Shore Transit "Choice Ridership" Study

FINAL REPORT

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Executive Summary

Shore Transit is a transportation agency that services the communities of the Lower Eastern Shore of Maryland, offering three route systems for individuals who live in Somerset, Wicomico, and Worcester County. These routes include rural fixed, local fixed, and ADA paratransit services. This report provides an overview of effective strategies public transportation agencies have implemented to increase their ridership. Compared to other peer transit agencies identified in our research, Shore Transit faces considerable challenges including:

1. Difficulty increasing ridership demand among potentially receptive sub-populations:
    a. Tourism
    b. Student Population
    c. Aging elderly population
2. Failure to attract ridership among college students outside of the standard university routes.
3. Slow adoption of technology which enables riders and consumers to access bus service (especially through mobile apps).
4. Uniform/flat fee structure for each Shore Transit route.

Despite these challenges, Shore Transit has been extremely effective in serving the region's elderly population. It has been a priority of Shore Transit to service this vulnerable population and provide a safe and efficient mode of transportation. Some of these benefits include:

1. Door-to-destination services for ADA paratransit riders, including:
    a. Transportation to doctor's appointments
    b. Dialysis trips
2. Affordable transportation for low-income riders.
3. Large variety of transfer routes.

Shore Transit's use of ADA paratransit routes greatly benefits the Lower Eastern Shore's aging population, many of whom lack access to private transportation. With the growing elderly population, maintaining the quality of ADA paratransit services will be imperative. Providing riders with more affordable rates and flexible ridding options should expand ridership, especially amongst low income residents.

This report summarizes research which focuses on technological innovation and other innovative strategies have been successfully utilized by other transit agencies to boost ridership. These changes, which improve the rider experience, include interactive LED touchscreen screens at bus stops, wireless connectivity through a 4G WI-FI service on busses, and an improved ticketing processes to attract new riders while proving data to improve route efficiency. Experience suggests that for technology to successfully improve ridership outcomes, it must be engaging and leverage both community

demographics and the geospatial population distribution (i.e., population clusters). Strategically introducing these innovations into targeted Shore Transit's bus routes should lead to improved ridership numbers because of the improved focus on services and features that benefit riders. These improvements should reduce the pain-points associated with new riders trying the system and should boost the value proposition of utilizing public transportation. All riders will find the bus to be a more comfortable, entertaining, and less frustrating experience, thus increasing customer satisfaction.

As part of our research into innovative practices, we first identified high-performing peer transit agencies.

Using federal data, we identified a list of peer transit agencies in which their urbanized population was comparable to Shore Transit's service area (i.e. within +/- 20%). Amongst these peer agencies (see Appendix A), the star performers with the highest number of average annual trips per person were identified:

1. Duluth Transit Authority – 22.9 trips
2. Chittenden County Transportation Authority – 19.1 trips
3. Williamsburg Area Transit Authority* - 17.4 trips
4. Decatur Public Transit System – 12.1 trips
5. Williamsburg Area Transit Authority** - 11.5 trips
6. City of Columbia – 10.04 trips

Focusing on these high performing peer transit agencies, we identified common factors and characteristics that they share with Shore Transit and determined how they have reacted to and leveraged these shared characteristics. Lessons learned from these agencies can guide Shore Transit in its efforts to increase choice ridership. Based on this research, we conclude that in addition to improving the rider experience (from ticketing to the ride itself), increasing student and tourist ridership offers the greatest potential to significantly boost Shore Transit's overall ridership.

We then summarized our recommendations as follows:

Based on the research and findings contained in this report, we suggest that Shore Transit should introduce some of the operational enhancement that have been effectively used in other cities/transit agencies, even though our simulation has not shown statistically significant future choice ridership improvements.

Potential operational actions (new or enhanced) to increase choice ridership could include:

1. Technological Upgrades/Features
    a. An Enhanced User-Friendly Website
    b. A State-of-the-Art Mobile App
    c. Enhanced Bus Stop Features
    d. Universal WiFi Connectivity

2. Bus Attributes
    a. Enhanced Cleanliness
    b. Enhanced Customer-Tested Scheduling
    c. Targeted Destinations (Events, Downtown Locations, etc.)

3. Targeted Marketing/Advertising

To validate these findings, we conducted a survey of local opinion leaders (selected from the local chambers of commerce). A copy of the survey can be found in Appendix E and the survey scores can be seen in Appendix F.

Finally, we developed a simulation model using demographic data, Shore Transit ride data, the opinion leader survey data, and peer choice rider data as inputs. We then simulated future choice rider behavior for each of the operational enhancements we studied. A screenshot of the simulation findings can be seen in Appendix G. Unfortunately, none of the operational enhancements improved future choice ridership at the minimum threshold of 5%. The most likely reason for this is the lack of awareness among potential choice riders and scheduling inadequacies.

Background and Literature Review

Transit System Complications

Before making specific recommendations, it is important to identify and understand the long-term contributing factors to the national decline in public transportation utilization, specifically bus transit. As developments in technology and services increase, there are three key factors on which transit agencies should focus: bus frequency, fares, and rider satisfaction. One focus of this study is to analyze the external factors which have contributed to the decline in ridership of small-urbanized public transportation authorities.

Public transportation modes are increasing throughout the country (bus, subway, or light-rail), some of which possess different advantages and features that other modes lack. Despite this overall growth in public transportation options, transit agencies have struggled to attract and retain riders. Research indicates that one of the key factors driving users away from public transportation is the explosive growth in the popularity of alternative transportation network companies (TNCs) like Uber and Lyft.

In the last decade, Uber and Lyft have provided more than 2.6 billion passengers with domestic transportation, thereby negatively impacting public transportation ridership. Malalgoda and Lim (2019) address the point that increased popularity of these services in the U.S. also coincides with the decline in public transportation usage, despite being traditionally cheaper (due to subsidies) than alternatives like taxi services. Recent studies support the claim that TNCs are having an especially negative impact on bus transit. Mucci (2017) finds that TNCs are responsible for both a 7% growth in light rail ridership and a 10% decline in bus ridership in San Francisco. Thus, both small-urbanized transit authorities and transit agencies based in large, densely populated cities are struggling with the negative effects of TNCs on bus ridership.

As reported by Loxton, O'Conner, and Salman (2019), another contributing factor to the ongoing decline in public transportation ridership is the increasing congestion of private vehicles on the roads. Supporting this claim, Santoso *et al.* (2012) indicates that convenience is not the only factor that leads people to choose private vehicles over public transportation. Diverse activity locations, abundant parking lots, and the non-existence of traffic jams, have all encouraged individuals to choose private vehicles over public transportation.

Another culprit that potentially has a negative impact on public transportation ridership is the increasing use of Bike Sharing Systems (BSS) in heavily populated areas. Ma *et al.* (2019) find empirical evidence that the introduction of BSS has reduced bus ridership in both China and the U.S. Specifically, they estimate that BSSs lead to a 2.43% decrease in daily bus trips in New York City. However, Ma *et al.*

(2019) suggest that integrating dock-less BSS's around popular bus stops may be a potential solution as it incentivizes riders to take bikes to the nearest bus stop and then transferring to the transit system.

Potential Solutions

Research has made it clear that it is important to identify the potential advantages of using public transportation compared to private vehicles as the primary method of transportation. A study by Sharaby and Shiftan (2012) focused on the impact of fare integration on transit ridership and travel behavior in the city of Haifa, Israel. The study conducted an experiment whereby an integrated fare policy was implemented over a five-zone fare system with free transfers. After implementing this change, researchers found that the new system ended the downward trend in transit ridership. The study also found that single ticket sales increased 25% over the first year and the survey results indicated an increase of 7.7% in passenger trips and 18.6% in boarding. These results indicate that transit fares were a leading factor in low bus ridership, integrating a plan that focuses on fare reduction solved this issue.

Another contributing factor to the decline in bus ridership is the lack of direct routes connecting origins and desired destinations. For example, a recent study by Suman and Bolia (2019) found that Delhi, India saw improvement in ridership by increasing the directness of services (meaning without intermediate transfers). The researchers found that with the redesigned network, direct passenger-kilometers increased by more than 35% and travel time savings exceeded 8%. Similarly, the New York City Metro has rolled out an initiative known as Select Bus Service to improve bus performance along high traffic routes. Specifically, changes included "off-board fare payment, bus lanes, traffic signal priority, and longer spacing between stops."[1] Studying these policy changes, Tyndall (2018) found that they significantly increased service frequency, improved bus arrival reliability, and raised bus mode share by 1.9 percentage-points. Researchers have also discovered that improvements in route efficiency have positive spillover effects in their local communities. For example, Rosiers *et al.* (2010) found that homes located within the vicinity of direct bus lines had higher property values. This study also found that by offering more direct and efficient stops than both their regular and Metrobus services, the express service proved to be a convenient substitute to private cars for the average suburban homeowner with a regular working schedule.

[1] Source: http://web.mta.info/mta/planning/sbs/

Innovative Changes and Increasing Ridership

In New Orleans, the public transit system introduced cashless ticket scanners and a student U-Pass that ramped-up ridership and revenue. Students pay a fee, typically $30-$100 per year, in exchange for an unlimited transit pass. If Shore Transit were to adopt a mobile app-based electronic fare system, it would be relatively easy to implement a U-Pass similar to New Orleans.

Furthermore, transit systems realize that the people riding their buses want to be dropped off as close as possible to their destination, without needing to walk a long distance. As a rule of thumb; “the closer, the better.” Most transportation/transit planning texts indicate that the maximum walking distance for transit passengers is approximately one quarter mile or three- and one-half city blocks.

When looking at what other agencies have implemented to attract riders, a common finding is that they have incorporated technology into the transit system to attract ridership. For example, Hennick (2019) found that transit agencies in San Antonio, Salt Lake City, and Santa Clara now offer 4G Wi-Fi access on buses, trains, and trolleys. Wireless capability is not only a customer amenity, but also supports the transit agencies’ mission-critical back-end functions for passenger counts and bus-tracking systems. Offering connectivity can also provide broadcasting messages to digital signage, improving the accuracy of bus-tracking systems, delivering alerts and messages to riders. In addition, connectivity provides officials with real-time access to video security footage in the case of an emergency or other disturbance (Hennick, 2019).

Similarly, having a user-friendly, innovative mobile app can go a long way to improve the experience of public transportation riders. Potentially beneficial features include bus frequency, nearest bus locations, and arrival and departure schedules. According to Brakewood (2014), in order to address these reliability problems, transit authorities have increasingly provided real-time vehicle location and arrival information to riders via web enabled and mobile devices. Jaffe (2014) reports that 18 percent of riders using real-time mobile apps report frustration with bus waits as compared to 25 percent of riders not using such apps.

Another benefit of employing mobile apps is that it allows both consumer and transit authority to evaluate real-time data that is being generated and distributed through these apps. Real-time data collection is a beneficial tool in public transportation. From MARTA study, HART riders in the OneBusAway group went from waiting an average of more than 11 minutes at the start of the study to an average of 9.5 minutes once they used the app (Jaffe, 2014). Using an app that tracks when a transportation service is expected to arrive and depart, can help riders plan when they need to arrive at the bus stop so they are showing up much earlier than they need. Along with providing real-time information, apps can also make it easier for users to purchase tickets, as they do not have to take time pulling money out of their wallet/purse. Establishing an app that allows the user to charge the account will reduce the time it takes waiting in line.

A recent experiment carried out by First Bus clearly showed that 'flash pass' based mobile ticketing can reduce boarding time up to 75% if used instead of paying by cash (Passenger, 2017) At the same time, having a mobile app opens a new 24/7 window of interaction with customers. Effectively managing this opportunity can increase customer satisfaction and promote a positive brand awareness (Passenger, 2017). Incentives can be implemented to encourage riders to use the app over a cash/card monetary purchasing system. Incentives to increase ridership numbers could also come from discounts.

Another key innovation identified in research is the impact that bus attributes have on a rider's perspective. Bus attributes are as features that are specific to the amenities of a traditional public transportation bus (e.g., comfortable seating, wheelchair lift, etc.). An issue that has been witnessed with ridership, is the gradual inconsistency with buses failing to provide a comfortable internal environment for its riders. Areas of improvement could include seating comfort, ticket purchasing speed (or boarding speed), bus cleanliness, etc. Externally, these attributes include the cleanliness of bus stops and waiting areas, the extent to which bus stops shelter riders from the weather, and pertinent information (e.g., schedule, how to download app, how to pay for fares, etc.) being readily available to riders waiting for the next bus. Both the internal and external factors involved in establishing a high-quality user experience and environment will attract new riders and increase rider retention and utilization.

According to Business Insider, San Francisco has the best public transportation system (BART) in the U.S. (GVC, 2019). The University of San Francisco (USF) is located in a popular location within the city that allows BART riders to take advantage of and enjoy the transit system. To incentivize students to take advantage of this transit, USF gives students the Muni Pass, which allows them to have unlimited access to all of the city's transit options for free academic year (GVC, 2019).

Similarly, Rush University, located in central Chicago, gives its students ample public transportation options. There are two subway lines adjacent to the college, the Blue Line and the Pink Line. It also has bus routes stopping close to the campus. Like many Chicago colleges, Rush University provides passes that allow students to ride the Chicago transportation system for free (GVC, 2019). The college also operates a free shuttle for students who commute by rail from outside the city. This shuttle leaves the nearest train station to the college every 10 to 15 minutes from 6 am to 9:30 am and 3 pm to 6:30 pm. (GVC, 2019)

Finally, the University of Pittsburgh has partnered with its city's Port Authority to offer year-round free public transportation for its students. What makes the University of Pittsburg excel is the college-run free shuttle services. While Carnegie Mellon runs five shuttles from its campus (one of which is just two other routes combined into one), the University of Pittsburgh runs nine shuttle services, with significantly more stops. The University of Pittsburgh also runs its shuttles much longer into the day than Carnegie Mellon's, with a night bus operating to 3 am on weeknights and 5 am on weekends (GVC, 2019).

Shore Transit Studies

Salisbury's public transportation system, Shore Transit, is a public transportation provider for Maryland's Lower Eastern Shore Counties—Somerset, Wicomico, and Worcester County. Founded in 2003, Shore Transit is a division of the Tri-County Council for the Lower Eastern Shore. The division was established through legislation of the Maryland General Assembly in 2001 in an effort to facilitate regional planning and development for the Lower Eastern Shore.

Shore Transit's service area consists of approximately 1,162 square miles of land area. In the 2010 Census, the region had a population of 176,657, showing an increase of 13.3% over the 2000 Census population of 155,934 (KFH Group, Inc., 2016). Population growth should impact the structure and scope of services provided by the public transportation system, as well as boosting overall ridership. Over this period, Wicomico County experienced the most growth and now includes an urbanized area. The Salisbury Wicomico Urbanized area, includes the City of Salisbury, the City of Fruitland, the Towns of Delmar and Hebron, and adjacent areas in both Wicomico County, Maryland, and Sussex County, Delaware (KFH Group, Inc., 2016).

Public transportation provided by Shore Transit comes in the form of different types of transit services, including Regional Fixed Routes, Local Fixed Routes, and Origin-to-Destination (Demand Response Transportation) (KFH Group, Inc, 2017). Shore Transit's diversified transit services allow them to access and serve different characteristics of the everyday rider. The three routes provided all have different operating qualifications, one being the service is traveling across county lines, another providing service within the county, and the other is primarily for those who meet the needs of ADA paratransit services.

Shore Transit's Regional Fixed Route is a service to connect the three counties with the major activity centers in the region. Beginning in 2014, Shore Transit also started to scale back on their services during the winter because of seasonal changes in demand (KFH Group, Inc., 2016). This service acts as the connector between each of the three Lower Eastern Shore counties in Maryland for those people who are moving from one county to another. Additionally, Shore Transit provides another service called their Local Fixed Routes. Shore Transit operates five local fixed routes in the Salisbury-Wicomico urbanized area (KFH Group, Inc., 2017). The Local Fixed Route service is provided strictly within the constraints of the Salisbury area and does not travel farther than Fruitland or Delmar. Lastly, Shore Transit's Origin-to-Destination (or Demand Response Transportation) provides services within the ADA Paratransit service area -- three-quarters of a mile within a Fixed Route - for eligible persons with disabilities under the Americans with Disabilities Act of 1990 (***PowerPoint - Shore Transit Services***). ADA paratransit services are designed to help people, those who meet the specific qualifications of this service, with disabilities to feel more comfortable using public transportation services. To be eligible for the ADA Paratransit transit service, there are several qualifications that must be met:

Table 1. ADA Regulations on Paratransit Eligibility

According to the Regulations, these criteria identify whether individuals are considered eligible for ADA Paratransit
Individuals who, because of disability, are unable to fully access fixed route transit systems. This includes those that are not able to properly navigate in a fixed route service, despite having services that are fully accessible. Eligibility under this category is impacted by the complexity of the fixed route system. A solution to this could involve travel training for those who meet this classification.
Individuals who, because of disability, are unable to use a fixed route service because that service or station has not yet been made properly accessible or they are not able to board at the stop they wish to use. This criterion is largely dependent on whether the accessibility of the fixed route system is acceptable. Although most transit systems operate 100% of accessible fleets, eligibility for this criterion is due to the lack of accessible bus stops or stations.
Individuals who are unable to get to or from bus stops or rail stations due to barriers in their community's environment, combined with their disability, block them from getting to or from those bus stops or rail stations. Environmental barriers include but are not limited to, lack of curb ramps, lack of sidewalks, steep terrain, or the difficulty in negotiating a street crossing, which combined with the individual's disability, prevents using a fixed route, and does not confer eligibility under this criterion. It is the interaction of the environmental barrier and the individual's disability that is key in determining the eligibility under this criterion. (KFH, 2017).

One of the more challenging mandates for transit agencies is that, with ADA regulations and subsequent interpretations, capacity constraints mean the transit agency cannot deny trips for eligible riders, as long as the trips are within the required service area and service hours for a fixed-route service (KFH Group, 2017).

Shore Transit's previous studies, analyses of each specific route, based on a number of factors like revenue hours and miles, annual passenger trips, operating costs, passenger trips/hour, and cost per revenue mile, provided valuable operational guidance.

Other Transit Systems

Peer Transit Agency Summary

Duluth Transit Authority, which services a primarily tourist city, boasts an impressive 1,700 bus stops, reflecting how successful this transit agency is and the high volume of usage among residents. Duluth Transit Authority has two main services, Fixed Route and Paratransit Service. One of the unique actions taken by the transit authority is the implementation of environmentally "green" investments in several of their facilities. They have also used buses to decrease their carbon footprint by introducing seven new electric buses, making them the first transit agency in the state to operate electric fixed-route buses (Duluth Transit, 2020).

Chittenden County, Vermont's transportation system partnered with the Green Mountain Transit Agency in the early 2000s and many of the agency's riders are business professionals, tourists, and students attending local universities. The Chittenden County Transportation Authority (CCTA) has an Unlimited Access program for students, faculty and staff, who work and attend classes at any of the three major colleges/universities in the Burlington Area. Riders using this program contribute approximately 17 percent of CCTA's system ridership annually. CCTA also seeks to be more student-friendly and provide more information to students who need it.

Williamsburg, Virginia is a large tourist city whose population is rather small at just over 14,000. A big contributor to the success of their transit system is due to the large number of tourist attractions available and the University of William and Mary, which is located in Williamsburg as well. Williamsburg's transit system looks to help tourist by offering their services as an alternative to private transportation. The Transit System provides users with the ability to become eco-friendly, as well avoid local traffic. Williamsburg's transit system offers a mobile app that helps contribute to improved safety, efficiency, and service for each of their riders.

Another star performer is Decatur Public Transit System, providing services to the people of Decatur, Illinois. One of the unique features this transit system offers is the use free transfers through other Decatur Public Transit System routes to attract more riders. Additionally, this transit system also offers another unique feature, punch cards, that lead to better frequency in loading, which also cuts unnecessary time from one stop to another.

The last of the star performers is the City of Columbia Public Transportation in Missouri. The City of Columbia's public transportation system is at the center of the University of Missouri, whose population alone makes up a quarter of the city's total population. One of the unique features they provide are free transit routes for students on all of their "Tiger Lines" that run seven days a week for the fall and spring

semesters, as well as “Game Day Football Routes,” two routes that run through the downtown Columbia area.

Shore Transit’s implementation of electric buses could help lower their carbon footprint on the Eastern Shore, which would be similar to what Duluth Transit Authority’s impact has been slowly switching to electric buses in 2018. Another component Shore Transit could take from these star peer performers that could benefit their system is a partnership with local transit agencies in the tri-county area, more specifically Ocean City’s public transportation. A partnership could see a rise in both agencies. Shore Transit’s current status in ridership shows to have a better performance than the seasonal performance of Ocean City’s transportation service. However, Ocean City’s tourism public transportation can help Shore Transit’s system with the number of riders they see during the summer season.

Five-Star Transit Systems

Numerous transit agencies were identified in data downloaded from the National Transit Database that provide insight into their performances for 2018. The data in this database includes unlinked passenger trips, urbanized population, service area square miles, passenger miles, average cost per trip, operating expenses, and average fares per trip. Calculating the average number of trips per person, there were five transit agencies that performed noticeably better than all peer agencies identified (see the table in Appendix A). Transit agencies identified in Appendix A service urbanized populations that are within +/- 20 percent of Shore Transit's urbanized population. The data in this table also includes the average number of trips per year, with those highlighted in blue having more than ten average trips per person annually from which we identified the top performers. The five-star performers include:

1. Duluth Transit Authority – 22.9 trips
2. Chittenden County Transportation Authority – 19.1 trips
3. Williamsburg Area Transit Authority* - 17.4 trips
4. Decatur Public Transit System – 12.1 trips
5. Williamsburg Area Transit Authority** - 11.5 trips
6. City of Columbia – 10.04 trips

Duluth Transit Authority

Duluth, Minnesota

Duluth Transit Authority's public transportation system averaged just under 23 trips per person in 2018. Duluth's transit system provides "service through four cities, in Minnesota and Wisconsin, along the western-most point on Lake Superior; cities include Duluth, Superior, Proctor, and Hermantown." (Duluth Transit – About DTA, 2020) What makes Duluth Transit Authority so successful is their geographic location, the city being a business and commercial shipping hub, and being a tourist town. Some of the major industries in Duluth are located in their "manufacturing, banking, healthcare, and arts and entertainment district." (CityData – Duluth: Economy, 2020) One of the more vital parts to the city's economy comes "from their commercial shipping sector, designated as a Foreign Trade Zone which ranks among the top ports in the country in total volume of international and domestic cargo shipped in a 10-month season." (CityData – Duluth: Economy, 2020)

The Transit Authority's service area is large, offering transit service to four cities in two states. One characteristic that stood out is the 1,700 bus stops they provide for the citizens across their service area. Duluth Transit Authority has two main services, Fixed Route and Paratransit Service. 7 electric buses, 6 hybrid, 53 diesel, and 3 trolley that brought more than $17 million to its operating budget with close to 3 million in annual ridership in 2018 operate the fixed route service. The Paratransit route is operated by 12 vehicles, which brought almost $1 million to their operating budget, and more than 34,000 to their annual ridership in 2018 (Duluth Transit, 2020). As stated previously, the transit authority has made substantial "green" investments in infrastructure and uses buses that decrease their carbon footprint. For example, in 2018 the transit authority introduced the state's first fixed-route new electric buses.

A downside to Duluth's transportation network is the struggle they have had with encouraging the student population, University of Minnesota Duluth, to ride the bus. A study from UMD (Epstein, 2019) was conducted to find various attitudes and beliefs that may stop students from riding public buses. Perceived barriers of time inefficiency and unfamiliarity with using the bus system has made many students avoid riding the buses in Duluth. The City of Duluth's student population numbers approximately 10,000 students, and is likely to grow. Additional reasons for low student ridership include bus route/times and weather conditions. Epstein (2019) reports that 71% of survey participants stated that they drive to school because it gets them there faster. This was the most chosen answer, followed by not wanting to get up earlier and fear of missing stops. Frequency and reliability are vitally important for transportation systems seeking to attract those who prefer driving their personal vehicles.

Chittenden County Transportation Authority

Chittenden County, Vermont

Chittenden County's transportation system partnered with the Green Mountain Transit Agency in the early 2000s, and operates in Chittenden County, Vermont. Using data from the National Transit Database, it was determined that they averaged slightly over 19 trips per person in 2018. Their public transportation service resides in the heart of the largest county in Vermont, along with the most populous city (Burlington). While the county does hold over a quarter of the state's total population with approximately 108,000 people, Chittenden County is home to some of the largest employers in the state and the entire country.

Business and tourism are heavily concentrated in this area in the state. "The business world in Chittenden County is home to a few big-name corporations, both nationally and internationally, like Ben and Jerry's, Bruegger's, and an IBM manufacturing plant" (Livability, 2019). The University of Vermont, based in Burlington, is another performance driver for the transit system. Students who do not feel the need to drive a car every day have elected to use the transit system. The other component that helps with the public transit system is the response they get from tourism and being located near Lake Champlain. Some of the more popular tourist attractions around the "Chittenden County area include the Shelburne Museum, Lake Champlain Cruises, ECHO Lake Aquarium and Science Center, Waterfront Park and Burlington bike path, and Smugglers Notch and Ski Resorts." (Rogers, 2019)

Chittenden County's public transportation success can be attributed to the attention they receive in their local tourist attractions, and corporations located in Burlington. Students in Burlington play a significant role in the county's public transportation performance with a considerably high number of passenger trips and miles. The Chittenden County Transportation Authority (CCTA) has an Unlimited Access program for students, faculty and staff, who work and attend classes at any of the three major colleges/universities in the Burlington Area. Riders using this program contribute approximately 17 percent of CCTA's system ridership annually. (Cochrane and Jinadu-Wright, 2015) CCTA sought to be more user friendly towards students, so they simplified the Burlington route map by looking at current routes and their proximity to key points of interest like shopping, restaurants, entertainment, etc. They applied that information to a printed, foldout piece of paper that could fit into your pocket. One side included the stripped-down map with key points of interest and the other side included basic "how-to" information. It also included a pocket that can accommodate a student ID card which students swipe in the farebox upon boarding the bus. In addition to the pocket-maps, CCTA printed this new service map in large format and posted them at select shelters around campus (Cochrane, & Jinadu-Wright, 2015).

Williamsburg Area Transit Authority

Williamsburg, Virginia

Williamsburg Area Transit Authority has two different types of service, both Directly Operated and Purchased Transportation. Annually, Williamsburg's provides more than 11 trips for their directly operated services. However, their third-party transportation services, purchased transportation, provides approximated 17 trips per person per year. Being a purchased transportation service means the service itself is contracted by a third party. Williamsburg is a large tourist city with a small population of just over 14,000 residents. A contributor to the success of their transit system is the large number of tourist attractions available and University of William and Mary, which is located in Williamsburg. "The university's student enrollment makes up roughly 45% of the city's total population, which can be another contributor to their increased ridership." (U.S. News, 2020)

Another performance enhancer to their ridership is the "number of tourists attracted to the area with attractions like Busch Gardens, Colonial Williamsburg, Historic Jamestown, Jamestown Settlement, Yorktown Battlefield, and much more." (VisitWilliamsburg, & TripAdvisor, 2020) With Williamsburg being a popular tourist city, tourism strongly influences the performance of public transportation services.

WATA has improved safety, efficiency, and service for their riders by using real-time information which is provided by using Clever Devices, a company that specializes in devices and applications for bus services. WATA's ITS program uses the following Clever Devices products: CleverCAD®- computer-aided dispatch and automatic vehicle location and BusTime®- provides real-time passenger information (KFH Group, 2016).

Decatur Public Transit System

Decatur, Illinois

Based in Decatur, Illinois, the Decatur Public Transit System provides 15 service routes to its more than 73,000 citizens. After evaluating the National Transit Database data, it was determined that the transit agency averaged 12 trips per person per year. In researching this public transportation system, little information was found, but a few features stand out. For example, “a unique feature that was found through research is their use of free transfers through other Decatur Public Transit System routes.” (City of Decatur, IL, 2020) This allows the transit system to attract riders who are not willing to pay more for additional trips that involve transferring to a new route line. “Another feature that could be looked at as an advantage are their use of punch cards that lead to better frequency in loading, which cuts unnecessary time from one stop to another.” (City of Decatur, IL, 2020)

Although Decatur is a mid-sized city, “Decatur is in the heart of agriculture country, labeled as the “Soybean Capital of the World,” while also being a semi-popular tourist city” (CityTownInfo, 2020). Along with being in an agricultural country, “two big named agriculture companies are housed in the region, one being ADM and the other Tate & Lyle North America.” (CityTownInfo, 2020) Businesses play a key role in the way public transportation is performed, especially in a dense area, can contribute to a significant increase in ridership. The two colleges/universities in Decatur, Illinois play a significant role in Decatur Public Transit System’s overall ridership as well.

City of Columbia Public Transportation

Columbia, Missouri

The City of Columbia's public transportation system is located in the center of the University of Missouri, whose population alone is nearly 30,000 students, making it a quarter of the total city population of 120,000 people. Having a transit system at the center of a college town puts a significant emphasis on the dependency for students to ride the bus to and from classes. With the service producing an average number of 10 trips per person per year, it is the smallest of the top performers based on the ridership criteria. The student population has contributed to much of the success that the public transportation system has enjoyed.

The student population as a whole, has benefited from the services provided to them. "A unique feature was found in research conducted on this transit authority and the City of Columbia, is that they provide free transit routes on all of their "Tiger Lines" that run seven days a week for the fall and spring semesters." (GoCOMO, 2020) The city's transit authority also offers "Game Day Football Routes, two routes that run through the downtown Columbia area and four routes that run to and from major area hotels for the game that only cost the passengers $1.50 one way. High school students or younger benefit from these services as well, receiving free rides by showing their student I.D.s to the bus driver" (Columbia Public Transit, 2020).

Natural Advantage

Geographical and Other Advantages

Shore Transit has a unique opportunity to exploit the geographical location in which they offer their services. The Eastern Shore of Maryland is home to different colleges, universities, businesses, and tourist attractions, such as Ocean City, Maryland, and a growing elderly population. Earlier in this report, five different transportation agencies were described as "stars" because of different features and strategies they have implemented. Shore Transit has a similar opportunity like the agencies mentioned, as Salisbury University is located in Salisbury and Ocean City is a popular tourist attraction outside of Salisbury. The University and Ocean City provides Shore Transit with at least two unique opportunities they must exploit to increase ridership. In addition to the two opportunities previously stated, the growing elderly population on the Lower Eastern Shore is another demographic that Shore Transit could leverage. Identifying and implementing the correct strategies to capture a larger audience such as students, employees, tourists, and the elderly, could increase choice ridership.

Salisbury is also home to some large employers like Perdue Farms, Peninsula Regional Medical Center, and Salisbury University (Wicomico County- Major Employer Lists), who are also the largest employers in the tri county area. Salisbury also has the geographic advantage of being within a prime distribution region. Salisbury's location puts them three hours from each of the nearest large cities, which provide quality distribution connections to these large cities. For example, if a business were to interact with businesses residing in Philadelphia or Washington D.C., they would only have to drive at most three hours one-way (without any issues with traffic).

Advantages

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Decatur Public Transit System, City of Columbia, and Chittenden County Transportation Authority, all serve local residents but also serve large populations of students. There are two colleges/universities in Decatur, Illinois, the University of Missouri is in Columbia. In addition to this, Chittenden County Transportation Authority serves the students of the University of Vermont. Salisbury University is home to over 8,000 students, which makes up roughly 25% of Salisbury's total population (Salisbury University). This number should increase as the university continues to grow and expand their facilities and programs.

As stated previously, a downside to Duluth's transportation network is the struggle they have had with encouraging the student population to ride the bus. Shore Transit has a similar problem, but fortunately for Shore Transit, a growing Salisbury population and limited parking provide them with a unique opportunity. As the student population grows, there has been an increase in parking "issues". Parking that provides students with a short (five minute or less) walk to campus buildings is limited. Like the previous systems stated, Shore Transit should look at implementing more stop locations throughout campus and more frequent stops per hour. The current system runs two buses in the morning that stop every 15 minutes or so, at the library on Salisbury's campus. In the afternoon, there is one bus that stops about every 20 minutes or so. Buses that come more often (every 10 minutes) and drop off at more locations throughout campus may attract riders.

Instead of offering their normal housing routes for students, Shore Transit should consider routes that leave from either campus or campus residential buildings that take students directly to points of interest like grocery stores or the mall. This service could benefit students who will not have to transfer lines to get to where they need to go, among these students benefiting from this service are freshman and international students who do not have their own personal transportation methods or rely on others to

get them around town. Exploring these routing ideas could potentially see an increase in the way students use public transportation in Salisbury.

As stated previously, Ocean City, Maryland is a popular tourist attraction throughout the summer months. (Need to find this statistic on the census….) Ocean City is home to about approximately 7,000 individuals, the city itself hosts between 50,000 and 350,000 people depending on the time of year, and about eight million individuals visit each year (Town of Ocean City, Maryland, 2020 & U.S. Census Bureau, 2019). The city attracts a large number of people, especially throughout the summer months. Finding quick and reliable transportation for traveling throughout Ocean City can be difficult, especially when traveling for work, recreation and other events.

Currently, Shore Transit has two different routes heading toward Ocean City, one of which drops riders at the south end of the town and the other drops riders in West Ocean City. Unfortunately, once riders leave the bus they are "on their own" in terms of transportation throughout Ocean City. Residents can take the Ocean City bus, ride a taxi, and/or use Uber/Lyft. Changing transportation is inefficient for individuals who are heading to work, visiting the beach, or attending other events along the 10-mile strip of Ocean City. Short Transit could explore adding a stop shortly before the route 90 bridge around 60th street. This would allow riders the opportunity to travel on the same Shore Transit bus further north. This location is also unique because after making a stop, the Shore Transit buses could use the route 90 bridge to travel back west towards Salisbury. Buses would not have to travel south through Ocean City and deal with the busy traffic in the warmer months.

In addition to Salisbury University and Ocean City, Shore Transit should take advantage of another demographic feature of being on the Lower Easter Shore. The tri-county area is home to a growing elderly population, who are 65 years and older. According to the census, in 2019, 27.8% of Worcester County residents are 65 years or older. This is the second largest percentage in the state, as Worcester County only trails Talbot County at 29.2%. Somerset County's 65 and older population consists of 17% of the population and Wicomico County's is 15.9% respectively. U.S. Census Data indicates that for the three Lower Eastern Shore Counties, the elderly population has experienced growth from 5-12 percent. Data shows that Wicomico County experienced the greatest 5-year change at 13.5% from 2012 to 2017, while Worcester experienced a 19.3% growth rate from 2009 to 2017.

As the elderly population continues to age, the ability to perform routine activities such as going to doctor's appointments, grocery stores, malls, and other experiences, become more difficult. A variety of health conditions can have a severe impact on the ability to drive a car and navigate roadways. Many individuals across the country refuse to stop driving, this can be dangerous not only for themselves, but for others who surround them.

In fact, the Community Transportation Association of America (CTAA) predicts that elderly traffic fatalities will triple by the year 2030. Additional research also indicates that older individuals who are no longer able to drive attend fewer medical appointments, shop less, go out to fewer restaurants, and reduce the frequency of their visits to friends and family compared to drivers of the same age (Connolly, 2019).

With a growing 65+ population on the Lower Eastern Shore, there is an excellent opportunity for Shore Transit to increase choice ridership, while also contributing to the community in a positive manner by proving seniors with an alternative form of transportation. The Lower Eastern Shore's gradual increase in elderly population raises the question of what can be done to provide valued services to this specific market demographic. A unique way to attract the elderly population into using public transportation is through various incentives. A study from AARP (U.S. Department of Transportation, 2010) suggests that incentives and disincentives both have the capability to significantly alter travel behavior. Disincentives in public transportation are factors that lead people away from using their own vehicles as their primary mode of transportation, and include: parking fees, travel tolls, and vehicle registration (U.S. Department of Transportation, 2010), which help make public transportation a more cost-effective method of travel. On the other hand, incentives could include features like Bus-only-travel-lanes and priority signals for buses, will both provide buses with faster traveling times on the street network (U.S. Department of Transportation, 2010).

Introducing these incentives and taking advantage of the disincentives in personal vehicle transportation should cause an increase in Shore Transit's ridership across ADA paratransit routes, and a slight improvement in their overall ridership numbers. The study also suggests that attracting senior drivers provides numerous benefits to the elderly population. For example, elderly riders familiarizing themselves with fixed route services can alleviate the pressure on the elderly population to continue driving (U.S. Department of Transportation, 2010). Similarly, finding a series of methods or initiatives/innovations that help meet the public transportation needs of the elderly community is a vital part in attracting these riders. One study suggests policies like improving transportation options, expanding ADA paratransit services to those who do not qualify but still have some difficulty in traveling or driving, and expanding door-to-door and volunteer community-based transportation services (The Council of State Governments, 2012).

Methodology & Results

There were three main methods used in this report that helped to derive the resulting recommendations. First, peer comparisons were used to get an understanding of what transit agencies are doing well to increase their bus ridership. Second, a literature review of the existing transportation agencies was conducted to identify effective strategies to boost bus ridership. Third, brainstorming and SWOT sessions were used to identify new and innovative ideas. Using these methods, the goal of the project is to find the most suitable methods for Shore Transit to consider that will attract more choice riders to their bus routes, and provide guidance regarding Shore Transit's next steps moving forward.

Firstly, from the national transit database provide a variety of different information and statistics of numerous transit agencies. This information was about their unlinked passenger trips, urbanized population, service area square miles, passenger miles, the average cost per trip, operating expenses, and average fares per trip of FY18. After gathering this research, data on the number of trips per person was collected to ranking the perspective agencies. There were five transit agencies that came out as star performers from a list of transit agencies, the table is found in Appendix A. These agencies highlighted in blue, were calculated to have more than ten average trips per person annually which helped identify the top performers from the list. The five, star performers based on this specific category, with their average number of trips, include Duluth Transit Authority, Chittenden County Transportation Authority, Decatur Public Transit System, City of Columbia, Missouri and Williamsburg Area Transportation Authority.

Analyzing the different peer transit agencies, identified in Appendix A, allowed for different opinions and conclusions to make, as well as what the key strategies and innovations are that make these other transit agencies successful. Another area looked at during research was whether these geographic areas and transit climates were closely matched to what Shore Transit's natural environment is. Research tools that supplied a considerable sized portion of the background research done was performed through databases like EBSCO host, Google Scholar, Salisbury University databases, and general Google searches as well.

Along with the research done on the various peer transit agencies identified, analyzing the geographic advantages and opportunities that are present for Shore Transit helped decide which strategies would be the most beneficial given Shore Transit's location. It was found that the Eastern Shore of Maryland is home to three popular universities (both locally and state) some large businesses, tourist attractions like Ocean City, Maryland. Finally, appropriate methods for Shore Transit are present in what the recommendations are moving forward for the transit agency.

To validate these findings, we conducted a survey of local opinion leaders (selected from the local chambers of commerce). A copy of the survey can be found in Appendix E and the survey scores can be seen in Appendix F.

Finally, we developed a simulation model using demographic data, Shore Transit ride data, the opinion leader survey data, and peer choice rider data as inputs. We then simulated future choice rider behavior for each of the operational enhancements we studied. A screenshot of the simulation findings can be seen in Appendix G. Unfortunately, none of the operational enhancements improved future choice ridership at the minimum threshold of 5%. The most likely reason for this is the lack of awareness among potential choice riders and scheduling inadequacies.

Recommendations

Based on the research and findings contained in this report, we suggest that Shore Transit should introduce some of the operational enhancement that have been effectively used in other cities/transit agencies, even though our simulation has not shown statistically significant future choice ridership improvements.

Potential operational actions (new or enhanced) to increase choice ridership could include:

4. Technological Upgrades/Features
    a. An Enhanced User-Friendly Website
    b. A State-of-the-Art Mobile App
    c. Enhanced Bus Stop Features
    d. Universal WiFi Connectivity

5. Bus Attributes
    a. Enhanced Cleanliness
    b. Enhanced Customer-Tested Scheduling
    c. Targeted Destinations (Events, Downtown Locations, etc.)

6. Targeted Marketing/Advertising

As stated earlier in this report, technological enhancements have a clear impact on ridership increases in other transit systems. To address the impact technology has on a public transportation system, a study from the University of South Florida (Polzin, 2016) states that technology is influencing virtually all aspects of travel, from planning to payment to in-travel entertainment, in addition to controlling vehicle functions.

Real-time accessible data is important because the transit agency will be able to access key demographics of their riders riding on specific routes and distance traveled. Readily accessible data is also important to riders as well, because this data gives the rider a sense of when the bus will likely arrive/depart. Through research, it was discovered that the share of riders frustrated with bus wait

times fell from 25 percent to 18 percent for those using real-time apps (Jaffe, 2014) Mobile apps can play a pivotal role in the way data can be available and properly conducted through a Shore Transit mobile app. A mobile app, like the examples in Appendix C, can include routing maps, purchasing methods, and even a mobile ticket bar scanner. Another technological feature that would prove to be a success, especially for long distance commuters, is the access to a wireless network. In summary, along with a unique, state-of-the-art Shore Transit mobile app, a user-friendly website that is easy to navigate and highly interactive is highly recommended. .

A note on emerging competitors:

1. Transportation Network Companies (TNC)
    a. Uber and Lyft

2. Bike Sharing Systems
    a. Rental bike markets.
    b. "Purchase, Go, Drop"

Public Transportation has seen a wide range of challenges that have had a big impact on public transportation ridership. One of the more challenging issues comes from TNC's like Uber and Lyft. TNCs offer more frequent (and more direct) service than the average bus transportation service. To lessen the effect of TNCs taking away riders, Shore Transit could focus on improving routes to offer more frequent service along streamlined and more direct routes that service large numbers of riders. The addition of more Ocean City or Salisbury University routes/stops is one such example.

Another challenge that transit agencies have encountered is Bike Sharing Systems. As mentioned above, Bike Sharing Systems are services that allow people to rent a publicly shared bike and leave it at or near their destination. Researchers found that these Bike Sharing Systems were responsible for a 2.43% decrease in daily bus trips in New York City. The study also found that integrating these Bike Sharing Systems, whereby riders take/return bikes near bus stops and then transfer over to bus transit can actual boost ridership. Specifically, a 10% increase in Bike Sharing System usage resulted in a 2.6% increase in transit ridership in Washington D.C. (Ma et. al., 2019). Shore Transit scould test out this market in popular bus stop locations to increase ridership or see if integrating this service into the public transportation service has a significant impact on ridership in Lower Eastern Shore communities. Providing a Bike Sharing System can also reach a certain group of people who are not willing to walk more than they need to get to the nearest bus stop.

Finally, Shore Transit could take advantage of the growing older population (65+). This is a key strategy to consider as this age range is increasing rapidly and likely to produce more people incapable of driving, thus increasing ADA paratransit participation. Also mentioned in the Advantage section of this report,

Shore Transit could consider a less stringent process/qualification method for this type of service. Making the qualifications less strict will enable those who do not meet the ADA standards, but still have a difficult time getting around through public transportation, the ability to access the same features as those who do meet the qualifications of ADA paratransit.

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Appendix A

National Transit Database BEACON Calculations

SECTION I – AVERAGE NUMBER OF TRIPS ANNUALLY FOR ALL TRANSIT AGENCIES WITHIN A +/- 20% OF SHORE TRANSIT's URBANIZED POPULATION

Figure 1.1: Average Number of Trips Annually with Miles Traveled per Person

Agency	Number of Trips Per Person	Miles Traveled per Person (Annually)
Albany Transit System	8.009	42.311
Blue Water Area Transportation Commission	**10.987**	**35.505**
Borough of Pottstown – Pottstown Area Rapid Transit	2.173	2.488
Brazos Transit District	2.379	15.203
Broome County Department of Public Transportation	12.352	44.461
Cedar Rapids Transit	7.117	32.649
Chittenden County Transportation Authority	**19.125**	**50.936**
City of Brownsville – Brownsville Metro	6.412	29.137
City of Columbia	**10.043**	**24.679**
City of Fargo, DBA: Metropolitan Area Transit	8.145	33.125
City of Jackson Transportation Authority	5.294	15.218
City of Moorhead, DBA: Metropolitan Area Transit	2.954	11.436
City of Tulare	1.316	5.782
City of Visalia – Visalia City Coach	6.426	39.181
Cooperative Alliance for Seacoast Transportation	4.564	37.898
County Commissioners of Charles County, MD	6.843	47.910
Decatur Public Transit System	**12.117**	**35.138**
Duluth Transit Authority	**22.932**	**91.312**
Eau Claire Transit	8.810	22.567
Erie Metropolitan Transit Authority	12.990	42.693
Gold Coast Transit	9.460	39.165
Greater Lafayette Public Transportation Corporation	31.906	79.590
Hill Country Transit District	2.032	12.178
Laredo Transit Management, Inc.	11.658	39.520
Macatawa Area Express Transportation Authority	3.417	13.463
Montachusett Regional Transit Authority	4.592	19.056
Municipality of Anchorage – Public Transportation Departme	11.709	50.855
Municipality of Anchorage – Public Transportation Departme	1.137	8.046
Pueblo Transit System	5.905	21.294
Redding Area Bus Authority	5.654	40.580
Rogue Valley Transportation District	7.519	41.958
Saginaw Transit Authority Regional Service	3.999	26.755
Salem Area Mass Transit District	12.727	38.945
Santa Barbara Metropolitan Transit District	32.109	131.465
Santa Clarita Transit	8.628	36.494
Santa Cruz Metropolitan Transit District	29.065	129.693
Santee Wateree Regional Transportation Authority	1.768	10.466
Su Tran LLC dba: Sioux Area Metro	4.989	20.860
The Eastern Contra Costa Transit Authority	8.041	57.080
The Gulf Coast Center	1.883	10.017
The Tri-County Council for the Lower Eastern Shore of Maryl	2.828	73.391
Topeka Metropolitan Transit Authority	8.141	33.864
Transit Authority of Central Kentucky	0.445	8.933
Transit Services of Frederick County	4.003	23.323
Ventura Intercity Service Transit Authority	0.137	0.812
Williamsburg Area Transit Authority	**17.358**	**22.367**
Williamsburg Area Transit Authority	**11.515**	**50.420**
Yakima Transit	7.458	26.573
Yuma County Intergovernmental Public Transportation Auth	3.212	33.364

SECTION II – UNLINKED PASSENGER TRIPS YEARLY TIME SERIES GRAPH FOR EACH STAR PERFORMER AND SHORE TRANSIT

Figure 1.2: Unlinked Passenger Trip Time Series Graph for Shore Transit

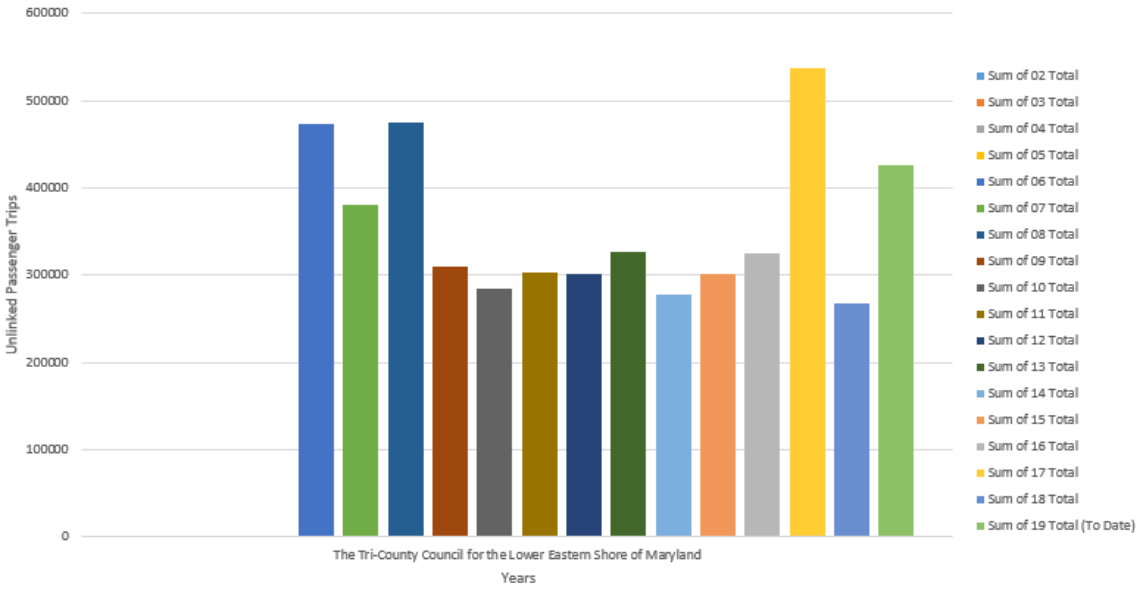


Figure 1.3: Unlinked Passenger Trip Time Series Graph for Duluth Transit Authority

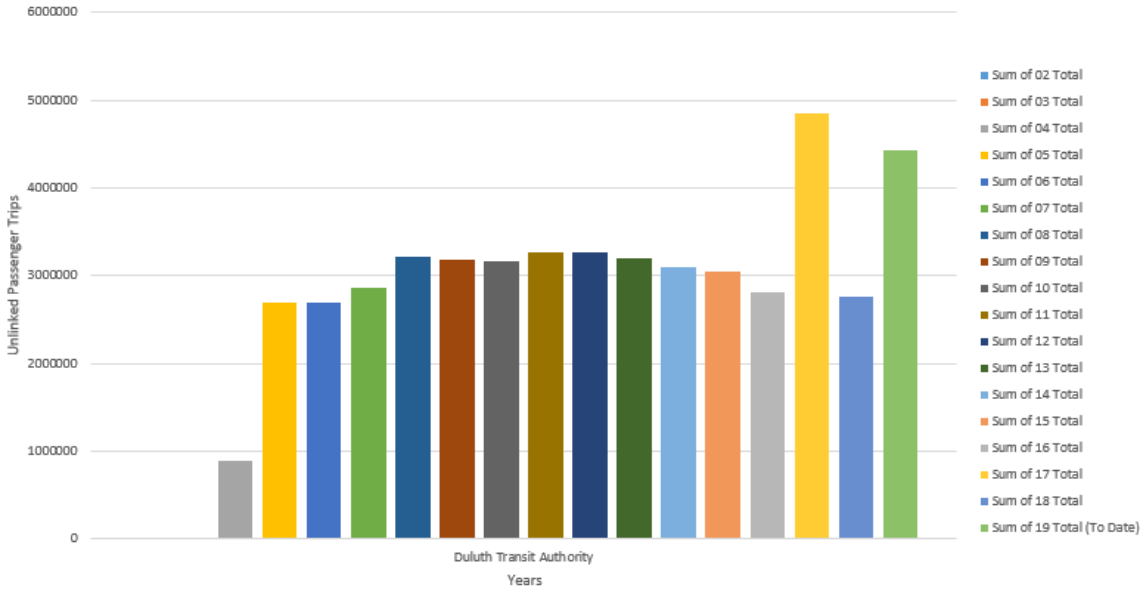


Figure 1.4: Unlinked Passenger Trip Time Series Graph for Chittenden County Transit Authority

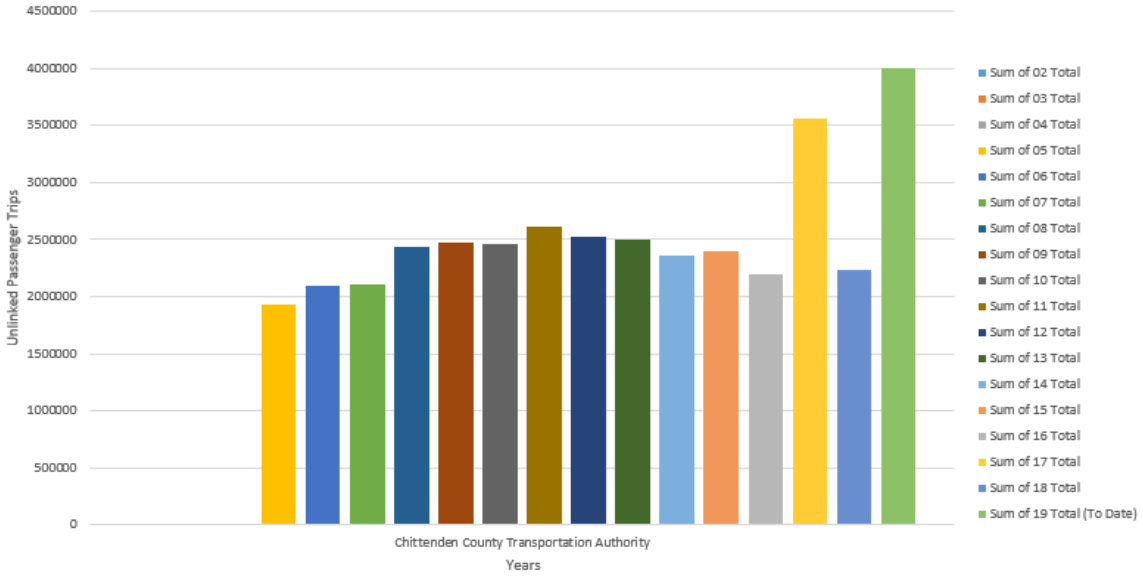


Figure 1.5: Unlinked Passenger Trip Time Series Graph for Williamsburg Area Transit Authority

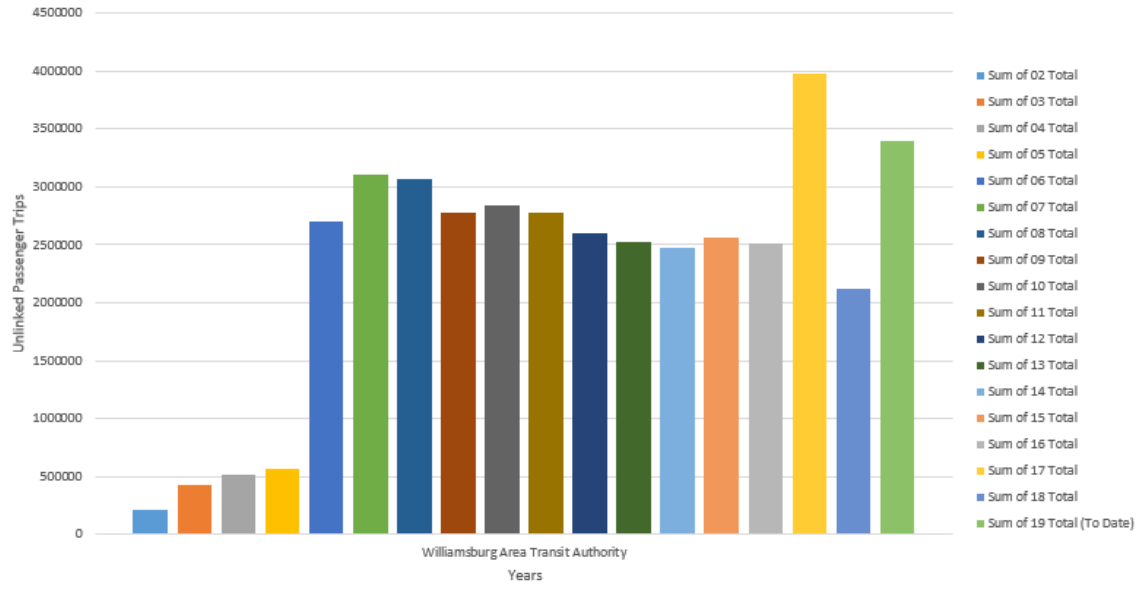


Figure 1.6: Unlinked Passenger Trip Time Series Graph for Decatur Public Transit System

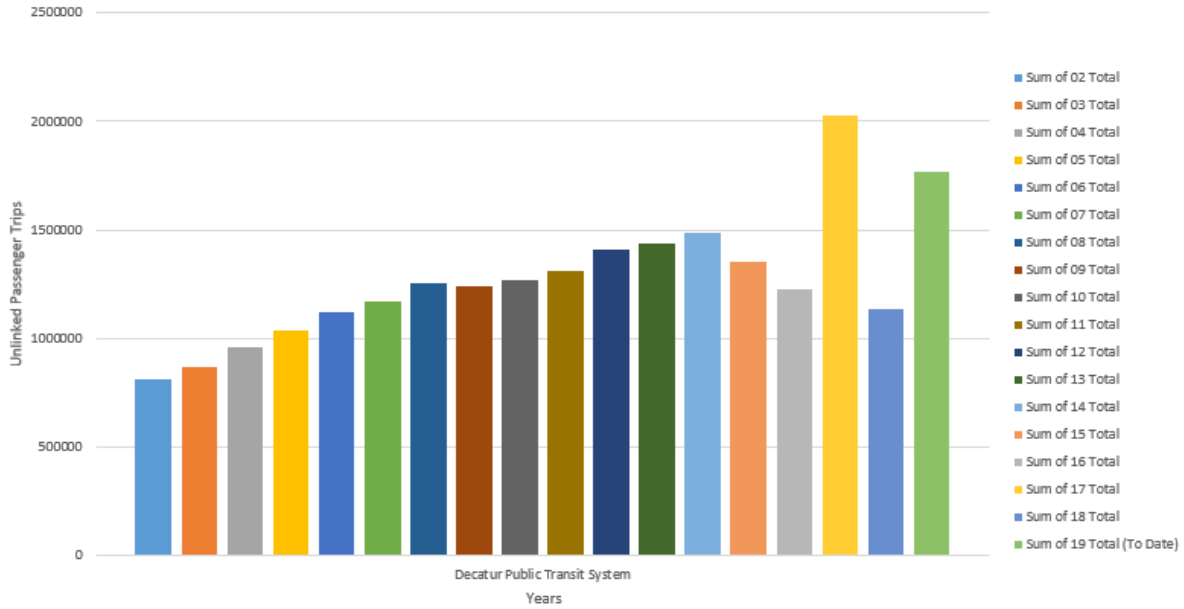
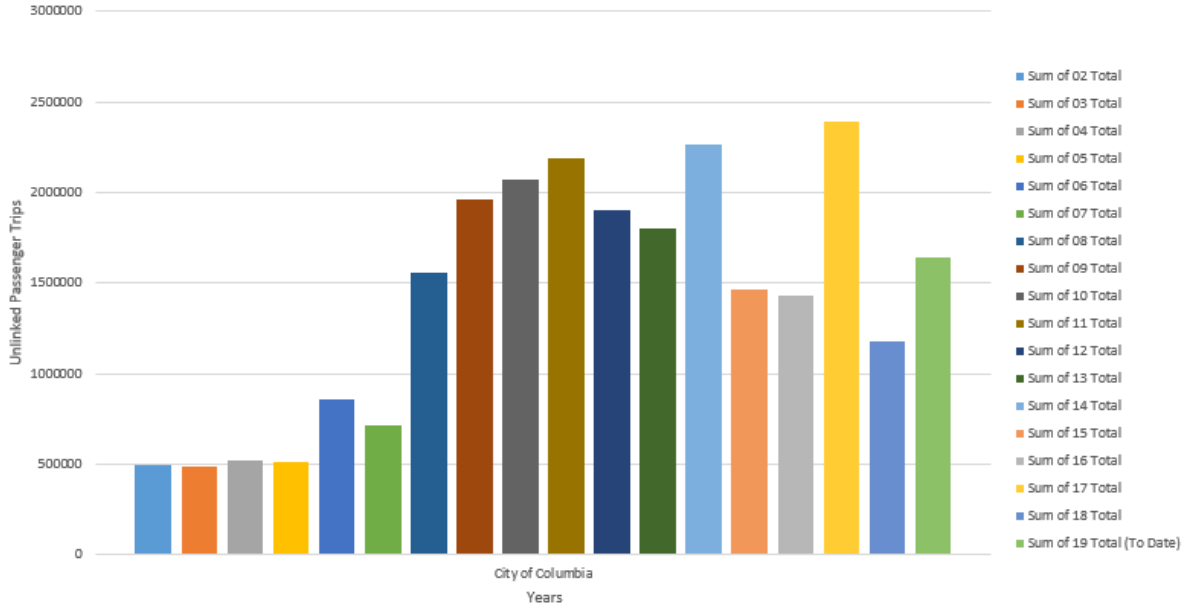


Figure 1.7: Unlinked Passenger Trip Time Series Graph for the City of Columbia, MO



Appendix B

National Transit Database Comparison Analysis of Star Performers and Shore Transit

SECTION I - COMBINED RIDERSHIP - ALL MODES

Figure 2.1: Combined Ridership - All Modes for Shore Transit

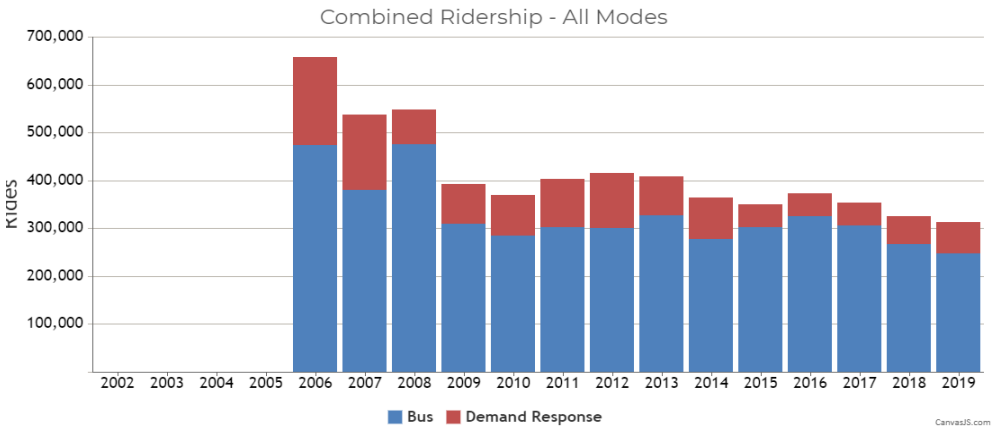


Figure 2.2: Combined Ridership - All Modes for City of Columbia, MO

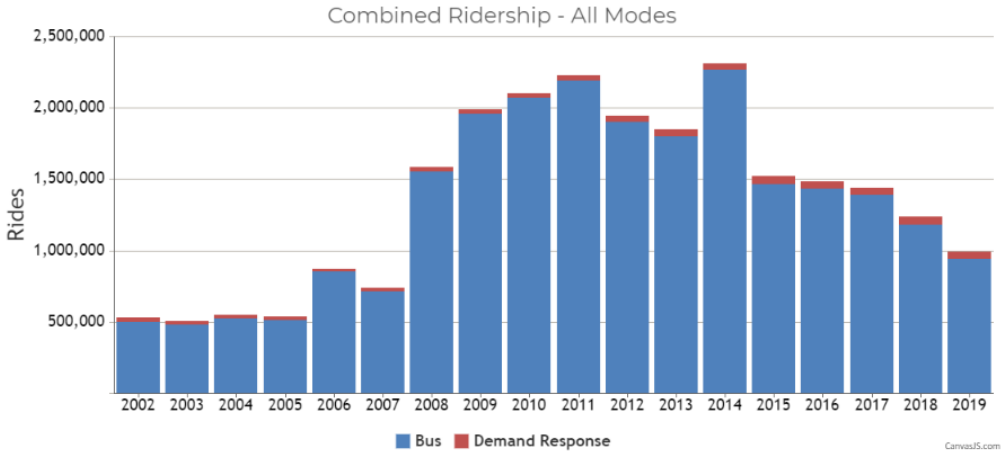


Figure 2.3: Combined Ridership - All Modes for Decatur Public Transit System

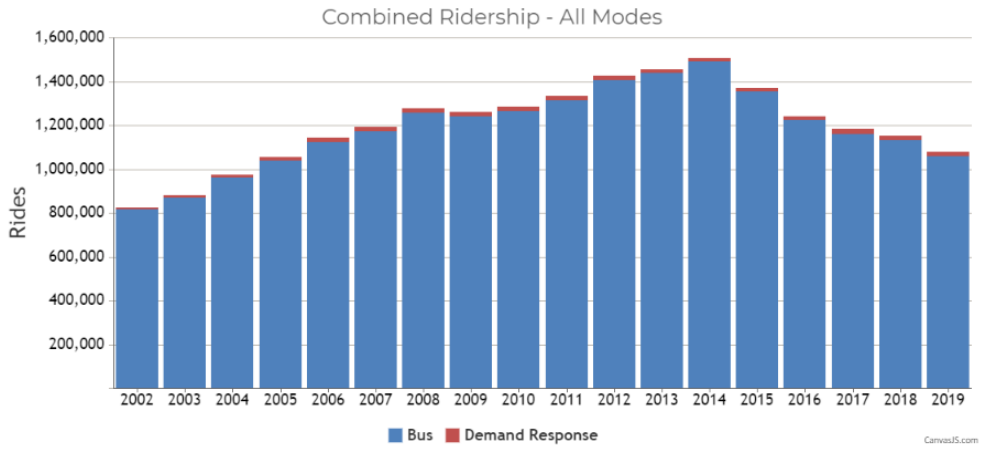


Figure 2.4: Combined Ridership - All Modes for Williamsburg Area Transit Authority

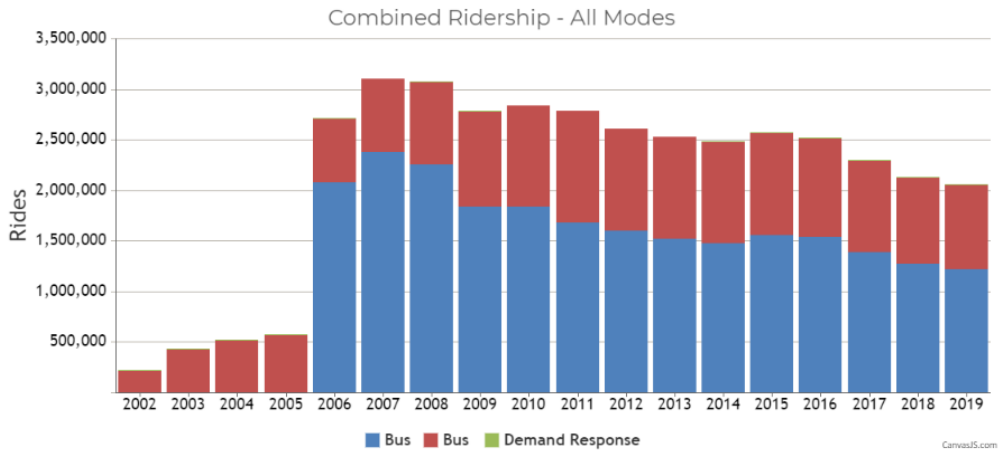
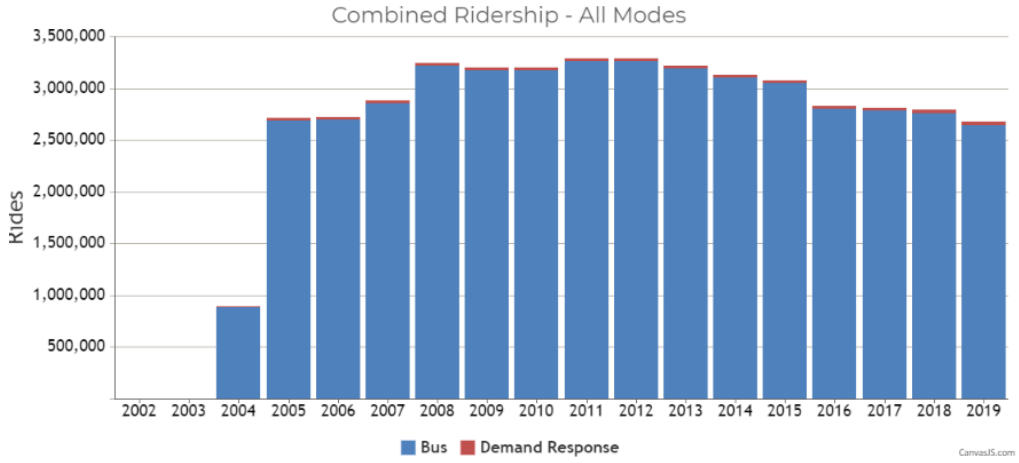


Figure 2.5: Combined Ridership - All Modes for Duluth Transit Authority



SECTION II - INDIVIDUAL MODE SERVICE DETAILS (DIRECTLY OPERATED) FOR FY17

Figure 2.6: Individual Mode Service Details - Bus (DO) - Shore Transit

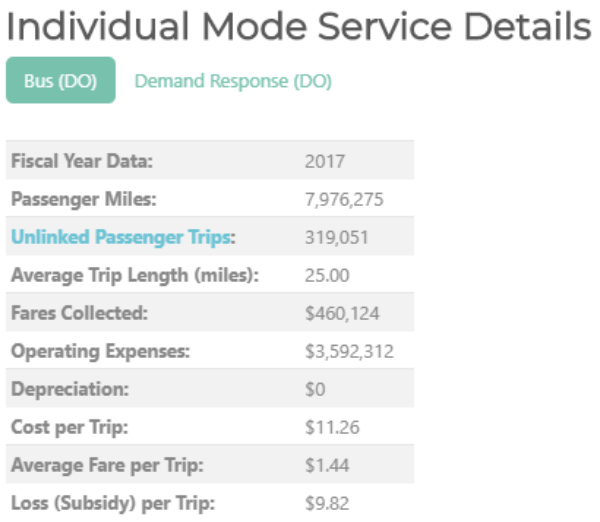


Figure 2.7: Individual Mode Service Details - Bus (DO) - City of Columbia, MO

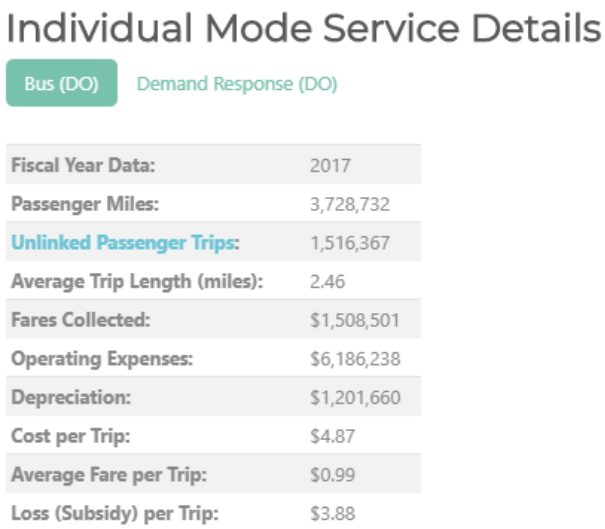
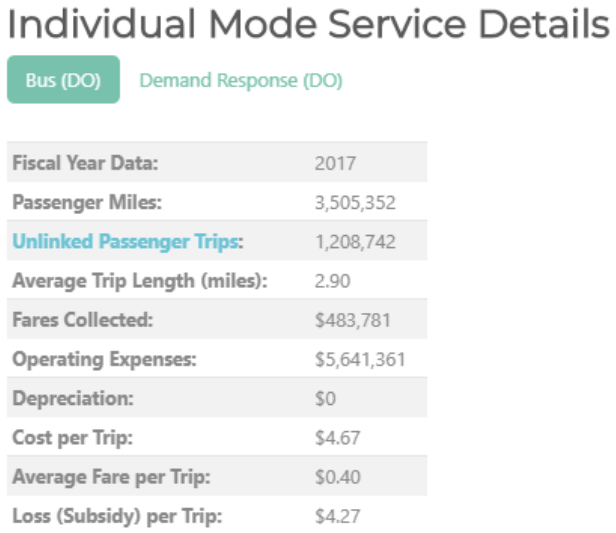


Figure 2.8: Individual Mode Service Details - Bus (DO) - Decatur Public Transit System

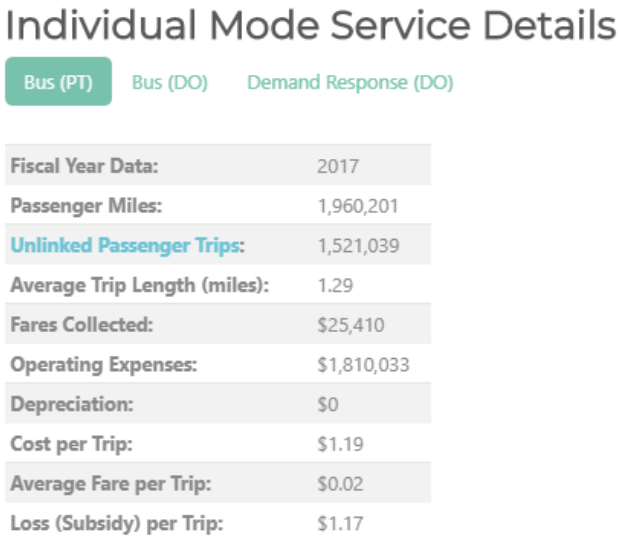


Individual Mode Service Details

Bus (DO) | Demand Response (DO)

Fiscal Year Data:	2017
Passenger Miles:	3,505,352
Unlinked Passenger Trips:	1,208,742
Average Trip Length (miles):	2.90
Fares Collected:	$483,781
Operating Expenses:	$5,641,361
Depreciation:	$0
Cost per Trip:	$4.67
Average Fare per Trip:	$0.40
Loss (Subsidy) per Trip:	$4.27

Figure 2.9: Individual Mode Service Details - Bus (DO) - Williamsburg Area Transit Authority



Individual Mode Service Details

Bus (PT) | Bus (DO) | Demand Response (DO)

Fiscal Year Data:	2017
Passenger Miles:	1,960,201
Unlinked Passenger Trips:	1,521,039
Average Trip Length (miles):	1.29
Fares Collected:	$25,410
Operating Expenses:	$1,810,033
Depreciation:	$0
Cost per Trip:	$1.19
Average Fare per Trip:	$0.02
Loss (Subsidy) per Trip:	$1.17

Figure 2.10: Individual Mode Service Details - Bus (DO) - Duluth Transit Authority

Individual Mode Service Details

Bus (DO) | Demand Response (PT)

Fiscal Year Data:	2017
Passenger Miles:	10,920,098
Unlinked Passenger Trips:	2,786,702
Average Trip Length (miles):	3.92
Fares Collected:	$2,433,944
Operating Expenses:	$15,680,025
Depreciation:	$4,867,374
Cost per Trip:	$7.38
Average Fare per Trip:	$0.87
Loss (Subsidy) per Trip:	$6.51

SECTION III - ANNUAL RIDERSHIP CHANGES

Figure 2.11: Annual Ridership Changes for Shore Transit

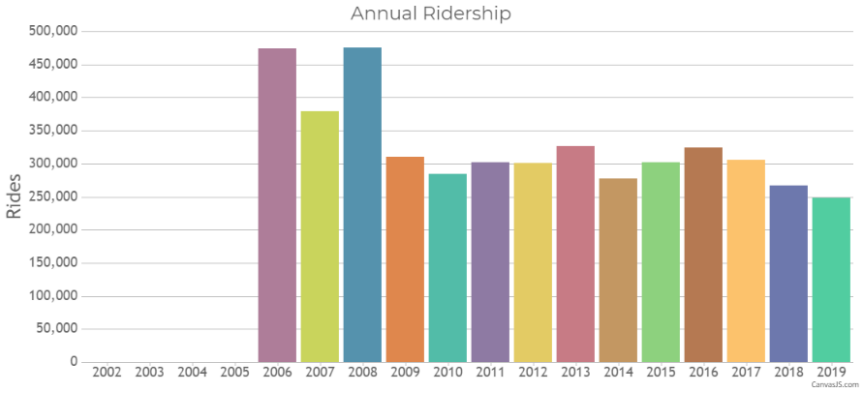


Figure 2.12: Annual Ridership Changes for the City of Columbia, MO

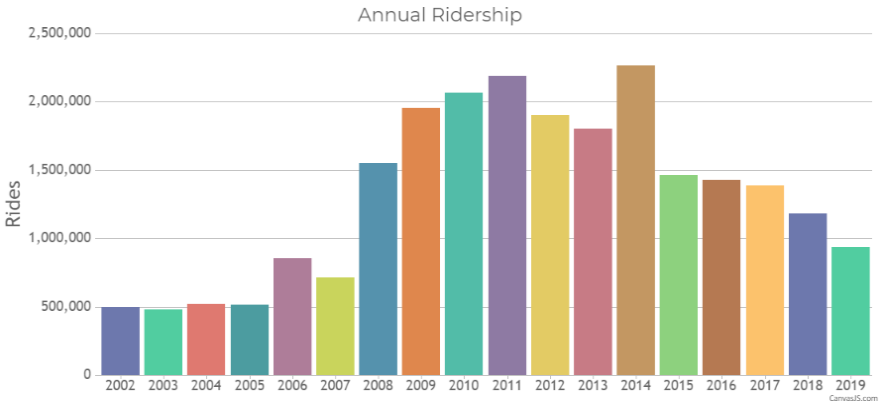


Figure 2.13: Annual Ridership Changes for Decatur Public Transit System

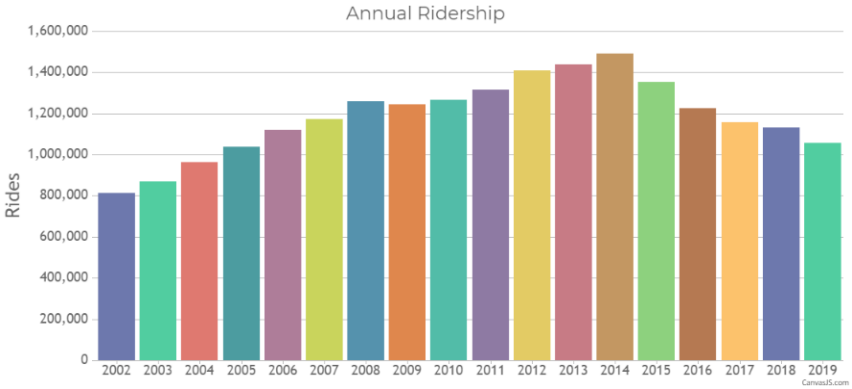


Figure 2.14: Annual Ridership Changes for Williamsburg Area Transit Authority

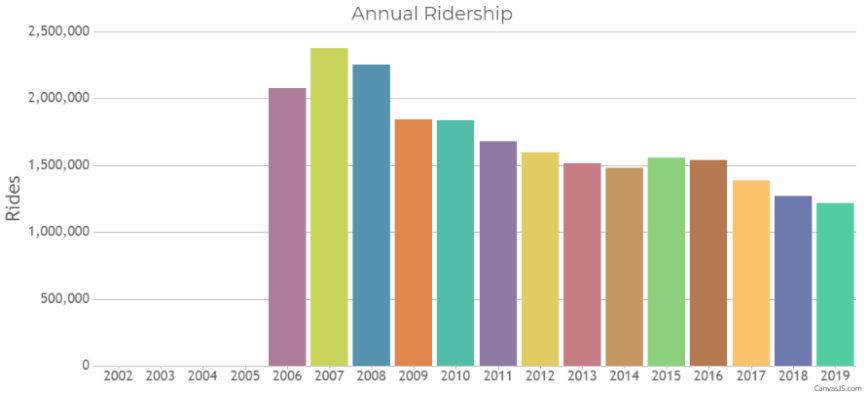
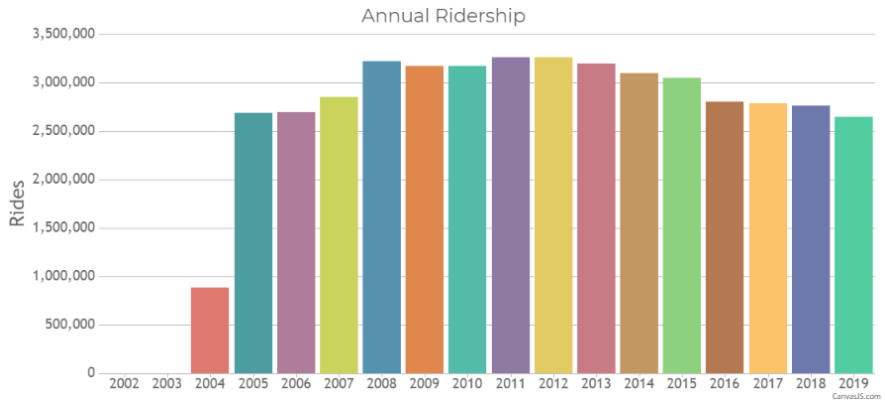


Figure 2.15: Annual Ridership Changes for Duluth Transit Authority



SECTION IV - YEAR-OVER-YEAR RIDERSHIP CHANGE PERCENTAGE (MONTHLY)

Figure 2.16: Year-over-Year Ridership Change % (Monthly) for Shore Transit

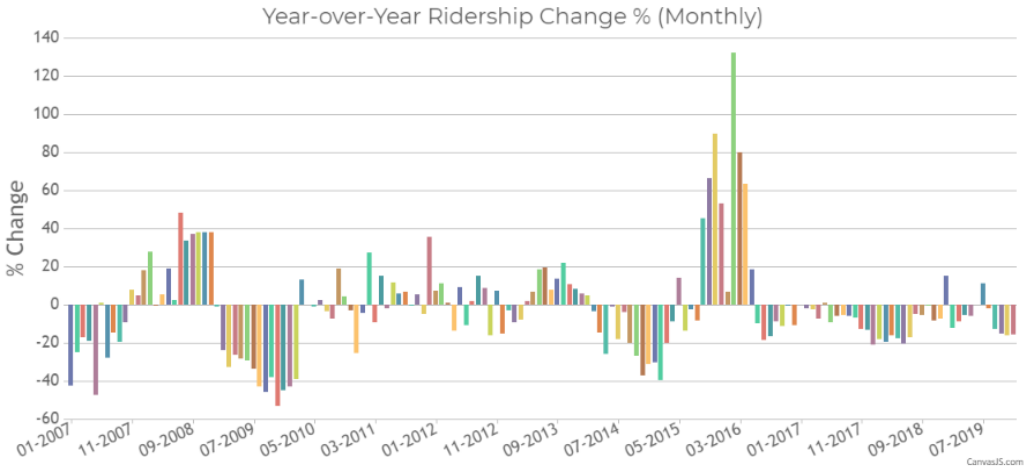


Figure 2.17: Year-over-Year Ridership Change % (Monthly) for City of Columbia, MO

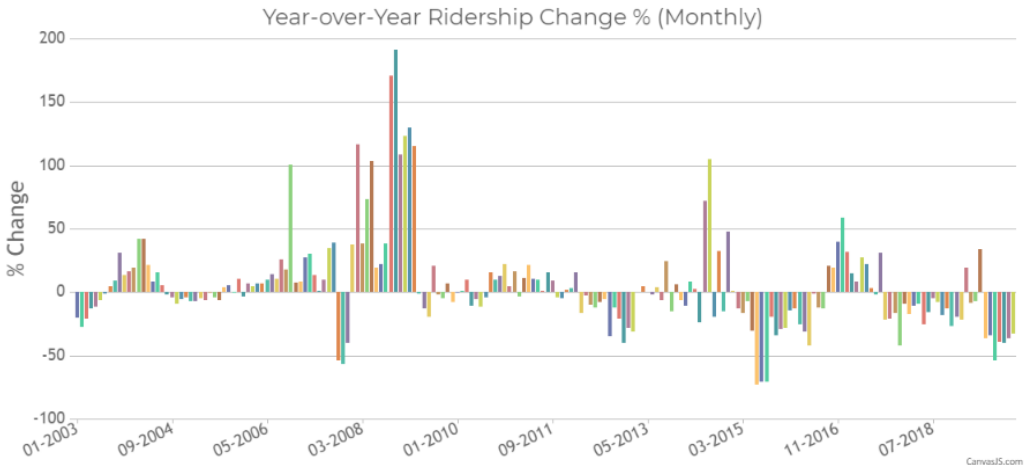


Figure 2.18: Year-over-Year Ridership Change % (Monthly) for Decatur Public Transit System

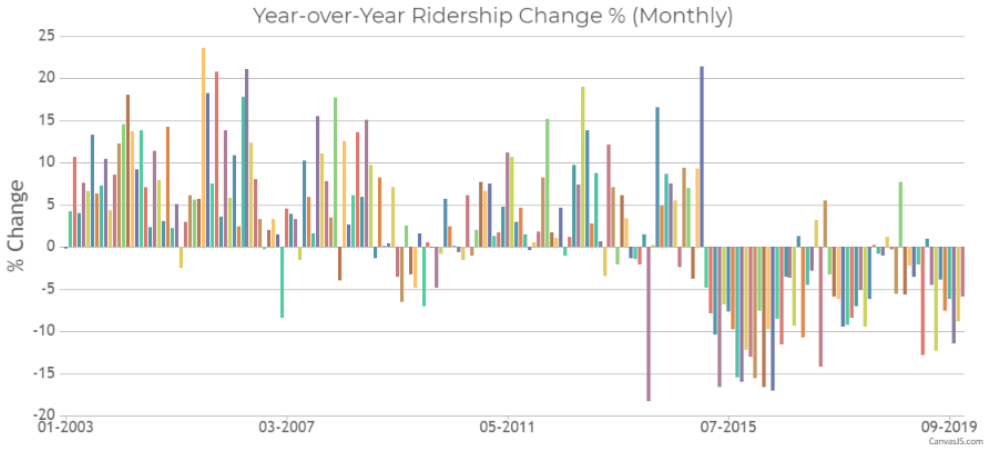


Figure 2.19: Year-over-Year Ridership Change % (Monthly) for Williamsburg Area Transit Authority

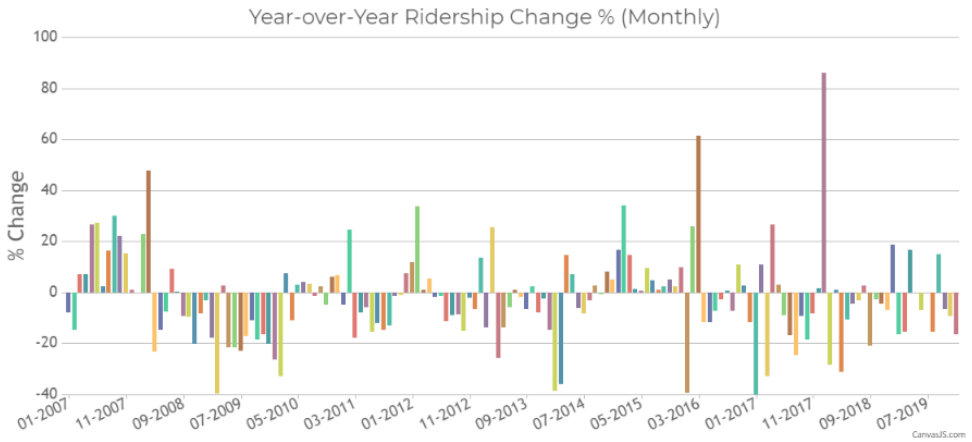
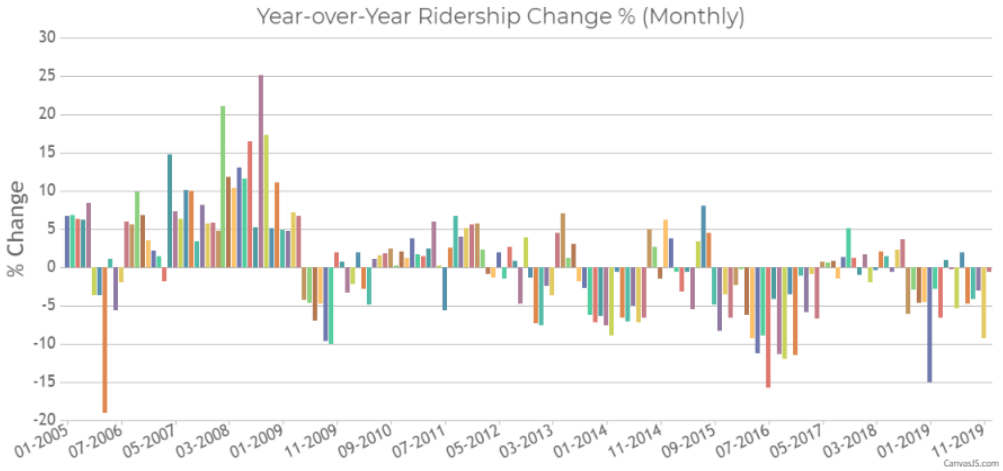


Figure 2.20: Year-over-Year Ridership Change % (Monthly) for Duluth Transit Authority



Appendix C

Examples of Apps Used by Other Agencies (Figures)

SECTION I - MOBILE APPS USED BY OTHER TRANSIT AGENCIES

Figure 3.1: "MARTA" Bus Service App Example

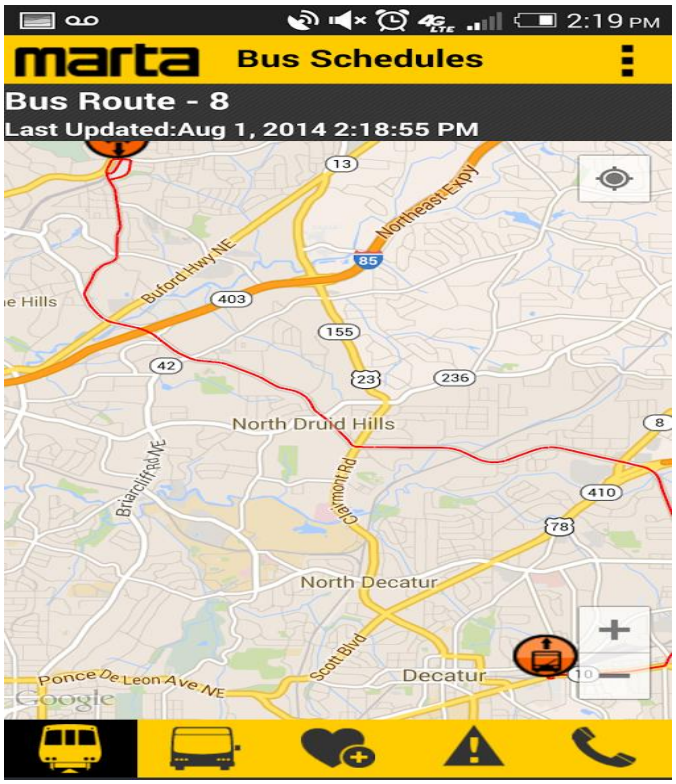
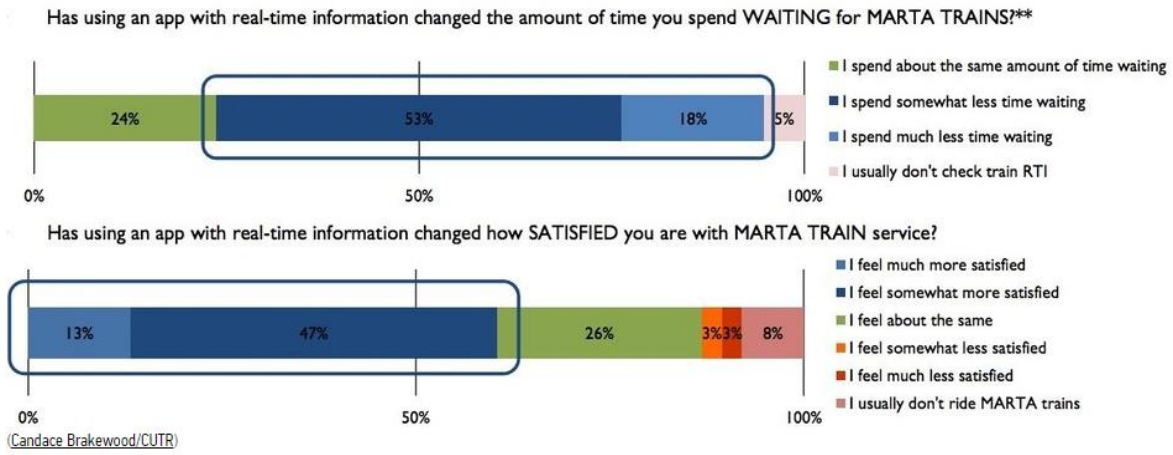


Figure 3.2: "MARTA" Transit Polling/Surveying Riders Results



SECTION II - THIRD PARTY APPS AVAILABLE

Figure 3.3: "Transit App" Overview

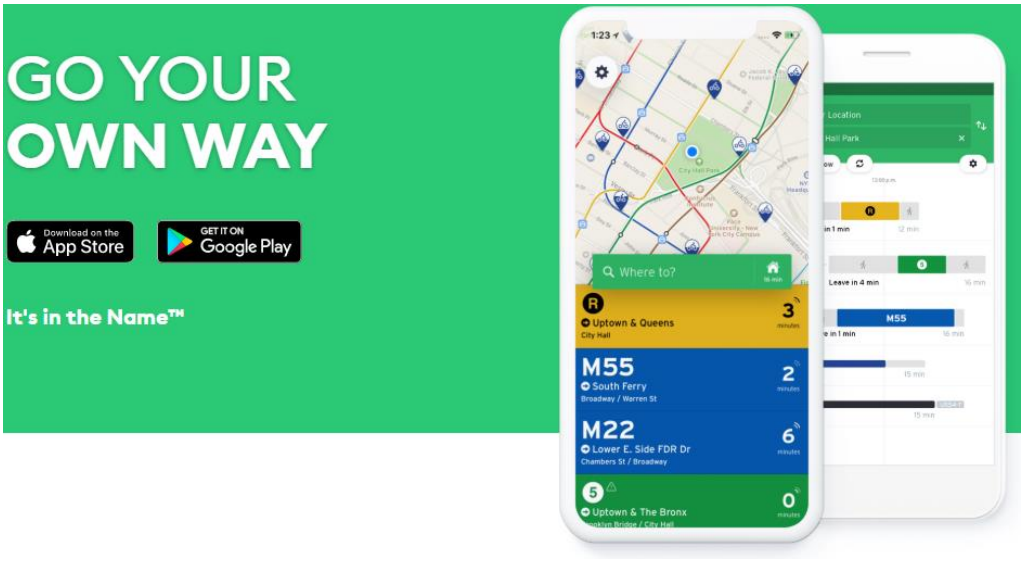


Figure 3.4: "Transit App" Number of Stops to Destination

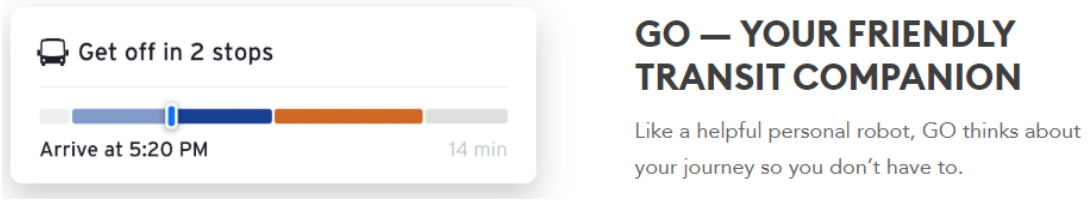
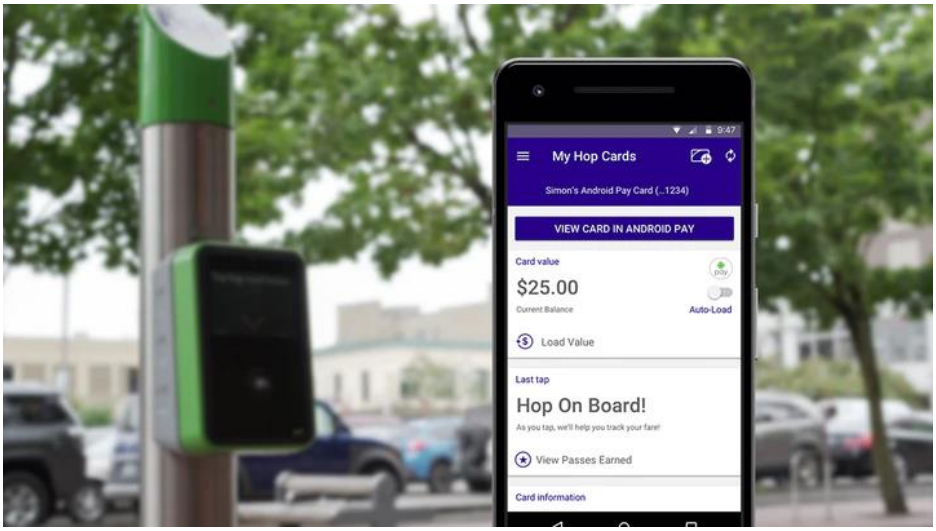
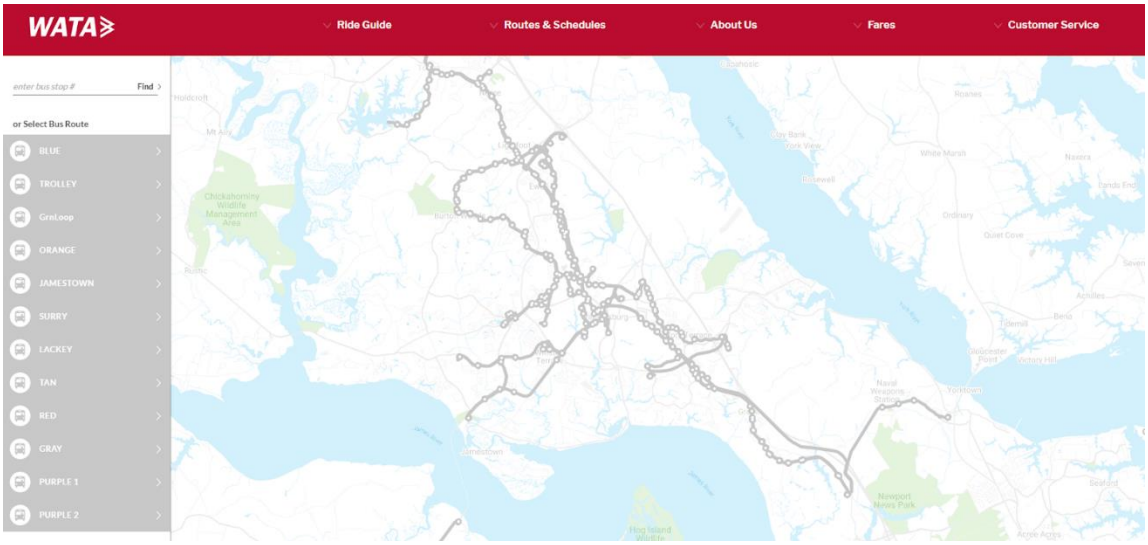


Figure 3.5: "Moovel's" Partnership with Google Payment Feature



SECTION III - USER FRIENDLY WEBSITES BY OTHER TRANSIT AGENCIES

Figure 3.6: WATA BusTime Application



Appendix D

Important Demographic Data from U.S. Census

SECTION I – POPULATION DEMOGRAPHICS BY COUNTY

Figure 4.1: Population Demographics by County

Population Demographics (Percentages)			
	Somerset	Wicomico	Worcester
Population	25,675	103,195	51,823
Persons over 18	82.9%	78.0%	82.8%
Persons over 65	17.0%	15.9%	27.8%
White Alone	53.9%	66.5%	83.1%
Black or African American	42.0%	27.1%	13.1%
Hispanic	3.6%	5.4%	3.6%
Asian	0.9%	3.1%	1.5%
In Civilian Labor Force	43.5%	65.6%	59.2%
Median Household Income	$ 39,239	$ 54,493	$ 59,458
Per Capita Income	$ 18,395	$ 27,755	$ 34,425
Persons in Poverty	24.7%	15.0%	9.9%
Source: Census Quickfacts			

Figure 4.2: Population by Place in Somerset County (Top Ten in Thousands)

Somerset	Population
Princess Anne	3.39
Crisfield	2.66
Mount Vernon	0.79
Eden	0.76
Deal Island	0.44
West Pocomoke	0.42
Fairmount	0.29
Chance	0.26
Smith Island	0.20
Dames Quarter	0.18
Source: Statistical Atlas	

Figure 4.3: Population by Place in Wicomico County (Top Ten in Thousands)

Wicomico	Population
Salisbury	32.34
Fruitland	5.15
Delmar	3.18
Pittsville	1.34
Hebron	1.19
Willards	0.92
Sharptown	0.92
Nanticoke	0.44
Bivalve	0.38
Mardela Springs	0.35

Figure 4.4: Population by Place in Worcester County (Top Ten in Thousands)

Worcester	Population
Ocean Pines	11.68
Ocean City	7.04
Berlin	4.54
W. Ocean City	4.2
Pocomoke City	4.15
Snow Hill	2.21
Bishopville	0.75
Newark	0.28
Stockton	0.13
Girdletree	0.11

Figure 4.5: Ambulatory Difficulty Population for each Lower Eastern Shore County in 2017

Ambulatory Difficulty Population (2017)			
	Somerset	Wicomico	Worcester
5 to 17 years	-	70	69
18 to 34 years	68	151	16
35 to 64 years	997	2,590	1,543
65 to 74 years	391	1,249	992
75 years and over	496	1,724	1,648
Total Population with Ambulatory Difficulty	1,952	5,784	4,268
Total Population 2017	20,595	94,565	48,667
Percent of Total Population	9.5%	6.1%	8.8%
Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-Year Estimation			

SECTION II – INCOME DISTRIBUTION LEVELS FOR EACH LOWER EASTERN SHORE COUNTY

Figure 4.6: Income Distribution Percentages

Income Distribution			
	Somerset	Wicomico	Worcester
Under $25,000	32.8%	21.7%	19.6%
$25,000 - $49,000	25.8%	25.0%	22.9%
$50,000 - $74,000	16.4%	18.5%	18.6%
$75,000 - $99,999	11.7%	12.9%	12.3%
$100,000 - $149,000	9.0%	13.0%	15.3%
$150,000 - $199,999	3.1%	4.9%	6.3%
$200,000 and over	1.1%	4.0%	5.0%
Source: Maryland Department of Commerce			

Figure 4.7: Income Distribution Break Down for Somerset County

	Somerset		
	Number	Percent Distribution	Mean Income
All Households	8,362	8,362	53,494
With Earnings	6,159	73.65%	53,760
With Wages or Salary Income	5,935	70.98%	50,224
With Self-Employment Income	872	10.43%	37,873
With Interest, Dividends, or Net Rental Income	991	11.85%	6,538
With Social Security Income	3,137	37.51%	18,344
With Supplemental Security Income (SSI)	523	6.25%	10,243
With Cash Public Assistance Income or Food Stamps/SNAP	2,108	25.21%	-
With Cash Public Assistance	308	3.68%	2,402
With Retirement Income	1,980	23.68%	19,153
With Other Types of Income	950	11.36%	8,598

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-year Estimates

Figure 4.8: Income Distribution Break Down for Wicomico County

	Wicomico		
	Number	Percent Distribution	Mean Income
All Households	37,415	37,415	72,948
With Earnings	30,129	80.53%	72,900
With Wages or Salary Income	29,140	77.88%	71,009
With Self-Employment Income	3,701	9.89%	34,373
With Interest, Dividends, or Net Rental Income	6,360	17.00%	15,862
With Social Security Income	11,493	30.72%	18,786
With Supplemental Security Income (SSI)	1,998	5.34%	9,850
With Cash Public Assistance Income or Food Stamps/SNAP	6,386	17.07%	-
With Cash Public Assistance	1,068	2.85%	2,777
With Retirement Income	6,935	18.54%	21,766
With Other Types of Income	3,825	10.22%	11,132

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-year Estimates

Figure 4.9: Income Distribution Break Down for Worcester County

	Worcester		
	Number	Percent Distributior	Mean Income
All Households	21,190	21,190	79,530
With Earnings	14,940	70.50%	74,442
With Wages or Salary Income	14,229	67.15%	71,089
With Self-Employment Income	2,751	12.98%	36,582
With Interest, Dividends, or Net Rental Income	5,827	27.50%	21,841
With Social Security Income	9,465	44.67%	20,515
With Supplemental Security Income (SSI)	760	3.59%	10,192
With Cash Public Assistance Income or Food Stamps/SNAP	2,492	11.76%	-
With Cash Public Assistance	448	2.11%	3,300
With Retirement Income	6,302	29.74%	33,583
With Other Types of Income	2,384	11.25%	12,909

Source: U.S. Census Bureau, 2013-2017 American Community Survey 5-year Estimates

Appendix E

SHORE TRANSIT CHOICE RIDER SURVEY

SHORE TRANSIT

Shore Transit Ridership Study: Community Stakeholder Opinion Poll

Your Opinion is Critical.

Thank you for agreeing to participate in this short survey. Your opinions regarding the demand for choice ridership on our regional public transportation system are critical to our understanding of the key issues. We will rely on your feedback as well as other research we are conducting to make key decisions to improve choice ridership on Shore Transit buses. Choice riders utilize public transit despite having other transportation options. Factors that influence choice riders include commute, parking costs, environmental sustainability, schedules and onboard amenities. Many passengers utilize Shore Transit because they do not have access to a vehicle and/or do not have a driver's license. Increased choice ridership could result in additional funding and an overall better rider experience.

Even though this survey comes to you during the current pandemic, Shore Transit fully intends to be part of the economic recovery and rebuilding in the aftermath of this crisis. You have been selected to participate in this survey because of your leadership role in our communities. Your knowledge of various economic and community development issues will help us in this endeavor. Please accept our deep appreciation for your time and your guidance. Your responses will be kept confidential and only the aggregate findings will be used.

1

Shore Transit Ridership Study: Community Stakeholder Opinion Poll

Consumer Facing Technology

Please indicate if you feel the following improvements to Shore Transit's *consumer facing technology* would increase overall ridership within the Tri-County area.

"Consumer Facing Technology" is software or hardware, that businesses use to directly interact with consumers. Examples can include the user interface within an app on your phone, or a help desk line that customers can call and ask questions.

1. Mobile App (iOS and Android) with mobile payments would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments about a mobile app that allows for mobile payments?

2. Mobile App (iOS and Android) with real time bus location tracking would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments about a mobile app with bus location tracking?

2

3. Mobile App (iOS and Android) with trip planning would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments regarding a mobile app with trip planning?

4. Enhanced mobile-friendly website with streamlined and improved interactive user experience would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on a mobile-friendly interactive website?

3

Shore Transit Ridership Study: Community Stakeholder Opinion Poll

Vehicles/Buses

Please indicate if you feel the following improvements to Shore Transit's *vehicles/buses* would increase overall ridership within the Tri-County area.

5. On board high-speed Wi-Fi would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments regarding on board Wi-Fi?

6. Digital fare collection capability to redeem fares via a mobile app would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on digital fare collection?

7. More bike racks on buses to allow riders to take bike with them (probably front-mounted) would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments about bike racks on buses?

4

Shore Transit Ridership Study: Community Stakeholder Opinion Poll

Bus Stops

Please indicate if you feel the following improvements to Shore Transit's *bus stops* would increase overall ridership within the Tri-County area.

8. Additional comfortable bus shelters on popular routes would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on bus shelters?

9. Improved signage at all stops would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments regarding signage at bus stops?

10. QR codes on all buses and at all bus stops to easily funnel new riders to the mobile app would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on QR codes and mobile apps?

5

11. Bike racks to enable riders to lock bikes at all stops would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on bike racks at bus stops?

12. Optional combination fare for use on Shore Transit and Ocean City bus system would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on a combination fare with Shore Transit and Ocean City?

13. New or enhanced seasonal evening and weekend routes from Salisbury University to downtown Salisbury to enable students to access restaurants and other facilities would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on evening and seasonal routes?

14. Shorebirds and other event related express routes to and from the Arthur W. Perdue stadium would be attractive to choice riders.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on routes to the Arthur W. Perdue stadium?

6

SHORE TRANSIT

Shore Transit Ridership Study: Community Stakeholder Opinion Poll

Marketing

Please indicate if you feel the following improvements to Shore Transit's *marketing* would increase overall ridership within the Tri-County area.

15. Targeted advertising campaigns for Salisbury University, University of Maryland Eastern Shore, and Wor-Wic Community College students and staff emphasizing free access and/or reduced fares would increase choice ridership.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on an advertising campaign geared towards local higher education institutions?

16. Targeted advertising campaigns about the improvement in amenities (mobile app for tracking buses, on board Wi-Fi, ability to take bike) would increase choice ridership.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments on an advertising campaign highlighting amenity improvements?

7

17. New or enhanced coordination with Ocean City to make convenient and comfortable travel from Somerset and Wicomico Counties to all points in Ocean City would improve choice ridership.

Strongly Disagree	Disagree	Agree	Strongly Agree	Not Sure
○	○	○	○	○

Do you have any comments regarding coordination with Ocean City?

18. Do you have any other comments or suggestions to help us improve choice ridership on Shore Transit?

8

Appendix F

SHORE TRANSIT CHOICE RIDER SURVEY SCORES

(1 Equals STRONGLY DISAGREE … 4 Equals STRONGLY AGREE)

Mobile App (iOS and Android) with mobile payments would be attractive to "Choice" riders. **3.3**

Mobile App (iOS and Android) with real time bus location tracking would be attractive to "Choice" riders. **3.4**

Mobile App (iOS and Android) with trip planning would be attractive to "Choice" riders. **3.4**

Enhanced mobile-friendly website with streamlined and improved interactive user experience would be attractive to "Choice" riders. **3.4**

On board high-speed Wi-Fi would be attractive to "Choice" riders. **4.0**

Digital fare collection capability to redeem fares via a mobile app would be attractive to "Choice" riders. **4.0**

More bike racks on buses to allow riders to take bike with them (probably front-mounted) would be attractive to "Choice" riders. **2.5**

Additional comfortable bus shelters on popular routes would be attractive to "Choice" riders. **4.0**

Improved signage at all stops would be attractive to "Choice" riders. **2.5**

QR codes on all buses and at all bus stops to easily funnel new riders to the mobile app would be attractive to "Choice" riders. **4.0**

Bike racks to enable riders to lock bikes at all stops would be attractive to "Choice" riders. **2.5**

Optional combination fare for use on Shore Transit and Ocean City bus system would be attractive to "Choice" riders. **4.0**

New or enhanced seasonal evening and weekend routes from Salisbury University to downtown Salisbury to enable students to access restaurants and other facilities would be attractive to "Choice" riders. **4.0**

Shorebirds and other event related express routes to and from the Arthur W. Perdue stadium would be attractive to "Choice" riders. **3.5**

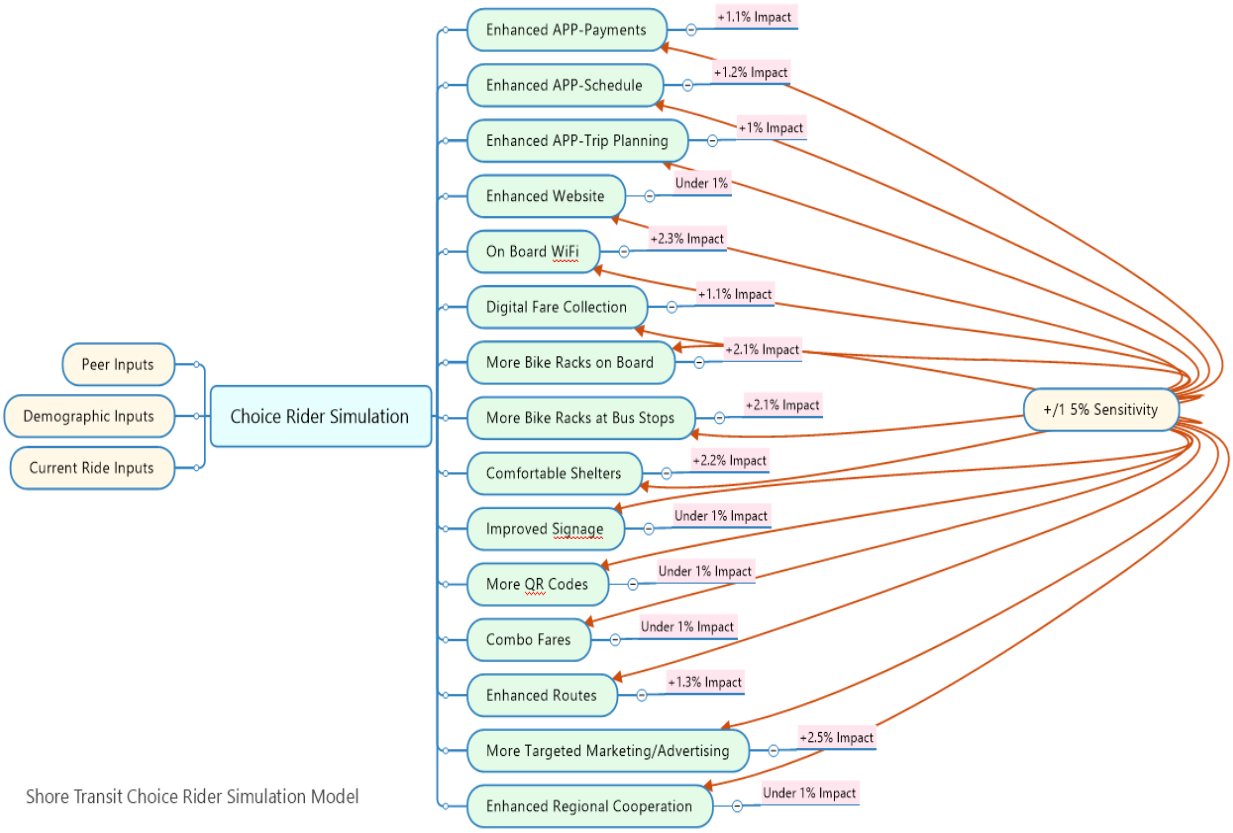
Targeted advertising campaigns for Salisbury University, University of Maryland Eastern Shore, and Wor-Wic Community College students and staff emphasizing free access and/or reduced fares would increase choice ridership. **2.0**

Targeted advertising campaigns about the improvement in amenities (mobile app for tracking buses, on board Wi-Fi, ability to take bike) would increase choice ridership. **2.0**

New/enhanced coordination with O.C. to make convenient and comfortable travel from Somerset and Wicomico Counties to all points in Ocean City would improve choice ridership. **4.0**

Appendix F

SHORE TRANSIT CHOICE RIDER SIMULATION MODEL



Shore Transit Choice Rider Simulation Model