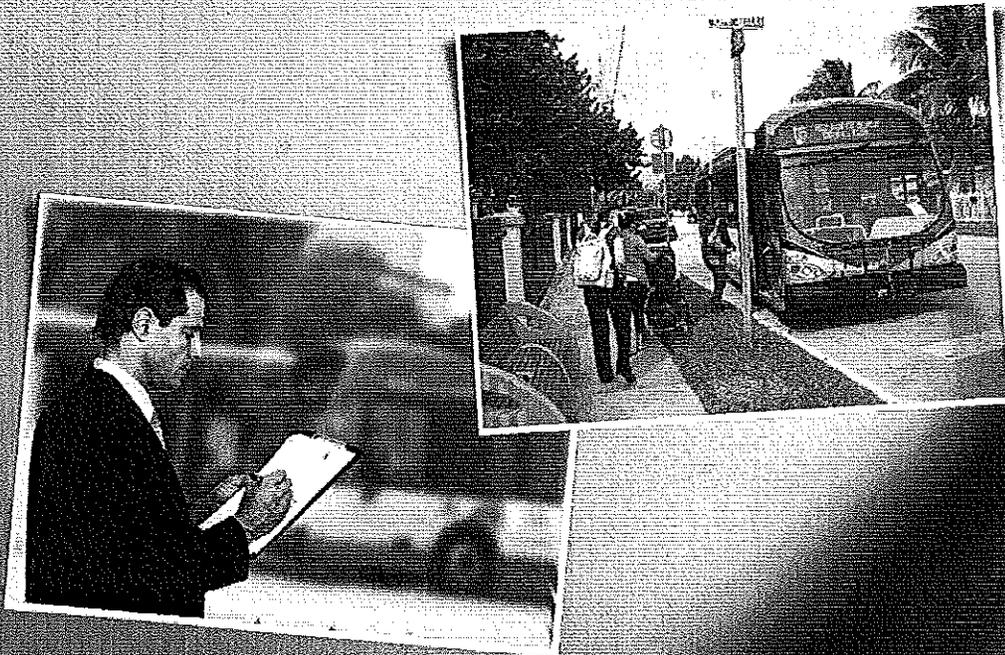




ORIGIN-DESTINATION SURVEYS for Local Bus Service

Work Order #GPC IV-30

Final Report: survey Implementation and Summary of Raw Data



PREPARED FOR



PREPARED BY



Kimley-Horn and Associates, Inc.

ORIGIN-DESTINATION SURVEYS for Local Bus Service

Origin-Destination Surveys for Local Bus Service

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September 2012

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Appendix A. Transit Passenger Survey

Appendix B. Electronic Survey Screen Views



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1. Introduction

The U.S. Federal Transit Administration (FTA) has guidelines for data collection and recommends that transit on-board surveys be conducted every five years. The Miami-Dade County Metropolitan Planning Organization (MPO) is conducting a series of transit ridership on-board surveys in Miami-Dade County to support the regional transit modeling efforts. The current Origin-Destination Surveys for Local Bus Service (Survey) study is the third of five efforts needed to complete on-board surveys for the entire Miami-Dade Transit (MDT) system. The MPO has previously completed the Miami-Dade Metrorail Transit Survey (2009) and the Origin Destination Study for the 95 Express (2012). These surveys are intended to obtain more accurate ridership characteristics, such as origin-destination patterns trip purpose and mode of access and egress. A survey instrument was developed in consultation with the MPO and MDT to ensure the collection address their specific data needs, including information on socioeconomic characteristics and transit travel patterns of current transit riders. The survey questions were targeted to provide insight into trip purpose, modes of travel, origin-destination patterns, modes of payment and other demographic information. The survey data will be used to update and validate the Southeast Regional Planning Model (SERPM) and will be used in the developing the Activity Based Model for the region. The ridership survey data serves to improve regional travel demand model forecasts based upon accurate and useful data on the existing characteristics and travel patterns of transit riders.

1.1 Miami-Dade Transit Local Bus Routes

On-board surveys were conducted systematically over a three-week period in April 2012 for 22 bus local routes served by the MDT Northeast Division Garage. The survey period was specifically selected to account for a broad range of typical riders, in advance of the end of the school year, and surveys were conducted mid-week generally between the hours of 6:00 am and 7:00 pm. This survey effort excluded the 95 Express bus routes that were completed under the prior 95 Express survey effort and the 246 Night Owl. A table of the bus routes and survey schedule is included in Table 1.

1.2 Survey Project Scope

The project scope focused on primarily on survey methodology development, survey instrument design, survey implementation, and database development. The final product is a database containing survey data collected. An initial raw data set was compiled and a preliminary geocoding effort was completed based on the raw data. A revised shapefile and dataset was completed on the raw survey data results and based on an additional review and cleanup effort. The subsequent geocoding effort is documented by a map series located in *Section 8. Trip Origin-Destination Maps by Route* of this summary report.

The following summary report outlines general findings and summary results. The survey effort does not include data expansion, correction of biases, if any, or conversion of origin-destination format to a productions and attractions format. Additional future data processing and editing is expected to be required.

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2. Survey Design

2.1 Sampling Plan

The survey was conducted over the course of three weeks in April 2012 on Tuesday, Wednesday, and Thursday generally between 6 am to 7 pm. The survey accounted for inbound and outbound directional service (i.e., northbound, southbound, eastbound, and westbound). A sampling target was set at surveying ten percent (10%) of daily ridership per route for each of the three time periods (AM peak, PM peak and off-peak), and with careful attention placed in acquiring a balance of inbound and outbound surveys for each time period. Survey teams usually completed round-trips along the surveyed bus routes usually originating from the NE Division Garage, Golden Glades, route terminus or a specific bus stop location.

Table 1 summarizes the overall survey schedule and Table 2 summarizes actual survey rate.

Table 1: Survey Dates

Route #	Route Name	Survey Date	Day of Week
2	2	April 11, 2012	Wednesday
3	3	April 17 and 25, 2012	Tuesday, Wednesday
9	9	April 12, 2012	Thursday
10	10	April 12, 2012	Thursday
16	16	April 12, 2012	Thursday
17	17	April 17, 2012	Tuesday
19	19	April 11, 2012	Wednesday
22	22	April 18 and 25, 2012	Wednesday, Wednesday
27	27	April 10 and 18, 2012	Tuesday, Wednesday
29	29	April 10 and 17, 2012	Tuesday, Tuesday
75	75	April 10, 2012	Tuesday
77	77	April 11, 2012	Wednesday
93	Biscayne MAX	April 17, 2012	Tuesday
97	27 Ave MAX	April 10, 2012	Tuesday
99	99	April 18, 2012	Wednesday
105	E	April 18 and 25, 2012	Wednesday, Wednesday
107	G	April 18, 2012	Wednesday
108	H	April 18, 2012	Wednesday
119	S	April 19 and 25, 2012	Thursday
135	135	April 19, 2012	Thursday
183	183 Local	April 19, 2012	Thursday
277	NW 7 Ave MAX	April 11, 2012	Wednesday

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2.2 Survey Questionnaire

The survey questionnaire was developed in coordination with the MPO and MDT. The survey was prepared as a two-sided, letter-sized questionnaire in English, and with translated copies in Spanish and Creole languages. A copy of the printed survey questionnaire is located in Appendix A.

The survey included 25 questions that were intended to provide a comprehensive information base for several different categories:

- Travel patterns (origin and destination)
- Trip purpose
- Mode of access
- Trip characteristics
- Travel behavior
- Frequency of transit use
- Fare payment method
- Household characteristics
- Passenger demographics
- Gender and disability status

Based on past experiences in acquiring quality survey data in Miami-Dade County, the surveys were completed through one-on-one, on-board transit rider interviews by a multilingual survey team surveys using handheld electronic iPad tablets. The electronic survey corresponded directly to the printed survey questions and the survey software application was configured to facilitate consistent data entry. The personal interviews were used to improve the response rate, quality and consistency of data, and better survey the diversity of transit riders. The survey team included English, Spanish and Creole speaking staff, and had printed copies of the survey instrument available in the three languages for reference. Screenshots of the electronic survey are located in Appendix B.

The electronic iPad survey devices each contained a unique identifier, and were reflected in the electronic surveys. Each device was entered in a daily log that enabled correlating survey devices with specific survey team members, routes and schedules. The electronic survey data included date and time stamps, and corresponding iPad device numbers.

2.3 Methodology

The data collection effort focused on entering transit rider survey interview responses. Advance planning and survey preparation was critical to the project success. MDT bus rotaries and passenger count data summaries were analyzed to develop an initial survey work plan. The survey work plan was prepared to determine the appropriate level of staffing needed for each route based on estimated ridership, anticipated response rates, and bus schedules. The work plan was prepared to achieve the ten percent target of valid surveys compared to the route's average daily ridership. Electronic survey data results were

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reviewed during the survey period and allowed for adjustment and reallocation of survey teams to better meet survey target rates.

Survey questions included multiple choice responses and data entry fields. The first nine survey instrument questions, related to the rider's trip purpose, mode and travel patterns, were mandatory and a response was required before being able to proceed to the next question.

The first nine questions covered key information required for this study, as follows:

- Trip origin – type of place and address or intersection
- Trip purpose
- Trip sequence
- Mode of access/egress
- Parking or park-and-ride locations
- Bus boarding and alighting location
- Trip destination – type of place and address or intersection

Subsequently, sixteen non-mandatory questions helped gain additional information. The response rate was dependent upon the time available and willingness to respond. Many surveys contain phone numbers for future use, if necessary.

All transit riders surveyed participated willingly and were asked to provide consent prior to conducting the interview. Transit rider survey participation was noted as part of the electronic survey to be able to compute response rates.

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3. Implementation

3.1 Training

A training session was held on April 9, 2012 at Miami-Dade College North Campus for the team leaders and the survey team. The training session was conducted to familiarize the entire survey team with the project objectives, survey format, survey methods, and to provide hands-on instruction, informational materials, and to answer questions. While some of the team members had prior surveying experience, most did not.

The training consisted of several parts:

- Project Overview
- Instructions & Key Factors
- Sample Survey Exercise using iPad
- Assignment Logistics

The project overview was a brief introduction to the project, including the purpose of the survey and an explanation of the questions. The instructions and key factors were explained to the team members. The expectations of the behavior were presented and discussed. A mock survey was completed with the iPad to help the team members familiarize themselves with the technology, survey questions and survey techniques. Survey teams were assigned and logistics were explained.

3.2 Survey Implementation

The survey was managed by Kimley-Horn and Associate, Inc. (KHA) professionals and staffed using seven (7) on-board survey teams. Each survey teams was led by professionals from KHA or sub-consultant, R.J. Behar & Company, Inc., who served as team leaders, and supported by a team of approximately 30 temporary staff from StaffingNow, a vendor. Each survey team leader was accompanied by approximately two to four staff. The survey team was distinguished by an identification badge and a t-shirt labeled with "Survey Crew."

This survey was administered on April 10-12, April 17-19, and April 25. Teams were distributed on select routes and runs on each of the designated survey days to improve survey response rate, and to best achieve survey targets for each route. The last survey date was used to address lower than anticipated survey response targets for select routes.

Survey teams were pre-assigned to specific routes and bus runs covering the survey schedule. Survey team members met at a designated central location before proceeding to and boarding the assigned bus at the pre-defined location, such as the NE Division Garage, Golden Glades or Aventura Mall.

The survey team members were each assigned their electronic iPad device with a unique identifier that was recorded in a daily log. The teams boarded the bus and the team leaders were positioned at the front of

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the bus or circulated through the bus to survey riders and manage their respective teams. The rest of the survey team was spaced out through the bus and conducted interviews with passengers.

Survey teams had printed, laminated surveys in three languages (English, Spanish and Creole) to use as visual aids and reference for passengers being interviewed. Each survey team member had access to a transit map on their electronic device, and cards to provide to passengers who have questions or comments directing them to the Miami-Dade County website or the County's 311 contact number. Printed surveys were available in each of the three languages, if needed, and identified by a unique serial number.

Before beginning the interview, the survey team would enter the bus route number and the direction (inbound/outbound) that the bus was travelling. The iPad device was loaded with "Random #", a random number generating iPad application, to help reduce interviewer selection bias. After passengers boarded at a stop, "Random #" was to be used to identify their first targeted person to interview, while subsequent interviews could be conducted with adjacent passengers. In practice, the buses were sufficiently staffed so that the survey team interviewed or requested an interview from most or all transit riders on the bus.

The surveyors actively engaged as many bus patrons as they could to complete the maximum amount of valid surveys possible. The survey team asked the potential participant if they would mind answering a few questions. Following verbal consent to be interviewed, the survey team would conduct the survey and enter responses into the iPad. If the person did not wish to participate in the survey, the negative response would be recorded to complete the survey and the survey team would proceed to approach a new transit rider.

The iPads were collected by the team leaders at the end of every survey day, and the information was uploaded to the survey database to be organized and analyzed at a future date.

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4. Minimizing and Mitigating Non-Response Bias

4.1 Survey Instrument

Survey instruments play a crucial role in reducing non-response bias. The use of an iPad as the survey instrument and using trained survey interviewers served to increase the response rate and to improve the quality and validity of survey data. As a backup, hard copies of the survey were prepared in three languages, each containing a unique serial number, in case of any mechanical failures or other unanticipated issue in administering the survey. The electronic survey instrument was prepared in English, but the multilingual survey team administered the survey in English, Spanish, Creole, and French, translated the questions, and recorded the answers directly into the iPads.

4.2 Implementation

To mitigate non-response bias for this project, the project methodology included:

1. Developing an easy-to-use survey instrument with simple understand questions
2. Selecting survey team members with prior survey experience
3. Selecting and training survey team members to effectively conduct the survey
4. Directly engaging transit riders to take the survey
5. Actively managing survey teams to engage transit riders
6. Adequately staffing bus routes depending on anticipated ridership
7. Making staffing adjustments to address non-performing survey team staff

Several of the team members were selected based upon experience conducting similar surveys in the past, their grasp on what was necessary to complete a successful survey, and their ability to perform. A training session was completed prior to the actual on-board surveys. Team members were instructed during the training on how to approach people, present themselves and conduct the surveys. They were provided with background information and simple, sample statements to use, and they participated in a trial survey exercise using all of the survey materials. The team was provided a target goal of the number of people to approach for a survey. The team leaders managed their teams and conducted interviews with transit riders.

The time spent completing the survey interview generally ranged from 5 minutes to 15 minutes for each transit rider.

Table 2 summarizes the percent of daily ridership surveyed by route number.

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Table 2: Percentage Surveyed of Daily Ridership by Route Number

Route	Average Daily Ridership*	Percentage of Daily Ridership
2	3,501	7.2%
3	8,586	12.2%
9	7,413	9.3%
10	2,869	14.5%
16	3,313	16.0%
17	5,074	8.2%
19	2,664	8.3%
22	5,228	13.2%
27	11,048	9.6%
29	1,003	8.8%
75	2,477	12.5%
77	10,893	8.5%
93	4,143	9.3%
97	1,495	12.3%
99	2,213	8.2%
105	1,790	11.7%
107	2,152	14.2%
108	2,202	6.7%
119	13,994	6.7%
135	1,769	10.1%
183	4,457	9.4%
277	1,174	16.5%

10 routes exceeded targeted goals to survey 10% of daily ridership

Source: *Miami-Dade Transit Ridership Technical Report, September 2011

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5. Survey Response

5.1 Overall Response

While over 9795 passengers were approached by the survey teams during the seven survey days, 4700 transit riders elected to participate in the survey and completed the minimum nine origin-destination questions. A 48% response rate was calculated by dividing the number of survey responses by the number of people approached to complete the survey.

The 4700 completed surveys make up the data set in use here. Table 3 shows the breakdown of surveys by bus route.

Table 3: Survey Response Rate by Bus Route

Route Number	Attempted Surveys	Completed Surveys	Percent Completed
2	253	167	66.0%
3	1047	351	33.5%
9	690	303	43.9%
10	412	216	52.4%
16	531	238	44.8%
17	414	224	54.1%
19	220	126	57.3%
22	688	205	29.8%
27	1061	670	63.2%
29	89	48	53.9%
75	310	143	46.1%
77	931	424	45.5%
93	384	232	60.4%
97	184	98	53.3%
99	183	114	62.3%
105	210	86	41.0%
107	307	91	29.6%
108	147	121	82.3%
119	942	482	51.2%
135	177	96	54.2%
183	422	175	41.5%
277	193	90	46.6%
Total	9795	4700	

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6. Data Editing and Processing

6.1 Data Compilation

The electronic survey data was compiled on the survey application website (iSurvey) and downloaded in a Microsoft Excel format file. The survey application database was prepared and tested prior to conducting the on-board surveys to ensure proper compilation, reporting, and data formatting. The electronic survey eliminated the additional requirement for data entry of paper surveys; no paper surveys were requested or completed.

The data was uploaded each night from the iPads to the survey website, compiled, reviewed and evaluated to determine the response rate by route. Following the completion of the surveys, the compiled data was downloaded and reviewed to identify overall errors and prepared for minor cleanup.

The data file is organized with rows representing separate surveys and columns organizing each question and the corresponding responses. Additional survey data fields include the iPad device number, date and time stamp for each entry, as well as survey team entered data (i.e., bus route and direction of travel).

6.2 Preliminary Data Results

As part of initial data compilation and review, the route numbers were verified by cross referencing the iPad device number, data and time of entry, and survey schedule to ensure that the surveys reflected the correct bus route and travel direction. A very small percentage of surveys required that the entry for the bus route be revised, but a larger percentage required adjusting inbound and outbound entries; direction of travel was not critical but this information provides some insight into origin-destination travel patterns.

An initial geocoding effort was prepared using the raw data. The initial maps provided an initial graphic illustration of travel patterns for each bus route. However, the results illustrated the need for some data clean-up. While the electronic surveys reduced secondary data entry error from transcribing paper surveys, they did not preclude transit rider misleading responses or errors, or eliminate data entry errors from survey team members. Upon review of the raw data file, data errors included incorrect typographical spelling for street names and other similar factors.

6.3 Data Review and Revision

A data review and revision effort was prepared on the completed surveys to improve data quality and validity of surveys. A series of subsequent geocoding efforts was completed to correct data entries and map the revised data.

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The Origin and Destination locations were reviewed and revised based on:

- Documented origin and destination locations (name of place, business, or attraction)
- Street name description
- Street and block number
- Logical directional attribute compared to street name
- Bus route and relative geographic location
- Logical trip sequence
- Boarding and alighting locations
- Reference and address verification using online maps

While transit riders were often apprehensive in providing their home or work addresses, the block number was often provided or entered. Survey respondents may not have accurately provided origin, destination, boarding and alighting locations, which may need to be further verified. Data revisions completed during the data revision process were limited to origin and destination intersections and addresses, and did not include the boarding and alighting data.

Section 8 of this report contains the origin and destination data maps.

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7. Summary of Raw Data

7.1 Survey Data

The following section presents a table and pie chart for each question quantifying the frequency of stated responses received for the total of all of bus routes. Questions with qualitative answers were not included in this section summary and responses for each bus route were not illustrated in this section. Each tabulated summary maintains a total 4,700 responses and indicates the quantity of invalid or no response to avoid providing an extrapolated generalized trend.

The following consists of the final list of questions and serve as the basis of this summary:

1. Where did you begin this one-way trip?
2. What is the address or intersection where you began this one-way trip?
3. Please list all the bus routes and trains you will use during this one-way trip?
4. How did you get to the first transit stop?
5. Where did you get on this bus?
6. Where will you get off this bus?
7. Where will you end this one-way trip?
8. What is the address or intersection of the place where you are going to end your one-way trip?
9. After your last transit trip, how will you get to the end of your one-way trip?
10. How many days per week do you make this trip?
11. What is the average time it takes to make a one-way trip from door to door?
12. What is the fare type that you used for this one-way trip?
13. Does your employer pay any or all of your bus fare?
14. Do you have a valid driver's license?
15. Is there a car / vehicle available you can use for this trip?
16. How many working, registered motor vehicles (cars, motorcycles, trucks) are owned by members of your household?
17. Gender?
18. My race is best described as?
19. What is you household's approximate total annual income?
20. Including you, how many people live in your house?
21. Including you, how many are less than 16 years old?
22. Including you, how many are over 65 years old?
23. Including you, work outside of your house?
24. What is the highest level of education you have completed?
25. What is your current employment status?
26. Can you provide a phone number, in case we need to clarify your responses?

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7.2 Data Summary

While questions one through nine were mandatory and each have a 100 percent response rate, the remaining questions continued to have strong response rates, which likely corresponds to conducting a personal interview survey process.

Based on the tabulated results, the following observations can be made:

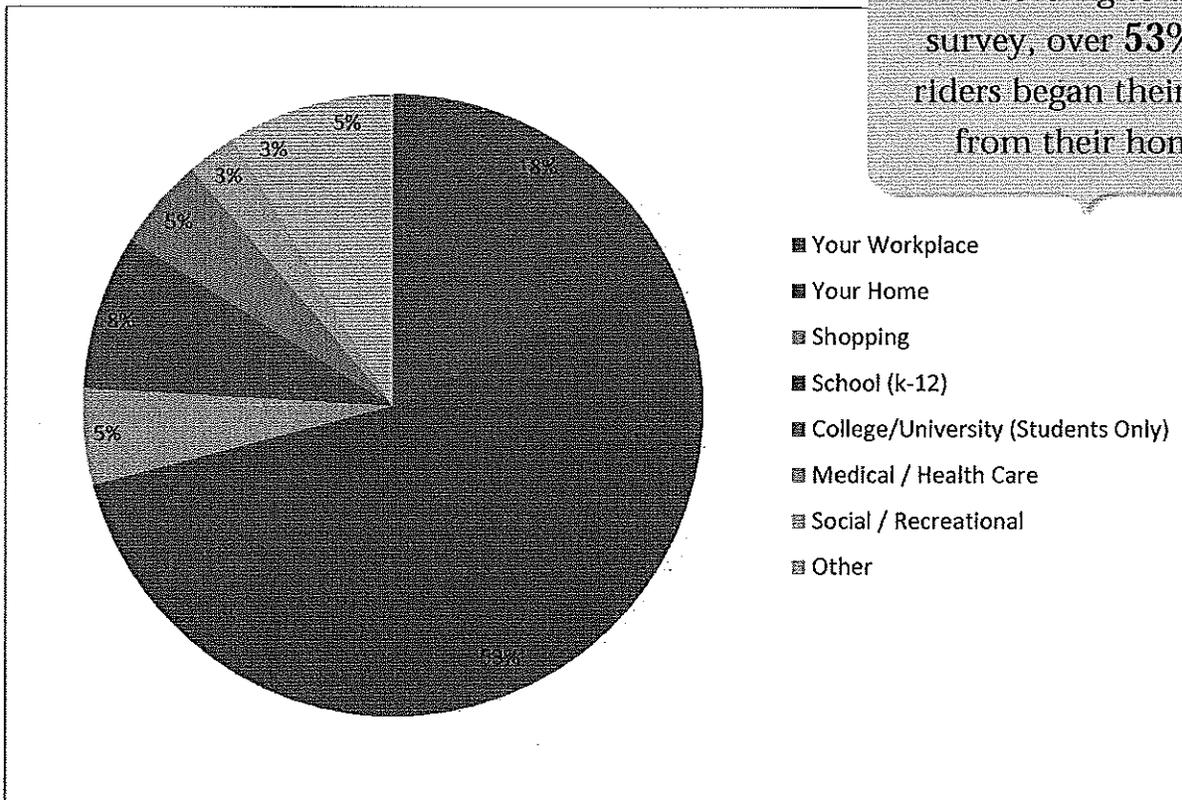
- Trip origins tend to be home-based since more than 53% of survey trips originate from home locations and 18% from work locations.
- Trip destinations have a greater distribution with surveyed trips ending at home representing 36% and at work representing 26%, respectively.
- 56% of transit trip are made using only one bus route, while 32% of trips are made with one transfer.
- Approximately 19 out of 20 transit riders walked to access transit and about two-thirds walked less than one quarter mile to their first or from their last transit stop.
- About 70% of respondents traveled up to 70 minutes for a one-way trip.
- Nearly two-thirds of respondents used cash or a cash value fare card for payment.
- Nearly 50% of respondents indicated they did not possess a valid driver's license.
- About two-thirds of respondents did not have a vehicle available for their trip.
- Nearly 50% of respondents were between the ages of 16 and 34 years of age.
- About one-half of respondents identified themselves as Black / African-American, while one-third identified themselves as Spanish / Hispanic / Latino.
- While 50% surveyed did not provide income level information, about 40% of those who did respond reported an annual household income less than \$16,500 and another 20% earned between \$16,500 and \$22,000. About 3% of respondents earned over \$75,000 per year.
- Over 25% of all survey participants provided their phone number.

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Table 4: (Q1) Where did you begin this one-way trip?

Description	Frequency	AM Peak	PM Peak	Off Peak
Your Workplace	825	91	387	347
Your Home	2506	1332	179	995
Shopping	235	19	89	127
School (K-12)	379	42	145	192
College/University (Students Only)	224	33	53	138
Medical / Health Care	124	8	25	91
Social / Recreational	162	26	36	100
Other	246	37	48	161
Total	4700			

Figure 1: (Q1) Where did you begin this one-way trip?



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Table 5: (Q3) How many bus transfers will you make during this one-way trip?

Description	Frequency
No Transfers	2619
One Transfer	1531
Two Transfers	429
Three Transfers	77
Four Transfers	44
Total	4700

56% of the respondents did not make any transfers during this one-way trip

Figure 2: (Q3) How many bus transfers will you make during this one-way trip?

