

# Florida Department of Transportation

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## Broward County Transit On-Board Study

### *Final Report*

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# Executive Summary

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In the spring of 2010, the Florida Department of Transportation (FDOT), with consultant support, conducted an Origin and Destination (O/D) Survey of Broward County Transit (BCT) riders. The self-administered surveys were conducted among riders of all fixed-route bus service. Data collection was performed from April 1 through June 11, 2010. A total of 7,749 fully weighted questionnaires, as included in the final data files, were collected. In addition to the O/D on-board study, boarding and alighting pairs (B/A Pairs) were also conducted for a subset of the routes in the system and collected 10,203 usable questionnaires capturing passenger flows. The study involved designing the survey instruments; developing a sampling plan; collecting, processing, and geocoding the collected data; weighting and expanding the data; analyzing the data; and reporting the results.

## Project Overview

In order to map out the project and specifics of the data collection, a sample plan was developed for the O/D study. For each route, a sample goal of 8.5 percent was developed, which, because of budget resources and the B/A Pairs portion of the study, is lower than the traditional sample goal of 10 percent. While goals were created at the route level, the sample plan also elaborated on the data collection methodology, a self-administered questionnaire with a mail-back option, specifically with regard to trip selection. All surveyed trips were selected at the block level, mimicking driver shifts for efficiency, and therefore providing de facto stratification to ensure the distribution of sampled trips is representative of the population of trips with regards to time of day and direction distributions.

A pilot test was conducted prior to the full-scale data collection. A pilot test is a full dress rehearsal of the data collection process for the O/D and the B/A Pairs studies, and included the following activities: questionnaire design, assignment generation, conducting of assignments, and data processing. The pilot test occurred from January 6 through January 13, 2010. A full description of the pilot test is contained in Appendix B: Pilot Test Memorandum.

Based on results from the pilot test, the full-scale methodology was finalized for the O/D and BA Pairs surveys. The full-scale data collection occurred from March 30 through June 11, 2010, followed by data processing, weighting, and expansion.

## Key Findings

The objectives of the 2010 O/D survey analysis were two-fold: (1) examine the demographics and (2) examine the travel behavior characteristics of BCT riders. The survey data used for this analysis were appropriately weighted and expanded to represent the unlinked trips made by BCT riders. Some important findings from the analysis of the riders are summarized below:

- The majority of trips made by riders begins or ends at home or work; 49 percent of riders make home-based work trips using transit, while 37 percent make home-based non-work trips.
- Walking is the dominant access and egress mode for all riders. Overall, 86 percent of trips were accessed or egressed by walking.
- Nearly two-thirds (65 percent) of riders make at least one transfer to complete their one-way trip.
- Just over half of all transit riders (54 percent) have a valid driver's license.
- Seventy percent of riders are employed either full- or part-time.
- Riders between 25 to 49 years of age make up nearly half of the customer base (49 percent).

# 1. Introduction

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The Florida Department of Transportation (FDOT), with consultant support, conducted an Origin and Destination (O/D) survey of Broward County Transit (BCT) riders in the spring of 2010. These questionnaires provide information about transit passenger demographics and trip details. The 2010 O/D survey was a system-wide study to include an appropriate level of sampling to reflect all services, including the new, expanded, and revised routes. In addition, a secondary study collecting boarding and alighting pairs (B/A Pairs) from selected routes was also conducted.

The O/D survey was conducted among riders of fixed-route bus services for BCT using self-administered questionnaires. Data collection was conducted on weekdays (Monday through Friday) from April 1 through June 11, 2010. A total of 7,749 usable questionnaires, as included in the final data files, were collected for the O/D study out of a total of 78,886 eligible boardings, which is a response rate of 9.8 percent. In addition, 10,203 usable questionnaires were collected for the B/A Pairs study out of a total of 16,747 eligible boarding, which is a response rate of 60.9 percent.

This report summarizes the survey methods and 2010 O/D survey findings as well as the B/A Pairs survey. Chapter 2 provides a description of the sampling approach, survey instrument and procedures, project challenges and solutions, and weighting and expansion methodology. Chapter 3 provides detailed information for the variables collected during the O/D study.

Appendix A includes the English, Spanish, and Creole survey instruments, as well as the B/A Pairs survey instrument.

## 2. Survey Methods

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### Sampling Plan

A total of 41 BCT routes were sampled on weekdays covering all fixed-route bus service. A sampling plan was designed at the route level and to provide a sample size adequate for analysis of weekday bus service. The sampling plan goal was to collect 10,251 valid questionnaires for BCT routes, 8.5 percent of the average daily ridership. The survey data collection resulted in 7,749 valid questionnaires from BCT routes, 6.4 percent of the average daily ridership. The reason for the reduction in the sample size was two-fold. First, very low response rates on certain routes made it difficult to reach the original goal despite the near census of trips conducted. Second, resources were shifted from the O/D study to help facilitate the B/A Pairs study.

The BCT On-Board Survey used a standard two-stage sampling approach that consisted of sampling passengers and sampling bus trips. Every passenger over the age of 16 (determined by visual estimation) who boarded the sampled bus received a questionnaire. If the surveyor was not able to determine whether a rider's age was over 16 by direct observation (which is the standard procedure), the surveyor asked the boarding passenger if they were over 16 years old.

### Approach to Sampling Bus Trips

The FDOT consultant on this survey study, PTV NuStats, prepared a plan to sample weekday bus trips to capture 8.5 percent of the average daily weekday ridership. The proposed sample plan was based on three main factors:

- First, the plan ensured that the sample adequately met data needs at the global level.
- Second, the plan ensured the collection of adequate samples at the various times of day. Times of the day (TOD) are defined as AM Peak (6:30 a.m.–8:59 a.m.), Mid-day (9:00 a.m.–2:59 p.m.), PM Peak (3:00 p.m.–6:29 p.m.), and Evening/Early Morning (6:30 p.m.–6:29 a.m.).
- Third, the plan ensured that FDOT staff would have the ability to segment the sample on key variables, such as route, day of the week, time of day, and direction.

The original sample plan was based on the average daily ridership from FY 2009 BCT's Automated Passenger Count (APC) and was geared to capture 8.5 percent of riders per route. The individual route goals are contained in Table 2-1.

**Table 2.1: BCT Sample Goals by Route**

Route	Route Name	Average Daily Ridership	Sample Goal (8.5%)
1	US-1 South	7,619	648
2	University Dr	6,202	527
3	Taft Street	542	46
4	A1A South	1,092	93
5	Pembroke Rd	1,561	133
6	County Line Rd-BCT	2,918	248
7	Pines Blvd	4,331	368

Route	Route Name	Average Daily Ridership	Sample Goal (8.5%)
9	Young Circle-BCT	2,118	180
10	US-1 North	3,883	330
11	A1A North	3,784	322
12	Sheridan Street	1,818	155
14	Powerline Rd	3,743	318
15	Hallandale Beach-FLL Tri-rail	462	39
16	Sterling Rd	978	83
17	Washington St	249	21
18	US-441	14,233	1210
20	N Broward Medical Center-BCT	1,155	98
22	Broward Blvd	4,578	389
23	Sawgrass Mills-Pembroke Pines Mall	603	51
28	Miramar Pkwy	3,784	322
30	Davie Blvd	2,248	191
31	Lyons Rd	3,722	316
34	Sample Rd	2,791	237
36	Sunrise Blvd	7,424	631
40	Lauderhill Mall to Galleria Mall	4,462	379
42	Atlantic Blvd	2,228	189
48	Hillsboro Blvd	702	60
50	Dixie Hwy	4,851	412
55	Commercial Blvd	2,019	172
56	Oakland Park	1,773	151
57	Nob Hill/Commercial Blvd	140	12
60	MLK Blvd-Andrews Ave	4,329	368
62	Riverside Dr-Cypress Creek Rd	2,044	174
72	Oakland Park Blvd	7,619	648
81	Oakland Park-Broward Blvd	2,575	219
83	Copans Rd	1,276	108
88	Pine Island Rd/Coral Springs Rd	921	78
101	US-1 South Breeze	914	78
102	University Dr Breeze	864	73
107	I-95 EXPRESS	264	21
441	US-441 Breeze	1,798	153
<b>Total</b>		120,617	10,251

While it is traditionally customary to collect a 10 percent sample at the route level, per FTA direction, the sample rate was reduced to 8.5 percent because of limited project funds, as well as the desire to also collect data for the B/A Pairs study, as previously mentioned.

## Pilot Test

The pilot test data collection was conducted from January 6 through January 13, 2010, prior to the implementation of the full-scale data collection effort. The purpose of the pilot test was to conduct an assessment of the entire data collection methodology. The specific goals were to assess the training procedures and logistics of operating out of the BCT garage, response to the different questionnaire formats (both from data item response and respondent participation), the ability to generate boarding and alighting control totals (B/A Pairs Method), and the efficacy of the incentives—\$2 gift certificates to McDonald's—which were given upon completion of the questionnaire on selected trips.

It was determined that the McDonald's gift certificates were not warranted and did not increase the response rate for the O/D Study. A full description of the pilot test is contained in Appendix B: Pilot Test Memorandum.

## Bus Trip Selection

The number of sampled bus trips was calculated by assuming an average response rate of 15 percent, depending on service type and service period, of typical rider loads by trip (this had to be lowered later in the study because of poor response rates on some routes). Thus, a route that had an average load of 500 riders and made 10 trips a day was determined to have an average rider load of 50 riders per trip. Assuming the route had a sample goal of 50 valid questionnaires, it was determined that seven bus trips would need to be sampled to meet the requirements at an estimated 15 percent response rate ( $500/10 = 50 \times .15 = 7.5$ ;  $50/7.5 = 6.7$  or 7). The number of trips sampled was rounded up to the nearest whole number for trip selection purposes.

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

## Surveyor Assignments

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

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

Surveyor assignment sheets were printed from the Web-based management system and included the organized bus trips to be sampled, along with necessary information for getting to and from the assignment. The assignment sheets were also bar-coded to link them to the field management system.

# Survey Instrument

## O/D Study

The survey instrument was designed as a self-completion questionnaire with 23 self-coded questions. The set of data items is presented in Table 2.2. Prior to data collection, returned questionnaires were defined as “complete” and “usable” if applicable questions were answered up to and including the question regarding reasons for taking the routes listed in the trip path question (Question 9). These items were: origin address, destination address, mode of access, mode of egress, trip purposes, and trip path (see sample questionnaire in Appendix A.)

Questionnaires were designed in a two-sided double letter-size format and printed on heavy card stock for easy distribution and completion. Each questionnaire contained a business reply mail permit for off-bus completion and mail-back. The form was pre-printed with a unique serial number and bar-code, which linked each questionnaire to a specific trip and bus stop boarding location. Text on the questionnaire invited passengers to register to win a monetary prize, one of 10 \$50 prizes, by providing their name and telephone number. The questionnaire was designed to obtain information in three major categories: O/D travel patterns, access and egress modes, and rider demographics. As noted in Table 2.2, some of the required data elements were captured by means other than a question on the questionnaire. This approach had multiple benefits: (1) the questionnaire was shorter to enhance response rates and (2) data quality was improved by circumventing respondent-provided information. The questionnaire was available in three languages: English, Spanish, and Creole.

**Table 2.2: Data Elements and Capture Method**

Data Elements	Capture Method
Day of Travel	GPS-enhanced Palm device
Time of Travel	GPS-enhanced Palm device
Route	GPS-enhanced Palm device
Direction	GPS-enhanced Palm device
Questionnaire Language	Field Code by editor
Origin Address	Questionnaire
Origin Trip Purpose	Questionnaire
Destination Address	Questionnaire
Destination Trip Purpose	Questionnaire
Access Mode	Questionnaire
Egress Mode	Questionnaire
Total Buses & Trains	Questionnaire
Trip Path	Questionnaire
Alighting Location	Questionnaire
Bus Stop On	GPS-enhanced Palm device
Bus Stop Off	Imputed using information from other sources: Destination, Egress Mode, Distance, and GPS data on bus stops for the sampled trip
Transfer Area	Questionnaire
Return Trip	Questionnaire
Children on Trip	Questionnaire
Valid Driver's License	Questionnaire
Working Vehicles	Questionnaire
Vehicle Availability	Questionnaire
Employment Status	Questionnaire
Household Size	Questionnaire
Household Adults	Questionnaire
Household Workers	Questionnaire
Passenger Age	Questionnaire
Ethnicity	Questionnaire
Race	Questionnaire
Household Income	Questionnaire

## B/A Pairs Study

The B/A Pairs Survey was conducted concurrently and was designed to capture the boarding and alighting locations of individual passengers. The survey instrument was designed as a self-completion questionnaire with two self-coded questions. The set of data items is presented in Table 2.3.

Questionnaires were designed in a two-sided postcard-size format and printed on heavy card stock for easy distribution and completion. Each questionnaire contained a business reply mail permit for off-bus completion and mail-back. The form was pre-printed with a unique serial number and bar-code, which linked each questionnaire to a specific trip and bus stop boarding location.

**Table 2.3: Data Elements and Capture Method**

Data Elements	Capture Method
Day of Travel	GPS-enhanced Palm device
Time of Travel	GPS-enhanced Palm device
Route	GPS-enhanced Palm device
Direction	GPS-enhanced Palm device
Questionnaire Language	Field Code by editor
Origin Trip Purpose	Questionnaire
Destination Trip Purpose	Questionnaire
Boarding Location	GPS-enhanced Palm device
Alighting Location	Collector Provided (3 <sup>rd</sup> person)

## Survey Procedures

### Staffing Plan for the O/D and B/A Pairs Studies

For the entirety of the data collection effort, a NuStats field coordinator was on site and stationed at the BCT garages to monitor surveyors and track production. Two field coordinators managed the pilot data collection, initiated the full-scale data collection, and alternated field manager responsibilities for the duration of the data collections effort. Supporting the field coordinators were multiple assistants who helped with the assignment distribution, assignment check-in, and questionnaire editing.

The same data collection staff was used for both the O/D and B/A Pairs studies. Data collection began with a focus on the O/D study for the majority of the first two months, and then slowly transitioned to the B/A Pairs study. The initial trainings prepared approximately 50 staff, or 25 teams of two, to conduct the O/D data collection. Throughout data collection, surveyors either quit the assignment or were removed because of poor performance, requiring additional staff and trainings. As staffing levels decreased to fewer than 30 surveyors, or 15 teams, additional trainings were held to bolster the number of surveyors and survey teams. Based on this level of staffing, approximately 20 assignments were conducted per day. As data collection shifted over to the B/A Pairs portion, a three-person surveyor team was used. For the weeks of this data collection, approximately 10 teams, or 30 surveyors, were used.

### O/D Study

At each stop, questionnaires were distributed by the surveyor to all boarding passengers over the age of 16. Concurrently, a “counter” counted each boarding and alighting passenger. The Palm device recorded the location and time (arrival and departure) at each bus stop, and counters entered the number of passengers boarding and alighting. This process of entering the top questionnaire number into the unit prior to arrival at a bus stop linked a sequence of questionnaires directly to a bus stop (using BCT digitized bus stop list). The data were uploaded daily into a Web-based field management system designed to manage surveyor assignments, provide progress reports and data summary tables, and monitor field staff performance.

## **Labor Recruitment and Training**

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

## **Survey Administration**

The full survey was managed by an in-field survey team comprising 1) a field manager to oversee the entire field team, 2) a surveyor assistant to manage surveyors, and 3) a counter assistant to manage the counters and provide ridership count quality assurance for uploads/downloads to the Web-based field management system. Initial trainings were conducted on March 30 and 31, 2010, prior to the start of data collection. Additional trainings were held during the data collection to account for staff attrition.

On-board data collection was conducted by teams comprising a surveyor and a counter. The surveyor handed out questionnaires, persuaded passengers to complete the questionnaires, assisted with questions, collected questionnaires, and scrutinized the returned questionnaires. The counter entered the questionnaire numbers into the hand-held unit to link questionnaires to a bus stop, counted the passengers boarding and alighting, ensured the unit had picked up accurate GPS location coordinates, collected questionnaires, and validated passenger loads after each stop. Daily surveyor assignments were distributed by the surveyor manager or by the assistants.

As assignments were handed out, information was updated in the Web-based field management system. When surveyors and counters returned from an assignment, the surveyor manager or assistant checked the assignment results (i.e., quickly reviewed the questionnaires to spot any glaring performance issues) and downloaded the passenger count data from the Palm devices. Feedback and additional training were provided when errors were found in the data. If certain errors persisted, staff would be relieved of their services. The surveyor manager updated the assignment status in the Web-based field management system and then handed out the next assignment. Once the completed assignments were reviewed, the questionnaires went through the in-field editing process for inspection and coding prior to being sent to Austin, the location of PTV NuStats' headquarters, for scanning and verification.

## **In-Field Survey Editing**

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

## **Status Reporting**

The surveyor manager prepared status reports from the Web-based field management system. This automated application conducted consistency checks, flagged problem records, and cleaned and purged

flagged records. The surveyor manager reviewed this information for accuracy in the status, response, and performance reports to the Web-based field management system.

## B/A Pairs Study

The B/A Pairs Survey was conducted in much the same way as the O/D Survey. This data collection was only conducted for a select group of routes. Specifically, Routes 1, 2, and 18 were surveyed along with their Breeze counterparts 101, 102, and 441. **Although Route 10 is also a counterpart to Route 101, it was not surveyed in the B/A Pairs study.** In addition, Routes 22, 36, 40, and 72 were also surveyed in this manner.

The main difference between the two studies was a significantly shorter questionnaire for the B/A Pairs study and a third team (collector) member charged with collecting the survey cards as riders alighted the vehicle. The collector received the alighting code from the counter, PDA generated, and coded all cards received at an alighting location. The boarding location was captured in the same way as it was for the O/D survey, the questionnaire number tied to the boarding location via the counter’s PDA.

## Full-Scale Data Collection Challenges and Solutions

The data collection efforts were mostly successful. The main issue with the study was the very low response rates for many of the longer, more diverse routes. In some cases, almost all trips were surveyed in an attempt to reach the route goal. Because such a large percentage of trips were needed, and many routes still did not reach the route goal, route goals were lessened as reaching the original goals became impractical. **Generally speaking, a response rate of roughly 20 percent is expected for these types of surveys, though there are city and regional variations to this assumption. Using 20 percent as a response rate, roughly 50 percent of trips would need to be surveyed to reach a 10 percent sample goal. Because of the low response rates, 10 percent overall, the sample rates needed to be increased significantly to reach the desired goal. Table 2.4 below shows the level of effort undertaken to capture the final sample size.**

**Table 2.4: Trip Sample Rates**

Route	Route Name	Total Weekday Trips	Surveyed Trips	Sample Rate
1	US-1 South	127	112	88.2%
2	University Dr	90	85	94.4%
3	Taft Street	30	30	100.0%
4	A1A South	48	42	87.5%
5	Pembroke Rd	44	44	100.0%
6	County Line Rd-BCT	66	66	100.0%
7	Pines Blvd	70	69	98.6%
9	Young Circle-BCT	47	47	100.0%
10	US-1 North	70	70	100.0%
11	A1A North	66	64	97.0%
12	Sheridan Street	37	37	100.0%
14	Powerline Rd	83	80	96.4%
15	Hallandale Beach-FLL Tri-rail	43	43	100.0%

Route	Route Name	Total Weekday Trips	Surveyed Trips	Sample Rate
16	Sterling Rd	50	46	92.0%
17	Washington St	30	30	100.0%
18	US-441	132	131	99.2%
20	N Broward Medical Center-BCT	41	41	100.0%
22	Broward Blvd	111	100	90.1%
23	Sawgrass Mills-Pembroke Pines Mall	32	26	81.3%
28	Miramar Pkwy	87	68	78.2%
30	Davie Blvd	67	59	88.1%
31	Lyons Rd	86	83	96.5%
34	Sample Rd	63	63	100.0%
36	Sunrise Blvd	117	104	88.9%
40	Lauderhill Mall to Galleria Mall	81	81	100.0%
42	Atlantic Blvd	66	66	100.0%
48	Hillsboro Blvd	42	40	95.2%
50	Dixie Hwy	83	79	95.2%
55	Commercial Blvd	38	33	86.8%
56	Oakland Park	56	49	87.5%
57	Nob Hill/Commercial Blvd	20	20	100.0%
60	MLK Blvd-Andrews Ave	83	83	100.0%
62	Riverside Dr-Cypress Creek Rd	48	48	100.0%
72	Oakland Park Blvd	115	108	93.9%
81	Oakland Park-Broward Blvd	65	55	84.6%
83	Copans Rd	58	58	100.0%
88	Pine Island Rd/Coral Springs Rd	44	35	79.5%
101	US-1 South Breeze	28	14	50.0%
102	University Dr Breeze	24	16	66.7%
107	I-95 EXPRESS	24	18	75.0%
441	US-441 Breeze	34	23	67.6%
<b>Total</b>		2,546	2,366	92.9%

## Data Weighting and Expansion

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

incorrect and/or when questionnaires are returned in a manner inconsistent with the assumed distribution.

In on-board surveys, the universe of trips operated by transit routes is generally not sampled. At the same time, all the riders who board the sampled routes cannot be surveyed due to non-response. All these factors lead to potential biases in the survey data. Consequently, sample weighting and expansion are critical to account and correct for these biases. In particular, sample weighting adjusts for non-response at the bus stop level and accounts for sampling trips at the route, time, and direction level (RTD). Sample expansion, on the other hand, expands the weighted sample to reflect the population ridership at the system-wide level. The next section describes the sample weighting procedure followed by the sample expansion procedure, calculation of the final analytic weights, and calculation of the linked trip factor that translates boardings (i.e., unlinked trips) to linked trips.

## Sample Weighting

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

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

## Response Factor

The Response factor adjusts for non-response associated with boarding passengers that do not return usable surveys<sup>1</sup> at each bus stop where a passenger boards. In order to capture all the non-responding boarding passengers, the Response factor is calculated at the bus stop level.

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

## Bus Stops with Non-Zero Boardings and Zero Completed Questionnaires

In an ideal world, every transit rider would participate in the survey. However, of the 29,115 bus stops along surveyed routes (i.e., sampled trips in which a passenger boarded at a stop), 23,197 bus stops had non-zero boardings and zero completed questionnaires. This is a higher-than-normal percentage (80 percent) for bus stops with boardings but without completed questionnaires and can be attributed to the low response rate encountered during data collection. In order to extrapolate the data to the stops without completed records, the Consultant applied a bus stop grouping methodology to the 5,918 bus stops with completed records. This bus stop grouping method was applied to the unique trips that included these bus stops of interest. Specifically, based on the sequence of the bus stops in the unique trip and the distance between bus stops, the bus stops of interest (with non-zero boardings and zero completes) were grouped with either the subsequent or the previous stop. In particular, the bus stop of

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<sup>1</sup> Each record in the database represents a usable survey (i.e., one that has passed all quality assurance procedures).

interest was grouped with the closest bus stop. However, if the previous and the subsequent stops had zero boardings and zero completes, the bus stop of interest was grouped with the second previous and subsequent stop, and so on.

### **Bus Stops with Fewer Boardings than Completes**

Of the 29,115 bus stops on surveyed routes, 61 bus stops had fewer boardings than completes, generally because of counter/surveyor error. These types of errors can occur for many reasons, including: counters incorrectly selecting a stop when GPS is not working properly, surveyors improperly distributing questionnaires, passengers requesting a questionnaire at a stop subsequent to their boarding location (thus having misallocated questionnaires), among others. These stops were addressed in the following way: based on the sequence of the bus stops in the unique trip that included these bus stops of interest, the Consultant grouped the bus stop of interest (with boardings less than completes) with the subsequent stops (i.e., bus stops in the direction of the trip). If a resolution was not reached by grouping with subsequent bus stops in the direction of the unique trip (i.e., total boardings were not equal or greater than the completed surveys at the group level), the bus stop of interest was grouped with previous ungrouped bus stops (i.e., bus stops in the opposite direction of the trip). The regrouping was carried out until a resolution was reached (i.e., the boardings were at least equal to the total number of completed surveys at the group level). Following the application of this method (i.e., after grouping the bus stop of interest with all other bus stops in the unique trip), if the total boardings were less than the total completed surveys at the group level, a Response factor of 1 was assigned to all the bus stops in the unique trip.

### **Unidentified Bus Stops**

The unidentified bus stops included stops that could not be geocoded (and hence could not be identified) with missing information on either the boardings or the completed surveys. Of the 10,287 bus stops on the surveyed routes, no bus stops were unidentified.

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

$$\text{Response Factor} = \text{Total Adult Boardings}^2 \text{ by Bus Stop} / \text{Usable Surveys by Bus Stop}$$

### **Vehicle Factor**

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

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

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

### **Boarding Factor**

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

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<sup>2</sup> Adult Boardings are defined as boardings made by individuals over 16 years of age who qualify for taking the survey.

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

## Sample Expansion

Sample expansion factors up the weighted sample to the population ridership at Route, Direction, Segment, and Time-of-Day level. In particular, the weighted sample data were expanded to represent *2009 BCT Ridecheck Ons and Offs data by Route, Direction, Segment, and Time of Day expanded to 2010 April-May route ridership from fare box data*. In order to more accurately represent student riders in the system, student boarding data collected by PTV NuStats were used as a control total to adjust the student riders in the survey data, prior to final expansion at Route, Direction, Segment, and Time-of-Day level.

## Expansion Factor

- *Student Rider Expansion factor:* The Student Rider Expansion factor was computed by expanding the weighted student riders to the student control totals by route. The control totals for students at the route level were obtained from the boarding counts collected during the survey.

The final Expansion factor was calculated at the Route, Time of Day, Direction, and Segment (RTDS) level with *2009 BCT Ridecheck data expanded to 2010 fare box ridership data* using the formula below.

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

## Expansion Weight

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

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

## Linked Trip Factor

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

# Final Data Set Summary

## O/D Study

A total of 7,749 questionnaires were deemed fully complete for the O/D Study, and these cases were used in the weighting and analysis. Overall, a response rate of 9.8 percent was achieved. While this figure is relatively low as compared to other O/D on-board studies, it is in line with response rates previously achieved in the region. Table 2.5 shows the number of completed questionnaires and response rates at the route level.

**Table 2.5: BCT O/D Completes and Response Rates at the Route Level**

Route	Route Name	Sample Goal (8.5%)	Eligible Boardings	Total Completes	Eligible Response Rate	Total Boardings	Total Response Rate
1	US-1 South	648	5,366	368	6.9%	5,694	6.5%
2	University Dr	527	3,691	365	9.9%	4,131	8.8%
3	Taft Street	46	388	28	7.2%	418	6.7%
4	A1A South	93	767	92	12.0%	787	11.7%
5	Pembroke Rd	133	1,071	110	10.3%	1,210	9.1%
6	County Line Rd-BCT	248	1,669	162	9.7%	1,842	8.8%
7	Pines Blvd	368	2,939	241	8.2%	3,228	7.5%
9	Young Circle-BCT	180	1,794	282	15.7%	1,944	14.5%
10	US-1 North	330	2,845	240	8.4%	3,002	8.0%
11	A1A North	322	2,250	219	9.7%	2,372	9.2%
12	Sheridan Street	155	1,248	149	11.9%	1,356	11.0%
14	Powerline Rd	318	2,235	336	15.0%	2,286	14.7%
15	Hallandale Beach-FLL Tri-rail	39	332	51	15.4%	360	14.2%
16	Sterling Rd	83	721	104	14.4%	803	13.0%
17	Washington St	21	304	39	12.8%	321	12.1%
18	US-441	1210	9,967	565	5.7%	10,709	5.3%
20	N Broward Medical Center-BCT	98	709	94	13.3%	771	12.2%
22	Broward Blvd	389	2,546	313	12.3%	2,670	11.7%
23	Sawgrass Mills-Pembroke Pines Mall	51	344	54	15.7%	380	14.2%
28	Miramar Pkwy	322	2,477	218	8.8%	2,690	8.1%
30	Davie Blvd	191	1,207	87	7.2%	1,341	6.5%
31	Lyons Rd	316	2,102	210	10.0%	2,499	8.4%
34	Sample Rd	237	1,761	188	10.7%	1,989	9.5%
36	Sunrise Blvd	631	3,867	439	11.4%	4,356	10.1%
40	Lauderhill Mall to Galleria Mall	379	3,395	190	5.6%	3,591	5.3%
42	Atlantic Blvd	189	1,726	139	8.1%	1,866	7.4%

Route	Route Name	Sample Goal (8.5%)	Eligible Boardings	Total Completes	Eligible Response Rate	Total Boardings	Total Response Rate
48	Hillsboro Blvd	60	508	68	13.4%	532	12.8%
50	Dixie Hwy	412	3,027	278	9.2%	3,337	8.3%
55	Commercial Blvd	172	1,111	214	19.3%	1,164	18.4%
56	Oakland Park	151	889	169	19.0%	1,032	16.4%
57	Nob Hill/Commercial Blvd	12	126	24	19.0%	141	17.0%
60	MLK Blvd-Andrews Ave	368	3,343	354	10.6%	3,611	9.8%
62	Riverside Dr-Cypress Creek Rd	174	1,465	191	13.0%	1,660	11.5%
72	Oakland Park Blvd	648	6,176	498	8.1%	6,717	7.4%
81	Oakland Park-Broward Blvd	219	1,367	134	9.8%	1,569	8.5%
83	Copans Rd	108	810	115	14.2%	888	13.0%
88	Pine Island Rd/Coral Springs Rd	78	528	81	15.3%	628	12.9%
101	US-1 South Breeze	78	443	100	22.6%	461	21.7%
102	University Dr Breeze	73	297	74	24.9%	308	24.0%
107	I-95 EXPRESS	21	43	22	51.2%	43	51.2%
441	US-441 Breeze	153	1,032	144	14.0%	1,081	13.3%
<b>Total</b>		10,251	78,886	7,749	9.8%	85,778	9.0%

## B/A Pairs Study

A total of 10,203 questionnaires were deemed fully complete (boarding and alighting pairs captured). Overall, a response rate of 60.9 percent was achieved. Table 2.6 shows the number of completed questionnaires and response rates at the route level.

**Table 2.6: BCT B/A Pairs Completes and Response Rates at the Route Level**

Route	Route Name	Eligible Boardings	Total Completes	Eligible Response Rate	Total Boardings	Total Response Rate
1	US-1 South	2,580	1,696	65.7%	2,781	61.0%
2	University Dr	1,511	1,121	74.2%	1,613	69.5%
18	US-441	4,494	2,412	53.7%	4,732	51.0%
22	Broward Blvd	1,289	730	56.6%	1,415	51.6%
36	Sunrise Blvd	2,133	1,350	63.3%	2,230	60.5%
40	Lauderhill Mall to Galleria Mall	913	611	66.9%	1,091	56.0%
72	Oakland Park Blvd	2,955	1,658	56.1%	3,253	51.0%
101	US-1 South Breeze	164	114	69.5%	166	68.7%
102	University Dr Breeze	280	179	63.9%	284	63.0%
441	US-441 Breeze	428	332	77.6%	460	72.2%
<b>Total</b>		16,747	10,203	60.9%	18,025	56.6%

### 3. Survey Results

This section provides detailed information, using weighted and expanded data, on travel behavior and demographic characteristics of the BCT system, focusing mainly on time of day distribution.

Surveys were conducted during the four times of day (TOD): AM Peak (6:30 a.m.–8:59 a.m.), Mid-day (9:00 a.m.–2:59 p.m.), PM Peak (3:00 p.m.–6:29 p.m.), and Evening/Early Morning (6:30 p.m.–6:29 a.m.). Trips were surveyed throughout the various TODs, with the largest percentage of trips occurring during the Mid-day.

**Table 3.1: Time of Day Distribution**

Time of Day	Count	%
AM Peak	31,522	26.3%
Mid-day	41,674	34.8%
PM Peak	29,154	24.3%
Evening/Early AM	17,556	14.6%
<b>Total</b>	119,906	100.0%

Overall, the largest percentages for trip origin were home (45.5 percent), followed by work (29.3 percent). The largest percentage of trips in the AM Peak originated from home, 70.3 percent, while the largest percentage of PM Peak trips originated from work, 48.8 percent. For the Mid-day and Evening/Early AM times of day, the largest trip originators were home and work.

**Table 3.2: Distribution of Trip Purpose Origin by Time of Day**

Origin Trip Purpose	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Work or Work Related	16.2%	23.9%	48.8%	33.6%	29.3%
Home	70.3%	42.5%	21.1%	48.3%	45.5%
Shopping	3.5%	9.6%	7.8%	6.9%	7.2%
College (Student only)	1.3%	2.7%	3.6%	1.8%	2.4%
Other School (Student only)	1.5%	4.5%	3.3%	1.8%	3.0%
Medical Services	2.7%	7.1%	3.5%	2.4%	4.4%
Social, Religious, or Personal Business	4.3%	8.8%	9.9%	4.9%	7.3%
Other	.3%	1.0%	2.0%	.4%	.9%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, the largest percentages for trip destination were home (40.4 percent), followed by work (30.6 percent). The largest percentage of AM Peak trip destinations was work, 52.1 percent, while the largest percentage of PM Peak trip destinations was home, 65.0 percent. For the Mid-day and Evening/Early AM times of day, the most common trip destinations were home and work.

**Table 3.3: Distribution of Trip Purpose Destination by Time of Day**

Destination Trip Purpose	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Work or Work Related	52.1%	22.8%	13.7%	38.3%	30.6%
Home	17.7%	40.0%	65.0%	41.4%	40.4%
Shopping	6.7%	12.5%	7.8%	6.1%	8.9%
College (Student only)	4.3%	2.0%	1.4%	1.8%	2.4%
Other School (Student only)	2.7%	1.7%	.9%	2.2%	1.8%
Medical Services	5.9%	5.5%	1.2%	1.9%	4.0%
Social, Religious, or Personal Business	9.8%	14.2%	9.1%	7.6%	10.8%
Other	.8%	1.3%	.9%	.6%	1.0%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Access modes are relatively consistent throughout the day with walk being the overwhelming leader at 88.5 percent of trips. There are slightly more riders driving alone during the Mid-day and Evening/Early AM time periods and lower carpooling rates during the same time periods.

**Table 3.4: Distribution of Access Mode by Time of Day**

Access Mode	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Walked/Wheelchair	89.4%	87.7%	88.6%	88.7%	88.5%
Rode my bicycle	4.3%	4.9%	3.4%	4.7%	4.3%
Drove my car	.9%	1.9%	.8%	1.5%	1.3%
Dropped off by someone	5.2%	5.4%	6.3%	4.9%	5.5%
Carpooled	.3%	.1%	.8%	.1%	.3%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Egress modes are relatively consistent throughout the day with walk being the overwhelming leader at 90.9 percent.

**Table 3.5: Distribution of Egress Mode by Time of Day**

Egress Mode	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Walk/Wheelchair	90.7%	90.5%	92.0%	90.1%	90.9%
Ride my bicycle	4.2%	4.9%	3.7%	4.7%	4.4%
Drive my car	.9%	1.0%	1.3%	1.1%	1.1%
Picked up by someone	4.0%	3.4%	2.4%	3.6%	3.4%
Carpool	.2%	.3%	.5%	.5%	.3%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, 74.7 percent of riders make either no transfers or only one transfer. Mid-day riders are the most likely not to transfer at 38.3 percent, but are also the most likely to need three or more transfers at 6.8 percent. The Evening/Early AM riders are the most likely to transfer at least once.

**Table 3.6: Distribution of Number of Transfers by Time of Day**

Number of Transfers	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
0	34.2%	38.3%	33.5%	30.9%	35.0%
1	38.0%	36.9%	43.0%	43.6%	39.7%
2	21.0%	16.9%	17.5%	19.8%	18.5%
3 or more	6.0%	6.8%	5.9%	5.2%	6.2%
Missing	.8%	1.1%	.1%	.5%	.7%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, the majority of riders, 51.3 percent, did not use a major transfer area. The airport Tri-Rail station is the most common transfer area across all times of day, 22.1 percent, while the Golden Glades transfer area is the second most commonly used transfer area at 8.1 percent. Where riders make their transfers is not affected by time of day.

**Table 3.7: Distribution of Major Transfer Areas Used by Time of Day (Multiple Response)\***

Transfer Location	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
No Major Transfer Area Used	52.6%	50.5%	50.5%	52.2%	51.3%
Broward Central	20.7%	23.5%	23.6%	18.8%	22.1%
Golden Glades	4.7%	2.8%	3.2%	4.3%	3.6%
Sawgrass Mills Mall	2.9%	3.1%	2.7%	3.5%	3.0%
Airport Tri-Rail Station	1.0%	2.2%	1.7%	1.3%	1.6%
Copans Rd./ US-1	.9%	1.6%	1.1%	.7%	1.2%
Lauderhill Mall	9.1%	8.2%	7.2%	7.2%	8.1%
West Regional	2.5%	3.5%	4.4%	4.1%	3.5%
Aventura Mall	2.8%	3.1%	3.6%	3.7%	3.2%
Galt Ocean Mile	.5%	.6%	.3%	.7%	.5%
Pembroke Lakes Mall	1.0%	1.1%	2.6%	1.6%	1.5%
Young Circle	2.8%	3.6%	3.5%	2.7%	3.2%
Other	4.5%	4.7%	4.0%	5.6%	4.6%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

\*Figures may add up to more than 100% due to multiple responses.

Overall, the majority of riders, 69.7 percent, made a round trip based on their current trip.

**Table 3.8: Distribution of Return Trip by Time of Day**

Return Trip	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
No, I will not make a return trip	14.8%	29.9%	39.0%	24.6%	27.4%
No, I cannot make a return trip on BCT	2.2%	1.5%	2.8%	2.1%	2.1%
Yes, I will be making a return trip on BCT	74.6%	56.5%	35.9%	58.5%	56.6%
This is the return trip for me	6.9%	11.4%	21.6%	14.1%	13.1%
Missing	1.4%	.7%	.6%	.7%	.9%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

If the bus was not available, 33.7 percent indicated they would forgo the trip. The next most common alternative was getting a ride with a friend, at 31.2 percent.

**Table 3.9: Distribution of Alternative Travel Mode by Time of Day (Multiple Response)\***

Bus Unavailable	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
Drive	10.3%	9.1%	8.7%	9.3%	9.3%
Walk/Wheelchair	14.5%	17.6%	16.7%	12.1%	15.8%
Ride with friend	31.7%	29.6%	33.3%	30.4%	31.2%
Taxi	11.4%	10.7%	12.3%	11.5%	11.4%
Bicycle	7.7%	10.4%	8.0%	12.8%	9.5%
Would not make this trip	32.8%	34.4%	34.6%	32.5%	33.7%
Missing	2.4%	1.4%	1.0%	1.9%	1.6%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

*\*Figures may add up to more than 100 percent due to multiple responses.*

Overall, the most likely household size for a rider is two, at 26.1 percent of ridership.

**Table 3.10: Distribution of Household Size by Time of Day**

Household Size	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
1	18.6%	20.4%	17.0%	16.8%	18.6%
2	23.0%	27.7%	26.9%	26.6%	26.1%
3	19.9%	16.2%	18.2%	20.3%	18.3%
4	18.2%	15.4%	18.1%	13.2%	16.5%
5 or more	17.6%	17.0%	16.4%	17.4%	17.1%
Missing	2.7%	3.4%	3.3%	5.6%	3.5%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, 91.1 percent of riders are traveling without any children. The time of day has little effect on whether riders are traveling with children or not.

**Table 3.11: Distribution of Number of Children in Traveling Party by Time of Day**

Children Traveling	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
0	91.4%	90.0%	91.2%	92.6%	91.1%
1	5.3%	6.0%	5.9%	4.4%	5.6%
2	2.4%	1.8%	1.1%	1.9%	1.8%
3	.5%	1.2%	1.1%	.6%	.9%
4	.5%	1.0%	.6%	.5%	.7%
5 or more	.0%	.0%	.0%	.0%	.0%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, only 54 percent of riders claim to have a driver’s license. The time of day has little effect on whether riders have a valid driver’s license or not.

**Table 3.12: Distribution of Riders with Valid Driver’s License by Time of Day**

License	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Yes	56.9%	51.9%	54.0%	53.8%	54.0%
No	43.1%	48.1%	46.0%	46.2%	46.0%
Missing	.0%	.0%	.0%	.0%	.0%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, the majority of riders (51.4 percent) do not own a household vehicle. Again, the time of day has little effect on this factor.

**Table 3.13: Distribution of Number of Vehicles by Time of Day**

Household Vehicle	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
0	50.4%	52.4%	50.8%	51.9%	51.4%
1	31.9%	31.9%	32.4%	30.2%	31.8%
2	13.3%	11.1%	13.0%	13.5%	12.5%
3	2.7%	3.8%	2.7%	3.1%	3.1%
4 or more	1.7%	.9%	1.0%	1.2%	1.2%
Missing	.0%	.0%	.0%	.0%	.0%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Forty-eight percent of riders are full-time workers, and 22.4 percent work only part-time. Another 17.8 percent of riders are unemployed. Compared to other times of day, Mid-day ridership is the least likely to be employed full-time, at 38 percent, and the most likely to not be employed, at 23.4 percent.

**Table 3.14: Distribution of Employment/Student Status by Time of Day (Multiple Response)\***

Employee Status	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
Full-time Worker	51.1%	38.0%	53.8%	56.2%	47.9%
Part-time Worker	22.4%	23.5%	20.8%	22.4%	22.4%
Homemaker	2.7%	3.4%	2.0%	1.1%	2.5%
Retired	5.9%	8.2%	5.0%	3.2%	6.1%
University/College Student	4.9%	4.8%	4.3%	4.6%	4.7%
Middle/High School Student	1.1%	2.0%	2.2%	2.0%	1.8%
Other Student	1.5%	2.2%	1.6%	1.5%	1.8%
Not Employed	15.5%	23.4%	15.4%	12.4%	17.8%
Refused	1.2%	2.3%	1.7%	2.5%	1.9%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

\*Figures may add up to more than 100% due to multiple responses.

Over one-third of riders (36.2 percent) come from a two-person household, 24.7 percent come from a one-person household, and 19.3 percent come from a three-person household. These percentages remain consistent across all times of day.

**Table 3.15: Distribution of Number of Household Adults by Time of Day**

Household Adults	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
1	24.0%	26.0%	25.7%	21.2%	24.7%
2	34.9%	37.0%	35.5%	38.0%	36.2%
3	21.5%	17.9%	18.2%	20.8%	19.3%
4	10.4%	8.0%	10.6%	9.1%	9.4%
5 or more	5.7%	6.2%	6.3%	4.0%	5.8%
Missing	3.5%	4.9%	3.8%	6.9%	4.6%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Thirty-six percent of riders indicated that there is only one worker in their household, while 27.8 percent indicated that two people work in their household. An additional 16.9 percent of riders have no workers in their household. The percentages are not affected much by the time of day.

**Table 3.16: Distribution of Number of Household Workers by Time of Day**

Household Workers	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
0	14.9%	22.0%	13.6%	13.8%	16.9%
1	36.7%	34.0%	39.2%	34.2%	36.0%
2	28.3%	25.8%	27.7%	32.0%	27.8%
3	10.7%	8.1%	11.6%	10.1%	9.9%
4	3.5%	2.7%	2.8%	2.3%	2.9%
5 or more	1.8%	2.1%	1.8%	.7%	1.7%
Missing	4.1%	5.4%	3.3%	6.8%	4.8%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Nearly half of all riders (49 percent) fall in the 25–49 age group, followed by riders aged 50–64 (22.6 percent) and 18–24 (18.6 percent). Time of day has little effect on ridership age overall.

**Table 3.17: Distribution of Age by Time of Day**

Age	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
16 to 17	1.1%	2.9%	2.5%	1.7%	2.1%
18 to 24	18.1%	18.7%	19.0%	18.5%	18.6%
25 to 49	51.1%	46.1%	50.0%	50.3%	49.0%
50 to 64	22.0%	23.6%	22.5%	20.9%	22.6%
65 to 74	3.6%	4.1%	2.6%	3.3%	3.5%
75 to 84	1.4%	1.3%	.6%	.6%	1.1%
85+ years of age	.2%	.2%	.4%	.0%	.2%
Missing	2.5%	3.1%	2.4%	4.6%	3.0%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Hispanic ridership is 15.2 percent overall. It is lowest during the Mid-day at 13.8 percent and highest during the Evening/Early AM at 16.5 percent.

**Table 3.18: Distribution of Hispanic Origin by Time of Day**

Hispanic Origin	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
Yes	15.9%	13.8%	15.5%	16.5%	15.2%
No	78.4%	79.3%	79.3%	75.0%	78.4%
Missing	5.7%	6.9%	5.2%	8.6%	6.4%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Overall, Black/African American ridership makes up 48.3 percent of total ridership, followed by White ridership (33.2 percent).

**Table 3.19: Distribution of Ethnicity/Race by Time of Day (Multiple Response)\***

Ethnicity	Time of Day				
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	Total
American Indian or Alaska Native	2.2%	1.5%	1.8%	1.2%	1.7%
Black/African American	50.2%	47.1%	49.5%	45.3%	48.3%
White	30.6%	35.2%	33.7%	32.3%	33.2%
Two or more races	5.8%	5.1%	5.8%	7.6%	5.8%
Asian	1.3%	.7%	1.2%	1.5%	1.1%
Native Hawaiian or Other Pacific Islander	.4%	.6%	.4%	.2%	.4%
Other	3.5%	4.1%	4.0%	3.9%	3.9%
Missing	7.8%	8.1%	5.5%	9.8%	7.6%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

*\*Figures may add up to more than 100 percent due to multiple responses.*

Nearly 31 percent of all riders indicated that their household income was between \$10,000 and \$24,999. Another 28.9 percent indicated that their household income was below \$10,000, while just over one-fifth of riders (21.4 percent) indicated that their household income fell between \$25,000 and \$49,999. These income percentages remain consistent across all times of day.

**Table 3.20: Distribution of Household Income by Time of Day**

Income	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Less than \$10,000	28.6%	31.5%	27.0%	26.0%	28.9%
\$10,000 to \$24,999	29.0%	31.3%	31.2%	30.3%	30.5%
\$25,000 to \$49,999	22.9%	18.6%	22.4%	24.0%	21.4%
\$50,000 to \$74,999	6.8%	5.1%	7.7%	6.0%	6.3%
\$75,000 or more	2.4%	2.8%	3.6%	3.3%	2.9%
Missing	10.2%	10.7%	8.1%	10.4%	9.9%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

The vast majority of riders walked to both access their first bus and egress the last bus at 85.8 percent. The second most common access/egress pair is riding a bicycle, with 3.8 percent of ridership. Getting dropped off at the bus stop, and then walking to the final destination is twice as likely as walking to the bus stop and then being picked up, at 3.5 percent and 1.7 percent respectively.

**Table 3.21: Distribution of Access Mode by Egress Mode**

Egress Mode	Access					Total
	Walked/ Wheelchair	Rode my bicycle	Drove my car	Dropped off by someone	Carpooled	
Walk/Wheelchair	85.8%	0.5%	0.8%	3.5%	0.3%	90.9%
Ride my bicycle	0.5%	3.8%	0.0%	0.0%	0.0%	4.4%
Drive my car	0.4%	0.0%	0.4%	0.3%	0.0%	1.1%
Picked up by someone	1.7%	0.0%	0.1%	1.6%	0.0%	3.4%
Carpool	0.2%	0.0%	0.0%	0.1%	0.1%	0.3%
<b>Total</b>	88.5%	4.3%	1.3%	5.5%	0.3%	100.0%

Home to work trips make up 25.8 percent of trips, and work to home trips make up 23.4 percent of trips. Home to social, religious, or personal business trips are the next most common trips at 7.3 percent, followed by home to shopping at 5.7 percent.

**Table 3.22: Distribution of Origin Purpose by Destination Purpose**

Destination Trip Purpose	Origin Trip Purpose								Total
	Work or Work Related	Home	Shopping	College (Student only)	Other School (Student only)	Medical Services	Social, Religious, or Personal Business	Other	
Work or Work Related	2.7%	25.8%	0.5%	0.3%	0.3%	0.3%	0.5%	0.1%	30.6%
Home	23.4%	0.0%	4.6%	1.6%	2.3%	2.9%	5.1%	0.4%	40.4%
Shopping	1.1%	5.7%	1.0%	0.2%	0.1%	0.4%	0.3%	0.2%	8.9%
College (Student only)	0.4%	1.7%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	2.4%
Other School (Student only)	0.2%	1.4%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	1.8%
Medical Services	0.3%	3.1%	0.1%	0.0%	0.1%	0.3%	0.0%	0.0%	4.0%
Social, Religious, or Personal Business	1.0%	7.3%	0.4%	0.1%	0.1%	0.5%	1.2%	0.2%	10.8%
Other	0.1%	0.3%	0.4%	0.0%	0.0%	0.0%	0.1%	0.0%	1.0%
<b>Total</b>	29.3%	45.5%	7.2%	2.4%	3.0%	4.4%	7.3%	0.9%	100.0%

Commuting from home to work or from work to home (home-based work) make up the largest type of trips at 49.3 percent, followed by home-based non-work trips at 36.6 percent. Only 6.2 percent of all trips do not involve home or work. Commuting trips are heaviest during the Evening/Early AM time period, with 62.2 percent of trips, and home-based non-work trips are heaviest during the Mid-day, with 46.4 percent of trips.

**Table 3.23: Distribution of Trip Types**

Trip Types	Time of Day				Total
	AM Peak	Mid-day	PM Peak	Evening/ Early AM	
Home-based Non-Work	30.5%	46.4%	34.7%	27.5%	36.6%
Home-based Work	57.5%	36.2%	51.4%	62.2%	49.3%
Non-Home-Based Work	7.8%	8.0%	8.5%	6.9%	7.9%
Non-Home Non-Work	4.2%	9.5%	5.3%	3.4%	6.2%
<b>Total</b>	100.0%	100.0%	100.0%	100.0%	100.0%

The distribution of the 7,749 questionnaires, that were deemed final completes, by language is presented below. In addition to the final completes, the total number of questionnaires returned and originally considered a complete is also displayed. The table indicates that the distribution of Spanish and Creole questionnaires was not adversely affected by the cleaning process, as the percentages of questionnaires are consistent through the cleaning process.

**Table 3.24: Distribution of Questionnaires by Language**

Language	O/D Final Dataset	%	O/D Prelim Dataset	%
English	7,656	98.8%	8,563	98.7%
Spanish	78	1.0%	98	1.1%
Creole	15	0.2%	18	0.2%
<b>Total</b>	7,749	100.0%	8,679	100.0%


# Appendix A: Survey Instruments

Figure A.1: BCT O/D Survey Instrument (English)

Please provide additional information about your trip today.

Return the completed survey to the surveyor, or drop it in any mailbox (no postage required).

Thank you!



If returning by mail, please close with tape.


**BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 5478 AUSTIN TX

POSTAGE WILL BE PAID BY ADDRESSEE

NUSTATS  
206 WILD BASIN RD STE A300  
AUSTIN TX 78746-9907

NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



**Florida DOT**

**BCT Rider**

**Transit Survey**

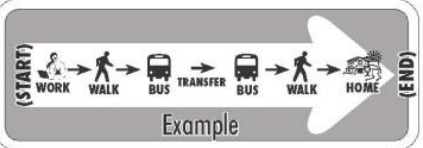
**1. Thank you for helping us improve YOUR transit system. Please provide us with your contact information in case we need to verify your survey.**

Name \_\_\_\_\_

Phone Number (\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ All information is confidential and will not be shared or sold.

**The following questions are about this ONE-WAY TRIP you are making now!**

**Example**



*Your trip may be different from our example.*

**Where are you coming from now?**

**2. What kind of place?**

<input type="radio"/> Work or Work Related	<input type="radio"/> Other School (student only)
<input type="radio"/> Home	<input type="radio"/> Medical Services
<input type="radio"/> Shopping	<input type="radio"/> Social, Religious, or Personal Business
<input type="radio"/> College (student only)	<input type="radio"/> Other, specify: _____

**3a. What is the name of this place/building?**

\_\_\_\_\_

**3b. What is the exact street address?**  
(Provide the nearest cross streets if you don't know the exact address.)

Address \_\_\_\_\_

Cross Street #1 \_\_\_\_\_

and Cross Street #2 \_\_\_\_\_

City \_\_\_\_\_ Zip \_\_\_\_\_

**Continue Inside →**

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**Where are you going to now?**

**4. What kind of place?**

- Work or Work Related
- Home
- Shopping
- College (student only)
- Other School (student only)
- Medical Services
- Social, Religious, or Personal Business
- Other, specify: \_\_\_\_\_

**5a. What is the name of this place/building?**

\_\_\_\_\_

**5b. What is the exact street address?**

(Provide the nearest cross streets if you don't know the exact address.)

\_\_\_\_\_

Address

\_\_\_\_\_

Cross Street #1

\_\_\_\_\_






and Cross Street #2

\_\_\_\_\_






City

Zip

**6. How did you get to the first bus (or rail) on this one-way trip?**

- Walked/Wheelchair  # blocks \_\_\_\_\_
- Bicycled   Taxi 
- Drove alone 
- Carpooled/Dropped off  Parking Lot Name/Cross Streets \_\_\_\_\_

**7. How will you get from the last bus (or rail) to your final destination on this one-way trip?**

- Walk/Wheelchair  # blocks \_\_\_\_\_
- Bicycle   Taxi 
- Drive alone 
- Carpool/Picked up  Parking Lot Name/Cross Streets \_\_\_\_\_

**8. How many TRANSFERS will you make on this one-way trip?**

- None
- 1
- 2
- 3 or more

**9. List the bus or rail routes in the exact order you use them in this one-way trip.**

Example: 

1st Bus or Rail Route	2nd Bus or Rail Route	3rd Bus or Rail Route	4th Bus or Rail Route
9	TRI-RAIL	32	—

1st Bus or Rail Route:	2nd Bus or Rail Route:	3rd Bus or Rail Route:	4th Bus or Rail Route:

**10. Where will you get off THIS bus?**

\_\_\_\_\_

Name of Place (including Park & Ride or other lots)

\_\_\_\_\_

Cross Street #1

\_\_\_\_\_

and Cross Street #2

**11. What major transfer areas did you/will you use for this one-way trip?**

- No major transfer areas used
- Broward Central Terminal
- Golden Glades
- Sawgrass Mills Mall
- Other, specify: \_\_\_\_\_
- Airport Tri-Rail Station
- Copans Rd./US-1
- Lauderdale Mall
- West Regional Terminal
- Aventura Mall
- Galt Ocean Mile
- Pembroke Lakes Mall
- Young Circle

**12. Will you make a return trip on BCT today?**

- No, I will not make a return trip.
- No, I cannot make a return trip on BCT.
- Yes, I will be making a return trip on BCT.
- This is the return trip for me.

**13. If bus service was not available, how would you make this trip?**

- Drive 
- Walk/Wheelchair 
- Ride with friend 
- Taxi 
- Bicycle 
- Would not make this trip

**14. How many children (under age 16) are traveling with you today on this trip?**

- None
- 1
- 2
- 3
- 4 or more

**15. Do you have a valid driver's license?**

- Yes
- No

**16. How many working vehicles are available to your household?**

- None
- 1
- 2
- 3
- 4 or more

**17. Are you... (fill in all that apply)**

- Full-time Worker
- Part-time Worker
- Homemaker
- Retired
- University/College Student
- Middle/High School Student
- Other Student
- Not Employed

**18. Including yourself, how many people live in your household?**

- 1
- 2
- 3
- 4
- 5 or more

**19. Including yourself, how many adults (18 and over) live in your household?**

- 1
- 2
- 3
- 4
- 5 or more

**20. Including yourself, how many of the people in your household are employed full-time or part-time?**

- None
- 1
- 2
- 3
- 4
- 5 or more

**21. What is your age?**

- 16 to 17
- 18 to 24
- 25 to 49
- 50 to 64
- 65 to 74
- 75 to 84
- 85 and over

**22. Are you Hispanic, Latino, or Spanish origin?**

- Yes
- No

**23. What is your race? (fill in all that apply)**

- American Indian or Alaska Native
- Black/African American
- White
- Two or more races
- Asian
- Native Hawaiian or Other Pacific Islander
- Other, specify: \_\_\_\_\_

**24. What was your estimated total household income in 2009 before taxes?**

- Less than \$10,000
- \$10,000 - \$24,999
- \$50,000 - \$74,999
- \$25,000 - \$49,999
- \$75,000 or more

**Please continue on the back →**

Figure A.2: BCT O/D Survey Instrument (Spanish and Creole)

**¿De dónde viene en este momento?**

**2. ¿Qué tipo de lugar?**

Trabajo o Relacionado con el Trabajo     Otra Escuela (solo estudiantes)

Casa     Servicios Médicos

Compras     Asunto Social, Religioso, o Personal

Universidad (solo estudiantes)     Otro, especifique: \_\_\_\_\_

**3a. ¿Cuál es el nombre de este lugar/edificio?**

\_\_\_\_\_

**3b. ¿Cuál es la dirección exacta?**  
(Indique el cruce de calles más cercano si no sabe la dirección exacta.)

Dirección \_\_\_\_\_

Cruce de Calles #1 \_\_\_\_\_

y Cruce de Calles #2 \_\_\_\_\_

Ciudad \_\_\_\_\_ Código Postal \_\_\_\_\_

**¿Adónde va en este momento?**

**4. ¿Qué tipo de lugar?**

Trabajo o Relacionado con el Trabajo     Otra Escuela (solo estudiantes)

Casa     Servicios Médicos

Compras     Asunto Social, Religioso, o Personal

Universidad (solo estudiantes)     Otro, especifique: \_\_\_\_\_

**5a. ¿Cuál es el nombre de este lugar/edificio?**

\_\_\_\_\_

**5b. ¿Cuál es la dirección exacta?**  
(Indique el cruce de calles más cercano si no sabe la dirección exacta.)

Dirección \_\_\_\_\_

Cruce de Calles #1 \_\_\_\_\_

y Cruce de Calles #2 \_\_\_\_\_

Ciudad \_\_\_\_\_ Código Postal \_\_\_\_\_

**6. ¿Cómo llegó al primer autobús (o tren) en este viaje sencillo?**

Caminando/Silla de ruedas # cuadras \_\_\_\_\_

En bicicleta     Taxi

Conduciendo solo/a \_\_\_\_\_

Compartiendo el auto con otros/ Alguien me llevó \_\_\_\_\_

Nombre del Estacionamiento/ Cruce de Calles \_\_\_\_\_

**7. ¿Cómo llegará desde el último autobús (o tren) a su destino final en este viaje sencillo?**

Caminando/Silla de ruedas # cuadras \_\_\_\_\_

En bicicleta     Taxi

Conduciendo solo/a \_\_\_\_\_

Compartiendo el auto con otros/ Alguien me va a recoger \_\_\_\_\_

Nombre del Estacionamiento/ Cruce de Calles \_\_\_\_\_

**8. ¿Cuántos TRANSBORDOS hará usted en este viaje sencillo?**

Ninguno     1     2     3 o más

**9. Anote las rutas de autobús o tren en el orden exacto en que las usa en este viaje sencillo.**

Ejemplo: 1ª Ruta del Autobús o Tren: 9    2ª Ruta del Autobús o Tren: TRI-RAIL    3ª Ruta del Autobús o Tren: 32    4ª Ruta del Autobús o Tren: \_\_\_\_\_

1ª Ruta del Autobús o Tren: _____	2ª Ruta del Autobús o Tren: _____	3ª Ruta del Autobús o Tren: _____	4ª Ruta del Autobús o Tren: _____
-----------------------------------	-----------------------------------	-----------------------------------	-----------------------------------

**10. ¿En dónde se bajará de ESTE autobús?**

Nombre del Lugar (incluyendo el Park & Ride u otros estacionamientos) \_\_\_\_\_

Cruce de Calles #1 \_\_\_\_\_

y Cruce de Calles #2 \_\_\_\_\_

**11. ¿Cuáles áreas principales de transbordo usó/usará usted para este viaje sencillo?**

No usó ninguna área principal de transbordo     Airport Tri-Rail Station     Aventura Mall

Broward Central Terminal     Copans Rd./US-1     Galt Ocean Mile

Golden Glades     Lauderdale Mall     Pembroke Lakes Mall

Sawgrass Mills Mall     West Regional Terminal     Young Circle

Otro, especifique: \_\_\_\_\_

**12. ¿Usará usted BCT hoy para hacer su viaje de regreso?**

No. No haré ningún viaje de regreso.

No. No puedo hacer ningún viaje de regreso en BCT.

Sí. Haré un viaje de regreso en BCT.

Este es mi viaje de regreso.

**13. Si este servicio de autobuses no estuviera disponible, ¿cómo haría este viaje?**

Conduciendo     Taxi

Caminando/Silla de ruedas     En bicicleta

En auto con un amigo/a     No haría este viaje

**14. ¿Cuántos niños (menores de 16 años) están viajando hoy con usted en este viaje?**

Ninguno     1     2     3     4 o más

**15. ¿Tiene usted una licencia de conductor válida?**

Sí     No

**16. ¿Cuántos vehículos que funcionan tienen disponibles en su hogar?**

Ninguno     1     2     3     4 o más

**17. ¿Es usted... (llene todo lo que corresponda)**

Trabajador/a de Tiempo Completo     Estudiante de Nivel Universitario

Trabajador/a de Medio Tiempo     Estudiante de Nivel Secundaria/Superior

Amo de Casa     Otro tipo de Estudiante

Jubilado/a     Sin Empleo

**18. Incluyéndose a usted, ¿cuántas personas viven en su hogar?**

1     2     3     4     5 o más

**19. Incluyéndose a usted, ¿cuántos adultos (18 años de edad o mayor) viven en su hogar?**

1     2     3     4     5 o más

**20. Incluyéndose a usted, ¿cuántas personas en su hogar tienen trabajo de tiempo completo o medio tiempo?**

Ninguna     1     2     3     4     5 o más

**21. ¿Cuál es su edad?**

16 a 17     18 a 24     25 a 49     50 a 64

65 a 74     75 a 84     85 años o mayor

**22. ¿Es usted de origen hispano, latino, o español?**

Sí     No

**23. ¿Cuál es su raza? (llene todo lo que corresponda)**

India Americana o Nativa de Alaska     Asiática

Negra/Afroamericana     Nativa Hawaiana u Otra

Blanca     Islaña del Pacífico

Dos o más razas     Otra, especifique: \_\_\_\_\_

**24. ¿Aproximadamente cuál fue el ingreso total de su hogar en el 2009 antes de impuestos?**

Menos de \$10,000     \$10,000 - \$24,999     \$25,000 - \$49,999

\$50,000 - \$74,999     \$75,000 o más

Una vez que complete la encuesta, por favor entréguesela al encuestador o déjela en cualquier buzón (sin gastos de envío). ¡Gracias!

Si lo requiere por correo por favor identifique con este. Si va por correo no se podrá aceptar el pago.

**BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 5478 AUSTIN TX  
POSTAGE WILL BE PAID BY ADDRESSEE

NUSTATS  
206 WILD BASIN RD STE A300  
AUSTIN TX 78746-9907

NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**Kibo ou ap soti kounyeya?**

**2. Ki jan de kote?**

Travay ou gain rap oak travay  Lot lekol  
 Lalay  Sevis medical (kay dokte)  
 Magazen  Sosyal, legliz, ate pesonel  
 Kolej  Lot bagay, speciyè: \_\_\_\_\_

**3a. Ki nom kote a?**  
 \_\_\_\_\_

**3b. Ki address kote sa?**  
 (Ki nom route ki kwaze kote li si ou pa konen address la.)  
 Address \_\_\_\_\_  
 Ri kwaze #1 \_\_\_\_\_  
 ak ri kwaze #2 \_\_\_\_\_  
 Vil \_\_\_\_\_ Zip \_\_\_\_\_

**Kibo ou pwale kounyeya?**

**4. Ki jan de kote**

Travay ou gain rap oak travay  Lot lekol  
 Lalay  Sevis medical (kay dokte)  
 Magazen  Sosyal, legliz, ate pesonel  
 Kolej  Lot bagay, speciyè: \_\_\_\_\_

**5a. Ki nom kote a?**  
 \_\_\_\_\_

**5b. Ki address kote sa?**  
 (Ki nom route ki kwaze kote li si ou pa konen address la.)  
 Address \_\_\_\_\_  
 Ri kwaze #1 \_\_\_\_\_  
 ak ri kwaze #2 \_\_\_\_\_  
 Vil \_\_\_\_\_ Zip \_\_\_\_\_

**6. Ki jan ou fe rive nan premye bis ou tren pou vwajaj youn chemen sa?**

Maché/Chaise a roulet  # blok  
 Biciclet  Taxi  
 Kondui  Kibo ou pakin/Non pakin nan  
 Kondui ak lot moun/ Woulib/Lage

**7. Ki jan ou pral fe pou al nan destinasyon final ou apre bis ou tren sa?**

Maché/Chaise a roulet  # blok  
 Biciclet  Taxi  
 Kondui  Kibo ou pakin/Non pakin nan  
 Kondui ak lot moun/ Woulib

**8. Konbyen fwa wap fe transfè nan vwajaj youn chemen sa?**

Okenn  Youn  De  Twa ou plis

**9. Ak ki nimewo bis ou tren ou sevi nan vwajaj youn chemen sa?**

Egzanp: 

Premye bis ou tren	Segona bis ou tren	Trwayèm bis ou tren	Katzyèm bis ou tren
9	TRI-RAIL	32	—

Premye bis ou tren  Segona bis ou tren  Trwayèm bis ou tren  Katzyèm bis ou tren

**10. Kibo ou pral desann bis sa?**

Nom kote a (Park & Ride ou lot)  
 Ri kwaze #1 \_\_\_\_\_  
 ak ri kwaze #2 \_\_\_\_\_

**11. Kibo ou ta/pral fe transfer pou vwajaj youn chemen sa? (Selman kote ou monte ou desann bis ou tren.)**

Pa fe transe  Airport Station Tri-Rail  Aventura Mall  
 Broward Central Terminal  Capcan Rd./US-1  Galt Ocean Mile  
 Golden Glades  Lauderdale Mall  Pembroke Lakes Mall  
 Sawgrass Mills Mall  West Regional Terminal  Young Carle  
 Lot, speciyè: \_\_\_\_\_

**12. Ou ap fe vwajaj retouren jodi a?**

Non, mwen pap fe vwajaj retouren.  
 Non, mwen pap fe vwajaj retouren sou BCT.  
 Wi, mwen pral fe vwajaj retouren sou BCT.  
 Sa se vwajaj retouren mwen.

**13. Si pa genyen sevis bis, ki jan ou ap fe vwajaj sa?**

Kondui  Taxi  
 Maché/Chaise a roulet  Biciclet  
 Woulib zanmi  Mwen pap fe vwajaj la

**14. Konbyen timoun (anba 15 ans) ki ap vwajaj avèc ou jodi a?**

Okenn  1  2  3  4 ou plis

**15. Ou genyen lisans pou kondui?**

Wi  Non

**16. Konbyen machin ou genyen lakay ou ki ap travay?**

Okenn  1  2  3  4 ou plis

**17. Eske ou... (make sa ki bon an)**

Travay full-time  Etidyan Kolej  
 Travay part-time  Etidyan  
 Rete lakay  Lot etidyan  
 Retired  Pap travay

**18. Konte ou menm, konbyen moun ki rete lakay ou?**

1  2  3  4  5 ou plis

**19. Konte ou menm, konbyen granmoun (18 ans ou plis) ki rete lakay ou?**

1  2  3  4  5 ou plis

**20. Konte ou menm, konbyen moun ki rete lakay ou ki travay full-time?**

Okenn  1  2  3  4  5 ou plis

**21. Ki laj ou?**

16 - 17  18 - 24  25 - 49  50 - 64  
 65 - 74  75 - 84  Plis ka 85 ans

**22. Eske ou se Hispanic? Eske ou soti nan peyi Hispanic?**

Wi  Non

**23. Qui race ou? (make tou sa ki bon)**

Indian American ou Natif Alaska  Asiatik  
 American Nwa  Natif Hawaï ou  
 Blan  IL Pacific  
 De ou plis ka de race  Lot, speciyè: \_\_\_\_\_

**24. Konbyen kob apksimatif tout moun lakay ou fe avan tax en 2009?**

Anba \$10,000  \$10,000 - \$24,999  \$25,000 - \$49,999  
 \$50,000 - \$74,999  \$75,000 ou plis

Souple retouren kesyone a complete bay mou kit e ba-oul la, obuyen lage li nan nepot bwat postal. Mesi.

Florida DOT **BCT Rider** Español & Creole

Sole pour el uso de la oficina. Pour utilisation bureau seulement.

**Español - Encuesta de Transporte**

**1. ¡Regístrese para ganar uno de diez premios de \$50 en efectivo cuando conteste todas las preguntas!**  
 Escriba las letras y números claramente en letras mayúsculas. **A B C 1 2 3**

Nombre \_\_\_\_\_  
 (Número de teléfono) \_\_\_\_\_ - \_\_\_\_\_  
 Número de teléfono \_\_\_\_\_

**¡Las siguientes preguntas se refieren a este VIAJE SENCILLO que está haciendo en este momento!**

**Ejemplo**

(COMIENZO) TRABAJO → AUTOBUS → TRANSBORDO → AUTOBUS → CASA (DESTINO)  
 CAMINANDO → CAMINANDO

*Su viaje puede ser diferente a nuestro ejemplo.*

**Para Español - Continúe Adentro →**  
 Toda la información es confidencial y no será compartida ni vendida.

**Creole - Kesyone Transit**

**1. Enskri pou genyen youn nan dis kado \$50 cash le ou reponn tout kesyon yo!**  
 Ecris tout let kle avèc gran let. **A B C 1 2 3**

Non \_\_\_\_\_  
 (Nimewo telefòn) \_\_\_\_\_ - \_\_\_\_\_  
 Nimewo telefòn \_\_\_\_\_

**Kesyon sa yo se pou vwajaj youn chemen ou ap fe kounyè-a.**

**Egzanp**


(KOMANSE) TRAVAY → MACHÉ → BIS → TRANSFÈ → BIS → MACHÉ → LAKAY (FINI)

*Vwajaj ou a kapab diferan.*

**← Kontinye su bo sa si Kreol**  
 Tout enfòmasyon prive. Nou pap pataje ou vann yo.

Sole para el uso de la oficina. Pour utilisation bureau seulement.

Figure A.3: BCT B/A Pairs Survey Instrument (English, Spanish, and Creole)



## Florida DOT - BCT Rider Transit Survey

**Please hold onto this card while on the bus and hand it to the surveyor as you exit the bus.**

**Thank you.**

**1. Where are you coming from now?**


<input type="radio"/> Work or Work Related	<input type="radio"/> Other School (student only)
<input type="radio"/> Home	<input type="radio"/> Medical Services
<input type="radio"/> Shopping	<input type="radio"/> Social, Religious, or Personal Business
<input type="radio"/> College (student only)	<input type="radio"/> Other, specify: _____

**2. Where are you going to now?**


<input type="radio"/> Work or Work Related	<input type="radio"/> Other School (student only)
<input type="radio"/> Home	<input type="radio"/> Medical Services
<input type="radio"/> Shopping	<input type="radio"/> Social, Religious, or Personal Business
<input type="radio"/> College (student only)	<input type="radio"/> Other, specify: _____

For office use only:  


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1 Please take card




2 Fill it out



3 Give it back as you leave

Español &  
Creole →

C - 26015-02-052010



## Florida DOT - BCT Rider Encuesta de Transporte / Kesyone Transit


**Por favor conserve esta tarjeta mientras permanece en el autobús y entréguela al encuestador al descender del autobús. Gracias.**

**1. ¿De dónde viene en este momento?**


<input type="radio"/> Trabajo o Relacionado con el Trabajo	<input type="radio"/> Otra Escuela (solo estudiantes)
<input type="radio"/> Casa	<input type="radio"/> Servicios Médicos
<input type="radio"/> Compras	<input type="radio"/> Asunto Social, Religioso, o Personal
<input type="radio"/> Universidad (solo estudiantes)	<input type="radio"/> Otro, especifique: _____

**2. ¿Adónde va en este momento?**


<input type="radio"/> Trabajo o Relacionado con el Trabajo	<input type="radio"/> Otra Escuela (solo estudiantes)
<input type="radio"/> Casa	<input type="radio"/> Servicios Médicos
<input type="radio"/> Compras	<input type="radio"/> Asunto Social, Religioso, o Personal
<input type="radio"/> Universidad (solo estudiantes)	<input type="radio"/> Otro, especifique: _____



1 Por favor recoge una tarjeta /  
Souple' pran kat la



2 Llenela / Pien kat la



3 Entrégala cuando termines tu  
viaje / Remet kat la le ou prale'

English →

C - 26015-02-052010

# Appendix B: Pilot Test Memorandum

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## Memo

**To:** David Schmidt (AECOM) and Jill Quigley (Jacobs)  
**From:** Fred G'sell  
**CC:** Tyler Hubble, Brad Carlson, Bob Clark  
**Date:** 2/18/10  
**Re:** Broward County Transit (BCT) On-Board Rider Survey Pilot Assessment

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## Background

The pilot data collection was conducted January 6 through January 13, 2010 prior to the implementation of the full data collection effort, which is scheduled to begin in March 2010. The purpose of the pilot was to have a complete test of the entire data collection methodology. The specific goals were to assess the training procedures and logistics of operating out of the BCT garage, response to the different questionnaire formats (both from data item response and respondent participation), the ability to generate boarding and alighting control totals (B/A Pairs Method), and the efficacy of the incentives—\$2 gift certificates to McDonald's—which were given upon completion of the questionnaire on selected trips.

## Survey Administration

Surveyor and Counter training occurred on Monday January 4, with thirteen team members. Each attendee was trained on surveying, collecting, and counting tasks to allow for optimal and efficient resource allocation for the data collection effort.

The training included:

- ✓ An introduction to the purpose of the project (travel demand modeling, transit planning, and SERPA model)
- ✓ Objectives of the survey (e.g., data items that will be collected, sample size, schedule)
- ✓ In-depth review of the survey instruments so that surveyors can assist respondents as needed
- ✓ Survey process and expectations of the surveyors
- ✓ Tips on maximizing response rates (both unit and item response rates)
- ✓ Counter process and expectations of the counters
- ✓ Counter testing of the equipment
- ✓ Collector protocol for capturing alighting location

The following is an assessment of the actual surveying process and of the returned questionnaires.

Assignments were generated to cover various times of day on different types of routes. The following table summarizes the number of trips sampled by the preliminary time-of-day definitions.

**Table 1 – Number of Trips Sampled by Time-of-Day**

<b>Time-of-Day</b>	<b>Definition</b>	<b>Trips Sampled</b>	<b>% by Time-of-Day</b>
AM Peak	6:30 a.m. – 9:29 a.m.	24	29%
Mid-day	9:30 a.m. – 3:29 p.m.	31	37%
PM Peak	3:30 p.m. – 6:29 p.m.	23	28%
Evening	6:30 p.m. – 6:29 a.m.	5	6%
<b>Total</b>		83	100%

The selected routes provided a full range of route characteristics (local and limited mirrored routes, heavily Spanish- and Creole-speaking ridership, cross-town, or potential “short trippers,” etc.)

**Table 2 – Number of Trips Sampled by Route**

<b>Route</b>	<b>Trips Sampled</b>	<b>% by Route</b>
18	23	28%
36	9	11%
50	18	22%
72	16	19%
441 Breeze	17	20%
<b>Total</b>	83	100%

## Qualitative Assessment

Overall, the data completeness and quality were lower than expected. Of the questionnaires identified as having errors, the following are the most common problems found:

- Either Origin or Destination address information given by the respondent was missing or incomplete. In order to help guard against this, NuStats will institute a detailed passenger call-back system to capture this information once it is determined to be incomplete.
- The user-provided route sequence was often missing, incomplete, or inconsistent. Nearly half of respondents did not fill out this part of the questionnaire correctly. Many respondents were confused by the transit authority bubbles underneath the route sequence fields and only filled in the bubbles, bubbled in the wrong transit authority, or simply put marks in the vehicle number fields. Possible methods to help minimize this error are contained later in this document.

## Survey Quantitative Results

### Unit Response

Overall, there was a lower-than-average level of participation. Of the total 3,841 passengers who boarded the sampled trips with full-length questionnaires, 268 questionnaires were found to be complete and usable for an overall response rate of 7 percent. This includes 4 mail-backs, but does not include 19 mail-backs that were received after the processing deadline. Of those 19 questionnaires, only 2 were incomplete; however, 13 had incomplete route sequence information.

Of the 582 questionnaires included in the analysis, 49 percent had inconsistencies in the route sequence, i.e., the answer for “total buses/trains” did not equal the number of buses/trains listed. This does not include those that responded with “one, this bus only” because the questionnaire instructed them to skip this part. Within these inconsistent records, 18 percent did not list any routes but bubbled in the transit

system, which was not always reliable. Records without valid routes listed were recorded as being on the surveyed route, and other routes were added to make a plausible trip to their destination.

For the pilot, these were considered as completes. Overall, 33 percent of the questionnaires deemed complete had to have the route sequence imputed because of either missing or incomplete data. Half of these incompletes were because of missing answers, and half were because of incomplete answers, such as only filling out the transit agency bubbles. Version A was more likely to have a transit agency selected, but this was not always the case, as described later in the Version Comparison Section.

For the full study, records without valid entries for this question will be called back to capture this information. For all records, NuStats performs an analysis on the plausibility of the trip path, but this was not considered a requirement for a complete questionnaire.

The definition of a complete questionnaire included the following variables:

- Origin and Destination Addresses
- Trip Purposes
- Access and Egress Modes
- Major Transfer Locations
- Minors in Traveling Party (Under Age 15)
- Driver’s License Status
- Number of Household Vehicles

The most common reason a record failed was because of an incomplete or missing destination address, closely followed by origin address. Although several respondents did not answer the last four required questions, only 13 were failed because of one of these questions exclusively. The table below shows the frequency of returned surveys with critical errors.

**Table 3 – Non-Response of Key Variables (582 Returned Questionnaires)**

<b>Question</b>	<b>Missing</b>	<b>% Non-Response</b>
Origin Incomplete or Missing	137	24%
Destination Incomplete or Missing	202	35%
Origin Purpose Missing	14	2%
Destination Purpose Missing	33	6%
Access Mode Missing	31	5%
Egress Mode Missing	47	8%
Transfer Location Missing	4	1%
Minors in Party Missing	42	7%
Driver's License Status Missing	61	10%
Household Vehicles Missing	55	9%
Home to Home Trip*	11	2%
Origin and Destination Same**	11	2%

*\*Respondents with home-to-home trips were missing the complete trip purpose.*

*\*\*Respondents with the same origin and destination were missing the complete origin-to-destination trip.*

The route-level response rates showed a large variability from a high of 12.4 percent on the 441 Breeze to a low of 5.8 percent on the 72. It was expected that the response rate on the Breeze routes would be higher due to the limited stops on these types of routes. The low rates and variability could be due to a number of factors, including the quality of the team, the interest of the passengers, length of the trip, etc.

**Table 4 – Completes and Response Rates of Standard Survey**

Route	Completes	Boardings	Response Rate
18	75	1,267	5.9%
36	29	392	7.4%
50	54	830	6.5%
72	51	875	5.8%
441 Breeze	59	477	12.4%
<b>Overall</b>	268	3,841	7.0%

## Item Response

Respondents who completed the required variables typically completed most of the other variables. Of the 268 questionnaires that were deemed to be complete, the route sequence question had the highest frequency of non-response at 16.4 percent (47 records). These are records that did not answer “total # of buses/trains” as “one” and did not have route numbers or transit agencies, and had to be imputed based on the origin, destination, and access/egress modes. Household income also had a high frequency of non-response at 4.5 percent (12 respondents). Item non-response rates for the non-required questions are contained in Table 5.

**Table 5 – Non-Response Rates for Individual Questions (268 Completes)**

Question	Missing	Percent Non-Response
Total # of buses/trains	5	1.9%
Route sequence	47	16.4%
Return trip status	1	0.4%
Mode if no bus service available	4	1.5%
Employment/Student Status	2	0.7%
Household size	4	1.5%
Adults in Household	6	2.2%
# of HH Employed FT/PT	5	1.9%
Age	2	0.7%
Race/Ethnicity	2	0.7%
HH Income	12	4.5%

## B/A Pairs Method

The B/A Pairs Method (short card) was used to capture control totals for the boarding and alighting locations for respondents on the 18 and 441 Breeze. The goal of this collection was to capture more of the short trips that are less likely to be captured with a standard questionnaire. The “short-card” version only required the respondent to take a card upon boarding the bus and hand it back to the surveyor upon alighting. The card collected the surveyed trip information from boarding to alighting by using the sample number to determine the boarding location and a code written on the card by the surveyor upon alighting to determine the alighting location.

Although the response rates were much higher than the full version, they were still lower than similar surveys, with no questions, that were administered in other parts of the U.S. and for which the response rate was at least 90 percent. There were 313 usable responses out of 863 boardings for a response rate of 36 percent. Eight cards that were turned in were unusable because of 6 illegible codes and 2 blank codes. The 441 Breeze experienced a much higher response than the 18, as shown in the table below. Both of

these figures are too low to make any informed decisions on the population base. It is thought that the poor performance is greatly influenced by the surveyor quality.

**Table 6 – Completes and Response Rates of “Short-Card” Survey**

Route	Completes	Boardings	Response Rate
18	203	675	30%
441 Breeze	110	188	59%
<b>Overall</b>	313	863	36%

## Questionnaire Version Comparison

Versions A and B were handed out simultaneously on the same trips. Odd sample numbers were version A, and even sample numbers were version B. Version A had the route sequence question on the first page before the address questions, while version B had the route sequence question after the addresses. Furthermore, version A only included transit agency bubbles for non-BCT transit authorities, while version B included bubbles for Palm Tran, Miami-Dade, Tri-Rail, and BCT. For version A, this may have made some passengers feel compelled to fill out a bubble as 12 percent of records bubbled non-BCT transit agencies for BCT routes, compared to 2 percent in version B. Overall, more version A questionnaires were handed back, but more version B questionnaires met the definition of a complete, as shown in the table below.

**Table 7 – Response by Version**

Version	Questionnaires Returned	Completes
A	299	126
B	283	142

In comparing the two different versions of the questionnaire, most items had little variance between questionnaires. The most significant difference is the quality of addresses, though the questions were presented in the same manner. In version A, 29 percent of returned questionnaires had an incomplete or missing address, while only 18 percent of version B questionnaires had the same issue. The destination address also fared better in version B, as shown in the following table.

**Table 8 – Non-Response of Key Variables by Version**

Question	Version A (299)	Version B (283)
Origin Incomplete or Missing	29%	18%
Destination Incomplete or Missing	38%	31%
Origin Purpose Missing	3%	1%
Destination Purpose Missing	6%	5%
Access Mode Missing	7%	4%
Egress Mode Missing	9%	7%
Transfer Location Missing	1%	0%
Minors in Party Missing	7%	7%
Driver's License Status Missing	10%	11%
Household Vehicles Missing	10%	9%
Home to Home Trip*	1%	3%
Origin and Destination Same**	1%	3%

\*Respondents with home to home trips were missing the complete trip purpose.

\*\*Respondents with the same origin and destination were missing the complete origin to destination trip.

## Incentives Comparison

An incentive of a \$2 gift certificate to McDonald's was given to each respondent who turned in a completed questionnaire on selected trips. In comparing the two different methods, the incentives did appear to make a small difference in response. However, many of the surveyors potentially did not announce the incentives properly, and a \$2 gift certificate may not have been an appropriate incentive for BCT riders. Table 9 shows the response rates by method.

**Table 9 – Response Rates by Presence of Incentives**

<b>Method</b>	<b>Completes</b>	<b>Eligible Boardings</b>	<b>Response Rate</b>
Incentive	144	1836	7.8%
No Incentive	124	2005	6.2%

## Conclusion

While the results from the pilot were disappointing overall, there are positive signs for improvement for the full-scale data collection effort.

In most cases, the surveyors from A1A were unable to perform in the position of surveyor. Fortunately, the counter and collector positions were both adequately filled by the staffing agency. As surveyors, they lacked the necessary communication skills and qualities needed to be successful in this capacity. Multiple plans are being researched to correct this for the full-scale data collection effort. First, NuStats has directly brought the poor performance of the surveyors to the attention of the staffing agency. Due to the short-term data collection, the staffing agency had a difficult time getting their most qualified staff willing to participate because they had better long-term opportunities. For the full-scale data collection, of at least two months, we have been told that this will not be an issue. Second, a second staffing agency is potentially being brought in to provide staff for the full study. Jacobs is currently working on getting a contract in place for the new staffing firm, which should provide additional talent pools from which to pull. Third, surveyors who have worked with Jacobs previously are being referred to the staffing agency to ensure more qualified surveying staff. Lastly, there have been discussions about getting FAU planning students to participate in the survey effort through the staffing agency. This option is still pending, as it is more difficult to implement. Currently, NuStats is developing a screening process that will allow for conducting remote final interviews with the staffing agencies to ensure higher quality surveyor.

Fielding the study from the garage areas, beginning and ending assignments, created some logistical challenges during the pilot. For the full-scale study, NuStats will continue to work with the supervisors, dispatchers, and drivers to ensure no trips are not missed due to drivers leaving extremely early in order to begin their shifts.

Typically, NuStats conducts call backs of passengers who return questionnaires that are incomplete in order to convert these questionnaires into completes. However, this was not done in the pilot because NuStats did not want the call backs to influence the raw data. In order to convert even more incompletes to completes, NuStats is developing a protocol that will allow all processed records deemed incomplete to also be dialed in a timely manner to convert these records as well. In order to facilitate this, NuStats will scan the questionnaires, via scanner, in the field rather than shipping the records back to Austin to begin the processing portion. Once the scanned images arrive via email to Austin, verification, geocoding, and cleaning will occur in a more streamlined process. Any records deemed incomplete during this portion will be pushed back to the field in order to conduct call backs geared at collecting those items missing and needed for a record to be considered a complete.

One of the major issues with the pilot study was the passengers' inability to comprehend the route sequence question in either version, A or B. The system/route selection was improperly attempted at a high percentage, as previously described. One of the options NuStats is exploring is removing the system portion all together. Relatively speaking, there are few one-way trips where MDT or Palm Tran will be used, and the route nomenclature is different enough that there are only a few plausible overlaps in route names, such as the Palm Tran-2 or the MDT-22. That, combined with the fact that there are limited transfer locations for such routes, would allow the processing to determine if a route number needs to be updated with a new system value. We will flag records if their origin or destination information contains an address outside of Broward County. All records that receive this flag will undergo manual review of the routes contained in the route sequence variable. Using the transfer location possibilities, various system maps, and transit websites, this determination will be straight forward and efficient. This should create significantly less confusion on the respondents' part since they will only have to concentrate on the route portion.