

May 2022

ZERO EMISSION TRANSITION PLAN

Contract: F-19-019/SS
Work Order: WSP-36

Prepared for:



Prepared by:



Zero Emission Transition Plan

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Final Report

May 2022

Prepared for: Palm Tran

Prepared by: WSP USA

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1.0 Introduction

1.1 Zero Emissions Transition Plan

The purpose of this study is to provide a Zero Emission Transition Plan for Palm Tran's fixed route system, allowing Palm Tran to apply for competitive Federal Transit Administration (FTA) funds. This zero-emissions transition plan will address the items in the FTA's December 1, 2021, Dear Colleague Letter and will review the infrastructure required for operating zero emission buses (ZEB).

The Zero Emission Transition Plan evaluates the following areas of Palm Tran's operations:



Fleet



Funding



Regulations



Facilities



Utilities



Work Force

Table 1: FTA Zero Emission Transit Plan Requirements

Plan Element	Requirement
1 Fleet	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.
2 Finance	Address the availability of current and future resources to meet costs for the transition and implementation.
3 Regulations	Consider policy and legislation impacting relevant technologies.
4 Facilities	Include an evaluation of existing and future facilities and their relationship to the technology transition.
5 Utilities	Describe the partnership of the applicant with the utility or alternative fuel provider.
6 Workforce	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.

Source: FTA Dear Colleague Letter, Dated December 1, 2021

1.2 Palm Tran Overview

Palm Tran provides fixed route, paratransit, and on-demand services within Palm Beach County. Located in southeastern Florida, Palm Beach County is the third largest county in Florida by population, with nearly 1.5 million residents, and the second largest county by land area, at 1,977 square miles. Palm Tran operates as a department of Palm Beach County and is overseen by the Board of County Commissioners. The fixed route service is operated directly by Palm Tran, while the paratransit and dial-a-ride services are operated by third-party contractors.

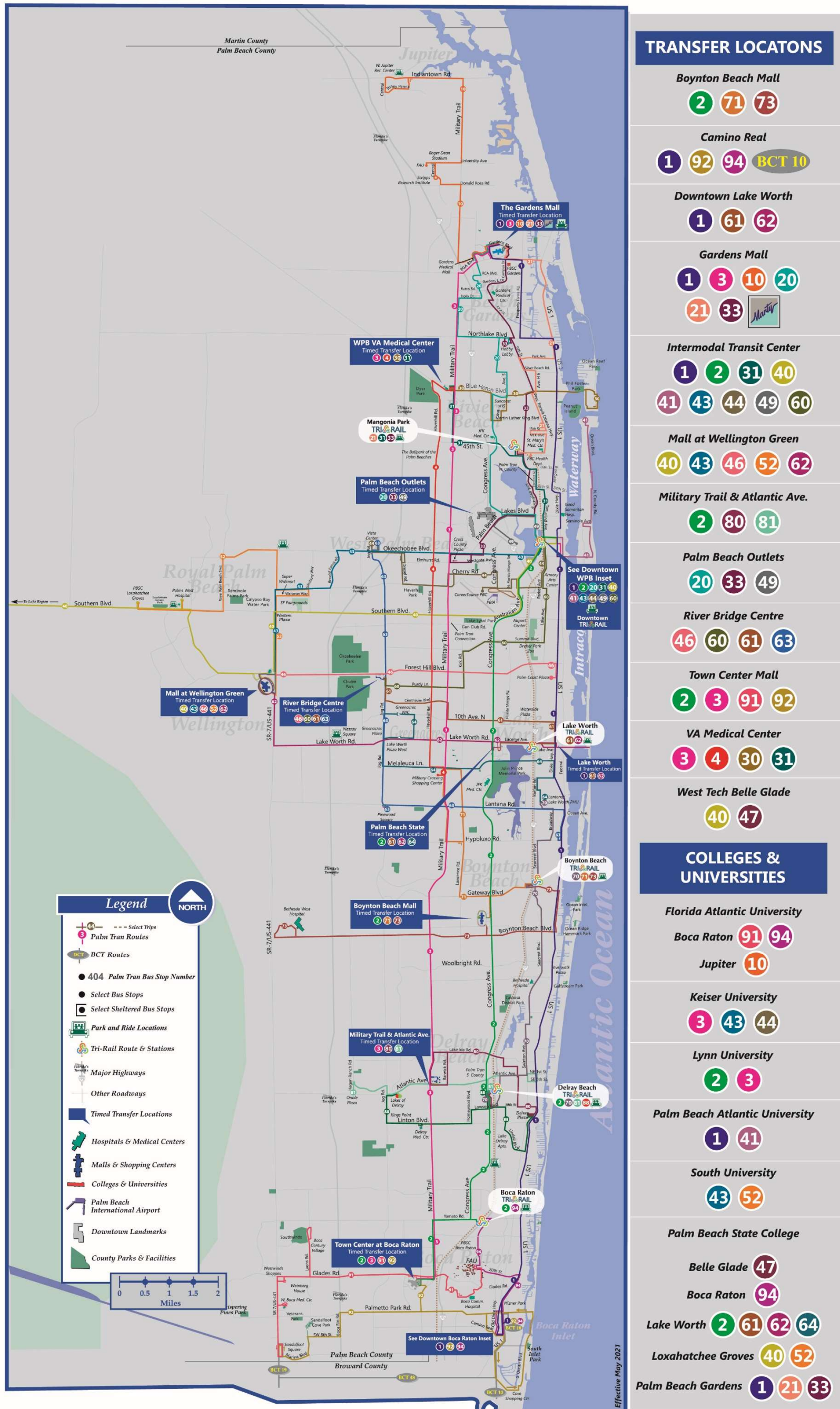
Palm Tran's fixed route network includes thirty-two (32) routes which serve approximately 3,000 bus stops and seventeen (17) park-and-rides. The fixed route system operates throughout the entire county, though most routes are located in the urbanized area east of the Florida Turnpike, as shown in Table 2. Cutout maps of West Palm Beach, Boca Raton, and Belle Glade are included in the Appendix.

Route 1 is Palm Tran's longest north-south route, serving Palm Beach Gardens down to Boca Raton on 20-minute headways. Route 1 also has the highest ridership per route, accounting for almost a quarter of Palm Tran's total ridership in 2021. Route 40 is Palm Tran's longest east-west route, providing a connection between the eastern and western-most parts of the county with all day service.

Routes generally operate from about 4:35 am to 11:00 pm on weekdays and Saturdays with headways between 10 to 120 minutes. Service is provided on Sundays and all holidays, but at reduced capacity. Palm Tran also offers Go Glades, a dial-a-ride service in the western part of the county, as well as Palm Tran Connection, a shared-ride, door-to-door paratransit service.

Palm Tran has already begun preparing for electrification of their fleet. The renovation of the South County facility in 2021 included the construction of conduits needed for electric vehicle (EV) infrastructure. Palm Tran has also secured grant funding from the Palm Beach Transportation Planning Agency and the Volkswagen (VW) Settlement program to purchase thirteen electric buses and EV infrastructure. Palm Tran is continuing to take steps toward electrification, with plans to develop an Electrification Master Plan in 2023.

Figure 1: Palm Tran System



2.0 Fleet

Palm Tran has a total of 142 fixed route vehicles as of March 2022. As shown below in Table 2: Palm Tran Existing Fixed Route Fleet, the majority of vehicles are Gillig Low Floor 40 ft buses. Most vehicles are internal combustion engine (ICE) vehicles, though fifteen (15) buses in the existing fleet are hybrid diesel vehicles.

Table 2: Palm Tran Existing Fixed Route Fleet

Year	Make	Model	Length	# of Vehicles	Vehicle Type
2011	Gillig	Low Floor	40 ft	9	ICE
2011	Gillig	Low Floor	40 ft	1	hybrid diesel
2012	Gillig	Low Floor	40 ft	7	ICE
2012	Gillig	Low Floor	35 ft	7	ICE
2013	Gillig	Low Floor	40 ft	10	ICE
2014	Gillig	Low Floor	40 ft	9	hybrid diesel
2015	Gillig	Low Floor	40 ft	14	ICE
2015	Gillig	Low Floor	40 ft	5	hybrid diesel
2016	Gillig	Low Floor	40 ft	7	ICE
2016	Gillig	Low Floor	29 ft	3	ICE
2017	Gillig	Low Floor	40 ft	14	ICE
2020	Gillig	Low Floor	40 ft	11	ICE
2021	Gillig	Low Floor	40 ft	45	ICE

Source: WSP

Palm Tran's standard for replacing vehicles is the FTA standard of twelve (12) years or 500,000 miles. Due to the large geographic size of Palm Beach County—over 1,970 square miles of land area—Palm Tran typically replaces vehicles after 500,000 miles, or after 10 to 11 years on average.

2.1 Zero Emission Replacement Schedule

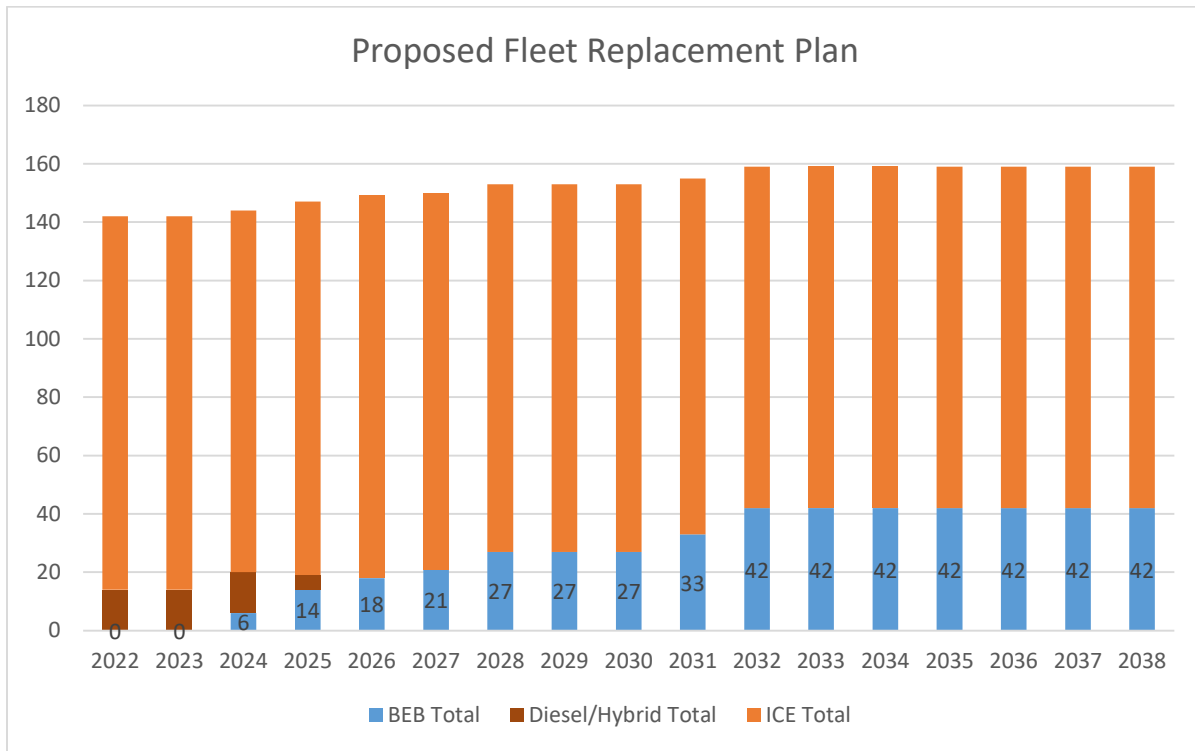
Based on past grant applications, Palm Tran strives for a 25% low or no-emission fleet. This would mean acquisition of 42 (including 3 spares) low or no-emission vehicles gradually over time. A fleet replacement plan reflecting this gradual addition of 42 electric buses (BEBs) is shown in The agency plans to research this area further to arrive at a long-term transition plan to determine how low and no emission goals can best be met. There are many ways to address range issues of battery electric buses, including on-route opportunity charging, adjusting the current run and blocking structure, as well as operator performance. Modeling an agency's service is always a good idea for an agency to understand how to best deploy BEBs, but in the case of Palm Tran, it will be a critical step towards a successful zero emission transition.

Figure 2 below. The plan assumes that vehicles will be replaced after 11 years and that no additional diesel/hybrid vehicles will be purchased moving forward. BEBs would be added to the fleet starting in 2024 in alignment with current procurement plans. Under this proposed fleet replacement plan, Palm Tran would reach a 25% low or no-emission fleet by 2032.

Zero Emission Vehicle (ZEV) acquisitions need to be considered relative to their range. Under optimal conditions (e.g., typical battery use), Palm Tran can operate BEBs on several existing routes. However, Palm Tran may encounter day-to-day challenges as the BEB fleet expands unless newer, higher capacity vehicles are available to perform the longer blocks as projected. Under conservative conditions (e.g., peak summer months and during times of peak ridership when battery drain rates are higher), Palm Train may struggle further to deliver service due to additional battery demand. Relative to its peers, Palm Tran has long service blocks. Few of its service blocks can be met by currently available BEBs in the marketplace. For planning purposes, the transition schedule assumes that as BEBs are introduced, 1.5 BEBs will replace 1 diesel or diesel/hybrid. The initial 17 BEBs programmed through grant funds and potential Low/No grant funds will result in a fleet increase of 6 buses to account for range issues, as well as 1 spare.

The agency plans to research this area further to arrive at a long-term transition plan to determine how low and no emission goals can best be met. There are many ways to address range issues of battery electric buses, including on-route opportunity charging, adjusting the current run and blocking structure, as well as operator performance. Modeling an agency's service is always a good idea for an agency to understand how to best deploy BEBs, but in the case of Palm Tran, it will be a critical step towards a successful zero emission transition.

Figure 2: Proposed Fleet Replacement Plan



Source: WSP

3.0 Funding

3.1 Current

Palm Tran has demonstrated long-term stability through sound fiscal management. Existing service is funded through a combination of gas tax, ad valorem taxes, grant reimbursements for preventive maintenance and rural service, fares, and community block grants. Palm Tran's budget for FY 2022 is \$192,472,764.

To fund future expansion, Palm Tran has secured funding for its first zero emission bus investments through the Palm Beach Transportation Planning Agency (TPA)—the region's Metropolitan Planning Organization—Local Initiatives (LI) program, as shown below in Table 3: Existing Funding Sources for Electric Vehicles

The LI program provides approximately \$20 million in funding annually of Federal Surface Transportation Program funds for lower-cost, non-regionally significant transportation projects within Palm Beach County. Grants are awarded through a competitive application process, in which applications are submitted to the TPA and prioritized for funding. The applicant is responsible for implementing the project then receives funding through a grant reimbursement agreement.

Palm Tran received \$4.34 million in LI funding to purchase three electric buses and install charging stations at the North County Maintenance Facility during the 2019 application cycle, with the project being given the highest priority ranking. The agency received an additional \$5 million in LI funding during the 2020 application process to purchase four more electric buses and install supporting electric charging stations at the North County Maintenance Facility. As with the previous grant, this project was given the highest prioritization of all projects submitted in the 2020 application cycle. The LI funds are programmed for FY 2024 and FY 2025 respectively, at which point the funds are flexed to the FTA. Funds will then become available for FTA's grant obligation process. Both projects receive "soft match" from local toll revenue credits.

Palm Tran was also recently awarded Volkswagen Settlement Funds, which provide funding to public transit agencies to replace eligible diesel transit buses with electric buses. Palm Tran was awarded \$1.8 million in VW funds, which will be used to cover the difference between a diesel and electric bus which will allow Palm Tran to purchase six (6) electric buses.

Table 3: Existing Funding Sources for Electric Vehicles

Funding Source	Capital Funding	Description	Procurement Year	Supplemental Funding
TPA LI Funds	\$4,336,388	3 electric vehicles / charging stations	FY 2024	Toll Revenue Credit
VW Settlement Funds	\$1,800,000*	6 electric vehicles	FY 2024	5307/5339 Funds
TPA LI Funds	\$5,000,000	4 electric vehicles / charging stations	FY 2025	Toll Revenue Credit

* This funding is to cover the additional costs to purchase a BEB vs a diesel bus.

Source: WSP

3.2 Future Infrastructure Funding

3.2.1 Federal

The Infrastructure Investment and Jobs Act (IIJA), signed into law in November 2021 as the Bipartisan Infrastructure Law (BIL), provides for the lion's share of transportation-related formula and discretionary grant assistance that comes from the U.S. federal government. This legislation included a reauthorization of the programs included in the Fixing America's Surface Transportation (FAST) Act, along with the creation of new ones. Overall, the BIL authorizes more funding opportunities to accommodate the country's transition to a more climate-friendly transportation system. Existing and new formula funding partnered with discretionary grant programs will receive a historic investment of federal funds that will be eligible for fleet electrification and associated infrastructure projects. The BIL also amends other programs and funding sources that could potentially be used for BEB purchases or other electrification projects. These include:

- Federal Highway Administration (FHWA) Surface Transportation Block Grant (STBG) funding eligible uses expanded to include installation of EV charging infrastructure.
- FHWA Congestion Mitigation and Air Quality (CMAQ) funding eligible use expanded to include the purchase of medium or heavy-duty ZE vehicles and related charging equipment.

One key program to come out of the BIL is the National Electric Vehicle (NEVI) Formula Program, which provides funding to states for electric vehicle charging infrastructure. To be eligible for NEVI funding, projects must be located on a designated Alternative Fuel Corridor. I-95 and the Florida Turnpike already have this designation, and the Palm Beach County Board of County Commissioner (BCC) recently signed a resolution supporting the designation of U.S. Routes 1, 27, and 441 as alternative fuel corridors, all of which traverse Palm Beach County. Table 4: Potential Federal Funding Sources Overview, provides a high-level summary of each funding source's key characteristics and considerations evaluated in this section.

In addition to federal funding coming from the BIL, the U.S. Environmental Protection Agency's (EPA) Office of Transportation and Air Quality provides funding through the Diesel Emissions

Reduction Act (DERA) National Grant Program. Priority for funding is given to fleets operating in areas designated as having poor air quality. Palm Beach County is listed in the EPA 2021 DERA Priority County List as a priority diesel particulate matter (PM) area where the modeled ambient diesel PM concentration from the 2014 National Air Toxics Assessment is above the 80th percentile (0.68 µg/m³) for census tracts nationwide, making Palm Beach County and Palm Tran eligible for this funding.

Table 4: Potential Federal Funding Sources Overview

Federal Funding Program	Administering Agency	Eligibility			Funding Potential
		Maintenance Facility	Charging Infrastructure	BEB Purchase	
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants	USDOT	✓	✓	✓	Moderate to Low
Capital Investment Grants (CIG) Small Starts	FTA		✓	✓	Low
Section 5307: Urbanized Area Formula Grants	FTA	✓	✓	✓	High to Moderate
Section 5339: Bus and Bus Facilities Formula Funds Grant	FTA	✓	✓	✓	High
Section 5339 (c): Low or No Emission Vehicle Program	FTA	✓	✓	✓	Moderate
Advanced Transportation and Technologies and Innovative Mobility Deployment	FHWA	✓	✓	✓	Low
Discretionary Grant Program for Charging and Fueling Infrastructure	FHWA		✓	✓	Low
Surface Transportation Block Grant Program (STBG)	FHWA		✓	✓	Moderate
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	FHWA	✓	✓	✓	Moderate
National Electric Vehicle (NEVI) Formula Program	FHWA		✓	✓	Low
Carbon Reduction Program	FHWA		✓	✓	Moderate
Charging and Fueling Infrastructure Grant Program	FHWA		✓		Low
Alternative Fuel Tax Credit	USDOE		✓		Moderate to High

New Market Tax Credits	USDOT		✓		Moderate
Opportunity Zones	USDOT	✓	✓		Low to Moderate

Source: WSP

There are also a number of funding opportunities focused on important related goals such as energy resiliency that could be considered in partnership with utilities or municipal government. Additional BIL funding opportunities are included in Table 5: Additional Bipartisan Infrastructure Act Funding Opportunities

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Table 5: Additional Bipartisan Infrastructure Act Funding Opportunities

Opportunity Name	Description	Eligible Use
DOE	Program Upgrading Out Electric Grid and Ensuring Reliability and Resiliency	To coordinate and collaborate with electric sector owners and operators—(A) to demonstrate innovative approaches to transmission, storage, and distribution infrastructure to harden and enhance resilience and reliability; and (B) to demonstrate new approaches to enhance regional grid resilience, implemented through States by public and rural electric cooperative entities on a cost-shared basis.
DOE	Battery Manufacturing and Recycling Grants	Demonstration projects, construction of commercial-scale facilities, and retrofit or retooling of existing facilities for battery component manufacturing, advanced battery manufacturing, and recycling.
DOT	Promoting Resilient Operations for Transformative, Efficient, and Cost Saving Transportation (PROTECT) Discretionary	Recipients may use PROTECT Formula Program funds to conduct resilience planning, strengthen and protect evacuation routes, and increase the resilience of surface transportation infrastructure from the impacts of sea level rise, flooding, wildfires, extreme weather events, and other natural disasters. Highway, transit, and certain port projects are eligible.
DOE	Energy Efficient and Conservation Block Grant Program	<p>Numerous Program Opportunities including: Development and implementation of programs to conserve energy used in transportation:</p> <ul style="list-style-type: none"> • use of flex time by employers; • satellite work centers; • development of infrastructure, such as bike lanes and pathways and pedestrian walkways; • synchronization of traffic signals; and • other measures that increase energy efficiency and decrease energy consumption; <p>Development, implementation, and installation on or in any government building of the eligible entity of onsite renewable energy technology that generates electricity from renewable resources, including— solar energy; wind energy; fuel cells; and biomass;</p> <p>Programs for financing energy efficiency, renewable energy, and zero-emission transportation (and associated infrastructure), capital investments, projects, and programs, which may include loan programs and performance contracting programs, for leveraging of additional public and private sector funds, and programs that allow rebates, grants, or other incentives for the purchase and installation of energy efficiency, renewable energy, and zero-emission transportation (and associated infrastructure) measures.</p>

3.2.2 State

Aside from the VW Settlement funding, which Palm Tran has been awarded, there are no state funding programs supporting the electrification of transit fleets at this time. However, the BIL provides new electric vehicle and electric vehicle infrastructure funding opportunities for FDOT by way of formula funds or block grants. In the future, FDOT could decide to apply some of those funds to local transit projects and direct funds to Palm Tran.

3.2.3 Local

Palm Beach County currently has a one-cent sales tax used to fund infrastructure projects, which is set to sunset no later than 2026. A possible ballot initiative for 2024 is a new transportation surtax that would replace the current infrastructure surtax upon it sunsetting. The new transportation surtax would ensure continued funding as well as expand the revenue available for new transportation projects. The surtax would also enhance eligibility for state and federal grants by providing a dedicated source of local funding for transportation projects.

4.0 Regulations

Currently, there are no specific requirements for greenhouse gas (GHG) emissions reductions or fleet electrification that apply to Palm Tran. Nonetheless, based on previous grant applications, Palm Tran has an internal goal of maintaining a 25% low or no emissions vehicle fleet.

Additionally, a number of federal, state and local goals and policies support EV planning and deployment, as well as climate change mitigation efforts more broadly.

4.1 Federal

In January 2021, President Biden signed the “Presidential Executive Order 14008: The Climate Crisis Order” which included steps to tackle the climate crisis at home and abroad with an overall economy wide net-zero emissions goal of no later than 2050. It also created the National Climate Task Force.

Some major takeaways of this order include:

- A Whole of Government approach to the climate crisis
- Leverage the Federal Governments footprint and buying power to lead by example
- Rebuild infrastructure for a sustainable economy
- Revitalize Energy Communities
- Secure Environmental Justice and Spur Economic Opportunities

There are many programs that are coming out of this order in combination with the Bipartisan Infrastructure Law (BIL) funding. As a federal grant subrecipient, Palm Tran may be eligible to participate in these future programs. As an example, the FTA Low and No Emissions grant program alone saw a large increase in appropriations, and many new programs were added as part of the BIL.

4.2 State

Florida is particularly at risk for the impacts of climate change. State efforts have primarily focused on climate change adaptation rather than mitigation. However, several state statutes promote GHG reductions and planning for electric vehicles:

- **Florida Statute 377.601** states that it is the policy of the State of Florida to address the potential of global climate change wherever possible, develop energy management programs aimed at reducing GHG emissions, and include energy considerations in all state, regional, and local planning.
- **Florida Statute 339.287** requires that FDOT develop a Master Plan for the development of EV charging station infrastructure on the State Highway System.

Climate change mitigation policies in Florida are primarily implemented at the local level. At the same time, recent state laws have limited what cities can do to transition from fossil fuels to renewable energy sources. Florida Statute 366.032 prohibits local and regional entities from restricting the fuel sources of energy production supplied to customers, meaning city or county governments cannot restrict utilities from using fossil fuel energy sources. Florida Statute 377.707 prohibits municipalities or counties from prohibiting the siting of gas stations and from requiring fuel retailers to install electric charging stations. Palm Beach County was previously drafting an EV Ready Ordinance and is planning to propose an updated ordinance that complies with Florida statutes.

While the State of Florida has not set specific targets for GHG emissions reductions, state Departments are planning for and recommending policies aimed at reducing emissions and promoting electric vehicle infrastructure. The Florida Department of Transportation (FDOT) published an EV Infrastructure Master Plan (EVMP) in 2021, per state statute requirements. The plan addresses challenges and opportunities related to EV charging infrastructure, including considerations for transit fleets, and offers recommendations to expand EV infrastructure and enhance public and private investment in EV infrastructure in the state.

The Florida Office of Energy, under the Department of Agriculture and Consumer Services, released the Florida Energy and Climate Plan in 2019. The plan recommends the development of a state GHG inventory, state support of local government mitigation efforts, and engaging in projects and programs that promote the facilitation of clean and sustainable transportation practices. The Office of Energy also recently published a state Electric Vehicle Roadmap, which identifies light-duty EV infrastructure needs and provides recommendations related to EV planning, financing, education, and infrastructure needs.

In April 2022, Florida Agricultural Commissioner Nikki Fried announced a goal of reaching 100% renewable energy by 2050, the first time the Florida has set a statewide target for renewable energy usage. The proposed rule would not be enforceable by the Department of Agriculture and Consumer Services though, as Florida electric companies are regulated by the Florida Public Service Commission.

4.3 Local

Local and regional policies and goals addressing climate change at the agency, county, and regional levels are described below.

4.3.1 Palm Tran

Palm Tran's Transit Development Plan (TDP) includes 10-Year Goals, supported by Objectives, Strategies, and Targets. One of their five goals is to deliver a safe, reliable, accessible, and environmentally friendly transit service. The Objective and Strategies shown in

Table 6: Palm Tran Sustainability Objectives and Strategies

Objective 2.5	Promote environmental sustainability by minimizing Palm Tran's carbon footprint
Strategy 2.5.1	Construct all new Palm Tran facilities to green/ LEED building standards for energy efficiency and sustainable design
Current Value	Construction of Palm Tran's new South County facility in Delray Beach was completed in 2021 using strategies of the Florida Green Building Coalition, such as water use reduction with low flow faucets, LED motion-sensor lighting, improved indoor air quality, and installing Florida-friendly landscaping
Target	100% of all future Palm Tran facilities constructed to green/LEED building standards for energy efficiency and sustainable design
Strategy 2.5.2	Explore alternative energy sources for Palm Tran's fleet to minimize vehicle emissions
Current Value	Initial infrastructure to charge fully electric, zero-emissions buses was installed at the new South County Facility and funds to purchase initial electric buses are programmed in the Five-Year Transportation Improvement Program
Target	By 2023, prepare an Electrification Master Plan to understand and evaluate fully electric, zero-emissions vehicle technology, infrastructure, and operational needs from a fleet-wide planning approach

Source: WSP

The agency's internal efforts are focused on a goal to continue the 25% Low or No emissions benchmark set with the purchase of hybrid diesel-electric vehicles.

4.3.2 Palm Beach County

As an agency within the County, Palm Tran develops its goals and policies to ensure consistency with County plans and policies. Palm Beach County's Comprehensive Plan provides goals, objectives, and policies to guide future growth and development within Palm Beach County. The Future Land Use Element, which was updated February 2022, includes Sub-Objective 1.1.1, outlines six policies that address climate change. Policy 1.1.1-b states that Palm Beach County will coordinate with other agencies to develop initiatives and goals to address climate change. Several other policies directly mention climate change mitigation, requiring that the County consider climate change mitigation strategies to reduce greenhouse gases and incorporate the consideration of mitigation strategies into existing and future system-wide planning, operations, policies, and programs.

In addition to the policies included in the Comprehensive Plan, the Palm Beach County Office of Resilience is in the process of updating the County GHG inventory and completing a climate change Vulnerability Assessment and Resilience Action Plan (VARAP). The Palm Beach County Board of County Commissioners recently approved the inclusion of GHG mitigation measures in the VARAP, signaling increasing levels of climate change mitigation planning at the local level.

Furthermore, the Office of Resilience has already begun installing electric vehicle charging stations at key locations throughout the county as part of a pilot program.

4.3.3 Palm Beach Transportation Planning Agency

The Palm Beach Transportation Planning Agency (TPA), the Metropolitan Planning Organization serving Palm Beach County, includes climate change mitigation objectives in their Long Range Transportation Plan. In addition to outlining objectives to decrease the daily fuel use per person and reduce the daily vehicle miles travelled per person, the LRTP states the TPA's dedication to helping Palm Tran move towards an electric vehicle transit fleet.

4.3.4 Southeast Florida Regional Climate Compact

Palm Beach County is also working to reduce emissions at the regional level through the Southeast Florida Regional Climate Compact, an innovative regional partnership among Palm Beach, Broward, Miami-Dade, and Monroe counties. The goal of the Compact is to work collaboratively to reduce regional GHG emissions, implement adaptation strategies, and build climate resilience across the Southeast Florida region. The Compact's resources and products include the Regional Climate Action Plan (RCAP), Unified Sea Level Rise Projections, a state and federal legislative program, a Regional Greenhouse Gas Inventory, and the Climate Assessment Tool.

The Climate Assessment Tool provides guidance to local government leaders on priority mitigation and adaptation strategies. The Greenhouse Gas Emission Mitigation Priority Actions are:

- **Mitigation Action #1:** Establish internal (government operations) and community-wide targets/commitments for greenhouse gas emissions reductions and renewable energy goals, measure, and publicly report progress.
- **Mitigation Action #2:** Improve building energy efficiency and conservation in new and existing buildings, across both residential, commercial, and government buildings.
- **Mitigation Action #3:** Advance the use and adoption of solar energy within government operations and community-wide.
- **Mitigation Action #4:** Expand the use of electric vehicles (EVs) and the installation of EV infrastructure both within government operations and community-wide.
- **Mitigation Action #5:** Reduce vehicle miles traveled. This may include major public transit investments, bike and pedestrian investments, alternative work schedules, and transit-oriented development.

The RCAP provides additional recommendations to reduce GHG emissions, as well as guidelines for implementation and shared best practices that align with the regional agenda. Among many other mitigation strategies, the RCAP recommends encouraging transit agencies to reduce GHG emission by procuring renewable fuel and electric buses. The Compact also published *Electric Vehicles and EV Infrastructure: An Introductory Guide for Southeast Florida*. This 2021 report offers tools to help localities install EV infrastructure and transition public fleets to electric vehicles.

5.0 Facilities

5.1 Existing Operations and Maintenance Facilities

Palm Tran has three operations and maintenance facilities for consideration as part of a zero emission transition plan. These facilities are spread throughout the county, and they all provide similar operations and maintenance functions for Palm Tran. The South County and North County facilities are the most active of the three facilities.

The facilities were last evaluated as part of the Palm Tran Transit Asset Management Plan completed in 2018. The overall conditions of the facilities using the FTA rating scale was between 3-4.53 out of a maximum 5 rating. However, since that plan was completed the South County Facility in Delray Beach has been rehabilitated and expanded, potentially increasing the rating. Statistics on the North County, South County and West County facilities are located in Table 7: Palm Tran Operations and Maintenance Facilities

Table 7: Palm Tran Operations and Maintenance Facilities

Facility	Facility Location Stats
North County	3201 Electronics Way, West Palm Beach, FL 33047 Year Built: 1998 Total Square Feet: 32,108 sq. ft. Total Facilities: 5
South County	100 North Congress Ave, Delray Beach, FL 33544 Year Built: 1996 Year Rebuilt & Expanded: 2021 Total Square Feet: 34,000 sq. ft. Total Facilities: 4
West County	38601 James Wheeler Way, Belle Glade, FL 33430 Year Built: 2010 Total Square Feet: 199,340 sq. ft. Total Facilities: 2

5.2 Existing and Planned Transfer Centers

Palm Tran has one existing Intermodal Transit Center located on 140 Clearwater Drive, adjacent to the Tri-Rail station. It also provides connections to Amtrack trains, Greyhound buses, Circuit, and the West Palm Beach Trolley at this location Palm Tran is also evaluating an expansion of Intermodal Transit Center on the other side of the train tracks on S Tamarind Ave.

5.3 Existing Infrastructure Zero Emission Review

5.3.1 North County Facility



The North County Facility was built in 1998 and is located at 3201 Electronics Way in West Palm Beach. It consists of five buildings, administration/operations, maintenance, fueling station, vehicle washing, guard shack and marketing storage. The age of this facility in addition to currently needed updates and improvements means that it will need to either

have a major renovation or be replaced before any zero emission related infrastructure is to be installed.

5.3.2 South County Facility



Palm Tran's South County Facility was recently renovated and expanded in 2021. It is located at 100 N Congress Avenue in Delray Beach. The expanded facility serves as Palm Tran's headquarters, and also includes administrative offices, a bus operator training center, an auditorium for public meetings and ancillary support space. Palm Beach does not currently operate any battery electric buses; however, the facility was constructed with conduit to prepare the facility for future electrification

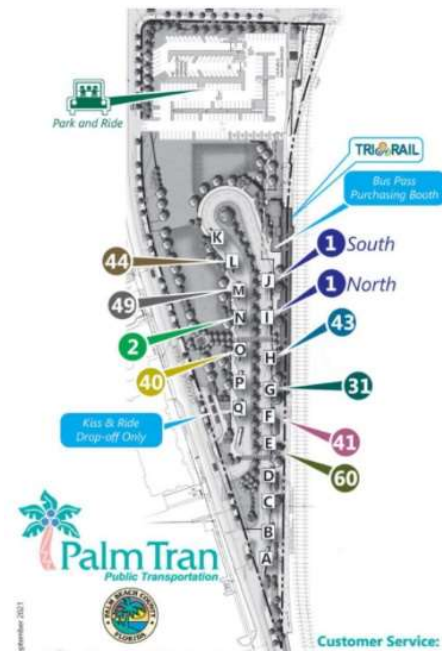
upgrades. For this reason, this facility would be the first facility to operate and maintain BEBs for Palm Tran when they are deployed into service. This will allow Palm Tran to complete a thorough Zero Emission Master Plan to evaluate the required upgrades to the other facilities and the construction schedules, while still moving forward with a zero emission bus program at the South County facility.

5.3.3 West County Facility



The West County facility is located at 38601 James Wheeler Way in Belle Glade. It was constructed in 2010. Like the North County facility, the West County facility is due to have some upgrades to the facilities. This can be evaluated further in the next step of Palm Tran's Zero Emission planning determining how to best design and schedule the upgrades in terms of general operations and zero emissions transitioning.

5.3.4 West Palm Beach Intermodal Transit Center



Palm Tran's main transfer point is the West Palm Beach Intermodal Transit Center. The current intermodal center was built in 2009 and has a total of 18 bus bays. Palm Tran service also connects to Tri-Rail, Amtrak, Greyhound, Circuit, and the West Palm Beach Trolley at this location. Currently, there are plans to expand the Intermodal Transit Center, and as the zero emission program grows, Palm Tran will need to evaluate if on-route charging at this location makes sense for their operations.

5.4 Additional Facilities for Consideration

5.4.1 Park and Ride Facilities

Palm Tran has seventeen (17) park and ride locations through the service area. Currently, the park-and-ride lots are free of charge and provide connection to not only Palm Tran service, but also several other transportation agencies. As part of Palm Tran's future zero emissions planning, the opportunity to use shared infrastructure to provide charging stations for both automobiles and buses should be evaluated.

6.0 Utilities

Electricity to Palm Tran's facilities is provided by Florida Power & Light (FPL), a subsidiary of NextEra Energy, Inc., the singular electric utility provider in Palm Tran's operating territory.

Palm Tran is focusing its utility investigation on two facilities, the North County and South County locations. Both facilities have FPL substations nearby.

North County and South County facilities have an existing FPL contract providing electrical service to them. This service supports maintenance activities and lighting, amongst other general applications. The existing electrical infrastructure (switchgears and transformers) will likely require significant upgrades and/or replacements to handle the power demand for a large battery electric bus fleet. At the South County facility, conduit and other necessary electric infrastructure was installed during a previous construction project in preparation for future chargers.

Coordinating with FPL as early as possible is a crucial step in ensuring the success of Palm Tran's transition to a battery electric bus fleet. Palm Tran has already initiated the coordination process. Palm Tran has provided site locations and preliminary peak load calculations to verify that surrounding substations, as shown in figures 3 and 4, have the capacity available to supply the significant load that will be required for electric vehicle service equipment (EVSE).

FPL has stringent requirements for all electric equipment, including standards on transformer mounting and when vaults are required. These same standards also have minimum requirements for the electric vehicle chargers that their customers can use, including maximum total harmonic distortion levels. These standards, according to FPL, will be published soon and provided to their customers, which will be required to follow the requirements closely.

Figure 3: Surrounding Substations Near the North County Facility

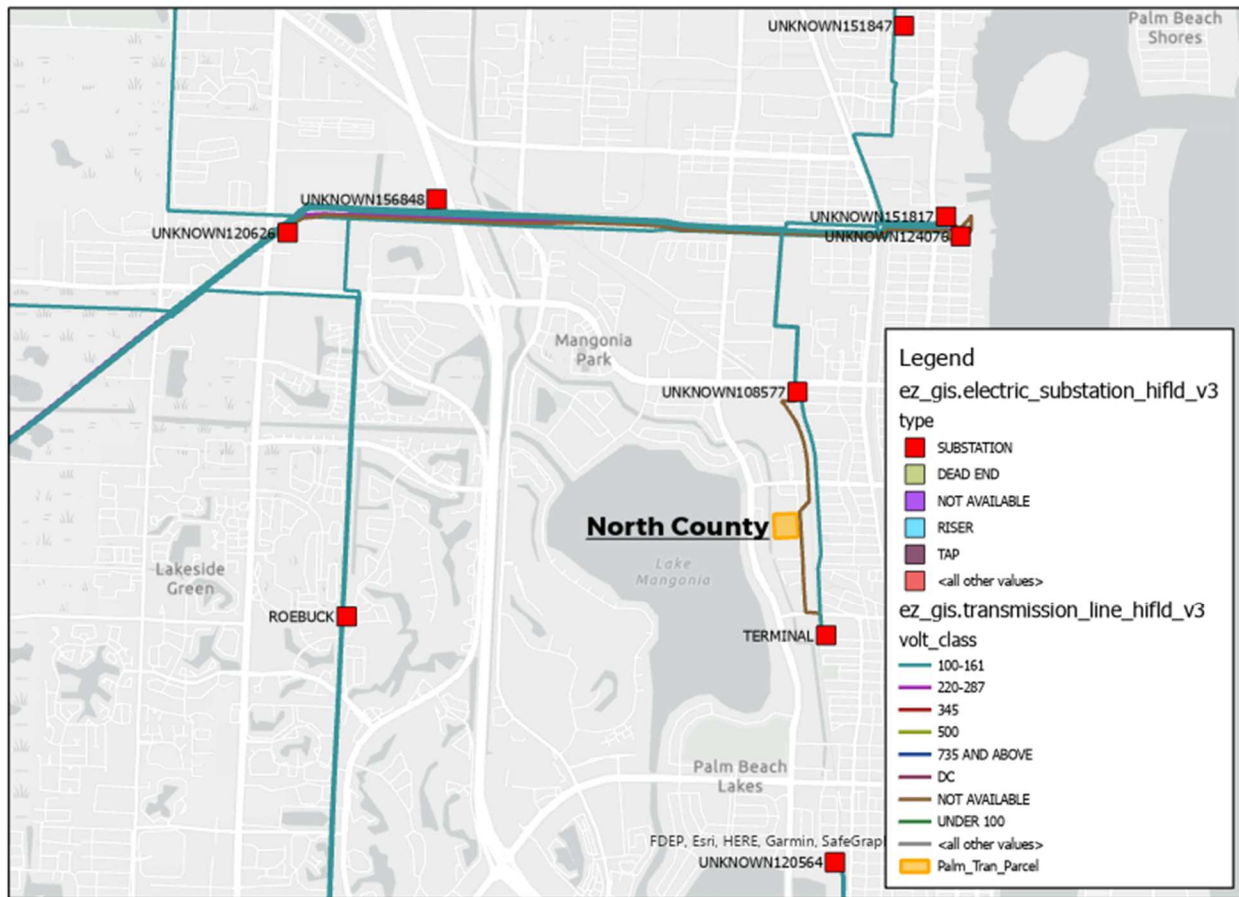
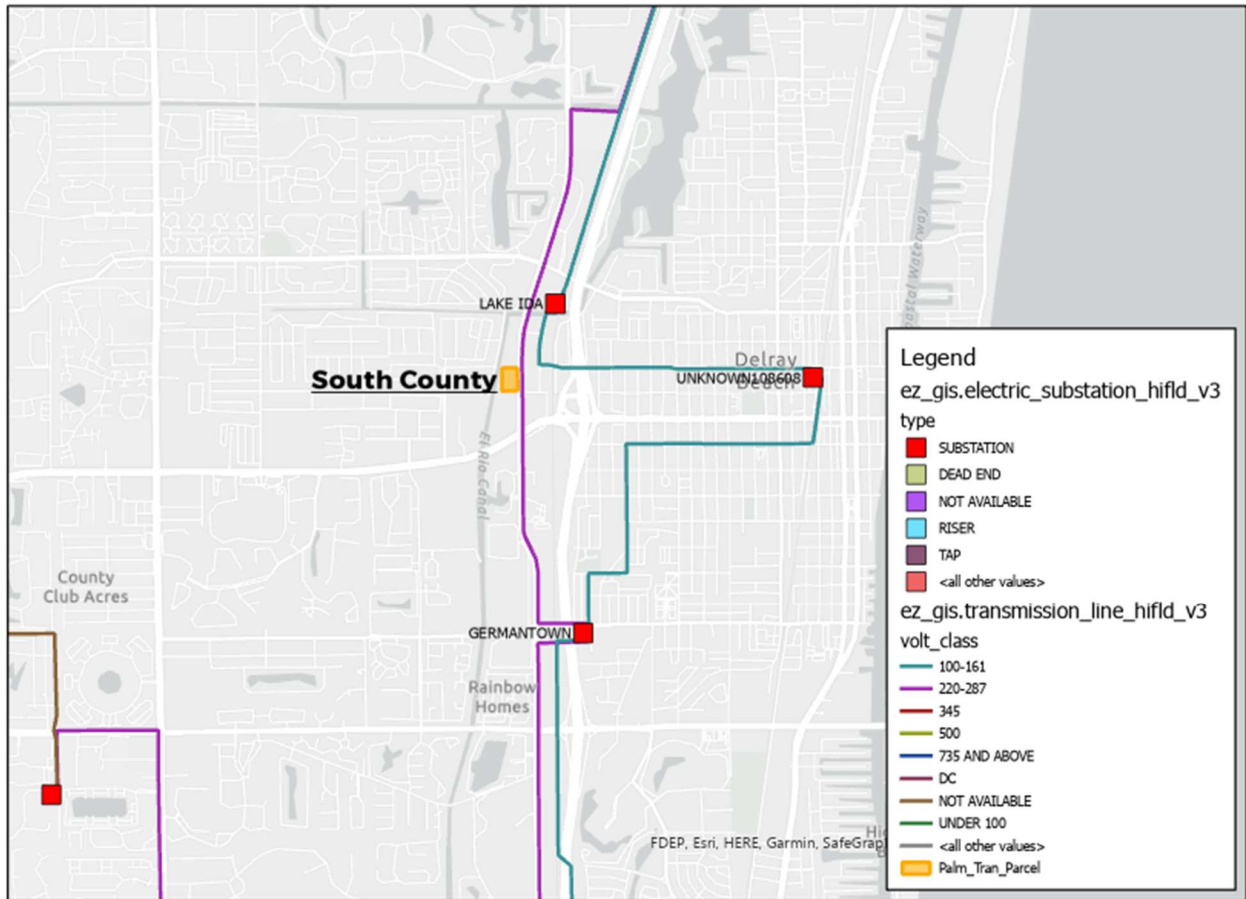


Figure 4 Surrounding Substations Near the South County Facility



7.0 Workforce

Workforce preparedness planning is an important component of an effective transition from ICE vehicles to ZEBs, including battery electric buses (BEB). The transition to BEBs affects not only the maintenance and operations department, but also employees working in facilities, procurement, scheduling, and dispatch. Many positions will be impacted, and a lack of preparation and training can have negative implications for the workforce, ranging from failure to deliver critical bus service to severe safety repercussions. Palm Tran's employees are vital to the success of our transition. Palm Tran is committed to ensuring employees have the necessary skills and training to support the new technologies as they are deployed.

Palm Tran has the internal infrastructure to be able to deliver the training to the workforce. However, to ensure the transition from ICE to BEB, new training modules will need to be developed. This can be achieved in combination with support from the original equipment manufacturers (OEMs), including training and maintenance through extended warranties, Palm Tran can support a BEB fleet using the existing departments and staff groups. There should be minimal requirements for major modifications to job roles and classifications. There is, however, opportunity to bolster BEB-related staff groups to support existing staffing capabilities.

This workforce development plan is a first step towards identifying the skills necessary to prepare the current Palm Tran workforce for the arrival of zero emissions. However, as this technology is rapidly evolving, this workforce development plan can also be expected to evolve. As Palm Tran continues with its zero-emissions transition, training deployed for the initial program will need to be evaluated and updated to support the full, agency-wide deployment and be incorporated into the new hire training.

7.1 Key training needs by Job Classification

All Palm Tran employees should receive an initial training on Palm Tran Zero Emission program. The topics should include why Palm Tran is making the transition, how it may or may not impact how employees complete their work and how to be safe around the vehicles.

Training Instructors – Training Instructors will be the custodians of this new BEB knowledge. Training Instructors will need to be prepared with knowledge in their subject area of training: Trainers who work with maintenance will need to receive the full scope of maintenance training, while trainers who work with operators will need to receive the full scope of operator training. It is beneficial for trainers of different subject areas to do cross-training and attend other in-class learnings for the rest of the Palm Tran workforce. Trainers should receive their knowledge directly from the OEMs and practical, hands-on education as much as possible. Refresher training for instructors should be completed annually at a minimum.

Mechanics & Technicians (including Maintenance Supervisors) – Mechanics and Technicians will be challenged with acquiring knowledge of the new systems from the switch of ICE to BEB

vehicles. While some systems will be unchanged, such as the multiplex system and the accessible ramp, other areas will be new. Mechanics and technicians should be comfortable with the Personal Protective Equipment (PPE) procedures surrounding high voltage electricity. All mechanics should receive the PPE and high voltage training. Training modules around entry level tasks should be directed to the entry level mechanics, with more advanced topics for BEB troubleshooting directed toward the senior mechanic positions.

Dispatchers and Operations Control Staff – This group of employees will need to be trained to provide trouble shooting of the vehicle to assist an operator while in the yard or in service. Additionally, the dispatch staff will need to be trained on troubleshooting to properly assist during an emergency.

Operators – This will be Palm Tran's largest class of employees to prepare for the ZEB transition. This training can be rolled out over time; based on the facility that is assigned BEB vehicles. As Palm Tran transitions more vehicles to BEBs, the entry-level operator curriculum will need to include the BEB materials. The operation of the bus can have a significant impact on battery performance, and operators need to know how to safely operate and evacuate a BEB if necessary.

Cleaners - This work group is an example of a class of employees that will not operate or work on a BEB vehicle but should know the basic safety elements to ensure every member of the Palm Tran team is safe.

Facility Technicians –To support maintenance of charging systems, items such as asset records, system drawings, maintenance manuals, preventative maintenance and inspection, and task descriptions for the new equipment should be available for the facility technician staff. Since some components of the charging systems will be covered under warranty training should also consider interaction with the charging system vendor and identification of issues that required formal reporting. This will allow facility technicians to monitor warranties and provide them the information they need to successfully contribute to the program.

Transit Field or Road Supervisors - Road Supervisors and the Dispatch staff are often the first line of defense when an operator needs assistance. The staff will require the same training as the operators and be provided with ZEB troubleshooting so they can assist operators in the field with basic problems.

Planners/Schedulers - With a decreased range capacity, vehicle capabilities will need to be an item that service planners consider when making schedules. Planners need to know the delivery dates of BEBs in advance so that they can create schedules that are appropriate ahead of the pick before a scheduled delivery. That way the buses can be deployed smoothly, and all the changes are communicated easily to the workforce. New Standard Operating Procedures will need to be in place and new considerations for planning service with BEBs will need to be considered for Planning and Scheduling staff.

Other Positions - Other positions at Palm Tran will not require the extensive training as the ones stated above. However, some positions may need to revisit current SOPs and adjust for BEBs. For example, procurement timelines may be different for the new parts and inventory levels need to be revisited. Ensuring that all staff understand how the BEBs operate, and their requirements will allow for smooth execution.

7.2 Skill Gap Assessment

In addition to the skills identified for each major job classification mentioned above, there are some new training items and knowledge that will need to be added as part of Palm Tran's training curriculum.

Some Palm Tran diesel mechanics currently do not have any familiarity with electrical work, even at the low voltage level. Additional training courses have been identified to assist in closing any workforce gaps, i.e. advanced electrical principles, multimeter usage, PPE for high voltage, and advanced diagnostic tools. These classes will equip an experienced diesel mechanic, with many valuable years of knowledge, and be able to transition safely and competently to working on zero-emissions vehicles.

The table below outlines the approximate impact to different job classifications due to the change to BEBs.

Table 8: Staffing Job Impact

Position	Job Impact
Maintenance Supervision	High
Mechanics & Technicians	High
Training Instructors	High
Bus Operations Supervision	Medium
Facility Technicians	Medium
Planners/Schedulers	Medium
Safety	Medium
Transit Field Supervisors	Medium
Cleaners	Low
Dispatchers	Low
Operators	Low

Source: WSP

7.3 Example of Training Needs

7.3.1 Mechanics

Mechanics will require the most in-depth and robust training program related to the ZEB conversion. This conversion will impact not only regular preventative maintenance schedules but also a different troubleshooting process and, most importantly, different safety precautions as to appropriate PPE and how to work with high voltage systems. It is expected that a significant portion of the maintenance training will be developed and delivered by the OEM.

Training topics for Mechanics include:

- Dashboard configuration and warning devices
- Charge management
- Behind the wheel bus operation
- In-depth trouble shooting
- High voltage safety complete course
- Emergency response
- Regenerative breaking, mechanical breaking, hill holding, and roll back
- Difference between regenerative breaking and mechanical braking
- Pedestrian risks related to BEBs (i.e., visual impaired), including yard maneuvering
- Lock out, tag out for BEB
- On board diagnostic systems
- Proper handling, storage, and disposal of batteries
- Recovery services (towing) procedures
- Preventative maintenance program for ZEV
- Overview of hazards associated with battery charters compared to conventional fuels.
- Safe handling and deactivation of high voltage, including PPE (Personal Protective Equipment)
- Battery specific hazards
- Location of emergency cutoff switches and fire response equipment
- Maintenance and testing of safety-critical systems
- Hazard reporting

7.3.2 Operators

A new hire is provided training, including classroom, closed course, and behind-the-wheel training. Palm Tran also has a process of where operators receive additional hours of training for recertification. Operators will be the largest class of employees that need to be trained on ZEB/BEB vehicles. Ensuring they are well trained and comfortable and knowledgeable on the new vehicle operation can be an asset. Providing excellent customer service is vital in the transition, but also operators will be the first people passengers talk to when they ride these new BEB buses, so knowledgeable operators will help develop a knowledgeable rider base.

Training needs for operators include:

- Dashboard configuration and warning devices
- Charge management
- Behind the wheel bus operation
- Trouble shooting basics
- Basic high voltage safety
- Emergency response
- Regenerative braking, mechanical braking, hill holding, and roll back
- Difference between regenerative braking and mechanical braking
- BEB successful driving habits
- Pedestrian risks related to BEB (i.e., visual impaired), including yard maneuvering
- Hazard reporting

7.4 Delivery of Training and Stabilizing the Workforce

Palm Tran currently has an in-house training program. This includes an eight (8) week technician course that all mechanics must pass when they begin working with Palm Tran. To ensure the training staff has full knowledge of the programs and systems available, Palm Tran will continue to utilize OEM training resources to prepare the training workforce with the knowledge to then transmit to other employees.

This will allow Palm Tran to take a multi-pronged approach, utilizing many resources to ensure a successful program. Training for the zero-emissions transition will include:

- Utilization of the Palm Tran training department.
- Utilization of OEM training staff.
- Utilization of contract labor to supplement staff where needed.
- Development of new training materials.

- Utilization of training resources and partnerships from labor unions.
- Utilization and partnerships from the International Transportation Learning Center.
- Leverage existing monthly maintenance toolbox talks to reinforce zero emission safety principals and protocols.

Palm Tran does not currently anticipate displacement of the workforce. Some roles and responsibilities may need to be modified but those employees will be provided with the training necessary to be successful with their new tasks.

7.5 Next Steps

The workforce will all receive the proper training, coaching and refresher training to ensure they may continue to operate and maintain the Palm Tran fleet safely and provide a critical service to the capital area. However, in such a rapidly evolving field it is important to recognize that any workforce plan will be iterative in nature. It will improve, revisit, revise as the technology, programs and workforce does.

Palm Tran has an existing student employee program, the program provides an opportunity for both high school aged and college students to get hands-on experience at a transit agency. The program currently does not include maintenance as one of the areas that will receive a student worker or intern. The program should add a position to extend the program to the maintenance program, to help grow interest in trade and electrical engineering positions.

Opportunities for partnership include Palm Beach State College, a two-year public college. Palm Beach State College currently offers Diesel Service, Heavy Equipment Service, Electrical Power Technology and Alternative Energy Engineering Program. A program should be created specifically for dealing with battery operated heavy-duty vehicles, including buses. As well expand the program scope for the Electrical Power Technical and the Alternative Energy Engineer Program. This will not only service Palm Tran but also other local entities as there is considerable federal money allocated in the Bipartisan Infrastructure Act towards school buses, electrical infrastructure, and reliance. Palm Tran can also look to establish a similar program to the current one at Miami Dade College, Advanced Automotive Service Technology Tesla Technician, but for battery electric buses.

8.0 Appendix

Appendix A: Palm Tran System Map - Insets

