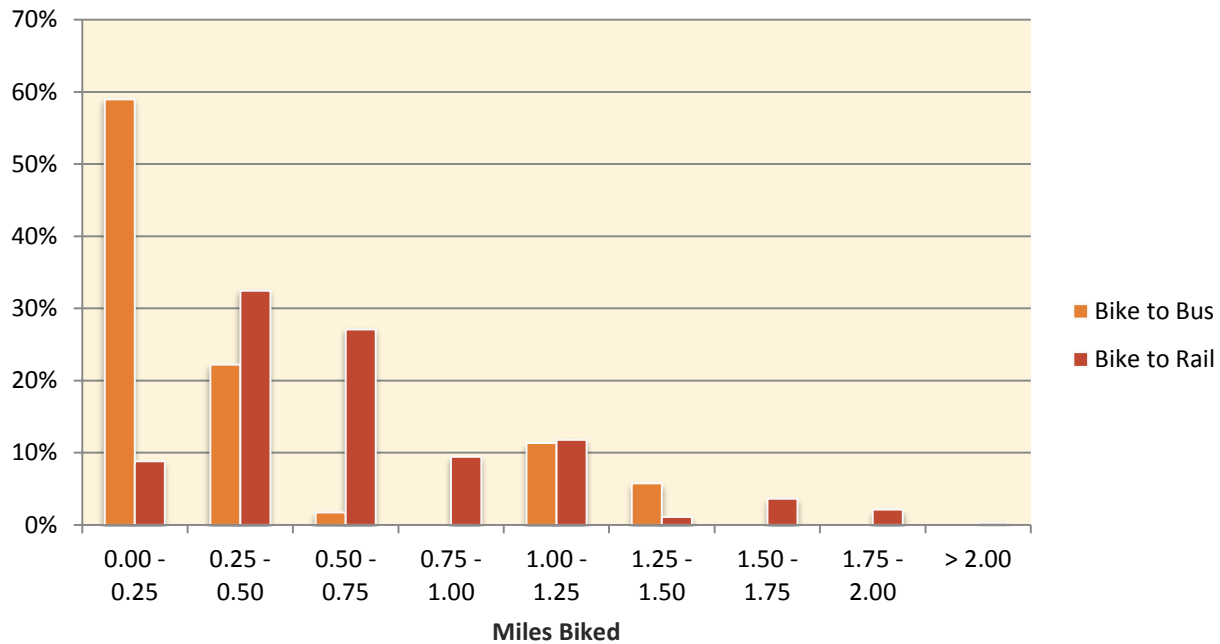
Source: Delaware Valley Regional Planning Commission, 2014

Table 12: Mean and Median Bike Distance to Terminal Station

Bike to	Mean Distance	Median Distance
Bus	0.41	0.40
Rail	0.85	0.98

Source: Delaware Valley Regional Planning Commission, 2014

Figure 13: Bike Distance to Non-Terminal Station by Transit Mode (Daily Trips)



Source: Delaware Valley Regional Planning Commission, 2014

Table 13: Mean and Median Bike Distance to Non-Terminal Station

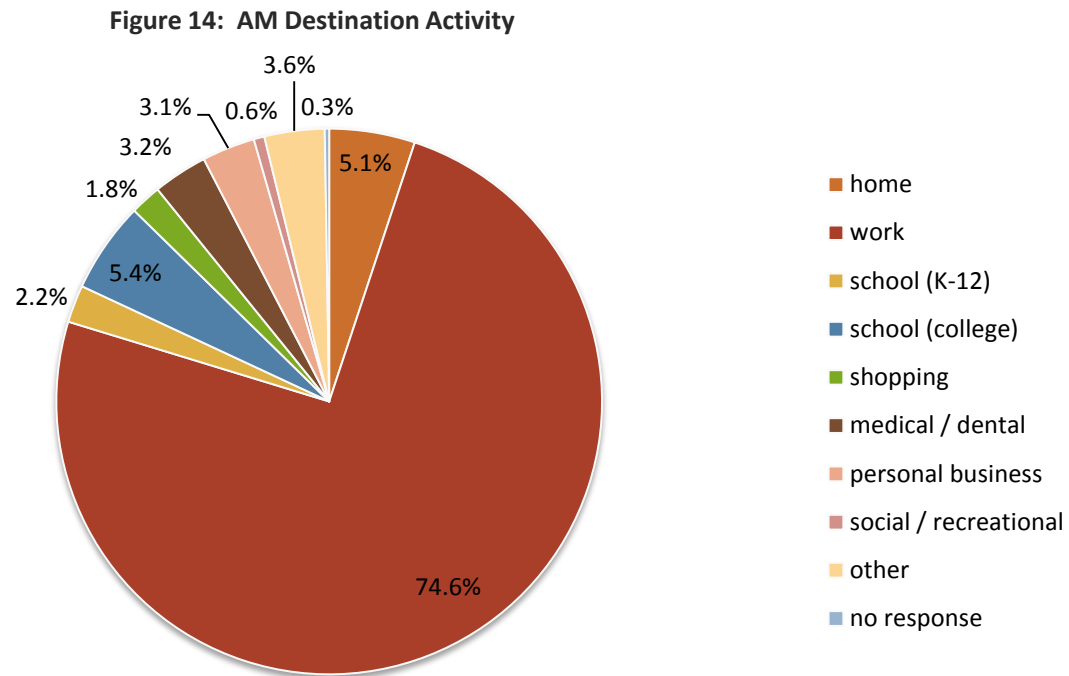
Bike to	Mean Distance	Median Distance
Bus	0.34	0.24
Rail	0.68	0.62

Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 3: Where are you going?

Table 14: AM Destination Activity

Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
5.1%	74.6%	2.2%	5.4%	1.8%	3.2%	3.1%	0.6%	3.6%	0.3%	100%

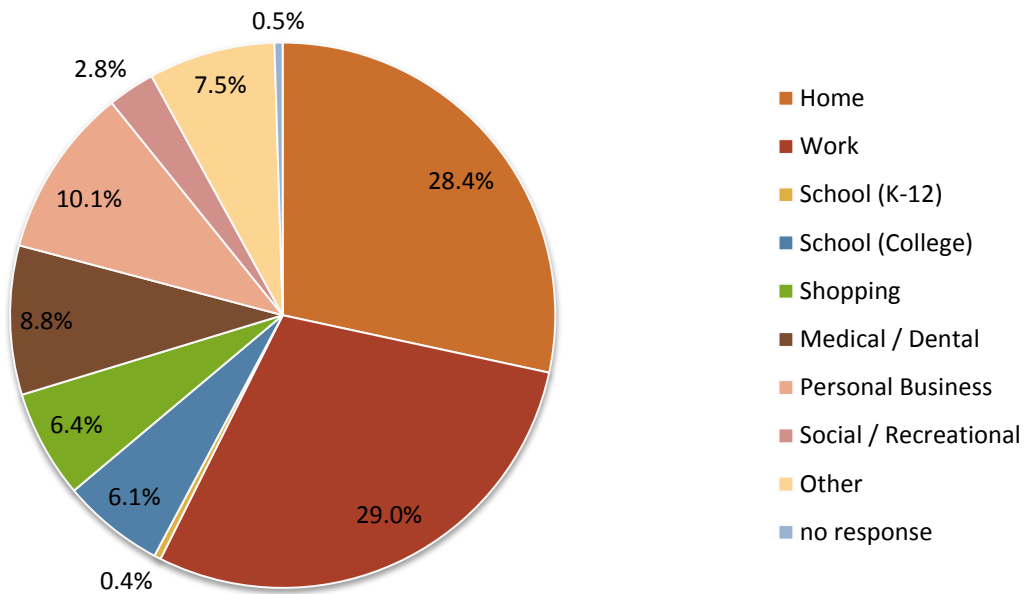


Source: Delaware Valley Regional Planning Commission, 2014

Table 15: Midday Destination Activity

Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
28.4%	29.0%	0.4%	6.1%	6.4%	8.8%	10.1%	2.8%	7.5%	0.5%	100%

Figure 15: Midday Destination Activity

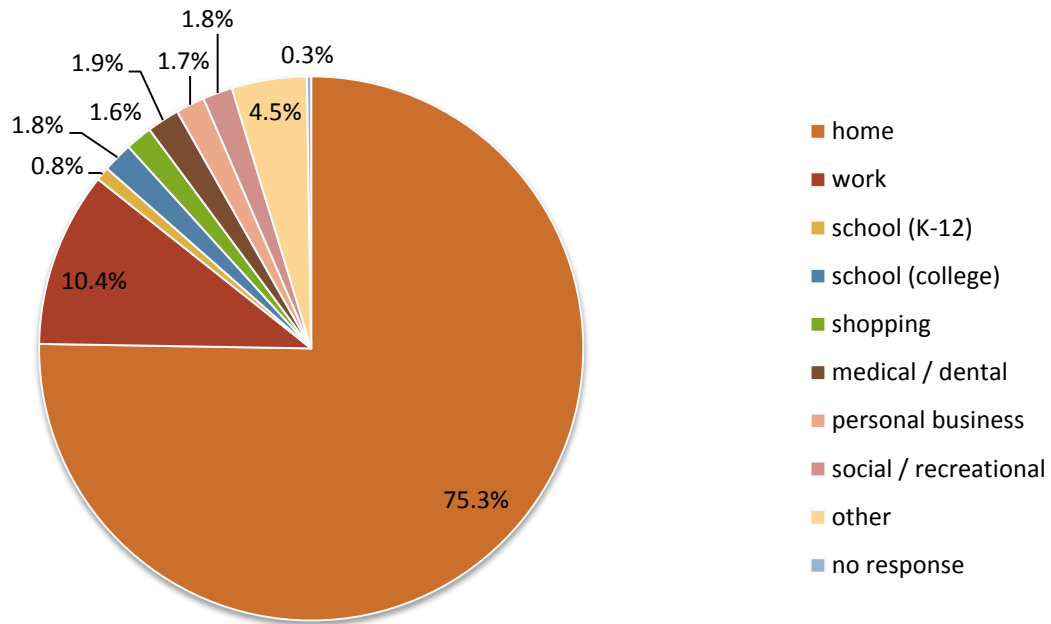


Source: Delaware Valley Regional Planning Commission, 2014

Table 16: PM Destination Activity

Home	Work	School (K-12)	School (College)	Shopping	Medical / Dental	Personal Business	Social / Recreational	Other	No Response	Total
75.3%	10.4%	0.8%	1.8%	1.6%	1.9%	1.7%	1.8%	4.5%	0.3%	100%

Figure 16: PM Destination Activity



Source: Delaware Valley Regional Planning Commission, 2014

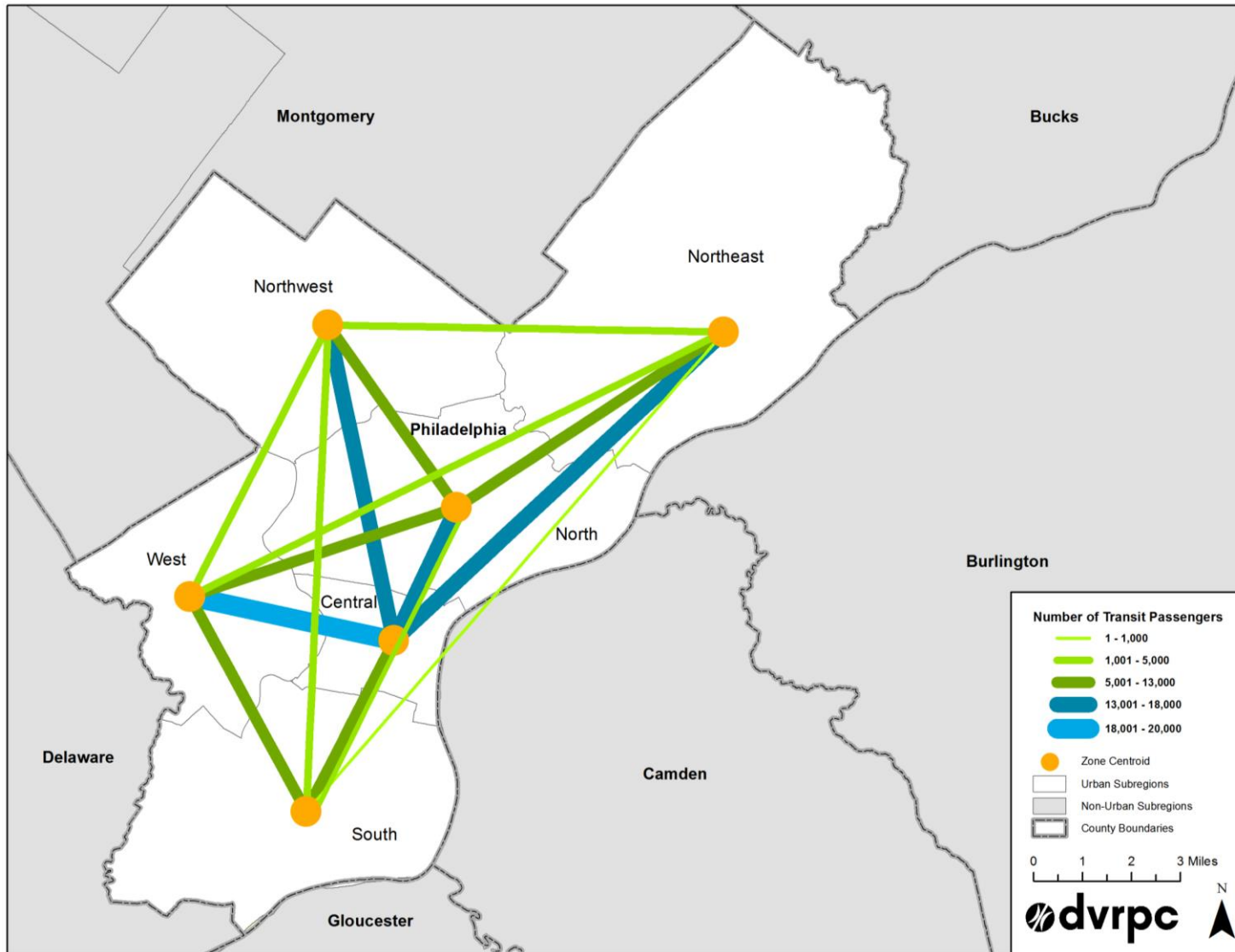
Figure 17: Origin-Destination Flows: Suburban - Urban (AM Peak)



Source: Delaware Valley Regional Planning Commission, 2014

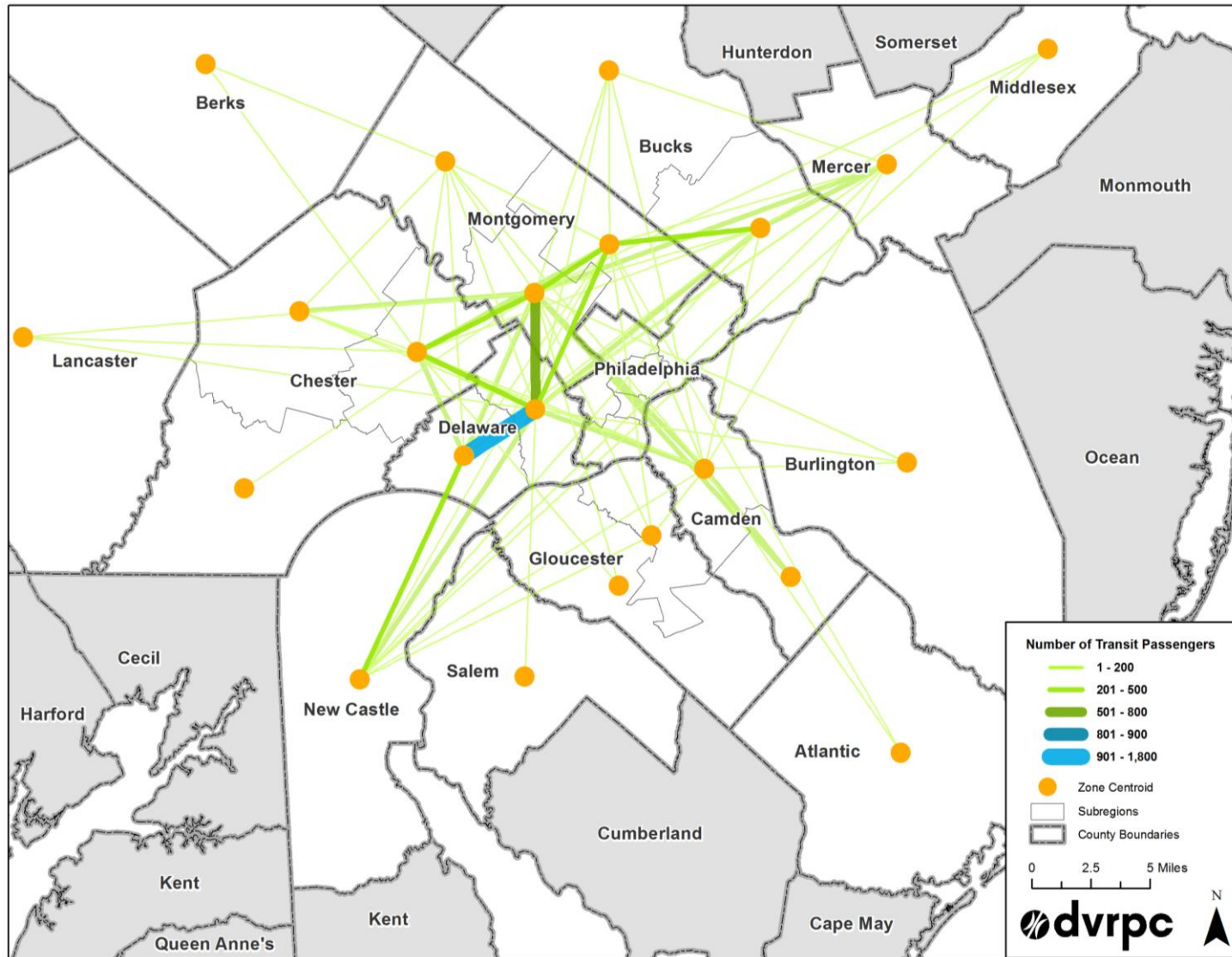
Note: Does not include New Jersey Transit trips

Figure 18: Origin-Destination Flows: Philadelphia Urban Area (AM Peak)



Source: Delaware Valley Regional Planning Commission, 2014

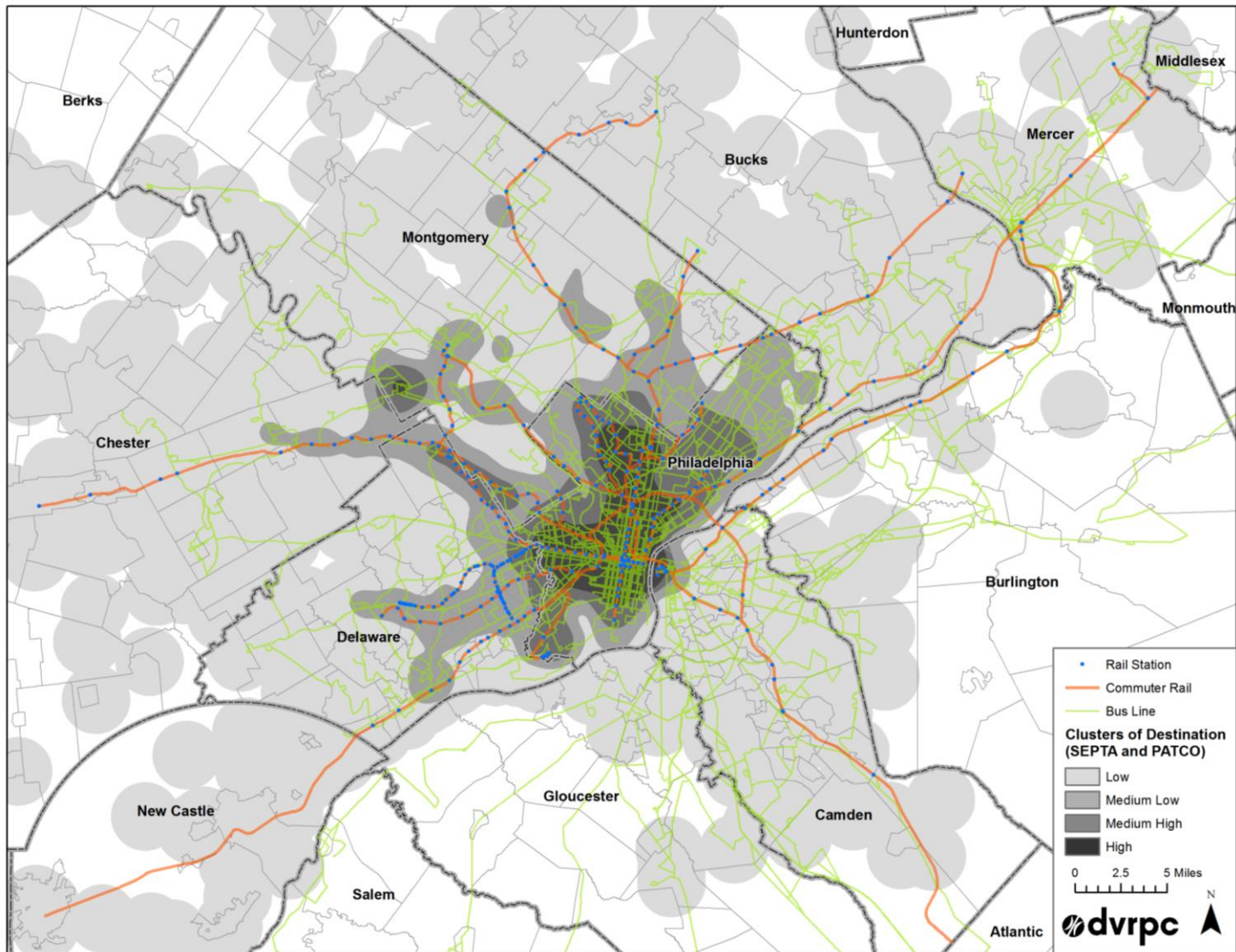
Figure 19: Origin-Destination Flows: Non-Urban Area (AM Peak)



Source: Delaware Valley Regional Planning Commission, 2014

Note: Does not include any New Jersey Transit trips.

Figure 20: Density of Transit Rider Destinations (Daily)



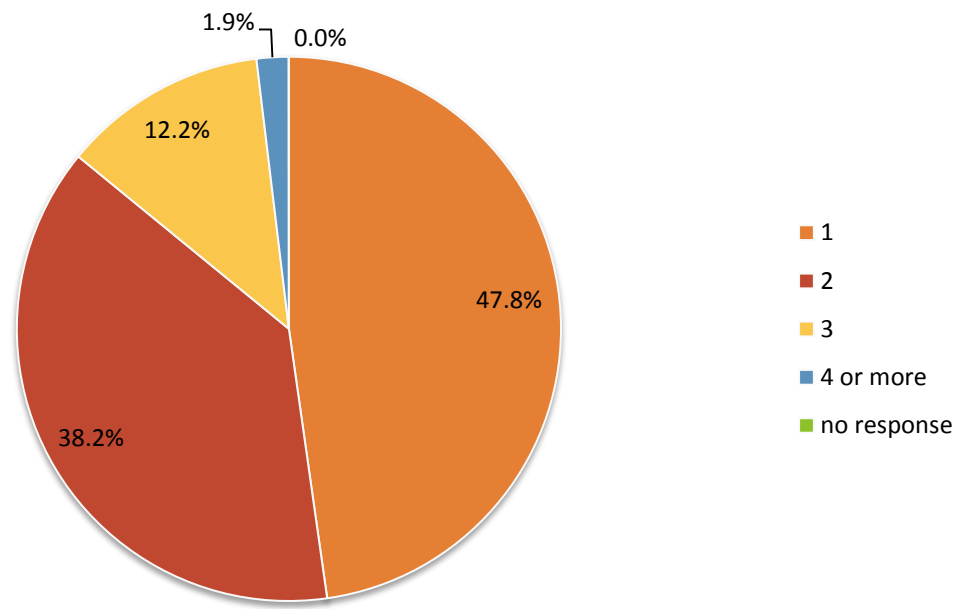
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 4: How many buses or trains will you use for this trip?

Table 17: AM Number of Buses / Trains

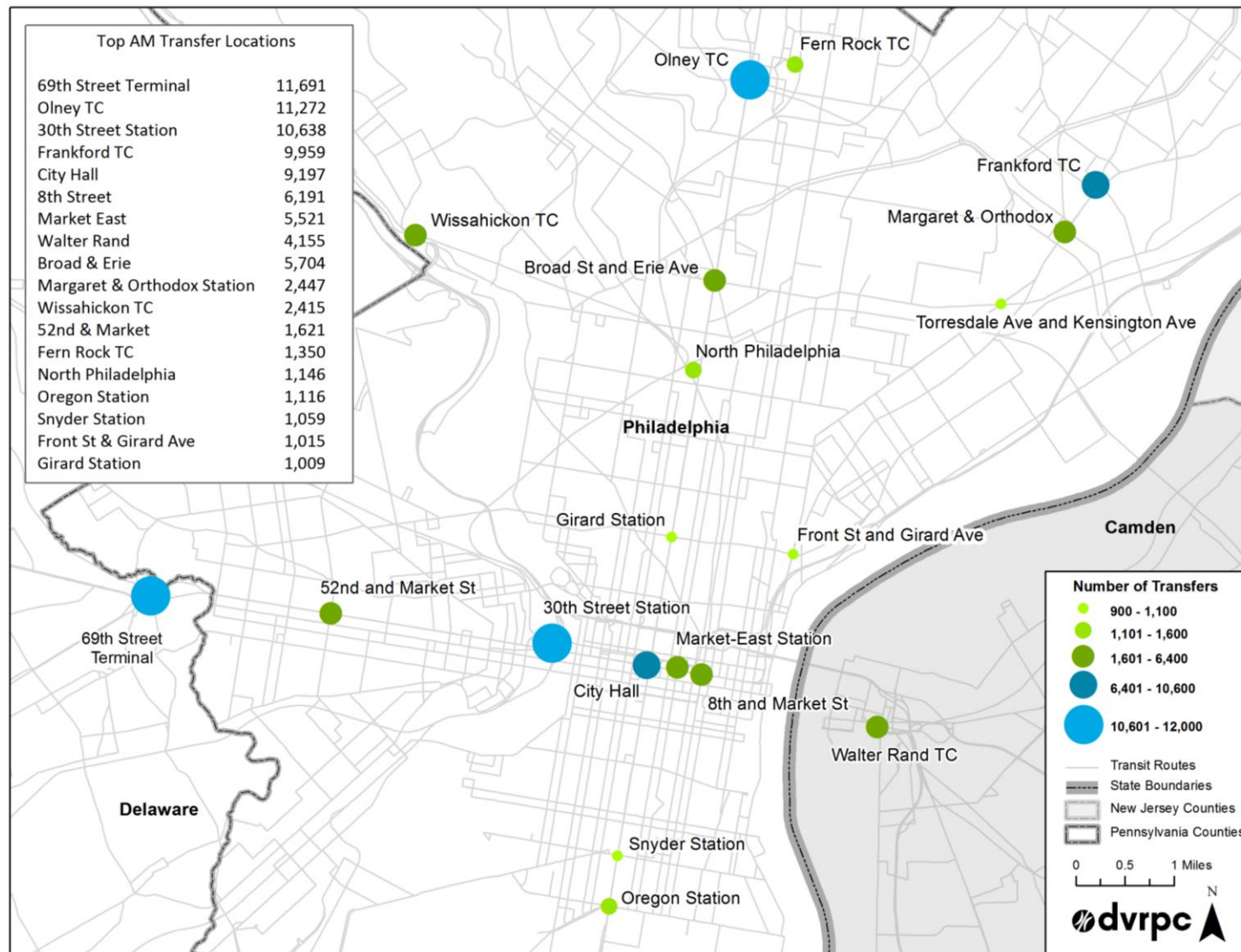
One	Two (e.g., 1 Transfer)	Three (2 Transfers)	Four or More (3+ Transfers)	No Response	Total
47.8%	38.2%	12.2%	1.9%	0.0%	100%

Figure 21: AM Number of Buses / Trains



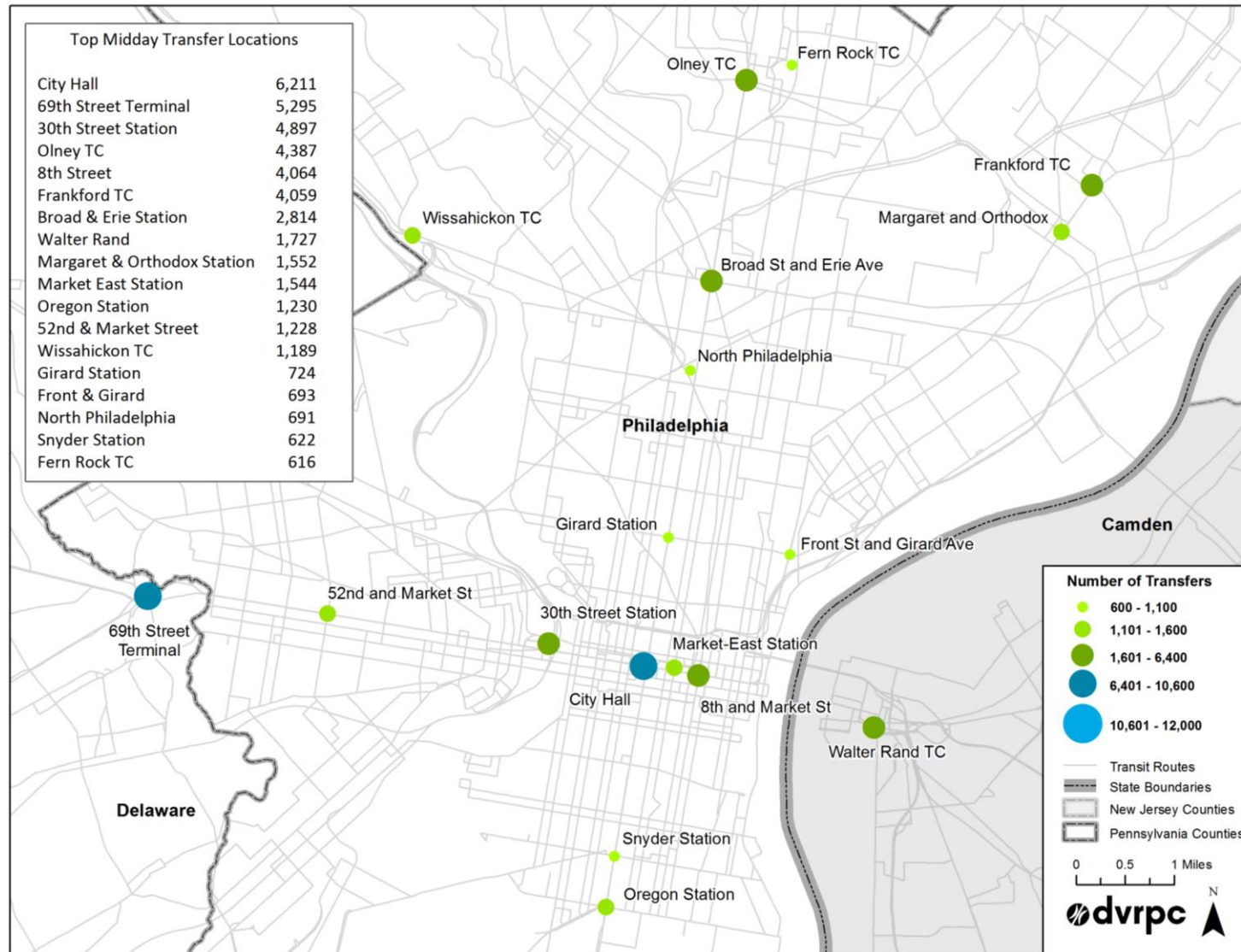
Source: Delaware Valley Regional Planning Commission, 2014

Figure 22: AM Transfer Locations



Source: Delaware Valley Regional Planning Commission, 2014

Figure 23: Midday Transfer Locations

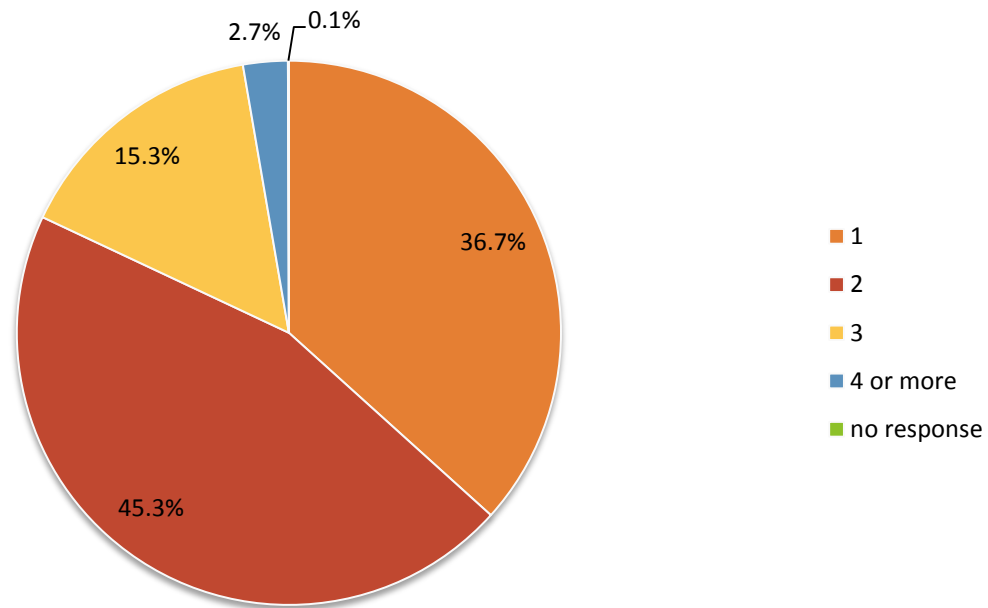


Source: Delaware Valley Regional Planning Commission, 2014

Table 18: Midday Number of Buses / Trains

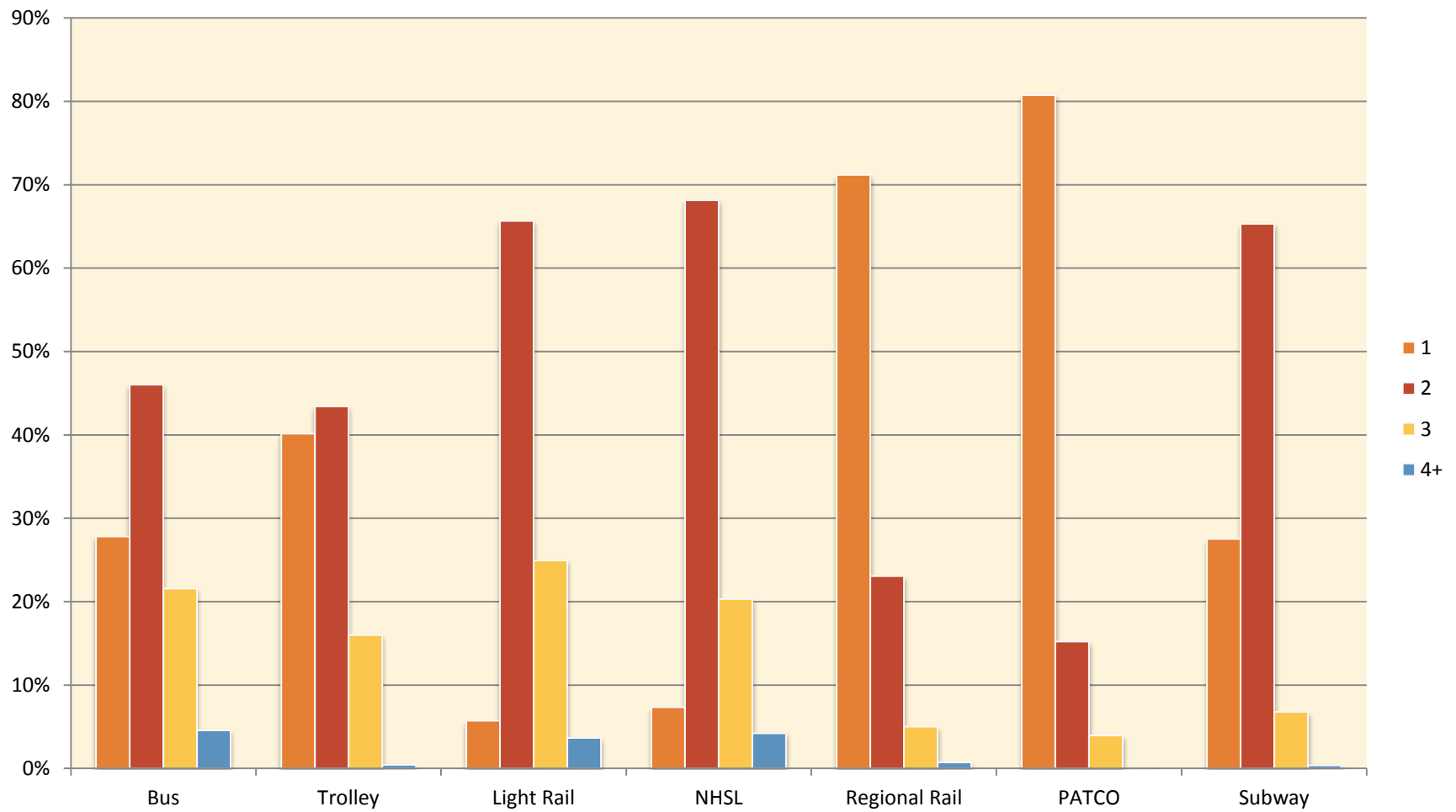
One	Two (e.g., 1 Transfer)	Three (2 Transfers)	Four or More (3+ Transfers)	No Response	Total
36.7%	45.3%	15.3%	2.7%	0.1%	100%

Figure 24: Midday Number of Buses / Trains



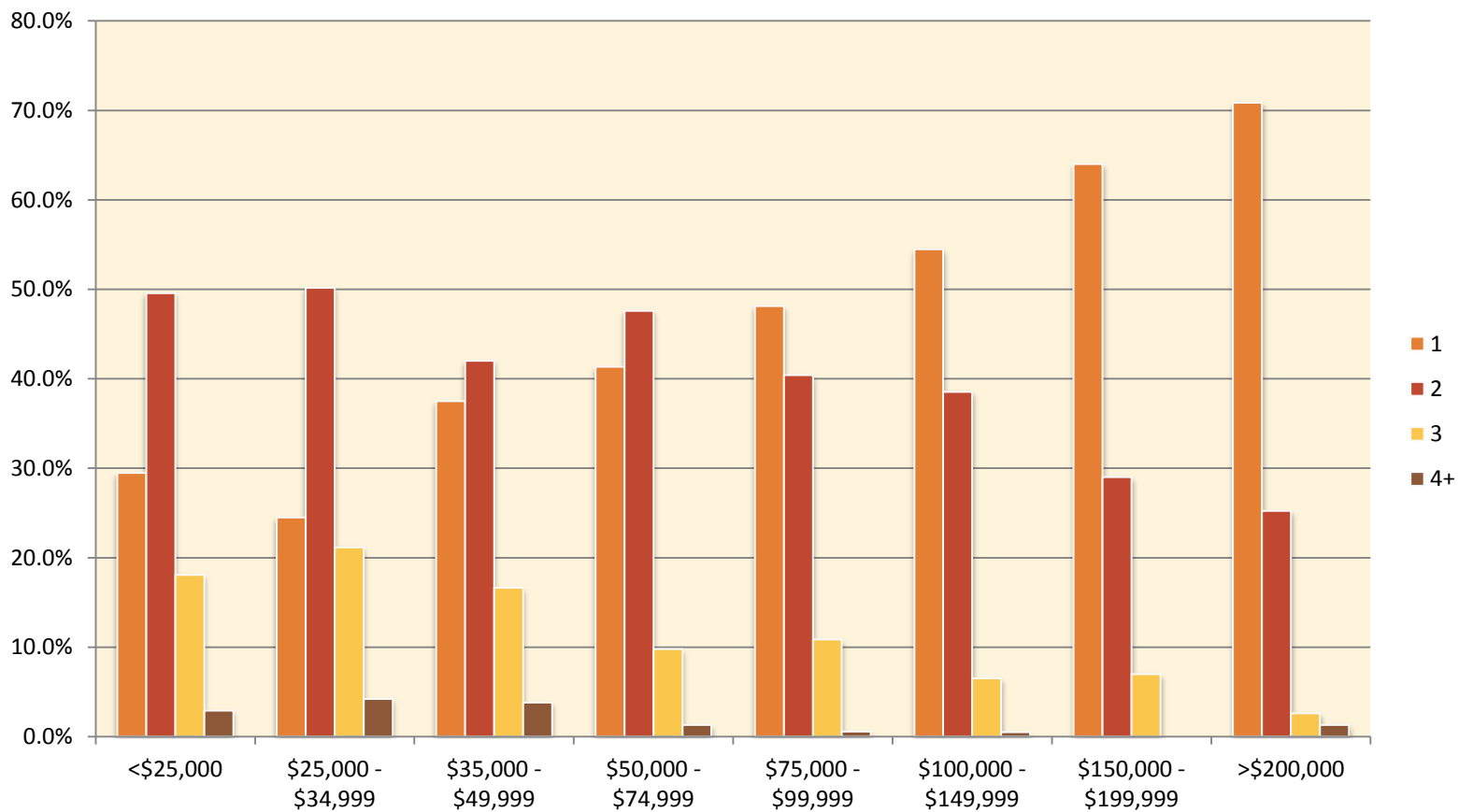
Source: Delaware Valley Regional Planning Commission, 2014

Figure 25: Number of Buses / Trains Used for Trip by First Mode (Daily)



Source: Delaware Valley Regional Planning Commission, 2014

Figure 26: Number of Buses / Trains Used for Trip by Household Income (Daily)

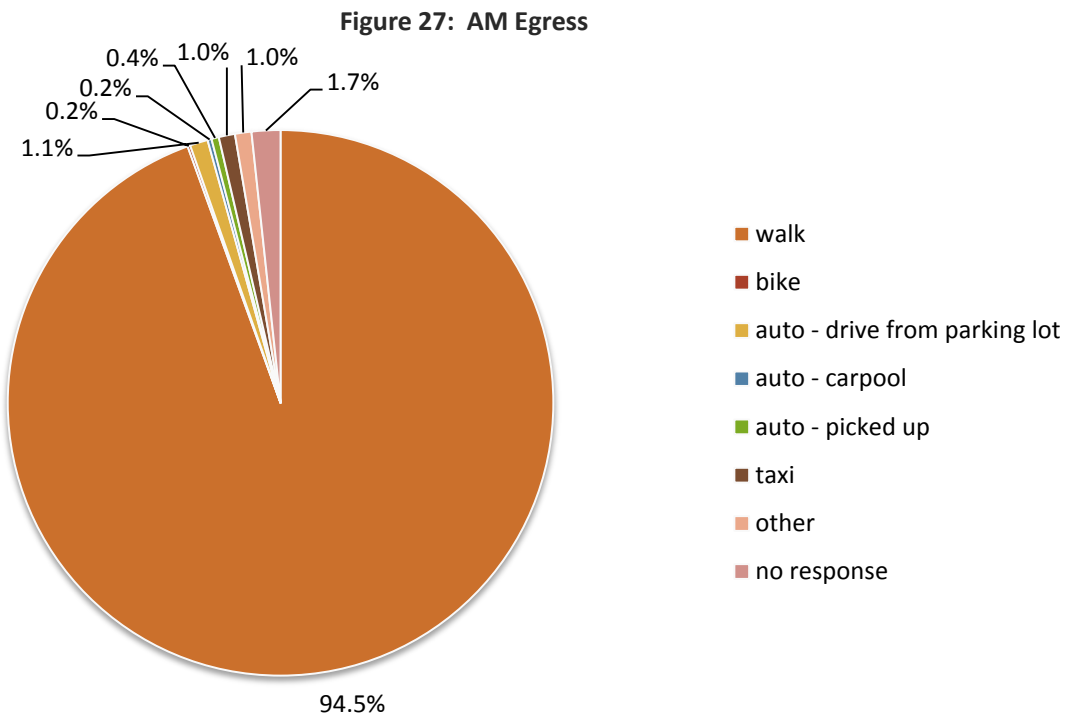


Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 5: How will you get to your final destination?

Table 19: AM Egress

Walk	Bicycle	Auto – drive from parking lot	Auto - Carpool	Auto - Picked Up	Taxi	Other	No Response	Total
94.5%	0.2%	1.1%	0.2%	0.4%	1.0%	1.0%	1.7%	100%

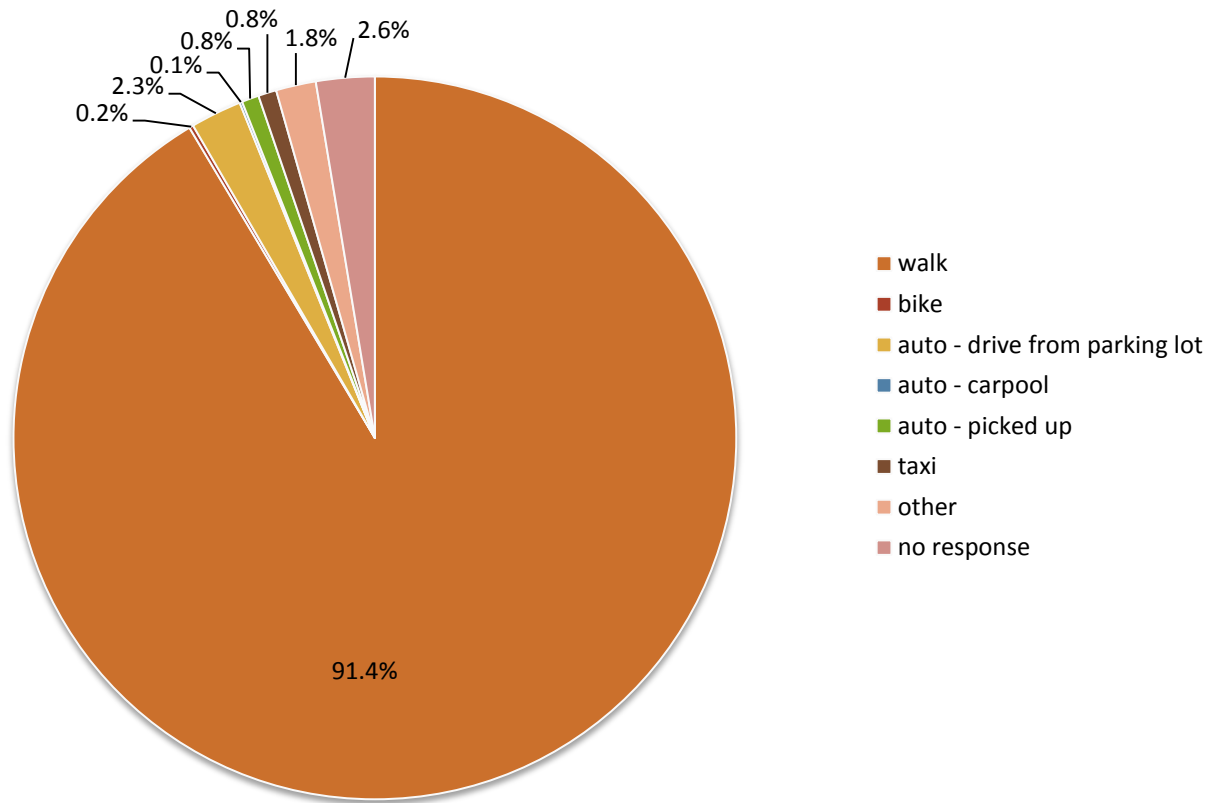


Source: Delaware Valley Regional Planning Commission, 2014

Table 20: Midday Egress

Walk	Bicycle	Auto – drive from parking lot	Auto - Carpool	Auto - Picked Up	Taxi	Other	No Response	Total
91.4%	0.2%	2.3%	0.1%	0.8%	0.8%	1.8%	2.6%	100%

Figure 28: Midday Egress

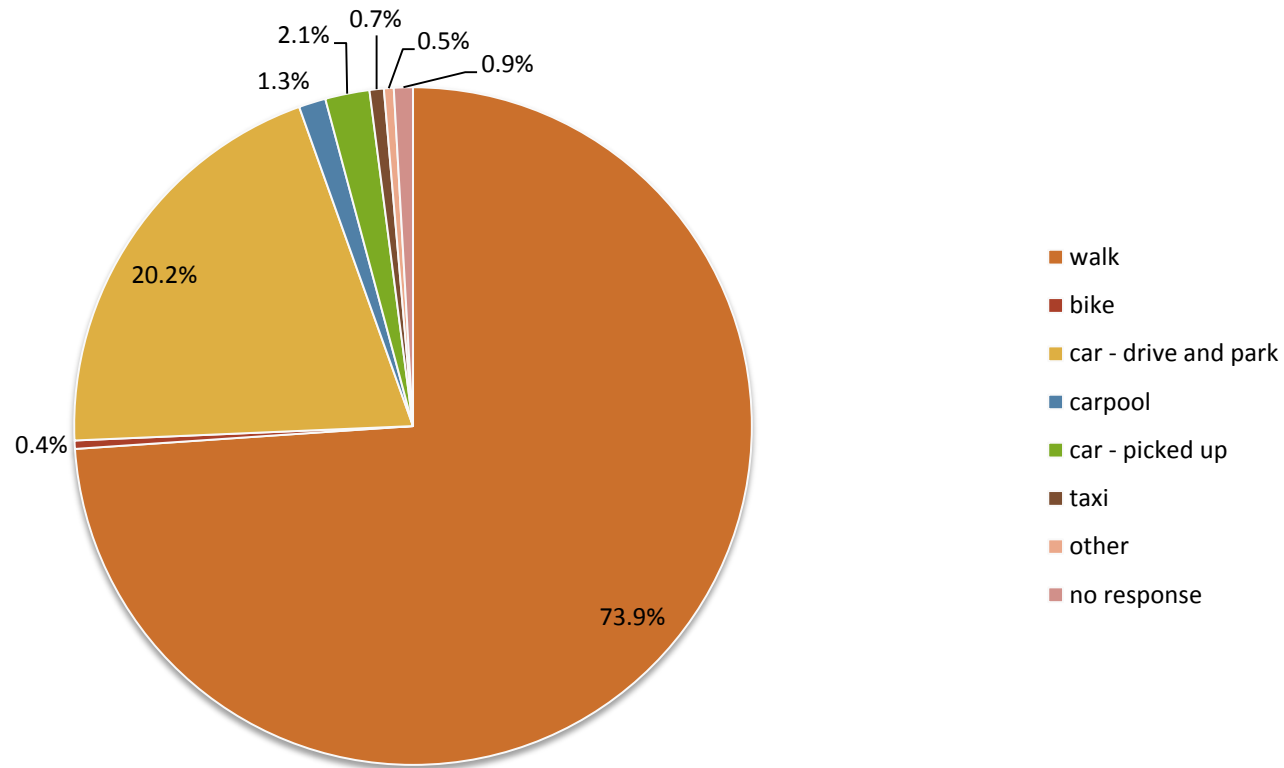


Source: Delaware Valley Regional Planning Commission, 2014

Table 21: PM Egress

Walk	Bicycle	Auto – drive from parking lot	Auto - Carpool	Auto - Picked Up	Taxi	Other	No Response	Total
73.9%	0.4%	20.2%	1.3%	2.1%	0.7%	0.5%	0.9%	100%

Figure 29: PM Egress



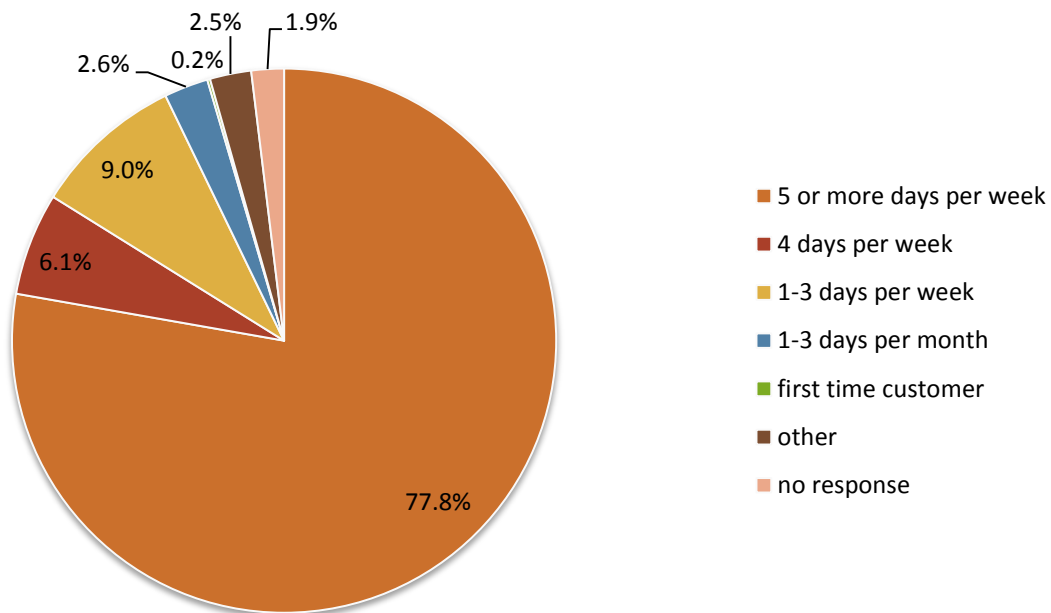
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 6: How frequently do you ride?

Table 22: Trip Frequency

First time using transit	1-3 days per month	1-3 days per week	4 days per week	5+ days per week	Other	No Response	Total
0.2%	2.6%	9.0%	6.1%	77.8%	2.5%	1.9%	100%

Figure 30: Trip Frequency



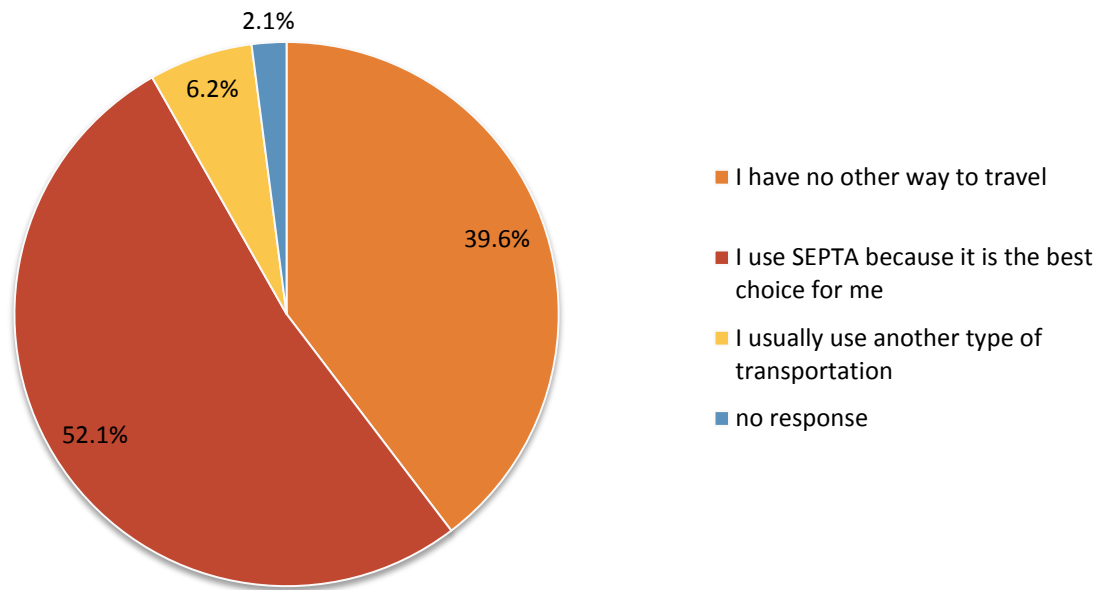
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 7: Do you have other travel options?

Table 23: Alternative Travel Mode

I have no other way to travel	I usually use another type of transportation, but I occasionally take SEPTA	I use SEPTA because it is the best choice	No Response	Total
39.6%	6.2%	52.1%	2.1%	100%

Figure 31: Alternative Travel Mode



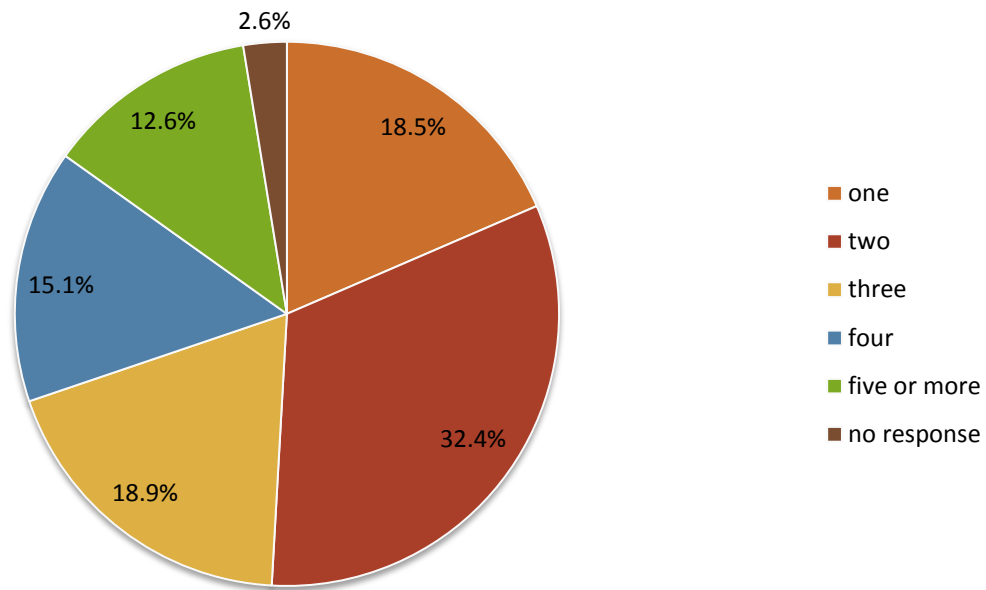
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 8: How many people, including yourself, live in your household?

Table 24: Household Size

One	Two	Three	Four	Five or more	No Response	Total
18.5%	32.4%	18.9%	15.1%	12.6%	2.6%	100%

Figure 32: Household Size



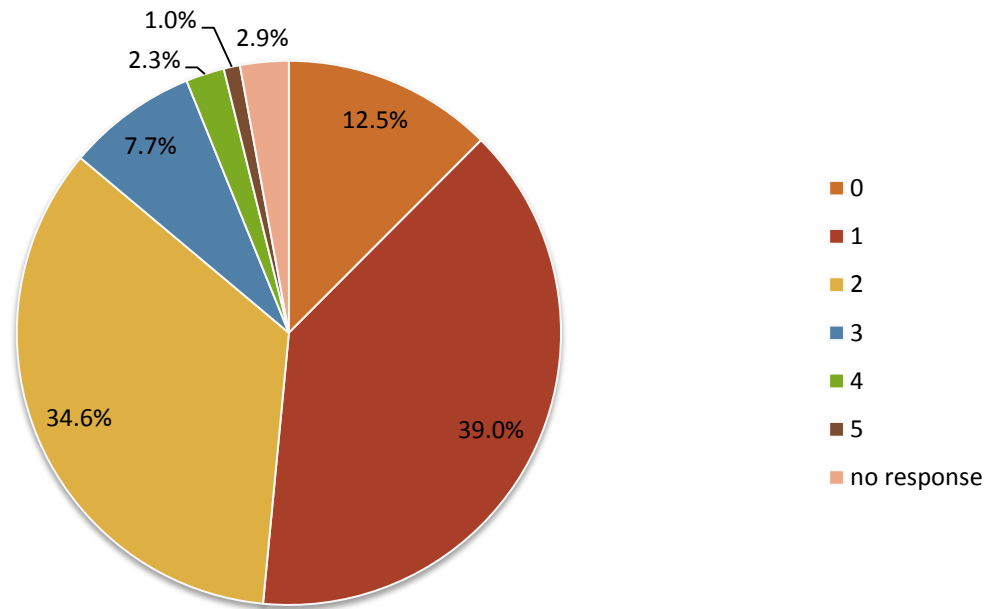
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 9: How many people in your household are currently employed?

Table 25: Household Employees

None	One	Two	Three	Four	Five or More	No Response	Total
12.5%	39.0%	34.6%	7.7%	2.3%	1.0%	2.9%	100%

Figure 33: Household Employees



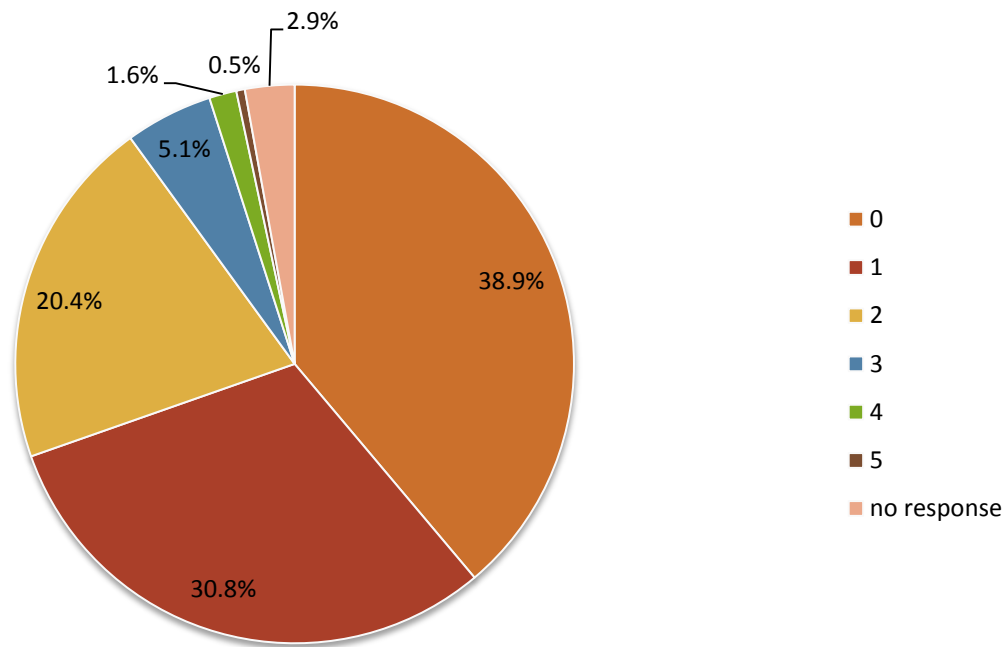
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 10: How many vehicles are available in your household?

Table 26: Household Vehicles

None	One	Two	Three	Four	Five or more	No Response	Total
38.9%	30.8%	20.4%	5.1%	1.6%	0.5%	2.9%	100%

Figure 34: Household Vehicles



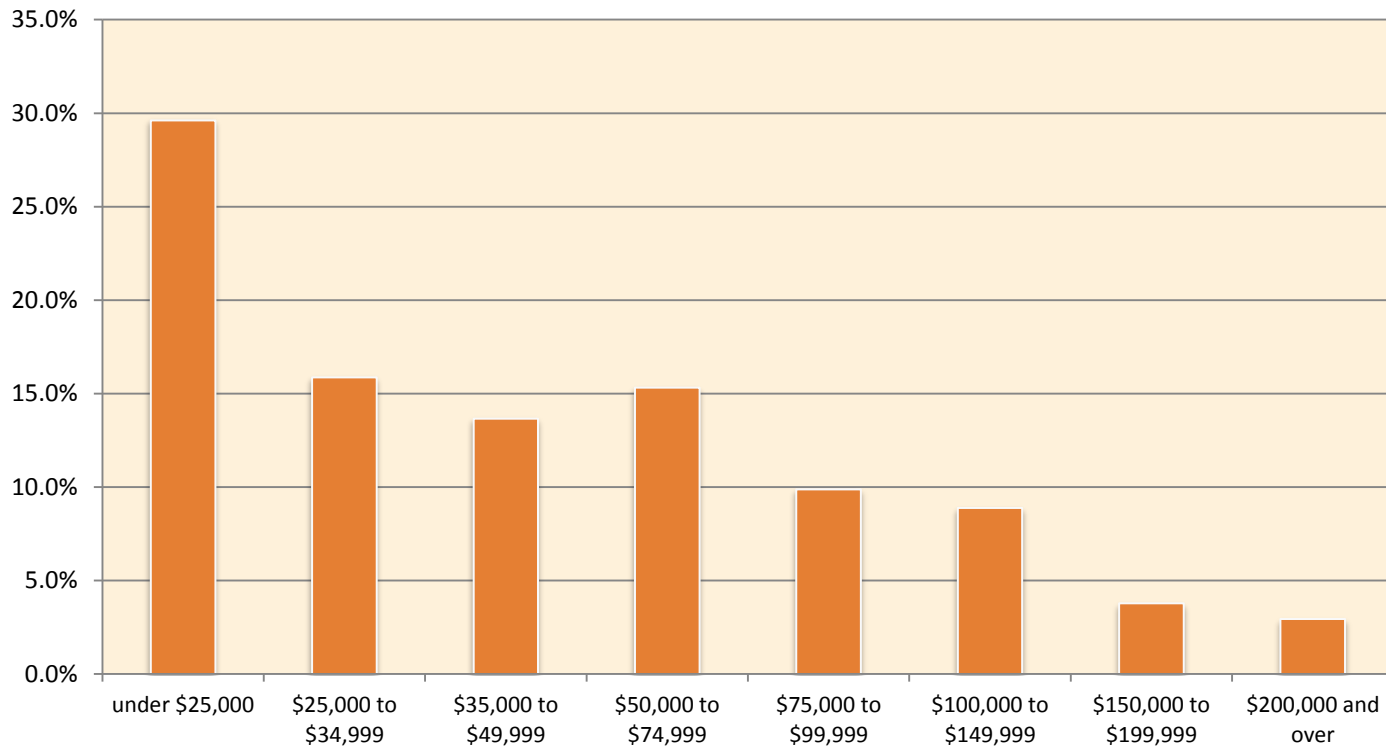
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 11: What is your approximate household income?

Table 27: Household Income

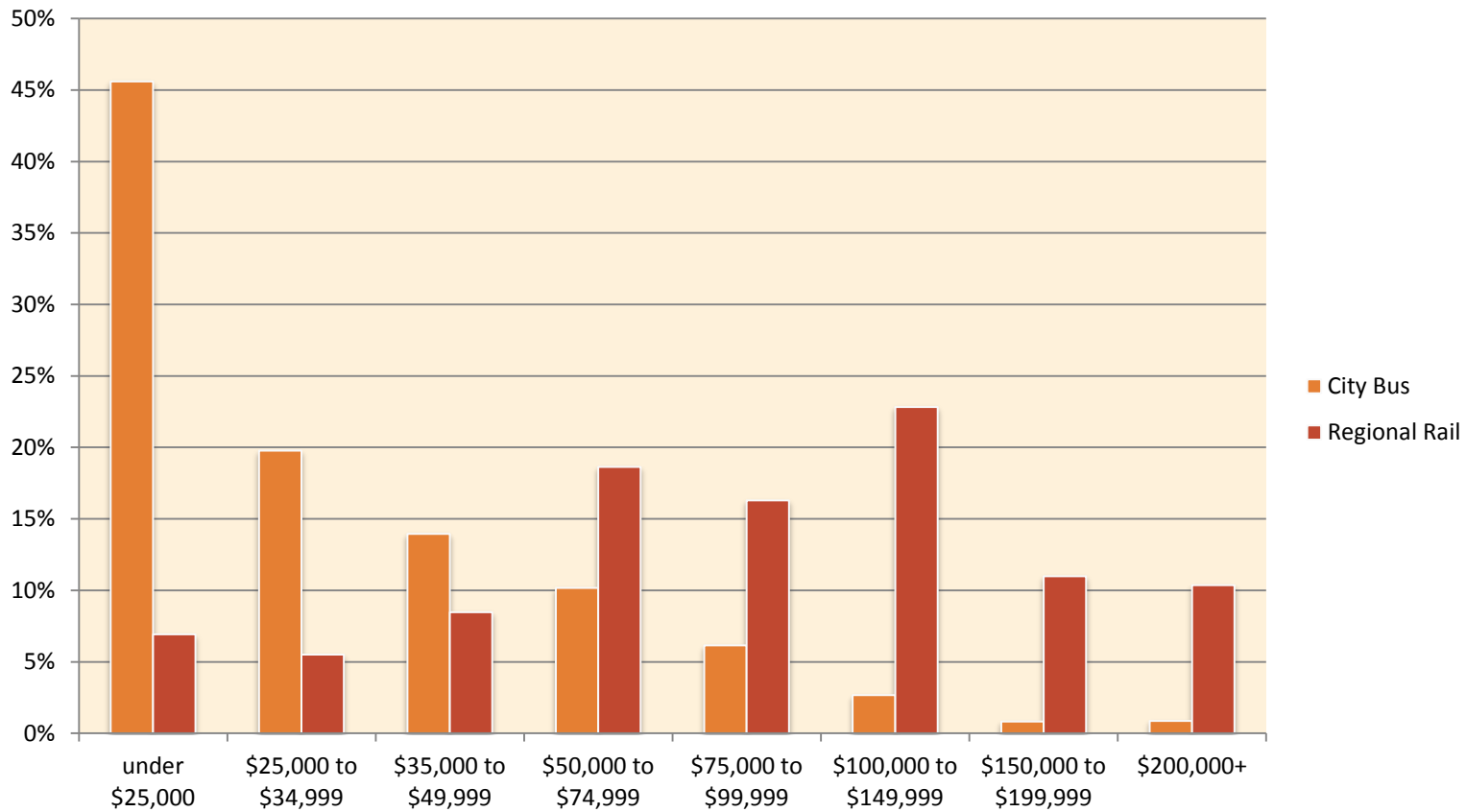
Under \$25,000	\$25,000 - \$34,999	\$35,000- \$49,999	\$50,000- \$74,999	\$75,000- \$99,999	\$100,000- \$149,999	\$150,000- \$199,999	\$200,000 +	No Response	Total
21.3%	11.2%	10.1%	14.6%	10.1%	12.1%	5.5%	4.6%	10.5%	100%
Normalized to account for non-response									
29.6%	15.9%	13.7%	15.3%	9.9%	8.9%	3.8%	2.9%	-----	100%

Figure 35: Household Income



Source: Delaware Valley Regional Planning Commission, 2014

Figure 36: Income Comparison - City Bus Passenger vs. Regional Rail Passenger



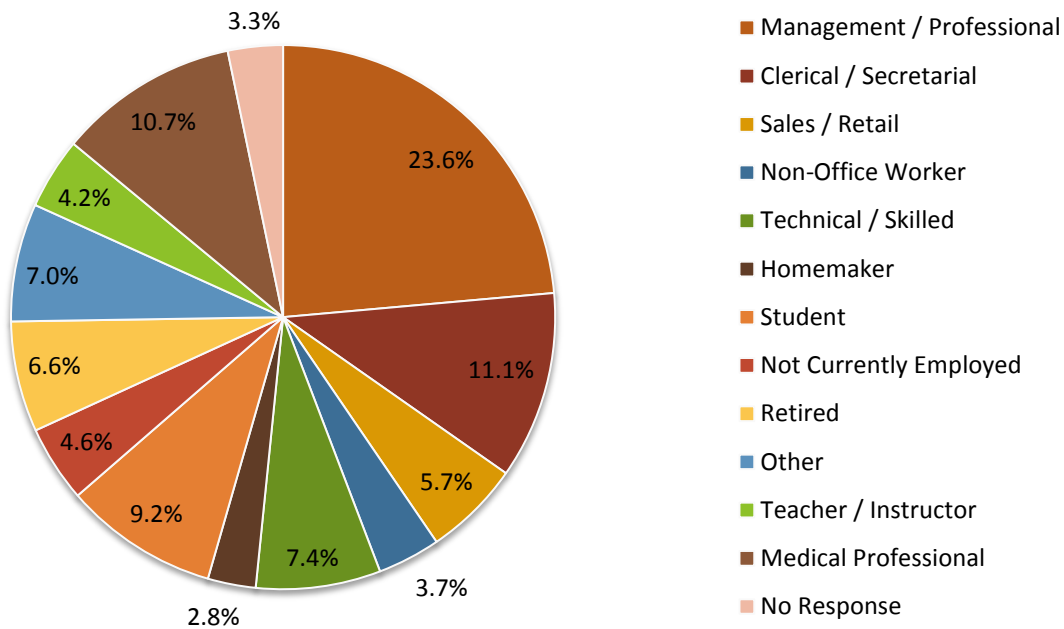
Source: Delaware Valley Regional Planning Commission, 2014

Survey Question 12: What is your occupation?

Table 28: Passenger Occupation

Management / Professional	Clerical / Secretarial	Sales / Retail	Non-Office Worker	Technical / Skilled	Medical Professional	Teacher / Instructor
23.6%	11.1%	5.7%	3.7%	7.4%	10.7%	4.2%
Homemaker	Student	Not Currently Employed	Retired	Other	No Response	Total
2.8%	9.2%	4.6%	6.6%	7.0%	3.3%	100%

Figure 37: Passenger Occupation



Source: Delaware Valley Regional Planning Commission, 2014

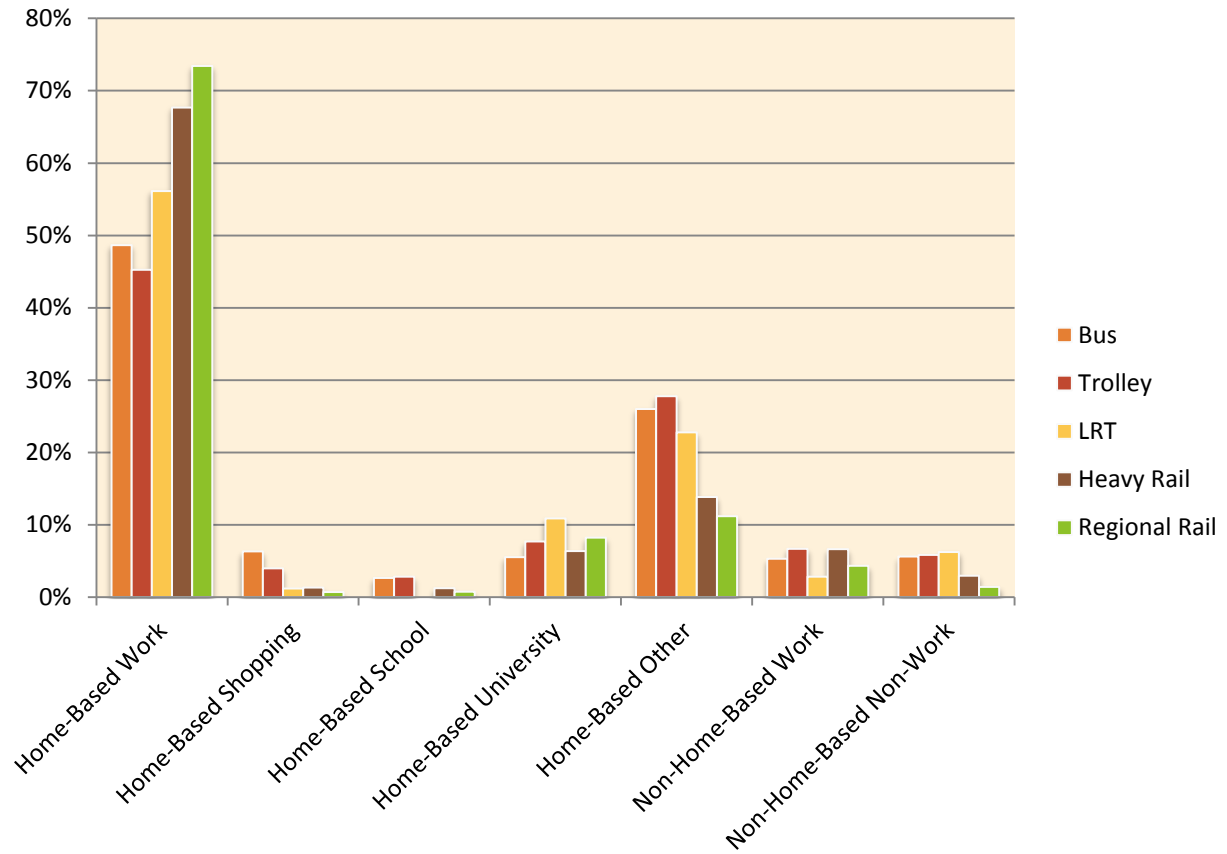
Table 29: Unlinked Trips by Activity and Mode

		SEPTA Bus ¹		SEPTA Trolley ²		SEPTA LRT ³		Heavy Rail ⁴		Regional Rail ⁵		TOTAL	
Activity	Trip Purpose	Trips	Percentage	Trips	Percentage	Trips	Percentage	Trips	Percentage	Trips	Percentage	Trips	Percentage
Work	Home Based Work	246,958	48.6%	40,558	45.3%	3,653	56.1%	242,622	67.7%	89,349	73.4%	623,141	57.5%
Shopping	Home Based Shopping	32,043	6.3%	3,544	4.0%	77	1.2%	4,704	1.3%	850	0.7%	41,217	3.8%
School	Home Based School	13,514	2.7%	2,521	2.8%	0	0.0%	4,481	1.2%	899	0.7%	21,416	2.0%
University	Home Based University	28,058	5.5%	6,870	7.7%	707	10.9%	22,746	6.3%	10,023	8.2%	68,403	6.3%
Other	Home Based Other	132,024	26.0%	24,896	27.8%	1,481	22.8%	49,665	13.9%	13,598	11.2%	221,665	20.4%
Work	Non Home Based Work	26,807	5.3%	5,993	6.7%	184	2.8%	23,725	6.6%	5,271	4.3%	61,979	5.7%
Not Work	Non Home Based Non Work	28,372	5.6%	5,215	5.8%	406	6.2%	10,644	3.0%	1,722	1.4%	46,359	4.3%
TOTAL		507,777	100%	89,597	100%	6,508	100%	358,586	100%	121,713	100%	1,084,181	100%

Source: Delaware Valley Regional Planning Commission, 2014

- Notes:
- 1 = Routes 1, 2, 3, 5, 6, 7, 8, 9, 12, 14, 17 – 33, 35, 37 – 40, 42, 43, 44, 46, 47, 48, 50, 52, 53, 54, 56, 57 – 61, 64 – 68, 70, 71, 73, 75, 77, 79, 84, 88, 89, 90, 95, 97, 98, 103 – 115, 117 – 120, 123 – 131, 150, 201, 204, 206, 310, 314, C, G, H, J, K, L, LUCY, R, XH and 55, 92, 94, 96, 99, 123, 124, 125,132,134, and 139
- 2 = Routes 10, 11, 13, 15, 34, and 36
- 3 = Routes 101, and 102
- 4 = MFL, BSS, and PATCO
- 5 = AIR, CHE, CHW, CYN, DOY / LAN, ELW, FOX, NWK / WIL, NOR, THO / PAO, TRE, WAR, WTR

Figure 38: Trips by Activity and Transit Service



Source: Delaware Valley Regional Planning Commission, 2014

3. Major Findings and Recommendations

The survey results provide a much clearer and up-to-date snapshot of the current users of the public transit system in the Philadelphia urban area. The picture that emerges is of a system that is primarily used to travel to and from work. In the morning, most trips originate at home (Figure 4) and are going to work (Figure 14). In the afternoon, the reverse is true, with most trips originating at work (Figure 6) and going to home (Figure 16). Table 29 and Figure 38 show the same thing, for trips made throughout the entire day (e.g., not just during the morning and afternoon commute times). Approximately 49 percent of all bus trips, 45 percent of trolley trips, 56 percent of LRT trips, 68 percent of heavy rail trips, and 73 percent of regional rail trips are home-based work. Overall, 63 percent of all of the transit trips from the on-board survey are for work (HBW + NHBW).

As shown in Table 30, this is comparable to most other urban areas in the U.S. The APTA study is a compilation from 150 on-board passenger surveys conducted by public transportation agencies from 2000 through 2005.

Table 30: Other Cities Activity

City	Work	School	Shop	Medical
Atlanta ⁷	44.7%	16.1%	7.1%	4.1%
Baltimore ⁸	60.2%	3.9%	4.2%	NA
Philadelphia	63.2%	8.3%	3.8%	
APTA ⁹	59.2%	10.6%	8.5%	3.0%

Source: Delaware Valley Regional Planning Commission, 2014

Note: Only reported statistics for common purposes / activities, therefore rows do not sum to 100%

Figures 7 and 20 illustrate the geographic origins and destinations of passenger's trips. Figure 7 shows where passengers are coming from while Figure 20 shows where passengers are going to. The origins show that many trips start from within the urban area, where there is the highest concentration of transit service. But it also shows the pockets of activity spread throughout the region along the regional rail lines. For example, the high concentration of origins in Camden County using the PATCO line is clearly visible, as well as the concentration in Lansdale along the Doylestown regional rail line.

Given that the data is slanted toward the AM Peak, when people are primarily traveling to work, Figure 20 shows that most transit trips are going to where there are high concentrations of employment. The destinations are focused on the urban area and downtown Philadelphia in particular. There are also employment centers in King of Prussia and in southwest Philadelphia, in and around the airport area that receive a fair number of transit trips.

Figures 17, 18, and 19 also show passenger origins and destinations, in a slightly different format. The figures are desire lines diagrams, that use color and line thickness to denote the number of passengers traveling between the different sub-regions during the AM Peak. Figure 18 shows the passenger flows

⁷ Atlanta Regional Commission (ARC). *Regional On-Board Transit Survey, Final Report*. June 2010.

⁸ Baltimore Metropolitan Council (BMC). *2007 On-board Transit Survey*. June 2010.

⁹ American Public Transportation Association (APTA). *A Profile of Public Transportation Passenger Demographics and Travel Characteristics Reported in On-Board Surveys*. May 2007

within the Philadelphia urban area. The major passenger flows occur between the close-in neighborhoods and Center City; for example, between the West Philadelphia / University City area and Center City, and between North Philadelphia and Center City. Figure 17 shows the flows between the suburban and urban areas, and Figure 19 shows the non-urban flows, between suburban and rural areas.

In terms of how passengers get to and from the bus stop or train station, on the origin end of trips, passengers primarily access the system by walking (Figures 8 and 9). Auto (park and ride, kiss and ride, or carpool) is the second most used access mode. This is especially true during the AM Peak (Figure 8) when approximately 25 percent of passengers drive to a park and ride lot. On the destination end of the trip, passengers mainly walk (Figures 27, 28, and 29) from their last stop to their final destination.

Of interest, as shown in Figure 10, passengers appear willing to walk a little further to a rail terminal station than they are to a bus terminal station, although, the difference is only a few extra tenths of a mile. Virtually no passengers are willing to walk beyond 0.8 miles to catch a bus or train. Figure 12 shows the same information for passengers who bicycle to a terminal station. Although for a much smaller number of people, as expected, the average distance for the bicyclists is two to three times greater than the corresponding pedestrian distance. Figures 11 and 13 show the same information for non-terminal stations. The data suggests that passengers are willing to walk and bike further to a terminal station, than they are to an intermediate station. This reflects the fact that passengers living closer in, tend to have more transit options (and don't need to walk as far to catch a bus or train) than passengers living at the periphery of the transit system.

In terms of the number of buses or trains needed to complete a trip, during the AM Peak (Figure 21) close to 50 percent of passengers are able to complete their trip using a single bus or train. For those who do need to make a transfer, the major transfer locations during the AM Peak (Figure 22) are 69th Street Station, Olney Transportation Center, 30th Street Station, Frankford Transportation Center, City Hall, 8th Street Station, Market East / 11th Street Station, and Walter Rand in Camden. But during the midday (Figure 24), the percentage of trips made using a single bus or train drops to 37 percent, and most passengers need to make a transfer.

Figure 25 shows how the number of transfers varies by the type of service that is used. For example, of the passengers who first board a light rail train only about six percent are able to stay on that train all the way to their destination. About 66 percent need to make one transfer to complete their trip, 25 percent need to make two transfers, and four percent need to make three or more transfers. In contrast, for passengers who first board regional rail or PATCO, 70 to 80 percent are able to complete their trip without needing to transfer. This suggests that the light rail service is predominantly used as a feeder to other bus and rail routes.

Figure 26 shows how the number of transfers varies by the income of the passenger. As income increases, the percentage of passengers making a transfer declines. For example, for people in households with incomes between \$25,000 and \$49,999, only 24.5 percent are able to complete their journeys using a single bus or train. But for people from households earning over \$200,000, 71 percent are able to make the trip with a single bus or train.

Most passengers are heavily reliant on the public transit system and use it five or more days per week (Figure 30). This corresponds with passengers' response to the question about the availability of other travel options (Figure 31). Most people are either using public transit because they do not have any

other options (40 percent) available, or because they have other options, but consider transit to be the best way to travel between their origin and destination (52 percent).

The household data for the transit users indicates an average of approximately 2.7 people per household (Figure 32). This number is close to data from the Census Bureau, which reports an average of 2.5 people per household for the City of Philadelphia¹⁰. In terms of employment status (Figure 33) most households report having one or two people who are currently employed. However, there are a significant percentage of households (12.5 percent) with no members who are working. When the survey was taken in 2011, the unemployment rate in the Philadelphia urban area was 8.6 percent¹¹.

Survey questions 7 (travel options) and 10 (number of vehicles in HH) are linked, and the responses from passengers to these two questions agree. For example, about 40 percent report having no vehicle (question 10), and having no other way to travel (question 7). Also, the percentage of households that have vehicles (58.4 percent) from question 10 matches the percentage of “choice” riders (58.3 percent) from question 7. This is a good check of the consistency of the data.

Passengers can be reluctant to divulge their income and, because of this, non-response was highest for question 11 (10.5 percent). The data was normalized to account for the non-response (Table 27 and Figure 35). The greatest percentage of respondents (29.6 percent) reports a household income of less than \$25,000 per year. However, a significant percentage of passenger households were also from the higher end of the income spectrum. The median household income for all survey respondents falls in the \$35,000 to \$49,999 range, and the mean is approximately \$59,835. Table 31 shows the corresponding median and mean income values from the U.S. Census Bureau for the nine counties that make up the DVRPC region.

Table 31: Household Income for the DVRPC Region

County	Median HH Income ¹²	Mean HH Income
Burlington County, NJ	\$78,229	\$97,154
Gloucester County, NJ	\$74,915	\$88,568
Camden County, NJ	\$62,320	\$80,897
Mercer County, NJ	\$73,759	\$101,981
Philadelphia County, PA	\$37,016	\$53,344
Bucks County, PA	\$76,859	\$98,840
Chester County, PA	\$86,184	\$113,161
Delaware County, PA	\$64,242	\$87,442
Montgomery County, PA	\$78,984	\$105,501

Source: 2008-2012 American Community Survey 5-Year Estimates, United States Census Bureau

¹⁰ United States Census Bureau. *County and City Data Book: 2007*. Table cc07_tabD3.xls.
<http://www.census.gov/statab/ccdb/ccdbcityplace.html>

¹¹ Bureau of Labor Statistics. 2011 Annual Unemployment Rate for the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Metropolitan Statistical Area.
http://data.bls.gov/timeseries/LAUMT423798000000003?data_tool=XGtable

¹² United States Census Bureau. *2008-2012 American Community Survey 5-Year Estimates*.
http://factfinder2.census.gov/faces/nav/jsf/pages/community_facts.xhtml

When compared to the data in Table 31, the survey data seems to reflect the high number of passengers who live within the more urban (e.g., Philadelphia County), as opposed to the suburban, part of the Region. The more outlying, suburban counties all have much higher median and mean HH incomes, than both Philadelphia County and the survey respondents.

The responses to several of the survey questions suggest several distinct populations of users, based on the geographic location of trip origins, household incomes, the times during the day they are using transit, and their trip purposes. For example, comparing the income of city bus passengers with the passengers riding regional rail, points out the income disparity between the urbanized area and the suburbs. The median income for city bus passengers falls in the \$25,000 to \$34,999 category, while the median for regional rail passengers falls in the \$75,000 to \$99,999 category.

As far as recommendations:

- This is a rich data source that should be shared with other interested members of the community. To that end, DVRPC has created a public version of the Access database (with any identifying information, like home address removed) that can be downloaded from its website.
- In terms of how data is collected in the future -
The recommendation would be to take advantage of coming advances in data collection methods. In particular, SEPTA is in process of transitioning to electronic fare payment. The new fare cards will record the time and the station or bus stop where a passenger boards, and the time and location where they get off the bus, or leave the station. The new system represents a huge advance in terms of the quantity of data that will be available. Origin-destination data (such as the number of passengers traveling between any two stops) will now be available for any day of the year.

It also represents a huge advance in terms of the accuracy of the data. As shown above in Table 3 above, overall only 13.5 percent of the paper on-board surveys that were handed out were actually returned. With electronic fare payment, data will be collected for every passenger who swipes a payment card.

Another advancement is the use of computer tablets to collect passenger trip and household information. This technology has been tried by several transit agencies¹³, and it has several advantages over paper surveys. The surveyor conducts a one-on-one interview with the passenger, and enters the passenger's responses directly into the database. Also, if the passenger has a question or needs clarification, the surveyor is able to provide immediate assistance. This ensures that the data that is entered is complete and correct. DVRPC is planning on trying this new technology to administer several surveys in 2016.

¹³ Atlanta Regional Council. *2009-2010 Regional On-Board Transit Survey*.
<http://www.atlantaregional.com/transportation/travel-demand-model/on-board-transit-survey>

- Revise questions

Several of the questions on the survey form were confusing or ambiguous. For example, for question 12, it was not really clear which occupations were supposed to check the “non-office worker” category.

With the scheduled introduction of New Payment Technology (NPT) in 2015, it would be useful to inquire whether passengers have switched over to an electronic fare card, and if anyone is still using cash to pay for their trip.

Age of passenger. It appears that age is playing an increasingly important role in terms of where people decide to live and work, and how they choose to travel. Like income, this is a tricky question because many passengers are reluctant to divulge this information. But several other transit agencies have been able to successfully collect it¹⁴.

¹⁴ Indianapolis Public Transportation Corporation (IndyGo). *On-Board Transit Survey*. April 8, 2010. <http://indygo.net/pages/transit-planning>

Appendix A

Appendix A: Survey Questionnaire

If you would like to enter our drawing for free SEPTA rides, please include your name, home address, phone number and e-mail address. All previous questions must be answered.

Name _____
Street Address _____
Borough/Town _____ State _____ Zip Code _____
Contact Phone number: () _____
E-mail address: _____

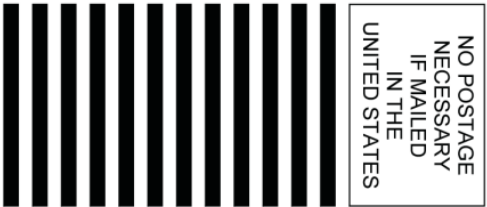
Any additional comments?

Thank you for riding SEPTA and for participating in this survey!



DELAWARE VALLEY REGIONAL PLANNING COMMISSION
190 N INDEPENDENCE MALL WEST 8TH FLR
PHILADELPHIA PA 19106-9833

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 29894 PHILADELPHIA, PA
POSTAGE WILL BE PAID BY ADDRESSEE



Transit Customer Survey
SEPTA wants to serve you better. Please complete this survey and return it to the survey agent. You can also mail it back to us postage paid.
Your personal information will be kept confidential. Fully completed surveys are eligible to win a prize.

For Your Trip Today...

1. Where did you board the Bus or Train you are on now?

_____ *Station OR Stop*

_____ *City* _____ *State* _____ *Zip Code*

2. What time did you board this bus or train today?

: ☐ AM ☐ PM
hour minutes

3. Where are you coming from?

- | | |
|---|--|
| <input type="checkbox"/> Home | <input type="checkbox"/> Shopping |
| <input type="checkbox"/> Work | <input type="checkbox"/> Medical/Dental |
| <input type="checkbox"/> School (K-12 Student Only) | <input type="checkbox"/> Personal Business |
| <input type="checkbox"/> School (Technical/College) | <input type="checkbox"/> Social/Recreational |
| <input type="checkbox"/> Other (Please specify) _____ | |

Number & Street OR Intersection OR Location

City/Town State Zip Code

☐ Home
 ☐ Shopping
☐ Work/Work Related
 ☐ Medical/Dental
☐ School (K-12 Student Only)
 ☐ Personal Business
☐ School (Technical/College)
 ☐ Social/Recreational
☐ Other (Please specify) _____

Number & Street OR Intersection OR Location

City/Town State Zip Code

for example: (your trip may vary)

work > walk > bus > TRANSFER > subway > walk > home

☐ Walk
 ☐ Carpool
☐ Bicycle
 ☐ Car-Drop Off
☐ Car-Drive and park
 ☐ Taxi
☐ Other (Please Specify) _____

1st route	2nd route	3rd route	4th route
_____	_____	_____	_____

1st route	2nd route	3rd route	4th route
47 Bus	Market Frankford El		

☐ Walk ☐ Carpool

☐ Bicycle ☐ Car-Pick Up

☐ Car-Drive and park ☐ Taxi

☐ Other (Please Specify) _____

☐ 5 or more days a week ☐ 1-3 days a month
☐ 4 days a week ☐ First-time customer
☐ 1-3 days a week ☐ Other (Please Specify)

☐ I have no other way to travel

☐ I use SEPTA because it is the best choice for me

☐ I usually use another type of transportation, but I occasionally take SEPTA

☐ Cash
 ☐ Token or single ticket
☐ Transfer
 ☐ Weekly TrailPass/TranPass
☐ Monthly TrailPass/TranPass
 ☐ Cross County Pass
☐ Intermediate Pass
 ☐ Independence Pass
☐ Other (Please Specify) _____

☐ one ☐ two ☐ three ☐ four ☐ five or more

☐ none ☐ one ☐ two ☐ three ☐ four ☐ five or more

☐ none ☐ one ☐ two ☐ three ☐ four ☐ five or more

☐ Under \$25,000 ☐ \$50,000-\$74,999 ☐ \$150,000-\$199,999

☐ \$25,000-\$34,999 ☐ \$75,000-\$99,999 ☐ \$200,000 and over

☐ \$35,000-\$49,999 ☐ \$100,000-\$149,999

☐ Management/Professional ☐ Homemaker
☐ Clerical/Secretarial ☐ Student
☐ Sales/Retail ☐ Not Currently Employed
☐ Non-Office Worker ☐ Retired
☐ Technical/Skilled ☐ Medical Professional
☐ Teacher/Instructor ☐ Other (Please Specify)

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Appendix B

Appendix B: Temporary Worker Training

The temporary workers received several days of training from DVRPC staff. The training was broken up into classroom instruction and field training. The classroom instruction covered topics such as the motivation for the survey, surveyor responsibilities and expectations, and the timeline for the survey. It was explained to the surveyors that the data gathered will be used to help policy makers, planners, engineers, and others make improvements to the public transportation system throughout the DVRPC region.

The importance of gathering good, high-quality data was impressed upon the temporary workers. The sampling plan was explained, and how two to eight people would be assigned to survey each route, depending on how busy the route is and how many people ride it. Every effort was made to make the survey as easy to use as possible, while still gathering all of the needed data. It was explained that the temporary workers would probably have the biggest influence on response rate, and how a friendly professional attitude, and a willingness to help as many passengers fill out the survey as possible was crucial to the success of the survey.

Each surveyor's activity on a given day was governed by an itinerary. The surveyor received Monday through Thursday itineraries a week in advance. The itinerary specified in detail exactly which buses or trolleys the temporary worker was supposed to ride on each day. Each itinerary looked like a SEPTA schedule, with the temporary worker's name on it, and the day he or she were supposed to survey. The itineraries included 30-minute lunch breaks.

In addition to which buses to take, the itinerary also included a distribution list of which surveys to pass out on which bus run. Each survey was individually numbered, and in this way, it would be possible to track where and when the surveys were handed out. For example, the distribution list might instruct the surveyor to pass out surveys numbered 75006 to 75016. If they managed to pass them all out in the first five minutes of the trip, they were instructed to write down that they passed all of them out, and then enjoy the rest of the ride for that particular bus run. If they only managed to pass out 75006 to 75012, they were instructed to write down the last survey passed out (75012) on that particular bus run, and then keep the remaining four surveys.

In terms of dress code, the temporary workers were instructed to look professional. For example, men were instructed to wear a dress shirt and a tie and decent pants – khaki or dress pants. Each surveyor was given a safety vest and a name badge / picture ID to wear, primarily to communicate to passengers that the surveyors were on official business. They were also given an authorization letter from SEPTA in the event that any passengers questioned them.

The classroom instruction also included a short role-playing activity so that the temporary workers could see exactly what they were supposed to do. The instructors played the role of surveyors, and the temporary workers played the role of passengers. The instructors would basically break down, step-by-step, how to administer the survey and handle certain situations. For example, the instructors walked through the following steps:

- Boarding the bus, at the designated stop and time;
- Introducing themselves to the bus driver;

- Making an announcement to any passengers already on the bus, about who they are, and what they are doing;
- Going passenger to passenger, and distributing surveys; and
- Positioning themselves near the front door in order to be able to hand a survey to any new passengers who board the bus.

The temporary workers were prepared for passengers who do not speak English. They were told that they would be given some surveys printed in Spanish, and also given instructions on how to determine if a passenger has limited English and primarily speaks Spanish.

The temporary workers were also given some instructions on how to handle a difficult or disruptive passenger, such as someone who is rude or demands to know why they are handing out surveys. The temporary workers were told that whatever the passenger is upset about probably has nothing to do with the survey and were instructed to be courteous, remain calm, and continue to hand out surveys. In the event a passenger really gets out of hand, they were instructed to notify the driver.

Every Friday, the temporary workers were instructed to go to DVRPC's offices. They were to drop off their completed surveys from that week and pick up their assignments for the next week. They would receive a cover sheet showing each day's task for next week, and four itineraries, one for each survey day. They would receive 4 distribution lists showing which surveys to pass out on which run. They would also pick up the surveys they were supposed to distribute during the following week.

The last phase of training involved a day of training in the field. The temporary workers were led by an experienced DVRPC or SEPTA staff person and actually rode buses and trains and observed the experienced staff person administering the survey. After riding and observing, each temporary worker then took turns handing out surveys on the bus or train under the guidance of the experienced staff person.

Appendix C

Appendix C: How to Correct a SEPTA On-Board Survey

[Instructions given to Temporary Workers]

The goal of correcting on-board surveys is to gather from each survey the passenger's starting location, boarding location, method of travel between starting and boarding locations, transit itinerary (including number of routes taken and route numbers used), and method of travel between where they get off transit and their final destination. Surveys also contain several demographic questions following the critical ones about travel information. Demographic questions help us ensure that service is being offered consistently and fairly throughout the city and across different socioeconomic groups. They are helpful, but not required, in the context of on-board surveys.

The trick is that people rarely read all the instructions on the survey, and when they do, they often misunderstand what is being asked. Be willing to look "outside the box" for the information you need, and be ready to set aside a frustrating survey for a revisit later. When in doubt, avoid making too many assumptions. If you find yourself making more assumptions about a person's trip than is reasonable given the amount of data they provided, discard the survey.

Questions 1 through 10 are all required data for the creation of a usable record; if information is lacking for any one of these questions, the survey will be unusable. Proceed through each question carefully and refer to the instructions below for pointers specific to each question.

Question 1

If question 1 is blank, illegible, or obviously incorrect, questions 8 and 9 should be consulted. Some people write their boarding time with their routing or boarding location. Some people also write their train number in question 8, which could then be cross-referenced with schedules and boarding location to determine the boarding time.

Question 2

If this question is blank, check question 3 and the contest entry information. If the two match, the person is likely coming from home.

Question 3

If blank and if question 2 is "Home," then check contest entry information for the home address. If question 2 is "Work," check to make sure that the specified address does not match contest entry information.

Question 4

Check question 5 against contest entry information. If they match, the person is likely coming from home.

Question 5

Check question 4 against contest entry information. If the contest entry from is blank, the survey is unusable.

Question 6

Check origin against stated routing. Be skeptical of car-drive-park, car-pick-up, and car-drop-off trips within Center City.

Question 7

Must match number of routes listed in Question 8.

Question 8

Minimum of one route number must be listed. Resources to verify routing include:

- Lookup table of survey serial numbers;
- SEPTA schedules and maps; and
- Google Maps transit routing.

Question 9

Must be an appropriate access or transfer point based on routing specified in question 8 and/or the access mode specified in question 6

Question 10

Must be an appropriate mode based on the routing specified in question 8 and the destination in question 5.

For questions 3 and 5: use information elsewhere in the survey to get as specific an answer as possible. Based on the final answer you get, the survey will be classified as follows:

- High Resolution: full address with street number, city, state, and ZIP.
- Low Resolution Center City: high resolution for an outlying address with a downtown location specified either by “Center City”, “Philadelphia”, “Downtown”, “S. Broad Street”, “Spring Garden Street”, or something equally as unspecific.
- Low Resolution Outlying: Same case as low resolution Center City, with an outlying area specified either by the name of a station or stop, or just a neighborhood.
- In the event that a station is listed as the origin or destination AND the access mode is “Walk”, the address will be the town in which the station is located OR “University City” for 30th Street Station or “Center City” for Suburban and Market East stations.
- In the event that a Campus or Neighborhood or Area is specified (e.g., Temple University, University of Pennsylvania, Fishtown, Old City, etc...), leave the response as is.

Common problems / special cases:

- Accidental inversion of question 6 and 10.
- Inversion of routing sequence.
- Inversion of origin and destination.
- Low resolution addresses.

- Single street name without a cross street or address number.
Assign a cross street where appropriate.
When doing this, refer to Google Maps and take into consideration how they got from this address to transit, or from transit to this address (walking versus driving distance).
- The Airport:
 - If it is clear that someone is working at the airport, leave question 2 or 4 as “Work / Work Related”;
 - Otherwise, cross out their original response to question 2 or 4 and check “Other”, followed by the reason they initially specified that you crossed out.
 - If someone is traveling for business, cross out “Work / Work Related” and mark “Other”, followed by “business travel”.

This guide does not cover all possible cases, but rather offers general principles for the cases that are most common. If you are not entirely comfortable with a correction that you want to make, ask for help or set the survey aside.

After the surveys have been corrected, they should be classified in one of the following 3 ways:

- “Usable”;
- “Useless”; or
- “Questionable” (to be looked over with or by someone else).

Each group should be kept in a separate pile or bundle.

Appendix D

Appendix D: Unlinked Expansion Factors by Transit Line

Table D-1: Unlinked Expansion Factors by Transit Line, and Time of Day

Transit Line	AM Expansion Factor	MIDDAY Expansion Factor	PM Expansion Factor	NT Expansion Factor
1	37.54	43.57	1,326.00	85.25
2	15.97	22.44	239.29	143.50
3	21.39	38.59	693.50	461.67
5	14.87	18.33	1,138.00	53.11
6	12.71	22.59	487.67	103.20
7	15.42	18.01	416.25	265.50
8	29.14	13.90	493.50	57.33
9	14.01	15.05	280.50	279.67
10	19.89	21.04	964.60	142.08
11	18.98	30.06	294.06	130.89
12	13.13	15.71	949.00	427.00
13	33.66	33.56	529.90	205.45
14	40.58	20.50	339.33	527.33
15	25.60	21.78	262.32	103.91
17	17.50	34.21	4,179.00	120.45
18	18.61	15.70	403.39	482.30
19	38.21	17.67	563.00	0.00
20	39.60	68.23	659.00	415.00
21	12.84	15.53	338.00	121.44
22	14.26	27.12	249.40	96.88
23	23.04	30.62	185.52	172.81
24	33.07	22.72	192.20	350.00
25	22.74	35.03	363.00	204.00
26	33.74	40.84	671.40	210.17
27	30.06	12.02	212.25	224.00
28	18.79	24.93	149.00	142.00
29	30.07	24.69	189.88	311.00
30	14.34	13.07	225.00	87.00
31	39.10	24.99	428.85	145.47
32	1,525.00	0.00	1,287.00	0.00
33	26.78	28.70	303.14	227.29
34	17.27	16.76	5,786.00	407.80
35	5.50	12.88	31.67	0.00
36	22.90	24.73	983.60	367.20
37	180.52	271.21	0.00	1,583.50
38	22.97	34.21	156.20	96.33
39	16.82	50.33	268.33	284.00
40	10.95	25.55	258.60	161.25
42	15.94	22.91	588.80	241.00
43	28.68	75.14	279.33	101.00
44	23.11	39.81	462.33	230.00
46	18.00	22.12	215.00	119.67
47	29.71	46.93	458.50	259.88
48	23.50	47.77	1,342.00	174.17

Transit Line	AM Expansion Factor	MIDDAY Expansion Factor	PM Expansion Factor	NT Expansion Factor
50	31.00	29.08	0.00	139.00
52	1,445.67	0.00	0.00	0.00
53	16.19	19.83	780.00	58.67
54	24.73	23.43	327.00	199.60
55	12.14	11.31	111.27	68.08
56	31.97	41.25	335.10	449.33
57	29.44	40.94	266.20	83.91
58	30.58	46.48	320.88	215.80
59	25.58	36.77	496.67	106.40
60	19.45	33.70	277.38	282.00
61	24.73	52.88	238.20	175.67
64	2.96	3.20	24.83	28.00
65	18.42	19.15	395.86	356.80
66	23.09	37.97	210.85	708.50
67	22.95	21.94	294.80	568.00
68	11.57	17.90	176.00	466.00
70	44.06	25.32	280.78	570.00
71	1.28	25.51	0.00	0.00
73	37.70	31.81	190.50	149.00
75	18.20	36.38	525.50	0.00
77	10.18	6.36	0.00	0.00
79	39.00	39.24	333.40	178.33
84	23.11	33.92	293.67	225.00
88	37.96	18.03	98.86	0.00
89	27.67	24.35	529.00	0.00
90	9.08	13.08	20.00	29.50
92	3.33	11.56	129.00	51.00
94	6.93	8.56	143.00	11.67
95	6.76	11.88	93.00	12.00
96	19.81	15.12	121.67	42.50
97	10.06	22.25	144.00	51.00
98	11.42	7.45	53.14	17.50
99	6.83	9.47	129.00	89.50
101	11.96	14.35	404.06	574.63
102	11.52	10.74	247.99	117.56
103	3.45	3.10	104.50	0.00
104	20.24	39.82	117.67	222.00
105	15.16	35.28	323.50	126.50
106	12.25	13.83	238.00	0.00
107	8.83	19.92	152.00	89.00
108	17.47	24.14	154.25	135.86
109	14.10	24.22	323.25	139.00
110	6.61	13.05	219.50	83.33
111	11.12	10.43	406.00	0.00
112	19.28	39.40	433.00	0.00
113	16.43	25.59	348.00	160.88
114	19.50	36.85	0.00	244.00
115	16.10	46.44	0.00	189.00

Transit Line	AM Expansion Factor	MIDDAY Expansion Factor	PM Expansion Factor	NT Expansion Factor
117	26.58	36.09	510.00	0.00
118	7.39	28.57	0.00	0.00
119	9.68	11.06	205.00	128.00
120	14.00	21.88	124.00	0.00
123	5.93	6.79	35.55	41.40
124	4.87	5.43	77.20	45.50
125	4.98	6.19	13.52	32.00
126	0.00	0.00	0.00	85.00
127	6.79	7.05	29.00	12.50
128	6.44	12.00	90.00	0.00
129	41.80	83.00	202.00	109.00
130	7.42	13.71	22.29	0.00
131	12.31	6.37	183.00	0.00
132	14.71	12.89	12.25	0.00
134	4.69	9.50	0.00	3.00
139	3.79	2.81	0.00	24.00
150	0.00	4.78	14.50	0.00
201	4.81	7.60	101.00	0.00
204	5.49	11.00	0.00	0.00
206	5.50	6.75	0.00	0.00
310	5.11	14.79	140.15	90.08
314	9.36	20.85	19.75	0.00
BSL	30.98	46.01	275.89	320.74
C	22.34	26.38	163.77	156.38
G	38.80	48.62	546.57	408.75
HXH	87.05	118.20	2457.17	1386.46
J	20.48	17.06	0.00	345.00
K	34.78	35.38	326.25	172.00
L	23.64	21.11	151.57	60.73
LUCY	0.00	0.00	0.00	0.00
MFL	19.85	63.51	154.46	271.08
NHSL	8.75	14.19	30.55	35.84
R	23.16	41.27	328.00	263.57
AIR	3.33	8.06	152.52	24.95
CHE	8.52	3.20	102.23	63.00
CHW	5.96	3.11	101.15	80.00
CYN	4.49	1.67	259.00	13.67
ELW	7.96	3.11	66.09	60.57
FOX	7.34	3.07	59.89	39.75
DOY	10.63	4.71	35.37	33.50
NOR	11.34	5.77	72.62	128.78
PAO	10.85	3.49	29.03	23.52
TRE	11.39	8.10	352.00	152.57
WAR	10.33	7.13	139.90	26.71
WTR	10.52	2.31	100.82	34.79
WIL	9.74	4.60	191.81	88.00
PATCO	6.47	59.45	390.66	208.91

Source: Delaware Valley Regional Planning Commission, 2014

Appendix E

Appendix E: Final Sample Size and Confidence Levels by Route

Table E-1: Final Sample Size and Confidence Levels by Route

Phase	Route	Mode	Actual Sample Size	Actual Confidence Level	Actual Error Rate (±)
1	PATCO	High Speed Rail	2,100	99%	2.7%
2	55	Bus	165	90%	6.3%
	92	Bus	22	90%	16.5%
	94	Bus	29	90%	15.0%
	96	Bus	26	90%	15.8%
	99	Bus	63	90%	10.1%
	123	Bus	86	90%	8.5%
	124	Bus	149	90%	6.4%
	125	Bus	175	90%	5.9%
	132	Bus	17	90%	19.4%
	134	Bus	17	90%	18.9%
	139	Bus	55	90%	10.2%
	TOTAL BUS		804	95%	3.4%
	NHSL	High Speed Rail	393	90%	4.1%
	AIR	Regional Rail	294	90%	4.7%
	CHE	Regional Rail	447	90%	3.7%
	CHW	Regional Rail	531	90%	3.4%
	CYN	Regional Rail	75	90%	8.9%
	DOY / LAN	Regional Rail	1,103	95%	2.8%
	ELW	Regional Rail	821	95%	3.3%
	FOX	Regional Rail	448	90%	3.7%
	NOR	Regional Rail	488	90%	3.6%
	PAO	Regional Rail	1,464	95%	2.5%
	TRE	Regional Rail	420	90%	3.9%
	WAR	Regional Rail	511	90%	3.5%
	WIL	Regional Rail	517	90%	3.5%
	WTR	Regional Rail	807	95%	3.3%
	TOTAL REGIONAL RAIL		7,926	99%	1.4%
3	BSS	Subway	706	90%	3.1%
	MFL	Subway	1,445	95%	2.6%
	TOTAL SUBWAY		2,151	99%	2.8%
	LUCY	Bus	44	90%	12.4%
	1	Bus	17	90%	19.9%
	2	Bus	99	90%	8.2%
	3	Bus	133	90%	7.1%
	5	Bus	108	90%	7.8%
	6	Bus	91	90%	8.6%
	7	Bus	125	90%	7.3%
	8	Bus	53	90%	11.2%
	9	Bus	143	90%	6.8%
	12	Bus	62	90%	10.4%
	14	Bus	44	90%	12.4%
	17	Bus	181	90%	6.1%
	18	Bus	174	90%	6.2%
	19	Bus	25	90%	16.5%
	20	Bus	21	90%	17.9%
	21	Bus	291	90%	4.7%
	22	Bus	121	90%	7.4%
	23	Bus	308	90%	4.7%
	24	Bus	18	90%	19.4%
	25	Bus	34	90%	14.1%
	26	Bus	92	90%	8.5%
	27	Bus	43	90%	12.5%
	28	Bus	36	90%	13.5%
	29	Bus	77	90%	9.3%
	30	Bus	37	90%	13.3%
	31	Bus	43	90%	12.5%
	32	Bus	10	90%	26.0%
	33	Bus	152	90%	6.6%
	35	Bus	16	90%	19.9%
	37	Bus	5	90%	36.8%
	38	Bus	29	90%	15.3%
	39	Bus	21	90%	17.9%
	40	Bus	140	90%	6.9%
	42	Bus	284	90%	4.8%
	44	Bus	44	90%	12.4%
	46	Bus	82	90%	9.0%
	47	Bus	148	90%	6.7%
	48	Bus	65	90%	10.2%
	52	Bus	8	90%	29.1%
	53	Bus	54	90%	11.1%
	54	Bus	139	90%	6.9%
	56	Bus	81	90%	9.1%
	57	Bus	80	90%	9.1%
	58	Bus	73	90%	9.6%

Phase	Route	Mode	Actual Sample Size	Actual Confidence Level	Actual Error Rate (±)
	59	Bus	58	90%	10.7%
	60	Bus	197	90%	5.8%
	61	Bus	21	90%	17.9%
	64	Bus	38	90%	13.3%
	65	Bus	70	90%	9.8%
	66	Bus	75	90%	9.4%
	67	Bus	51	90%	11.5%
	68	Bus	18	90%	19.4%
	70	Bus	117	90%	7.6%
	71	Bus	32	90%	13.9%
	73	Bus	18	90%	19.4%
	75	Bus	45	90%	12.1%
	77	Bus	45	90%	11.9%
	79	Bus	63	90%	10.3%
	84	Bus	32	90%	14.5%
	88	Bus	44	90%	12.3%
	89	Bus	19	90%	18.9%
	90	Bus	19	90%	18.4%
	95	Bus	14	90%	22.0%
	97	Bus	14	90%	22.0%
	98	Bus	48	90%	11.6%
	103	Bus	50	90%	11.2%
	104	Bus	15	90%	21.2%
	105	Bus	44	90%	12.3%
	106	Bus	5	90%	36.8%
	107	Bus	8	90%	29.1%
	108	Bus	30	90%	15.0%
	109	Bus	78	90%	9.3%
	110	Bus	80	90%	9.0%
	111	Bus	51	90%	11.3%
	112	Bus	32	90%	14.3%
	113	Bus	94	90%	8.4%
	114	Bus	8	90%	29.1%
	115	Bus	17	90%	19.9%
	117	Bus	23	90%	17.2%
	118	Bus	26	90%	15.8%
	119	Bus	26	90%	15.8%
	120	Bus	11	90%	24.8%
	126	Bus	9	90%	27.4%
	127	Bus	28	90%	15.0%
	128	Bus	24	90%	16.1%
	130	Bus	41	90%	12.4%
	131	Bus	33	90%	13.9%
	150	Bus	10	90%	24.8%
	201	Bus	24	90%	16.1%
	204	Bus	8	90%	29.1%
	206	Bus	19	90%	18.4%
	310	Bus	19	90%	18.4%
	314	Bus	4	90%	41.1%
	C	Bus	225	90%	5.4%
	G	Bus	85	90%	8.9%
	H	Bus	44	90%	12.4%
	J	Bus	89	90%	8.6%
	K	Bus	64	90%	10.3%
	L	Bus	65	90%	10.1%
	R	Bus	78	90%	9.3%
	XH	Bus	55	90%	11.0%
	TOTAL BUS		6,411	99%	1.6%
	101	Light Rail	52	90%	11.3%
	102	Light Rail	77	90%	9.3%
	TOTAL LIGHT RAIL		129	90%	7.2%
	Krapf's	TMA Bus	2	90%	58.2%
	Upper Merion Rambler	TMA Bus	2	90%	58.2%
	Bristol Rushbus	TMA Bus	1	90%	82.3%
	TOTAL TMA BUS		5	90%	36.8%
	10	Trolley	352	90%	4.3%
	11	Trolley	257	90%	5.1%
	13	Trolley	174	90%	6.2%
	15	Trolley	123	90%	7.4%
	34	Trolley	468	90%	3.7%
	36	Trolley	285	90%	4.8%
	TOTAL TROLLEY		1,659	95%	2.4%

Source: Delaware Valley Regional Planning Commission, 2014

Appendix F

Appendix F: Data Map – List and Description of Variables

[In Microsoft Access file “DVRPC OnBoard Transit Survey.accdb”]

- SurveyID: Unique 5 digit identification number on each survey form.
- Transit Service: The transit service passenger was riding when they received survey.
- Board Time: The time the passenger boarded the bus or train on which they received the survey.
- Coming From: The purpose at the origin end of the trip. The 8 response options are Home, Work, K-12 School, Technical / College School, Shopping, Medical / Dental, Personal Business, or Social / Recreational.
- Coming From Other: Write in response from passenger in the event the purpose at the origin was something other than the 8 listed options.
- Address Coming From: The street address of the origin. Not available in the public version of the database.
- City Coming From: The city where the origin is located.
- State Coming From: The state where the origin is located.
- Zip Coming From: The zip code of the origin.
- Going To: The purpose at the destination end of the trip. The 8 response options are Home, Work, K-12 School, Technical / College School, Shopping, Medical / Dental, Personal Business, or Social / Recreational.
- Going To Other: Write in response from passenger in the event the purpose at the destination end was something other than the 8 listed options.
- Address Going To: The street address of the passenger’s destination. Not available in the public version of the database.
- City Going To: The city where the destination is located.
- State Going To: The state where the destination is located.
- Zip Going To: The zip code of the destination.
- Get To Transit: The access mode passenger used to get to their first bus or train, e.g., if they took 2 buses to reach their destination, and they received the survey while riding on the second bus, this question referred to how they got to their first bus. Response options are Walk, Bicycle, Car – Drive and Park, Carpool, Car – Dropped Off, or Taxi.

- Get To Transit Other: Write in response from passenger in the event they used some other access mode than the 6 listed options.
- Transit Count: The number of buses and / or trains it took passenger to reach their destination. For example, if it took 2 transfers, then they would have used 3 buses or trains.
- Route 1: The first transit route that the passenger used. For example, the Market-Frankford Line (MFL).
- Route 2: The second transit route the passenger used to complete their trip. This would be blank if Transit Count was equal to 1.
- Route 3: The third transit route the passenger used to complete their trip. This would be blank if Transit Count was less than or equal to 2.
- Route 4: The fourth transit route the passenger used to complete their trip. This would be blank if Transit Count was less than or equal to 3.
- Final Route: The final route the passenger used to complete their trip. This response should match passenger's response to Route 1, Route 2, Route 3, or Route 4 unless it took 5 or more buses or trains for passenger to reach their destination.
- Address Transit: The bus stop or train station where the passenger boarded their first bus or train (e.g., Route 1).
- City Transit: The city where this station is located.
- State Transit: The state where this station is located.
- Zip Transit: The zip code of this station.
- Last Mode: The mode passenger used to get from the destination transit station to their actual final destination. Response options are Walk, Bicycle, Car – Drive and Park, Carpool, Car – Dropped Off, or Taxi.
- Last Mode Other: Write in response from passenger in the event they used some other last mode than the 6 listed options.
- Frequency: How frequently the passenger uses public transportation. Response options included 5 or more days a week, 4 days a week, 1-3 days a week, 1-3 days a month, or first time customer.
- Frequency Other: Write in response in the event that passenger used public transit some other frequency than the 5 listed options.

- Choice: Whether the passenger had alternative transportation options available. Response options include: I have no other way to travel; I use SEPTA because it is the best choice for me; I usually use another type of transportation, but I occasionally take SEPTA.
- SEPTA Ticket: How SEPTA passenger paid their fare. Response options include Cash, Transfer, Monthly TrailPass / TranPass, Intermediate Pass, Token or Single Ticket, Weekly TrailPass / TranPass, Cross County Pass, Independence Pass.
- Ticket Other: Write in option in the event SEPTA passenger used some other means than the 8 listed options to pay their fare.
- PATCO Ticket: How PATCO passenger paid their fare. Response options include One-Way Ticket, Two-Way Ticket, or Freedom Pass.
- PATCO Ticket Other: Write in option in the event PATCO passenger used some other means than the listed options to pay their fare.
- Household: The number of people in the passenger's household. Response options include One, Two, Three, Four, or Five or More.
- Employment: The number of employed people in the passenger's household. Response options include None, One, Two, Three, Four, or Five or More.
- Vehicle: The number of vehicles in the passenger's household. Response options include None, One, Two, Three, Four, or Five or More.
- Income: The annual household income of the passenger's household. Response options include Under \$25,000; \$25,000 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 to \$149,999; \$150,000 to \$199,999; or \$200,000 and Over.
- Occupation: The passenger's occupation. Response options include: Management / Professional, Clerical / Secretarial, Sales / Retail, Non-Office Worker, Technical / Skilled, Teacher / Instructor, Homemaker, Student, Not Currently Employed, Retired, or Medical Professional.
- Occupation Other: Write in option in the event passenger's occupation was not one of the listed options.
- Internet Access: Whether the passenger had internet access. Response options include No, Yes, and then if Yes, at Work, at Home, Mobile, or Other.
- Internet Other Description: Write in response by passenger. Example responses include: @School, @Friends, @Library.
- File type: For internal use by DVRPC.

- Bus 124: For internal use by DVRPC.
- Bus 123: For internal use by DVRPC.

Philadelphia Regional On-Board Transit Survey

Publication Number: 14040

Date Published: March 2015

Geographic Area Covered:

Delaware Valley region comprising five counties in Pennsylvania (Bucks, Chester, Delaware, Montgomery, and Philadelphia), and four counties in New Jersey (Burlington, Camden, Gloucester, and Mercer).

Key Words:

On-Board Transit Survey, Southeastern Pennsylvania Transportation Authority, SEPTA, Port Authority Transit Corporation, PATCO, Pennsylvania Transportation Management Association, TMA, Philadelphia, Camden, transit passenger, transit rider, transfer locations, origin-destination flows, sampling plan, return rate, survey instrument, data processing, quality assurance, geocoding, survey weighting and expansion.

Abstract:

This report summarizes the on-board transit survey that was conducted by DVRPC during 2010 and 2011. The first chapter outlines the methods that were used to conduct the survey, the second chapter provides summary results for each survey question, and the third chapter provides insight, analysis, and key findings from the survey.

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9. Which Route number/name will you use on this trip?

1st route

2nd route

3rd route

4th route

for *example:* (your trip may vary)

1st route

47 Bus

2nd route

Market/Frankford El

3rd route

4th route

10. How will you get to your final destination after exiting the last bus/train/trolley/subway vehicle?

☐ Walk

☐ Carpool

☐ Bicycle

☐ Car-Pick Up

☐ Car-Drive and park

☐ Taxi

☐ Other (Please Specify) _____

11. Generally, how often do you ride SEPTA?

☐ 5 or more days a week

☐ 1-3 days a month

☐ 4 days a week

☐ First-time customer

☐ 1-3 days a week

☐ Other (Please Specify) _____

12. Which of the following statements best applies to you? (Check only one)

☐ I have no other way to travel

☐ I use SEPTA because it is the best choice for me

☐ I usually use another type of transportation, but I occasionally take SEPTA

13. What type of ticket are you using for this trip?

☐ Cash

☐ Token or single ticket

☐ Transfer

☐ Weekly TrailPass/TranPass

☐ Monthly TrailPass/TranPass

☐ Cross County Pass

☐ Non-Resident Pass

☐ International Pass

About You...

14. How many people, including yourself, will be riding with you?

☐ one

☐ two

☐ three

15. How many people in your household are you traveling with?

☐ none

☐ one

☐ two

16. How many vehicles are available in your household?

☐ none

☐ one

☐ two

17. What is your approximate annual household income?

This question is asked to ensure that you are eligible to receive a SEPTA fare discount.

☐ Under \$25,000

☐ \$50,000+

☐ \$25,000-\$34,999

☐ \$75,000+

☐ \$35,000-\$49,999

☐ \$100,000+

18. What is your occupation? (Choose only one)

☐ Management/Professional

☐ Clerical/Secretarial

☐ Sales/Retail

☐ Non-Office Worker

☐ Technical/Skilled

☐ Teacher/Instructor



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