2022 Tucson On-Board Survey

FINAL REPORT
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Prepared for The City of Tucson and Pima Association of Governments by ETC Institute

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EXECUTIVE SUMMARY

The 2022 Transit On-Board Origin-Destination (OD) Survey was conducted by ETC Institute on behalf of The City of Tucson and collected data from Sun Tran, Sun Link, and Sun Shuttle passengers. The data collection began on January 10, 2022, and ended March 4, 2022. This report will provide an overview and detailed description of the 2022 On-Board OD Survey process. The report covers the survey findings, purpose and background, design, sampling, administration methodology, and quality control process.

OBJECTIVES

The primary objectives for the survey were as follows:

- Compile statistically accurate information about the use of transit in the region by Sun Tran, Sun Link, and Sun Shuttle passengers for future planning.
- Collect and provide valid and current transit rider travel patterns, demographic information for Title VI reporting, and transit service characteristics.
- Provide data for updating the Pima Association of Governments' (PAG) Regional Travel Model.

SURVEY METHODOLOGY SUMMARY

Origin Destination Survey

For this study, ETC Institute conducted the on-board passenger intercept interview surveys using tablet PCs (tablets). ETC Institute developed the survey in cooperation with Sun Tran and The City of Tucson (The City). Passengers were selected for participation using a random sampling protocol built into the survey program, and passengers' responses were captured in real time. For those passengers who elected to participate, the survey was administered in two portions. The first portion captured a detailed account of the passenger's complete one-way trip, and the second captured various usage and demographic data. In the initial section, the survey program's mapping function allowed for the geocoding of addresses using information provided by the passenger. Passengers were able to see on-screen maps and confirm the accuracy of the location data collected. At the end of the first portion, passengers confirmed a comprehensive summary of their complete origin-to-destination one-way trip. In the second portion passengers were asked questions pertaining to their transit usage, as well as personal and household demographics. Upon completion of the survey passengers were thanked for their time and willingness to participate.

ETC Institute interviewers were also available to answer passenger questions, the most common of which involved the need to ask for personal information and how the information gathered would be used. Passengers were assured all information collected would be kept strictly confidential, and that The City intended to use the information for research purposes designed to improve their system, and that the information would never be used for any commercial purpose.

On-to-Off Survey

In addition to conducting the intercept survey, ETC conducted an On-to-Off survey on all routes with over 2,000 average daily riders. These routes included the Sun Link and Sun Tran routes 4,8,11,16, and 18. The on-to-off data was collected to expand the origin-destination survey data.

The on-to-off count administrators (counters) were responsible for the distribution and collection of the on-to-off count cards. There were two counters assigned to each bus with both counters covering the back of the bus due to passengers only being allowed to board the bus from the rear entrances. One counter scanned and distributed cards printed with barcodes to boarding passengers while the other counter collected and scanned the cards as passenger alighted. The counters used tablets equipped with hand-held scanners which were used to capture the boarding and alighting locations of passengers.

For the Sun Link (Rail), counters asked passengers at which stop they entered and exited the train, if not observed. The rationale for this was two-fold. First, since a significantly higher number of rail passengers know the stop names along routes, the ability to verbally collect on-to-off stop data from rail passengers was significantly more efficient than it would have been on busses. Second, the logistics of having staff at each door handling both the boarding and alighting activity would have been overwhelming for the counters.

Weekday Transit Trip Characteristics and Passenger Profile

The following bullets describe the Tucson region's passenger profile for weekday (Monday through Friday) riders.

- Forty-four percent of weekday riders' origin place type was "Home" and forty percent of riders' destination place type was "Home," with "Workplace" being only fifteen percent of origins and sixteen percent of destinations. Nine percent of riders were coming from and/or going to school (K-12 and college). With the Sun Link going through the University of Arizona campus, it has the highest amount of "College" trips made with thirty percent of trips originating from a college and twenty-four percent of trips having a final destination at a college.
- Most passengers walk to their first stop from their origin location (94%), and to their destination from their final stop (95%). Not only do most passengers walk to and from their first and last boarding and alighting locations, but over half of all passengers interviewed (58%) take only one vehicle on their one-way-trip without having to use transfers.
- During the survey, fare was not being collected. If fare had been collected, over half (54%) the passengers interviewed would have paid regular fare, and nearly half (48%) of passengers would have used a SunGo plastic card to pay their fare.
- The average passenger rides transit at least five days a week (72%), has been riding transit more than two years (61%), does not use any additional tools to plan their trip(s) (36%), and believes that adding more weekend service is the most important transit enhancement (28%).
- Passengers' individual demographic responses show that over half of passengers do not possess a valid driver's license (51%), they do not have any disabilities limiting travel (90%), are between 18-44 years of age (66%), are White (63%), Non-Hispanic (63%), and male (62%). They are also employed (60%) and non-students (70%).
- Regarding passengers' households, fifty percent of passengers do not have any vehicles available to their household. Seventy-one percent live in households with three or less people, thirty-seven percent have one or less employed household members, and fifty-eight percent live in households that make less than $24,999 annually.

Weekend Transit Trip Characteristics and Passenger Profile

The following bullets describe the Tucson region's passenger profile for weekend (Saturday and Sunday) riders.

- Fifty-three percent of weekend riders' origin place type was "Home" and twenty-six percent of riders' destination place type was "Home." Passengers coming from and going to work was less than weekday trips with "Workplace" being only ten percent of origins and fifteen percent of destinations.
- Similar to weekday passengers, most weekend passengers walk to their first stop from their origin location (92%), and to their destination from their final stop (95%). More passengers make transfers on the weekends compared to weekdays with fifty-three percent of passengers having to make at least one transfer.
- During the survey, fare was not being collected. If fare had been collected, nearly half (48%) the passengers interviewed would have paid regular fare, and nearly half (44%) the passengers would have used a SunGo plastic card to pay their fare.
- The average passenger surveyed on the weekend rides transit at least five days a week (69%), has been riding transit more than two years (68%), does not use any additional tools to plan their trip(s) (39%), and believes that adding more weekend service is the most important transit enhancement (33%).
- Passengers' individual demographic responses show that over half of passengers do not possess a valid driver's license (54%), they do not have any disabilities (86%), are between 25-54 years of age (60%), are white (65%), non-Hispanic (64%), and male (68%). They are also employed (57%) and non-students (86%).
- Regarding weekend passengers' households, sixty-six percent of passengers do not have any vehicles available to their household. Seventy-eight percent live in households with three or less people, sixty-five percent have one or less employed household members, and sixty-eight percent live in households that make less than $24,999 annually.

Lessons Learned

Overall, the project performed very well. This survey was conducted during the Covid-19 pandemic which provided a few challenges. Staffing the survey in the beginning showed a high turnout of interested survey staff, yet a high number of staff dropped-off from the project on a weekly basis. Other staffing issues were due to Covid protocols which required that if staff felt ill or showed Covid-type symptoms, they were required to take off from work to get tested and could not return until they showed a negative test or waited 14 days before they returned to work.

As free fares had been implemented during the time the study was conducted, more passengers were observed using transit without a specific trip purpose than what is typically observed when fares are being collected. ETC planned for this prior to administering the survey and implemented

procedures for capturing these types of trips. ETC believes capturing these trips should be done on all future surveys in the region. Survey staff felt unsafe at times due to some of these newer riders and incidents did occur on buses.

Another noteworthy item was that passengers were only allowed to enter and exit the vehicle from the back door. This caused the on-to-off survey to have both collectors at the rear door rather than one at the front and one at the back. ETC managed to effectively handle this problem but recommends that, for future surveys, both doors on the vehicle be accessible for boarding and alighting.

Chapter 1. WEEKDAY OD SURVEY SYSTEM RESULTS

TRIP INFORMATION

WHAT TYPE OF PLACE ARE YOU COMING FROM NOW? (THE STARTING PLACE FOR YOUR ONE-WAY TRIP)

The series below shows the top types of places passengers are coming from. Based on the Survey results, nearly half the passengers (43.5%) interviewed on busses selected "Your HOME" for where their trip originated from, and 60.5%of Sun Link passengers reported they were coming from home. Another top choice was "Your usual WORKPLACE" with 15.1% of passengers selecting this option. An additional 8.3% of passengers reported they were coming from "Shopping." Sun Link has the highest amount of college origin place types with 27.9%.

Table 1-1: What type of place are you COMING FROM NOW? (the starting place for your one-way trip)

What type of place are you COMING FROM NOW? (the starting place for your one-way trip)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Your usual WORKPLACE	15.1%	16.7%	6.9%	4.7%
Your HOME	43.5%	44.4%	60.5%	35.6%
Your Hotel / motel / lodging	0.5%	0.4%	0.0%	0.8%
College / University (students only)	6.0%	3.0%	0.5%	27.9%
School (K-12) (students only)	3.3%	3.6%	1.8%	1.4%
Medical appointment / Doctor visit (non-work)	2.5%	2.8%	2.5%	0.5%
Shopping	8.3%	8.8%	11.1%	4.9%
Dining out	3.3%	2.2%	0.0%	11.7%
Other business related (e.g. meeting, delivery)	1.0%	1.0%	0.0%	1.1%
Social visit (e.g. friends, relatives)	6.0%	6.2%	8.9%	4.5%
Airport (passengers only)	0.1%	0.1%	0.0%	0.0%
Major sporting event	0.0%	0.0%	0.0%	0.0%
Pick up / Drop off someone (e.g. school, daycare)	0.2%	0.3%	0.0%	0.0%
Personal business (e.g. bank, post office)	4.8%	5.0%	3.5%	3.6%
Recreation / Sightseeing	2.7%	2.8%	3.6%	2.0%
Escorting / Accompanying someone	0.3%	0.4%	0.0%	0.0%
No particular destination	2.0%	2.1%	0.0%	1.5%
Other	0.2%	0.2%	0.8%	0.0%

HOW DID YOU GET FROM YOUR ORIGIN?

Series below shows How passengers first access public transit for their one-way. A large majority of all passengers (94.6%) selected that they accessed public transit by "Walk," compared to next highest (1.7%) of passengers who reported "Bike." "Was dropped off by someone" was used by 1.3% of passengers to enter the transit system. Sun Shuttle has the highest number of personal vehicle access at 10.7%.

Table 1-2: How did you GET FROM your origin

How did you GET FROM your origin	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	94.7%	94.6%	84.6%	96.0%
Bike	1.7%	2.0%	0.3%	0.3%
Was dropped off by someone	1.3%	1.4%	6.9%	0.3%
Wheelchair	0.6%	0.7%	0.0%	0.2%
Drove alone and parked	0.5%	0.1%	3.0%	2.5%
Drove or rode with others and parked	0.4%	0.4%	0.8%	0.5%
Cat Tran Shuttle	0.2%	0.2%	3.0%	0.0%
E-scooter (e.g. Spin, Razor)	0.2%	0.2%	1.1%	0.0%
Uber, Lyft, etc.	0.2%	0.2%	0.0%	0.0%
Other	0.1%	0.1%	0.2%	0.0%
Taxi	0.0%	0.0%	0.0%	0.0%
Bike share	0.0%	0.0%	0.0%	0.0%

WHAT TYPE OF PLACE ARE YOU GOING TO NOW? (THE ENDING PLACE FOR YOUR ONE-WAY TRIP)

Series below shows the top types of places to which passengers traveled. Based on the Survey results, 40.4% of passengers selected "Your HOME" for where they were headed on this trip. Another top choice was "Your usual WORKPLACE" with 15.7% of passengers. The third most common choice was "Social Visit" with 9.7% of passengers selecting this option. SunLink has the highest amount of college destination place types at 23.7%.

Table 1-3: What type of place are you GOING TO NOW? (the ending place for your one-way trip)

What type of place are you GOING TO NOW? (the ending place for your one-way trip)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Your usual WORKPLACE	15.7%	16.7%	15.7%	8.4%
Your HOME	40.4%	41.3%	31.1%	34.2%
Your Hotel / motel / lodging	0.1%	0.1%	0.0%	0.2%
College / University (students only)	5.7%	3.3%	2.3%	23.7%
School (K-12) (students only)	2.8%	3.1%	1.8%	0.9%
Medical appointment / Doctor visit (non-work)	2.5%	2.8%	3.5%	0.3%
Shopping	9.3%	9.8%	12.2%	5.1%
Dining out	3.9%	2.7%	0.0%	12.5%
Other business related (e.g. meeting, delivery)	0.9%	0.8%	0.0%	1.0%
Social visit (e.g. friends, relatives)	9.7%	10.2%	12.3%	5.8%
Airport (passengers only)	0.1%	0.1%	0.0%	0.0%
Major sporting event	0.0%	0.0%	0.0%	0.1%
Pick up / Drop off someone (e.g. school, daycare)	0.3%	0.3%	0.0%	0.4%
Personal business (e.g. bank, post office)	5.5%	5.7%	12.9%	3.6%
Recreation / Sightseeing	2.8%	2.6%	5.8%	3.8%
Escorting / Accompanying someone	0.2%	0.2%	0.0%	0.0%
Other	0.1%	0.1%	2.4%	0.1%

HOW WILL YOU GET TO YOUR DESTINATION?

Series below shows how passengers traveled from transit to their destination. The majority of all transit passengers (95.4%) selected "Walk" for their egress mode to their final destination after exiting public transit, compared to the next highest egress mode (1.6%) passengers selected, which was "Bike." An additional 1.1% of passengers reported they left public transit by "Picked up by someone." Sun Shuttle has the highest number of personal vehicle egress at 4.1%.

Table 1-4: How will you GET TO your destination

How will you GET TO your destination	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	95.4%	95.2%	82.6%	98.3%
Bike	1.6%	1.8%	0.3%	0.3%
Be picked up by someone	1.1%	1.2%	3.4%	0.0%
Wheelchair	0.7%	0.8%	0.0%	0.2%
Get in a parked vehicle & drive/ride w/others	0.3%	0.3%	0.0%	0.4%
Get in a parked vehicle & drive alone	0.3%	0.2%	1.8%	0.6%
Other	0.2%	0.1%	7.8%	0.2%
Cat Tran Shuttle	0.1%	0.1%	3.0%	0.0%
Uber, Lyft, etc.	0.1%	0.2%	0.0%	0.0%
E-scooter (e.g. Spin, Razor)	0.1%	0.1%	1.1%	0.0%
Taxi	0.0%	0.0%	0.0%	0.0%

TOTAL NUMBER OF IN-SYSTEM TRANSFERS

The table below shows the total number of system transfers used in the one-way trip by passengers. Most passengers (58.0%) made zero transfers to make their current trip, compared to, 35.8% of passengers that made one transfer during their trip. SunLink has the least amount of transfers with 85.2% of passengers not making a transfer. ***Transfer percentages were based on the unlinked expansion.***

Table 1-5: Total number of in-system transfers

Total number of in-system transfers	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(0) None	58.0%	55.0%	53.2%	85.2%
(1) One	35.8%	38.3%	40.3%	13.6%
(2) Two	5.7%	6.2%	6.5%	1.2%
(3) Three	0.5%	0.5%	0.0%	0.0%

FARE/RIDING INFORMATION

IF FARES WERE BEING COLLECTED, WHAT FARE CATEGORY WOULD APPLY TO YOU?

The series below illustrates the fare category used by passenger if fares were being collected. As shown in these visuals, "Regular (Full) Fare" was the most widely selected fare category type as indicated by passengers (54.0%), compared to the next highest, "Economy Low-Income Fare" (23.5%).

Table 1-6: If fares were being collected, what fare category would apply to you?

If fares were being collected, what fare category would apply to you?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Regular (Full) Fare	54.0%	53.9%	47.7%	55.5%
Economy Senior Fare	5.3%	5.5%	6.3%	4.1%
Economy Disabled Fare	3.6%	3.9%	4.6%	0.9%
Economy Low-Income Fare	23.5%	25.2%	34.1%	11.1%
Don't Know	13.6%	11.6%	7.3%	28.4%

IF FARES WERE BEING COLLECTED, HOW WOULD YOU PAY FOR THIS ONE-WAY TRIP?

The series below illustrates the fare payment that would be used by passengers if fares were being collected. As shown in these visuals, "SunGo Card" was the most widely used fare payment type as indicated by passengers (48.0%), compared to the next highest, "Cash Fare" (38.5%).

Table 1-7: If fares were being collected, how would you pay for this one-way trip?

If fares were being collected, how would you pay for this one-way trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Cash Fare	38.5%	39.9%	51.6%	24.9%
SunGo Card (plastic)	48.0%	48.8%	40.6%	41.4%
Smart Phone / GOTucson Mobile App	10.0%	7.6%	7.0%	31.6%
Don't Know	3.5%	3.7%	0.7%	2.1%

HOW WOULD YOU HAVE MADE THIS TRIP IF SUN TRAN, SUN LINK, OR SUN SHUTTLE WERE NOT AVAILABLE?

The series below shows what passengers would use for other modes of transportation if Sun Tran, Sun Link, or Sun Shuttle were not available. Twenty-three percent of passengers would use "Friend/Family Member," or Twenty-one percent would use a "Taxi/Uber" if Sun Tran, Sun Link, or Sun Shuttle were not available.

Table 1-8: How would you have made this trip if Sun Tran, Sun Link, or Sun Shuttle were not available?

How would you have made this trip if Sun Tran, Sun Link, or Sun Shuttle were not available?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	20.8%	16.2%	13.5%	54.5%
Other	0.5%	0.6%	1.5%	0.2%
Drive own vehicle	8.7%	8.0%	7.8%	13.9%
Friend/family member	23.7%	26.2%	23.1%	6.2%
Taxi/Uber	21.2%	23.1%	17.5%	8.5%
Would not make trip	10.0%	10.8%	27.0%	2.7%
Sun On Demand	0.6%	0.6%	0.0%	0.3%
Ride bicycle/scooter/skateboard	14.4%	14.6%	9.6%	13.7%

WHAT DID YOU USE TO PLAN THIS TRIP?

The series below shows how passengers plan for their trip. Outside of "Did not do any trip planning," Passengers indicated "Google Transit" was the most widely used method for trip planning (28.1%), compared to "SunTran App" (19.2%).

Table 1-9: What did you use to plan this trip?

What did you use to plan this trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Other	0.5%	0.6%	0.0%	0.3%
Paper schedule	11.9%	13.4%	7.4%	1.7%
Called customer service	1.2%	1.2%	8.8%	0.2%
Google Transit	28.1%	29.2%	9.4%	22.1%
Online trip planner (suntran.com)	3.1%	3.4%	2.8%	1.1%
SunTran App	19.2%	20.9%	11.7%	7.7%
Did not do any trip planning	35.9%	31.3%	59.8%	66.9%

HOW OFTEN DO YOU RIDE TRANSIT (SUN TRAN, SUN LINK, SUN SHUTTLE)?

The series below shows the frequency usage reported by the Passenger. Over forty percent of passengers (44.1%) indicated they ride "Everyday" compared to the next highest "5 Days per week" (28.0%). Most Sun Shuttle passengers ride less frequent with 52.6% of Sun Shuttle passengers reporting they ride between 2 and 5 days per week.

Table 1-10: How often do you ride transit (Sun Tran, Sun Link, Sun Shuttle)?

How often do you ride transit (Sun Tran, Sun Link, Sun Shuttle)?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Everyday	44.1%	44.3%	29.3%	43.9%
5 days/week	28.0%	28.2%	27.3%	26.3%
2-4 days/week	21.1%	21.1%	25.3%	20.8%
Once per week	2.6%	2.6%	3.1%	2.4%
2-3 times/month	2.3%	2.1%	12.0%	2.6%
Once per month	0.4%	0.4%	0.0%	0.3%
Less than once per month	1.5%	1.2%	3.1%	3.8%

HOW LONG HAVE YOU BEEN RIDING PUBLIC TRANSIT IN THE TUCSON AREA?

The series below illustrates the length of service usage reported by the respondent. As shown in this visual, "2 to 5 years" was the most common length of used services reported by passengers (25.6%) compared to the next two highest lengths "1 to 2 years" (20.8%) and "More than 10 years" (19.9%).

Table 1-11: How long have you been riding public transit in the Tucson area?

How long have you been riding public transit in the Tucson area?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
First time riding	1.3%	1.1%	0.3%	2.9%
Less than 1 year	17.2%	14.0%	17.7%	39.9%
1-2 years	20.8%	19.3%	18.7%	31.8%
2-5 years	25.6%	27.4%	27.0%	12.5%
5-10 years	15.2%	16.5%	15.2%	6.2%
More than 10 years	19.9%	21.7%	21.0%	6.6%

WHAT IS THE SERVICE ENHANCEMENT THAT IS OF MOST IMPORTANCE TO YOU? (SELECT ONLY ONE)

The series below illustrates what passengers indicated as the most important service enhancement. Overall, over a quarter of passengers (27.7%) viewed "More weekend service" as the most important service enhancement compared to the next highest, "More frequent service" (21.9%).

Table 1-12: What is the service enhancement that is of most importance to you? (select only one)

What is the service enhancement that is of most importance to you? (select only one)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Other	12.3%	12.1%	19.2%	13.4%
More frequent service	21.9%	20.9%	14.9%	29.6%
Earlier operating hours	6.4%	6.8%	0.2%	4.1%
Later operating hours	18.9%	18.4%	19.9%	22.3%
More weekend service	27.7%	29.5%	30.3%	14.3%
Shorter travel time	6.8%	7.1%	5.2%	4.7%
Different destinations	6.0%	5.2%	10.3%	11.5%

RIDER INFORMATION

HOW MANY VEHICLES (CARS, TRUCKS, OR MOTORCYCLES) ARE AVAILABLE TO YOUR HOUSEHOLD?

The series below illustrates the number of household vehicles for passengers' household. Half (50.0%) the passengers indicated they are without a working vehicle in their household, compared to 30.1% of passengers with one working vehicle in their household, and 19.9% of passengers with two or more working vehicles in their household. Of those passengers who indicated they have a vehicle in their household, the majority (69.3%) indicated their vehicle was not available for this one-way trip.

Table 1-13: How many vehicles (cars, trucks, or motorcycles) are available to your household?

How many vehicles (cars, trucks, or motorcycles) are available to your household?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
None (0)	50.0%	50.4%	52.3%	47.5%
One (1)	30.1%	29.6%	29.5%	34.0%
Two (2)	15.3%	15.7%	14.6%	12.4%
Three (3)	3.0%	2.8%	3.7%	4.4%
Four (4)	1.0%	0.9%	0.0%	1.6%
Five (5)	0.4%	0.4%	0.0%	0.2%
Six (6)	0.1%	0.1%	0.0%	0.0%
Seven (7)	0.0%	0.1%	0.0%	0.0%
Eight (8)	0.0%	0.0%	0.0%	0.0%
Ten or more (10+)	0.0%	0.0%	0.0%	0.0%

COULD YOU HAVE USED ONE OF THESE VEHICLES TO COMPLETE THIS TRIP?

Of those that responded as having one or more household vehicles, nearly three-quarters (69.3%) of passengers stated that they could not use a household vehicle to make their current trip.

Table 1-14: Could you have used one of these vehicles to complete this trip?

Could you have used one of these vehicles to complete this trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	30.7%	27.1%	26.0%	55.5%
(2) No	69.3%	72.9%	74.0%	44.5%

INCLUDING YOU, HOW MANY PEOPLE LIVE IN YOUR HOUSEHOLD?

The total number of household members for passengers' households is shown below. Half of passengers (50.4%) are in a one or two-member households, compared to 37.7% of passengers with three or four members in the household.

Table 1-15: Including YOU, how many people live in your household?

Including YOU, how many people live in your household?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
One (1)	27.1%	27.6%	24.5%	24.2%
Two (2)	23.3%	22.5%	14.4%	29.6%
Three (3)	20.8%	21.1%	18.5%	18.6%
Four (4)	16.9%	16.3%	14.8%	21.1%
Five (5)	6.5%	6.9%	12.8%	2.9%
Six (6)	3.3%	3.5%	6.2%	1.9%
Seven (7)	0.7%	0.8%	1.7%	0.3%
Eight (8)	0.5%	0.6%	2.8%	0.0%
Nine (9)	0.4%	0.4%	3.8%	0.2%
Ten or More (10+)	0.6%	0.5%	0.5%	1.2%

INCLUDING YOU, HOW MANY PEOPLE (OVER AGE 15) IN YOUR HOUSEHOLD ARE EMPLOYED FULL OR PART-TIME?

The total number of employed household members for passengers' households is shown below. Nearly two-thirds of passengers (65.3%) are in a household with one or two-members employed, compared to 19.6% of passengers with zero employed members in the household, and 14.1% of passengers with three or four employed members in the household.

Table 1-16: Including YOU, how many people (over age 15) in your household are employed full or part-time?

Including YOU, how many people (over age 15) in your household are employed full or part-time?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
None (0)	19.6%	18.0%	21.9%	30.8%
One (1)	37.0%	38.6%	28.9%	25.9%
Two (2)	28.3%	28.4%	26.6%	27.5%
Three (3)	11.0%	11.1%	6.5%	10.3%
Four (4)	3.1%	2.8%	12.6%	4.4%
Five (5)	0.6%	0.6%	2.3%	0.2%
Six (6)	0.2%	0.2%	0.7%	0.1%
Seven (7)	0.1%	0.1%	0.5%	0.2%
Eight (8)	0.1%	0.1%	0.0%	0.0%
Nine (9)	0.0%	0.0%	0.0%	0.0%
Ten or More (10+)	0.1%	0.1%	0.0%	0.6%

WHAT IS YOUR EMPLOYMENT STATUS? (CHECK THE ONE RESPONSE THAT BEST DESCRIBES YOU)

The series below shows the employment status of passengers. Most passengers (59.8%) reported "Employed" (either full- or part-time) for employment status. Thirty-five percent of Sun Link passengers reported that they are not employed nor seeking work.

Table 1-17: What is your employment status? (Check the one response that BEST describes you)

What is your employment status? (Check the one response that BEST describes you)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Employed full-time (at least 35 hours per week)	38.7%	41.3%	31.9%	20.5%
Employed part-time (less than 35 hours per week)	21.1%	19.5%	18.5%	32.4%
Not currently employed, but seeking work	12.5%	13.5%	7.7%	6.2%
Not currently employed, and not seeking work	19.0%	16.6%	28.3%	35.6%
Retired	7.9%	8.3%	10.6%	5.3%
Homemaker	0.8%	0.9%	3.0%	0.1%

WHAT IS YOUR STUDENT STATUS? (CHECK THE ONE RESPONSE THAT BEST DESCRIBES YOU)

The series below shows the student status of passengers. Most passengers (69.9%) reported that they were "Not a student" for student status, compared to 20.9% of passengers that reported either "Full/Part-time College/University" as their student status. SunLink has the most college students out of all three systems (74.7%).

Table 1-18: What is your student status? (check the one response that BEST describes you)

What is your student status? (check the one response that BEST describes you)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Not a student	69.9%	76.4%	84.3%	22.6%
Yes - Full-time College / University	15.2%	7.6%	5.1%	70.6%
Yes - Part-time College / University	5.7%	6.0%	2.2%	4.1%
Yes - Vocational / Technical / Trade School	0.8%	0.9%	0.0%	0.1%
Yes - K-12th grade	8.1%	8.9%	8.4%	2.5%
Yes - Other	0.2%	0.2%	0.0%	0.0%

DO YOU HAVE A VALID DRIVER'S LICENSE?

Th series below shows if the transit passenger had a valid driver's license. Over half the passengers (51.6%) indicated they did not have a valid driver's license.

Table 1-19: Do you have a valid driver's license?

Do you have a valid driver's license?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(2) No	51.6%	55.1%	61.6%	25.9%
(1) Yes	48.4%	44.9%	38.4%	74.1%

DO YOU HAVE A DISABILITY THAT LIMITS YOUR MOBILITY?

The series below shows if the transit passenger had a disability that limits their mobility. Most passengers (90.0%) indicated they did not have a disability that limits their mobility, compared to (9.1%) who indicated they had a disability that limits their mobility.

Table 1-20: Do you have a disability that limits your mobility?

Do you have a disability that limits your mobility?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Prefer Not to say	0.9%	1.0%	3.0%	0.4%
(1) Yes	9.1%	10.0%	13.8%	2.5%
(2) No	90.0%	89.0%	83.2%	97.2%

WHAT IS YOUR AGE?

The series below illustrates the age of passengers. Nearly half (48.7%) the passengers indicated their age is between 18-34, compared to 29.3% of passengers indicated their age is between 35-54.

Table 1-21: What is your age?

What is your age?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
15 and under	2.5%	2.8%	5.3%	0.6%
16 - 17	4.8%	5.3%	3.1%	1.7%
18 - 24	25.6%	20.1%	7.9%	66.9%
25 - 34	23.1%	24.5%	28.1%	13.0%
35 - 44	17.3%	19.1%	16.5%	4.8%
45 - 54	12.0%	12.9%	19.6%	4.4%
55 - 64	8.7%	9.4%	11.1%	3.5%
65 and older	5.9%	6.0%	8.4%	5.1%

WHAT IS YOUR RACE / ETHNICITY? (CHECK ALL THAT APPLY) …

The series below shows the race/ethnicity of passengers. Passengers were able to select 'American Indian/Alaskan Native,' 'Asian,' 'Black/African American,' 'White/Caucasian,' and/or 'Native Hawaiian/Pacific Islander.' The totals add up to over 100% because respondents were encouraged to check all answers that applied. Over sixty percent of passengers (62.9%) indicated they were "White/Caucasian," compared to the next highest (15.0%) of passengers who reported "Black / African American."

Passengers were then also asked if they were Hispanic, Latino, or Spanish origin. Over one-third of passengers reported "Yes," they were of Hispanic, Latino, or Spanish origin (37.0%).

Table 1-22: What is your Race / Ethnicity? (check all that apply)…

What is your Race / Ethnicity? (check all that apply)…	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
American Indian / Alaska Native	12.5%	13.7%	39.3%	2.6%
Asian	4.5%	4.1%	1.5%	8.2%
Black / African American	15.0%	15.5%	4.1%	12.5%
Native Hawaiian / Pacific Islander	0.8%	0.8%	0.4%	0.9%
White / Caucasian	62.9%	61.5%	47.5%	74.2%
Prefer not to answer	4.2%	4.5%	7.2%	1.6%

Table 1-23: Are you of Hispanic, Latino, or Spanish origin?

Are you of Hispanic, Latino, or Spanish origin? (includes: Mexican/Mexican American, Puerto Rican, Cuban/Cuban	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	37.0%	38.9%	37.8%	23.5%
(2) No	63.0%	61.1%	62.2%	76.5%

DO YOU SPEAK A LANGUAGE OTHER THAN ENGLISH AT HOME?

Other languages spoken at the passengers' homes is displayed in the series below. Over a quarter (27.2%) of passengers indicated they spoke a language other than English at home. Of those passengers, nearly ninety percent (88.9%) indicated they spoke English "Very well" as shown in the second chart in the series. The third series shows the languages spoken at home.

Table 1-24: Do you speak a language other than English at home?

Do you speak a language other than English at home?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	27.2%	27.7%	28.9%	23.6%
(2) No	72.8%	72.3%	71.1%	76.4%

HOW WELL DO YOU SPEAK ENGLISH?

Table 1-25: If yes, How well do you speak English?

How well do you speak English?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Very well	88.9%	87.9%	100.0%	96.3%
Well	6.5%	6.9%	0.0%	3.4%
Less than well	4.0%	4.5%	0.0%	0.3%
Not at all	0.6%	0.7%	0.0%	0.0%

Table 1-26A: Other Languages Spoke at Home

Language respondent speaks at home other than English	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Spanish	79.4%	83.1%	76.7%	48.7%
Arabic, Standard	2.2%	1.4%	1.6%	8.7%
Other	1.7%	1.7%	21.0%	0.1%
French	1.4%	1.1%	0.0%	4.0%
Hindi	1.1%	0.1%	0.0%	10.2%
Russian	1.1%	1.0%	0.8%	2.0%
German	1.0%	1.0%	0.0%	1.5%
Japanese	1.0%	0.9%	0.0%	1.8%
American Sign Language (ASL)	0.9%	1.0%	0.0%	0.2%
Swahili	0.9%	1.0%	0.0%	0.0%
Korean	0.8%	0.8%	0.0%	1.5%
Old Persian	0.8%	0.8%	0.0%	1.1%
Italian	0.6%	0.3%	0.0%	3.0%
Vietnamese	0.6%	0.5%	0.0%	1.4%
Chinese, Mandarin	0.6%	0.3%	0.0%	3.4%
Somali	0.5%	0.5%	0.0%	0.9%
Chinese	0.5%	0.3%	0.0%	2.0%
Navajo	0.4%	0.5%	0.0%	0.0%
Hebrew	0.3%	0.3%	0.0%	0.8%
Filipino	0.3%	0.4%	0.0%	0.0%
Judeo-Malayalam	0.3%	0.4%	0.0%	0.0%
Chinese, Cantonese	0.2%	0.2%	0.0%	0.8%
Portuguese	0.2%	0.1%	0.0%	1.1%
Nepali	0.2%	0.0%	0.0%	2.0%
Portuguese creole of Tugo	0.2%	0.2%	0.0%	0.0%
Turkish	0.2%	0.1%	0.0%	0.8%
Afrikaans	0.2%	0.2%	0.0%	0.1%
Akan	0.2%	0.1%	0.0%	0.5%
Haitian Creole French	0.1%	0.1%	0.0%	0.0%
Noric	0.1%	0.1%	0.0%	0.0%
Dari	0.1%	0.1%	0.0%	0.0%
Finnish	0.1%	0.1%	0.0%	0.0%
Hungarian	0.1%	0.0%	0.0%	1.1%
Jamaican	0.1%	0.1%	0.0%	0.0%
Ojibwa	0.1%	0.1%	0.0%	0.0%
Louisiana Creole French	0.1%	0.1%	0.0%	0.0%
Kannada	0.1%	0.0%	0.0%	0.7%
Seselwa Creole French	0.1%	0.1%	0.0%	0.0%
Old English	0.1%	0.1%	0.0%	0.0%
Ukrainian	0.1%	0.0%	0.0%	0.6%
Thai	0.1%	0.0%	0.0%	0.6%
Farsi, Eastern	0.1%	0.1%	0.0%	0.0%
Dutch	0.1%	0.1%	0.0%	0.0%
Norwegian	0.0%	0.1%	0.0%	0.0%
Yakut	0.0%	0.1%	0.0%	0.0%
Classical Greek	0.0%	0.1%	0.0%	0.0%
Indonesian	0.0%	0.0%	0.0%	0.0%
Nahuatl	0.0%	0.0%	0.0%	0.0%
Bengali	0.0%	0.0%	0.0%	0.0%
Urdu	0.0%	0.0%	0.0%	0.0%
Kreyol	0.0%	0.0%	0.0%	0.0%
Amharic	0.0%	0.0%	0.0%	0.0%
Ndebele	0.0%	0.0%	0.0%	0.3%
Tagalog	0.0%	0.0%	0.0%	0.0%
Dutch Creole	0.0%	0.0%	0.0%	0.0%
Swedish	0.0%	0.0%	0.0%	0.0%
Telugu	0.0%	0.0%	0.0%	0.1%
Malay	0.0%	0.0%	0.0%	0.1%
Czech	0.0%	0.0%	0.0%	0.0%
Early Contemporary Swedish	0.0%	0.0%	0.0%	0.0%
Aragonese	0.0%	0.0%	0.0%	0.0%
Danish	0.0%	0.0%	0.0%	0.0%

WHAT IS YOUR GENDER?

The gender of passengers is presented in series below. Totals add up to more than 100% because respondents were able to check all answers that applied. Over half of passengers (62.3%) indicated they were male, compared to (36.0%) who indicated they were female.

Table 1-27: What is your gender?…

What is your gender?…	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Male	62.3%	64.1%	65.1%	49.7%
Female	36.0%	34.2%	31.8%	48.8%
Non-binary / third gender	1.0%	1.0%	0.0%	0.7%
Transgender	0.3%	0.3%	0.0%	0.6%
Other / Prefer to self-describe	0.2%	0.2%	0.0%	0.1%
Prefer not to say	0.2%	0.2%	3.1%	0.1%

WHICH OF THE FOLLOWING BEST DESCRIBES YOUR TOTAL ANNUAL HOUSEHOLD INCOME IN 2021 BEFORE TAXES?

The series below shows the Total Annual Household Income for passengers' households. Over half (58.2%) the passengers indicated their household income is below "$25,000", compared to 29.37% of passengers with household income between "$25,000 - $50,000", and 12.5% of passengers with household income of "$50,000 or more". Fifteen Percent (15.2%) refused or did not answer the question.

Table 1-28: Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2021 before taxes?

Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2021 before taxes?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Less than $10,000	24.7%	23.7%	36.7%	30.7%
$10,000 - $14,999	13.2%	13.2%	20.0%	12.5%
$15,000 - $24,999	20.3%	21.0%	19.2%	15.5%
$25,000 - $34,999	17.6%	18.6%	5.4%	11.2%
$35,000 - $49,999	11.7%	12.3%	9.1%	7.6%
$50,000 - $74,999	7.8%	7.8%	7.4%	8.2%
$75,000 - $99,999	2.8%	2.3%	0.3%	6.5%
$100,000 or more	1.9%	1.1%	1.9%	7.8%

Chapter 2. WEEKEND OD SURVEY SYSTEM RESULTS

This section summarizes the weekend survey results by transit system.

TRIP INFORMATION

WHAT TYPE OF PLACE ARE YOU COMING FROM NOW? (THE STARTING PLACE FOR YOUR ONE-WAY TRIP)

The series below shows the top types of places passengers are coming from. Based on the Survey results, more than half of weekend passengers (53.3%) selected "Your HOME" for where their trip originated from. Another top choice was "Shopping" with 11.1% of weekend passengers. An additional 10.0% of weekend passengers reported they were coming from "Your usual WORKPLACE."

Table 2-1: What type of place are you COMING FROM NOW? (the starting place for your one-way trip)

What type of place are you COMING FROM NOW? (the starting place for your one-way trip)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Your usual WORKPLACE	10.0%	10.3%	0.0%	5.2%
Your HOME	53.3%	52.8%	83.5%	61.3%
Your Hotel / motel / lodging	0.7%	0.4%	3.3%	5.2%
College / University (students only)	0.2%	0.1%	0.0%	2.6%
Medical appointment / Doctor visit (non-work)	1.5%	1.5%	0.0%	0.0%
Shopping	11.1%	11.4%	13.2%	6.1%
Dining out	2.6%	2.7%	0.0%	1.3%
Other business related (e.g. meeting, delivery)	2.1%	2.2%	0.0%	0.0%
Social visit (e.g. friends, relatives)	9.0%	9.2%	0.0%	6.5%
Airport (passengers only)	0.2%	0.2%	0.0%	0.0%
Pick up / Drop off someone (e.g. school, daycare)	0.1%	0.1%	0.0%	0.0%
Personal business (e.g. bank, post office)	2.9%	2.8%	0.0%	3.9%
Recreation / Sightseeing	4.5%	4.3%	0.0%	7.8%
Escorting / Accompanying someone	0.5%	0.6%	0.0%	0.0%
Other	1.4%	1.5%	0.0%	0.0%

HOW DID YOU GET FROM YOUR ORIGIN?

The series below shows How weekend passengers first access public transit for their one-way. A large majority of all weekend passengers (92.2%) selected that they accessed public transit by "Walk," compared to next highest category (2.5%) of weekend passengers who reported "Was dropped off by someone." An additional 2.3% of weekend passengers used "Bike" to access public transit.

Table 2-2: How did you GET FROM your origin

How did you GET FROM your origin	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	92.2%	92.7%	85.0%	84.3%
Wheelchair	0.9%	0.9%	0.0%	0.0%
Bike	2.3%	2.3%	0.0%	2.6%
Was dropped off by someone	2.5%	2.5%	0.0%	2.6%
Drove alone and parked	0.7%	0.4%	15.0%	5.2%
Drove or rode with others and parked	0.7%	0.4%	0.0%	5.2%
Uber, Lyft, etc.	0.1%	0.1%	0.0%	0.0%
E-scooter (e.g. Spin, Razor)	0.4%	0.4%	0.0%	0.0%
Other	0.2%	0.3%	0.0%	0.0%

WHAT TYPE OF PLACE ARE YOU GOING TO NOW? (THE ENDING PLACE FOR YOUR ONE-WAY TRIP)

The series below shows the top types of places weekend passengers are going to. Based on the Survey results, 26.8% of weekend passengers selected "Your HOME" for where they were headed on this trip. Another top choice was "Shopping" with 18.1% of weekend passengers. The third top choice was "Your usual WORKPLACE" with 15.3% of weekend passengers.

Table 2-3: What type of place are you GOING TO NOW? (the ending place for your one-way trip)

What type of place are you GOING TO NOW? (the ending place for your one-way trip)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Your usual WORKPLACE	15.3%	15.8%	18.3%	5.2%
Your HOME	26.8%	27.4%	13.2%	17.8%
College / University (students only)	0.9%	0.7%	0.0%	5.2%
School (K-12) (students only)	0.2%	0.2%	0.0%	0.0%
Medical appointment / Doctor visit (non-work)	2.5%	2.6%	0.0%	1.3%
Shopping	18.1%	18.6%	0.0%	10.4%
Dining out	2.3%	2.3%	0.0%	2.6%
Other business related (e.g. meeting, delivery)	2.7%	2.5%	0.0%	5.2%
Social visit (e.g. friends, relatives)	15.2%	14.5%	2.2%	28.7%
Airport (passengers only)	0.1%	0.1%	0.0%	0.0%
Major sporting event	0.0%	0.0%	0.0%	0.0%
Pick up / Drop off someone (e.g. school, daycare)	0.2%	0.2%	0.0%	0.0%
Personal business (e.g. bank, post office)	6.6%	6.6%	0.0%	7.8%
Recreation / Sightseeing	4.5%	3.7%	66.3%	15.7%
No particular destination	3.7%	3.9%	0.0%	0.0%
Other	0.8%	0.8%	0.0%	0.0%

HOW WILL YOU GET TO YOUR DESTINATION?

The series below shows how passengers traveled from transit to their destination. The majority of weekend transit passengers (94.5%) selected "Walk" for their egress mode type to their final destination after exiting public transit, compared to the next highest group (2.1%) of weekend passengers that selected either "Bike" or "Be picked up by someone" (1.5%).

Table 2-4: How will you GET TO your destination

How will you GET TO your destination	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	94.5%	94.6%	100.0%	92.2%
Wheelchair	0.9%	0.9%	0.0%	0.0%
Bike	2.1%	2.0%	0.0%	2.6%
Be picked up by someone	1.5%	1.6%	0.0%	0.0%
E-scooter (e.g. Spin, Razor)	0.3%	0.3%	0.0%	0.0%
Other	0.2%	0.3%	0.0%	0.0%
Get in a parked vehicle & drive alone	0.3%	0.2%	0.0%	2.6%
Get in a parked vehicle & drive/ride w/others	0.2%	0.0%	0.0%	2.6%

TOTAL NUMBER OF IN-SYSTEM TRANSFERS

The series below shows the total number of system transfers used in the one-way trip by weekend passengers. Most weekend passengers (47.3%) used zero system transfers to make their current trip, compared to, 41.7% of weekend passengers that used one system transfer during their trip. ***Transfer percentages were based on the unlinked expansion.***

Table 2-5: Total number of in-system transfers

Total number of in-system transfers	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(0) None	47.3%	45.9%	16.2%	83.3%
(1) One	41.7%	42.7%	80.0%	14.3%
(2) Two	9.9%	10.3%	3.8%	2.4%
(3) Three	1.0%	1.0%	0.0%	0.0%
(4) Four	0.1%	0.1%	0.0%	0.0%

FARE/RIDING INFORMATION

IF FARES WERE BEING COLLECTED, WHAT FARE CATEGORY WOULD APPLY TO YOU?

The series below illustrates the fare category that would be used by weekend passengers if fares were being collected. As shown in these visuals, “Regular (Full) Fare” was the most widely used fare category type as indicated by weekend passengers (47.9%), compared to the next highest, “Economy Low-Income Fare” (25.3%).

Table 2-6: If fares were being collected, what fare category would apply to you?

If fares were being collected, what fare category would apply to you?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Regular (Full) Fare	47.9%	48.8%	94.5%	28.7%
Economy Senior Fare	9.8%	9.7%	0.0%	12.6%
Economy Disabled Fare	4.7%	5.0%	0.0%	0.0%
Economy Low-Income Fare	25.3%	25.6%	5.5%	20.9%
Don't Know	12.2%	10.8%	0.0%	37.8%

IF FARES WERE BEING COLLECTED, HOW WOULD YOU PAY FOR THIS ONE-WAY TRIP?

The series below illustrates the fare payment that would be used by weekend passengers if fares were being collected. As shown in these visuals, “SunGo Card” was the most widely used fare payment type as indicated by weekend passengers (43.5%), compared to the next highest, “Cash Fare” (40.0%).

Table 2-7: If fares were being collected, how would you pay for this one-way trip?

If fares were being collected, how would you pay for this one-way trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Cash Fare	40.0%	40.5%	87.9%	27.4%
SunGo Card (plastic)	43.5%	44.4%	12.1%	29.6%
Smart Phone / GOTucson Mobile App	2.5%	2.4%	0.0%	5.2%
Don't Know	14.0%	12.8%	0.0%	37.8%

HOW WOULD YOU HAVE MADE THIS TRIP IF SUN TRAN, SUN LINK, OR SUN SHUTTLE WERE NOT AVAILABLE?

The series below shows what passengers would use for other modes of transportation if Sun Tran, Sun Link, or Sun Shuttle were not available. Twenty-four percent of weekend passengers would "Walk," and Twenty-one percent would use a "Taxi/Uber" if Sun Tran, Sun Link, or Sun Shuttle were not available.

Table 2-8: How would you have made this trip if Sun Tran, Sun Link, or Sun Shuttle were not available?

How would you have made this trip if Sun Tran, Sun Link, or Sun Shuttle were not available?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Walk	24.1%	23.3%	16.5%	39.1%
Other	1.5%	1.6%	0.0%	0.0%
Drive own vehicle	5.4%	3.9%	0.0%	33.9%
Ride bicycle	11.9%	11.9%	0.0%	11.7%
Friend/family member	16.0%	17.0%	0.0%	0.0%
Taxi/Uber	21.3%	22.3%	0.0%	5.2%
Would not make trip	18.9%	19.2%	83.5%	10.0%
Sun On Demand	0.9%	0.9%	0.0%	0.0%

WHAT DID YOU USE TO PLAN THIS TRIP?

The series below shows how weekend passengers plan for their trip. Outside of "Did not do any trip planning," passengers indicated "Google Transit" was the most widely used method for trip planning (24.5%), compared to "SunTran App" (16.8%) and "Paper Schedule" (15.6%).

Table 2-9: What did you use to plan this trip?

What did you use to plan this trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Other	0.8%	0.8%	0.0%	0.0%
Paper schedule	15.6%	16.3%	0.0%	4.8%
Called customer service	1.0%	0.9%	0.0%	2.6%
Google Transit	24.5%	23.6%	3.3%	41.7%
Online trip planner (suntran.com)	2.2%	2.1%	6.6%	5.2%
SunTran App	16.8%	17.2%	6.6%	9.1%
Did not do any trip planning	39.0%	39.0%	83.5%	36.5%

HOW OFTEN DO YOU RIDE TRANSIT (SUN TRAN, SUN LINK, SUN SHUTTLE)?

The series below shows the weekend passenger frequency usage. Over forty percent of weekend passengers (43.8%) indicated they ride "Everyday" compared to the next highest categories, "5 Days per week" (24.7%) and "2-4 days per week" (22.2%).

Table 2-10: How often do you ride transit (Sun Tran, Sun Link, Sun Shuttle)?

How often do you ride transit (Sun Tran, Sun Link, Sun Shuttle)?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Everyday	43.8%	44.1%	68.5%	37.4%
5 days/week	24.7%	25.6%	3.3%	10.4%
2-4 days/week	22.2%	22.6%	15.0%	15.7%
Once per week	3.3%	3.2%	6.6%	5.2%
2-3 times/month	2.6%	2.6%	6.6%	2.6%
Once per month	0.4%	0.4%	0.0%	0.0%
Less than once per month	2.9%	1.5%	0.0%	28.7%

HOW LONG HAVE YOU BEEN RIDING PUBLIC TRANSIT IN THE TUCSON AREA?

The series below illustrates the length of service usage reported by the respondent. As shown in this visual, “More than 10 years” was the most common length of used services by weekend passengers (29.7%) compared to the next highest, “2 to 5 years” (24.1%).

Table 2-11: How long have you been riding public transit in the Tucson area?

How long have you been riding public transit in the Tucson area?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
First time riding	1.8%	1.2%	0.0%	13.0%
Less than 1 year	15.6%	15.1%	0.0%	27.4%
1-2 years	15.0%	14.5%	0.0%	24.8%
2-5 years	24.1%	24.6%	24.9%	15.7%
5-10 years	13.7%	13.9%	68.5%	7.8%
More than 10 years	29.7%	30.8%	6.6%	11.3%

WHAT IS THE SERVICE ENHANCEMENT THAT IS OF MOST IMPORTANCE TO YOU? (SELECT ONLY ONE)

The series below illustrates what weekend passengers indicated as the most important service enhancement. Overall, nearly one-third of passengers (32.5%) viewed “More weekend service” as the most important service enhancement compared to the next highest “More frequent service” (20.4%).

Table 2-12: What is the service enhancement that is of most importance to you? (select only one)

What is the service enhancement that is of most importance to you? (select only one)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Other	15.7%	14.4%	2.2%	40.4%
More frequent service	20.4%	20.6%	21.6%	17.0%
Earlier operating hours	4.9%	5.2%	0.0%	0.0%
Later operating hours	16.5%	17.0%	3.3%	8.7%
More weekend service	32.5%	33.2%	72.9%	18.3%
Shorter travel time	5.6%	6.0%	0.0%	0.0%
Different destinations	4.3%	3.7%	0.0%	15.7%

RIDER INFORMATION

HOW MANY VEHICLES (CARS, TRUCKS, OR MOTORCYCLES) ARE AVAILABLE TO YOUR HOUSEHOLD?

The series below illustrates the number of household vehicles for weekend passengers' households. Two-thirds (66.0%) of passengers indicated they are without a working vehicle in their household, compared to 23.4% of passengers with one working vehicle in their household, and 10.6 percent of passengers with two or more working vehicles in their household. Of those passengers who indicated they have a vehicle in their household, the majority (59.7%) indicated their vehicle was not available for this one-way trip.

Table 2-13: How many vehicles (cars, trucks, or motorcycles) are available to your household?

How many vehicles (cars, trucks, or motorcycles) are available to your household?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
None (0)	66.0%	67.4%	71.8%	40.4%
One (1)	23.4%	22.3%	6.6%	45.2%
Two (2)	7.3%	7.1%	15.0%	10.4%
Three (3)	2.0%	1.9%	6.6%	3.9%
Four (4)	1.0%	1.1%	0.0%	0.0%
Five (5)	0.3%	0.3%	0.0%	0.0%

COULD YOU HAVE USED ONE OF THESE VEHICLES TO COMPLETE THIS TRIP?

Out of the passengers that responded as having one or more household vehicles, 59.7% of passengers stated that they could not use a household vehicle to make their current trip.

Table 2-14: Could you have used one of these vehicles to complete this trip?

Could you have used one of these vehicles to complete this trip?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	40.3%	37.4%	46.9%	70.1%
(2) No	59.7%	62.6%	53.1%	29.9%

INCLUDING YOU, HOW MANY PEOPLE LIVE IN YOUR HOUSEHOLD?

The total number of household members for weekend passengers' households is shown below. Over half the passengers (62.0%) reported being in one or two-member households, compared to 25.5% of passengers with three or four members in the household.

Table 2-15: Including YOU, how many people live in your household?

Including YOU, how many people live in your household?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
One (1)	40.9%	40.8%	2.2%	44.3%
Two (2)	21.1%	20.9%	6.6%	27.4%
Three (3)	16.1%	15.9%	87.9%	15.7%
Four (4)	9.4%	9.8%	3.3%	2.6%
Five (5)	5.8%	5.9%	0.0%	3.9%
Six (6)	2.5%	2.6%	0.0%	0.0%
Seven (7)	1.2%	1.3%	0.0%	0.0%
Eight (8)	1.0%	1.1%	0.0%	0.0%
Nine (9)	0.4%	0.4%	0.0%	0.9%
Ten or More (10+)	1.5%	1.3%	0.0%	5.2%

INCLUDING YOU, HOW MANY PEOPLE (OVER AGE 15) IN YOUR HOUSEHOLD ARE EMPLOYED FULL OR PART-TIME?

The total number of employed household members for weekend passengers' households is shown below. Nearly two-thirds of passengers (64.8%) are in a household with one or two-members employed, compared to 30.2% of passengers with zero employed members in the household, and 11.1% of passengers with three or four employed members in the household.

Table 2-16: Including YOU, how many people (over age 15) in your household are employed full or part-time?

Including YOU, how many people (over age 15) in your household are employed full or part-time?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
None (0)	30.2%	29.9%	2.2%	37.4%
One (1)	34.6%	35.2%	9.9%	24.8%
Two (2)	22.1%	21.7%	66.3%	27.4%
Three (3)	8.5%	8.7%	21.6%	5.2%
Four (4)	2.6%	2.8%	0.0%	0.0%
Five (5)	0.6%	0.6%	0.0%	0.0%
Six (6)	0.3%	0.3%	0.0%	0.0%
Seven (7)	0.1%	0.1%	0.0%	0.0%
Eight (8)	0.3%	0.3%	0.0%	0.0%
Ten or More (10+)	0.8%	0.5%	0.0%	5.2%

WHAT IS YOUR EMPLOYMENT STATUS? (CHECK THE ONE RESPONSE THAT BEST DESCRIBES YOU)

The series below shows the employment status of weekend passengers. Most passengers (57.3%) reported "Employed" (either full- or part-time) for employment status.

Table 2-17: What is your employment status? (Check the one response that BEST describes you)

What is your employment status? (Check the one response that BEST describes you)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Employed full-time (at least 35 hours per week)	39.1%	40.1%	6.6%	22.2%
Employed part-time (less than 35 hours per week)	18.2%	17.1%	24.9%	37.8%
Not currently employed, but seeking work	13.5%	13.6%	66.3%	10.4%
Not currently employed, and not seeking work	16.7%	17.3%	0.0%	7.4%
Retired	11.8%	11.3%	2.2%	22.2%
Homemaker	0.6%	0.7%	0.0%	0.0%

WHAT IS YOUR STUDENT STATUS? (CHECK THE ONE RESPONSE THAT BEST DESCRIBES YOU)

The series below shows the student status of weekend passengers. Most passengers (86.4%) reported "Not a student" for student status, compared to 8.4% of passengers that reported "Full/Part-time College/University" as their student status.

Table 2-18: What is your student status? (check the one response that BEST describes you)

What is your student status? (check the one response that BEST describes you)	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Not a student	86.4%	87.7%	100.0%	60.9%
Yes - Full-time College / University	6.8%	5.1%	0.0%	39.1%
Yes - Part-time College / University	1.6%	1.7%	0.0%	0.0%
Yes - Vocational / Technical / Trade School	0.6%	0.6%	0.0%	0.0%
Yes - K-12th grade	4.4%	4.7%	0.0%	0.0%
Yes - Other	0.1%	0.1%	0.0%	0.0%

DO YOU HAVE A VALID DRIVER'S LICENSE?

The series below shows if the transit passenger has a valid driver's license. Over half the passengers (54.2%) indicated they did not have a valid driver's license, compared to (45.8%) who indicated they had a valid driver's license.

Table 2-19: Do you have a valid driver's license?

Do you have a valid driver's license?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	45.8%	43.6%	24.9%	87.0%
(2) No	54.2%	56.4%	75.1%	13.0%

DO YOU HAVE A DISABILITY THAT LIMITS YOUR MOBILITY?

The series below shows if the transit passenger has a disability that limits their mobility. Most passengers (86.0%) indicated they did not have a disability that limits their mobility, compared to 13.9% who indicated they had a disability that limits their mobility.

Table 2-20: Do you have a disability that limits your mobility?

Do you have a disability that limits your mobility?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Prefer not to say	0.1%	0.1%	0.0%	0.0%
(1) Yes	13.9%	14.6%	0.0%	1.3%
(2) No	86.0%	85.3%	100.0%	98.7%

WHAT IS YOUR AGE?

The series below illustrates the age of weekend passengers. Nearly a quarter (23.8%) of passengers indicated their age is between 25-34, compared to 19.5% of passengers that indicated their age is between 35-44.

Table 2-21: What is your age?

What is your age?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
15 and under	1.6%	1.7%	0.0%	0.0%
16 - 17	2.0%	2.1%	0.0%	0.0%
18 - 24	12.6%	11.3%	6.6%	36.5%
25 - 34	23.8%	23.8%	84.6%	19.6%
35 - 44	19.5%	20.5%	6.6%	1.3%
45 - 54	16.2%	16.5%	0.0%	11.7%
55 - 64	15.8%	15.9%	2.2%	15.7%
65 and older	8.5%	8.2%	0.0%	15.2%

WHAT IS YOUR RACE / ETHNICITY? (CHECK ALL THAT APPLY)…

The series below shows the race/ethnicity of weekend passengers. Passengers were able to select from 'American Indian/Alaskan Native,' 'Asian,' 'Black/African American,' 'White/Caucasian,' and/or 'Native Hawaiian/Pacific Islander.' Totals add up to more than 100% because respondents were encouraged to check all answers that applied. Over sixty percent of passengers (64.8%) indicated they were "White/Caucasian," compared to the next highest group (13.6%) of passengers who reported "Black / African American."

Passengers were then also asked if they were Hispanic, Latino, or Spanish origin. Nearly one-third of passengers reported "Yes," they were of Hispanic, Latino, or Spanish origin (35.7%).

Table 2-22: What is your Race / Ethnicity? (check all that apply)…

What is your Race / Ethnicity? (check all that apply)…	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
White / Caucasian	64.8%	63.9%	33.7%	84.2%
Black / African American	13.6%	14.2%	0.0%	3.0%
Asian	2.7%	2.3%	0.0%	8.9%
Prefer not to answer	6.6%	7.0%	0.0%	0.0%
American Indian / Alaska Native	11.7%	11.9%	66.3%	3.9%
Native Hawaiian / Pacific Islander	0.6%	0.7%	0.0%	0.0%

Table 2-23: Are you of Hispanic, Latino, or Spanish origin?

Are you of Hispanic, Latino, or Spanish origin? (includes: Mexican/Mexican American, Puerto Rican, Cuban/Cuban	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Choose not to answer	1.0%	1.1%	0.0%	0.0%
(1) Yes	35.7%	36.4%	72.9%	20.4%
(2) No	63.3%	62.5%	27.1%	79.6%

DO YOU SPEAK A LANGUAGE OTHER THAN ENGLISH AT HOME?

The language spoken at the homes of weekend passengers is displayed in the series below. Over a quarter (28.7%) of passengers indicated they spoke a language other than English at home. Of those passengers, nearly ninety percent (86.8%) indicated they spoke English "Very well" as shown the second chart in the series. Table 6-25A shows the other languages spoken at home.

Table 2-24: Do you speak a language other than English at home?

Do you speak a language other than English at home?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
(1) Yes	28.7%	28.7%	72.9%	25.7%
(2) No	71.3%	71.3%	27.1%	74.3%

HOW WELL DO YOU SPEAK ENGLISH?

Table 2-25: How well do you speak English?

How well do you speak English?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Not at all	1.4%	1.5%	0.0%	0.0%
Well	4.2%	4.4%	0.0%	0.0%
Less than well	7.5%	8.0%	0.0%	0.0%
Very well	86.8%	86.1%	100.0%	100.0%

Table 2-26A: Other Languages Spoke at Home

Language respondent speaks at home other than English	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Spanish	79.6%	81.0%	100.0%	43.4%
Arabic, Standard	2.3%	2.4%	0.0%	0.0%
Other	2.0%	2.1%	0.0%	0.0%
Hindi	1.9%	1.0%	0.0%	22.6%
Chinese	1.3%	1.4%	0.0%	0.0%
German	1.3%	1.3%	0.0%	0.0%
American Sign Language (ASL)	1.2%	0.8%	0.0%	11.3%
Italian	1.2%	1.3%	0.0%	0.0%
French	1.0%	1.1%	0.0%	0.0%
Japanese	0.8%	0.9%	0.0%	0.0%
Farsi, Eastern	0.8%	0.8%	0.0%	0.0%
Navajo	0.8%	0.3%	0.0%	11.3%
Chinese, Mandarin	0.8%	0.8%	0.0%	0.0%
Tagalog	0.6%	0.6%	0.0%	0.0%
Latin	0.5%	0.6%	0.0%	0.0%
Urdu	0.5%	0.5%	0.0%	0.0%
Swahili	0.5%	0.5%	0.0%	0.0%
Thai	0.5%	0.5%	0.0%	0.0%
Serbian	0.5%	0.0%	0.0%	11.3%
Portuguese	0.4%	0.4%	0.0%	0.0%
Sicilian	0.4%	0.4%	0.0%	0.0%
Russian	0.4%	0.4%	0.0%	0.0%
Ayiwo	0.2%	0.2%	0.0%	0.0%
Hebrew	0.2%	0.2%	0.0%	0.0%
Old Spanish	0.2%	0.2%	0.0%	0.0%
Vietnamese	0.0%	0.0%	0.0%	0.0%

WHAT IS YOUR GENDER? …

The gender of weekend passengers is presented in the series below. Over half the passengers (67.7%) indicated they were male, compared to 31.2% who indicated they were female.

Table 2-27: What is your gender?…

What is your gender?…	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Male	67.7%	69.0%	33.7%	45.9%
Female	31.2%	30.2%	66.3%	48.9%
Non-binary / third gender	0.5%	0.4%	0.0%	2.6%
Prefer not to say	0.3%	0.2%	0.0%	2.6%
Transgender	0.2%	0.2%	0.0%	0.0%

WHICH OF THE FOLLOWING BEST DESCRIBES YOUR TOTAL ANNUAL HOUSEHOLD INCOME IN 2021 BEFORE TAXES?

The series below shows the Total Annual Household Income for weekend passengers' household. Over half (67.91%) the passengers indicated their household income is below "$25,000", compared to 22.2% of passengers with household income between "$25,000 - $50,000", and 9.9% of passengers with household income of "$50,000 or more". Nearly twenty percent (19.6%) of respondents refused or did not answer the question.

Table 2-28: Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2021 before taxes?

Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2021 before taxes?	Total Weight Factor (%)	SUNTRAN	SUNSHUTTLE	SUNLINK
Less than $10,000	36.2%	35.8%	10.5%	42.2%
$10,000 - $14,999	13.5%	13.3%	0.0%	17.0%
$15,000 - $24,999	18.2%	18.9%	0.0%	7.3%
$25,000 - $34,999	13.7%	14.5%	21.0%	0.0%
$35,000 - $49,999	8.5%	8.5%	0.0%	10.2%
$50,000 - $74,999	6.5%	6.8%	68.5%	0.0%
$75,000 - $99,999	1.9%	1.7%	0.0%	5.8%
$100,000 or more	1.5%	0.5%	0.0%	17.5%

Chapter 3. SURVEY METHODOLOGY

SAMPLING PLAN

Origin-Destination (OD) Survey

To ensure that the distribution of completed surveys mirrors the distribution of the region's passengers, ETC Institute, The City of Tucson, and Sun Tran established proportional sampling goals. ETC Institute developed a sampling plan that would ensure the completion of the Weekday OD survey by at least 5,102 weekday passengers. Overall, a total of 6,721 weekday surveys were collected. The weekend sampling goals were set to collect a total of 768 surveys, and a total of 978 weekend surveys were collected.

Tables 1 through 3 show the weekday sampling goals by system that were used to guide the collection by route, time period, and direction. Table 4 shows the weekend sampling goals for all systems by day type. The ridership data that supported these goals was collected between September 13th, 2021 and November 24th, 2021.

Table 29 - OD Weekday Sampling Goals SunTran

		Sampling Goals							COMPLETED						
Route #	Direction	Early AM (Before 6:30am)	AM Peak (6:30-8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys	Early AM (Before 6:30am)	AM Peak (6:30-8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys
1	EASTBOUND	0	4	17	6	5	33	78	9	9	24	9	8	59	118
	WESTBOUND	2	5	16	4	3	30		3	9	28	10	9	59	
2	NORTHBOUND	2	3	17	4	3	29	62	3	6	27	9	6	51	102
	SOUTHBOUND	0	2	6	2	3	13		2	6	21	12	10	51	
3	EASTBOUND	3	12	37	10	7	69	209	7	14	67	16	17	121	253
	WESTBOUND	5	15	39	6	5	70		5	25	72	16	14	132	
4	EASTBOUND	4	15	65	19	22	126	355	16	21	140	33	25	235	472
	WESTBOUND	7	14	59	13	17	111		9	29	124	34	41	237	
5	EASTBOUND	1	4	13	3	1	21	66	3	9	32	2	11	57	117
	WESTBOUND	1	6	13	3	1	23		2	9	39	4	6	60	
6	NORTHBOUND	2	6	35	10	9	62	183	3	16	55	15	16	105	206
	SOUTHBOUND	2	9	35	9	5	60		7	14	46	18	16	101	
7	EASTBOUND	2	10	36	10	9	67	197	5	11	72	32	16	136	251
	WESTBOUND	4	9	35	9	6	64		4	15	63	21	12	115	
8	EASTBOUND	7	16	58	15	14	109	313	20	21	125	18	25	209	416
	WESTBOUND	6	12	56	13	12	99		8	30	118	31	20	207	
9	EASTBOUND	4	10	42	9	9	74	229	7	13	76	17	17	130	268
	WESTBOUND	5	11	43	11	9	78		6	16	87	13	16	138	
10	NORTHBOUND	1	6	18	5	6	36	104	4	7	33	13	11	68	139
	SOUTHBOUND	2	4	19	5	4	33		3	13	34	11	10	71	
11	NORTHBOUND	5	8	38	11	8	70	253	8	33	70	26	18	155	310
	SOUTHBOUND	7	14	52	13	13	99		12	24	69	22	28	155	
12	NORTHBOUND	2	9	20	5	6	43	128	3	12	37	10	8	70	133
	SOUTHBOUND	1	6	22	7	8	43		2	11	27	12	11	63	
15	NORTHBOUND	1	3	14	4	2	25	81	2	6	24	8	9	49	99
	SOUTHBOUND	1	5	17	4	2	29		2	8	26	6	8	50	
16	NORTHBOUND	3	17	65	15	18	118	305	7	24	99	30	18	178	365
	SOUTHBOUND	5	10	46	11	13	86		6	23	88	35	35	187	
17	NORTHWEST	8	11	40	7	7	73	221	13	14	73	32	22	154	306
	SOUTHEAST	4	10	41	9	10	74		6	33	67	30	16	152	
18	NORTHBOUND	5	12	57	13	12	99	297	9	28	102	25	28	192	375
	SOUTHBOUND	3	9	58	16	13	99		16	23	98	28	18	183	

Route #	Direction	Sampling Goals							COMPLETED						
		Early AM (Before 6:30am)	AM Peak (6:30-8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys	Early AM (Before 6:30am)	AM Peak (6:30-8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys
19	NORTHBOUND	1	2	8	3	4	17	46	3	6	20	12	10	51	95
	SOUTHBOUND	0	1	6	2	4	14		2	6	21	8	7	44	
21	NORTHBOUND	0	1	8	2	2	12	35	2	4	11	5	7	29	57
	SOUTHBOUND	0	2	7	2	1	11		0	4	12	3	9	28	
22	NORTHBOUND	0	0	2	2	1	5	11	1	1	6	2	3	13	22
	SOUTHBOUND	0	0	1	0	0	2		1	1	4	1	2	9	
23	NORTHBOUND	3	4	20	5	2	34	111	6	5	41	7	5	64	132
	SOUTHBOUND	2	4	21	6	6	40		4	5	41	11	7	68	
24	Circulator	1	3	15	5	3	29	43	2	5	31	11	7	56	56
		0	0	0	0	0	0		0	0	0	0	0	0	
25	NORTHBOUND	5	7	26	6	5	49	145	6	16	47	21	16	106	191
	SOUTHBOUND	2	7	22	8	9	48		13	11	36	12	13	85	
26	EASTBOUND	1	2	9	4	4	20	60	1	6	12	7	9	35	70
	WESTBOUND	1	3	12	3	2	21		2	4	17	3	9	35	
27	NORTHBOUND	2	3	9	3	2	18	50	4	8	17	7	5	41	78
	SOUTHBOUND	0	2	8	2	2	15		1	6	17	5	8	37	
29	EASTBOUND	3	5	15	4	4	30	97	4	5	24	10	8	51	102
	WESTBOUND	1	4	18	5	7	34		1	4	27	7	12	51	
34	NORTHBOUND	3	10	39	8	7	68	209	7	11	75	15	15	123	262
	SOUTHBOUND	4	11	38	11	8	71		4	16	76	27	16	139	
37	NORTHBOUND	1	3	7	3	1	14	46	1	7	16	7	12	43	84
	SOUTHBOUND	1	2	9	3	1	17		2	6	23	3	7	41	
50	EASTBOUND	0	2	5	1	1	9	21	1	4	7	1	2	15	35
	WESTBOUND	0	0	3	1	1	5		1	2	11	3	3	20	
61	NORTHBOUND	1	2	2	1	0	6	26	3	4	18	3	4	32	57
	SOUTHBOUND	0	2	7	2	1	11		1	4	13	4	3	25	
101X	EASTBOUND	0	0	0	2	0	2	3	0	0	0	0	3	3	3
	WESTBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
102X	NORTHBOUND	0	0	0	0	0	0	2	0	0	0	0	5	5	5
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
103X	NORTHBOUND	0	0	0	1	0	1	1	0	0	0	0	2	2	3
	SOUTHBOUND	0	1	0	0	0	1		0	1	0	0	0	1	
104X	NORTHBOUND	0	0	0	0	0	0	1	0	0	0	0	1	1	1
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
105X	NORTHBOUND	0	0	0	1	0	1	2	0	0	0	0	3	3	3
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
107X	NORTHBOUND	0	0	0	1	0	1	2	0	0	0	0	3	3	5
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	1	1	2	
108X	EASTBOUND	0	0	0	1	0	1	1	0	0	0	0	2	2	2
	WESTBOUND	0	0	0	0	0	0		0	0	0	0	0	0	
109X	EASTBOUND	0	0	0	0	0	0	1	0	0	0	0	1	1	1
	WESTBOUND	0	0	0	0	0	0		0	0	0	0	0	0	
110X	NORTHBOUND	0	0	0	0	0	0	1	0	0	0	0	1	1	3
	SOUTHBOUND	0	0	0	1	0	1		0	0	0	0	2	2	
201X	EASTBOUND	0	0	0	1	0	1	2	0	0	0	0	2	2	2
	WESTBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
203X	NORTHBOUND	0	0	0	1	0	1	3	2	0	4	0	3	9	9
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
204X		0	0	0	1	0	1	2	0	0	2	0	2	4	4
	SOUTHBOUND	0	1	0	0	0	1		0	0	0	0	0	0	
	TOTALS	136	376	1,447	382	340	2,682	4,001	287	684	2,692	794	755	5,212	5,212

Table 30 - OD Weekday Sampling Goals SunLink

ROUTE_SURVEYED	AGENCY	AM Peak (Before 8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys	AM Peak (Before 8:30am)	Midday (8:30am-4:00pm)	PM Peak (4:00-6:00pm)	Evening (6:00pm-3:00am)	Total	Total Surveys
Sun Link WESTBOUND	SUN LINK	8	154	49	71	282	1026	34	367	147	166	714	1409
Sun Link EASTBOUND	SUN LINK	19	136	27	48	230		41	459	94	101	695	
TOTAL		**28**	**291**	**76**	**118**	**513**	**1,026**	**75**	**826**	**241**	**267**	**1,409**	**1,409**

Table 31 - OD Weekday Sampling Goals SunShuttle

			Sampling Goals					COMPLETED				
Route #	Route Name	Direction	AM Peak (Before 8:30am)	Midday (8:30am-4:00pm)	PM Peak and Evening (4:00pm and after)	Total	Total Surveys	AM Peak (Before 8:30am)	Midday (8:30am-4:00pm)	PM Peak and Evening (4:00pm and after)	Total	Total Surveys
401	N. Oracle/Catalina	NORTHBOUND	1	1	0	2	5	1	1	0	2	5
		SOUTHBOUND	0	1	0	2		1	2	0	3	
410	Anway/Trico	EASTBOUND	1	1	0	2	3	0	2	0	2	2
		WESTBOUND	0	0	0	0		0	0	0	0	
412	Thornydale/River	NORTHBOUND	1	3	1	5	11	2	4	0	6	10
		SOUTHBOUND	1	2	1	4		0	4	0	4	
413	Marana/I-10	NORTHBOUND	0	1	1	2	6	1	1	0	2	8
		SOUTHBOUND	1	2	0	3		1	5	0	6	
421	Green Valley/Sahuarita Connector	NORTHBOUND	1	2	0	4	10	0	0	0	0	7
		SOUTHBOUND	1	2	1	4		3	4	0	7	
430	Tucson Estates	EASTBOUND	1	1	0	3	12	3	1	0	4	8
		WESTBOUND	1	4	2	7		1	3	0	4	
440	San Xavier	NORTHBOUND	2	2	2	5	13	2	4	0	6	14
		SOUTHBOUND	1	2	2	5		3	5	0	8	
450	Southeast Tucson/Rita Ranch	NORTHBOUND	1	1	0	2	5	3	2	0	5	6
		SOUTHBOUND	0	1	0	2		0	1	0	1	
486	Ajo/Tucson	EASTBOUND	0	0	0	0	8	6	0	0	6	7
		WESTBOUND	0	0	0	0		1	0	0	1	
		TOTALS	12	27	12	50	75	28	39	0	67	67

Table 32 – Weekend Sampling Goals by Day Type

Route	Sampling Goals			COMPLETED		
	Saturday	Sunday	Grand Total	Saturday	Sunday	Grand Total
1	9	8	17	17	8	25
2	5	5	10	6	6	12
3	13	9	22	18	9	27
4	32	24	56	44	24	68
5	5	4	9	6	4	10
6	18	7	25	33	7	40
7	14	8	22	40	8	48
8	38	29	67	49	31	80
9	16	11	27	16	18	34
10	8	7	15	12	7	19
11	25	22	47	26	35	61
12	8	12	20	11	14	25
15	4	4	8	5	8	13
16	34	29	63	36	29	65
17	13	8	21	19	15	34
18	34	27	61	38	27	65
19	12	7	19	19	8	27
21	5	4	9	5	6	11
22	1	1	2	3	3	6
23	8	6	14	13	6	19
24	4	8	12	4	4	8
25	13	4	17	21	8	29
26	5	2	7	5	6	11
27	3	2	5	4	3	7
29	7	4	11	8	4	12
34	13	9	22	29	9	38
37	4	3	7	5	5	10
50	2	2	4	8	2	10
61	2	2	4	4	4	8
412 SunShuttle	1	0	1	4	0	4
413 SunShuttle	1	0	1	1	0	1
440 SunShuttle	1	0	1	1	0	1
SunLink	104	35	139	108	42	150
Grand Total	**462**	**303**	**765**	**618**	**360**	**978**

On-to-Off (O2O) Survey

The sampling plan for the O2O counts were designed to obtain complete weekday boarding-alighting pairs from a minimum of 20% of the daily ridership (7,665 pairs) on all routes selected for the O2O collection. ETC collected a total of 8,127 boarding-alighting pairs. The sample plan in Table 5 below shows the goals for each line by route, time, and direction.

Table 33 – On-to-Off Sampling Goals

	O2O SUMMARY COLLECTED						O2O GOAL					
ROUTE	EARLY AM / AM PEAK	MIDDAY	PM PEAK	EVE	Grand Total	Total Surveys	EARLY AM / AM PEAK	MIDDAY	PM PEAK	EVE	Grand Total	Total Surveys
11 Alvernon Way NORTHBOUND	42	148	46	29	265	504	25	70	21	14	131	422
11 Alvernon Way SOUTHBOUND	60	127	26	26	239		39	97	24	25	186	
16 Oracle/Ina NORTHBOUND	49	179	72	44	344	616	38	122	28	33	221	509
16 Oracle/Ina SOUTHBOUND	49	99	62	62	272		28	87	21	25	161	
18 S 6th Ave NORTHBOUND	40	219	65	67	391	841	33	108	24	22	186	495
18 S 6th Ave SOUTHBOUND	72	264	53	61	450		23	108	29	24	185	
4 Speedway EASTBOUND	40	177	52	50	319	609	35	122	36	42	236	591
4 Speedway WESTBOUND	41	169	28	52	290		40	111	25	32	208	
8 Broadway EASTBOUND	41	144	66	62	313	590	43	108	27	26	205	521
8 Broadway WESTBOUND	29	148	42	58	277		34	105	24	23	186	
SUNLINK EASTBOUND	126	1083	440	800	2449	4967	193	1365	267	478	2303	5127
SUNLINK WESTBOUND	76	987	540	915	2518		85	1544	490	705	2824	
Grand Total	**665**	**3744**	**1492**	**2226**	**8127**	**8127**	**616**	**3947**	**1019**	**1449**	**7030**	**7665**

Survey Instrument

The survey was designed to obtain information in three major categories: origin-destination (OD) travel patterns, usage information, and rider demographics. Once the survey questionnaire had been finalized, ETC designed a tablet-based intercept interview survey as the primary survey medium. The survey is included as Appendix A. The weekend survey was designed to mimic the weekday OD survey but did not capture location coordinates for riders' origin, destination, boarding, and alighting locations. The survey was created to ensure that Title VI requirements were met and to provide additional information on riders.

The tablet survey methodology utilized the tablets on-screen mapping features which allowed for real-time geocoding of addresses and locations using exact addresses, intersections, and/or place names. The riders would then confirm the geocoded locations on the map via on-screen indicator icons. The interviewers used the mapping feature to collect the global positioning system (GPS) coordinates of all survey locations (home address, origin address, destination address, boarding location(s), and alighting location(s). This allowed the interviewer to answer questions as well as ensure the accuracy of the data collected. The respondent was allowed to select the answers to some demographic questions directly on the tablet to allow for enhanced privacy (e.g. household income, gender).

Respondents who did not have time to complete the survey during their trip were given the option to receive a phone call later to complete the survey.

A paper instrument was used for Sun Shuttle Route 486 which was distributed and collected by the shuttle drivers. These paper surveys were then sent to ETC which then entered the survey data into their survey program.

In addition, ETC created an additional survey that was included for passengers who were not headed to a specific destination but were simply riding the vehicle. Two percent of the weekday surveys and four percent of weekend surveys that were conducted were with passengers riding the vehicle with no end point and are shown as "No Particular Destination" for trip purpose in Chapters 1 and 2.

Chapter 4. SURVEY ADMINISTRATION

LABOR RECRUITMENT AND TRAINING

Assembling a team of high-quality surveying staff was one of the most important steps in the OD administration process. ETC collaborated with a staffing firm to provide interviewers for the OD survey and utilized survey supervisors to survey as well.

The training session focused on the survey purpose and objectives, the survey instrument, scripts on how to respond to passengers' questions, how to use data collection tools correctly, random sampling protocols, instructions on how to conduct themselves when working with the public, and safety training. Survey staff were instructed to understand that, while they were not Sun Tran employees, they were representing the agency while on transit vehicles or property and that they needed to act in a manner that reflected positively on Sun Tran. A total of two training sessions conducted throughout the data collection process.

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

TRAINING OD INTERVIEWERS

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

ETC ensured training addressed the following details:

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

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

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

Following classroom training, applicants got a chance to conduct interviews under the supervision of an experienced ETC supervisor. Supervisors oversaw interviewers and provided feedback on performance throughout the day.

Interviewers who were conducting the survey properly could go to the next phase of field training. Interviewers who needed more help but showed promise were asked to spend a second day in the field under direct supervision. Once an interviewer had demonstrated proficiency under direct supervision, they were given a field test during which the prospective interviewer conducted surveys on their own. During this period, the interviewer's productivity and data quality were remotely assessed by ETC's staff.

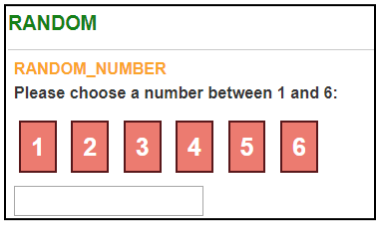
Survey Administration

Selection Of Participants

For the OD interview, the tablet generated a random number (shown in Figure 1) to determine which passengers were asked to participate in the survey after boarding the vehicle.

If four people boarded a bus, the tablet randomly generated a number from 1 to 4. If the tablet responded 2, the second person who boarded the bus was asked to participate in the survey. If the tablet responded 1, the first person was asked to participate in the survey, and so forth. The selection was limited to the first six people who boarded a bus or train at any given stop to ensure the interviewer could keep track of the passengers as they boarded.

Figure 1- OD Survey Random Number Generator



For example, if 20 people boarded a vehicle, the tablet program would randomly pick one of the first six people for the survey. If the interview was refused by the randomly selected passenger, then the passenger who boarded before the passenger selected would be attempted.

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

Origin Destination Procedures

Interviewers selected passengers in accordance with the same sampling procedures previously described. The interviewer then:

- Approached the passenger, identified themselves, and asked the passenger to participate in the survey.
- If the passenger refused, the interviewer ended the survey, excused themselves, and completed three observational questions (age, race, and gender).
- If the passenger agreed to participate, the interviewer asked the passenger if they had at least 5 minutes to complete the survey.
- If the passenger did not have at least 5 minutes on the bus, the interviewer asked the passenger to provide their name and phone number for a call-back in the event that they alighted prior to completing the survey. The interviewer continued to capture data until the passenger alighted the vehicle. A phone interviewer from ETC Institute's call center contacted the respondent and asked them to provide the remaining information by phone if the interview was not completed on the vehicle. This methodology ensured that people who completed short trips on public transit were well represented. Most records were able to be completed on-board with only a nominal number of records completed by phone.
- If the person had at least 5 minutes on the bus, the interviewer completed the survey on the vehicle.

On-to-Off Procedures

The bus O2O counts were collected using ETC's proprietary software running on GPS-capable tablets equipped with barcode scanners. Tablets on-board the same bus were paired before each data collection session began. The passengers' routes, directions of travel, and boarding and alighting information (time, latitude and longitude) was captured with a high degree of accuracy via the following process:

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

Passenger were asked to hand their cards back as they exited the vehicle and the cards were scanned as they exited the bus.

The O2O software sent the scanned data to the O2O server where a server-side processing system evaluated the data and paired the boarding and the alighting locations of each passenger based on the

unique barcode, time stamps, and other variables. Before any collection took place, staff were trained on every aspect of the on-board O2O process. Supervisory staff administered a variety of quality control checks during tablet set-up, including review of Route #, Team #, Block #, Run #, Bus #, and Partner Tablet ID #. The O2O software was centered on a live map of the current transit route and associated stops. ETC's on-board data collection staff could follow the map of the route and accurately select the passengers' boarding and alighting locations. Route termini were clearly marked on the map and the user was alerted when approaching a route terminus, at which point, the session was closed and a new session was initiated when the bus/train began a new run.

For the Sun Link, counters asked passengers at which stops they entered, if not observed, and exited the train. The count data was immediately uploaded to a secure server for monitoring and reporting purposes. Validations screened out any individual records boarding stations that were the same the alighting station (i.e.: 4th and 4th station to 4th and 4th station).

In-Field Quality Assurance/Quality Control

ETC Institute field supervisors reviewed each interviewer's data scrutinizing the following elements to ensure they were administering the interview properly:

- Distribution of surveys by demographics.
- Distribution of surveys by trip characteristics.
- Length of each survey in minutes.
- Percentage of refusals.
- Percentage of short trips.

In addition to daily reviews of demographic responses, the field manager created a comprehensive weekly report.

Data Collection Issues

Overall, there were no issues with passengers participating in the survey. The key issues that arose during data collection included:

- Personnel issues with survey staff

  -Many survey staff were terminated and we reduced to a core team
- Issues with passengers stealing counters' personal belongings

  -Survey staff were instructed to leave belongings at home
- Issues with passengers damaging buses while staff were on-board

  -Sun Tran was contacted regarding all safety issues
- Issues going after station level cell goals on the Sun Link

  -We stationed staff for an entire day to try to reach some station level goals

Chapter 5. DATA REVIEW PROCESS

Many of the monitoring processes described previously in the report are essential elements of the overall quality assurance/quality control (QA/QC) process that was implemented throughout the survey. The establishment of specific sampling goals and procedures for managing the goals ensured that a representative sample was obtained. The geocoding tools embedded in Google map searches, ETC Institute Visual Review program, and Caliper® Maptitude geographic information system (GIS) software, allowed for the geocoding accuracy that was achieved.

The following subsections describe the QA/QC processes that were utilized after the data were collected.

PROCESS FOR IDENTIFYING COMPLETE RECORDS

To classify a survey as being complete, the record must contain all elements of the one-way trip. ETC Institute has classified complete trip data as containing complete answers to the following:

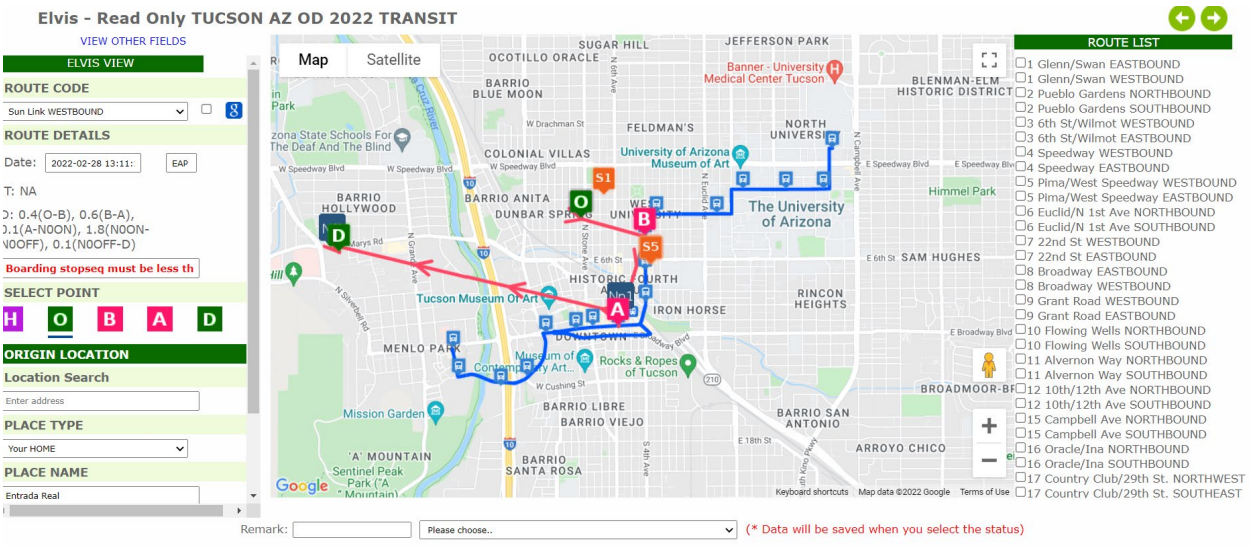
- Route/Direction
- Time of trip
- Transfers made
- Home address
- Origin address
- Destination address
- Origin place type
- Destination place type
- Access mode
- Egress mode
- Boarding location
- Alighting location

In addition to the required trip-data questions, an interview must be considered complete by the online survey program. This occurs if the interviewer navigates through all questions from the survey, including demographics.

ONLINE VISUAL REVIEW TOOL

ETC Institute's online visual review tool allowed for the review of all completed records. The tool displayed all elements of the one-way trip, as well as a series of distance ratio checks. After directions were finalized, each record went through speed/distance/time checks. Figure 2 shows an example of the online visual review tool.

Figure 2 - Online Visual Review Tool (Editable Version)



Pre-Distance Checks

The series of distance and ratio checks were contained in the online visual review tool for ETC Institute's Transit Review Team (TRT) to systematically approach the reviewing of completed records. The TRT process for editing surveys is described later in this section. *Note: The distance and ratio checks described are meant to alert the reviewer that closer evaluation may be needed. However, this does not indicate the record was inaccurate or unusable.*

The distances for the checks are created using the great-circle distance formula that is based on a straight line from point A to point B that considers the curvature of the earth. Some of the distance checks are listed below:

- Access/Egress-Mode Distance Check (distances from origin to boarding and alighting to destination).
- Origin-to-Destination Check (distance from origin to destination).
- Boarding-and-Alighting Distance Check (distance checks from boarding to alighting location).

Pre-Ratio Checks

After all transfer reviews were conducted, three QA/QC ratio checks were conducted. First, the distance between the boarding and alighting location was divided by the distance between origin and destination. Second, the distance between origin and boarding locations was divided by the distance between the origin and destination. Third, the distance between the alighting location and destination was divided by the distance between origin and destination.

Transit Review Team

The TRT reviewed all completed records, paying special attention to records that were flagged by the previously described checks. Typically, around 10 percent of all records receive an automatic flag. The issues listed in Table 4 result in actions that allow about 30 percent of those records that are flagged to be retained.

Table 34 - General Issues

Issue	Description of Issue	Action
Origin/Destination Condition 1	Origin/Destination appears incorrect because the wrong location of a multiple-location organization was selected	If, for example, an Origin/Destination appears illogical based on the college campus that was selected, but an appropriate campus of the same college does appear logical given the other points and answer choices of the trip, then the appropriate campus will be selected.
Origin/Destination Condition 2	Origin/Destination appears to have been geocoded to the incorrect city/state	If for example, an Origin/Destination appears illogical based on the city/state that was geocoded, but the address/intersection is logical within the trip if the city/state are changed. This occurs occasionally because the interviewer selects the wrong choice from the list of address choices that appear in the online survey instrument, then the appropriate address information will be inserted.
Access/Egress Mode	Access/Egress Mode seems illogical based on trip	If the access/egress mode involves the use of a vehicle and the distance from either origin to boarding or alighting to destination is less than 0.2 miles, then the access/egress mode is recoded to walk/walked and that change will be reflected in the database.
Directionality of Record	Boarding and alighting locations indicate that the trip is going in the opposite direction of what was selected by the interviewer	Change direction of route selected and, if necessary, update boarding and alighting locations based on appropriate direction.

POST-PROCESSING ADDITIONAL CHECKS

After records were reviewed by the TRT, the next step involves the application of QA/QC non-trip checks. Non-trip related checks included:

- Ensuring the respondents who indicated they were employed reported that at least one member of the household was employed.
- Ensuring the time-of-day a survey was completed was reasonable given the published operating schedule for the route.
- Ensuring that the appropriate fare type was used given the age of respondent.
- Removing personal information to protect the anonymity of the respondents.

Once all records complete the pre-processing and post-processing QA/QC checks, those deemed complete and usable are appended to the completion report to ensure that goals are met. After the final review is completed, a data dictionary was created to describe the data in the database.

Chapter 6. SURVEY WEIGHTING AND EXPANSION

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

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

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

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

The ridership provided for the goal creation is not the ridership used for expansion. Once the OD data collection was finished then the various agencies provided updated ridership data that was representative of the OD collection period. That updated ridership data was used for the expansion purposes described in this section.

ROUTE SEGMENTATION PROCEDURES

Route Segmentation with APC Data

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

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

Table 35 – Route Segmenting: APC Provided Routes with On-to-Off Counts

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

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

Route Segmentation without APC Data

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

Table 36 – Route Segmenting: Non- APC Provided Routes

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

EXPANSION TYPES

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

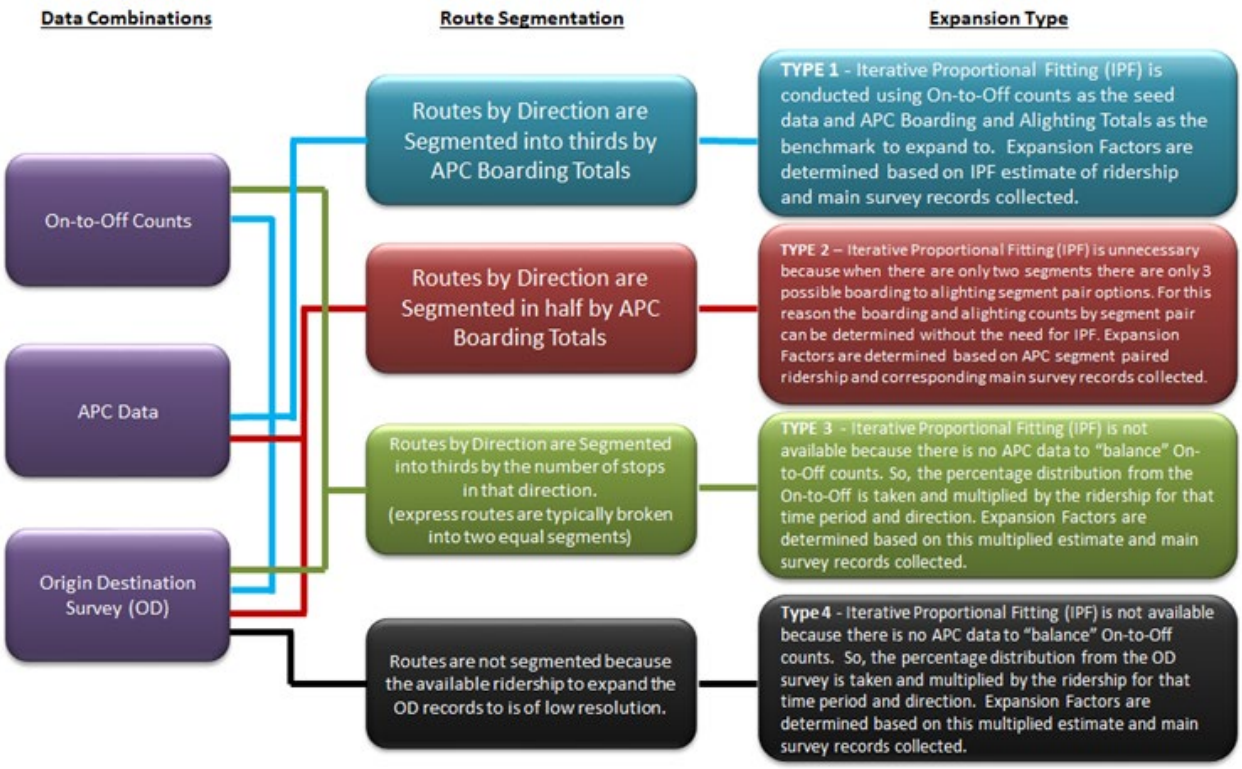
1. Stop-Level Ridership/Automatic Passenger Counter (APC) Data (from ARC agencies),
2. On-to-Off counts data (collected by ETC Institute), and
3. OD Survey Data (collected by ETC Institute).

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

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

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

Figure 3 – Data Combination, Route Segmentation, and Expansion Type

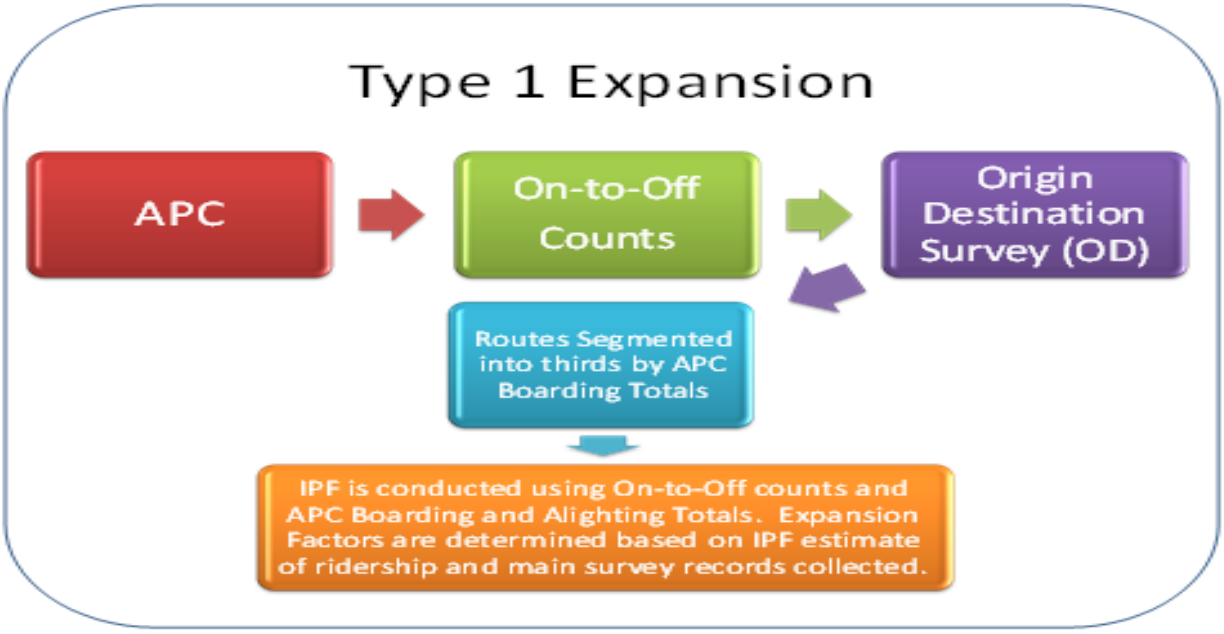


In the subsequent explanation of expansion types, Iterative Proportional Fitting (IPF) is utilized where possible. IPF is an algorithm ETC Institute utilizes to balance the differences between the ridership projected from the On-to-Off counts and the APC ridership for each segment. Further detail on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

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

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

Figure 4 – Type 1 Expansion



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

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

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

Figure 5 shows the segmented results for the On-to-Off counts that were administered for a certain route, direction, and time. Each row in the table identifies the segment where passengers boarded the bus. The columns in the table identify where passengers alighted the bus. For example, 20 of the On-to-Off counts had passenger board in segment 2 and alighting in segment 3.

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

Figure 5 – Results of the On-to-Off Survey

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

Figure 5 shows the distribution of the data in Figure 6 expressed as a percentage of all boardings for the specific time and direction. Figure 6 was created by dividing each On-to-Off cell in Figure 5 by the sum of all On-to-Off counts in Figure 5, which is 115. For example, 20/115 (17.4%) of all trips boarded in segment 2 and alighted in segment 3 as shown in Figure 6.

Figure 6 – Distribution of the On-to-Off Survey

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

The total ridership for the route, time, and direction was applied to the On-to-Off distribution percentages shown in Figure 6.

This produces an initial estimate of the ridership flow for the boarding segment to the alighting segment as shown in Figure 7. Applying the actual ridership of 320 creates an initial estimate of 56 trips (17.4% x 320) boarding in segment 2 and alighting in segment 3.

Figure 7 – Initial Estimate of Ridership Flows Between Stations

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

To develop a more accurate estimate of the ridership flows between segments on each route, ETC Institute developed an Iterative Proportional Fitting (IPF) Algorithm to balance the differences between the ridership projected from the On-to-Off counts (shown in Figure 6) and the APC ridership for each segment (shown in Figure 7). The IPF process is described below:

Figure 8 – Boardings and Alightings by Station

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

Step 1: Correction for the Boardings

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

Step 2: Correction for the Alightings

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

The processes described in Steps 1 and 2 were repeated sequentially until the difference between the actual and estimated boardings and alightings was zero. Figure 9 shows that after seven balancing iterations in this algorithm, there were no differences between the projected distribution and the actual boardings and alightings.

Figure 9 – Seventh Step of Iterative Balancing to Correct Distribution of Ridership by Alighting Location

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

The final estimate for ridership flows is shown in Figure 10.

Figure 10 – Final Estimate of Ridership Between Stations

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

The actual number of OD records completed for each boarding-to-alighting segment pair is shown in Figure 10. To calculate the expansion factors, the final estimate of ridership between segments shown in Figure 9 was divided by the actual number of OD records collected, as shown in Figure 10. This calculation produces the expansion factors shown in Figure 11. For example, the 32 estimated passengers projected to board in segment 2 and alight in segment 3 were divided by the 10 OD records to produce an expansion factor of 3.15 to be applied to records who board in segment 2 and alighting in segment 3 as shown in Figure 12.

Figure 11 – Number of Completed Surveys

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

Figure 12 – Weighting Factors

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

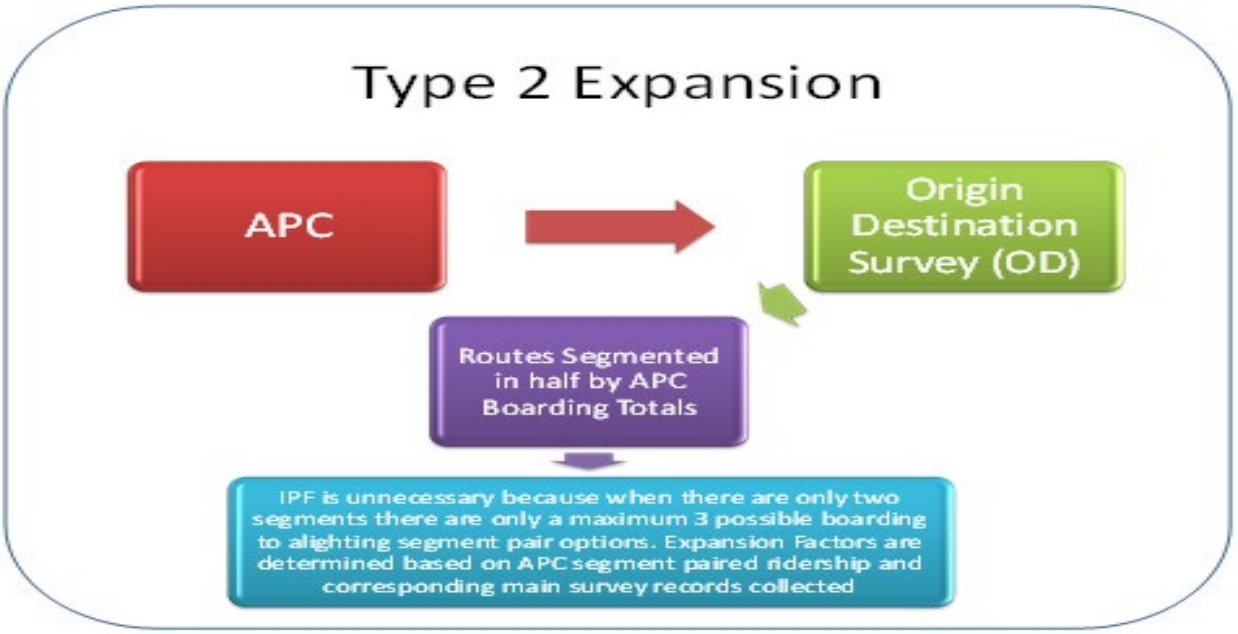
The following routes were expanded using the Type 1 expansion method described on the previous pages:

Table 37 – Routes Expanded Using Type 1 Expansion

Expansion Type 1 Routes	Segments Created
4 Speedway	3
8 Broadway	3
11 Alvernon	3
16 Oracle / Ina	3
18 S. 6th Avenue	3
SUNLINK	7

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

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



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

Figure 13 – Segment Examples for Type 2 Expansion

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

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

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

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

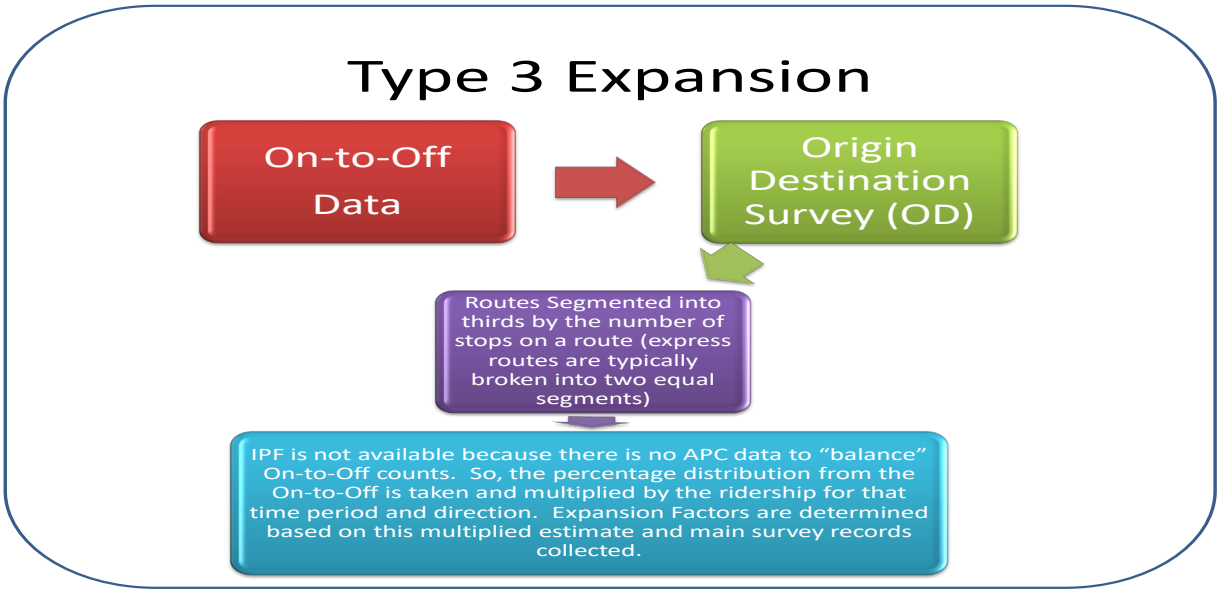
Table 38 – Routes Expanded Using Type 2 Expansion

Expansion Type 2 Routes	Segments Created
1 Glenn/Swan	2
2 Pueblo Gardens	2
3 6th St/Wilmot	2
5 Pima/West Speedway	2
6 Euclid/N 1st Ave	2
7 22nd St	2
9 Grant Road	2
10 Flowing Wells	2
12 10th/12th Ave	2
15 Campbell Ave	2
17 Country Club/29th St.	2
19 Stone Ave	2
21 Congress/Silverbell	2
22 El Rio/W. Speedway	2
23 Mission Road	2
24 S 12th Ave	2
25 S Park Ave	2
26 Benson Highway	2
27 Midvale Park	2
29 Valencia	2
34 Craycroft/Ft Lowell	2
37 Pantano	2
50 Ajo Way	2
61 La Cholla	2
101X Golf Links-Downtown Express	2
102X Northwest-UA Express	2
103X Northwest-Downtown Express	2
104X Marana-Downtown Express	2
105X Foothills-Downtown Express	2
107X Oro Valley-Downtown Express	2
108X Broadway-Downtown Express	2
109X Catalina Hwy-Downtown Express	2
110X Rita Ranch-Downtown Express	2
201X Eastside-Aero Park Express	2
203X Oro Valley-Aero Park Express	2
204X Northwest- Aero Park Express	2

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

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

Figure 14 – Type 3 Expansion



No routes were expanded using Type 3 Expansion

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

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

All routes that were surveyed on Saturday and Sunday were expanded using Type 4 expansion since no boarding location was acquired due to the nature of the weekend survey and limited expansion segmentation and the weekday routes listed below.

Table 39 – Routes Expanded Using Type 4 Expansion

Expansion Type 4 Routes
401 N Oracle/Catalina
410 Anway/Trico
412 Thornydale/Dove Mountain
413 Marana/I-10
421 Green Valley/Sahuarita Connector
430 Tucson Estates
440 San Xavier
450 Southeast Tucson/Rita Ranch
486 Ajo
All Weekend Routes

General Rule for Expansion Factors

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

1 / (Sampling percentage) x 3 = Guideline Weight Factor

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

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

LINKED TRIP DECOMPOSITION ANALYSIS

Decomposition analysis measures the overall representativeness of the survey records relative to linked and unlinked trips on an individual route basis. Self-enumeration surveys have historically suffered from substantial errors in route level boarding levels when linked trips were determined by simply dividing the boarding factor by one plus the number of transfers.

The advent of the personal interview, coupled with tablet technology and more effective management of counters, has reduced this issue. The decomposition analysis examines each record and the recorded sequence of routes and tabulates boardings for each route using this information. After all records have been examined, total boardings by route are summarized and compared with the observed level of boardings. The result of this analysis will help to determine the relationship between observed and estimated boardings by route.

The decomposition analysis below and on the following pages show the summed link factors for the routes for which the survey was conducted along with the summed linked weight factors for those same routes that was captured in transfer information for both previous transfers and transfers that would occur after the rider alighted the route they were being surveyed on. The findings from the decomposition analysis show that the overall results for the on-board survey do an excellent job of representing the system. In fact, at the overall level, there is .00% difference between the total boardings calculated from the summed linked weight factors and the observed ridership. The routes that deviate the farthest from the summed linked factors compared to the observed counts are typically the routes that are expected to deviate the most as they are low volume ridership routes and therefore have a higher inherit error probability.

The table on the following page shows the results at the route level.

Table 40 – Decomposition Analysis

Route Name	System	Route Surveyed	Transfer Route	tal Summed Link	bserved Boardin	Total Difference	% Difference
1 Glenn/Swan	Sun Tran	807.85	187.31	995.16	1019.00	23.84	2.3%
10 Flowing Wells	Sun Tran	753.94	177.89	931.83	991.00	59.17	6.0%
11 Alvernon Way	Sun Tran	2352.39	540.72	2893.10	3048.00	154.90	5.1%
110X Rita Ranch-Downtown Express	Sun Tran	14.17	0.45	14.62	17.00	2.38	14.0%
12 10th/12th Ave	Sun Tran	596.20	289.41	885.61	1026.00	140.39	13.7%
15 Campbell Ave	Sun Tran	634.93	133.18	768.11	722.00	-46.11	-6.4%
16 Oracle/Ina	Sun Tran	2432.21	698.13	3130.34	3264.00	133.66	4.1%
17 Country Club/29th St.	Sun Tran	1868.79	366.32	2235.11	2137.00	-98.11	-4.6%
18 S 6th Ave	Sun Tran	1837.37	756.20	2593.58	2793.00	199.42	7.1%
19 Stone Ave	Sun Tran	623.84	284.76	908.61	832.00	-76.61	-9.2%
2 Pueblo Gardens	Sun Tran	385.93	309.78	695.71	583.00	-112.71	-19.3%
21 Congress/Silverbell	Sun Tran	216.49	140.33	356.82	315.00	-41.82	-13.3%
22 El Rio/W. Speedway	Sun Tran	104.17	32.78	136.94	159.00	22.06	13.9%
23 Mission Road	Sun Tran	574.16	279.38	853.53	794.00	-59.53	-7.5%
24 S 12th Ave	Sun Tran	308.89	206.63	515.52	450.00	-65.52	-14.6%
25 S Park Ave	Sun Tran	1055.22	378.21	1433.43	1368.00	-65.43	-4.8%
26 Benson Highway	Sun Tran	404.73	162.97	567.71	600.00	32.29	5.4%
27 Midvale Park	Sun Tran	321.86	181.42	503.27	523.00	19.73	3.8%
29 Valencia	Sun Tran	640.01	300.29	940.30	862.00	-78.30	-9.1%
3 6th St/Wilmot	Sun Tran	1303.95	333.36	1637.32	1599.00	-38.32	-2.4%
34 Craycroft/Ft Lowell	Sun Tran	1560.42	369.96	1930.38	1984.00	53.62	2.7%
37 Pantano	Sun Tran	319.11	155.02	474.14	396.00	-78.14	-19.7%
4 Speedway	Sun Tran	2441.13	582.87	3024.00	2966.00	-58.00	-2.0%
5 Pima/West Speedway	Sun Tran	527.42	91.39	618.81	614.00	-4.81	-0.8%
50 Ajo Way	Sun Tran	169.53	57.83	227.36	245.00	17.64	7.2%
6 Euclid/N 1st Ave	Sun Tran	1207.16	400.81	1607.97	1576.00	-31.97	-2.0%
61 La Cholla	Sun Tran	163.53	139.05	302.57	233.00	-69.57	-29.9%
7 22nd St	Sun Tran	1299.85	418.42	1718.27	1704.00	-14.27	-0.8%
8 Broadway	Sun Tran	2281.40	656.82	2938.22	2960.00	21.78	0.7%
9 Grant Road	Sun Tran	1469.80	329.29	1799.10	1824.00	24.90	1.4%
700 Sun Link	Sun Link	4006.41	122.01	4128.42	4336.90	208.48	4.8%
101X Golf Links-Downtown Express	Sun Tran	19.17	2.05	21.21	23.00	1.79	7.8%
102X Northwest-UA Express	Sun Tran	20.00	8.92	28.92	20.00	-8.92	-44.6%
103X Northwest-Downtown Express	Sun Tran	8.00	1.90	9.90	8.00	-1.90	-23.8%
104X Marana-Downtown Express	Sun Tran	9.00	0.00	9.00	9.00	0.00	0.0%
105X Foothills-Downtown Express	Sun Tran	15.83	20.62	36.45	19.00	-17.45	-91.8%
107X Oro Valley-Downtown Express	Sun Tran	14.40	19.19	33.59	16.00	-17.59	-110.0%
108X Broadway-Downtown Express	Sun Tran	12.00	0.00	12.00	12.00	0.00	0.0%
109X Catalina Hwy-Downtown Expres	Sun Tran	7.00	13.42	20.42	7.00	-13.42	-191.7%
201X Eastside-Aero Park Express	Sun Tran	5.42	0.00	5.42	13.00	7.58	58.3%
203X Oro Valley-Aero Park Express	Sun Tran	16.00	7.75	23.75	18.00	-5.75	-32.0%
204X Northwest- Aero Park Express	Sun Tran	26.25	8.83	35.08	30.00	-5.08	-16.9%
401 N Oracle/Catalina	Sun Shuttle	13.97	35.49	49.46	28.39	-21.07	-74.2%
410 Anway/Trico	Sun Shuttle	10.77	2.09	12.86	16.88	4.02	23.8%
412 Thornydale/Dove Mountain	Sun Shuttle	34.92	48.81	83.73	45.84	-37.89	-82.7%
413 Marana/I-10	Sun Shuttle	16.96	28.64	45.59	26.79	-18.80	-70.2%
421 Green Valley/Sahuarita Connecto	Sun Shuttle	33.02	28.88	61.90	50.69	-11.21	-22.1%
430 Tucson Estates	Sun Shuttle	39.85	30.08	69.93	61.30	-8.63	-14.1%
440 San Xavier	Sun Shuttle	94.47	29.55	124.02	105.55	-18.47	-17.5%
450 Southeast Tucson/Rita Ranch	Sun Shuttle	11.60	17.90	29.50	22.27	-7.23	-32.5%
486 Ajo	Sun Shuttle	75.00	0.00	75.00	80.00	5.00	6.3%
	Total	33166.50	9387.12	42553.61	42553.61	0.00	0.00%

APPENDIX A: SURVEY INSTRUMENT

Tucson 2022 On Board Transit Survey

(for office use only) Route Code: ____ Dir: N S E W Time: ____ am / pm Interviewer: ____ Serial #: ____

Complete the questionnaire and have a chance to win 1 of 5 Transit Goodie Bags!

Are you a visitor to the Tucson area? ○ Yes ○ No

What is your HOME ADDRESS?: (please be specific, ex: 123 W. Main St):
(*If you are visiting Tucson area, please list the **hotel name** or address where you are staying*)

Street Address _____ City _____ State _____ ZIP Code _____

COMING FROM?

1. What type of place are you COMING FROM NOW? *(the starting place for your one-way trip)*
- ○ Your usual Workplace
- ○ Other business related (e.g., meeting, delivery)
- ○ College / University (students only)
- ○ School K-12 (students only)
- ○ Medical appointment / doctor visit (non-work)
- ○ Pick up / Drop of someone (e.g. school, daycare)
- ○ Shopping
- ○ Personal business (e.g. bank, post office)
- ○ Dining out
- ○ Social visit (e.g. friends, relatives)
- ○ Recreation / Sightseeing
- ○ Major sporting event
- ○ Escorting / accompanying someone
- ○ Airport (passengers only)
- ○ Your hotel/motel/lodging → *Go to Question #4*
- ○ Your **HOME** → *Go to Question #4*
- ○ No particular destination → **H Survey**
- ○ Other: _____

2. What is the NAME of the place you are coming from now?

_____

3. What is the EXACT STREET ADDRESS of this place? (OR Intersection)

_____

City: _____ State: _____ ZIP: _____

4. How did you GET FROM the place in Questions #1-3 TO THE VERY FIRST vehicle you used for this one-way trip?
- ○ Walk/wheelchair (go to Q5)
- ○ Bike (go to Q5)
- ○ Wheelchair (go to Q5)
- ○ Bike share (go to Q5)
- ○ Was dropped off by someone (answer 4a)
- ○ Drove alone and parked (answer 4a)
- ○ Drove or rode with others and parked (answer 4a)
- ○ Uber, Lyft, etc.
- ○ Taxi
- ○ E-scooter (e.g. Spin, Razor)
- ○ Cat Tran Shuttle
- ○ Other Specify_____

4a. Where did you park/get dropped off before the FIRST vehicle you used for this one-way trip (Nearest intersection / Park-N-Ride lot below):

_____

GOING TO?

5. What type of place are you GOING TO NOW? *(the ending place for your one-way trip)*
- ○ Your usual Workplace
- ○ Other business related (e.g., meeting, delivery)
- ○ College / University (students only)
- ○ School K-12 (students only)
- ○ Medical appointment / doctor visit (non-work)
- ○ Pick up / Drop of someone (e.g. school, daycare)
- ○ Shopping
- ○ Personal business (e.g. bank, post office)
- ○ Dining out
- ○ Social visit (e.g. friends, relatives)
- ○ Recreation / Sightseeing
- ○ Major sporting event
- ○ Escorting / accompanying someone
- ○ Airport (passengers only)
- ○ Your hotel/motel/lodging → *Go to Question #8*
- ○ Your **HOME** → *Go to Question #8*
- ○ Other: _____

6. What is the NAME of the place you are going to now?

_____

7. What is the EXACT STREET ADDRESS of this place? (OR Intersection)

_____

City: _____ State: _____ ZIP: _____

8. How will you GET TO your destination (in Qs #5-7) after you get off the LAST vehicle you will use for this one-way trip?
- ○ Walk (go to Q9)
- ○ Bike (go to Q9)
- ○ Wheelchair (go to Q9)
- ○ Bike share (go to Q9)
- ○ Be picked up by someone (answer 8a)
- ○ Get in a parked vehicle & drive alone (answer 8a)
- ○ Get in a parked vehicle & drive/ride w/others (answer8a)
- ○ Uber, Lyft, etc.
- ○ Taxi
- ○ E scooter (e.g. Spin, Razor)
- ○ Cat Tran Shuttle
- ○ Other Specify_____

8a. Where will you get your car/get picked up after the LAST vehicle you are using for this one-way trip (nearest intersection / Park-N-Ride lot below):

_____

9. Did you transfer FROM another transit vehicle BEFORE getting on this transit vehicle? ○ Yes ○ No

10. Where did you GET ON THIS vehicle? *Please provide the nearest intersection / station name / Park & Ride lot:*

_____

11. Where will you GET OFF THIS vehicle? *Please provide the nearest intersection / station name / Park & Ride lot:*

_____

12. Will you transfer TO another transit vehicle AFTER getting off this transit vehicle? ○ Yes ○ No

13. Please list BUS ROUTES in the exact order you use them for this one-way trip.

START → [ ] → [ ] → [ ] → [ ] → **END**

1st Route 2nd Route 3rd Route 4th Route

Continue

OTHER INFORMATION ABOUT THIS TRIP

14. What time did you GET ON this vehicle? _____ : _____ **a.m. / p.m. (circle one)**

15. Will you make a RETURN TRIP today to get you back to the place where you started this one-way trip? O No
O Yes, I will make a return trip in exactly the opposite direction today (or this is my return trip) at what time
_____:_____ am/pm (circle one)

16. If fares were being collected, what fare category would apply to you? O Don't know
O Regular (Full) Fare O Economy Senior fare O Economy Disabled fare O Economy Low-Income fare

17. If fares were being collected, how would you pay for this one-way trip?
O Don't know O Cash Fare O SunGo card (plastic) O Smart Phone / GOTucson Mobile App

18. How would you have made this trip if Sun Tran, Sun Link, or Sun Shuttle were not available?
O Drive own vehicle O Ride bicycle O Friend/family member O Walk
O Taxi/Uber O Would not make trip O Sun on demand O Other_____

ABOUT YOU AND YOUR HOUSEHOLD

19. How many vehicles (cars, trucks, or motorcycles) are available to your household? _____ vehicles
19a. [If #19 is ONE OR MORE] Could you have used one of these vehicles to complete this trip? O Yes O No

20. Including YOU, how many people live in your household? _____ people

21. Including YOU, how many people (over age 15) in your household are employed full/part-time? _____ people

22. What is your employment status? ***(check the one response that BEST describes you)***
O Employed full-time (at least 35 hrs/wk) O Employed part-time (less than 35 hrs/wk) O Retired
O Not currently employed, but seeking work O Not currently employed, and not seeking work O Homemaker

23. What is your student status? ***(check the one response that BEST describes you)***
O Not a student O Yes – Full-time college/university O Yes – Part-time college/university
O Yes – Vocational/technical/trade school O Yes – K-12th grade O Yes - Other

24. Do you have a valid driver's license? O Yes O No

25. Do you have a disability that limits your mobility? O Yes O No

26. What is your Age? O 15 & under O 16-17 O 18-24 O 25-34 O 35-44 O 45-54 O 55-64 O 65 & older

27. Are you Hispanic, Latino, or Spanish origin? O Yes O No O Choose not to answer
(includes: Mexican/Mexican American, Puerto Rican, Cuban/Cuban American, Columbian, Nicaraguan, Guatemala, etc.)

28. What is your Race? ***(check all that apply)***
O American Indian / Alaska Native O Asian O Black/African American
O Native Hawaiian / Pacific Islander O White / Caucasian O Other: _____

29. Do you speak a language other than English at home? O No O Yes - **Which language?** _____
29a. [If #29 = Yes] How well do you speak English? O Very well O Well O Less than well O Not at all

30. What is your gender? O Male O Female O Transgender O Non-binary/third gender
O Other/Prefer to self-describe O Prefer not to say

31. Which of the following BEST describes your TOTAL ANNUAL HOUSEHOLD INCOME in 2021 before taxes?
O Less than $10,000 O $15,000 - $24,999 O $35,000 - $49,999 O $75,000 - $99,999
O $10,000 - $14,999 O $25,000 - $34,999 O $50,000 - $74,999 O $100,000 or more

32. What did you use to plan this trip? O Paper schedule O Called customer service O Google Transit
O Online trip planner (suntran.com) O Sun Tran App O Did not do any trip planning O Other_____

33. How often do you ride transit (Sun Tran, Sun Link, Sun Shuttle)? O Everyday O 5 days/week
O 2-4 days/week O Once/week O 2-3 times/month O Once per month O Less than once per month

34. How long have you been riding public transit in the Tucson area?
O First time riding O Less than 1 year O 1-2 years O 2-5 years O 5-10 years O More than 10 years

35. What is the service enhancement that is of most importance to you (select only one)?
O More frequent service O Earlier operating hours O Later operating hours
O More weekend service O Shorter travel time O Different destinations O Other

REGISTER TO WIN 1 of 5 Transit Goodie Bags

People who submit an accurately completed survey will have the option of being entered in a random drawing for one of five Transit Goodie Bags. You must provide your home address at the beginning of the survey to be eligible.

Name: _____

Phone Number: (_____) _____

Email:_____

Are you willing to participate in future Tucson transit research and may we email/text you? O Yes O No

Thank you for your help!