HILLSBOROUGH TPO

ELECTRIC VEHICLE

INFRASTRUCTURE PLAN

Existing Conditions Report

February 2023

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"Car charging in downtown Tampa." Credit: Ryan Casburn, Kittelson & Associates, Inc.

KEY TERMS AND DEFINITIONS

Terms	Definitions
Electric Vehicle (EV)	A vehicle powered by one or more electric motors for propulsion. This plan focuses on BEVs and PHEVs, both of which can be plugged in and recharged from external sources of electricity.
Battery Electric Vehicles (BEVs)	Also known as "all-electric vehicles", BEVs are powered only by electricity battery and are charged by an external power source.
Plug-in Hybrid Electric Vehicles (PHEVs)	PHEVs have an electric battery that operates an electric motor in addition to a gasoline tank that fuels a gasoline motor. The electric battery can be plugged in to recharge and the gas tank can be refilled.
Hybrid Electric Vehicles (HEVs)	HEVs have an electric battery that operates an electric motor AND a gas tank that fuels a gasoline motor. The gas tank can be refilled, but the electric battery cannot be plugged in to charge.
Fuel Cell Electric Vehicles (FCEVs)	FCEVs use hydrogen to power an electric motor.
Vehicle-to-Grid (V2G)	Also known as Vehicle-to-home (V2H) or Vehicle-to-load (V2L), it describes a technology that enables energy to be pushed back to the power grid from the battery of an electric car using bi-directional charging equipment.
Electric Vehicle Supply Equipment (EVSE)	EVSE provides for the transfer of energy between the electric utility power and the EV. EVSE includes EV charge cords, charge stands (residential or public), attachment plugs, vehicle connectors, and protection.
Electric Vehicle Service Provider (EVSP)	Also referred to as EV supply vendors, EVSP delivers end-to-end EV charging, handling charging station installation, operations and maintenance.
Zero-Emission Vehicle (ZEV)	ZEV is a vehicle that does not emit exhaust gas or other harmful pollutants from the onboard source of power during vehicle operation. BEVs, PHEVs, and FCEVs qualify as ZEVs.

PLAN OVERVIEW

Introduction

The popularity of electric vehicles (EVs) has increased significantly in recent years and many are now expressing interest in this new travel option, with special interest in where and how these EVs can be charged. The Hillsborough Transportation Planning Organization (TPO) is developing this Electric Vehicle Infrastructure Plan (Plan) to provide a framework for developing widespread, convenient, and accessible EV charging in Hillsborough County. As EV technology evolves, this Plan is intended to adapt and help the TPO continue to meet the needs of residents, workers, and visitors. The development of this Plan will empower the TPO to access funding opportunities, inform the TPO's long range planning efforts, and provide near term goals and guidance to support communities in accessing EV technology and experiencing the benefits of EVs. This Plan is intended to complement the work of the HART Zero-Emission Fleet Transition Plan (adopted in 2022), FDOT's Electric Vehicle Infrastructure Master Plan (adopted in 2021), and other work by regional and national agencies.

Figure 1: Desired Outcomes of EV Plan

Help Communities Experience Benefits of EVs

Inform Planning

Access Funding Opportunities

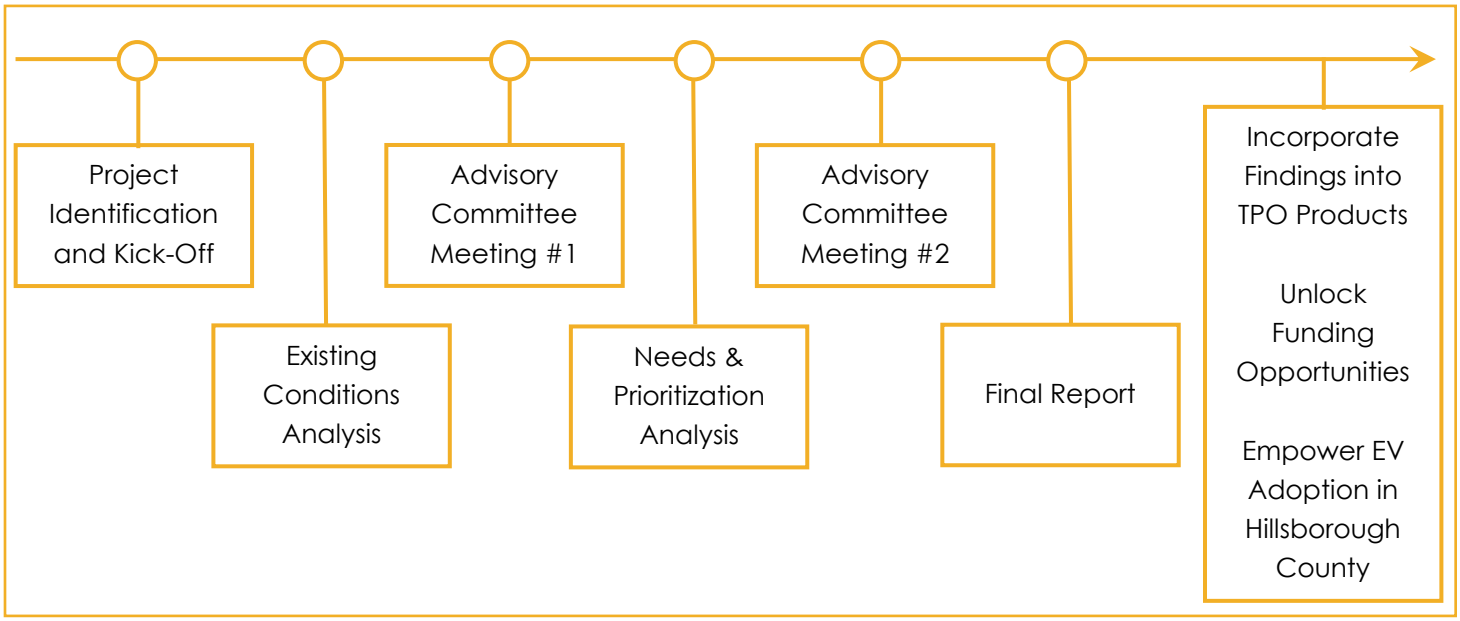
The development of this Plan occurs at a time when EVs are trending and being adopted throughout Hillsborough County, the country, and world. In 2021, there were about 6,000 registered EVs within the County's overall total of 1 million registered vehicles (0.006%). However, various forecasts anticipate EV adoption to range from about 5 - 30% of total vehicles by 2035. Beyond 2035, some agencies envision even greater numbers of private vehicles transitioning to EVs (the City of Orlando sees 80% of light-duty vehicles being EVs in 2050). Hillsborough County must prepare for the increasing presence of EVs.

EVs promise a slew of benefits to owners and the community, but residents and visitors in Hillsborough County also face barriers to adoption. One key barrier is a lack of visible charging infrastructure. People are used to seeing gas stations on the corners of their neighborhood but may not see places where they can recharge their EV. This Plan is intended to evaluate the existing charging infrastructure in Hillsborough County and identify gaps that can be addressed.

Timeline

Hillsborough TPO is developing this Plan with the support of an Advisory Committee made up of local agencies and with the participation of various stakeholders. An overview of the process is shown below.

Figure 2: EV Plan Development Process



"Timeline of Plan Development Process with Meetings and Major Documents Highlighted"

The existing conditions, documented in this report, are intended to provide a baseline understanding of the existing infrastructure and needs in Hillsborough County. The future work in this Plan will build upon the existing conditions to identify next steps to resolving needs.

"Cars charging at DC Fast Charging Station in Hillsborough County"

Fundamentals of Electric Vehicles & Charging Infrastructure

Benefits of Electric Mobility

EVs offer numerous benefits to owners of and to communities where EVs are driven.

Figure 3: Benefits of EV Adoption

Reduced Fuel Costs

EVs can save owners about 60% of fueling costs compared to gasoline vehicles[1].

Reduced Emissions

According to the United States Environmental Protection Agency (EPA) in 2020, transportation accounted for 27% of greenhouse gas (GHG) emissions in the US. Considering the total lifecycle of a vehicle (including manufacturing and driving) GHG emissions for EVs is about half of emissions from gas powered vehicles[2]. Reduced emissions means healthier air, especially along busy corridors or industrial areas. Additionally, under a proposed rule from the Federal Highway Administration (FHWA) MPOs will need to set declining targets for on-road greenhouse gas emissions. EVs may help achieve these targets. This proposed rule aligns with Executive Orders to reach net-zero targets and tackle the climate crisis[3].

Reduced Maintenance Cost

With fewer moving parts, the maintenance cost of EV is about half as much over the life of the vehicle, saving owners about $4,600 over the life of the vehicle[4].

Backup Power Supply

EVs have the potential to serve as back-up power for personal use when electricity service is disrupted through a technology called "vehicle-to-grid". Using bi-directional charging equipment, EVs can operate as a battery and provide electricity back to the electrical grid on the local level. This could be used in places with frequent power disruptions, during storm-related power outages or other emergencies, or to balance out electricity generation from renewable sources like solar. Some vehicles are already equipped with this technology and larger-scale applications are being piloted[5].

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[1] Harto, C. (2020, October). *Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers.* Consumer Reports. https://advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf (Note: The exact savings are dependent on fluctuations in gas prices, electricity prices, and how much charging is done at home (where charging tends to be cheaper).

[2] International Energy Agency. (2022, October 26). *Comparative life-cycle greenhouse gas emissions of a mid-size BEV and ICE vehicle*. https://www.iea.org/data-and-statistics/charts/comparative-life-cycle-greenhouse-gas-emissions-of-a-mid-size-bev-and-ice-vehicle

[3] FHWA. (2022, July 7). FHWA. *Biden-Harris Administration Takes Step Forward to Combat Climate Change, Announces Proposed Transportation Greenhouse Gas Emission Reduction Framework*. https://highways.dot.gov/newsroom/biden-harris-administration-takes-step-forward-combat-climate-change-announces-proposed

[4] Preston, B. (2020, September 26). *Pay Less for Vehicle Maintenance with an EV.* Consumer Reports. https://www.consumerreports.org/car-repair-maintenance/pay-less-for-vehicle-maintenance-with-an-ev/

[5] Duke Energy. (2022, August 16). *Illuminating possibility: Duke Energy and Ford Motor Company plan to use F-150 Lightning electric trucks to help power the grid.* https://news.duke-energy.com/releases/illuminating-possibility-duke-energy-and-ford-motor-company-plan-to-use-f-150-lightning-electric-trucks-to-help-power-the-grid

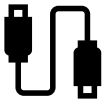
Barriers to Adoption

To encourage EV adoption, barriers that impede the progress toward electrified transportation must be acknowledged and addressed. Such barriers can be related to fundamental policies, access to vehicles and charging infrastructure, public charging experience, and utility support. Figure 4 describes several barriers to EV adoption.

Figure 4. Barriers to EV Adoption

EV Purchase Price

EVs typically have higher up-front purchase prices[1]. However, cost parity between new gasoline vehicles and EVs is anticipated in the mid-2020s[6]. More electric vehicles are becoming available as used vehicles, but in general gasoline powered vehicles remain more prevalent and available at lower prices.



EV Charging Access

EV charging infrastructure is not as visibly common or evenly distributed as gas stations. Charging may be even more challenging for those living in multi-family dwellings who may not have access to home charging. For long-distance trips, EV drivers may need to plan their route and destination with consideration of available charging infrastructure.

Lack of Education

EV technology has been rapidly developing, but education related to EV charging advancements can leave many confused, misinformed, and with a lack of trust. Potential misperceptions surround EV pricing, range, charging infrastructure, maintenance costs, and reliability.

Types of Electric Vehicles

Sometimes the term "electric vehicle" is used to describe several different types of vehicles. The types, features, and performance characteristics of several EVs include:

- **Battery Electric Vehicles (BEVs):** These vehicles operate only on an electric battery and are also known as "all-electric vehicles". BEVs are powered only by electricity and are charged by an external power source. BEVs have a very large battery and can travel between 150 and 400 miles on a single charge[7]. Some popular models of BEVs include Tesla Model 3, Nissan Leaf, and Rivian delivery vans.
- **Plug-in Hybrid Electric Vehicles (PHEVs):** These vehicles have an electric battery that operates an electric motor in addition to a gasoline tank that fuels a gasoline motor. The electric battery can be plugged in to recharge and the gas tank can be refilled. PHEVs consume 14 - 47% less fuel than conventional vehicles when their batteries are fully charged[8]. Using just the battery and electric motor PHEVs can travel between 20 and 40 miles on a single charge[7], but in the absence of electricity, PHEVs can also operate on gasoline. Some popular models of PHEVs include Chevrolet Volt, Chrysler Pacifica, and Ford Fusion Energi.

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[6] City of Orlando (n.d.). *Orlando's 2030 Electric Mobility Roadmap*. Retrieved January 4, 2023, from https://www.orlando.gov/files/sharedassets/public/departments/sustainability/21_exo_emobility-roadmap_020322_pages.pdf.

[7] Alternative Fuels Data Center: Electric Vehicles. (n.d.). *Electric vehicles*. Retrieved January 4, 2023, from https://afdc.energy.gov/vehicles/electric.html.

[8] Charge Together Fleets. (2020, April 17). *Electric vehicles introduction*. Retrieved January 4, 2023, from https://fleets.chargetogether.org/article/introduction/. This is the main source of information, unless otherwise noted.

- **Hybrid Electric Vehicles (HEVs):** These vehicles have an electric battery that operates an electric motor AND a gas tank that fuels a gasoline motor. The gas tank can be refilled, but the electric battery cannot be plugged in to charge. The battery is typically smaller than the battery for PHEVs. Some popular models of HEVs include Toyota Prius and Ford Maverick.
- **Fuel Cell Electric Vehicles (FCEVs):** These vehicles use hydrogen to power an electric motor. They are not very common for use as a personal vehicle, but are gaining traction for commercial uses such as buses and long-haul trucks. Similar to gasoline powered vehicles, FCEVs have a tank that is filled with Hydrogen at a centralized station (similar to a gas station).

These vehicles are currently used in Hillsborough County or may be used in the near future. This Plan considers charging infrastructure for BEVs and PHEVs, which will be referred to as "EVs" in this Plan. The characteristics of these vehicles affect how Hillsborough County can prepare for and develop a supportive charging infrastructure for all residents and visitors.

Charging Infrastructure Overview

Many people are familiar with refueling an internal combustion engine (ICE) vehicle with gasoline, but how does an EV without a gas tank get filled? Recharging an EV is not too different from recharging the battery on a phone, laptop, or any other electronic device. Similar to all of these devices, there is a cable that connects the vehicle to a power source to allow for the movement of electrical current (an EV can even be plugged into a regular wall outlet in a house!).

A few key considerations for EV charging include:

1/ Charging Speeds (Referred to as "Levels")
2/ Types of Connectors
3/ Charging Venues
4/ Ownership Models for Public Charging Stations

These considerations are important for Hillsborough TPO to understand existing conditions of charging infrastructure and the opportunities to develop charging infrastructure that meets the needs of the community.

Levels of Charging Infrastructure

There are different types of chargers that charge EVs at different speeds. EVs can charge at three "levels", each of which carries a different amount of electricity, measured using kilowatt-hours (kWh). Simply stated, the larger the kWh, the faster electricity is refueling the EV. The three levels of charging are described in Table 1.

Level 1 charging equipment can be publicly available, but it is frequently associated with at-home charging using a standard wall outlet. Level 2 charging equipment is found at public charging stations and can also be installed in residential settings. Level 3 charging equipment, also known as DCFC equipment, is typically only available at public charging stations.

Table 1: EV Charging Levels and Associated Energy Needs and Charging Speeds

Charging Level	Alternating Current (AC)	Charging Rate (Kilowatts per hour)	BEV Charging Time (hours)[9]	PHEV Charging Time (hours)[9]	Miles Per Hour of Charge*
Level 1 (L1)	120V	1.9	40-50h	5-6h	3-5
Level 2 (L2)	240V (residential) or 208V (commercial)	19.2	4-10h	1-2h	12-50
Direct Current Fast Charger (DCFC or L3)	NA	50-350	0.4-1.25h	NA	75-300

* When comparing charger types, rather than a vehicle's driving range, it's helpful to consider how much energy is being stored (kW) because the driving range also depends on the vehicles efficiency.

Types of Charging Connectors

As charging equipment has developed, different charging connectors have emerged from different vehicle manufacturers due to a lack of regulatory standards as well as proprietary technologies. The different vehicle ports are shown in Figure 5. This results in needing multiple connectors at charging stations. The types of connectors that are typically available at charging stations are shown in Table 2 by the Level of the charging station.

For L1 and L2 charging, an SAE J1772 EV connector type is the most common connector. Almost all EVs in the United States and Canada can be charged using this type of connector, including Tesla cars with an adapter. Similarly, non-Tesla EVs can connect to Tesla L2 chargers using an adapter.

For L3 charging, three connector types are used: CHAdeMO, SAE Combo CCS, and Tesla Supercharger. Unlike L2 charging, these connectors are not interchangeable. For example, a vehicle with a CHAdeMO port can only use a CHAdeMO connector at an EV charging station[10].

Figure 5: Different Charging Standards Used by Manufacturers

SAE Combo CCS (L1, L2, and DCFC) used by many manufacturers including Ford, GM, and Honda.

Credit: WMrapids from Wikimedia

CHAdeMO (DCFC) and SAE J1772 (L1 and L2) used by Nissan and Mitsubishi

Credit: CleanTechnica

Tesla Supercharger (L1, L2, and DCFC) used by Tesla

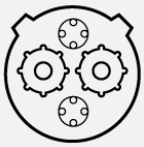
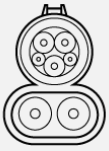
Credit: everythingsticker from Etsy

[9] U.S. Department of Transportation. (n.d.). *Electric vehicle charging speeds*. Retrieved January 4, 2023, from https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds#:~:text=Level%201,vehicle%20(PHEV)%20from%20empty.

[10] Charge Hub. (n.d.). *Definitive guide on how to charge an electric car*. Retrieved January 4, 2023, from https://chargehub.com/en/electric-car-charging-guide.html.

"DC Fast Charging Station with CCS and CHAdeMO Connectors"

Table 2. Types of Charging Connectors by Charging Level

Charging Level	Station Example	Connector	Wall Plug
L1	 Credit: CleanTechnica	 Port J1772  Tesla HPWC	 Nema 515, Nema 520
L2			 Nema 1450 (RV plug)  Nema 6-50
L3		 CHAdeMO  SAE Combo CCS  Tesla Supercharger	-

Charging Locations

For internal combustion engine (ICE) vehicles that are powered by gasoline, typically gas stations are the only option for refueling. EVs offer the opportunity to refuel at just about any place where electricity is available. Charging locations can be divided into three categories: At-Home Charging, Workplace Charging, and Public Charging. Charging stations in each of these locations have unique considerations. Some of the installation considerations specific to the location of charging infrastructure are included in Table 3. In addition to these considerations, installation of charging infrastructure typically requires cooperation with the local electricity provider, adherence to local zoning codes and parking requirements, and stakeholder participation.

Data from the EV Project and the ChargePoint America project, launched by US Department of Energy, suggests that 98 percent of charging happens at home or at the workplace for those with access to both home and workplace charging[11]. According to the US Department of Energy, more than 80 percent of EV charging is performed at home. An estimated 30% of EV drivers rely on workplace charging for most of their charging. This indicates that workplace charging is important for those without access to home charging or those with longer commutes that cannot be completed on one charge.

Charging cost at workplaces can differ based on the workplace charging program. Typically, public charging costs more than workplace charging or at-home charging.

This Plan is focused on Workplace Charging and Public Charging. However, due to the frequency of use of At-Home Charging, it is also very important to consider when planning for charging stations located in either workplaces or other public locations.

Table 3. Charging Installation Considerations for Different Contexts

Context	Charging Type	EV User Charging Costs	EV Charging Provider Costs Installation Considerations
At-Home Charging	L1 or L2	Vary by seasons, individual plan costs, peak versus off-peak adjustments, and incentives or rebates provided by local electricity providers. (FL residential cost – 12.12 cents/kWh as of Oct. 2021)[12].	• State or utility incentives • Safety-certified equipment • Adequate electrical capacity for vehicle charging • Local requirements • Codes and standards at all levels (e.g. National Electrical Code)

[11] Smart, J. G., & Salisbury, S. D. (2015). *Plugged In: How Americans Charge Their Electric Vehicles*. United States. https://doi.org/10.2172/1369632.

[12] US Energy Information Administration (EIA). (n.d.).Electric Power Monthly. Retrieved January 4, 2023, from https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a.

Context	Charging Type	EV User Charging Costs	EV Charging Provider Costs Installation Considerations
Workplace Charging	L1, L2, or DCFC	Vary by the adoption of a workplace charging program and relevant fee schedule.	• Employee survey for workplace charging • Employers' sustainability portfolio • Management of workplace charging (administration, registration and liability, station sharing, pricing) • Federal, state, and utility incentives
Public Charging	L2 or DCFC	Vary by network and pricing structures. E.g. Electrify America network in FL - 43 cents/kWh (regular rate), 31 cents/kWh (member discounted rate: $4 monthly membership fee)[13].	• Peak demands • Membership programs • Garage locations/paid parking • Nearby amenities • Zoning, codes, and parking ordinances • Charging infrastructure costs and maintenance

Finding EV stations may seem tricky, but there are apps and websites to help identify locations and signage to clarify station location. PlugShare and ChargeHub identify stations and give an opportunity to review stations or leave notes for other EV drivers. These tools and others can also allow EV drivers to see if charging ports are available in real time, or if they are currently occupied. Some sample signage for EV charging are shown in the image below.

How do you navigate to and identify charging stations?

"How do you navigate to and identify charging stations? With Wayfinding Signage and Station Markings"

[13] Electrify America. (n.d.). *Pricing and plans for EV charging*. Retrieved January 4, 2023, from https://www.electrifyamerica.com/pricing/.

At-Home Charging

At-home charging can be accomplished with L1 or L2 equipment. For EV owners interested in faster charging, L2 equipment can be installed, typically by the vehicle manufacturer. Generally, the cost of charging an EV at home is in alignment with typical home energy costs but is subject to the considerations included in **Table 3**. Typically, overnight charging is most cost-effective, as electricity demand usually dips during the nighttime. Increasingly, utility providers are developing special rates to incentivize off-peak charging for EV owners at-home. The image to the right displays a typical at-home EV charging system for L2 equipment.

"Typical At-Home EV Charging"

Workplace Charging

Workplace charging can be provided as an amenity for employees in company parking lots or garages that increases the convenience and affordability of driving electric vehicles. Workplace charging stations can utilize L1, L2, or L3 equipment, depending on the company's needs. Prior to the installation of workplace charging, it is crucial to evaluate the goals and needs of current and potential EV drivers. Design considerations including enforcement of parking and charging fees may be simpler to resolve once a workplace charging program is determined to be right for an organization.

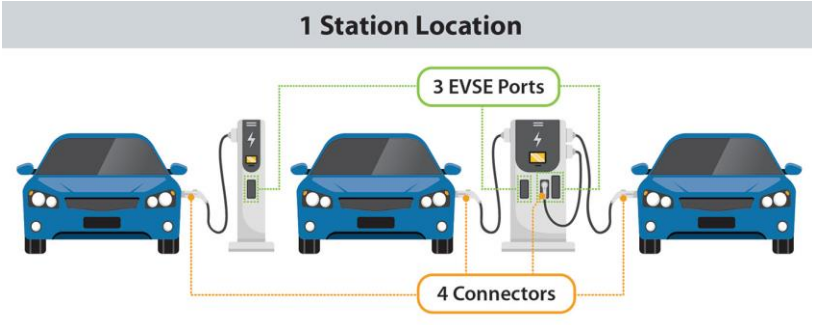
Public Charging

Public charging can be hosted and managed by a variety of agents, described further in the *Charging Infrastructure Ownership Models* section. Fees at some public stations are priced by kilowatt-hour (i.e., kWh, the amount of energy transferred to the EV's battery). For the most part, individual station owners set the charging prices. Thus, charging prices within the same network can vary by location. Public charging at some stations can be free. For instance, free charging is available at some retailers, such as Whole Foods, and many car dealers. However, the distant locations and limited hours of operation at dealership locations inhibit EV drivers from utilizing such perks. In addition, public charging prices can also be subscription-based. Members pay a membership fee and get to enjoy discounted charging rates at stations within the network. The image below features an example of a public charging station.

What is the difference between an EV station and an EVSE port?

Charging Port: A charging port provides power to charge only one vehicle at a time, but it may have multiple connectors. The unit that houses charging ports is sometimes called a charging post, which can have one or more charging ports.

Charging Station: A station location is a site with one or more charging ports at the same address such as a parking garage or a gas station parking lot.



Developing infrastructure to charge electric vehicles. Alternative Fuels Data Center. (n.d.). Retrieved January 19, 2023, from https://afdc.energy.gov/fuels/electricity_infrastructure.html.

"Examples of Public Charging Stations in Hillsborough County – DCFC Station, Parking Garage, and On Street"

Charging Infrastructure Ownership Models

Public and private efforts are both needed to meet the growing demand for EV charging. A variety of ownership models are used for charging deployments, many of which are still in their early stages.

Table 4 summarizes the roles of electric vehicle service providers (EVSPs), also referred to as EV supply vendors, and station hosts, as well as the distribution of revenues in four ownership models: charging as a service, outright purchase, EVSP owned, and hybrid owned. Among the four models, "charging as a service" and "outright purchase" are most common models in today's market.

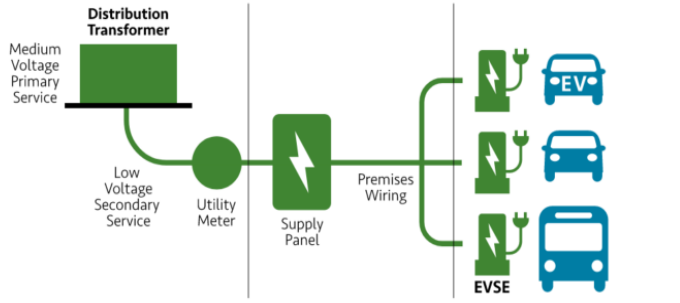
Regarding the costs of stations, an L1 station is approximately $600 per unit; an L2 station is around $2,000 per unit; and the cost of an L3 station is comparatively high, ranging from $50k to $100k. In "charging as a service" and "EVSP-owned" models, the EVSP owns and maintains charging stations and is responsible for the deployment cost. In the "outright-purchase" model, the deployment and maintenance costs are the responsibility of the station host. Rather than having one party responsible for the station cost, all costs and revenues are shared between EVSP and the station host in the "hybrid owned" model.

Figure 6 displays the different roles of providers and station hosts in different contexts.

Table 4. Charging Infrastructure Ownership Models

	Electric Vehicle Service Provider	Station host	Revenue
Charging as a Service	• Deploys the charging station • Owns, maintains, and operates the station • Leases charging equipment to the station host • Provides management services and may include add-ons such as proactive maintenance, monitoring, and driver support services	• Responsible for providing the initial real estate • Enters into a term-based agreement with the EVSP for the use of the land	May be shared between the station host and the EVSP
Outright Purchase	• May be contracted to install the station • Be paid on a subscription basis to maintain and operate the charging station • May switch the maintenance contract after several years due to the increase in maintenance costs	• Owns the charging station equipment • May choose to maintain and operate the equipment themselves	Received by the station host
EVSP Owned	• Owns, operates, maintains, and administers the charging equipment	• May not be involved, if the EVSP owns the land	A portion of the revenue may be shared with the site host
Hybrid Owned	• Costs are shared with the station host • Typically pays costs associated with equipment installation, operation, maintenance, and administration	• Costs are shared with the EVSP • Typically owns the property and pays make-ready costs	Shared between the station host and the EVSP

Figure 6. Roles of Providers and Station Hosts



	UTILITY SERVICE	PREMISES WIRING	EVSE
1. Traditional	Electric Company	Customer	
2. Make Ready	Electric Company		Customer
3. EVSE Only	Electric Company	Customer	Elecric Company
4. Full Ownership	Electric Company		

Potential Partners	Key Roles in EVSE Installations: Electricity Provider	EVSE Operator	EVSE Owner	Site Host
Utility	x	x	x	
Charging Network Provider		x	x	
Property Owner		x	x	x
Tenant		x	x	x

Public agencies should consider some of the following questions when considering capital investments for EV infrastructure. This Existing Conditions report and the subsequent work through this Plan will help agencies answer these questions.

- What use cases for electric vehicles exist in the community? Which use cases should be prioritized when planning for EV charging infrastructure?
- What rate of adoption of EVs is expected under each use case?
- What opportunities does an agency have to influence the rate of adoption? This may be through the adoption or modification of plans or codes.
- How can EVs currently be charged? Are there gaps in the current charging network or unmet needs?
- Considering unmet needs, what type of place should the charging infrastructure be located at (grocery stores, main streets, employment centers, parks, or somewhere else)?
- Considering the type of place and the use case, what level of charging infrastructure should be provided? Is a Level 2 charger or a DCFC more appropriate?
- How can the EV charging station be funded? Is sufficient utilization expected, such that a private company might be able to install, maintain, and operate the station? Should the agency provide an incentive to install a charging station at a particular location?
- Should agencies expect to generate revenue through EV charging? How should the collected funds be used or accounted for?
- How can charging infrastructure and access to benefits from electric vehicles be distributed equitably? How can the equitable distribution of benefits be measured and ensured?
- How can agencies account for or mitigate negative externalities of EV adoption? Negative externalities may include: heavier vehicles posing a greater risk for vulnerable road users, opportunity cost of not investing in other projects due to directing funds towards EV infrastructure, or inducing more driving due to lowering the cost of operating EVs.

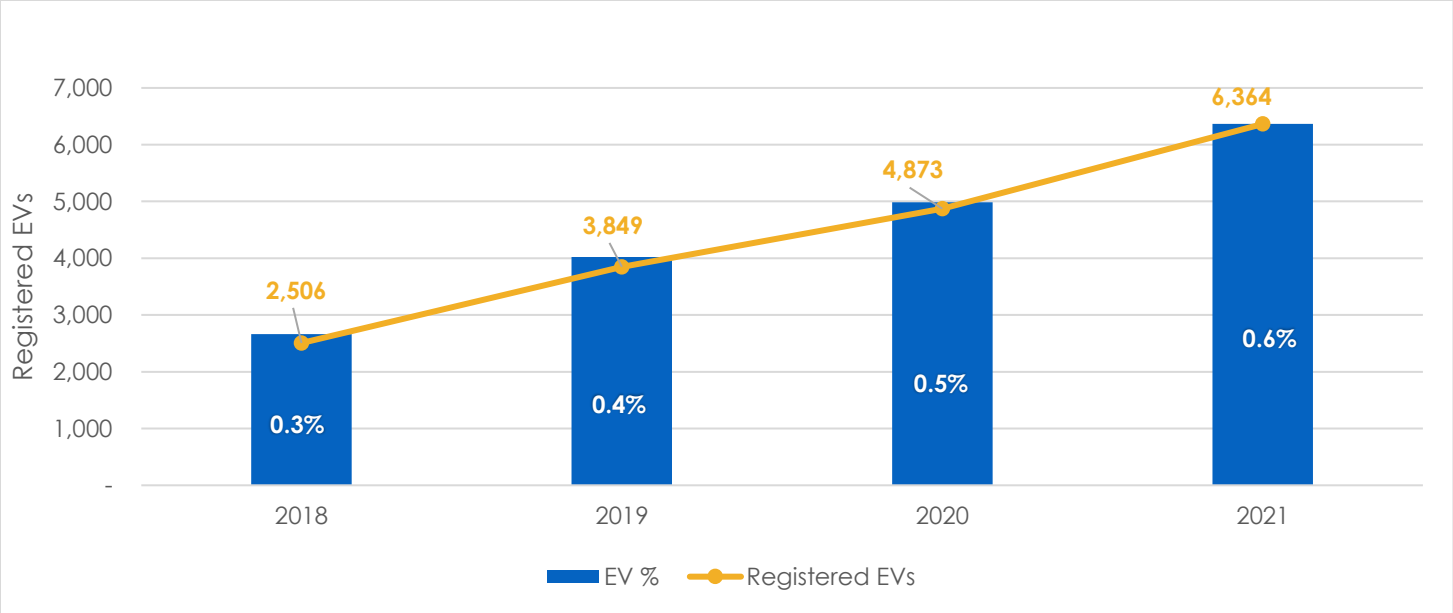
Electric Vehicle Adoption Trends

EVs have been adopted at an increasing rate in the last several years across the nation, but the growth rate of EV adoption in Hillsborough County has been relatively consistent.

Adoption in Hillsborough County

As depicted in Figure 7, there has been a steep rise in the EV registrations in Hillsborough County in recent years. Between 2018 and 2021, this number has grown by 154%, at an annual rate of 51%. Registered EVs, as a proportion of total registered vehicles in Hillsborough County, have increased from 0.3 % in 2018 to 0.6% in 2021. The EV adoption rate in Hillsborough is likely to continue increasing in the near future with the deployment of EV supply equipment and the EV transition of major auto manufactures.

Figure 7. Registered EVsin Hillsborough County, 2018 – 2021 (Data source: Altas EV Hub; Florida Department of Highway Safety and Motor Vehicles (FLHSMV))



Additionally, the Hillsborough TPO's planning area is one of nine major US metro areas where used EVs are selling faster than used conventional vehicles with internal combustion engines[14]. This major shift in the vehicle sales market indicates a growing need for charging that suits a variety of use cases.

Adoption in the United States

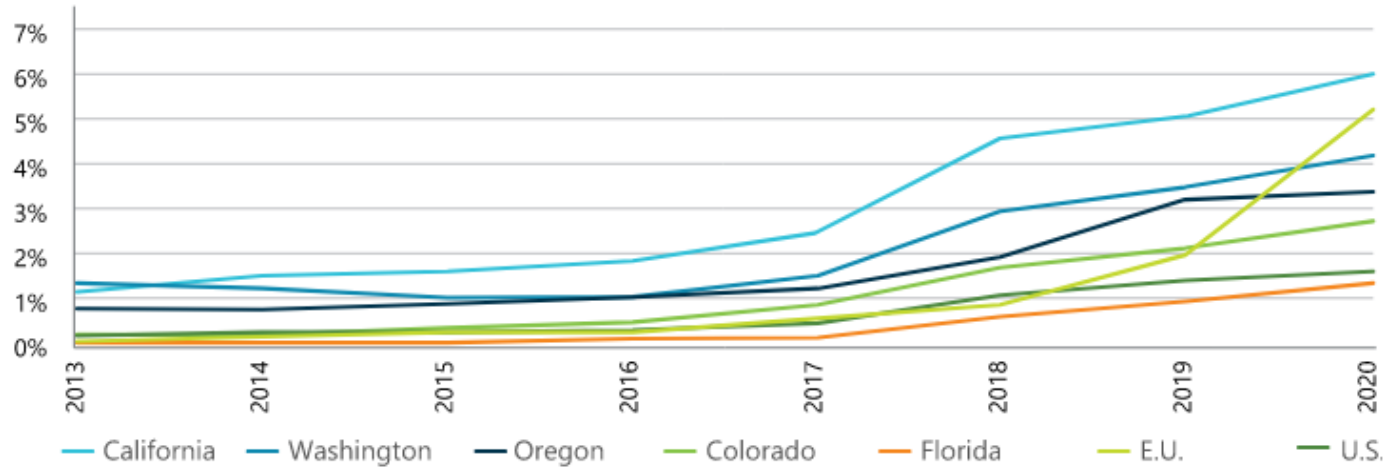
Electric vehicles have steadily gained momentum in the US over the past decade. The number of PHEVs and BEVs sold in the United States has exceeded 2.9 million since 2010[15]. BEVs represent 3.4% of the light-duty vehicles sold in the US, while EVs, in total, account for over 10% of all light-duty vehicles sold (including hybrid

[14] Zukowski, Dan. (July 29, 2022). *EVs are the Fastest-Selling Used Cards in 9 Major Metro Areas*. Smart Cities Dive.

[15] Argonne National Laboratory. (n.d.). *Light Duty Electric Drive Vehicles Monthly Sales Updates*. Retrieved January 4, 2023, from https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates.

and PHEVs)[16]. Figure 8 depicts this substantial growth across leading states in the US and in the European Union (EU) between 2013 – 2020, showing steady increases across the board.

Figure 8. Comparison of EV Sales in Various Markets, 2013 - 2020 (Source: FDOT EV Infrastructure Master Plan)



California leads the nation in EV sales largely due to its clean energy policies including the Advanced Clean Cars Program. Between January and September 2022, nearly 18% of new vehicles sold in California were zero-emission vehicles[17]. By 2035, all new passenger cars and trucks sold in CA must be zero-emission or EVs, by State Executive Order. As of August 2022, seventeen states have adopted California's zero-emission vehicle standards or low-emission vehicle standards, including Colorado, Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Jersey, Nevada, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, Washington, and the District of Columbia[18].

Florida has not adopted California's zero-emission vehicle standards or low-emission vehicle standards. However, the Florida Department of Agriculture has established goals for the amount of renewable energy produced in Florida to be at least 40% renewable by 2030, 63% renewable by 2035, 82% renewable by 2040, and 100% renewable by 2050[19].

Additionally, several regional consortiums have emerged to encourage the EV transition, including:

- Multi-State Zero-Emission Vehicle (ZEV) Task Force, established in 2013 to coordinate the deployment of EVs in California, Connecticut, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, Vermont.
- In 2020, Colorado, the District of Columbia, Hawaii, Maine, North Carolina, Pennsylvania, and Washington joined the task force to spur the transition for medium and heavy-duty EVs.

[16] US Energy Information Administration (EIA). (n.d.). *Electric vehicles and hybrids surpass 10% of US light-duty vehicle sales*. Homepage Retrieved January 4, 2023, from https://www.eia.gov/todayinenergy/detail.php?id=51218.

[17] California Energy Commission. (n.d.). *New ZEV sales in California*. California Energy Commission. Retrieved January 19, 2023, from https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales.

[18] Center for Climate and Energy Solutions. (August 2022). *US State Clean Vehicle Policies and Incentives*. https://www.c2es.org/document/us-state-clean-vehicle-policies-and-incentives/#:~:text=As%20of%20August%202022%2C%20fourteen,Vermont%2C%20Virginia%2C%20and%20Washington.

[19] Statewide Renewable Energy Goals, Rule 5O-5.002 (2022). https://www.flrules.org/gateway/RuleNo.asp?id=5O-5.002

- Regional Electrical Vehicle Plan for the West, a consortium created in 2017 and consisting of Arizona, Colorado, Idaho, Montana, New Mexico, Utah, and Wyoming with the goal of promoting a seamless EV charging network across the region's major corridors.
- Regional Electric Vehicle Midwest Coalition, established in 2021 to accelerate medium and heavy-duty fleet electrification in Illinois, Indiana, Michigan, Minnesota, and Wisconsin.

Adoption Estimates

Federal agencies and interest groups have assessed the expected rate of adoption to help with planning for EVs and to prepare other elements of the market. These adoption estimates vary widely and can inform the forecasting of EV adoption in Hillsborough County. Estimates from a selection of agencies are listed below and visualized in Figure 9:

- **United States:** By 2030, it is projected that half of all new vehicles sold will be ZEV[20], and that 26.4 million EVs will be on US roads[21]. The New York DMV reports about 1.9 Million standard registrations in 2018. Considering the number of standard registered passenger in 2018, the EV goal is about 21% of registered vehicles in 2030.
- **Florida**: In 2035, between 5 - 20% of light-duty vehicles are projected to be EVs[22].
- **City of Orlando**: In 2030, 30% of all light-duty registered vehicles in Orlando are projected to be electric. In 2050, 80% of all light-duty registered vehicles in Orlando are projected to be electric[23].
- **New York**: By 2025, 850,000 ZEVs are forecast to be in New York. By 2035, all new passenger vehicles sold in the state will be ZEVs. The New York DMV reports about 9.5 Million standard registrations in 2018. Considering the number of standard registered passenger in 2018, the ZEV goal is about 9% of registered vehicles in 2025.
- **New York City**: By 2030, 400,000 EVs are forecast to be in New York City[27]. The New York DMV reports about 1.9 Million standard registrations in 2018. Considering the number of standard registered passenger in 2018, the EV goal is about 21% of registered vehicles in 2030.
- **Oregon**: By 2030, 25% of registered light-duty vehicles and 50% of new light-duty vehicles sold are projected to be ZEVs. By 2035, 90% of new light-duty vehicles sold are projected to be ZEVs[28].
- **City of San Francisco:** By 2030, 25% of all private vehicles are EVs. By 2040, 100% of private vehicles are EVs[29].

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[20] U.S. Department of Transportation. (2022, February). *Charging forward: A toolkit for planning and Funding Rural Electric Mobility Infrastructure*. Retrieved January 4, 2023, from https://www.transportation.gov/rural/ev/toolkit

[21] Edison Electric Institute and the Institute for Electric Innovation. (2022, June). *EEI projects 26 million electric vehicles will be on US roads in 2030*. Retrieved January 4, 2023, from https://www.eei.org/News/news/All/eei-projects-26-million-electric-vehicles-will-be-on-us-roads-in-2030.

[22] FDOT. (2021, July). *EV Infrastructure Master Plan (EVMP)*. Retrieved January 4, 2023, from https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/fto/fdotevmp.pdf.

[23] City of Orlando (n.d.). *Orlando's 2030 Electric Mobility Roadmap*. Retrieved January 4, 2023, from https://www.orlando.gov/files/sharedassets/public/departments/sustainability/21_exo_emobility-roadmap_020322_pages.pdf.

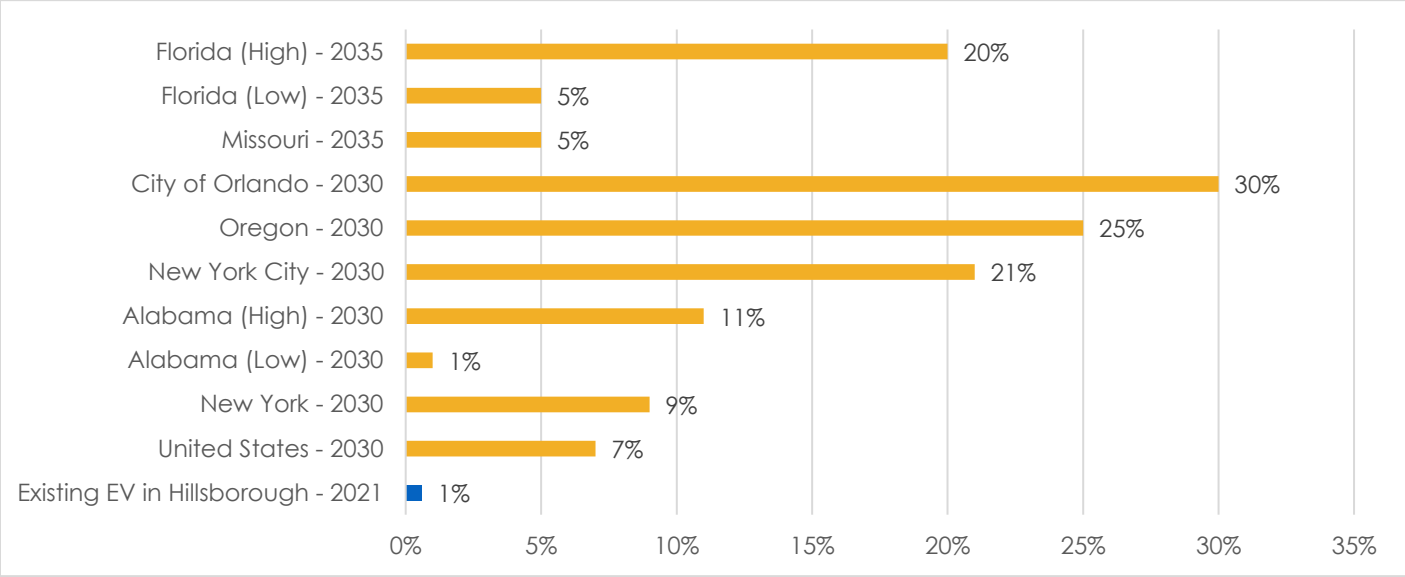
[27] NYC Mayor's Office of Climate and Sustainability, & NYC DOT. (2021, September). *Electrifying New York: An Electric Vehicle Vision Plan for New York City*. Retrieved January 4, 2023, from https://www1.nyc.gov/html/dot/downloads/pdf/electrifying-new-york-report.pdf

[28] Oregon Department of Transportation. (2022, August). *Oregon's Transportation Electrification Infrastructure Needs Analysis (TEINA)*. Retrieved January 4, 2023, from https://www.oregon.gov/odot/Programs/Documents/23021%20T031%20TEINA%20Report%20August%202022.pdf.

[29] Office of the Mayor. (2021, July 20). *San Francisco Adopts New Climate Action Goals*. City and County of San Francisco. https://sfmayor.org/article/san-francisco-adopts-new-climate-action-goals

- **Alabama**: In 2030, between 42,000 and 550,000 light duty vehicles are forecasted to be EVs[30]. The Alabama Department of Revenue reports about 5.1 Million passenger vehicle registrations in 2022. Considering the number of registered passenger vehicles in 2022, the EV goal is between 1 – 11% of registered vehicles in 2030.
- **Missouri**: In 2035, 5% of registered vehicles are forecasted to be EVs[33].

Figure 9. Estimated EV Adoption Rates in Various US Cities and States by Year



*Note: Reported values are for forecasts, goals, and legislative directive for different agencies. Some agencies have set goals of number of vehicles, which have been converted to portion of vehicles using available registration data.

"Charging an Electric Bus. Photo Credit: PSTA"

[30] Holmes, J. (2022, September 23). *Professionals preparing Alabama for surge in electric vehicles*. Alabama Political Reporter. Retrieved January 4, 2023, from https://www.alreporter.com/2022/09/23/professionals-preparing-alabama-for-surge-in-electric-vehicles/

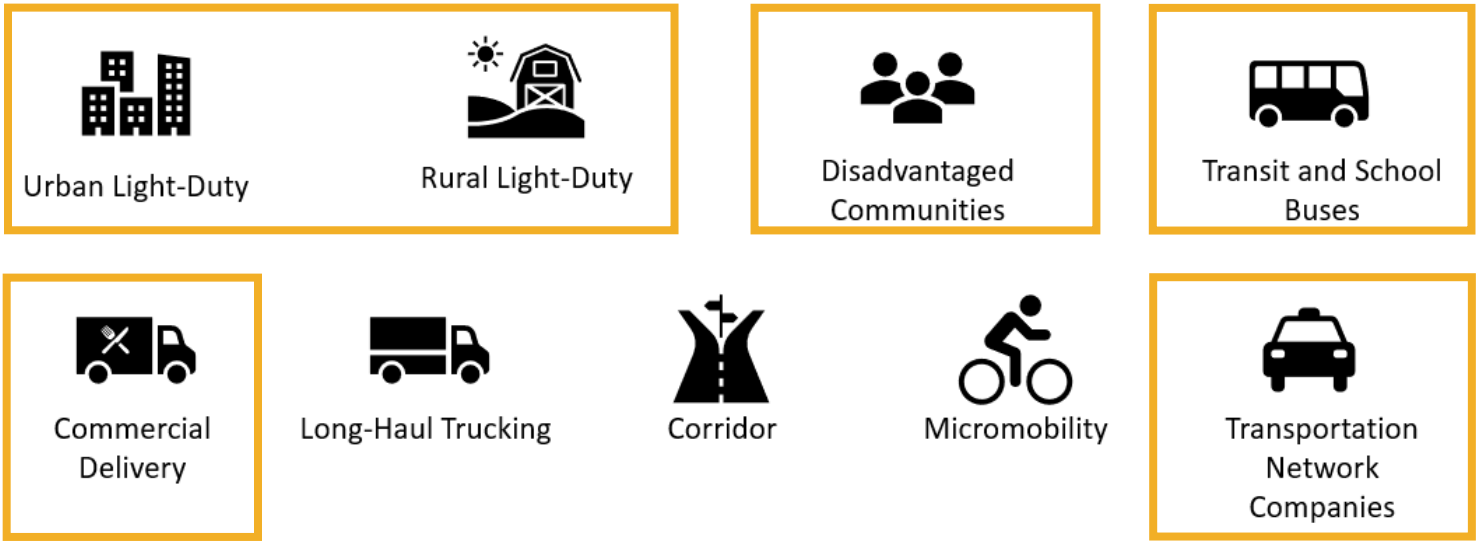
[33] Missouri Department of Transportation. (2022, July). *Missouri Electric Vehicle Infrastructure Deployment Plan*. Retrieved January 4, 2023, from https://www.modot.org/sites/default/files/documents/DRAFT%20FINAL%20MoDOT%20NEVI%20Deployment%20Plan%202022-07-28.pdf.

Electric Vehicle Use Cases

The opportunities and challenges that EVs present are varied in their contexts, applications, and solutions. This section will discuss how different 'use cases' for EVs can be understood, planned for, and supported in the coming years as the electrification of transportation continues to gain momentum. Key takeaways for each use case include charging considerations, such as location, accessibility, and appropriate charging level, as well as supportive policies for each.

Generally, nine use cases for EVs have been identified, and are displayed in Figure 10. These use cases include: Urban Light-Duty, Rural Light-Duty, Disadvantaged Communities, Transit and School Buses, Commercial Delivery, Long-Haul Trucking, Corridor, Micromobility, and Transportation Network Companies (TNC). The FDOT EV Infrastructure Deployment Plan is expected to largely address the Corridor use case by allocating federal funding to high activity corridors in Hillsborough County and throughout Florida.

Figure 10. EV Use Cases



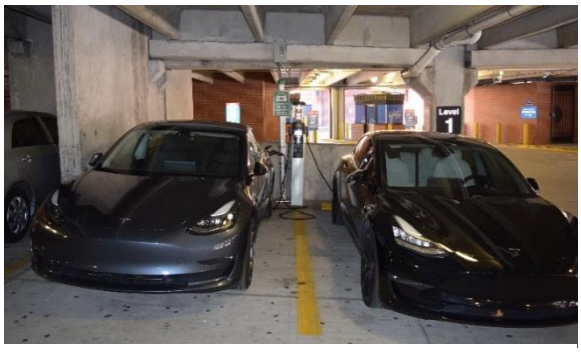
This Plan will discuss the following use cases that are relevant to Hillsborough County. The TPO selected these use cases in consultation with its partner agencies.

- Urban and Rural Light-Duty Vehicles
- Disadvantaged Communities
- Transit Buses
- Transportation Network Companies
- Commercial Delivery

Urban & Rural Light-Duty Vehicles

The Urban & Rural Light-Duty Vehicles use case considers the vehicles that individuals use for personal travel. These vehicles include sedans, SUVs, and pick-up trucks that are rented, leased, or owned.

More than 80% of EV drivers rely on home charging[35], as it tends to be cheaper and more convenient than charging at public stations. However, home charging is not always a viable or easy option, especially for people living in multifamily housing (such as apartments and condos) and for people who are renting their home.



"EVs Charging in a Parking Garage"

Recent research indicates that EV charging as an amenity is increasing in importance for renters[34]. For existing complexes and communities, property managers must analyze current electrical demand to determine existing network electrical loads, and then work with their utility provider to evaluate charging options. In new buildings, the US Department of Energy has recently adopted an International Code Council provision that requires apartment communities to provide EV charging infrastructure for up to 20% of spaces in lots with 25 or more parking spaces. For both retrofits and new builds, the Inflation Reduction Act of 2022 reinstated a tax credit for multifamily dwellings up to 30% of the cost of EV charging infrastructure installation. If at-home charging is unavailable, workplace and public charging is especially important. This Plan will focus on the determination of need for workplace and public charging stations and the identification of the types of places these charging stations should be prioritized.

Thus far in the lifespan of EVs, urban areas have tended to adopt at a higher rate than rural areas, however people living in rural areas can also benefit from EVs, which further underscores the importance of EV charging availability in rural areas. As described in the US Department of Transportation *Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure*, "In rural parts of the country – home to 20% of Americans and almost 70% of American's road miles – EVs can be an especially attractive alternative to conventional vehicles. Rural residents **drive more** than their urban counterparts, **spend more** on vehicle fuel and maintenance, and often have **fewer alternatives** to driving to meet their transportation needs."

However, the EV transition in rural areas must contend with significant adoption barriers, including upfront vehicle costs, geographic dispersion of EV drivers, utility pricing, upfront infrastructure costs (including electrical service capacity upgrades), and public awareness[35]. To address some of these issues, the USDOT recommends developing public charging stations in rural areas that promote economic development and community place-making to create attractive spaces that support local jobs, with training and employment opportunities for local workers to operate and maintain the charging station. Example locations in rural areas to consider installing charging infrastructure are near community assets like parks, preserves, and main street areas or corners. Additionally, the USDOT recommends designing and building rural charging stations with flexibility at the forefront, by using modular charging equipment to adjust as demand changes.

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[34] Lawrence, Robyn Griggs. (December 13, 2022). *Demand Soars for EV Charging at Apartments.* Smart Cities Dive.

[35] US Department of Transportation. (February 2022). *Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure.*

Disadvantaged Communities

Historically, many burdens of the transportation system are borne disproportionately by disadvantaged communities. In considering the development of EV technology and the investment of charging infrastructure, it is important to proactively ensure that the same pattern of burden distribution is not continued. Disadvantaged communities are identified two ways in this Plan:

- **Hillsborough TPO Nondiscrimination and Equity Plan**: The TPO identified the most underserved communities by considering a combination of social and demographic characteristics.
- **Justice40**: The Joint Office of Energy and Transportation (JOET) identified Census Tracts throughout the United States as disadvantaged as part of the Justice40 Initiative. The Justice40 Initiative is intended to identify and prioritize projects that benefit communities facing barriers to affordable, equitable, reliable, and safe transportation.

Consideration of disadvantaged communities is needed for several reasons, including:

- Lower-income households are more likely to buy higher-emitting and/or used vehicles because of their lower purchase costs, to hold onto these vehicles longer, and to bear a disproportionate burden of transportation-related air pollution compared with higher-income households[36].
- Transportation-disadvantaged households are more likely to live in multi-family dwellings, which may face increased barriers to accessing EV charging infrastructure.
- Public charging reliance can increase the monetary cost of recharging EVs, compared with at-home charging in a single-family dwelling[37].
- In accordance with the Justice 40 Initiative, 40% of eligible federal programs, including the National Electric Vehicle Infrastructure (NEVI) Program must benefit historically disadvantaged communities to repair and mitigate environmental injustices faced in the past.

To encourage equitable EV charging infrastructure development, the USDOT[38] recommends the following:

- Conduct meaningful community engagement in Disadvantaged Communities and Underserved Areas,
- Dedicate funding towards addressing the issues brought forward by stakeholders,
- Invest in transit electrification and affordable mobility options,
- Partner with local utility providers to identify necessary grid upgrades in equity communities,
- Offer assistance for navigating incentives programs to offset high upfront costs,
- Organize test drives to increase awareness,
- Design EV branding and wayfinding that is regionally consistent, and
- Adjust building codes to abolish parking minimums and require new parking is EV-equipped.

[36] RMI. (October 2022). *Increasing Equitable EV Access and Charging: A Path Forward for States – Recommendations for US Policymakers and Projected Impacts on Equitable Access to EV Adoption and Charging.*

[37] Dong-Yeon, L., Yang, F., Wilson, A., & Wood, E. (April 2022). *Electric Vehicle Infrastructure – Equity.* National Renewable Energy Laboratory.

[38] US Department of Transportation. (2022). *Equity Considerations in EV Infrastructure Planning.* Federal Highway Administration.

Commercial Delivery (Medium-Duty Freight)

The Commercial Delivery use case considers vehicles used to make deliveries or other short distance freight trips. The vehicles used for commercial delivery include box trucks and delivery vans, examples of which are displayed in the images below[39, 40]. These vehicles are typically owned by a company, which may have a fleet of similar vehicles. The vehicles typically return to their "home base" or "depot" at the end of each day.

"Examples of Electric Medium Duty Vehicles"

Delivery companies are beginning to replace gas-powered vehicles with electric or low-emission vehicles. UPS has ordered 10,000 electric delivery vehicles, Amazon is purchasing 100,000 EV vehicles, DHL reports zero-emission vehicles already make up 20% of its fleet with more to be added, and FedEx has pledged to have an all battery-electric delivery fleet by 2040. Delivery companies believe transitioning to electric vehicles will save money while simultaneously fighting climate change and reducing urban pollution[39].

Although medium- and heavy-duty vehicles only make up 5% of vehicles on the road, they produce 33% of the greenhouse gas emissions caused by transportation. They are a major source for air pollution, especially in communities near major freight facilities[41]. Electrifying these vehicles can therefore have an outsized impact on reducing greenhouse gas emissions and reducing air pollution.

Similar to light-duty vehicles, there are two main types of places commercial delivery vehicles charge. Delivery vehicles that use a fixed route and return to a home base each day, often charge at their home base, also called "depot charging". For some vehicles this is sufficient to complete all of the necessary routes. However, some vehicles also require "on-route charging" where they are recharged at least partly during the route or at a destination site, to extend the battery range for the whole route[41]. Depot charging is outside the purview of this EV plan, but on-route charging can be considered when developing public DCFC stations.

Some additional considerations can be made for allowing medium-duty vehicles to use public DCFC stations. These considerations may be more appropriate in areas with high freight activity or along corridors expecting

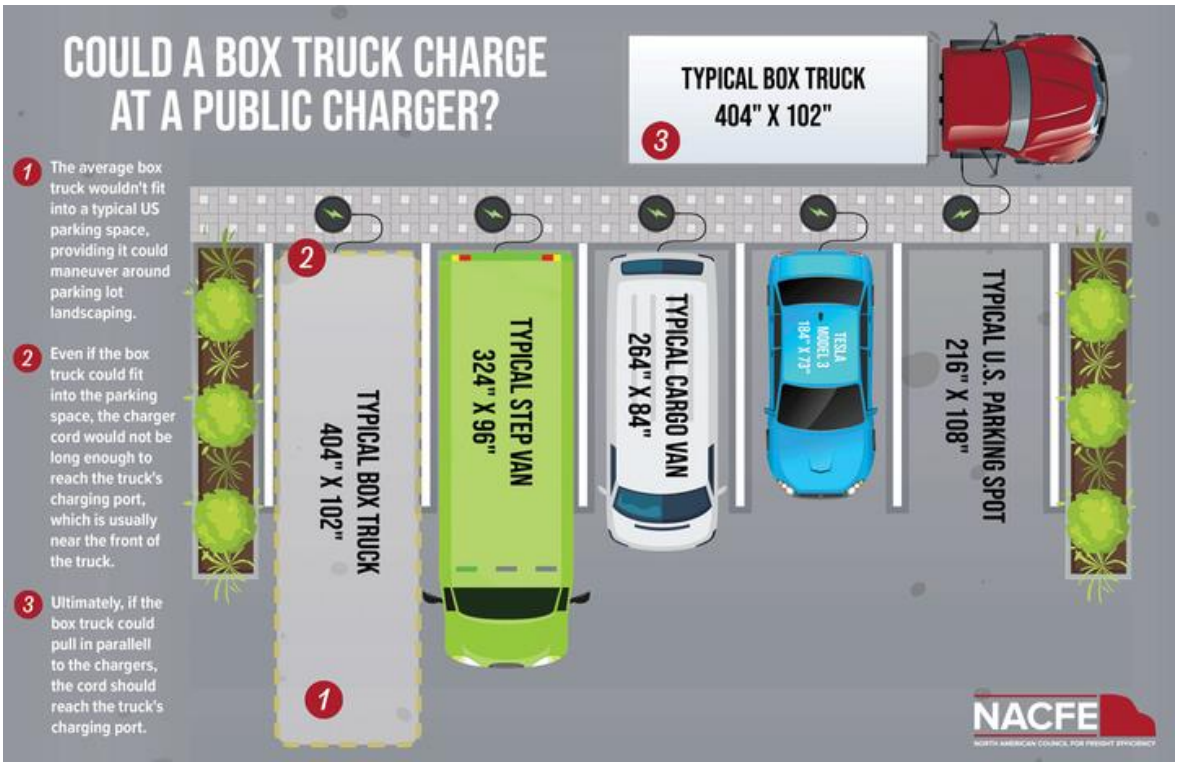
[39] Domonoske, C. (2021, March 17). From Amazon To FedEx, The Delivery Truck Is Going Electric. NPR. https://www.npr.org/2021/03/17/976152350/from-amazon-to-fedex-the-delivery-truck-is-going-electric

[40] Staff (2022, June 28). Benefits and Challenges in Electrifying Medium-Duty Box Trucks. Truckinginfo. https://www.truckinginfo.com/10175806/benefits-and-challenges-in-electrifying-medium-duty-box-trucks

[41] Pournazeri, S. (2022, April 28). Criteria to consider when siting EV charging infrastructure for medium- and heavy-duty vehicles. ICF. Criteria for EV Charging Infrastructure for Medium- and Heavy-Duty Vehicles | ICF.

to see higher freight activity. Figure 11 investigates whether a box truck could charge at a public charging station.

Figure 11. Considerations for Medium Duty Vehicles at Public Chargers[40]



The Tampa Bay Regional Freight Plan identifies some areas in Hillsborough County that have a high freight activity, as shown in Figure 12. Additionally, the City of Tampa has established truck routes in the City shown in Figure 13.

Figure 12. Freight Activity Centers (Inset from Tampa Bay Region Freight Plan)

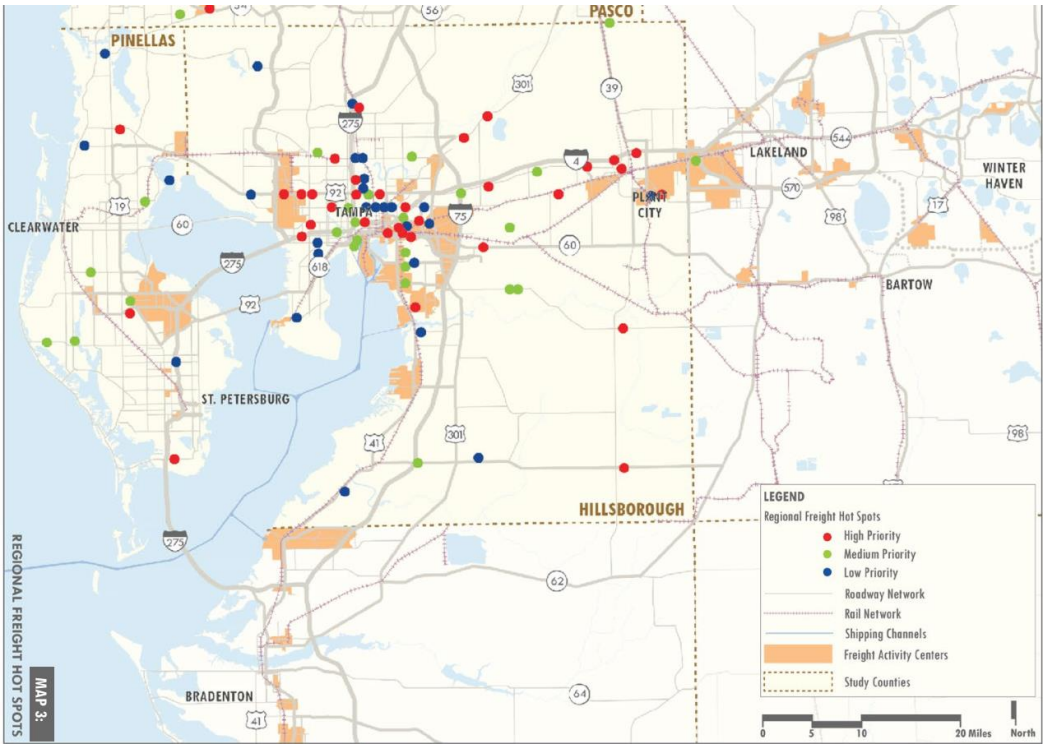
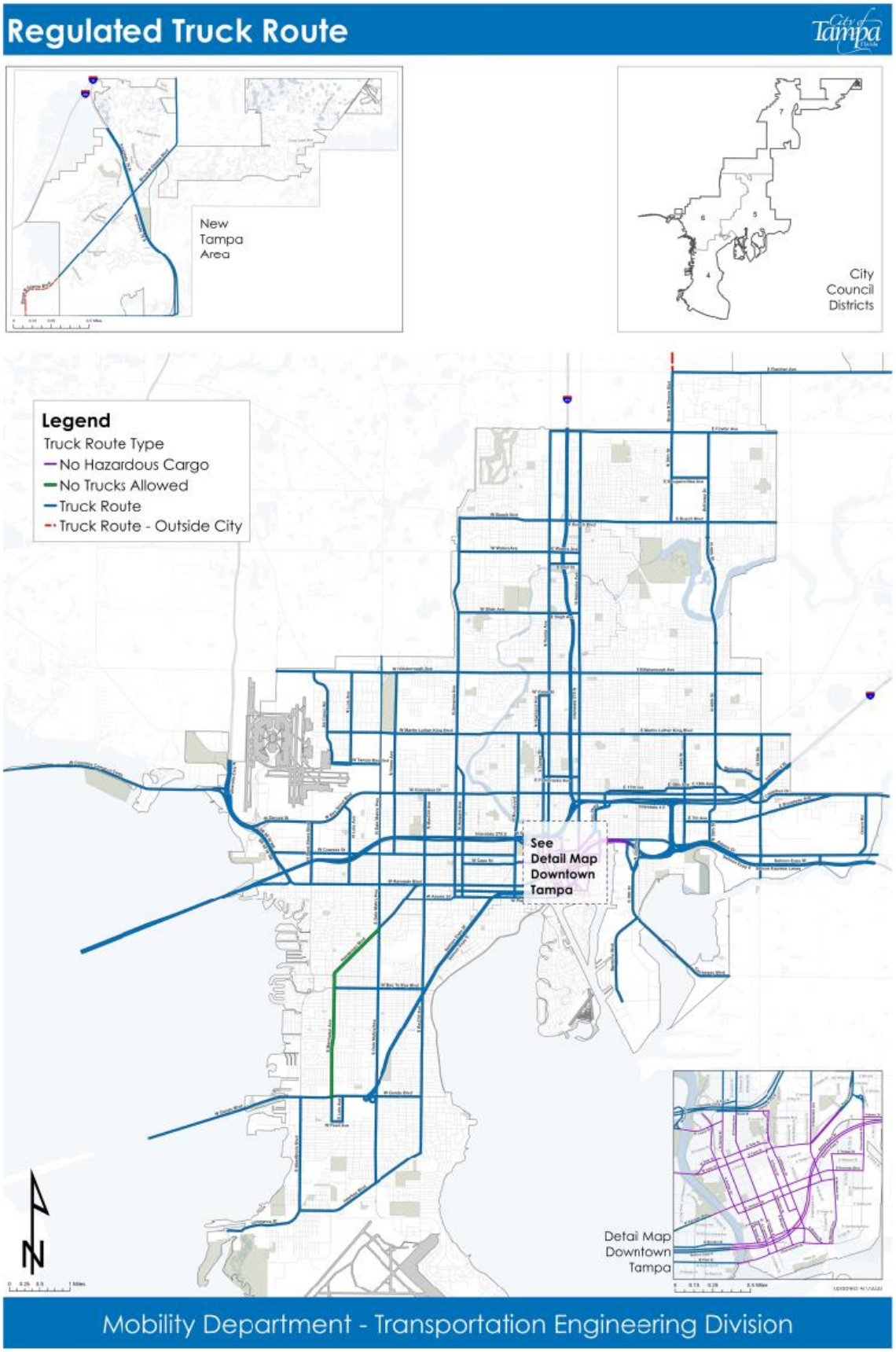


Figure 13. City of Tampa Truck Routes (City of Tampa)



Transportation Network Companies (TNCs)and Gig Drivers

Transportation Network Companies (like Lyft and Uber) and other Gig Companies (like Door Dash or Amazon Flex) contract with individuals to use light-duty vehicles to make deliveries or give rides. The vehicles used for this use case are typically like those used for the Urban & Rural Light-Duty Vehicles use case, but they tend to be driven more miles in a day and may have a greater need for on-route charging. The average driver travels about 35 miles per day compared to TNC drivers who may travel between 100 and 300 miles per day[42].

"Rideshare Loading Zone in a Parking Lot"

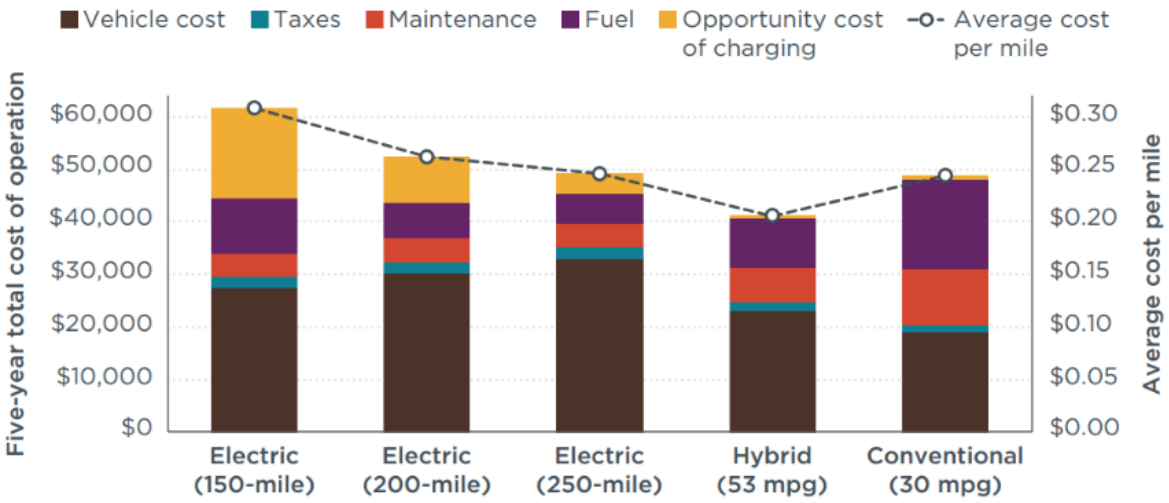
For these drivers, charging overnight while the vehicle is not in use is *not* expected to be sufficient to meet the daily driving requirements. On-route charging can close the gap for TNC drivers. Public fast charging is identified as reducing the opportunity cost for TNC drivers who must pause their workday to refuel their vehicle. As noted by one commenter on the Uber Driver Reddit page, long trips to areas without a DCFC station can result in drivers not being able to charge when they need to. Ensuring broad access to DCFC across the service area could mitigate this concern. To address this challenge, in 2019, a partnership between the City of Los Angeles, the Maven carshare platform, and Evgo fast charging network created the first rideshare-specific EV charging hubs[43].

Although EVs present some additional challenges for TNC and gig drivers, electrifying TNCs can also offer outsized benefits compared to other light-duty vehicles. Due to the longer distance travelled each day, EVs will tend to more quickly reach a breakeven point with the original purchase price. Additionally, in comparing personal vehicles used for rideshare or gig work with personal vehicles used exclusively for personal travel, electrification of rideshare and gig vehicles will have a more substantial impact on GHG emissions. Figure 14 visualizes the total cost of ownership for ridehail vehicles by fuel type.

[42] The Uber Driver's Subreddit. (2021, September 29) *How many miles do you drive per day?* Reddit. https://www.reddit.com/r/uberdrivers/comments/py320p/how_many_miles_do_you_drive_per_day/

[43] EVgo. (April 2019). *EVgo and General Motors' Maven Gig Introduce First in the Nation Public-Rideshare EV Fast Charging Hubs in Los Angeles.* https://www.evgo.com/press-release/evgo-and-general-motors-maven-gig-introduce-first-in-the-nation-public-rideshare-ev-fast-charging-hubs-in-los-angeles/

Figure 14. Total Cost of Ownership (TCO) for Ridehail Vehicles by Fuel Type



This figure presents data on the TCO of different ride-hail vehicles by fuel type excluding existing state and federal vehicle incentives. Without public subsidies, EVs have a higher TCO than conventional ride-hail vehicles.

For both TNC and gig drivers, EVs are coming, and coming fast. In the US, both Uber and Lyft have committed to electrifying their fleets in the coming years. Lyft has publicly committed to "achieve 100% electric vehicles across the Lyft platform by 2030", though not through forcing drivers to purchase EVs[44]. Uber has also publicly committed to phasing out internal combustion engine vehicles from its platform by 2030, with the aim to increase its fleet to 50,000 EVs in North America by the end of 2023[45]. Uber is also pursuing custom-built electric vehicles suitable for its rideshare and delivery services that reduce the purchase price to increase fleet transition[46]. With these ambitious targets in place, there is even more impetus for metro regions like Hillsborough County to facilitate the widely available and accessible installation of charging infrastructure. For the TNC and gig drivers use case, specific considerations related to EVs include:

/ Minimizing wait times and charge times reduces the opportunity cost of charging.
/ Fast charging should be available throughout the service area.

[44] Lyft. (2023). *Lyft Impact: Electric Vehicles.* https://www.lyft.com/impact/electric

[45] CBS. (September 2022). *Uber CEO says that it will phase out gas-powered cars by 2030.* https://www.cbsnews.com/news/uber-ceo-dara-khosrowshahi-electric-vehicles/

[46] Weber, Harri. (January 2023). *In race to electrify, Uber wants EVs that sacrifice top speeds, wheels.* TechCrunch+. https://techcrunch.com/2023/01/19/electrify-uber-ceo-wants-evs-that-sacrifice-top-speeds-wheels/

Transit Fleet

The Transit Fleet use case focuses on public buses. While Hydrogen Fuel Cell Electric Buses are used by some agencies, this report focuses specifically on Battery Electric Buses. Across the United States, many transit agencies have begun exploring the potential to shift their operations from gasoline or diesel-powered fleets to zero emissions vehicles, including electric vehicles. In fact, between 2018 – 2021, the number of electric transit buses on order or operating in the US grew 112%[47]. As of 2022, a typical battery electric bus had a range between 150 and 350 miles. Buses could be charged along the route for a short period like 10 minutes to extend their range. Buses could also be charged in the depot more slowly for a longer period, closer to 8 hours.

"A Portland, Oregon TriMet Battery Electric Bus Charging"

However, before procuring vehicles or electrifying routes can take place, a substantial amount of planning and program design must occur to ensure fiscal responsibility and success. In their review of best practices and lessons learned from deployments across the US, Atlas Public Policy recommends creating an Electrification Transition Plan, which HART, the Hillsborough transit provider, has recently completed. Due to the focus of recent legislation on climate justice and energy efficiency, there has never before been a better time to explore transit fleet electrification. Numerous federal programs are authorized to fund fleet electrification, including vehicle procurement, charging infrastructure, and associated operations and maintenance costs, including:

- Federal Transit Administration (FTA) Low or No Emissions Vehicle Program[48]
- FTA Bus and Bus Facilities Program[49]
- USDOT Rebuilding American Infrastructure with Sustainability and Equity (RAISE)[50]
- Federal Highway Administration (FHWA) Congestion Mitigation and Air Quality Improvement Program[51]
- Environmental Protection Agency (EPA) Diesel Emissions Reduction Program[52]

Additionally, at the state level, the Florida Department of Environmental Protection (FDEP) administers the Electric Transit Bus Grant Program, funded through Volkswagen Settlement Funds. In 2022, FDEP awarded $68 million to thirteen counties for the purchase of 227 electric transit buses[53].

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[47] MacDougal, Pamela. (July 28, 2022). *Four Main Takeaways from America's Top Transit Agencies on Electrifying Buses.* Smart Cities Dive.

[48] Federal Transit Administration. Low or No Emission Vehicle Program – 5339(c). https://www.transit.dot.gov/lowno#:~:text=The%20Low%20or%20No%20Emission,leasing%20of%20required%20supporting%20facilities

[49] Federal Transit Administration. Bus and Bus Facilities Program. https://www.transit.dot.gov/bus-program

[50] United States Department of Transportation. (November 2022). *RAISE Grants*. https://www.transportation.gov/RAISEgrants/about

[51] Federal Highway Administration. (February 2022). *Congestion Mitigation and Air Quality Improvement Program*. https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm

[52] United States Environmental Protection Agency. (November 2022). *Diesel Emissions Reduction Act Funding*. https://www.epa.gov/dera

[53] Florida Department of Environmental Protection. (November 2022). *DEMP – Volkswagen Settlement and DERA*. https://floridadep.gov/air/air-director/content/demp-volkswagen-settlement-and-dera

Review of Relevant EV Plans

Planning for electric vehicles charging infrastructure is already underway in Florida. The Hillsborough Transit Authority (HART) recently prepared a transition plan for their fleet to move towards zero-emission vehicles. FDOT has prepared two plans, most recently in 2022 to develop EV charging infrastructure primarily along highway corridors throughout Florida and including corridors in Hillsborough County. Planning has also been completed at the national level. Hillsborough TPO seeks to align with the work completed by partner agencies. This section documents the relevant EV plans noted above.

HART Zero-Emission Fleet Transition Plan (2022)

The Hillsborough Transit Authority (HART) Zero-Emission Fleet Transition Plan summarizes the existing service HART provides and a preliminary evaluation of a process to transition to a zero-emission fleet. The long-term fleet management plan is to replace the entire active bus fleet with zero-emission buses at the end of their useful life, contingent on funding availability.

The Transition Plan considers both battery electric buses and hydrogen fuel cell electric buses and their respective infrastructure needs. A preliminary evaluation identified a pilot project for 3-4 battery electric buses that would include chargers at the depot and an on-route charger at the main transfer center in downtown Tampa.

In addition to reviewing the Transition Plan, Hillsborough TPO met with a representative of HART to discuss plans for electrification. HART expects fuel cell electric buses to be more aligned with their needs because more routes are more than 200 miles long with short periods of time for layover at night time. These parameters would make recharging the buses difficult both on route and at the depot.

Florida EV Roadmap (2020)

The Florida EV Roadmap (Roadmap) is the first comprehensive study of EV charging status and needs in Florida, which was completed in 2020. The Roadmap identified recommended sites for charging infrastructure. Two sites were identified directly north of Hillsborough County both of which are near the I-275 interchange with I-75 (Worthington Gardens Area). Several EV charging sites were identified that would serve people evacuating during events such as hurricanes. One solution proposed for these locations is temporary charging installations of DCFC infrastructure. In Hillsborough County, one location was identified near the Hillsborough County I-75 Rest Area (Sun City Area).

The Roadmap identified planning recommendations to address several topics. Including the following:

- Develop State incentives for workplace charging
- Develop a statewide EV educational campaign
- Develop methodologies to track and forecast EV sales and infrastructure requirements

Projected EV sales for Florida were determined using the US Energy Information Administration (EIA) Annual Energy Outlook (AEO). The AEO was used to calculate annual percent growth in PHEVs and BEVs, which was then applied to existing 2019 vehicle registrations in Florida to forecast the EVs in Florida up to 2030. The National Renewable Energy Laboratory (NREL) EVI-Pro Lite tool was used to estimate infrastructure needs based

on projected charging demand. For the needs analysis, 85 % of drivers were assumed to have access to home charging. Infrastructure need was calculated at the county level by scaling the State need down according to the county's 2019 share of EVs and LDVs. The infrastructure need in Hillsborough County is shown in Table 5

Table 5. Hillsborough County Infrastructure Need (EV Roadmap 2020)

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Public Level 2 Chargers	14	15	17	22	29	31	32	34	36	38
Workplace Level 2	14	16	20	27	37	39	41	43	46	49
Public DCFC	29	31	36	44	55	58	60	63	66	71

Then, a suitability analysis was completed to identify sites for charging stations at a granularity of 0.25 square mile cells. The intention of the suitability analysis is summed up as, "Charging stations should be in an area that is safe, near commercial activity, accessible to residents in multi-unit dwellings, and efficiently distanced from existing charging locations." The suitability analysis considered the following factors:

- Distance from existing charging stations (35% weight)
- Commercial land use density (15% weight)
- Multi-unit dwelling density (15% weight)
- Registered EVs (15% weight)
- Employment density (10% weight)
- Population density (10% weight)

In 2020, the analysis suggested that at the State level, there were enough DCFC to meet charging demand until 2025 and enough Level 2 chargers to meet charging demand until 2030. However, because the charging infrastructure is not evenly distributed, some areas may require additional charging infrastructure. Hillsborough County was identified as having sufficient DCFC plugs to meet the expected need under the assumptions that formed the basis for these projections.

The Roadmap included a survey of owners of EVs who lived in Florida. A few key findings from the survey included:

- 86% of respondents felt that Florida did not have adequate charging infrastructure.
- 88% of respondents lived in a single-family house. 80% of those living in single-family houses most often charge at home.
- 74% of respondents reported doing 75-100% of their charging at their residence.
- 45% of respondents living in a multi-unit dwelling reported doing less than 25% of their charging at their residence.
- Respondents identified their preference for the location of public charging with the following preferences: 42% along public highways, 37% in shopping and entertainment areas, 10% at work, 7% at multi-unit dwellings, and 4% at government facilities.

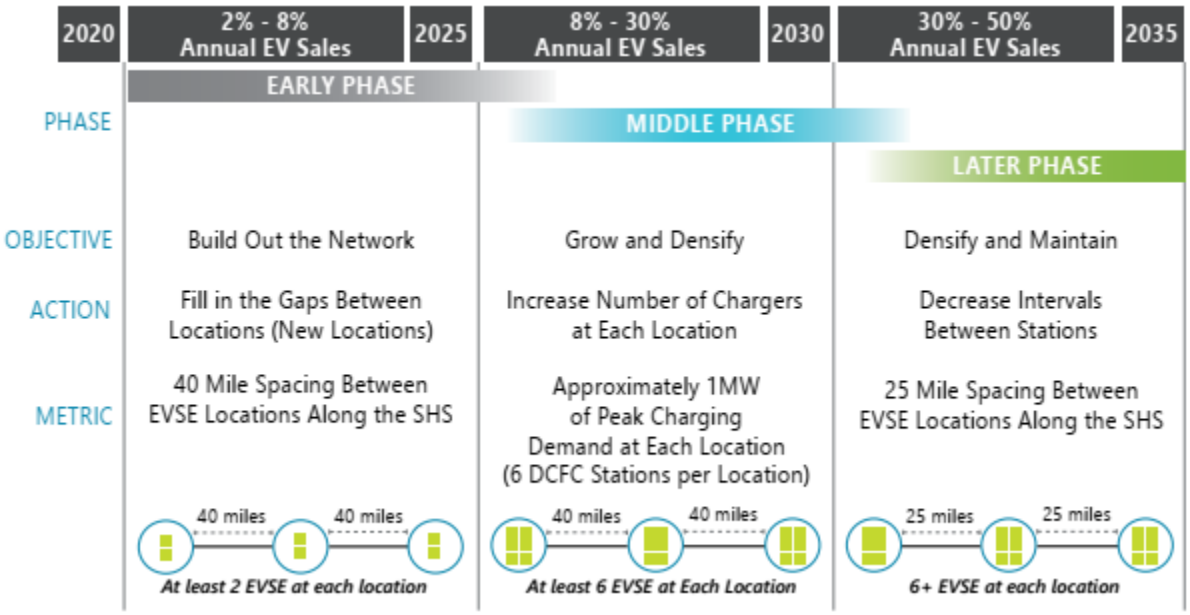
Florida Department of Transportation EV Infrastructure Master Plan (2021)

Florida Department of Transportation (FDOT) developed the Electric Vehicle Infrastructure Master Plan (EVMP) in 2021 to identify needs and opportunities for EV charging station infrastructure along the State Highway System. The EVMP identifies challenges and opportunities for EV charging infrastructure. The objectives of the EVMP are to:

- Support short-range and long-range EV travel as well as emergency evacuation in the state
- Adapt state highway infrastructure consistent with market demand
- Ensure availability of adequate and reliable EV charging stations

The EVMP developed a framework to expand the EV charging infrastructure network along the State Highway System, as shown in Figure 15. In the initial phase of development, the objective is to build out the network. As the network develops, the objective shifts to increasing the density of the network and maintaining the network. By 2035, the plan expects 30-50% of new vehicle sales to be EVs.

Figure 15. FDOT EVMP Plan



The EVMP includes considerations for installation plans, fleet vehicle transitions, utility regulations, and evacuations. The EVMP includes gap analyses for DCFC chargers along the State Highway System and Level 2 charging within urban areas. Recommendations and work completed for the EVMP that may be especially relevant for the Hillsborough EVIP include:

- Gap analysis for DCFC and Level 2 charging stations
- Model building and zoning code language
- EV-ready parking requirements
- Consumer-oriented education and outreach program
- LRTP guidance

FDOT Electric Vehicle Infrastructure Deployment Plan (2022)

In 2022, FDOT developed the Electric Vehicle Infrastructure Deployment Plan (Deployment Plan), Florida's framework for implementing the National Electric Vehicle Infrastructure Program (NEVI). The Deployment Plan focuses on DCFC stations located along federally recognized Alternative Fuel Corridors (AFC). Candidate sites will be determined through ongoing public and partner engagement, with the primary focus being along the Interstate system. The basic requirements that charging infrastructure must meet to qualify for NEVI Program funds includes at least four 150 Kwh DCFC chargers capable of operating simultaneously that are no more than 1 mile driving distance from the designated AFC, spaced no more than 50 miles apart, with a reliability of operations greater than 97%, among other considerations[54].

The NEVI program requires 40% of benefits of investments to go to disadvantaged communities as defined by the JOET Justice40 data.

AFCs in Hillsborough County are shown in Figure 16. FDOT identified gaps in NEVI compliant stations along major interstates in Hillsborough County including I-4, along with other interstates throughout the State. The gaps within Hillsborough County are also shown in Figure 16, and are referred to as "Pending" in the EV Corridor Designation legend. FDOT intends to use NEVI funding to fill these gaps in the 1st year of the NEVI program. NEVI funding can be used to implement stations along other AFCs in subsequent years.

[54] Federal Highway Administration. (February 2022). *National Electric Vehicle Infrastructure Formula Program: Program Guidance*. https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

Figure 16. Alternative Fuel Corridors, Justice40 Disadvantaged Communities, and Existing DCFC Chargers in Florida

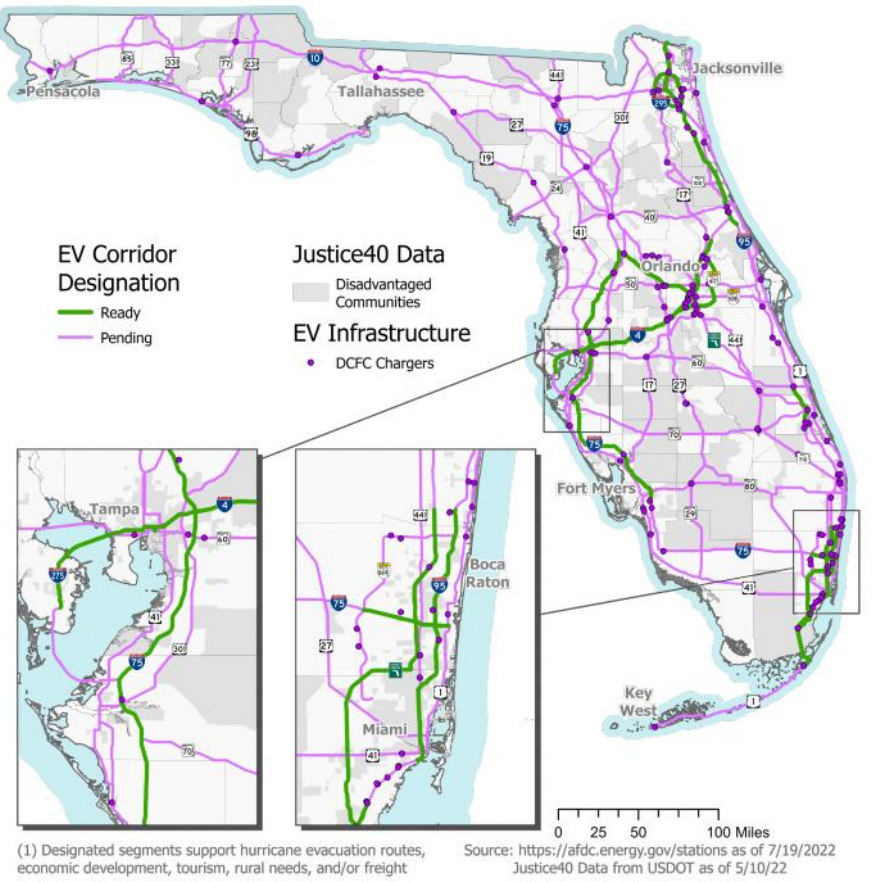


Figure 2: Florida's DCFC Locations within one-mile of an AFC

The Deployment Plan identifies several considerations related to stakeholder needs that should be considered at each identified site including:

- Hurricane evacuation routes and AFC connectors to Interstates
- Utility readiness and alignment with utility expansion plans
- "Smart hub" locations with regional charging nuclei, to fill gaps in high-traffic areas
- Safety considerations and access to amenities and other services

The Deployment Plan identifies other programmatic actions that should be taken in addition to installing charging infrastructure, including:

- Developing a program for mobile charging
- Building a redundant and resilient charging network
- Monitor trends and data to inform planning
- Engage with stakeholders
- Develop the workforce

USDOT Charging Forward – A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure (2022)

This toolkit is intended to help rural communities scope, plan, and fund EV charging infrastructure. Today, the rate of EV adoption in rural areas is about 40% lower than urban areas. As a county with both urban and rural areas, Hillsborough County must consider the needs, barriers, and opportunities for rural charging.

The USDOT guidance identifies common tourist destinations in rural areas as including public lands such as national and State parks, national forests, wildlife refuges, and monuments. Charging stations can also be installed in gateway communities that lead to these destinations. Federal land management agencies can use the General Service Administration's Blanket Purchasing Agreement to acquire EVSE. Coordination with local branches of federal land management agencies will be a critical step in ensuring that many rural recreational areas are served by EV charging infrastructure. Renewable energy sources and off-grid charging are innovative methods for providing sustained EV charging in rural areas and could be combined with communications network coverage to improve the overall connectivity and feasibility of charging infrastructure in rural areas[55]. Many rural areas are also disadvantaged communities, and therefore have special equity considerations for planning and installing charging infrastructure and are also eligible for increased funding through various funding programs.

USDOE National Plug-In Electric Vehicle Infrastructure Analysis (2017)

The United States Department of Energy (USDOE) National Plug-in Electric Vehicle Infrastructure Analysis assesses the quantity of EV charging infrastructure needed in the US. The Analysis considers four specific geographic areas for both public and workplace chargers: Cities (>50,000 population), Towns (2,500 – 50,000 population), Rural Areas, and Interstate Corridors. The Analysis considers a central scenario (that is likely to occur) along with bounding scenarios (that represent the high and low variation that could occur) to understand the sensitivity of the analysis. Several key model variables are delineated for each scenario in Table 6. These key model variables produce useful forecasts for how PHEVs could impact the state of Florida, and the amount of charging infrastructure and capability needed to support them.

Table 6. USDOE National Plug-In Electric Vehicle Infrastructure Analysis Modelling Scenarios & Variables

Variable	Central Scenario	Bounding Scenarios
Light Duty Vehicle EV Total (2030)	15 million (20% linear growth)	• 9 million (10% linear growth) • 21 million (30% linear growth)
Share of EVs in Cities	83% (based on existing Hybrid Electric Vehicles)	• 71% (based on existing LDVs) • 91% (based on existing PHEVs)
Home Charging	88%	82%, 85%, 88%

[55] The Federal Communications Commission projects that all of Hillsborough County will have full LTE data coverage to support cellular connectivity of charging infrastructure, as depicted at: https://fcc.maps.arcgis.com/apps/webappviewer/index.html?id=6c1b2e73d9d749cdb7bc88a0d1bdd25b

The analysis contained several assumptions for modelling purposes, including:

- That the spatial dispersion of BEV adoption will be similar to that of PHEV adoption, using trends from the previous decade.
- That all EVs have a home-dominant charging preference, resulting in 88% of charging occurring at home locations. No distinction is made for multi-unit dwelling residents.
- Level 3 / DCFC charging availability coverage was estimated with a ratio of 56 stations per 1,000 square miles (which equates to stations approximately 3 miles apart).

The Analysis concluded that communities are expected to have significantly larger charging infrastructure requirements than Interstate corridors. The Analysis suggests that organizations planning for charging infrastructure need to be aware of the importance of consumer preferences with respect to electric range and charging behavior. The Analysis suggests that planners focus on providing adequate charging coverage (particularly DCFC) and monitor station utilization over time to increase capacity as the market grows.

FDOT Florida Transportation Plan (2022)

The Florida Transportation Plan (FTP) is the overarching plan guiding Florida's transportation future. The FTP includes strategies and visions related to the adoption of electric vehicles for personal and freight mobility. Several key takeaways from the FTP include:

- By 2030 automobile manufacturers expect upwards of 50% of global vehicles sales will be electric.
- By 2030 medium- and heavy-duty trucks will be cheaper to buy, operate, and maintain as zero emissions vehicles.
- In 2018, 32,000 EVs were sold in Florida making up 2.4% of total vehicle sales.
- In the FTP Visioning section, a key strategy that will be considered is "Leveraging emerging technologies and business practices, such as automated, connected, **electric**, and shared vehicles, to **improve safety**, **mobility**, and **accessibility**."
- To mitigate risks to the transportation system, Florida will update emergency management plans to reflect increasing use of technologies such as electric vehicles.
- To close system gaps, improve connections between modes and systems, and support complete end-to-end trips for people and freight, Florida will expand statewide access to mobility solutions through mobility hubs, micromobility stations, and EV charging stations.
- Develop funding mechanisms other than fuel tax.
- A priority implementation action to transform major corridors and hubs is to expand alternative fuel infrastructure at locations including seaports, intermodal logistics centers, and major trade corridors.
- A priority implementation action to prioritize people and freight mobility is to update zoning, rules, and procedures to accommodate mobility solutions including electric vehicles.

Neighboring Agency EV Readiness

City of Orlando

Orlando Electric Vehicle Readiness Policy (2022)

The City of Orlando implemented an Electric Vehicle Readiness policy, effective January 1, 2022, to provide widespread access to EV charging throughout the city. This policy requires future developments of commercial and multifamily housing in Orlando to be equipped to support EV use. The EV Readiness code requires 2% of parking spaces to be equipped with EV charging stations (in parking lots with at least a certain number of spaces) and 10% or 20% of parking spaces to be built "EV Capable", in commercial/industrial or multifamily

housing uses respectively. "EV Capable" means there is dedicated capacity in the electrical panel and conduit running to future EV charging spaces.

Orlando's 2030 Electric Mobility Roadmap (2021)

The City of Orlando E-Mobility Task Force identified four goals and associated indicators related to the development of EV charging infrastructure, summarized Table 7.

Table 7. Orlando 2030 Electric Mobility Roadmap Goals, Targets, and Indicators

Goal	Targets/Indicators
Provide equitable and affordable access to e-mobility.	/ 100% of Orlando residents live within 10-minute walk of a Level 2 public charging station or 10-minute drive of a DCFC by 2030. / Proportion of e-mobility adoption and use by demographics match city demographics (race, income) by 2030. / 100% of disadvantaged communities are served by electric buses by 2030.
Accelerate EV adoption in multiple transportation sectors	/ 30% of all light-duty registered vehicles in Orlando are electric by 2030, and 80% by 2050. / City and Orlando Utilities Commission (OUC) establish 100% light-duty fleet procurement policy by 2025; perform a medium- and heavy-duty transition analysis by 2025. / 30% of goods deliveries are zero emission by 2030.
Develop a robust charging ecosystem	/ City has 1,400 Level 2 public ports and 250 DCFC public ports by 2030. / City has 200 city-owned Level 2 public ports and 40 DCFC public ports by 2030.
Advance multimodal e-mobility options	/ Transit and school bus fleets are all electric by 2040. / 75% of commute trips are zero emission (walking, biking, electrified transit or shared mobility, EV, or avoided) by 2030.

The Task Force identified a variety of strategies to meet these goals including:

/ Develop ongoing engagement and outreach processes with disadvantaged communities,
/ Advance fleet electrification,
/ Pass EV Readiness land development code,
/ Incentivize new development to include e-mobility access, and
/ Pursue additional charging hubs.

The Roadmap identifies some barriers to EV adoption including:

/ Insufficient access to charging options. Nationwide, 28% of respondents say lack of charging at home prevents them from buying an EV and 48% say lack of public charging stations prevents them.
/ Limited range on vehicles. Nationwide, 2842 of respondents say insufficient vehicle range prevents them from buying an EV.

The Roadmap includes a discussion of EV adoption in Orlando compared to Florida and the United States. The adoption of EVs by zip code was also considered relative to the portion of people of color, type of residence (single unit or multi-unit), and income. Ongoing initiatives are summarized by the partner involved in the program, including the utility company, transit agency, expressway authority, and other agencies.

Under the Roadmap, two adoption scenarios from the National Renewable Energy Laboratory (NREL) were applied to Orlando's estimated baseline condition to estimate the number of personal electric vehicles registered in the city by 2025 and by 2030. These adoption rates are substantially higher than those relied on by FDOT and Florida Department of Agriculture and Consumer Services. The chosen adoption rates would better enable the city to reach its ambitious climate goals. NREL's EVI-Pro Lite online tool was used to estimate the number of Workplace Level 2, Public Level 2, and DCFC ports needed by 2030.

An analysis of public EV charging coverage is included which considered 10-minute walksheds around Level 2 stations and 10-minute drive sheds around DCFC stations.

Pinellas County

Pinellas County has supported EV adoption through acquiring seven battery electric vehicles and three plug-in hybrid electric vehicles for County operations, with plans to transition the whole light-duty vehicle fleet to EVs over the next 10 years.

Pinellas Suncoast Transit Authority

Pinellas Suncoast Transit Authority (PSTA) leads Florida with the largest fleet of hybrid buses and plans to eliminate all diesel buses from its fleet by 2033. Each electric bus saves PSTA about $20,000 a year in diesel fuel costs[56]. As of 2021, PSTA had six battery powered electric buses. The PSTA Board of Directors approved a contract to purchase 60 electric buses by 2027, with 14 buses on order for delivery in 2023[57].

In 2022, PSTA announced an agreement with Duke Energy Sustainable Solutions to install, maintain, and operate electric bus charging infrastructure[57].

Sarasota County

Sarasota County has supported EV adoption through resolutions, installation of charging stations, and education programs. The County also added an EV to its light duty fleet and plans to add an additional 7 EVs. The ChargeUP! Sarasota County program provides rebates (up to $4,000) to certain types of site hosts for the installation of EV charging stations. Eligible locations include tourism attractions, hotels, retail hubs, community centers, government properties with visitors, and major employers (more than 150 employees).

[56] Rank, S. (2021, February 1). PSTA. *PSTA Rolls Out Four New Electric Buses.* https://www.psta.net/about-psta/press-releases/2021/psta-rolls-out-four-new-electric-buses/

[57] Duke Energy. (2022, July 29). Duke Energy. *Pinellas Suncoast Transit Authority Continues to Go Green.* https://news.duke-energy.com/releases/pinellas-suncoast-transit-authority-continues-to-go-green

Hillsborough County Infrastructure Inventory

This section outlines the existing and planned electric vehicle charging infrastructure in Hillsborough County, HART Transit fleet and facilities, and the City of Tampa's vehicular parking inventory. This section also includes an assessment of the access to charging infrastructure for disadvantaged communities and underserved areas in Hillsborough County.

Charging Infrastructure

As of January 2023, there are 180 electric vehicle charging stations in Hillsborough County (both unincorporated county and cities), with over 460 charging ports. Fourteen of the charging stations host Level 3 fast charging[58]. The 180 charging stations belong to nine different charging networks, while a few charging stations are non-networked, which is important for drivers, as charging networks typically set charging cost rates for their networks. Some networks offer subscription plans that allow a user to pay a set rate per month and access discounted charging rates. Table 8 delineates the charging stations by network, charging level, and connector type. All the charging stations are depicted in Figure 17.

Table 8. Publicly Available Electric Vehicle Charging Stations in Hillsborough County

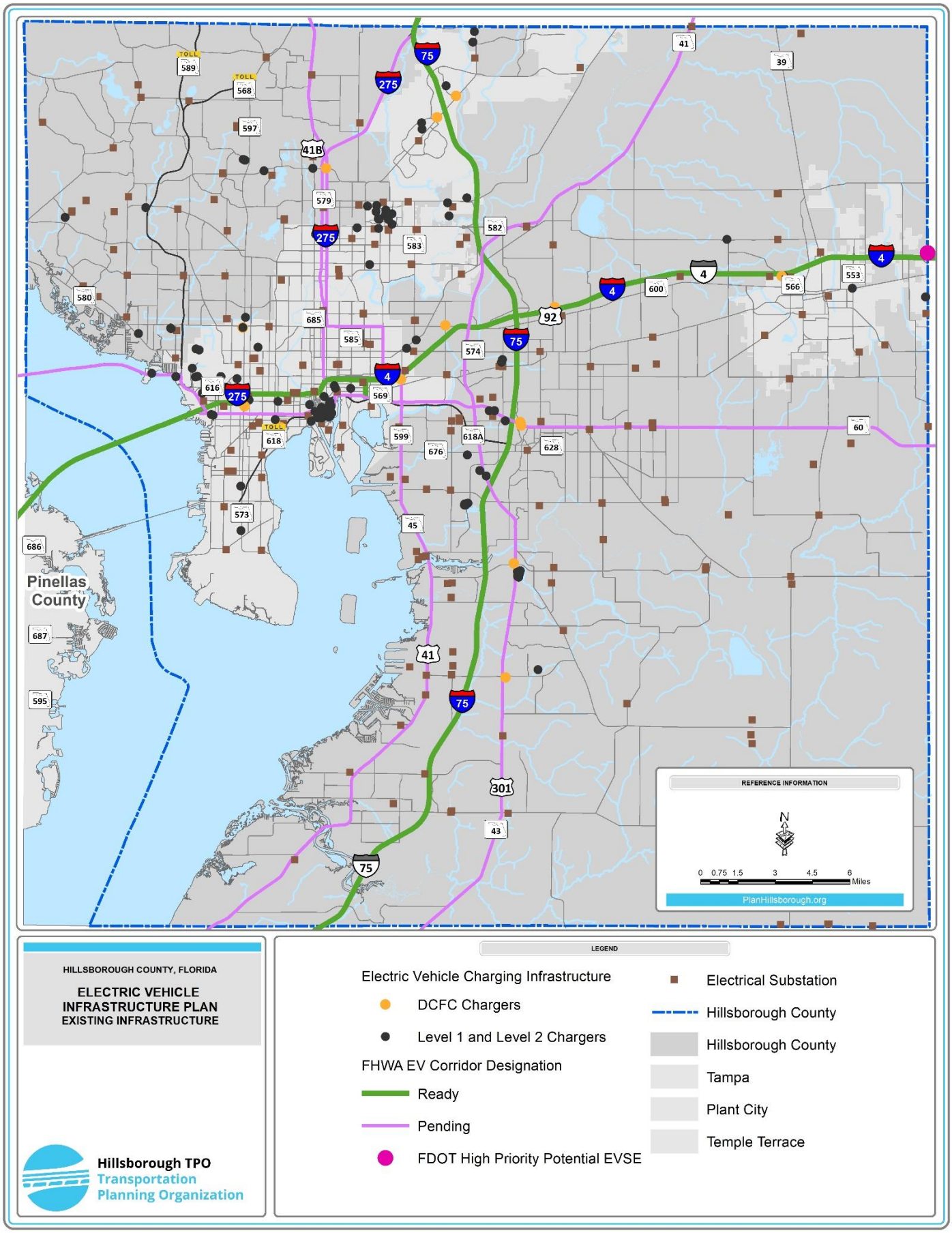
EV Network	Number of Stations	Number of Chargers	Station Levels	Station Connector Types
AMPUP	2	8	Level 2	J1772
Blink	8	12	Level 2	J1772
ChargePoint	99	197	Level 2	J1772
Electrify America	1	8	Level 3	CHADEMO J1772 Combo
eVgo	1	4	Level 3	CHADEMO J1772 Combo
SemaCharge	17	49	Level 2	J1772
Shell Recharge	1	3	Level 2	J1772
Tesla / Tesla Destination	30	57	Level 2 & Level 3	TESLA, J1772
Non-Networked	21	131	Level 1, Level 2, & Level 3	CHADEMO, J1772, CHADEMO J1772 Combo, NEMA515, NEMA520, TESLA

Source: Alternate Fuels Data Center

This figure also displays the designated and pending Federal Highway Administration Electric Vehicle routes in Hillsborough County, which will likely dictate where future fast charging stations are constructed to serve regional travel. As described previously, FDOT recently completed a planning study to determine where electric vehicle charging infrastructure is most needed throughout the state. Figure 17 displays the proposed location of a high priority FDOT EVSE site, along I-4 near Hillsborough County's eastern border.

[58] Florida Department of Environmental Protection. (2023). Diesel Emissions Mitigation Program – Electric Vehicle Charging Infrastructure Phase 1 & Phase 2. https://floridadep.gov/air/air-director/content/demp-volkswagen-settlement-and-dera

Figure 17. Existing and Planned Electric Vehicle Charging Infrastructure



Equitable Access for Disadvantaged Communities

Ensuring equitable access to electric vehicle charging is a critical component of a successful transition to electric mobility in Hillsborough County and across the nation. To support this transition, an interim definition of historically disadvantaged communities ("DACs") has been implemented by the USDOT, in partnership with the USDOE, for the National Electric Vehicle Infrastructure Program (NEVI). This interim, joint working definition of DACs includes combined census tracts from both the DOT and the DOE working definitions, as well as tribal lands and US territories, as consolidated by the Joint Office for Energy and Transportation (JOET) in their Electric Vehicle Charging Justice40 Map[59, 60]. DACs are designated based on six data-driven categories: transportation, health, environment, economic, resilience, and history[61]. In Hillsborough County, 137 Census tracts are designated as DACs.

The Hillsborough TPO, as part of their Nondiscrimination and Equity Plan[62], created an index of the most underserved areas in the County, analyzed at the Census Block group geography, based on demographic and environmental justice measures. These areas are categorized by how many 90th-percentile 'characteristics' are met.

To understand where the existing and planned electric vehicle charging infrastructure is located in relation to identified equity areas, the displayed infrastructure from Figure 17 was combined with the mapped communities to determine the equitable distribution of charging infrastructure. Figure 18 depicts the planned and existing infrastructure overlaid with the equity communities. As depicted below, many of the areas designated as DACs and underserved areas overlap. There are 62 charging stations that are located within either a DAC, an underserved area, or both. Of these, 53 are Level 2 charging stations and 9 are DCFC charging stations.

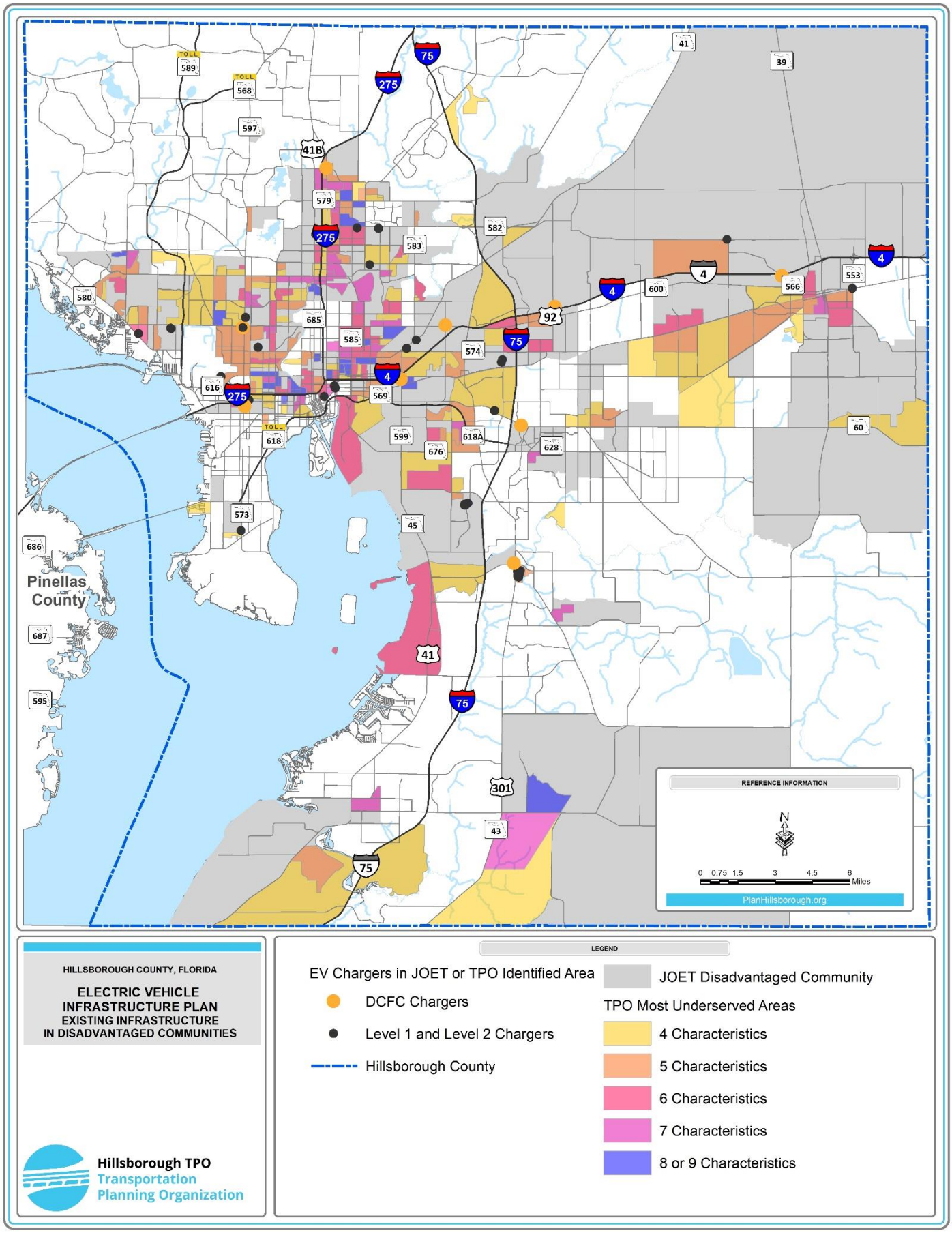
[59] Argonne National Laboratory. (ND). *Electric Vehicle Charging Equity Considerations.* https://www.anl.gov/esia/electric-vehicle-charging-equity-considerations

[60] Joint Office of Energy and Transportation. (May 2022). *Electric Vehicle Charging Justice40 Map*. Electric Vehicle Charging Justice40 Map (arcgis.com)

[61] United States Department of Transportation. (November 2022). *Justice 40 Fact Sheet*. https://www.transportation.gov/sites/dot.gov/files/2022-11/Justice40_Fact_Sheet_v1.2pptx.pdf

[62] Hillsborough Transportation Planning Organization. (August 2021). Plan Hillsborough Nondiscrimination & Equity Plan. https://planhillsborough.org/wp-content/uploads/2021/08/August2021_Nondiscrimination_Equity_Plan.pdf

Figure 18. Existing EV Infrastructure in Equity Communities

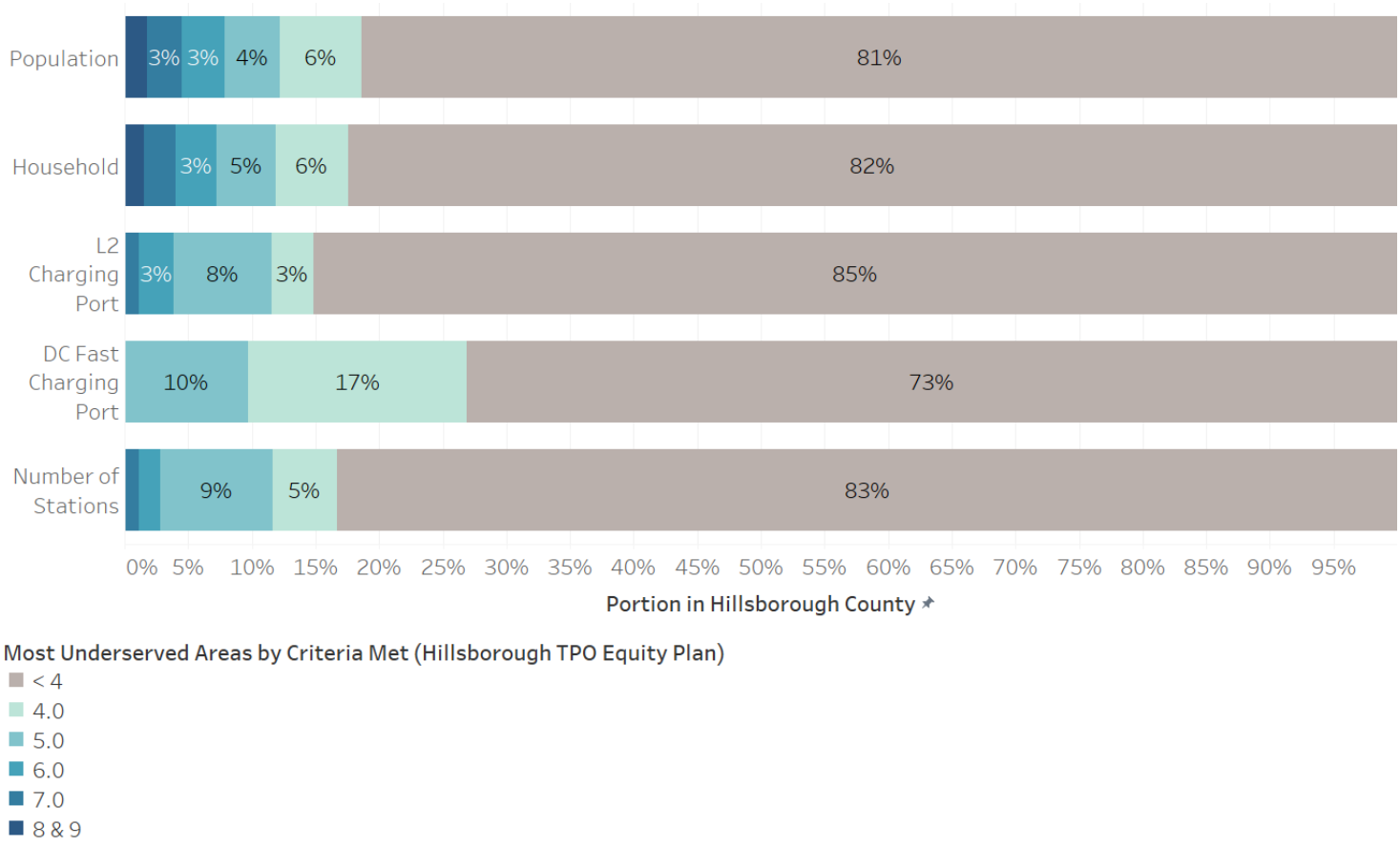


The distribution of charging ports in disadvantaged communities is compared to the distribution of population and households in Hillsborough County in Figure 19 and Figure 20. An equitable distribution of charging stations in Hillsborough County will serve all residents.

In Figure 19 several statistics are shown, considering a categorization of Census Block groups by the number of criteria met for underserved areas in the Hillsborough TPO Equity Plan. For example, considering the population in Hillsborough County, 2% of people live in Census Block groups that meet 8 or 9 of the criteria from the TPO Equity Plan, 3% of people live in areas that meet 7 criteria, 3% of people live in areas that meet 6 criteria, 4% of people live in areas that meet 5 criteria, 6% of people live in areas that meet 4 criteria, and 81% of people live in areas that meet less than 4 criteria. The portion of households, Level 2 charging ports, DCFC ports, and EV charging stations in areas that meet each number of criteria are also shown.

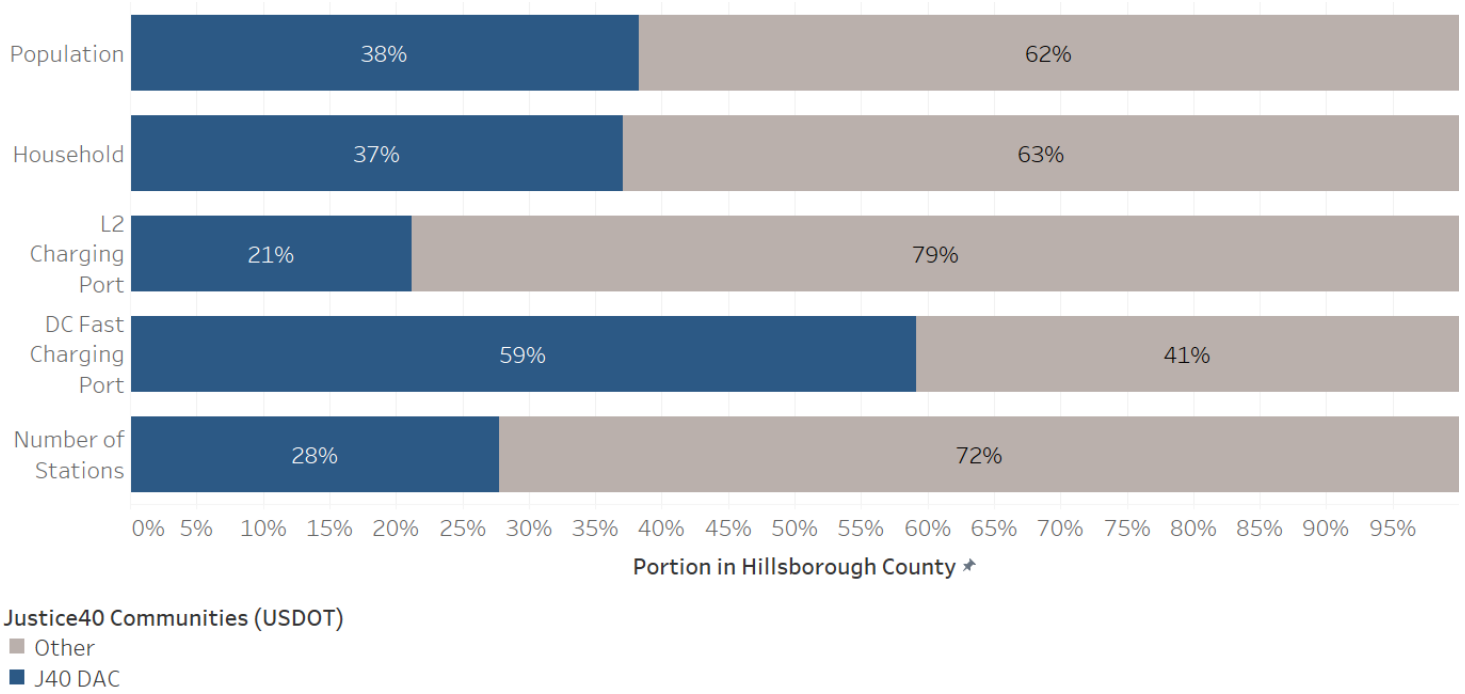
As shown in Figure 19, about 8% of the population in Hillsborough County lives in Census Block groups that meet at least 6 criteria from the Equity Plan. However, only 4% of L2 charging ports, 0% of DCFC ports, and 3% of EV charging stations are located in Census Block groups that meet at least 6 criteria from the Equity Plan. Therefore considering solely the location of charging stations, underserved areas tend to have fewer DC Fast Charging ports, Level 2 Charging Ports, and EV charging stations compared to the portion of the population and households in Hillsborough County who live there. This suggests that at a high-level, people who live in underserved areas tend to have less convenient access to EV charging infrastructure. This analysis only considers the 'home' location for residents and does not consider the convenience of EV charging infrastructure to wherever someone may go regularly. For example, this analysis would not account for charging infrastructure located at someone's workplace.

Figure 19. Distribution of Charging Infrastructure and Population in Hillsborough County (by TPO Equity Plan Metrics)



In Figure 20, several statistics are shown, considering a categorization of Census Tracts as being included in the USDOT Justice40 definition of disadvantaged communities. As shown in Figure 20, about 38% of the population in Hillsborough County lives in Census Tracts defined as disadvantaged communities under the USDOT Justice40 definition. However, only 21% of L2 charging ports and 28% of EV charging stations are located in Census Tracts that are defined as disadvantaged communities. Therefore Census Tracts that meet the USDOT Justice40 criteria tend to have fewer Level 2 charging ports compared to the population and number of households. Dissimilarly, areas that are defined as disadvantaged communities tend to have more DC Fast Charging ports than their relative population and number of households.

Figure 20. Distribution of Charging Infrastructure and Population in Hillsborough County (by USDOT Justice40)



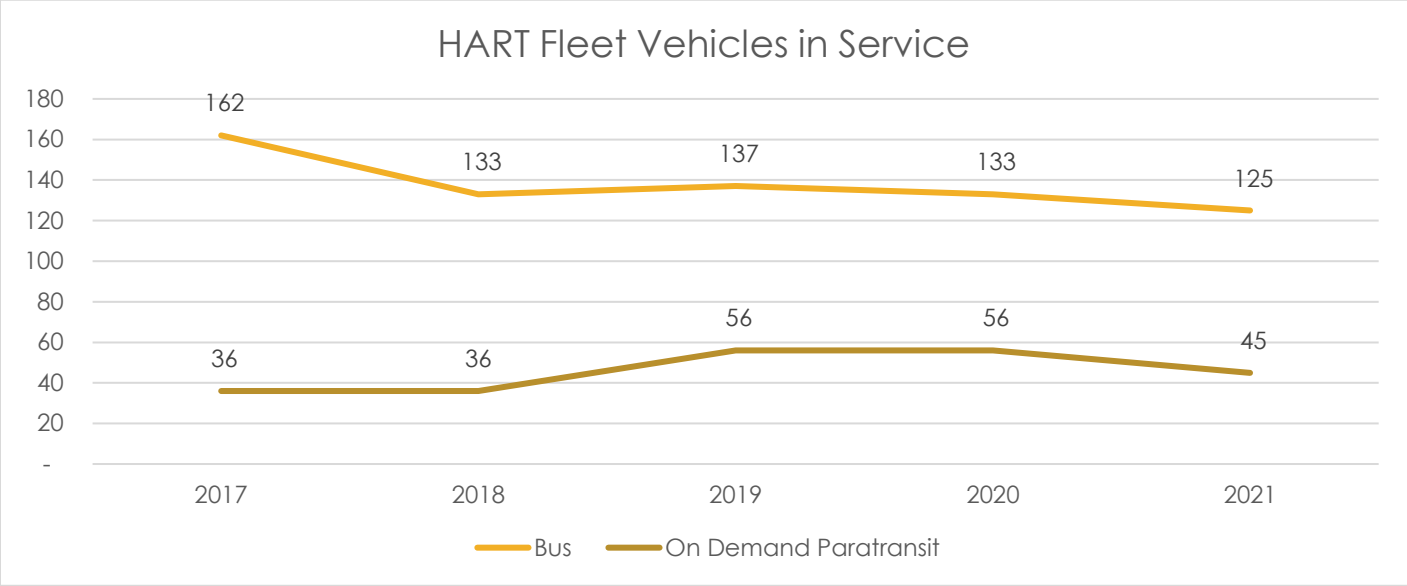
"Electric Bus Charging Station. Photo Credit: PSTA"

HART Fleet & Facilities

Hillsborough Transit Authority (HART) is the public transit provider within the Hillsborough TPO planning area. Currently, HART operates 27 local fixed route, seven limited express routes, one bus rapid transit (BRT) route, and paratransit on-demand service[63]. Across HART's service area, there are over 3,300 bus stops, with nine transit centers and twenty-two Park & Ride facilities. These routes, along with the stops, centers, the HART Maintenance & Operations Facility, are depicted on Figure 22.

To service all these destinations, including the demand-response paratransit locations, HART maintains an annual fleet of, on average, 187 vehicles[64]. Figure 21 displays the trends in fleet size by year and type of vehicle. Currently, HART has a fleet of 132 forty-foot compressed natural gas (CNG) and diesel buses. Fixed route buses travel an average of 205 miles daily, ranging from about 100 to 300 miles daily. HART also operates a demand response van fleet with 83 gasoline-powered 23-foot cutaway vans.

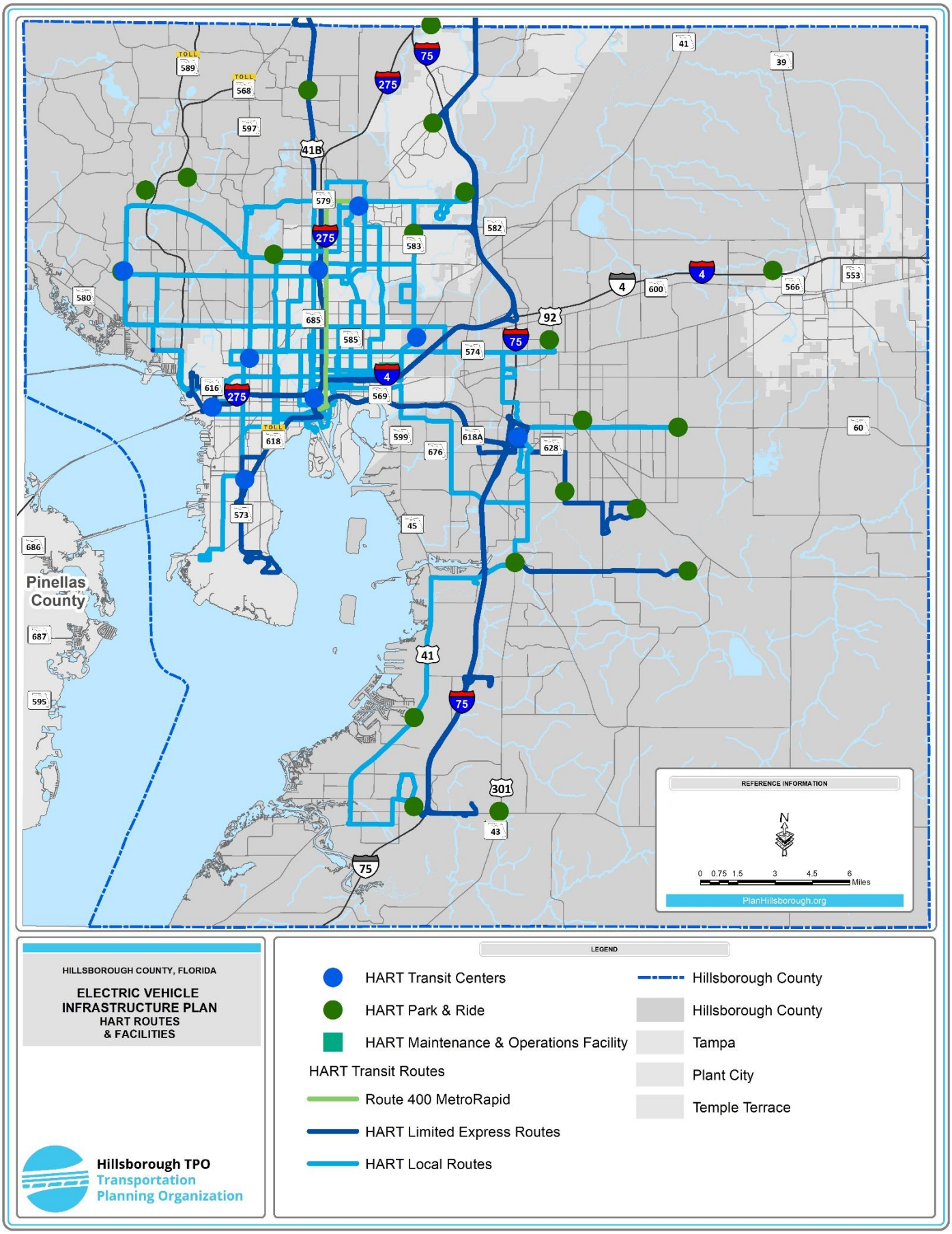
Figure 21. HART Fleet Vehicles in Service (2017 - 2021)



[63] Hillsborough Transit Authority. *HART Takes You There*. http://www.gohart.org/Pages/AboutUS-HART.aspx

[64] National Transit Database. (January 2023). HART Agency Profiles 2017 – 2021. https://www.transit.dot.gov/ntd/transit-agency-profiles/hillsborough-area-regional-transit-authority

Figure 22. HART Services and Facilities



In HART's 2017 *Operations and Maintenance Feasibility Study*, the existing Operations and Maintenance Facility is described as "operating above maximum capacity" for its average fleet size of 200 vehicles. Additional funding is needed for an additional satellite maintenance facility for future fleet expansion[65]. Additionally, this document states that it is "HART's policy to continue purchasing vehicles that are fueled by CNG as the fleet is updated", rather than gasoline or diesel fuels. As such, all scenarios and site selection included in this study consider CNG refueling requirements but exclude the considerations of electric vehicles.

The *HART Transit Development Plan FY2022* (TDP) states that in December 2020, HART was awarded a $4.3 million FTA Bus and Bus Facilities Grant to replace 16 existing diesel buses with new compressed natural gas (CNG) buses[66]. While not a zero emissions fuel, CNG is considered an alternate fuel to gasoline and diesel, with lower greenhouse gas emissions.

However, the following year, HART was awarded a $2.7 million FTA Low or No Emissions Vehicle Grant to purchase four electric buses. As part of the *FY 2027 Hillsborough TPO Transportation Improvement Program* (TIP), HART submitted funding requests for additional electric buses and charging infrastructure but has not yet released a transit electrification plan that outlines specific charging infrastructure needs or planned fleet inventory. The TDP also states that its top priority unfunded project is the replacement of 325 buses and paratransit vans with energy-efficient vehicles – both CNG and EVs. This project needs an estimated $195 million, with an additional $1 million needed for charging infrastructure at all transit centers and $70 million needed for a maintenance facility to service the vehicles.

Understanding the opportunities and deficiencies of the existing HART facilities, especially the Maintenance & Operations Facility will be crucial towards successfully transitioning the HART fleet towards lower emission fuels.

Public Vehicular Parking Facilities

Public vehicular parking is an important asset in the Hillsborough TPO planning area, as the combination of on-street spaces and off-street lots and garages provide necessary facilities that support the economic vibrancy of the region. This section focuses on public vehicular parking in the City of Tampa, as theirs was available for use in this Plan. Many of these parking facilities indicate trip attractors such as schools, places of work, shops, recreation, government services, and more. Existing on and off-street vehicular parking present ideal opportunities for electric vehicle charging retrofits, as they already provide space for vehicles in places that people already park for stretches of time. Figure 23 displays both the on-street and off-street parking facilities in the City of Tampa. It is noteworthy that some public parking garages already have EV charging available, which is further detailed in Table 9. In the City of Tampa, there are over 1,880 on-street parking spaces, none of which currently are EV charging stations. This supply presents an enormous opportunity for providing convenient and accessible EV charging throughout the city.

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[65] Hillsborough Transit Authority. (June 2017). *HART Operations and Maintenance Feasibility Study.* http://www.gohart.org/PlanningDocuments/Final%20HART%20OM.pdf

[66] Hillsborough Transit Authority. (August 2021). *FY2022 – FY2031 Transit Development Plan Annual Update.* http://www.gohart.org/PlanningDocuments/TDFY22-FY31.pdf

Figure 23. Existing Parking Facilities and EV Charging Stations in Tampa

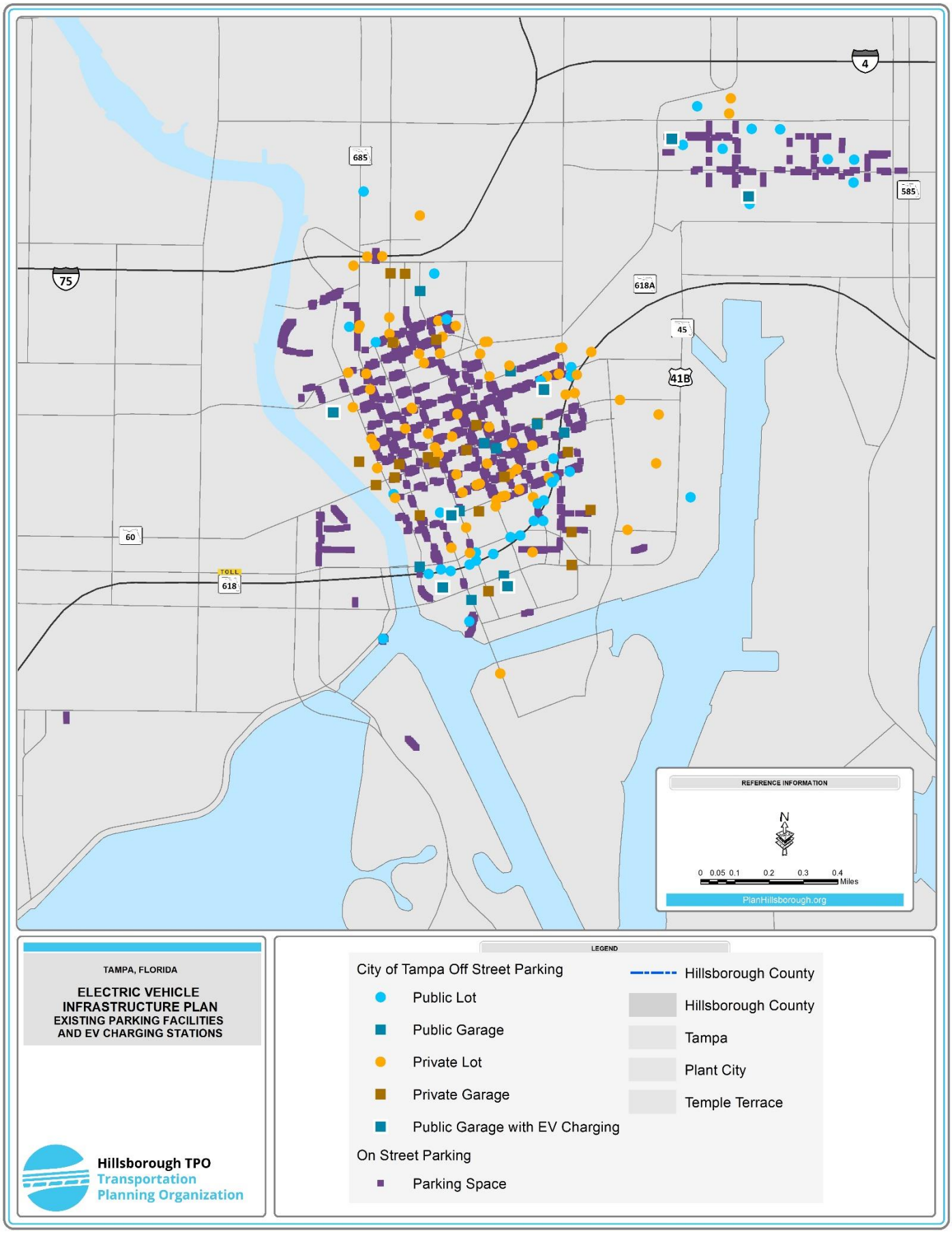


Table 9. Public Parking Garages with EV Chargers in Tampa

Name	Address	Charging Level	Number of Chargers	Connection Types
Twiggs Garage	901 E Twiggs St	Level 2	2	J1772
Palm Fernando Garage	2010 N 13th St	Level 2	2	J1772
Tampa Convention Center Garage	141 E Brorein St	Level 2	2	J1772
Fort Brooke Garage	107 N Franklin St	Level 2	6	J1772
William F Poe Garage	802 N Ashley St	Level 2	4	J1772
Centro Ybor Garage	1500 E 5th Ave	Level 2	2	J1772
Pam Iorio Garage	301 Channelside Dr	Level 2	2	J1772

"Level 2 Charging Equipment in Pierce Street Garage. Photo Credit: Hillsborough TPO"

Local Development & Zoning Regulations

This section documents the current Comprehensive Plan and other land use policies that may impact the implementation of publicly available commercial electric vehicle charging stations. It also reviews guidance from FDOT's *Electric Vehicle Infrastructure Deployment Plan*, published in August 2022. Lastly, it offers collected best practices from other communities. Further information regarding these topics is available in *Appendix B: Additional Information on Local Development & Zoning Regulations*.

Current Plans & Codes

The Comprehensive Plans and Land Development Codes for Unincorporated Hillsborough County, City of Tampa, Plant City, and Temple Terrace present opportunities to better address EV charging to encourage further adoption. The Plans and Codes may be amended to address the inclusion or disallowance of EV charging infrastructure in certain circumstances or land use categories. Key findings are summarized in Table 10.

Table 10. Local Agency Plans & Codes Key Findings

Local Agency	Key Findings
Hillsborough County[67, 68]	/ Policy 6.7.7 of the Comprehensive Plan directly addresses the role that Hillsborough County plays in the electrification of transportation, by stating: "Incentivize the use of electric vehicles through the implementation and expansion of electric vehicle charging stations." / Additional Comprehensive Plan goals and policies address energy efficiency, air quality, and reduced use of fossil fuels, all of which electric vehicles address. / The Hillsborough County Land Development Code does not mention electric vehicles or charging infrastructure at this time.
City of Tampa[69, 70]	/ The Comprehensive Plan does not outrightly address electric vehicles. / Comprehensive Plan goals and policies address energy efficiency, air quality, and reduced use of fossil fuels, all of which electric vehicles address. / In Chapter 15 of Tampa's Land Development Code, the City prohibits all other vehicles except those charging to parking in electric vehicle charging spaces, as per Ord. No. 2011-84, § 6, 7-14-2011 / Other references to electric vehicles similarly address off and on street parking requirements.

[67] Hillsborough County. (September 2022). *Hillsborough County Comprehensive Plan*. https://planhillsborough.org/wp-content/uploads/2021/08/Hillsborough-County-Comprehensive-Plan.pdf

[68] Hillsborough County. (October 2022). *Hillsborough County Land Development Code*. library.municode.com/fl/hillsborough_county/codes/land_development_code

[69] City of Tampa. (November 2022). *City of Tampa 2040 Comprehensive Plan*. planhillsborough.org/wp-content/uploads/2022/10/Adopted-Tampa-2040-Comp-Plan.pdf

[70] City of Tampa. (November 2022). *City of Tampa Land Development Code*. library.municode.com/fl/tampa/codes/code_of_ordinances

Local Agency	Key Findings
Plant City	/ The Comprehensive Plan does not outrightly address EVs. / Goals in the Comprehensive Plan may be affected by the adoption of EVs and increased need for EV charging. / The Land Development Code encourages the development of EV charging spaces. EV charging spaces must be supplied with a working charger and signed to indicate use solely for EV charging. EV charging spaces can be compact spaces.
Temple Terrace	/ The Comprehensive Plan does not outrightly address EVs. / Goals in the Comprehensive Plan may be affected by the adoption of EVs and increased need for EV charging. / The Land Use Development Code does not address EVs or EV charging.

Best Practices

As mentioned in the *Review of Relevant EV Plans* section, the City of Orlando is preparing for electric vehicle readiness through its local policies. In the Orlando Ordinance 2021-47, Section 3G – Electric Vehicle Readiness, the City addresses both quantity and location of EV charging[71]. The ordinance outlines where charging infrastructure will be installed (new developments and substantial remodels), the minimum electrical load capability required, the number of charging spaces required. By clearly outlining how EV charging should be provided within the City limits, Orlando is ensuring that the distribution and capability of its charging network is built out as redevelopment occurs. Further information on the Orlando Ordinance is available in *Appendix B: Additional Information on Local Development & Zoning Regulations*.

Permitting Process

While there is no specific mention of the permitting requirements to install a Level 2 charger in the Hillsborough County Development Services Permitting tool, county staff are familiar with the requirement. Installation of Level 1 charger should not require changes to the electrical system and therefore does not require a permit.

The General Electrical Building Permit applies to all residential installations of a Level 2 charger. This type of permit is used for residential construction, additions, alterations, remodeling and repairs that require electrical work. This permit may be used for projects including electrical service upgrade, generator installation, or replacement of electrical service panels. The residential permit costs $77.

Installing a Level 2 charger at a commercial site, requires a minor site review with an electrical diagram signed in ink by an electrician or engineer. The structure needs to meet design criteria for hurricane force winds. The minor site review process requires a contractor. Electric vehicle charging stations as additions to an existing commercial building are not listed in the permit fee schedule, included as Figure 24, or the Appendix.

[71] City of Orlando. (2021). *Orlando Ordinance 2021-47*. orlando.novusagenda.com/AgendaIntranet/AttachmentViewer.ashx?AttachmentID=107422&ItemID=57297

Figure 24: Hillsborough County's Permit Fee Schedule

Type	Residential Fees	Commercial Fees
New Construction and Additions	See Appendix I	See Appendix I
Alterations and Renovations	See Appendix II	See Appendix II
Electrical (General) For all electrical-related activities not addressed in Appendix I	$77 (maximum one inspection)	$77 (maximum one inspection)
Stand alone- New residential - Electrical	$65	N/A
Multi-Family - Electrical	$77 plus $35 per unit	$77 plus $35 per unit

The installation process for a Level 2 home charging unit is provided by TECO, as summarized below[72]:

1/ **Identify**: Ask your automobile dealer or manufacturer to identify one or more licensed electricians to install charging equipment at your home. You may also contact your own licensed electrician.
2/ **Assess**: Schedule the licensed electrician to perform a home assessment and inspect your electric service. This will help determine the installation location, the amount of work and time required to install and whether your existing electric service can support charging equipment. Most installations will not require a utility upgrade. If a utility upgrade is necessary, your electrician will coordinate with Tampa Electric.
3/ **Permit**: You or your licensed electrician must obtain a permit through the appropriate city or county agency. The process to apply for and receive a permit will vary by jurisdiction. Tampa Electric recommends that you contact your designated permitting office to obtain any specific requirements.
4/ **Install**: Once a permit is secured, the licensed electrician can complete the installation.
5/ **Inspection**: After installation is complete, you or the licensed electrician must contact the permitting office to schedule a final inspection. Charging equipment is typically approved for use as soon as it passes inspection.

"Cars charging in Hillsborough County." Credit: Ryan Casburn, Kittelson & Associates, Inc.

[72] TECO. Charging Options. https://www.tampaelectric.com/company/environment/electricvehicles/chargingoptions/

EV Infrastructure Supportive Lands

A parcel-level analysis was performed to identify appropriate sites for publicly available charging stations, situated on publicly owned lands to reduce barriers to implementation, such as identifying a station host or additional land acquisition. It is important to note that to fully build out the necessary charging infrastructure to support future EV demand, public-private partnerships will likely be necessary to provide additional charging infrastructure on privately held lands. And so, while the evaluated land conditions are public, the analysis does indicate that the same land use context would support EV infrastructure on private land as well. The analysis focuses on current and future activity centers, parks, highway exits, underserved areas, and schools to identify areas to prioritize for EV infrastructure installation. As the Plan development progresses, these locations will be supplemented by results from the public survey. Key findings from the parcel-level analysis include:

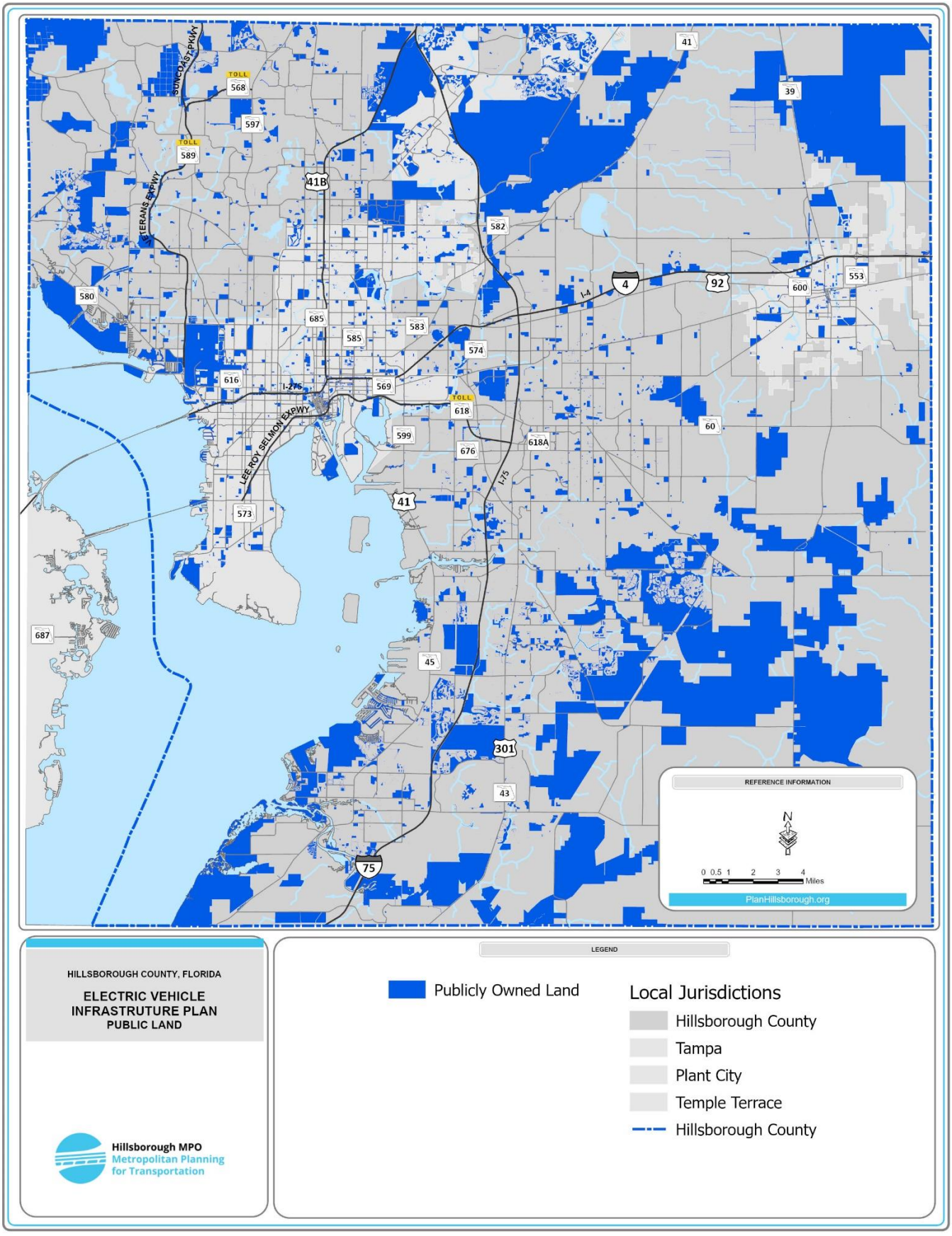
- There are approximately 300,000 acres of publicly owned parcels in Hillsborough County, although much of it is conservation land, wetland, or otherwise unsuitable for charging infrastructure.
- There are about 14,000 acres of publicly owned land in activity centers or Key Economic Spaces, and about 400 acres in both activity centers and Key Economic Spaces. There are about 3,000 acres of publicly owned land in the parcels identified as "Future Activity Centers".
- There are 31 libraries in Hillsborough County, seven of which are in underserved communities.
- There are approximately 10,000 acres of publicly owned land within a half mile of the 74 interchanges in Hillsborough County.
- There are about 11,000 acres of publicly owned land in and adjacent to TPO-identified underserved areas.

Many of these locations could serve as potential places to install EV charging stations. The public parcels identified in this analysis will be used to determine, along with EV demand modelling performed as part of the next step in the Plan, to prioritize locations for EV infrastructure in Hillsborough County.

Existing Land Use and Parcel-Level Analysis

Installing public EV infrastructure on land that is already publicly owned avoids the need for property acquisition. There are approximately 300,000 acres of publicly owned parcels in Hillsborough County, although much of it is conservation land, wetland, or otherwise unsuitable for charging infrastructure. Figure 25 shows publicly owned parcels in Hillsborough County.

Figure 25. Publicly Owned Parcels in Hillsborough County



To identify public land with a high opportunity for successful EV infrastructure development, several factors have been considered:

- Proximity to activity centers with high concentrations of population and employment
- Co-locating with activities (such as parks or libraries) to promote tourism and give users something to do while their vehicle is charging
- Proximity to highway interchanges
- Access for underserved communities

The following sections include maps of publicly owned parcels that meet each of the above criteria. As this analysis has been done at a high level, inclusion on the maps below does not necessarily indicate that the parcel is completely suitable for EV infrastructure. Further evaluation of sites is required before installing charging infrastructure.

Activity Centers

Activity centers are areas with high concentrations of people living, working, and spending time. As there are multiple ways to define activity centers, several types of activity centers have been explored as locations for EV charging infrastructure.

Key Employment Spaces and Current Activity Centers

The Hillsborough TPO identified Key Economic Spaces for the 2045 LRTP, which are defined as "Clusters of at least 5,000 jobs representative of existing employment patterns and areas of future growth potential"[73]. These areas represent high employment densities, but high population densities also indicate opportunities for EV infrastructure. Therefore, another type of activity center has been identified as locations with relatively high density of both population and jobs. They are based on the Hillsborough TPO's Traffic Analysis Zone (TAZ) level population and employment projections for 2025. These activity centers are located around downtown Tampa, Westshore, the University of South Florida (USF), and Brandon. In some cases, they overlap with Key Economic Spaces, indicating areas that may be the most active at all hours.

Figure 26 shows publicly owned parcels within activity centers and Key Economic Spaces. There are about 14,000 acres of publicly owned land in activity centers or Key Economic Spaces, and about 400 acres in both activity centers and Key Economic Spaces.

Future Activity Centers

Future activity centers are those that have been designated as mixed-use and high-density Future Land Uses in the Tampa and Hillsborough County Comprehensive Plans. Figure 27 shows publicly owned parcels within these future activity centers. There are about 3,000 acres of publicly owned land in the parcels shown here.

[73] Hillsborough MPO 2045 Long Range Transportation Plan. https://planhillsborough.org/wp-content/uploads/2017/10/LRTP2045-HMPO-ADA.pdf

Figure 26. Publicly Owned Land Near Activity Centers

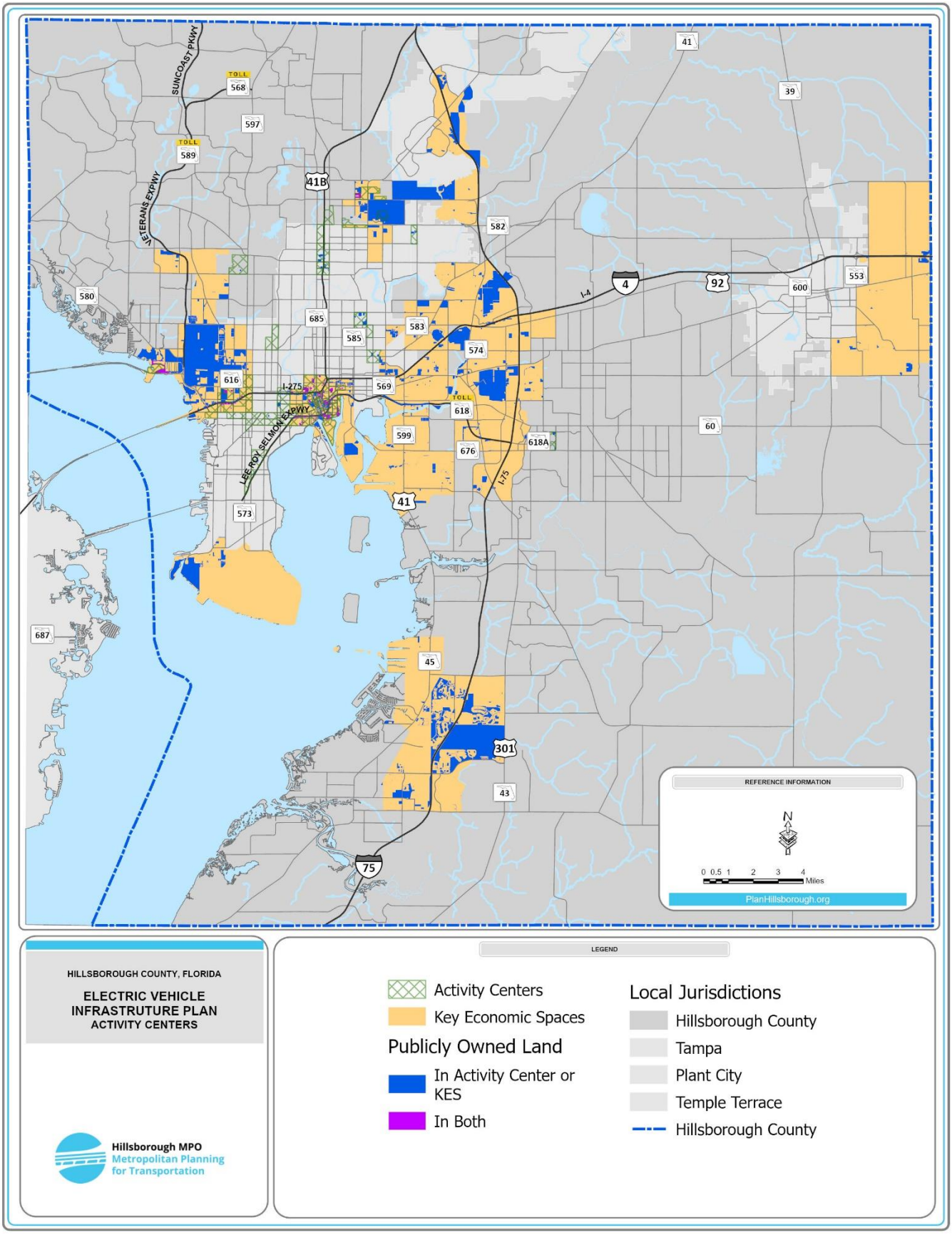
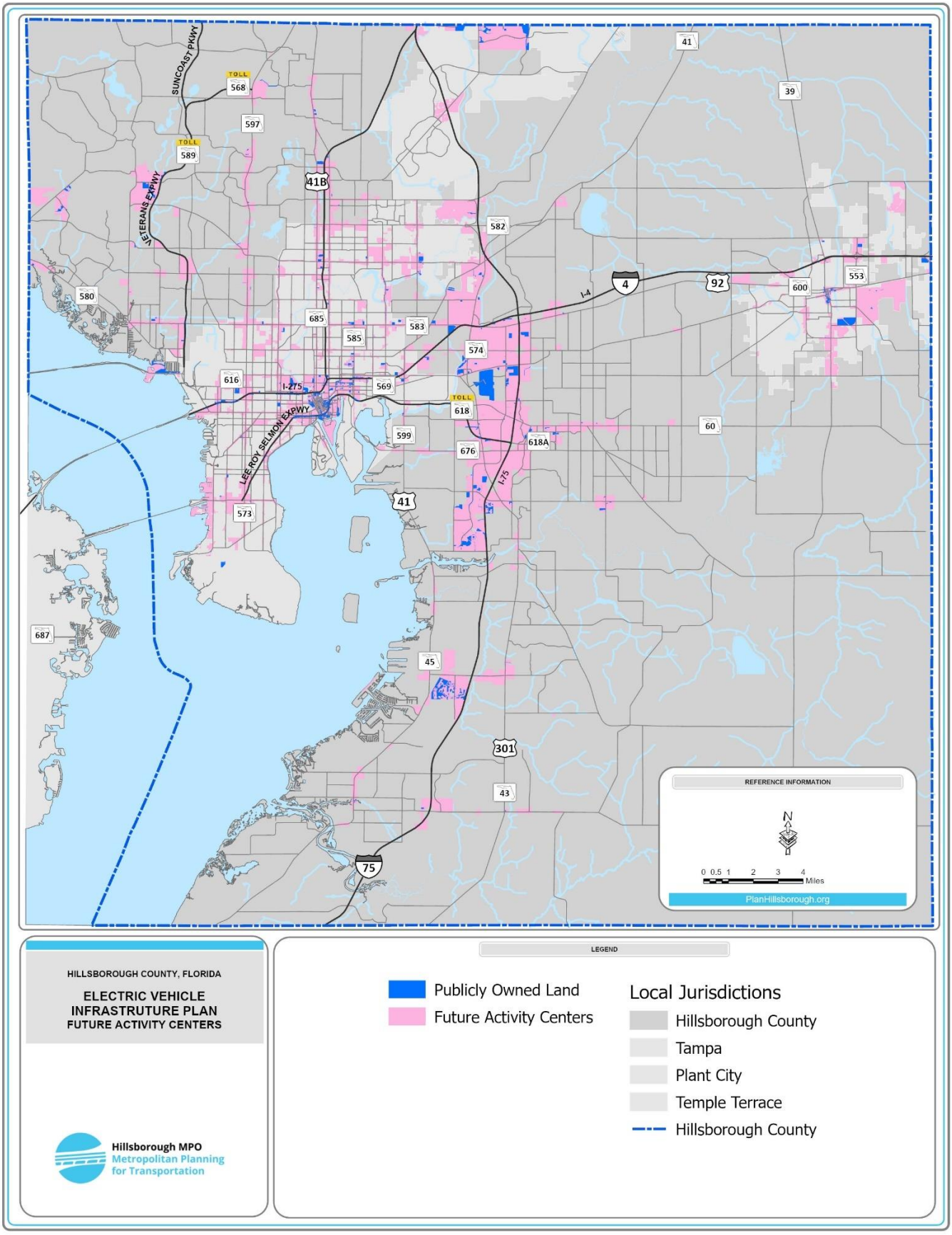


Figure 27. Publicly Owned Land in Future Activity Centers



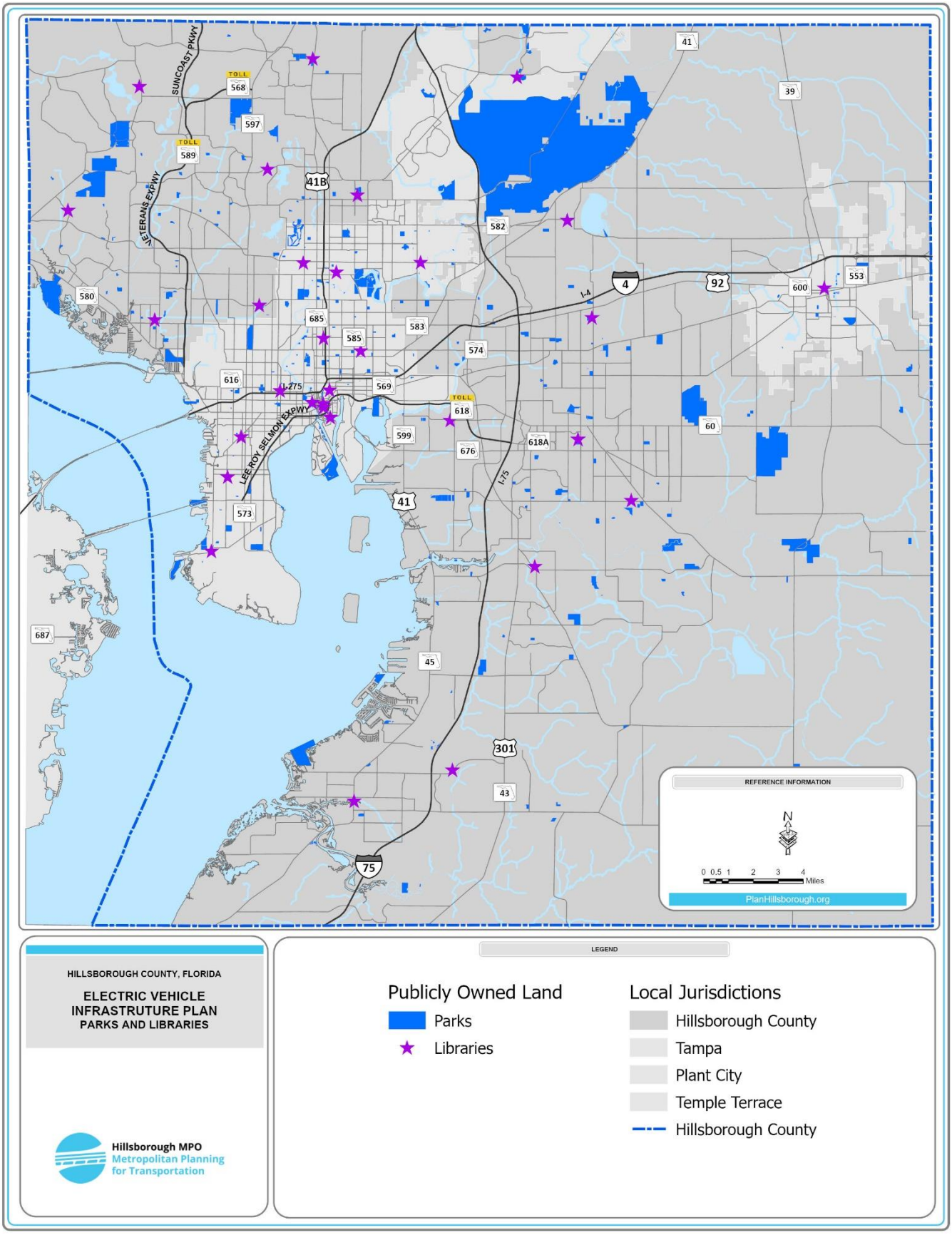
Parks and Libraries

Because charging an electric vehicle takes time, ideal locations for EV infrastructure offer some type of activity for users. Parks and libraries are two types of publicly owned facilities that can provide entertainment for EV users while they take advantage of charging facilities.

There are many parks of various types (neighborhood parks, dog parks, conservation parks, and more) in Hillsborough County, most of which have their own off-street parking. Parks would be excellent places to provide charging infrastructure, as users can enjoy park facilities while they charge. Visitors to Hillsborough County can be directed to parks for charging, increasing tourism to these locations.

There are 31 libraries in Hillsborough County, seven of which are located in underserved communities (see section on underserved areas below). Figure 28 shows the parks and libraries in Hillsborough County.

Figure 28. Park And Library Parcels in Hillsborough County

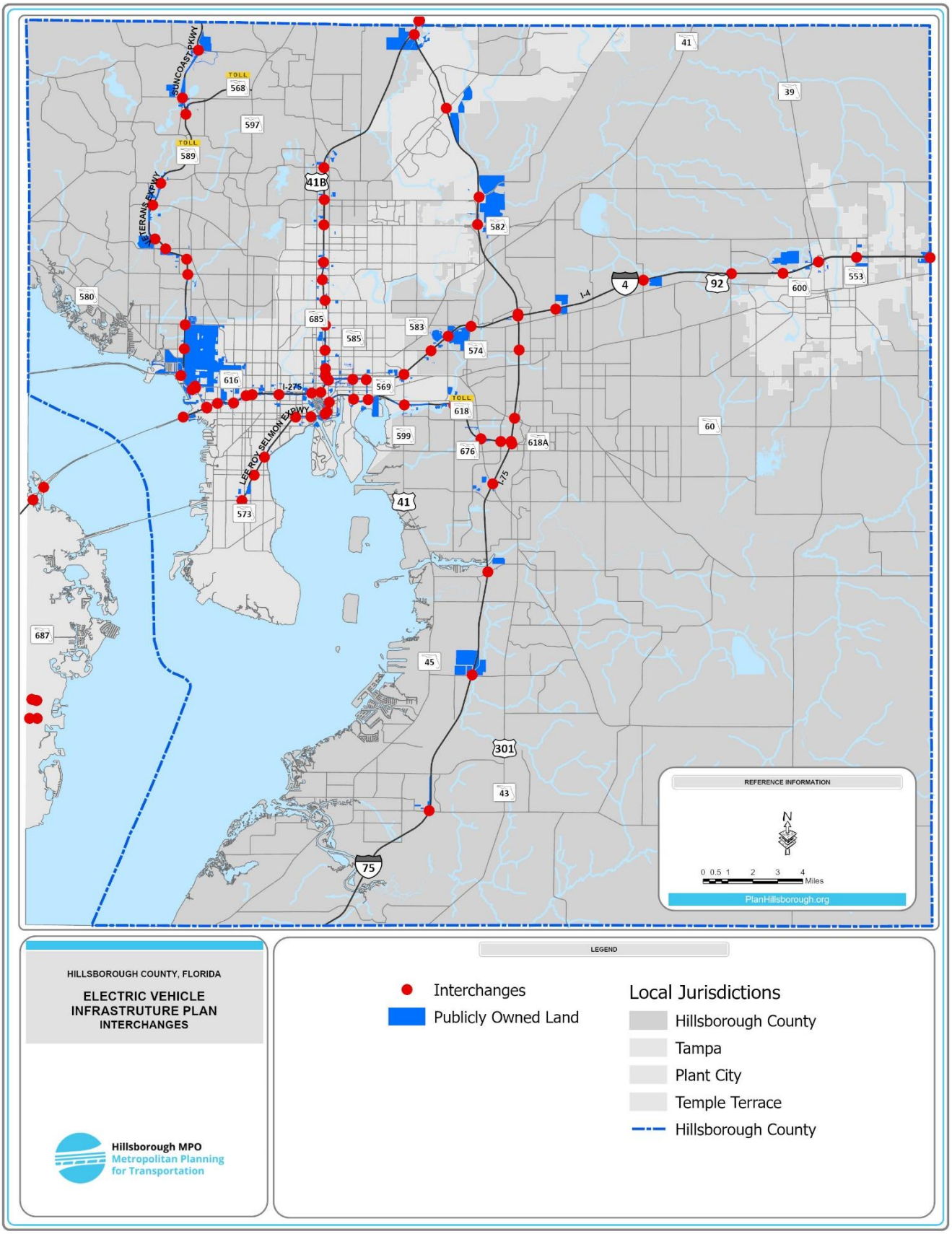


Highway Exits

The NEVI Program allocates funding to states to create a nationwide EV charging network along highway corridors. Interstates 4, 75, and 275 traverse Hillsborough County and have been designated as EV-Corridor Ready or EV-Corridor Pending by the FHWA[74]. Building EV infrastructure along major highways is practical for drivers, and with consideration to other NEVI Program requirements, charging infrastructure in these locations could qualify for formula and grant funding through the NEVI Program. Figure 29 shows the public parcels within ½-mile of highway interchanges, including Veterans Expressway (FL-589) and the Selmon Expressway. There are about 10,000 acres of publicly owned land in the parcels shown below.

[74] https://hepgis.fhwa.dot.gov/fhwagis/ViewMap.aspx?map=Highway+Information%7CElectric+Vehicle+(EV-Round+1,2,3,4+and+5)

Figure 29. Publicly Owned Land Near Highway Interchanges



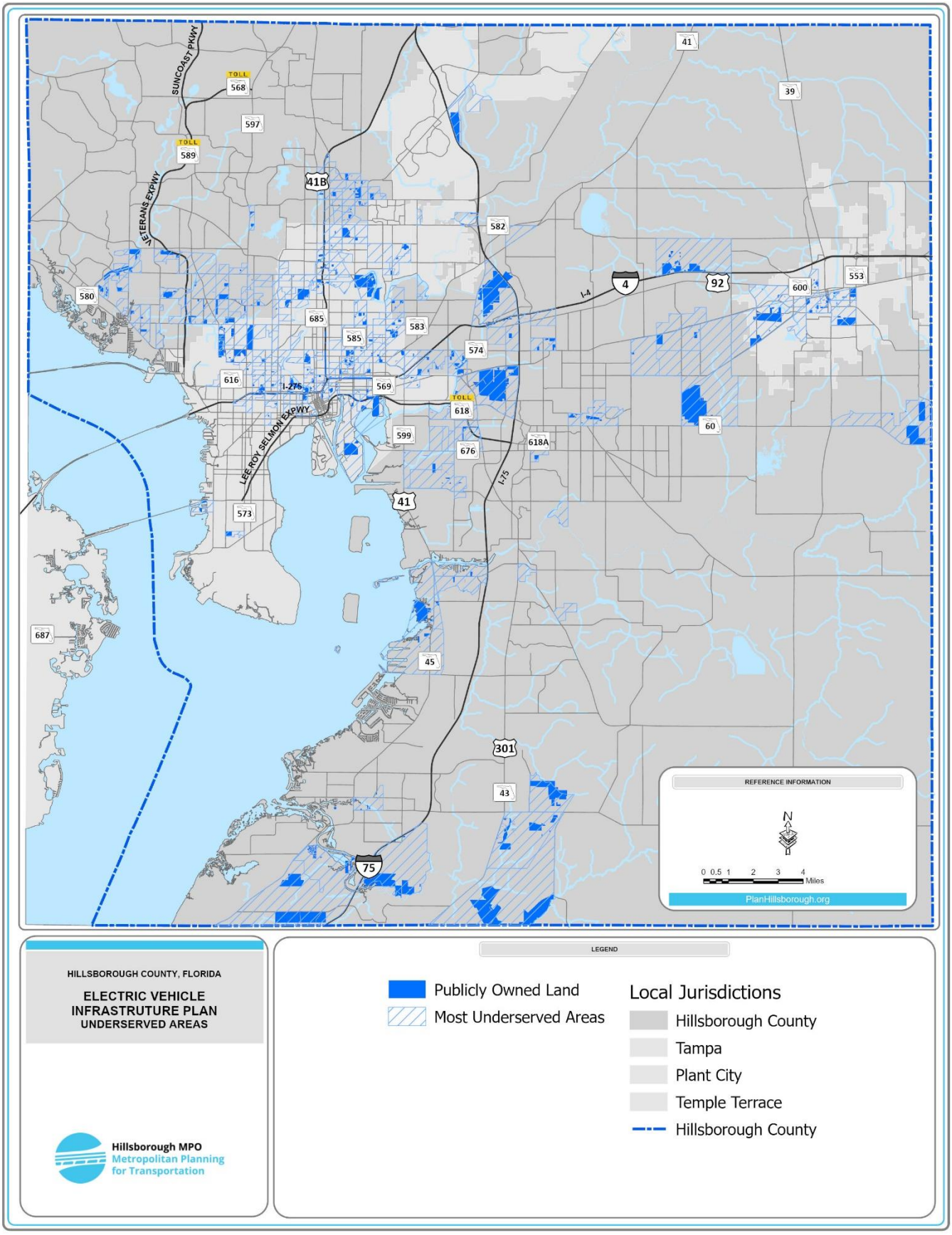
Underserved Areas

Underserved areas (Figure 30) are identified in the TPO's Nondiscrimination and Equity Plan as those with high concentrations (in the 80th percentile) of four or more of the following characteristics:

- Racial minority
- Ethnic minority
- Limited English proficiency
- Older adults
- Youth
- Low-income
- People with disabilities
- People without a high school diploma
- Zero vehicle households
- Female head of household

There are about 11,000 acres of publicly owned land in and adjacent to these underserved areas.

Figure 30. Publicly Owned Land in Underserved Areas



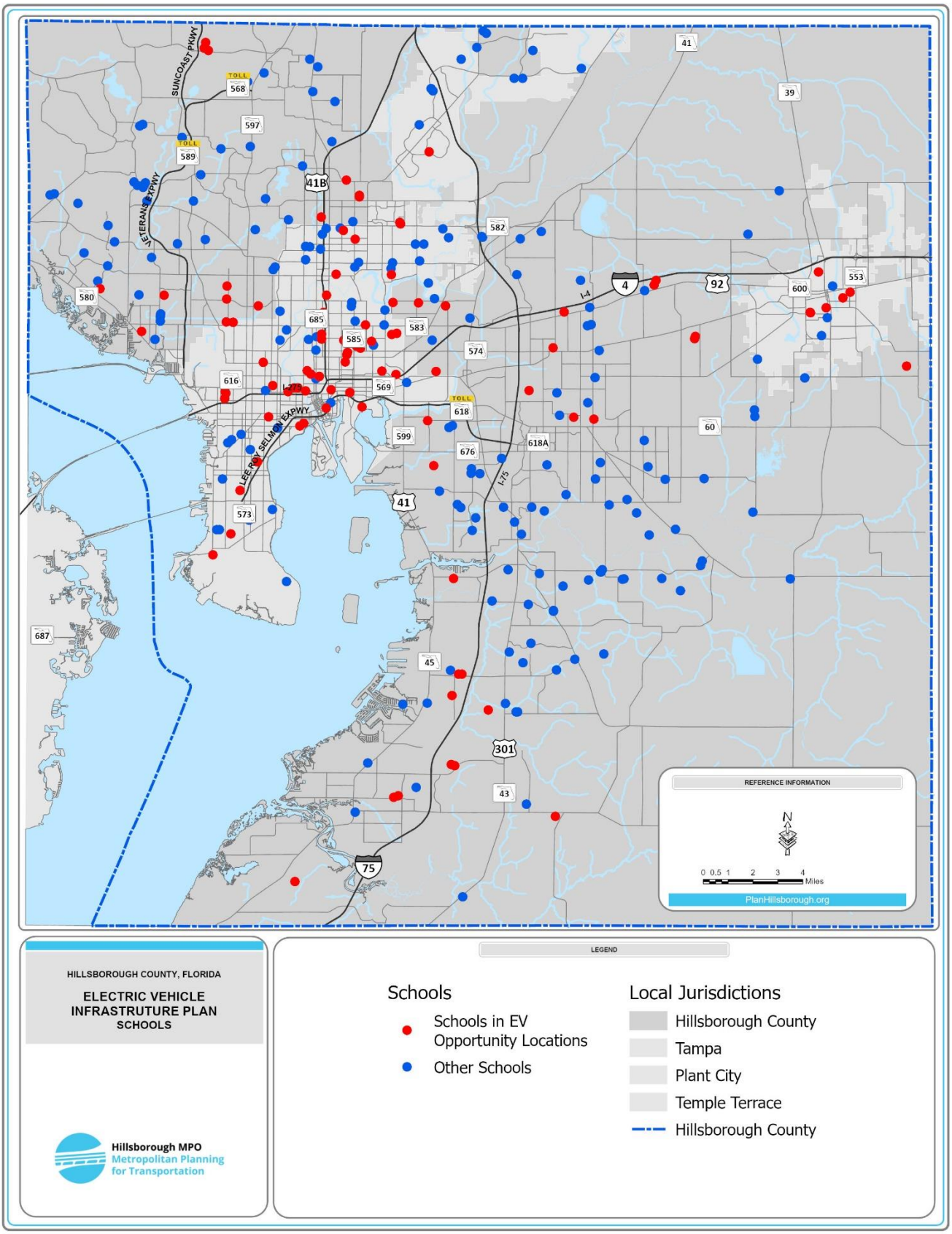
Schools

Many of the publicly owned parcels that meet multiple criteria above (near activity centers, highway interchanges, and/or underserved areas) are schools.

Providing charging stations on school property would be beneficial for staff and students who can charge their vehicles during the school day. Stations could potentially be made publicly available when school is not in session, such as on weekends and during the summer. There may even be an opportunity to use these stations for school fundraising.

There are about 290 public elementary, middle, and high schools in Hillsborough County on about 5,000 acres of land. Figure 31 shows the locations of these schools throughout the county. Schools symbolized in red are in one of the above identified EV opportunity areas – near an Activity Center, near a highway interchange, or within or adjacent to an underserved community.

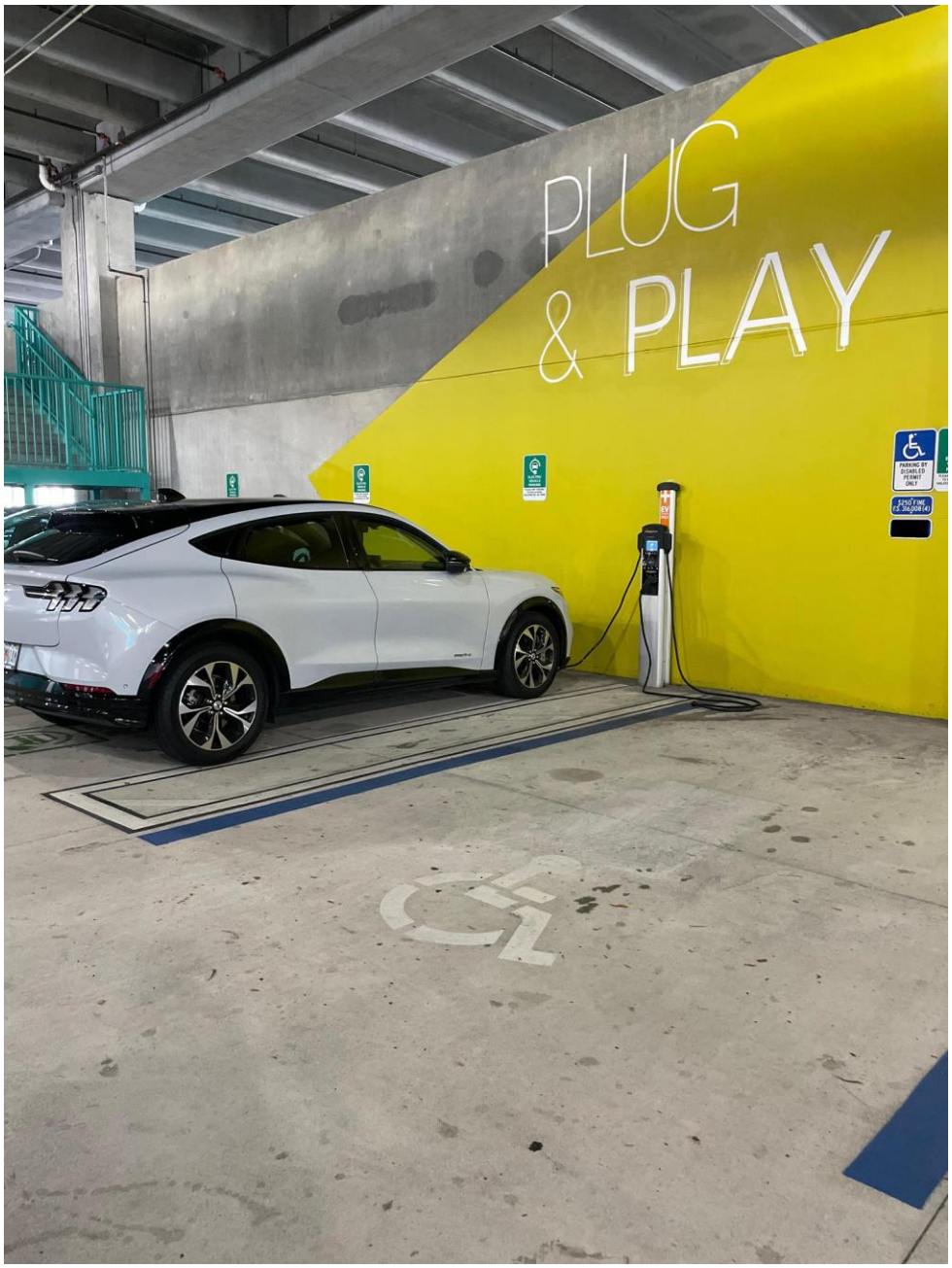
Figure 31. Public Schools in Hillsborough County



Next Steps

The Hillsborough TPO will build upon the existing conditions analysis by completing a needs analysis to identify charging needs and develop a framework for prioritizing the location of charging infrastructure. Additionally, the Hillsborough TPO will provide recommendations for the adoption of local zoning regulations and guidelines. The Hillsborough TPO intends to incorporate findings from this analysis including adoption rates, targets for EV infrastructure, and priorities into other TPO products including the Long Range Transportation Plan (LRTP).

Throughout the needs analysis and recommendation portion of the Plan, the Hillsborough TPO will engage with stakeholders through the Advisory Committee and focused listening sessions related to the identified use cases.



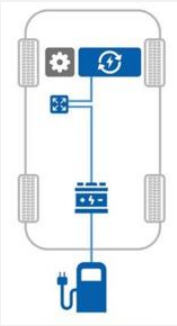
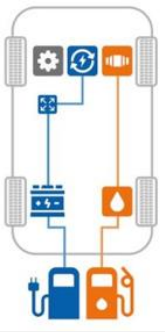
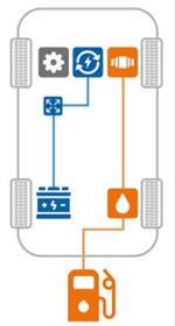
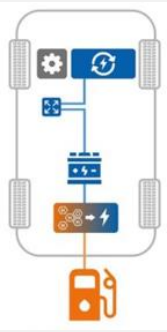
"Vehicle charging in Hillsborough County." Credit: PlugShare.

APPENDICES

Appendix A: Additional Information on Electric Vehicles

The components of different types of electric vehicles power the engine in different manners[75]. Table 11 illustrates how the power sources of different types of EVs connect with the drivetrain and engine of the vehicle.

Table 11. Power Systems by EV Type

Battery Electric Vehicles (BEVs)	Plug-In Hybrid Electric Vehicles (PHEVs)	Hybrid Electric Vehicles (HEVs)	Fuel Cell Electric Vehicles (FCEVs)
			

[75] Miller, T. (2021). *The different types of electric and hybrid vehicles*. National Motorists Association. Retrieved January 4, 2023, from https://ww2.motorists.org/blog/different-types-of-electric-and-hybrid-vehicles/.

Appendix B: Additional Information on Local Development & Zoning Regulations

Current Plans & Policies

Related mentions are recorded below. This content could be tailored in the future to guide the implementation of electric vehicle infrastructure in a way and in locations that is most beneficial to the county's residents and visitors.

Hillsborough County Comprehensive Plan

The Hillsborough County Comprehensive Plan was last updated in September 2022[76]. The Comprehensive Plan mentions the following items that are related to electric vehicles and their charging infrastructure:

- Mobility Goal 6: Build a smart system that utilizes technology and strategies to improve safety, efficiency and reliability for all modes of transportation and to meet the needs of all users.
    - Objective 6.7: Monitor and support emerging technologies and strategies that improve safety, sustainability, efficiency, and access for all modes of travel on existing and planned transportation facilities, as appropriate for the context.
        i. Policy 6.7.7: Incentivize the use of electric vehicles through the implementation and expansion of electric vehicle charging stations.
- Environmental and Sustainability Goal 1: Ensure sufficient, reliable, and clean energy is available to meet the future needs of Hillsborough County residents, businesses, and government.
    - Objective 1.1: Actively participate in EPA's Energy Star for Buildings program, which promotes energy conservation in major public and private structures and facilities.
        i. Policy 1.1.1: Engage in and promote practices that result in energy conservation and efficiency.
        ii. Policy 1.1.2: Continue to offer energy conservation and efficiency information to enable residents, businesses, and County employees to reduce electrical loads and demands on the electrical utility system.
        iii. Policy 1.1.4: Promote energy efficient and sustainable development practices.
- Environmental and Sustainability Goal 3: Support the preservation, conservation, restoration, and management of natural resources while maintaining or enhancing environmental quality.
    - Objective 3.1: Comply with all national and state ambient air quality standards.
        i. Policy 3.1.1: Collaborate with the EPC to promote energy conservation measures and alternative energy sources to reduce the demand for electricity and to minimize power plant emissions from the burning of fossil fuels.

Hillsborough County Land Development Code

The Hillsborough County Land Development Code was last updated in October 2022, and at the time did not mention electric vehicles or charging infrastructure.

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[76]

Tampa 2040 Comprehensive Plan

The City of Tampa 2040 Comprehensive Plan, which was adopted in November 2022, contains the following references related to electric vehicles and charging infrastructure:

/ Environmental Goal 3: Have sufficient, reliable, and resource-efficient energy available to meet the future needs of City of Tampa residents, businesses, and government.
- Objective 3.1: Engage in and promote practices that result in energy conservation and efficiency.
  i. Policy 3.1.1: Offer energy conservation and efficiency information to enable residents, businesses, and City employees to reduce electrical loads and demands on the electrical utility system.
- Objective 3.2: Encourage energy and resource efficient green building and sustainable development practices.
  i. Policy 3.2.1: Encourage builders and developers to exceed the minimum requirements for energy efficiency of the Florida Building Code by sharing information on available training, tools, or literature on resource efficient development
  ii. Policy 3.2.4: When planning to construct City-owned buildings or facilities, build to satisfy, at a minimum, the most current United States Green Building Council "Leadership in Energy and Environmental Design" (LEED) Silver Standard program or meet similar standards.
- Objective 3.3: Support the development of, and engage in the use of, alternative energy and fuels in order to achieve energy supplies that are proven to do no harm to other sectors of the world economy, population or environment, and are secure, resource efficient and sustainable.
  i. Policy 3.3.2: Diversify its fuel supply and reduce its use of fossil fuels by using alternative energy technologies that are proven to do no harm in other sectors of the world economy, population or environment, and are secure, resource efficient and sustainable.
  ii. Policy 3.3.4: Investigate on-site electrical generation using micro-turbines, fuel cells, combined heat and power, renewable, or other technology for City facilities.
  iii. Policy 3.3.6: Pursue the incorporation of alternative energy technology and energy saving specifications within its construction bidding documents, for example, on-site generation using micro-turbines, fuel cells, combined heat and power, photovoltaic power or other appropriate technology.

City of Tampa Land Development Code

The City of Tampa Land Development Code was last updated in November 2022, and contains the following references to electric vehicles and charging infrastructure:

/ Chapter 15: Parking; Article II: regulations, permits, penalties
- Sec 15-56. No person shall park any vehicle in any parking space located in any city owned or operated parking garage or parking lot which is clearly marked as being reserved for the use of an electric vehicle charging station located within said parking garage or lot, unless such vehicle is actually using the electric vehicle charging station. (Ord. No. 2011-84, § 6, 7-14-2011)

/ Chapter 27: Zoning and Land Development; Article III: establishment of zoning districts and district regulations
- Sec 27-184. Official schedule of permitted principal, accessory, and special uses; required off-street parking ratios by use; parking space equivalencies by transportation use (Table 184-B) specific to CBD. (*Does not address parking ratios for charging stations, but does include an 8:1 ratio for "Car-share, ride-hail, or similar type of shared vehicle/neighborhood electric vehicle (low-speed vehicle) vehicle stall.")*
- *Sec 27-185. General parking design standards by transportation mode addresses "neighborhood electric vehicle (low-speed vehicle)" (may mean golf cart)*

Imagine 2040: Plant City Comprehensive Plan

The Plant City Comprehensive Plan was adopted in 2016 and last amended January 25, 2023. The Plant City Comprehensive Plan does not specifically address EV adoption or charging infrastructure. However, Plant City does have goals that may be achieved or are impacted by the adoption of EVs and increased need for EV charging.

/ Environmental Goal 1: Preserve, conserve, restore, and appropriately manage the natural resources of importance to the citizens of the city of plant city, in order to maintain or enhance environmental quality for present and future generations.
    - Objective 1.1: Cooperate as appropriate to maintain compliance with federal and state air quality standards in part by implementing the following policies and practices.
        i. Policy 1.1.1: Actively promote, through conditions in development orders, signs, media promotions and other techniques, the use of ride-sharing, carpooling, safer bicycle routes, improved traffic signal timing and other techniques for reducing vehicle emissions in the City.
/ Environmental Goal 2: Have sufficient and reliable energy available to meet the future needs of residents, businesses and government, and development practices shall be resource efficient.
    - Objective 2.1: Engage in and promote practices that result in energy conservation and efficiency.
    - Objective 2.2: Encourage energy efficient and sustainable development practices.
    - Objective 2.3: Support the development of and consider use of alternative energy/fuel in order to achieve energy supplies that are secure, sustainable and not harmful to the environment.

Plant City Development Code

The Plant City Land Development Code was last updated in January 2023. The Plant City Land Development Code encourages the inclusion of EV charging spaces, with the following guidance and requirements:

Subpart B, Chapter 102, Article VII, Division 11, Sec. 102-1413 – Standards for off-street parking areas:

/ Electric Vehicle Charging Spaces (EVCS) are encouraged and must be supplied with a working charging unit.
/ [Electric Vehicle Charging Spaces] can be compact spaces and shall be no smaller than eight feet wide and eighteen feet long (8' × 18').
    - Note: Except as provided in subsections (a)(5), (10), (11) (12) and (14) herein, each off-street parking space shall consist of a minimum net area of 200 square feet and shall have a minimum width of 10 feet and a minimum length of 20 feet.
/ [Electric Vehicle Charging Spaces] shall be clearly and prominently marked with paint or signs to advise that the charging station spaces are reserved for electric vehicle charging use only.

Imagine 2040: Temple Terrace Comprehensive Plan

The Temple Terrace Comprehensive Plan was adopted in 2016 and last amended January 20, 2023. The Temple Terrace Comprehensive Plan does not specifically address EV adoption or charging infrastructure. However, Temple Terrace goal of having sufficient and reliable energy available to meet future needs is impacted by the adoption of EVs and increased need for EV charging.

/ Environmental Goal 3: Have sufficient and reliable energy available to meet the future needs of residents, businesses and government, and development practices shall be resource efficient.
    - Objective 3.1: Engage in and promote practices that result in energy conservation and efficiency.
    - Objective 3.2: Encourage energy efficient and sustainable development practices.
    - Objective 3.3: Support the development of and consider use of alternative energy/fuel in order to achieve energy supplies that are secure, sustainable and not harmful to the environment.

Temple Terrace Development Code

The Temple Terrace Land Development Code was last updated in January 2023. The Temple Terrace Land Development Code does not include any references specific to EVs or charging infrastructure.

Best Practices

City of Orlando

/ Sec 61.360 - Purpose of EV Parking Requirements. The requirements of this Part are intended to provide electric vehicle charging abilities distributed throughout the City to serve public mobility needs, prepare for emerging electric vehicle technologies, improve air quality, and achieve City sustainability goals, including climate change mitigation.
/ Sec 61.361 – Applicability. The requirements of this Part shall apply to new development or substantial enlargement of structures. Only the new parking spaces added as part of a substantial enlargement are subject to the requirements of this Part.
/ Sec 61.362 - General Requirements. (a) Electric vehicle parking spaces shall meet all performance standards of Ch. 61 Part 3. (b) EV Readiness requirements are categorized in two levels as follows:
    - EV Capable: These parking spaces prepare for future EVSE installation by providing dedicated electrical capacity in the service panel (40amp breaker for every two EV Capable two spaces) and conduit to the EV Capable space. These spaces do not require wiring to the space or a receptacle.
    - EVSE Installed: These parking spaces are reserved for EVs and provide drivers the opportunity to charge their electric vehicle using EV charging stations rated at a minimum of 32amp 7.2 kW. These spaces should be installed per the requirements of the National Electrical Code (NFPA 70) as adopted and amended by the State of Florida.
/ Sec 61.363 - Number of Spaces Required. The parking requirements of this Part are intended to provide minimum standards and do not count towards maximum parking requirements. The EV parking requirements are based on a percentage of the minimum required parking spaces of Part 3 of this Chapter.

Sec 61.364 – Location.

TYPE	EV Capable**	EVSE Installed (threshold)**
Certified Affordable Multi-family Housing	20%	N/A
Multifamily, Hotel, all parking structures	20%	2% (requirement begins at 50 spaces)
Commercial (non-residential)* (office, retail, and public, recreational & institutional uses)	10%	2% (requirement begins at 250 spaces)
Industrial (employee parking only)	10%	2% (requirement begins at 250 spaces)

*Commercial projects for fuel retailers in which *automotive services* is the primary use are excluded from requirements contained in this Part.
**All partial space requirements are rounded down.