**Memorandum**

TO: RTTAC-MS

FROM: SERPM 8 Model Update Team

DATE: September 29, 2017

RE: Southeast Florida Transit On-Board Survey Data Expansion and Analysis

The purpose of this memo is to summarize the survey expansion and analysis tasks performed by Connetics Transportation Group (CTG) as part of the Southeast Florida Regional Planning Model (SERPM) version 8 model update contract. Over the past five years, FDOT, MPOs and the transit agencies (MDT, BCT, Palm Tran and SFRTA) in the tri-county region have conducted various transit surveys on the bus/rail services. CTG expanded the available surveys to the 2015 year, which is the base model year in SERPM 8. The processing, expansion and key results from the following surveys are summarized in this document:

* Tri-Rail: 2013 on-board survey
* Palm Tran buses: 2015 on-board survey
* Broward County Transit (BCT) buses: 2010 on-board survey
* I-95 Express: 2011 on-board survey
* Miami Dade Transit (MDT) Metrobus: Three (3) on-board surveys conducted between 2012 and 2015
* MDT Metromover: 2014 on-board survey
* MDT Metrorail: 2009 on-board survey

Tri-Rail System-wide Survey

Overview

The Tri-Rail onboard survey was conducted on February 13th, 2013 (Wednesday) between 4 AM and 3 PM. A total of 28 trains (14 in each direction) out of the 50 daily trains were surveyed. All 24 trains starting before noon and 4 trains starting after noon were surveyed. The survey was offered to all passengers on these trains and was self-administered.

CTG expanded this survey to the 2015 ridership using the station level boardings obtained from the South Florida Regional Transit Authority (SFRTA). The data was obtained for the months from April through December 2015 to account for the reopening of the Miami International Airport (MIA) station in April. Table 1 shows the 2015 Tri-Rail station level boardings and alightings to which the survey was expanded. For comparison purposes, the Tri-Rail ridership shown in the table matches the average American Public Transportation Association (APTA) ridership for the last three quarters of 2015.

Table : Tri-Rail Station Level Boardings and Alightings

|  |  |  |
| --- | --- | --- |
| **Station name** | **Boardings** | **Alightings** |
| Mangonia Park | 765 | 789 |
| West Palm Beach | 1,064 | 1,153 |
| Lake Worth | 865 | 889 |
| Boynton Beach | 688 | 647 |
| Delray Beach | 625 | 608 |
| Boca Raton | 1,177 | 1,199 |
| Deerfield Beach | 694 | 683 |
| Pompano Beach | 742 | 745 |
| Cypress Creek | 1,041 | 1,059 |
| Fort Lauderdale | 871 | 888 |
| Fort Lauderdale Airport | 891 | 851 |
| Sheridan Street | 406 | 410 |
| Hollywood | 691 | 659 |
| Golden Glades | 609 | 582 |
| Opa-locka | 313 | 299 |
| Metrorail | 1,299 | 1,176 |
| Hialeah Market | 259 | 270 |
| Miami International Airport | 754 | 853 |
| **Total** | **13,753** | **13,760** |

Processing/Expansion

The original survey records were cleaned and post-processed. As part of this process, the following records were removed:

* Records with ‘home’ as a response on both ends of the trip
* Records without information on train number, trip purpose, access/egress modes, boarding/alighting stations, number of vehicles in the household or number of workers in the household (for work trip purpose) / people in the household (for non-work trip purposes)

This resulted in 2,551 useable records. These records were then used to generate return trip of the riders. It should be noted that not everyone answered the required questions of the return trip questionnaire portion of the survey. This resulted in 1,188 records that could be used to create a virtual sample. With the original 2,551 useable records and the 1,188 imputed records, the final number of records used for expansion was 3,739.

For the 2013 survey, the Iterative Proportional Fitting (IPF) method was used to expand the records. In this method, a seed matrix of station to station flows containing the actual number of useable records is scaled iteratively to match the row and column totals (boarding and alighting counts). The survey expansion was done by direction and by three time periods (AM peak, off-peak and PM peak).

To expand the survey to the 2015 ridership, CTG applied the IPF method by scaling the expanded 2013 survey station to station flows to the 2015 daily boarding and alighting counts. It should be noted that at the time the 2013 survey was conducted, the MIA station was closed for construction. Thus, the boardings at the MIA station were combined with the Hialeah Market station during expansion. Table 2 shows the Tri-Rail expansion factors.

Table : Tri-Rail Expansion Factors



Analysis

The survey was detailed enough to develop tables by access mode, purpose, auto availability and station-to-station flows. Two-dimensional cross-tabulations can also be developed. However, there wasn’t enough detail to properly geocode the survey records and thus, an origin-to-destination (OD) flow table at the TAZ level cannot be developed. CTG will rely on the 2008 survey in understanding the OD travel patterns.

The 2015 average weekday ridership on Tri-Rail is 13,753. Of these, half of the trips are Home-based-work (HBW). Home-based-school and university trips account for 10% and 12% of the total trips. The remaining trips are split between home-based-other (9%) and non-home-based (18%).

Tri-Rail is used by choice riders, with only 8% of the trips coming from households with zero cars. Almost 70% of the trips occur during the peak periods. The location of Tri-Rail stations makes it difficult to walk to and from these stations. The survey shows that 72% of the trips use a non-walk mode on both ends of the trip.

Table : Tri-Rail Linked Trips by Purpose

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Linked Trips** | ***%*** |
| HBW | 6,971 | *51%* |
| HBO | 1,370 | *10%* |
| HBSch | 1,280 | *9%* |
| HBUniv | 1,670 | *12%* |
| NHBO | 1,107 | *8%* |
| NHBW | 1,359 | *10%* |
| **Total** | **13,757** | ***100%*** |

Table : Tri-Rail Linked Trips by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 6,971 | *51%* |
| School | 1,508 | *11%* |
| University | 1,895 | *14%* |
| Maintenance | 1,254 | *9%* |
| Discretionary | 2,128 | *15%* |
| **Total** | **13,757** | ***100%*** |

Table : Tri-Rail Linked Trips by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 552 | 2,128 | 4,291 | **6,971** | ***51%*** |
| HBO | 317 | 1,333 | 2,670 | **4,320** | ***31%*** |
| NHB | 265 | 736 | 1,465 | **2,465** | ***18%*** |
| **Total** | **1,133** | **4,197** | **8,426** | **13,757** | ***100%*** |
| ***%*** | ***8%*** | ***31%*** | ***61%*** | ***100%*** |  |

Table : Tri-Rail Linked Trips by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 552 | 3,656 | 2,764 | **6,971** | ***51%*** |
| School | 43 | 1,156 | 309 | **1,508** | ***11%*** |
| University | 62 | 1,193 | 641 | **1,895** | ***14%*** |
| Maintenance | 152 | 625 | 477 | **1,254** | ***9%*** |
| Discretionary | 325 | 885 | 917 | **2,128** | ***15%*** |
| **Total** | **1,133** | **7,515** | **5,108** | **13,757** | ***100%*** |
| ***%*** | ***8%*** | ***55%*** | ***37%*** | ***100%*** |  |

Table : Tri-Rail Linked Trips by Time-of-day

|  |  |  |
| --- | --- | --- |
| **Time of day** | **Linked Trips** | ***%*** |
| AM Peak (6-9AM) | 4,684 | *34%* |
| Off-peak (9AM-3PM, 7PM-6AM) | 4,369 | *32%* |
| PM Peak (3-7PM) | 4,703 | *34%* |
| **Total** | **13,757** | ***100%*** |

Table : Tri-Rail Linked Trips by Access and Egress Modes (OD format)

|  |  |  |  |
| --- | --- | --- | --- |
| **Access mode at origin** | **Egress mode at destination** | **Total** | **%** |
| **Walk** | **PNR** | **KNR** | **Shuttle** | **Transit Bus Transfer** | **Metrorail Transfer** | **School Bus** | **Other** |
| Walk | 922 | 503 | 365 | 71 | 237 | 61 | 17 | 38 | **2,214** | ***17%*** |
| PNR | 525 | 853 | 327 | 539 | 435 | 314 | 23 | 73 | **3,090** | ***23%*** |
| KNR | 476 | 283 | 928 | 526 | 464 | 199 | 245 | 53 | **3,174** | ***24%*** |
| Shuttle | 71 | 479 | 427 | 66 | 169 | 103 | 2 | 37 | **1,354** | ***10%*** |
| Transit Bus Transfer | 241 | 377 | 365 | 140 | 503 | 91 | 3 | 30 | **1,751** | ***13%*** |
| Metrorail Transfer | 91 | 363 | 227 | 59 | 78 | 84 |  | 23 | **923** | ***7%*** |
| School Bus | 23 | 19 | 260 | 3 | 9 | 5 | 40 | 3 | **363** | ***3%*** |
| Other | 55 | 91 | 45 | 42 | 38 | 6 | 7 | 57 | **340** | ***3%*** |
| **Total** | **2,403** | **2,968** | **2,945** | **1,445** | **1,933** | **864** | **337** | **314** | **13,209** | ***100%*** |
| ***%*** | ***18%*** | ***22%*** | ***22%*** | ***11%*** | ***15%*** | ***7%*** | ***3%*** | ***2%*** | ***100%*** |  |

Table : Tri-Rail Linked Trips by Access and Egress Modes for “AM Peak Period”

|  |  |  |  |
| --- | --- | --- | --- |
| **Access mode at origin** | **Egress mode at destination** | **Total** | **%** |
| **Walk** | **PNR** | **KNR** | **Shuttle** | **Transit Bus Transfer** | **Metrorail Transfer** | **School Bus** | **Other** |
| Walk | 327 | 13 | 31 | 24 | 82 | 4 | 9 | 9 | **499** | ***11%*** |
| PNR | 395 | 314 | 132 | 357 | 252 | 176 | 19 | 39 | **1,683** | ***37%*** |
| KNR | 297 | 90 | 324 | 308 | 279 | 92 | 230 | 27 | **1,647** | ***36%*** |
| Shuttle | 6 | 16 | 16 | 8 | 20 | 13 |  | 6 | **86** | ***2%*** |
| Transit Bus Transfer | 72 | 7 | 35 | 84 | 160 | 36 | 3 | 3 | **400** | ***9%*** |
| Metrorail Transfer | 28 | 6 | 19 | 29 | 29 | 9 |  | 8 | **127** | ***3%*** |
| School Bus | 2 |  | 2 |  | 4 |  | 20 |  | **29** | ***1%*** |
| Other | 25 | 4 |  | 24 | 15 | 3 | 5 | 15 | **92** | ***2%*** |
| **Total** | **1,153** | **449** | **560** | **834** | **842** | **332** | **286** | **107** | **4,563** | ***100%*** |
| ***%*** | ***25%*** | ***10%*** | ***12%*** | ***18%*** | ***18%*** | ***7%*** | ***6%*** | ***2%*** | ***100%*** |  |

Table : Tri-Rail Station-to-Station Flows (O-D)





Figure : Distance Traveled on Tri-Rail

Palm Tran System-Wide Survey

Overview

The Palm Tran on-board OD survey was administered during weekdays (Tuesday through Thursday) in October of 2015. The OD survey was administered at the time of day that coincided with the hours that each route was operational. This was to ensure that the administration of the survey began prior to peak ridership levels in the morning and continued after peak ridership levels in the evening. Administration of the OD survey began as early as 6:00 am and continued to as late as 11:00 pm on some routes. The OD survey instrument was designed to be administered as a face-to-face interview using tablet PCs.

The 2015 route level ridership on Palm Tran buses is shown in the table below.

Table : Palm Tran Route Level Boardings

| **Route** | **Boardings** |
| --- | --- |
| 1 | 8,560 |
| 2 | 5,499 |
| 3 | 4,591 |
| 4 | 260 |
| 10 | 304 |
| 20 | 400 |
| 21 | 430 |
| 30 | 391 |
| 31 | 1,557 |
| 33 | 831 |
| 40 | 922 |
| 41 | 69 |
| 42 | 121 |
| 43 | 2,351 |
| 44 | 536 |
| 45 | 214 |
| 46 | 938 |
| 47 | 833 |
| 48 | 556 |
| 49 | 259 |
| 52 | 216 |
| 60 | 173 |
| 61 | 677 |
| 62 | 2,444 |
| 63 | 547 |
| 64 | 339 |
| 70 | 1,032 |
| 71 | 302 |
| 73 | 482 |
| 80 | 422 |
| 81 | 578 |
| 91 | 946 |
| 92 | 390 |
| 94 | 976 |
| **Total** | **39,146** |

Processing/Expansion

The survey was processed and cleaned. Some of the specific checks that were conducted during the processing phase included:

* Checking for valid home street names, city names, and zip codes
* Checking for valid origin street names, city names, and zip codes
* Checking for valid destination street names, city names, and zip codes

The details of the data processing and clean up are included in the “2015 Palm Tran On-Board Surveys: Survey Methodology Report”. The cleaned survey records were expanded at a route level by scaling the survey data records to the average of boardings and alightings obtained from the Palm Tran APC data. The APC data was available for all scheduled bus runs for 10 days in October 2014 and 10 days in February 2015.

A total of 1,046 records were used in the final expansion. All these records were also geocoded.

CTG obtained this cleaned and expanded data. No other post-processing of the records or survey data was done by CTG.

Analysis

One-dimensional tabulations by access mode, purpose and auto availability can be developed using this survey. Two dimensional cross-tabulations and OD flows will not be possible with this survey given the survey sampling plan.

The expanded surveys show a transfer rate (unlinked trips / linked trips) of 27%, resulting in total linked transit trips of 30,261. Of these, 39% of the trips are Home-based-work (HBW). Home-based-school and university trips account for 4% and 8% of the total trips. The remaining trips are split between home-based-other (42%) and non-home-based (7%).

Half of the trips are from households with zero cars. The trips are slightly peak period oriented with 54% of the trips occurring during the peak period. Approximately 95% of the trips walk to and from the bus stops, with the remaining trips split between KNR and PNR access.

Table : Palm Tran Linked Trips by Purpose

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| HBW | 11,795 | *39%* |
| HBO | 12,709 | *42%* |
| HBSch | 1,259 | *4%* |
| HBUniv | 2,439 | *8%* |
| NHBO | 1,432 | *5%* |
| NHBW | 627 | *2%* |
| **Total** | **30,261** | ***100%*** |

Table : Palm Tran Linked Trips by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 11,795 | *39%* |
| School | 1,329 | *4%* |
| University | 2,735 | *9%* |
| Maintenance | 8,505 | *28%* |
| Discretionary | 5,817 | *19%* |
| At-Work | 80 | *0%* |
| **Total** | **30,261** | ***100%*** |

Table : Palm Tran Linked Trips by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 5,715 | 4,154 | 1,926 | **11,795** | ***39%*** |
| HBO | 7,850 | 5,633 | 2,924 | **16,407** | ***54%*** |
| NHB | 1,275 | 409 | 374 | **2,059** | ***7%*** |
| **Total** | **14,841** | **10,197** | **5,223** | **30,261** | ***100%*** |
| ***%*** | ***49%*** | ***34%*** | ***17%*** | ***100%*** |  |

Table : Palm Tran Linked Trips by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 5,715 | 5,455 | 625 | **11,795** | ***39%*** |
| School | 211 | 1,093 | 25 | **1,329** | ***4%*** |
| University | 844 | 1,791 | 100 | **2,735** | ***9%*** |
| Maintenance | 5,005 | 3,141 | 359 | **8,505** | ***28%*** |
| Discretionary | 2,996 | 2,525 | 296 | **5,817** | ***19%*** |
| At-Work | 70 | 10 | - | **80** | ***0%*** |
| **Total** | **14,841** | **14,015** | **1,405** | **30,261** | ***100%*** |
| ***%*** | ***49%*** | ***46%*** | ***5%*** | ***100%*** |  |

Table : Palm Tran Linked Trips by Time-of-day

|  |  |  |
| --- | --- | --- |
| **Time of day** | **Linked Trips** | ***%*** |
| AM Peak (6-9AM) | 7,633 | *25%* |
| Off-peak (9AM-3PM, 7PM-6AM) | 13,872 | *46%* |
| PM Peak (3-7PM) | 8,756 | *29%* |
| **Total** | **30,261** | ***100%*** |

Table : Palm Tran Linked Trips by Access Mode at Origin

|  |  |  |
| --- | --- | --- |
| **Access mode at origin** | **Linked Trips** | ***%*** |
| Walk | 28,582 | *94%* |
| PNR | 333 | *1%* |
| KNR | 1,346 | *4%* |
| **Total** | **30,261** | ***100%*** |

Table : Palm Tran Linked Trips by Egress Mode at Destination

|  |  |  |
| --- | --- | --- |
| **Egress mode at destination** | **Linked Trips** | ***%*** |
| Walk | 29,718 | *98%* |
| PNR | 241 | *1%* |
| KNR | 301 | *1%* |
| **Total** | **30,261** | ***100%*** |

BCT System-Wide Survey

Overview

The BCT on-board survey was administered on weekdays (Monday through Friday) from April 1 through June 11, 2010. The self-administered surveys were conducted among riders of all fixed-route bus service.

CTG expanded this survey to the 2015 ridership using the monthly ridership reports published on BCT’s website. The route level average of all 12 months in 2015 was used. There were notable changes services on two corridors – SR 7 and US 1 – between 2010 and 2015. Corridor-focused surveys conducted by FDOT between 2012 and 2014 were used to re-estimate the expansion targets. The 2015 route level ridership on BCT buses is shown in the table below.

Table : BCT Route Level Boardings

|  |  |  |
| --- | --- | --- |
| **Type** | **Route** | **Boardings** |
| Local | 1 | 5,689 |
| Local | 2 | 6,201 |
| Local | 4 | 908 |
| Local | 5 | 1,478 |
| Local | 6 | 2,090 |
| Local | 7 | 4,062 |
| Local | 9 | 1,798 |
| Local | 10 | 4,029 |
| Local | 11 | 3,099 |
| Local | 12 | 1,679 |
| Local | 14 | 3,982 |
| Local | 15 | 149 |
| Local | 16 | 1,001 |
| Local | 18 | 5,280 |
| Local | 19 | 6,409 |
| Local | 20 | 1,000 |
| Local | 22 | 4,359 |
| Local | 23 | 321 |
| Local | 28 | 4,305 |
| Local | 30 | 2,465 |
| Local | 31 | 3,194 |
| Local | 34 | 3,453 |
| Local | 36 | 5,258 |
| Local | 40 | 3,649 |
| Local | 42 | 2,256 |
| Local | 48 | 700 |
| Local | 50 | 4,221 |
| Local | 55 | 2,685 |
| Local | 56 | 428 |
| Local | 60 | 4,118 |
| Local | 62 | 2,157 |
| Local | 72 | 8,480 |
| Local | 81 | 3,712 |
| Local | 83 | 1,374 |
| Local | 88 | 846 |
| Breeze | 101 | 2,272 |
| Breeze | 102 | 922 |
| Breeze | 441 | 5,467 |
| **Total** | **115,496** |

Processing/Expansion

The survey was processed and cleaned. Survey questions related to origin address, destination address, mode of access, mode of egress, trip purposes, and trip path had to be answered for the surveys to be ‘useable’. The details of the data processing and clean up are included in the “Broward County Transit On-Board Study” report of August 2011. The cleaned survey records were originally expanded to the 2010 ridership as part of a previous modeling effort. The survey was expanded by route, segment of route, direction and time of day.

A total of 7,749 records were used in the final expansion. All these records were also geocoded. CTG obtained this cleaned and expanded data. CTG expanded this data to the 2015 ridership by scaling the ridership at the route level. It should be noted that between 2010 and 2015, BCT changed the service levels and patterns on SR-7 and US-1, which are two of the highest transit ridership corridors in the county. CTG accounted for this by appropriately adjusting the route level scaling factors to reflect the difference in service levels between the two years using the corridor-focused surveys conducted by FDOT between 2012 and 2014.

Analysis

One-dimensional tabulations by access mode, purpose and auto availability will be developed. OD flows are also possible with this survey.

The expanded surveys show a transfer rate (unlinked trips / linked trips) of 55%, resulting in total linked transit trips of 74,649. Of these, 44% of the trips are Home-based-work (HBW). Home-based-school and university trips account for 5% and 6% of the total trips. The remaining trips are split between home-based-other (28%) and non-home-based (17%).

Approximately half of the trips are from households with zero cars. The trips are slightly peak period oriented with 53% of the trips occurring during the peak period. Approximately 95% of the trips walk to and from the bus stops, with the remaining trips split between KNR and PNR access. PNR access mostly represent ‘informal’ park and ride trips.

Table : BCT Linked Trips by Purpose

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Linked Trips** | **%** |
| HBW | 33,088 | *44%* |
| HBO | 20,702 | *28%* |
| HBSch | 4,049 | *5%* |
| HBUniv | 4,198 | *6%* |
| NHBO | 6,350 | *9%* |
| NHBW | 6,261 | *8%* |
| **Total** | **74,649** | ***100%*** |

Table : BCT Linked Trips by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 33,088 | *44%* |
| School | 5,142 | *7%* |
| University | 5,206 | *7%* |
| Maintenance | 17,136 | *23%* |
| Discretionary | 12,204 | *16%* |
| At-Work | 1,873 | *3%* |
| **Total** | **74,649** | ***100%*** |

Table : BCT Linked Trips by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 15,990 | 11,377 | 5,721 | **33,088** | ***44%*** |
| HBO | 13,302 | 9,628 | 6,019 | **28,949** | ***39%*** |
| NHB | 6,441 | 4,141 | 2,030 | **12,612** | ***17%*** |
| **Total** | **35,734** | **25,146** | **13,770** | **74,649** | ***100%*** |
| ***%*** | ***48%*** | ***34%*** | ***18%*** | ***100%*** |  |

Table : BCT Linked Trips by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 15,990 | 13,636 | 3,462 | **33,088** | ***44%*** |
| School | 1,496 | 2,400 | 1,246 | **5,142** | ***7%*** |
| University | 1,397 | 3,015 | 794 | **5,206** | ***7%*** |
| Maintenance | 9,258 | 5,146 | 2,732 | **17,136** | ***23%*** |
| Discretionary | 6,664 | 3,902 | 1,638 | **12,204** | ***16%*** |
| At-Work | 928 | 654 | 291 | **1,873** | ***3%*** |
| **Total** | **35,734** | **28,752** | **10,163** | **74,649** | ***100%*** |
| ***%*** | ***48%*** | ***39%*** | ***14%*** | ***100%*** |  |

Table : BCT Linked Trips by Time-of-day

|  |  |  |
| --- | --- | --- |
| **Time of day** | **Linked Trips** | ***%*** |
| AM Peak | 16,667 | *22%* |
| Off-peak | 34,781 | *47%* |
| PM Peak  | 23,201 | *31%* |
| **Total** | **74,649** | ***100%*** |

Table : BCT Linked Trips by Access Mode at Origin

|  |  |  |
| --- | --- | --- |
| **Access mode at origin** | **Linked Trips** | ***%*** |
| Walk | 66,472 | *89%* |
| PNR | 4,794 | *6%* |
| KNR | 3,384 | *5%* |
| **Total** | **74,649** | ***100%*** |

Table : BCT Linked Trips by Egress Mode at Destination

|  |  |  |
| --- | --- | --- |
| **Egress mode at destination** | **Linked Trips** | ***%*** |
| Walk | 67,979 | *91%* |
| PNR | 3,001 | *4%* |
| KNR | 3,670 | *5%* |
| **Total** | **74,649** | ***100%*** |

I-95 Express Bus Survey

Overview

The I-95 Express bus survey was administered during the months of September and October 2011. One hundred percent of the daily express bus runs were surveyed for one day. Since then, the route alignments and frequencies have been changed several times and newer routes have been added. Thus, CTG used the expanded 2011 survey and generated ballpark estimates by scaling the overall ridership to the 2015 ridership.

Table 27 shows the 2015 ridership on I-95 Express Buses. The ridership is obtained from the BCT and MDT monthly ridership reports.

Table : I-95 Express Buses Route Level Boardings

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Route** | **Route Name** | **Boardings** |
| BCT 95E | 106 | Miramar to Civic Center | 486 |
| BCT 95E | 107 | Hollywood to Miami CBD | 229 |
| BCT 95E | 108 | Pembroke Pines to Civic Center | 366 |
| BCT 95E | 109 | CB Smith Park to Miami CBD | 584 |
| BCT 95E | 110 | Sunrise to Miami CBD | 344 |
| BCT 95E | 114 | Sunrise to Civic Center | 368 |
| MDT 95E | Broward Blvd and Sheridan St | 1,170 |
| MDT 95X | Intra Miami-Dade Express Buses | 2,114 |
| **Total** |  | **5,661** |

*\*95E are inter-county express buses whereas 95X are intra-county express buses*

Processing/Expansion

The original survey was processed and cleaned to remove records with missing information on trip purpose, access mode, egress mode, market segment information, origin, destination, boarding and alighting locations. In addition, records that were part of the round trip taken by the riders were reversed and added to the survey data. In all, 838 survey records were deemed complete and were used for expansion. The cleaned survey records were originally expanded to the 2011 ridership. The survey data was expanded by bus route, time-of-day, direction and route segment.

Analysis

The express bus service has changed significantly since the surveys were conducted. BCT routes 106, 109, 110 and 114 were not in service when the survey was conducted. Thus, only ballpark estimates will be generated.

The I-95 Express buses operate only during the peak periods. The survey also shows that almost all the riders come from households with at least one car. These express buses are primarily used for work trips with 74% of the trips being work related. The express bus is primarily accessed by auto, with 80% of the trips being PNR or KNR in the AM peak period.

Table : I-95 Express Bus Boardings by Purpose

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Linked Trips** | **%** |
| HBW | 4,188 | *74%* |
| HBO | 100 | *2%* |
| HBSch | 85 | *1%* |
| HBUniv | 321 | *6%* |
| NHBO | 139 | *2%* |
| NHBW | 828 | *15%* |
| **Total** | **5,661** | ***100%*** |

Table : I-95 Express Bus Boardings by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 4,188 | *74%* |
| School | 179 | *3%* |
| University | 331 | *6%* |
| Discretionary | 963 | *17%* |
| **Total** | **5,661** | ***100%*** |

Table : I-95 Express Bus Boardings by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 167 | 1,153 | 2,868 | **4,188** | ***74%*** |
| HBO | 80 | 278 | 148 | **506** | ***9%*** |
| NHB | 58 | 310 | 599 | **967** | ***17%*** |
| **Total** | **306** | **1,740** | **3,615** | **5,661** | ***100%*** |
| ***%*** | ***5%*** | ***31%*** | ***64%*** | ***100%*** |  |

Table : I-95 Express Bus Boardings by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 167 | 745 | 3,276 | **4,188** | ***74%*** |
| School | - | 90 | 89 | **179** | ***3%*** |
| University | - | 162 | 169 | **331** | ***6%*** |
| Discretionary | 139 | 182 | 643 | **963** | ***17%*** |
| **Total** | **306** | **1,178** | **4,177** | **5,661** | ***100%*** |
| ***%*** | ***5%*** | ***21%*** | ***74%*** | ***100%*** |  |

Table : I-95 Express Bus Boardings by Access and Egress Modes (OD format)

|  |  |  |  |
| --- | --- | --- | --- |
| **Access mode at origin** | **Egress mode at destination** | **Total** | ***%*** |
| **Walked** | **PNR** | **KNR** | **Tri-Rail** | **Metrorail/ Metromover** | **Transfer from other bus** |
| **Walked** | 168 | 1,265 | 441 | 15 | 69 | 132 | **2,090** | ***37%*** |
| **PNR** | 1,392 | 92 | 24 | 7 | 375 | 32 | **1,923** | ***34%*** |
| **KNR** | 462 | 28 | 21 | - | 117 | 4 | **633** | ***11%*** |
| **Tri-Rail** | 18 | 10 | 12 | - | 23 | - | **63** | ***1%*** |
| **Metrorail/ Metromover** | 70 | 309 | 125 | 20 | 23 | 68 | **616** | ***11%*** |
| **Transfer from other bus** | 181 | 18 | 10 | - | 92 | 36 | **337** | ***6%*** |
| **Total** | **2,291** | **1,722** | **634** | **42** | **699** | **272** | **5,661** | ***100%*** |
| ***%*** | ***40%*** | ***30%*** | ***11%*** | ***1%*** | ***12%*** | ***5%*** | ***100%*** |  |

Table : I-95 Express Bus Boardings by Access and Egress Modes in the “AM Peak Period”

|  |  |  |  |
| --- | --- | --- | --- |
| **Access mode at origin** | **Egress mode at destination** | **Total** | ***%*** |
| **Walked** | **PNR** | **KNR** | **Tri-Rail** | **Metrorail/ Metromover** | **Transfer from other bus** |
| **Walked** | 90 | 16 | 25 | - | 29 | 37 | **197** | ***7%*** |
| **PNR** | 1,377 | 48 | 14 | 7 | 369 | 32 | **1,848** | ***61%*** |
| **KNR** | 443 | 12 | 12 | - | 105 | - | **573** | ***19%*** |
| **Tri-Rail** | 18 | - | - | - | 23 | - | **41** | ***1%*** |
| **Metrorail/ Metromover** | 42 | 5 | 31 | - | 11 | - | **90** | ***3%*** |
| **Transfer from other bus** | 152 | - | 6 | - | 92 | 17 | **268** | ***9%*** |
| **Total** | **2,123** | **80** | **89** | **7** | **630** | **87** | **3,017** | ***100%*** |
| ***%*** | ***70%*** | ***3%*** | ***3%*** | ***0%*** | ***21%*** | ***3%*** | ***100%*** |  |

MDT Garage Surveys

Overview

The following is a list of the transit on-board surveys conducted on MDT buses:

* Northeast Garage: April 2012
* Central Garage: April 2013
* Coral Way (South) Garage: October 2014 (and supplemented in April 2015 with additional surveys)

It should be noted that not all routes were surveyed due to financial constraints when the individual garage surveys were conducted. The following is a list of routes that were surveyed and used for the current analysis in each of the three surveys:

* Northeast Garage: Routes #2, #3, #9, #10, #16, #17, #19, #22, #27, #29, #75, #77, #93, #99, #105, #107, #108, #119, #135, #183, #277. A total of 21 routes were used for expansion purposes. It should be noted that #97 was also surveyed as part of this effort, but it was not included because this route doesn’t exist in 2015.
* Central Garage: Routes #7, #12, #21, #32, #33, #36, #37, #42, #54, #62, #79, #102, #103, #110, #112, #113, #120, #123, #150, #207, #208, #267. All the 22 surveyed routes were used for expansion purposes.
* South Garage: Routes #8, #11, #24, #31, #34, #35, #38, #40, #51, #52, #70, #71, #72, #73, #87, #88, #104, #137, #204, #252, #272, #288. All the 22 surveyed routes were used for expansion purposes.

The three surveys were expanded to the 2015 ridership. CTG used the APC data obtained from MDT for the three months from September through November 2015 and the corresponding route level ridership from MDT’s monthly ridership reports published on their website for expanding the data. The APC data was scaled to the average systemwide boardings obtained from MDT’s ridership reports for the three months. This resulted in a total MDT bus ridership of 218,903, excluding 95 express buses. The route level ridership is shown in Table 34. Low volumes routes #1, #6, #46, #48, #56, #57, #101, #115, #117, #132, #136, #200, #202, #211, #212, #238, #246, #249, #254, #286, #287, #297, #344 and #500 were not surveyed. Total ridership on these routes is 8,689.

Table : MDT Route Level Boardings

|  |  |  |  |
| --- | --- | --- | --- |
| **Route** | **Type** | **Boardings** | **Surveyed** |
| 1 | Local | 370 | NO |
| 2 | Local | 3,199 | YES |
| 3 | Local | 7,095 | YES |
| 6 | Local | 430 | NO |
| 7 | Local | 4,035 | YES |
| 8 | Local | 6,781 | YES |
| 9 | Local | 6,145 | YES |
| 10 | Local | 2,859 | YES |
| 11 | Local | 11,336 | YES |
| 12 | Local | 3,370 | YES |
| 16 | Local | 2,852 | YES |
| 17 | Local | 4,879 | YES |
| 19 | Local | 2,228 | YES |
| 21 | Local | 2,539 | YES |
| 22 | Local | 4,925 | YES |
| 24 | Local | 2,495 | YES |
| 27 | Local | 8,853 | YES |
| 29 | Local | 880 | YES |
| 31 | Busway Local | 1,909 | YES |
| 32 | Local | 3,004 | YES |
| 33 | Local | 2,036 | YES |
| 34 | Busway Flyer | 1,758 | YES |
| 35 | Local | 2,717 | YES |
| 36 | Local | 2,827 | YES |
| 37 | Local | 4,063 | YES |
| 38 | Busway MAX | 7,035 | YES |
| 40 | Local | 2,387 | YES |
| 42 | Local | 1,554 | YES |
| 46 | Local | 50 | NO |
| 48 | Local | 208 | NO |
| 51 | KAT/MAX | 3,252 | YES |
| 52 | Local | 1,490 | YES |
| 54 | Local | 3,980 | YES |
| 56 | Local | 570 | NO |
| 57 | Local | 586 | NO |
| 62 | Local | 3,673 | YES |
| 70 | Local | 1,592 | YES |
| 71 | Local | 1,207 | YES |
| 72 | Local | 1,049 | YES |
| 73 | Local | 2,500 | YES |
| 75 | Local | 2,052 | YES |
| 77 | Local | 10,778 | YES |
| 79 | KAT/MAX | 503 | YES |
| 87 | Local | 1,697 | YES |
| 88 | Local | 2,548 | YES |
| 93 | KAT/MAX | 3,752 | YES |
| 99 | Local | 1,784 | YES |
| 101 | Local | 82 | NO |
| 102 | Local | 1,766 | YES |
| 103 | Local | 3,676 | YES |
| 104 | Local | 1,308 | YES |
| 105 | Local | 1,814 | YES |
| 107 | Local | 2,003 | YES |
| 108 | Local | 1,720 | YES |
| 110 | Local | 2,828 | YES |
| 112 | Local | 9,465 | YES |
| 113 | Local | 1,135 | YES |
| 115 | Local | 374 | NO |
| 117 | Local | 322 | NO |
| 119 | Local | 11,007 | YES |
| 120 | KAT/MAX | 7,016 | YES |
| 123 | Local | 1,910 | YES |
| 132 | Local | 45 | NO |
| 135 | Local | 1,848 | YES |
| 136 | Local | 335 | NO |
| 137 | Local | 1,898 | YES |
| 150 | Local | 2,290 | YES |
| 183 | Local | 3,877 | YES |
| 200 | Local | 185 | NO |
| 202 | Local | 237 | NO |
| 204 | KAT/MAX | 1,236 | YES |
| 207 | Local | 2,082 | YES |
| 208 | Local | 1,925 | YES |
| 211 | Local | 267 | NO |
| 212 | Local | 119 | NO |
| 238 | Local | 528 | NO |
| 246 | Local | 114 | NO |
| 249 | Local | 1,203 | NO |
| 252 | KAT/MAX | 1,073 | YES |
| 254 | Local | 32 | NO |
| 267 | Local | 123 | YES |
| 272 | KAT/MAX | 576 | YES |
| 277 | KAT/MAX | 977 | YES |
| 286 | Local | 111 | NO |
| 287 | KAT/MAX | 325 | NO |
| 288 | Local | 1,043 | YES |
| 297 | KAT/MAX | 1,976 | NO |
| 344 | Local | 96 | NO |
| 500 | Local | 124 | NO |
| **Total** | **Total** | **218,903** |  |

Processing/Expansion

CTG cleaned and post-processed the survey records. As part of this process, the following records were removed:

* Records with ‘home’ as a response on both ends of the trip
* Records without information on access/egress modes, number of vehicles in the household or number of people in the household

Table 35 shows the number of records remaining after applying each of the above-mentioned screening criteria.

Table : Post-processing the Survey Records

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Northeast Garage** | **Central Garage** | **South Garage** | **Total** |
|  | **# of records** | **% of ridership** | **# of records** | **% of ridership** | **# of records** | **% of ridership** | **# of records** | **% of ridership** |
| **Target average weekday ridership**  | **85,527** | **100%** | **65,800** | **100%** | **58,887** | **100%** | **210,214** | **100%** |
| **Total surveys returned** | **4,526** | **5%** | **2,475** | **4%** | **2,414** | **4%** | **9,415** | **4%** |
| Survey records remaining after deleting records with… |
| "Home" on both trip ends | 4,294 | 5% | 2,366 | 4% | 2,338 | 4% | 8,998 | 4% |
| Missing access/ egress mode | 4,294 | 5% | 2,366 | 4% | 2,338 | 4% | 8,998 | 4% |
| Missing number of vehicles in household | 3,149 | 4% | 2,052 | 3% | 1,595 | 3% | 6,796 | 3% |
| Missing number of household people | 2,779 | 3% | 1,949 | 3% | 1,514 | 3% | 6,242 | 3% |
| **Number of survey records used for final expansion** | **2,779** | **3.2%** | **1,949** | **3.0%** | **1,514** | **2.6%** | **6,242** | **3.0%** |
| **Records with geocodable origin & destination locations** | **1,412** | **1.7%** | **0** | **0.0%** | **689** | **1.2%** | **2,101** | **1.0%** |

The surveyed routes account for 210,214 average weekday boardings on MDT buses. Useable survey records for the final expansion accounted for approximately 3% of this ridership. Each of the three garage surveys were expanded by route, direction and time of day (peak: 6-9AM, 3-7PM and off-peak: 9AM-3PM, 7PM-6AM).

Since some of the routes were not surveyed in any of the three surveys, the various tabulations, such as trips by purpose, access mode, auto availability etc. were eventually scaled to the full observed ridership on the MDT buses. The I-95 Express buses were excluded as part of this process.

The survey data also included the origin and destination locations of the riders. CTG received the geocoded origins and destinations for all the three surveys, but the geocodes for the Central Garage survey couldn’t be tagged to their original survey records. The following are the number of ‘useable’ records with geocoded origins and destinations:

* Northeast Garage: 1,412 records
* South Garage: 689 records
* Central Garage: Geocodes couldn’t be tagged to the survey records

Analysis

Given the very small sample size for model development purposes and lack of data on all routes, only ballpark estimates on the system-wide splits by access mode, purpose and auto availability were generated. Detailed two dimensional cross-tabulations and OD flows will not be possible.

The 2015 average weekday ridership on all the MDT buses, except the I-95 Express buses is 218,903. The expanded surveys show a transfer rate (unlinked trips / linked trips) of 39%, resulting in total linked transit trips of 157,137. Of these, 37% of the trips are Home-based-work (HBW). Home-based-school and university trips account for 9% and 8% of the total trips. The remaining trips are split between home-based-other (29%) and non-home-based (17%).

Approximately half of the trips are from households with zero cars. The trips are equally split between the peak and off-peak periods. Approximately 95% of the trips walk to and from the bus stops, with the remaining trips split between KNR and PNR access.

Table : MDT Linked Trips by Purpose

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Linked Trips** | **%** |
| HBW | 57,876 | *37%* |
| HBO | 45,046 | *29%* |
| HBSch | 14,772 | *9%* |
| HBUniv | 12,737 | *8%* |
| NHBO | 16,438 | *10%* |
| NHBW | 10,267 | *7%* |
| **Total** | **157,137** | ***100%*** |

Table : MDT Linked Trips by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 57,876 | *37%* |
| School | 17,612 | *11%* |
| University | 15,632 | *10%* |
| Maintenance | 37,937 | *24%* |
| Discretionary | 23,255 | *15%* |
| At-Work | 4,825 | *3%* |
| **Total** | **157,137** | ***100%*** |

Table : MDT Linked Trips by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 26,750 | 18,592 | 12,535 | **57,876** | ***37%*** |
| HBO | 34,581 | 20,583 | 17,392 | **72,556** | ***46%*** |
| NHB | 13,336 | 8,089 | 5,280 | **26,705** | ***17%*** |
| **Total** | **74,667** | **47,263** | **35,207** | **157,137** | ***100%*** |
| ***%*** | ***48%*** | ***30%*** | ***22%*** | ***100%*** |  |

Table : MDT Linked Trips by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 26,750 | 26,196 | 4,930 | **57,876** | ***37%*** |
| School | 5,008 | 11,682 | 922 | **17,612** | ***11%*** |
| University | 4,596 | 9,866 | 1,169 | **15,632** | ***10%*** |
| Maintenance | 22,430 | 12,170 | 3,338 | **37,937** | ***24%*** |
| Discretionary | 13,208 | 7,738 | 2,309 | **23,255** | ***15%*** |
| At-Work | 2,675 | 1,668 | 482 | **4,825** | ***3%*** |
| **Total** | **74,667** | **69,319** | **13,151** | **157,137** | ***100%*** |
| ***%*** | ***48%*** | ***44%*** | ***8%*** | ***100%*** |  |

Table : MDT Linked Trips by Time-of-day

|  |  |  |
| --- | --- | --- |
| **Time of day** | **Linked Trips** | ***%*** |
| AM Peak (6-9AM) | 41,436 | *26%* |
| Off-peak (9AM-3PM, 7PM-6AM) | 80,356 | *51%* |
| PM Peak (3-7PM) | 35,345 | *22%* |
| **Total** | **157,137** | ***100%*** |

Table : MDT Linked Trips by Access Mode at Origin

|  |  |  |
| --- | --- | --- |
| **Access mode at origin** | **Linked Trips** | ***%*** |
| Walk | 148,427 | *94%* |
| PNR | 1,439 | *1%* |
| KNR | 5,427 | *3%* |
| Bus | 1,086 | *1%* |
| Other | 759 | *0%* |
| **Total** | **157,137** | ***100%*** |

Table : MDT Linked Trips by Egress Mode at Destination

|  |  |  |
| --- | --- | --- |
| **Egress mode at destination** | **Linked Trips** | ***%*** |
| Walk | 152,386 | *97%* |
| PNR | 769 | *0%* |
| KNR | 2,534 | *2%* |
| Bus | 1,253 | *1%* |
| Other | 196 | *0%* |
| **Total** | **157,137** | ***100%*** |

Recommendations

Although the survey instrument asks the questions needed for travel demand modeling, the useable sample size of only 3% is too low to extract much more detailed information for modeling purposes. Specifically, two-dimensional and three-dimensional cross-tabulations are not possible with this sample size. Further, the useable OD geocodes represent only about 1.5% of the overall ridership. This makes it practically impossible to generate good quality TAZ-to-TAZ OD flows which can be used for assignment in the model.

MDT Metromover Survey

Overview

The Metromover survey was conducted in February 2014. The survey was conducted at the following seven Metromover stations for only the boarding passengers:

1. School Board
2. Adrienne Arsht Center
3. Government Center
4. Bayfront Park
5. College/Bayside
6. Brickell
7. Financial District

The survey asked basic questions related to trip purpose, access mode and alighting station. The survey was expanded to the 2015 ridership. CTG used the station level ridership from MDT’s monthly ridership reports published on their website for expanding the data. The ridership was based on a 3-month average from September through November to be consistent with the MDT bus ridership. Table 43 shows the Metromover station level ridership.

Table : Metromover Station Level Ridership

|  |  |
| --- | --- |
| **Station** | **Boardings** |
| School Board | 737 |
| Omni | 2,465 |
| Museum Park | 233 |
| Eleventh Street | 276 |
| Park West | 391 |
| Freedom Tower | 664 |
| College/Bayside | 2,424 |
| First Street | 1,733 |
| Bayfront Park | 3,298 |
| Knight Center | 1,033 |
| Third Street | 318 |
| Miami Avenue | 792 |
| Government Center | 9,109 |
| Wilkie D. Ferguson, Jr. | 829 |
| College North | 1,541 |
| Riverwalk | 900 |
| Fifth Street | 616 |
| Eighth Street | 835 |
| Tenth Street/Promenade | 1,530 |
| Brickell | 3,367 |
| Financial District | 1,526 |
| **Total** | **34,617** |

Processing/Expansion

A total of 867 responses were recorded in the survey. After removing records with “home” on both trip ends, 815 records remained. CTG expanded these records by boarding station as shown in the table below.

Table : Metromover Expansion Weights

|  |  |  |  |
| --- | --- | --- | --- |
| **Boarding station** | **# of records** | **Targets** | **Weight** |
| Adrienne Arsht Center | 101 | 2,465 | 24.4 |
| Bayfront Park | 121 | 3,298 | 27.3 |
| Brickell | 65 | 3,367 | 51.8 |
| College/Bayside | 96 | 2,424 | 25.3 |
| Financial District | 97 | 1,526 | 15.7 |
| Government Center | 237 | 9,109 | 38.4 |
| School Board | 98 | 737 | 7.5 |
| **Grand Total** | **815** | **22,926** | **28.1** |

Analysis

Given the very small sample size and lack of data from all stations, only ballpark estimates on the system-wide splits by access mode and trip purpose were generated.

The expansion shows that HBW trips account for 34% of the trips and NHB trips account for 28%. Based on the access and egress modes, roughly two-thirds of the trips transfer to/from another transit service.

Table : Metromover Boardings by Purpose (scaled to daily Metromover ridership)

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Trips** | ***%*** |
| HBW | 11,654 | *34%* |
| HBO | 8,605 | *25%* |
| HBSch | 543 | *2%* |
| HBUniv | 4,086 | *12%* |
| NHBO | 4,125 | *12%* |
| NHBW | 5,604 | *16%* |
| **Total** | **34,617** | ***100%*** |

Table : Metromover Boardings by Access and Egress Mode (scaled to daily Metromover ridership)

|  |  |  |
| --- | --- | --- |
| **Access mode at origin** | **Egress mode at destination** | **Total** |
| **Walk** | **KNR** | **Bus** | **Metrorail** | **Metromover** |
| Walk | 8,224 | 593 | 1,569 | 2,108 | 58 | 12,553 |
| KNR | 1,254 | 1,429 | 136 | 382 | 0 | 3,201 |
| Bus | 3,154 | 11 | 3,899 | 1,571 | 0 | 8,635 |
| Metrorail | 4,043 | 270 | 1,841 | 3,560 | 58 | 9,772 |
| Metromover | 282 | 0 | 0 | 58 | 116 | 456 |
| **Total** | **16,957** | **2,303** | **7,445** | **7,679** | **232** | **34,617** |
|  |  |  |  |  |  |  |
| **Access mode at origin** | **Egress mode at destination** | **Total** |
| **Walk** | **KNR** | **Bus** | **Metrorail** | **Metromover** |
| Walk | 24% | 2% | 5% | 6% | 0% | 36% |
| KNR | 4% | 4% | 0% | 1% | 0% | 9% |
| Bus | 9% | 0% | 11% | 5% | 0% | 25% |
| Metrorail | 12% | 1% | 5% | 10% | 0% | 28% |
| Metromover | 1% | 0% | 0% | 0% | 0% | 1% |
| **Total** | **49%** | **7%** | **22%** | **22%** | **1%** | **100%** |
|  |  |  |  |  |  |  |
| **%Transfers** | **67%** |  |  |  |  |  |

Recommendations

The survey doesn’t ask some of the important modeling questions related to travel patterns (origin and destination locations), transfer patterns and household characteristics. Further, the survey wasn’t held at all the stations within the system. So, findings from this survey will only be used as ballpark estimates during model calibration and validation.

Metrorail System-Wide Survey

Overview

The Metrorail survey was conducted on April 28, 2009. Tri-lingual survey questionnaires (English, Spanish, and Creole) were distributed to all passengers as they accessed Metrorail stations from 6:00 AM to 6:00 PM for both northbound and southbound trains and were collected at the exits of all 22 Metrorail stations.

CTG used the Metrorail station level ridership from MDT’s monthly ridership reports for the three months from September through November 2015 for expanding the data. The 2015 Metrorail station level boardings to which the survey was expanded is shown in the table below.

Table : Metrorail Station Level Boardings

|  |  |
| --- | --- |
| **Station** | **Boardings** |
| Palmetto | 1,542 |
| Okeechobee | 1,438 |
| Hialeah | 1,866 |
| Tri-Rail transfer | 1,479 |
| Northside | 1,890 |
| Dr. Martin Luther King Jr. Plaza | 1,658 |
| Brownsville | 1,197 |
| Earlington Heights | 2,045 |
| Allapattah | 2,280 |
| Santa Clara | 936 |
| Civic Center | 6,486 |
| Culmer | 1,635 |
| Historic Overtown | 2,165 |
| Government Center | 12,556 |
| Brickell | 6,703 |
| Vizcaya | 1,548 |
| Coconut Grove | 2,121 |
| Douglas Road | 4,351 |
| University | 2,381 |
| South Miami | 3,790 |
| Dadeland North | 7,102 |
| Dadeland South | 7,675 |
| Miami International Airport | 1,821 |
| **Total** | **76,665** |

Processing/Expansion

The original survey records were cleaned and post-processed. As part of this process, records with missing boarding/alighting station, trip purpose, access/egress modes or number of vehicles in the household were removed.

This resulted in 10,644 useable records. Of these, 6,690 records could be geocoded. The 2009 survey was originally expanded to the 2010 Metrorail ridership of 57,884 as part of previous modeling efforts. The expansion was done by boarding station, direction, time of day and number of stations traveled (1-3 stations, 4 or more stations)

To expand the survey to the 2015 ridership, CTG scaled the expanded survey records by boarding station. It should be noted that at the time the 2009 survey was conducted, Metrorail didn’t serve the MIA station. Thus, boardings at the MIA station were excluded during expansion. Table 48 shows the Metrorail expansion factors.

Table : Metrorail Expansion Factors

|  |  |  |  |
| --- | --- | --- | --- |
| **Station** | **2010 Boardings** | **2015 Boardings** | **Factor** |
| Palmetto | 1,267 | 1,542 | 1.22 |
| Okeechobee | 1,036 | 1,438 | 1.39 |
| Hialeah | 1,750 | 1,866 | 1.07 |
| Tri-Rail transfer | 1,921 | 1,479 | 0.77 |
| Northside | 2,098 | 1,890 | 0.90 |
| Dr. Martin Luther King Jr. Plaza | 1,267 | 1,658 | 1.31 |
| Brownsville | 915 | 1,197 | 1.31 |
| Earlington Heights | 1,482 | 2,045 | 1.38 |
| Allapattah | 1,843 | 2,280 | 1.24 |
| Santa Clara | 616 | 936 | 1.52 |
| Civic Center | 5,969 | 6,486 | 1.09 |
| Culmer | 1,134 | 1,635 | 1.44 |
| Historic Overtown | 1,666 | 2,165 | 1.30 |
| Government Center | 9,494 | 12,556 | 1.32 |
| Brickell | 2,632 | 6,703 | 2.55 |
| Vizcaya | 1,263 | 1,548 | 1.23 |
| Coconut Grove | 1,637 | 2,121 | 1.30 |
| Douglas Road | 3,420 | 4,351 | 1.27 |
| University | 2,115 | 2,381 | 1.13 |
| South Miami | 3,275 | 3,790 | 1.16 |
| Dadeland North | 4,833 | 7,102 | 1.47 |
| Dadeland South | 6,699 | 7,675 | 1.15 |
| **Total** | **58,331** | **74,844** | **1.28** |

Analysis

The survey has enough detail to develop tables by purpose, access mode, auto availability and station-to-station flows. TAZ level OD flows can also be developed, but given that the survey is almost seven years old and the MIA station was added during this time, along with an increase in service, the OD flows will be developed at a more aggregate level.

Table : Metrorail Linked Trips by Purpose

|  |  |  |
| --- | --- | --- |
| **Trip purpose** | **Linked Trips** | ***%*** |
| HBW | 45,376 | *61%* |
| HBO | 7,345 | *10%* |
| HBSch | 5,616 | *8%* |
| HBUniv | 8,690 | *12%* |
| NHBO | 2,808 | *4%* |
| NHBW | 5,008 | *7%* |
| **Total** | **74,844** | ***100%*** |

Table : Metrorail Linked Trips by SERPM 8 Purpose Definition

|  |  |  |
| --- | --- | --- |
| **Purpose** | **Linked Trips** | **%** |
| Work | 45,376 | *61%* |
| School | 6,629 | *9%* |
| University | 10,823 | *14%* |
| Maintenance | 1,857 | *2%* |
| Discretionary | 7,916 | *11%* |
| At-Work | 2,242 | *3%* |
| **Total** | **74,844** | ***100%*** |

Table : Metrorail Linked Trips by Purpose and Auto-availability

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip purpose** | **Auto-availability** | **Total** | ***%*** |
| **0-Car** | **1-Car** | **2+-Car** |
| HBW | 5,480 | 14,282 | 25,615 | **45,376** | ***61%*** |
| HBO | 5,202 | 7,718 | 8,732 | **21,652** | ***29%*** |
| NHB | 1,414 | 2,469 | 3,934 | **7,817** | ***10%*** |
| **Total** | **12,095** | **24,468** | **38,280** | **74,844** | ***100%*** |
| ***%*** | ***16%*** | ***33%*** | ***51%*** | ***100%*** |  |

Table : Metrorail Linked Trips by Purpose and Auto Sufficiency

|  |  |  |  |
| --- | --- | --- | --- |
| **Trip Purpose** | **Auto Sufficiency** | **Total** | ***%*** |
| **No Vehicles** | **Vehicles<Adults** | **Vehicles>=Adults** |
| Work | 5,480 | 20,540 | 19,356 | **45,376** | ***61%*** |
| School | 1,126 | 4,197 | 1,305 | **6,629** | ***9%*** |
| University | 2,268 | 5,711 | 2,844 | **10,823** | ***14%*** |
| Maintenance | 671 | 857 | 330 | **1,857** | ***2%*** |
| Discretionary | 2,309 | 3,704 | 1,903 | **7,916** | ***11%*** |
| At-Work | 242 | 959 | 1,040 | **2,242** | ***3%*** |
| **Total** | **12,095** | **35,970** | **26,779** | **74,844** | ***100%*** |
| ***%*** | ***16%*** | ***48%*** | ***36%*** | ***100%*** |  |

Table : Metrorail Linked Trips by Time-of-day

|  |  |  |
| --- | --- | --- |
| **Time of day** | **Linked Trips** | ***%*** |
| AM Peak (6-9AM) | 24,945 | *33%* |
| Off-peak (9AM-3PM, 7PM-6AM) | 29,382 | *39%* |
| PM Peak (3-7PM) | 20,517 | *27%* |
| **Total** | **74,844** | ***100%*** |

Table : Metrorail Linked Trips by Access Mode at Origin

|  |  |  |
| --- | --- | --- |
| **Access mode at origin** | **Linked Trips** | ***%*** |
| Walk | 54,505 | *73%* |
| PNR | 13,605 | *18%* |
| KNR | 6,555 | *9%* |
| **Total** | **74,664** | ***100%*** |

Table : Metrorail Linked Trips by Egress Mode at Destination

|  |  |  |
| --- | --- | --- |
| **Egress mode at destination** | **Linked Trips** | ***%*** |
| Walk | 58,670 | *79%* |
| PNR | 11,475 | *15%* |
| KNR | 4,550 | *6%* |
| **Total** | **74,695** | ***100%*** |

Table : Metrorail Station-to-Station Flows from “Faregate Data” (October 2015)



*\*The flow data in this table reflects the average flows on Tuesdays, Wednesdays and Thursdays in the month of October 2015. Hence the station level boardings in this table are slightly different from those in Table 47, which is based on a three-month average ridership from MDT monthly reports (September through November 2015)*



Figure : Distance Traveled on Metrorail

BCT Community Buses and Tri-Rail Shuttles

In addition to all the transit services discussed previously, SERPM 8.0 will also include the community buses operated by BCT and shuttle services that serve the Tri-Rail station. This section summarizes the boarding targets on the BCT community buses and Tri-Rail shuttles.

Table 57 shows the community bus ridership by the city served. CTG obtained the ridership from the monthly ridership reports published on BCT’s website. Average of all 12 months in 2015 was used. Since the ridership reports on BCT’s website only had total monthly ridership on community bus routes, an annualization factor of 283 was used to obtain the average weekday ridership shown in the table. This factor is obtained from the National Transit Database (NTD) report for BCT community buses.

Table : BCT Community Bus Ridership by City

|  |  |
| --- | --- |
| **City** | **Ridership** |
| Coconut Creek | 501 |
| Coral Springs | 295 |
| Dania Beach | 165 |
| Davie | 626 |
| Deerfield Beach | 243 |
| Fort Lauderdale | 1,207 |
| Hallandale Beach | 659 |
| Hillsboro Beach | 88 |
| Lauderdale-by-the-Sea | 139 |
| Lauderdale Lakes | 391 |
| Lauderhill | 2,074 |
| Lighthouse Point | 44 |
| Margate | 209 |
| Miramar | 603 |
| Pembroke Pines | 731 |
| Pompano Beach | 376 |
| Tamarac | 207 |
| West Park | 27 |
| **Total** | **8,586** |

Table 58 shows the Tri-Rail shuttle ridership by station served. The ridership represents fiscal year 2015 ridership obtained from SFRTA’s Transit Development Plan for FY 2016-2025. The annual ridership is scaled using an annualization factor of 290 to obtain the average weekday ridership shown in the table. The table only includes the shuttles operated by SFRTA. The Arvida Park of Commerce (APOC) shuttles at the Boca Raton station are not included in the table.

Table : Tri-Rail Shuttle Ridership by Station

|  |  |
| --- | --- |
| **Station** | **Boardings** |
| Lake Worth | 109 |
| Boca Raton | 143 |
| Deerfield Beach | 244 |
| Pompano Beach | 89 |
| Cypress Creek | 470 |
| Fort Lauderdale | 671 |
| Fort Lauderdale Airport | 1,032 |
| Sheridan Street | 55 |
| Opa-Locka | 428 |
| **Total** | **3,242** |

SERPM 8 Transit Validation Plan

This section will be updated once the model estimation / structure is better defined. More specifically, the mode choice structure will determine the dimensions used for calibration targets. In general, the overall calibration and validation targets are shown in Table 59.

Summary

An overall summary of all fixed-route transit services in the tri-county is shown in the table below. Based on the analysis of the data presented in this document, CTG recommends the following as the next steps:

* Utilize the results presented in the tables and maps presented in this document as a guide for calibrating and validating transit trips estimated by SERPM 8
* Based on the survey sample rates, develop expanded and/or unexpanded survey trip tables separately for each agency/mode for mode choice structure validation purposes (For Tri-Rail, Metrorail and BCT, expanded trip table can be developed. For MDT buses and Palm Tran, develop unexpanded trip table. Trip table for Metromover trips cannot be developed.)
* Using the results from the MDT bus surveys as much as possible and utilizing estimated transit trips from SERPM7 combined with the APC data, develop a ‘synthesized’ observed trip table for validating the mode choice structure for SERPM 8. The process of developing this synthesized trip table needs further investigation.

Table : Summary of all On-board Surveys

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **Tri-Rail** | **Palm Tran** | **BCT** | **95X/E** | **Metrobus** | **Metromover** | **Metrorail** | **Region-wide** |
| **Year conducted** | 2013 | 2015 | 2010 | 2011 | 2012 – 2015 | 2014 | 2009 | -- |
| **Universe of Survey Sampling** | Tri-Rail  | All Palm Tran routes | All BCT routes | I-95 express buses | Almost all Metrobus routes | Specific Metromover stations | Metrorail | -- |
| **Processed survey records** | 3,739 | 1,046 | 7,749 | 865 | 6,242 | 815 | 10,664 | 31,120 |
| **2015 boardings** | 13,753 | 39,146 | 115,496 | 5,661 | 218,903 | 34,617 | 76,665 | 504,241 |
| **2015 linked trips** |  |  |  |  |  |  |  | 351,961 |
| **Transfer rate (boardings/****linked trips – 1)** | -- | 27% | 55% | -- | 39% | *--* | -- | 43% |
| **% of riders who transfer** | 60% | 22% | 43% | 23% | 31% | 67% | 49% | 39% |
| **Access split (walk/non-walk)** | 17%/83% | 94%/6% | 89%/11% | *16%/84% (production end)* | 94%/6% | 36%/64% | 73%/27% | 83%/17% |
| **Egress split (walk/non-walk)** | 18%/82% | 98%/2% | 91%/9% | *90%/10% (attraction end)* | 97%/3% | 49%/51% | 79%/21% | 87%/13% |
| **% zero-car** | 8% | 49% | 48% | Almost 0% | 48% | 32% (est.) | 16% | 40% |
| **% work** | 50% | 39% | 44% | Almost 100% | 37% | 34% | 61% | 43% |
| **TOD split (AM/OP/PM)** | 34%/31%/35% | 25%/46%/ 29% | 22%/47%/31% | 50%/0%/ 50% | 26%/51%/22% | NA | 33%/39%/27% | 27%/47%/ 27% |

*\*non-walk includes PNR, KNR, transit bus/rail transfer and school bus transfer*