

Atlanta Regional Commission

Regional On-Board Transit Survey *2019 Final Report*

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Table of Contents

Executive Summary	1
Background	1
Survey Design and Administration	1
Survey Results	1
1. Introduction	2
2. Survey Methods	3
2.1 Sampling Plan	3
2.1.1 MARTA Overview	4
2.1.2 Other Transit Providers	8
2.2 Survey Instrument	10
2.3 Survey Administration	11
2.3.3 Survey Procedures Selection of Participants	13
2.3.4 In-Field Quality Assurance / Quality Control	14
2.3.5 Pre-Processing Distance Checks	17
2.3.6 Pre-Processing Ratio Checks	18
2.3.7 Post-Processing Additional Checks	20
2.3.8 In-Field Quality Assurance/Quality Control	22
3. Survey Weighting and Expansion	24
3.1 Route Segmentation Procedures	24
3.1.1 Route Segmentation with APC Data	24
3.1.2 Route Segmentation without APC Data	25
3.3 Expansion Types	26
3.3 General Rule for Expansion Factors	44
3.3.1 Linked Trip Expansion Factors for All Records	44
4. Survey Results	46
4.1 Regional Data Summary and Analysis	47
4.1.1 Survey Results by System	47
4.1.2 Types of Places for Origins and Destinations	75
5. Survey Result Comparisons	79
5.1 Trend Comparisons by System	79

List of Tables and Figures

Table 1: August through December 2018 Average Ridership by System and 10% Sample Allocation	3
Table 2: MARTA Bus 10 Percent Route Sample Goals	4
Table 3: MARTA Rail 10 Percent Entry Station Level Sample Goals	7
Table 4: CATS 10 Percent Route Sample Goals	8
Table 5: Gwinnett 10 Percent Route Sample Goals	8
Table 6: Gainesville Connection 10 Percent Route Sample Goals	9
Table 7: CobbLinc 10 Percent Route Sample Goals	9
Table 8: SRTA 10 Percent Route PM Peak Sample Goals	10
Table 9: Distance Checks for Access and Egress Modes	17
Table 10: Distance Checks Based on the Origin and Destination Locations	18
Table 11: Distance Checks on the Boarding and Alighting Locations	18
Table 12: Ratio Checks	18
Table 13: General Issues	19
Table 14: Directionality of Record	22
Table 15: On-to-Off Check Name	22
Table 16: Route Segmenting: APC Provided Routes with On-to-Off counts	25
Table 17: Route Segmenting: Non-APC Provided Route	25
Table 18: Routes Expanded Using Type 1 Expansion	32
Table 19: Routes Expanded Using Type 2 Expansion	35
Table 20: Routes Expanded Using Type 4 Expansion	43
Table 21: Overall View of Weighting Factors	45
Table 22: Total Transfers by System (based on secondary unlinked weight factors)	47
Table 23: Origin Purpose by System	48
Table 24: Access Mode by System	49
Table 25: Destination Purpose by System	50
Table 26: Egress Mode by System	52
Table 27: Fare Method by System	53
Table 28: Type of Fare by System	55
Table 29: Breeze Card Use by System	56
Table 30: Alternative Travel Mode by System	57
Table 31: Trip Frequency by System	58
Table 32: Share Services Used by System	59
Table 33: Household Vehicles by System	60
Table 34: Household Size by System	61
Table 35: Household Members on Current Trip by System	62

Table 36: Household Employees by System	63
Table 37: Employment Status by System	64
Table 38: Student Status by System	65
Table 39: Valid Driver's License by System	66
Table 40: Age by System	67
Table 41: Race / Ethnicity by System	68
Table 42: Hispanic Latino Origin by System	69
Table 43: Gender by System	70
Table 44: Other Language Spoken at Home by System	71
Table 45: English Proficiency by System	72
Table 46: Income by System	73
Table 47: Regional Distribution of Origin Place Type by Destination Place Type	75
Table 48: Regional Distribution of Access Mode by Egress Mode	76
Table 49: Distribution of Trip Types	77
Table 50: Origin Trip Purpose by System (2019 vs. 2010)	79
Table 51: Access by System (2019 vs. 2010)	79
Table 52: Destination Trip Purpose by System (2019 vs. 2010)	80
Table 53: Egress by System (2019 vs. 2010)	80
Table 54: Fare by System (2019 vs. 2010)	80
Table 55: Used Breeze Card by System (2019 vs. 2010)	81
Table 56: License by System (2019 vs. 2010)	81
Table 57: Age by System (2019 vs. 2010)	81
Table 58: Employment Status by System (2019 vs. 2010)	81
Table 59: Student Status by System (2019 vs. 2010)	81
Table 60: Household Vehicles by System (2019 vs. 2010)	82
Table 61: Household Size by System (2019 vs. 2010)	82
Table 62: Household Workers by System (2019 vs. 2010)	82
Table 63: Race/Ethnicity by System (2019 vs. 2010)	82
Table 64: Gender by System (2019 vs. 2010)	83
Table 65: Income by System (2019 vs. 2010)	83
Figure 1 – Timeline of Major Project Tasks	11
Figure 2 - Random Number Generator	13
Figure 3 – Online Visual Review Tool	15
Figure 4 – Online Visual Review Tool – 2 nd Example	16
Figure 5 - On-to-Off Software Program	20
Figure 6 – On-to-Off Collection Routes	21
Figure 7 – Data Combination, Route Segmentation, & Expansion Type	26
Figure 8 – Type 1 Expansion	27

Figure 9: Results of the On-to-Off Survey	28
Figure 10: Distribution of the On-to-Off Survey	28
Figure 11: Initial Estimate of Ridership Flows Between Station	28
Figure 12: Boardings and Alightings by Station	29
Figure 13: 7th Step of Iterative Balancing to Correct Distribution of Ridership by Alighting Location	30
Figure 14: Final Estimate of Ridership Flows Between Stations	30
Figure 15: Number of Completed Surveys	31
Figure 16: Weighting Factors	31
Figure 17 – Type 2 Expansion	33
Figure 18 – Segments Example for Type 2 Expansion	33
Figure 19 – Type 3 Expansion	42
Figure 20 – Calculations for Linked Weight Factors	45

Executive Summary

Background

In the spring and fall of 2019, the Atlanta Regional Commission (ARC), with consultant support from ETC Institute, conducted a regional on-board origin-destination (OD) survey of all fixed-route transit systems in the Atlanta region. The transit systems surveyed in the 20 county study area, were those operated by the Metropolitan Atlanta Rapid Transit Authority (MARTA), Cherokee Area Transportation System (CATS), Gwinnett County Transit, Hall Area Transit (Gainesville Connection), Cobb Transit Service (CobbLinc), and the State Road and Tollway Authority (SRTA).

The main purpose of this on-board transit survey is to update ARC's Travel Demand Forecasting Model. The data collected was able to provide valuable, current information on travel patterns and demographics for transit riders as well as service characteristics.

Survey tasks involved developing a sampling plan, designing the survey instrument, conducting a pilot test, processing the data in terms of weight, expansion, and analyzing, and reporting the results. Data collection was performed from March 2019 through December 2019 with a break in the summer when schools were out of session. A total of 43,398 completed questionnaires were collected.

Survey Design and Administration

The survey design process consisted of ARC and ETC Institute collaborating to design the survey questionnaire and develop a sampling plan that would ensure adequate data collection to perform analysis. The goal was to obtain at least 33,490 completed surveys which were allocated among the region's transit systems.

Upon approval of the questionnaire, a pilot survey was conducted to test the efficiency of the survey. The pilot was intended to be a test-run of the full-scale data collection and the results were then used to develop and finalize the data quality assurance and control (QA/QC) plan.

Comparisons are made later in this report to the 2009-2010 survey conducted using the same survey methodology. Any perceived insights when comparing the results of the two surveys should consider the significant differences between the collections. For example, transit riders have changed since the 2009-2010 survey. A new streetcar has been added since the 2009-2010 survey and riders travel choices have also changed.

Survey Results

ETC Institute created sets of statistics at both the regional level and the individual transit system level. These statistics focused on passengers' attitude towards the transit services, transit traveler's demographics, transit travel patterns, trip purposes, and service coverage and quality. Over half of the region's riders (61.1%) reported having to use at least two or more transit vehicles (bus or rail) to get them from their origin to destination locations. Most SRTA riders (88.8%) only had to use one transit (bus) vehicle for their trip due to the nature of SRTA being express service only. More than half (61.8%) of MARTA riders had to use two or more transit vehicles (buses/ rail) to get from their origin to destination.

More than twenty five percent (36.4%) of transit riders live in households without vehicle availability. In the CATS area (Cherokee County), more than three quarters (82.4%) of riders do not have access to a household vehicle, while almost all (98.1%) of SRTA riders have at least one vehicle available to their household. Almost one quarter (23.6%) of riders in the ARC region do not have a valid driver's license, and furthermore, thirteen percent (13.6%) of riders surveyed in the region were unemployed or retired. Fifty percent (51.2%) of ARC regional riders are between the ages of 25-44 and nearly three-quarters (66.3) are of African American descent and gender distribution is somewhat equal with fifty percent (52.6) of regional riders being male and forty eight percent (47.2%) being female.

1. Introduction

The Federal Transit Administration (FTA) requires accurate and valid transit usage forecasts for investment purposes, and so to support the demand models' data requirements, up-to-date on-board transit surveys that are fully compliant are needed. Therefore, the Atlanta Regional Commission (ARC), working with transit research consultant ETC Institute, conducted a regional on-board survey for the riders on line-haul fixed bus routes operated by the Metropolitan Atlanta Rapid Transit Authority (MARTA), Cherokee Area Transportation System (CATS), Gwinnett County Transit, Hall Area Transit (Gainesville Connection), Cobb Transit Service (CobbLinc), and the State Road and Tollway Authority (SRTA).

The purpose of conducting the 2019 on-board transit survey is to update ARC's Travel Demand Forecast Model (TDFM) and enhance the transit and mode choice component based on previously noted changes. The data collected should provide valid and current transit rider travel patterns, demographic information, and transit service characteristics.

ARC defined a set of criteria for a successful survey that includes the following:

- Proper coverage and representation of transit users and all regional transit service providers.
- Sampling plan and data collection methodology focusing on trip purposes and transit access/egress mode.
- Completeness of detail in the trip OD records collected, including accurate geocoding.
- Comprehensive and transparent documentation of all methods, procedures, and outcomes in the survey.

ARC and transit providers will use this data to characterize and predict travel patterns of customers traveling on transit systems in the Atlanta region. The collected data will also be essential for the enhancement of the mode choice component of ARC's TDFM and for producing model output that follows the recommendations of federal funding programs. Anticipated applications of these survey data include:

- Enhancement of the transit and mode-choice components of the ARC Regional TDFM,
- Compliance with the travel model recommendations and guidelines for applications,
- Identification of current levels of service,
- Establishing baseline information for boardings/alightings and transfer rates, and
- Identification of ridership patterns on local and express services.

The OD survey was conducted among riders of fixed route bus services for all ARC systems using intercept surveys conducted via transit interviewers on the bus/rail lines. Data collection was conducted on weekdays (Monday through Thursday) from March 2019 to December 2019 with a break in the summer when school was out of session. A total of 43,398 usable surveys, as included in the final data files, were collected for the OD survey.

This report summarizes the survey methods and findings. Chapter 2 provides a description of the sampling approach, survey instrument and procedures, and survey administration. Chapter 3 provides survey weighting and expansion procedures, expansion types, and decomposition analysis. Chapter 4 provides detailed information for the variables collected during the OD survey and summarizes the data by transit system. Chapter 5 shows the trends and comparisons to the 2009-2010 survey. Included in the appendices are the Questionnaire (Appendix A), and the secondary expansion (Appendix B).

2. Survey Methods

2.1 Sampling Plan

In order to account for all the various systems and their ridership in the ARC region, the sample plan was developed prior to the data collection with collaboration between ARC and ETC Institute for the most appropriate sample distribution.

The proposed sample plan was based on three main factors:

- First, the plan ensured that the sample adequately met data needs at the regional level.
- Second, the plan ensured the collection of adequate samples at various times of day. Times of day (TOD) are defined as Early Morning, AM Peak, Midday, PM Peak, and Evening time periods.
- Third, the plan ensured to collect station-to-station level goals for MARTA rail in order for a true representation of riders for stop segmentation.

The population ridership figures were gathered by each agency from periods meant to best approximate the expected ridership to be encountered during the field data collection. Based on previous discussions with FTA regarding best current practices, ETC Institute suggested a 10 percent sample proportional to population ridership as a starting point in the sample design. Average Weekday Ridership (AWR) numbers from August through December 2018 were used to create the sample plan.

The population ridership figures, and base 10 percent sample figures are contained in Table 1.

Table 1: August through December 2018 Average Ridership by System and 10% Sample Allocation

System		Average Weekday Ridership	Sampling Goals at 10%
MARTA	Bus	165,771	16,577
	Rail	148,764	15,051
CATS		84	9
GWINNETT		4,933	493
GAINSEVILLE		545	55
COBBLINC		9,331	933
SRTA (PM Peak)		3,720	372
Totals		333,148	33,490

2.1.1 MARTA Overview

Communications were held with MARTA to better describe each route and route type as well as better understand trip characteristics. MARTA is the principal transit service in the Atlanta region with 110 bus routes and four (4) rail lines that mostly operates in Fulton, Clayton, and Dekalb counties. The rail component of the MARTA system includes the Gold, Red, Green, and Blue lines that include 38 total rail stations which most of the bus services feed into. MARTA bus routes were sampled at a 10% sampling goal at the route level. MARTA rail was sampled at the station entry level at 10%. The total sample goal for MARTA (bus and rail) was 31,628 surveys. MARTA is broken up into section 2.1.1.1 Bus and 2.1.1.2 Rail.

2.1.1.1 MARTA Bus

A 10 percent sample for MARTA bus produced a sample goal of 16,577. *Note: The ridership below references the ridership which the collection goals were based. They are not the ridership daily averages that were expanded to at the conclusion of the project. Updated ridership figures were provided during the expansion process.*

ETC Institute implemented a 10 percent sample goal for MARTA bus routes, as shown in Table 2.

Table 2: MARTA Bus 10 Percent Route Sample Goals

Route	Name	Average Daily Weekday Ridership	10% Ridership Sample
1	Marietta Blvd/Joseph E Lowery Blvd	891	89
2	Ponce de Leon Avenue / Druid Hills	1025	103
3	Martin Luther King Jr Dr/Auburn Ave	1185	118
4	Moreland Avenue	795	80
5	Piedmont Road / Sandy Springs	3820	382
6	Clifton Road / Emory	1864	186
8	North Druid Hills Road	817	82
9	Boulevard / Tilson Road	900	90
12	Howell Mill Road / Cumberland	1882	188
14	14th Street / Blandtown	695	69
15	Candler Road	3558	356
19	Clairmont Road	1131	113
21	Memorial Drive	2326	233
24	McAfee / Hosea Williams	692	69
25	Peachtree Industrial Boulevard	342	34
26	Marietta Street / Perry Boulevard	1277	128
27	Cheshire Bridge Road	831	83
30	LaVista Road	782	78
32	Bouldercrest	1144	114
34	2nd Ave/Gresham Rd/Clifton Spgs Rd	869	87
36	N Decatur Road / Virginia Highland	1026	103
37	Defoors Ferry Road	841	84
39	Buford Highway	5809	581
40	Peachtree Street / Downtown	1094	109
42	Pryor Road	1390	139
47	I-85 Access Road / Briarwood Road	872	87
49	McDonough Boulevard	2319	232
50	Donald Lee Hollowell Parkway	1950	195
51	Joseph E Boone Boulevard	2390	239
55	Jonesboro Road	2397	240

58	West Lake Avenue / Hollywood Road	1312	131
60	Hightower Road	1439	144
66	Lynhurst Drive / Princeton Lakes	1417	142
68	Benjamin E Mays Drive	1609	161
71	Cascade Road	3178	318
73	Fulton Industrial	4675	467
74	Flat Shoals Road	1319	132
75	Lawrenceville Highway	1406	141
78	Cleveland Avenue	3684	368
79	Sylvan Hills	620	62
81	Venetian Hills / Delowe Drive	1338	134
82	Camp Creek / South Fulton Parkway	2012	201
83	Campbellton Road	4570	457
84	Washington Rd/Camp Crk Marketplace	1852	185
85	Roswell / Mansell Road	1168	117
86	Fairington Road	2300	230
87	Roswell Road / Morgan Falls	2173	217
89	Old National Highway / Union City	3561	356
93	Headland Drive / Main Street	1257	126
94	Northside Drive	811	81
95	Metropolitan Parkway	2845	285
102	North Avenue / Little Five Points	1245	124
103	Peeler Road / N Shallowford Road	604	60
104	Winters Chapel Road	465	47
107	Glenwood	2331	233
110	Peachtree Road / Buckhead	3634	363
111	Snapfinger Woods	1658	166
114	Columbia Drive	1440	144
115	Covington Highway	2458	246
116	Redan Road	2026	203
117	Rockbridge Road / Panola Road	2797	280
119	Hairston Road / Stone Mtn Village	1296	130
120	East Ponce De Leon Avenue	2238	224
121	Memorial Drive / N Hairston Road	4030	403
123	Church Street / North DeKalb Mall	504	50
124	Pleasantdale Road	1661	166
125	Clarkston	2145	214
126	Chamblee-Tucker Road	744	74
132	Tilly Mill Road	695	70
133	Shallowford Road	346	35
140	North Point Parkway	907	91
141	Haynes Bridge Road / Milton	1164	116
142	East Holcomb Bridge Road	130	13
143	Windward Park & Ride	1611	161

148	Mount Vernon Highway	107	11
150	Dunwoody Village	429	43
153	James Jackson Parkway	756	76
155	Pittsburgh	917	92
162	Myrtle Drive / Alison Court	1278	128
165	Fairburn Road	1981	198
172	Sylvan Road / Virginia Avenue	1043	104
178	Empire Blvd / Southside Ind Park	1279	128
180	Roosevelt Highway	1741	174
181	Washington Road / Fairburn	2457	246
183	Barge Road P&R / Lakewood	837	84
185	Alpharetta / Old Milton Parkway	1339	134
186	Rainbow Drive / South DeKalb	2762	276
189	Flat Shoals Road / Scofield Road	2016	202
191	Riverdale / ATL Intl Terminal	1512	151
192	Old Dixie / Tara Boulevard	1334	133
193	Morrow / Jonesboro	2279	228
194	Conley Road / Mt Zion	1037	104
195	Forest Parkway	937	94
196	Upper Riverdale / Southlake	3773	377
201	Six Flags Over Georgia	136	14
221	Memorial Drive Limited	514	51
295	Metropolitan Campus Express	264	26
800	Lovejoy	181	18
809	Monroe Drive / Boulevard	893	89
813	Atlanta University Center	877	88
816	North Highland Avenue	828	83
823	Belvedere	150	15
825	Johnson Ferry Road	154	15
832	Grant Park	649	65
850	Carroll Heights / Fairburn Heights	663	66
853	Collier Heights	709	71
856	Baker Hills / Wilson Mill Meadows	499	50
865	Boulder Park Drive	498	50
867	Peyton Forest / Dixie Hills	713	71
899	Old Fourth Ward	641	64
Totals		165771	16577

2.1.1.2 MARTA Rail

The MARTA rail sampling method was created by rail station entry and time-of-day. The rail sampling was created to allow proper segmentation during the weighting and expansion process described later in this document in the weighting and expansion section. The sampling plan included station to station goals and ensured either minimum 200 riders or a 10 percent sample of riders, whichever was greater. The rail entry level sample goal of 15,051 is shown in Table 3. *Note: Table 3 displays the 10 percent rail station entry goals only.*

Table 3: MARTA Rail 10 Percent Entry Station Level Sample Goals

Entry Station	Average Daily Weekday Ridership	Ridership Sample
Five Points	14713	1000
Georgia State	3826	383
King Memorial	1251	200
Inman Park	2259	226
Edgewood/Candler Park	1061	200
East Lake	1199	200
Decatur	2759	276
Avondale	2482	248
Kensington	4902	490
Indian Creek	4107	411
Peachtree Center	8821	800
Civic Center	2209	221
North Avenue	5273	527
Midtown	5367	537
Arts Center	6340	634
Lindbergh Center	6925	693
Buckhead	3001	300
Medical Center	1461	200
Dunwoody	3089	309
Sandy Springs	2965	297
North Springs	6036	604
Lenox	2456	246
Brookhaven	2156	216
Chamblee	3201	320
Doraville	4967	497
Garnett	1287	200
West End	5029	503
Oakland City	3436	344
Lakewood/Ft McPherson	2821	282
East Point	5743	574
College Park	8061	800
Airport	9228	800
Dome/GWCC	1105	200
Vine City	607	200
Ashby	1419	200
West Lake	1149	200
H. E. Holmes	5164	516
Bankhead	889	200
Totals	148764	15051

2.1.2 Other Transit Providers

The five (5) other transit systems that operate in the Atlanta region include Cherokee Area Transportation System (CATS), Gwinnett County Transit, Hall Area Transit (Gainesville Connection), Cobb Transit Service (CobbLinc), and the State Road and Tollway Authority (SRTA). All other transit agencies were sampled at a 10 percent sample rate and are described below in this sub section.

2.1.2.1 Cherokee Area Transportation System

CATS operates two bus routes that service The City of Canton. Operating without time-of-day definitions, CATS was sampled throughout the entire service day of 8:00am – 4:00pm for both routes. A 10 percent sample for CATS produced a sample goal of nine (9) surveys shown in Table 4 below.

Table 4: CATS 10 Percent Route Sample Goals

Route	Average Daily Weekday Ridership	10% Ridership Sample
100	45	5
200	39	4
Totals	84	9

2.1.2.2 Gwinnett County Transit

Gwinnett County operates local and express services throughout Gwinnett County that connect Gwinnett to downtown Atlanta and northern MARTA rail stations. A 10 percent sample for Gwinnett produced a sample goal of 493 surveys shown in Table 5 below.

Table 5: Gwinnett 10 Percent Route Sample Goals

Route	Average Daily Weekday Ridership	10% Ridership Sample
20	695	70
30	340	34
35	633	63
40	341	34
45	115	12
101	306	31
102	164	16
103	875	88
110	160	16
103A	8	1
10A	747	75
10B	549	55
TOTALS	4,933	493

2.1.2.3 Hall Area Transit (Gainesville Connection)

Gainesville Connection operates five (5) local routes throughout Hall County and The City of Gainesville and Oakwood. A 10 percent sample for Gainesville Connection produced a sample goal of 55 surveys shown in Table 6 below.

Table 6: Gainesville Connection 10 Percent Route Sample Goals

Route	Average Daily Weekday Ridership	10% Ridership Sample
10	139	14
20	92	9
30	99	10
40	133	13
50	83	8
Totals	545	55

2.1.2.4 Cobb Transit Services (CobbLinc)

CobbLinc provides local bus service within Cobb County and provides commuter bus services that extend to downtown Atlanta and connect to MARTA rail stations. A 10 percent sample for CobbLinc produced a sample goal of 933 surveys shown in Table 7 below.

Table 7: CobbLinc 10 Percent Route Sample Goals

Route	Average Daily Weekday Ridership	10% Ridership Sample
10	2,845	285
15	631	63
20	834	83
25	609	61
30	2,120	212
40	468	47
45	296	30
50	825	83
100	306	31
101	115	12
102	148	15
10A	14	1
10B	22	2
10C	10	1
BLUE	52	5
GREEN	36	4
Totals	9,331	933

2.1.2.5 State Road and Tollway Authority (SRTA)

SRTA operates 27 express routes in 12 Atlanta metro counties connecting commuter riders with downtown Atlanta and MARTA rail stations. SRTA was sampled at the pm peak time period only since there was a previous study conducted for SRTA collecting am peak surveys a year prior and the majority of riders that were surveyed in the pm

peak also used the exact route for their am commute. A 10 percent pm peak only sample for SRTA produced a sample goal of 376 surveys shown in Table 8 below.

Table 8: SRTA 10 Percent Route PM Peak Sample Goals

Route	Average Daily Weekday Ridership	10% Ridership Sample
400	83	8
401	74	7
408	37	4
410	69	7
411	144	14
412	167	17
413	120	12
414	112	11
416	140	14
417	32	3
419	304	30
423	149	15
426	437	44
428	58	6
430	160	16
431	159	16
432	241	24
440	169	17
441	66	7
442	68	7
453	153	15
463	263	26
476	171	17
480	108	11
482	17	2
483	142	14
490	78	8
Totals	3720	372

2.2 Survey Instrument

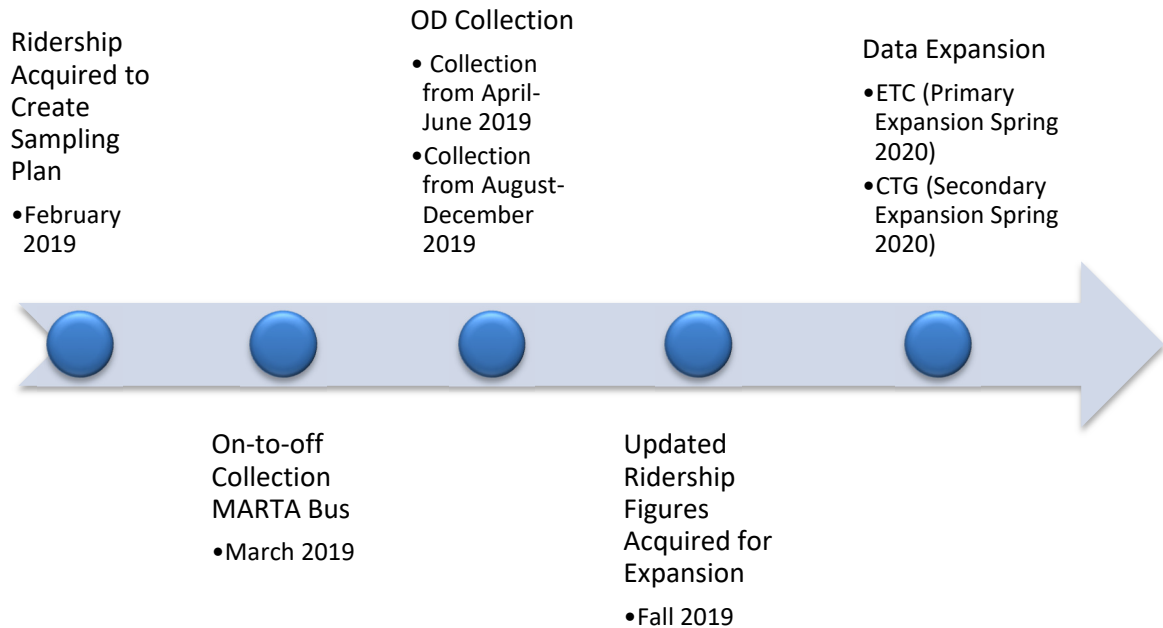
During the survey design process, ARC and ETC Institute collaborated to design the survey instrument (Appendix A). The survey was designed to obtain information in three major categories: OD travel patterns, usage information, and rider demographics. Interviewers who were bilingual were available to administer the survey in languages other than English depending on the language the passenger spoke. For those passengers who didn't speak English and didn't encounter a bilingual interviewer, the interviewer would record the refusal as "Didn't Speak English" and provide information to the passenger to collect a telephone number so someone from the ETC Institute call center could call back later.

2.3 Survey Administration

2.3.1 Project Timeline

Data collection occurred in the spring of 2019 with the On-to-Off survey collection occurring in March and the OD survey collection occurring from April to June 2019. Data collection for the OD survey picked back up in August and ended in December 2020. The figure below shows the general timeline of the major project tasks.

Figure 1 – Timeline of Major Project Tasks



2.3.2 Labor Recruitment and Training

Assembling a team of high-quality surveying staff was one of the most important steps in the OD administration process. ETC Institute collaborated with Stat Team and ANIK to provide two groups of interviewers: On-to-Off surveyors and OD survey interviewers.

The training session focused on the survey purpose and objectives, the survey instrument, scripts on how to respond to passengers' questions, how to use data collection tools correctly, the random sampling protocol, instructions on how to conduct themselves when working with the public, and safety training. Survey staff were instructed to understand that while they were not ARC or any of the transit agencies employees, they were representing the agencies while on transit vehicles or property, and that they always needed to act in a manner that reflected positively on ARC. ARC representatives also participated in all training sessions to provide an overview of the project as well as express their gratitude of the interviewers. There were additional training sessions conducted throughout the data collection process on an as-needed basis but with smaller groups.

Maximizing participation and legitimizing the survey among passengers depended on the public response to the survey staff. To support a good public image, ETC Institute imposed strict dress code standards that required survey staff to wear clean, appropriate clothing to present a casual, yet neat, appearance that ensured professionalism and comfort. Survey staff were provided with interviewer badges and vests to identify interviewers to transit agency staff and passengers to further legitimize their appearance. The badge and dress code standards promoted a professional appearance and reinforced survey legitimacy, which increased passengers' trust in the interviews and the process.

Training On-to-Off Surveyors

The ETC Institute field supervisor created the necessary training materials and conducted the On-to-Off training. The primary tool that was used for the training session was a PowerPoint presentation. The training went over the following details:

- Equipment use and set-up.
- Methodologies for collecting boarding and alighting pairs.
- The importance of achieving 100% coverage of the route.
- How to approach passengers.
- How to handle refusals.
- How to react in various situations that may be encountered.
- Safety training.

Once surveyors had demonstrated that they could perform the On-to-Off counts, the surveyors were invited to field training. The field training provided hands on training that involved the actual conducting of the On-to-Off counts with all passengers. During the field training, surveyors were tested on their proficiency and were provided with additional coaching if needed. Any surveyor deemed unable to perform the On-to-Off count was replaced.

On-to-Off Count Surveyor Roles

The On-to-Off count surveyors were responsible for the distribution and collection of the On-to-Off count cards. Typically, there were two surveyors assigned to each bus with one surveyor covering the front of the bus and a second surveyor positioned at the back of the bus. The surveyor at the front of the bus scanned and distributed bar-coded cards to boarding passengers while the surveyor at the back of the bus collected and scanned the cards as passengers alighted. The surveyors were equipped with handheld scanning devices to capture the boarding and alighting GPS locations and time stamps. The front door surveyor was designated “team leader”. She/he communicated with the bus driver as needed. The rear door surveyor was the dedicated “note taker” who recorded any unusual activity, interruptions, or delays on the route throughout the shift. This ensured there were no unexplained gaps in On-to-Off coverage. The note taker submitted daily shift notes to her/his supervisor at the end of each workday. The supervisor would then add those notes to an ongoing shift notes log maintained by the Field Supervisor throughout the project.

Training OD Interviewers

The ETC Institute field supervisors created the training materials and conducted the OD training. The classroom training session included a PowerPoint presentation to explain the purpose and objectives of the survey, questionnaire content, interviewer procedures and requirements, random sampling protocol, survey logistics, how to maximize response rates (including difficult-to-survey passengers), and the data collection process in a step-by-step format. Other goals of the training included building interviewer staff confidence, helping interview staff feel that they are an important part of the survey’s success and helping them understand the importance of the survey and the long-term benefits to their community.

ETC Institute ensured that the training addressed the following details:

- Tips on intercepting/interacting with non-English speakers and passengers with limited English proficiency.
- Cultural sensitivity.
- Importance of understanding the intent of the questions.
- Instructions on conveying the purpose of the survey to passengers.
- Importance of adhering to our random sampling protocol at the outset of every survey.
- Procedure for properly recording all refusals and completing a short observational assessment of the refusing passenger for internal purposes.

- Importance of data confidentiality and instruction on how to address passenger concerns regarding same.
- Overview of ARC's regional systems covering all topics covered in the tablet questionnaire with route-specific instruction as needed.
- How to handle passenger comments and complaints.
- Safety training.

Toward the end of training, interviewers conducted mock interviews using the survey tablets. This allowed ETC Institute staff to gauge each interviewer's comprehension of the survey instrument and provide feedback as needed. After the training, interviewers were tested on items discussed in training.

Following classroom training, applicants got a chance to conduct interviews under the supervision of an experienced ETC Institute supervisor. Supervisors oversaw interviews and provided feedback on performance throughout the day. Once an interviewer had demonstrated proficiency under direct supervision, he/she was given a field test during which the prospective interviewer conducted surveys on his/her own. During this period, the interviewer's productivity and data quality were remotely assessed by ETC Institute's staff.

2.3.2 Survey Administration Methodology

The tablets were the preferred survey method as the tablets have on-screen mapping features that allow for real-time geocoding of addresses and places based off either address, intersection, or place searches using feedback from respondents. The respondents could then confirm the geocoded location based on the on-screen map that displayed the searched address/location via a Google Map indicator icon. In addition to using the mapping feature to collect the global positioning system coordinates of major survey locations (home address, origin address, destination address, boarding location, and alighting location), the tablet also allowed the interviewer to walk through each question with the respondent. This allowed the interviewer to answer any questions as well as to ensure the accuracy of the data collected. The respondent could also select the answers to the questions directly on the tablet during the demographic section to allow for more privacy.

2.3.3 Survey Procedures Selection of Participants

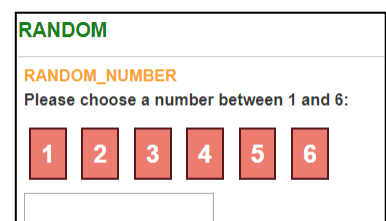
For the OD surveys conducted by tablets, a random number generator (shown in Figure 2) was used to determine which passengers were asked to participate in the survey after boarding the surveying bus.

If six people boarded a bus, the tablet randomly generated a number from 1 to 6. If the answer was 2, the second person who boarded the bus was asked to participate in the survey. If the answer was 1, the first person was asked to participate in the survey, and so forth. The selection was limited to the first six people who boarded a bus/rail at any given stop to ensure the interviewer could keep track of the passengers as they boarded.

For example, if 20 people boarded a bus/rail, the tablet program would randomly pick one of the first six people for the survey. If the interview was refused by the randomly selected passenger, then the passenger who boarded before the passenger selected would be attempted (*after, if 1 was elected*).

Respondents who did not have time to complete the survey during their bus trip or who spoke a language different from the interviewer were given the option of providing their phone numbers to conduct the survey at another time. Those who provided their phone numbers for call back were then contacted by ETC Institute's call center to complete the survey. Those interviewers that did speak the foreign language of the passenger translated the English tablet version and indicated which language the interview was conducted in.

Figure 2 - Random Number Generator



The image shows a digital interface for a random number generator. At the top, the word "RANDOM" is displayed in green. Below it, "RANDOM_NUMBER" is written in orange. A prompt in black text asks the user to "Please choose a number between 1 and 6:". Underneath the prompt are six red square buttons, each containing a white number from 1 to 6. At the bottom of the interface is a white rectangular input field.

OD Survey Procedure

All routes were classified as fixed routes and were surveyed using the tablet method. Fixed routes are routes that provide regular/continuous service throughout the day. All SRTA routes were surveyed using a paper questionnaire that surveyors distributed to passengers to self-complete as they boarded the vehicle.

Interviewers selected people for the survey in accordance with the sampling procedures. Once an interviewer had employed random sampling protocol to identify the passenger to be surveyed, the interviewer:

- Approached the passenger who was identified and asked him or her to participate in the survey.
- If the person refused, the interviewer ended the survey, excused themselves and completed three observational questions.
- If the person agreed to participate, the interviewer asked the respondent if he/she had at least 5 minutes to complete the survey.
- If the person did not have at least 5 minutes on the bus/rail, the interviewer asked the person to provide his/her name and phone number or e-mail address for a later call back and/or e-mail in the likely event that they alighted prior to completing the survey. An e-mail with a link was sent if the person provided an e-mail address only. For passengers providing only phone numbers, a phone interviewer from ETC Institute's call center contacted the respondent and asked him/her to provide the information by phone. This methodology ensured that people who completed short trips on public transit were well represented. Most records were able to be completed on-board with only a nominal amount of records completed by e-mail or phone.
- If the person had at least 5 minutes on the bus, the interviewer began administering the survey to the respondent as a face-to-face interview using a tablet.

2.3.4 In-Field Quality Assurance / Quality Control

The tablets that were used to collect the Origin Destination (OD) survey data contained an on-screen mapping feature that allowed for real-time geocoding of locations based off of: address, intersection, or place searches gathered from feedback of respondents. The respondents then confirmed the geocoded location based on the on-screen map that showed the searched address/location via a Google Map indicator icon.

In addition to using the mapping feature to collect the GPS coordinates of major survey locations (home address, origin address, destination address, boarding location, and alighting location), the tablet program also allowed the interviewer to walk through each question with the respondent to answer any questions as well as to ensure appropriate interpretation of the survey questions.

Field Supervisor Quality Checks

ETC Institute employs full-time Field Supervisors and Assistant Field Supervisors who are solely responsible for: training, scheduling, and managing transit data collection efforts. ETC Institute continually adds steps to improve the Field Supervisors' ability to effectively manage field staff. One way in which Field Supervisors are able to manage their field staff is by the use of an online dashboard that is created for each transit project. The online survey database that stores all the data collected in the field allows for connection to multiple Business Intelligence (BI) dashboards. This allows ETC Institute to create dashboards for Field Supervisors that allows them to instantly see the data collected in the field in a variety of different ways.

They were instantly able to view the number of records completed by route, time period, and direction, which supports effective management of sampling goals. The dashboard also displayed a breakdown of the overall trip information and demographics that were collected. The dashboard then went one step further by providing a breakdown of that same information for each individual interviewer. Individual interviewer data reviews were typically completed while the interviewer is on the bus/train and the findings were discussed with that interviewer when they checked in with the supervisor. This allowed the research team to provide immediate feedback to interviewers to improve their overall performance.

These instant data breakdowns allowed Field Supervisors to ensure that sampling procedures were being followed appropriately and the data collected was representative of the system.

Field Supervisor Online Review Tool

In addition to being able to review various breakdowns of data, Field Supervisors were also able to review each individual record. This was typically done in the field as a way to make sure that trip data was being collected accurately by individual interviewers. Another benefit of Field Supervisors being able to look up individual records by interviewer in database/spreadsheet form, is that it allowed them to call survey respondents in order to check on the accuracy of the data collected, as well as the job performance of the interviewer. Field Supervisors were also able to visually review individual records by using the non-editable version of the online visual review tool. This tool allowed Field Supervisors to see a visual representation of individual surveys. An example screenshot of the Field Supervisor's version of this online tool is shown in the figure below.

Figure 3 – Online Visual Review Tool

Route Code: W Line Light Rail to Line 2082
Date: 2015-11-19 19:29:1
T: NA
D: 0.1(O-B), 2.2(B-A), 0.1(A-D)
OK

SELECT POINT
H O B A D

ORIGIN LOCATION
Location Search
Enter address
PLACE TYPE
Social Visit / Church / Personal
PLACE NAME
0001 Perry St
ORIGIN ADDRESS
0001 Perry St
Denver CO 80204

Home Information Tab
Origin Information Tab
Boarding, Access Mode and Previous Transfers Tab
Alighting, Egress Mode and Next Transfers Tab
Destination Information Tab

Remarks: Please choose... (* Data will be saved when you select the status)

Secret Shopper / Ride Along

Field supervisors or secret shoppers also rode on bus routes to gauge interviewers' demeanor, overall behavior, and adherence to protocols during interviews.

Call Center Field Checks

ETC Institute has an in-house call center that conducts random quality control check calls for each transit project. These calls are similar to the calls made by Field Supervisors just on a larger scale. The call center can conduct hundreds of quality control calls to respondents per project on a weekly basis. The goal of the call is to identify any missing or incorrect elements in the interview as well as gather any feedback regarding the interviewer's job performance during the interview.

Process for Identifying Complete Records

To classify a survey as being completed, the record must have contained all required trip data. ETC Institute has classified required trip data as containing the complete answers to the following:

- Route used
- Direction of route
- Time of trip
- Home address
- Origin address
- Destination address

- Origin type place
- Destination type place
- Access mode
- Egress mode
- Boarding location
- Alighting location

In addition to the required trip data questions, a survey must be marked as complete by the online survey program which occurs only if the interviewer has navigated through every required question on the online survey instrument including demographic questions.

Online Visual Review Tool

ETC Institute has created an online visual review tool that allows for the review of all completed records within the database. This tool shows all components of each individual trip as well as a series of preprogrammed distance and ratio checks as described on subsequent pages. After directions were finalized, the next step was to run each record through the Speed/Distance/Time checks. The figure below is an example of the online visual review tool. It is very similar to the online visual review tool used by Field Supervisors described previously, with the additional functionality of being able to review all aspects of the survey as well as being able to make edits when appropriate.

Figure 4 – Online Visual Review Tool – 2nd Example

The screenshot displays the 'ATLANTA ARC GA 2019 OB SURVEY' interface. The left sidebar contains the following sections:

- ELVIS VIEW**: Includes a 'VIEW OTHER FIELDS' link and a 'ROUTE CODE' dropdown set to 'GWINNETT TRANSIT 10B - Sugarloaf'.
- ROUTE DETAILS**: Includes a 'Date' field (2019-08-12 06:42:), a 'RJE' button, and a 'T: 5:30' field. Below this is a 'D: 1.7(O-B), 9.5(B-A), 0(A-NOON), 6(NOON-NOOFF), 0.2(NOOF-D)' field and a red warning message: 'Walk Egress seems too far!'.
- SELECT POINT**: Includes a row of colored buttons: H (purple), O (green), B (red), A (blue), and D (dark green).
- ORIGIN LOCATION**: Includes a 'Location Search' field with the text 'Enter address'.
- PLACE TYPE**: Includes a dropdown menu set to 'Your HOME'.
- PLACE NAME**: Includes a text field with '2401 Arbor Dr'.

The main map area shows a Google Map of Atlanta with a transit route highlighted in blue and red. The route starts at a point labeled 'NF1' and ends at a point labeled 'S1'. The right sidebar contains a 'ROUTE LIST' with a scrollable list of transit routes, including 'Atlanta Heavy Rail', 'Atlanta Streetcar EASTBOUND', 'Atlanta Streetcar WESTBOUND', 'CHEROKEE TRANSIT (CATS) Route 100', 'CHEROKEE TRANSIT (CATS) Route 200', 'CobbLINC ROUTE 10 - INBOUND TO MARIETTA TRANSFER CTR', 'CobbLINC ROUTE 10 - OUTBOUND FROM MARIETTA TRANSFER CTR', 'CobbLINC ROUTE 10A - NORTHBOUND FROM ATLANTA', 'CobbLINC ROUTE 10A - SOUTHBOUND TO ATLANTA', 'CobbLINC ROUTE 10B - NORTHBOUND FROM ATLANTA', 'CobbLINC ROUTE 10B - SOUTHBOUND TO ATLANTA', 'CobbLINC ROUTE 10C - NORTHBOUND FROM ATLANTA', 'CobbLINC ROUTE 10C - SOUTHBOUND TO ATLANTA', 'CobbLINC ROUTE 15 - INBOUND TO MARIETTA TRANSFER CTR', 'CobbLINC ROUTE 15 - OUTBOUND FROM MARIETTA TRANSFER CTR', 'CobbLINC ROUTE 20 - INBOUND TO MARIETTA TRANSFER CTR', 'CobbLINC ROUTE 20 - OUTBOUND FROM MARIETTA TRANSFER CTR', and 'CobbLINC ROUTE 25 - INBOUND TO CUMBERLAND TRANSFER CTR'.

At the bottom of the interface, there is a 'Remark:' field and a dropdown menu with the text 'Please choose...'. A red note at the bottom right states: '(* Data will be saved when you select the status)'.

2.3.5 Pre-Processing Distance Checks

A series of distance and ratio checks are preprogrammed into the online visual review tool in order to allow for ETC Institute's team of Transit Reviewers to take a more systematic approach in reviewing complete records. The Transit Review Team's process for editing surveys is described in a later section. *Note: The distance and ratio checks described were meant to alert the reviewer that closer evaluation was needed. It did not necessarily indicate that the record was inaccurate or unusable.*

The distances used for the checks were created using the great-circle distance formula which is based on a straight line from point A to point B that takes into account the curvature of the earth.

Access/Egress Mode Distance Check

The table below shows the distance checks for access (Origin to Boarding) and egress modes (Alighting to Destination).

Table 9: Distance Checks for Access and Egress Modes

Distance Check Name	Check	Condition 1	Condition 2	Flag?
Origin to Boarding	Origin to Boarding distance is greater than 1.75 miles	Access Mode - <u>ANY USE OF A VEHICLE</u> (ie, dropped off, rode with others, drove, taxi...)		No
		Access Mode - Walk/Wheelchair/Skateboard	There is at least one transfer from origin to boarding	No
		Access Mode - Walk/Wheelchair/Skateboard	There are no transfers from origin to boarding	Yes
	Origin to Boarding distance is less than .2 miles	Access Mode - <u>ANY USE OF A VEHICLE</u> (ie, dropped off, rode with others, drove, taxi...)		Yes
		Access Mode - Every mode	There is at least one transfer from origin to boarding	Yes
		Access Mode - Walk/Wheelchair/Skateboard	There are no transfers from origin to boarding	No
Alighting to Destination	Alighting to Destination distance is greater than 1.75 miles	Egress Mode - <u>ANY USE OF A VEHICLE</u> (ie, will get picked up, ride with others, drive, taxi...)		No
		Egress Mode - Walk/Wheelchair/Skateboard	There is at least one transfer from alighting to destination	No
		Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	Yes
	Alighting to Destination distance is less than .2 miles	Egress Mode - <u>ANY USE OF A VEHICLE</u> (ie, will get picked up, ride with others, drive, taxi...)		Yes
		Egress Mode - Every mode	There is at least one transfer from alighting to destination	Yes
		Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	No

Origin to Destination Distance Check

The Table below shows the distance checks based on the origin and destination locations.

Table 10: Distance Checks Based on the Origin and Destination Locations

Distance Check Name	Check	Flag Record
Origin to Destination	Origin equals the Destination	Yes
	Origin to Destination is greater than 50 miles	Yes
	Origin to Destination is less than .25 miles	Yes

Table 11: Distance Checks on the Boarding and Alighting Locations

Distance Check Name	Check	Flag Record
Boarding to Alighting	Boarding equals the Alighting	Yes
	Boarding to Alighting is less than .25 miles	Yes

2.3.6 Pre-Processing Ratio Checks

After all transfer checks were completed, the next step in this process involved the application of a series of QA/QC Ratio Checks.

Three ratio checks were conducted for each record. First, the distance between boarding and alighting was divided by the distance between origin and destination. If the rider had a high ratio for this check, the rider was on the bus for an extensive time compared to the origin to destination distance. If the check created an extremely low ratio, the use of transit seemed unnecessary.

Second, the distance between origin and boarding was divided by the distance between origin and destination. If the rider had a high ratio for this check, the origin to boarding distance was excessive compared to the origin to destination.

Lastly, the distance between alighting and destination was divided by the distance between origin and destination. If the rider had a high ratio for this check it meant that the alighting to destination distance was excessive compared to the origin to destination.

The table below describes in more detail the ratio checks used, and the conditions in which a record would be flagged.

Table 12: Ratio Checks

Ratio Checks	Check	Result of Formula	Condition 1	Condition 2	Flag?
Boarding to Alighting distance divided by Origin to Destination distance	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is 1.5 or greater			Yes
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	Access and Egress modes are both Walk/Wheelchair/Skateboard	There are NO transfers involved in the trip	Yes
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	Access or Egress mode - ANY USE OF A VEHICLE		No
	Boarding to Alighting Distance/Origin to Destination Distance	the result of this formula is less than .3	There is at least one transfer involved in the trip		No
Origin to Boarding distance divided by Origin to Destination distance	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	there is at least one transfer from origin to boarding		No
	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Access Mode - ANY USE OF A VEHICLE (ie, dropped off, rode with others, drove, taxi...)		No
	Origin to Boarding Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Access Mode - Walk/Wheelchair/Skateboard	There are no transfers from origin to boarding	Yes
Alighting to Destination divided by Origin to Destination	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	there is at least one transfer from alighting to destination		No
	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Egress Mode - ANY USE OF A VEHICLE (ie, will get picked up, ride with others, drive, taxi...)		No
	Alighting to Destination Distance/Origin to Destination Distance	the result of this formula is 1 or greater	Egress Mode - Walk/Wheelchair/Skateboard	There are no transfers from alighting to destination	Yes

Transit Review Team

ETC Institute has a dedicated team of employees whose main priority is reviewing and editing completed records through the use of an online visual review tool. One of their other key responsibilities is the process of calling and completing "Callback" surveys. Callback surveys are surveys that were unable to be completed in the field. The

“Callback” surveys were conducted within a week of when the initial survey began so that the information of the trip could be more easily be recalled by the respondent.

The Transit Review Team reviewed all complete records collected for the survey, paying special attention to records that were automatically flagged by the online visual review tool. Prior to making edits to any survey, they first attempted to contact the respondent to clarify any questionable answer choices regarding the trip. If no contact was made, or if contact was not possible, the following actions were taken.

Pre-Processing General Issues and Actions

The table below describes the general issues that could occur within a trip where changes may have been appropriate.

Table 13: General Issues

Issue	Description of Issue	Action
Origin/Destination Issue - 1	Origin/Destination appears incorrect because the wrong location of a multiple-location organization was selected	If for example, an Origin/Destination appears illogical based on the college campus that was selected, but an appropriate campus of the same college does appear logical given the other points and answer choices of the trip, then the appropriate campus will be selected.
Origin/Destination Issue - 2	Origin/Destination appears to have been geocoded to the incorrect city/state	If for example, an Origin/Destination appears illogical based on the city/state that was geocoded, but the address/intersection is logical within the trip if the city/state are changed. This occurs occasionally because the surveyor selects the wrong choice from the list of possible address choices that appear in the online survey instrument, then the appropriate address information will be inserted.
Access/Egress Mode	Access/Egress Mode seems illogical based on trip	If the access/egress mode involves the use of a vehicle and the distance from either origin to boarding or alighting to destination is less than .2 miles then the access/egress mode is recoded to walk/walked and that change will be reflected in the database. Unless the terrain of the area makes walking unlikely.
Directionality of Record	Boarding and alighting locations indicate that the trip is going in the opposite direction of what was selected by the surveyor.	Change Direction of Route Selected and if necessary update boarding and alighting locations based on appropriate direction.

2.3.7 Post-Processing Additional Checks

After all records were reviewed by the Transit Review Team, the next step in this process involved the application of a series of QA/QC “non-trip” Checks. Non-trip checks are described as anything not pertaining to the respondent’s actual trip, i.e. demographic information.

Non-trip related checks included:

- Ensuring the respondents who indicated that they were employed also reported that at least one member of their household was employed.
- Ensuring the time of day a survey was completed was reasonable given the published operating schedule for the route.
- Ensuring that the appropriate fare type was used in response to the age of respondent.
- Checking that there is a representative demographic distribution based on age, gender, and income status.
- Removing any personal contact information used for quality control purposes during the data collection portion of the project in order to protect the anonymity of the respondents.

Once all records had gone through the pre-processing and post-processing QA/QC checks, those that were deemed complete and usable were then used to update the completion report used by the Fields Supervisor and Assistant Field Supervisor to ensure that all contractual goals had been met. After the final high-level review was completed, metadata (a codebook) was created in order to suitably explain the data in the database.

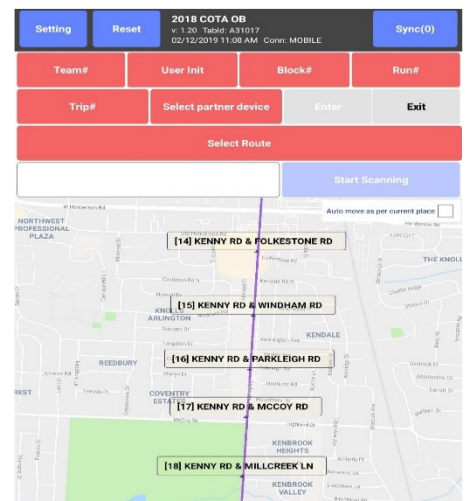
On-to-Off Survey Procedure

The On-to-Off counts were collected using ETC Institute’s proprietary software running on GPS-capable tablets equipped with barcode scanners. Tablets on-board the same bus were paired up before a data collection session began. The passengers’ route, direction, boarding and alighting information (time, latitude, and longitude) were captured with a high degree of accuracy via the following process:

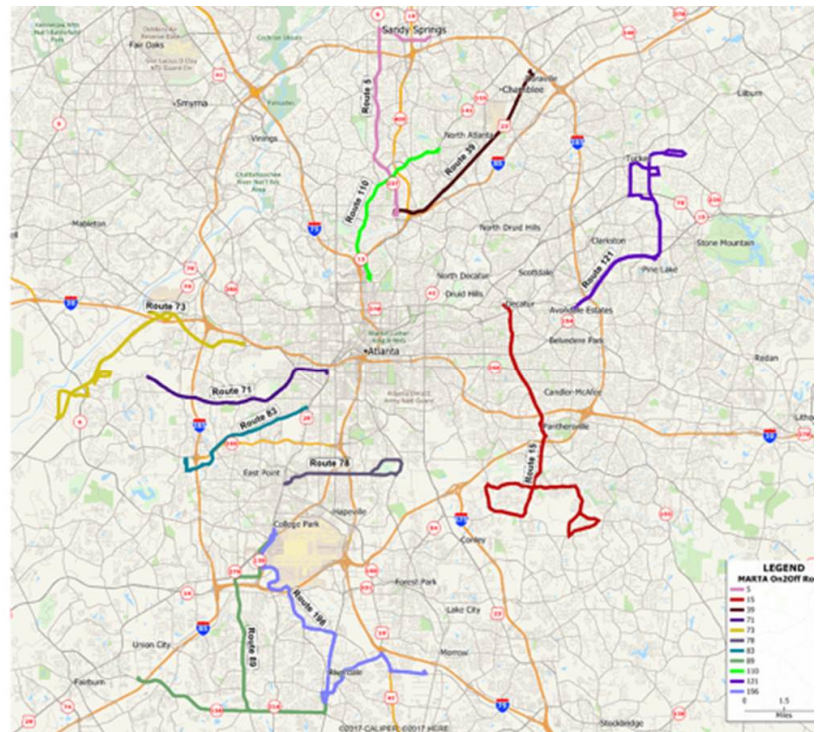
- Transit passengers were asked to participate as they entered the transit vehicle.
- Each passenger entering the bus was handed a barcoded card moments after the card was scanned by ETC Institutes on-board team member.
- Passengers were asked to keep the bar-coded card for the duration of their trip on that transit vehicle.
- Passengers were asked to hand their cards back as they exited the vehicle. The cards were scanned as the passengers exited the bus.

The On-to-Off software sent the scanned data to the On-to-Off server where a server-side processing system evaluated the data and paired up the boarding and alighting locations of each passenger based on the unique barcode, time stamps, and other variables. Before any collection took place, counter staff were trained on every aspect of the on-board process. Supervisory staff administered a variety of quality control checks during tablet set-up, including review of Route #, Team #, Block #, Run #, Bus #, and Partner Tablet ID #. The On-to-Off software was centered on a live map of the current transit route and associated stops. ETC Institute’s on-board data collection staff could follow the map of the route and accurately select the passengers’ boarding and alighting locations. Route termini were clearly marked on the map and the user was alerted when approaching a route terminus, where the session was closed, and a new session initiated when the bus/train began a new run. An example screenshot of the On-to-Off software is shown in Figure 5.

Figure 5 - On-to-Off Software Program



Overall, eleven (11) MARTA routes were included in the On-to-Off collection illustrated in Figure 6 below.



Pre-Processing Quality Assurance / Quality Control

- Sort and delete low confidence records that were created. Confidence levels are created based on the *on-to-off* software's QA/QC algorithm (described below)
- Check completeness of all fields for each record
- Verify the time of day when a survey set was completed was reasonable given the published operating schedule for the route

The record matching algorithm uses the barcode value and time stamp of the scan to match the ON and OFF records. The level of confidence of the match, expressed as a number - e.g. 100 means perfect match – is determined based on auxiliary attributes of the scans falling within certain tolerances or matching expected values. These auxiliary attributes include:

- Paired device ID – the OFF scan is expected to have been captured on a device that was paired up with the ON scan device
- Session Number – an auto-generated globally unique session ID assigned to each scan and is combined with the device ID and the ID of any paired devices
- Time gap between two consecutive candidate scans must be between a minimum and a maximum value, e.g. 1 min to 3 hours; the maximum value is set for the specific transit system under study
- If travel time is greater than X (e.g. 30 min), vehicle speed must be greater than Y (e.g. 5 mph)
- Distance between location of two matching scans must be greater than L (e.g. 0.1 mile)

Post-Processing Quality Assurance / Quality Control

After all addresses were successfully geocoded, the next step in this process involved the application of a series of QA/QC Checks.

Directional Check

Following the boarding and alighting stop locations being geocoded, the direction of travel for each record was confirmed. Stop locations and IDs were then updated based on established direction. The table below shows the actions that were taken if the direction was incorrect.

Table 14: Directionality of Record

Issue	Description of Issue	Suggested Action
Directionality of Record	Boarding and alighting locations indicate that the trip is going in the opposite direction of what was selected by the surveyor.	Change Direction of Route Selected and if necessary update boarding and alighting locations based on appropriate direction.

Speed/Distance/Time Check

After directions were finalized, the next step was to run each record through the Speed/Distance/Time checks. If any of the conditions in the table on the following page, were met, the record was flagged for further review.

Table 15: On-to-Off Check Name

On-to-Off Check Name	Check	Condition 1	Flag?
Speed Check	Checks Speed between boarding and alighting pair	< 1mph	Yes
		>70mph	Yes
Distance Check	Checks Distance between boarding and alighting pair	< 0.12 miles	Yes
		Exceeds route terminus to terminus distance	Yes
Time Check	Checks time between boarding and alighting pair	< 1 minute	Yes
		Exceeds route terminus to terminus average time	Yes

2.3.8 In-Field Quality Assurance/Quality Control

Each day, ETC Institute's field supervisor reviewed each employee's data regarding the following issues to assess whether the employee was conducting the survey properly:

- Distribution of surveys by demographics.
- Distribution of surveys by trip characteristics.

- Length of each survey in minutes.
- Percentage of refusals.

In addition to daily reviews of demographic responses, length, etc., a comprehensive weekly report was created at the direction of the field supervisors which included a detailed itemized breakdown of each interviewer's performance for the week, specifically analyzing distribution of survey responses in relation to the norm. The supervisor would take the corrective action, then add a dated note to the weekly report describing in detail the remedial action taken. The same supervisor would be assigned to follow-up on the issue with the interviewer in question during the current week. If the corrective plan did not prove successful, the interviewer was removed from the schedule, either temporarily pending supplemental training or permanently, where such action was deemed appropriate by the field supervisor.

ETC Institute's field supervisors routinely conducted spot checks on assigned bus routes and made unannounced visits to stops and stations. Supervisors also utilized anonymous "secret shoppers" to pose as passengers on buses to check up on staff attitude, appearance, performance, and compliance with ETC Institute rules and procedures. Also, field supervisors could verify if an interviewer was on their assigned route by viewing the displayed geographic locations of where the interviews were taking place as well as track productivity and data accuracy down to the second it occurred. These checks ensured data integrity and helped identify any interviewer who was falling short of our standards for field survey collection.

3. Survey Weighting and Expansion

ARC interviews were expanded by route, direction, time-of-day, and by segments containing the boarding and corresponding alighting location of the passenger. The following sections describe the methodology that was used to develop the unlinked expansion factors.

When survey quantity goals are created, they are typically based upon a percentage of the average weekday ridership for the routes in the system. These are further broken down by time periods and directions. The time periods that are created (e.g., 9 am to 3 pm) are based off the specific needs of ARC systems.

The purpose of developing survey quantity goals is to collect an appropriate number of survey records that will be expanded to represent the total average weekday ridership of each route by time period and direction. To further increase the specificity of the expansion process, segments were created for each route and for each. Stops were grouped into segments along that route so that boarding segments could be paired with alighting segments when creating the expansion factor. Segmentation occurs on bus routes because it is unrealistic to expand bus survey data at the stop level.

Stop/station-level expansion is generally reserved for rail lines as passengers more typically remember the stop they got on and off the rail. Rail expansion is similar to Type 1 expansion with the only difference being the stations are not segmented into 3 segments but are rather kept at the station-level.

The ridership provided for the goal creation is not the ridership used for expansion. Earlier in this report, goals were shown based on ridership figures provided in the fall of 2018. Once the OD data collection was finished then the various agencies provided updated ridership data that was representative of the OD collection period. That updated ridership data was used for expansion purposes described in this section.

3.1 Route Segmentation Procedures

3.1.1 Route Segmentation with APC Data

There are two ways ETC Institute creates segments for bus routes: 1) boarding percentages of the route from APC data by direction, and 2) based on the number of stops for the route and direction. When possible, segmenting routes using APC data is the preferred way to segment routes as opposed to segmenting routes based on the number of stops.

Routes with both APC data and On-to-Off counts are separated based on direction, then divided into three segments based on the total boardings. After approximately one-third of the route's total APC ridership has boarded, a new segment begins. After approximately two-thirds of the route's total APC ridership has boarded the third segment begins. The table at the top of the following page is a simplified example of APC Data Segmenting for a route with both APC data and On-to-Off counts. *(Note: Iterative Proportional Fitting (IPF) is discussed later in Type 1 expansion later this document. For IPF to work properly, the boarding totals must match the alighting totals. For this reason, APC alightings are adjusted using a multiplying factor in order to make sure their overall totals match the overall boarding totals. These are typically nominal alterations, however, if there are significant differences in boarding and alighting totals by direction of a route, it may require additional review of the functionality of the route to ensure that the surveys are both collected and expanded appropriately.)*

Table 16: Route Segmenting: APC Provided Routes with On-to-Off counts

Segmentation with APC Example					
Direction: Eastbound	APC DATA		Segmentation		
	Boardings	Alightings	Running Total of Boardings	Running Percentage of Total Boardings	Segment
Stops	Boardings	Alightings	Boardings	Boardings	Segment
Stop 1	35	0	35	23.0%	1
Stop 2	20	10	55	36.2%	1
Stop 3	20	5	75	49.3%	2
Stop 4	15	10	90	59.2%	2
Stop 5	5	12	95	62.5%	2
Stop 6	4	4	99	65.1%	2
Stop 7	19	4	118	77.6%	3
Stop 8	12	3	130	85.5%	3
Stop 9	15	5	145	95.4%	3
Stop 10	3	10	148	97.4%	3
Stop 11	2	15	150	98.7%	3
Stop 12	2	11	152	100.0%	3
Stop 13	0	10	152	100.0%	3
Stop 14	0	15	152	100.0%	3
Stop 15	0	38	152	100.0%	3
	152	152			

If On-to-Off counts are not collected, but APC data is available, those routes are typically segmented into 2 segments by time period and direction boarding totals. The reason for that is you can only accurately determine the flows between two segments when you only have APC data. Those routes are segmented similarly to the process above with the main difference being that the second segment begins after approximately half of the route's total APC ridership has boarded. When a route is segmented in half, you have the possibility of three boarding to alighting cell combinations: board segment 1 to alight segment 1, board segment 1 to alight segment 2, board segment 2 to alight segment 2. *Note: board segment 2 to alight segment 1 is not possible as that would indicate the individual was traveling in the opposite direction. Also, some route directions may only receive 2 segments if one stop (generally the first boarding stop for the specific route direction) has an inordinately high boarding percentage of greater than 50%.* When you have 3 segments you have twice (6) the number of possible boarding to alighting pair combination possibilities.

3.1.2 Route Segmentation without APC Data

Routes without APC data are divided into three segments based on the total number of stops. After approximately one-third of the route's stops occurred, a new segment begins. After approximately two-thirds of the route's stops have occurred, the final segment begins. Below is an example of segmenting without APC Data.

Table 17: Route Segmenting: Non-APC Provided Route

Segmentation without STOP-LEVEL RIDERSHIP Example														
Direction: Eastbound														
Stops	Stop 1	Stop 2	Stop 3	Stop 4	Stop 5	Stop 6	Stop 7	Stop 8	Stop 9	Stop 10	Stop 11	Stop 12	Stop 13	Stop 14
Segment	1	1	1	1	1	2	2	2	2	2	3	3	3	3

3.3 Expansion Types

The type of bus data expansion conducted depended on the data available for the specific route. The three types of data that created the combinations that guided the type of expansion used were:

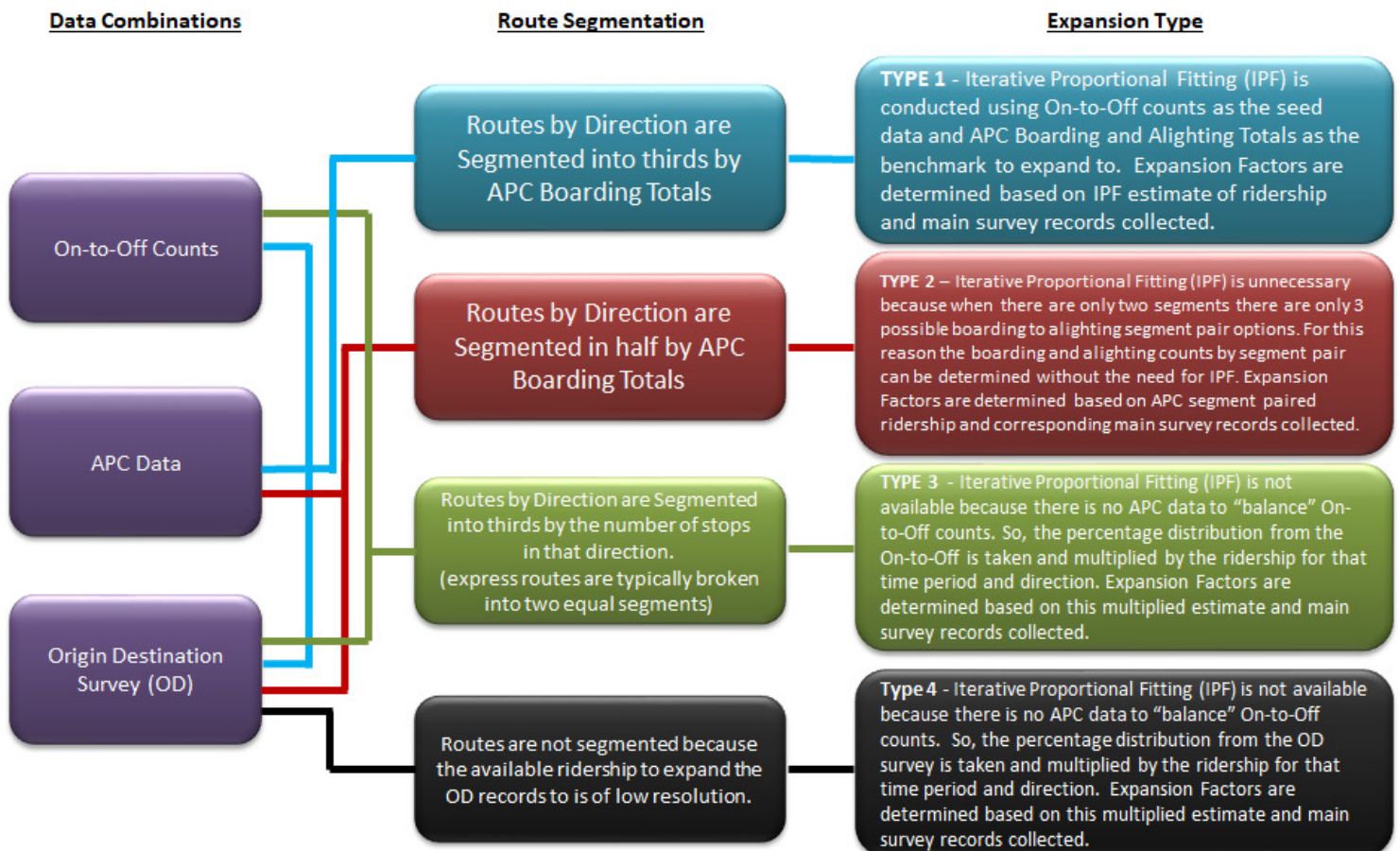
1. Stop-Level Ridership/Automatic Passenger Counter (APC) Data (from ARC agencies),
2. On-to-Off counts data (collected by ETC Institute), and
3. OD Survey Data (collected by ETC Institute).

These three different data types determine the type of expansion (1, 2, 3, or 4 as shown below) that will be used for a route.

Notes: 1) All types of expansion are conducted at the route, time period and direction level. Some more rudimentary expansion occurs when the level of ridership information is of a lower resolution. 2) During Iterative Proportional Fitting, the On-to-Off data serves as the “Seed” data while the APC boarding and alighting counts serve as the totals or “Benchmarks” that the On-to-off data is expanded to. After those two pieces of data finish going through the IPF process the result is a final estimate of ridership flows between segment pairs for that route, direction, and time period. These final estimated segment to segment pair ridership flow counts are then divided by the corresponding number of OD surveys in the same segment to segment pair. 3) Type 3 expansion was not utilized for this project.

The figure below shows the data type (On-to-off counts, APC data, OD data) combinations along with the corresponding types of route segmentation and type of expansion used.

Figure 7 – Data Combination, Route Segmentation, & Expansion Type

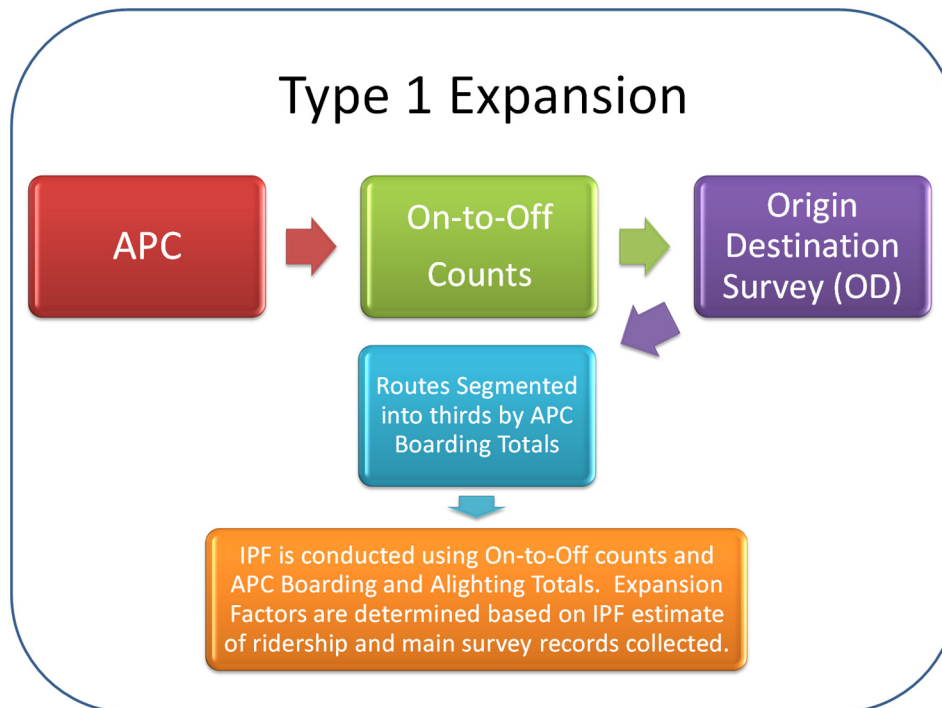


In the subsequent explanation of expansion types, Iterative Proportional Fitting (IPF) is utilized where possible. IPF is an algorithm ETC Institute utilizes to balance the differences between the ridership projected from the On-to-Off counts and the APC ridership for each segment. Further detail on the IPF process is explained under Type 1 expansion.

Type 1 Expansion: Routes with APC Data, On-to-Off Counts, and OD Survey Data

Of the four types of bus expansion discussed, Type 1 Expansion is the preferred method as it incorporates all three types of data available. Typically, On-to-Off data collection is reserved for more heavily traveled routes, so this type of expansion was conducted on the more heavily traveled routes in the system and occurred after route stops were divided into *three segments based on total boarding distribution by direction. The APC daily ridership totals were provided by the appropriate agencies. The segments were then appended to both the On-to-Off counts and the OD data.

Figure 8 – Type 1 Expansion



An example of the methodology for Type 1 Expansion is as follows:

Type 1: Expansion Methodology for Bus Routes with Stop-Level APC Data, On-to-Off Data, and OD Survey Data

Once the segments were appended to the On-to-Off counts, APC data, and OD Survey databases, the records were ready for expansion. A simplified version of the process for how the data was expanded in Type 1 Expansion is explained below:

Figure 8 shows the segmented results for the On-to-Off counts that were administered for a certain route, direction, and time period. Each row in the table identifies the segment where passengers boarded the bus. The columns in the table identify where passengers alighted the bus. For example, 20 of the On-to-Off counts had passenger board in segment 2 and alighting in segment 3.

Note: The On-to-Off counts serve as the seed data in the IPF process while the APC boarding totals and alighting totals serve as the “Benchmark” totals that the On-to-Off counts are expanded to.

Figure 9: Results of the On-to-Off Survey

Route: Example Eastbound (6am-9am)		ACTUAL RIDERSHIP COUNTS FROM THE ON/OFF SURVEY		
Segment	Total	1	2	3
1	60	5	15	40
2	45		25	20
3	10			10
Total	115	5	40	70

Figure 9 shows the distribution of the data in Figure 8 expressed as a percentage of all boardings for the specific time period and direction. Figure 9 was created by dividing each On-to-Off cell in Figure 8 by the sum of all On-to-Off counts in Figure 8, which is 115. For example, 20/115 (17.4 percent) of all trips boarded in segment 2 and alighted in segment 3 as shown in Figure 9.

Figure 10: Distribution of the On-to-Off Survey

Route: Example Eastbound (6am-9am)		PERCENTAGE DISTRIBUTION OF RIDERSHIP COUNTS FROM THE ON/OFF SURVEY		
Segment	Total	1	2	3
1	52.2%	4.3%	13.0%	34.8%
2	39.1%	0.0%	21.7%	17.4%
3	8.7%	0.0%	0.0%	8.7%
Total	100.0%	4.3%	34.8%	60.9%

The total ridership for the route, time period, and direction was applied to the On-to-Off distribution percentages shown in Figure 9.

This produces an initial estimate of the ridership flow for the boarding segment to the alighting segment as shown in Figure 10. Applying the actual ridership of 320 creates an initial estimate of 56 trips (17.4% x 320) boarding in segment 2 and alighting in segment 3.

Figure 11: Initial Estimate of Ridership Flows Between Station

(percentages in table 2 were applied to the total boardings for this time period in this direction)				
Route: Example Eastbound (6am-9am)		PROJECTED RIDERSHIP BASED ON THE ON-TO-OFF SURVEY		
Segment	Total	1	2	3
1	167	14	42	111
2	125	0	70	56
3	28	0	0	28
Total	320	14	111	195

In order to develop a more accurate estimate of the ridership flows between segments on each route, ETC Institute developed an Iterative Proportional Fitting (IPF) Algorithm to balance the differences between the ridership projected from the On-to-Off counts (shown in Figure 10) and the APC ridership for each segment (shown in Figure 11). The IPF process is described below:

Figure 12: Boardings and Alightings by Station

Route: Example Eastbound (6am-9am)				
Average Weekday Ridership	Total	1	2	3
BOARDINGS	320	100	100	120
ALIGHTINGS	320	20	100	200
DIFFERENCE FROM PROJECTED				
BOARDINGS	0	-67	-25	92
ALIGHTINGS	0	6	-11	5

Step 1: Correction for the Boardings

The estimated ridership from the On-to-Off counts for each route (as shown in Figure 10) was multiplied by the ratio of the actual boardings from Stop-Level Ridership/APC Data for each segment by the estimated boardings for each segment. For example, if the actual boardings for Segment 1 were 120 and the estimated boardings were 100, each cell associated with Segment 1 would have been multiplied by 1.2 (120/100) to adjust the estimated boardings to actual boardings.

Step 2: Correction for the Alightings

Once the correction in Step 1 was applied, the estimated boardings would be equal to the actual boardings. However, the adjustment to the boardings total may have changed the alighting estimates. To correct the alighting estimates, the new values calculated in Step 1 were adjusted by multiplying the ratio of the actual alightings from the Stop-Level Ridership/APC Data for each stop by the estimated alightings for each segment from Step 1. For example, if the actual alightings for Segment 2 were 220 and the estimated alightings from Step 1 were 200, each cell associated with Segment 2 would have been multiplied by 1.1 (220/200) to adjust the estimated alightings from Step 1 to actual alightings.

The processes described in Steps 1 and 2 were repeated sequentially until the difference between the actual and estimated boardings and alightings was zero. Figure 12 shows that after seven balancing iterations in this algorithm, there were no differences between the projected distribution and the actual boardings and alightings.

Figure 13: 7th Step of Iterative Balancing to Correct Distribution of Ridership by Alighting Location

Segment	Total	DIFFERENCE FROM ACTUAL BOARDINGS	1	2	3
1	100	0	20	32	49
2	100	0	0	68	32
3	120	0	0	0	120
Total	320	0	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0		0	0	0
7th STEP of ITERATIVE BALANCING TO CORRECT DISTRIBUTION OF RIDERSHIP BY BOARDING LOCATION					
Segment	Total	DIFFERENCE FROM ACTUAL BOARDINGS	1	2	3
1	100	0	20	32	48
2	100	0	0	68	32
3	120	0	0	0	120
Total	320	0	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0		0	0	0

The final estimate for ridership flows is shown in Figure 13.

Figure 14: Final Estimate of Ridership Flows Between Stations

Route: Example Eastbound (6am-9am)				
Segment	Total	1	2	3
1	100	20	32	48
2	100	0	68	32
3	120	0	0	120
Total	320	20	100	200
DIFFERENCE FROM ACTUAL ALIGHTINGS	0	0	0	0

The actual number of OD records completed for each boarding to alighting segment pair is shown in Figure 14. To calculate the expansion factors, the final estimate of ridership between segments shown in Figure 13 was divided by the actual number of OD records collected, as shown in Figure 14. This calculation produces the expansion factors shown in Figure 15. For example, the 32 estimated passengers projected to board in segment 2 and alight in segment 3 were divided by the 10 OD records to produce an expansion factor of 3.15 to be applied to records who board in segment 2 and alighting in segment 3 as shown in Figure 15.

Figure 15: Number of Completed Surveys

Route: Example Eastbound (6am-9am)				
Segment	Total	1	2	3
1	32	3	9	20
2	17		7	10
3	8			8
Total	57	3	16	38

Figure 16: Weighting Factors

Route: Example Eastbound (6am-9am)				
Segment	Boarding Segment Expansion Factors	1	2	3
1	3.13	6.67	3.50	2.42
2	5.88	0.00	9.78	3.15
3	15.00	0.00	0.00	15.00
Alighting Segment Expansion Factors	5.61	6.67	6.25	5.26

The following routes were expanded using the Type 1 expansion method described on the previous pages:

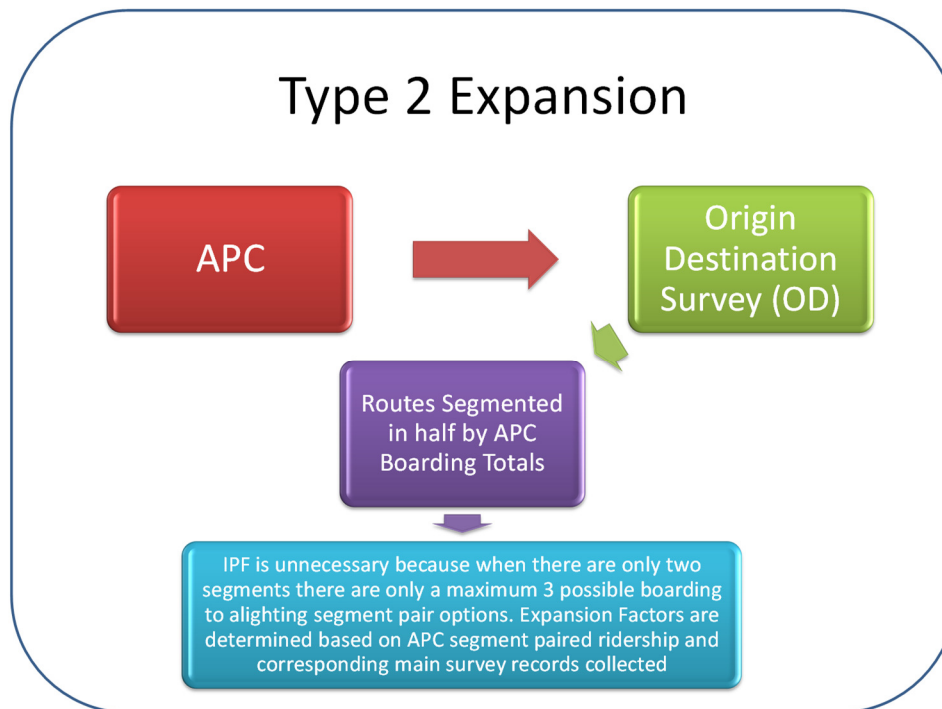
Table 18: Routes Expanded Using Type 1 Expansion

Type	Agency	Route Surveyed
Type 1	MARTA	MARTA 110 - Church Street / North DeKalb Mall NORTHBOUND
Type 1	MARTA	MARTA 110 - Church Street / North DeKalb Mall SOUTHBOUND
Type 1	MARTA	MARTA 121 - Memorial Drive / N Hairston Road NORTHBOUND
Type 1	MARTA	MARTA 121 - Memorial Drive / N Hairston Road SOUTHBOUND
Type 1	MARTA	MARTA 15 - Candler Road NORTHBOUND
Type 1	MARTA	MARTA 15 - Candler Road SOUTHBOUND
Type 1	MARTA	MARTA 196 - Upper Riverdale / Southlake NORTHBOUND
Type 1	MARTA	MARTA 196 - Upper Riverdale / Southlake SOUTHBOUND
Type 1	MARTA	MARTA 39 - Buford Highway NORTHBOUND
Type 1	MARTA	MARTA 39 - Buford Highway SOUTHBOUND
Type 1	MARTA	MARTA 5 - Piedmont Road / Sandy Springs NORTHBOUND
Type 1	MARTA	MARTA 5 - Piedmont Road / Sandy Springs SOUTHBOUND
Type 1	MARTA	MARTA 71 - Cascade Road EASTBOUND
Type 1	MARTA	MARTA 71 - Cascade Road WESTBOUND
Type 1	MARTA	MARTA 73 - Fulton Industrial NORTHBOUND
Type 1	MARTA	MARTA 73 - Fulton Industrial SOUTHBOUND
Type 1	MARTA	MARTA 78 - Cleveland Ave EASTBOUND
Type 1	MARTA	MARTA 78 - Cleveland Ave WESTBOUND
Type 1	MARTA	MARTA 83 - Campbellton Road EASTBOUND
Type 1	MARTA	MARTA 83 - Campbellton Road WESTBOUND
Type 1	MARTA	MARTA 89 - Old National Highway / Union City NORTHBOUND
Type 1	MARTA	MARTA 89 - Old National Highway / Union City SOUTHBOUND
Type 1	MARTA	Atlanta Heavy Rail

Type 2 Expansion: Bus Routes with APC Data, OD Survey Data, but No On-to-Off Counts Data

For Type 2 expansion, On-to-Off counts are not collected; however, these routes still have APC data available. This type of expansion divides the stops into *two* segments based on total boarding distribution by direction. Iterative Proportional Fitting (IPF) is unnecessary because when there are only 2 segments there are only a maximum of 3 possible boarding to alighting segment pair options. The boarding and alighting counts by segment pair can be determined without the need for IPF.

Figure 17 – Type 2 Expansion



After the segmentation process, the segments were then appended to the APC dataset and OD dataset. The next step was to determine how much ridership belonged into each paired boarding to alighting segment for each route, direction, and time period. The figure below shows an example of what the segments look like after being appended to the APC data for the appropriate route, direction, and time period.

Figure 18 – Segments Example for Type 2 Expansion

Route X Eastbound during the AM Peak			
Stops	Boardings	Alightings	Segment
Stop 1	15	0	1
Stop 2	3	3	1
Stop 3	5	4	1
Stop 4	3	7	1
Stop 5	3	3	1
Stop 6	4	3	2
Stop 7	3	4	2
Stop 8	10	5	2
Stop 9	8	10	2
Stop 10	7	5	2
Stop 11	1	8	2
Stop 12	0	10	2
	62	62	

In the previous figure you can see the boardings and alightings for each stop along with the segments. With two segments you have three possible boarding to alighting pair options: a) boarding segment 1 to alighting segment 1, b) boarding segment 1 to alighting segment 2 and c) boarding segment 2 to alighting segment 2. Boarding segment 2 to alighting segment 1 is not an option as that means the rider would be going in the opposite direction. In the case of this example, the rider would be heading westbound if they boarded segment 2 and alighted on segment 1. In order to determine the ridership for the possible boarding to alighting pairs in this example we start with boarding segment 1 to alighting segment 1. This is simple to determine as you simply add up the alightings for those stops associated with segment 1 which equals 17. Since these 17 people alighted in segment 1 that means they must have boarded on stops within segment 1, so boarding to alighting pair (1 to 1) for this route, time period and direction has 17 boardings and 17 alightings. For boarding to alighting pair (2 to 2) instead of looking at the alightings we instead look at the boardings. Adding up the boardings for segment 2 in the example above shows 33 total boardings. If those riders boarded within segment 2, then they must have alighted within segment 2 as well which means boarding to alighting pair (2 to 2) for this route, time period and direction has 33 boardings and 33 alightings. This only leaves boarding to alighting segment pair 1 to 2. This can be determined two different ways. Adding up all the boardings for segment 1 gives us a total of 29 boardings. We have already determined that 17 of those segments 1 boardings alighted within segment 1, which means the remaining segment 1 boardings must have alighted within segment 2, which gives us 12 boardings and 12 alightings for segment pair 1 to 2 (29-17). Likewise, you can sum up the total number of alightings for segment 2 which equals 45 alightings. We have already determined that 33 of those segments 2 alightings boarded within segment 2, which means the remaining segment 2 alightings must have boarded within segment 1, which also gives us 12 boardings and 12 alightings for segment pair 1 to 2 (45-33).

The final step in the process is simply to append the appropriate boarding and alighting segments to each record in the OD dataset based on route, direction, time period, boarding location, and alighting location. Then divide the appropriate segment to segment pair ridership, calculated as described previously, by the corresponding number of records that match the same route, direction, time period and boarding segment to alighting segment. For example, in the previously described scenario for Route X heading eastbound in the “AM Peak” time period we had 12 riders boarding on segment 1 and alighting on segment 2. If we had 4 OD surveys that were also Route X heading eastbound during the “AM Peak” time period that boarded within segment 1 and alighted within segment 2, we would just divide 12 riders by 4 surveys to come up with an unlinked weight factor of 3 for each of the 4 OD surveys. These unlinked weight factors are then appended to the OD dataset, summed by route, direction, and time period to ensure that the total summed unlinked weight factors match the provided APC boardings by route, direction, and time period.

The following routes were expanded using the Type 2 expansion method described on the previous page:

Table 19: Routes Expanded Using Type 2 Expansion

Type	Agency	Route Surveyed
Type 2	CLC	CobbLINC ROUTE 10 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 10 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 10A - NORTHBOUND FROM ATLANTA
Type 2	CLC	CobbLINC ROUTE 10A - SOUTHBOUND TO ATLANTA
Type 2	CLC	CobbLINC ROUTE 10B - NORTHBOUND FROM ATLANTA
Type 2	CLC	CobbLINC ROUTE 10B - SOUTHBOUND TO ATLANTA
Type 2	CLC	CobbLINC ROUTE 10C - NORTHBOUND FROM ATLANTA
Type 2	CLC	CobbLINC ROUTE 10C - SOUTHBOUND TO ATLANTA
Type 2	CLC	CobbLINC ROUTE 15 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 15 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 20 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 20 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 25 - INBOUND TO CUMBERLAND TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 25 - OUTBOUND FROM CUMBERLAND TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 30 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 30 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 40 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 40 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 45 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 45 - OUTBOUND FROM MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 50 - INBOUND TO MARIETTA TRANSFER CTR
Type 2	CLC	CobbLINC ROUTE 50 - OUTBOUND FROM MARIETTA TRANSFER CTR

Type	Agency	Route Surveyed
Type 2	GWN	GWINNETT TRANSIT 101 - I-985 Park & Ride - Atlanta Downtown to I-985 Park & Ride
Type 2	GWN	GWINNETT TRANSIT 101 - I-985 Park & Ride - Atlanta I-985 Park & Ride to Downtown
Type 2	GWN	GWINNETT TRANSIT 102 - Indian Trail Park & Ride - Atlanta Downtown to Indian Trail Park & Ride
Type 2	GWN	GWINNETT TRANSIT 102 - Indian Trail Park & Ride - Atlanta Indian Trail Park & Ride to Downtown
Type 2	GWN	GWINNETT TRANSIT 103 - Sugarloaf Mills Park & Ride - Atlanta Downtown to Sugarloaf Mills Park & Ride
Type 2	GWN	GWINNETT TRANSIT 103 - Sugarloaf Mills Park & Ride - Atlanta Sugarloaf Mills Park & Ride to Downtown
Type 2	GWN	GWINNETT TRANSIT 10A - Sugarloaf - Gwinnett Transit Center - Doraville via Satellite To Doraville MARTA Station
Type 2	GWN	GWINNETT TRANSIT 10A - Sugarloaf - Gwinnett Transit Center - Doraville via Satellite To Sugarloaf Mills Park & Ride
Type 2	GWN	GWINNETT TRANSIT 110 - Emory University / CDC Emory University to Indian Trail, Sugarloaf Park & Ride
Type 2	GWN	GWINNETT TRANSIT 110 - Emory University / CDC Sugarloaf Park & Ride, Indian Trail to Emory University
Type 2	GWN	GWINNETT TRANSIT 20 - Beaver Ruin - Doraville To Beaver Ruin & Price Place
Type 2/Type 4	GWN	GWINNETT TRANSIT 20 - Beaver Ruin - Doraville To Doraville MARTA Station
Type 2	GWN	GWINNETT TRANSIT 30 - Lilburn - Gwinnett Transit Center To Gwinnett Transit Center
Type 2	GWN	GWINNETT TRANSIT 30 - Lilburn - Gwinnett Transit Center To Live Oak & Thompson
Type 2	GWN	GWINNETT TRANSIT 35 - Norcross - Doraville To Doraville MARTA Station
Type 2	GWN	GWINNETT TRANSIT 35 - Norcross - Doraville To Peachtree Pkwy @ The Forum
Type 2	GWN	GWINNETT TRANSIT 40 - Lawrenceville - Gwinnett Transit Center - Sugarloaf Mills To Gwinnett Transit Center
Type 2	GWN	GWINNETT TRANSIT 40 - Lawrenceville - Gwinnett Transit Center - Sugarloaf Mills To Sugarloaf Pkwy & Five Forks Trickum Rd
Type 2	GWN	GWINNETT TRANSIT 45 - Sugarloaf Mills - Georgia Gwinnett College To Gwinnett Medical Resource Center
Type 2	GWN	GWINNETT TRANSIT 45 - Sugarloaf Mills - Georgia Gwinnett College To Sugarloaf Mills Park & Ride

Type	Agency	Route Surveyed
Type 2	MARTA	MARTA 1 - Marietta Blvd/Joseph E Lowery Blvd NORTHBOUND
Type 2	MARTA	MARTA 1 - Marietta Blvd/Joseph E Lowery Blvd SOUTHBOUND
Type 2	MARTA	MARTA 102 - North Avenue / Little Five Points EASTBOUND
Type 2	MARTA	MARTA 102 - North Avenue / Little Five Points WESTBOUND
Type 2	MARTA	MARTA 103 - Peeler Road / N Shallowford Road NORTHBOUND
Type 2	MARTA	MARTA 103 - Peeler Road / N Shallowford Road SOUTHBOUND
Type 2	MARTA	MARTA 104 - Winters Chapel Road NORTHBOUND
Type 2	MARTA	MARTA 104 - Winters Chapel Road SOUTHBOUND
Type 2	MARTA	MARTA 107 - Glenwood EASTBOUND
Type 2	MARTA	MARTA 107 - Glenwood WESTBOUND
Type 2	MARTA	MARTA 111 - Snapfinger Woods EASTBOUND
Type 2	MARTA	MARTA 111 - Snapfinger Woods WESTBOUND
Type 2	MARTA	MARTA 114 - Columbia Drive NORTHBOUND
Type 2	MARTA	MARTA 114 - Columbia Drive SOUTHBOUND
Type 2	MARTA	MARTA 115 - Covington Highway EASTBOUND
Type 2	MARTA	MARTA 115 - Covington Highway WESTBOUND
Type 2	MARTA	MARTA 116 - Redan Road EASTBOUND
Type 2	MARTA	MARTA 116 - Redan Road WESTBOUND
Type 2	MARTA	MARTA 117 - Rockbridge Road / Panola Road EASTBOUND
Type 2	MARTA	MARTA 117 - Rockbridge Road / Panola Road WESTBOUND
Type 2	MARTA	MARTA 119 - Hairston Road / Stone Mtn Village EASTBOUND
Type 2	MARTA	MARTA 119 - Hairston Road / Stone Mtn Village WESTBOUND
Type 2	MARTA	MARTA 12 - Howell Mill Road / Cumberland NORTHBOUND
Type 2	MARTA	MARTA 12 - Howell Mill Road / Cumberland SOUTHBOUND
Type 2	MARTA	MARTA 120 - East Ponce De Leon Avenue EASTBOUND
Type 2	MARTA	MARTA 120 - East Ponce De Leon Avenue WESTBOUND
Type 2	MARTA	MARTA 123 - Church Street / North DeKalb Mall NORTHBOUND
Type 2	MARTA	MARTA 123 - Church Street / North DeKalb Mall SOUTHBOUND
Type 2	MARTA	MARTA 124 - Pleasantdale Road EASTBOUND
Type 2	MARTA	MARTA 124 - Pleasantdale Road WESTBOUND
Type 2	MARTA	MARTA 125 - Clarkston / Northlake NORTHBOUND
Type 2	MARTA	MARTA 125 - Clarkston / Northlake SOUTHBOUND
Type 2	MARTA	MARTA 126 - Chamblee-Tucker Road EASTBOUND
Type 2	MARTA	MARTA 126 - Chamblee-Tucker Road WESTBOUND
Type 2	MARTA	MARTA 132 - Tilly Mill Road NORTHBOUND
Type 2	MARTA	MARTA 132 - Tilly Mill Road SOUTHBOUND
Type 2	MARTA	MARTA 133 - Shallowford Road NORTHBOUND
Type 2	MARTA	MARTA 133 - Shallowford Road SOUTHBOUND
Type 2	MARTA	MARTA 14 - 14th Street / Blandtown EASTBOUND
Type 2	MARTA	MARTA 14 - 14th Street / Blandtown WESTBOUND
Type 2	MARTA	MARTA 140 - North Point Parkway NORTHBOUND
Type 2	MARTA	MARTA 140 - North Point Parkway SOUTHBOUND

Type	Agency	Route Surveyed
Type 2	MARTA	MARTA 141 - Haynes Bridge Road / Milton NORTHBOUND
Type 2	MARTA	MARTA 141 - Haynes Bridge Road / Milton SOUTHBOUND
Type 2	MARTA	MARTA 142 - East Holcomb Bridge Road EASTBOUND
Type 2	MARTA	MARTA 142 - East Holcomb Bridge Road WESTBOUND
Type 2	MARTA	MARTA 143 - Windward Park & Ride NORTHBOUND
Type 2	MARTA	MARTA 143 - Windward Park & Ride SOUTHBOUND
Type 2	MARTA	MARTA 148 - Mount Vernon Highway EASTBOUND
Type 2	MARTA	MARTA 148 - Mount Vernon Highway WESTBOUND
Type 2	MARTA	MARTA 150 - Perimeter Center / Dunwoody Village EASTBOUND
Type 2	MARTA	MARTA 150 - Perimeter Center / Dunwoody Village WESTBOUND
Type 2	MARTA	MARTA 153 - James Jackson Parkway NORTHBOUND
Type 2	MARTA	MARTA 153 - James Jackson Parkway SOUTHBOUND
Type 2	MARTA	MARTA 155 - Pittsburgh NORTHBOUND
Type 2	MARTA	MARTA 155 - Pittsburgh SOUTHBOUND
Type 2	MARTA	MARTA 162 - Myrtle Drive / Alison Court EASTBOUND
Type 2	MARTA	MARTA 162 - Myrtle Drive / Alison Court WESTBOUND
Type 2	MARTA	MARTA 165 - Fairburn Road NORTHBOUND
Type 2	MARTA	MARTA 165 - Fairburn Road SOUTHBOUND
Type 2	MARTA	MARTA 172 - Sylvan Road / Virginia Avenue NORTHBOUND
Type 2	MARTA	MARTA 172 - Sylvan Road / Virginia Avenue SOUTHBOUND
Type 2	MARTA	MARTA 178 - Empire Blvd / Southside Ind Park NORTHBOUND
Type 2	MARTA	MARTA 178 - Empire Blvd / Southside Ind Park SOUTHBOUND
Type 2	MARTA	MARTA 180 - Roosevelt Highway NORTHBOUND
Type 2	MARTA	MARTA 180 - Roosevelt Highway SOUTHBOUND
Type 2	MARTA	MARTA 181 - Washington Road / Fairburn EASTBOUND
Type 2	MARTA	MARTA 181 - Washington Road / Fairburn WESTBOUND
Type 2	MARTA	MARTA 183 - Barge Road P&R / Lakewood EASTBOUND
Type 2	MARTA	MARTA 183 - Barge Road P&R / Lakewood WESTBOUND
Type 2	MARTA	MARTA 185 - Alpharetta / Old Milton Parkway NORTHBOUND
Type 2	MARTA	MARTA 185 - Alpharetta / Old Milton Parkway SOUTHBOUND
Type 2	MARTA	MARTA 186 - Rainbow Drive / South DeKalb EASTBOUND
Type 2	MARTA	MARTA 186 - Rainbow Drive / South DeKalb WESTBOUND
Type 2	MARTA	MARTA 189 - Flat Shoals Road / Scofield Road NORTHBOUND
Type 2	MARTA	MARTA 189 - Flat Shoals Road / Scofield Road SOUTHBOUND
Type 2	MARTA	MARTA 19 - Clairmont Road NORTHBOUND
Type 2	MARTA	MARTA 19 - Clairmont Road SOUTHBOUND
Type 2	MARTA	MARTA 191 - Riverdale / ATL Intl Terminal NORTHBOUND
Type 2	MARTA	MARTA 191 - Riverdale / ATL Intl Terminal SOUTHBOUND
Type 2	MARTA	MARTA 192 - Old Dixie / Tara Boulevard NORTHBOUND
Type 2	MARTA	MARTA 192 - Old Dixie / Tara Boulevard SOUTHBOUND
Type 2	MARTA	MARTA 193 - Morrow / Jonesboro NORTHBOUND
Type 2	MARTA	MARTA 193 - Morrow / Jonesboro SOUTHBOUND

Type	Agency	Route Surveyed
Type 2	MARTA	MARTA 194 - Conley Road / Mt Zion NORTHBOUND
Type 2	MARTA	MARTA 194 - Conley Road / Mt Zion SOUTHBOUND
Type 2	MARTA	MARTA 195 - Forest Parkway EASTBOUND
Type 2	MARTA	MARTA 195 - Forest Parkway WESTBOUND
Type 2	MARTA	MARTA 2 - Ponce de Leon Avenue / Druid Hills EASTBOUND
Type 2	MARTA	MARTA 2 - Ponce de Leon Avenue / Druid Hills WESTBOUND
Type 2	MARTA	MARTA 201 - Six Flags Over Georgia EASTBOUND
Type 2	MARTA	MARTA 201 - Six Flags Over Georgia WESTBOUND
Type 2	MARTA	MARTA 21 - Memorial Drive EASTBOUND
Type 2	MARTA	MARTA 21 - Memorial Drive WESTBOUND
Type 2	MARTA	MARTA 221 - Memorial Drive Limited EASTBOUND
Type 2	MARTA	MARTA 221 - Memorial Drive Limited WESTBOUND
Type 2	MARTA	MARTA 24 - McAfee / Hosea Williams EASTBOUND
Type 2	MARTA	MARTA 24 - McAfee / Hosea Williams WESTBOUND
Type 2	MARTA	MARTA 25 - Peachtree Industrial Boulevard NORTHBOUND
Type 2	MARTA	MARTA 25 - Peachtree Industrial Boulevard SOUTHBOUND
Type 2	MARTA	MARTA 26 - Marietta Street / Perry Boulevard EASTBOUND
Type 2	MARTA	MARTA 26 - Marietta Street / Perry Boulevard WESTBOUND
Type 2	MARTA	MARTA 27 - Cheshire Bridge Road NORTHBOUND
Type 2	MARTA	MARTA 27 - Cheshire Bridge Road SOUTHBOUND
Type 2	MARTA	MARTA 295 - Metropolitan Campus Express EASTBOUND
Type 2	MARTA	MARTA 295 - Metropolitan Campus Express WESTBOUND
Type 2	MARTA	MARTA 3 - Martin Luther King Jr Dr/Auburn Ave EASTBOUND
Type 2	MARTA	MARTA 3 - Martin Luther King Jr Dr/Auburn Ave WESTBOUND
Type 2	MARTA	MARTA 30 - LaVista Road EASTBOUND
Type 2	MARTA	MARTA 30 - LaVista Road WESTBOUND
Type 2	MARTA	MARTA 32 - Bouldercrest NORTHBOUND
Type 2	MARTA	MARTA 32 - Bouldercrest SOUTHBOUND
Type 2	MARTA	MARTA 34 - 2nd Ave/Gresham Rd/Clifton Spgs Rd NORTHBOUND
Type 2	MARTA	MARTA 34 - 2nd Ave/Gresham Rd/Clifton Spgs Rd SOUTHBOUND
Type 2	MARTA	MARTA 36 - N Decatur Road / Virginia Highland EASTBOUND
Type 2	MARTA	MARTA 36 - N Decatur Road / Virginia Highland WESTBOUND
Type 2	MARTA	MARTA 37 - Defoors Ferry Road EASTBOUND
Type 2	MARTA	MARTA 37 - Defoors Ferry Road WESTBOUND
Type 2	MARTA	MARTA 4 - Moreland Avenue NORTHBOUND
Type 2	MARTA	MARTA 4 - Moreland Avenue SOUTHBOUND
Type 2	MARTA	MARTA 40 - Peachtree Street / Downtown NORTHBOUND
Type 2	MARTA	MARTA 40 - Peachtree Street / Downtown SOUTHBOUND
Type 2	MARTA	MARTA 42 - Pryor Road NORTHBOUND
Type 2	MARTA	MARTA 42 - Pryor Road SOUTHBOUND
Type 2	MARTA	MARTA 47 - I-85 Access Road / Briarwood Road NORTHBOUND
Type 2	MARTA	MARTA 47 - I-85 Access Road / Briarwood Road SOUTHBOUND

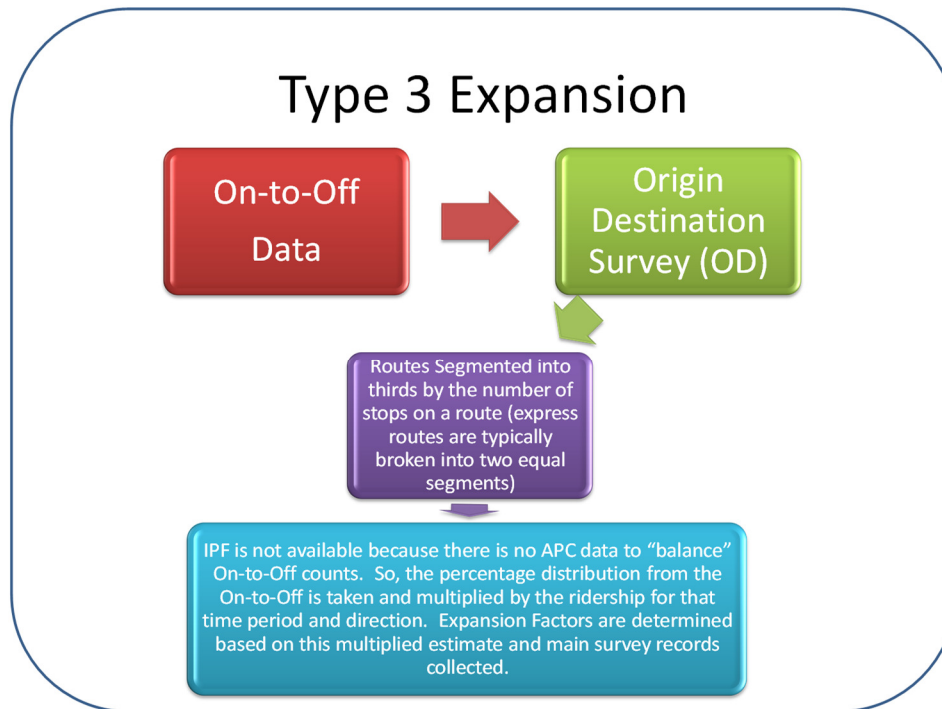
Type	Agency	Route Surveyed
Type 2	MARTA	MARTA 49 - McDonough Boulevard NORTHBOUND
Type 2	MARTA	MARTA 49 - McDonough Boulevard SOUTHBOUND
Type 2	MARTA	MARTA 50 - Donald Lee Hollowell Parkway EASTBOUND
Type 2	MARTA	MARTA 50 - Donald Lee Hollowell Parkway WESTBOUND
Type 2	MARTA	MARTA 51 - Joseph E Boone Boulevard EASTBOUND
Type 2	MARTA	MARTA 51 - Joseph E Boone Boulevard WESTBOUND
Type 2	MARTA	MARTA 55 - Jonesboro Road NORTHBOUND
Type 2	MARTA	MARTA 55 - Jonesboro Road SOUTHBOUND
Type 2	MARTA	MARTA 58 - West Lake Avenue / Hollywood Road NORTHBOUND
Type 2	MARTA	MARTA 58 - West Lake Avenue / Hollywood Road SOUTHBOUND
Type 2	MARTA	MARTA 6 - Clifton Road / Emory NORTHBOUND
Type 2	MARTA	MARTA 6 - Clifton Road / Emory SOUTHBOUND
Type 2	MARTA	MARTA 60 - Hightower Road NORTHBOUND
Type 2	MARTA	MARTA 60 - Hightower Road SOUTHBOUND
Type 2	MARTA	MARTA 66 - Lynhurst Drive / Princeton Lakes NORTHBOUND
Type 2	MARTA	MARTA 66 - Lynhurst Drive / Princeton Lakes SOUTHBOUND
Type 2	MARTA	MARTA 68 - Benjamin E Mays Drive EASTBOUND
Type 2	MARTA	MARTA 68 - Benjamin E Mays Drive WESTBOUND
Type 2	MARTA	MARTA 74 - Flat Shoals Road EASTBOUND
Type 2	MARTA	MARTA 74 - Flat Shoals Road WESTBOUND
Type 2	MARTA	MARTA 75 - Lawrenceville Highway NORTHBOUND
Type 2	MARTA	MARTA 75 - Lawrenceville Highway SOUTHBOUND
Type 2	MARTA	MARTA 79 - Sylvan Hills NORTHBOUND
Type 2	MARTA	MARTA 79 - Sylvan Hills SOUTHBOUND
Type 2	MARTA	MARTA 8 - North Druid Hills Road NORTHBOUND
Type 2	MARTA	MARTA 8 - North Druid Hills Road SOUTHBOUND
Type 2	MARTA	MARTA 800 - Lovejoy CLOCKWISE
Type 2	MARTA	MARTA 809 - Monroe Drive / Boulevard NORTHBOUND
Type 2	MARTA	MARTA 809 - Monroe Drive / Boulevard SOUTHBOUND
Type 2	MARTA	MARTA 81 - Venetian Hills / Delowe Drive NORTHBOUND
Type 2	MARTA	MARTA 81 - Venetian Hills / Delowe Drive SOUTHBOUND
Type 2	MARTA	MARTA 813 - Atlanta Student Movement Boulevard EASTBOUND
Type 2	MARTA	MARTA 813 - Atlanta Student Movement Boulevard WESTBOUND
Type 2	MARTA	MARTA 816 - North Highland Avenue NORTHBOUND
Type 2	MARTA	MARTA 816 - North Highland Avenue SOUTHBOUND
Type 2	MARTA	MARTA 82 - Camp Creek / South Fulton Parkway EASTBOUND
Type 2	MARTA	MARTA 82 - Camp Creek / South Fulton Parkway WESTBOUND
Type 2	MARTA	MARTA 823 - Belvedere/Decatur NORTHBOUND
Type 2	MARTA	MARTA 823 - Belvedere/Decatur SOUTHBOUND
Type 2	MARTA	MARTA 825 - Johnson Ferry Road EASTBOUND
Type 2	MARTA	MARTA 825 - Johnson Ferry Road WESTBOUND

Type	Agency	Route Surveyed
Type 2	MARTA	MARTA 832 - Grant Park EASTBOUND
Type 2	MARTA	MARTA 832 - Grant Park WESTBOUND
Type 2	MARTA	MARTA 84 - Washington Rd/Camp Crk Marketplace EASTBOUND
Type 2	MARTA	MARTA 84 - Washington Rd/Camp Crk Marketplace WESTBOUND
Type 2	MARTA	MARTA 85 - Roswell / Mansell Road NORTHBOUND
Type 2	MARTA	MARTA 85 - Roswell / Mansell Road SOUTHBOUND
Type 2	MARTA	MARTA 850 - Carroll Heights / Fairburn Heights NORTHBOUND
Type 2	MARTA	MARTA 850 - Carroll Heights / Fairburn Heights SOUTHBOUND
Type 2	MARTA	MARTA 853 - Collier Heights EASTBOUND
Type 2	MARTA	MARTA 853 - Collier Heights WESTBOUND
Type 2	MARTA	MARTA 856 - Baker Hills / Wilson Mill Meadows WESTBOUND
Type 2	MARTA	MARTA 856 - Baker Hills / Wilson Mill Meadows EASTBOUND
Type 2	MARTA	MARTA 86 - Fairington Road EASTBOUND
Type 2	MARTA	MARTA 86 - Fairington Road WESTBOUND
Type 2	MARTA	MARTA 865 - Boulder Park Drive EASTBOUND
Type 2	MARTA	MARTA 865 - Boulder Park Drive WESTBOUND
Type 2	MARTA	MARTA 867 - Peyton Forest / Dixie Hills EASTBOUND
Type 2	MARTA	MARTA 867 - Peyton Forest / Dixie Hills WESTBOUND
Type 2	MARTA	MARTA 87 - Roswell Road / Morgan Falls NORTHBOUND
Type 2	MARTA	MARTA 87 - Roswell Road / Morgan Falls SOUTHBOUND
Type 2	MARTA	MARTA 899 - Old Fourth Ward NORTHBOUND
Type 2	MARTA	MARTA 899 - Old Fourth Ward SOUTHBOUND
Type 2	MARTA	MARTA 9 - Boulevard / Tilson Road EASTBOUND
Type 2	MARTA	MARTA 9 - Boulevard / Tilson Road WESTBOUND
Type 2	MARTA	MARTA 93 - Headland Drive / Main Street EASTBOUND
Type 2	MARTA	MARTA 93 - Headland Drive / Main Street WESTBOUND
Type 2	MARTA	MARTA 94 - Northside Drive NORTHBOUND
Type 2	MARTA	MARTA 94 - Northside Drive SOUTHBOUND
Type 2	MARTA	MARTA 95 - Metropolitan Parkway NORTHBOUND
Type 2	MARTA	MARTA 95 - Metropolitan Parkway SOUTHBOUND

Type 3 Expansion: Bus Routes with On-to-Off Counts and OD Survey Data, but Without APC Data

Expansion Type 3 is utilized for routes where On-to-Off counts are collected but APC Data is not available. In this expansion method, routes without APC Data are segmented into three segments based on number of stops along a route. For example, if Route X has 30 stops, then the first ten stops would be Segment 1, the second ten stops would be Segment 2, and the remaining ten stops would be Segment 3. These segments were then appended to the On-to-Off and OD survey databases. The data is then expanded using a similar process to the previous expansion methods by route and direction. Instead of using APC Data in this expansion process, however, it is only expanded using the OD Survey Data and the On-to-Off Counts.

Figure 19 – Type 3 Expansion



Note: This type of expansion was not utilized in this project.

Type 4 Expansion: Bus Routes with OD Survey Data, without On-to-Off Counts Data, or APC Data

For routes that *only* have OD survey data, Type 4 expansion is utilized. For this type of expansion there is no stop level data available. For this reason, a more rudimentary form of expansion must take place. The level of granularity for average daily ridership that can be provided from the agency determines the level of granularity for which expansion can occur. For example, when average daily ridership figures were available by route, time period and direction the number of OD surveys captured for that route, time period and direction were directly divided into the corresponding ridership provided. Alternatively, when average daily ridership figures were only available for the entire route and not broken down into time period or direction, the number of OD surveys captured for that route were directly divided into the corresponding ridership provided.

The following routes were expanded using the Type 4 expansion method described above:

Table 20: Routes Expanded Using Type 4 Expansion

Type	Agency	Route Surveyed
Type 2/Type 4	GWN	GWINNETT TRANSIT 20 - Beaver Ruin - Doraville To Doraville MARTA Station
Type 4	HAT	GAINESVILLE (HALL AREA) TRANSIT Route 10
Type 4	HAT	GAINESVILLE (HALL AREA) TRANSIT Route 20
Type 4	HAT	GAINESVILLE (HALL AREA) TRANSIT Route 30
Type 4	HAT	GAINESVILLE (HALL AREA) TRANSIT Route 40
Type 4	HAT	GAINESVILLE (HALL AREA) TRANSIT Route 50
Type 4	CLC	CobbLINC BLUE CIRCULATOR
Type 4	CLC	CobbLINC GREEN CIRCULATOR
Type 4	CLC	CobbLINC ROUTE 100 - NORTHBOUND FROM ATLANTA
Type 4	CLC	CobbLINC ROUTE 100 - SOUTHBOUND TO ATLANTA
Type 4	CLC	CobbLINC ROUTE 101 - NORTHBOUND FROM ATLANTA
Type 4	CLC	CobbLINC ROUTE 101 - SOUTHBOUND TO ATLANTA
Type 4	CLC	CobbLINC ROUTE 102 - NORTHBOUND FROM ATLANTA
Type 4	CLC	CobbLINC ROUTE 102 - SOUTHBOUND TO ATLANTA
Type 4	CAT	CHEROKEE TRANSIT (CATS) Route 100
Type 4	CAT	CHEROKEE TRANSIT (CATS) Route 200
Type 4	GWN	GWINNETT TRANSIT 103A - Atlanta - Sugarloaf Mills Park & Ride Downtown to Sugarloaf Mills Park & Ride
Type 4	GWN	GWINNETT TRANSIT 103A - Atlanta - Sugarloaf Mills Park & Ride Sugarloaf Mills Park & Ride to Downtown
Type 4	GWN	GWINNETT TRANSIT 10B - Sugarloaf - Gwinnett Transit Center - Doraville via Buford Highway To Doraville MARTA Station
Type 4	GWN	GWINNETT TRANSIT 10B - Sugarloaf - Gwinnett Transit Center - Doraville via Buford Highway To Sugarloaf Mills Park & Ride
Type 4	MARTA	Atlanta Streetcar EASTBOUND
Type 4	MARTA	Atlanta Streetcar WESTBOUND

Rail Expansion and Dummy Record Explanation

During the rail data expansion process, it was noticed that while a high percentage of the ridership was represented with the collected origin-destination records at the station to station level, there were still some boarding station to alighting station pairs that were not represented. This was not unexpected as the high number of rail stations creates a substantial number of boarding station to alighting station possibilities, especially when the data is broken down into time periods. In order to account for this relatively low volume of missing ridership while maintaining the granularity of station to station expansion, "dummy records" were used. A dummy record is a record in the dataset that represents uncaptured ridership for a specific time period. It holds the value of the ridership for the missing combination of the boarding station, alighting station, and time period variables. Since dummy records hold limited data, they are generally excluded from many descriptive statistics.

3.3 General Rule for Expansion Factors

While there are no specific guidelines for the expansion factor values, ETC Institute uses a guideline of keeping expansion factors below three times the average expansion factor based on the sampling percentage. This is done to keep any one record from representing a markedly high number of passengers in the system. The formula for determining this guideline is:

$$1 / (\text{Sampling percentage}) \times 3 = \text{Guideline Weight Factor}$$

For example, if the sampling percentage is 10% for a route, then the guideline weight factor would be $[1 / (10\%) \times 3] = 30$, so the guideline weight factor for that route would be 30. If a sampling percentage is 7.5% it would be 40 since $[1 / (7.5\%) \times 3] = 40$.

If the expansion factor for a boarding segment to alighting segment pair is greater than three times the average expansion factor, then it is aggregated into the adjacent boarding-to-alighting segment where it will have the least impact on the previously existing expansion factors. This guideline is standard for all the various expansion types.

3.3.1 Linked Trip Expansion Factors for All Records

The linked-trip expansion factor helps to account for the number of transfers that were made by each passenger, so the linked expansion factors should better represent the overall system. Linked expansion factors are generated after the unlinked expansion factors are created. The equation that is used to calculate the linked trip multiplying factor is shown below:

$$\text{Linked Trip Multiplying Factor} = [1 / (1 + \# \text{ of in-system transfer})]$$

If a passenger did not make a transfer, the linked trip multiplying factor would be 1.0 because the person would have only boarded one vehicle. If a person made two transfers, the linked trip expansion factor would be 0.33 because the person would have boarded three transit vehicles during his/her one-way trip. An example of how the linked trip expansion factors were calculated, and subsequent example results are provided in Figure 19.

Figure 20 – Calculations for Linked Weight Factors

Number of Transfers	Calculation [1/(1+Number of Transfers)]	Linked Trip Multiplying Factor	Unlinked Weight Factor	Linked Weight Factor
0	[1/(1+0)]	1	3	3
1	[1/(1+1)]	0.5	3	1.5
2	[1/(1+2)]	0.33	3	0.99
3	[1/(1+3)]	0.25	3	0.75

Once the linked trip multiplier is created, it is multiplied by the unlinked expansion factor to create the linked expansion factor as shown above.

Table 21 below provides an overall view of how the various weighting factors impacted the raw survey counts:

Table 21: Overall View of Weighting Factors

Number of OD Surveys Collected	43,398
OD Surveys Weighted Using Unlinked Weight Factors (Represents Average Daily Boardings)	317,612
OD Surveys Weighted Using Linked Weight Factors (Represents Estimated Average Daily Trips)	211,057

4. Survey Results

The fully weighted and expanded ARC data were used to create the following analyses, displayed in two separate sections. The first section displays system level frequencies of the survey questions, while the second section focuses on the origin and destination place types.

All tables are based on the secondary expansion numbers conducted by CTG and are showing the sum of the linked weight factors except where stated otherwise.

When reviewing the results of this section be sure to consider the sample size of respondents by agency when interpreting the results. Some agencies had significantly fewer respondents than other agencies and these small sample sizes result in larger margins of error as shown below:

Agency	Number of OD Surveys	Average Daily Boardings	Margin of Error
CHEROKEE	20	63	+/- 18.25
COBB	941	9,753	+/- 3.04
SRTA	472	3,951	+/- 4.23
GWINNETT	617	5,844	+/- 3.73
HALL	94	552	+/- 9.22
MARTA BUS	19,844	160,557	+/- 0.65
MARTA RAIL	21,410	136,891	+/- 0.62
MARTA (Bus + Rail)	41,254	297,448	+/- 0.45

4.1 Regional Data Summary and Analysis

The survey results in the following section have been broken down by separate agencies. The MARTA results, further broken down by bus and by rail, can be seen in the first set of charts and all other agencies subsequently.

All results are based on the secondary expansion linked weight factor, except where stated otherwise. Dummy records were used for the rail expansion as explained in the expansion section of this report, but for the purpose of the results have been excluded.

4.1.1 Survey Results by System

Just over one-third (38.2%) of all respondents for the MARTA system indicated they took no additional transfers to make their one-way trip. Rail respondents were more likely to not use any additional transfers than bus respondents (51.6% vs. 27.4%). There were no significant differences between MARTA respondents and regional respondents for the number of transfers a respondent took to complete their trip, but regional respondents were more likely to take one or more transfers (61.2%) compared to other agency respondents (52.3%). For the region, 38.9% of riders

Table 22: Total Transfers by System (based on secondary unlinked weight factors)

Total Transfers – MARTA / Regional (based on unlinked weight factor)				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
(0) None	27.4%	51.6%	38.2%	38.9%
(1) One	46.0%	33.7%	40.5%	39.9%
(2) Two	25.2%	14.2%	20.3%	20.0%
(3) Three	1.4%	0.5%	1.0%	1.2%
(4+) Four or more	0.1%	0.0%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Nearly half (47.7%) of all respondents for all other agencies indicated they took no additional transfers to make their one-way trip and just under one-third (31.4%) indicated they took one additional transfer. SRTA respondents had the highest percentage of respondents indicate they do not use any additional transfers (88.8%) compared to the other agencies.

Total Transfers – Other Agencies (based on unlinked weight factor)						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
(0) None	33.8%	41.5%	88.8%	61.0%	73.5%	47.7%
(1) One	40.2%	30.7%	10.2%	37.5%	26.5%	31.4%
(2) Two	19.1%	22.4%	1.0%	1.5%	0.0%	15.9%
(3) Three	6.7%	5.2%	0.0%	0.0%	0.0%	4.8%
(4+) Four or more	0.2%	0.2%	0.0%	0.0%	0.0%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The most common origin place type was “Your HOME” for MARTA respondents (48.9%) followed by “Your usual WORKPLACE” (28.6%). Rail respondents were more likely to indicate their origin place type was “College or University (student only)” (4.0%) compared to bus respondents (1.8%). There were no significant differences between MARTA respondents and regional respondents for the origin place type the respondent indicated they came from, but regional respondents were less likely to select “Your usual WORKPLACE” as their origin (29.7%) compared to other agency respondents (45.0%).

Table 23: Origin Purpose by System

Origin Place Type – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Your HOME	52.6%	45.2%	48.9%	48.2%
Your usual WORKPLACE	26.2%	31.0%	28.6%	29.7%
Store / Retail Place	6.0%	2.5%	4.3%	4.2%
College or University (student only)	1.8%	4.0%	2.9%	3.0%
Bank, or other office / Errands	3.4%	2.7%	3.1%	3.0%
Airport (airline passenger only)	0.4%	4.1%	2.3%	2.1%
Your Hotel or Lodging	0.8%	3.4%	2.1%	2.0%
Hospital / Doctor	2.3%	1.4%	1.9%	1.8%
Recreation Place	1.5%	1.7%	1.6%	1.5%
Personal Business	1.2%	1.3%	1.3%	1.3%
Restaurant	1.1%	1.5%	1.3%	1.2%
Another Home	1.5%	0.9%	1.2%	1.1%
School (K-12) / Day Care (student only)	0.9%	0.3%	0.6%	0.5%
Place of Worship	0.2%	0.1%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The most common destination place type was “Your usual WORKPLACE” for all other agency respondents (45.0%) followed by “Your HOME” (39.1%). Less than one-quarter of respondents (22.7%) indicated an origin place type other than HOME or WORKPLACE. Cherokee respondents were more likely to indicate their origin place type was “Bank, or other office / Errands” (22.3%) than other agencies.

Origin Place Type – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Your usual WORKPLACE	27.8%	31.8%	90.2%	19.3%	11.8%	45.0%
Your HOME	52.3%	54.5%	0.2%	52.2%	40.0%	39.1%
College or University (student only)	2.7%	4.8%	8.8%	2.0%	0.0%	4.9%
Store / Retail Place	4.9%	1.6%	0.0%	8.1%	16.5%	2.9%
Bank, or other office / Errands	3.0%	2.4%	0.0%	9.9%	22.3%	2.4%
Hospital / Doctor	2.4%	1.4%	0.2%	3.3%	2.4%	1.6%
Personal Business	3.2%	0.3%	0.2%	0.0%	0.0%	1.5%
Recreation Place	1.3%	1.2%	0.0%	0.0%	0.0%	0.9%
Restaurant	0.5%	0.7%	0.0%	3.5%	7.1%	0.6%
Your Hotel or Lodging	0.9%	0.3%	0.0%	1.0%	0.0%	0.5%
Another Home	0.4%	0.2%	0.1%	0.0%	0.0%	0.3%
Airport (airline passenger only)	0.2%	0.4%	0.1%	0.0%	0.0%	0.2%
School (K-12) / Day Care (student only)	0.0%	0.4%	0.2%	0.7%	0.0%	0.2%
Place of Worship	0.3%	0.0%	0.0%	0.0%	0.0%	0.1%

Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
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The majority of MARTA respondents indicated they “Walk” (81.0%) to get from their origin to transit. Bus respondents were twenty percent more likely to indicate “Walk” as their access mode (91.3%) compared to rail respondents (70.8%). Additionally, rail respondents were more likely to indicate their access mode was “Drove alone and parked” (14.8%) compared to bus respondents (1.4%). There were no significant differences between MARTA respondents and regional respondents for the egress mode respondents used to get from their origin to transit.

Table 24: Access Mode by System

Access Mode – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Walk	91.3%	70.8%	81.0%	81.2%
Drove alone and parked	1.4%	14.8%	8.1%	8.1%
Was dropped off by someone going someplace else	3.7%	6.8%	5.3%	5.2%
Uber, Lyft, etc.	0.9%	2.6%	1.8%	1.7%
Shuttle	0.8%	2.1%	1.4%	1.4%
Wheelchair / Mobility Aid	1.1%	0.4%	0.8%	0.7%
Personal Bike	0.3%	0.8%	0.6%	0.6%
Drove or rode with others and parked	0.1%	0.8%	0.5%	0.4%
E-scooter (e.g. Lime, Bird, etc.)	0.1%	0.5%	0.3%	0.3%
Taxi	0.0%	0.1%	0.1%	0.1%
Bike share (Jump, Relay, etc.)	0.1%	0.1%	0.1%	0.1%
School Bus / Other Bus	0.1%	0.0%	0.1%	0.0%
Car share (e.g. Zipcar, etc.)	0.0%	0.0%	0.0%	0.0%
Skateboard	0.0%	0.0%	0.0%	0.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority of all other agency respondents indicated they “Walk” (84.1%) to get from their origin to transit. The agency that was most likely to use some form of vehicle to access transit was Cobb (13.7%).

Access Mode – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Walk	85.5%	72.1%	92.6%	95.3%	95.3%	84.1%
Drove alone and parked	6.3%	19.1%	0.9%	0.0%	0.0%	8.1%
Was dropped off by someone going someplace else	4.8%	5.3%	1.2%	3.6%	2.4%	3.9%
Uber, Lyft, etc.	1.7%	2.0%	0.8%	0.0%	0.0%	1.5%
Shuttle	0.5%	0.3%	3.6%	0.0%	0.0%	1.2%
Personal Bike	0.2%	0.8%	0.2%	0.0%	0.0%	0.4%
Drove or rode with others and parked	0.3%	0.2%	0.4%	0.0%	0.0%	0.3%
Wheelchair / Mobility Aid	0.4%	0.2%	0.0%	0.0%	2.4%	0.2%
Taxi	0.1%	0.1%	0.4%	1.0%	0.0%	0.2%
Skateboard	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%
Bike share (Jump, Relay, etc.)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
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The most common MARTA destination place type was “Your HOME” (40.1%) followed closely by “Your usual WORKPLACE” (31.7%). Bus and rail respondents were equal in the percentage of respondents that indicated their destination place type to be “Your usual WORKPLACE” (31.7%). The greatest difference between bus and rail respondents in regard to destination place type was “Store / Retail Place” (7.1% - bus vs. 3.2% - rail). Other agency respondents had a higher percentage of “Your HOME” as their destination place type (53.9%) compared to regional respondents (41.1%).

Table 25: Destination Purpose by System

Destination Place Type – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Your HOME	39.4%	40.8%	40.1%	41.1%
Your usual WORKPLACE	31.7%	31.7%	31.7%	31.3%
Store / Retail Place	7.1%	3.2%	5.2%	5.0%
Bank, or other office / Errands	5.7%	3.7%	4.7%	4.6%
College or University (student only)	2.3%	3.8%	3.0%	3.1%
Another Home	3.0%	1.9%	2.4%	2.4%
Recreation Place	2.0%	2.7%	2.4%	2.3%
Airport (airline passenger only)	0.5%	4.3%	2.4%	2.2%
Personal Business	2.3%	1.7%	2.0%	2.1%
Restaurant	2.1%	1.8%	2.0%	1.9%
Hospital / Doctor	2.0%	1.3%	1.7%	1.6%
Your Hotel or Lodging	0.5%	2.7%	1.6%	1.5%
School (K-12) / Day Care (student only)	1.0%	0.3%	0.7%	0.7%
Place of Worship	0.3%	0.1%	0.2%	0.2%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The most common other agency destination place type was “Your HOME” (53.9%) followed by “Your usual WORKPLACE” (26.4%). SRTA agency respondents were significantly more likely to indicate “Your HOME” as their destination place type (98.7%) compared to other agency respondents.

Destination Place Type – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Your HOME	37.8%	38.3%	98.7%	31.3%	51.8%	53.9%
Your usual WORKPLACE	35.8%	37.4%	0.4%	21.4%	17.7%	26.4%
College or University (student only)	2.6%	9.5%	0.0%	0.0%	0.0%	3.7%
Store / Retail Place	4.8%	2.7%	0.3%	23.3%	0.0%	3.6%
Bank, or other office / Errands	4.0%	4.9%	0.0%	15.5%	15.3%	3.6%
Personal Business	4.8%	1.4%	0.2%	0.0%	0.0%	2.5%
Recreation Place	3.2%	1.7%	0.0%	2.2%	4.7%	1.9%
Another Home	3.1%	0.3%	0.0%	1.6%	8.2%	1.5%
Restaurant	2.0%	1.2%	0.1%	1.9%	2.4%	1.3%
Hospital / Doctor	1.5%	1.2%	0.0%	2.9%	0.0%	1.0%
School (K-12) / Day Care (student only)	0.2%	1.1%	0.3%	0.0%	0.0%	0.5%
Your Hotel or Lodging	0.1%	0.3%	0.0%	0.0%	0.0%	0.1%
Airport (airline passenger only)	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%
Place of Worship	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (83.2%) of MARTA respondents indicated they “Walk” from transit to their final destination. Bus respondents were more likely to indicate they “Walk” from transit to their final destination (93.6%) compared to rail respondents (73.0%). Regional respondents had a higher percentage of respondents indicate they “Walk” to get from transit to their destination (81.8%) compared to other agency respondents (62.9%).

Table 26: Egress Mode by System

Egress Mode – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Walk	93.6%	73.0%	83.2%	81.8%
Get in a parked vehicle and drive alone	0.9%	14.1%	7.6%	8.9%
Be picked up by someone	2.2%	5.2%	3.7%	3.8%
Uber, Lyft, etc.	0.7%	2.5%	1.6%	1.6%
Shuttle	0.7%	2.0%	1.3%	1.3%
Wheelchair / Mobility Aid	1.1%	0.6%	0.8%	0.8%
Get in a parked vehicle and drive/ride with someone	0.1%	0.9%	0.5%	0.6%
Personal Bike	0.4%	0.8%	0.6%	0.6%
E-scooter (e.g. Lime, Bird, etc.)	0.1%	0.6%	0.3%	0.3%
Bike share (Jump, Relay, etc.)	0.1%	0.1%	0.1%	0.1%
Taxi	0.0%	0.1%	0.1%	0.1%
School Bus / Other Bus	0.0%	0.0%	0.0%	0.0%
Skateboard	0.0%	0.0%	0.0%	0.0%
Car share (e.g. Zipcar, etc.)	0.0%	0.0%	0.0%	0.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (62.9%) of other agency respondents indicated they “Walk” from transit to their final destination. SRTA agency respondents were significantly less likely to indicate “Walk” as their egress mode from transit to their final destination (3.1%) compared to other agencies, but more likely to indicate “Get in a parked vehicle and drive alone” (75.9%) compared to other agencies.

Egress Mode – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Walk	88.4%	76.0%	3.1%	99.0%	97.6%	62.9%
Get in a parked vehicle and drive alone	5.5%	16.7%	75.9%	0.0%	0.0%	27.0%
Be picked up by someone	2.6%	2.5%	11.8%	1.0%	0.0%	5.0%
Uber, Lyft, etc.	1.4%	1.9%	3.3%	0.0%	0.0%	2.0%
Get in a parked vehicle and drive/ride with someone	0.3%	1.4%	5.2%	0.0%	0.0%	1.9%
Shuttle	0.9%	0.4%	0.1%	0.0%	0.0%	0.5%
Personal Bike	0.2%	0.7%	0.2%	0.0%	0.0%	0.3%
Wheelchair / Mobility Aid	0.4%	0.2%	0.0%	0.0%	2.4%	0.2%
Car share (e.g. Zipcar, etc.)	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%
Skateboard	0.2%	0.0%	0.0%	0.0%	0.0%	0.1%
Taxi	0.0%	0.2%	0.0%	0.0%	0.0%	0.1%

Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
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Respondents were asked what type of fare method they used for their trip. The “-” denotes that MARTA respondents did not have that option to select from. The most commonly used fare method by MARTA respondents was the “One-way Trip” (32.6%) followed very closely by “7 Day Pass” (29.6%) and the “30 Day Pass” (20.4%). Rail passengers were more likely to indicate they used “Employer Partnership Program” for their fare method (11.2%) compared to bus passengers (3.9%). Totals will not equal 100% as multiple responses could be selected. The most notable differences between MARTA respondents and regional respondents were the “One-way Trip” and the “7 Day Pass”, both of which MARTA respondents were more likely to select than regional respondents.

Table 27: Fare Method by System

Fare Method – MARTA / Regional	MARTA		MARTA		Regional	
	BUS	RAIL	Total		Total	
One-way Trip	34.3%	30.9%	32.6%		30.9%	
1 Day Pass	6.9%	7.3%	7.1%		6.6%	
2 Day Pass	0.7%	0.5%	0.6%		0.5%	
3 Day Pass	1.2%	2.6%	1.9%		1.8%	
4 Day Pass	1.3%	1.1%	1.2%		1.1%	
7 Day Pass	33.9%	25.3%	29.6%		27.6%	
30 Day Pass	16.9%	23.8%	20.4%		19.0%	
2 Trip Pass [Spring]	2.0%	1.5%	1.7%		1.6%	
10 Trip Pass [Spring]	1.3%	0.8%	1.1%		1.0%	
20 Trip Pass [Spring]	1.0%	1.2%	1.1%		1.0%	
Employer Partnership Program	3.9%	11.2%	7.6%		7.0%	
University Pass Program	2.4%	4.6%	3.5%		3.3%	
Student Pass Program (K-12)	1.0%	0.4%	0.7%		0.7%	
Free - child under 47 inches	0.0%	0.0%	0.0%		0.0%	
Local One-Way	-	-	-		2.0%	
Local 10-Ride Ticket	-	-	-		0.7%	
Local 31-Day Pass	-	-	-		0.2%	
Express One-Way	-	-	-		0.0%	
Express 20-Ride Ticket	-	-	-		0.2%	
Express 31-Day Pass	-	-	-		0.1%	
Free - Child under 42 inches	0.0%	0.0%	0.0%		0.0%	
Free - Paratransit Certified	-	-	-		0.0%	
Local One-Way Cash	-	-	-		0.9%	
Local Monthly Pass	-	-	-		0.1%	
Express One-Way Cash	-	-	-		0.1%	
Express 10-Ride Ticket	-	-	-		0.3%	
Express Monthly Pass	-	-	-		0.3%	
Free - Child Farebox Height	-	-	-		0.0%	
Cash	-	-	-		0.0%	
10-Ride Pass	-	-	-		0.0%	
One-Way Ticket plus Transfer	-	-	-		0.0%	
Day Pass	0.0%	0.0%	0.0%		0.1%	
Free - Age 3 or under 42 inches	-	-	-		0.0%	
Round Trip	-	-	-		0.1%	
10-Trip	-	-	-		0.7%	
31-Day	-	-	-		0.7%	
Monthly Pass Blue	-	-	-		0.0%	
Monthly Pass Green	-	-	-		0.0%	
Free Other [Spring]	0.0%	0.1%	0.1%		0.1%	

Other	0.3%	0.1%	0.2%	0.2%
Grand Total	107.2%	111.6%	109.4%	109.0%

The most commonly used fare method by other agency respondents was the “Local One-Way” (29.4%) followed by “Local One-Way Cash” (12.5%). Cobb agency respondents had the highest percentage of respondents to indicate they used “Local One-Way” (68.6%), Gwinnett agency respondents had the highest percentage of respondents to indicate they used “Local One-Way Cash” (46.0%), SRTA agency respondents had the highest percentage of respondents to indicate they used “10-Trip” (36.8%) and “31-Day” (37.5%), Hall agency respondents had the highest percentage of respondents to indicate they used “One-way Trip” (73.1%), and Cherokee agency respondents had the highest percentage of respondents to indicate they used “Cash” (88.2%). Totals will not equal 100% as multiple responses could be selected.

Fare Method – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
One-way Trip	0.0%	0.0%	20.0%	73.1%	0.0%	7.6%
Local One-Way	68.6%	0.0%	0.0%	0.0%	0.0%	29.4%
Local 10-Ride Ticket	16.5%	10.0%	0.0%	0.0%	0.0%	9.8%
Local 31-Day Pass	6.4%	0.0%	0.0%	0.0%	0.0%	2.7%
Express One-Way	0.6%	0.0%	0.0%	0.0%	0.0%	0.2%
Express 20-Ride Ticket	8.1%	0.1%	0.0%	0.0%	0.0%	3.5%
Express 31-Day Pass	2.6%	0.0%	0.0%	0.0%	0.0%	1.1%
Free - Paratransit Certified	0.8%	0.0%	0.0%	0.0%	0.0%	0.4%
Local One-Way Cash	0.0%	46.0%	0.0%	0.0%	0.0%	12.5%
Local Monthly Pass	0.0%	7.2%	0.0%	0.0%	0.0%	2.0%
Express One-Way Cash	0.0%	8.0%	0.0%	0.0%	0.0%	2.2%
Express 10-Ride Ticket	0.0%	14.8%	0.0%	0.0%	0.0%	4.0%
Express Monthly Pass	0.0%	14.9%	0.0%	0.0%	0.0%	4.1%
Free - Child Farebox Height	0.0%	0.7%	0.0%	0.0%	0.0%	0.2%
Cash	0.0%	0.0%	0.0%	0.0%	88.2%	0.3%
10-Ride Pass	0.0%	0.0%	0.0%	0.0%	11.8%	0.0%
One-Way Ticket plus Transfer	0.0%	0.0%	0.0%	1.6%	0.0%	0.1%
Day Pass	0.0%	0.0%	0.0%	50.0%	0.0%	1.6%
Free - Age 3 or under 42 inches	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%
Round Trip	0.0%	0.0%	6.1%	0.0%	0.0%	1.6%
10-Trip	0.0%	0.0%	36.8%	0.0%	0.0%	9.7%
31-Day	0.0%	0.0%	37.5%	0.0%	0.0%	9.9%
Monthly Pass Blue	0.0%	0.0%	0.0%	2.2%	0.0%	0.1%
Monthly Pass Green	0.0%	0.0%	0.0%	8.2%	0.0%	0.3%
Grand Total	103.5%	101.7%	100.4%	136.5%	100.0%	103.2%

Respondents were asked what type of fare they used for their trip. The “-” denotes that MARTA respondents did not have that option to select from. The most common type of fare used to pay for MARTA respondents’ trips was “Regular Fare” (92.0%). Bus respondents were more likely to use “Senior (65 and older)” and “Disabled/Medicare Discount” compared to rail passengers. The most notable difference between regional respondents is the percentage of respondents who selected “Disabled/Medicare Discount” regionally (3.0%) compared to other agency respondents (0.9%).

Table 28: Type of Fare by System

Type of Fare – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Regular Fare	89.7%	94.4%	92.0%	92.2%
Senior (65 and older)	4.5%	1.9%	3.2%	3.1%
Disabled/Medicare Discount	4.2%	2.0%	3.1%	3.0%
Other	1.6%	1.7%	1.7%	1.6%
Not Provided	0.0%	0.0%	0.0%	0.0%
Medicare Card Holder	-	-	-	0.0%
Senior (60 and Older)	-	-	-	0.0%
Youth (Under 18)	-	-	-	0.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The most common type of fare used to pay for other agency respondents’ trips was “Regular Fare” (95.3%). Hall agency respondents were much more likely to use “Disabled/Medicare Discount” (17.4%) type of fare compared to Cobb, Gwinnett, and SRTA agency respondents.

Type of Fare – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Regular Fare	94.9%	98.1%	100.0%	73.8%	75.3%	95.3%
Senior (65 and older)	2.7%	1.3%	0.0%	0.0%	14.1%	2.0%
Disabled/Medicare Discount	0.0%	0.5%	0.0%	17.4%	10.6%	0.9%
Other	1.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Medicare Card Holder	0.9%	0.0%	0.0%	0.0%	0.0%	0.5%
Senior (60 and Older)	0.0%	0.0%	0.0%	8.8%	0.0%	0.4%
Youth (Under 18)	0.5%	0.0%	0.0%	0.0%	0.0%	0.3%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (95.0%) of MARTA respondents indicated that they did use a plastic Breeze card. There were no significant differences between bus and rail passengers for the type of breeze card they used. There was only a slight difference between MARTA averages and regional averages regarding the use of a Breeze card. Other agency respondents were much more likely to indicated “No”, they did not use a Breeze card (12.7%) compared to regional respondents (2.1%).

Table 29: Breeze Card Use by System

Use Breeze Card – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Yes plastic card	95.6%	94.5%	95.0%	94.3%
Yes paper ticket	2.3%	5.0%	3.6%	3.6%
No	2.1%	0.6%	1.4%	2.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (83.9%) of other agency respondents indicated that they did use a plastic Breeze card with SRTA agency respondents being the highest to indicate the use of a plastic Breeze card (93.5%). Cobb agency respondents had the highest percentage of respondents to indicate they used a paper ticket (6.6%).

Use Breeze Card – Other Agencies				
	COBB	GWINNETT	SRTA	Grand Total
Yes plastic card	81.3%	78.5%	93.5%	83.9%
No	12.1%	20.0%	6.2%	12.7%
Yes paper ticket	6.6%	1.5%	0.3%	3.4%
Grand Total	100.0%	100.0%	100.0%	100.0%

Respondents were asked how they would have made their trip had transit not been available. Thirty-one percent (31.4%) of MARTA respondents indicated they used “Uber, Lyft, etc.” to make their trip, followed by “Drive alone” (24.6%) and “Driven with someone else” (20.4%). Bus passengers were more likely to “Walk” (9.1%) compared to rail passengers (2.8%), while rail passengers were more likely to “Drive alone” (38.7%) than bus passengers (10.4%). There were no significant differences between MARTA overall percentages, regional overall percentages, and other agency overall percentages regarding an alternative travel mode respondents would have taken had transit not been an option.

Table 30: Alternative Travel Mode by System

Alternative Travel Mode - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Uber, Lyft, etc	35.9%	26.9%	31.4%	30.9%
Drive alone	10.4%	38.7%	24.6%	25.5%
Driven by someone else	24.2%	16.7%	20.4%	20.1%
Would not make trip	12.6%	8.8%	10.7%	10.7%
Walk	9.1%	2.8%	5.9%	5.8%
Other	2.7%	2.0%	2.4%	2.2%
Carpool / Vanpool	2.2%	2.0%	2.1%	2.1%
Taxi	1.7%	1.5%	1.6%	1.7%
Personal bike	1.1%	0.6%	0.9%	0.9%
Bike share	0.1%	0.1%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Respondents were asked how they would have made their trip had transit not been available. Thirty-eight percent (37.8%) of other agency respondents indicated they “Drive alone” to make their trip, followed by “Uber, Lyft, etc.” (25.1%). SRTA agency respondents were more likely to “Drive alone” (72.4%) compared to the other agencies, while Cherokee agency respondents were more likely to not make the trip (62.4%) and “Walk” (28.2%) than the other agencies.

Alternative Travel Mode – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Drive alone	19.3%	38.0%	72.4%	1.8%	0.0%	37.8%
Uber, Lyft, etc.	39.2%	23.1%	7.1%	2.6%	0.0%	25.1%
Driven by someone else	20.2%	15.6%	6.9%	25.3%	9.4%	15.5%
Would not make trip	11.0%	14.1%	8.6%	15.9%	62.4%	11.6%
Walk	5.2%	3.8%	0.6%	12.7%	28.2%	3.9%
Taxi	2.0%	1.5%	0.3%	39.3%	0.0%	2.6%
Carpool / Vanpool	1.1%	2.8%	3.7%	0.0%	0.0%	2.2%
Other	1.2%	0.1%	0.4%	0.0%	0.0%	0.6%
Personal bike	0.7%	1.0%	0.0%	2.4%	0.0%	0.6%
Bike share	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Over half (69.0%) of MARTA respondents indicated they use public transit “5 or more days a week”. Ten percent (10.4%) of MARTA respondents indicated they use public transit less than “2 to 4 days a week”. Bus respondents were more likely to use transit “5 or more days a week” (74.0%) compared to rail passengers (64.0%). Regional respondents were only slightly more likely to use transit “2 to 4 days a week” compared to MARTA respondents. There were no significant differences between MARTA respondent response rate and regional respondent response rate, but regional respondents were more likely to indicate they use transit once a month or less (5.1%) compared to other agency respondents (1.8%).

Table 31: Trip Frequency by System

Frequency of Use – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
5 or more days a week	74.0%	64.0%	69.0%	68.8%
2 to 4 days a week	20.2%	21.2%	20.7%	21.2%
About once a week	2.7%	3.0%	2.9%	2.8%
2 to 3 times a month	1.3%	2.9%	2.1%	2.1%
About once a month	0.6%	1.6%	1.1%	1.0%
Several times a year	0.5%	4.4%	2.4%	2.3%
Once a year	0.2%	0.9%	0.6%	0.6%
First time	0.6%	2.0%	1.3%	1.2%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Over half (66.7%) of other agency respondents indicated they use public transit “5 or more days a week”. Six percent (5.5%) of other agency respondents indicated they use public transit less than “2 to 4 days a week”. Cherokee agency respondents were less likely to use transit “5 or more days a week” (47.1%) compared to the other agencies but were more likely to use transit “2 to 4 days a week” (48.2%) compared to the other agencies.

Frequency of Use – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
5 or more days a week	72.9%	62.4%	62.9%	53.8%	47.1%	66.7%
2 to 4 days a week	20.5%	32.5%	33.3%	37.1%	48.2%	27.7%
About once a week	1.5%	2.1%	1.5%	6.5%	4.7%	1.8%
2 to 3 times a month	2.8%	0.9%	1.5%	1.9%	0.0%	1.9%
About once a month	0.2%	0.4%	0.0%	0.8%	0.0%	0.2%
Several times a year	1.0%	0.6%	0.1%	0.0%	0.0%	0.6%
Once a year	0.3%	0.0%	0.3%	0.0%	0.0%	0.2%
First time	0.9%	1.1%	0.4%	0.0%	0.0%	0.8%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Respondents were asked if they use any additional services in the Atlanta regional area. Nearly three-quarters (72.5%) of MARTA respondents indicated they also use “Uber, Lyft, etc.” in addition to public transit. There were no significant differences between bus and rail passengers for the additional types of services they use. Totals will not equal 100% as multiple responses could be selected. Regional respondents were slightly more likely to use “None” (27.4%) additional services in the Atlanta area compared to MARTA respondents (26.1%), but less likely compared to other agency respondents (45.4%).

Table 32: Share Services Used by System

Share Services Used – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Uber, Lyft, etc.	72.7%	72.3%	72.5%	71.2%
Car share (e.g. Zipcar, etc.)	2.2%	2.8%	2.5%	2.4%
E-scooter (Bird, Lime, etc.)	4.8%	7.0%	5.9%	5.8%
None	25.9%	26.3%	26.1%	27.4%
Grand Total	105.6%	108.3%	107.0%	106.7%

Respondents were asked if they use any additional services in the Atlanta regional area. Just over half (53.2%) of other agency respondents indicated they also use “Uber, Lyft, etc.” in addition to public transit. Hall agency respondents were the least likely to also use “Uber, Lyft, etc.” (12.3%) in addition to public transit and were most likely to use no additional services (87.7%) compared to the other agencies. Totals will not equal 100% as multiple responses could be selected.

Share Services Used – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Uber, Lyft, etc.	68.4%	54.6%	32.4%	12.3%	14.1%	53.2%
Car share (e.g. Zipcar, etc.)	1.3%	0.7%	1.0%	0.0%	0.0%	1.0%
E-scooter (Bird, Lime, etc.)	4.1%	4.9%	3.3%	0.0%	0.0%	4.0%
None	30.8%	43.4%	65.5%	87.7%	85.9%	45.4%
Grand Total	104.7%	103.5%	102.2%	100.0%	100.0%	103.6%

Over half (56.6%) of MARTA respondents indicated they have one or two vehicles in their household. Bus passengers had a higher percentage of respondents to indicate they have no vehicles in their household (48.5%) compared to rail passengers (25.4%). There were no significant differences in MARTA respondents and regional respondents in the number of household vehicles a respondent has and minimal differences between regional respondents and other agency respondents.

Table 33: Household Vehicles by System

Number of Household Vehicles - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
None (0)	48.5%	25.4%	36.9%	36.4%
One (1)	34.1%	35.8%	34.9%	34.4%
Two (2)	14.3%	29.1%	21.7%	22.1%
Three (3)	2.5%	7.2%	4.9%	5.2%
Four (4)	0.4%	1.9%	1.2%	1.4%
Five (5)	0.1%	0.5%	0.3%	0.3%
Six (6)	0.0%	0.1%	0.1%	0.1%
Seven (7)	0.0%	0.0%	0.0%	0.0%
Eight (8)	0.0%	0.0%	0.0%	0.0%
Ten or more (10+)	0.0%	0.0%	0.0%	0.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Over half (54.8%) of other agency respondents indicated they have one or two vehicles in their household. Cherokee agency respondents had the highest percentage of respondents to indicate they have no working vehicles in their household (82.4%) compared to other agencies. SRTA agency respondents had the highest percentage of four or more vehicles in their household (15.3%).

Number of Household Vehicles – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
None (0)	44.7%	29.5%	1.9%	63.9%	82.4%	30.0%
One (1)	32.1%	27.8%	19.2%	17.7%	11.8%	27.0%
Two (2)	18.6%	27.0%	46.1%	9.3%	0.0%	27.8%
Three (3)	3.1%	12.3%	17.7%	4.4%	0.0%	9.5%
Four (4)	1.1%	2.9%	12.0%	0.5%	5.9%	4.4%
Five (5)	0.2%	0.2%	2.0%	3.2%	0.0%	0.8%
Six (6)	0.0%	0.3%	0.5%	0.0%	0.0%	0.2%
Seven (7)	0.0%	0.0%	0.5%	0.9%	0.0%	0.2%
Eight (8)	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%
Ten or more (10+)	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (86.3%) of MARTA respondents had households of 1-4 people. Less than two percent (1.8%) of MARTA respondents indicated they had a household of seven or more people. There were no significant differences in household size between bus and rail passengers. There were no noticeable differences between MARTA respondents and regional respondents in household size, and minimal differences between regional and other agency respondents.

Table 34: Household Size by System

Household Size - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
One (1)	21.7%	19.2%	20.5%	20.2%
Two (2)	24.1%	27.4%	25.8%	25.8%
Three (3)	23.3%	22.2%	22.7%	22.6%
Four (4)	17.1%	17.4%	17.3%	17.4%
Five (5)	9.0%	9.2%	9.1%	9.1%
Six (6)	2.9%	2.9%	2.9%	3.0%
Seven (7)	1.0%	0.9%	1.0%	1.0%
Eight (8)	0.3%	0.3%	0.3%	0.4%
Nine (9)	0.1%	0.1%	0.1%	0.1%
Ten or More (10+)	0.5%	0.2%	0.4%	0.4%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (83.4%) of other agency respondents had households of 1-4 people. Less than four percent (3.4%) of other agency respondents indicated they had a household of seven or more people. SRTA agency respondents had the lowest percentage of respondents (9.5%) of one person households while Cherokee agency respondents had the highest percentage (48.2%) of one person households.

Household Size – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
One (1)	21.5%	15.3%	9.5%	23.4%	48.2%	16.8%
Two (2)	24.7%	24.8%	28.4%	34.7%	29.4%	26.0%
Three (3)	21.4%	20.0%	21.9%	18.9%	12.9%	21.0%
Four (4)	16.8%	22.0%	23.1%	11.2%	0.0%	19.6%
Five (5)	10.0%	10.0%	8.3%	4.4%	0.0%	9.4%
Six (6)	2.0%	5.3%	4.9%	1.5%	4.7%	3.7%
Seven (7)	1.0%	0.8%	2.9%	2.8%	4.7%	1.5%
Eight (8)	1.9%	0.3%	0.7%	0.0%	0.0%	1.1%
Nine (9)	0.1%	0.1%	0.3%	0.0%	0.0%	0.1%
Ten or More (10+)	0.6%	1.4%	0.0%	3.2%	0.0%	0.7%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (91.2%) of MARTA respondents were making their trip by themselves with no other household members with them. There were no significant differences between bus and rail respondents for the number of household members travelling with them. There were no significant differences between MARTA respondents and regional respondents in the number of household members on the trip, but regional respondents were slightly more likely to have “Two (2)” household members on the trip (6.8%) compared to other agency respondents (3.9%).

Table 35: Household Members on Current Trip by System

Household Members on Trip - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
One (1)	91.0%	91.4%	91.2%	91.5%
Two (2)	7.2%	6.8%	7.0%	6.8%
Three (3)	1.2%	1.1%	1.2%	1.1%
Four (4)	0.4%	0.4%	0.4%	0.4%
Five (5)	0.1%	0.2%	0.1%	0.1%
Six (6)	0.1%	0.0%	0.0%	0.0%
Seven (7)	0.0%	0.0%	0.0%	0.0%
Ten or More (10+)	0.0%	0.0%	0.0%	0.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (95.3%) of other agency respondents were making their trip by themselves with no other household members with them. There were no significant differences between other agency respondents for the number of household members travelling with them, however, Cherokee agency respondents had the highest percentage of three household members travelling with them (4.7%) compared to the other agencies.

Household Members on Trip – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
One (1)	94.7%	94.3%	97.7%	93.2%	90.6%	95.3%
Two (2)	4.4%	4.9%	2.1%	6.0%	4.7%	3.9%
Three (3)	0.5%	0.6%	0.3%	0.7%	4.7%	0.5%
Four (4)	0.2%	0.1%	0.0%	0.0%	0.0%	0.1%
Five (5)	0.4%	0.1%	0.0%	0.0%	0.0%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The highest category of employed people in the household for MARTA respondents was two people (41.3%). The majority (88.9%) of MARTA respondents had 1-3 people employed in the household. There were no significant differences between bus and rail respondents for the number of employed household members. MARTA respondents, regional respondents, and other agency respondents were very similar in the number of employed people in the household.

Table 36: Household Employees by System

Employed Persons in Household – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
None (0)	7.9%	5.0%	6.5%	6.3%
One (1)	31.5%	31.5%	31.5%	31.5%
Two (2)	38.5%	44.1%	41.3%	41.3%
Three (3)	17.0%	15.2%	16.1%	16.2%
Four (4)	3.7%	3.3%	3.5%	3.6%
Five (5)	0.8%	0.6%	0.7%	0.7%
Six (6)	0.2%	0.2%	0.2%	0.2%
Seven (7)	0.1%	0.0%	0.1%	0.1%
Eight (8)	0.0%	0.0%	0.0%	0.0%
Nine (9)	0.0%	0.0%	0.0%	0.0%
Ten or More (10+)	0.2%	0.1%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The highest category of employed people in the household for other agency respondents was two people (41.8%). The majority (90.5%) of other agency respondents had 1-3 people employed in the household. SRTA agency respondents had the lowest percentage of respondents indicate they had no employed household members (0.2%).

Employed Persons in Household – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
None (0)	3.6%	3.7%	0.2%	25.6%	38.8%	3.6%
One (1)	33.4%	29.5%	32.2%	28.3%	50.6%	31.9%
Two (2)	42.3%	41.6%	42.1%	36.2%	10.6%	41.8%
Three (3)	15.3%	18.9%	18.5%	6.7%	0.0%	16.8%
Four (4)	4.4%	4.8%	6.0%	0.0%	0.0%	4.8%
Five (5)	0.8%	1.0%	1.0%	0.0%	0.0%	0.9%
Six (6)	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Seven (7)	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Eight (8)	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%
Ten or More (10+)	0.2%	0.1%	0.0%	3.2%	0.0%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (86.2%) of MARTA respondents are employed either full- or part-time. Rail passengers were slightly more likely to be employed full-time (74.7%) compared to bus passengers (67.9%), while bus passengers were slightly more likely to be employed part-time (15.5%) compared to rail passengers (14.2%). There were no significant differences between MARTA respondents, regional respondents, and other agency respondents in employment status.

Table 37: Employment Status by System

Employment Status - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Employed full-time	67.9%	74.7%	71.3%	71.8%
Employed part-time	15.5%	14.2%	14.9%	14.6%
Not currently employed, and not seeking work	9.4%	6.9%	8.1%	8.0%
Retired	3.8%	2.0%	2.9%	2.8%
Not currently employed, but seeking work	2.4%	1.7%	2.0%	2.1%
Homemaker	0.6%	0.4%	0.5%	0.5%
Not Provided	0.3%	0.2%	0.2%	0.3%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (89.1%) of other agency respondents are employed either full- or part-time. Cherokee agency respondents were least likely to be employed full-time (28.2%), while most likely to be a homemaker (9.4%).

Employment Status – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Employed full-time	79.4%	71.5%	87.8%	38.6%	28.2%	78.0%
Employed part-time	10.8%	15.1%	6.1%	21.4%	20.0%	11.1%
Not currently employed, and not seeking work	5.8%	6.5%	3.0%	29.1%	38.8%	6.1%
Not currently employed, but seeking work	2.2%	4.2%	2.1%	2.6%	3.5%	2.7%
Retired	1.4%	0.9%	0.0%	5.3%	0.0%	1.0%
Not Provided	0.2%	1.8%	1.0%	0.0%	0.0%	0.8%
Homemaker	0.3%	0.0%	0.0%	3.0%	9.4%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (85.6%) of MARTA respondents are not a student compared to fourteen percent (14.0%) of MARTA respondents that indicated they were a student of some kind. Rail passengers were more likely to indicate they are a “Full time College / University” student than bus passengers (10.1% vs. 5.7%). There were no significant differences between MARTA respondents, regional respondents, and other agency respondents in student status.

Table 38: Student Status by System

Student Status - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Not a student	87.2%	84.0%	85.6%	85.4%
Yes - Full time College / University	5.7%	10.1%	7.9%	8.1%
Yes - Part time College / University	3.4%	3.7%	3.5%	3.5%
Yes - K - 12th grade	2.4%	0.9%	1.7%	1.6%
Yes - Other type of student	0.9%	0.9%	0.9%	1.0%
Not Provided	0.5%	0.4%	0.5%	0.4%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (83.1%) of other agency respondents are not a student compared to seventeen percent (16.8%) of other agency respondents that indicated they were a student of some kind. Gwinnett agency passengers were more likely to indicate they are a college/university student than other agencies (21.7%). Cherokee agency passengers had no respondents indicate anything other than “Not a student”.

Student Status – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Not a student	85.9%	76.0%	84.8%	90.1%	100.0%	83.1%
Yes - Full time College / University	6.5%	16.6%	11.1%	2.0%	0.0%	10.3%
Yes - Part time College / University	3.7%	5.1%	2.7%	3.8%	0.0%	3.8%
Yes - Other type of student	3.3%	0.5%	0.7%	4.0%	0.0%	1.9%
Yes - K - 12th grade	0.5%	1.9%	0.2%	0.0%	0.0%	0.8%
Not Provided	0.1%	0.0%	0.6%	0.0%	0.0%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (76.1%) of MARTA respondents indicated they do have a valid driver's license. Rail respondents were more likely to indicate a valid driver's license (85.4%) compared to bus passengers (66.8%). Regional respondents were similar to both MARTA respondents and other agency respondents in the response rate for having a valid driver's license.

Table 39: Valid Driver's License by System

Valid Driver's License – MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
No	33.2%	14.6%	23.9%	23.6%
Yes	66.8%	85.4%	76.1%	76.4%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (79.4%) of other agency respondents indicated they do have a valid driver's license. SRTA agency respondents had the highest percentage of respondents indicate they do have a valid driver's license (94.7%). Cherokee agency respondents had more respondents indicate they do not have a valid driver's license (57.6%).

Valid Driver's License – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
No	25.5%	22.4%	5.3%	62.1%	57.6%	20.6%
Yes	74.5%	77.6%	94.7%	37.9%	42.4%	79.4%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (84.4%) of MARTA respondents indicated they are between the ages of 18-54, with the highest category being 25-34 (29.7%). Rail passengers were slightly more likely to be between the ages of 35-54 compared to bus passengers. The most notable difference is regional respondents had a higher percentage of respondents indicate they are between the ages of 25-34 (29.1%) compared to other agency respondents (20.5%).

Table 40: Age by System

Age - MARTA / Regional	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
6-15	0.5%	0.2%	0.3%	0.3%
16-17	2.0%	0.7%	1.3%	1.3%
18-24	18.7%	18.4%	18.5%	18.5%
25-34	29.7%	29.7%	29.7%	29.1%
35-44	20.2%	24.0%	22.1%	22.1%
45-54	13.6%	15.2%	14.4%	14.8%
55-64	9.5%	8.4%	8.9%	9.4%
65 and older	5.6%	3.3%	4.5%	4.4%
Not Provided	0.2%	0.1%	0.2%	0.2%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (95.0%) of other agency respondents indicated they are between the ages of 18-64, with the highest category being 35-44 (21.3%). Cherokee agency passengers had the highest percentage of respondents indicate they are age 55 and older (52.9%).

Age – Other Agencies	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
6-15	0.2%	0.4%	0.0%	0.0%	0.0%	0.2%
16-17	0.6%	2.0%	0.6%	0.7%	0.0%	1.0%
18-24	17.4%	23.8%	12.6%	12.0%	8.2%	17.7%
25-34	26.4%	20.0%	12.7%	10.5%	20.0%	20.5%
35-44	24.9%	17.8%	20.2%	14.0%	7.1%	21.3%
45-54	16.9%	19.7%	26.5%	21.3%	11.8%	20.3%
55-64	9.5%	14.5%	22.6%	33.6%	48.2%	15.2%
65 and older	4.0%	1.8%	4.5%	7.9%	4.7%	3.7%
Not Provided	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The highest category for race / ethnicity for MARTA passengers was “Black/African American” (70.3%). Additionally, that was also the highest category for bus and rail passengers. Rail passengers had a higher percentage of respondents indicate they are “White / Caucasian” (32.4%) than bus passengers (13.7%). Regional respondents had a higher percentage of respondents indicate they are “Black/African American” (69.6%) compared to other agency respondents (60.5%), but otherwise are similar to MARTA and other agency respondents.

Table 41: Race / Ethnicity by System

The highest category for race / ethnicity for other agency passengers was “Black/African American” (57.8%). For Cobb, Gwinnett SRTA, and Hall agencies, “Black/African American” was the highest race/ethnicity category indicated (65.8%, 53.7%, 51.8% and 37.3%), but Cherokee, “White / Caucasian” was the highest race/ethnicity category indicated (43.5%).

Race/Ethnicity – MARTA/Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Black / African American	77.6%	56.4%	66.9%	66.3%
White / Caucasian	10.6%	29.2%	19.9%	20.0%
Mixed Race	6.3%	5.9%	6.1%	6.3%
Asian	1.7%	4.7%	3.2%	3.5%
Hispanic	3.0%	3.0%	3.0%	3.1%
American Indian / Alaska Native	0.4%	0.3%	0.4%	0.4%
Other	0.4%	0.2%	0.3%	0.4%
Native Hawaiian / Pacific Islander	0.0%	0.1%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Race/Ethnicity – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
Black / African American	65.8%	53.7%	51.8%	37.3%	37.7%	57.8%
White / Caucasian	17.6%	15.4%	27.2%	31.4%	43.5%	20.1%
Mixed Race	6.8%	11.8%	9.0%	28.1%	18.8%	9.5%
Asian	1.8%	14.1%	7.8%	1.5%	0.0%	6.7%
Hispanic	6.3%	3.9%	2.2%	0.0%	0.0%	4.4%
Other	1.5%	0.3%	1.2%	0.0%	0.0%	1.1%
American Indian / Alaska Native	0.2%	0.4%	0.0%	1.6%	0.0%	0.3%
Native Hawaiian / Pacific Islander	0.0%	0.3%	0.6%	0.0%	0.0%	0.2%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (93.2%) of MARTA respondents indicated they are not of Hispanic or Latino origin. There were no significant differences between bus and rail passengers. MARTA and regional respondents were more likely to indicate they are not of Hispanic or Latino origin (93.2% and 92.8%) compared to other agency respondents (87.7%).

Table 42: Hispanic Latino Origin by System

Hispanic or Latino Origin - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
No	92.8%	93.5%	93.2%	92.8%
Yes	7.2%	6.5%	6.8%	7.2%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (87.7%) of other agency respondents indicated they are not of Hispanic or Latino origin. The largest difference between the agencies is with Hall agency respondents having a lower percentage of non-Hispanic/Latino respondents (72.6%) and a higher percentage of Hispanic/Latino respondents (27.4%).

Hispanic or Latino Origin – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
No	89.7%	84.9%	89.1%	72.6%	90.6%	87.7%
Yes	10.3%	15.1%	10.9%	27.4%	9.4%	12.3%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Just over half (52.8%) of MARTA respondents indicated they were “Male”. There were no significant differences between bus and rail passengers. Additionally, there were no significant differences between MARTA respondents, other agency respondents, and regional respondents regarding gender.

Table 43: Gender by System

Gender - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Female	47.1%	47.1%	47.1%	47.2%
Male	52.8%	52.7%	52.8%	52.6%
Other	0.0%	0.2%	0.1%	0.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Half (50.8%) of other agency respondents indicated they were “Male”. SRTA agency respondents and Cherokee agency respondents were the only two agencies that indicated a higher percentage of “Female” respondents than “Male” respondents.

Gender – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Female	44.9%	48.7%	55.8%	43.7%	63.5%	48.9%
Male	54.6%	51.3%	43.7%	56.3%	36.5%	50.8%
Other	0.5%	0.0%	0.6%	0.0%	0.0%	0.4%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

The majority (90.6%) of MARTA respondents indicated they do not speak another language other than English at home. There were no significant differences between bus and rail passengers. MARTA respondents and regional respondents were less likely to indicate they can speak another language other than English at home (9.4% and 10.0%) compared to other agency respondents (17.8%).

Table 44: Other Language Spoken at Home by System

Other Language Spoken at Home - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
No	91.0%	90.1%	90.6%	90.0%
Yes	9.0%	9.9%	9.4%	10.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The majority (82.2%) of other agency respondents indicated they do not speak another language other than English at home. Hall agency respondents had the highest percentage of respondents to indicate they do speak another language other than English at home (30.8%) followed closely by Gwinnett agency respondents (28.8%).

Other Language Spoken at Home – Other Agencies						Grand Total
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	
No	86.8%	71.2%	87.5%	69.2%	90.6%	82.2%
Yes	13.2%	28.8%	12.5%	30.8%	9.4%	17.8%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Of those MARTA respondents that indicated they do speak another language other than English at home, the majority (93.0%) indicated they speak English “Well” or “Very well”. Rail passengers who indicated they speak another language other than English at home were more likely to indicate they speak English “Very well” (84.1%) compared to bus passengers (68.8%). There were no significant differences between MARTA respondents, other agency respondents, and regional respondents regarding respondent’s English proficiency.

Table 45: English Proficiency by System

English Proficiency – MARTA / Regional	MARTA	MARTA	MARTA	Regional
	BUS	RAIL	Total	Total
Very well	68.8%	84.1%	76.9%	77.0%
Well	21.2%	11.5%	16.1%	16.0%
Less than well	7.9%	2.1%	4.8%	4.9%
Not at all	0.1%	0.0%	0.1%	0.1%
Unknown	2.0%	2.3%	2.1%	2.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

Of those other agency respondents that indicated they do speak another language other than English at home, the majority (93.0%) indicated they speak English “Well” or “Very well”. SRTA agency passengers who indicated they speak another language other than English at home were more likely to indicate they speak English “Very well” (90.4%) compared to the other agencies.

English Proficiency – Other Agencies						Grand
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Total
Very well	71.5%	81.9%	90.4%	44.7%	0.0%	78.0%
Well	19.4%	12.5%	7.1%	36.7%	50.0%	15.0%
Less than well	6.8%	4.7%	2.6%	13.0%	50.0%	5.5%
Not at all	1.7%	0.0%	0.0%	0.0%	0.0%	0.6%
Unknown	0.6%	0.9%	0.0%	5.6%	0.0%	0.9%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Just under half (45.6%) of MARTA passengers indicated their total annual household income to be between \$20,000 and \$59,999. Bus passengers were more likely to indicate having a total annual household income of \$30,000-\$39,999 (15.1%) compared to rail passengers (10.0%), while rail passengers were more likely to indicate a total annual household income of “More than \$120,000” (5.6%) compared to bus passengers (0.9%). The most noticeable difference in responses would be regional respondents were more likely to indicate their total annual household income to be between \$20,000-\$59,999 (44.8%) compared to other agency respondents (33.5%).

Table 46: Income by System

Income - MARTA / Regional				
	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Below \$5,000	5.7%	2.6%	4.2%	4.2%
\$5,000 - \$9,999	3.7%	2.0%	2.9%	2.9%
\$10,000 - \$19,999	9.3%	4.8%	7.0%	7.1%
\$20,000 - \$29,999	13.7%	7.5%	10.6%	10.5%
\$30,000 - \$39,999	15.1%	10.0%	12.6%	12.2%
\$40,000 - \$49,999	12.7%	11.9%	12.3%	12.1%
\$50,000 - \$59,999	8.7%	11.5%	10.1%	10.0%
\$60,000 - \$74,999	6.4%	11.3%	8.9%	8.7%
\$75,000 - \$99,999	3.7%	10.5%	7.1%	7.3%
\$100,000 - \$119,999	1.4%	5.1%	3.2%	3.4%
More than \$120,000	0.9%	5.6%	3.3%	3.7%
REFUSED	18.6%	17.2%	17.9%	18.0%
MARTA Total	100.0%	100.0%	100.0%	100.0%

One-third (33.5%) of other agency passengers indicated their total annual household income to be between \$20,000 and \$59,999. SRTA agency passengers were more likely to indicate a total annual household income of “More than \$120,000” (18.9%) compared to the other agencies.

Income – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Below \$5,000	3.3%	5.3%	1.7%	17.1%	21.2%	3.9%
\$5,000 - \$9,999	4.4%	3.0%	1.0%	11.5%	31.8%	3.5%
\$10,000 - \$19,999	11.1%	6.5%	2.2%	23.3%	15.3%	7.9%
\$20,000 - \$29,999	13.6%	7.3%	3.0%	16.6%	11.8%	9.2%
\$30,000 - \$39,999	9.2%	7.6%	3.9%	5.6%	2.4%	7.3%
\$40,000 - \$49,999	8.9%	11.1%	6.7%	5.6%	3.5%	8.8%
\$50,000 - \$59,999	8.9%	6.5%	9.5%	1.7%	0.0%	8.2%
\$60,000 - \$74,999	4.4%	7.0%	11.6%	2.0%	0.0%	6.9%
\$75,000 - \$99,999	4.0%	10.5%	19.4%	1.0%	0.0%	9.7%
\$100,000 - \$119,999	3.0%	5.7%	10.2%	0.0%	0.0%	5.5%
More than \$120,000	3.7%	10.0%	18.9%	4.5%	9.4%	9.5%
REFUSED	25.4%	19.5%	11.9%	11.1%	4.7%	19.7%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

4.1.2 Types of Places for Origins and Destinations

The chart below shows the regional distribution of origin place type by destination place type for all agencies. Origin place type is in the rows on the left and destination place type is in the columns on the top. From the chart below you can see the most common distributions were between “Your HOME” and “Your usual WORKPLACE” (29.7% and 27.1%) with the next highest distribution being between “Your HOME” and “Store / Retail Place” (3.5% and 3.2%).

Table 47: Regional Distribution of Origin Place Type by Destination Place Type

Regional Distribution of Origin Place Type by Destination Place Type															
	Your HOME	Your usual WORKPLACE	Store / Retail Place	Bank, or other office / Errands	College or University (student only)	Another Home	Recreation Place	Airport (airline passenger only)	Personal Business	Restaurant	Hospital / Doctor	Your Hotel or Lodging	School (K-12) / Day Care (student only)	Place of Worship	Grand Total
Your HOME	0.0%	29.7%	3.5%	3.4%	2.9%	1.5%	1.5%	1.1%	1.3%	1.1%	1.4%	0.0%	0.6%	0.2%	48.2%
Your usual WORKPLACE	27.1%	0.4%	0.5%	0.4%	0.1%	0.3%	0.2%	0.1%	0.3%	0.3%	0.1%	0.1%	0.0%	0.0%	29.7%
Store / Retail Place	3.2%	0.2%	0.2%	0.1%	0.0%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	4.2%
College or University (student only)	2.6%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.0%
Bank, or other office / Errands	2.0%	0.2%	0.2%	0.3%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	3.0%
Airport (airline passenger only)	1.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	2.1%
Your Hotel or Lodging	0.0%	0.1%	0.3%	0.1%	0.0%	0.1%	0.3%	0.8%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	2.0%
Hospital / Doctor	1.5%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%
Recreation Place	1.1%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	1.5%
Personal Business	0.8%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	1.3%
Restaurant	0.8%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	1.2%
Another Home	0.6%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%
School (K-12) / Day Care (student only)	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%
Place of Worship	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Grand Total	41.1%	31.3%	5.0%	4.6%	3.1%	2.4%	2.3%	2.2%	2.1%	1.9%	1.6%	1.5%	0.7%	0.2%	100.0%

The chart below shows the regional distribution of access mode by egress mode for all agencies. Access mode is in the rows on the left and egress mode is in the columns on the top. From the chart below you can see the most common distributions were between “Walk” (66.4%) with the next highest distribution being between “Walk” and “Get in a parked vehicle and drive alone / Drove alone and parked” (8.3% and 7.5%).

Table 48: Regional Distribution of Access Mode by Egress Mode

Distribution of Access Mode by Egress Mode															
	Walk	Get in a parked vehicle and drive alone	Be picked up by someone	Uber, Lyft, etc.	Shuttle	Wheelchair / Mobility Aid	Get in a parked vehicle and drive/ride with someone	Personal Bike	E-scooter (e.g. Lime, Bird, etc.)	Bike share (Jump, Relay, etc.)	Taxi	School Bus / Other Bus	Skateboard	Car share (e.g. Zipcar, etc.)	Grand Total
Walk	66.4%	8.3%	3.3%	1.3%	0.8%	0.0%	0.6%	0.2%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	81.2%
Drove alone and parked	7.5%	0.1%	0.1%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.1%
Was dropped off by someone going someplace else	4.6%	0.1%	0.2%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.2%
Uber, Lyft, etc.	1.4%	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.7%
Shuttle	1.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
Wheelchair / Mobility Aid	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
Personal Bike	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%
Drove or rode with others and parked	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
E-scooter (e.g. Lime, Bird, etc.)	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
Taxi	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Bike share (Jump, Relay, etc.)	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
School Bus / Other Bus	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Car share (e.g. Zipcar, etc.)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Skateboard	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	81.8%	8.9%	3.8%	1.6%	1.3%	0.8%	0.6%	0.6%	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%	100.0%

The chart below shows the trip types based on origin and destination places types indicated by MARTA passengers and regional totals. The highest category for trip type for MARTA passengers was “Home – Work” (30.0%) followed by “Work – Home” (26.0%) and “Home – Other” (15.4%). Bus passengers were more likely to make a “Other – Home” trip (13.2%) than rail passengers (9.3%). MARTA response rate and regional response rate were similar and no noticeably differences could be seen while regional respondents were less likely to indicate their trip type to be “Work – Home” (27.1%) compared to other agency respondents (42.4%).

Table 49: Distribution of Trip Types

	MARTA BUS	MARTA RAIL	MARTA Total	Regional Total
Home - Other	19.1%	11.8%	15.4%	15.0%
Home - School	3.2%	3.8%	3.5%	3.5%
Home - Work	30.3%	29.6%	30.0%	29.7%
Work - Home	23.9%	28.0%	26.0%	27.1%
Work - Other	1.8%	2.5%	2.2%	2.2%
Work - School	0.1%	0.1%	0.1%	0.1%
Work - Work	0.4%	0.4%	0.4%	0.4%
School - Home	2.3%	3.5%	2.9%	3.0%
School - Other	0.2%	0.4%	0.3%	0.4%
School - School	0.0%	0.0%	0.0%	0.0%
School - Work	0.1%	0.2%	0.2%	0.2%
Other - Home	13.2%	9.3%	11.2%	10.9%
Other - Other	4.3%	8.7%	6.5%	6.3%
Other - School	0.1%	0.1%	0.1%	0.1%
Other - Work	0.9%	1.4%	1.2%	1.1%
MARTA Total	100.0%	100.0%	100.0%	100.0%

The chart below shows the trip types based on origin and destination places types indicated by other agency passengers. The highest category for trip type was “Work – Home (42.4%) followed by “Home – Work (25.8%). SRTA agency passengers were more likely to make a “Work – Home” trip (89.5%) and less likely to make a “Home – Work” trip (0.2%) compared to other agencies.

Trip Purpose – Other Agencies						
	COBB	GWINNETT	SRTA	HALL	CHEROKEE	Grand Total
Home - Other	14.5%	7.3%	0.0%	33.6%	22.4%	9.3%
Home - School	2.4%	10.6%	0.0%	0.0%	0.0%	3.9%
Home - Work	35.4%	36.6%	0.2%	18.6%	17.7%	25.8%
Work - Home	23.8%	29.6%	89.5%	15.0%	11.8%	42.4%
Work - Other	3.7%	2.2%	0.4%	4.4%	0.0%	2.4%
Work - School	0.3%	0.0%	0.3%	0.0%	0.0%	0.2%
School - Home	2.3%	4.4%	8.8%	2.7%	0.0%	4.6%
School - Other	0.4%	0.8%	0.0%	0.0%	0.0%	0.4%
School - Work	0.1%	0.0%	0.2%	0.0%	0.0%	0.1%
Other - Home	11.6%	4.4%	0.4%	13.6%	40.0%	6.9%
Other - Other	5.1%	3.4%	0.2%	9.4%	8.2%	3.5%
Other - School	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%
Other - Work	0.4%	0.8%	0.0%	2.8%	0.0%	0.5%
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

5. Survey Result Comparisons

The survey result comparisons in this chapter are based on the previous 2009-2010 report data and the current 2019 report data.

All 2019 data in the tables are based on the secondary expansion numbers conducted by CTG and are showing the sum of the linked weight factors except where stated otherwise. The 2019 categories of “Unknown” or “Not Provided” have been removed from the subsequent tables for more accurate comparison purposes.

Any perceived insights based on differences in the results between the current study and the previous study should be done with extreme caution as the previous survey was a paper-based survey collection conducted nearly a decade ago.

5.1 Trend Comparisons by System

Table 50: Origin Trip Purpose by System (2019 vs. 2009)

Origin Place Type	2019	2009
Your HOME	48.2%	51.7%
Your usual WORKPLACE	29.7%	22.2%
Store / Retail Place	4.2%	3.9%
College or University (student only)	3.0%	4.4%
Bank, or other office / Errands	3.0%	1.0%
Airport (airline passenger only)	2.1%	0.9%
Your Hotel or Lodging	2.0%	0.5%
Hospital / Doctor	1.8%	2.7%
Recreation Place	1.5%	0.4%
Personal Business	1.3%	4.2%
Restaurant	1.2%	1.1%
Another Home	1.1%	2.1%
School (K-12) / Day Care (student only)	0.5%	4.7%
Place of Worship	0.1%	0.2%
Grand Total	100.0%	100.0%

Table 51: Access by System (2019 vs. 2009)

Access Mode	2019	2009
Walk	81.2%	72.4%
Drove alone and parked	8.1%	10.6%
Was dropped off by someone going someplace else	5.2%	14.0%
Other	4.9%	2.7%
Personal Bike	0.6%	0.3%
Grand Total	100.0%	100.0%

Table 52: Destination Trip Purpose by System (2019 vs. 2009)

Destination Place Type	2019	2009
Your HOME	41.1%	37.1%
Your usual WORKPLACE	31.3%	28.3%
Store / Retail Place	5.0%	6.5%
Bank, or other office / Errands	4.6%	1.3%
College or University (student only)	3.1%	5.6%
Another Home	2.4%	3.8%
Recreation Place	2.3%	0.7%
Airport (airline passenger only)	2.2%	1.4%
Personal Business	2.1%	5.8%
Restaurant	1.9%	1.3%
Hospital / Doctor	1.6%	2.5%
Your Hotel or Lodging	1.5%	0.4%
School (K-12) / Day Care (student only)	0.7%	4.8%
Place of Worship	0.2%	0.4%
Grand Total	100.0%	100.0%

Table 53: Egress by System (2019 vs. 2009)

Egress Mode	2019	2009
Walk	81.8%	80.6%
Get in a parked vehicle and drive alone	8.9%	8.6%
Be picked up by someone	3.8%	8.6%
Personal Bike	0.6%	0.3%
Other	4.9%	2.0%
Grand Total	100.0%	100.0%

Table 54: Fare by System (2019 vs. 2009)

Fare Method	2019	2009
One-way Trip	30.9%	4.8%
1 Day Pass	6.6%	7.4%
7 Day Pass	27.6%	31.2%
30 Day Pass	19.0%	25.0%
10 Trip Pass [Spring]	1.0%	2.9%
20 Trip Pass [Spring]	1.0%	3.1%
University Pass Program	3.3%	1.8%
Student Pass Program (K-12)	0.7%	0.6%
Cash	0.0%	7.6%
Round Trip	0.1%	4.2%
31-Day	0.7%	3.8%
Other	0.2%	1.8%
Grand Total	109.0%	94.2%

Table 55: Used Breeze Card by System (2019 vs. 2009)

Breeze Card Used	2019	2009
Yes	97.9%	89.1%
No	2.1%	10.9%
Grand Total	100.0%	100.0%

Table 56: License by System (2019 vs. 2009)

Driver's License	2019	2009
No	23.6%	29.0%
Yes	76.4%	71.0%
Grand Total	100.0%	100.0%

Table 57: Age by System (2019 vs. 2009)

Age	2019	2009
Under 18	1.6%	3.8%
18-24	18.5%	26.3%
25-34	29.1%	25.2%
35-44	22.1%	18.3%
45-54	14.8%	15.7%
55-64	9.4%	8.6%
65 and older	4.4%	2.1%
Not Provided	0.2%	-
Grand Total	100.0%	100.0%

Table 58: Employment Status by System (2019 vs. 2009)

Employment Status	2019	2009
Employed	86.4%	74.5%
Not Employed	13.6%	25.5%
Grand Total	100.0%	100.0%

Table 59: Student Status by System (2019 vs. 2009)

Student Status	2019	2009
Student	14.1%	30.6%
Not a student	85.4%	69.4%
Not Provided	0.4%	-
Grand Total	100.0%	100.0%

Table 60: Household Vehicles by System (2019 vs. 2009)

Count of Household Vehicles	2019	2009
None (0)	36.4%	40.7%
One (1)	34.4%	32.0%
Two (2)	22.1%	19.4%
Three (3)	5.2%	7.9%
Four or More (4+)	1.8%	0.0%
Grand Total	100.0%	100.0%

Table 61: Household Size by System (2019 vs. 2009)

Household Size	2019	2009
One (1)	20.2%	18.3%
Two (2)	25.8%	29.0%
Three (3)	22.6%	22.2%
Four (4)	17.4%	16.0%
Five (5)	9.1%	8.1%
Six or More (6+)	4.8%	6.4%
Grand Total	100.0%	100.0%

Table 62: Household Workers by System (2019 vs. 2009)

Number of Household Members Employed	2019	2009
None (0)	6.3%	8.6%
One (1)	31.5%	38.6%
Two (2)	41.3%	39.3%
Three (3)	16.2%	10.1%
Four (4)	3.6%	2.3%
Five (5)	0.7%	0.7%
Six or More (6+)	0.4%	0.5%
Grand Total	100.0%	100.0%

Table 63: Race/Ethnicity by System (2019 vs. 2009)

Race / Ethnicity	2019	2009
American Indian / Alaska Native	0.4%	0.8%
Black/African American	66.3%	70.8%
Asian	3.5%	2.1%
White / Caucasian	20.0%	20.8%
Native Hawaiian / Pacific Islander	0.10%	-
Other	0.4%	5.5%
Grand Total	100.0%	100.0%

Table 64: Gender by System (2019 vs. 2009)

Gender	2019	2009
Female	47.2%	51.6%
Male	52.6%	48.4%
Other	0.1%	-
Grand Total	100.0%	100.0%

Table 65: Income by System (2019 vs. 2009)

Total Annual Household Income	2019	2009
Below \$5,000	5.1%	14.0%
\$5,000 - \$9,999	3.5%	8.9%
\$10,000 - \$19,999	8.7%	12.8%
\$20,000 - \$29,999	12.8%	15.7%
\$30,000 - \$39,999	14.9%	14.3%
\$40,000 - \$49,999	14.7%	9.3%
\$50,000 - \$59,999	12.2%	6.0%
\$60,000 - \$74,999	10.6%	6.4%
\$75,000 - \$99,999	8.9%	5.6%
\$100,000 - \$119,999	4.1%	2.9%
More than \$120,000	4.5%	4.1%
Grand Total	100.0%	100.0%
<i>*Excluding "REFUSED"</i>		