Public Transit Advisory Committee
Collier Area Transit
Hybrid Meeting
Collier County Museum Lecture Hall
3331 Tamiami Trail East Naples, Florida
January 15th, 2025
1:00 p.m.

Agenda Packet

1) Call to Order
2) Roll Call
3) Approval of Agenda
4) Approval of Minutes
    a. November 20, 2024
5) Committee Action
6) Reports and Presentations
    a. Update on Transit Development Plan (TDP) Process
    b. Zero Emissions Plan Update
7) Member Comments
8) Public Comments
9) Next Meeting Date – February 19th, 2025, Collier County Museum Lecture Hall
10) Adjournment

Two or more members of the Board of County Commissioners may be present and may participate at the meeting. The subject matter of this meeting may be an item for discussion and action at a future BCC meeting.

Collier Area Transit operates in compliance with Federal Transit Administration, (FTA) program requirements and ensures that transit services are made available and equitably distributed and provides equal access and mobility to any person without regard to race, color, or national origin, disability, gender or age. Title VI of the *Civil Rights Act of 1964*; FTA Circular 4702.1A, "Title VI and Title VI Dependent Guidelines for Federal Transit Administration Recipients.

Anyone who required an auxiliary aid or service for effective communication, or other reasonable accommodations in order to participate in this proceeding, should contact the Collier County Facilities Management Department located at 3335 Tamiami Trail East, Naples, Florida 34112 or 239-252-8380 as soon as possible, but no later than 48 hours before the scheduled event. Such reasonable accommodations will be provided at no cost to the individual.

MINUTES OF THE PUBLIC TRANSIT ADVISORY COMMITTEE MEETING

NAPLES, FLORIDA

NOVEMBER 20, 2024

LET IT BE REMEMBERED, the Public Transit Advisory Committee in and for the County of Collier, having conducted business herein, met on this date at 1:00 P.M. in REGULAR SESSION at Collier County Museum Lecture Hall, 3331 Tamiami Trail E, Naples, Florida with the following members present:

Chair:	John DiMarco, III
Vice Chair:	Peter Berry
	Cliff Donenfeld
	Dewey Enderle
	Sonja Lee Samek
	Benita Staadecker
	Open Seat

ALSO PRESENT: Brian Wells, Director, Collier County PTNE
Omar DeLeon, Public Transit Manager, Collier County PTNE
Alexander Showalter, Senior Planner, Collier County PTNE
Keyla Castro, Operations Support Specialist, Collier County PTNE
Rosio Garcia, Operations Analyst, Collier County PTNE
Marika Maldonado, Paratransit Manager, Collier County PTNE
Elena-Ortiz Rosado, Marketing Manager, Collier County PTNE
Corene Sanger, Management Analyst, Collier County PTNE
Liz Soriano, Project Manager, Collier County PTNE
Jacob Stauffer, Transit Planner, MV Transportation
Nolan Begley, Fixed Route Manager, MV Transportation

1. **Call to Order**
   Chair DiMarco called the meeting to order at 1:00 P.M.

2. **Roll Call**
   Roll call was taken, and a quorum of four was established.

3. **Approval of Agenda**
   Ms. Staadecker moved to approve the Agenda as presented. Second by Vice Chair Berry. Carried unanimously 4 - 0.

4. **Approval of Minutes**
   Mr. Enderle moved to approve the minutes of the September 18, 2024, Public Transit Advisory Committee meeting. Second by Vice Chair Berry. Carried unanimously 5 - 0.

Ms. Samek and Mr. Donenfeld joined the meeting at 1:04 P.M. A quorum of six was present.

5. **Committee Action**
   a. **Grant Applications for 5310, 5311, and 5339**
   Mr. DeLeon presented the Executive Summary *"Grant Application for 5310, 5311, and 5339"* for the submission of the FY25 Capital/Operating Grants Program applications to the Florida Department of Transportation (FDOT). The Board of County Commissioners (BCC) must approve the grant application submissions. He noted:

FTA Section 5310 Grant Request
The 5310 capital and operating grant requests in FY25 supports the Collier Area Transit (CAT) System to purchase replacement vehicles and operating expenses to support the paratransit service.

- Funding in the amount of $625,766 will be used to purchase four replacement paratransit vehicles and equipment that have met their useful life.
- Another $800,000 requested will be utilized to provide paratransit services in the urbanized areas. Funding allocated, which requires a 50% local match, would be $400,000 in Federal funds and $400,000 in Local funds.
- The capital grant includes Federal Funding ($900,613), a State Match of ($62,577) and a Local Match of ($462,577) for a total of $1,425,766.
- Replacement vehicles will not increase the overall paratransit fleet inventory.
- The acquisition will provide for ongoing transportation services to the elderly and disabled residents of the County.

FTA Section 5311 Grant Request
The 5311 capital grant request in FY24 supports the Collier Area Transit (CAT) System to offset operational costs to support fixed route service in the rural areas.

- Rural capital grant funding in the amount of $1,444,000 will be used to offset operational costs to support fixed route service in the rural areas.
- The capital grant includes a 50% Federal Share ($722,000), and a 50% Local Match ($722,000).

FTA Section 5339 Grant Request

The 5339 capital grant request in FY24 supports the Collier Area Transit (CAT) System to purchase a replacement vehicle to support fixed route service and construction of four bus stop improvements in rural areas.

- Funding in the amount of $852,079 will be used to purchase one forty-foot fixed route bus to replace a bus that has met its useful life.
- Additionally, funding in the amount of $284,071 will be used for the purchase and construction of bus stop improvements including shelters.
- The capital grant funding match requirements include an 80% Federal share ($924,481) with a 20% State Match ($231,120) for a total grant funding request of $1,155,602.

Mr. DeLeon noted:

- Grant funds, awarded to FDOT by the Federal Transit Administration (FTA), are utilized annually by the Program.
- Rural area boundaries, determined by PTAC, rely on census data. FDOT recently approved the boundaries.
- Collier County is not in competition with other entities for rural Grants 5311 and 5339.
- "Elderly Eligibility Criteria" would be defined if introduced as a criterion for Grant distribution.

Vice-Chair Berry motioned to endorse the submittal of Grant Applications 5310, 5311 Rural, and 5339 Rural in the amount of $4,025,368.00 to the Board of County Commissioners (BCC) for approval and submission to the Florida Department of Transportation (FDOT). Seconded by Ms. Staadecker. Carried unanimously 6 – 0.

6. Reports and Presentations

a. Seasonal Schedule Change 2024

Mr. Stauffer presented the Executive Summary "*November Route Changes"* updating the Committee on the service modifications to be implemented for the season schedule change on November 17, 2024. He noted:

- Changes will be implemented across multiple Collier Area Transit routes.
- Public notification in advance of the changes included distribution of the proposed schedule modifications throughout the community and postings on social media and RideCAT.com.
- Many changes are driven by an effort to improve the On-Time Performance of CAT's fixed route service.
- Data collected over the past two years includes "run times" and driver feedback, resulting in adjustment to the timepoints to provide riders a more accurate estimation of bus arrival at the stops.
- Significant route changes related to Route 19 and Route 22.
- Route 22 had its morning outbound trip from the Government Center to Immokalee, as well as the evening inbound trip from Immokalee to CAT Ops, removed.
- The Route 19 Express will be out of service on the way to Immokalee to service the Route 22 segment before starting service as Route 19.
- Changes will be available for public review online and on social media.

Mr. Stauffer noted:
Facebook Survey

- Statistical data will be reported when available.

Paratransit Bus Schedule
A member reported wait time experienced for passenger pick-up was occasionally unreasonable and efforts to contact dispatch were unsuccessful.

Mr. Stauffer noted:

- Eligibility requirements must be met to book special trips.
- A "window time and" is provided to the passenger for pick up as is ride time.
- Dispatch should be notified if the passenger is ready ahead of the scheduled pick up. accommodation will be made if possible.
- The dispatch number (239.262.7272) offers a recorded option menu.

***Mr. Stauffer** will investigate the functionality of the dispatch number and provide an update at the December 18, 2024 meeting.*

7. Member and Staff Comments
Marco Island Trolley Pilot Program
Mr. Showalter reported:

- Two new members were elected to the Marco Island City Council.
- The Council members voted against the trolley route pilot program to the island.
- The program, scheduled to commence in January 2025, was designed to reduce traffic congestion on the island.

8. Public Comments
None

9. Next Meeting Date December 18, 2024 - 1:00 P.M.
Collier County Museum Lecture Hall
3331 Tamiami Trail E
Naples, FL. 34104

10. Adjournment
There being no further business for the good of the County, the meeting was adjourned by the chair at 1:30 P.M.

Public Transit Advisory Committee

_____
John DiMarco III, Chair

These minutes approved by the Board/Committee on _____,2024 as presented_____ or as amended _____.

EXECUTIVE SUMMARY
Reports and Presentations
Item 6a
Update on Transit Development Plan (TDP) Process

Objective:

To provide an update on the Transit Development Plan (TDP) Process.

Considerations:

To receive State Block Grant Funds for transit system operations, each transit agency must develop a Transit Development Plan (TDP) Major Update every five years. The TDP is a 10-year plan for transit needs, cost and revenue projections, and community transit goals, objectives, and policies. The TDP serves as Collier Area Transit's planning, development, and operational guidance document, and the major update is developed in coordination with the MPO's Long-Range Transportation Plan.

CAT Staff has been working with the Consulting Team of Stantec and MPO Staff to update the plan. The consultant has made steady progress on the update by producing the Public Involvement Plan, consistent updates to each section of the TDP, as well as identifying new peers for comparison of transit systems. CAT and the MPO Staff have been providing comments and feedback on these working documents produced so far and ask the PTAC for any further input.

As MPO and CAT comments have been incorporated into the documents, we would like to provide updates on the progress of the report for discussion and receive any further comments from the committee.

Recommendation:

Review and provide feedback regarding updates to the CAT Major TDP.

Attachments:

1. TDP Situational Appraisal Final Report

Prepared by: _____ Date: 12/13/24
Alexander Showalter, Planner II

Approved by: _____ Date: 12/13/2024
Brian Wells, PTNE Division Director

Situational Appraisal
Technical Memo No. 1

Date: **December 3, 2024**

Reference: **Contract 18-7432 MP Professional Services Library – Metropolitan Planning**
Transit Development Plan (TDP) Major Update
Purchase Order/Work Order No. 4500229353
Project No. 33804.6.2.3

Document: **Situational Appraisal – Technical Memo No. 1**

The Situational Appraisal has been updated. Please review.

Prepared for:
Collier MPO

Prepared by:
Stantec

Project Number:
215811425

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1 Baseline Conditions, Demand Estimation & Land Use Development Assessment

The baseline conditions analysis provides a detailed report on the existing and projected future conditions of the service area. The foundation of the transportation development plan will be based on the contextual information presented in this section. The collected data will also be used in the Situational Appraisal to provide the basis for transit improvement considerations.

The following topics were reviewed and analyzed for Collier County in the context of the TDP:

- Study Area
- Population Profile
- Demographic Characteristics
- Transportation Disadvantaged Population
- Labor and Employment Characteristics
- Educational Attainment
- Tourism
- Major Trip Generators
- Major Developments
- Existing and Future Land Use
- Commuter Travel Patterns
- Roadway Conditions

Data collected for select population, demographic, and socioeconomic characteristics are supported by various maps and tables. Primary data sources include the U.S. Census Bureau, specifically from the 2020 Decennial Census and the 5-Year American Community Survey (ACS), Collier County, Florida Commission for the Transportation Disadvantaged, Collier Area Transit, and the Regional Economic Research Institute at Florida Gulf Coast University, supplemented by local and regional agency sources, as necessary.

1.1 Study Area

Collier County is in southwest Florida, east of the Gulf of Mexico. The county is bordered on the northwest, northeast, east, south, respectively by Lee, Hendry, Broward, Miami-Dade, and Monroe counties. Collier County has three municipalities: Everglades City, Marco Island, and Naples, the County seat.

In terms of geographical area, Collier County is the largest county in Florida with a land area of approximately 1,996.8 square miles according to the 2020 Decennial Census from the US Census Bureau. A significant portion of the county area is designated as protected lands (more than 1,875 square miles), primarily in the eastern and southern parts of the county.

Figure 1-1 shows the extent of the study area. Due to the size of Collier County, a study area has been produced as outlined by the red boundary, which covers the existing transit network along with the core populated areas of the County and excludes some of the park land. For presentation purposes moving forward in this document, some of the map figures will be zoomed to the study area extent to show greater detail and avoid wasted space.

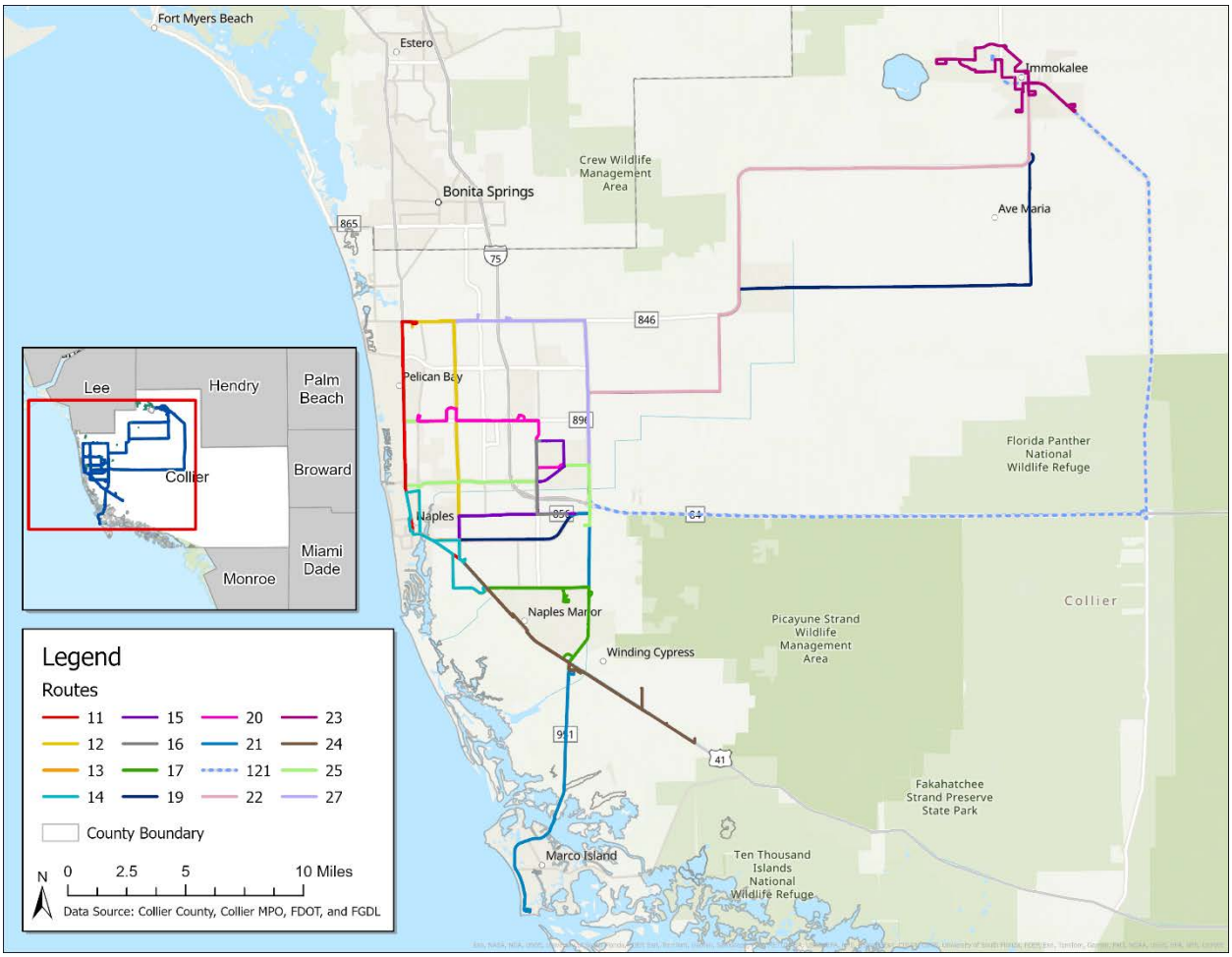


Figure 1-1: Map of Study Area.

1.2 Population Profile

As of the 2020 Decennial Census, Collier County was ranked the 19th most populous county in Florida. As per the US Census Bureau 2020 Decennial Census, the county population accounts for 1.74% of the total state population in 2020 and is estimated to grow to 1.83% by 2050 based on State population projections.

The Collier County population has been steadily increasing over the last few decades, as shown in Figure 1-2 below. Population values were obtained from US Census Bureau decennial censuses and annual population estimates. There was a slight dip in the census population count in 2020 compared to the estimated values for the previous years, likely due to the COVID-19 pandemic. The population projection values were obtained from the Florida Bureau of Economic and Business Research (BEBR) at 5-year intervals until 2050. Collier County's population is projected to continue increasing steadily.

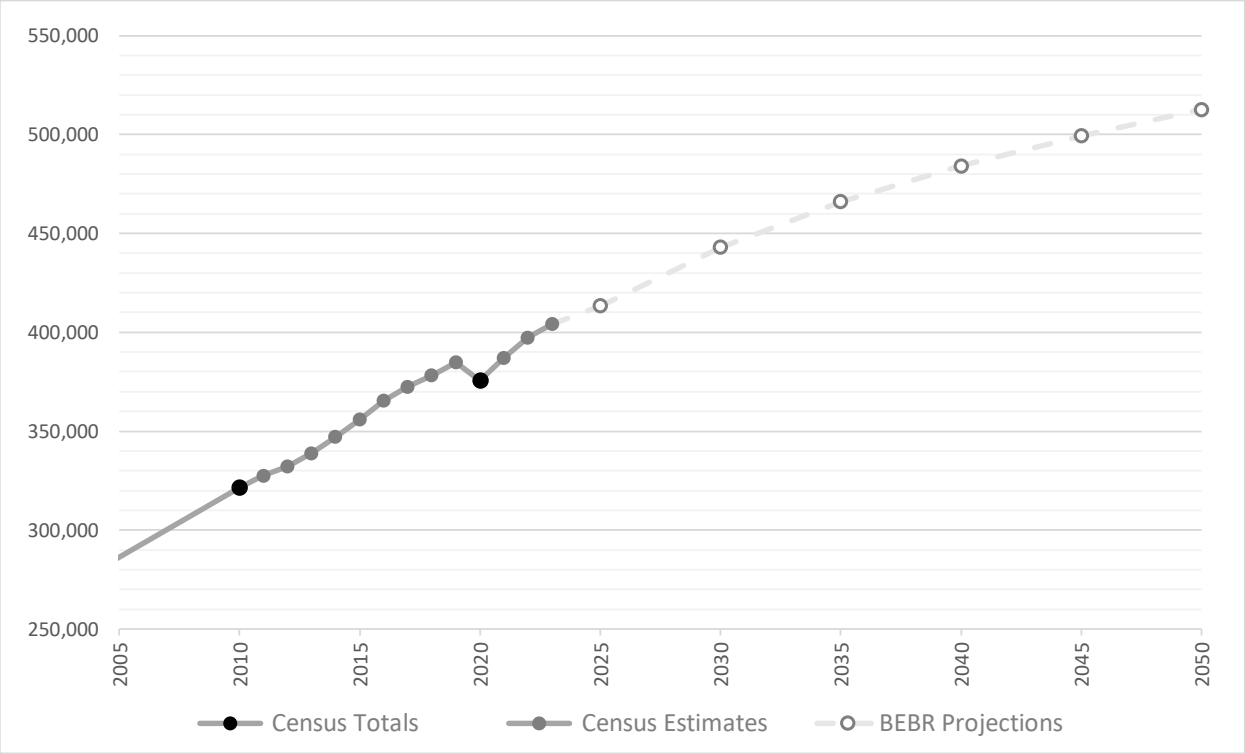


Figure 1-2: Collier population totals, estimates, and projections (Source: US Census Bureau and BEBR).

Collier County's population has been increasing during the past few decades; however, the overall growth rate is expected to slow over the next couple of decades, like state-wide conditions. In general, the county has consistently experienced and will continue to have higher rates of growth compared to that of Florida, as shown in Figure 1-3 below.

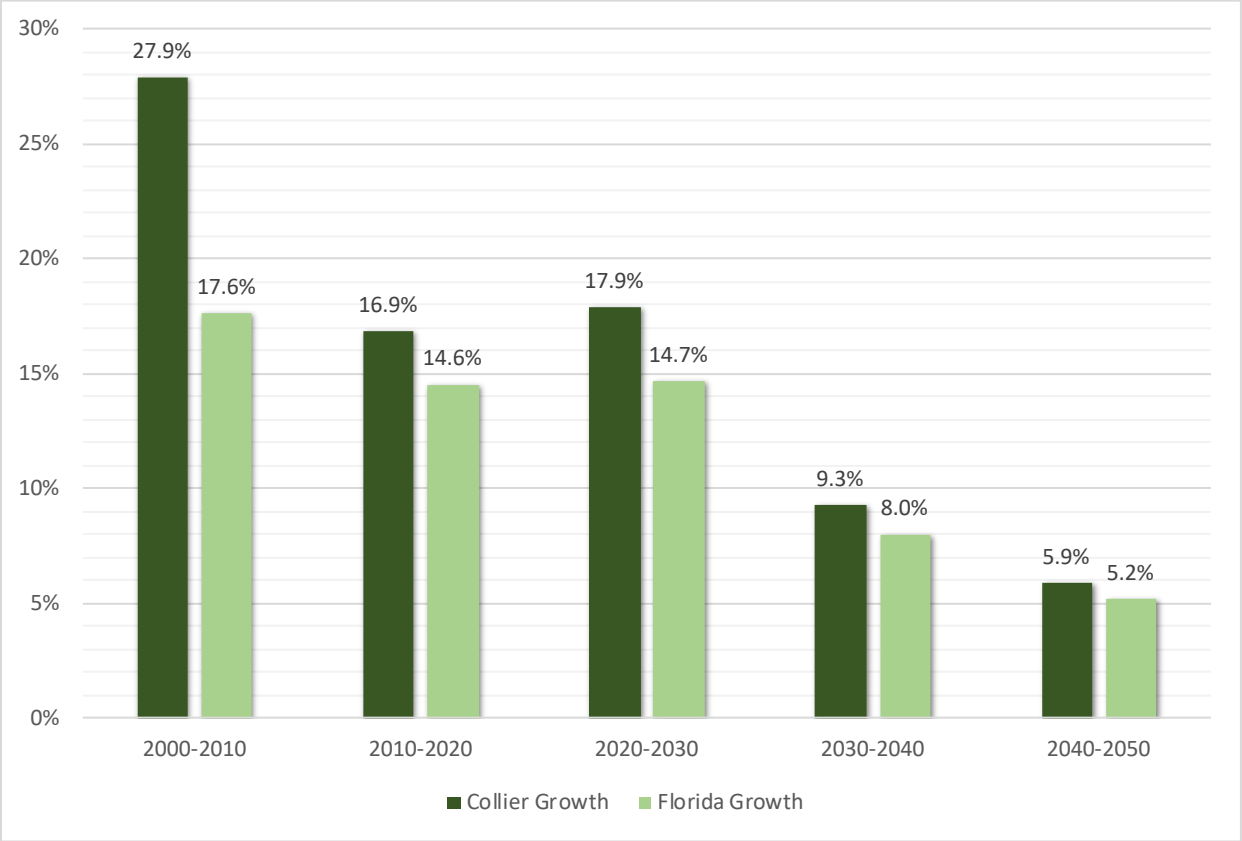


Figure 1-3: Historical and Projected Decennial Population Growth Rates (Source: US Census Bureau).

Collier County typically receives a significant number of tourists and seasonal residents, impacting the travel patterns and increasing traffic congestion during the peak season periods. The County developed annual population projections for the fiscal year and peak season periods to better plan for seasonal demand impact on public services. Figure 1-4 displays these projection values; with annual fiscal year population values reflecting the permanent resident population and peak season population values estimated with a constant adjustment factor.

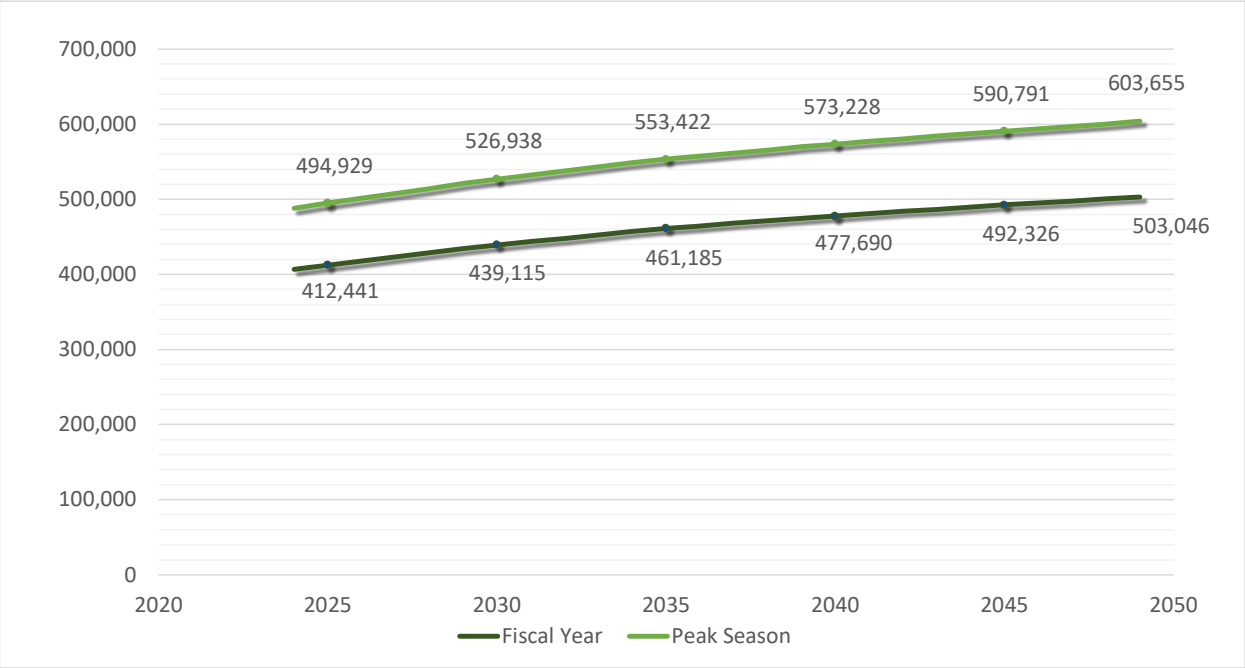


Figure 1-4: Collier County year by year population projections (Source: Collier County Government).

Traffic Analysis Zones (TAZ) were used to analyze statistics and change at a smaller geographic unit. Estimated and projected population, employment, and dwelling density values were interpolated from 2015 base year data for Collier's 2050 Long Range Transportation Plan (LRTP). Employment will be discussed in another section of the report.

Figure 1-5 and Figure 1-6 depict population density at the TAZ level for 2015 and 2050, respectively. The estimated population distribution within Collier County for 2015 is highly concentrated in the central business and residential districts of Immokalee, Ave Maria, Pelican Bay, Golden Gate, and other communities around North, East, Central, and South Naples. East Naples and Golden Gate especially has a high concentration of population with several red and orange TAZ blocks symbolizing higher population density. The distribution pattern remains very similar for the projected 2050 population densities, with the addition of Ave Maria to the communities with higher population densities. The areas with higher population density are all located near, if not along the existing transit network, which means that the current network is doing well in providing service in the more populated areas.

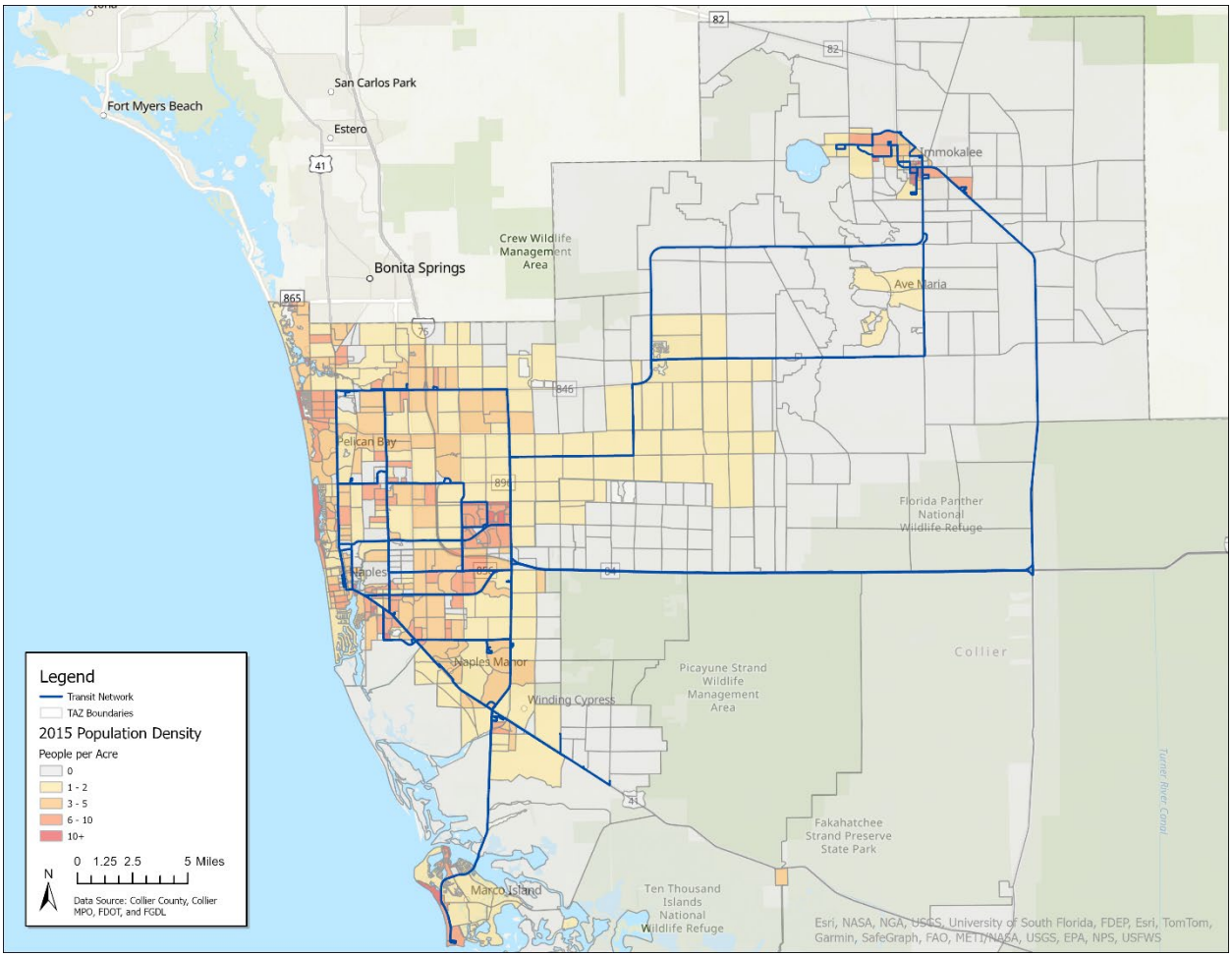


Figure 1-5: Collier County Estimated Population Density by TAZs in 2015.

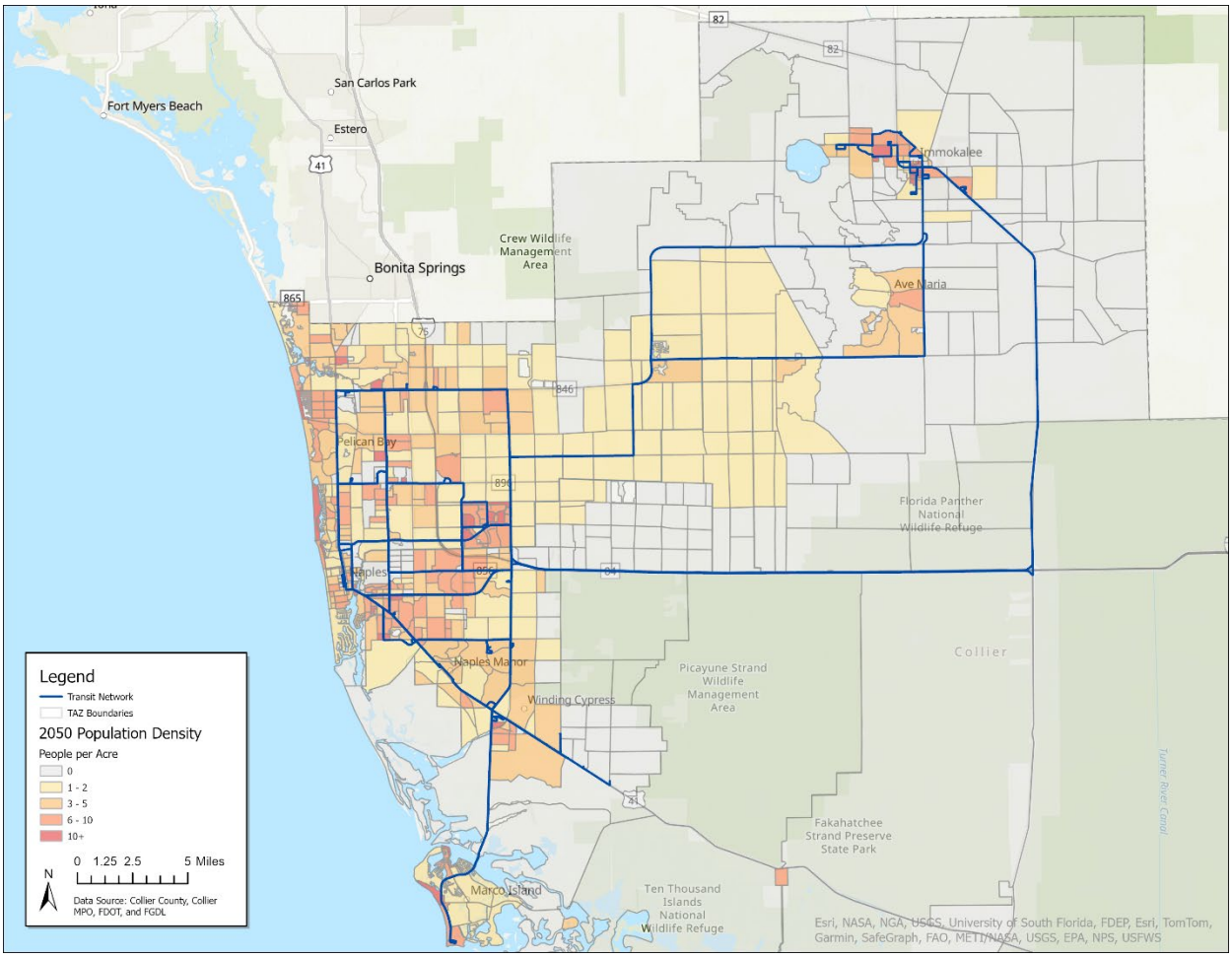


Figure 1-6: Collier County Projected Population Density by TAZs in 2050.

Figure 1-7 shows the population density increase between the 2015 estimates and the 2050 projections. This growth rate map indicates greater increases for the TAZs within and around the urban communities of Immokalee, Ave Maria, Orangetree (west of Ave Maria), Winding Cypress, and Golden Gate. There are also a few TAZ blocks around North and South Naples with high growth rates, symbolized in red showing higher population density increase. These areas of high growth indicate potential for more transit demand as the population increases. The agricultural areas next to these communities appear to have little to no population growth, specifically outside of Immokalee and in the parks or nature reserves, which is expected as there are limited residential areas and fewer dwelling units there.

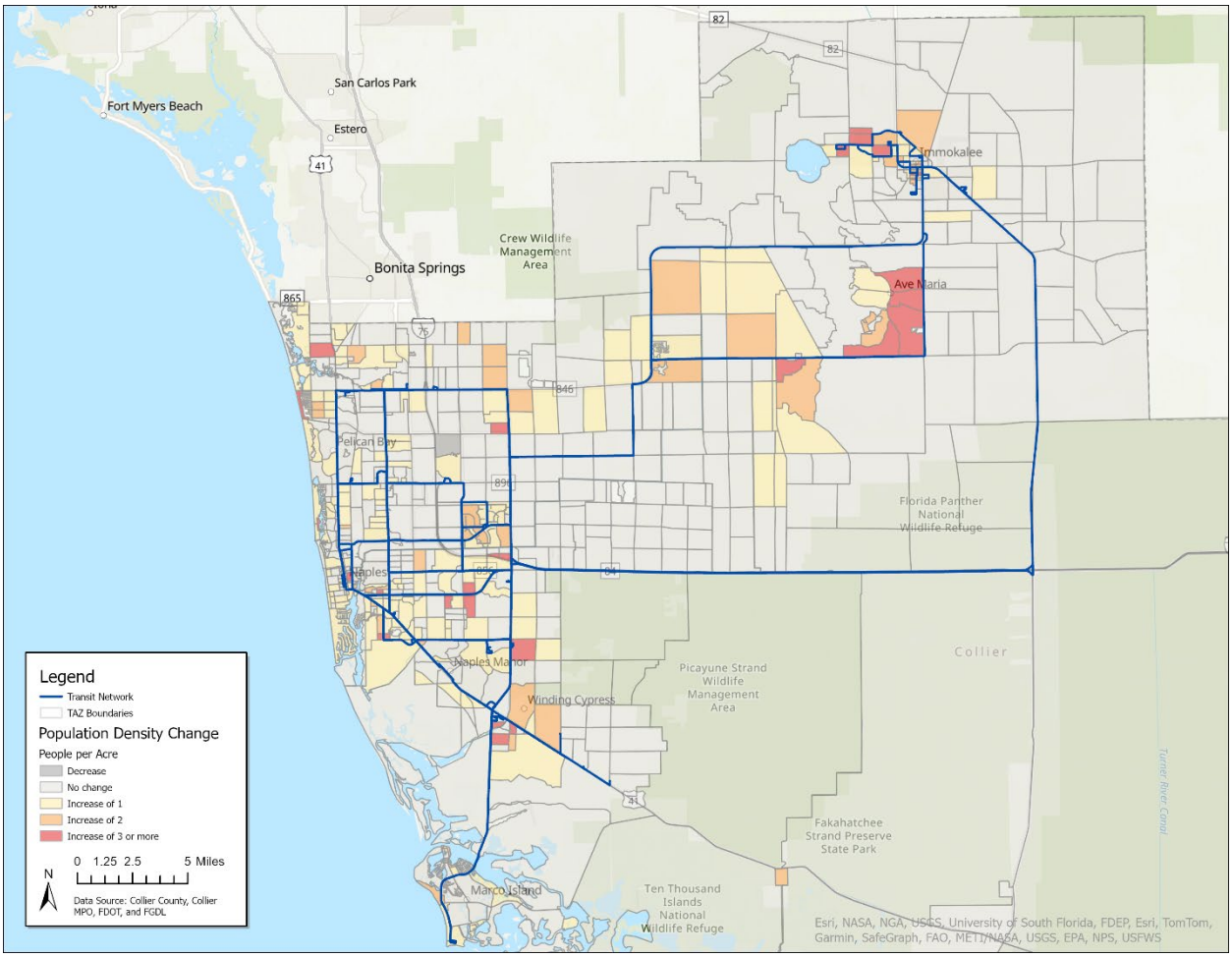


Figure 1-7: Collier County Population Density Growth per TAZ from 2015 to 2050.

Figure 1-8 and Figure 1-9 illustrate the distribution of dwelling units at the TAZ level for 2015 and 2050, respectively. Similar to the population distribution in Collier County, higher numbers of dwelling units are seen in and around Golden Gate and East and South Naples, indicating greater resident occupancy and transit demand in these regions. Higher dwelling unit numbers are also observed along the Gulf of Mexico coast in Central Naples and Marco Island. This distribution pattern remains very similar for the 2050 estimated projections. Again, following population density patterns, areas with higher numbers of dwelling units are all located near, if not along, the existing transit network, indicating that the current network is doing well in providing service in the more populous residential areas.

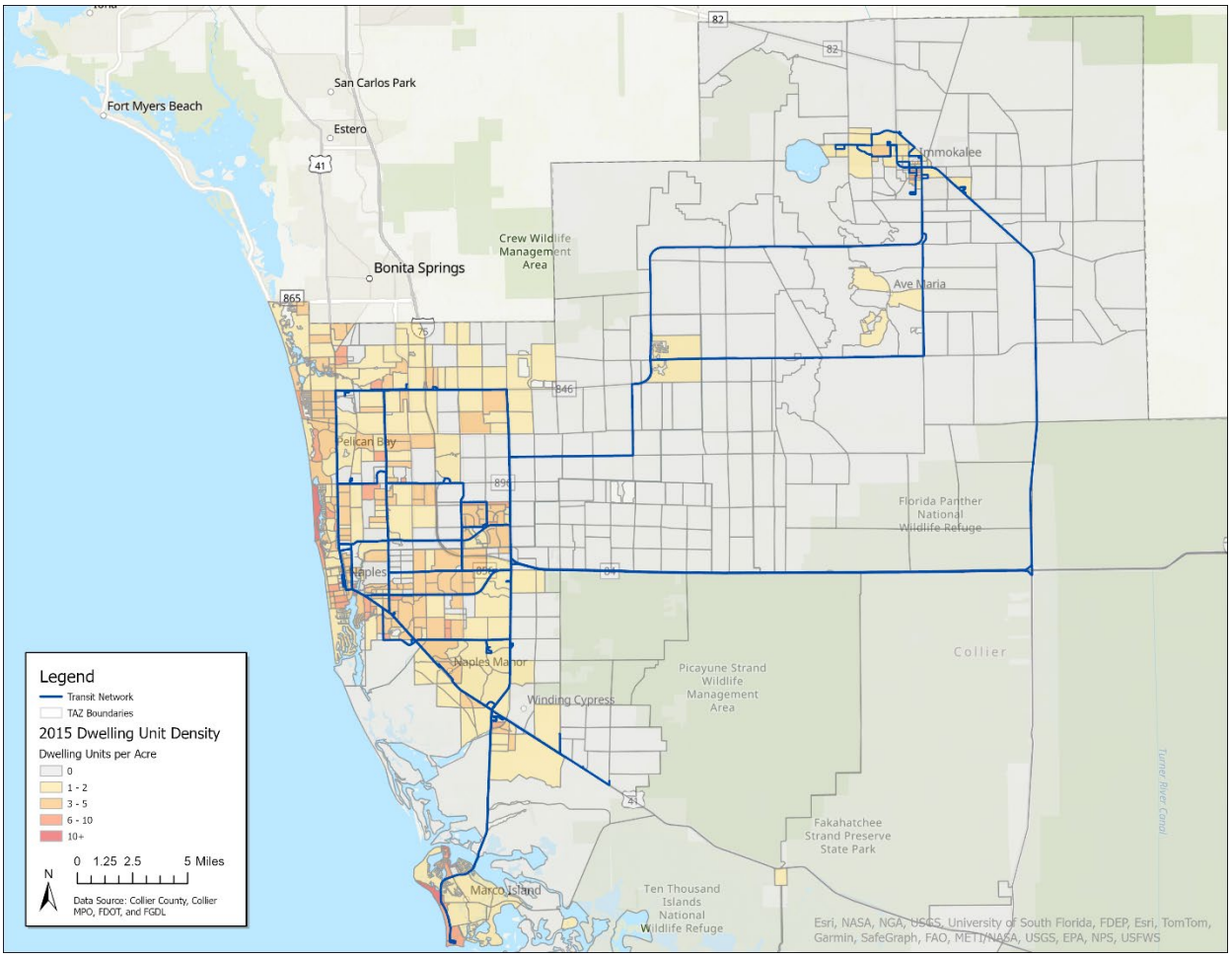


Figure 1-8: Collier County Estimated Dwelling Unit Density per TAZ in 2015.

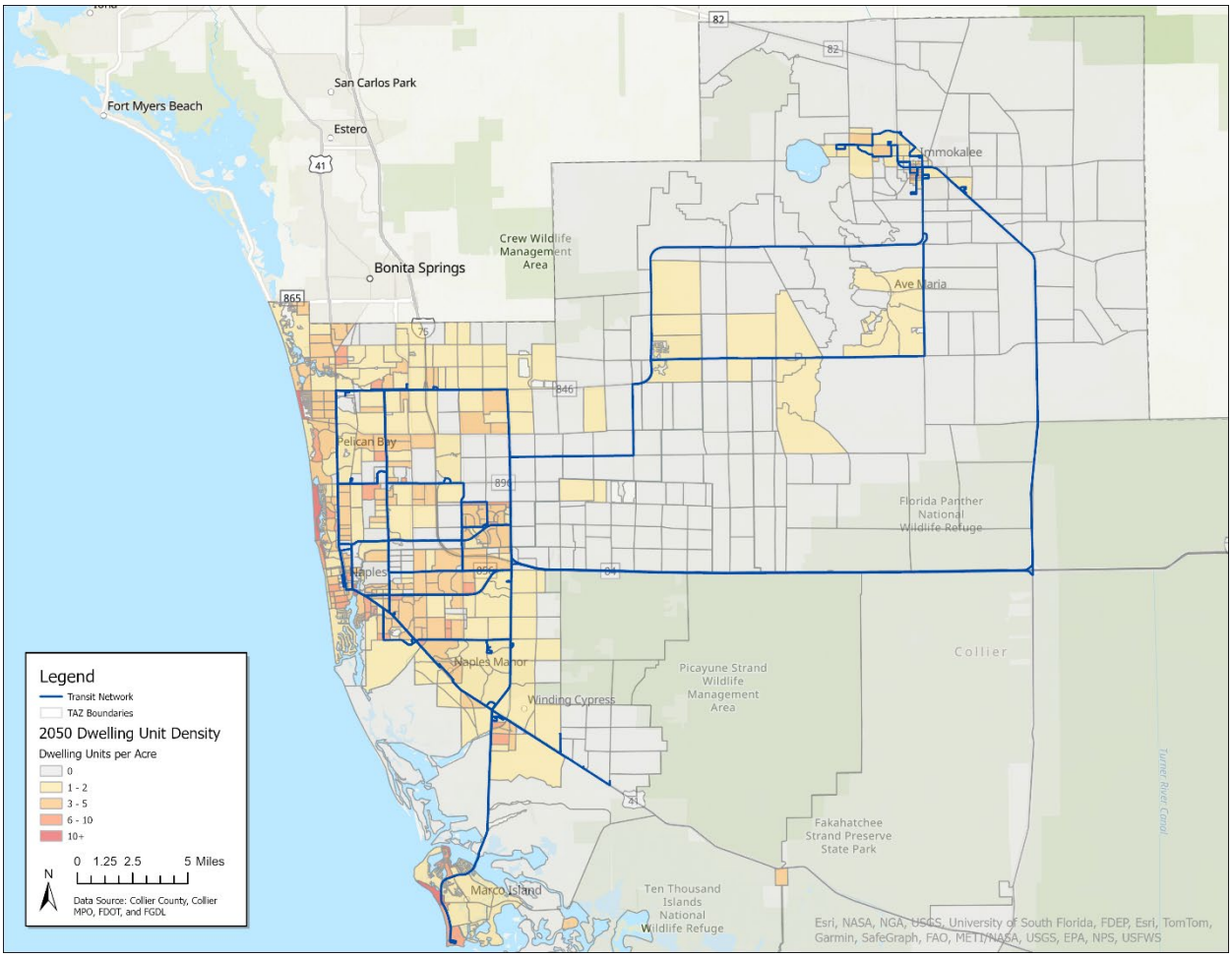


Figure 1-9: Collier County Projected Dwelling Unit Density per TAZ in 2050.

Figure 1-10 shows the increase in dwelling unit density per TAZ between the 2015 estimates and the 2050 projections. This growth change map indicates that there will not be a significant increase in dwelling units per acre in Collier County. There are a few TAZ blocks with greater increases in Ave Maria, South Naples, and Winding Cypress. As with population growth, the agricultural areas next to these communities appear to have little to no increase in dwelling units, specifically outside of Immokalee and in the parks or nature reserves, which is expected as there are limited residential areas and less dwelling units there. The increase in dwelling unit density appears to be slower than population density increase, as there are much less higher increase blocks (symbolized by red and orange) in the dwelling unit density maps compared to the population density maps.

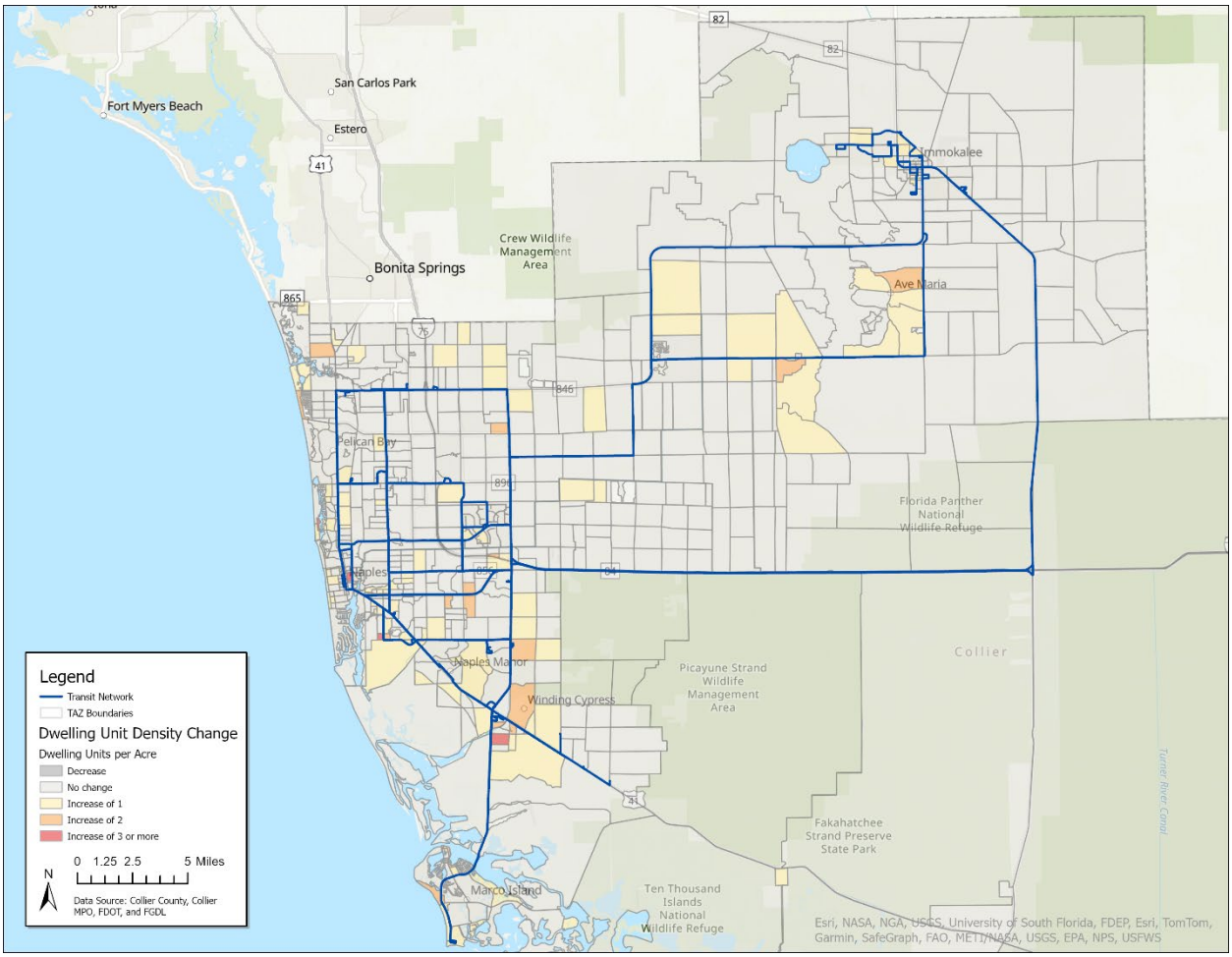


Figure 1-10: Collier County Dwelling Unit Density Increase by TAZ from 2015 to 2050.

1.3 Demographic Characteristics

Demographic characteristics such as age, household income, poverty status and the number of vehicles available in a household are key indicators to helping understand transit propensity. Table 1-1 summarizes these characteristics pulled from data from the United States Census Bureau in the years of 2010, 2018, 2020 and 2022.

Table 1-1: Collier County Demographic Characteristics

Characteristic	2010	2018	2020	2022
Gender				
Male	49.7%	49.3%	49.2%	49.5%
Female	50.3%	50.7%	50.8%	50.5%
Ethnic Origin				
White	85.8%	88.1%	84.5%	73.2%
Black or African American	6.6%	7.0%	6.8%	6.5%
Other	6.4%	3.6%	3.6%	5.6%
Two or more races	1.1%	1.3%	5.2%	14.6%
Hispanic Origin				
Not of Hispanic/Latino origin	74.8%	72.5%	72.0%	71.4%
Hispanic or Latino origin	25.2%	27.5%	28.0%	28.6%
Age				
<15 years	20.0%	18.8%	18.6%	18.2%
15-59 years	62.1%	59.9%	59.1%	59.8%
60+ years	17.9%	21.3%	22.3%	22.0%
Household Income				
Under $10,000	7.2%	6.3%	5.8%	4.9%
$10,000-$49,999	40.9%	35.8%	33.2%	28.9%
$50,000-$99,999	30.9%	30.0%	30.0%	28.9%
$100,000-$200,000	16.7%	20.9%	22.7%	25.9%
$200,000 or more	4.2%	7.0%	8.3%	11.4%
Poverty Status				
Above poverty level	86.2%	85.9%	87.2%	87.5%
Below poverty level	13.8%	14.1%	12.8%	12.5%
Vehicle Available in Household				
None	4.3%	4.3%	4.2%	4.3%
One	21.1%	20.6%	20.1%	20.3%
Two	42.5%	41.0%	40.5%	40.3%
Three or more	32.1%	34.1%	35.2%	35.2%

Source: 2010 ACS 5-year estimates, 2018 ACS 5-year estimates, 2020 ACS 5-year estimates, 2022 ACS 5-year estimates

A significant portion of the population owns two or more vehicles, and around a third of the residents in Collier County have an annual income exceeding $100,000. Combined, these statistics may indicate a lower propensity to use transit among the community. Household income reveals an increasing disparity between the rich and poor, as those earning over $100,000 have increased from 16.7% to 25.9%, while those earning under $10,000 have only decreased around 2%. Moreover, the percentage of the population living above the poverty line has only shown a slight increase. In Figure 1-11, changes in income brackets are shown over time.

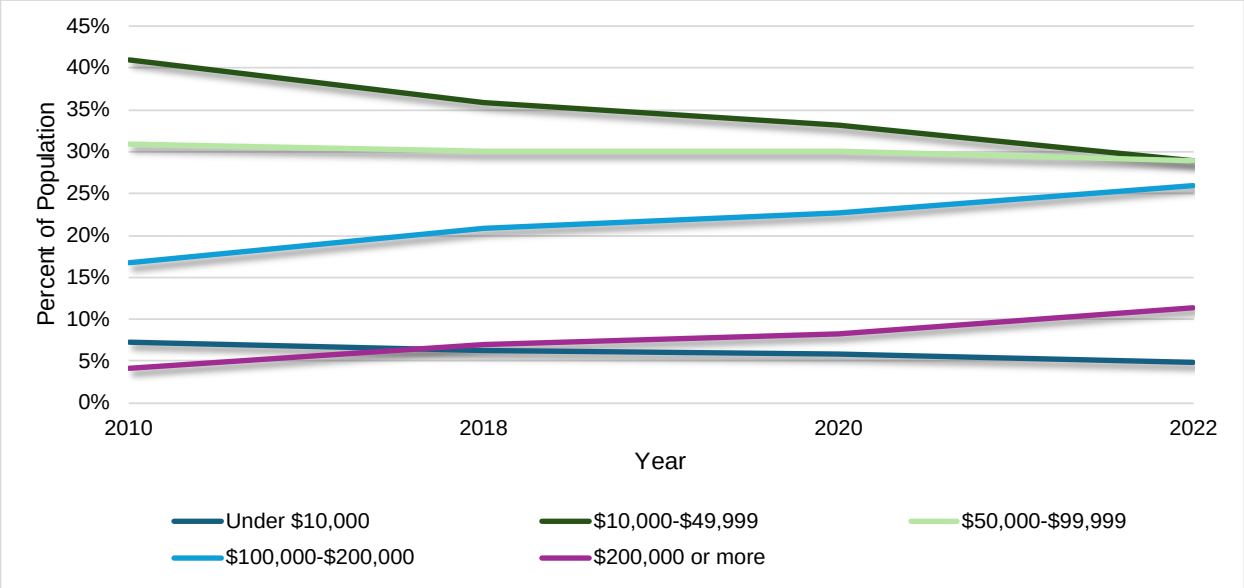


Figure 1-11: Household Income Over Time in Collier County

Source: 2010 ACS 5-year estimates, 2018 ACS 5-year estimates, 2020 ACS 5-year estimates, 2022 ACS 5-year estimates

The percentage of individuals earning less than $10,000 annually declined from 7.2% in 2010 to 4.9% in 2022, reflecting a 2% decrease. Conversely, those earning $100,000 or more saw a 10% increase, indicating a faster rate of income growth among higher earners. As incomes rise, fewer individuals may rely solely on public transportation, with increased access to private vehicles or alternative options. The percentage of those earning between $50,000 and $99,999 has remained stable, representing a group that may still favor public transit for its convenience and cost-effectiveness, particularly in urban areas where traffic congestion and parking costs are significant. Additionally, the proportion of individuals earning $200,000 or more grew by 7% between 2010 and 2022.

The age distribution among males and females has remained relatively consistent from 2000 to 2022, with a balanced ratio between genders, each comprising about half of the population. The ethnic majority remains Caucasian. Over time, there has been a slight decrease in the youth population and a corresponding rise in the senior population, underscoring the growing need for accessible services. Notably, the percentage of residents aged 60 and older is on the rise, potentially increasing demand for fixed-route transit and paratransit services. Figure 1-12 illustrates the population distribution by gender and age group, showing Collier's aging population, where older age groups now surpass younger ones.

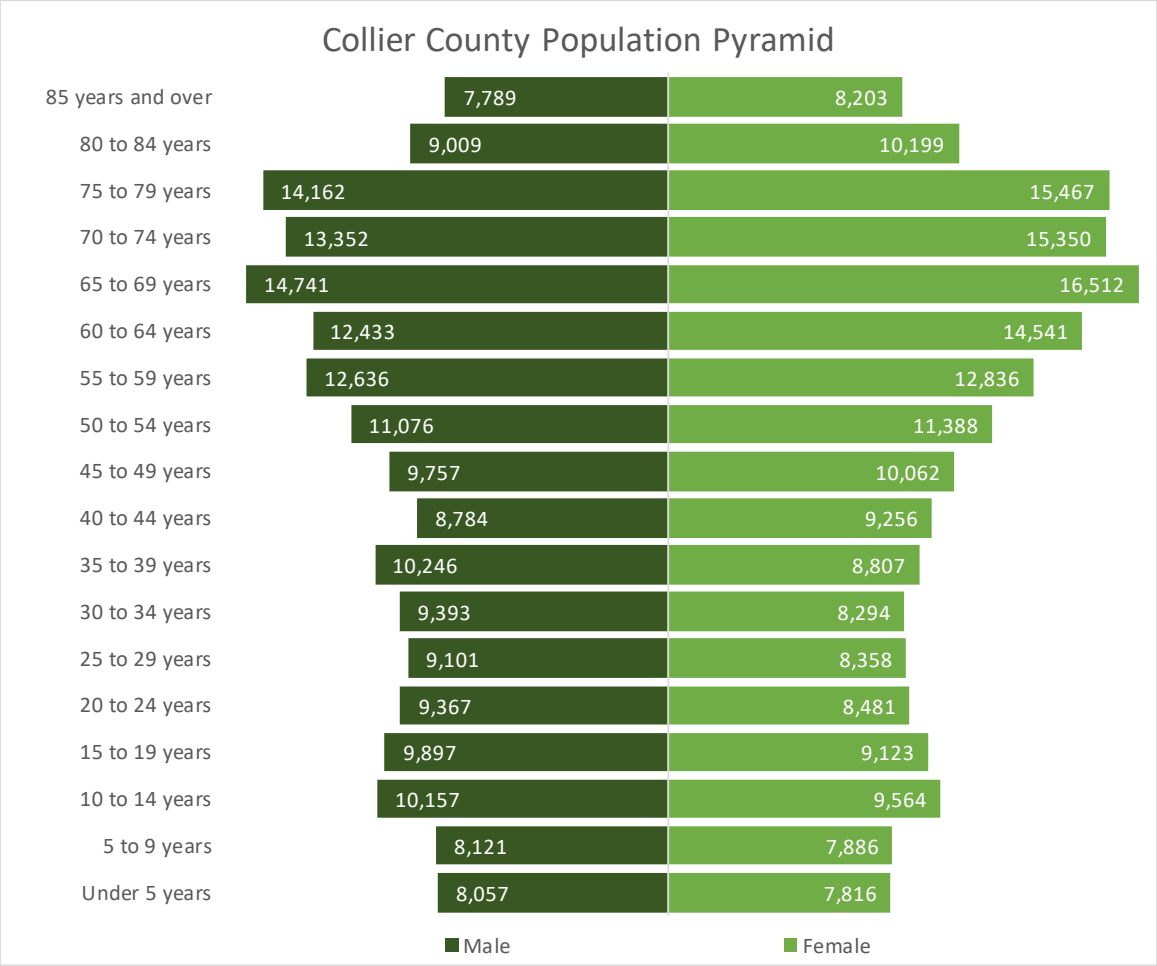


Figure 1-12: Population Age Distribution in Collier County

Since 2010, over 95% of households in Collier County have consistently had access to at least one vehicle, with less than 5% of households lacking a private vehicle. Although this percentage is small, it remains a significant demographic indicator, highlighting areas that may be more dependent on public transit and could potentially benefit from enhanced service. Increasing transit options could also encourage a shift among the majority who currently rely on private vehicles, offering convenient alternatives that promote greater use of public transportation for daily travel.

Figure 1-13 illustrates the distribution of households without vehicles across Collier County at the TAZ level. The existing transit network appears to serve most of these areas effectively, though coverage is limited in regions further east of Immokalee/Ave Maria near the conservation or rural areas. A small number of no-vehicle households are also present in Everglades; however, transit service is absent in much of southern Collier County, leaving this area underserved by the current network.

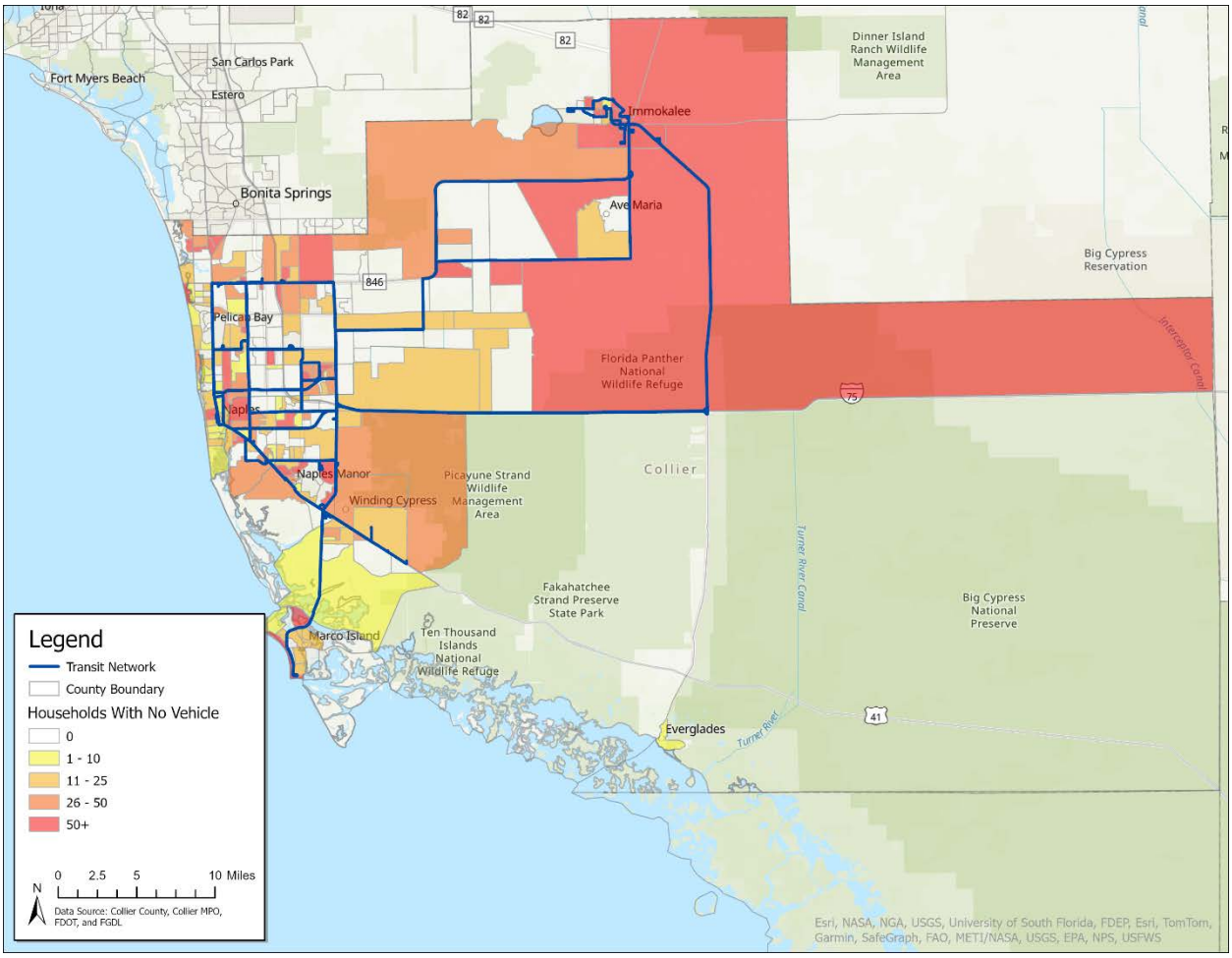


Figure 1-13: Distribution of Households with No Vehicle in Collier County in 2022.

1.4 Transportation Disadvantaged Population

The Transportation Disadvantaged (TD) population represents a key demographic with a growing need for public transit services, including fixed route services. As part of its paratransit service known as CAT Connect, CAT provides transportation to the eligible TD population with service available children who are handicapped or high-risk or at-risk persons, who because of physical or mental disability, income status, or age or who for other reasons are unable to transport themselves or to purchase transportation and are, therefore, dependent on others to obtain access to healthcare, employment, education, shopping, social activities, or other life sustaining activities. Table 1-2 shows the total number of TD trips served between 2019 to 2024.

Table 1-2: Collier County transportation disadvantaged trips served.

	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	% Change (2019-2024)

TD Trips Served	117,585	104,137	113,598	109,044	133,799	156,438	33.0%

Source: Collier County Community Transportation Coordinator's Annual Operating Reports, Fiscal Years 2019-2024.

The number of TD trips served through CAT's brokered system, as the Community Transportation Coordinator (CTC) for Collier County, increased 33% from 117,585 in 2019 to 156,438 in 2024. This demonstrates the increasing desire and need for more paratransit trips in the region. Figure 1-14 shows the number of TD passengers served from 2019 to 2024.

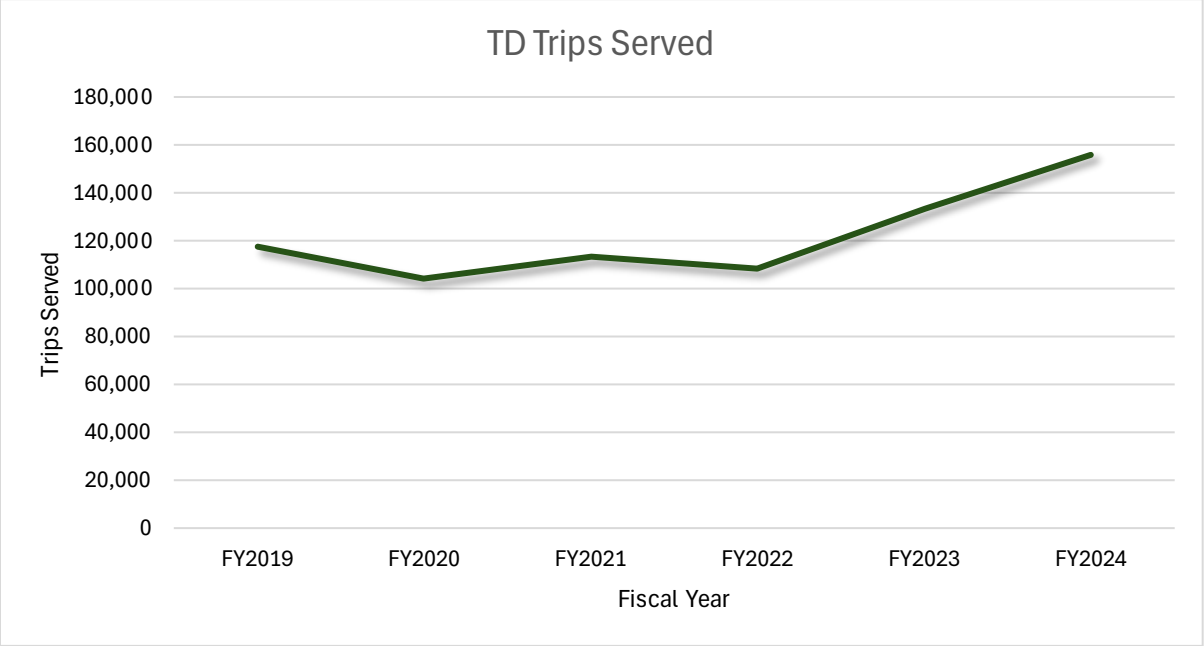


Figure 1-14: Collier County transportation disadvantaged trips, 2019–2024 (Source: Collier County Community Transportation Coordinator's Annual Operating Reports, Fiscal Years 2019-2024).

During this period, the total number of TD passengers followed an overall upward trend, despite occasional dips in ridership in 2020 and 2022, likely caused by the lasting effects of the COVID-19 pandemic. The most notable growth in TD trips occurred between 2022 and 2023, with a 22% increase. As TD ridership continues to expand, it will be essential to ensure adequate services are available to support this community, while also promoting access to fixed-route services, which offer a more cost-effective option for all users. As shown in Figure 1-15 below, TD trips have increased in line with population growth. As per the 2023 TDSP, the potential TD population is 165,309. This is expected to increase year after year.

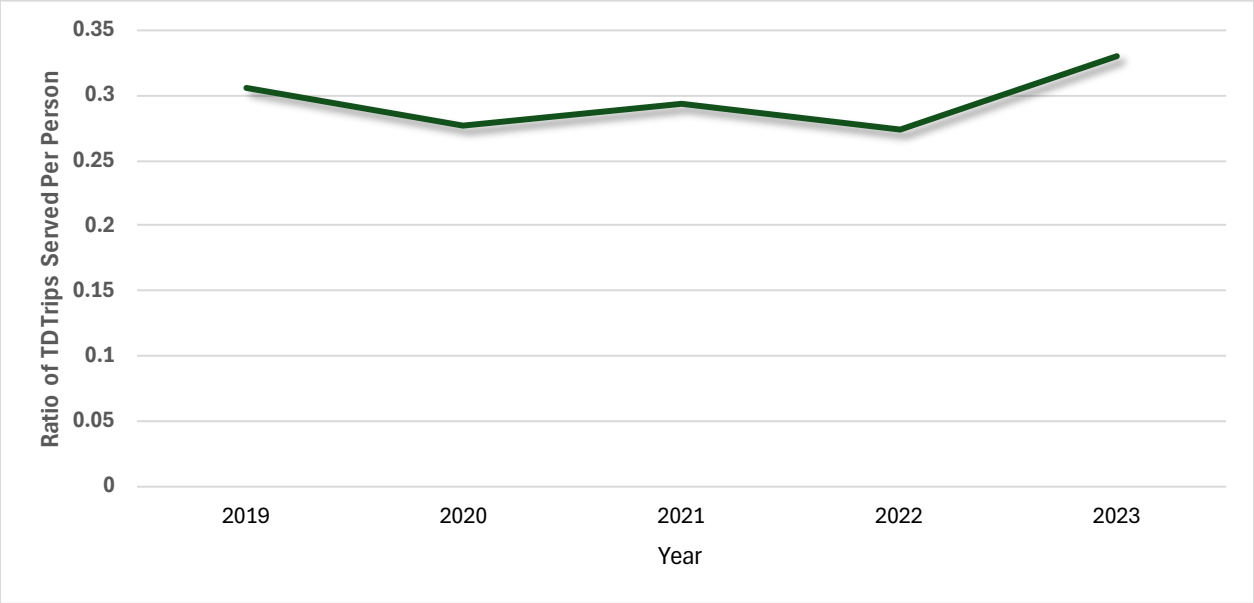


Figure 1-15: Ratio of TD Trips to Total Population.

1.4.1 RECENT IMPROVEMENTS TO PARATRANSIT SERVICES

Several improvements have been implemented to the paratransit services in Collier County as outlined by the CAT Connect Paratransit Service Report. Ecolane, a paratransit software, has been implemented, and Travel Trainings provided by CAT have been ongoing. Additionally, improvements to the phone systems have resulted in a decrease in average queuing time and a reduction in abandoned calls.

1.5 Labor and Employment Characteristics

The employment sector distribution in Collier County not only reflects the economic vitality and job market trends but also serves as a critical indicator of transit dependency and the necessity for inclusive transportation planning. Figure 1-16 and Figure 1-17 show the estimated and projected employment densities at the TAZ level in 2015 and 2050, respectively. As commercial areas and places of employment grow and develop, urban communities such as Pelican Bay, Golden Gate, Immokalee, Marco Island, and Naples will experience a higher increase in employment numbers. This is depicted in the employment distribution maps, as the TAZs around these urban communities have higher employment numbers compared to the rest of the County, represented by yellow, orange, and red. Especially Pelican Bay, Golden Gate, and Central Naples, as the projected 2050 map shows many TAZ blocks in red, symbolizing more than 10 jobs per acre. These TAZs are mostly located along the existing transit network, which means that the current network is doing well in providing service in the more employment-dense areas.

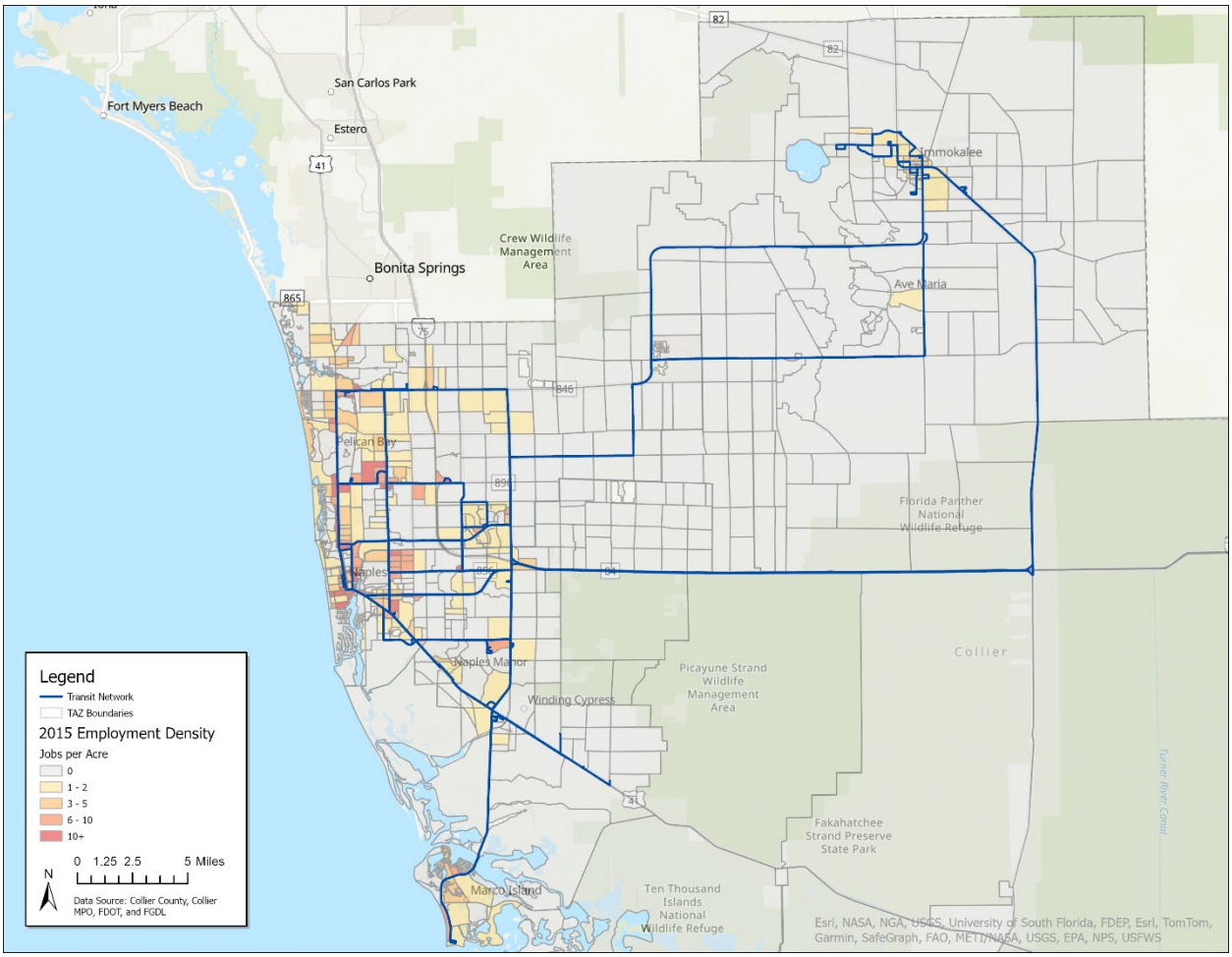


Figure 1-16: Collier County Estimated Employment Density by TAZs in 2015.

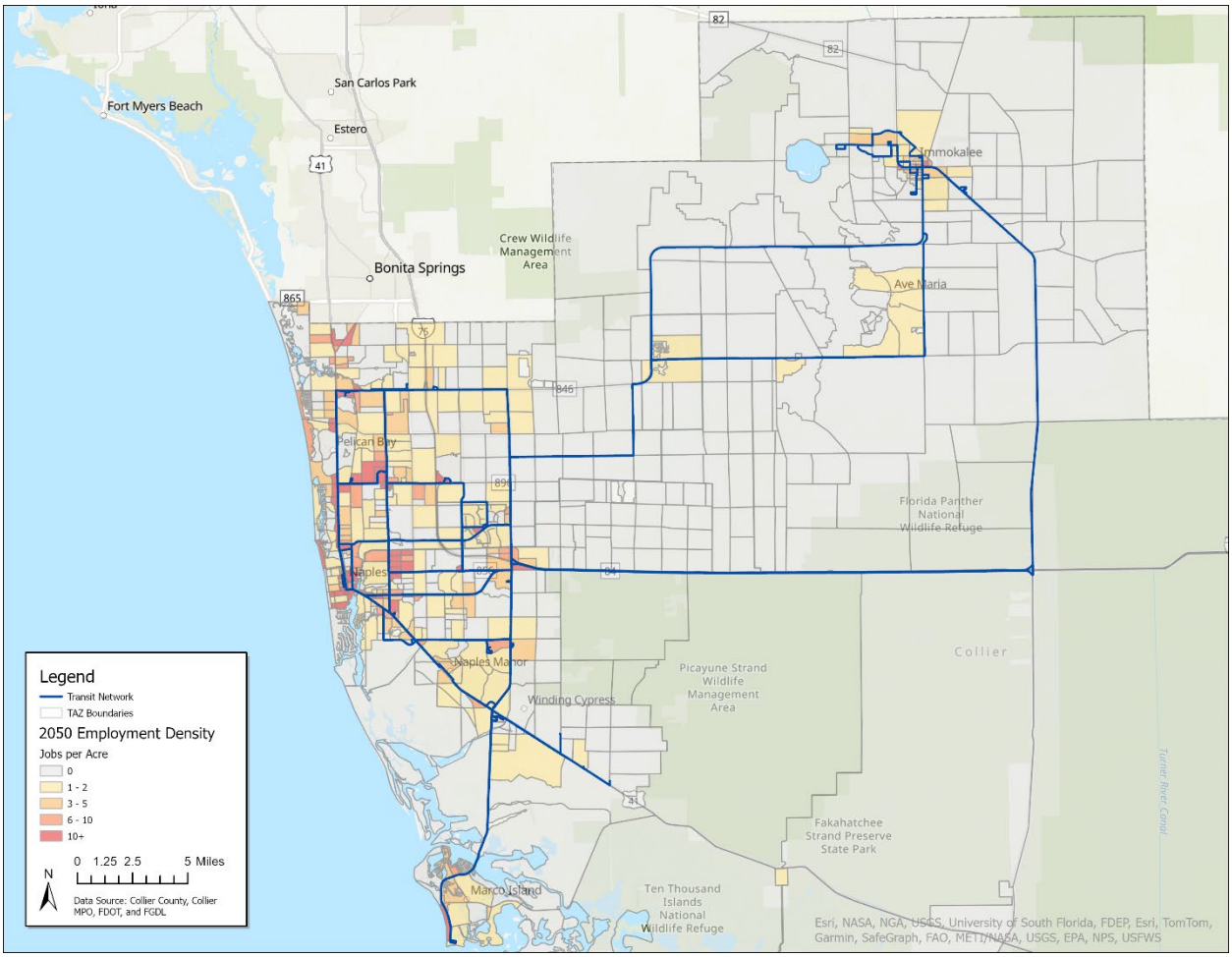


Figure 1-17: Collier County Projected Employment Density by TAZs in 2050.

Figure 1-18 shows the employment density increase between the 2015 estimates and the 2050 projections. The TAZs with higher growth rates seem to be scattered across Collier County, but are mainly located around the communities of Immokalee, Golden Gate, Pelican Bay, North Naples, and Central Naples. The high growth areas for employment are centered around the urban communities and along the existing transit network. Areas with high increases in employment numbers indicate potential for more transit demand as employment opportunity increases, generating more trips to get to these destination points.

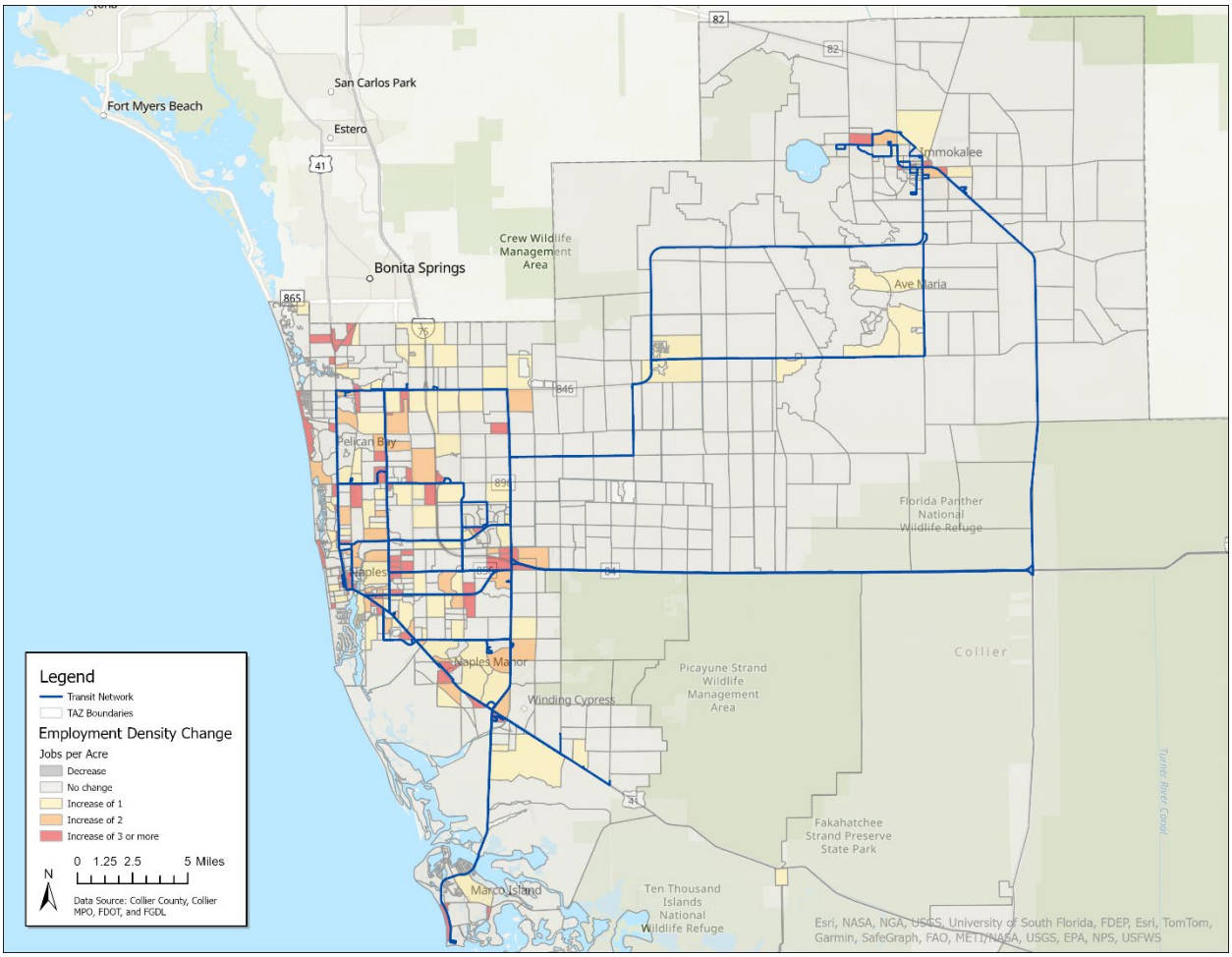


Figure 1-18: Collier County Employment Density Growth by TAZs from 2015 to 2050.

Figure 1-19 illustrates the distribution of employment across various sectors in Collier County in 2010, 2020 and 2022, offering insights into which sectors most influence the mobility requirements of the residents in before, during and after the COVID-19 pandemic.

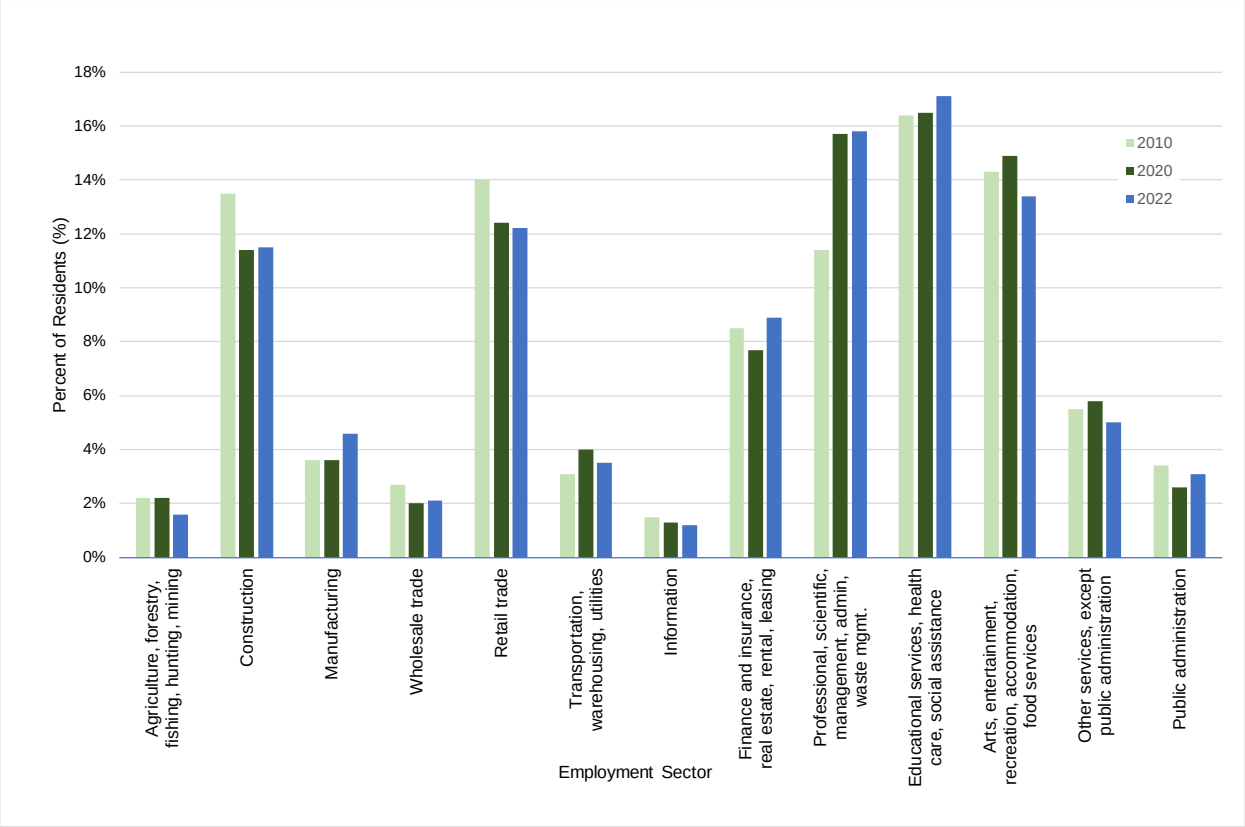


Figure 1-19: Collier County Labor Force Distribution by Service Area, 2010, 2020, and 2022.

Source: 2010 ACS 5-year estimates, 2020 ACS 5-year estimates 2022 ACS 5-year estimates.

As seen from Figure 1-19, the largest employment sectors in Collier County from 2010 to 2022 were the educational services, health care and social assistance sectors at around 16-17% of the workforce. Following closely is professional, scientific, management, administrative, waste management services and the arts, entertainment, recreation, accommodation, and food services sectors, each accounting for approximately 11-15% of the workforce. From Figure 1-11, a greater percent of the population earns more than $50,000. Thus, over time, more residents in Collier County can afford personal transportation, which may reduce their reliance on public transit. This observation also presents itself in Table 1-1; most of Collier's households own two or more cars. In contrast, sectors such as agriculture, forestry, fishing, hunting, mining, and transportation and warehousing, and utilities have experienced a downtick in their share of the workforce from 2010 to 2022. These types of jobs tend to have less employees working from home, leading to a higher reliance on personal vehicles or transit options in the County. Overall, the figure highlights the need for targeted transit solutions that cater to the unique needs of each employment sector, ensuring equitable access to mobility for all residents, regardless of income level.

According to commuting patterns derived from the US Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES), there were 150,665 total jobs where the workers lived in Collier and 150,529 jobs where residents worked in Collier in 2021, 93,937 of which were intra-county jobs where the worker both lived and worked in Collier (62% of all jobs). Aside from internal trips within Collier County, Lee County is primary origin location where people working in Collier but residing outside of the county travel from and is also the primary destination for Collier County residents that work outside of the county. In 2021, 19% of people that worked in Collier County lived in Lee County,

compared to 3% or less for each of the other origin counties, and 13% of workers that lived in Collier County worked in Lee County, compared to 4% or less for each of the other destination counties.. This highlights the extent to which the labor markets of the two counties are interconnected.

Figure 1-20 shows the unemployment rates in years ranging from 2010-2022 based on ACS 5-year estimates.

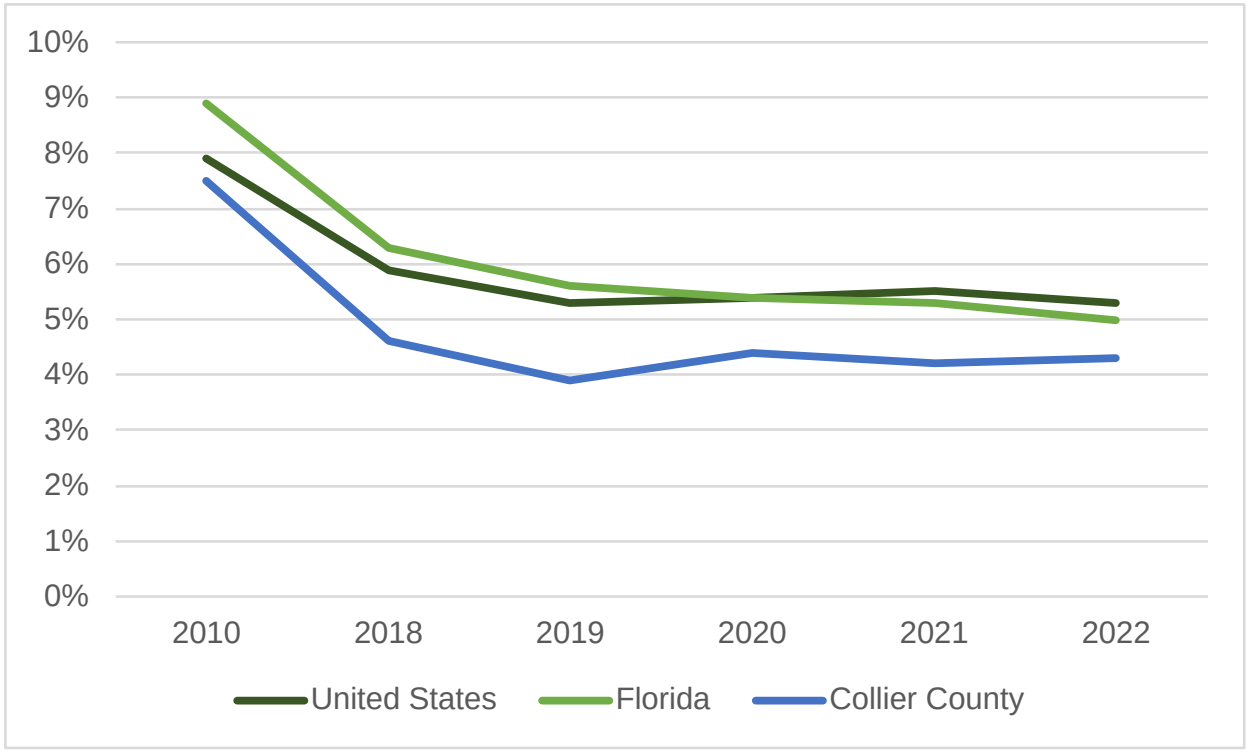


Figure 1-20: National, State and County Unemployment

In 2010, Collier County experienced higher unemployment rates. However, since then, there has been a consistent decline year by year. Collier County's unemployment rates consistently outperformed both national and state-wide averages. Even during the pandemic, when many regions faced economic challenges, Collier County maintained lower unemployment rates. Lower unemployment rates can correlate with economic recovery, as more people are employed of all income ranges engage in various activities. This increased economic activity can lead to higher public transportation usage.

1.6 Educational Attainment

Levels of educational attainment in the county can correlate with earnings potential and job security. This influences mobility needs. Figure 1-21 shows the educational attainment of residents ages 25 years and older in Collier County.

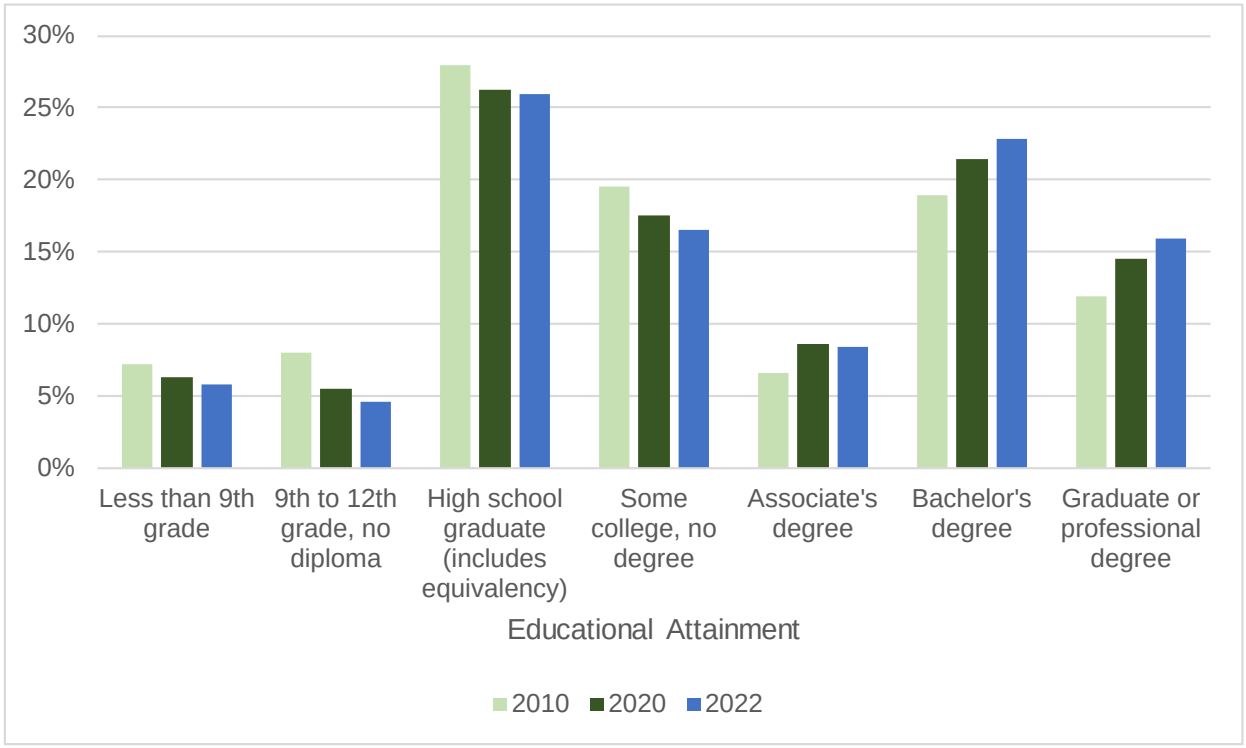


Figure 1-21: Educational Attainment in Collier County.

As seen from Figure 1-21 above, more residents have obtained a bachelor's degree over time from 2010-2022. Despite this, while those obtaining bachelor's and graduate degrees are increasing in the County, approximately 30% of the population does not have a college degree which indicates around a third of the population with potentially lower potential earnings and an increased likelihood of requiring transit service.

1.7 Tourism

Tourism plays a vital role in shaping transportation needs and services within Collier County. Tourists arrive in Collier County year-round, but the peak season spans in the winter from October to April. There are two distinct groups of visitors: seasonal residents who live in Naples for more than 4 months (typically October - April) and those visiting the area as tourists. The Tourist Development Council (TDC) makes a distinction between these groups, as seasonal residents tend to own properties while vacationing visitors do not.

In most tourist destinations, tourists often rely on public transit, especially those accustomed to using it in their home communities and therefore tourists, combined with seasonal visitors and residents contribute to an overall increased transportation demand. According to the Collier County Tourist Development Council and Gulfshore Business, in 2023, through October, Collier County welcomed 2.3 million visitors, generating an economic impact of $3.01 billion (Roesler, 2023). This substantial economic impact underscores the importance of efficient transportation services.

Collier County boasts pristine beaches, attracting sun-seekers and water enthusiasts. Tourists may use various services such as the Breeze Beach Shuttles, bike routes, and bicycle rentals as first mile/last mile access to transit hubs. However, it is worth noting that tourism numbers have shown some fluctuations. For instance, in March 2023, Collier County experienced a 20% year-over-year decline in visitors compared to

March 2022. These fluctuations in visitor numbers can impact transportation needs and usage patterns throughout the year.

Figure 1-22 and Figure 1-23 show key tourist destinations by mapping major points of interests in Collier County in relation to transit line locations in the region. Attractive destinations include airports, beaches, museums, boating areas, and parks. While a grand majority of points of interest lie around the Naples region, there could be more extensive access to the beaches on Marco Island.

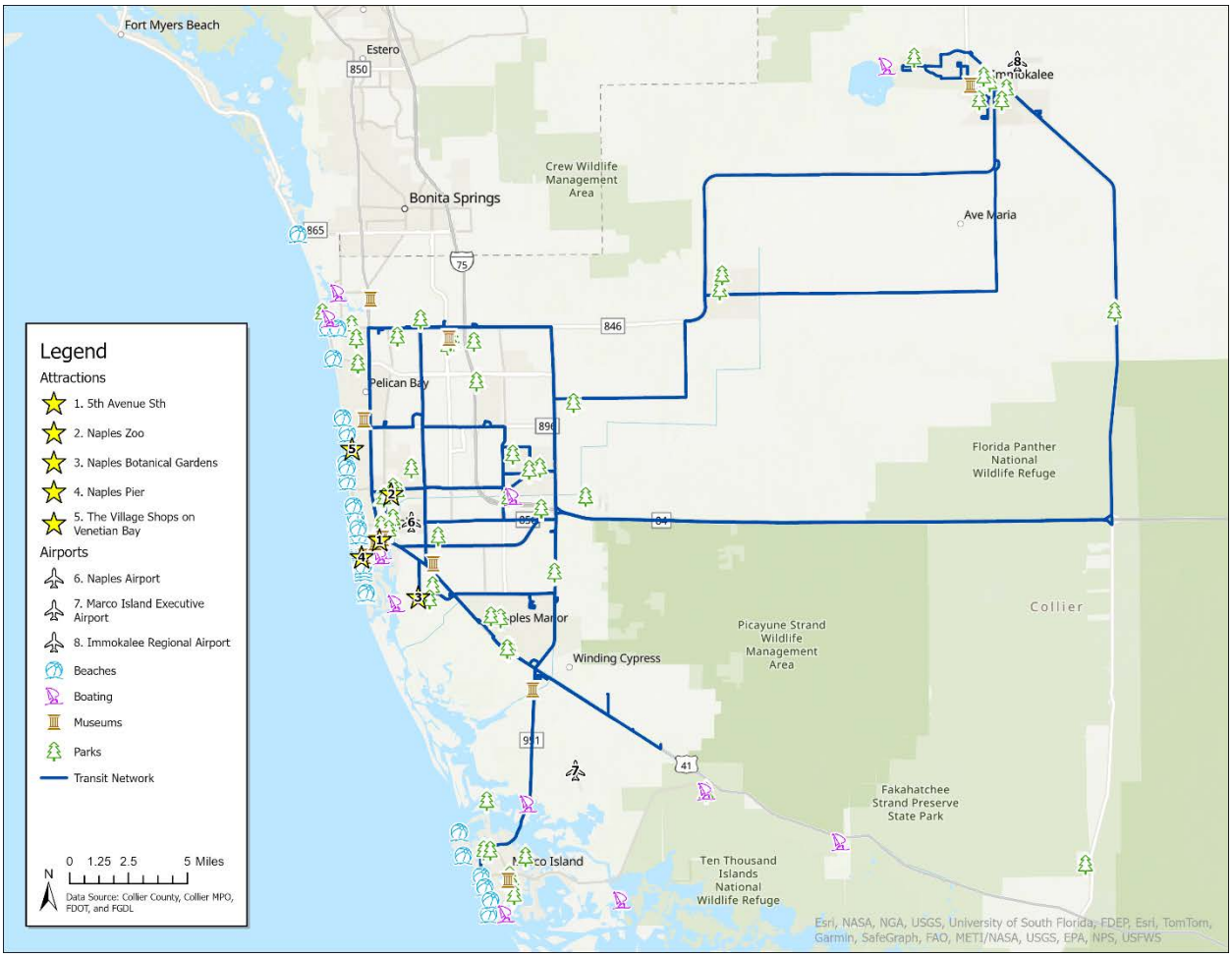


Figure 1-22: Transit Access to Point of Interest Destinations in Collier County.

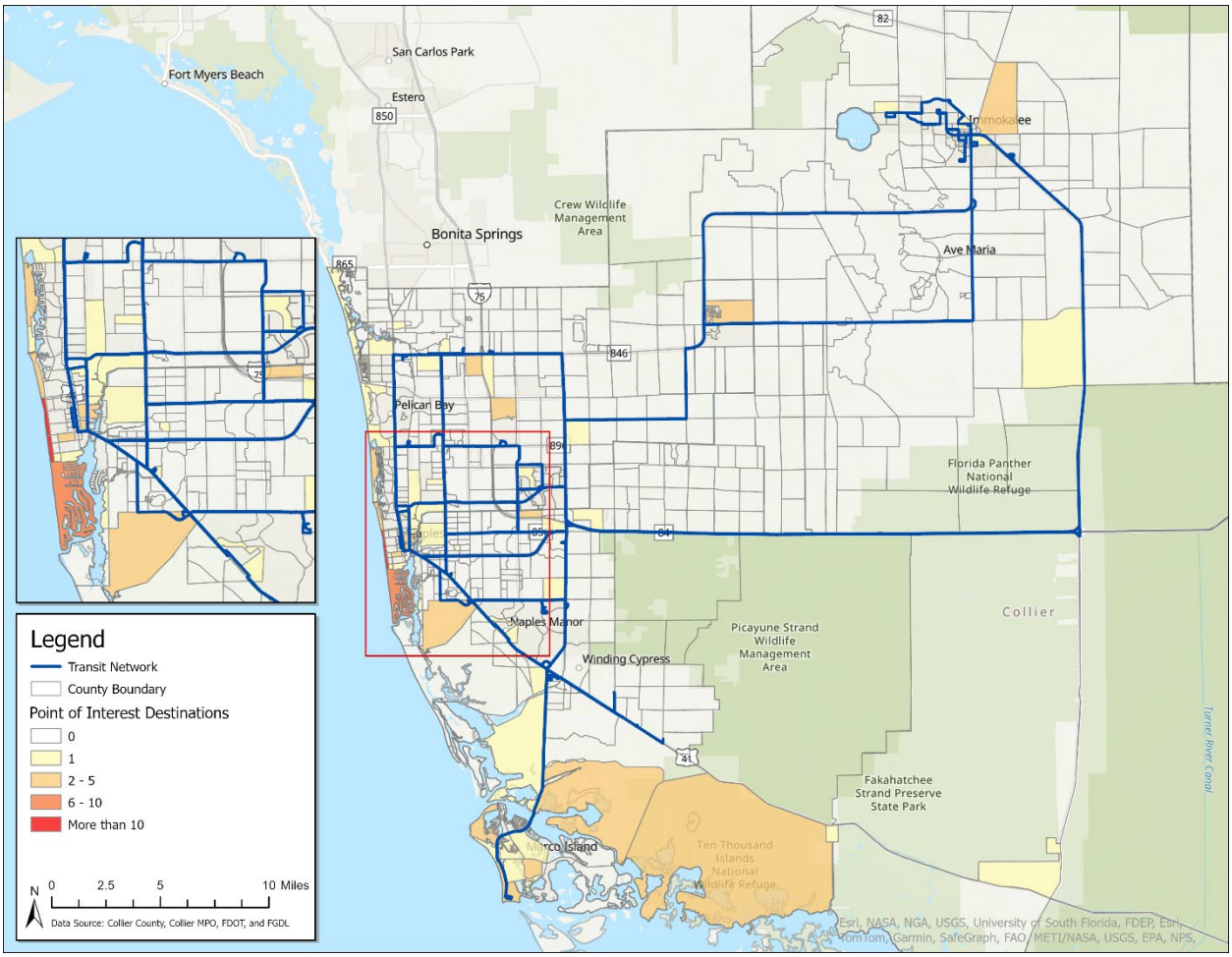


Figure 1-23: Density Map of Point of Interest Destinations by TAZ.

More recently, a study in June 2024 by Florida Gulf Coast University on Regional Economic Indicators (Southwest Florida Economic Outlook, Regional Economic Research Institute, FGCU, 2024) found that seasonally adjusted real tourist tax revenues for coastal counties were up 14% in March 2024 compared to March 2023. In addition, airport passenger activity also increased 12% from April 2023 to April 2024. This suggests that tourists are increasingly visiting Florida's coastal areas, like Collier, and spending more money, which likely reduces their propensity to use transit.

1.8 Major Trip Generators

Understanding the major trip generators within the county can help determine where to provide the most transit service. Table 1-3 displays the top employers in Collier County by the number of employees. The largest employers operate in the educational, government, and healthcare industries. Arthrex, Publix Supermarket, and Gargiulo are the three largest private sector employers in the county. On the other hand, some of Gargiulo's locations are in rural or industrial areas, lacking public transit access. The nearest stop to the location at Oil Well Road is one of Route 19's stops 2.72 miles away. Further, the closest bus stop to the Gargiulo packing house location in Immokalee is a Route 22 stop 1.63 miles away. Due to all Publix locations being near commercial centers, most, if not all, locations are accessible by transit. Similarly, most, if not all, public-school and local government buildings in the county are surrounded by residential or

commercial hubs areas that have access to public transit stops. As development expands to accommodate more housing and commercial demand (see Section 3.8), it will be necessary for CAT to consider expanding their public transit services.

Table 1-3: Top Employers in Collier County in 2023.

Employer	Number of Employees
Collier County Public Schools	5810
Collier County Local Government	5045
Arthrex	3983
NCH Healthcare System	3288
Publix Super Market	2935
Gargiulo	2082
Pacific Tomato Growers	872
Walmart	807
Marriott International, Inc.	669
Moorings Park	657
Downing-frye Realty Inc.	605
McDonald's	545
Vi at Bentley Village	494
Asg	447
David Lawrence Center	423
Philharmonic Center For The Arts	412
Naples Lake Country Club	402
Walgreens	389
Ave Maria School of Law	372
Heartland Health Care Center Ft Myers	372
Aa Stucco & Drywall Inc.	350
Home Depot	350
Seminole Casino Hotel Immokalee	350
CVS Pharmacy	349
Twineagles Pro Shop	333

Source: Regional Economic Research Institute at Florida Gulf Coast University (2023).

Figure 1-24 and Figure 1-25 show the distribution of top employer locations in Collier County and their distribution relative to existing transit lines. While most places of employment are accessible to transit, there exist many points of interest north of Pelican Bay and North or Immokalee which are further from a transit line. An extension of transit lines along Route 29 and 41 towards Everglades City would be important as well and would increase commercial zones in that area.

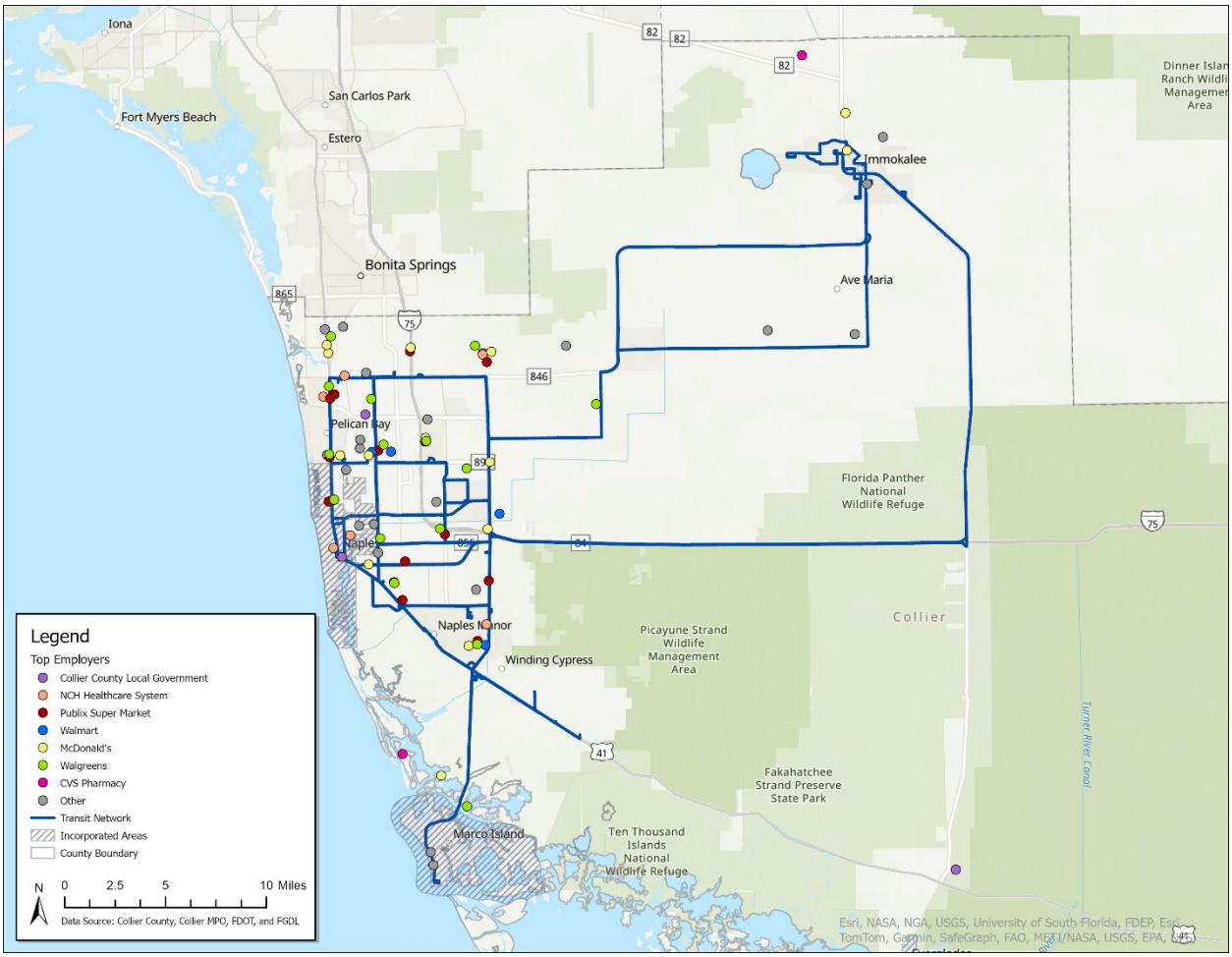


Figure 1-24: Transit Access to Top Employers in Collier County in 2023.

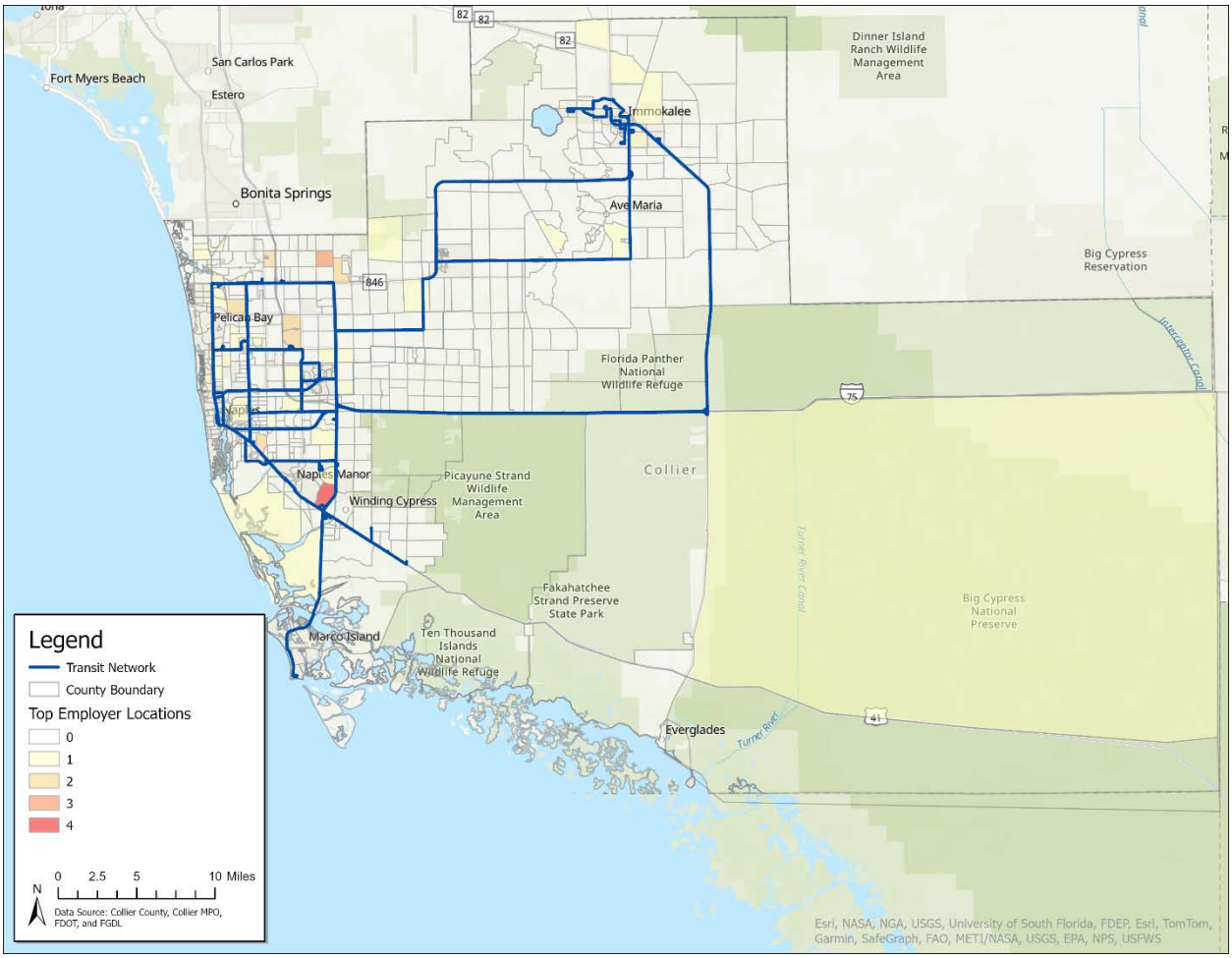


Figure 1-25: Density Map of Top Employer Locations by TAZ.

1.9 Major Developments

Table 1-4 shows the top 10 planned unit developments (PUDs) by acreage. Transit lines running adjacent to each proposed development are also outlined.

Table 1-4: Top Ten Planned Unit Developments in Collier County by Area.

Planned Unit Development	Acres	Transit
Town of Ave Maria SRA	5928	Routes 19/22/23
Marco Shores/Fiddler's Creek	4215	Routes 21/24/121
Lely Resort	2880	Routes 17/21/24/121
Heritage Bay	2562	Route 27
Sabal Bay	2518	Routes 13/14/24
Hacienda Lakes	2264	Routes 17/21/121
Pelican Marsh	2191	Routes 11/12/27
Orange Tree	2131	Routes 19/22
Pelican Bay	2114	Routes 11/25/29
Winding Cypress	1960	Routes 12/17/21/24/121

Source: Collier County GIS Hub.

Most of the proposed developments have transit services running adjacent to them. However, it is crucial to note that a significant portion of these developments are gated communities, which presents unique challenges for public transit access. Gated communities, which are prevalent in Collier County, often have restricted entry points and private roads that can limit direct access for public transit vehicles. Since most of these developments seek to expand residential areas, it will be important to ensure either an expansion of existing transit routes or the addition of new transit lines to serve these areas effectively. This may require innovative solutions to overcome the access limitations posed by gated communities.

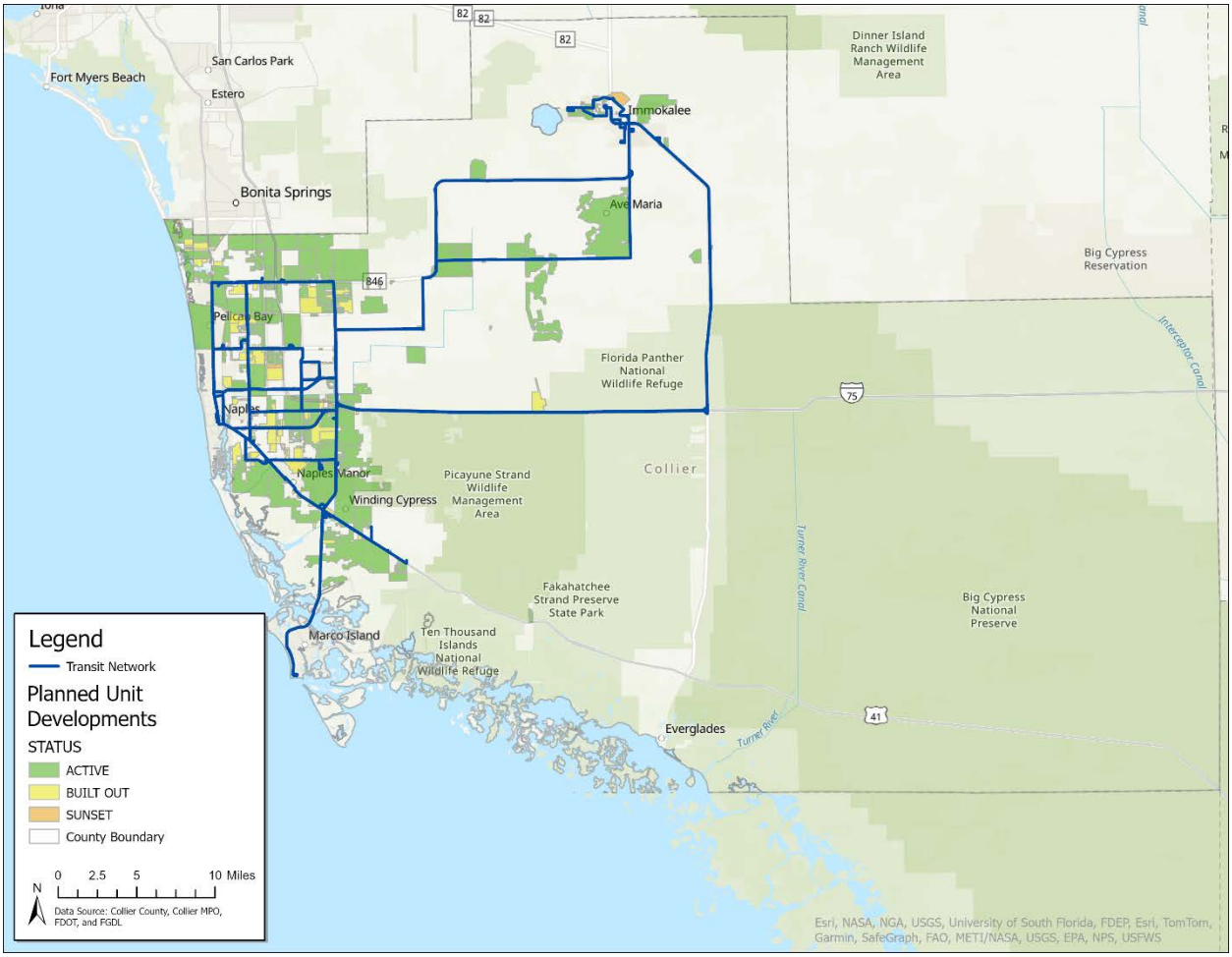


Figure 1-26: Status of Planned Unit Developments in Collier County.

Figure 1-26 shows the Developments of Regional Impact (DRIs) in Collier County as of May 3, 2024. These developments are noted for potential impacts on existing and future travel demand. The table shows which routes currently serve these developments in the existing CAT transit network as of May 3, 2024.

1.10 Existing and Future Land Use

With a fairly large land area, much of Collier County consists of agricultural land or park space. A significant portion of Collier County's land area is currently zoned for agriculture or open space (more than 90% altogether; 38% and 54% respectively). About 5% of the land area is zoned for planned unit development

(PUD), allowing for a significant amount of new or upcoming developments that would impact transit use and demand. Naples and Marco Island are both zoned as incorporated areas. The land use varies more in Immokalee and the urban communities surrounding Naples, including Palm River, Golden Gate, Fiddler's Creek and surrounding planned communities, and so on. Excluding agriculture, open space, PUD, and incorporated area zoning, these areas consist of 76% residential, 12% commercial, 9% industrial, and 3% civic and institutional zoned land.

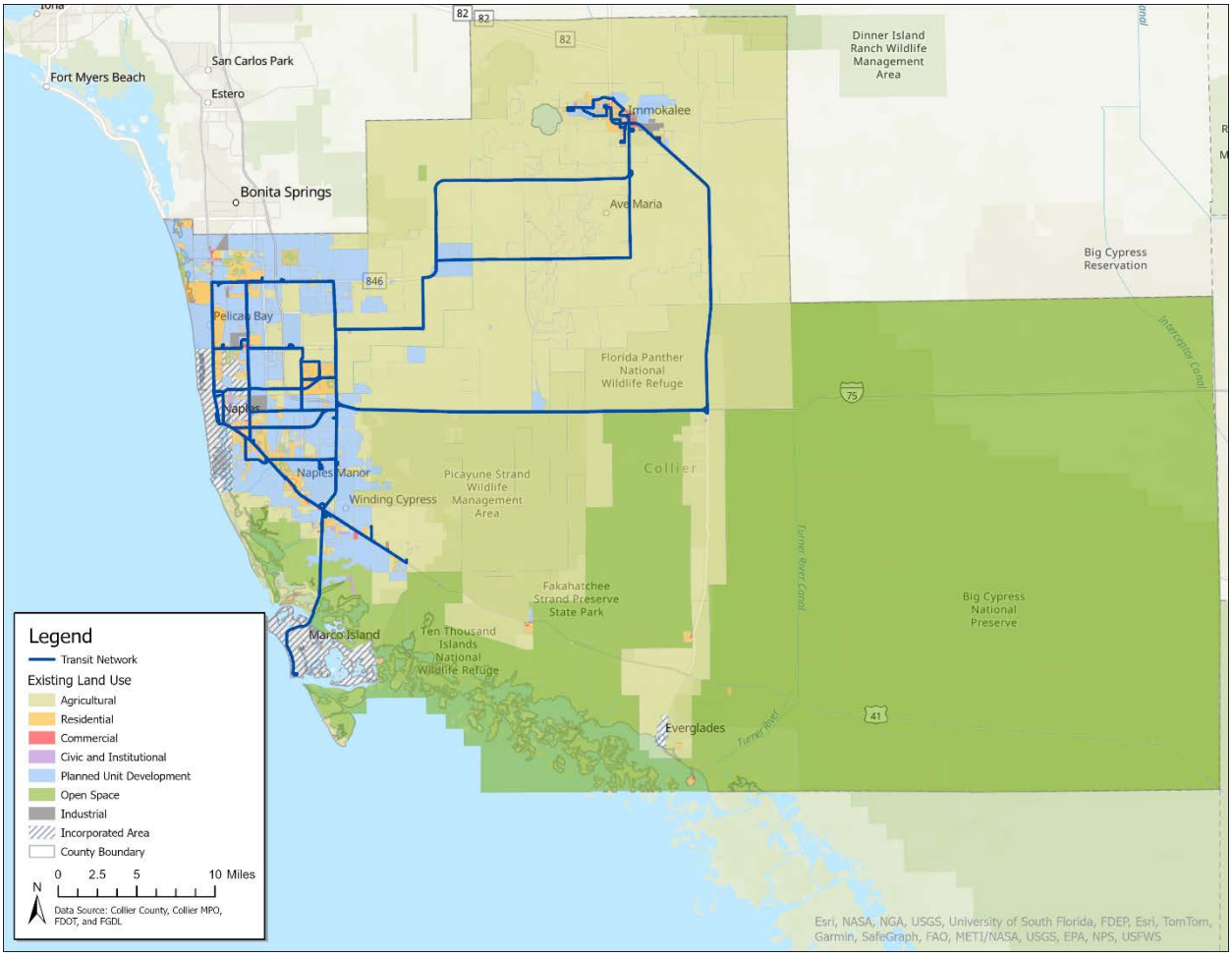


Figure 1-27: Existing Land Use Zoning Areas in Collier County.

As the County grows and develops, land use areas are redesignated consequently to accommodate development needs and purposes. In the County's future land use designations, open space or conservation designation areas are expanding, specifically in the Big Cypress National Preserve as it now includes the Florida Panther National Wildlife Refuge where it was previously zoned as agricultural land. A notable amount of agricultural land has been rezoned as rural or estates designation, which is defined as low density residential development with limited agricultural activities. The PUD areas are zoned as urban residential land. The future land use designation also adds a new category of mixed-use activity in replacement of commercial and civic and institutional zoning.

A more detailed breakdown of future land use designations shows that conservation continues to occupy the largest portion (59%) of the County's acreage. It is still followed by agricultural/rural uses at 18%, but at a significantly smaller percentage compared to existing agricultural area. Estate designation and

residential uses each constitute another 7% of the land. Noteworthy is the presence of sending and receiving areas, comprising of 3% and 2% of the land respectively, which serve as mechanisms to steer development away from environmentally sensitive regions towards designated growth areas.

Although the predominant land use remains focused on conservation and agriculture, mixed-use zoning holds immense potential for fostering transit-oriented development. Transit planning should prioritize serving receiving areas, ensuring that transit infrastructure supports the anticipated influx of development in these zones. Meanwhile, transit routes passing through sending areas should aim to minimize ecological impact and focus on connecting these areas to transit hubs and receiving districts.

Residential areas present opportunities for creating walkable, mixed-income neighborhoods that are well-connected to transit services. Transit-oriented design principles should be integrated into the planning and development of these areas, emphasizing pedestrian-friendly streetscapes, mixed-use zoning, and access to public transportation. Additionally, transit routes serving these neighborhoods should offer frequent and reliable service, catering to the diverse needs of residents across different income levels and demographics.

Figure 1-28 and Table 1-5 depict future land use designation in Collier County as of 2024. The figure shows more generalized categories of land use. The table includes more detail including finer subcategories of land designations along with percentage breakdowns for each designation, sorted by acreage.

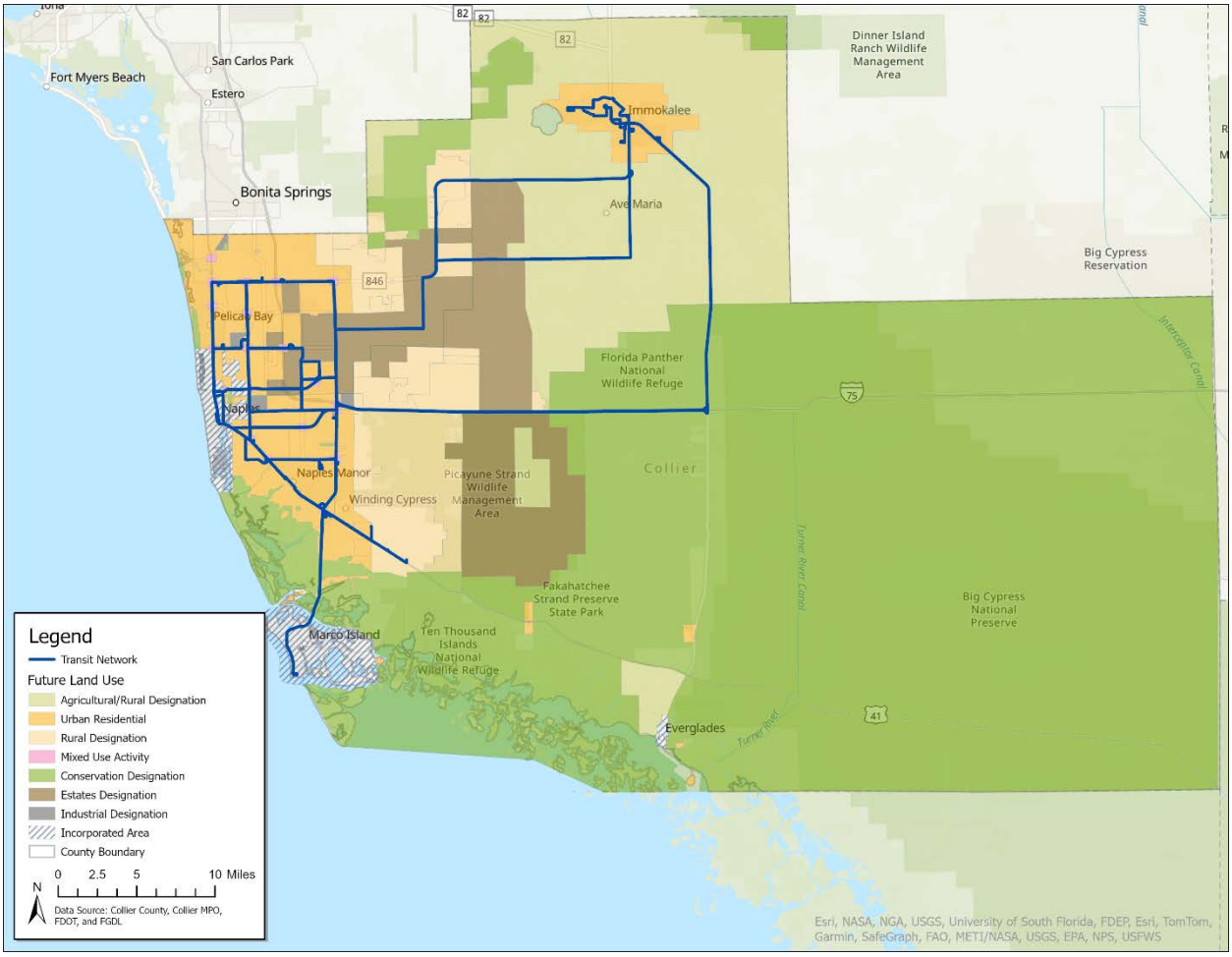


Figure 1-28: Future Land Use Designation in Collier County as of 2024.

Table 1-5: Future Land Use in Collier County.

Future Land Use	Acres	% of Area
Conservation	856,551	59%
Agricultural/Rural	257,645	18%
Estates Designation	101,302	7%
Residential Uses	95,936	7%
RF-Sending	44,843	3%
Incorporated Area	25,941	2%
RF-Receiving	22,672	2%
Urban Coastal Fringe Subdistrict	11,775	1%
RF-Neutral	8,836	1%
Mixed Use	3,079	<1%
Rural Settlement Area District	2,824	<1%
Immokalee Road Rural Village Overlay	2,778	<1%
Industrial District/Rural Industrial District	1,839	<1%
US 41 East Overlay	1,526	<1%
Bayshore/Gateway Triangel Redevelopment	1,190	<1%
Interchange Activity Center Subdistrict	454	<1%
Commercial	249	<1%
Livingston Rd/Veterans Memorial Blvd E Resi Subdistrict	36	<1%
Carman Drive Subdistrict	15	<1%
Orange Blossom/Airport Crossroads Comm'l Subdistrict	10	<1%
Corkscrew Island Neighborhood Coml Subdistrict	9	<1%
Ivy Medical Center Subdistrict	4	<1%
Total	**1,440,427**	**100%**

Source: Collier County GIS Hub.

1.11 Commuter Travel Patterns

Understanding mode choices of commuters is essential to understanding the frequency and need of transit options in Collier County. In Table 1-6, journey-to-work characteristics and commuter flow patterns were compiled based on Census data for residents 16 years or older.

Table 1-6: Journey-to-Work Characteristics.

Characteristic	2010	2020	2022
Place of Work			
Worked inside county	89.5%	89.3%	89.3%
Worked outside county	8.1%	8.4%	8.3%
Mode to Work			
Drive alone	75.3%	74.0%	74.0%
Carpool	12.3%	12.0%	10.9%
Public transit	1.6%	1.1%	0.5%
Walk	1.2%	1.1%	0.7%
Work at home	6.1%	9.4%	11.7%
Taxicab, motorcycle, or other means	2.5%	1.7%	1.7%
Travel Time to Work			
<10 minutes	11.6%	10.6%	10.0%
10-19 minutes	33.1%	29.7%	29.1%
20-29 minutes	24.2%	24.7%	24.9%
30-44 minutes	18.9%	22.2%	22.8%
45+ minutes	12.2%	12.8%	13.2%
Departure Time to Work			
6:00-8:59 AM	67.8%	65.9%	64.8%
Other times	32.2%	34.1%	35.2%

Source: 2010 5-year estimates, 2018 5-year estimates, 2022 5-year estimates.

As shown in Table 1-6, more people work inside the county. As time passes, less people use public transit or walk and more work at home. A consistent percentage of people drive alone (74-75%). Travel times to work remain consistent, although longer commute times are steadily increasing. Finally, a consistent number of residents (around 65-67%) leave for work between 6AM-8:59AM.

1.12 Roadway Conditions

Part of the baseline conditions assessment is the examination of existing roadway conditions. The conditions of the roads that a transit route operates on can significantly impact route run time and on-time performance, and in turn, implicate the efficiency of that route. Figure 1-29 depicts the conditions of major roadways in Collier County, including existing deficiencies (shown in red), projected deficiencies within five (orange) and ten years (yellow), and roads currently undergoing capacity enhancement projects (grey). The transit network has been overlayed on top, to show where the existing service may be impacted by the road conditions. A significant portion of the existing transit network appears to be operating on roads with existing deficiencies or are projected to be deficient within the next five years, especially around Naples, Pelican Bay, Orangetree, and along the roads towards Ave Maria and Immokalee. This indicates that transit service is highly impacted by the roadway conditions in these areas and will worsen in the next few years. Routes 13, 14, 19, 21, and 22 are especially impacted as large sections or most of the route lengths are along existing deficiencies (shown in red in Figure 1-29), The impact on Route 19 is particularly notable as it has high average monthly and annual ridership, as indicated in a later section. Routes 15, 16, 20, 21, 25, 27, and 121 may also need to be considered as some of the route lengths are along roads that are projected to be deficient in five to ten years, very few of the existing or planned capacity enhancement projects are

along the transit service roads. Improvements to the road conditions are highly suggested to improve transit efficiency along these roads.

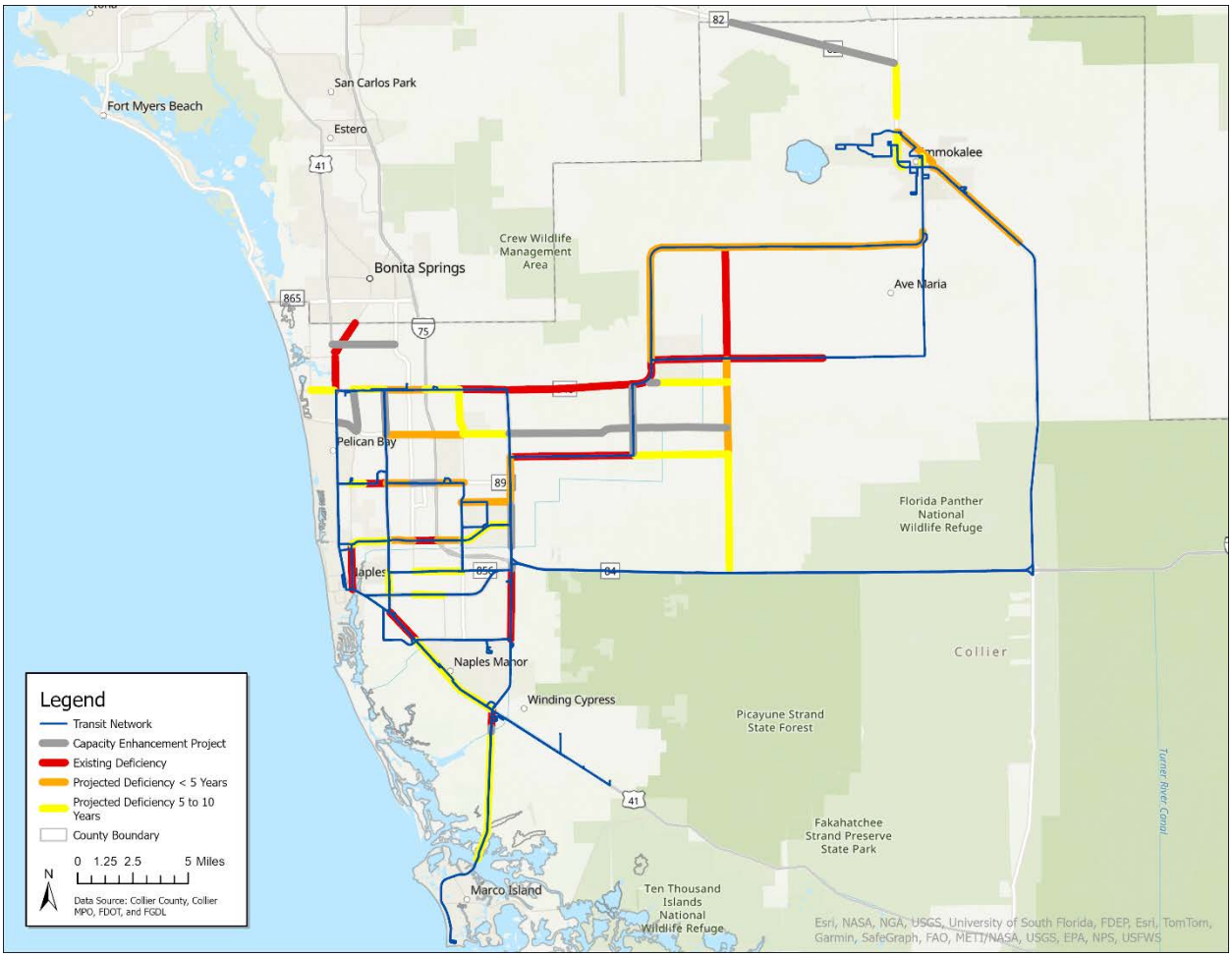


Figure 1-29: Existing and projected deficiency of Collier County roads (Source: Collier County 2024 Annual Update and Inventory Report (AUIR)).

Traffic conditions can also serve as an indicator for areas with potential need for alternative transportation modes in place of the private vehicle or additional public transit service, especially on routes towards popular destinations and major roads with high congestion levels. Figure 1-30 depicts the percent change in peak hour directional volumes on major roads from 2023 to 2024. The green lines represent a decrease in volume, meaning that there are less vehicles along those roads compared to 2023 conditions. The red lines depict the opposite, an increase in volume, indicating more vehicles compared to 2023 and potentially more congestion. Many of the roads with high increases in volume are already serviced by transit, especially around Naples, Pelican Bay, and Immokalee. This could indicate a need for more service along those roads. Other high volume increase roads are not yet serviced by transit, including Immokalee Rd, Randall Blvd, and Everglades Blvd N around the Orangetree community, as well as on Highway 29 from Miles City to Everglades. This could indicate a need for transit service to reduce vehicle volumes in those areas.

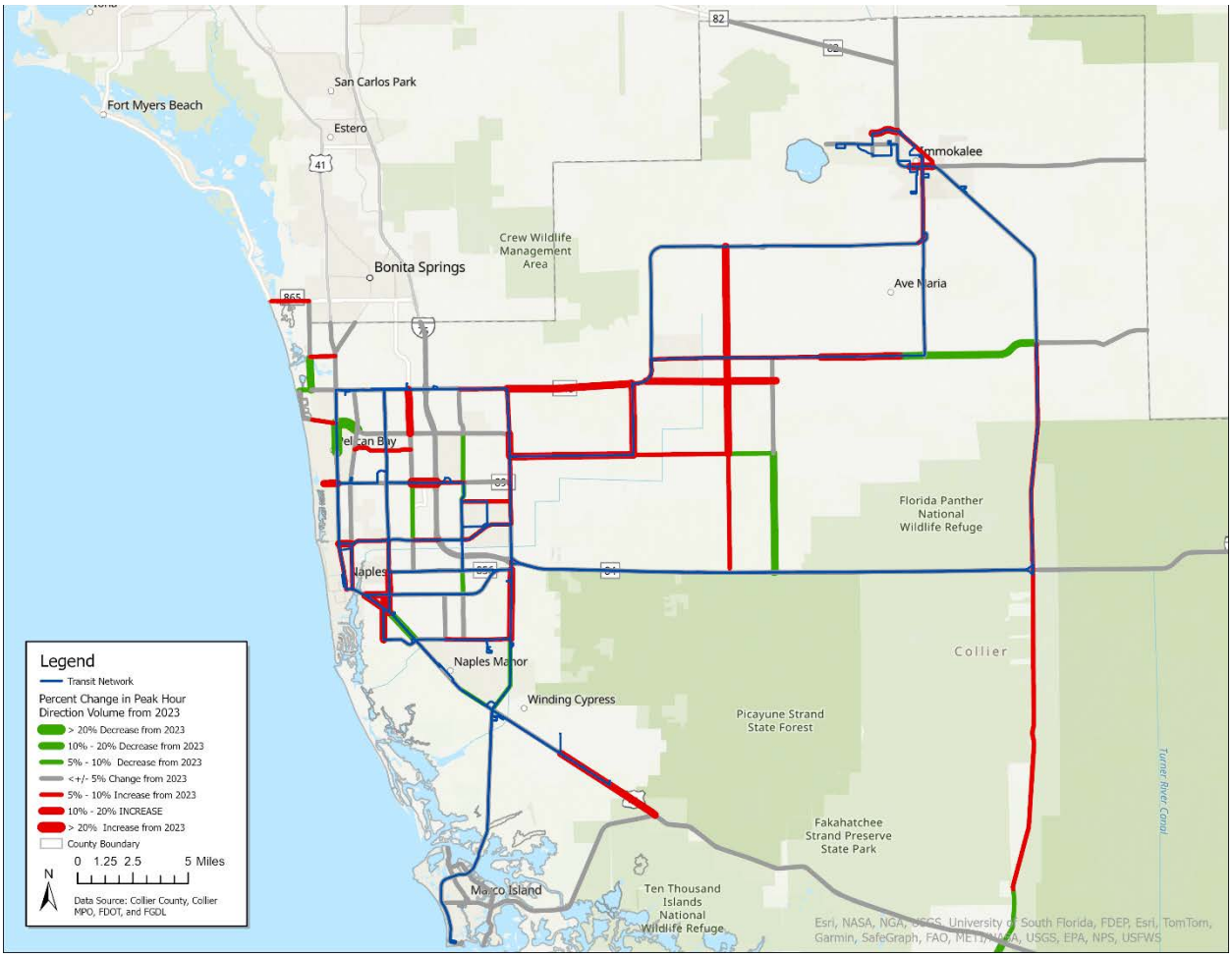


Figure 1-30: Percent change in peak hour direction volume on major roads in Collier County from 2023 to 2024 (Source: Collier County 2024 AUIR).

2 Transit Performance

This section evaluates transit services in Collier County, including an overview of current services, trend analysis, and peer comparison. It examines existing transit operations, infrastructure, and other key providers. Additionally, it reviews performance trends over the past five years and compares CAT service with peers using standard criteria.

2.1 Existing Transit Services

2.1.1 FIXED ROUTE SERVICES

As of 2024, Collier Area Transit (CAT) operates 16 existing fixed bus routes services that operate throughout Collier County. CAT's service area largely consists of the urbanized part of Collier County, including the City of Naples and the City of Marco Island. Unincorporated rural communities in the County that receive transit service include Ave Maria and Immokalee. Service is provided 7 days a week, all year round except for 6 holidays. Daily service typically begins between 5:30 AM and 6:00 AM and ends later

in the evening between 7:30 PM and 8:00 PM for most routes. No services are provided on major holidays, including Thanksgiving Day, Christmas Day, New Year's Day, Memorial Day, Independence Day, and Labor Day. In 2023, the service's annual ridership was 729,767. CAT routes 11, 12, and 27 connect to the LinC – Lee-Collier route, LeeTran's Route 600, a route providing transit connections between Lee County and Collier County. It is interlined with LeeTran's Route 240 and also connects to LeeTran Routes 140 and 240. Table 2-1 shows the existing transit lines in Collier County as of 2024.

Table 2-1: Existing Fixed-Route Services in Collier County.

Count	Route	Services
1	11	US 41 to Creekside Commerce Park
2	12	Airport to Creekside Commerce Park
3	13	NCH & Coastland Center Mall
4	14	Bayshore to Coastland Center Mall
5	15	Golden Gate City (Santa Barbara)
6	16	Golden Gate City (Santa Barbara)
7	17	Rattlesnake to FSW
8	19	Golden Gate Estates & Immokalee
9	20	Pine Ridge Road
10	21	Marco Island Circulator
11	121	Express Immokalee to Marco Island
12	22	Immokalee Circulator
13	23	Immokalee Circulator
14	24	US 41 East to Charlee Estates
15	25	Golden Gate Parkway & Goodlette - Frank
16	27	Immokalee Road

Source: CAT Website.

In addition to fixed-route services, CAT operates the Paradise Beach Trolley. This service runs every Friday, Saturday, and Sunday from mid-February to the end of April. It shuttles passengers from the Conner Park Parking Lot on Bluebill Avenue to Delnor-Wiggins Pass State Park and Vanderbilt Beach, operating from 8 am to 3 pm and from 4:30 pm to 7 pm. Figure 2-1 shows a map with the current transit routes in Collier County as of 2024.

Collier County transit services may be impacted by parking policy development that is currently under consideration. Florida's Senate Bill 102, known as the Live Local Act, is a policy that would consider reducing the provision of parking in order to promote more transit use. This policy has not yet been incorporated in Collier County's Land Development Code; however, it is undergoing consideration in the county's land development code sub-committees and may be implemented in the future.

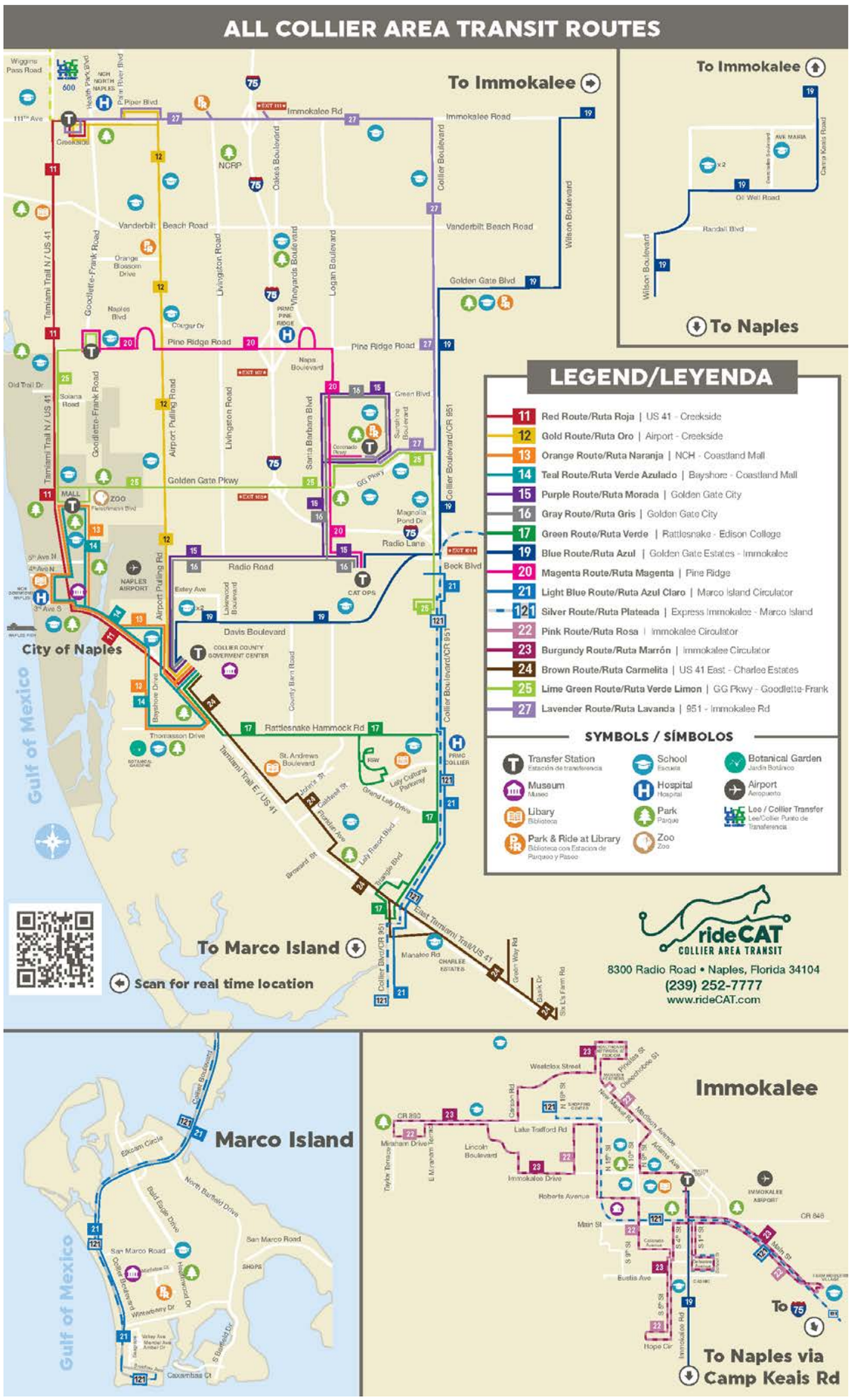


Figure 2-1: Existing CAT Services

2.1.2 PARATRANSIT SERVICES

Collier County also provides paratransit (shared ride, door-to-door) services through the CATConnect program with funding from the Florida Department of Transportation, Agency for Persons with Disabilities and Florida Commission for the Transportation Disadvantaged (TD). Those who qualify for CATConnect are primarily those under the Americans with Disabilities Act (ADA) as well as those who qualify as TD individuals. TD individuals are counted as those who because of a mental or physical disability, income status, or age are unable to transport themselves or to purchase transportation and are, therefore, dependent upon others to obtain access to healthcare, employment, education, shopping, social activities, or other life-sustaining activities.

The CATConnect paratransit service is administered by Collier County Public Transit & Neighborhood Enhancement (PTNE) Division and provides shared, door to door transportation service for medical appointments, work, school and select other trips depending on the funding program requirements.

In the June 2024 CATConnect Paratransit Service Report, it was found that paratransit ridership was on an increasing trend, with a significant increase from 2022 to 2023 of 35.8%, see Figure 2-2. Collier County overall has 7% fewer vehicles than peer systems but higher passengers per trip compared to peer agencies.

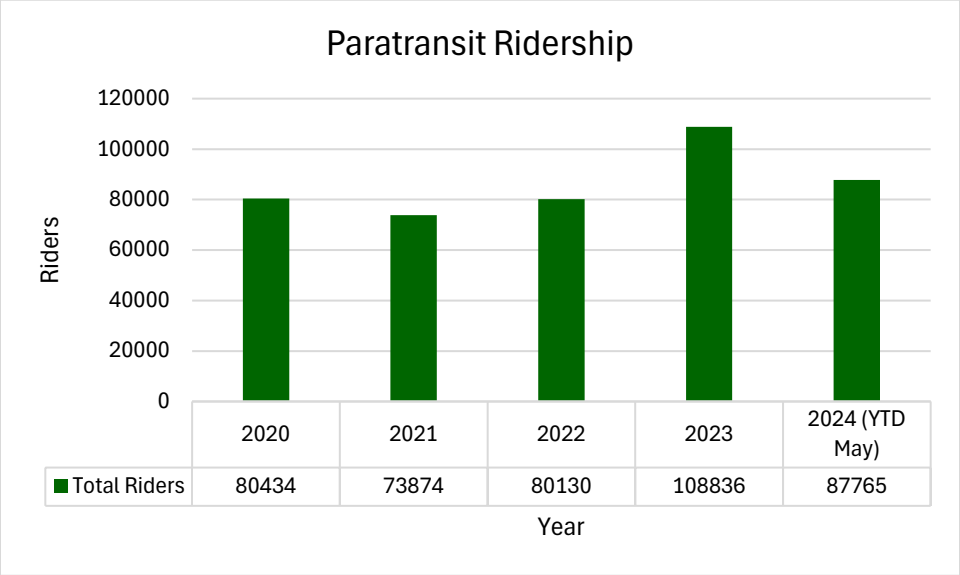


Figure 2-2: Paratransit Ridership

2.1.3 TECHNOLOGY SOLUTIONS

Collier County has several existing technology solutions and goals that will help the County prosper in the next 10 years.

2.1.3.1 IT Infrastructure and Management

Collier Area Transit (CAT) has a dedicated IT department responsible for managing both the physical and digital infrastructure of its transit services. This includes software development, maintenance, and ensuring data privacy and security.

2.1.3.2 Transit Development Plan and Mobility Initiatives

The 10-year Transit Development Plan identifies mobility-on-demand services as a top priority. In line with this, CAT started using Ecolane scheduling software for paratransit services in July 2021. This upgrade streamlined scheduling, dispatching, and real-time updates, significantly improving efficiency and service reliability.

2.1.3.3 Passenger Convenience and Mobile App Integration

In March 2022, CAT launched the CATconnect Mobile App. The app allows passengers to schedule, monitor, and manage trips seamlessly. Integrated with the CATCash fare system, it provides an account-based payment option that eliminates the need for cash transactions. The app also offers trip details and past journey records for user convenience.

Collier County also offers the Collier 311 App, which connects users to a variety of government services and information, including construction updates, waste services, and service requests.

2.1.3.4 Exploring Sustainable Transportation

In response to evolving demands, CAT is exploring the introduction of electric shuttles as a greener alternative to traditional buses. Additionally, CAT is considering ride-share-style services in specific areas to improve flexibility and accessibility.

2.1.3.5 Infrastructure Enhancements and Data Integration

Collier County's express lanes present an opportunity for conversion into BRT routes. The County's Transportation Management Services Department is key in planning and enhancing this infrastructure, working alongside the dedicated planning team to drive technological innovation.

CAT also maintains both static and real-time General Transit Feed Specification (GTFS) data, feeding into the Transit App service. Ongoing upgrades to CAD/AVL systems, Mobile Data Terminals (MDTs), Automatic Voice Annunciation (AVA) systems, and Automated Passenger Counters (APCs) are part of CAT's commitment to providing accurate data and seamless passenger experiences. These systems are integrated with the Mobile Ticketing Platform, powered by Masabi, and aligned with ITxPT standards to ensure a unified, efficient transit experience.

2.1.4 FARE STRUCTURE

As of 2024, CAT uses TripSpark fareboxes on all their transit vehicles which accept cash, reloadable smartcards, and paper transfer tickets. Mobile tickets for CAT buses can also be purchased on the RideCAT mobile application or Transit App. In the future, they will be working with LECIP fareboxes.

The fare structure as of 2024 is presented in Table 2-2.

Table 2-2: Fare Structure in Collier County (2024)

Fare Category	Fare	Reduced Fare
One-Way	$2.00	$1.00
Children 5 years of age and younger	Free	Free
Marco Express	$3.00	$1.50
Transfers – up to 90 minutes	Free	Free
Day Passes	$3.00	$1.50
Smart Card Pass		
15-Day Pass	$20.00	$10.00
30-Day Pass	$40.00	$20.00
Marco Express 30-Day Pass	$70.00	$35.00
Discounted Pass		
Summer Paw Pass (Valid June 1 – August 31 for students. Price includes Smart Card)	$30.00	
30-Day Corporate/Perk Pass (300+ Employees)	$29.75	
Smart Card Media Fees		
Smart Card	$2.00	
Registration	$3.00	
Replacement with Registration	$1.00	

Source: rideCAT website; Collier County

The Reduced Fares are for members of Medicare, Disabled Community, those 65 years and older, children 17 and under, high school and college students and active / retired military personnel. ID is required. This fare would also apply to the subcontracted transportation provider with the Florida Commission for the Transportation Disadvantaged that provides transportation services under the non-emergency transportation Medicaid Contract for Collier County. Discount Passes are for people eligible under the identified programs.

2.1.5 TRANSIT FACILITIES

2.1.5.1 Passenger Transfer Stations

There are currently two passenger transfer stations and five passenger transfer points provided on the CAT system. The first transfer station located at the Mobi Transfer Station, also known as the Radio Road Transfer Station, which is located at 8300 Radio Road in Naples as shown in Figure 2-3. This building is also a facility for the CAT Connect Paratransit program. At this facility, bus operations and bus transfers occur.

Figure 2-3: CAT Radio Road Transit Facility (Source: Google Street View)

The second passenger transfer station operated by CAT is the Government Center Transfer Station located at 3355 Tamiami Trail in East Naples, as shown in Figure 2-4 below, which accommodates pedestrians, cyclists, and "kiss-and-ride" passengers that are briefly either picked up or dropped off. This location provides in-person customer service, schedules, and pass sales, and is served by routes 11-17, 19, 22, and 24. Although parking is free, it is not an official park-and-ride site. The facility includes a busway with a turn-around, six sawtooth bus berths, a passenger platform with benches and trash receptacles, restrooms, snack machines, an air-conditioned lobby, and a customer service area with an informational kiosk.

Figure 2-4: Intermodal Transfer Station (Source: Google Street View)

Collier County plans to build a third transfer facility in the Immokalee Community on a vacant parcel owned by the county, with the plans currently underway and scheduled for completion in the fall of 2024. The

proposed site, approximately 1.7 acres in size, is currently a grass field adjacent to a green wooded area. It features an asphalt/concrete driveway providing access to the Health Department and a maintenance shed. The bus transfer station will enhance passenger and transit efficiency with new bus bays, canopy-covered shelters for passengers, a waiting platform with benches and trash receptacles, vending machines or options for food trucks, restroom facilities for passengers and drivers, and ADA improvements. Currently, passengers transferring at this location use a shelter located in a parking lot shared by visitors to the Health Department, County Library, and the David Lawrence Center.

Other transfer point locations within Collier County include Walmart Plaza; Pine Ridge and Goodlette-Frank Rd (Magnolia Square Plaza); Coastland Center; Creekside (Immokalee Road); and the Health Department in Immokalee. CAT also has dedicated parking spaces at the Orange Blossom Library, Golden Gate Parkway Library, Golden Gate Estates Library, Marco Island Library, and Immokalee Library.

2.1.5.2 Park-and-Ride Locations

There are currently four park-and-ride locations around Colier county. They are free to park in and operate from 5 A.M. to 9 P.M. on all days of the week, however, overnight parking is prohibited. Table 2-3 below lists the four park-and-ride locations along with the address of the lot, the number of parking spots provided, the nearest bus stop number, and connecting bus routes. Figure 2-5 depicts a map of the park-and-ride locations along with the CAT transit system.

Table 2-3: Park-and-ride locations and connections.

Name	Address	# of Parking Spots	Nearest Stop	Connecting Routes
Livingston Park and Ride	Livingston Rd/Immokalee Rd	20	682	27
Park and Ride at Orange Blossom Library	2385 Orange Blossom Dr	5	101	12
Park and Ride at Golden Gate Public Library	2432 Lucerne Rd	5	564	15, 16, 20, 25, 27
Park and Ride at Estates Library	1266 Golden Gate Blvd W	5	278	19

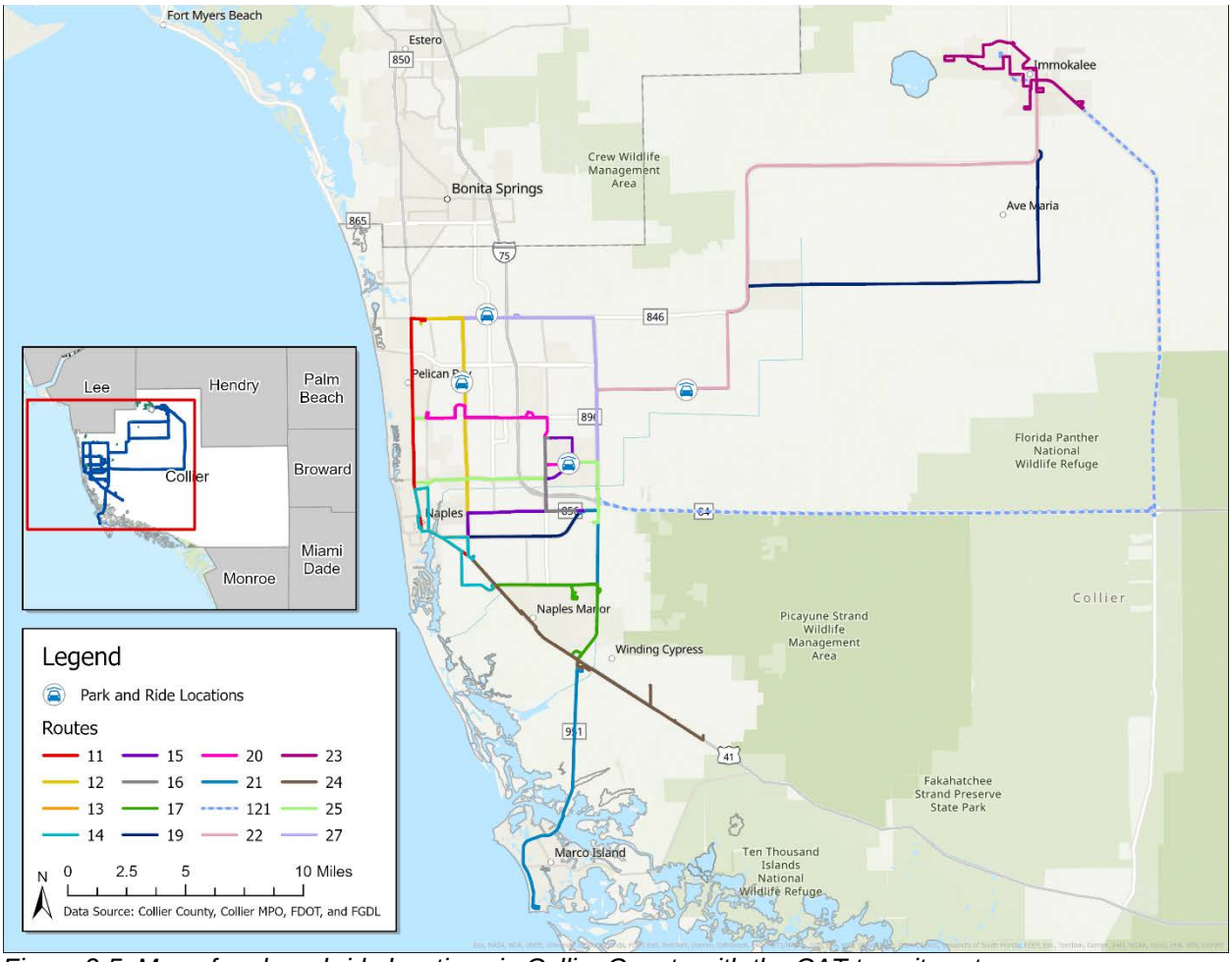


Figure 2-5: Map of park-and-ride locations in Collier County with the CAT transit system.

In addition, the 2020 Park and Ride Study identified and prioritized sites for potential park and ride facilities. These facilities are designed to provide areas where commuters can park and access public transit, carpools, or vanpools, helping to address traffic congestion and parking constraints. The locations of these areas include Creekside, the Government Campus, Coastland Center Mall, Freedom Square, Physicians regional, the Golf Course near VA Hospital, Immokalee Health Department, Beach Lot at Pine Ridge Road, and Radio Road Transfer.

2.1.6 VEHICLE INVENTORY

Table 2-4 below provides a summary of the 74-vehicle fleet at CAT, with a breakdown by make and model and some key statistics. These 74 vehicles include those used for fixed-route public transit services, paratransit services and support vehicles. The fixed route fleet increased by 17% from 2013 when there were 29 vehicles, compared to 34 currently. It is understood that even with this fleet size expansion, CAT still currently struggles to provide the services required, which is likely due to the large service area that the agency serves.

The age of the fleet generally can be considered quite near the end of life, with the average expected date of retirement only 2 years away in 2026 with many already being beyond their expected retirement age.

Table 2-4: CAT Vehicle Inventory 2024

Make	Model	Vehicle Type	Number of vehicles	Average Miles/Yr	Average Cost	Average % Federal funding	Average Expected Date of Retirement
CHEVROLET			**5**	**42,893**	**$105,141**	**80%**	**2021**
	Glaval	D	5	42,893	$105,141	80%	2021
FORD			**33**	**47,160**	**$77,985**	**81%**	**2026**
	Challenger	D	15	51,191	$79,663	75%	2025
	Escape	F	1	6,543	$23,170	100%	2031
	F-150 XL	G	1	28,897	$21,888	100%	2029
	F-150 XLT	G	1	22,859	$26,200	92%	2028
	Glaval	D	4	58,034	$83,093	80%	2023
	Impulse	D	6	66,666	$82,161	80%	2026
	Taurus SEL	F	1	6,080	$26,667	73%	2029
	Transit	F	2	24,053	$22,874	100%	2030
	Villager 7.3L V8	C	2	21,902	$204,781	100%	2032
FREIGHTLINER			**1**	**25,265**	**$138,632**	**90%**	**2028**
	Legacy	C	1	25,265	$138,632	90%	2028
GILLIG			**31**	**63,453**	**$433,013**	**98%**	**2028**
	G27B102N4	A	10	69,016	$393,761	98%	2026
	G27D102N4	A	3	84,276	$410,091	98%	2026
	G27E102H2	A	4	24,542	$476,193	100%	2035
	G27E102N2	A	12	68,768	$440,861	96%	2031
	G30B102N4	A	2	50,336	$530,207	100%	2022
VPG			**4**	**18,749**	**$50,173**	**80%**	**2020**
	MV1	F	4	18,749	$50,173	80%	2020
Total System			**74**	**51,866**	**$227,864**	**88%**	**2026**

(Source: Collier Area Transit Vehicle Inventory Report-1st Half February 2024)

2.1.7 SAFETY

There is not much discussion of safety and security in any of these documents. It is a required expenditure under the FTA grants. Annually 5307 grants must commit 1% of their federal allocation to safety and security improvements.

2.2 Other Transportation Service Providers

Although the LinC bus route provides commuter service between the Collier and Lee counties by connecting riders to local bus service in both counties, there is a lack of regional public transportation that provides

intercity commuter service. Additional transportation services such as van pooling programs and private bus companies help to bridge the gaps in terms of regional connectivity to destinations further afield. The Commute Connector program is a vanpooling service in Collier County, offered through a partnership with the Florida Department of Transportation (FDOT) and operated by Enterprise. Table 1-1 below shows the vanpool statistics from the FY2023 FDOT Report for the Commute Connector Program in Collier County.

Table 2-5: Vanpool performance statistics in Collier County for FY2022, FY2023, and projected FY2024.

			Average Per Vanpool, Per Month		
	Number of Vanpools	Average Number of Riders (including driver)	Revenue Miles	Passenger Miles	Operating Cost
FY2022	23	5.53	1,901	10,515	$1,089
FY2023	19	5.13	1,766	9,056	$1,183
Projected FY2024	29	5.13	1,766	9,056	$1,183

Services offered by private intercity bus companies, including Greyhound, RedCoach, and FlixBus, can both complement and/or compete with public transportation services. The private bus companies in Collier as listed above provide transportation services with connections to major cities in Florida. They typically provide direct service to Fort Myers, Sarasota, Tampa, Fort Lauderdale, Miami, and so on, as well as further cities such as Orlando and Tallahassee. The station stops for all Greyhound, RedCoach, and Flixbus services is located at 8845 Davis Boulevard. It is accessible by CAT route 19 as shown in Figure 2-6. Collier County is currently working to establish an exclusive facility use agreement to lease space to Flixbus at the Collier Area Transit Transfer Station. This would allow Flixbus to conduct bus transportation operations on the station premises and allow their staff and customers to use the onsite parking spaces, public restrooms, and customer boarding, alighting and waiting areas. Although agreement has not yet been reached, it should be kept in consideration as a potential source of revenue for Collier County and CAT.

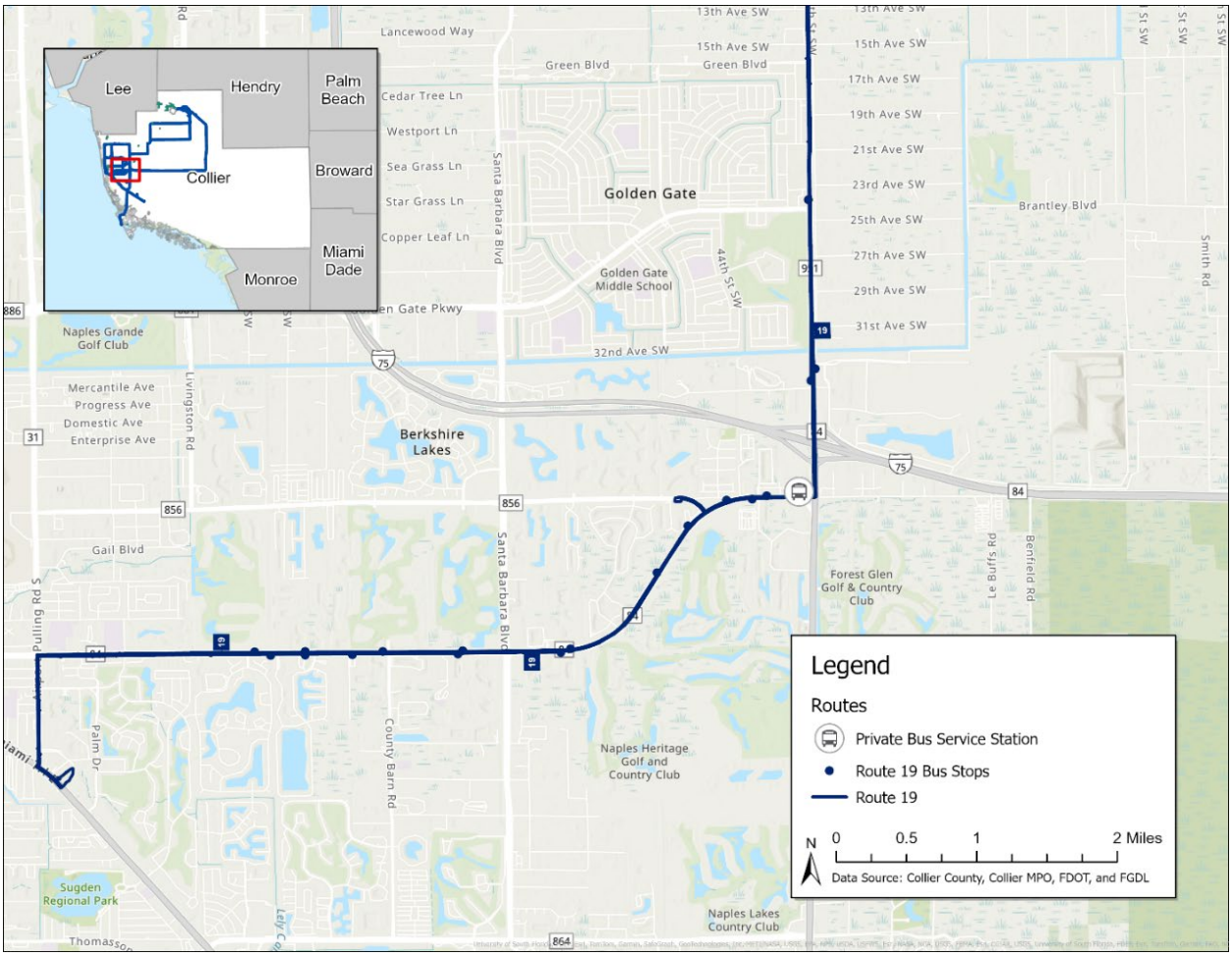


Figure 2-6: Station location for private bus service and Park and Ride locations along transit network.

2.3 Comprehensive Operations Analysis 2021 - Recap

The purpose of a Comprehensive Operations Analysis (COA) is to review the transit network and assess how best the agency can improve services and efficiency, particularly in relation to day-to-day operations. This assists with increasing value for the agency and ensuring that the transit system is as effective and efficient as possible in the short term. Generally, the COA is thought of as feeding into the TDP where the TDP sets the longer-term strategic goals and identifies the needs to help the transit system grow, evolve and improve over time.

The COA conducted in 2021 analyses the fine details of the transit operations, assessing elements such as service enhancements and optimization. This can include repurposing routes, moving service from less productive areas and routes, and enhancing well performing routes.

The key takeaways in relation to route optimization from the extensive analysis undertaken in the COA that have been implemented to date are summarized below. The recommendations that were implemented were the ones that were deemed to be cost neutral:

- Elimination of Route 12B – low productivity and requires additional bus.

- Route 17 and 18, which followed similar alignments, were consolidated into the current Route 17.
- Re-alignment of Route 19 - Maintain service on Collier Boulevard and Immokalee Road with select trips to Ave Maria via Oil Well Road.
- Route 21 alignment changes – maintaining service on Collier Boulevard between Marco Island and Walmart but removing service on San Marco Road. Additionally consolidated with Route 28.
- Route 25 alignment changes – A low ridership route moved to travel on US41 between Pine Ridge Road and Golden Gate Parkway. Removing service on Collier Boulevard and Goodlette Frank Road.
- Removal of Route 28 – consolidating Route 28 with Route 19.
- Route consolidation of 20 and 26. Routes 20 and 26 were the two lowest performing routes in terms of trips per revenue hour. By combining, all day service can be provided at 90minute frequency.

2.4 Transit Usage

2.4.1 ROUTE RIDERSHIP BY MONTH

Trends for the FY2020-FY2023 years are assessed in this section. Only routes active in 2024 are displayed in the graphs below. Ridership per month from the most recent full financial year is presented below in Figure 2-7 below.

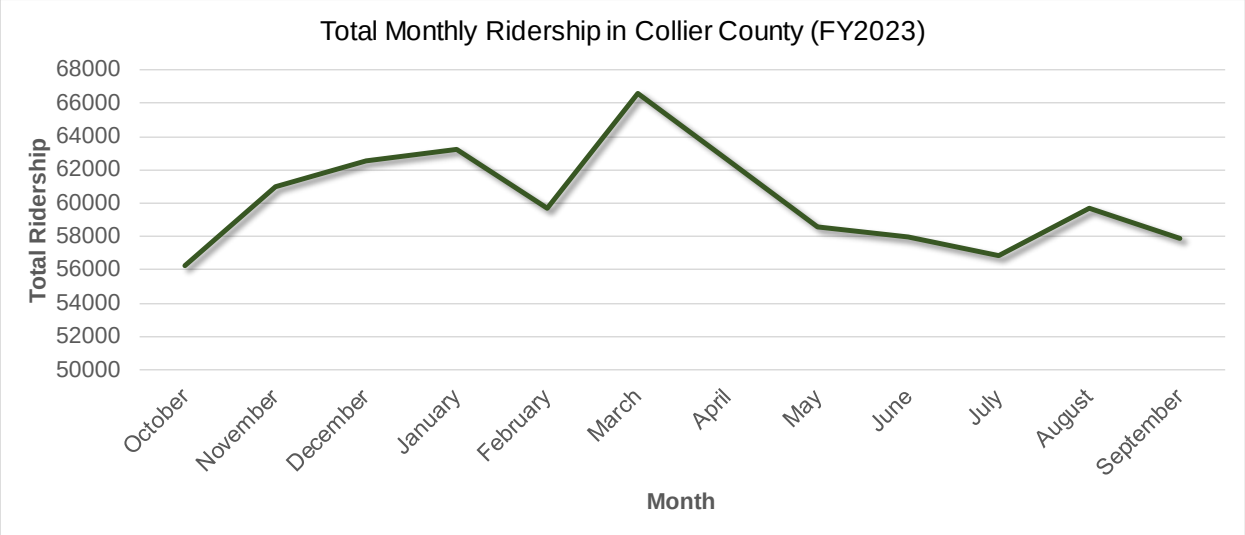


Figure 2-7: Total Monthly Ridership in Collier County during FY2023

As seen from the graph above, total ridership peaks in the holiday season (December-January) and March. Ridership then dips starting in May as the peak tourist and visitor season declines. This trend could indicate that more tourists are populating the buses during the peak seasons.

Figure 2-8 displays the total ridership for each route throughout the 2023 fiscal year.

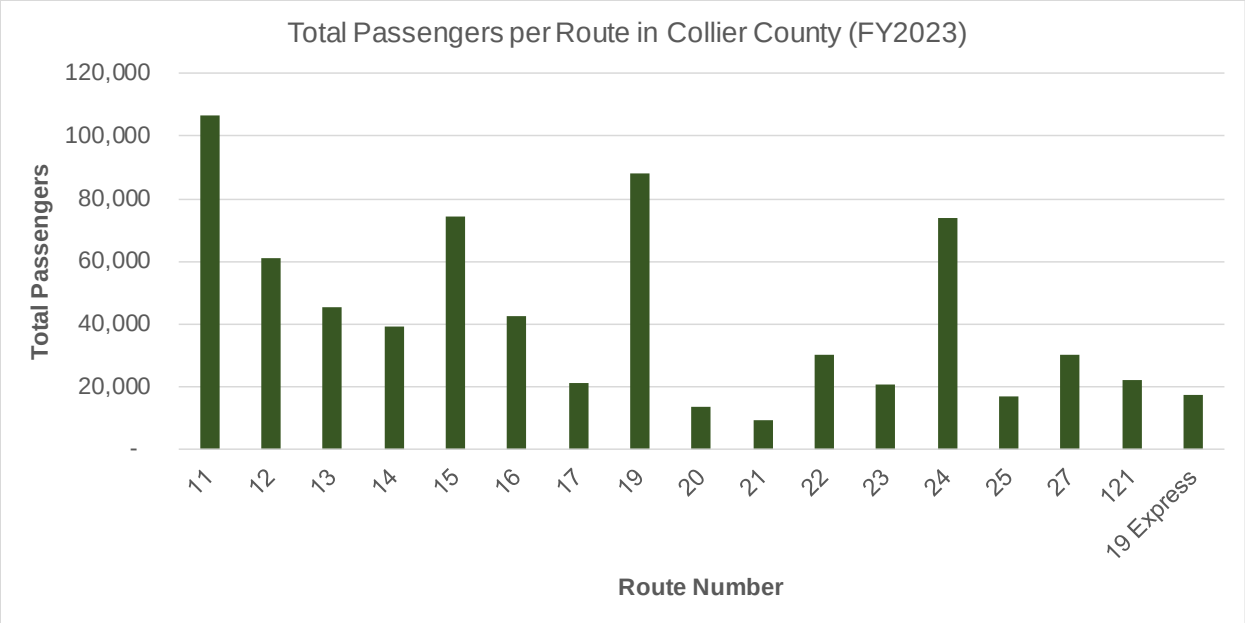


Figure 2-8: Total Passengers per Route in Collier County during FY2023

When examining the total number of passengers per route, Routes 11, 19, and 24 are the three most well-used routes. This is logical, as Route 11 passes through the Central Business District (CBD) in Naples, Route 19 is the only route connecting Immokalee and the downtown, and Route 24 serves the Collier County Government Center (although noted that other Routes do also serve the government center as well). In contrast, Routes 20, 21, and 25 are the least used routes, presenting opportunities to reroute or merge them to better accommodate demand.

Figure 2-9 below shows a graph of the passengers per revenue hour in Collier County.

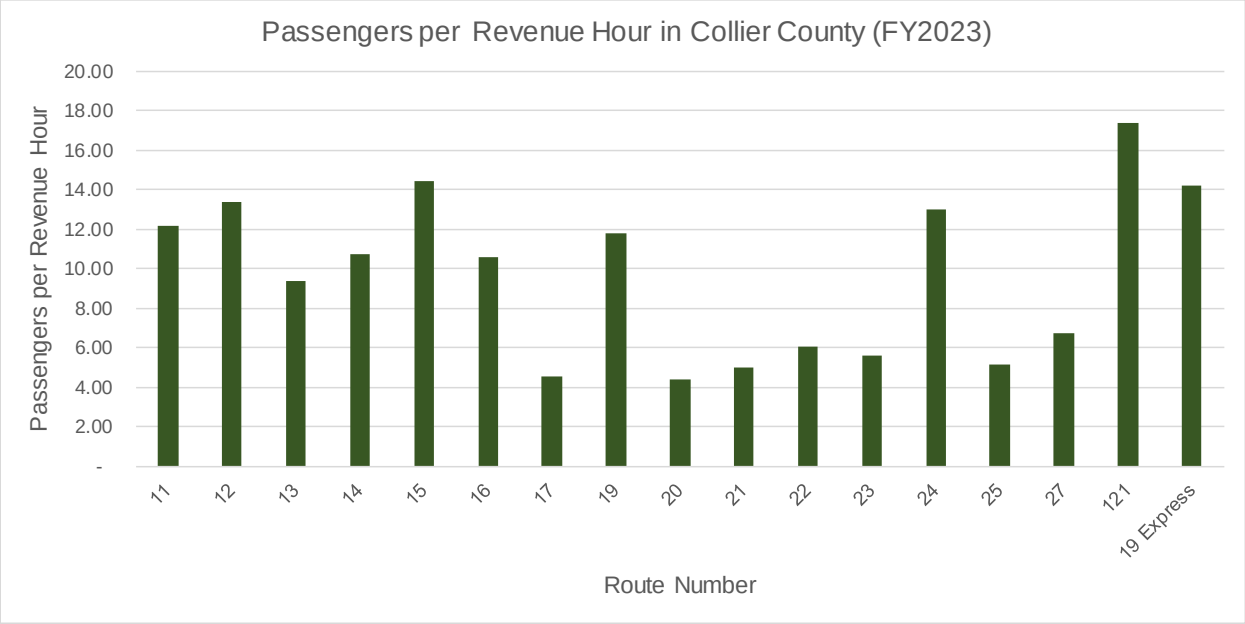


Figure 2-9: Passengers per Revenue Hour in Collier County during FY2023

Routes 121, Route 19 Express and Route 15 have the highest number of passengers per revenue hour, indicating that these routes may serve areas with higher transit dependency or demand and have schedules and frequencies of these routes likely align well with passenger needs. Routes 17, 20 and 21 have the lowest passengers per revenue hour. CAT might consider reallocating resources from low-performing routes to high-performing ones or to support the high-performing routes with increased frequency or extended hours. There may be opportunities to adjust the low-performing routes to better serve potential riders or connect to more popular destinations.

In Figure 2-10 below, ridership was averaged by season to determine seasonal variations for each route.

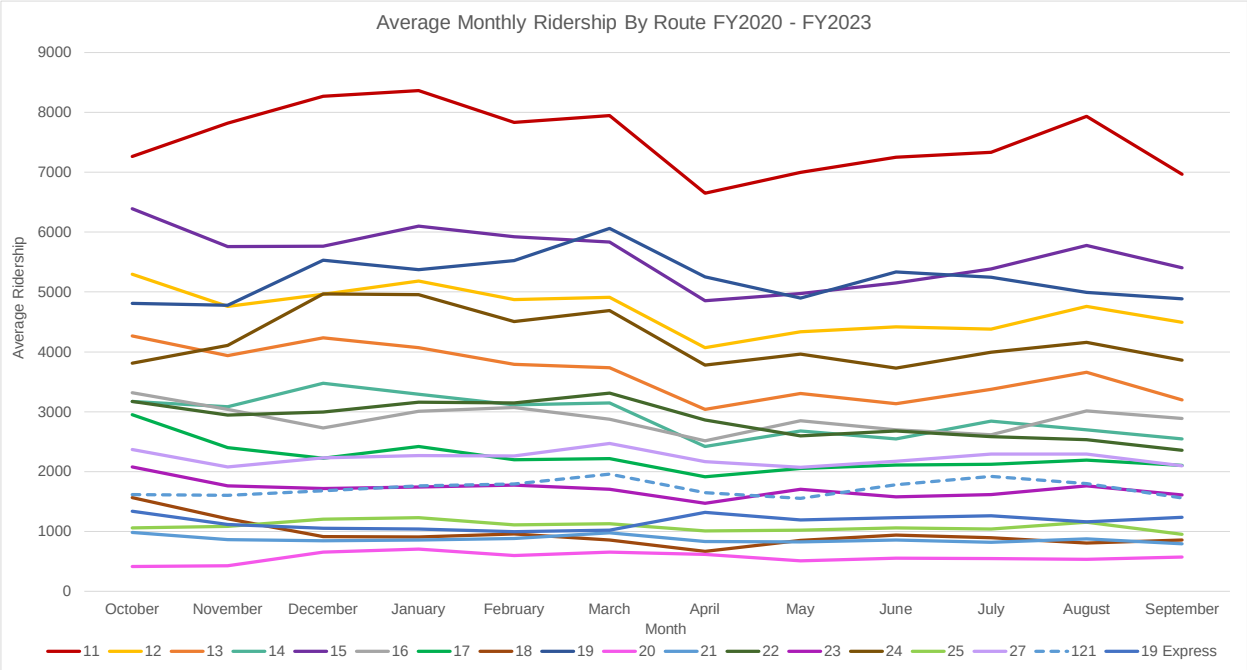


Figure 2-10: Seasonal Variation of Average Monthly Ridership

Other than Route 29, which is the beach shuttle with ridership only during the winter, most routes do not show significant seasonal variation. Route 29 also has lower ridership compared to other routes. Despite winter being a peak tourist season, the lack of significant ridership fluctuations suggests that tourists and seasonal residents may not be heavily utilizing the public transit system. This could be due to several factors like higher spending power of tourists visiting a wealthy area like Collier County. While ridership in the winter tends to be slightly higher than in the later months, promoting transit use among visitors and residents requires improvements to the accessibility and visibility of transit information. For instance, offering a transit pass could incentivize visitors to use the public transportation system, this pass could provide discounts for group travel and even cover multi-modal options if possible.

Figure 2-11 and Figure 2-12 highlight the routes with the highest ridership and riders per revenue hour, focusing on those within or near the core of the city, such as Naples or the Naples Airport. Notably, routes 11, 12, 15, 19, 24, and 121 were selected for this analysis for these reasons.

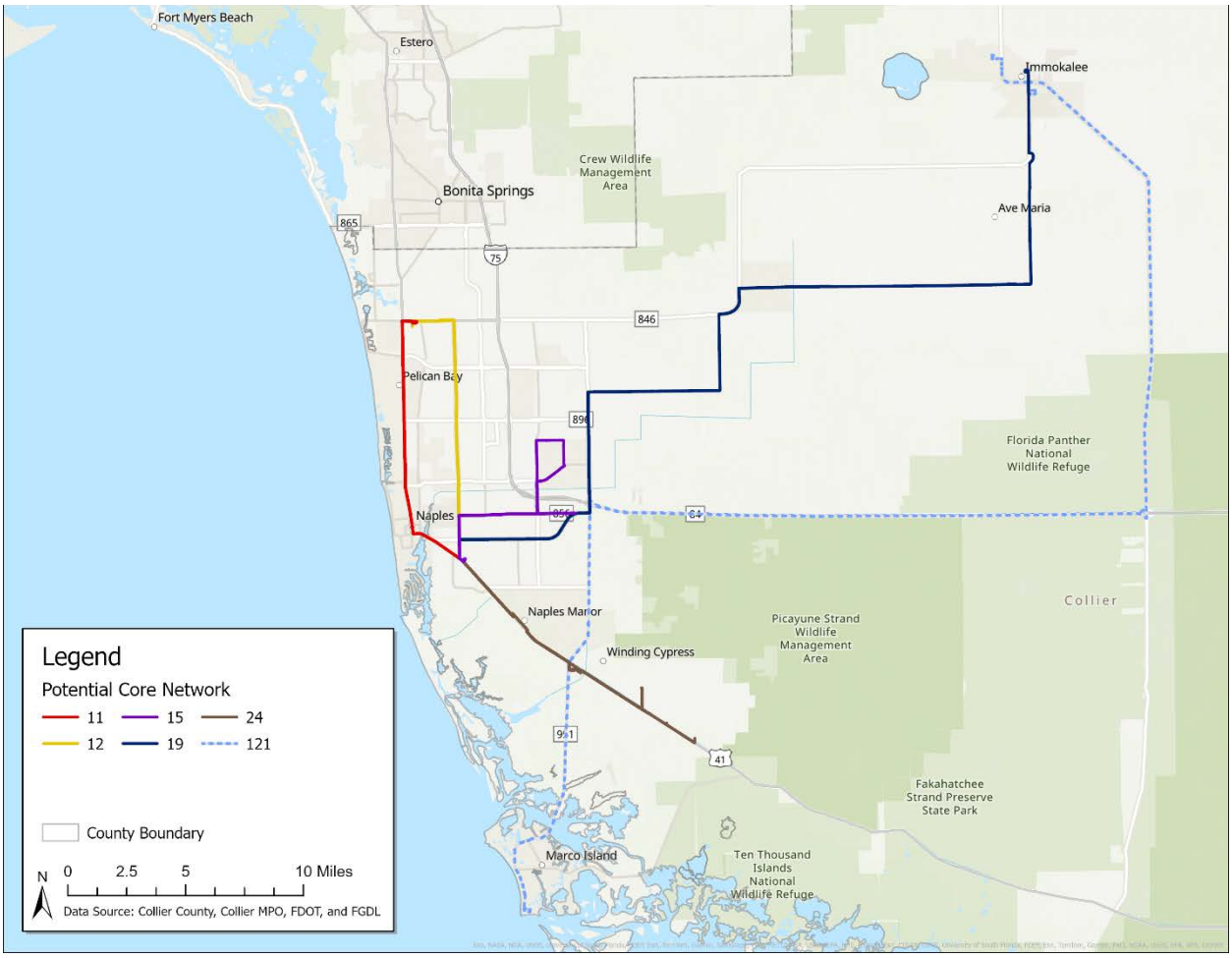


Figure 2-11: Top Ridership Routes in Collier County in FY2023

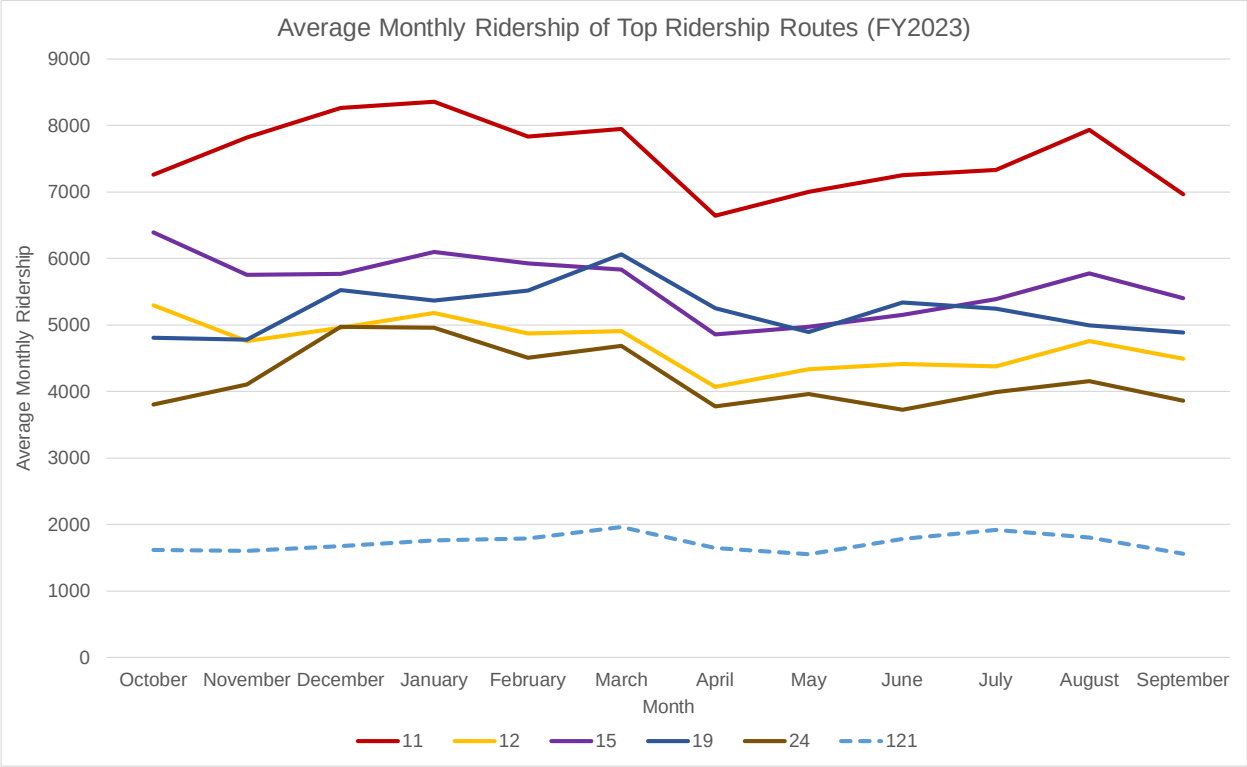


Figure 2-12: Average Monthly Ridership of Top Ridership Routes in Collier County in FY2023

The ridership pattern for these potentially "core" routes is highest between October to February, during the winter season. Ridership dips in April at the end of the peak tourist season. The ridership pattern suggests that tourists and seasonal residents may be contributing to increased usage of these core routes during the peak winter season. This aligns with the general tourism patterns in Collier County.

2.4.2 FAREBOX RECOVERY

For 2022 financial year, the overall farebox recovery ratio for the CAT system is 8%, derived from the ratio between the total fare revenue and total operating cost values from NTD data. This represents a 20% decrease (2 percentage points) from FY2018 farebox recovery ratio of 10%.

2.4.2.1 Recent Fare Studies and Changes for Upcoming Years

Following the fare study completed in 2018, the current fare structure for CAT is still in line with the approved changes from that study which are shown in Table 2-6 below. CAT plans to conduct another fare study in FY2025.

Table 2-6: Fare Structure in Collier County (2024)

Fare Category	Fare	Reduced Fare
One-Way	$2.00	$1.00
Children 5 years of age and younger	Free	Free
Marco Express	$3.00	$1.50
Transfers – up to 90 minutes	Free	Free
Day Passes	$3.00	$1.50
Smart Card Pass		
15-Day Pass	$20.00	$10.00
30-Day Pass	$40.00	$20.00
Marco Express 30-Day Pass	$70.00	$35.00
Discounted Pass		
Summer Paw Pass (Valid June 1 – August 31 for students. Price includes Smart Card)	$30.00	
30-Day Corporate/Perk Pass (300+ Employees)	$29.75	
Smart Card Media Fees		
Smart Card	$2.00	
Registration	$3.00	
Replacement with Registration	$1.00	

Source: rideCAT website; Collier County

In March 2024, CAT conducted a regional service and fare study with the aim of evaluating how best to serve the regional transit demands in conjunction with LeeTran (Lee County Transit) which included an evaluation of the most appropriate fare structure to deploy. This fare policy analysis evaluated the benefits and drawbacks of having a joint fare structure with LeeTran or having a separate structure.

The culmination of this review concluded that it would be better to maintain a separate fare structure for the regional services. This means each agency charges their own fares and keeps the revenues on their own vehicles as this provides the most cost-effective solution at this time as there is only one regional service with only one additional service proposed.

A zero-emissions fleet transition plan is underway and anticipated to be completed in 2025.

2.4.2.2 Strategies to Improve the Farebox Recovery

There are a number of different strategies that can be used to increase the farebox recovery ratio in order to make the transit system more cost effective. These include:

- Increasing ridership:
    - Prioritizing higher ridership of routes, by making sure they serve areas of high demand and as well as major activity centers to increase the number of riders and therefore the revenue being generated.
    - Increasing the accessibility of the fixed route transit network to encourage and enable TD and ADA passengers to be able to use the fixed route system.
    - Attract new riders through increasing frequency of services and increased marketing and communications of the benefit of transit. Note that when increasing services, it would be important to secure additional funding from other potential sources so as not to increase the cost for CAT.

  - Opportunities exist around partnering with local businesses and institutions to provide transit benefits (in the form of discounts of deals) to employees and students to further increase the likelihood of ridership.
  - Engage with the community to understand how best transit can serve them, and what would make them use transit more to increase ridership.
  - Introduce ancillary services or additional services on and around transit (both on-board and at major stops or interchanges). This can take the form of mobility hubs to increase transit usage and increase integration with other more sustainable modes.

- Reducing operational costs:
  - Increasing efficiency of service delivery, which can be done by optimizing routes and scheduling, making use of the latest scheduling technology available.
  - Investment in technology can help to improve fare collection and reduce fare evasion.
  - Utilizing more fuel efficient or energy saving vehicles that cost less to operate and run.

- Adjusting fares:
  - There could be opportunities to integrate fares among different modes and other agencies.
  - Introducing a form variable pricing based on time of day or demand to optimize revenue.

2.5 Trend and Peer Comparison Analysis

This section provides trend analyses for key performance, effectiveness, and efficiency measures for the CAT system for the past 5 years. In addition, comparisons to peer agencies have been provided to show how the CAT system performs against similar systems.

This evaluation was conducted using data directly obtained from the National Transit Database (NTD) across a number of different variables for transit performance. These system performance measures are recommended by the FDOT TDP Handbook for general performance, efficiency, and effectiveness, as listed and categorized in the table below.

Table 2-7: System Performance Review Measures

Performance Measures	Effectiveness Measures	Efficiency Measures
Unlinked Passenger Trips	Unlinked Passenger Trips per Capita	Operating Expense per Capita
Passenger Miles Travelled	Passenger Miles Travelled per Capita	Operating Expense per Unlinked Passenger Trip
Vehicle Revenue Miles	Vehicle Revenue Miles per Capita	Operating Expense per Passenger Miles Travelled
Vehicle Revenue Hours	Unlinked Passenger Trips per Vehicle Revenue Mile	Operating Expense per Vehicle Revenue Miles

Vehicles Operating/Available at Maximum Service	Unlinked Passenger Trips per Vehicle Revenue Hour	Operating Expense per Vehicle Revenue Hours
Operating Expense		Vehicle Revenue Miles per Vehicle
Fare Revenue		Farebox Recovery Ratio
		Average Fare

2.5.1 PEER SELECTION

The peer selection process followed the methodology provided by the Transit Cooperative research Program (TCRP) Report 141: A Methodology for Performance Measurement and Peer Comparison in the Public Transportation Industry and recommended by the FDOT TDP Handbook (2022).

The guidance recommends a minimum of 4 agencies and for the purposes of this TDP, 10 agencies have been selected as the final peer group. It is crucial to select a suitable group of peer agencies to ensure that credible comparisons can be made to provide insight and trigger action, as opposed to poorly chosen peers which can produce irrelevant results.

For the purpose of performance measuring, an initial group of 16 peers was formed to be compared to CAT. For this TDP update, all previous agencies that were included in the prior TDP update were included as well as additional agencies that were deemed to be similar in nature to CAT. This initial list of peer agencies consisted of:

Table 2-8: Transit System Peer Review Selection

Transit System	**Location**	Peer Description
The M (Montgomery Area Transit)	City of Montgomery, AL	From Previous TDP
TTA (Tri-State Transit Authority)	Huntington, WV	From Previous TDP
The Wave Transit System	City of Mobile, AL	From Previous TDP
ART (Asheville Redefines Transit)	City of Asheville, NC	From Previous TDP
GCT (Gwinnett County Transit)	Lawrenceville, GA	From Previous TDP
PCPT (Pasco County Public Transportation)	New Port Richey, FL	From Previous TDP
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	From Previous TDP
Breeze Transit (Sarasota County Area Transit)	Sarasota, FL	Newly Added
LeeTran (Lee County Transit)	Fort Myers, FL	Newly Added
Bayway (Bay County Transportation)	Pensacola, FL	Newly Added
GoLine (Indian River County)	Vero Beach, FL	Newly Added
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	Newly Added
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	Newly Added
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	Newly Added
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	Newly Added

The selection of potential peers was conducted using the peer selection methodology outlined in the FDOT TDP Handbook, employing validated 2022 National Transit Database (NTD) data and the Florida Transit

Information System (FTIS). Additional potential peers that were selected consisted of transit agencies from the previous TDP and agencies located in the southeastern United States, specifically those with coastal characteristics in their geographic profiles.

From the newly identified transit agencies, Breeze Transit (Sarasota, FL), LeeTran (Fort Myers, FL), Bayway (Pensacola, FL), GoLine (Vero Beach, FL), and Citrus Connection (Lakeland, FL) were chosen because they are situated within Florida, either in coastal counties or counties near Collier County. Additionally, CARTA (North Charleston, SC), ECAT (Pensacola, FL), and CCRTA (Hyannis, MA) were selected based on their recommendation as top peers to CAT according to the FTIS Urban iNTD tool. It is worth noting that ART was also recommended but was already included in the previous TDP peer group.

NTD data for this initial set of peer agencies was then obtained and analyzed to determine similarity to CAT and suitability to be used as a peer. Likeness scores were calculated for 14 different indicators including 8 operating characteristics and 6 exogenous variables. A secondary screening was also performed with additional indicators to rule out any anomalies within the initial peer group. A detailed account of the selection methodology can be found in Appendix A.

Based on the results from the initial likeness score comparison and the secondary screening, a final set of 10 agencies were selected, as listed in Table 2-9 below. The table also includes the likeness score for each agency and the reasons that the agency was selected to be in the final peer group.

Table 2-9: Average of Likeness Score Sums by Peer Group

Peer Agency	Likeness Score	Reasoning for Top 10 Selection
Breeze Transit (Sarasota County Area Transit), Sarasota, FL	6.98	Likeness score and location of the peer is desirable.
LeeTran (Lee County Transit), Fort Myers, FL	7.80	Likeness score from the primary review was substantially lower and location of the peer is desirable.
Bayway (Bay County Transportation), Pensacola, FL	6.03	Likeness score and location of the peer is desirable.
ECAT (Escambia County Area Transit Authority), Pensacola, FL	6.05	Likeness score
CCRTA (Cape Cod Regional Transit Authority), Hyannis, MA	6.30	Likeness score
CARTA (Charleston Area Regional Transportation Authority), North Charleston, SC	6.06	Likeness score
Citrus Connection (Lakeland Area Mass Transit District), Lakeland, FL	5.68	Likeness score and location of the peer is desirable.
The Wave (Cape Fear Public Transportation Authority), Wilmington, NC	5.49	Likeness score
The Wave Transit System, City of Mobile, AL	6.81	Likeness score
PCPT (Pasco County Public Transportation), New Port Richey, FL	6.35	Likeness score

It is acknowledged as part of the methodology that peers will not be exactly like one another in all categories and the approved methodology is built to allow for that and allow for similarity in only a few other categories.

For full details on stage 2 of the screening refer to Appendix A for the full Peer Selection methodology.

2.5.2 NORMALIZING DATA

To accurately portray cost data, all monetary values were normalized to reflect the effects of inflation and differences in labor costs between geographical regions. It is important to consider for labor costs differences as it allows for conclusions to be drawn with more certainty that the cost differences between agencies are due to internal agency efficiency variances rather than external cost variation. Labor costs are also typically the largest component of an agency's operating costs. It is relevant to consider inflation rates to see if an agency's costs are changing faster or slower than inflation when conducting trend analyses.

To adjust for differences in labor costs between counties, average labor wage rates were used to recalculate cost data. Annual average weekly wages for 2022 were obtained from the US Bureau of Labor Statistics' Quarterly Census of Employment and Wages. All occupation types were included in the average calculation as agencies have no control over general labor environments in the county, which the cost data is being adjusted for, as opposed to the industry-specific labor rates that the agencies have some control over. Including all occupations also allows for an agency to analyze how much of its labor is spent in comparison to the county's average wages, as well as to adjust its costs to reflect changes in the county's overall cost of living. The peer agencies' cost data was adjusted for labor cost differences by multiplying the raw cost data from NTD by the ratio between Collier's average labor cost over the peer agency county's average labor cost.

To adjust for inflation in trend analyses, consumer price indices (CPI) were used to recalculate cost data. As the selected peers are located in different states around the United States, national CPIs were used. CPI values for the years of 2018 to 2022 were obtained from the US Bureau of Labor Statistics' CPI Inflation Calculator to adjust cost data for inflation across these years. This was done by multiplying the raw cost data from NTD by a ratio between the initial year's (2018) CPI over the analysis year's CPI.

2.5.3 PERFORMANCE MEASURES

Data for select system characteristics were taken from NTD to assess the general operating performance of the CAT system and its chosen peers. All of the performance indicators are based on exact data values from the NTD database, reflecting total values for all modes.

2.5.3.1 Unlinked Passenger Trips

Unlinked passenger trips (UPT) refer to the number of people riding only one public transit vehicle from origin to destination, counting a new trip each time a vehicle is boarded no matter how many transfers are made. UPT data represents the market demand for service, and a higher number of passenger trips is considered a positive metric. UPT numbers for CAT decreased by almost 30% from 0.95 million trips in 2018 to 0.65 million in 2021 but increased to 0.75 million in 2022. The growth in trips from 2021 to 2022 suggests service improvements have started to take effect as ridership has returned following the COVID pandemic. Due to three peers with much higher UPT values, CAT falls below the average UPT (shown with the orange line in the peer comparison chart below) of the peer group. Excluding these top three peers, Collier has one of the higher UPT values amongst the remaining peers.

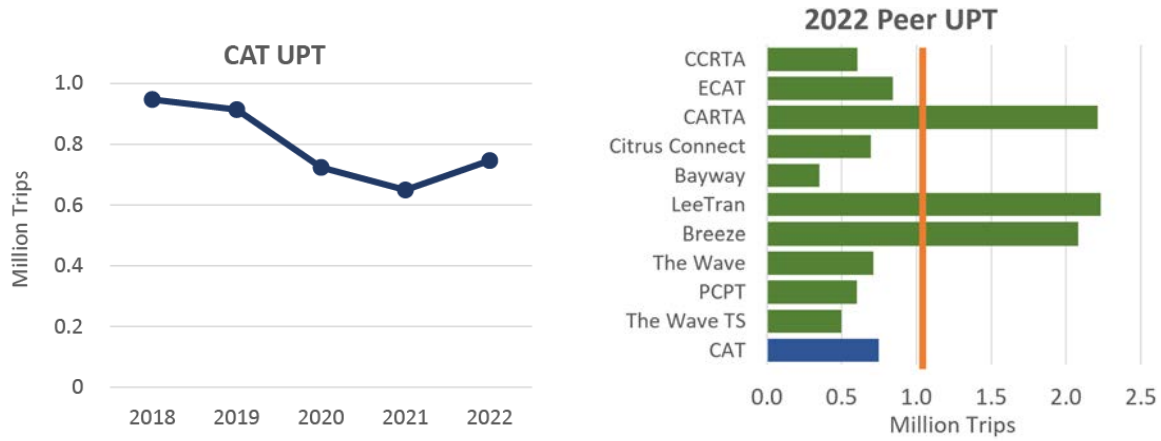


Figure 2-13: 5-year trend (left) and 2022 peer comparison (right) charts for unlinked passenger trips.

2.5.3.2 Passenger Miles Travelled

Passenger miles travelled (PMT) denotes the total distance travelled by all passengers using the service. As with UPT, higher PMT is also a positive metric. PMT numbers for CAT follow the same trend as the UPT numbers, decreasing about 30% from 7.4 million miles in 2018 to 5.3 million in 2021, but increasing to 6.1 million in 2022. This is directly reflective of passenger trips which are to be expected. Similar to UPT, the same three agencies with much higher PMT values are influencing the average value to be higher. CAT PMT is just below the average value and is also one of the higher values excluding these top three agencies.

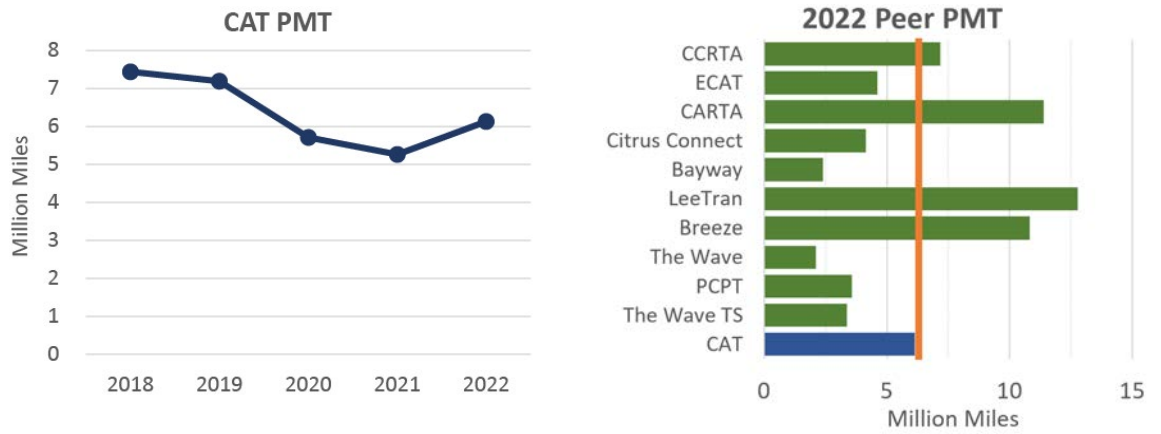


Figure 2-14: 5-year trend (left) and 2022 peer comparison (right) charts for passenger miles travelled.

2.5.3.3 Vehicle Revenue Miles

Vehicle revenue miles (VRM) detail the total distance travelled where the transit service was operating in revenue service, which excludes deadhead travel, training operations, and charter services. VRM as a metric itself is not indicative of positive or negative performance and should be analyzed in relation to productivity and cost-effectiveness measures. The slightly decreasing trend in CAT vehicle revenue miles suggests that services are being withdrawn, and with the lack of riders and passenger miles in 2020 and 2021 but a relatively stable amount of service being provided suggest that a major cost recovery issue would have occurred that is likely still impacting the agency. CAT VRM is just below the peer average, however, VRM itself is not indicative of performance. The larger transit agencies such as LeeTran and Sarasota Breeze most likely run more service or longer routes that result in greater VRM.

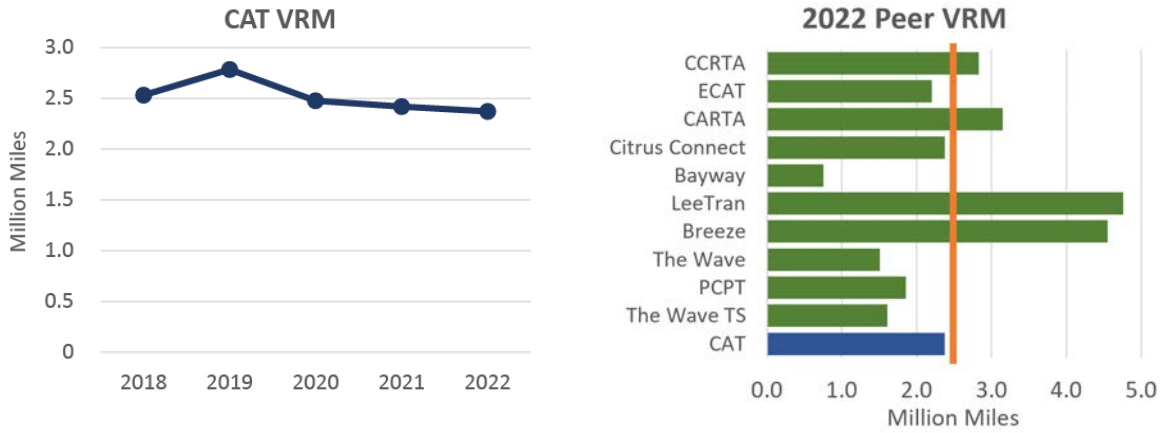


Figure 2-15: 5-year trend (left) and 2022 peer comparison (right) charts for vehicle revenue miles.

2.5.3.4 Vehicle Revenue Hours

Vehicle revenue hours (VRH) represent the total travel time that transit vehicles have operated during revenue service. Like with VRM, VRH as a metric itself is not indicative of positive or negative performance and should be analyzed in relation to productivity and cost-effectiveness measures. Given than CAT VRH values have gone up slightly from 2021 to 2022 compared to decreasing VRM, this would suggest that routes that serve longer distances and cover more miles, possibly towards more rural areas have been restricted and instead shorter routes with more service has replaced it. The increase is also a reflection of congestion as a result of the growth within the county, causing longer travel times for the same distances compared to the previous year. CAT VRH is below the peer average, but again VRH itself is not indicative of performance. The larger transit agencies such as LeeTran and Sarasota Breeze most likely run more service or for longer times which results in greater VRH.

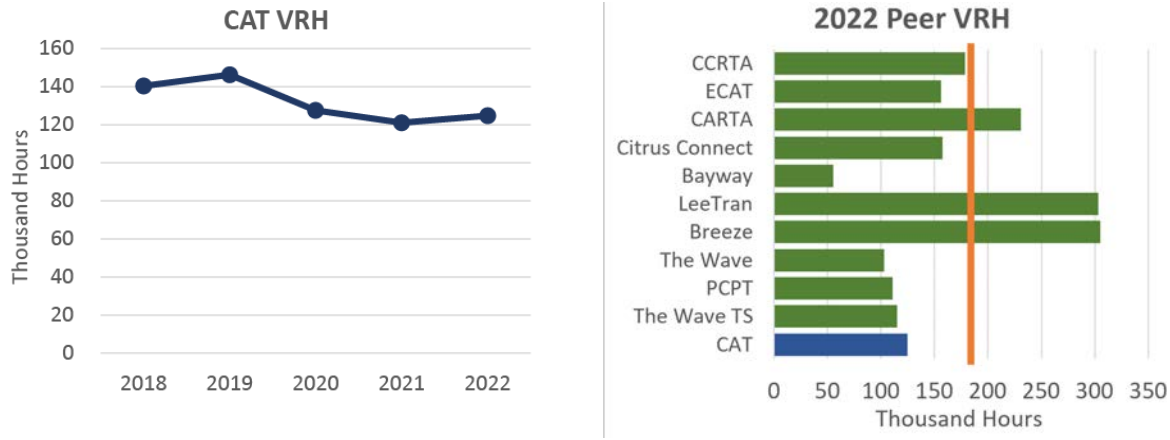


Figure 2-16: 5-year trend (left) and 2022 peer comparison (right) charts for vehicle revenue hours.

2.5.3.5 Vehicles Operating/Available at Maximum Service

Vehicles operating or available at maximum service counts the number of vehicles that are required for (VOMS) or are available to (VAMS) the transit agency to operate at peak full service. VOMS is important for assessing fleet size, directly relating to the network structure and availability of service. VOMS/VAMS numbers can impact the number of routes and frequency of service offered by the transit agency. VOMS helps to determine the required vehicle demand during maximum service versus the vehicles available. VAMS increased from 2020 to 2021 during the pandemic, when less service was required and VOMS was lower. This likely resulted in the decrease in VAMS from 2021 to 2022, however, VOMS has since increased, which would suggest that CAT are operating very close to the line in terms of not having enough vehicles to provide service. Both CAT VOMS and VAMS values are below the peer average, but this is not indicative of performance as agencies will require different numbers of vehicles due to varying services.

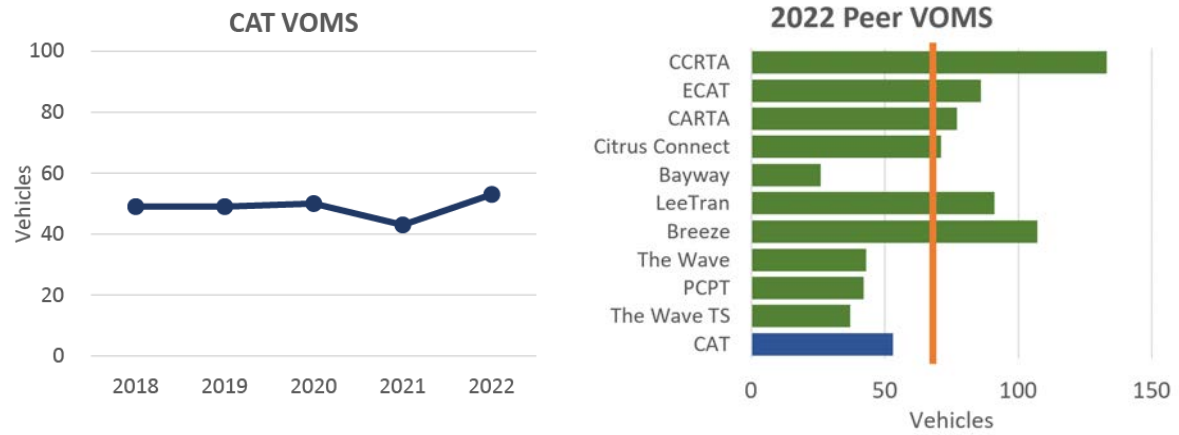


Figure 2-17: 5-year trend (left) and 2022 peer comparison (right) for vehicles operating at maximum service.

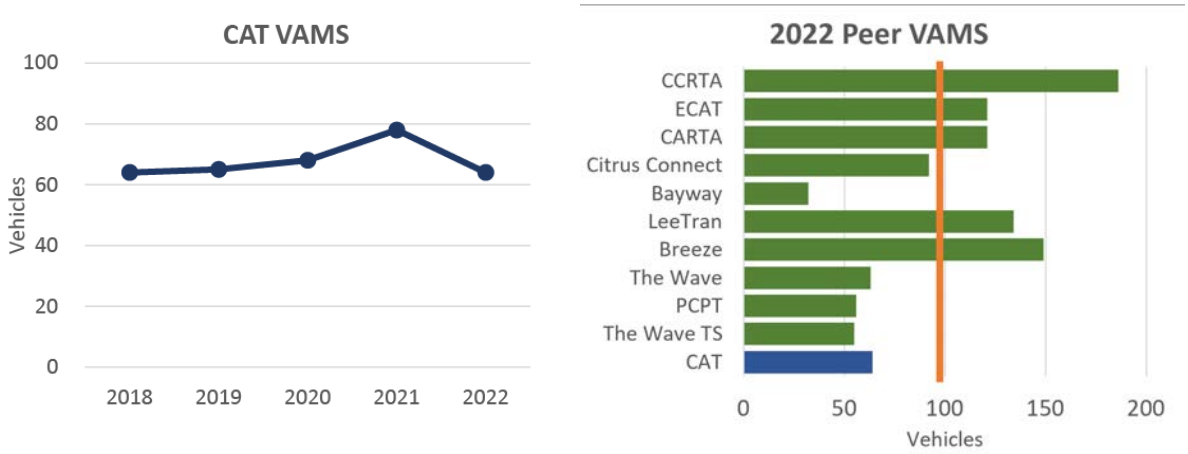


Figure 2-18: 5-year trend (left) and 2022 peer comparison (right) for vehicles available at maximum service.

2.5.3.6 Operating Expense

Total operating expense considers all costs associated with operating the transit service, including operational, maintenance, and administrative costs. The NTD data values for operating expense were recalculated for the peer comparison chart to account for differences in labor costs across different geographical regions. The CAT trend chart includes a secondary data series reflecting the cost data in

2018-dollar values, depicting the impacts of inflation over the years. CAT operating expenses have shown a general increase in trends since 2018 which is to be expected as service gets more expensive to deliver. However, the increase in operating expenses does not appear as drastic between 2021 to 2022 in 2018-dollars, indicating the increase in cost is mostly due to the impact of inflation. Operating expenses should be analyzed in relation to fare revenue and farebox recovery rates to determine how much of the cost of the service is being recuperated. CAT operating expenses are below the peer average, indicating that the transit system does not cost as much to operate compared to the other larger agencies.

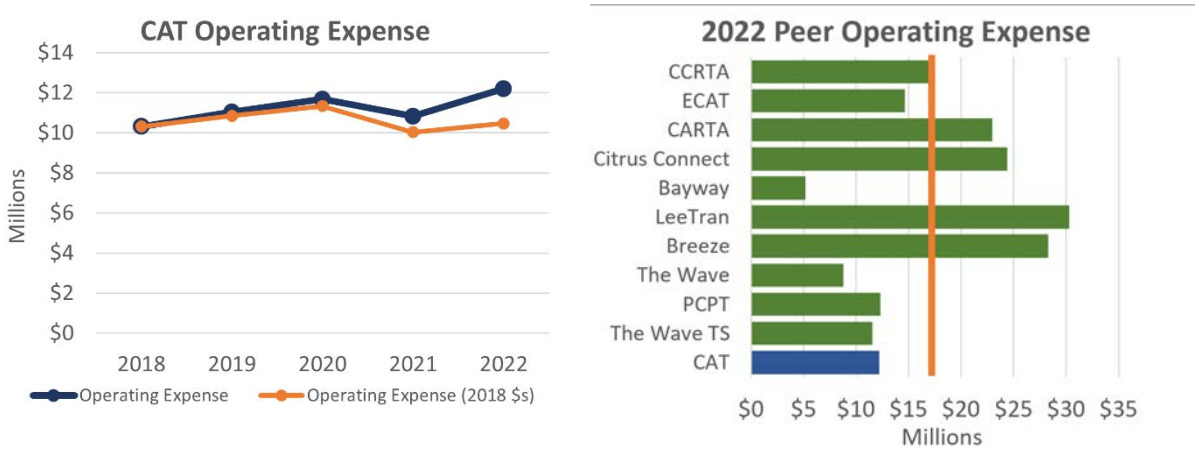


Figure 2-19: 5-year trend (left) and 2022 peer comparison (right) charts for operating expense.

2.5.3.7 Fare Revenue

Fare revenue is the total amount of revenue generated from fare-paying transit service users. Again, the CAT trend chart includes a secondary data series reflecting the revenue data in 2018-dollar values, depicting the impacts of inflation over the years. Post-pandemic, CAT fare revenue has been steadily increasing which would be in line with passenger trips also increasing. As with operating expense, fare revenue is most useful when analyzed in relation to operating expense and farebox recovery rates. CAT fare revenue is below the peer average, indicating that CAT receives less revenue from rider fares compared to other agencies, especially CARTA with a significantly higher fare revenue value.

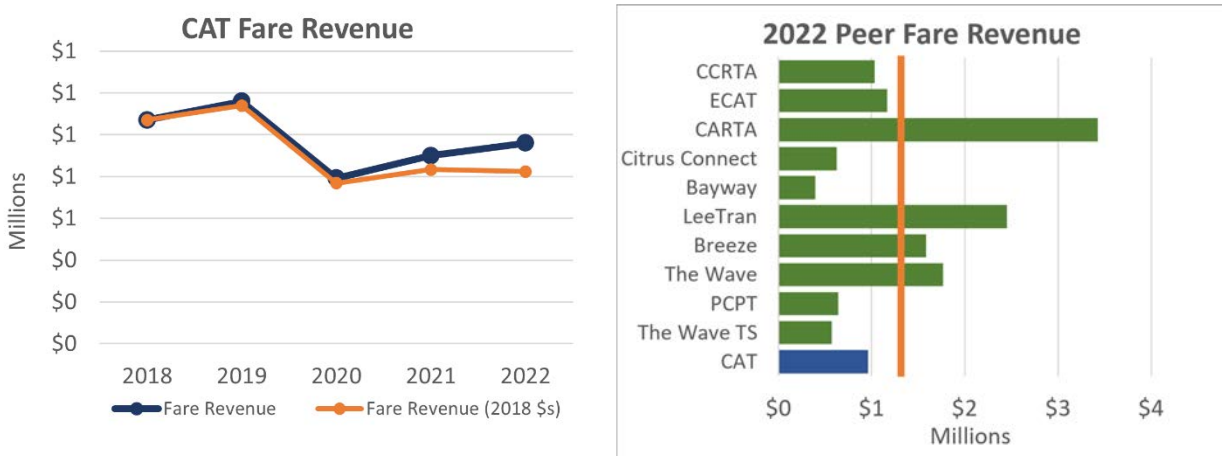


Figure 2-20: 5-year trend (left) and 2022 peer comparison (right) charts for fare revenue.

2.5.4 EFFECTIVENESS MEASURES

Service effectiveness is represented by performance characteristics in relation to the population, as the selected indicators demonstrate to what extent service-related goals are being achieved. This includes service supply, service consumption, and quality of service. Effectiveness measure values are obtained or derived from NTD data and reflect total values for all modes.

2.5.4.1 Unlinked Passenger Trips/Passenger Miles Travelled per Capita

UPT per capita is calculated by dividing UPT by the service area population, measuring transit usage within the service area. Similarly, PMT per capita is derived from dividing PMT by the service area population. Higher values represent a greater utilization of service. CAT UPT and PMT per Capita values have been decreasing over the years, with a steeper decrease towards 2020, likely due to people taking transit less during the pandemic. There was a small increase from 2021 to 2022 as ridership began to improve back towards pre-pandemic levels. CAT UPT per capita is below the peer average and PMT per capita just slightly below, demonstrating that service utilization is less effective compared to other agencies, especially CARTA with a significantly higher value.

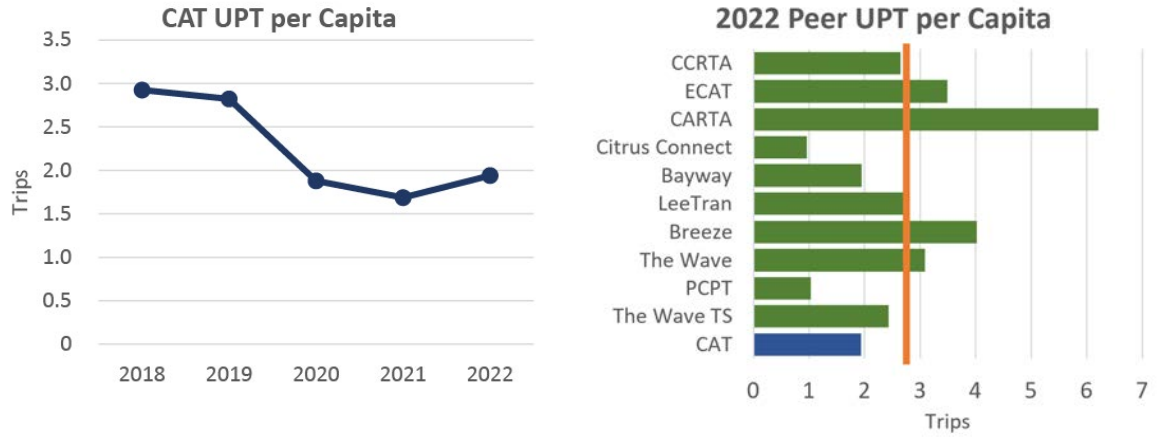


Figure 2-21: 5-year trend (left) and 2022 peer comparison (right) for unlinked passenger trips per capita.

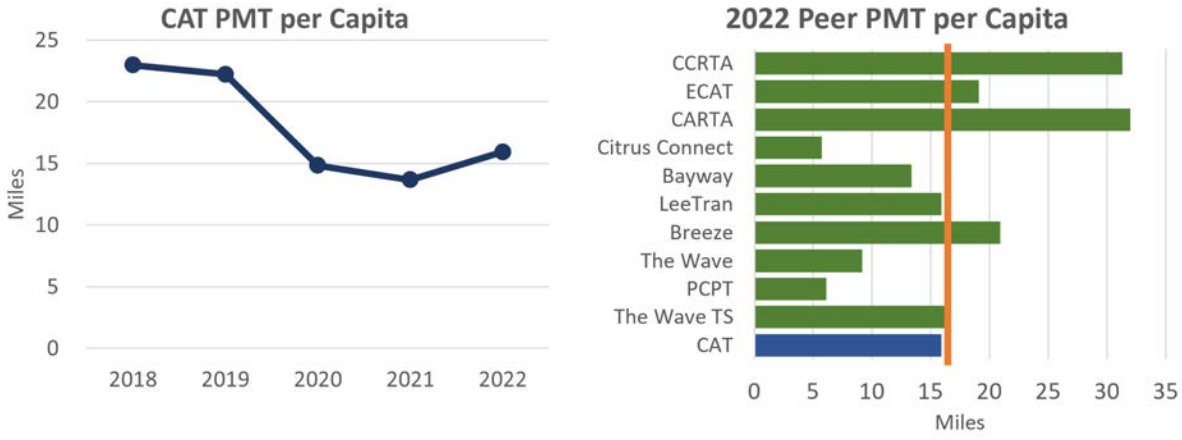


Figure 2-22: 5-year trend (left) and 2022 peer comparison (right) for passenger miles travelled per capita.

2.5.4.2 Vehicle Revenue Miles per Capita

VRM per capita is calculated from the dividing VRM by the service area population, measuring the supply of service provided based on the population of the service area. There was a significant decrease in VRM per capita from 2019 to 2020, likely due to reduced service as a result of the pandemic. Values stayed relatively steady after 2020, but still slightly decreasing. The 2022 CAT value is just below the peer average.

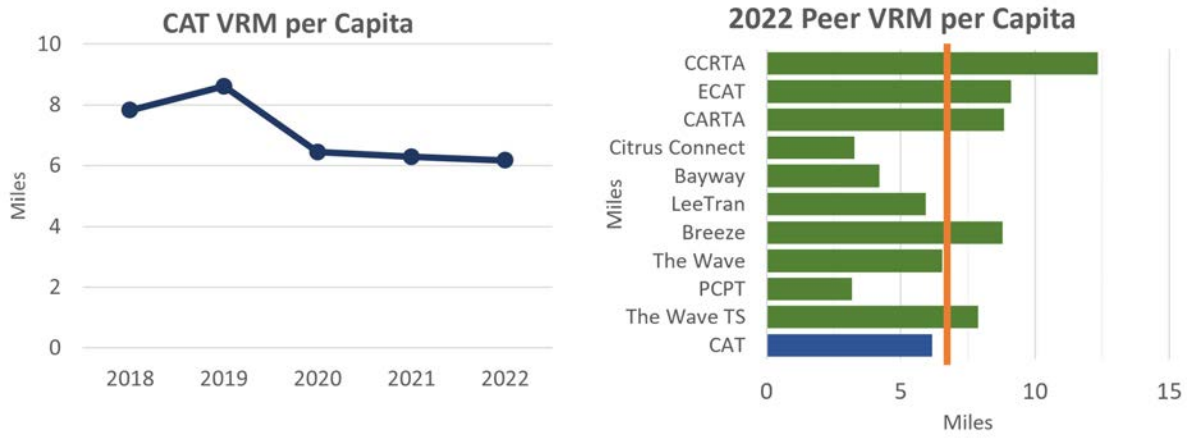


Figure 2-23: 5-year trend (left) and 2022 peer comparison (right) for vehicle revenue miles per capita.

2.5.4.3 Unlinked Passenger Trips per Vehicle Revenue Mile/Vehicle Revenue Hour

Dividing UPT by VRM or VRH can serve as other indicators for productivity and service consumption, measuring the utilization rates per unit of provided service. Higher values are desirable as it reflects that there is greater utilization of service. CAT UPT per VRM values stayed consistent for four years after a decrease from 2018 to 2019, while UPT per VRH values decreased over the years and only increased from 2021 to 2022. CAT UPT per VRM is below average and UPT per VRH is average amongst the peers.

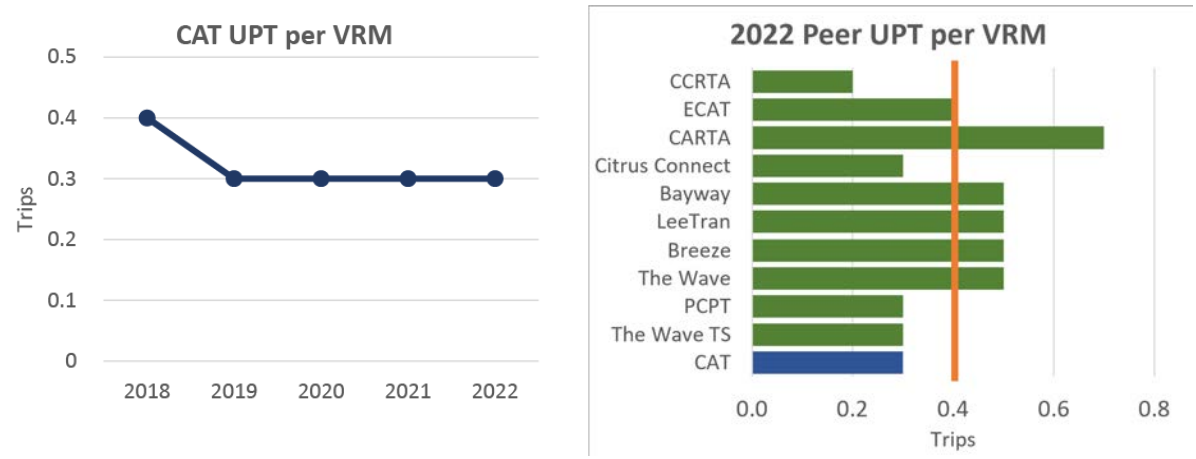


Figure 2-24: 5-year trend (left) and 2022 peer comparison (right) for unlinked trips per vehicle revenue mile.

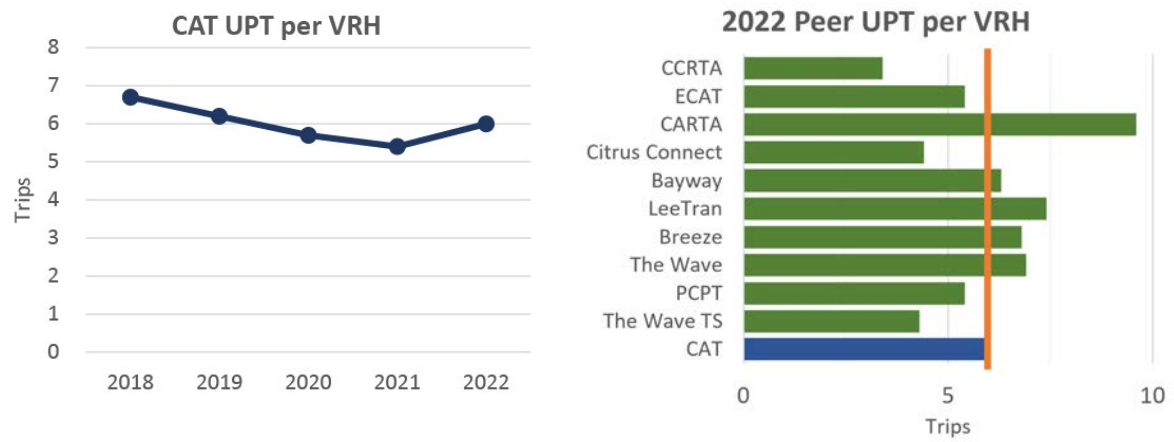


Figure 2-25: 5-year trend (left) and 2022 peer comparison (right) for unlinked trips per vehicle revenue hour.

2.5.5 EFFICIENCY MEASURES

Service efficiency revolves mostly around operating expenses and a few other indicators, in essence, how much it costs to provide and run the service. Most of the efficiency measures are derived from ratios between two performance measures, and again reflect total values for all modes. The data values for all measures involving operating expense were recalculated for the peer comparison charts to account for differences in labor costs across different geographical regions. The trend charts include secondary data series reflecting the cost data in 2018-dollar values, depicting the impacts of inflation over the years.

2.5.5.1 Operating Expense per Capita

Operating expense per capita reflects the total investment spent on provided transit services in relation to the service area population. The metric itself reflects greater investment in transit with higher values, however, there are many additional underlying considerations including productivity, demand, and utilization. Operating expense per capita decreased from 2019 to 2021, possibly due to lowered costs from less service during the pandemic, then increased in 2022. CAT's operating expense per capita value is below the peer average, indicating that it spends less per capita to operate compared to other agencies.

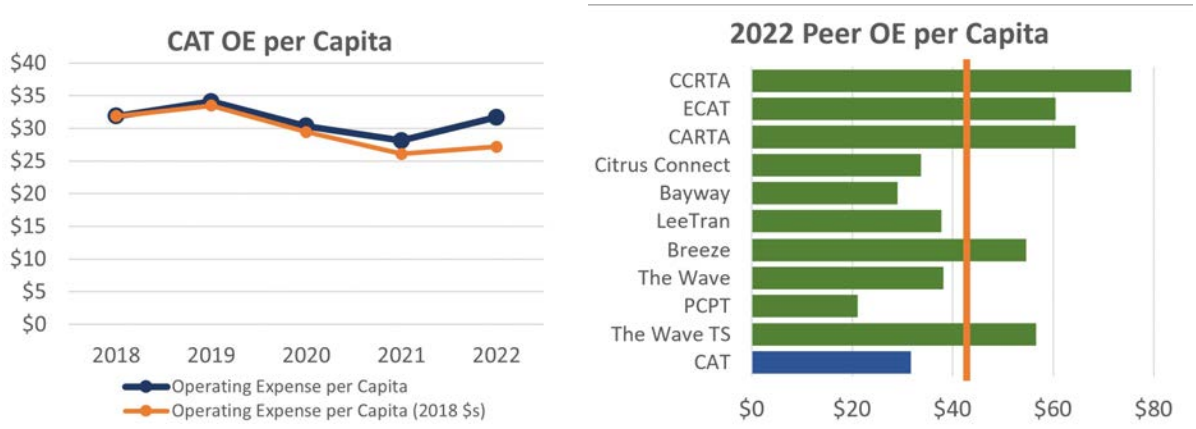


Figure 2-26: 5-year trend (left) and 2022 peer comparison (right) charts for operating expense per capita.

2.5.5.2 Operating Expense per Unlinked Passenger Trip/Passenger Mile Travelled

Operating expense per UPT/PMT indicate the average cost to provide service for each unlinked trip or passenger mile, showcasing the market demand for the service and how service is delivered. The lower these values, the better, as it is ideal to minimize cost per trip/mile. The trends for operating expense per UPT/PMT are identical; increasing up to 2021 and slightly decreased in 2022. The increase from 2020 to 2021 was mostly due to inflation as the trends decreased from 2020 to 2022 in 2018-dollar values. The operating expense per UPT/PMT values for CAT are below the peer averages, meaning that it costs less to operate per trip/mile compared to other agencies.

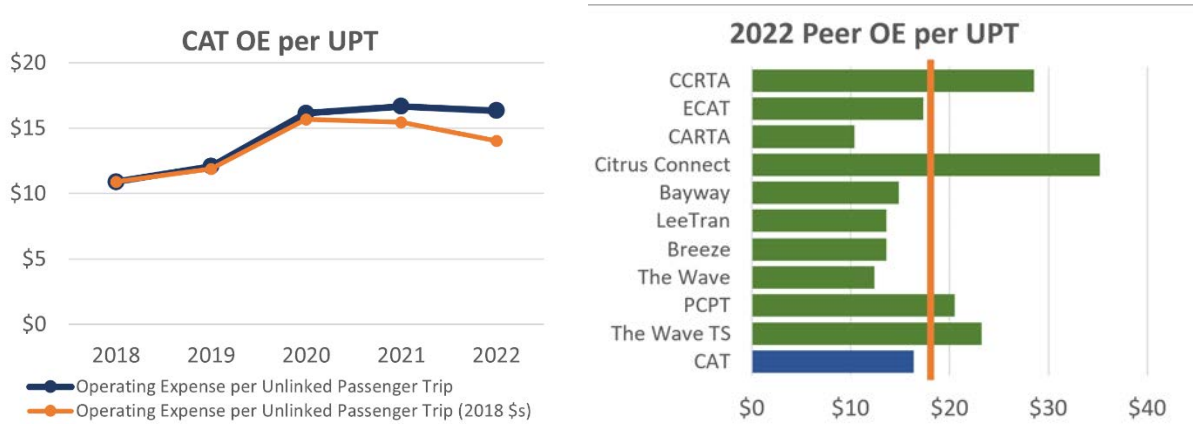


Figure 2-27: 5-year trend (left) and 2022 peer comparison (right) for operating expense per unlinked trip.

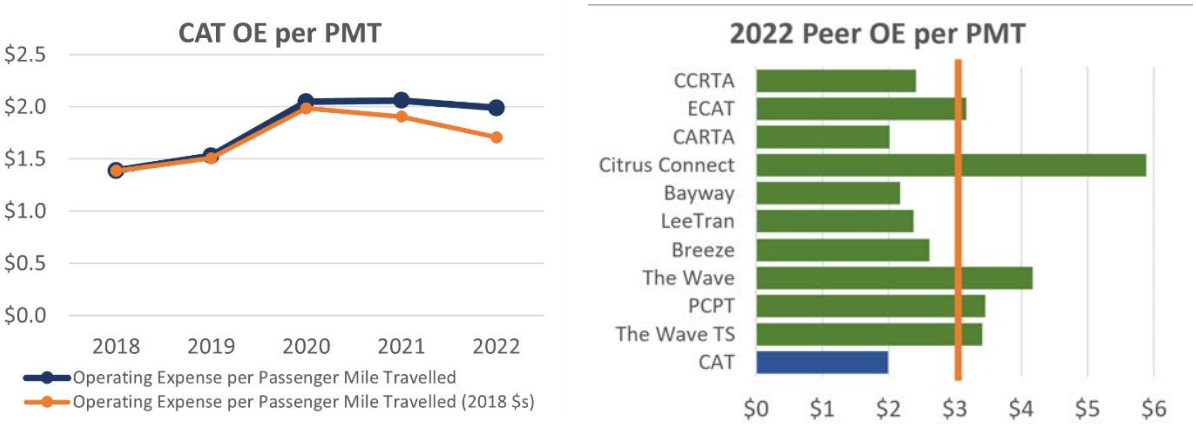


Figure 2-28: 5-year trend (left) and 2022 peer comparison (right) for operating expense per passenger mile.

2.5.5.3 Operating Expense per Vehicle Revenue Mile/Vehicle Revenue Hour

Operating expense per VRM/VRH are average cost calculations for every service mile or hour, evaluating the efficiency of transit service delivery. Lower values are ideal to minimize the cost per mile/hour. CAT operating expense and vehicle revenue miles have been consistently increasing, except for a slight decrease from 2020 to 2021. Apart from Citrus Connect, the operating expense per VRM/VRH values are close together across the agencies. CAT's values are below the peer averages, demonstrating that it costs less to operate per mile/hour compared to other agencies.

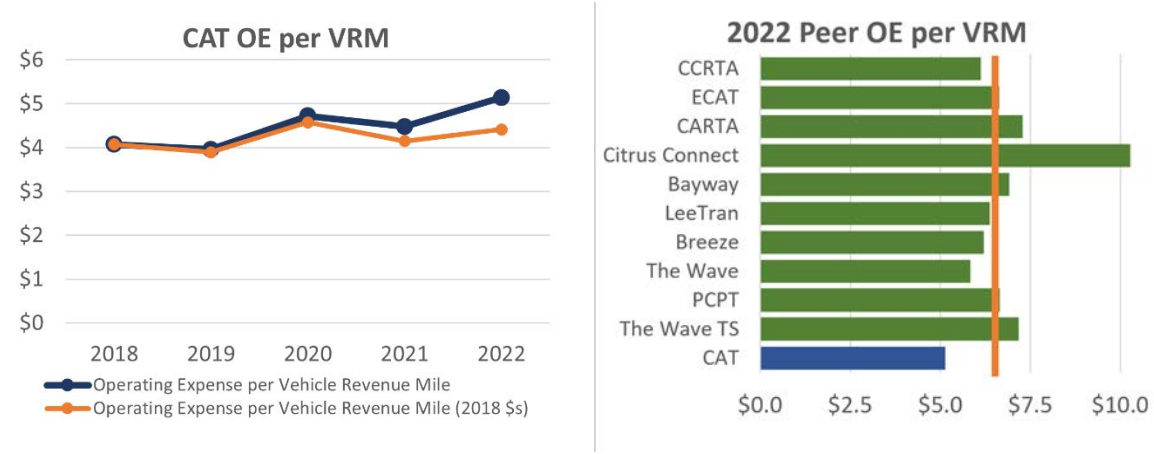


Figure 2-29: 5-year trend (left) and 2022 peer comparison (right) for operating expense per revenue mile.

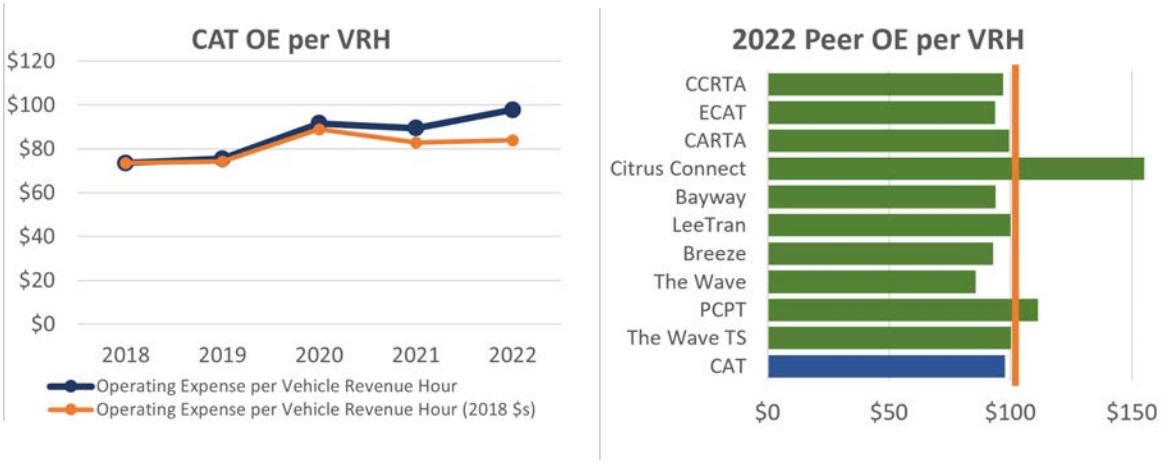


Figure 2-30: 5-year trend (left) and 2022 peer comparison (right) for operating expense per revenue hour.

2.5.5.4 Vehicle Revenue Miles per Vehicle

VRM per vehicle is the average service provided by each vehicle in operation during maximum service, derived from dividing VRM by VOMS. It is an indication of vehicle utilization, but there are other contextual considerations to be made including fleet size and age. VRM per vehicle values decreased from 2019 to 2021, likely due to lowered vehicle utilization during the pandemic. CAT has the highest VRM per vehicle value compared to the other peer agencies, indicating high vehicle utilization. The increase is also a reflection of congestion as a result of the growth within the county, causing longer travel times for the same distances compared to the previous year.

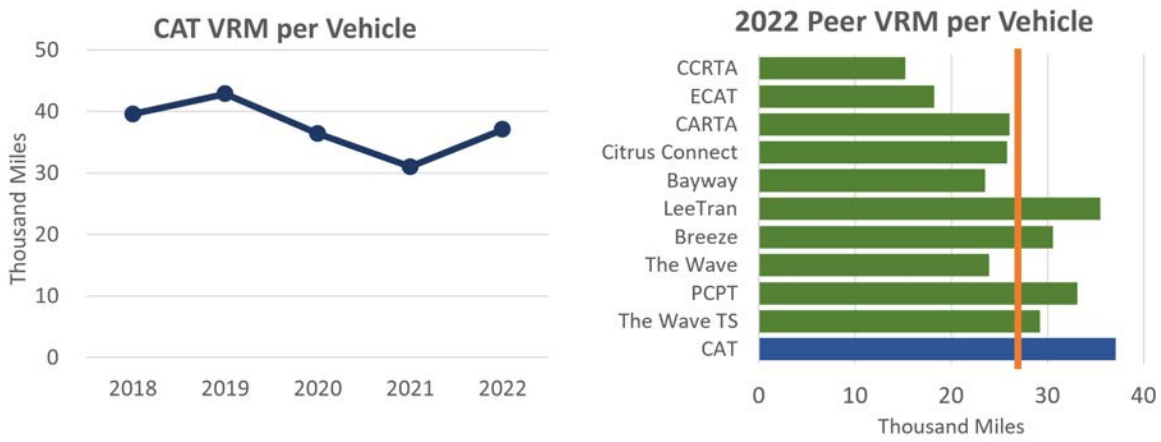


Figure 2-31: 5-year trend (left) and 2022 peer comparison (right) charts for vehicle revenue mile per vehicle.

2.5.5.5 Farebox Recovery Ratio

Farebox recovery ratio is the percentage of the total operating expenses that are funded by total fare revenue from service users, equating fare revenue over operating costs. Higher farebox recovery is desired as that means a greater percentage of the operating costs are covered by passengers compared to other funding sources. The farebox recovery ratio of approximately 8% in 2022 demonstrates a low level of recovery and therefore indicating that the transit network is heavily reliant on other funding sources. However, CAT is performing below but near the peer mean which suggests that it is performing at an average level in comparison to other agencies, many of whom are performing worse.

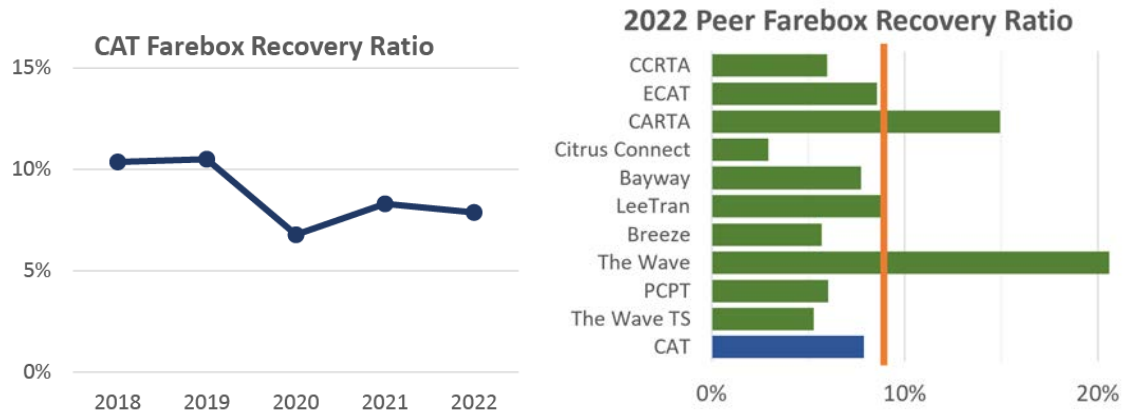


Figure 2-32: 5-year trend (left) and 2022 peer comparison (right) charts for farebox recovery ratio.

2.5.5.6 Average Fare

Average fare is the average amount paid per passenger per trip and is calculated by dividing fare revenue by UPT. The metric itself is not necessarily indicative of performance but is a good comparison to other transit systems in terms of fare cost. CAT's average fare value is right at the peer average, showing that the fares implemented by CAT are comparable to the other agencies, other than The Wave, which has a much higher average fare.

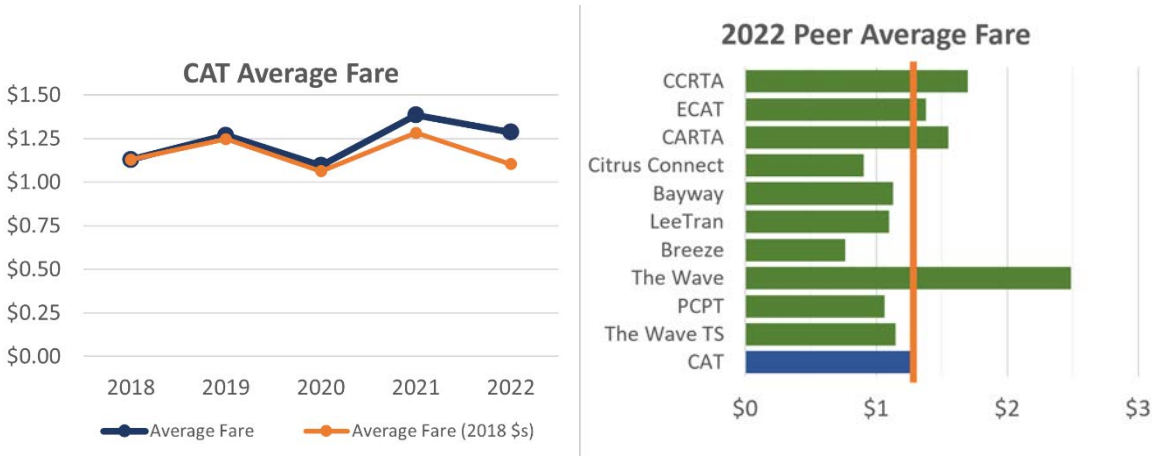


Figure 2-33: 5-year trend (left) and 2022 peer comparison (right) charts for average fare.

2.5.6 KEY FINDINGS

Over the past five years, a clear trend has emerged across most performance measures. From 2018 to 2021, values declined, with the most significant drop occurring between 2019 and 2020, likely due to the onset of the COVID-19 pandemic, which severely impacted the CAT transit system. By 2022, performance measures began to recover, possibly reflecting adaptations by the transit systems to pandemic-related challenges and a gradual return of riders. Rising costs and inflation since the pandemic have likely driven up operating expenses, affecting service delivery. Despite the removal of the last loop for Routes 11, 12, 13, 14, and 17, as per the FY2024 update of the TDP, ridership increased during the peak season between FY23 and FY24.

Overall, the indicators for CAT are mostly below the peer averages. This has different meanings and implications for the various measures. For the general performance measures, it indicates that CAT provides less service and there may be less transit demand compared to other agencies. The charts showed that CAT values were actually quite close to most of the other agencies in the peer group aside from CARTA, LeeTran, and Sarasota Breeze, which are larger transit agencies that serve a larger population size. For the effectiveness measures, CAT values falling lower than the peer average demonstrates that the transit system may not be as effective as other agencies, as the utilization of service is lower. On the other hand, lower than average values for the efficiency measures indicates that CAT is doing better than the peer agencies, as it costs less for CAT to operate per capita, trip, mile, or hour.

In general, the analysis of CAT trends over the years and comparing CAT to other peer agencies helps to identify how CAT is performing in its operations. Seeing how other agencies perform can assist with identifying where CAT can improve its existing system.

3 On-Board Surveys

CAT conducts surveys frequently with a target of every two years to evaluate the existing system and provided service, as well as soliciting suggestions and feedback. Surveys are conducted to better understand the needs and concerns of current users, welcoming CAT riders to provide feedback on how they think service can be improved.

Two past surveys were developed and conducted to gather information on how the existing system is perceived and what services are in demand. These are the CAT Sticker Survey conducted in November 2022 and the Baseline CAT Survey. The CAT Sticker Survey explores how riders use CAT service and the RideCAT mobile app. The Baseline CAT Survey delves more into the demand of services in addition to service satisfaction. This survey has a lot more responses compared to the previous survey.

The results from these surveys provide a better understanding of the attitudes, habits, and preferences of riders as survey responders indicate their common trip routes and purposes. This helps to show the gaps in the existing transit service and potential for service improvements based on demand.

An additional survey was started in mid-November 2024. Once this data is provided it will be incorporated into this report.

3.1 Survey Characteristics

The surveys consisted of questions regarding passenger socio-demographics, travel behaviour and characteristics, and rider satisfaction. The gathered information included:

- Socio-demographics:
    - Age
    - Gender
    - Education Attainment
- Travel behaviour and characteristics:
    - Commonly taken bus routes
    - Trip purpose for transit trips
    - Length of time using CAT services
    - Method for receiving service alerts
    - RideCAT mobile app usage
- Rider satisfaction:
    - How well various services meet transportation needs
    - Ease of usage for various services
    - Service improvement importance rankings
    - Cleanliness of transportation infrastructure
    - Overall experience ratings
    - Satisfaction of service

3.2 Passenger Demographic Information

The CAT Sticker Survey asked riders for demographic information including age, gender, and highest level of education attained. From the results, it appears that most of the survey respondents were young adults aged between 21-30, most likely university students. There were a few more male respondents than female respondents. The results can be seen in the following graphs below.

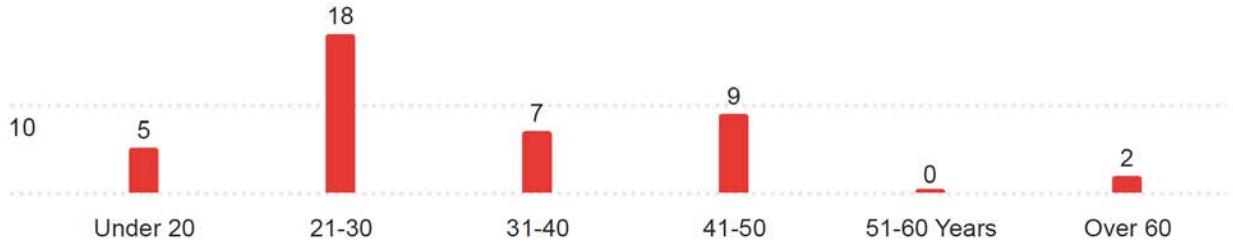


Figure 3-1: Distribution of respondent age from CAT Sticker Survey responses.

Figure 3-2: Distribution of respondent gender from CAT Sticker Survey responses.

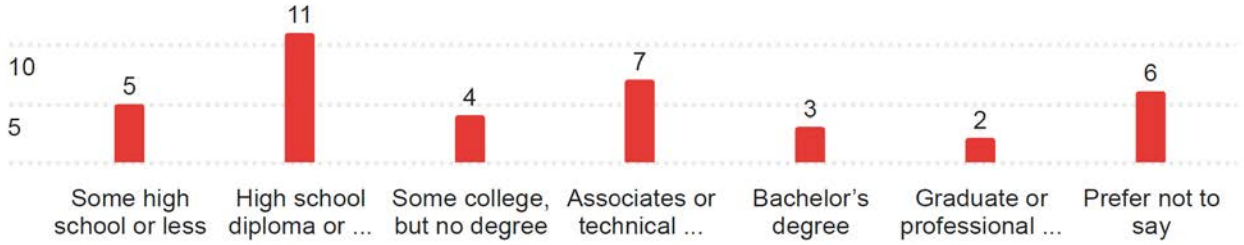


Figure 3-3: Distribution of respondent educational attainment from CAT Sticker Survey responses.

3.3 Passenger Travel Behavior and Characteristics

Survey respondents were asked which routes they usually ride, and the results are shown in the graph below. The top routes were the 11, 12, and 19.

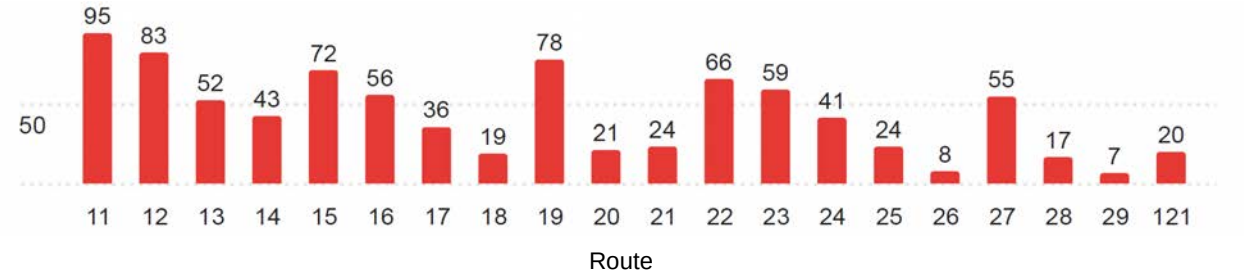


Figure 3-4: Distribution of most frequented routes from Baseline CAT survey responses.

Additionally, respondents were asked to indicate which destinations they take transit to get to. The top trip purpose for transit trips was to go to work, followed by shopping, and the remaining trip purposes had a fairly even distribution of responses.

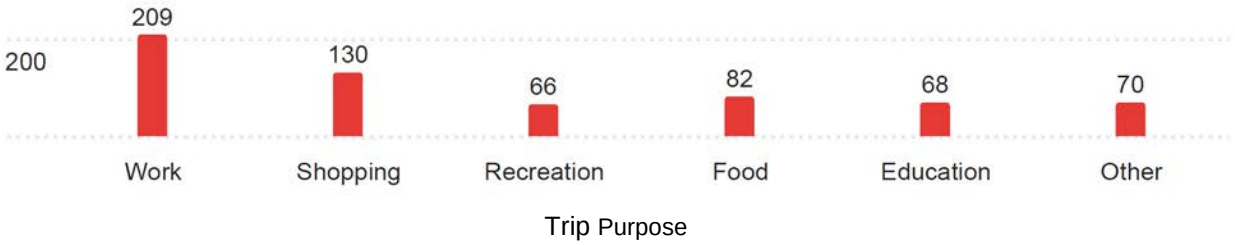


Figure 3-5: Distribution of trip destinations from Baseline CAT Survey responses.

Other survey questions include how long the rider has been a user of CAT and how they receive CAT service alerts. A majority of the survey respondents indicated that they have only taken CAT for a year or less (20 responses), others were riding CAT for the first time (10 responses), a few had been riding with CAT for over 5 years (7 responses), and very few between 1 to 5 years (5 responses in total). The majority of respondents find out about CAT service alerts through the website at rideCAT.com (28 responses), some through rideCAT social media (10 responses), and a few through subscription text alerts (6 responses). These results are shown in the graphs in Figure 3-6 and Figure 3-7 below.

Figure 3-6: Distribution of amount of time riding with CAT from CAT Sticker Survey responses.

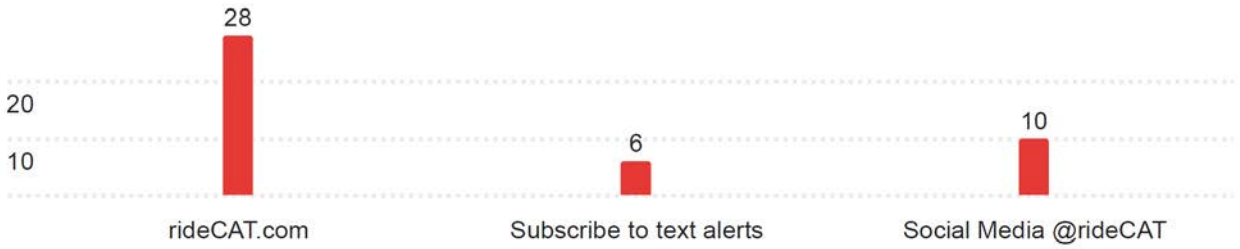


Figure 3-7: Distribution of method for receiving service alerts from CAT Sticker Survey responses.

The survey also includes a few questions about the RideCAT mobile app such as if riders are aware of the app, if they use it, or what prevents them from using it. Majority of the responders said that they are aware of the app and use it (38 and 31 respectively), however, 9 were not aware of the app and 17 did not use it. The answers to why the respondents do not use the app include that they did not know about it, do not know how to use it, or just have no need for it.

3.4 Passenger Satisfaction

Survey responders were asked to rate how well different aspects of the service met their transportation needs, overall ease of use for various services, cleanliness of the different transit infrastructure, the service they received, and their overall experience with CAT.

The responses to this question varied between the CAT Sticker Survey and the Baseline CAT Survey. The graph for the CAT Sticker Survey results shows a positive skew where the majority of responseswas very satisfied and very few were very dissatisfied, as seen in Figure 3-8 below. The graph for the Baseline CAT Survey results in Figure 3-9 shows that most riders just feel neutral about CAT service, many are satisfied with their experience, and an almost equal amount of people are very dissatisfied or very satisfied.

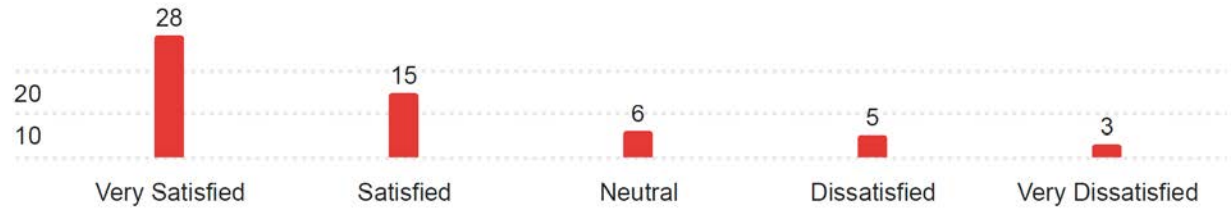


Figure 3-8: Distribution of satisfaction level with CAT service from CAT Sticker Survey responses.

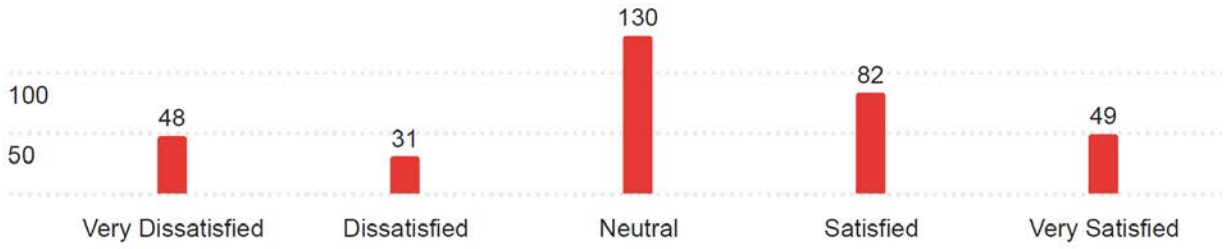


Figure 3-9: Distribution of satisfaction level with CAT service from Baseline CAT Survey responses.

Both surveys also asked how likely the rider would be to recommend CAT services to a friend or colleague. The responses for both surveys followed a similar trend where a majority said they would recommend CAT. The results from both surveys are shown in Figure 3-10 and Figure 3-11 below.

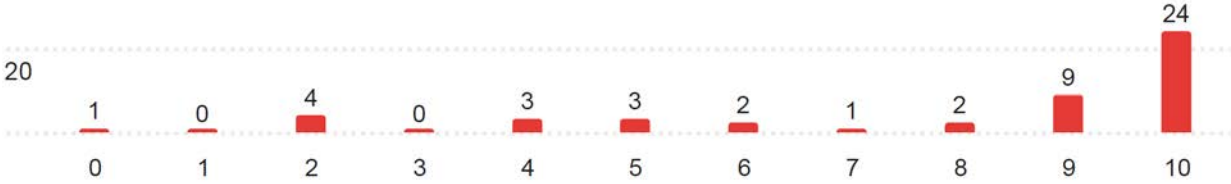


Figure 3-10: Distribution of likeliness to recommend CAT from CAT Sticker Survey responses.

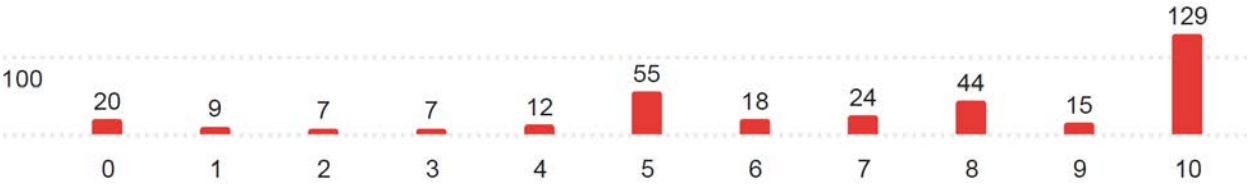


Figure 3-11: Distribution of likeliness to recommend CAT from Baseline CAT Survey responses.

APPENDICES

Appendix A – Peer Selection Methodology

Situational Appraisal – Peer Selection Methodology
Technical Memo No. 1

Date: **July 1, 2024**

Reference: **Contract 18-7432 MP Professional Services Library – Metropolitan Planning**
Transit Development Plan (TDP) Major Update
Purchase Order/Work Order No. 4500229353
Project No. 33804.6.2.3

Document: **Situational Appraisal – Technical Memo No. 1**

Introduction

The following memorandum is an update to the original peer selection undertaken in 2020 as part of the previous TDP. Updating and re-analyzing past selected agencies as well as being open to adding new agencies are important during the process of selecting relevant and useful peers for comparison, as this allows Collier Area Transit (CAT) to continually improve and compare itself with relevant peers. It is also important that the chosen peers reflect areas and agencies that can be thought of as aspirational to help CAT identify a path forward for improvement. As a result of this process, nine new peers have been selected for consideration.

The peer selection process followed the methodology provided by the Transit Cooperative Research Program (TCRP) Report 141: A Methodology for Performance Measurement and Peer Comparison in the Public Transportation Industry and recommended by the FDOT TDP Handbook (2022). Peer comparisons use selected performance indicators, effectiveness measures, and efficiency measures to illustrate the performance of the CAT fixed route system relative to the peer group. The peer identification methodology and the identified peers are described below.

Best practice typically dictates that a peer group is comprised of eight to ten peers, for the purposes of this TDP, 16 agencies have been selected for the first level assessment. It is crucial to make sure that the right peer agencies are selected to provide credible comparisons that can provide insight and trigger action, compared to badly chosen peers which can produce irrelevant results.

Initial Peer Group

An initial peer group of agencies similar to CAT was formed, and likeness scores were calculated to determine their similarity and appropriateness. For this TDP update, all agencies included in the previous TDP report were retained, along with additional agencies deemed similar to CAT. This initial peer list consisted of 16 transit agencies as shown in the following table:

Table 3-1: Transit System Peer Review Selection

Transit System	**Location**	Peer Description
The M (Montgomery Area Transit)	City of Montgomery, AL	From Previous TDP
TTA (Tri-State Transit Authority)	Huntington, WV	From Previous TDP
The Wave Transit System	City of Mobile, AL	From Previous TDP
ART (Asheville Redefines Transit)	City of Asheville, NC	From Previous TDP
GCT (Gwinnett County Transit)	Lawrenceville, GA	From Previous TDP
PCPT (Pasco County Public Transportation)	New Port Richey, FL	From Previous TDP
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	From Previous TDP
Breeze Transit (Sarasota County Area Transit)	Sarasota, FL	Newly Added
LeeTran (Lee County Transit)	Fort Myers, FL	Newly Added
Bayway (Bay County Transportation)	Pensacola, FL	Newly Added
GoLine (Indian River County)	Vero Beach, FL	Newly Added
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	Newly Added
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	Newly Added
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	Newly Added
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	Newly Added
GTA (Greensboro Transit Authority)	Greensboro, NC	Newly Added

The selection of potential peers was conducted using the peer selection methodology outlined in the FDOT TDP Handbook, employing validated 2022 National Transit Database (NTD) data and the Florida Transit Information System (FTIS). The pool of potential peers consisted of transit agencies located in the southeastern United States, specifically those with coastal characteristics in their geographic profiles.

From the newly identified transit agencies, Breeze Transit (Sarasota, FL), LeeTran (Fort Myers, FL), Bayway (Pensacola, FL), GoLine (Vero Beach, FL), and Citrus Connection (Lakeland, FL) were chosen because they are situated within Florida, either in coastal counties or counties near Collier County. Additionally, CARTA (North Charleston, SC), ECAT (Pensacola, FL), and CCRTA (Hyannis, MA) were selected based on their recommendation as top peers to CAT according to the FTIS Urban iNTD tool. It is worth noting that ART was also recommended but was already included in the previous TDP peer group.

Overview of Methodology

The methodology for selecting the final peer group adheres to the guidelines outlined in the TCRP report. This process involves comparing data values for CAT and potential peer agencies using various indicators to calculate likeness scores for each indicator between CAT and each potential peer agency. The first stage was the primary review, which involved initially selecting indicators and scoring their likeness to CAT, then a comparison was made from the new peers against the previous TDP peers to determine whether the new peer group had a similar likeness and provided a good comparison overall to CAT. A secondary review was initiated to provide further insight to the primary likeness score where 2 new indicators were used. Results were then drawn utilizing the likeness score from the primary review, referencing the secondary review and weighing the location and demographic of the locations to determine the results. This comprehensive approach ensures a robust and well-rounded peer selection process. The methodology recognizes that peers will not be identical in all categories, accommodating variations and allowing for similarity in only a few key categories.

The methodology outlined in the TCRP report identifies 14 indicators for selecting peer agencies, primarily based on demographic characteristics and other exogenous variables, as utilized in the FTIS tool. While adhering to the TCRP guidance for peer selection, our approach slightly diverges in the factors used to assess potential peers. Rather than focusing primarily on exogenous variables, we prioritized various transit system performance measures as the primary criteria for peer selection. These performance indicators were considered more relevant for comparing peers, particularly in the context of enhancing transit system effectiveness. Nonetheless, demographic variables were still integrated into the peer selection process, although greater emphasis was placed on transit performance indicators.

As such, the potential peer agencies were analyzed based on the following 14 indicators: 8 operating characteristics and 6 exogenous variables.

- Operating Characteristic Indicators
    - Vehicles Operated in Maximum Service
    - Annual Passenger Miles Traveled
    - Annual Vehicle Revenue Miles
    - Annual Vehicle Revenue Hours
    - Number of Revenue Vehicles
    - Total Revenue Miles Operated
    - Total Operating Expense
    - Percent Service Demand Response
- Exogenous Variables
    - Service Area Population
    - Service Area Density
    - Service Area
    - Population Density
    - Urban Area Population
    - Population Growth Rate

The selection of these indicators for primary transit peer analysis ensures a comprehensive and robust assessment of both operational performance and contextual factors. Key operational characteristics such as vehicles operated in maximum service, annual passenger miles traveled, and total operating expenses provide critical insights into efficiency, capacity, and financial health within transit operations. Metrics like percent service demand response and annual vehicle revenue hours are essential for evaluating service quality and responsiveness to demand.

Given the growing emphasis on operational efficiency and the increasing adoption of demand response services, the percentage of service demand response serves as a particularly noteworthy indicator. It helps gauge where agencies stand in this evolving process, acknowledging disparities between agencies at different stages of implementing demand-responsive solutions.

Including exogenous variables such as service area population, density, and population growth rate contributes to a comprehensive understanding of the demographic and geographic contexts influencing these transit systems. This holistic approach ensures a well-rounded comparison, capturing both internal performance metrics and external factors that impact transit operations.

To create a chart that scores each category comparing CAT to other transit systems, a likeness score for each factor was calculated. This likeness score is a representation of the difference between two data

values. Data values that are identical between the peer agency and CAT result in a score of 0 (which is very rare and highly unlikely), while a score of 1 represents a percentage difference of 100%, indicating that the value for one agency is twice the amount of the other. In essence, the larger the difference between the values of the agencies, the higher the score, and vice versa. Peer agencies that have larger differences in values should be avoided and are undesirable due to greater dissimilarity between factors, but could still potentially be used with caution after screening for potential prominent differences that could deem them an unsuitable peer.

The likeness score is determined by calculating the percentage differences between the values for CAT and the peer agency, using the following formula:

$$\text{Likeness Score} = \frac{|F_{\text{cat}} - F_{\text{peer}}|}{\max(F_{\text{cat}}, F_{\text{peer}})}$$

Where:

- F_{cat} = the target agency's value for a given factor,
- F_{peer} = the peer agency's value for the same factor, and
- $\max(F_{\text{cat}}, F_{\text{peer}})$ = the maximum of the two values being compared.

As per the scoring guidance provided in the TCRP Report, the likeness scores are rated as such:

- **0.00 – 0.50: Good score**; none or small difference percentages, ideal matches to use
- **0.51 – 0.75: Satisfactory score**; smaller difference percentages, decent matches to use
- **0.76 – 0.99: Mediocre score**; larger difference percentages, could be used but check for anomalies
- **More than 1: Poor score**; large differences percentages, poor match, avoid using if possible

The 2022 data values for each of the 14 indicators and 17 transit agencies including CAT can be found in the data tables attached at the end of the memo, along with the corresponding likeness scores calculated for each indicator and agency. The likeness scores are highlighted according to the score breakdown as previously described, in that the good scores are in green, satisfactory scores are in yellow, decent scores that require more investigation are in orange, and poor scores are in red. This breakdown helps to easily identify which peers are more similar to CAT in which aspects.

Normalizing Cost Data

To accurately reflect cost values, cost data was normalized to reflect the impacts of differences in labor costs between geographical regions. It is important to consider labor cost differences as it allows for conclusions to be drawn with more certainty that the cost differences between agencies are due to internal agency efficiency variances rather than external cost variation. Labor costs are also typically the largest component of an agency's operating costs.

To adjust for differences in labor costs between counties, average labor wage rates were used to recalculate cost data. Annual average weekly wages for 2022 were obtained from the US Bureau of Labor Statistics Quarterly Census of Employment and Wages. All occupation types were included in the average calculation as agencies have no control over general labor environments in the county, which the cost data is being adjusted for, as opposed to the industry-specific labor rates that the agencies have some control

over. Including all occupations also allows for an agency to analyze how much of its labor is spent in comparison to the county's average wages, as well as to adjust its costs to reflect changes in the county's overall cost of living. The peer agencies' cost data was adjusted for labor cost differences by multiplying the labor cost portion of the agencies' operational expense values from NTD by the ratio between Collier's average labor cost over the peer agency county's average labor cost.

Comparison of Results with Previous TDP

As multiple transit systems were analyzed, calculations were performed to assess differences between the previous peer group from the 2020 TDP and the newly added peer agencies. For each potential peer, the sums of the exogenous variables and operating characteristics were calculated separately to identify which peers were most similar to CAT for each of the categories of indicators. An average score was then computed for easier comparison between the peer group from the previous TDP and the new potential peers using the following formula:

$$\text{Total Likeness Score} = \frac{\sum_{i=1}^{n} \text{Factor Likeness Score}_i}{n}$$

Where:

- **Total Likeness Score** = the average score representing overall similarity.
- **Factor Likeness Score** $_i$ = the likeness score for the i-th factor.
- n = the total number of factors.

The results indicated that the newly added peers had a higher average score in operational characteristics compared to the previous TDP peer group. While this suggests that the new peers are less similar to Collier County overall in terms of operational characteristics, it is still a valuable comparison. Focusing on operational characteristics is crucial as they directly impact service delivery and customer satisfaction. Additionally, the new peer group includes 9 peers compared to the 7 in the previous group, which can slightly elevate the average score due to the larger sample size.

Moreover, many of the new peers possess coastal features, which is a significant consideration for Collier County. These similarities in geographic characteristics can provide more relevant insights and best practices tailored to coastal areas. Exogenous factors such as demographics, which are major considerations for the new peer agencies, and operational characteristics such as service delivery modes and vehicle utilization are also critical. Coastal and geographic locations are necessary to consider due to their unique environmental and operational challenges. The exogenous variables for the new peer agencies are relatively low, with an average score of 2.89, indicating closer data values to that of Collier County for these external factors. This is beneficial as it ensures that the newly added peers reflect similar contextual influences, further supporting their relevance. Therefore, despite the higher scores in operational characteristics, the new peer agencies remain a relevant and useful selection for the TDP update.

Table 3-2: Average of Likeness Score Sums by Peer Group

Peer Group	Average for Operating Characteristics	Average for Exogenous Variables	Average for All Indicating Factors
Previous TDP Peers	2.45	3.67	6.99
New Peers Considered	2.87	2.89	5.75

Stage 2 Secondary Screening

A secondary screening of the potential peer group is recommended to fully account for all potential factors and allow for the most comparable peers to be chosen. Two new variables were introduced to the 16 peers: service area type and fare revenue. These secondary factors provide a more nuanced and comprehensive evaluation of transit performance, ensuring that peers are truly comparable in all relevant aspects to CAT.

Service area type significantly impacts performance and influences demand patterns and requirements. Of the eight service area types based on the FDOT TDP Handbook, six were characterized for the 16 peers and are as follows:

- Type 2: Agency provides service to multiple urban areas (may also include non-urban areas) and is the primary service provider within at least one urban area's central city.
- Type 3: Only agency operating within an urban area and has no non-urban service.
- Type 4: Agency is the primary service provider in the urban area's central city, where other agencies also provide service to portions of the urban area. Urban areas with multiple central cities (e.g., Tampa–St. Petersburg) may have more than one type 4 agency.
- Type 5: Agency provides service into an urban area's central city, but its primary service area does not include a central city.
- Type 6: Agency provides service within an urban area but does not provide service to a central city.
- Type 7: Only agency operating in an urban area and providing non-urban service.

Fare revenue values were evaluated to determine revenue generation, service affordability and accessibility, and subsidy requirements. Comparing agencies with similar fare revenue structures highlights effective fare policies and strategies, ensuring that transit services remain financially sustainable and accessible to the public.

By incorporating service area type and fare revenue as secondary screening factors, the analysis ensures a fair and comprehensive comparison with the primary agency, CAT. This approach helps compare the primary review of the operational characteristic and exogenous variables and identify truly comparable peers and provides a deeper understanding of the factors influencing transit performance, ultimately supporting more informed decision-making for CAT.

Final Peer Group Selection

An initial set of 16 potential peer agencies was identified for CAT (see Table 1-1). From this group, poor comparing peers were filtered out based on the overall likeness scores from the primary review, supplemented by additional likeness scores from the secondary review. In essence, peers with many high scoring factors or higher overall likeness scores were removed as it meant they have less similarity to CAT. 11 peers with the lowest scores in the primary review were selected as the CAT peer group. As shown in the likeness score tables attached at the end of the memo, the potential peers all do fairly well as the majority of the individual factors score well (below 0.5). The exogenous factors appear to compare more poorly in contrast to the operating factors, as there are more satisfactory and mediocre scores. There are very few poor-scoring factory-agency pairs; ART and GTA with poor scores for the percent service demand

response factor, and The M and The Wave Transit System have poor scores for the population growth rate factor. As such, these agencies were removed from the final peer group.

The last data table attached at the end of the memo shows averages and sums of the likeness scores grouped by operational, exogenous, and all factors, as well as by peer group. The likeness scores in each column are formatted in order from the lowest and best scores to the highest and worst scores in a green to red color scale. This table depicts which agencies score better across all factors. Most of the peer agencies from the previous TDP scored poorly for exogenous and all factors. The M, TTA, and ART consistently had poor scores across all groups, and were removed from consideration for the final peer group, along with GCT and PCPT.

The secondary review, which accounted for service area type and fare revenue, was necessary but less significant than operational characteristics, from the primary review, in this TDP. Consequently, if the secondary review led to a substantial increase in the peer likeness score, it was disregarded. This decision was based on the fact that only two indicators were used in the secondary review, making them less critical compared to the primary review.

Subsequently, upon conducting the secondary review, one peer agency was found to have incomplete NTD data. The 2022 NTD data for GoLine was missing the fare revenue information, which is one of the two indicators used in the secondary review. As such, this agency was also eliminated from the final peer group.

The following table lists the final 10 selected peers, their likeness score, and their selection reasoning.

Table 3-3: Average of Likeness Score Sums by Peer Group.

Peer Agency	Likeness Score	Reasoning for Top 10 Selection
Breeze Transit (Sarasota County Area Transit), Sarasota, FL	6.98	Likeness score and location of the peer is desirable.
LeeTran (Lee County Transit), Fort Myers, FL	7.80	Likeness score from the primary review was substantially lower and location of the peer is desirable.
Bayway (Bay County Transportation), Pensacola, FL	6.03	Likeness score and location of the peer is desirable.
ECAT (Escambia County Area Transit Authority), Pensacola, FL	6.05	Likeness score
CCRTA (Cape Cod Regional Transit Authority), Hyannis, MA	6.30	Likeness score
CARTA (Charleston Area Regional Transportation Authority), North Charleston, SC	6.06	Likeness score
Citrus Connection (Lakeland Area Mass Transit District), Lakeland, FL	5.68	Likeness score and location of the peer is desirable.
The Wave (Cape Fear Public Transportation Authority), Wilmington, NC	5.49	Likeness score
The Wave Transit System, City of Mobile, AL	6.81	Likeness score
PCPT (Pasco County Public Transportation), New Port Richey, FL	6.35	Likeness score

It is important to note that three of the selected peers were peers from the previous TDP: The Wave Transit System, PCPT, and The Wave, while the remaining peers are new.

Characteristics of Peer Systems

The following are brief descriptions of the transit agencies in the final new peer group for comparative purposes. The peer and trend analysis were conducted with this set of peers. The data values in the agency profiles were all obtained from NTD 2022 data. The total operating cost values included in these agency profiles are the original cost values from NTD and are not adjusted for labor cost differences. The recalculated operating costs used for likeness scoring can be found in Appendix A. The service type information in the profiles was gathered from each transit agency's respective website.

Baseline Transit Agency: CAT (Collier Area Transit), Naples, FL
Services provided: Fixed-route bus and paratransit services
Service area population (2022): 384,902 people
Service area population density (2022): 172 persons per square mile
Annual revenue hours (2022): 124,701 hours
Annual ridership (2022): 746,338 unlinked trips
Operating costs (2022): $12,194,270
Fleet (2022): 53 vehicles at maximum service

Peer Transit Agency: Breeze Transit (Sarasota County Area Transit), Sarasota, FL
Services provided: Fixed-route bus, trolley, on-demand rideshare, and paratransit services
Service area population (2022): 517,423 people
Service area population density (2022): 848 persons per square mile
Annual revenue hours (2022): 304,917 hours
Annual ridership (2022): 2,080,349 unlinked trips
Operating costs (2022): $27,790,551
Fleet (2022): 107 vehicles at maximum service

Peer Transit Agency: LeeTran (Lee County Transit), Fort Myers, FL

Services provided: Fixed-route bus, trolley, ADA paratransit, and transportation disadvantaged services, as well as an employer vanpool program

Service area population (2022): 802,178 people

Service area population density (2022): 978 persons per square mile

Annual revenue hours (2022): 303,204 hours

Annual ridership (2022): 2,231,974 unlinked trips

Operating costs (2022): $28,031,267

Fleet (2022): 91 vehicles at maximum service

Peer Transit Agency: Bayway (Bay County Transportation), Pensacola, FL

Services provided: Fixed-route bus, rideshare, and on-demand services

Service area population (2022): 179,168 people

Service area population density (2022): 236 persons per square mile

Annual revenue hours (2022): 55,418 hours

Annual ridership (2022): 349,281 unlinked trips

Operating costs (2022): $5,098,436

Fleet (2022): 26 vehicles at maximum service

Peer Transit Agency: ECAT (Escambia County Area Transit Authority), Pensacola, FL

Services provided: Fixed-route bus, seasonal trolley, and ADA paratransit services

Service area population (2022): 241,661 people

Service area population density (2022): 1,280 persons per square mile

Annual revenue hours (2022): 156,107 hours

Annual ridership (2022): 842,731 unlinked trips

Operating costs (2022): $13,589,817

Fleet (2022): 86 vehicles at maximum service

Peer Transit Agency: CCRTA (Cape Cod Regional Transit Authority), Hyannis, MA

Services provided: Fixed-route bus, on-demand, ride-hail, seasonal train, reservable medical transportation, and ADA paratransit services

Service area population (2022): 228,996 people

Service area population density (2022): 582 persons per square mile

Annual revenue hours (2022): 178,475 hours

Annual ridership (2022): 605,951 unlinked trips

Operating costs (2022): $17,215,743

Fleet (2022): 133 vehicles at maximum service

Peer Transit Agency: CARTA (Charleston Area Regional Transportation Authority), North Charleston, SC

Services provided: Fixed-route bus, fixed-route shuttle, seasonal shuttle, on-demand, and ADA paratransit services

Service area population (2022): 356,082 people

Service area population density (2022): 2,580 persons per square mile

Annual revenue hours (2022): 230,727 hours

Annual ridership (2022): 2,212,089 unlinked trips

Operating costs (2022): $22,952,085

Fleet (2022): 77 vehicles at maximum service

Peer Transit Agency: Citrus Connection (Lakeland Area Mass Transit District), Lakeland, FL

Services provided: Fixed-route bus, ADA paratransit, and transportation disadvantaged Medicare transportation services

Service area population (2022): 724,777 people

Service area population density (2022): 9,413 persons per square mile

Annual revenue hours (2022): 157,376 hours

Annual ridership (2022): 693,018 unlinked trips

Operating costs (2022): $21,434,610

Fleet (2022): 71 vehicles at maximum service

Peer Transit Agency: The Wave (Cape Fear Public Transportation Authority), Wilmington, NC
Services provided: Fixed-route bus service and mobility assistance program
Service area population (2022): 230,310 people
Service area population density (2022): 1,152 persons per square mile
Annual revenue hours (2022): 102,655 hours
Annual ridership (2022): 710,993 unlinked trips
Operating costs (2022): $8,592,522
Fleet (2022): 43 vehicles at maximum service

Peer Transit Agency: The Wave Transit System, City of Mobile, AL
Services provided: Fixed-route bus service and mobility assistance program
Service area population (2022): 203,900 people
Service area population density (2022): 1,488 persons per square mile
Annual revenue hours (2022): 114,952 hours
Annual ridership (2022): 495,899 unlinked trips
Operating costs (2022): $10,804,979
Fleet (2022): 37 vehicles at maximum service

Peer Transit Agency: PCPT (Pasco County Public Transportation), New Port Richey, FL
Services provided: Fixed-route bus and ADA paratransit services
Service area population (2022): 584,067 people
Service area population density (2022): 782 persons per square mile
Annual revenue hours (2022): 110,773 hours
Annual ridership (2022): 601,717 unlinked trips
Operating costs (2022): $10,599,068
Fleet (2022): 42 vehicles at maximum service

Primary Review Data Values for All Factors and Potential Peers

Indicating Factor Values for Operating Characteristics										
Agency Name	Location	Peer Group	Vehicles Operated in Maximum Service	Annual Passenger Miles Traveled	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours	Number of Revenue Vehicles	Total Revenue Miles Operated	Total Operating Expenses	Percent Service Demand Response
CAT (Collier Area Transit)	**Naples, FL**	**Target**	53	6,128,249	2,371,843	124,701	73	$ 2,371,843	$ 12,194,270	58%
The M (Montgomery Area Transit)	City of Montgomery, AL	Previous TDP	25	1,567,963	1,382,282	86,390	28	$ 1,382,282	$ 9,987,208	24%
TTA (Tri-State Transit Authority)	Huntington, WV	Previous TDP	33	3,874,462	1,183,447	70,293	55	$ 1,183,447	$ 6,625,367	30%
The Wave Transit System	City of Mobile, AL	Previous TDP	37	3,380,866	1,605,194	114,952	55	$ 1,605,194	$ 10,804,979	46%
ART (Asheville Redefines Transit)	City of Asheville, NC	Previous TDP	19	4,039,338	1,287,477	100,062	33	$ 1,287,477	$ 10,550,615	0%
GCT (Gwinnett County Transit)	Lawrencevill, GA	Previous TDP	54	10,719,532	2,388,912	134,989	92	$ 2,388,912	$ 22,947,660	9%
PCPT (Pasco County Public Transportation)	New Port Richey, FL	Previous TDP	42	3,564,565	1,852,338	110,773	63	$ 1,852,338	$ 10,599,068	40%
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	Previous TDP	43	2,108,293	1,505,790	102,655	65	$ 1,505,790	$ 8,592,522	44%
Sarasota Breeze (Sarasota County Area Transit)	Sarasota, FL	New	107	10,819,212	4,551,933	304,917	150	$ 4,551,933	$ 27,790,551	69%
LeeTran (Lee County Transit)	Fort Myers, FL	New	91	12,768,415	4,756,395	303,204	141	$ 4,756,395	$ 28,031,267	51%
Bayway (Bay County Transportation)	Pensacola, FL	New	26	2,396,995	752,218	55,418	40	$ 2,202,931	$ 13,589,817	48%
GoLine (Indian River County)	Vero Beach, FL	New	27	5,765,570	1,210,921	71,197	37	$ 1,210,921	$ 5,402,008	48%
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	New	71	4,147,701	2,372,575	157,376	94	$ 2,372,575	$ 21,434,610	42%
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	New	77	11,394,692	3,152,002	230,727	134	$ 3,152,002	$ 22,952,085	26%
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	New	86	4,610,071	2,202,931	156,107	90	$ 2,202,931	$ 13,589,817	48%
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	New	133	7,170,207	2,826,345	178,475	192	$ 2,826,345	$ 17,215,743	59%
GTA (Greensboro Transit Authority)	City of Greensboro, NC	New	76	9,159,005	3,695,161	257,346	104	$ 3,695,161	$ 27,555,354	0%

Indicating Factor Values for Exogenous Variables								
Agency Name	Location	Peer Group	Service Area	Urban Area Population	Population Density	Population Growth Rate	Service area population	Service area density
CAT (Collier Area Transit)	**Naples, FL**	**Target**	2,025	449,527	1,850	5.60%	348,902	172
The M (Montgomery Area Transit)	City of Montgomery, AL	Previous TDP	135	251,158	1,731	-1.25%	205,764	1,524
TTA (Tri-State Transit Authority)	Huntington, WV	Previous TDP	92	202,754	1,573	1.30%	144,339	1,569
The Wave Transit System	City of Mobile, AL	Previous TDP	137	320,855	1,453	-0.33%	203,900	1,488
ART (Asheville Redefines Transit)	City of Asheville, NC	Previous TDP	45	294,013	1,183	2.88%	93,350	2,074
GCT (Gwinnett County Transit)	Lawrencevill, GA	Previous TDP	143	5,180,179	2,029	1.57%	702,116	4,910
PCPT (Pasco County Public Transportation)	New Port Richey, FL	Previous TDP	747	2,861,173	2,953	2.81%	584,067	782
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	Previous TDP	200	268,625	1,888	5.21%	230,310	1,152
Sarasota Breeze (Sarasota County Area Transit)	Sarasota, FL	New	610	825,572	2,042	5.97%	517,423	848
LeeTran (Lee County Transit)	Fort Myers, FL	New	820	654,405	1,972	9.21%	802,178	978
Bayway (Bay County Transportation)	Pensacola, FL	New	758	398,813	1,519	2.21%	179,168	236
GoLine (Indian River County)	Vero Beach, FL	New	217	186,637	1,759	7.01%	163,662	754
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	New	77	280,346	1,921	0.87%	724,777	9,413
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	New	138	706,884	2,085	3.23%	356,082	2,580
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	New	189	398,813	1,519	2.21%	241,661	1,280
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	New	394	313,064	917	3.23%	228,996	582
GTA (Greensboro Transit Authority)	City of Greensboro, NC	New	136	338,928	2,050	2.42%	297,878	2,190

Primary Review Likeness Scores for All Factors and Potential Peers

Likeness Score for Operating Characteristics												
Agency Name	Location	Peer Group	Vehicles Operated in Maximum Service	Annual Passenger Miles Traveled	Annual Vehicle Revenue Miles	Annual Vehicle Revenue Hours	Number of Revenue Vehicles	Total Revenue Miles Operated	Total Operating Expenses	Percent Service Demand Response	Average Operational Likeness Score	Total Operational Likeness Score
CAT (Collier Area Transit)	**Naples, FL**	**Target**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
The M (Montgomery Area Transit)	City of Montgomery, AL	Previous TDP	0.53	0.74	0.42	0.86	0.62	0.42	0.11	0.59	0.53	2.59
TTA (Tri-State Transit Authority)	Huntington, WV	Previous TDP	0.38	0.37	0.50	0.82	0.25	0.50	0.37	0.48	0.46	2.93
The Wave Transit System	City of Mobile, AL	Previous TDP	0.30	0.45	0.32	0.89	0.25	0.32	0.05	0.21	0.35	2.04
ART (Asheville Redefines Transit)	City of Asheville, NC	Previous TDP	0.64	0.34	0.46	0.88	0.55	0.46	0.13	1.00	0.56	3.47
GCT (Gwinnett County Transit)	Lawrencevill, GA	Previous TDP	0.02	0.43	0.01	0.91	0.21	0.01	0.47	0.85	0.36	2.44
PCPT (Pasco County Public Transportation)	New Port Richey, FL	Previous TDP	0.21	0.42	0.22	0.89	0.14	0.22	0.01	0.31	0.30	1.78
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	Previous TDP	0.19	0.66	0.37	0.88	0.11	0.37	0.28	0.24	0.39	1.87
Sarasota Breeze (Sarasota County Area Transit)	Sarasota, FL	New	0.50	0.43	0.48	0.59	0.51	0.48	0.57	0.16	0.47	3.72
LeeTran (Lee County Transit)	Fort Myers, FL	New	0.42	0.52	0.50	0.59	0.48	0.50	0.60	0.12	0.47	3.73
Bayway (Bay County Transportation)	Pensacola, FL	New	0.51	0.61	0.68	0.56	0.45	0.07	0.11	0.17	0.39	3.16
GoLine (Indian River County)	Vero Beach, FL	New	0.49	0.06	0.49	0.43	0.49	0.49	0.56	0.17	0.40	3.18
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	New	0.25	0.32	0.00	0.21	0.22	0.00	0.50	0.28	0.22	1.78
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	New	0.31	0.46	0.25	0.46	0.46	0.25	0.47	0.55	0.40	3.21
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	New	0.38	0.25	0.07	0.20	0.19	0.07	0.17	0.17	0.19	1.50
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	New	0.60	0.15	0.16	0.30	0.62	0.16	0.30	0.02	0.29	2.30
GTA (Greensboro Transit Authority)	City of Greensboro, NC	New	0.30	0.33	0.36	0.52	0.30	0.36	0.06	1.00	0.40	3.22

Likeness Score for Exogenous Variables

Agency Name	Location	Peer Group	Service Area	Urban Area Population	Population Density	Population Growth Rate	Service area population	Service area density	Average Exogenous Likeness Score	Total Exogenous Likeness Score
CAT (Collier Area Transit)	**Naples, FL**	**Target**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
The M (Montgomery Area Transit)	City of Montgomery, AL	Previous TDP	0.93	0.44	0.06	1.22	0.41	0.89	0.66	3.96
TTA (Tri-State Transit Authority)	Huntington, WV	Previous TDP	0.95	0.55	0.15	0.77	0.59	0.89	0.65	3.90
The Wave Transit System	City of Mobile, AL	Previous TDP	0.93	0.29	0.21	1.06	0.42	0.88	0.63	3.79
ART (Asheville Redefines Transit)	City of Asheville, NC	Previous TDP	0.98	0.35	0.36	0.49	0.73	0.92	0.64	3.82
GCT (Gwinnett County Transit)	Lawrencevill, GA	Previous TDP	0.93	0.91	0.09	0.72	0.50	0.96	0.69	4.12
PCPT (Pasco County Public Transportation)	New Port Richey, FL	Previous TDP	0.63	0.84	0.37	0.50	0.40	0.78	0.59	3.53
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	Previous TDP	0.90	0.40	0.02	0.07	0.34	0.85	0.43	2.58
Sarasota Breeze (Sarasota County Area Transit)	Sarasota, FL	New	0.70	0.46	0.09	0.06	0.33	0.80	0.41	2.43
LeeTran (Lee County Transit)	Fort Myers, FL	New	0.60	0.31	0.06	0.39	0.56	0.82	0.46	2.75
Bayway (Bay County Transportation)	Pensacola, FL	New	0.63	0.11	0.18	0.61	0.49	0.27	0.38	2.28
GoLine (Indian River County)	Vero Beach, FL	New	0.89	0.58	0.05	0.21	0.53	0.77	0.51	3.04
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	New	0.96	0.38	0.04	0.85	0.52	0.98	0.62	3.72
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	New	0.93	0.36	0.11	0.42	0.02	0.93	0.46	2.79
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	New	0.91	0.11	0.18	0.61	0.31	0.87	0.50	2.98
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	New	0.81	0.30	0.50	0.42	0.34	0.70	0.51	3.09
GTA (Greensboro Transit Authority)	City of Greensboro, NC	New	0.93	0.25	0.10	0.57	0.15	0.92	0.48	2.91

Agency Name	Location	Peer Group	Average Operational Likeness Score	Sum of Operational Likeness Scores	Average of Operational Sum by Peer Group	Average Exogenous Likeness Score	Sum of Exogenous Likeness Scores	Average of Exogenous Sum by Peer Group	Average Likeness Score for All Factors	Total Sum of Likeness Score for All Factors	Average of Total Sum by Peer Group
CAT (Collier Area Transit)	**Naples, FL**	**Target**	0	0	0	0	0	0	0	0	0
The M (Montgomery Area Transit)	City of Montgomery, AL	Previous TDP	0.53	2.59		0.66	3.96		0.59	8.24	
TTA (Tri-State Transit Authority)	Huntington, WV	Previous TDP	0.46	2.93		0.65	3.90		0.54	7.57	
The Wave Transit System	City of Mobile, AL	Previous TDP	0.35	2.04		0.63	3.79		0.47	6.59	
ART (Asheville Redefines Transit)	City of Asheville, NC	Previous TDP	0.56	3.47	2.45	0.64	3.82	3.67	0.59	8.27	7.04
GCT (Gwinnett County Transit)	Lawrencevill, GA	Previous TDP	0.36	2.44		0.69	4.12		0.50	7.01	
PCPT (Pasco County Public Transportation)	New Port Richey, FL	Previous TDP	0.30	1.78		0.59	3.53		0.42	5.94	
The Wave (Cape Fear Public Transportation Authority)	Wilmington, NC	Previous TDP	0.39	1.87		0.43	2.58		0.40	5.67	
Sarasota Breeze (Sarasota County Area Transit)	Sarasota, FL	New	0.47	3.72		0.41	2.43		0.44	6.16	
LeeTran (Lee County Transit)	Fort Myers, FL	New	0.47	3.73		0.46	2.75		0.46	6.48	
Bayway (Bay County Transportation)	Pensacola, FL	New	0.39	3.16		0.38	2.28		0.39	5.44	
GoLine (Indian River County)	Vero Beach, FL	New	0.40	3.18		0.51	3.04		0.44	6.22	
Citrus Connection (Lakeland Area Mass Transit District)	Lakeland, FL	New	0.22	1.78	2.87	0.62	3.72	2.89	0.39	5.51	5.75
CARTA (Charleston Area Regional Transportation Authority)	North Charleston, SC	New	0.40	3.21		0.46	2.79		0.43	5.99	
ECAT (Escambia County Area Transit Authority)	Pensacola, FL	New	0.19	1.50		0.50	2.98		0.32	4.48	
CCRTA (Cape Cod Regional Transit Authority)	Hyannis, MA	New	0.29	2.30		0.51	3.09		0.38	5.39	
GTA (Greensboro Transit Authority)	City of Greensboro, NC	New	0.40	3.22		0.48	2.91		0.44	6.13	

EXECUTIVE SUMMARY
Reports and Presentations
Item 6b
Zero Emissions Transition Plan Update

Objective:

To provide an update on the Zero Emissions Transition Plan.

Considerations:

CAT Staff, the Collier Metropolitan Planning Organization (MPO), and consulting firm Benesch have recently begun the process to develop a Zero-Emissions Transition Plan. The Zero-Emissions Transition Plan is a strategic initiative by CAT looking to transition our existing fleet of diesel busses, into a mixed fleet including zero or low-emissions alternatives. This plan is critical to have in place before applying for grants related to zero or low-emissions purchases.

Through this plan, we aim to assess the financial, operational, and infrastructural changes needed to adopt these technologies into our fleet. The goal is to provide a path forward to include these vehicles into our everyday fleet in a cost-effective and operationally efficient manner.

Recommendation:

None

Attachments:

1. State of ZEV Draft

Prepared by: _____ Date: 12/13/24
Alexander Showalter, Planner II

Approved by: _____ Date: 12/13/2024
Brian Wells, PTNE Division Director

1 INTRODUCTION

The transit industry is shifting from traditional diesel vehicles to various alternative fuel technologies due to a combination of increasing environmental awareness, availability and advancement of alternative fuel technologies, and federal incentives (i.e., grant funding). Collier Area Transit, operating as CAT, is exploring options related to replacing its fleet with alternative fuel vehicles.

In 2021, the Federal Transit Administration (FTA) announced that no-emission projects seeking funding under the Grants for Buses and Bus Facilities Competitive Program (49 U.S.C. § 5339(b)) and the Low- or No-Emission Program (49 U.S.C. § 5339(c)) must have a Zero-Emission Transition Plan (ZETP). This report substantially meets this requirement in support of future FTA grant funding requests made by Collier County.

A ZETP must meet the following six requirements:

- Element 1 | Demonstrate a long-term fleet management plan with a strategy for how the applicant intends to use the current request for resources and future acquisitions.
- Element 2 | Address the availability of current and future resources to meet costs for the transition and implementation.
- Element 3 | Consider policy and legislation impacting relevant technologies.
- Element 4 | Include an evaluation of existing and future facilities and their relationship to the technology transition.
- Element 5 | Describe the partnership of the applicant with the utility or alternative fuel provider.
- Element 6 | Examine the impact of the transition on the applicant's current workforce by identifying skill gaps, training needs, and retraining needs of the existing workers of the applicant to operate and maintain zero-emission vehicles and related infrastructure and avoid displacement of the existing workforce.

The purpose of this report is to develop a ZETP based on a selection of alternative fuel technologies identified in the following chapters and to meet the requirements of the FTA for competitive grants through the Low- or No-Emission Grant program. CAT has determined that a balanced mix of technologies will be the goal of its transition plan, the details of which are documented in this ZETP. Nearly _____% of the current diesel vehicle fleet will transition to low-emission or zero-emission vehicles within the next 12 years. The agency finds it appropriate that _____% of its fleet remain composed of diesel vehicles as these vehicles would be critical to support mobility during power outages, especially after natural disasters such as hurricanes, which are common in the region.

2 STATE OF ZERO EMISSION VEHICLES

The State of Zero Emission Vehicles (ZEVs) chapter explores various technology options to determine which technology or technologies are most appropriate for the agency to consider moving forward. This chapter documents the benefits and drawbacks of popular alternative fuel technologies and how they compare to diesel vehicles.

2.1 Recent Trends in Alternative Fuel Technologies

There are two broad categories of alternative fuel technologies: low-emission and zero-emission. Low-emission technologies refer to any alternative technology or alternative fuel that emit lower amounts of harmful tailpipe emissions than diesel. Zero-emission (also known as no-emission) technologies do not rely on fossil fuels for operation and have zero (or nearly zero) harmful tailpipe emissions. Generally, these designations only account for the emissions produced during the usable lifecycle of vehicles and not the emissions produced during the production, disposal of the vehicles, or the production of the fuel source. **Table 2-1** lists the selection of alternative fuel technologies discussed in this report by their respective emission category.

TABLE 2-1 CATEGORIZATION OF MAJOR ALTERNATIVE FUEL TECHNOLOGIES

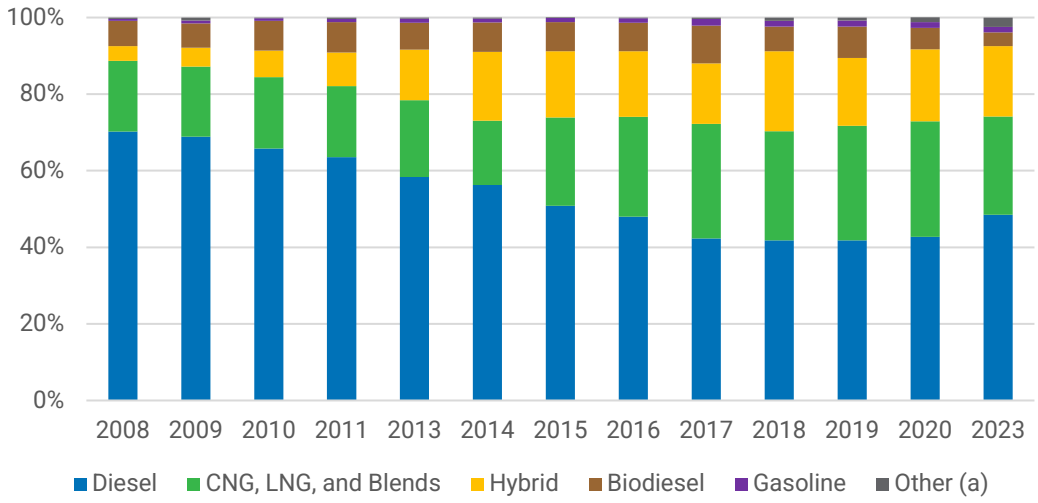
Low-Emission Technologies	Zero-Emission Technologies
• Biodiesel • Compressed natural gas (CNG) • Diesel and battery electric (hybrid) • Gasoline • Liquified natural gas (LNG) • Propane	• Battery electric • Hydrogen fuel cell electric (FCE)

Note: While the term "hybrid technology" can refer to a myriad of combinations of fuels, for the purposes of this report, hybrid refers solely to a combination of diesel and battery electric technologies.

There are multiple fuel alternatives to diesel, and each has evolved at a different pace. The American Public Transportation Association (APTA) maintains a database of more than 450 transit agencies across the United States. The database has helped track various trends in public transportation including fleet fuel mix. **Figure 2-1** shows the changes in fuel mix for buses (excluding commuter bus) between 2008 and 2023. It should be noted that transit agencies voluntarily provide data to APTA and may not update it every year; therefore, data is only as accurate as the agencies reporting.

On average, diesel buses dropped by 1.5 percent annually between 2008 and 2023, beginning with a market share of 70 percent to a current share of 49 percent. The largest diesel decrease occurred between 2011 and 2018. Biodiesel adoption has wavered, with popularity in the past decade peaking at 9.9 percent in 2017 compared to the most recent figure of 3.6 percent.

FIGURE 2-1: BUS VEHICLE POWER SOURCES



Source: APTA Public Transportation Vehicle Database Appendix A (2023)
(a) Includes battery-electric, hydrogen, and propane powered buses
Note: Data for 2012 is not available.

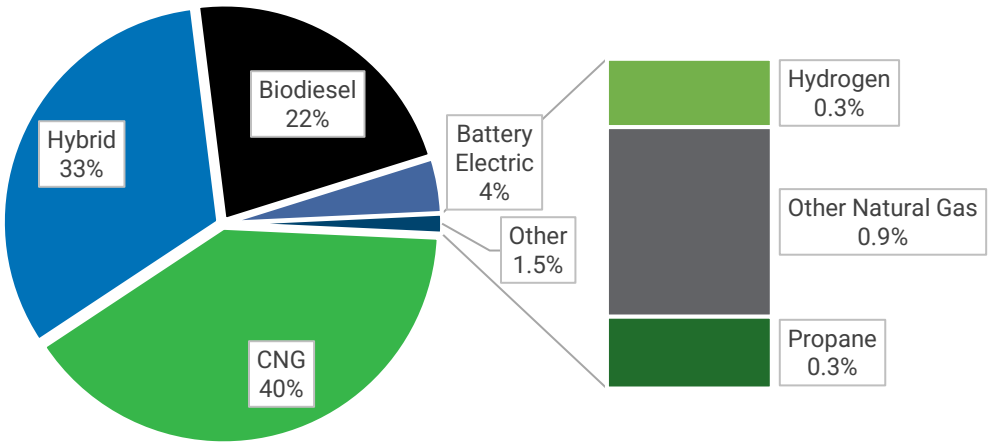
The first alternative fuel technology to gain prominence among transit fleets was compressed natural gas, which increased from 3 percent of transit vehicles to 13 percent between 1996 and 2005. A greater increase in CNG vehicles can be observed between 2015 and 2019, growing about 7 percent annually to an overall 30 percent share in fuel mix, making it the most employed alternative fuel on the market.

Hybrid vehicles (i.e., diesel and battery electric) have had a slow market penetration, with the first models introduced in the late 1990s. However, hybrid vehicles quickly gained traction between 2008 and 2014, growing from an overall fuel mix share of 3.8 percent to 17.9 percent. In 2023, the overall fuel mix share of hybrid vehicles was 18.3 percent.

Other alternative fuel technologies have made marginal market penetration, only recently surpassing 2% of overall fuel mix in 2023. The other alternatives category includes battery-electric, hydrogen, and propane. Propane as a fuel alternative is often used for smaller buses while gasoline is relatively unpopular due to its fuel compression properties and its lack of emission benefits over diesel. The adoption rates of these and other fuel alternative technologies have been impacted either by their level of maturity, cost, or reliability.

Figure 2-2 shows the current share that each alternative fuel technology has achieved among bus fleets in the U.S. in 2024. The most popular alternative fuel technology is CNG. Approximately 40 percent of the alternative fuel fleet is composed of CNG buses, followed by hybrid buses at 33 percent. Zero-emission buses make up close to 4 percent of all bus fleets, with 3 percent battery electric buses and less than 1 percent being hydrogen buses. Around 22 percent of buses use biodiesel and a combined 1.5 percent use some other fuel alternative such as propane, hydrogen, or another natural gas combination.

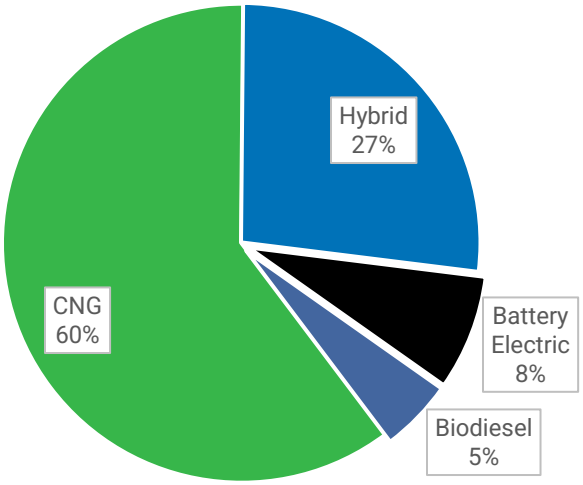
FIGURE 2-2: MIX OF ALTERNATIVE FUELS FOR US BUSES (2024)



Source: APTA Public Transportation Vehicle Database (2024)
Other Natural Gas includes compressed natural gas & diesel, compressed natural gas & gasoline, liquified natural gas propane & diesel, propane & gasoline, propane & compressed natural gas, liquified natural gas & diesel

Similar to the national trend, transit agencies in Florida are increasing their adoption of alternative fuel technologies. **Figure 2-3** shows the alternative fuel mix across buses in Florida in 2024. Among the various fuel alternative fuel technologies, CNG buses are the most common, followed by hybrid buses and battery electric buses.

FIGURE 2-3: MIX OF ALTERNATIVE FUELS FOR FLORIDA BUSES (2024)



Source: APTA Public Transportation Vehicle Database (2024)

The continued transition away from diesel fuel is expected to accelerate in the coming decade due to state and federal initiatives incentivizing conversion. Zero-emission fuels remain challenging to adopt, although their current fuel mix share continues to grow slowly. It is expected that these technologies will gain greater traction in the coming decades as their respective technologies mature.

Due to their low adoption rates, lack of readily available data and/or relatively small reductions in emissions, gasoline, propane, and LNG will not be explored further in this report. **Section 2.2** provides

greater detail on five alternative fuel technologies: hybrid diesel-electric, CNG, biodiesel, battery electric and hydrogen FCE. Hybrid, CNG and biodiesel fuel technologies are widely used by transit agencies in Florida. Battery electric and hydrogen FCE vehicles have not been adopted very broadly; however, they are projected to become more popular and are becoming more affordable.

2.2 Alternative Fuel Technology Profiles

This section provides detailed profiles for each fuel type. Profiles include data related to the current state of the technology, a basic understanding of the fuel type, performance and reliability, and an evaluation of their impact on infrastructure and operations. Diesel is included below for comparison purposes. The various fuel alternative technologies are presented by category, starting with the low-emission category, and ending with the zero-emission category.

2.2.1 Technology Profiles

2.2.1.1 Diesel

Diesel engines have been used for propulsion since the early 20th century. The maturity and reliability of this fuel has made it the primary choice for bus fleet propulsion over the last century. Fuel consumption increased in the later 20th century as modern features were introduced in bus models such as air conditioning, heating, wheelchair lifts and other features that required more engine horsepower. In recent decades, federal regulations and technological advancements have reduced the impact of the fuel's emissions. Current improvements in diesel technology are focused on increased fuel efficiency and a reduction in emissions.

The latest changes in U.S. diesel engine standards. occurred between 2007 and 2010, when the Environmental Protection Agency (EPA) aimed for the reduction of diesel emissions in a twofold approach. First, it required the reduction of sulfur content in diesel fuel by 97 percent. Second, it required vehicle exhaust emission controls like particulate filters and exhaust recirculation that reduce nitrogen oxide (NOx) and particulate matter (PM) emissions. The latter approach required improvements in engine design, leading to higher vehicle costs, and added parts for bus repair.

In March 2022, the EPA proposed rules to further reduce air pollution by lowering the emissions of NOx and PM from diesel engines to be introduced in diesel vehicles by model year 2027. Finally, the EPA suggests that for diesel vehicles in 2027, useful life periods and mileages be extended to reflect real-world usage, to extend the emissions durability requirement for heavy-duty engines and to ensure certified emission performance is maintained throughout more of an engine's operational life. These measures will likely impact bus operators by lengthening vehicle life spans, challenging current replacement schedules, increasing maintenance periods, and raising costs due to additional parts for emission control maintenance.

Breeze Diesel Fueling Station
Source: Benesch

2.2.1.2 Biodiesel

Biodiesel, not to be confused with renewable or green diesel, is a low-emission diesel alternative produced through transesterification, where biodegradable elements such as feedstock or restaurant grease react to alcohol in the presence of a catalyst such as lye. The resulting biodiesel is referred to as B100, an acronym that indicates the percentage of biodiesel present. Pure B100 usage is uncommon; usually, biodiesel is blended with regular diesel to reduce the diesel content in favor of a more biodegradable alternative. Popular biodiesel blends currently available include five percent, 10 percent, and 20 percent forms known as B05, B10, and B20.

Source: National Renewable Energy Laboratory. www.nrel.gov

B20 is the more broadly available and used blend today, higher grades are expected to become more common. Biodiesel functions similarly to diesel in compression-ignition engines. While current diesel buses can use certain biodiesel blends, higher blends may require engine upgrades, as pure biodiesel can degrade rubber parts, affecting hoses and gaskets, and causing potential leaks. Biodiesel's lower oxidative stability can also lead to degradation with metals like copper, lead, tin, or zinc, creating sediment that may clog filters.

A cetane number (CN) is assigned to diesel and biodiesel fuels as a measure for identifying fuel ignition delay and related engine performance. Biodiesel fuels generally have a higher CN value than diesel and are considered a lower performing alternative which produces less energy. Biodiesel contains about 8 percent less energy per gallon than diesel. Nonetheless, fuel emissions are notably lower when using biodiesel blends and engines using them are notably cleaner because of a reduced amount of particulate matter compared to diesel.

In freezing temperatures, biodiesel may congeal due to grease-based components, however this is not a concern in Florida's subtropical climate.

Biodiesel blends below B20 are widely available and distributed and require no new infrastructure. The main considerations for any biodiesel fuel blend include specifying which biodiesel feedstock to use given the identified performance and maintenance concerns.

2.2.1.3 Compressed Natural Gas

CNG buses use natural gas as a low-emission fuel for internal combustion, similar to diesel buses but with key differences in fuel type. First, because natural gas is in a gaseous state, it must be compressed for optimal use. CNG is considered one the most mature and well-established fuels available to transit agencies, but its gaseous state has limitations.

CNG contains less energy than diesel, and its high-pressure cylinders connect to the engine via a fuel line with multiple valves and regulators. CNG engines require different mechanical parts than diesel, expanding the parts inventory and requiring specialized staff training.

CNG is considered a low-emission fuel alternative as its main emission is limited to NOx. This fuel alternative is flammable and, because it is an odorless and colorless gas, an additive provides a

distinct odor to help detect leaks. Garages supporting CNG vehicles require an extensive evaluation to adhere to guidance from the National Fire Protection Association (NFPA). Additionally, maintenance facilities where CNG is stored or CNG vehicles are repaired require increased ventilation and gas detection systems that can detect and control gas leaks. While CNG may require additional safety infrastructure, issues related to gas leaks are rare.

CNG fueling can occur off site or on site. CNG fueling is a time-consuming process. If a fleet is larger, CNG is ideally produced or pumped on site as it increases operational efficiency. The availability of CNG is contingent upon the local natural gas utility provider. Collier County may coordinate with the Florida Power and Light (FPL) subsidiary, FPL Energy Services (FPLES), for natural gas services. Alternatively, private companies such as Trillium or Nopetro can provide CNG to transit agencies. On-site CNG infrastructure involves substantial investment, including a gas dryer, compressor, and storage system, with costs ranging from $500,000 to $2 million depending on size and application[1].

2.2.1.4 Hybrid

Hybrid, specifically diesel-electric hybrid, buses are low-emission vehicles that combine an electric motor with an internal combustion engine. While hybrid buses have an electric component, they operate more like diesel buses than battery-electric buses and don't require external charging, instead using a rechargeable battery alongside traditional mechanical parts.

There are two types of propulsion system configurations in a hybrid bus:

- **Parallel hybrid:** Uses both the electric motor and internal combustion engine, switching between them based on driving conditions. Mostly, the electric motor is used in stop-and-go traffic, while the combustion engine powers the bus at higher speeds, such as on highways.
- **Series hybrid:** Relies solely on the electric motor for propulsion, with power supplied by a battery or a generator driven by an internal combustion engine. This configuration is better suited for stop-and-go conditions.

Concerns have been raised about the impacts related to the mining of lithium, a component required in vehicle batteries. There are two primary concerns: (1) environmental destruction from drilling and mining and (2) water contamination from the refining process. Some environmental advocates contend that the negative impacts created by the mining process may outweigh the environmental benefits achieved by battery powered vehicles.

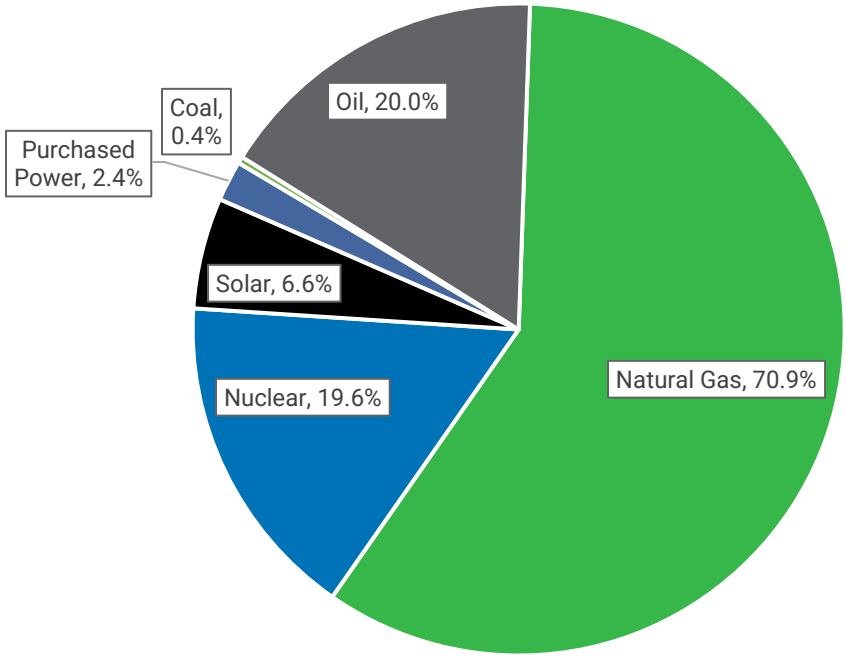
In general, hybrid buses are known for their compromise in emissions and reliability between a diesel and a battery electric bus. Route characteristics and bus configuration may affect the performance of a hybrid bus, which often leads to lower reliability of the vehicle than their diesel and CNG counterparts. Nonetheless, most data shows that hybrids are much more fuel efficient than their diesel counterparts.

[1] Costs Associated With Compressed Natural Gas Vehicle Fueling Infrastructure, US Department of Energy, https://afdc.energy.gov/files/u/publication/cng_infrastructure_costs.pdf

2.2.1.5 Battery Electric

Battery electric buses are a zero-emission technology powered by electricity from rechargeable batteries, which draw energy from the local electric grid. The environmental impact of battery electric buses depends on the fuel mix used by the local utility provider, in this case, FPL. **Figure 2-4** shows the most recent fuel mix reported by FPL, CAT's local electric utility provider.

FIGURE 2-4: FPL ELECTRIC GENERATION FUEL MIX SOURCES (2024)



Source: Florida Power and Light, Energy News (2024)

Battery electric buses are evolving rapidly with every year bringing new, more efficient models, but the technology is far from mature. Battery electric buses draw concern due to multiple factors:

- Limited mileage range per charge
- Battery production and life cycle
- Lengthy charging times
- Variability in electric consumption affected by factors such as load, terrain, and climate

Buses carry large batteries that can be recharged and switched out as needed. These batteries require investments in charging infrastructure, with three main charging systems available

1. **Stand-alone Chargers:** This is the most widely used charging system. Chargers can be placed either at the depot or on the right of way, where buses can park next to the chargers and plug into the adapter.
2. **Pantograph Chargers:** These chargers require overhead wiring and a pantograph, an extension that transfers electricity from the overhead wiring into the electrical unit on the bus.
3. I**nduction Chargers:** These chargers provide electricity to buses via electromagnetic induction where buses park over coils that are placed in the street surface to transfer electricity on board.

Most fleets start with stand-alone chargers, typically charging buses overnight at depots. Pantograph and induction chargers offer in-service boosts at stations with longer dwell times. These chargers may

require facilities in the right of way and are more useful for larger battery electric fleets with high frequencies.

Two forms of charging exist for buses: long-range charging or fast charging. Long-range charging is typically used overnight to charge vehicles for the following day. A full charge may require up to six hours, and the range may still be inadequate for some operational blocks. Overnight charging provides the cost benefit of lower electric rates, thereby keeping fuel costs down.

Source: APTA

Fast charging is generally used in-route to provide a quick recharge of batteries to extend range. To implement fast-charging, in-route facilities require careful coordination to provide enough time to recharge and an understanding that the boost may be minimal compared with energy output. Scheduling for the charging facility is needed to avoid overlap, which can be difficult for low frequency systems using a pulse schedule. Additionally, since fast charging facilities are used in-route, they draw energy during daytime hours when the cost of electricity is typically higher than overnight. Fast charging may also need grid upgrades, as battery electric buses require 480 volts in three phases, while typical commercial supply is 240 volts.

Transitioning to battery electric buses involves considerations for maintenance and repair, with mechanics requiring specialized training. While battery electric buses theoretically need less maintenance due to fewer mechanical parts, practical experience may vary, and agencies often need to expand parts inventory. Moreover, complex repairs that cannot be addressed by local mechanical crews may require that a bus be taken out of service to be repaired by the manufacturer.

As noted under the hybrid section, concerns have been raised about lithium mining needed to produce these batteries.

2.2.1.6 Hydrogen Fuel Cell Electric

Hydrogen FCE buses are zero-emission vehicles that use hydrogen to generate electricity, emitting only water vapor. Despite being the cleanest mobility technology, FCE buses have low market penetration due to high costs and the need for new parts.

Hydrogen FCE buses expose hydrogen to oxygen to create electrical energy that powers the electric motor to propel the bus. While hydrogen is an abundant and renewable natural element, the gas is highly volatile and requires pressurization to be used as a fuel.

Hydrogen propulsion systems are similar to a battery electric bus, while its gas injection and maintenance is very similar to CNG buses. Hydrogen FCEs are in a stage of near maturity, but they remain expensive relative to other technologies.

Fueling options include on-site or off-site hydrogen production, though off-site sources are rare. Moreover, on-site fueling requires a substantial investment in infrastructure to deliver hydrogen. Hydrogen, like CNG, may be provided through trailered cylinders acquired locally. Hydrogen may also be stored in a liquid state. Finally, and more commonly, hydrogen may be created on site, using components similar to CNG such as a compressor, storage units, coolers and dispensers. The increased level of volatility requires more expensive materials, driving up costs significantly.

Source: https://www.act-news.com/

Due to complexity and the low levels of both demand and supply, training for such a fuel alternative is more challenging than with other fuel alternatives. Moreover, manufacturers of hydrogen equipment possess a stronghold over maintenance and repairs, meaning that specialized crews provided by manufacturers are required to perform maintenance, leading to increased lifespan costs and operational inefficiencies. Still, hydrogen FCE buses have fewer mechanical parts than diesel engines and offer a longer range than battery-electric buses, making them an appealing alternative.

Overall, nearly $3 to $5 million are required to build or modify facility conditions to adequately allow the use of hydrogen, while also requiring nearly 4,500 square feet of space. The cost of hydrogen equipment continues to drop over time, making it more affordable. The initial investment in hydrogen as an alternative may be expensive, but larger hydrogen fleets reduce the investment per vehicle costs.

2.2.2 Technology Comparison

The following section summarizes the data side-by-side to make comparing fuel technologies easier. **Table 2-2** compares key considerations for the various alternative fuel technologies. Several factors are assessed and correspond to five broad categories of impact:

- **State of Technology:** Evaluates the current state of each alternative fuel technology such as the level of technology maturity, current industry adoption rate, the coordination required with various parties to deliver services using the technology for each bus, etc.
- **Financial Impact:** Considers the impact that each technology may have on agency finances, such as lifecycle costs, vehicle costs, and potential grant funding for each technology.
- **Impact to Facility Spaces:** Assesses the impact that the adoption of each fuel alternative technology may have on existing facility spaces, like whether using the fuel alternative requires facility upgrades or if additional space may be needed for new facilities.
- **Operations and Maintenance Impact:** Considers daily impacts of adoption such as the operational burden on the route network, reliability, and the number of unknown factors that may present themselves over time.
- **Regional Impact:** Considers a technology based on regional factors, such as the successful adoption of a technology in the region or climate and terrain factors.

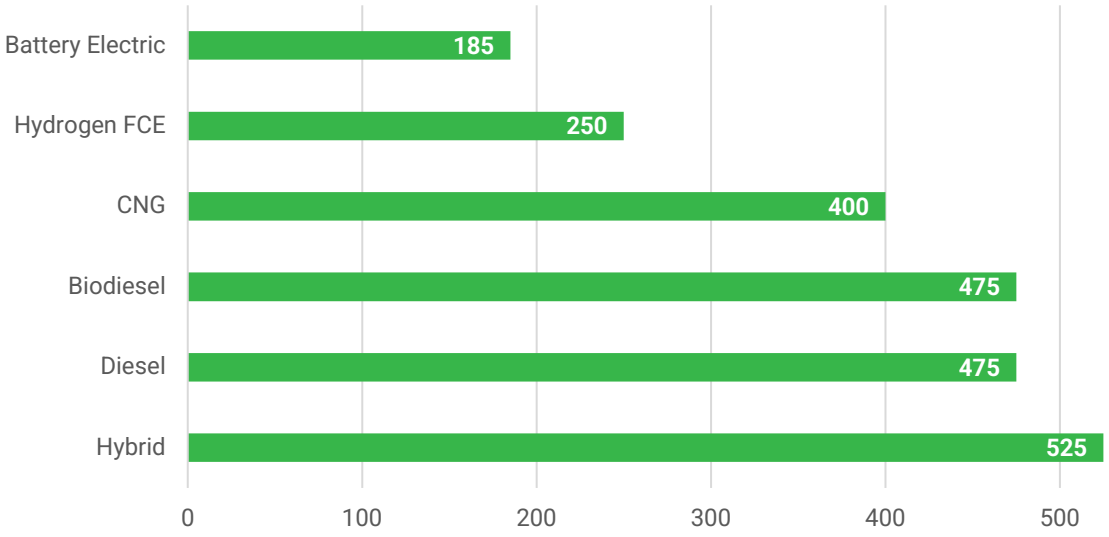
TABLE 2-2: ALTERNATIVE FUEL TECHNOLOGIES COMPARISON

	Diesel	Biodiesel	CNG	Hybrid	Battery Electric	Hydrogen FCE
State of Technology						
Current Adoption Rate	Phasing Out	Stagnant	Steady	Steady	Growing	Growing
Maturity	Mature	Mature	Mature	Evolving	Evolving	Almost Mature
Emission Reduction	None	Low	Low	Low	High	High
Coordination Level	Few	Few	Some	Some	Many	Many
Ease of Adoption	Easy	Easy	Challenging	Easy	Challenging	Challenging
Financial Impact						
Lifecycle Cost	Medium	Medium	Low	Medium	Low	High
Vehicle Cost	Low	Medium	Medium	Medium	High	High
Infrastructure Cost	Low	Low	High	Low	Medium	High
Grant Security	None	Low	High	High	High	Medium
Impact to Facility Spaces						
Added Footprint	None	Low	High	Low	Medium	High
Facility Upgrades	None	Some	Many	None	Many	None
Operations and Maintenance Impact						
O&M Cost	High	High	High	Medium	Low	High
Vehicle Range	Standard	Standard	Standard	High	Low	Standard
Additional Training	None	Low	High	Medium	High	High
Added Inventory	None	Minimal	High	Medium	Medium	High
Reliability	High	Medium	High	Low	Low	Medium
Refueling Time	5 mins	5 mins	5-15 mins	5 mins	4 to 6 hours	7-20 mins
Unknown Factors	None	Few	Few	Some	Many	Many
Regional Impact (Florida)						
Regional Climate and Terrain Impact	None	Low	Low	Low	Medium	Low
Regional Agencies with Technology	Broad	Some	Broad	Broad	Minimal	None

Source: Benesch

Because vehicle range is so important to technology adoption, **Figure 2-5** provides greater detail on the range of each technology. On a full tank, hybrid buses provided the greatest vehicle range, even an improvement over the vehicle range for diesel buses. CNG buses, offering a 400-mile range, perform similarly to diesel. Battery electric buses have a relatively low range, which can present a challenge for systems that operate on longer blocks and routes. Hydrogen FCE has a relatively short range as well. It should be noted that vehicle range is affected by many factors including load, use of auxiliary systems such as heating and cooling, terrain, weather, etc.

FIGURE 2-5 AVERAGE VEHICLE RANGE (MILES)



Sources: HART presentation, "Adopting new Fuel Technologies" (2017); Fairfax County DOT presentation, "Electric Buses Overview" (2020); and Academies of Sciences, Engineering, and Medicine, Guidebook for Deploying Zero-Emission Transit Buses (2020)