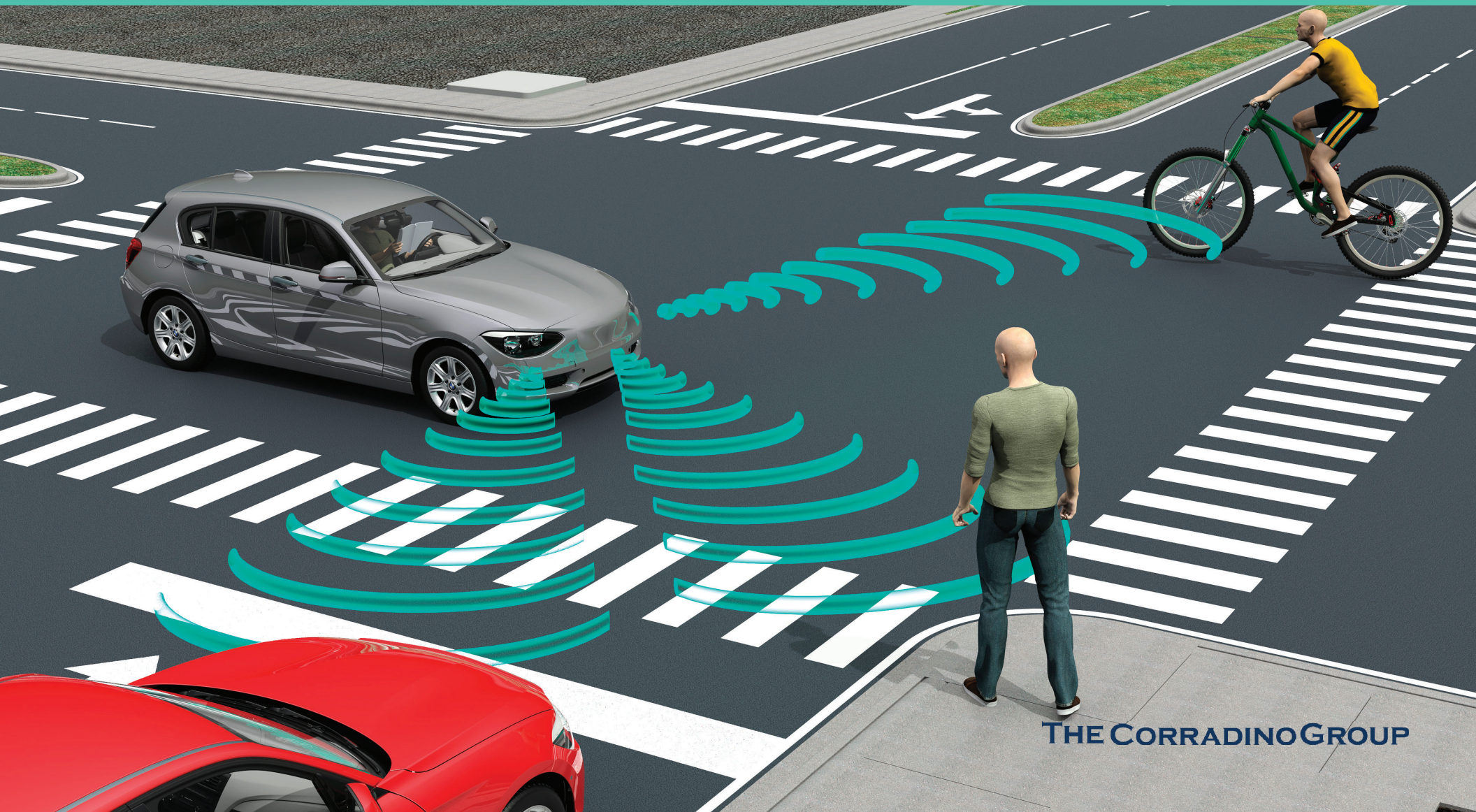
TOWN OF

MIAMI LAKES

DRAFT | SEPTEMBER 12, 2019

SMART TECHNOLOGY IMPLEMENTATION PLAN 2020-2035



THE CORRADINO GROUP

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INTRODUCTION

What is a Smart City? A Smart City is a city dedicated to integrating information and communications through emerging technologies to optimize operations and services, with the intent of providing connectivity to improve the lives of citizens. This includes the development of networks and physical devices designed to obtain and relay information anywhere in a digital city. A Smart City involves the development of up-to-date infrastructure that involves the latest technology, and through this effort, citizens and visitors are able to access various services through any connected device, and experience enhanced city functions in areas of mobility, connectivity, traffic control, utilities, safety and sustainability.

The Town was awarded funding for a Smart Mobility Technology Study from the SMART Moves Grant Program with assistance from the Miami-Dade Transportation Planning Organization (TPO). The purpose of the study is to identify, plan, and establish a future network of diverse transportation technologies to build an infrastructure system that is capable of supporting the community's needs, as well as, improving safety and mobility for all users. The Miami Lakes Smart Mobility and Future Technology Transportation Study incorporates the evaluation of existing and future technologies that could impact and transform transportation in Miami Lakes, including the integration of diverse future technologies to support connected and autonomous transportation, traffic control and management, adaptive signalization, traveler data, pedestrian and bicycle safety, smart parking, energy efficient transportation technologies, and potential funding mechanisms to sustain a cost-effective future transportation network Town-wide.

Smart City technologies optimize infrastructure that can improve functionality and the quality of life in the Town of Miami Lakes by addressing challenges the Town and its stakeholders have identified. Integrating these technologies into various aspects of the Town's fabric will improve utilities, mobility, pedestrian and bicycle safety, traffic congestions, and enhance public safety and quality of life to advance the town as a sustainable place to live, work, and visit, which will be essential for Town operations as it continues to grow.

The Miami Lakes Smart Mobility and Technology Transportation Study identifies how Smart Technology can be implemented to improve transportation, mobility, and safety within the Town. The Town of Miami Lakes is on the forefront of planning efforts as new technologies emerge such as autonomous vehicles that will impact mobility and the way people move in the future. These technologies connect, collect and transmit information, and monitor conditions for efficient Town management and operations. The Town of Miami Lakes SMART Technology Implementation Plan has seven goals which will be achieved by adopting Smart City technologies:

1. Be prepared to accommodate for current and future technology deployment
2. Optimize shared mobility
3. Enhanced pedestrian and bicycle safety and comfort
4. Support efficient travel and public safety
5. Promote public safety
6. Bolster a connected quality of life
7. Achieve universal sustainability

The technologies outlined in this plan are interconnected as they seek to attain the Town's overarching goal to achieve national recognition as a "Model Town" for creativity, education, innovation and use of technology. These Smart Technology goals go beyond just moving vehicular traffic. Connecting people safely and efficiently in a sustainable way is the Town of Miami Lakes' overall mission. The Town of Miami Lakes is ready to lead with new Smart Technology strategies and the technologies outlined in this report have been compiled and are recommended for implementation based on an assessment of regional and local resources, ,the list of technologies identified in the Literature Review from task 2, a review of existing inventory from task 3, feedback received from the Study Advisory Committee, discussions with the Town, and a review of ongoing initiatives and public needs.

The Town has already taken steps to implement certain technologies to improve efficiencies on town roadways, and The Miami Lakes Smart Mobility and Technology Transportation Study is intended to further guide the Town, its citizens and stakeholders towards expanding and implementing additional Smart City technologies that will improve transportation, mobility, and safety within Miami Lakes. This technology study further identifies ways the Town can improve transportation through the use of new and emerging technologies. While the Town of Miami Lakes already has many technologies implemented and operated locally, there are some technologies in place and proposed that require regional support to implement and operate.

METHODOLOGY

As part of this study a technology review and inventory assessment was conducted. The review included street technologies that support autonomous transportation, traffic control and management, adaptive signalization, the collection of traveler data, improvement of pedestrian and bicycle safety, smart parking, and energy efficient transportation technologies. The literature review covered these technologies and analyzed how they affect the planning process and the various potential impacts they have. A survey of existing ITS technology and local inventory of pedestrian, bicycle, transit and roadway infrastructure was undertaken and reviewed to understand the needs for interoperability and communication of information. Data collection and management tools were also reviewed. While most of the technology that was reviewed during the course of the study could help the Town , resources are not infinite, and a prioritization and ranking scheme was developed for the proposed projects. During the review of technologies, it was also found that there were different technologies which provide for the same needs; in these cases, a decision was made to proceed based on the most advantageous option. In preparing this plan, Smart Technologies were selected based on the following factors:

1. Cost
2. Sequence and Prerequisites (i.e. some items needed to be in place for other technology to be usable or effective)
3. Viable locations within the Town
4. Achievement of specific objectives and goals for the Town

Sequencing and prerequisites were incorporated into the recommended schedule provided within this section. Importantly, goals and objectives were created and refined, so that the Town could utilize these as anchoring principles as technologies evolve in the future.

Strategic action steps are provided for each technology, along with suggested "in-charge" staff from the Town as applicable. However, it may be advisable for the Town to hire and designate a SMART City coordinator to guide future efforts.

LITERATURE REVIEW

Transportation technologies are tools used to improve efficiency and mobility of transportation systems and their users. Many are "hard" technologies that involve the application of new materials or tools, and include "soft" elements such as new methods, procedures, and organizational structures for delivering transportation facilities and services. The Internet of Things (IoT) can process information, improving communication among systems that may otherwise be in conflict to improve efficiency, which, in turn, increase safety and mobility in a transportation network. When selecting technologies, it is first important to understand why it is needed and how certain interventions will fit that specific need. In studying potential technological improvements that will enhance transit services in Miami Lakes, we began by understanding the questions people are asking when they are traveling: "Where am I going?" "How am I going to get there?" and "How long will it take to get there?." Understanding how people make decisions regarding travel allows us to understand what tools and information are needed to plan and complete a trip seamlessly. Questions such as these in conjunction with assessing historical data and trends and collecting and examining new data will uncover any gaps or opportunities in the transportation network for viable improvements.

The charts below outline various steps required to travel by transit. Understanding the data required and infrastructure available, from the start of a trip up until it is completed, can determine the types of technology to implement.

Data Flow and Understanding Infrastructural Needs				
	Traveler/Person			Operations
Data User Type	**Planning a Trip**	**Beginning Transit**	**In Transit**	**Systemic Needs**
Items to consider/ Thought process	Can I get there?, How can I get there?, How long will it take me?	Where am I going?, What's my route?, When will I arrive?, Alternative routes?	What's taking so long?, Detour options?, Will I miss my connection? How long until the next one?, Do I need to contact to let someone know I'm running late?	Traffic planning, Congestion management, Signal timing adjustments, Congestion pricing, Automation, Interlink, Disaster/ Emergency Planning
Categorical Needs	Transportation options, Standard time estimate, Timetables	Real time data, Route info, Delays/construction info, Transit timetables	Real-time data, Detour data	Real time data, Route option data, Passenger occupancy data
Data Needed	Route options (multimodal), Bus/Train Schedules	Current traffic data/ETA, Specific route taken, Transfer locations and timetables (Transit)	Current traffic data/ Detour data, Changes in ETA, Transfer locations and layover times (Transit)	Transit ridership, accident data, congestion data, construction/roadwork data
Data Sources	Existing maps, schedules, Destination data (Geolocated data, i.e. Google Earth Maps), Crowdsourcing	Existing maps/schedules, Destination data (Geolocated data, i.e. Google Earth, Maps), Crowdsourcing, Current traffic data accidents, incidents, congestion)	Schedules, Wireless data, Police, Crowdsourcing, Current traffic data (crashes, incidents, congestion)	Sensors (Proximity sensors, Infrared), Cameras, Wireless data (Pings), GPS, Police, Crowdsourcing
Data Distribution	Maps (printed and electronic), internet, word of mouth, Bus/ Transit schedules, Online trip planners	Phone (Waze, Google Maps, etc.), Computer, Word of mouth, Maps (printed or electronic), Schedules (Printed and electronic)	Phone (Waze, Google Map), GPS, Transportation displays (Nextbus, Overhead displays); Text message	Computer interfaces between systems (Wiring, Wireless, Net), Dispatcher systems (Uber, Lyft, Taxis), Digital signage, Radio, Phone, Text

Traffic congestion in Miami Lakes results in excessive delays for road users, and can make for unsafe walking and biking conditions , as automobile priority is often assumed, especially at intersections. The perception of a lack of safety can act as a barrier for movement throughout areas with high traffic volume discouraging shared road use from pedestrians, bicyclist and scooters. In addition, traveling on higher-speed streets may cause higher levels of stress for walkers and bicyclists sharing the road than in other areas with lower speeds. Technology can improve mobility and safety as well as the perception of safety on sidewalks and streets, improving the efficiency and safety of transportation networks for all users. Technology can assist from the moment one plans a trip, until reaching a destination. When selecting technology to implement it is important to determine strengths, weaknesses, opportunities, and threats within transportation networks. These include matters of:

1. Convenience (such as integrated apps for easier access to information; new ways to travel, such as dockless bicycles and scooters)
2. Safety, or perceptions of safety
3. Sustainability, as can be found with green technology

These determinations, along with a cost-benefit analysis, can indicate if/where any technology interventions will pay off.

Implementing technologies can improve mobility for all, improve quality of life, enable new connections, and broaden accessibility. The following review includes: street technologies that will support autonomous transportation; traffic control and management; adaptive signalization; collection and use of traveler data; improvement of pedestrian and bicycle safety; smart parking, energy-efficient transportation technologies; and, potential funding mechanisms to sustain the future transportation network.

KEY WORDS AND CONCEPTS IN CONTEXT

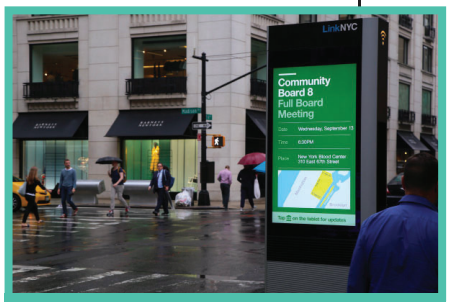
1. **Smart Cities: A place (municipality, neighborhood, and other geographical locations) that incorporates information and communication technologies to enhance the quality and performance of services such as energy, transportation and utilities in order to reduce resource consumption, wastage and overall costs.**
2. **IoT: Interconnecting and interacting technologies to create a large network of objects and systems.**
3. **Equity: Serving travel demands of traditionally underserved populations (low income, minority, aging populations, and people with limited language proficiency and disabilities).**
4. **Access: People's ability to reach goods, services and activities.**
5. **AV: Vehicles that have the capability of driving on their own, without human assistance.**
6. **Energy: The generation of power to provide electricity for functions within a specified area.**

Miami Lakes SMART Mobility and Future Technology Literature Review

SMART INFRASTRUCTURE

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Energy	Smart Grid Infrastructure Electric Vehicle Charging Stations	Installing more Electric vehicle charging stations can encourage more electric vehicle usage and ownership.	• Tesla Supercharger Stations • ChargePoint • SemaConnect; • Blink • EVgo	Cost ranges depending on the charging schematic. A public level 2 charging schematic can range from $3,000-$6,000. Additionally, there are maintenance and operation costs, including the cost of power. Government grants can lower the upfront cost of a charging project and allow an owner-operator to achieve a revenue stream. Grant opportunities are now available such as the Florida Smart City Challenge and Electrify America. Miami Lakes can "host" an electric charging company to install a Pilot Program, or rent stations as a low-risk option. For the user, charging fees range from $0 to a few dollars per hour of charging.	Public charging locations can be installed in parking garages, transportation hubs, and retail and commercial hubs. Public-Private Partnerships will assist in implementing and selecting sites. There is minimal risk for a municipality to own and install the infrastructure and give companies a license to operate it. The following are strategies to implementing public charging stations: • Municipality owns and operates the EV charging stations on public property. • A sponsor/ private partner funds the purchase and installation of a charger at a municipally-designated location for public use. The partner is allowed to recover costs by charging a fee for the fueling service or the provision of other services. • Municipality provides land for a third party to own and operate an EV charging station. The equipment could be owned and operated by the equipment provider, or an independent third party. • Municipality works with private sector or not-for-profit entity to build an EV charging station for public use.	https://www.wired.com/story/us-charging-network-electric-vehicle-needs/ https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf https://www.theicct.org/sites/default/files/publications/EV-charging-best-practices_ICCT-white-paper_04102017_vF.pdf http://www.naseo.org/data/sites/1/documents/publications/Strategic-Planning-to-Implement-Publicly-Avaiable-EV.pdf http://tompkinscountyny.gov/files2/itctc/projects/EV/Tompkins%20County%20EVSE%20Implementation%20Strategies.pdf http://www.sustainablejersey.com/actions-certification/actions/type=1336777436&tx_sjcert_action%5BactionObject%5D=521&tx_sjcert_action%5Baction%5D=getPDF&tx_sjcert_action%5Bcontroller%5D=Action&cHash=e136260b594094a98ecb6f78df43448a

Source: PluginCars.com; Tesla

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Smart Cities	Smart Kiosks	Touchscreen Kiosks can provide information about bus departures, route details, trip planning, and advertising. Software can track individual interactions such as: what users request the most; how long sessions last; plus collect traffic and pedestrian data on travel patterns.	• Connectpoint • SmartStop • Civiq	Cost varies between $6,000 and $13,000 depending on indoor or outdoor use. There is the opportunity to generate ad revenue to cover the cost to install a kiosk network and help finance maintenance.	Smart Kiosks are best located at heavily trafficked areas, public spaces and at transit stops. Implementation will require personalized software support and maintenance.  *Source: Civiq*	https://www.connectpointdigital.com/smartstop/
Smart Cities	Communications Kiosk	Communication networks can provide emergency services such as 911-calling and public service announcements on HD displays. Other amenities can include free public WIFI, phone call capabilities, and usb power charging. Mapping services can also be provided. Advertising opportunities are also available.	• LinkNYC in New York City	LinkNYC Smart Kiosks can cost upwards of $30,000 per unit to install.[1] Advertising on screens create revenue opportunities to defray/cover cost.	Kiosks are best located at heavily foot-trafficked areas, public spaces and at transit stops. Community participation can reveal areas where kiosks are needed the most.  *Source: LinkNYC*	https://link.nyc/

[1] https://techcrunch.com/2018/12/01/the-economics-and-tradeoffs-of-ad-funded-smart-city-tech/

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Smart Cities	Public Wi-Fi 	Public Wi-Fi is wireless connectivity to the internet provided by a municipality or public institution. Providing access to free Wi-Fi provides an amenity for residents and visitors. Internet access helps bridge any digital divide, and can enable other IoT based city services, such as networked LED street lighting or Smart parking.	• San Francisco • Boston	Cost is variable based on service range.	Miami Lakes provides Public-Wi-Fi at all park facilities. Expanding to provide public Wi-Fi in other public spaces and on Miami Lakes Moovers will enhance quality of life for residents and visitors.	https://ruckus-www.s3.amazonaws.com/pdf/other/role-of-public-wifi.pdf http://vtaorgcontent.s3-us-west-1.amazonaws.com/Site_Content/WiFi%20Case%20Study.pdf
Smart Cities	Smart Furniture	Solar-powered benches offer an inviting place to relax and furnish streets with amenities such as free Wi-Fi and usb charging. Smart furniture also can collect user data and metrics such as temperature, foot-traffic counts.	• D.C. Department of Parks and Recreation "Soofa" bench	The data plan costs $600 to $2,000 per year for each bench, and purchasing costs $3,800 per bench.	Smart furniture is best situated at bus stops, commercial areas with high foot-traffic, and parks.  *Source: Civiq*	http://www.soofa.co/
Smart Cities	5G Wi-Fi network	Provide Wi-Fi on transit, in taxis, shuttles, parks and public spaces. 5G offers faster connections, more reliability and greater capacity at lower costs, to better connect infrastructure, devices and people. Moreover, compared to the current 4G standard, 5G offers the capacity to enable additional Smart City capabilities, and it will be a prerequisite to enable various high-bandwidth and low-latency Smart City applications.	• 5G networks are expected to be introduced in the US by 2020	Cost of implementation cannot yet fully be determined. There are advertisement revenue or sponsorship opportunities . In addition, when a user signs in to the system or creates an account, user data can be collected, and there will be an ability to support location-based services that can deliver highly-targeted multimedia content to users.	5G network technology and standards are still being developed. It is expected that 5G will be wide in use within the next 5 years.	http://www.govtech.com/fs/infrastructure/5G-Can-Enable-Smart-Cities-If-Policymakers-Allow-It.html https://www.mckinsey.com/industries/telecommunications/our-insights/the-road-to-5g-the-inevitable-growth-of-infrastructure-cost https://www.ariasystems.com/blog/3-ways-telecoms-will-monetize-5g/

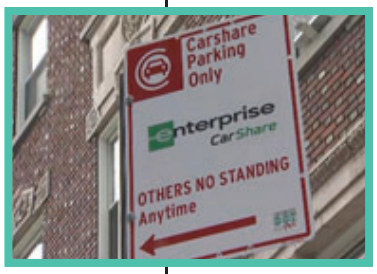
TRANSIT

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
AV/ IoT	Autonomous Shuttle/Taxis/ Ride-Hail Network  *Source: Reuters*	Self-driving, electric vehicles to address first mile/last mile issues.	• Waymo in Phoenix, AZ	Autonomous taxi costs will decline from 85¢ per mile in 2018 to about 35¢ per mile by 2035, less than half of personal cars' Total Cost of Ownership (TCO) and slightly less than their operating expenses.	State Autonomous Vehicle Legislative Efforts exist in Florida. Miami Lakes' suitable year-round weather and areas with slower street speeds, make for favorable autonomous vehicle testing and operating conditions. Florida municipalities can partner with The Florida Department of Transportation (FDOT) Florida Automated Vehicles Initiative to design a testing program.	https://www.theguardian.com/technology/2016/aug/18/self-driving-buses-helsinki http://dupress.com/articles/smart-mobility-trends/%23sup-2 https://ddswireless.com/blog/5-cities-with-noteworthy-autonomous-vehicle-pilot-programs/
Smart Cities	Air-Conditioned Bus Shelters	Air conditioned bus shelters make public transportation more comfortable and attractive, especially in regions with warm climates.	• Hialeah, FL • Dubai, UE  *Source: Phillip Pessar*	The Bus Shelter in Hialeah was built at a cost of $65,000.	Bus shelters with the most sun exposure, and bus stops with the highest use are candidates for such investment.	https://www.miamiherald.com/news/traffic/article96915402.html
IoT	Real-time Public Transit Vehicle Arrival Information System	GPS technology can provide bus arrival information. Information can include waiting time and messages such as any service disruptions or other important service messages. To encourage ridership and promote service accountability.	• Maryland Transit Administration	Capital costs for providing real-time bus arrival information can range from $60,000 for a small deployment to $69.75 million for a larger deployment (London buses).	Real-time information can be installed at bus stops and provided on Web and mobile applications, moving users to plan trips.  *Source: NYC DOT*	https://www.baltimoresun.com/news/maryland/bs-md-bus-real-time-20150209-story.html http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_48.pdf

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Demand Responsive Transit (Micro-Transit)	Micro Transit is a shared, on-demand, app-based mobility service that groups travelers with similar trip pickup and drop-off locations.. Researchers at the University of Texas found that one share vehicle could replace 10 single-occupancy vehicles with wait times from 20 seconds to five minutes.	• Sacramento Regional Transit • SmaRT Ride • Freebee in South Florida	Infrastructure for Micro-Transit is relatively inexpensive for a public transportation alternative/ supplement. Regular roadways will be utilized for route service. Fleet will need to be purchased and requires storage and regular maintenance. Associated costs cover vehicle fleet, depot space, labor, maintenance, development of mobile app, and other tech support. There is an opportunity to collect advertising revenue with sponsorships and advertising space. For example, Freebee offers a 50/50 advertising revenue share with partnering municipalities.	Miami Lakes, along with other cities in South Florida have introduced "Freebee" service to their transportation network, which provides free ride-hailing for individuals, or small groups, through the Freebee application. It is free to users and services a general area with a flexible route. Large fleet microtransit, routes, or general service areas, will be determined based on need, focuses on short-distance trips and first mile / last mile connections. A mobile application will need to be developed to make this possible.	http://www.ce.utexas.edu/prof/kockelman/public_html/TRB15SAVsinAustin.pdf https://smartride.sacrt.com/ https://ridefreebee.com/

Source: Sacramento Regional Transit

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
AV	Autonomous (AV) Technology	It is expected that the integration of privately owned AV cars will reach about 25 percent of the fleet during the period 2026–2035. Boston Consulting Group found about 28 percent of all crashes could be prevented with driver-assisted technologies that are already available today. These technologies include automatic braking, cruise control, and automatic parking. The Boston Consulting Group estimated that almost 10,000 fatalities could be stopped next year if more of these technologies were now in use.	• Many major car manufacturers have developed and deployed AV technology in their vehicles	Cost of AV technology has decreased in the recent past, allowing it to be accessible to the masses. Tesla has released a version of their self-driving vehicle for $35,000.	Many technologies, such as a 5G Network, will be required to fully integrate roadways with AV technology. Precursor technologies will determine how implementation will occur. New facilities will be required, and there will be zoning and building code implications.	http://www.rand.org/pubs/research_reports/RR443-2.html https://www.bcg.com/d/press/29september2015-roadmap-to-safer-driving-through-driver-assistance-systems-17647
IoT	Ride sharing /Car sharing	Ride Sharing and Car Sharing are economical and efficient ways to address first mile/ last mile issues. It is expected that ridesharing will widely expand by 2026–2035, much of which will be by use of autonomous vehicles. Uber expects its entire fleet will be fully autonomous by 2030.	• Uber/Lyft/ & Zip Car; Enterprise Car Share	There are few associated costs, as the operator pays for cost of operations and associated maintenance. For users, rates start at less than $10 per hour, and, in some cases, include fuel and insurance.	Working with service providers will allow to select the best locations. Parking spaces will need to be reserved for loading and ride sharing pick up locations. Car sharing also requires parking spaces and will be managed and operated by selected providers.	https://www.autonews.com/article/20181022/OEM06/181029969/counter-revolution-rental-agencies-explore-mobility-frontiers https://www.cnet.com/roadshow/news/general-motors-maven-car-sharing/ http://www.wsj.com/articles/gm-lyft-to-test-self-driving-electric-taxis-1462460094



Source: Zipcar

FREIGHT						
Key Word	**Technology**	**Summary**	**Examples**	**Cost**	**Implementation**	**Sources**
IoT	Intelligent Freight Management	The Freight Signal Priority service package (FSP) provides traffic signal priority for freight and commercial vehicles traveling in a signalized network. This technology can also be utilized by emergency and personal vehicles. The goal of Freight Signal Priority is to reduce stops and delays to improve travel time reliability for freight traffic, and to enhance safety.	--	Cost information not available.	Freight technologies can improve freight volume movement.	https://www.its.dot.gov/research_archives/efm/index.htm
IoT	Delivery Drones	Drones, or unmanned aerial vehicles (UAVs) can deliver lightweight packages to homes/businesses. Drones have the capability to remove the need for some delivery vehicles on the road, which would reduce traffic volume and Vehicles Miles Traveled (VMT).	• Commercial drone delivery is being tested by companies such as Amazon, Walmart, Google and UPS  *Source: Amazon*	Licenses for commercial drone delivery service is soon expected to be issued in the U.S. Cost of infrastructure required cannot yet be determined.	Buildings and streets would require sensors, visual cues and have parameters for drones to identify viable routes, which has legal, zoning, and land use policy implications.	https://www.citylab.com/life/2014/08/ubiquitous-as-pigeons-imagining-life-in-the-city-of-drones/375568/ http://www.thehumanitarianspace.com/2014/08/zoning-and-urban-land-use-planning-for.html https://medium.com/predict/the-three-dimensional-city-how-drones-will-impact-the-future-urban-landscape-5103af61af72

PEDESTRIANS

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Smart Cities	In-Road Warning Lights (IRWL) 	In-road lights alert motorists that a pedestrian is preparing to cross a street. The pedestrian activates the system, either by using a push-button or through detection from an automated device, and in-ground lights begin to flash in unison, warning the motorist that a pedestrian is in the vicinity of the crosswalk ahead.	• IRWL technology is used across Miami-Dade County, especially for new roadway enhancement projects	Installation costs are an estimated $25,000 per crosswalk which includes parts, materials, labor and equipment.	IRWL enhance safety of marked crosswalks. Locations with low pedestrian-visibility are good candidates for IRWL.  *Source: GreenDC*	http://www.pedbikeinfo.org/data/faq_details.cfm?id=3903
IoT	Pedestrian Hybrid Beacons (PHB)  *Source: Insurance Institute for Highway Safety*	Pedestrian beacons detect a phone's unique identifier, called a Media Access Control (MAC) address. This anonymous signal shows where people congregate and when, and can identify unique visitors . Over time, this has helped local businesses, real estate developers, and transportation agencies respond to a spike in activity.	• "Living Lab" in Dallas, Texas[2]; Las Vegas, NV; and City of Tucson, Arizona	Pedestrian hybrid beacons are less expensive than a full traffic signal installation and can range from $21,000 to $128,000 with an average per-unit cost of $57,680.	PHBs are often considered for installation at locations where pedestrians need to cross and vehicle speeds or volumes are high, but traffic signal warrants are not met. These devices have been successfully used at school crossings, parks, senior centers, and other pedestrian crossings on multilane streets. PHBs are typically installed at the side of the road or on mast arms over midblock pedestrian crossings.	http://www.freepatentsonline.com/y2018/0308356.html https://www.citylab.com/solutions/2019/02/las-vegas-smart-city-technology-surveillance-data-privacy/583474/ http://pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=53
Access/Equity	Extended Time (Tap Cards)	Using Radio Frequency Identification (RFID) technology, a reader detects designated RFIC card issued to elderly and disabled pedestrians which triggers the crossing light to extend.	• The Green Man Plus in Singapore	RFID sensors are relatively inexpensive to purchase and install. Cards have minimal costs.	Targeted areas will consist of areas with larger aging populations. Public input will determine crosswalks with greatest need for crossing time extensions.	https://www.lta.gov.sg/content/ltaweb/en/roads-and-motoring/managing-traffic-and-congestion/intelligent-transport-systems/green-man---.html

[2] Fierce Wireless. Tips, tricks and techniques for successful IoT deployments. June 2018.

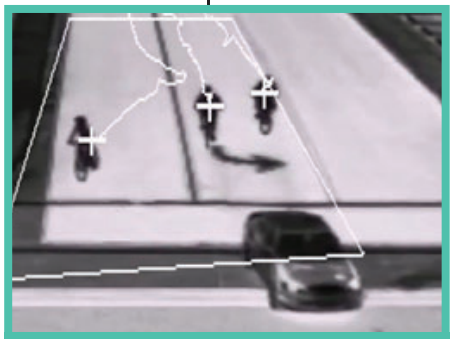
Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Automated Pedestrian Detection	Automated pedestrian detection devices can sense when a pedestrian is waiting at a crosswalk and automatically send a signal to switch to a pedestrian WALK phase. Some automated pedestrian detection devices are also able to determine whether a pedestrian needs more time to cross the roadway and will lengthen the crossing interval to accommodate the slower pedestrian.	• Miami-Dade County, FL and Las Vegas, NV	The cost to install a pedestrian hybrid signal system is approximately $50,000 to $120,000, depending on site conditions and the equipment is alreadyavailable. Operation costs are approximately $4,000 per year. Adding automated detectors to an existing pedestrian signal can range from $10,000 to $70,000 per crosswalk.[3]	Future assessment must be made to determine which detection technology will be the best option. There are ultrasonic, microwave-radar, infrared, piezoelectric, laser scanners and video image processing detectors to be installed for intersections with heavy pedestrian use.	http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=11 http://www.pedbikesafe.org/pedsafe/casestudies_detail.cfm?CM_NUM=11&CS_NUM=101 http://www.pedbikesafe.org/pedsafe/casestudies_detail.cfm?CM_NUM=11&CS_NUM=82
Access/Equity	Extended Time (Tap Cards)	Using Radio Frequency Identification (RFID) technology, a reader detects designated RFIC card issued to elderly and disabled pedestrians which triggers the crossing light to extend.	• The Green Man Plus in Singapore	RFID sensors are relatively inexpensive to purchase and install. Cards have minimal costs.	Targeted areas will consist of areas with larger aging populations. Public input will determine crosswalks with greatest need for crossing time extensions.	https://www.lta.gov.sg/content/ltaweb/en/roads-and-motoring/managing-traffic-and-congestion/intelligent-transport-systems/green-man---.html
Access/Equity	Accessible Pedestrian Signals (APS)	Signals are designed to accommodate the needs of all pedestrians, including those with vision and mobility impairments. They provide information in nonvisual formats, such as audible tones, speech messages, and vibrating surfaces to indicate the appropriate time for pedestrians to cross a street.	• Clearwater, FL	APS can cost anywhere from $500-$10,000 per device	Will need to retrofit current pedestrian signals when they are installed or replaced.	https://www.nap.edu/catalog/22902/accessible-pedestrian-signals-a-guide-to-best-practices-workshop-edition-2010

Source: San Francisco MTA

[3] http://www.pedbikesafe.org/pedsafe/countermeasures_detail.cfm?CM_NUM=11

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Smart Cities	Interactive LED Road Crossing	This crossing is dynamic for all users, and is designed for the age of smartphones. By tracking objects with cameras, the crossing adjusts orientation, markings and colors to accommodate the number of people needing to cross. With the use of smartphones and within heavy traffic areas, more prompts are needed for pedestrians, drivers and cyclists to make road crossings safer.	• Starling Crossing prototype in South London, UK	Costly to retrofit road with LED equipment. 	Crossings with the most users, and high pedestrian use are prime for this technology.	https://www.architectmagazine.com/technology/the-future-of-pedestrian-crossing_o https://www.curbed.com/2017/10/13/16469630/starling-crossing-umbrellium-smart-crosswalk-road-tech

BICYCLES AND SCOOTERS

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Thermal Technology	Thermal imaging cameras can make a distinction among vehicles, pedestrians and bicyclists. The information collected can assist in addressing problem areas. Thermal imaging pedestrian sensors are used to control traffic signals or warning lights by detecting pedestrians at intersection. The pedestrian presence detector transmits its detection information to the traffic signal controller and allows a more dynamic control of traffic signals in favor of pedestrians and bicyclists and activation of warning lights to make them more visible in the traffic scene.	• Arizona Department of Transportation (ADOT)  *Source: Popular Mechanics*	Cost is estimated at up to $16,000 per intersection to install thermal sensors.	Looking at streets with most bicycle usage, and conducting an analysis of crash data will determine intersections with high pedestrian and bicycle crashes. These locations will be the best candidates for thermal sensor installations.	https://www.flir.com/discover/traffic/urban/pedestrian-and-bicyclist-detection-with-thermal-imaging-cameras/ http://www.azbikeped.org/downloads/Bicyclist-and-Pedestrian-Count-Strategy-Plan.pdf
IoT	Stereoscopic Sensors	Stereoscopic sensors are similar to video imaging with automated reduction but use stereoscopic video inputs instead of a single video input. Computer algorithms are used to automatically identify and count pedestrians and bicyclists.	• Arizona Department of Transportation (ADOT)	Cost varies based on location.	An analysis of heavily-trafficked pedestrian and bicycle routes will determine locations for stereoscopic sensors	http://azbikeped.org/downloads/Bicyclist-and-Pedestrian-Count-Strategy-Plan.pdf

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Radio Beams	Ultra-low power, high-frequency pulses are transmitted and reflected off a target object (e.g., bicyclist), and the return pulses are analyzed to determine object type, distance, and motion. The radar sensors are typically installed in the pavement. Detection-enables timing and phasing of traffic signals to be adjusted to significantly enhance safety for cyclists, instantly increasing their visibility to other road users and ensuring fair passage.	• Arizona Department of Transportation (ADOT)	Cost can run upwards of $3,000 for purchase of sensor. Note that the cost of most counting technologies is subject to economies of scale, so the per-site cost can be reduced by purchasing more counters.	Examining streets with most bicycle usage and conducting analysis of crash data will determine problem bicycle areas.	http://ijiee.org/papers/330-T180.pdf http://azbikeped.org/downloads/Bicyclist-and-Pedestrian-Count-Strategy-Plan.pdf
IoT	Automated Bicycle Counters	Counters use sensors embedded in the pavement to collect bike data that uncovers information about bicycle ridership, helping to prioritize projects and evaluate their effectiveness. This data and transparency normalizes biking and encourages more use.	• San Francisco MTA 	Each counter costs around $60,000.	Counters are most effective when installed in areas with heavy bicycle use.	https://www.sfmta.com/bicycle-ridership-data-1

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Smart Bicycle Parking	Bike lockers provide long-term parking solutions for bicycles at an affordable price and offer the most protection for bicycles. These are often placed at bus or train stations to help with first mile/ last mile connections.	• Bikelink; prevalent on the West Coast	Partnering with a provider will require allocating land or street space for lockers. Cost is minimal, if any, for the Community. Cost for the user is affordable, starting at $0.05 per hour.	A service provider must be selected, and locations must be determined based on location of most trafficked bicycle areas.  *Source: Errant Knight*	https://www.bikelink.org/map
IoT	Dockless Bicycles and Scooters	Dockless options for bicycle and scooter rentals expand transportation access. These rely on GPS and sensor technologies to track availability and distance of unit.  *Source: BIRD*	• Bird • Lime • Skip • Spin	The cost to maintain and operate these programs fall on private providers, with cities paying little to nothing. By allowing these companies to operate in their jurisdictions, communities may give up revenue opportunities or need to provide resources such as promoting and advertising, to staffing and space for storage facilities. There are little to no installation costs associated with implementation.	A service provider must be selected. General locations for the concentration of bikes and scooters will be determined by examining where transportation connections are made, to address first mile/last mile and where connections may be lacking.	https://www.smartcitiesdive.com/news/dockless-revolution-2019/544446/

TRAFFIC MANAGEMENT AND LOGISTICS

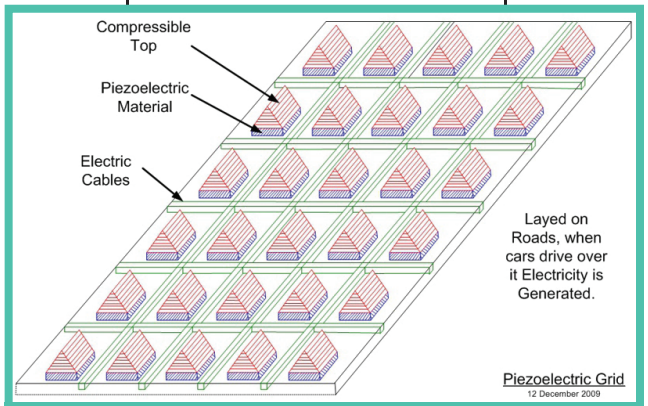
Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Adaptive Signal Control Technology (ASCT)	The variability and unpredictability of tra¬ffic demand on arterial systems often outpace the ability of local and state agencies to update signal timings to ensure that signalized intersections operate efficiently for all road users.	• Michigan Department of Transportation (MDOT) • Virginia Department of Transportation (VDOT) • Colorado Department of Transportation (CDOT) • Miami-Dade County	The average cost to implement Adaptive Signal Control Technology is $28,725 per intersection.[4]	Adaptive signal control technologies are best suited for arterials that experience highly variable or unpredictable tra¬ffic demand for which multiple signal timing solutions are necessary throughout the day.	https://www.fhwa.dot.gov/innovation/everydaycounts/edc-1/pdf/asct_brochure.pdf
IoT	Enterprise Data Management System	The collection, transmittal/transporting, sorting, storing, sharing, aggregating, fusing, analyzing, and applying traffic data points will be needed for management and operations of transportation systems.	• U.S. Department of Transportation (USDOT) • Pennsylvania Department of Transportation (PENNDOT)	Software can cost upwards of $50,000 depending on custom features.	Enterprise Data Management Systems are required in conjunction with street sensor technologies to maximize usefulness of data collected.	https://www.fhwa.dot.gov/infrastructure/asstmgmt/dipa.pdf https://www.its.dot.gov/research_areas/enterprise.htm
IoT	Smart Parking	Cameras to survey and monitor street parking availability.	• Saratoga Springs, NY	Cost of installation can be reasonable when installing a single camera for a wide-area parking lot.	If a provider is selected to administer Smart Parking services, they may assist in installing infrastructure to enhance their product. Businesses may wish to contribute as well.	https://www.saratoga-springs.org/DocumentCenter/View/7186/Team-7-Street-Parking-FullReport?bidId=

[4] https://www.itscosts.its.dot.gov/its/benecost.nsf/ID/34ACAD7692BB577585257B20006C7649?OpenDocument&Query=Home

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	In-ground parking sensors	Along with hardware, parking meters, and pricing algorithm, these in-ground sensors have helped reduce traffic congestion and improve driver satisfaction. By infusing technology with demand-based pricing, city officials in Los Angeles sought to change driver behavior and balance demand by achieving 10-30% of the parking spaces on each block being available throughout the day. Ensuring availability reduces congestion and pollution, shortens travel times, and encourages the use of alternative forms of transportation.	• LA Express Park in Los Angeles, CA • ParkMe in Santa Monica, CA • SFpark in San Francisco, CA • GoVegas in Las Vegas, NV	Cost of installation is relatively high when compared to other Smart Parking technologies, because one sensor is needed per parking space.	Can begin as a Pilot Program in a small area where parking may be in high demand, and if successful, expanded into other areas.  *Source: Cardiff City*	https://downloads.conduent.com/content/usa/en/case-study/la-express-park.pdf
IoT	Dynamic Parking & App	A strategy that involves parking fees that are dynamically varied based on demand and availability to influence parking facility location choice to balance parking supply and demand, and to reduce traffic impacts associated with peak-period trip making.	• San Francisco, CA	The cost to maintain and operate these programs fall on private providers, with communities paying little to nothing. There is little to no installation costs associated with a parking app.	If a provider is selected to administer Smart Parking services, user parking fees will pay for the service.	http://www.govtech.com/fs/automation/San-Francisco-Rolls-Out-Dynamic-Parking-Rate-Model.html
Smart Cities	Smart Street Sweeper	Software is installed on equipment, to help the manage street sweeping routes, dispatching and vehicle location, as well as enabling drivers to flag issues and pathway obstructions. Smart Street Sweepers provide more transparency of daily operations to residents and ensure that a city's streets are well-maintained.	• Fort Collins, CO - 6 month pilot program beginning in March 2019	Cost is unavailable.	Technology will be tested this year.	https://www.smartcitiesworld.net/news/news/fort-collins-pilots-smart-street-sweepers-3899

ENERGY AND UTILITIES

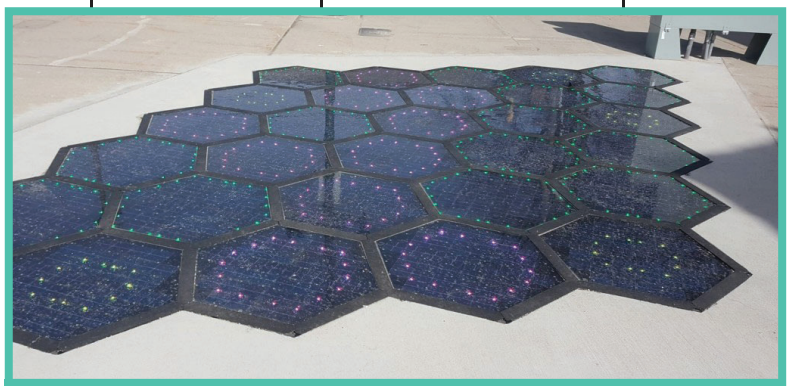
Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
IoT	Intelligent LED Streetlights	Light poles can have Smart Sensors and controls that allow technicians to use a 4G cellular connections to remotely adjust light levels and track usage and outages. Photocells on light poles can sense ambient light to automatically illuminate street lights before dusk, and switch them "off" after dawn. This efficiency has shown to save a significant amount of energy.	• "Living Lab" in Dallas, TX[5]  *Source: Shutter Stock*	Installations often pay for themselves, considering the savings in electricity costs.	Compact area (6.8 miles) of Miami Lakes allows for a variety of sensors and devices to be deployed and maintained.	https://www.bizjournals.com/dallas/news/2018/11/08/living-lab-in-dallas-shows-smart-city-efforts-can.html http://www.dallasinnovationalliance.com/news https://www.smart-energy.com/industry-sectors/business-finance-regulation/smart-street-lighting-strengthens-role-of-utility-in-smart-city-landscape/
Energy	Electricity-generating roads and walkways (Piezoelectric Technology)	Embedding piezoelectric material in the road can convert pressure exerted by moving vehicles into voltage and current. Electric roads have the potential to play an important role in power generation.	• University of Wisconsin, Madison, WI. • California Energy Commission (CEC) pilot program	Cost cannot be determined, as technology is not readily available	Road energy is a source of energy that can be utilized for the fueling of future Smart Street technologies employed.	http://www.iaescore.com/journals/index.php/IJECE/article/view/5437



Source: Piezoelectric Grid by James Childs

[5] Fierce Wireless. Tips, tricks and techniques for successful IoT deployments. June 2018.

Key Word	Technology	Summary	Examples	Cost	Implementation	Sources
Energy	Solar Roads	Solar panels can be installed over existing walkway surfaces at rest stops. Technology is expanding to parking surfaces and roadways.	• Missouri DOT - Pilot Project on Route 66 (pilot program)	Cost is an upward of $450 per square meter. Other types of solar panels such as roof panels or solar farms may be more effective alternative to generating solar energy.	Across the entire U.S., there are thousands of miles of roadway and walkway surfaces where solar roadway panels could potentially be in-stalled.	http://www.upworthy.com/one-of-americas-most-famous-highways-is-about-to-become-an-awesome-science-experiment http://www.solarroadways.com/ http://www.ky3.com/content/news/Solar-pilot-project-could-pave-way-to-roadways-of-the-future-383470771.html http://www.riverfronttimes.com/newsblog/2016/06/27/route-66-will-get-a-dose-of-solar-power-in-southwest-missouri https://www.youtube.com/watch?v=qlTA3rnpgzU https://www.youtube.com/watch?v=YQba3ENhlKA



Source: Motor Authority

TRAVELER DATA AND MOBILE APPS						
Key Word	**Technology**	**Summary**	**Examples**	**Cost**	**Implementation**	**Sources**
Smart Cities	Mobility Marketplace	A Mobility Marketplace enables finding and paying for a variety of transportation options – bikeshare, carshare, transit, rideshare – all in one place.	• SoMo App	Cost to develop app is variable and can range in the tens to hundreds of thousands of dollars. There is also an option to partner with a provider for lower start-up costs.		https://www.smartcitiesdive.com/news/here-technologies-mobility-app/545322/ https://www.androidcentral.com/somo-new-ride-planningsharing-app-designed-take-uber-and-lyft
Equity	Specialized apps for non-English speakers and people with disabilities	Mobility device users navigate their system of Americans with Disabilities Act (ADA)-compliant ramps by offering trip planning based on accessibility. It would support the visually impaired by highlighting locations with audible traffic signals. The app could provide data about where people with disabilities are traveling.		Cost to develop app is variable and can range in the tens to hundreds of thousands of dollars.	An inventory of accessible routes and resources available will need to be compiled.	
Smart Cities	Optimized Transparency	Trip planning app, allowing users to plan efficient trips, track in real-time and receive service alerts.	• TriMet, App Portland, OR	Cost to develop app is variable and can range in the tens to hundreds of thousands of dollars.	All transportation must be updated and equipped with real-time updates and alerts.	https://trimet.org/

SUMMARY

While the technologies summarized above are designed to improve efficiency, safety and the comfort of transportation system users, there remain challenges and concerns in areas related to reliability, safety, security, maintenance, operations, resources and staffing. With the implementation of many of these systems, there is an increased need for "soft" technology infrastructure, especially for the collection and storage of data. In addition, there are concerns with increased data collection and maintaining user privacy. Implementing many of these technologies have policy implications to ensure the community has the proper instruments to adapt to these technologies. In Miami Lakes, many implemented technologies can be scaled to assure there are adequate resources to support these technologies.

Source: Bike Walk Lincoln Park

◆ EXISTING CONDITIONS & POTENTIAL FUTURE CONDITIONS

The Town of Miami Lakes is 6.52 square miles located in the northwestern corner of Miami-Dade County. The Town was incorporated in 2000 and was originally modeled under the New Urbanism movement with mixed uses, as shopping and services are located within walking distance of residential areas. However, over time most of the Town has become car-dependent. Low public transportation access and ridership has led to high levels of road congestion, which is not sustainable for the Town as it continues to grow. Traffic congestion has been cited as the main concern for many of Miami Lakes residents and affects the ability to get around comfortably and safely within the Town. In 2015, the Town developed a Transportation Master Plan that is focused on addressing traffic congestion through a multi-modal approach designed to improve access, connectivity, and safety for all modes of transportation. One aspect of the plan was to evaluate ways technology could be implemented over time to improve traffic congestion, mobility, safety issues. Thus, this plan is intended to support the Town's 2015 Transportation Master Plan and help guide the transportation planning priorities to address mobility issues and assist the Town to become a more connected, efficient, and safer community using technology.

EXISTING TECHNOLOGIES AND INITIATIVES

The Town is dedicated to integrating innovation and technology in its operations and has been on the forefront of planning efforts for incorporating new technologies as they emerge, with an active history of pursuing Smart City initiatives throughout the town. The following technologies are being used in the Town of Miami Lakes, which enforce the Town's commitment to incorporating technologies to improve safety and efficiencies.

Automatic License Plate Readers

Miami Lakes has recently implemented License Plate Reader (LPR) technology, and have invested $675,000 in purchasing and installing LPRs to strategically cover several intersections throughout the own for the purpose of enhancing crime investigations and crime prevention. These readers capture roughly 2,000 license plates a minute, helping police to solve and prevent future crimes.

LED Streetlight conversion

In 2018, the Town completed an LED streetlight conversion project for Town owned lights and FPL owned lights and have saved energy and money. This study recommends the next step is to install smart sensors and controls for automatic lighting controls.

Adaptive signalization (ACST)

The Town has installed these technologies along six sections of Miami Lakes Drive in March of 2019. As the County continues expanding this program, this study recommends expanding ACST technologies to problematic sections with high traffic congestion, as this technology have proven results with up to 23% reduction in travel time for ACST intersections.[6]

CCTV

The Town of Miami Lakes has a total of 32 CCTV cameras. Six CCTV cameras are on NW 154th Street, and 26 CCTV cameras are located in Park facilities. These cameras are used for monitoring Town conditions, and adaptive signalization technologies. The CCTV cameras allow the County to see the intersections live and be able to manually synchronize the intersections if needed. This study recommends the Town install more CCTV cameras to monitors more efficiently and protect new assets and infrastructure. The study recommends for more cameras to be installed around areas of new investment.

[6] *Adaptive Signal Technology cutting Miami Drive Time*. Jesse Scheckner. Miami Today News. June 18, 2019.

Bicycle Sharing

Dockless LIME bicycles have operated in the Town; however, LIME has pulled out and the Town is interested in expanding the capacity of available bicycles. The LIME bicycles are station-less, lime-green colored bikes equipped with onboard GPS units and cellular modems. Rides are affordable costing 50 cents for every 30 minutes. The bikes can be parked anywhere within the Town at designated landscape/furniture zones on sidewalks. This study recommends expansion of a bicycle share program, as well as introduce an electric bicycle option to provide even more choices for the riders.

Micro Transit

Freebee in the Lakes service is now provided in all areas within the Town limits, and serves as a form of Micro-transit, solving first mile/last mile problems. This study recommends expanding micro transit as ridership levels increase, to keep up with demand. The Town is currently exploring potential pilot programs for autonomous vehicle transit operations, and is looking at viable locations within the Town to effect this program.

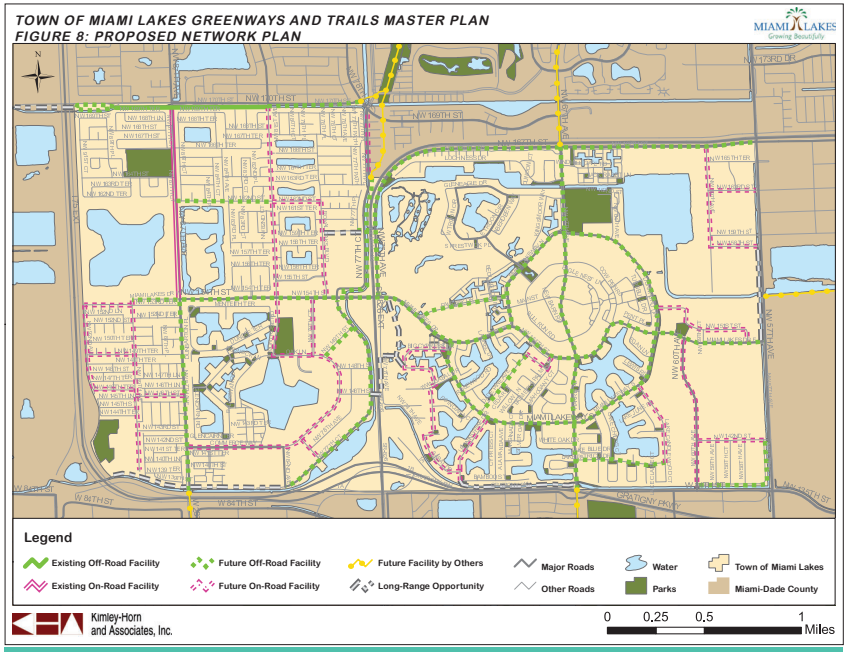
EXISTING INFRASTRUCTURE INITIATIVES

As part of the study, an inventory was compiled for roadways, bus stops, parks, vehicle stock, WIFI access points, crosswalks, traffic signals, adaptive signalization, cameras, and electric charging stations. This information was compiled through Google Earth, Miamigeographic.com, and information received from the Town (See Appendix A for inventory results). The Town has existing infrastructure that provides opportunities for inclusion of emerging technologies. Further, conditions, such as speed limits, require consideration given current technology, including for micro mobility and autonomous vehicle pilot program considerations. These considerations were included as we reviewed technology applications as detailed later in this report.

Over 18 miles of sidewalk, intersection, and bikeway improvements have been proposed in the Miami Lakes Greenways and Trails Master Plan. The overall goal of the plan is to make bicycle travel a more viable option while providing recreation and health benefits to the community. Expanding and improving bicycle infrastructure will provide an additional modal option for the Town. Pedestrian safety improvements at intersections were also incorporated in this plan. The proposed Network Plan Map shown identifies facilities that will serve the Town's mobility needs to help ease traffic congestion.

In 2013 the Town completed the Commute Trip Reduction Program that identified strategies to help reduce traffic congestion. The following are some Transportation Demand Strategies identified:

- Carpooling
- Vanpooling
- Emergency Ride Home
- Telecommuting

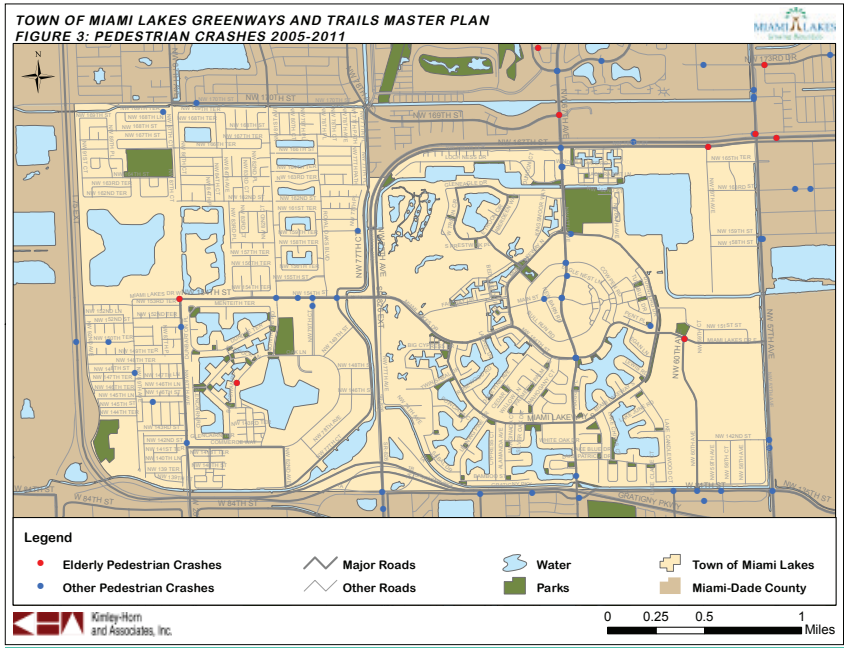


Source: Greenways and Trails Master Plan

- Flexible/Compressed Work Week
- Commuter Tax Incentives
- Bicycle Master Planning
- Pedestrian Master Planning
- Public Outreach
- Employer Outreach
- TDM Marketing and Promotion
- Employer Transportation Coordinator
- Commute Trip Reduction Ordinance

Proposed bikeways, open space, and pedestrian paths from prior planning efforts include:

- Proposed NW 170th Street Greenway Plan
- Proposed Memorial Trail
- Proposed NW 154th Street Trail
- Proposed NW 77th Avenue Greenway (MD Open Space Master Plan)

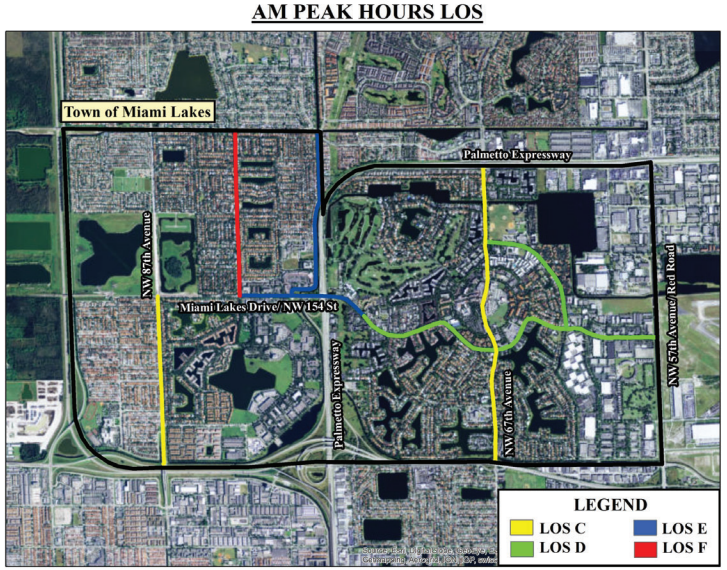


Source: Greenways and Trails Master Plan

The promotion of pedestrian safety was an additional goal of the Miami Lakes Greenways and Trails Master Plan. The Plan identified pedestrian crash locations for elderly and other pedestrians. This information is a key indicator of where enhanced pedestrian Smart Technology infrastructure should be implemented.

As a result of the Greenways and Trails Master Plan, the Safe Routes to School Project along Miami Lakeway South, will begin construction in 2019. This project was grant funded through FDOT's Transportation Alternatives Program and created a multi-use trail connecting Miami Lakes Elementary and Middle Schools. Other projects include the NW 146th Street Greenway which enhanced safety for bicyclists and pedestrians, and the NW 77th Court Greenway.

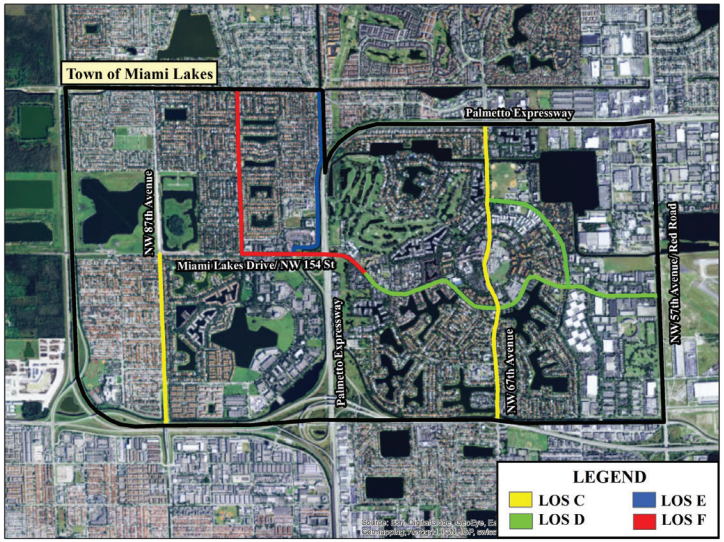
Adaptive Signalization along NW 154th Street was completed in 2017. Adaptive Signal Technology was installed on NW 154th Street from NW 87th Avenue to NW 77th Avenue, using Econolite BlueTOAD technology. Adding additional adaptive control on congested intersections, incorporating transit signal priority, and a traffic monitoring system with CCTV, are key steps to reducing traffic congestion within the Town. In addition, consistency with existing systems should be maintained moving forward.



An interagency event was coordinated by the Town of Miami Lakes in 2015. This Transportation Summit brought together multiple stakeholders to coordinate ideas to relieve traffic congestion within the Town. The following LOS Maps were presented by the Town.

As a result of the Miami Lakes Transportation Summit held in 2015, the Town adopted the following strategies to reduce congestion and to resolve mobility issues. Funding estimates are also included.

PM PEAK HOURS LOS



	Transportation Initiatives		Responsible Agency	Town Cost
	General Issues			
1		Transportation strategy funding plan		$30,000
2		Develop cost estimates for various improvements		$10,000
3		Update Comprehensive Plan Transportation Element		In-house
	Achieve the Greenways and Trails Network			
4		Safe routes to schools project along MLS	Town	$120,000
5		Greenways and Trails Master Plan	Town	$2,435,500
	Targeted Improvements at Troubles Spots			
6		Police to prevent blocking box	Town	$50,000
7		Modify intersection & traffic ligth at 87th Avenue & 164th Street	County/Town	TBD
8		Additional lane at Windmill Gate	County/Town	$400,000
9		Modify traffic ligth at 79th to eliminate northbound traffic	County/Town	$0
10		Create direct connection from Palmetto frontage to Palmetto south	FDOT	$0
11		Reconfiguration of 67th Avenue and Palmetto	FDOT/County/Town	$0
12		Reconfiguration of 57th Avenue and Palmetto	FDOT	
13		Add 150ft to Nourthbound rigth turn lane at 154th & 77th Ct	Town	$120,000
14		Allow left turns from southbound Montrose to eastbound Oak Ln.	County/Town	TBD
15		Add traffic light at NW 79th Ct & NW 154th Street	County/Town	TBD
	Improve East- West connectivity			
16		New underpass at 146th at Palmetto	FDOT/Town	$3,800,000
17		New underpass at 160th under Palmetto	FDOT/Town	$3,900,000
18		Recognifiguration of 154th and Palmetto	FDOT	$0
19		Move guard gate east of 82 from 167th to 162nd	Town/County	$100,000
20		Adaptive signalazation along 154th street	Town/County	$360,000
	Improve Transit and Pedestrian Mobilty			
21		Improve pedestrian connections at Town Center	Town/County	$400,000
22		Implement queu jumps for transit buses	Town/County	TBD
23		Amend code to require sidewalk construction/repair upon development/redevelopment	Town	Private Sector
24		ADA sidewalk master plan	Town	$2,000,000
25		Complete sidewalk system in Business Park	Town	$1,100,000
26		Increase sidewalk widths on arterials/collectors	Town	$700,000
27		Redevelopment planning: Miami Lakes Drive from 82nd to Palmetto (long term)	Town	TBD
28		Redevelopment planning: 151st/153rd area (long term)	Town	TBD
	Provide mobility alternatives for inter-town trips			
29		Provide on-demand bus services thru ridesharing like	Town	TBD
30		Feed Town bus system thru ridesharing	Town	TBD
31		Connect to Metrorail thru ridesharing	Town	TBD
	Transportation Demand Management			
32		Periodic presentations to large employers about commuting alternatives (carpooling, transit, staggered work hours, etc.)	Town/South Florida Commuter Services	TBD
33		Incentivize use of TDM measures by employers	Town	TBD
	Improve Distribution of Traffic Flows (both spatially and timing)			
34		School to change start and dismissal times	Town/School System	$0
35		Make 57th avenue more free flowing	Town	$0
36		Extend 59th Ave south to Miami Lakes Drive	Town	$5,800,000
	Provide better regional transportation connections			
37		Metrorail to NW Dade County	County	$0
38		MDX connection to 67th Avenue	MDX	$0
39		MDX connection to 87th Avenue	MDX	$0
40		I75 northbound connection at 154th Street	FDOT	$0

MULTIMODAL REVIEW OF APPLICABLE TECHNOLOGY

What is a Smart City? A Smart City is a city dedicated to integrating information and communications to optimize operations and services, with the intent of providing connectivity to improve the lives of citizens. This includes the development of networks and physical devices designed to obtain and relay information anywhere in a digital city. A Smart City involves the development of up-to-date infrastructure that involves the latest technology, and through this effort, citizens and visitors can access various services through any connected device.

When selecting technologies to implement for the Town of Miami Lakes, it is important to understand why it is needed and how certain interventions will fit that specific need. In studying potential technological improvements that will enhance transit services in the Town of Miami Lakes ("The Town"), we began by understanding the questions people are asking when they are traveling: "Where am I going?" "How am I going to get there?" and "How long will it take to get there?." Understanding how people make decisions regarding travel allows us to understand what tools and information are needed to plan and complete a trip seamlessly. Questions such as these in conjunction with historical data and researching trends and collecting and examining new data have uncovered opportunities in the transportation network for viable improvements in technology.

Combining these needs with the practical applications of implementation, however, is a completely different matter. In evaluating the technologies, we must consider the differences between local and regional application of technologies. This occurs both a practical standpoint – carshare technology and programs, for example, generally need a critical mass of users to remain financially viable, and thus work better regionally; or from a jurisdictional standpoint – signalization in Miami-Dade County, for example, are under the purview of the County Department of Transportation and Public Works. The projects being put forward are noted to be implementable primarily with the City as the primary or lead actor.
The following applicable technologies have been compiled and are recommend for implementation based on an assessment of regional and local resources, the list of technologies identified in the Literature Review from task 2, a review of existing inventory from task 3, feedback received from the Study Advisory Committee, and a review of ongoing initiatives and public needs. Many technologies are implemented and operated locally, and others require regional support to implement and operate. Some technologies are implementable now, and others are recommended to be put on "hold" and deferred for future assessment. Other technology, while interesting, have been assessed as inapplicable to the Town and its current and future needs and thus will be excluded from the final plan.

SMART Infrastructure

Miami Lakes has been committed to integrating to smart city technologies, and has demonstrated this with ongoing smart city initiatives and infrastructure such as adaptive signalization controls, micro-transit and a bicycle sharing program. The Town has the potential to implement SMART infrastructure throughout the town to improve services and expand amenities.

Electric Vehicle (EV) Charging Stations

Electric Vehicle charging stations deliver the electricity needed to charge electric vehicles. Electric Vehicle Charging infrastructure is essential for encouraging more electric vehicle usage and ownership throughout the Town. By 2025, it is estimated that electric vehicles will be a 7 percent share of all vehicles on the road.[7] Currently, within the Town there are two privately owned charging stations in the downtown area. Expanding the electric charging initiative to more public parking areas, and incentivizing new commercial and residential developments to require installation, will provide an amenity to the public as charging stations will prepare the Town

[7] "US Electric Vehicle Loyalty and Volumes Reach Record Highs" IHS Markit.

for an inevitable increase in electric vehicle ownership and use. The Town is working on making the installation of charging stations a requirement for new developments and currently provides a mobility fee credit to developments that include electric vehicle charge stations. It is an objective for the Town to achieve universal environmental sustainability in public and private environments, operations and infrastructure.[8] To further this objective, the Town government can gradually phase out its current fleet to replace with electric vehicles and install more charging stations to support this objective by providing the necessary infrastructure to easily charge and promote cleaner air by reducing emissions.

The Town should consider creating a partnership with a electric vehicle charging station, or work with other providers to install charging stations on government-owned sites, as there is minimal risk for a municipality to own and install the infrastructure and give companies a license to operate it.

Locations	Cost	Benefit	Application
• Municipal parking lots • Private developments • Business and retail corridors • Downtown Miami Lakes area	• A public level 2 charging schematic can range from $3,000-$6,000 • Additionally, there are software, maintenance, and operation costs, including the cost of power	• Encourage more electric car use and ownership • Offer service to community • Promote cleaner air	• Partner with service provider, private developers and businesses that own parking lots • Requirements through changes to the Town's existing Land Development Regulations

Smart Kiosks

Smart kiosks are an interactive wayfinding instrument for pedestrians that can offer many capabilities which can be customized based on a communities' needs. Smart kiosks serve as modern-day triangulation in public spaces,[9] or a certain characteristic of a public space that brings people together. Smart kiosks are best suited for walkable areas with concentrated activity, and by creating an agreement with private developers and property owners within the Miami Lakes Town Center District it could possibly be the right venue for this technology. Within the area along NW 151st and 153rd street, the Town intends to encourage redevelopment of the area in order to create an additional main street type district. The Town plans to reconstruct the entire corridor to create a more urban complete street with Smart Technology. It is an objective of the town to promote the Town Center as a community meeting and gathering place and installing a Smart Kiosk can help achieve this objective.[10]

The Miami Lakes Town Center District which has been envisioned since the original master plan for the Town as a walkable, mixed-use area similar to a traditional small town "Main Street" currently lacks any technology to guide, engage and asset pedestrians in public spaces and sidewalks. Main Street, which is considered the social hub for Miami Lakes and the surrounding communities, has many attractions and social activities, which makes this section of Town a candidate for Smart Kiosks.

Common features of Smart Kiosks range from practical and informative to fun and entertaining as they can offer the capability to post Town news and alerts, can offer interactive maps for wayfinding and pick up locations, information regarding Town attractions and scheduled events, as well as dining, shopping and hotel information. Kiosks can include real-time information on weather conditions, bus arrivals, and offer the option to request a freebee ride, or book an Uber or Lyft without cellphone service.

[8] Miami Lakes Strategic Plan 2015-2025.
[9] Term coined by William Whyte in "The Social Life of Small Urban Spaces"
[10] Objective 10A.7 of the Comprehensive Master Plan Ordinance

There is also the capability to include interactive games and a camera for selfies. Kiosks can collect data on foot traffic and activity use, it can also be used to charge electronic devices and offer WIFI hotspot. For these reasons, a Smart Kiosk maybe beneficial to install and would be a valuable addition to the Town Center, and other pedestrian areas.

More importantly, kiosks at key locations can be explored as on-call points for shuttle services, or for folks with dead phones or a need for more information to access any future apps that provide for an integrated multi-modal application.

It is estimated that deploying two kiosks will cost around $100,000. Maintenance costs will need to be considered, and cannot be estimated at this time. The Department of Communication and Community Affairs, or a similar department will need to manage the digital media for efficient management and consistency of content. The Department of Economic Development can play a role in programming the kiosks and keeping them updated, as well as working with the community and businesses to advertise business and events. The more engagement a kiosk attracts, the more revenue it will be able to generate. The Economic Development Department can collect revenue from advertising campaigns. According to a study performed by Nielsen, the average company makes $2.87 for every dollar spent on advertising.

Locations	Cost	Benefit	Application
• Public Plazas/ Spaces - Main Street - NW 151st/ 153rd Street Corridor - Miami Lakes Business Park West District	• Estimated at $300,000 for 6 kiosks	• Wayfinding • Community engagement • Advertising revenue • Free WIFI and USB charging	• Department of Communications and Community Affairs • Department of Economic Development

Smart Furniture

SMART furniture adds technology to street furniture that otherwise would only serve one purpose and not be able to multitask. Adding new benches and replacing existing benches is an efficient way to incorporate smart furniture in Miami Lakes. SMART benches are powered with solar panels and can offer free charging, WIFI, and can provide energy saving throughout the Town. SMART furniture can collect data on usage, which can provide the Town with specific information of where people are going. The nature of solar power allows for use when there are power outages like there often is in this region after major storms. This feature makes solar SMART benches a sensible technology for Miami Lakes to implement. The Town has many public spaces and parks where benches can be replaced with SMART benches. Additionally, including these benches at county bus stops will provide improved amenities for transit riders. A data plan is required to collect and aggregate data which can go to the Planning and Zoning Department, and shared with the Parks and Open Space and Public Works Departments. The cost to run these systems can be considerable; mass deployment of townwide internet/WiFi networks, if exercised will change the need for SMART benches from providing hotspot points to being more of a "charge" station area, which reduces the costs. Else, private sources of funding, such as advertisements, are recommended to cover data plan costs.

Locations	Cost	Benefit	Application
• Public parks (all) • Main Street/ Downtown Miami Lakes • Miami Lakes Drive, west of SR 826 by the Commercial district	• The data plan costs $600 to $2,000 per year for each bench, and purchasing costs $3,800 per bench	• Free WIFI and green charging capabilities • Offer more seating throughout the Town	• Town can purchase and install through coordination with the Public Works and Parks and Open Spaces Departments

Book Vending Machines

Library vending machines are fully automated machines that can dispense books and can accept returns. These machines are a fun way of encouraging reading, while only requiring a small footprint in terms of space. In addition to encouraging more reading, these machines can encourage spending time outside and more walking. The Town of Miami Lakes pilot program Little Free Library will be implemented at several Town pocket parks. If the program proves to be a success, the Town will expand the program to additional areas.

In other areas, these facilities are provided near bus stops to provide ease of access to quality reading materials for transit users, who can borrow and return books at transit stops. In some places, the book system is tied to the transit system's SMART card. Implementation of a system involving a transit smart card will require coordination with Miami-Dade Transit and with Miami-Dade Public Libraries but is not a pre-requisite for this technology's implementation.

Locations	Cost	Benefit	Application
• Outside parks • Outside Schools • Near bus stops • Town Center	• About $20,000 per machine	• Increase access to books • More locations return books. • Can encourage more reading	• Requires Miami -Dade Public Library to manage and operate • Miami Lakes Branch Library can partner

Shared Multimodal Mobility

Town of Miami Lakes will implement Freebee service and dockless bicycle and electric scooter rentals to improve mobility for many people, which has traffic calming effects by diverting cars off the roads. It is important for the community to be connected in a seamless and convenient way to the SMART plan and its corridors, and Bus Express Rapid Transit (BERT) routes to maintain first mile and last mile connections to the South Florida transportation network . The Town has applied for funding through FDOT Transit Service Development Program to conduct a pilot Freebee Peak Hour Express System from Miami Lakes to Palmetto Metro Rail System.

The goal is to have two temporary stations on at Picnic Park West and another in Main Street by Town Hall to provide peak hour Freebee Shuttle Service with larger 16 passenger vans between Miami Lakes and the Metro Rail Station. The goal is to help build the ridership needed for the Town's future Park-N-Ride facility with bus express service provided by MDT from Miami Lake Park-N-Ride to Palmetto Metrorail and Dadeland South. The Town's long-term plan for regional connectivity is to construct a Park-N-Ride with transit service to the Palmetto Station and have other existing bus route service the Park-N-Ride, as well. Most people in the Town commute by driving alone. The percentage of people commuting by public transit is lower than the national average and the percentage of people working from home is about the same as the national average.

In addition to bike and scooter sharing, Miami-Dade Public Transportation, and the Town on-demand transportation service provided by Freebee, there are other technologies that can be implemented to ease commutes and increase mobility throughout the Town and the region. The Town may consider a Request for Information or Request for Proposal in order to bring autonomous vehicles to the Town to see how they can improve mobility for Town residents by filling first/last mile gaps.

Test siting for Freebees for autonomous shuttle technology within the Town is an option, and will be dependent on control of speed factors as well as access. Residential areas with low speed limits connected to local roadways that provide access to commercial retail without having to go onto the Town's main arterials and collectors, which have high levels of traffic, can be considered as potential test locations. However, until technology improves for autonomous shuttles, test sites within the Town should avoid Ludlam Road, Miami Lakes Drive, and NW 87th Avenue. Due to the configuration of the roadway network within the town, this provides high levels of limitations in constructing a geofenced area for the shuttle to operate, and initial pilot programs will need to be consigned to short trip loops.

Car Sharing

Car sharing is a model of car rentals where one can rent a car for short period of time. Car sharing rental services are intended to substitute private vehicle ownership and can be structured as a one- way or two-way car share system. One shared, two-way vehicle could replace six to 23 private cars on the road.[11] The City of Miami, and various South Florida universities have a carshare program. Car share vehicles are located in neighborhoods and can be rented by the hour or by the day, and serve populations that both live and work in the Town, or that work from home who may need access to a car at all times, as well as people who may not want to own a car or those who can't afford it. The Town can partner with a carshare company to offer curbside car sharing areas, as well as partner with park and ride stations to allow for customers to pick up a vehicle at one location in the Town and drop it off at a Metrobus, Metrorail, or Tri-rail station. This service gives drivers an incentive to minimize their vehicle use and rely on other travel options as much as possible.[12]

The Town will require a contract agreement with a carshare company, and reserve exclusive curb space or parking lot space (surface or structure) for the rental fleet. There is minimal startup cost, and the carshare companies, in partnership with the Town, can manage and operate the program. Due to minimal implementation costs and infrastructure requirements, this program can be piloted before implementing on a larger-scale.

Car share, however, is limited in its applicability on municipalities that have high car ownership due to existing local needs. Towns like Miami Lakes, where people commute longer distances to work or for a higher percentage of day-to-day activities, fall under this category. Once a certain threshold of usage is met, it is less expensive for an individual to own a car than to utilize a rental or car share system. Public subsidies would there be needed in order to entice and retain companies to offer this service, as there is a minimal usage threshold for these companies to remain profitable or break even, or to reduce the price of the service for individual users in order to make it cost competitive, versus owning a car, for a household. In cases like this, cities should tap into a regional network, and provide dedicated parking space locations, but not initialize a program by itself.

Locations	Cost	Benefit	Application
• Town Center for best access • Edges of Town • Public parking (garages and on-street parking locations)	• Minimal cost	• Can encourage less car ownership • Offer first mile /last mile connections	• Parking spaces will need to be reserved for loading and ride sharing pick up locations • Car sharing also requires parking spaces and will be managed and operated by selected providers.

Multimodal Mobility Marketplace

Figuring out the best option for transportation can be a challenge, as no integrated system exists to compare prices of rides requires jumping back and forth between apps. A Mobility Marketplace is a mobility app that connects users to a variety of transportation options together and integrates a social aspect to transportation, which can be a favorable feature for most commuters in Miami Lakes that drive alone. The app offers alternative transportation options from traditional ride-hail services and can display all transportation options – bikeshare, carshare, transit, rideshare – all in one place. The SoMo app (Social Mobility) allows for social ride sharing which allows the choice to share a ride with friends, participate in gatherings that allow users to connect with social circles based on common activities and ride together, and a

[11] Carsharing Association
[12] vtpi.org

Mobility Marketplace that is open and competitive aggregates all mobility services and transportation options into one interface.

The SoMo mobile app exists and used in dozens of U.S. cities, bus route information for traveling throughout South Florida is only available for personal cars. Taxi services and public transportation information is not yet linked to this system. Since, public transportation is operated by the County, and taxis are licensed by the County, they can partner with the SoMo app to integrate all transportation options in one place.

Miami-Dade County's Department of Transportation and Public Works is currently updating its transit app, which also includes routes within Miami Lakes, to provide for first and last mile information. The Town should monitor the development of this app before making further determinations for itself. Further, it should be noted that Mobility Marketplace apps are only necessary when multiple options for transportation and the need to provide information to link different services, such as transit to e-scooter or bikeshare programs, is present.

Locations	Cost	Benefit	Application
• N/A	• Staff time for processing data. Depending on the Town's wage rates, it should assume that this is a part-time position with a minimum of 1040 manhours per year	• Social mobility • One-interface platform • Ridesharing platform • Increased transparency for all transportation options	• Miami-Dade County Transportation and Public Works Department

Subsidized Car for Hire

The Town Freebee services the entire Town, which addresses first mile/last mile connections and eliminates the need for subsidizing for-hire cars during service hours, but on Saturdays and non-operating hours, the Town can subsidize Uber or Lyft rides in lieu of taking public transportation. Riders could pay a flat fare to travel to community hubs or get a discount on regular fares to other destinations in and around town. Uber Assist and Accessible Vehicle Dispatch through Lyft provide ADA accessible vehicles.

Locations	Cost	Benefit	Application
• N/A	• To be determined based on budget	• Fill in gaps in existing public transit and Freebee service	• Uber and Lyft work with municipalities to collect payments

Pedestrian

The majority of arterial intersections in Miami Lakes are equipped with crosswalks and pedestrian signals, however there are other areas that lack crosswalks and markings to complete the pedestrian network and offer connections throughout the Town. As the Town receives Transportation Alternative Program (TAP) grant money for pedestrian and bicycle infrastructure improvements, the following pedestrian technologies can be integrated to improve safety for these intersections or can be implemented as new crosswalks are added. These technologies will further strategies adopted in the Town's Transportation Master Plan, Greenways and Trails Master Plan, and the Complete Streets Implementation Plan.

In-Road Warning Lights (IRWL)

In-Road Warning Lights are a series of amber lights embedded in the roadway that face oncoming traffic. The lights are visible to approaching drivers as a warning that a pedestrian is in the marked crosswalk or near it. Lights can be activated by using a traditional push button, or an automatic sensor. IRWL can be added to marked crosswalks that have no signalization, to increase yield rates and pedestrian mobility. IRWL eliminates delays from signalized intersection, as lights would only initiate when a crossing is needed. IRWL are one of the best technologies to capture driver attention, and to safety share the road for all users.

Older designs indicate that annual maintenance costs can be upwards of $15,000 for one system. Considering that it is $25,000 per system, this is significant. However, newer models on the market today tend to be better designed with longer lifespans, with corresponding warranties for 8 to 10 years before replacement. This reduces the annual maintenance costs, and it can reasonably be expected that future costs will continue to decrease as the technology becomes increasingly refined.

Locations	Cost	Benefit	Application
• Midblock crossings • School crosswalks • Crosswalks between facilities • Crosswalks on roadways with high levels of traffic • Major intersections	• Installation costs are an estimated $25,000 per crosswalk which includes parts, materials, labor and equipment	• Increase pedestrian visibility, especially in low-lit areas • Improve safety in pedestrian crossings that are not controlled by traffic signals	• FDOT and Transportation Department to integrate IRWL in design for new crosswalks

Pedestrian Hybrid Beacons (PHB)

A pedestrian hybrid beacon (PHB) is a traffic control device that is only activated when needed by pedestrians. Signal lights are overhead roadways, which increase motorists' awareness of pedestrian crossings at uncontrolled marked crosswalk locations. PHBs are useful in locations where traditional crosswalk signings and markings do not result in adequate motorist yielding rates, and where the deployment or cost of a full traffic signal would not be warranted. This includes mid-block crossings or uncontrolled crossing points.[13]

PHB signals are best suited in areas with widely spaced controlled signals, where pedestrians have few opportunities to cross roadways. A pedestrian mobility study can determine specific locations PHB's can be deployed.

Locations	Cost	Benefit	Application
• Mid-block or uncontrolled locations	• Pedestrian hybrid beacons are less expensive than a full traffic signal installation and can range from $21,000 to $128,000 with an average per-unit cost of $57,680	• Improve safety in pedestrian crossings that are not controlled by traffic signals • Increase pedestrian mobility	• Pedestrian mobility study is recommended to study pedestrian and traffic volumes, roadway speeds, and sight distance.

Accessible Pedestrian Signals (APS)

An accessible pedestrian signal and pedestrian pushbutton is an integrated device that communicates information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats, accommodating the needs of all pedestrians, including those with vision and mobility impairments. The Town can continue to expand this initiate by adding APS technology to each signalized intersection, especially the intersections with the most pedestrian use.

[13] *Pedestrian Hybrid Beacon Guide - Recommendations and Case Study*. Federal Highway Administration. April 2019.

Locations	Cost	Benefit	Application
• All signalized intersections, with the most-used intersections as priority.	• APS can cost up to $10,000 per device.	• Extend accessibility throughout Miami Lakes, making crossing safer and easier for all users • A step to implementing complete streets to accommodate the needs of all pedestrians, including those with vision and mobility impairments	• FDOT to integrate APS in design for new crosswalks

Embedded LEDs in Signs

Embedded LEDs can be retrofitted to existing signs, which make this option a financially feasible countermeasure. The retrofit is significantly less expensive than other pedestrian technologies which enhance driver awareness of traffic-control signs and pedestrian crosswalks. LEDs may be illuminated 24 hours a day, or be activated by vehicles or pedestrians. Due to the low power requirements of LEDs, signs with embedded LEDs can typically be powered using stand-alone solar panel units.[14] This technology is best suited for areas where sight lines are restricted, and 4-lane crossings where each side of the street has 2 lanes where these signs will not be obstructed.

Locations	Cost	Benefit	Application
• Locations with sight visibility limitations • Locations with documented problems of drivers failing to recognize an intersection • At STOP signs – this treatment may help to increase the rate of vehicles stopping and to avoid drivers failing to detect the STOP sign	• Estimated cost is $2,000 to $6,000 per intersection • Maintenance costs are assumed to be for replacement LED bulbs, which cost approximately $8/bulb and have a lifespan of 25,000 hours, or approximately 3 years of continuous usage. At 8-16 bulbs per stop sign, an annualized maintenance cost of approximately $25-$50/sign is expected	• Increase visibility of crosswalks, and other regulatory signs • Enhance visibility and recognition of regulatory and warning signs to drivers, especially under low-light or low-visibility conditions.	• The Town to identify locations, prioritize in the CIP and secure funding in partnership with FDOT

Bicycles and Scooters

Miami Lakes has fragmented on-road and off-road bicycle facilities throughout the Town and has prioritized completing a bicycle network by implementing a proposed network of bike lanes and trails which is outlined in the Miami Lakes Greenways and Trails Master Plan. The following technologies will help integrate a bicycle network into the existing transportation network and enhance practicality and convenience for users.

[14] U.S. Department of Transportation.

Smart Bicycle Parking

Bicycle parking goes hand in hand with bicycle usage. Offering safe bicycle parking incentivizes more people to use bicycles. While short-term parking may be suitable for bicycle racks, bicycle lockers offer long-term parking solutions for bicycles at an affordable price and provide the most protection for bicycles, which is especially suitable in hot climates. For many bicyclists, parking on bike racks can be nerve-wracking, as there is no guarantee that bikes are being monitored. Bicycle lockers are often placed at bus or train stations to help with first mile/ last mile connections. Parking is launched through a mobile app that identifies free spaces and keeps track of the time parked, and once the locker is unlocked and bike is retrieved, the app collects payment.

Locations	Cost	Benefit	Application
• Near bus shelters and stops • Along future planned bicycle trail main entry or key juncture points • Downtown Miami Lakes • Town Hall • Parks • Park-N-Ride	• Maintenance and operational cost are passes on to users via rental fees • Town cost is minimal, depending on service agreement • Space costs are dependent on location but are minimized with planning or utilization of publicly owned land	• Offer safe parking solutions for bicycle users, especially for those on longer trips • Encourage more bicycle usage	• Partnering with a provider will require allocating street or curb space for lockers in exchange for processing fees • BikeLink is a provider popular in municipalities on the West Coast

Vehicular Traffic

Traffic congestion is one of the most common concerns for residents and businesses in Miami Lakes. Vehicular technologies that calm traffic are managed by Miami-Dade County, as they operate and manage all traffic controls in conjunction with the Florida Department of Transportation and inter-local agreements.

Adaptive Signal Control Technology (ASCT)

Adaptive signal control technology utilizes sensors to adjust the timing of light changes to accommodate shifting traffic patterns, thus easing traffic congestion. Adaptive signal controls have the ability to reduced average travel times and have proved to do so successfully. Recently, the Town has installed adaptive signalization in conjunction with CCTV cameras at various intersections. The adaptive technology receives traffic information regarding the number of cars traveling on each direction and uses the data in real time to control traffic lights in the most effective way. The CCTV cameras serve as a manual "check" and offers the ability to monitor road conditions in real-time, and manually synchronize intersections if needed.

Keeping these signals operating and maintained properly is the responsibility of Miami-Dade County. Due to Enterprise Data Management and staffing requirements with ACST technologies. ACST technology monitors the performance of the signals and automatically notifies appropriate staff when a traffic signal malfunctions, enabling staff to respond with maximum efficiency and effectiveness. The Town has paid for the procurement of all equipment, materials, and services required to install these technologies along sections of Miami Lakes Drive in the past. As the County continues expanding this program, the Town can look to expand ACST technologies to problematic sections with high traffic congestion, as this technology have proven results with up to 23% reduction in travel time for ACST intersections.[15]

[15] *Adaptive Signal Technology cutting Miami Drive Time*. Jesse Scheckner. Miami Today News. June 18, 2019.

Locations	Cost	Benefit	Application
• Corridors with high congestion - Ludlam - Miami Lakes Drive - NW 87th Avenue - Red Road (future need)	• The average cost to implement Adaptive Signal Control Technology is $28,725 per intersection	• Reduces travel time and traffic build ups	• County Transportation & Public Works Department, and Miami Lakes Transportation Department

Parking Technology

Smart Parking

Smart Parking is a parking strategy that relies on technology to achieve faster, easier parking of vehicles. Ensuring availability reduces congestion and pollution, shortens travel times, and encourages the use of alternative forms of transportation. Miami Lakes has many surface parking lots that can adapt smart parking technology. Cameras are the most cost-effective way to survey and monitor parking lot availability, which makes this parking technology the best option for the Town of Miami Lakes. Installation is cost-effective when installing a single camera for a wide-area parking lot. Cameras can "count" open spaces and advertise this outside the entry to a parking lot. However, this technology is only applicable if the Town chooses to create a parking system in the future.

Locations	Cost	Benefit	Application
• Government-owned parking lots • Private parking lots (must incentivize)	• Cost around $50 per space to install.	• Offer parking transparency • Eliminate traffic from cars looking for parking.	• Camera can be automatic and serviced by the Public Works Department. • If needed, can be monitored remotely

Mobile Parking App

Parking apps often partner with municipalities at little to no cost. Parking apps make parking easier for people on the go and can send reminders when a parking meter is low and allow to extend your allotted time from any location or distance. Some parking apps have the ability to monitor open spaces and can reserve a spot in advance. This technology is only applicable if the Town chooses to create a parking system in the future.

Locations	Cost	Benefit	Application
• All government-owned public parking spaces. - Prioritize spaces most in demand - Future park and rides or parking should be designed with the same technology	• Minimal Cost • Any cost associated with removing current parking meters	• Flexible parking; can pay as you go if more time is needed • Parking payments simplified through one electronic system. • Collect more parking revenue	• Municipality to partner with a provider • Must have ability to enforce parking meters

Utilities

In 2018, the Town completed an LED streetlight conversion project for Town owned lights and FPL owned lights and have saved energy and money. The following technologies will allow for even more efficiencies, and enhanced resident and visitor experiences.

Street Lights

Now that the Town has converted all Town owned lights and FPL owned lights to LED lights, they can install smart sensors and controls that allow technicians to use a 4G cellular connections to remotely adjust light levels and track usage and outages. In addition, photocells on light poles can sense ambient light to automatically illuminate and switch them off after dawn. This efficiency has shown to save a significant amount of energy. The relatively compact area (6.8 miles) of Miami Lakes allows for a variety of sensors and devices to be deployed and maintained, while still providing impact.

Locations	Cost	Benefit	Application
• Town owned lights • FPL owned lights	• Planning level cost assumptions varies based on design and installation costs - $300 - $800/location	• More efficiencies in maintenance and operation	• Must partner with a provider to install sensors

5G WIFI Network

5G wireless networks offer faster connections, more reliability and greater capacity at lower costs, to better connect infrastructure, devices and people. 5G wireless will be deployed in the Miami area by the end of 2019 through Verizon, offering broadband services to homes. Miami Lakes can partner with wireless carriers to expand 5G network throughout the Town . There is an additional option to explore how to offer free WIFI in public spaces. Deploying 5G will help prepare the Town for implementing other Internet of Things (IoT) technologies. For example, a 5G network will be required to fully integrate roadways with Connected and automated vehicle (CAV) technology. Design of civic infrastructure in the future should incorporate this need.

Locations	Cost	Benefit	Application
• Parks (all) • Public Spaces • Public and Civic facilities (Town Hall, any future community center) • Libraries • Schools	• N/A	• Fast WIFI for free to better connect the community • Prepare the Town for future applications using 5G infrastructure	• Public Works to partner with a wireless provider to install 5G networks throughout the Town • May require partnerships with FPL if installing on light poles or utilities

Enforcement

Technology can assist the Town in increasing enforcement in certain areas and can change dangerous behaviors. Miami Lakes has been interested in implementing technologies to assist in enforcement, as seen with the recently deployed automatic license plate readers that can capture roughly 2,000 license plates a minute, helping police to solve and prevent future crimes. In an effort to maximize resources and improve efficiency, the following technologies are recommended for the Town.

Automatic License Plate Readers

Miami Lakes has recently implemented License Plate Reader technology to strategically cover several intersections throughout the own for the purpose of enhancing crime investigations and crime prevention. The Town can expand this program by installing fixed readers to cover more of the Town, especially at entry and exit points. It is beneficial to install fixed systems to monitor more license plates at all times at strategic intersections.

Locations	Cost	Benefit	Application
• NW 87th Avenue/NW 138th Street • NW 87th Avenue/NW 170th Street • Miami Lakes Drive/NW 157th Avenue • NW 67th Avenue/167th Street • NW 67th NW 138th Street	• Mobile Systems cost up to $25,000 per reader • Fixed systems cost up to $100,000	• Solve crimes • Boost revenue by identifying license plates with outstanding citations	• MDCPD/Miami Lakes Police Department provide monitoring of license plates that have matches in database

CCTV Cameras

With future public investments with the installation of new technologies throughout the town, installing cameras will protect these new assets from theft, damage and vandalism. Cameras promote public safety and allow for remote monitoring.

Locations	Cost	Benefit	Application
• Parks • Public Spaces • Public and Civic facilities (Town Hall, any future community center)	• Cost varies depending on number of cameras installed, and if monitoring services are needed outside of Miami Lakes resources • Estimated range $100,000-$200,000, with $30,000-$50,000 in annual maintenance costs per Town-wide system	• Ability to monitor multiple locations simultaneously • Promote public safety • Discourage potential vandalism and other crimes	• MDCPD/ Miami Lakes Police Department provide monitoring of camera locations - Uniform Patrol Services Unit

SMART CURB Space Management

Street activities that rely on curb space such as walking, bike and scooter sharing, electric vehicle charging, e-commerce deliveries, and ride hail services can create congested curb space if not managed or regulated. Many cities are recognizing the value of the curbside, and its ability to constrain or facilitate daily activities, and are offering solutions for all activities and users. As dockless scooters and bicycles are used throughout the Town, curb space may need to be reassessed or regulated to meet demand and type of users. Curb data is collected, then put in a database and mapped out. There is an increased need if the Town elects to regulate its vehicular parking further.

Locations	Cost	Benefit	Application
• Throughout the Town	• Staffing is required to survey curbs and work on data entry. • A part time position with benefits may cost $30,000	• Curb data can be used to improve mobility and adapt curbs to current needs of the Town	• Planning department can use this data to reassess parking and loading areas, as well as for the management of dockless bicycles and scooters

Technologies Deferred for the Future

There are a variety of technologies that can be applicable to the Town but are not recommended to pursue at this time. Some technologies may still be in development, and not ready yet for wide spread application. Others can be implemented pending when other initiatives have begun, or when the Town achieves more capabilities. It is recommended that the following technologies be deferred and reassess in the near future as new advancements are made and application is more critical to mobility and convenience.

Connected and Autonomous Vehicle (CAV) Technology

Autonomous vehicles technology is currently still under development throughout the State and is not ready to be deployed in municipalities on a wide-scale; however, pilots and demonstrations are a way to test this technology now. The Florida Department of Transportation's (FDOT) CAV Program has been engaged in planning, designing, and deploying several CAV pilot projects. FDOT has also started to engage with private-sector companies that are developing, testing, and implementing CAV technologies and applications. Miami Lakes can work with FDOT as implementation moves forward to coordinate CAV deployment. Full-scale implementation will begin in 2020 and focus on completing infrastructure upgrades, implementing large CAV projects, conducting performance and outcome assessments, performing O&M activities, advancing outreach with stakeholders, and analyzing the impacts of agency and industry partnerships.

However, the Town may consider that in the near future, it may be approached by vendors trying to test out their new technologies. Considerations of liability and appropriateness of place need to be considered. The Town may also elect to create a request for proposals to test out new technology in the future. The recommendations section of this report further provides key guidance on the approach for implementation in the future.

Drones

Drones will be critical for reliable delivery service and will assist in getting more delivery vehicles off the road. Commercial drone delivery is in testing by companies such as Amazon, Walmart, Google and UPS, and are not yet ready for deployment. Once licenses are issued for this service, Miami Lakes can implement the necessary technologies to provide this service. However, service in the area may be limited by current and future FAA regulations.

Big Data

Continuous collections of data by the Town is an intensive task, while offering, at this point, not much benefit given the size of the town and existing levels of traffic. In addition, it remains to be seen if adaptive signalization or other technologies will reduce that need – if a system is automatically adjusting for traffic, then continuous counts, which are useful for dealing with traffic in real time for larger cities, may be useful; however, there is no current need. Rather, big data technology, because of the manpower needed to process and how it is used, are more suited to regional analyses and should be referred to the County or State for implementation.

Bicycle Detection

Miami Lakes does not yet have a complete network of on-road facilities that would warrant bicycle detection, but this technology can be implemented once more facilities are constructed.

Electricity-generating Roads and Walkways

Miami Lakes is interested in producing alternative energy but does not yet have the capacity to store electricity generated. These roads and walkways can be installed in the future when the Town has the capability and resources to generate and store their own energy for consumption.

Interactive LED Road Crossings

These crossings offer dynamic and interactive pedestrian crossings that make intersections safer for all users. This technology is not yet readily available as it is in testing in pilot programs, but once available can further the Town's goal to implement complete streets by serving walkers with smartphones and cyclists or drivers with low visibility.

Extended Time (Tap Cards)

About 1/3 of Miami Lakes population is under 18 and over 65.[16] Offering for more time to cross can benefit families with young children, seniors, and disabled populations, making crossing more comfortable and safer. This technology will require one of two systems – one including registration by the Town, or utilizing the Golden Pass system by the County. The latter involves coordination with the County Department of Transportation and Public Works. Further, while the installation of such systems are relatively inexpensive, coordination of impact on signal timing is needed. This technology is better served by having adaptive signalization within the City completely implemented first, as time extensions without adjustments can have the potential for cascading traffic flow issues.

Technology Not Considered

While reviewing a full list of technologies, some items were eliminated from a recommended list of technologies for Miami Lakes. Some technologies align with the Town's goals, are more beneficial than others, and other technologies are redundant or obsolete. In some cases, costs outweigh potential benefits, or the Town has already implemented a comparable technology.

Intelligent Freight Management

Freight management technology benefits areas with high freight traffic. The current land use in Miami Lakes, and the fact that the County freight system networks does not pass through Miami Lakes, which is why intelligent freight management is not a priority for the Town at this time.

In-ground Parking Sensors

The cost of individual installation of parking sensors at each parking space and the disruption of installation on parking makes this not feasible, and this is more applicable with paid parking program, which does not yet exist. Parking cameras are more efficient, are more accurate and require less maintenance than in-ground sensors.

Smart Street Sweeper

Autonomous vehicles, specifically passenger autonomous vehicles are priority of the Town, based on the Town's mobility goals. After passenger autonomous vehicles these have been implemented, the Town can look at implementing autonomous street sweepers, and other waste management technologies. Street sweeping is a contracted service, and the Town can work with a provider to offer autonomous sweeping as a service.

Solar Panel Bicycle Lanes

Solar bicycle lanes successfully collect energy but are not the most efficient way to do so, as has been seen in the Netherlands. This technology is not appropriate for Miami Lakes, as solar panels are best suited for separated pathways, and Florida has a high water table, which makes this option not a suitable option for Miami Lakes.

Demand Responsive Transit (Micro-Transit)

Freebee in the Lakes service is provided in all areas within the Town limits, and serve as a form of Micro-transit, solving first mile/last mile problems, which is why other demand responsive transportation is not needed at this time.

Air-Conditioned Bus Shelters

Air-conditioned bus shelters make public transportation more comfortable and attractive, especially in regions with warm climates, however the cost is high at $65,000 a shelter, plus the cost of electricity. These shelters are recommended for high-ridership areas with extreme heat or sun exposure. Miami Lakes has proportionately low public transit ridership number, which makes this a cost prohibitive measure at this time.

[16] Census Population Estimates, 2018.

GOALS AND OBJECTIVES

The first step in an implementation plan is to define goals, objectives and the desired outcomes. The Town's overarching goal is to achieve national recognition as a "Model Town" for creativity, education, innovation and use of technology. Technology will be deployed to achieve the following goals:

1. **Be prepared to accommodate for current and future technology deployment:**
   - o Prepare the Town of Miami Lakes for future technology deployment
     - Develop Smart City Coordinator position to manage technology projects
     - Introduce and revise new policy to enable and incentivize smart city technologies to be implemented in the private sector
     - Install 5G Network
2. **Optimize shared mobility:**
   - o Seamlessly connect Miami Lakes to the South Florida transportation network
     - Introduce car sharing service
     - Create a subsidize cars for hire program
     - Create part-time staff position to collect curb data for curb management
   - o Maximize first mile/last mile connections
     - Deploy Micro transit
     - Expand Dockless Bicycle sharing
     - Introduce Dockless Electric Scooter sharing
3. **Enhance pedestrian and cyclist mobility, comfort and safety:**
   - o Improve pedestrian visibility and awareness to promote walking
     - Install In-Road Warning Lights
     - Install Rectangular Rapid Flashing Bacons
     - Retrofit signalized crosswalks for Accessible Pedestrian Signals
     - Install Automated Pedestrian Detection devices
   - o Provide smart bicycle infrastructure and facilities to promote bicycle usage and support Bicycle Master Plan
     - Install Smart Bicycle parking
     - Install Video Imaging for bicycle and pedestrian counts
4. **Support efficient travel:**
   - o Improve traffic congestion
     - Expand Adaptive Signal Controls
     - Install and incentivize Smart Parking
     - Streamline parking operations with a Mobile Parking App
   - o Design and accommodate for autonomous vehicles
     - Launch pilot program for Connected and Autonomous Vehicle (CAV) Technology deployment on Town roads
5. **Promote public safety:**
   - o Locate, mitigate and prevent crimes
     - Expand CCTV Camera Technology
6. **Bolster a connected quality of life:**
   - o Provide resources and facilities to engage, connect, and share information
     - Install Smart Kiosks
     - Install Smart Furniture
     - Integrate book vending machines
7. **Achieve universal environmental sustainability :**
   - o Adopt technologies that promote cleaner air and efficiency
     - Introduce electric vehicle parking requirements for new developments and incentivize for current developments
     - Install electric vehicle charging stations
     - Purchase and deploy municipal electric vehicle fleet

► Goal 1: Be prepared to accommodate for current and future technology deployment

Prepare the Town of Miami Lakes for future technology deployment

Implementing a 5G Wireless Network is a pre-requisite to becoming a Smart City. 5G Smart Technology prepares the Town of Miami Lakes for the deployment of future technologies. All advanced data analysis, IoT communication, and autonomous vehicles need fast communication networks. Smart cities have open data and enable connectivity through physical devices and external databases which are then analyzed to manage resources more effectively. The main concept is exchanging data for analysis. This will provide better mobility for the future. 5G wireless networks offer faster connections, more reliability and greater capacity at lower costs, to better connect infrastructure, devices and people. Deploying 5G will help prepare the Town for implementing other Internet of Things (IoT) technologies and 5G Networks provide lower latency which is significant for the operation of autonomous vehicles.

► Goal 2: Optimize shared mobility

Seamlessly connect Miami Lakes to the South Florida transportation network

Car sharing, curb management, dockless scooters and bicycles, provide multimodal options throughout the Town. The Town is already providing Freebee rides eliminating the need for sub sizing car for hire services. Providing multimodal options not only services first/last mile gaps but also connects Miami Lakes to the regional network furthering the goal of optimizing shared mobility.

► Goal 3: Enhance pedestrian and cyclist mobility, comfort and safety

Improve pedestrian visibility and awareness to promote walking

Enhancing pedestrian and cyclist comfort and safety is key to promoting these mobility options. Most of Miami Lakes is car dependent, however there are concentrated areas that have increased pedestrian usage. In road warning lights and pedestrian beacons are Smart technologies that promote safety. The intent of the Town is to integrate Smart Technology to improve pedestrian safety which will further Town-wide walkability.

Provide smart bicycle facilities to promote bicycle usage and support Bicycle Master Plan

Smart bicycle technologies promote bicycle usage and support the Greenways and Trails Master Plan while reducing car dependency. Smart bicycle lockers and Smart Bicycle app parking systems can encourage the community to ride their bicycles instead of driving. These Smart technologies provide an incentive and additional comfort and safety for cyclists.

► Goal 4: Support efficient travel

Improve traffic congestion

Improving traffic congestion is a common concern for Miami Lakes residents. Smart parking technologies such as Smart parking camera and applications help eliminate congestion by reducing the time spent searching for parking. It is recommended that the Town perform a parking management study in order to properly identify the need and locations for this technology. Expanding Adaptive signal controls throughout the Town, in order to monitor roadway volumes and adjust signal timing, will allow for better traffic control during peak hours mitigating congestion on roadways.

► Goal 5: Promote public safety

Locate, mitigate and prevent crimes

Ensuring public safety and crime prevention can be accomplished by monitoring through the expansion of the CCTV Smart Camera Technology. The Town of Miami Lakes vision is to deploy innovative Smart Technology to help improve safety and enhance security and protect Town residents and visitors. Many of the Smart Technologies addressed in the study involve enhancing safety. These technologies will also assist the Town in measuring events to estimate the need for further safety enhancements.

► Goal 6: Bolster a connected quality of life

Provide resources and facilities to engage, connect and share information

Providing Smart Kiosks and Smart Furniture and will enhance the quality of life of residents and visitors. These smart technologies will be provided at public locations throughout the Town, allowing for community gathering and promoting the Town and businesses. Interactive services engage the public and can optimize the disbursement of information while providing an amenity.

► Goal 7: Achieve universal environmental sustainability

Adopt technologies that promote cleaner air and efficiency

Smart infrastructure including electric vehicle charging stations and an electric vehicle fleet assist the Town in achieving its goal of universal environmental sustainability. Providing the infrastructure to easily charge vehicles for not only the Town but also the public promotes and encourages the use of electric vehicles. These technologies promote cleaner air and serve as an additional amenity for the public. Street light sensors are energy efficient and technologically advanced as usage and outages can be tracked providing efficiencies in maintenance and operations advancing the Town's goal of environmental sustainability.

Table 1 below is a timeline that provides a time frame for deploying technology items that achieve each goal. The following tables detail the steps for implementation, lead agencies, and potential partners where applicable.

Table 1: Town of Miami Lakes Technology Deployment Timeline

Technologies	0-5 years	5-10 years	10-15 years
5G Network			
Connected Vehicle Technology			
Electric Vehicle Charging Stations			
Accessible Pedestrian Signals			
In Road Warning Lights			
Rectangular Rapid Flashing Beacons			
Embedded LEDs in Signs			
Curb Space Management			
Subsidized on-demand car for-hire			
Smart Benches			
Smart Kiosks			
Smart Parking			
Smart Bicycle Lockers			
Electric Vehicle Fleet			
CCTV Expansion			
Adaptive Signal Controls			
Car Share			
Light Sensors			
Parking Program / App			
Micro Transit			
Bicycle Sharing			
Video Imaging for Bicycle and Pedestrian Detection			
Electric Scooter Sharing			
Connected Autonomous Vehicles			
Mobility App / "Mobility Marketplace"			
Book Vending Machines			
Automated Pedestrain Detection			

Goal Items
Be prepared to accomidate for current and future technology deployment
Optimize shared mobility
Enhance pedestrian and cyclist mobility, comfort and safety
Support efficient travel
Promote public safety
Bolster a connected quality of life
Achieve universal environmental sustainability

Table 2					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Be prepared to Accommodate for Current and Future Technology Deployment	5G WIFI Network	1	Create Inventory of current Fiber Optic network and locations	Public Works	Telecommunication Service Providers
		2	Compile list of potential sponsors to help with installation and maintenance	Wieless Provider	
		2.a	Conduct outreach to list of potential sponsors	Planning	
		3	Select Service provider partner	Information Technology	
		4	Add expenditure costs to Capital Improvement Plan	Finance	
		5	Create agreements with Town developers and other major stakeholders to allow for installation on private property when necessary	Town Attorney	Developers
		5.a	In exchange for fronting much implementation costs. Give access to Town's utility poles and expedited permitting.	Building/Public Works	
		6	Add costs to Capital Improvement Plan	Finance	
		7	Fill any gaps in the fiber optic network	Public Works	
		8	Install 5G WIFI at Town properties, schools, parks and libraries	Public Works	FPL
		9	Expand service throughout all public spaces in the Town	Public Works	
		10	Create Smart City Coordinator staff position to oversee adherence to implementation plan	Town Manager/Human Resources	
	Connected Vehicle Technology	1	Determine a demonstration project to adopt that will explore CAV infrastructure	Transportation	Miami-Dade County Department of Transportation and Public Works
		1.a	Select a service provider	Transportation	
		2	Include in Town Transportation Plan	Transportation	
		3	Monitor selected project	Transportation	

Table 3					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Optimize Shared Mobility	Subsidized on-demand car for-hire	1	Advertise and send survey to gauge support for subsidized rides	Public Information Officer	
		1.a	If there is support, structure budget and decide level of subsidy	Finance	
		2	Contact service porviders to structure a subsidized ride deal	Finance	
		3	Select Taxi Company to partner with to meet ADA requirements	Town Manager	
		4	Select special pick-up and drop off locations	Transportation	
		4.a	Reserve areas of curb space during certain hours/days to support this program	Transportation	
		5	Launch marketing campaign to advertise service	Public Information Officer	
	Car Share	1	Compile list of businesses that may wish to participate	Public Information Officer/Planning	
		1.a	Conduct outreach to list of potential partners	Public Information Officer/Planning	
		2	Select Car share company to use	Transportation	
		3	Create agreement with car share company to operate on curb	Town Attorney	
		4	Develop curb regulations to support dedicated parking for car share vehicles	Planning	
		5	Launch marketing campaign to advertise service	Public Information Officer/Planning	
		6	Launch Car Share program	Planning/Transportation	
	Curb Space Management	1	Assign staff /or hire new staff to survey and document curb conditions	Public Works/Tansportation	
		2	Upload data to a database to be managed internally	Public Works/Tansportation	Mapping platform
		2.a	Update and analyze annually	Public Works/Transportation	
		3	Make changes to curb regulations as needed based on findings	Planning/Tranportation	
	Micro Transit	1	Continue to monitor ridership rates of micro transit	Transportation	Freebee
		1.a	Based on findings, determine when micro transit service is to be extended or more fleet be added	Transportation	Freebee
	Bicyle and Scooter Sharing	1	Continue to monitor use of bicycle program	Transportation	Service Provider
		2	Based on findings, determine when bicycle sharing program is to be expanded more units be added	Transportation	Service Provider
		3	Select electric scooter provider(s)	Transportation	Service Provider
		3.a	Add electric scooters to fleet	Transportation	Service Provider

Table 4					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Enhance pedestrian and cyclist mobility, comfort and safety	In-Road Warning Lights	1	Partner with FDOT to purchase and install	Town Manager	FDOT
		2	Add to Capital Improvement Plan	Finance	
		3	Consider as part of All complete streets and Safe Routes to School improvements	Public Works/Transportation	
	Accessible Pedestrian Signals	1	Create list of signalized crossings	Public Works/Transportation	
		1.a	Prioritize intersections with the most use	Public Works/Transportation	
		2	Identify signals onwed and maintained by the Couny, and coordinate improvements and maintenance	Public Works/Transportation	Miami-Dade County Transportation and Public Works
		3	Coordinate with FDOT to secure funding	Transportation	FDOT
		4	Add to Capital Improvement Plan	Finance	
		4	Purchase and install APS	Public Works/Procurement	
	Rectangular Rapid Flashing Beacons	1	Coordinate with FDOT to secure funding	Transportation	FDOT
		2	Identify favorable locations for installing mid block beacons	Transportation/Public Works	
		3	Add to Capital Improvement Plan	Finance	
		4	Purchase and install Rectangular Rapid Flashing Beacons	Public Works/Procurement	
	Embedded LEDs in Signs	1	Survey existing signage with low-visibility	Transportation/Public Works	
		2	Identify essential signs to install lights on	Transportation/Public Works	
		3	Purchase new signage with embedded lights	Transportation/Public Works/Procurement	
		3	OR purchase lights to retrofit on existing signs	Transportation/Public Works/Procurement	
	Smart Bicycle Lockers	1	Identify locations for smart bicycle locker	Transportation	
		2	Decide budget and amount of structures to purchase or lease	Transportation	
		3	Construct Right of Way agreement for provider to operate on ROW	Town Attorney	
		4	Select service provider and structure of ownership	Public Works/Transportation	
		5	Add to Capital Improvement Plan	Finance	
		6	Purchase or lease lockers	Public Works/Procurement	
	Automated Pedestrian Detection	1	Select signalized crosswalks to equip with automated pedestrain detection	Transportation/Public Works	
		1.a	Identify signals onwed and maintained by the Couny, and coordinate improvements and maintenance	Transportation/Public Works	Miami-Dade County Transportation and Public Works
		2	Add to Capital Improvement Plan	Finance	
		3	Coordinate with FDOT to secure funding	Transportation/Public Works/Finance	FDOT
		4	Purchase and install automated pedestrian detction devices	Public Works/Procurement	
	Video Imaging for bicycle and pedestrian counts	1	Determine location and number of cameras to be installed	Transportation/Public Works	
		2	Include in Transportation Improvement Plan	Transportation	
		3	Select service provider	Transportation/Procurement	Service Provider
		3.a	Determine if data processing will need to be outsourced	Tranportation/Town Manager	
		4	Purchase and install	Public Works/Procurement	Service Provider
		5	Synthesize data to make changes to bicycle or pedestrian network	Transportation	

Table 5					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Support Efficient Travel	Smart Parking	1	Main Street District will pilot the first program	Town Manager	Private land owners
		2	Select service provider	Public Works/Planning	Service Provider
		3	Purhase and install	Finance/Procurement	
	Adaptive Signal Controls	1	Coordinate with Miami-Dade County to prioritize these corridors	Transportation	Miami-Dade County Department of Transportation and Public Works
		2	Assist county with purchasing and installing equipment	Transportation/Procurement	Miami-Dade County Department of Transportation and Public Works
	Parking App	1	Select parking software partner	Public Works/Planning	Parking Software Partner
		1.a	Draft Parking Plan	Public Works/Planning	Council and Legal
		2	Label new department for parking enforcement or tranportation will take over as parking authority	New agency	
	Mobility App/ Mobility Marketplace	1	Communicate with County need for Mobility Marketplace	Transportation	Miami-Dade County Department of Transportation and Public Works
		2	After County agrees to offer resources, coordinate with County to provide Town information to be included in the marketplace	Transportation	Miami-Dade County Transit
		3	Participate in marketing for the app	Transportation	Miami-Dade County Transit
	Connected Autonomous Vehicles	1	Gather public input to determine support and location of potential pilot program	Transportation	Public
		2	Determine viable pilot areas	Transportation	
		2.a	Determine goals and objectives for pilot program	Transportation	
		3	Draft ordinance to allow for autonomous vehicle technology testing on Miami Lakes roads	Transportation	
		4	Design RFI	Transportation/Procurement	
		4.a	Select provider/partner	Transportation	Autonomous vehicle partner
		5	Continue to moniter trends in street design for autonomous vehicles	Transportation	

Table 6					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Public Safety	CCTV	1	Determine locations and number of cameras based on monitoring needs	Police/Public Works	
		2	Select service provider	Public Works/ Procurement	Service Provider
		3	Add to Capital Improvement Plan	Finance	
		4	Purchase and Install CCTV cameras	Finance/Procurement	Service Provider

Table 7					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Bolster a Connected Quality of Life	Smart Benches	1	Compile bench inventory	Parks and Recreation	
		1.a	Identify benches in state of repair that need to be replaced	Parks and Recreation	
			Identify bus stop benches that need to be replaced	Public Works	
		2	Compile list of commercial areas with benches	Parks and Recreation	
		2.a	Conduct outreach to gaguge private interest in purchasing or sponsoring bench purchases	Parks and Recreation	
		3	Select Service provider to partner with	Information Technology Manager	
		4	Purchase and install benches	Finance/Public Works	
	Smart Kiosks	1	Create agreement with plaza owners and developers to lease land in exchange for installing kiosks	Town Attorney	Plaza Owners/ Developers
		2	Confirm locations for kiosks are in agreement with plaza owners	Planning	
		3	Develop desired list of programming capabilities	Information Technology	
		4	Select Service provider	Information Technology	
		4.a	Purchase and install kiosks	Finance/Procurment/Public Works	
		5	Develop programming with outreach for adverising opportunities	Public Information Officer	
	Book Vending Machines	1	Partner with Little Free Library program	Public Works	Little Free Library
		2	Partner with Miami-Dade County Publc Library for resources	Miami-Dade County Public Library	Miami-Dade County Publc Library
		3	Determine favorable locations for vending machines	Public Works	
		4	Secure funding through grant or library funds	Finance/Grant writer	
		5	Select Service provider	Public Works	Service Provider
		6	Purchase, install and program machines	Finance/Public Works	Service Provider

Table 8					
	Technology		Strategies for Implementation	Lead Agencies	Partners
Universal Environmental Sustainability	Electric Vehicle Charging Stations	1	Amend zoning code to require EV parking spaces for commercial and residential developments	Planning	
		2	Select electric charging provider for installation on Town property	Town Manager	Service Provider
		3	Decide to install Level 2, or Level 3 charging stations	Town Manager	
		4	Partner with an electric charging provider to install stations on Town properties	Public Works	EVCS Provider
		5	Partner with FPL to purchase electricity at wholesale rates	Finance	FPL
		6	Expand Incentive Program for property owners and business owners to convert parking to EV parking.	Planning	
		7	Add to Capital Improvement Plan	Finance	
		8	Purchase and install charging stations	Finance/Procurement/Public Works	
	Electric Vehicle Fleet	1	Reserve budget to purchase 3 new sedans	Finance	
		2	After electric charging is installed at Town Hall, electric sedans can be purchased	Finance	
		3	Purchase sedans	Procurement	Automobile manufacturer
		4	After truck technology is available, replace gasoline truck vehicles with electric trucks	Public Works	
	Streetlights Sensors	1	Decide capacity and capabilities of sensors	Information Technology/Public Works	
		2	Confirm target number for sensors	Public Works	
		3	Select an area to pilot sensors for 1/10 of total lights	Town Manager	
		4	Add to Capital Improvement Plan	Finance	
		5	Select service provider	Town Manager	Service Provider
		6	Purchase and install sensors	Finance/Procurement	Service Provider

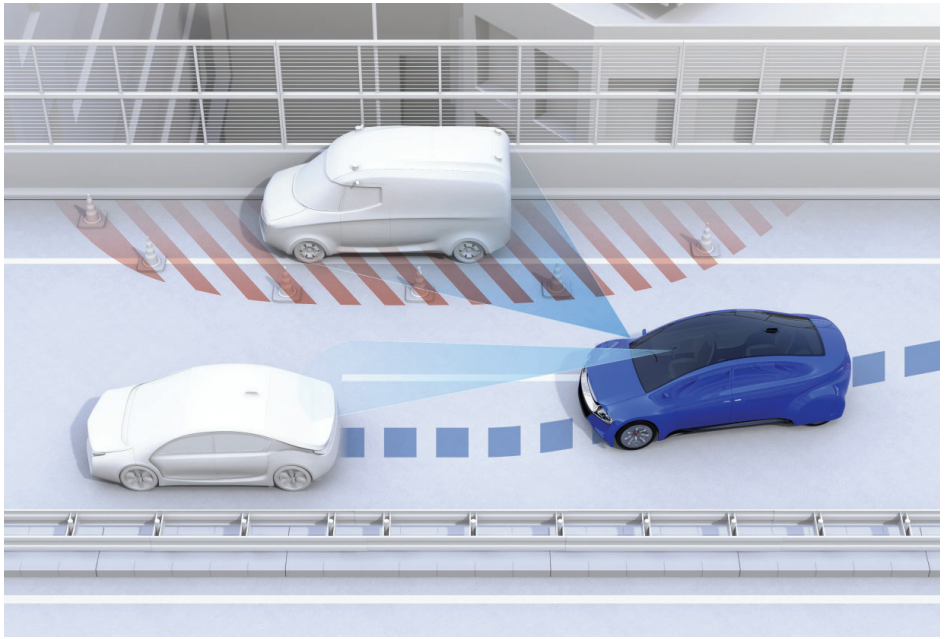
◆TECHNOLOGIES PROJECT SHEETS

The Town must prepare for future technology implementation and can begin to do so with implementing 5G Network throughout the Town, which will enable a full integration of roadways with connected and autonomous vehicle technology (CAV). A 5G network will be essential for future technology deployment.

Technology can enhance quality of life for all residents by providing resources and facilities to engage, connect, and share information such as smart kiosks and smart benches. In addition to these amenities, the Town is working towards achieving universal environmental sustainability by adopting technologies that promote cleaner air and efficiency. Future trends show more electric vehicles will be on the road, which will require the Town to dedicate more parking spaces to be available for charging. Also the Town can upgrade street lights so that they are connected with automatic sensors to help reduce energy usage and reduce the cost of electricity.

The Town can work towards optimizing shared mobility by seamlessly connecting Miami Lakes to the South Florida transportation network by developing a car share programming, subsidizing vehicle ride share during times of limited transit service hours. Utilizing curb space management tools will help to dictate curb regulations and dedicate space for different users and purposes.

Miami Lakes desires to be a model town as this is a safe and comfortable place to walk and bike. The Town desires to enhance pedestrian and cyclist mobility, comfort and safety by improving pedestrian visibility and awareness with In-Road Warning Lights, Rectangular Rapid Flashing Beacons and Accessible Pedestrian Signals to promote walking. In addition, the Town will provide smart bicycle parking facilities to promote bicycle usage and support implementation of the Greenways and Trails Master Plan.



Miami Lakes is focused on providing efficient travel conditions by improving traffic congestion through expanding the Adaptive Signal Control Technology program throughout the Town and looking to install smart parking and mobile parking capabilities in the future. CCTV camera technology promotes public safety and installing more systems will assist the town in providing additional monitoring, which will be critical for locating and mitigating crimes in addition to safeguarding new investments in technology. The following section lists information for each technology recommendation.

▶ **Technology Number:** 1 ▶ **Technology Name:** 5G Network ▶ **Technology Category:** Utilities

▶ **Goal:** Goal 1: Be prepared to accommodate for current and future technology deployment

▶ **Description:** 5G wireless networks offer faster connections, more reliability and greater capacity at lower costs, to better connect infrastructure, devices and people. 5G wireless will be deployed in the Miami area by the end of 2019 through Verizon, offering broadband services to homes. Miami Lakes can partner with wireless carriers to expand 5G network throughout the town to offer free WIFI in public spaces. Implementing 5G Wireless Network is a pre-requisite to becoming a Smart City. All advanced data analysis, IoT communication, and autonomous vehicles need fast communication networks. Smart cities have open data and enable connectivity through physical devices and external databases which are then analyzed to manage resources more effectively. The main concept is exchanging data for analysis. This will provide better mobility for the future. 5G wireless networks offer faster connections, more reliability and greater capacity at lower costs, to better connect infrastructure, devices and people. 5G wireless will be deployed in the Miami area by the end of 2019 through Verizon, offering broadband services to homes. Miami Lakes can partner with any wireless carrier to expand 5G network throughout the town to offer free WIFI in public spaces. Deploying 5G will help prepare the Town for implementing other Internet of Things (IoT) technologies. For example, a 5G network will be required to fully integrate roadways with CAV technology. Design of civic infrastructure in the future should incorporate this need. Simply put, 5G Networks provide lower latency which is significant for the operation of autonomous vehicles.

▶ **Purpose:** Fast free network connection to better connect and prepare the community for future applications using 5G infrastructure.

▶ **Need:** Deploying 5G will help prepare the Town for implementing Internet of Things (IoT) technologies. For example, a 5G network will be required to fully integrate roadways with CAV technology.

▶ **Location(s):** Ultimately, 5G is to deployed throughout the town, but the following locations will be prioritized:

- Parks
  - o Optimist Park
  - o Royal Oaks Park
  - o Picnic Park
- Public Spaces
- Public and Civic facilities (Town Hall, any future community center)
- Miami Lakes Branch Library
- Schools

▶ **Cost:**

Purchase	N/A
Installation	Installation cost is dependent on gaps in fiber optic network
Annual Maintenance/Fees	Dependent on negotiations. Generally, service providers own the infrastructure and will maintain.

▶Technology Number: 2 **▶Technology Name:** Connected Vehicle Technology

▶Goal: Goal 1: Be prepared to accommodate for current and future technology deployment

▶Description: A connected vehicle (CV) environment enables wireless communications among vehicles (vehicle-to-vehicle, or V2V), infrastructure (vehicle-to-infrastructure, or V2I), and mobile devices. Vehicles include light vehicles, trucks, and transit vehicles. Pedestrians, bicyclists, or motorcyclists can carry mobile devices, allowing vehicles and infrastructure to communicate with other CV participants and vice versa (vehicle-to-anything, or V2X). The information shared through these communications may include the following:

- Presence, speed, location, and direction of travel.
- Road and traffic conditions.
- On-board vehicle data, such as emissions, braking, and windshield wiper activation. (The availability of on-board vehicle data for planning purposes is subject to privacy and legal agreements that have not yet been established.

▶Purpose: The full benefits of vehicle automation can be achieved only through connectivity, and integrating automated vehicles. Thing to keep in mind for planning include:[17]

- Timeframes for the implementation of C/AV-supporting infrastructure and programs (e.g., V2I).
- Funding sources for C/AV-supporting infrastructure and programs.
- Societal and organizational impacts, as well as ways to adapt to disruption in the private and public sectors
- C/AV data outputs to support planning needs.

▶Need: Connected vehicle technology will help Improve congestion, safety and mobility, and will be a precursor for fully autonomous vehicles.

▶Location(s): A location can be determined for a connected vehicle technology demonstration where the Town can test and showcase this emerging technology.

[17] U.S. Department of Transportation.

▶ **Technology Number:** 3 ▶ **Technology Name:** Car Share ▶ **Technology Category:** Shared Multimodal Mobility

▶ **Goal:** Goal 2 - Optimize shared mobility

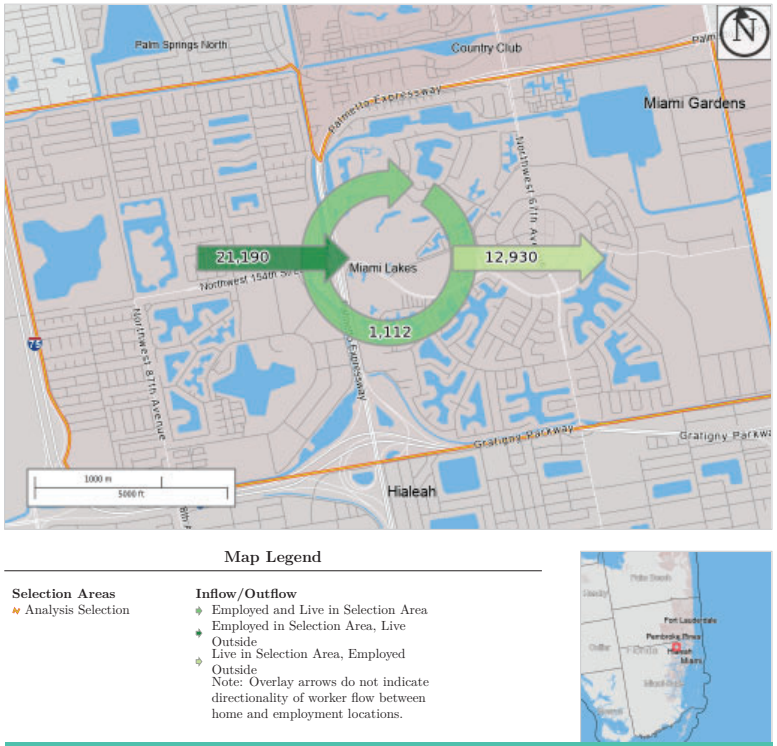
▶ **Description:** Car sharing is a model of car rentals where one can rent a car for short period of time. Members only pay for the time they reserve the vehicle. Gas, insurance, roadside assistance, maintenance and lease payments are covered in the hourly rental fee. Mileage is generally capped, at approximately 180 miles per day.

▶ **Purpose:** Car sharing rental services are intended to substitute private vehicle ownership and can be structured as a one- way or two-way car share system. One shared, two-way vehicle could replace six to 23 private cars on the road.[18] Car share vehicles are located in neighborhoods and can be rented by the hour or by the day, and serve populations that both live and work in the Town, or that work from home who may need access to a car at all times, as well as people who may not want to own a car or those who can't afford it.

▶ **Need:** Car-sharing can reduce car ownership and offers first mile / last mile connections which can encourage more transit usage and therefore reduce traffic congestion which is a major concern and priority for the Town. While most people who work in Miami Lakes live outside the Town, as of 2015 the share of workers that live and are employed by the town is about 8% of all workers. With the Town's efforts to strengthen the local economy by growing the job sector, and with new businesses locating in the Town, this number may increase in the near future.

▶ **Location(s):** Locations are displayed in Figure 1 Map.

- Main Street District (5 spaces)
- NW 79th Avenue/NW 154th Street (3 spaces)
- Park and ride facility at NW 77th Avenue and NW 154th Street (5 spaces)



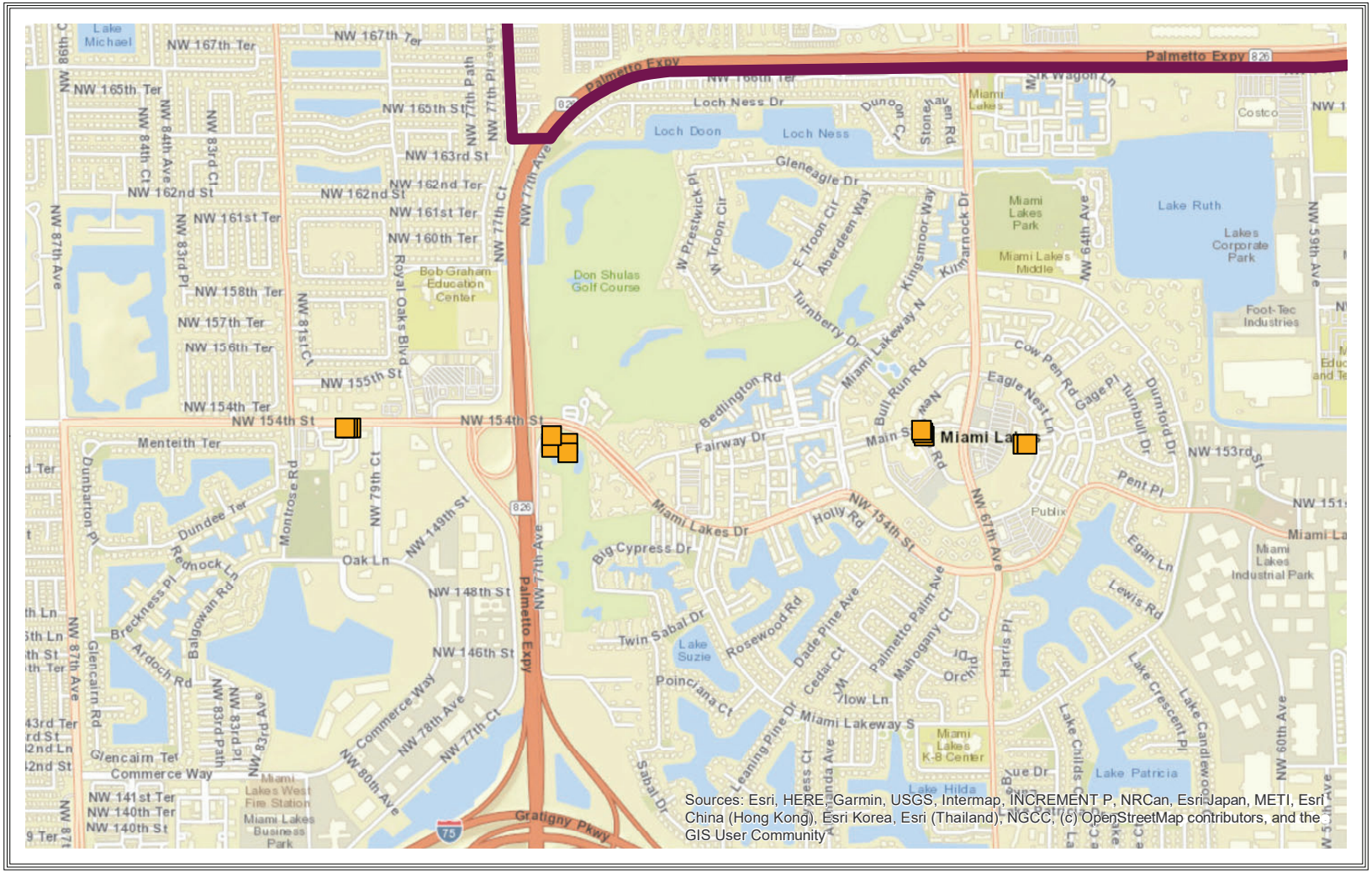
Source: "OnTheMap" U.S.Census Bureau, Center for Economic Studies

▶ **Cost per parking space:**

Purchase	N/A
Installation	$200 for signage and stripping
Annual Maintenance/Fees	Costs incurred by service provider

[18] U.S. Department of Transportation.

Figure 1: Potential Car Share Locations



▶ **Technology Number:** 4 ▶ **Technology Name:** Subsidized on-demand car for-hire

▶ **Technology Category:** Shared Multimodal Mobility ▶ **Goal:** Goal 2 - Optimize shared mobility

▶ **Description:** The Town can work with Uber or Lyft to offer subsidized or reduced-cost rides to destinations in and around town. All rides can be subsidized especially in designated pick up areas near bus stations. The partnership can be constructed as a flat rate, a flat discount, or percentage off total price. In addition, the Town will need to partner with a local cab company to address Title XI compliance.

▶ **Purpose:** On-Demand cars for hire provide passengers with additional transportation options within Town of Miami Lakes limits. This service provides on-demand connectivity for trip that are generated and end in the Town, as well as between bus stops and final destinations. Ride companies collect and can share data to assist in identifying any unmet service needs and cultivate public/private partnerships within the Town of Miami Lakes.

▶ **Need:** The Town provides Freebee rides throughout the Town, which serves first mile/last mile connections and eliminates the need for subsidizing for-hire cars during service hours.

▶ **Location(s):** Service to be available for trip generated and completed within Town Limits during limited hours.

▶ **Costs:** Cost is dictated by the amount of money the Town can spend, which also will determine the length and reach of the program. The following budget is a suggested range deducted from other municipal budgets in in Florida of similar size that have adopted subsidized rides to serve passengers traveling outside normal service hours or that may have first mile/last mile gaps.

Standard ride subsidies	$8,000-$35,000
ADA accessible ride subsidies	$1,000-$8,000
Marketing materials	$1,000-$1,500

▶ **Technology Number:** 5 ▶ **Technology Name:** Curb space management

▶ **Technology Category:** Shared Multimodal Mobility ▶ **Goal:** Goal 2 - Optimize shared mobility

▶ **Description:** Curb space management is a data collection and mapping to help municipalities catalog their curb data on curb usage and regulations, which can be used to improve mobility as curb needs change.

▶ **Purpose:** Ability to document curbside uses and use this information to develop and adopt policy to respond to real-time needs. Curb management improve efficiencies and safety for drivers and capitalizes on curb space for multi-use options.

▶ **Need:** As dockless scooters and bicycles are used throughout the Town, curb space will need to be monitored, regulated and managed to meet demand and type of users. In addition, the rise of e-commerce and shared mobility, drop off and pick up areas can be added in certain areas.

▶ **Location(s):** Curb space management is to be applied throughout the town, and be used to assess curb assets by collecting and synthesizing curb data.

▶ **Labor Costs:**

25% of full time with benefits:	$30,000/year

▶ **Technology Number:** 6 ▶ **Technology Name:** Micro Transit ▶ **Technology Category:** Shared Multimodal Mobility

▶ **Goal:** Goal 2 - Optimize shared mobility

▶ **Description:** Micro Transit is a shared, on-demand, app-based mobility service that groups travelers with similar trip pickup and drop-off locations. Often, micro transit offers more transparency and reliability in service that public transportation, as it operates on smaller capacity and has a limited service area. Researchers at the University of Texas found that one share vehicle could replace 10 single-occupancy vehicles.

▶ **Purpose:** Micro transit fills in any gaps in public transportation service and offers first mile/last mile solutions for passengers complete a trip. In addition, micro-transit can be a clean alternative to buses or cars as often this service is operated by electric vehicles which have no fuel emissions.

▶ **Need:** The Town is dedicated to improving mobility and traffic congestion, and micro transit is a solution to helping people move around efficiently without a personal car. In addition, Miami-Dade County Metrobus service is limited in certain areas of the Town, which limits public transportation options. Micro transit is a reliable alternative that offers a subsidized ride with minimal waiting time.

▶ **Location(s):** Micro transit service is currently offered in Miami Lakes, and it is recommended that service expand and continue to be available throughout the Town's jurisdiction.

Source: Freebee Miami

▶ **Costs per unit:**

Operations	$65,000 a year per vehicle

▶Technology Number: 7 **▶Technology Name:** Dockless Bicycle Sharing

▶Technology Category: Shared Multimodal Mobility **▶Goal:** Goal 2 - Optimize shared mobility

▶Description: Dockless bicycles are short-term bicycle rentals that are not "parked" but instead are located in various locations to be picked up as needed and can be used as a first mile/last mile solution. Dockless bicycles rely on GPS and sensor technologies to track availability and locations of unit. Dockless bikes can be located and unlocked using a smartphone app, and can be rented by the day, or unlimited use can be prepaid for through monthly of annual memberships.

▶Purpose: Dockless options for bicycle and scooter rentals help improve mobility and expand access to public transportation.

▶Need: The Town is dedicated to improving mobility and traffic congestion, and dockless bicycles serve as a low-risk solution to helping people move around more efficiently without a personal automobile, as well as make first mile/last mile connections.

▶Location(s): Dockless bicycles are spread throughout the town as service is not centralized but depends on where the last rider dropped the bike off. It is recommended that electric bicycle fleet be added to the regular bicycle fleet to offer more mobility options. Dockless bicycles are currently offered in Miami Lakes, and it is recommended that more bicycles be added to this service as more bicycle facilities are constructed.

▶Costs per unit: Provider can pay the Town $50-$200 per unit to operate in the Town's jurisdiction, and to allow for operators to use curb and sidewalk space to "park" bicycles. The following fees are passed on to the user/rider:

User fee/cost varies by length of rental	$180-$300/year $25-35/month $5-25/day $5-6/hour

Source: Johnny Diaz/Sun Sentinel

▶ **Technology Number:** 8 ▶ **Technology Name:** Dockless Electric Scooter Sharing

▶ **Technology Category:** Shared Multimodal Mobility ▶ **Goal:** Goal 2 - Optimize shared mobility

▶ **Description:** Dockless electric scooters are battery powered electric scooters that are rented for short-term. Dockless means the scooters are "parked" in various locations to be picked up as needed and can be used as a first mile/last mile solution. Dockless electric scooters rely on GPS and sensor technologies to track availability and locations of unit. Dockless scooters can be located and unlocked using a smartphone app, and can be rented by the minute. A fully charged scooter can travel 15 to over 35 miles, and its electric power allows for a faster travel alternative to walking or cycling.

▶ **Purpose:** Dockless options for bicycle and scooter rentals help improve mobility and expand access to public transportation.

▶ **Need:** The Town is dedicated to improving mobility and traffic congestion, and dockless electric scooters serve as a low-risk solution to helping people move around more efficiently without a personal automobile, as well as make first mile/last mile connections.

▶ **Location(s):** Dockless electric scooters are spread throughout the town as service is not centralized. It is recommended that electric scooters be introduced in Miami Lakes as more shared paths are constructed.

▶ **Costs per unit:** Provider can pay the Town $50-$200 per unit to operate in the Town's jurisdiction, and to allow for operators to use curb and sidewalk space to "park" scooters. The following fees are passed on to the user/rider:

User fee/cost varies by length of rental	$1 fee plus 15 cents per minute

Technology Number: 9 **Technology Name:** In-Road Warning Lights **Technology Category:** Pedestrian Safety

Goal: Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

Description: In-Road Warning Lights (IRWL) are a series of amber lights embedded in the roadway that face oncoming traffic. The lights are visible to approaching drivers as a warning that a pedestrian in the marked crosswalk or near it. Lights can be activated by using a traditional push button, or an automatic sensor.

Purpose: IRWL can be added to marked crosswalks that have no signalization, to increase yield rates and pedestrian mobility. IRWL eliminates delays from signalized intersection, as lights would only initiate when a crossing is needed. IRWL are one of the best technologies to capture driver attention, and to safety share the road for all users. These lights can reduce speed at intersections without needing to add a signalized crosswalk or lowering speed limits.

Need: While most of Miami Lakes is car dependent, the Town Center neighborhood is one of the busiest pedestrian areas, and is the most walkable area in the town with the highest Walkscore of 71 percent. On the edge of this area, on NW 67th Avenue (Ludlam Drive), there has been a concentrated number of pedestrian crashes. Adding more marked crosswalks on NW 67th Ave with In-Road Warning Lights will improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.

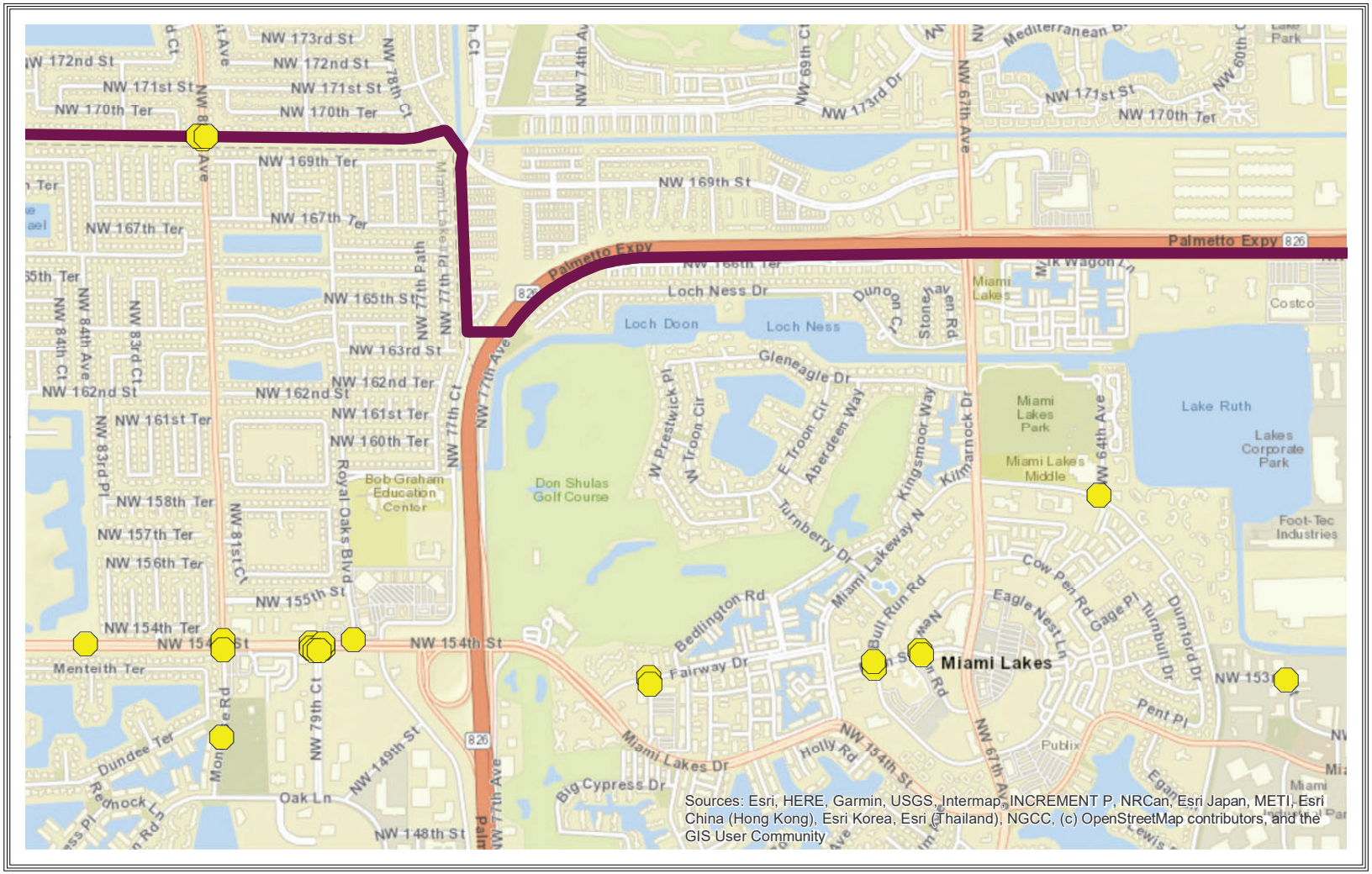
Location(s): (See Figure 2):

- NW 170th Street & NW 82nd Avenue (3)
- NW 154th Street & NW 82nd Avenue (2)
- NW 79th Avenue & NW 154th Street (1)
- NW 79th Court & 154th Street (6)
- New Barn Road & Main Street (2)
- NW 153rd Street & NW 60th Avenue (1)
- NW 64th Avenue & Miami Lakeway North (1)
- Bull Run Road & Main Street (2)
- Midblock crossing at NW 82nd Avenue (2)
- Midblock crossing at Fairway Drive (2)

Costs per crosswalk:

Purchase and Installation	$25,000

Figure 2: Potential In-Road Warning Light Locations



Technology Number: 10 **Technology Name:** Rectangular Rapid Flashing Beacons

Technology Category: Pedestrian Safety **Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

Description: Rectangular Rapid Flashing Beacons (RRFBs) are user-activated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system. RRFBs can be solar powered and use an irregular flash pattern that is similar to emergency flashers on police vehicles.

Purpose: RRFBs can enhance safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts increases driver yielding behavior significantly and allowing for pedestrians to safely cross busy or higher-speed roadways at midblock crossings and uncontrolled intersections. RRFB increase pedestrian visibility, stopping road traffic only as needed and eliminating the need for a signalized crosswalk.

Need: Some crossings are more than 3-minutes apart, causing pedestrians to cross outside of a marked crosswalk.

Location(s): RRFB signals are best suited in areas with widely spaced controlled pedestrian signals, where pedestrians have limited opportunities to cross roadways. Crosswalk spacing criteria should be determined according to the pedestrian network, built environment, and observed desire lines. The following location has been assessed as having mid block crossing needs. (See Figure 3 Map):

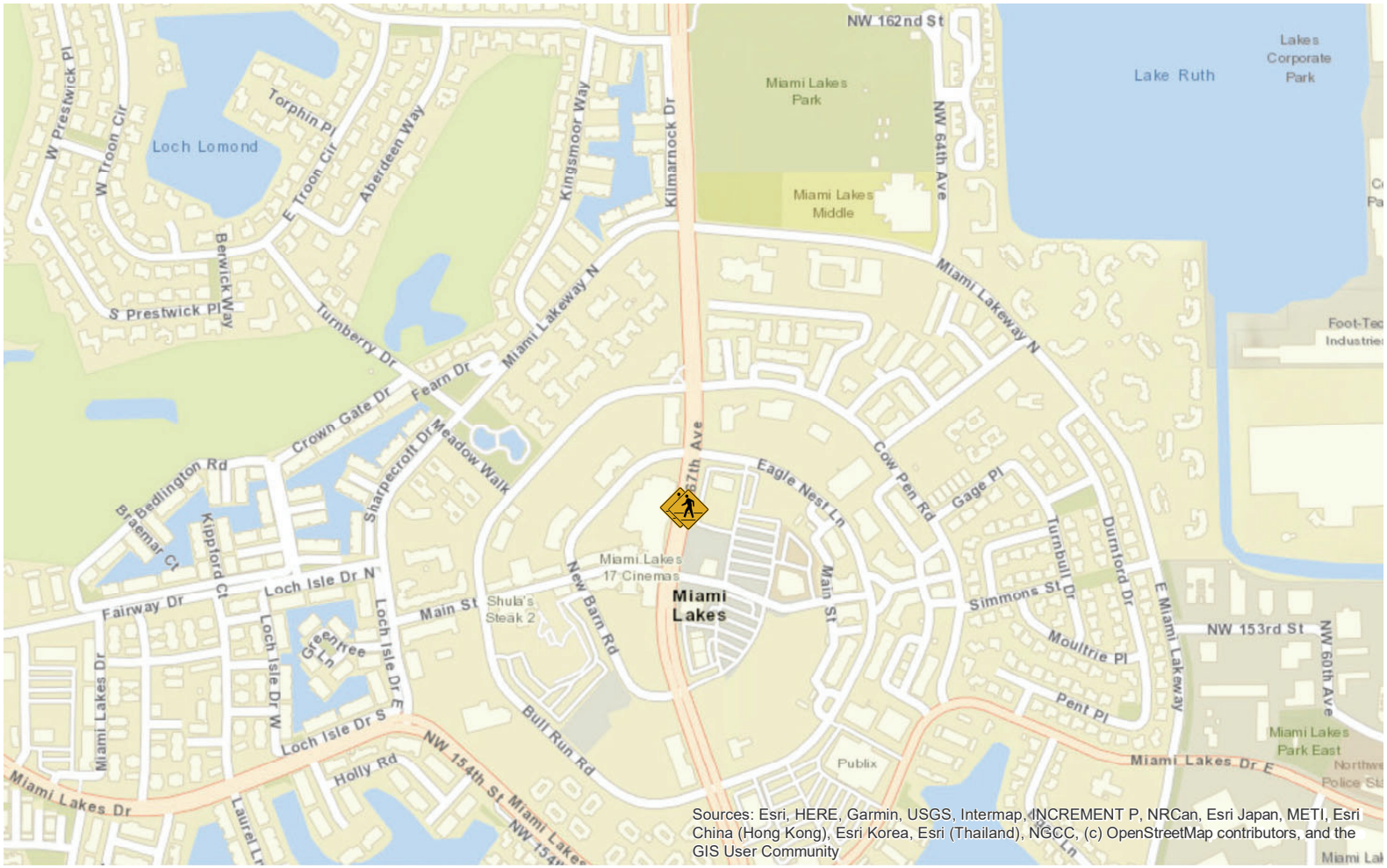
- Between East Nest Lane and Main Street on NW 67th Avenue

Costs per two units (one on either side of a street):

Purchase	$10,000-$15,000

Source: CommuteOrlando

Figure 3: Potential Rectangular Rapid Flashing Bacons Locations



N

0 0.1 0.2 0.4 Miles

Legend

Rectangular Rapid Flashing Bacons

Technology Number: 11 **Technology Name:** Embedded LEDs in Signs

Technology Category: Pedestrian Safety **Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

Description: Embedded LEDs are lights that illuminate roadway signage. Typically these are seen on signs to signal caution, for yielding and stopping. Embedded LEDs are utilized in areas where signage may have low visibility. This measure can be more cost effective than striping and replacing existing signage. Embedded LEDs can be retrofitted to existing signs, which make this option a financially feasible countermeasure. The retrofit is significantly less expensive than other pedestrian technologies which enhance driver awareness of traffic-control signs and pedestrian crosswalks. LEDs may be illuminated 24 hours a day, or be activated by vehicles or pedestrians.

Purpose: Embedded LEDs increase visibility of crosswalks, and other regulatory signs, enhance visibility and recognition of regulatory and warning signs to drivers, especially under low-light or low-visibility conditions, improving roadway behaviors and enhancing pedestrian visibility.

Need: While the Town is well lit, embedded LEDs can increase pedestrian sense of safety and comfort at crosswalks and intersections.

Location(s): This technology is best suited for areas where sight lines are restricted, and particularly in locations with:

- Documented problems of drivers failing to recognize an intersection, and at stop signs which may help to increase the rate of vehicles stopping, and to avoid drivers failing to detect the STOP sign

Costs per intersection:

Estimated cost range	$2,000 to $6,000
Maintenance costs	Costs are assumed to be for replacement LED bulbs, which cost approximately $8/bulb and have a lifespan of 25,000 hours, or approximately 3 years of continuous usage. At 8-16 bulbs per stop sign, an annualized maintenance cost of approximately $25-$50/sign is expected

▶ **Technology Number:** 12 ▶ **Technology Name:** Accessible Pedestrian Signals (APS)

▶ **Technology Category:** Pedestrian Safety ▶ **Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

▶ **Description:** An accessible pedestrian signal and pedestrian pushbutton is an integrated device that communicates information about the WALK and DON'T WALK intervals at signalized intersections in non-visual formats, including in sound, accommodating the needs of all pedestrians including those with vision and mobility impairments.

▶ **Purpose:** This signal allows to communicate to the visually and mobility impaired when it is time to cross, increasing safe crossings. These signals allow for increased mobility for all.

▶ **Need:** A step to implementing complete streets to accommodate the needs of all pedestrians, including those with vision and mobility impairments. In addition, Miami Lakes is not in compliance with ADA requirements as the Town's signalized crosswalks lack APS technology.

▶ **Location(s):** All 127 marked crosswalks.

▶ **Costs per crosswalk:**

Purchase	$20,000
Installation	$2,000

▶Technology Number: 13 **▶Technology Name:** Automated Pedestrian Detection

▶Technology Category: Pedestrian Safety **▶Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

▶Description: Automated pedestrian detection devices sense when a pedestrian is waiting at a crosswalk and automatically send a signal to switch to a pedestrian WALK phase. Some automated pedestrian detection devices can determine whether a pedestrian needs more time to cross the roadway and will lengthen the crossing interval to accommodate the slower pedestrian.

There are generally two types of pedestrian detection technologies: microwave and infrared. A delay can be built into either of the devices so that the Walk signal is called only if the pedestrian stays within the detection zone for a certain amount of time. The delay helps to prevent pedestrians who walk by the detection zone from accidentally activating the WALK signal.

▶Purpose: Automatic pedestrian detection gives an advantage to pedestrians to change traffic lights. These sensors can reduce the percentage of pedestrians who cross roadways at inappropriate times.

▶Need: Some pedestrians may not push a button to receive a WALK signal, or will ignore signals if the change takes too long. Automated pedestrian detection technology is therefore safer than traditional push signals and ensures pedestrians have enough time to safely cross the roadway.

▶Location(s): All 127 marked crosswalks.

▶Cost per unit:

Purchase to add to existing signal	$10,000
Operation Costs/Year	$4,000

▶ **Technology Number:** 14 ▶ **Technology Name:** Smart Bicycle Locker Parking ▶ **Technology Category:** Bicycle Comfort

▶ **Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

▶ **Description:** Smart Bicycle Parking is an app-based parking system for bicycles. Parking capability is launched through a mobile app that identifies free spaces and keeps track of the time parked, and once the locker is unlocked and bike is retrieved, the app collects payment.

▶ **Purpose:** Bicycle parking goes hand in hand with bicycle usage. Offering safe bicycle parking incentivizes more people to use bicycles. While short-term parking may be suitable for bicycle racks, bicycle lockers offer long-term parking solutions for bicycles at an affordable price and provide the most protection for bicycles, which is especially suitable in hot climates.

▶ **Need:** The Town has bicycle racks, but lacks variety in parking options for bicycles. As the Town implements its Greenways and Trails Master Plan, it can provide more parking options for its expanding network and cyclists.

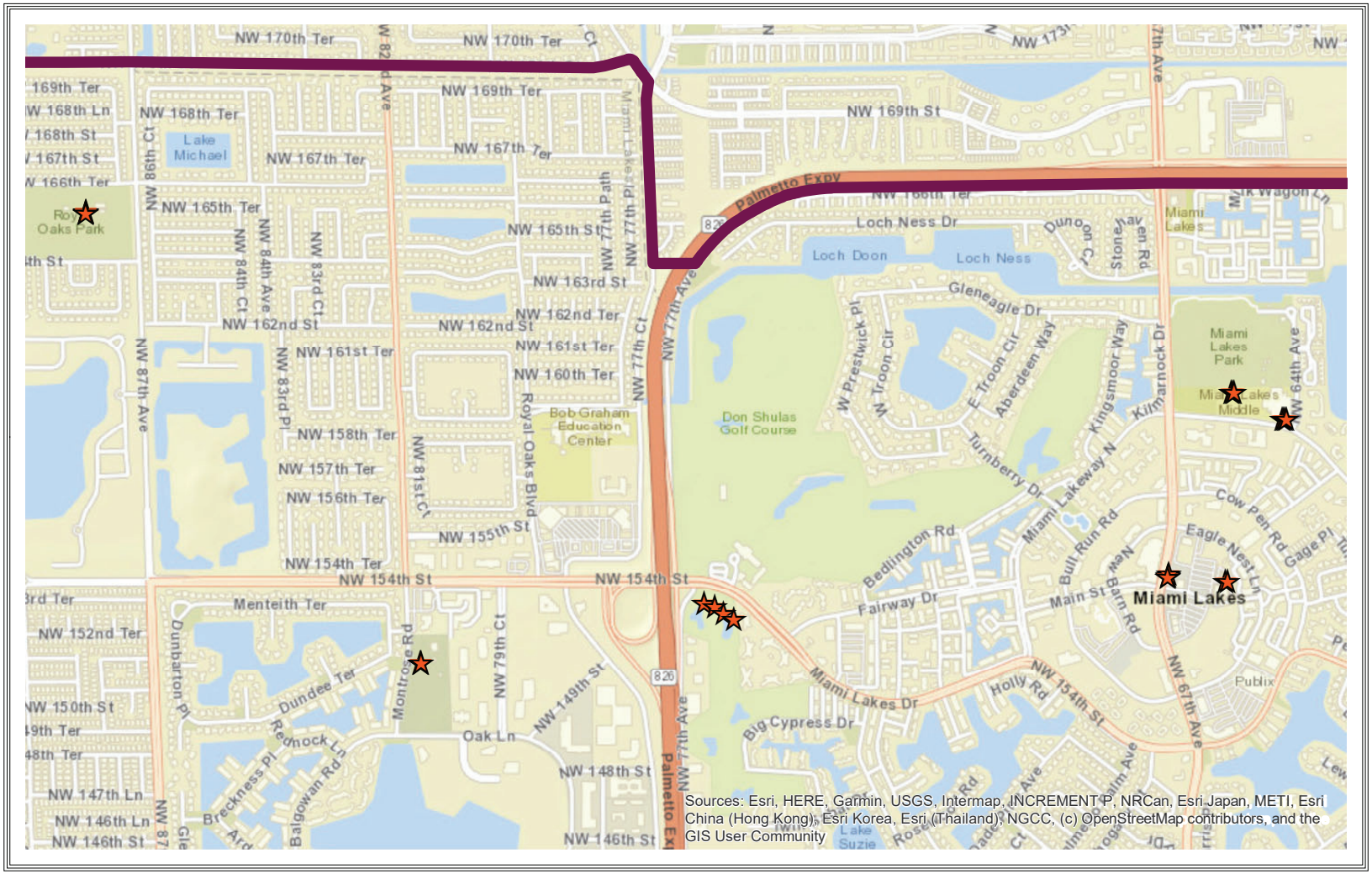
▶ **Location(s):** Include at the following locations (See Figure 4 Map):

- Park and ride facility at NW 154th Street & NW 77th Avenue (8)
- Parks
  - o Optimist Park (3)
  - o Royal Oaks Park (5)
  - o Picnic Park (3)
- Miami Lakes Middle School (4)
- Main Street District (4)
- Town Hall (2)

▶ **Costs per parking space:**

Purchase and installation	$0-650
Annual Maintenance/Fees	Fees are paid by user

Figure 4: Potential Smart Bicycle Locker Locations



N

0 0.225 0.45 0.9 Miles

Legend

- Smart Bicycle Lockers
- Miami Lakes Boundary

▶ **Technology Number:** 15 ▶ **Technology Name:** Video Imaging ▶ **Technology Category:** Bicycle detection

▶ **Goal:** Goal 3 - Enhance pedestrian and cyclist mobility, comfort and safety

▶ **Description:** Video imaging are video recorders mounted above the count area records movements coupled with a software program that processes the video to produce bicycle or pedestrian counts. Imaging uses visual pattern recognition technology and computerized algorithms to detect bicyclists, pedestrians, and vehicles. Bicycle counters provide digital files of bicycle counts, and the Town will need the capacity to permanently store raw and processed count data, and this data will carry labor costs, as a staff position is required to process data in-house or outside hire.

▶ **Purpose:** Video imaging has a high accuracy rate and will establish a baseline of information about cycling. This data is needed to justify funding for bike related initiatives, and to measure impact of bicycle infrastructure projects, and where new investments may be needed.

▶ **Need:** As the Town begins to expand its bicycle network and as it receive TAP funding within the next 5 years, bicycle data collection will be priority for the Town.

▶ **Location(s):**Video recorders are to be installed when the Town's bicycle facility network expands. The cameras can be located on off-street trails or near on-street bicycle lanes.

Source: Iteris

▶ **Cost per unit:**

Purchase and installation	$1,200 - $8,000
Labor cost	$100,000/Year $50 - $100/Hour

▶ **Technology Number:** 16 ▶ **Technology Name:** Mobility App/"Mobility Marketplace"

▶ **Technology Category:** Shared Multimodal Mobility ▶ **Goal:** Goal 4 - Support efficient travel

▶ **Description:** A Mobility Marketplace is an app based platform that enables locating and paying for a variety of transportation options – bikeshare, carshare, transit, rideshare – all in one place.

▶ **Purpose:** A Mobility Marketplace is a mobility app that connects users to a variety of transportation options together and integrates a social aspect to transportation, which can be a favorable feature for most commuters in Miami Lakes that drive alone.

▶ **Need:** Figuring out the best option for transportation can be a challenge, as no integrated system exists to compare prices of rides requires jumping back and forth between apps. Transparency encourages people to find an alternative to solo driving.

▶ **Location(s):** App development is best suited for from Miami-Dade County, as they have the resources and a wide reach of information and partners to create and maintain this app.

▶ **Cost:** There is no cost to the Town, if this technology falls under the jurisdiction of the County.

▶ **Technology Number:** 17 ▶ **Technology Name:** Adaptive Signal Control Technology (ACST)

▶ **Technology Category:** Vehicular Traffic ▶ **Goal:** Goal 4 - Support efficient travel

▶ **Description:** Adaptive signal control technology utilizes sensors to adjust the timing of traffic lights to accommodate shifting traffic patterns, easing traffic congestion in real-time.

▶ **Purpose:** Adaptive signal controls have the ability to reduce average travel time. The adaptive technology receives traffic information regarding the number of cars traveling on each direction and uses the data in real time to control traffic lights in the most efficient way. This technology has proven it has helped made improvements to traffic flow with up to 23% reduction in travel time for ACST intersections.

▶ **Need:** Traffic congestion is one of the most common concerns for residents and businesses in Miami Lakes. Expanding this program in other intersections can calm traffic and reduce travel time even more.

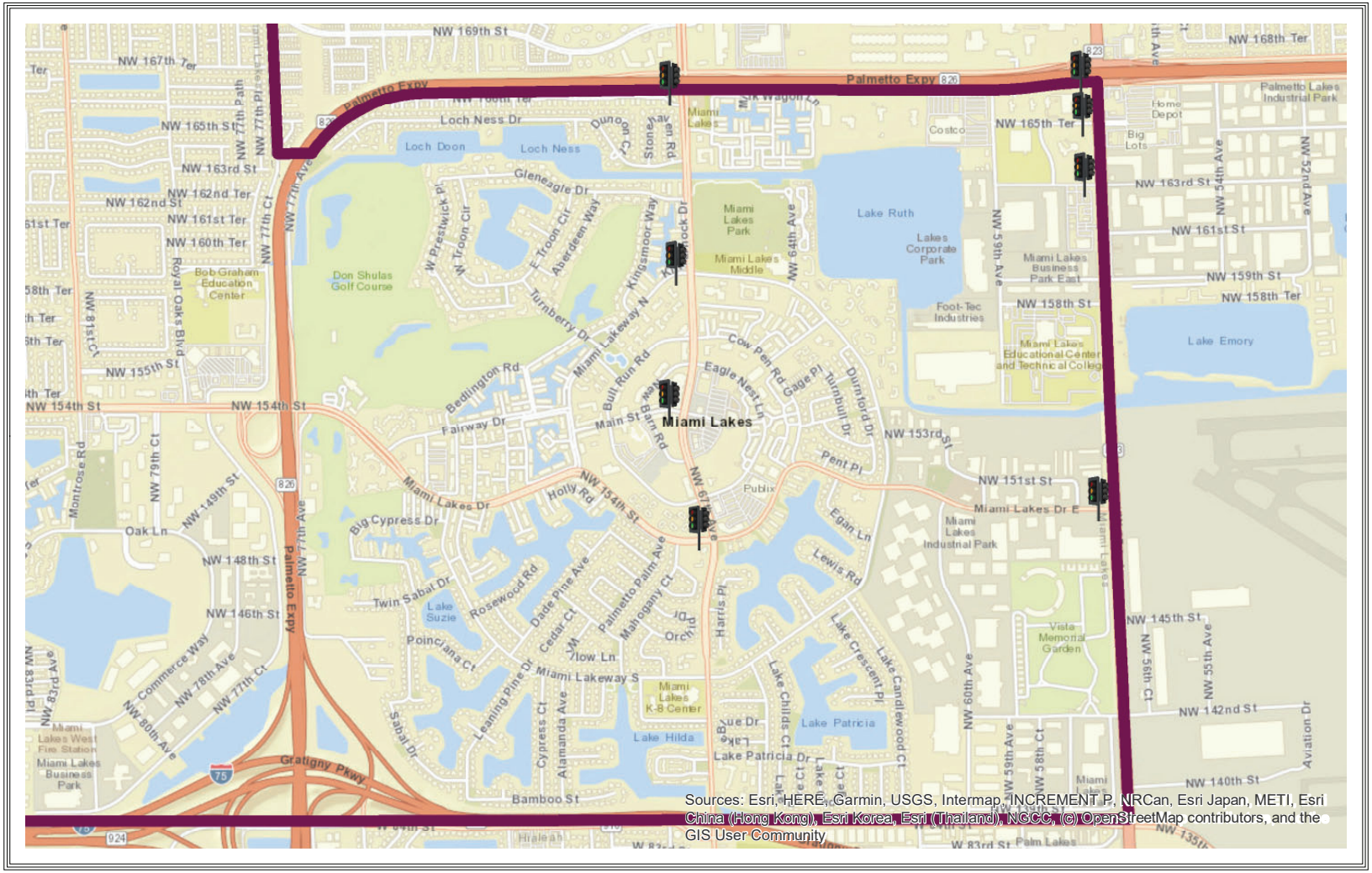
▶ **Location(s):** (See Figure 5):

- It is recommended to install ASCT systems along the arterials and major collectors within the Town. These roads include Miami Lakes Drive, NW 67th Avenue, NW 87th Avenue, and NW 57th Avenue. The following locations are represented on the Figure 5 Map.
  - NW 154th Street (Miami Lakes Drive) & NW 67th Avenue
  - NW 67th Avenue (Ludlam Road) & NW 167th Street
  - NW 67th Avenue (Ludlam Road) & Miami Lakeway North
  - NW 67th Avenue (Ludlam Road) & Main Street
- Town edges
  - NW 57th Avenue (Red Road) & NW 167th Street
  - NW 57th Avenue (Red Road) & 165th Street
  - NW 57th Avenue (Red Road) & 163rd Street
  - NW 57th Avenue (Red Road) & NW 154th Street/Miami Lakes Drive

▶ **Cost:**

Purchase and installation	$30,000 per intersection

Figure 5: Potential New Adaptive Signal Locations



▶ **Technology Number:** 18 ▶ **Technology Name:** Smart parking ▶ **Technology Category:** Vehicular traffic

▶ **Goal:** Goal 4 - Support efficient travel

▶ **Description:** Smart Parking is a parking strategy that relies on technology to achieve faster, easier parking of vehicles.

▶ **Purpose:** Smart parking increases parking efficiencies by offering parking transparency from Cameras that "count" open spaces and advertise parking availability outside the entry to a parking lot. Smart parking eliminates traffic from cars looking for parking. Ensuring availability reduces congestion and pollution, shortens travel times, and encourages the use of alternative forms of transportation.

▶ **Need:** Traffic congestion is one of the most common concerns for residents and businesses in Miami Lakes. Smart parking technology will reduce traffic by eliminating circling or stalled cars looking for parking.

▶ **Location(s):** Miami Lakes has many private surface parking lots and garages that can adapt smart parking technology.

- Town-Managed street parking
- Park and ride facility at NW 154th Street & NW 77th Avenue
- Parks

It is recommended that smart parking technology be considered at Main Street. The Town should work with the private owner to encourage the use of this technology.

▶ **Cost per space:**

Purchase	$50
Installation	$1,000

Technology Number: 19 **Technology Name:** Mobile parking app **Technology Category:** Vehicular Traffic

Goal: Goal 4 - Support efficient travel

Description: A Mobile parking app allows for users to pay for parking electronically, and for municipalities to efficiently monitor parking electronically.

Purpose: Parking apps make parking easier for people who prefer to pay as you go if more time is needed. Parking apps simplify payments through one electronic system, and collects parking revenue.

Need: Currently, no parking program exists in the Town. As areas become more developed and with more demand for parking, a parking program can be developed integrating a mobile parking app.

Location(s):

- Prioritize spaces most in demand
- All government-owned public parking spaces (not Town Hall)
- Park and ride facility at NW 154th Street & NW 77th Avenue

Cost per space/transaction:

Signage	$100
Installation	$0
Annual Fees	$0.35-0.50 per transaction (passed on to user)

▶ **Technology Number:** 20 ▶ **Technology Name:** Connected and Autonomous Vehicle (CAV) Technology

▶ **Technology Category:** Connected vehicles ▶ **Goal:** Goal 4 - Support efficient travel

▶ **Description:** A connected and autonomous vehicle is an autonomous vehicle that is equipped with wireless communication capabilities that allows it to share information with other vehicles and objects on the roadway, opening up the opportunity for the automobile to make real-time decisions.

▶ **Purpose:** CAV deployment may include: significant improvements in safety and fewer crashes. CAV can reduce delays and reduce commute times. In addition, CAV can offer reduced emissions due to more consistent speeds and less idling

▶ **Need:** CAV technology is an efficient means to travel, and CAV shuttles or taxis will help bring personal automobiles off roads, and ease congestion.

▶ **Precursor:** It is possible that smart sign technology can be a precursor to full-scale CAV implementation; however, many automated vehicles are being developed to operate on existing road infrastructure. As vehicles become increasingly automated and connected, existing road signs and markings can be updated to ensure safety and reliability of this emerging technology. Companies have began to experiment with advanced road markings which are durable improving lane detection and traffic safety in even the most extreme weather conditions, and smart signs that are retroreflective signs that provide better readability, which results in more accurate navigation and faster decision-making for both drivers and automated vehicle systems. In addition, smart signs are compatible with traditional signage, and these technologies can be tested in Miami Lakes.

▶ **Location(s):** State Autonomous Vehicle Legislative Efforts exist in Florida. Miami Lakes' suitable year-round weather and areas with slower street speeds, make for favorable autonomous vehicle testing and operating conditions. Miami Lakes can partner with The Florida Department of Transportation (FDOT) Florida Automated Vehicles Initiative to design a testing program in a limited area of the Town as implementation moves forward to coordinate CAV deployment. Full-scale implementation will begin in 2020 and focus on completing infrastructure upgrades, implementing large CAV projects, conducting performance and outcome assessments, performing O&M activities, advancing outreach with stakeholders, and analyzing the impacts of agency and industry partnerships.

Technology Number: 21 **Technology Name:** CCTV Camera Technology **Technology Category:** Enforcement

Goal: Goal 5 - Promote public safety

Description: CCTV is an acronym for closed circuit television cameras. These cameras can knit together police and emergency services by offering surveillance in many places simultaneously. CCTV systems can give a sense of security, help fight crime and make cities safer.

Purpose: CCTV cameras monitor certain locations and allow for remote monitoring. Currently, the Town has 32 CCTV cameras.

Need: With future public investments with the installation of new technologies throughout the town, installing cameras will protect these new assets from theft, damage and vandalism. Cameras promote public safety and allow for remote monitoring.

Location(s): Locations will depend on final technology installations. Many locations will be privately owned and will require agreements. CCTV is recommended to be expanded and installed in the following locations (See Figure 6 Map*):

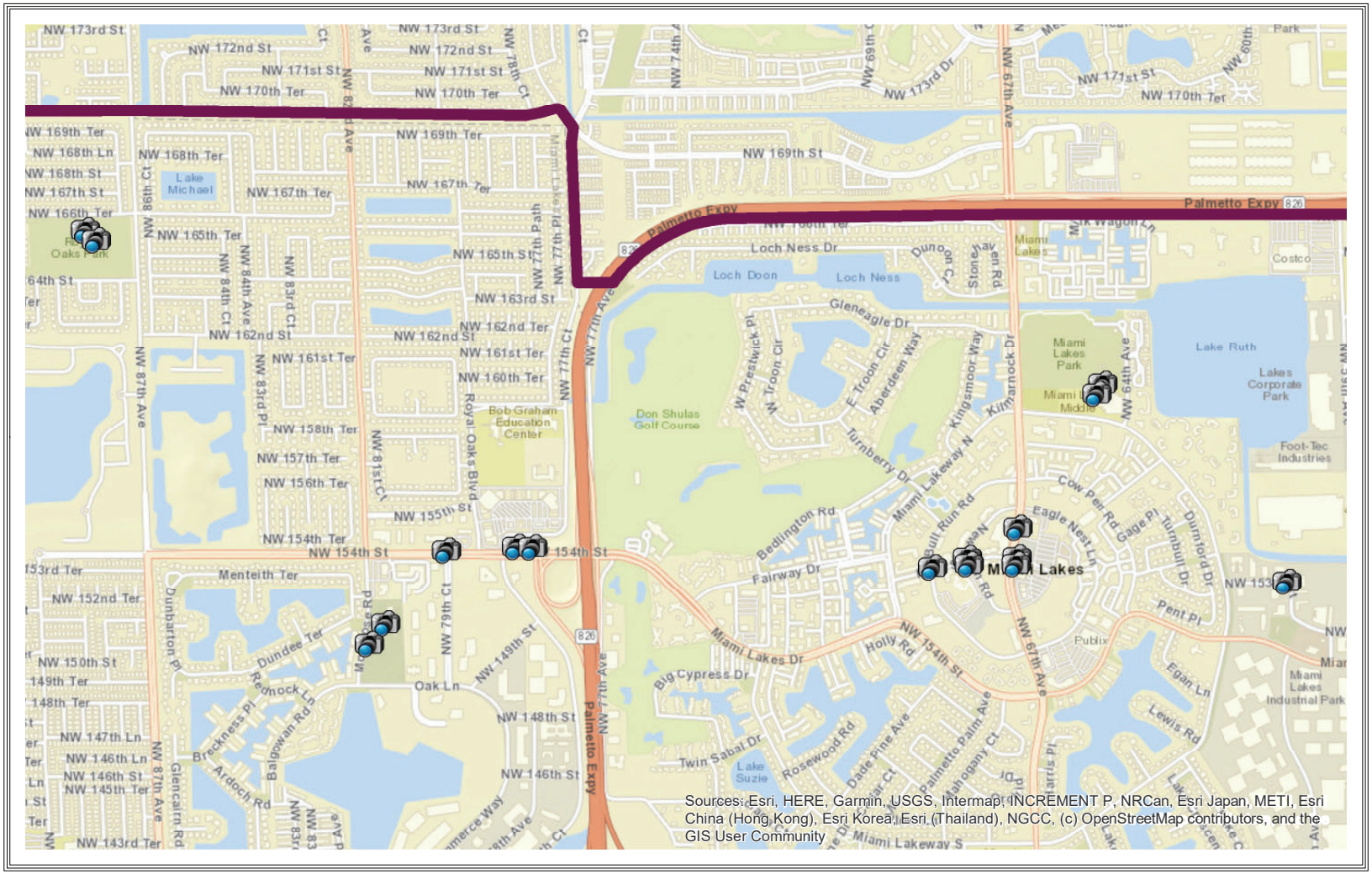
- Main Street District (6)
- Parks
  - Optimist Park (2)
  - Royal Oaks Park (2)
  - Picnic Park (2)
- Major roadways (4)
- Park and ride facility at NW 154th Street & NW 77th Avenue

Cost per unit:

Purchase	$6,000
Installation	$1,700

*It is recommended that more cameras be added in areas where new infrastructure investments or improvements are expected. New infrastructure such as bicycle lockers, smart kiosks and benches can be targets of vandalism, and cameras can assist in monitoring conditions in these sites, while offering a sense of security and trust to its users.

Figure 6: Potential CCTV Camera Locations



N

0 0.275 0.55 1.1 Miles

Legend

CCTV Cameras

Miami Lakes Boundary

▶ **Technology Number:** 22 ▶ **Technology Name:** Smart Kiosk ▶ **Technology Category:** Smart Infrastructure

▶ **Goal:** Goal 6 - Bolster a connected quality of life

▶ **Description:** Smart kiosks are stationary interactive digital tablets that are approachable and include software and hardware that can host many applications including communication and real-time data.

▶ **Purpose:** Common features of Smart Kiosks range from practical and informative to fun and entertaining as they can offer the capability to post Town news and alerts, can offer interactive maps for wayfinding and pick up locations, information regarding Town attractions and scheduled events, as well as dining, shopping and hotel information. Kiosks can include real-time information on weather conditions, bus arrivals, and offer the option to request a freebee ride, or book an Uber or Lyft without cellphone service. There is also the capability to include interactive games and a camera for selfies. Kiosks can collect data on foot traffic and activity use, it can also be used to charge electronic devices and offer WIFI hotspot. Kiosks can offer advertising revenue opportunities for the Town.

▶ **Need:** The Town currently lacks any technology to guide, engage and assist pedestrians in public spaces and sidewalks including digital signage, maps, event and programming information, and other alerts. Smart kiosks are an interactive wayfinding instrument for pedestrians that can offer many capabilities which can be customized based on a communities' needs. Smart kiosks serve as modern-day triangulation in public spaces,[19] or a certain characteristic of a public space that brings people together. It is an objective of the town to promote the Town Center as a community meeting and gathering place and installing a Smart Kiosk can help achieve this objective.[20] The Town currently has limited free WIFI and no phone or device charging stations, and Smart kiosks can expand and add provide these services.

Source: CIVIQ

▶ **Location(s):** Smart kiosks are best suited for walkable areas with concentrated activity. The following locations are currently suitable for kiosk deployment, or will be soon as new developments are advancing (See Figure 7 Map):

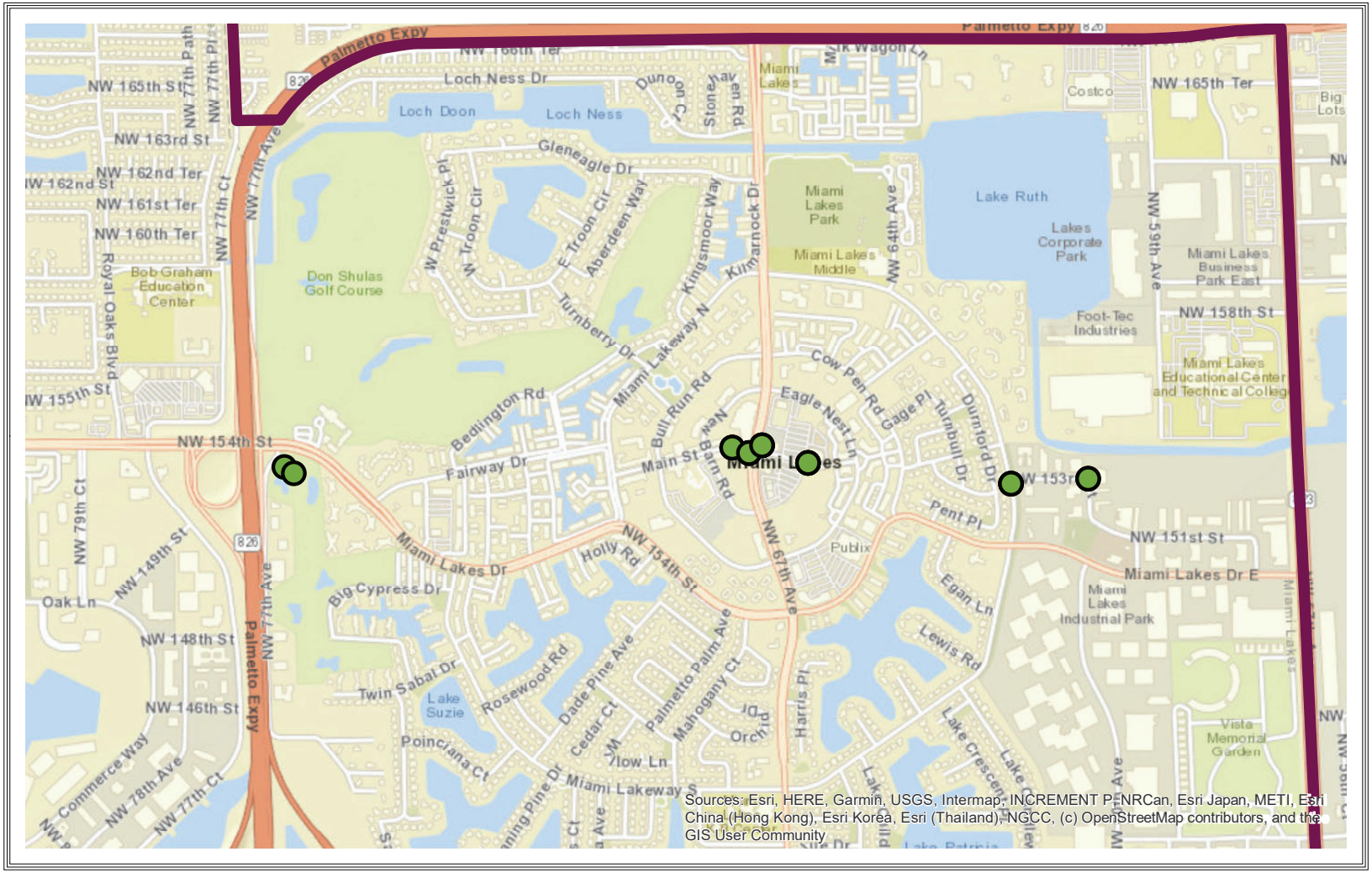
- Main Street Plazas
- NW 153rd Street & Miami Lakeway South
- NW 151st/NW 59th Avenue
- Park and ride facility at NW 154th Street & NW 77th Avenue

▶ **Cost per unit:**

Purchase and Installation	$50,000

[19] Term coined by William Whyte in "The Social Life of Small Urban Spaces".
[20] Objective 10A.7 of the Comprehensive Master Plan Ordinance.

Figure 7: Potential Smart Kiosk Locations



N

0 0.225 0.45 0.9 Miles

Legend

Kiosk

Miami Lakes Boundary

Technology Number: 23 **Technology Name:** Smart Benches **Technology Category:** Smart Infrastructure

Goal: Goal 6 - Bolster a connected quality of life

Description: Smart benches are practical solar-powered benches fitted with technological features such as WIFI and USB charging that enhance a user's resting experience, while collecting datapoints to provide municipalities useful user and environmental information.

Purpose: SMART benches are powered with solar panels and can offer free charging, WIFI, and can provide energy saving throughout the Town. SMART furniture can collect data on usage which can provide the Town with specific information on how many people are using the space, when they are there and the length of their stay which opens up more efficient programming and resource allocation.

Need: The Town can use more public seating. Benches can improve walkability as benches may encourage more people to walk if there are true resting areas. Data collection will allow for the Town to plan programming more efficiently in real-time instead of retroactively. The Town currently has limited free WIFI and no phone or device charging stations, and along with Smart kiosks can expand and provide these services throughout the Town. In addition, solar powered USB charging allows for charging when there are power outages like there often is in this region after major storms.

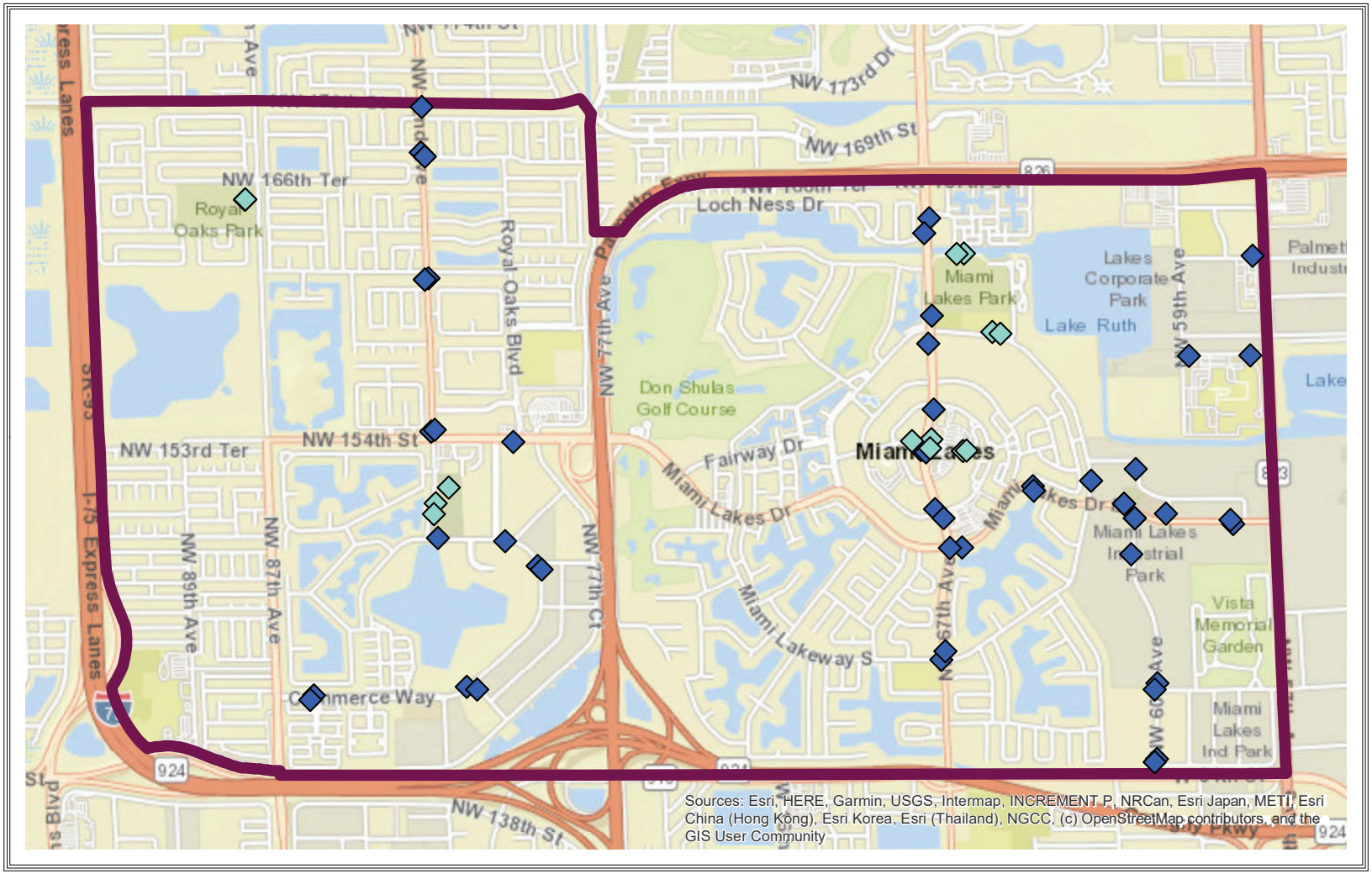
Location(s): It is recommended that 14 benches be purchased and installed throughout the town, replacing traditional benches. In addition, 48 bus stop benches are to be replaced as needed in the following locations (See Figure 8 Map):

- Parks
  - o Optimist Park (2)
  - o Royal Oaks Park (2)
  - o Picnic Park (2)
- Miami Lakes Middle School (2)
- Miami Lakes Community Center (1)
- Plazas on Main Street (3)
- Town Hall (2)
- Bus stops (48)

Cost per unit:

Purchase and Installation	$4,000
Annual Maintenance/Fees	$1,700

Figure 8: Potential Smart Bench Locations



Technology Number: 24 **Technology Name:** Book Vending Machines **Technology Category:** Smart Infrastructure

Goal: Goal 6 - Bolster a connected quality of life

Description: Book vending machines serve as a miniature library and are fully automated machines that can dispense books and can accept returns. These machines are a fun way of encouraging reading, while only requiring a small footprint in terms of space. In addition to encouraging more reading, these machines can encourage spending time outside and more walking. The Town of Miami Lakes pilot program Little Free Library has been implemented at several Town pocket parks. If the program proves to be a success, the Town will expand the program to additional areas.

Purpose: Book vending machines increases access to books and connect the community to information and entertainment. The availability of vending machines can encourage reading, especially for young populations.

Need: Book vending machines can be integrated as an expansion of service for the current Little Free Library program.

Location(s):

- Parks
  - Optimist Park
  - Royal Oaks Park
  - Picnic Park
- Miami Lakes Middle School
- Miami Lakes Community Center
- Miami Lakes Branch Library

Cost per unit:

Purchase and Installation	$20,000 per machine

▶ **Technology Number:** 25 ▶ **Technology Name:** Electric Vehicle Charging Stations

▶ **Technology Category:** Smart Infrastructure ▶ **Goal:** Goal 7 - Achieve universal environmental sustainability

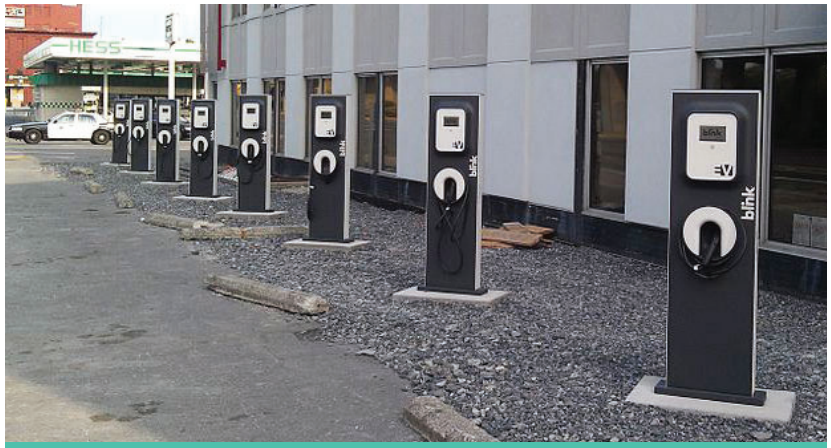
▶ **Description:** Charging Stations are parking spaces that are fitted with electric stations that have the capability to plug into and charge electric vehicles.

▶ **Purpose:** Charging stations deliver the electricity needed to charge electric vehicles. This infrastructure is a service that is required for electric cars and is a convenience to those without a place to charge at home or work. It is an objective for the Town to achieve universal environmental sustainability in public and private environments, operations and infrastructure.[21] The installation of more electric charging stations encourages more electric car use and ownership and promotes cleaner air. Electric charging stations will provide an amenity to the public and installing more electric vehicle charging stations will prepare the Town for an inevitable increase in electric vehicle ownership and use.

▶ **Need:** The Town has two public charging stations in the Main Street Parking Garage at 6621 Main Street. Electric Vehicle Charging infrastructure is essential for encouraging more electric vehicle usage and ownership throughout the Town. By 2025, it is estimated that electric vehicles will be a 7 percent share of all vehicles on the road,[22] and Miami Lakes does not yet have the necessary public infrastructure to support use of these vehicles.

▶ **Location(s):** Recommend a minimum of 7 more stations be installed by the Town in the following locations (See Figure 9 Map): These will be available to the public for a small fee.

- Town Hall Parking Lot (2)
- Main Street District (2)
- Optimist Park (2)
- Private developments and garages
- Business and retail corridors
- Picnic Park West (1)



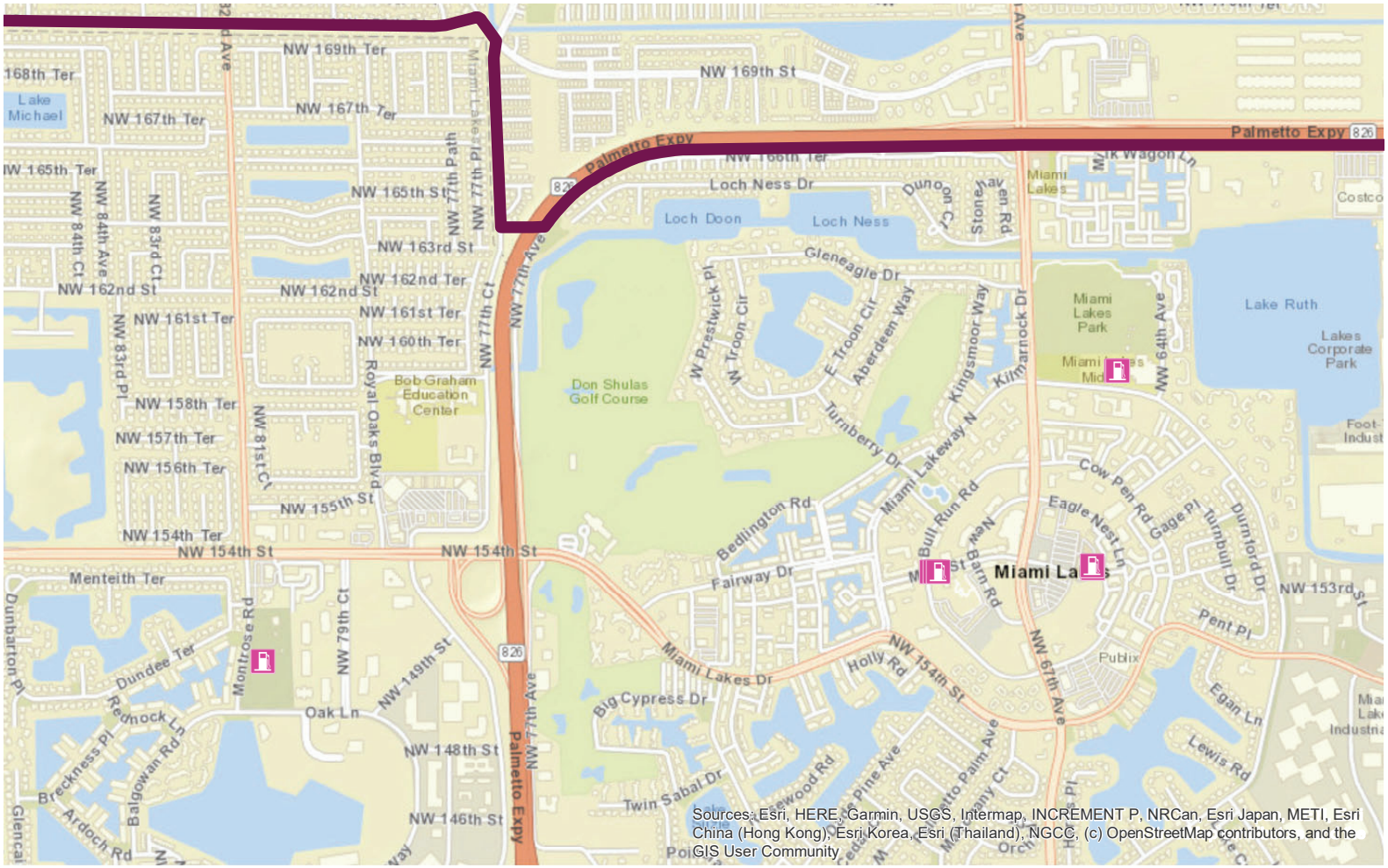
Source: Plugincars.com

▶ **Cost per station:**

Purchase and installation	A public level 2 charging schematic can range from $5,000-$10,000
Annual Data Fees	$400

[21] Miami Lakes Strategic Plan 2015-2025.
[22] "US Electric Vehicle Loyalty and Volumes Reach Record Highs" IHS Markit.

Figure 9: Potential Electric Vehicle Charging Locations



N

0 0.225 0.45 0.9 Miles

Legend

Electric Vehicle Charging Stations

Miami Lakes Boundary

▶ **Technology Number:** 26 ▶ **Technology Name:** Electric Vehicle Fleet ▶ **Technology Category:** Utilities

▶ **Goal:** Goal 7 - Achieve universal environmental sustainability

▶ **Description:** Electric vehicles are purchased to be used for government vehicles, phasing out current gasoline vehicles.

▶ **Purpose:** The Miami Lakes Strategic Plan (2015-2025) outlines how it is an objective of the Town to achieve universal environmental sustainability in public and private environments, operations and infrastructure. To further this objective, the Town can gradually phase out its current fleet to replace with electric vehicles and install more charging stations to support this objective by providing the necessary infrastructure to easily charge and promote cleaner air by reducing emissions. In addition, electric vehicles have much lower fuel costs on average than conventional gasoline vehicles. Electricity prices are lower and more stable than regular gasoline prices which will save the Town money on fuel costs.

Miami Lakes Fleet Inventory List			
Model	**Year**	**Description**	**Type of Engine**
Champion Bus	2006	Bus >20 Pass, No Lift	gasoline
Custom Signature-Smart Variable Message Sign Trailer	2005	Trailer- NO CHARGE	gasoline
Custom Signature-Smart Variable Message Sign Trailer	2005	Trailer- NO CHARGE	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Ford Expedition	2008	Light truck	gasoline
Ford F150 Std Cab P/U	2010	Light Truck	gasoline
International Truck W/Sewer Vacuum Body	2013	Heavy Truck	gasoline
Toyota Tacoma PU	2013	Light Truck	gasoline
Ford Crown Victoria	2008	Private Passenger	gasoline
Ford Crown Victoria	2008	Private Passenger	gasoline
Ford Crown Victoria	2009	Private Passenger	gasoline
Freebee Vehicles			
XL Freebee: Zenith Motors Electric Passenger Shuttle	2019	10 passenger shuttle	electric
Regular Freebee: Polaris GEM e6	2019	5 passenger shuttle	electric
Regular Freebee: Polaris GEM e6	2019	5 passenger shuttle	electric

▶ **Need:** Many of the Town's vehicles are aging and are due for an upgrade. Phasing out gas vehicles with an electric fleet will further the town's objective to achieve environmental sustainability and provides a more fuel efficiency.

▶ **Location(s):** N/A.

The Town has three (3) Ford Crown Victoria cars that can be replaced with electric vehicles.

▶ **Cost per electric sedan:**

Purchase	$30,000
Annual Maintenance/Fees	$300 for electricity at a wholesale rate[23]

[23] *City of Newark will add electric cars to its fleet.* Josh Shannon. NewarkPost. Jun 28, 2019.

▶Technology Number: 27 **▶Technology Name:** Street Light Sensors **▶Technology Category:** Utilities

▶Goal: Goal 7 - Achieve universal environmental sustainability

▶Description: Sensors connected to streetlights can monitor lighting conditions and automatically adjust public lighting.

▶Purpose: The Town has recently converted all Town owned lights and FPL owned lights to LED lightbulbs. To further energy efficiency efforts, the Town can install smart sensors and controls that allow technicians to remotely adjust light levels and track usage and outages. In addition, photocells on light poles can sense ambient light to automatically illuminate and switch them off after dawn. This efficiency has shown to save a significant amount of energy.

▶Need: Sensors will provide more efficiencies in maintenance and operations, advancing the Town's objective to achieve universal environmental sustainability in public and private environments, operations and infrastructure.

▶Location(s): The Town has 2,324 Street Lights owned and maintained by various entities. It is recommended that the 915 light poles that are owned by the town with lamps maintained by FPL be fitted with sensors through a phased pilot program over a 10-year period. (See Figure 10 Map):

- 90 Town-Owned Light Poles (1/10 of total number) per year over a 10-year period

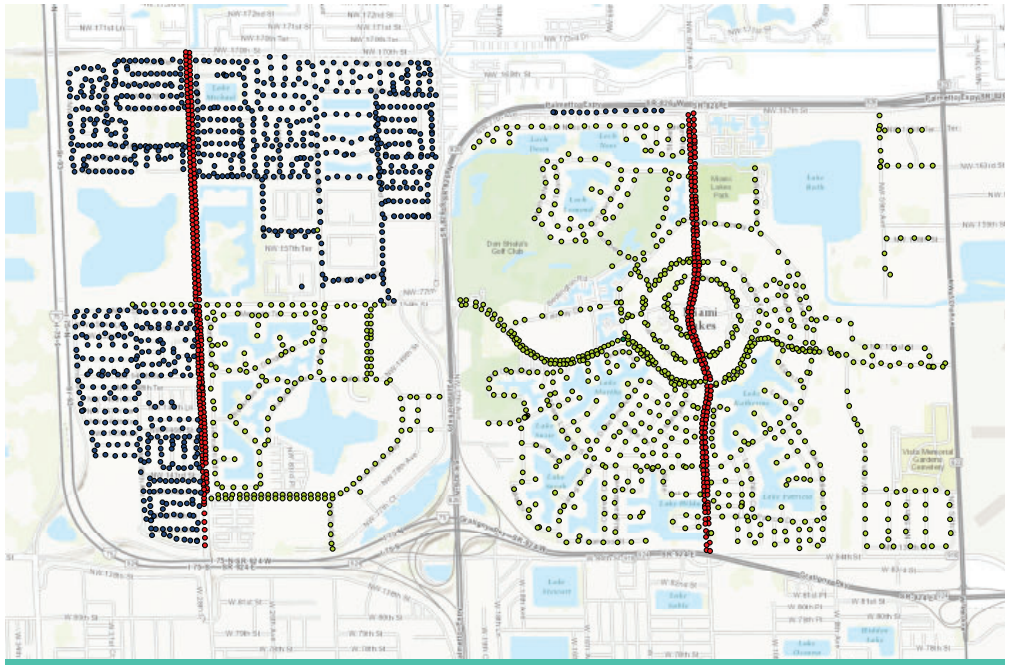


Figure 10: Street Lamp Locations in the Town of Miami Lakes. Street Lamps represented in green will be fitted with sensors over a 10-year period

▶Cost per sensor:

Purchase and installation	$10,000

◆PRIORITIZATION & IMPLEMENTATION

Smart City technologies offer positive socioeconomic impacts. Project prioritization and implementation provide the framework for infrastructure and other improvements. In this section the project along with the need, description, and estimated cost will be provided. This plan will evaluate, identify, and prioritize projects that will improve overall functioning of the Town's network. Implementation strategies for projects and prioritization of recommended projects, based on need, project feasibility and cost are provided in this section.

Various technologies presented in the previous sections were organized, streamlined and defined as projects. The projects were evaluated based on available resources, cost, benefits, community needs, and desires in the creation of an overall Project List.

The Town of Miami Lakes has collaborated with the community through Public Workshops in order to develop the implementation for the Smart City technologies provided. The Town identified 53 projects focusing on 7 goals. The projects are structured to be implemented most efficiently. As identified previously, the goals are as follows:

1. Be prepared to accommodate for current and future technology deployment
2. Optimize shared mobility
3. Enhanced pedestrian and bicycle safety and comfort
4. Support efficient travel and public safety
5. Promote public safety
6. Bolster a connected quality of life
7. Achieve universal sustainability

Technologies were prioritized by effectively recognizing the value of each project to its surroundings and to the Town while supporting the Town's vision of becoming a Smart City. Technologies were reviewed individually by location, not through a one size fits all approach. Area characteristics were defined in order to select the most appropriate projects for the goals identified. The technologies need to support efficient use of land, neighborhood character, economic development, transportation mode options, and a sustainable environment. The benefits were weighed effectively against the operational and physical costs. The administrative and maintenance costs to keep the technology sustainable and operational were also considered. Additionally, opportunities for input from key stakeholders and the community regarding prioritization and goals were provided. Following implementation, the Town of Miami Lakes will create an evaluation process to monitor the effectiveness of applicable smart technologies. Both the Public Works and Planning Departments must be involved in the monitoring of the success of the applied technologies and the potential impacts.

Table 9: Prioritization and Implementation of Technology Projects						
Rank	Technology No.	Project Type	Location	Goal	Cost	Description
1	9	In-Road Warning Lights	NW 170th Street & NW 82nd Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$75,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
2	9	In-Road Warning Lights	NW 154th Street & NW 82nd Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$50,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
3	9	In-Road Warning Lights	NW 79th Avenue & NW 154th Street	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
4	9	In-Road Warning Lights	NW 79th Court & 154th Street	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
5	9	In-Road Warning Lights	New Barn Road & Main Street	Enhance Pedestrian and cyclist mobility, comfort and safety	$55,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
6	9	In-Road Warning Lights	NW 153th Street & NW 60th Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
7	9	In-Road Warning Lights	NW 64th Avenue & Miami Lakeway	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
8	9	In-Road Warning Lights	Bull Run Road & Main Street	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
9	9	In-Road Warning Lights	Miami Lakeway North & NW 64th Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$25,000	Improve pedestrian visibility and slow down vehicles when pedestrian crossings are occurring.
10	10	Rectangular Rapid Flashing Beacon	Between East Nest Lane & Main Street on NW 67th Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$15,000	User-activated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks.

Table 9: Prioritization and Implementation of Technology Projects (continued)						
Rank	**Technology No.**	**Project Type**	**Location**	**Goal**	**Cost**	**Description**
11	11	Embedded LEDs in Signs	Town-Wide in areas with low signage visibility	Enhance Pedestrian and cyclist mobility, comfort and safety	$6,000	Embedded LEDs are lights that illuminate roadway signage. Typically these are seen on signs to signal caution, for yielding and stopping. Embedded LEDs are utilized in areas where signage may have low visibility
12	1	5G Network	Miami Lakes Branch Library Schools Parks (Optimist, Royal Oaks, Picnic)	Be Prepared to accommodate for current and future technologies	N/A	Fast free WIFI to better connect and prepare the community for future applications using 5G infrastructure.
13	25	Electric Vehicle Charging Stations	Town Hall (2)	Universal Environmental Sustainability	$30,000	Electric Vehicle Charging infrastructure is essential for encouraging more electric vehicle usage and ownership throughout the Town.
14	26	Electric Vehicle Fleet	N/A	Universal Environmental Sustainability	$100,000	Replace 3 Town Vehicles
15	25	Electric Vehicle Charging Stations	Main Street District (2)	Universal Environmental Sustainability	$60,000	Electric Vehicle Charging infrastructure is essential for encouraging more electric vehicle usage and ownership throughout the Town.
16	18	Smart Parking	Main Street District	Support Efficient Travel	$70,000	Implement Smart Parking at Town Hall
17	13	Smart Bicycle Locker Parking	Town Hall	Enhance Pedestrian and cyclist mobility, comfort and safety	$1,300	Bicycle Locker Parking
18	13	Smart Bicycle Locker Parking	Park & Ride Facility at NW 154th Street & NW 77th Avenue	Enhance Pedestrian and cyclist mobility, comfort and safety	$5,200	Bicycle Locker Parking
19	12	Accessible Pedestrian Signals	All 127 Marked Crosswalks	Enhance Pedestrian and cyclist mobility, comfort and safety	$2.5 mil	This signal allows to communicate to the visually and mobility impaired when it is time to cross, increasing safe crossings. These signals allow for increased mobility for all.

Table 9: Prioritization and Implementation of Technology Projects (continued)						
Rank	Technology No.	Project Type	Location	Goal	Cost	Description
20	13	Automated Pedestrian Detection	All 127 Marked Crosswalks	Enhance Pedestrian and cyclist mobility, comfort and safety	$1.8 mil	Automated pedestrian detection devices sense when a pedestrian is waiting at a crosswalk and automatically send a signal to switch to a pedestrian WALK phase
21	2	Connected Vehicle Technology	N/A	Be prepared to accommodate for current and future technology deployment	N/A	A connected vehicle (CV) environment enables wireless communications among vehicles (vehicle-to-vehicle, or V2V), infrastructure (vehicle-to-infrastructure, or V2I), and mobile devices
22	20	Connected and Autonomous Vehicle (CAV) Technology	N/A	Provide Efficient Travel	N/A	A connected and autonomous vehicle is an autonomous vehicle that is equipped with wireless communication capabilities that allows it to share information with other vehicles and objects on the roadway
23	27	Streetlights Sensors	Town-Wide	Universal Environmental Sustainability	$9 mil	Sensors to adjust lighting
24	23	Smart Benches	• Miami Lakes Middle School (2) • Miami Lakes Community Center (1) • Plazas on Main Street (3) • Town Hall (2)	Connected Quality of Life	$46,000	SMART benches are powered with solar panels and can offer free charging and WIFI
25	23	Smart Benches	• Town Parks • Optimist Park (2) • Royal Oaks Park (2) • Picnic Park (2)	Connected Quality of Life	$35,000	SMART benches are powered with solar panels and can offer free charging and WIFI
26	23	Smart Benches	Bus Stops (48)	Connected Quality of Life	$274,000	SMART benches are powered with solar panels and can offer free charging and WIFI
27	8	Dockless E-Scooter Sharing	N/A	Optimize Shared Mobility	N/A	Dockless electric scooters are battery powered electric scooters that are rented for short-term. Dockless means the scooters are "parked" in various locations to be picked up as needed

Table 9: Prioritization and Implementation of Technology Projects (continued)

Rank	Technology No.	Project Type	Location	Goal	Cost	Description
28	24	Book Vending Machine	N/A	Connected Quality of Life	$20,000	Book vending machined dispense book rentals or purchases
29	4	Subsidized on-demand car for hire	N/A	Optimize Shared Mobility	$50,000	On-Demand cars for hire provide passengers with additional transportation options within Town of Miami Lakes limits.
30	7	Dockless Bicycle Sharing	N/A	Optimize Shared Mobility	N/A	Dockless bicycles are short-term bicycle rentals that are not "parked" but instead are located in various locations to be picked up as needed.
31	22	Smart Kiosk	• Main Street Plazas • NW 153rd Street & Miami Lakeway South • NW 151st/NW 59th Avenue • Park and ride facility at NW 154th Street & NW 77th Avenue	Connected Quality of Life	$350,000	Smart kiosks are an interactive wayfinding instrument for pedestrians that can offer many capabilities which can be customized based on a communities' needs.
32	3	Car Share	Main Street District (5 spaces)	Optimize Shared Mobility	$1,000	Car sharing rental services are intended to substitute private vehicle ownership and can be structured as a one-way or two-way car share system.
33	3	Car Share	NW 79th Avenue/ NW 154th Street (3 spaces)	Optimize Shared Mobility	$1,000	Car sharing rental services are intended to substitute private vehicle ownership and can be structured as a one-way or two-way car share system.
34	17	Adaptive Signal Control Technology	NW 154th Street/ Miami Lakes Drive & NW 67th Avenue	Provide Efficient Travel	$30,000	Sensors to adjust signal timing
35	17	Adaptive Signal Control Technology	NW 67th Avenue/ Ludlam Road & NW 167th Street	Provide Efficient Travel	$30,000	Sensors to adjust signal timing

Table 9: Prioritization and Implementation of Technology Projects (continued)						
Rank	Technology No.	Project Type	Location	Goal	Cost	Description
36	17	Adaptive Signal Control Technology	NW 67th Avenue/ Ludlam Road & Miami Lakeway North	Support Efficient Travel	$30,000	Sensors to adjust signal timing
37	17	Adaptive Signal Control Technology	NW 67th Avenue/ Ludlam Road & Main Street	Support Efficient Travel	$30,000	Sensors to adjust signal timing
38	5	Curb Space Management	One part time staff position	Optimize Shared Mobility	$30,000	Curb space management is a data collection and mapping to help catalog curb data on curb usage and regulations, which can be used to improve mobility as curb needs change.
39	14	Smart Bicycle Locker Parking	• Parks • Optimist Park (3) • Royal Oaks Park (5) • Picnic Park (3)	Enhance Pedestrian and cyclist mobility, comfort and safety	$7,800	Bicycle Locker Parking
40	14	Smart Bicycle Locker Parking	Town Hall (2)	Enhance Pedestrian and cyclist mobility, comfort and safety	$1,300	Bicycle Locker Parking
41	14	Smart Bicycle Locker Parking	Miami Lakes Middle School (4)	Enhance Pedestrian and cyclist mobility, comfort and safety	$2,600	Bicycle Locker Parking
42	14	Smart Bicycle Locker Parking	Main Street District (4)	Enhance Pedestrian and cyclist mobility, comfort and safety	$2,600	Bicycle Locker Parking
43	14	Smart Bicycle Locker Parking	Park and ride facility at NW 154th Street & NW 77th Avenue (8)	Enhance Pedestrian and cyclist mobility, comfort and safety	$5,200	Bicycle Locker Parking
44	19	Mobile Parking App	Town-Wide	Provide Efficient Travel	$100,000	Currently, no parking program exists in the Town. As areas become more developed and with more demand for parking, a parking program can be developed integrating a mobile parking app.

Table 9: Prioritization and Implementation of Technology Projects (continued)						
Rank	**Technology No.**	**Project Type**	**Location**	**Goal**	**Cost**	**Description**
45	16	Mobility App/"Mobility Marketplace"	County-Wide	Support efficient travel	N/A	A Mobility Marketplace is a mobility app that connects users to a variety of transportation options together.
46	21	CCTV	• Main Street District (6) • Optimist Park (2) • Royal Oaks Park(2) • Picnic Park (2) • Major roadways (4) • Park and ride facility at NW 154th Street & NW 77th Avenue	Promote Public Safety	$150,000	CCTV cameras monitor certain locations and allow for remote monitoring. Currently the Town has 32 CCTV cameras.
47	6	Micro Transit	Town-Wide	Optimize Shared Mobility	$65,000	Micro Transit is a shared, on-demand, app-based mobility service that groups travelers with similar trip pickup and drop-off locations.
48	6	Bicycle Sharing	Town-Wide	Optimize Shared Mobility	N/A	Dockless bicycles are short-term bicycle rentals that are not "parked" but instead are located in various locations to be picked up as needed and can be used as a first mile/last mile solution.
49	7	Electric Scooter Sharing	Town-Wide	Optimize Shared Mobility	N/A	Electric scooters are battery powered electric scooters that are rented for short-term. Dockless means the scooters are "parked" in various locations to be picked up as needed and can be used as a first mile/last mile solution
50	15	Video Imaging	Along Bicycle Facility network	Enhance pedestrian and cyclist mobility, comfort and safety	$108,000	Video imaging are video recorders mounted above the count area records movements coupled with a software program that processes the video to produce bicycle or pedestrian counts

◆ FUNDING SOURCES

Implementing and maintaining elements of the Technology Plan will require sources of funding, as the Town is responsible for purchasing operating and maintaining these technologies. The Town must secure various forms of funding and pursue innovative funding strategies in order to deploy technologies that will address the goals outlined in this plan.

As Miami Lakes looks to upgrade infrastructure with smart technologies, private partnerships and funding will help make this a reality. With increasing construction costs, and increased limitations on the ability to generate revenue, municipalities are creating partnerships with other jurisdictions as well as the private sector in order to create new funding opportunities to finance projects. These partnerships are called Public Private Partnerships, or P3's, and they are the most efficient especially as partners may offer expertise in areas of applied technologies in an environment where technologies are constantly evolving. The Town may approach potential partners to better understand various technologies currently available.

The Town of Miami Lakes does not own, operate, nor maintain all public spaces and roads within its jurisdiction. It is imperative that Town staff coordinate with property owners, developers and agencies such as FDOT, Miami-Dade County and the Miami-Dade TPO. Funding for improvements to roadway improvement projects are typically funded through Federal, State, and Local agencies, and other improvements or upgrades are often funded by the private sector through sponsorships or P3's. The following contains a description of relevant funding opportunities at all levels.

LOCAL FUNDING

Local funding is generated from within a city or county, generally relying on property taxes or other funds. Numerous communities have concurrency fees or impact fees, which can be applied to local infrastructure projects.

IMPACT FEE

Transportation impact fees can be arranged so that the fees are able to be spent on improvements other than projects which increase roadway vehicular capacity. A transportation impact fee may be used to fund pedestrian, bicycle and transit improvements, including sidewalks, trails, crosswalks, bikeways, bus shelters, dedicated rapid bus lanes, light rails lines and stops, and other justifiable items. The Town has utilized Impact Fees to pay for installing Adaptive Signal Control technology. While most states will only generally authorize transportation impact fees only for road capacity improvements, there are no such restrictions in Florida. In Florida, impact fees are authorized by statute and covered by case law. For Miami Lakes, a vital aspect of adopting a multimodal impact fee lies in the justification of infrastructure or alternative assessments of capacity. The argument must be made that multimodal improvements, such as bicycling facilities and other multimodal transportation infrastructure on and off the roadways free up vehicular capacity in a system, instead focusing on the overall capacity of the system.

MOBILITY FEE

The Town of Miami Lakes adopted a mobility fee in 2016. A mobility fee has similar principles as a road impact fee, except that it offers additional flexibility to fund capital infrastructure for transit, bicycle, and pedestrian facilities. It is a one-time capital charge levied against new development. A mobility fee is intended to cover the portion of the capital costs of transportation infrastructure capacity consumed by new development. Assisting in funding the implementation of projects identified in the Capital Improvements Element (CIE) and other capital improvement programs for the respective facility/service categories, is the principle purpose of a mobility fee. This fee replaces concurrency at the site-plan review stage. As the Town adopts technology projects with mobility implications, it should add these projects to the plan list for the mobility fee and amend the fee accordingly. Additionally, the Town created mobility fee credits for developments that provide site

specific urban design, multimodal, amenities, and transportation demand techniques that further the goal of providing sustainable mobility options for the community.

STATE FUNDING

The State of Florida has several funding sources that primarily come from FDOT. The Town should continue to monitor future funding that can be pursued through legislative appropriation requests.

Natural Resources, Environmental Issues, Growth Management and Transportation expenditures is the only area of the budget to see a reduction in funding compared to the previous fiscal year.

The Federal Highway Administration may at times provide grant funding for the following areas, to be routed through FDOT:

- Aging Road Users
- Community Traffic Safety
- Impaired Driving
- Motorcycle Safety
- Occupant Protection and Child Passenger Safety
- Pedestrian and Bicycle Safety
- Police Traffic Services
- Speed and Aggressive Driving
- Teen Driver Safety
- Traffic Records
- Traffic Record Coordinating Committee (TRCC)

Awards to state and local safety-related agencies are used as "seed" money to assist in developing and implementing programs that address traffic safety deficiencies or expand ongoing safety programs activities. Enforcement technologies can be funded with this money. Funding for these grants are apportioned to states annually from the National Highway Traffic Safety Administration (NHTSA) according to a formula based on population and road mileage. Funding may be available for projects in other program areas if there is documented evidence of need.

Through public rule making processes conducted in 1982, 1988, 1995 and 1998, it has been determined that certain highway safety program areas have proven to be more effective than others in reducing traffic crashes, injuries, and fatalities. These programs, designated as National Priority Program Areas are: Impaired Driving, Police Traffic Services, Speed Control, Occupant Protection/Child Passenger Safety, Pedestrian and Bicycle Safety, Motorcycle Safety, Traffic Records, and Community Traffic Safety.

It is expected that programs funded through these grants will become self-sufficient and continue when grant funding terminates. To promote self-sufficiency, agencies are expected to provide a local funding match when personnel costs are included in second and third year projects. The local match is normally 25% of eligible costs for second year projects and 50% for third year projects.

Government agencies, political "subdivisions" of the state, local city and county government agencies, state colleges, universities, school districts, fire departments, public emergency services providers, and certain qualified non-profit organizations are eligible to receive traffic safety grant funding. These grants are awarded on a Federal fiscal year basis and can be funded for a maximum of three consecutive years in each priority area.

The Economic Development Transportation Fund, commonly referred to as the "Road Fund," is an incentive tool designed to alleviate transportation problems that adversely impact a specific company's location or expansion decision. The award amount is based on the number of new and retained jobs and the eligible transportation project costs, up to $3 million. The award is made to the local government on behalf of a specific business for transportation improvements.

FEDERAL FUNDING

Federal programs make up the bulk of the funding for large projects. Florida is a "donor" state, which means it receives less than it contributes to Federal transportation programs each year. The US Department of Transportation helps communities fund transportation projects by issuing grants to eligible recipients for planning, vehicle purchases, facility construction, operations, and other purposes. The USDOT administers this financial assistance according to federal transportation authorization, Fixing America's Surface Transportation (FAST) Act.

MAP - 21 combined the Transportation Enhancement Program, Safe Routes to School and the Recreational Trails Program into a comprehensive Transportation Alternatives Program. Miami Lakes planning for its transportation infrastructure should carefully monitor availability of grants for this fund, as this funding's allocation structure is expected to change as administered by the FDOT.

The Transportation Alternative Set Asides, formerly known as the Transportation Alternative Program, was developed as a result of the Moving Ahead for Progress in the 21st Century (originated in MAP- 21). Eligible activities for funding include:

1. Construction, planning and design of on and off-road facilities for bicyclists, pedestrians, and other forms of non-motorized transportation;
2. Construction, planning and design of infrastructure related projects/systems to provide safe routes for non-drivers;
3. Conversion and use of abandoned railroad corridors for non-motorized use;
4. Construction of turnouts, overlooks, and viewing areas under community improvement activities;
5. Inventory, control or removal of outdoor advertising;
6. Historic preservation and rehabilitation of historic transportation facilities;
7. Vegetation management practices in transportation rights of way; and
8. Archaeological activities related to impacts from transportation projects eligible under Title 23; and 9. Environmental mitigation activities.

In addition, the Safe Routes to School (SRTS) Program and Recreational Trails Program (RTP) were both consolidated within the nine (9) activities under the TAP. The planning, designing, and constructing of boulevards and other roadways largely in the right of way of former Interstate System routes or other divided highways are also eligible as well.

The USDOT has over $350 million in public and private funds for smart city and advanced transportation technology grants. Additional funds are available through the Readiness Challenge Grants from the Smart Cities Council. Funds can be used for connected infrastructure, public Wi-Fi, sustainability, and more.

The U.S. Environmental Protection Agency offers grants to support activities that promote improved quality of development and protect human health. These Smart Growth Grants are available to assist communities addressing varied aspects of smart growth. Smart Growth national funding opportunities include energy, environmental justice, transportation, and more.

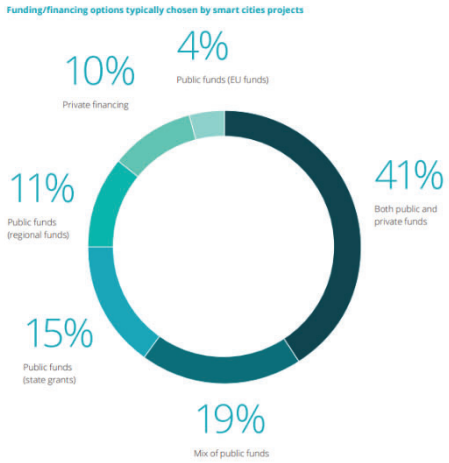
The Florida Department of Environmental Protection's Diesel Emissions Mitigation Program (DEMP) provides project specific funding to mitigate mobile sources of emissions as a result of the Volkswagen Settlement and the EPA's Diesel Emissions Reduction Act. Florida's share of the overall Mitigation Trust fund is approximately $166 million. The grant may be used to fund electric vehicle charging stations. Additional grants include the AARP Community Challenge and the US Ignite and Knight Foundation.

The Town of Miami Lakes must explore ways to create revenue, such as advertising opportunities and paid parking. A parking management plan must be conducted in order to identify where the Town can implement smart parking technologies.

FINANCING MECHANISMS

It is important to understand the limited public resources available in order to implement the proposed projects. Strategic public private partnerships are an option. These partnerships influence private investment and can enhance mobility through partnerships with carshare and bikeshare companies. Partnering with non-profit car-share companies using a pilot period will determine the success of the program.

The following chart has been adapted from a Deloitte report titled *The Challenge of Paying for Smart Cities Projects.* This report unveils that smart city financing can be structured by many mechanisms, and precedent has proven the most efficient way to secure financing is by public/private partnerships (P3's), followed by an aggregate of public funds. The town can open up financing by partnering with developers, property owners and vendors. University of Miami's Center for Computational Science created a Smart Cities Miami Conference, an annual gathering to showcase the work of local and global partners. Other municipalities have partnered with the University to host the event and competitions that explore how technology can solve issues such as traffic congestion. These events and partnerships would be beneficial to the Town.



Typical Financing Mechanisms	
Project financing	Focuses on the financial assessment of a given project, rather than on the business/enterprise as a whole. The remuneration is set according to the estimated cash flows and profits generated by the project.
Traditional loans and leases	Focuses on paying for infrastructure investment over time. Repayment can come from public sector or third-party/user payments. Financing is at the project level and involves a private equity partner.
Vendor finance	An equipment vendor; an engineering, procurement, and construction (EPC) contractor; or another supplier will offer financing for the project. Because an equipment vendor, for example, may have a better understanding of a project's technical risks, or of the industry concerned, it might be more willing than a commercial lender to assume those risks.
Consumption-based financing	Project sponsor pays for technology based on usage and adjusts capacity up and down as needed. Financing is at the supplier level rather than project level.
"As-a-service" financing	Rather than purchasing technology, project consumes it as a service. Financing is at the supplier level.
Concession financing	Project gains the benefits of technology at little to no cost, while enjoying incremental revenues and cost savings.
Revenue share financing	Project obtains funding for technology investments in exchange for a share of the revenues from customer contracts. Revenues may be committed or uncommitted.
Equity financing	Scales business across multiple cities with capital and expertise from a strategic private equity partner.

AUTONOMOUS VEHICLE POLICY AND RESEARCH

There are few places where companies can test self-driving cars without requiring a human in the vehicle. As of July 1,2019 under House Bill 311, Florida now allows for autonomous vehicles to operate on the roads without requiring a human to be behind the wheel. This means that Florida officially has an open-door policy to autonomous vehicle companies to operate and test on Florida roads. Under this law, the Town can invite RFI submissions for a pilot program, ensuring pilot serves visitors and residents in targeted areas where autonomous transit can be affected based on local travel behavior. The Town can create an RFI submission as part of a larger redevelopment initiative, as an autonomous vehicle program will attract social and economic activity. The following components will assist the Town yo develop a pilot program.[24]

- Integrate shared-use mobility and enhance first/last mile to transit.
- Begin pilot projects and small, fixed-route autonomous shuttle service with more complex services over time.
- Use scenario planning, pilot projects and small-scale planning to test new concepts prior to investing in larger scale corridor plan.
- Identify a network of mobility hub locations that feed riders to the corridor.
- Designate pickup and drop off zones for ride-hailing and delivery zones.
- Harness first-generation smart city technology for data-driven decisions.

In addition, as autonomous vehicle technology advances, it is recommended that street design standards for autonomous vehicles be monitored, as the industry evolves.

Policy

Miami Lakes can make the following changes to their land development code to require or incentivize Smart City infrastructure as new or existing developments:

1. Add electric vehicle parking requirements for off-road and private developments.
2. Develop electric vehicle parking incentives for existing developments.
3. Offer development bonus for installing smart technology improvements.
4. Adopt a local ordinances that enables the Town to be responsive to autonomous vehicle testing and Connected Automobile Technology testing.
5. Add appropriate definitions to land development code for:
   - Electric Vehicle Parking
   - Autonomous Vehicles
   - Autonomous Technology
6. Develop flexible parking policies that can allow for the reduction or elimination of certain parking requirements as AV market penetration increases.
7. Require smart bicycle parking for new developments.

[24] Adapted from American Planning Association symposium report *PREPARING COMMUNITIES FOR AUTONOMOUS VEHICLES* by Jennifer Henaghan, aicp, Editor.

MOVING MIAMI LAKES FORWARD

The Town of Miami Lakes is eager to lead Miami-Dade County in transportation innovation and its existing infrastructure allows for integration of smart technologies. With its mixed-use zoning practices the Town promotes a cohesive urban form, promoting walkable and connected neighborhoods for its residents and visitors. This type of development promotes better walkability and bicycle infrastructure, increased access to transit, creating a strong sense of place. Implementing these smart technologies will further strengthen connectivity and safety throughout the Town. A car-optional lifestyle is a possibility in the Town of Miami Lakes. The Town will ensure a multi-modal lifestyle for its residents, while becoming a Smart City with a cleaner, more efficient and safer transportation system.

The Town of Miami Lakes has engaged its citizens during the development of this report. In its workshop on August 21, 2019, the Town reached out to the public in presenting this draft plan. Among the feedback from the public was the need to prioritize safety and convenience, with safety being the most important aspect for determination of local needs. In addition, there was noted discussion on the need to "do business" differently, especially in how items are coordinated, and that this includes how the Town needs to engage with vendors, as well as set up infrastructure. There was also lengthy discussion on potential pilot programs such as autonomous shuttles for transit, and how and when these should come into place. It is encouraged that the Town continue to engage its citizens with meeting like this workshop, especially since technologies continue to emerge and can address local needs.

It is recommended that the Town of Miami Lakes create an evaluation process for Planning and Public Works staff to monitor the effectiveness of the implementation of the smart technologies identified in this study. Ensuring the technologies are appropriately utilized and monitoring the potential impacts is key. Additionally, it is recommended the Town assess its current parking conditions throughout the Town. Smart Technology encourages the use of multiple modes of transportation. The smart technologies must be monitored, evaluated, and encouraged or adjusted based on findings. In order to successfully implement Smart technologies for parking, an appropriate parking management strategy must be identified. An area parking management plan will be an intensive process; however, it is necessary to ensure parking management and smart technology decisions align with the vision of the Town and the community.

This plan will become part of daily decision making of smart technology related programs and policies in the future. As new technology arises, the Town can reference this study for direction so decisions will benefit the Town and the public. In order to make the Town's vision of becoming a Smart City a success it is imperative that all stakeholders commit to this vision and as technology changes over time this document will be a dynamic guide to assist the Town in navigating through new advances in technology. As the Town grows and changes this study will continue to evolve.

As a Smart City the Town of Miami Lakes will help grow its economy while looking towards the future of sustainability, safety, and mobility. The Town must collaborate with local businesses, various stakeholders, and agencies to create a system merging technology with existing infrastructure. The Smart Technology Study will be applied in all planning processes moving forward. Town planning initiatives will reflect the smart technology initiative and recommended strategies. The application of these smart technologies will be evaluated in such a manner where stakeholders and Town staff will monitor impacts and adjust as necessary. The vision of Miami Lakes supports moving the Town and the region forward through advanced smart technologies.

APPENDIX A INVENTORY

Roadway Inventory for Miami Lakes		
Street Name	**Juristiction**	**Speed Limit (mph)**
Aberdeen Way	Town	30
Alamanda Ave	Town	30
Ardoch Place	Town	30
Ardoch Road	Town	30
Balgowan Road	Town	30
Ballantrae Court	Private	
Bamboo Court	Town	30
Bamboo Street	Town	30
Bedlington Road	Private	
Berwick Way	Town	30
Big Cypress Court	Town	30
Big Cypress Drive	Town	30
Bottle Brush Drive	Town	30
Braemar Court	Private	
Breckness Place	Town	30
Briar Patch Place	Private	
Bridge End Road	Private	
Bull Run Road	Town	30
Burnside Way	Town	30
Cairnryan Court	Private	
Cassia Place	Town	30
Cedar Court	Town	30
Coconut Avenue	Private	
Coconut Court	Private	
Commerce Way	Town	30
Cotton Tail Road	Private	
Cow Pen Road	Town	30
Crooked Palm Court	Town	30
Crooked Palm Lane	Town	30
Crooked Palm Place	Town	30
Crooked Palm Terrace	Town	30
Crown Gate Court	Private	
Crown Gate Drive	Private	
Crown Date Place	Private	
Cypress Court	Town	30
Dade Pine Avenue	Town	30
Dade Pine Court	Town	30
Dalkeith Lane	Town	30
Dornoch Round	Town	30
DunBarton Place	Town	30
Dundee Terrace	Town	30
Dunnon Court	Town	30
Durnford Drive	Town	30
E Loch Isle Drive	Private	
E Troon Circle	Town	30
Eagle Nest Lane	Town	30
Egan Lane	Town	30
English Road	Town	30
Fairway Drive	Town	30
Falkirk Place	Town	30
Fearn Drive	Town	30
Fintry Place	Town	30
Fitzpatrick Road	Town	30
Fox Den Court	Private	
Gage Place	Town	30
Garvock Place	Town	30
Glencairn Terrace	Town	30
Gleneagle Drive	Town	30
Glenny Terrace	Town	30
Governors Square Boulevard	Private	
Greentree Lane	Private	
Haldemand Place	Town	30
Harris Place	Town	30
Harris Terrace	Town	30
Holly Road	Town	30
Hutchinson Road	Town	30
Jacaranda Lane	Town	30
Jack Rabbit Lane	Private	
Kilmarnock Drive	Private	
Kingsmoor Way	Town	30
Kippford Court	Private	
Lake Blue Drive	Town	30
Lake Candlewood Court	Town	30
Lake Champlain Terrace	Town	30
Lake Childs Court	Town	30
Lake Claire Court	Town	30
Lake Como Terrace	Town	30
Lake Crescent Place	Town	30
Lake Geneva Road	Town	30
Lake George Court	Town	30
Lake June Road	Town	30
Lake Lure Court	Town	30
Lake Patricia Drive	Town	30
Lake Placid Court	Town	30
Lake Saranac Avenue	Town	30
Lake Success Place	Town	30
Laurel Lane	Town	30
Leaning Pine Drive	Town	30
Lemon Tree Lane	Private	
Lewis Road	Town	30
Loch Ness Court	Town	30
Loch Ness Drive	Town	30
Loch Ness Lane	Town	30
Mahogany Court	Town	30
Main Street	Town/Private	30
Maple Terrace	Town	30
Marginada Court	Town	30
Meadow Walk	Town	30
Menteith Place	Town	30
Menteith Terrace	Town	30
Miami Lakes Drive	Town	35
Miami Lakes Drive E	Town	35
Miami Lakeway N	Town	35
Miami Lakeway S	Town	35
Milk Wagon Lane	Town	30
Montrose Road	Town	30
Moultrie Place	Town	30
N Loch Isle Drive	Private	
New Barn Road	Town	30
NW 138th Street	FDOT	30
NW 138th Terrace	Private	
NW 139th Lane	Private	
NW 139th Street	Town	30
NW 139th Terrace	Town	30
NW 140th Lane	Town	30
NW 140th Street	Private	
NW 140th Terrace	Private	
NW 141st Lane	Private	
NW 141st Terrace	Town	30
NW 142nd Lane	Town	30
NW 142nd Street	Town	30
NW 143rd Street	Town	30
NW 143rd Terrace	Town	30
NW 144th Street	Town	30
NW 144th Terrace	Town	30
NW 145th Lane	Town	30
NW 145th Street	Town	30
NW 145th Terrace	Town	30
NW 146th Lane	Town	30
NW 146th Street	Town	30
NW 145th Terrace	Town	30
NW 147th Lane	Town	30
NW 147th Terrace	Town	30
NW 148th Street	Town	30
NW 148th Terrace	Town	30
NW 149th Terrace	Town	30
NW 150th Street	Town	30
NW 150th Terrace	Town	30

NW 151st Street	Town	30
NW 151st Terrace	Town	30
NW 152nd Lane	Town	30
NW 152nd Street	Town	30
NW 152nd Terrace	Town	30
NW 153rd Street	Town	30
NW 153rd Terrace	Town	30
NW 154th Street	Town	35
NW 154th Terrace	Private	
NW 155th Street	Town	30
NW 156th Terrace	Private	
NW 157th Terrace	Private	
NW 158th Street	Town	30
NW 158th Terrace	Town	30
NW 159th Street	Town	30
NW 159th Terrace	Town	30
NW 160th Street	Private	
NW 160th Terrace	Town	30
NW 161th Terrace	Private	
NW 162nd Street	Town	30
NW 162nd Terrace	Town	30
NW 163rd Street	Town	30
NW 163rd Terrace	Town	30
NW 164th Street	Town	30
NW 164th Terrace	Town	30
NW 165th Street	Town	30
NW 165th Terrace	Town	30
NW 166th Street	Town	30
NW 166th Terrace	Town	30
NW 167th Street	FDOT	35
NW 167th Terrace	Private	
NW 168th Lane	Town	30
NW 168th Street	MDC	30
NW 168th Terrace	Town	30
NW 169th Street	MDC	35
NW 169th Terrace	MDC	30
NW 170th Street	Town	30
NW 57th Avenue	FDOT	45
NW 57th Court	Town	30
NW 58th Avenue	Town	30
NW 58th Court	Town	30
NW 59th Avenue	Town	30
NW 59th Court	Town	
NW 60th Avenue	Town	35
NW 64th Avenue	Town	
NW 67th Avenue	MDC	40
NW 70th Avenue	MDC	30
NW 70th Court	Private	
NW 71st Avenue	Private	
NW 71st Court	Private	
NW 72nd Avenue	MDC	30
NW 72nd Court	MDC	30
NW 72nd Place	Private	
NW 73rd Avenue	MDC	30
NW 73rd Court	MDC	30
NW 73rd Place	Private	
NW 74th Avenue	MDC	30
NW 77th Avenue	FDOT	30
NW 77th Court	Joint	35
NW 77th Path	Town	30
NW 77th Place	Town	30
NW 78th Avenue	MDC	30
NW 78th Court	MDC	30
NW 78th Place	MDC	30
NW 79th Avenue	MDC	30
NW 79th Court	MDC	30
NW 79th Place	MDC	30
NW 80th Avenue	MDC	30
NW 80th Court	MDC	30
NW 81st Avenue	MDC	30
NW 81st Court	MDC	30
NW 82nd Avenue	MDC	30
NW 82nd Court	MDC	30
NW 82nd Place	Private	
NW 83rd Avenue	Town	30
NW 83rd Court	Town	30
NW 83rd Pass	Private	
NW 83rd Path	Private	
NW 83rd Place	Town	30
NW 84th Avenue	MDC	30
NW 84th Court	Town	30
NW 84th Path	Private	
NW 84th Place	MDC	30
NW 85th Avenue	MDC	30
NW 85th Court	MDC	30
NW 86th Court	Town	30
NW 87th Avenue	MDC	40
NW 87th Court	Town	
NW 87th Place	Town	30
NW 88th Avenue	Town	30
NW 88th Court	Town	30
NW 88th Path	Town	30
NW 88th Place	Town	30
NW 89th Avenue	Town	30
NW 89th Court	Town	30
NW 89th Place	Town	30
NW 90th Avenue	Town	30
NW 90th Court	Town	30
NW 91st Avenue	Town	30
NW 91st Court	Town	30
NW 92nd Avenue	Town	30
Oak Lane	Town	30
Oak Walk	Private	
Orchid Drive	Town	30
Palmetto Frontage Road	FDOT	30
Palmetto Palm Avenue	Town	30
Parkinsonia Drive	Town	30
Pent Place	Town	30
Poinciana Court	Town	30
Queen Palm Terrace	Town	30
Ravenwood Place	Private	
Royal Palm Avenue	Private	
Royal Palm Court	Private	
Royal Palm Lane	Private	
S Loch Isle Drive	Private	
S Prestwick Place	Town	30
Sabal Drive	Town	30
Sawmill Lane	Private	
Seagrape Terrace	Town	30
Shadow Court	Private	
Sharpecroft Court	Private	
Sharpecroft Drive	Private	
Silver Oak Drive	Town	30
Simmons Street	Town	30
Stonehaven Road	Town	30
Tabebuia Lane	Town	30
Torphin Place	Town	30
Turkey Run Terrace	Private	
Turnberry Drive	Town	30
Turnbull Drive	Town	30
Turtle Rock Terrace	Private	
Twin Sabal Drive	Town	30
W Loch Isle Drive	Private	
W Prestwick Place	Town	30
W Troon Circle	Town	30
White Oak Drive	Town	30
Willow Creek Drive	Private	
Willow Lane	Town	30
Windmill Gate Road	Private	
Wood Walk	Private	

BUS STOP MATRIX MIAMI LAKES											
Location	Stop Number	ARRA Bus Shelter	Town Shelter	Freebee Information	Bench	Trash Can	Freebee Stop	County Sign	Bus Routes Available	Concrete (C) or Grass (G)	Additional Info?
Commerce Way @ #8306 (EB)	129						X				
Commerce Way @ 14382 (NEB)								X	54	G	
Commerce Way @ 14382 (SWB)					X			X	54	G	
Commerce Way @ NW 146th Street (NB)	131		X	X	X	X	X	X	54	G, C	
Commerce Way @ NW 80th Avenue (SWB)								X	54	G	
Commerce Way @ NW 85th Avenue (EB)	128				X		X	X	54	G	
Commerce Way @ NW 85th Avenue (WB)					X			X	54	G	
Commerce Way @NW 146th Street (SWB)					X			X	54	G	
Commerce Way @NW 80th Avenue (NEB)	130						X	X	54		
Inner Miami Lakeway East @ Miami Lakes Drive (SB)		No but covered by agreeement						X	135		
Miami Lakes Drive @ NW 67th Avenue (EB)		X							73		
Miami Lakes Drive @ Publix (EB)					X	X		X	73	G	
Miami Lakes Drive @ Publix (WB)			X		X	X		X	73	C	
Miami Lakes Drive E @ NW 67th Avenue (WB)					X			X	73	C	
Miami Lakes Drive East @ NW 57th Avenue (WB)		X							29		
Miami Lakes Drive East @ NW 57th Court (EB)	110		X		X		X	X	29, 73	C	
Miami Lakes Drive East @ NW 60th Avenue (NWB)		X		X	X	X		X	135	C	
Miami Lakes Drive East @ Pent Place (EB)			X		X			X	73	C	
Miami Lakes Drive East @ Pent Place (WB)		X			X	X		X	73	C	
Miami Lakes Drive W @ Fairway Drive (WB)	119						X				
Miami Lakes Drive W @ Miami Lakeway N (WB)	118						X				
Miami Lakeway North @ 15575 (NWB)	113							X			
Miami Lakeway North @ 15579 (NWB)	114							X			
Miami Lakeway South @ Big Cypress Dr. (SB)	135							X			
Miami Lakeway South @ Leaning Pine Drive (EB)	136							X			
Miami Lakeway South @ NW 67th Avenue (EB)	137							X			
NW 151st Street @ 5881 (WB)	111							X		G	
NW 153rd Street @ N Miami Lakeway (EB)	112							X			
NW 153rd Street @ N Miami Lakeway (WB)									X	135	
NW 154th Street @ NW 79th Avenue (NB)	120							X			
NW 158th Street @ NW 57th Avenue (EB)	106		X	X	X	X	X	X	29, 75	C	
NW 158th Street @ NW 57th Avenue (WB)					X				29, 75	G	
NW 158th Street @ NW 59th Avenue (EB)	105	X		X	X	X	X	X	29, 75	C	
NW 163rd Street @ NW 57th Avenue (EB)									75		
NW 163rd Street @ NW 57th Avenue (WB)								X	75		
NW 163rd Street @ NW 58th Avenue (WB)								X	29, 75	G	
NW 167th Terrace @ NW 82nd Avenue (WB)	123						X				
NW 59th Ave @ NW 163rd St (NB)					X				75	G	
NW 59th Ave @ NW 163rd St (SB)	104				X		X	X	75	G	
NW 59th Court @ Miami Lakes Drive (SB)		X			X	X		X	135	C	
NW 60th Ave @ 14740 (SB)					X			X	29, 73, 135	G	
NW 60th Avenue @ 14400 (NB)	108		X	X	X		X	X	29, 73, 135	C	
NW 60th Avenue @ 14400 (SB)					X			X	29, 73, 135	G	
NW 60th Avenue @ Miami Lakes Drive (NB)	109		X		X		X	X	29	C	

NW 60th Avenue @ Miami Lakes Drive (SB)			X		X	X		X	29, 73, 135	C	
NW 60th Avenue @ NW 139th Street (NB)		X							29, 73, 135	C	
NW 60th Avenue @ NW 139th Street (SB)		X							29, 73, 135	C	
NW 60th Avenue @ NW 142nd Street (NB)	107				X		X	X	29, 73, 135	G	
NW 60th Avenue @ NW 142nd Street (SB)					X			X	29, 73	G	
NW 60th Avenue @ NW 153rd Street (EB)					X			X	135	G	
NW 67th Ave @ Miami Lakesway N	101		X		X		X	X	267, 73	C	
NW 67th Avenue @ Bull Run Road N (SB)	116		X	X	X	X	X			C	
NW 67th Avenue @ Bull Run Road S (SB)		X			X	X		X	73	C	
NW 67th Avenue @ Cow Pen Road (NB)	143		X	X	X	X	X			C	
NW 67th Avenue @ Eagle Nest Lane N (NB)	142						X			C	
NW 67th Avenue @ Eagle Nest Lane S (NB)	140						X			C	
NW 67th Avenue @ Hialeah Miami Lakes Sr. High (Hialeah)	138						X			C	
NW 67th Avenue @ Kingsmore Way (NB)	102				X		X	X	73	G	
NW 67th Avenue @ Loch Ness Drive (SB)		X		X	X	X		X	73, 267	C	
NW 67th Avenue @ Main Street (NB) *TOWN HALL*	141		X	X	X	X	X	X	73, 267	C	
NW 67th Avenue @ Main Street (SB)	117		X	X	X		X	X	73, 267	C	
NW 67th Avenue @ Miami Lakes Drive (NB)	139						X			C	
Miami Lakeway N @ NW 67th Ave (WB)	115						X			C	
NW 67th Avenue @ Miami Lakeway S (NB)								X	257	C	
NW 67th Avenue @ Miami Lakeway S (SB)								X	257	C	
NW 67th Avenue @ New Barn Road (SB)		X		X	X	X	X	X	73	C	
NW 67th Avenue @ Windmill Gate Road (NB)	103	X			X	X	X	X		C	

NW 79th Avenue @ NW 159th Terrace (NB)	122						X			G	
NW 79th Avenue @ Royal Oaks Shopping Plaza (NB)	121						X			G	
NW 79th Court @ NW 154th Street (NB)	134						X		54	G	
NW 79th Court @ NW 154th Street (SB)		X							54	G	
NW 82nd Avenue @ Glenny Terrace (NB)		X			X	X		X	54	C	
NW 82nd Avenue @ NW 154th Street (NB)		X			X	X		X	54	C	
NW 82nd Avenue @ NW 154th Street (SB)								X	54	C	
NW 82nd Avenue @ NW 162nd Street (NB)		X			X	X		X	54	C	
NW 82nd Avenue @ NW 162nd Street (SB)								X	54	C	
NW 82nd Avenue @ NW 167th Terrace (NB)					X			X	54	G	
NW 82nd Avenue @ NW 167th Terrace (SB)								X	54	G	
NW 82nd Avenue @ NW 170th Street (NB)	124				X		X	X	54	C/G	
NW 82nd Avenue @ NW 170th Street (SB)		No but covered by ARRA			X	X		X	54	C	
NW 87th Avenue @ Royal Oaks Park (SB)	125						X				
NW 89th Avenue @ NW 143rd Street (SB)	127	X (TWO)		X	X	X	X			C	
NW 89th Avenue @ NW 149th Terrace (SB)	126						X			G	
Oak Lane @ Miami Lakes Picnic Park (WB)					X			X	54	G	
Oak Lane @ NW 148th Street (NB)	132		X		X		X	X	54	C/G	
Oak Lane @ NW 148th Street (SB)					X			X	54	G	
Oak Lane @ NW 79th Court (EB)					X			X	54	G	
Oak Lane @ NW 79th Court (WB)	133				X		X			G	

Park Inventory for Miami Lakes	
Park Name	**Address**
P1	16100 W. Troon Circle
P2 (Loch Lomond)	7105 S. Prestwick Pl.
P2 (Lake Patricia)	6280 Lake Patricia Drive
P3 (Loch Lomond)	6900 Gleneagle Drive
P3 (Lake Patricia)	6357 Lake Patricia Drive
P4	6434 Lake Patricia Drive
P5	14028 Lake Saranac Ave.
P6	14210 Lake Saranac Ave.
P10	6271 Lake Champlain Terrace
P11	6276 Lake Geneva Road
P12	6651 Harris Terrace
P13	14410 Harris Place
P14	6315 Miami Lakeway South
P15	14810 Palmetto Palm Ave.
P16	14620 Palmetto Palm Ave.
P17	6976 Maple Terrace
P18	6943 Willow Lane
P19	14416 Mahogany Ct.
P20	14611 Mahogany Ct.
P22	14125 Alamanda Ave.
L22	8511 Dundee Terrace
P23	6961 Bamboo Street
P24	7235 Bamboo Street
P28	7350 Sabal Drive
P29	14170 Leaning Pine Drive
P30	14295 Sabal Drive
P31	7255 Poinciana Ave.
P35	7370 Miami Lakeway S.
L41	15100 Garvock Place
P50	16470 Loch Ness Drive
P58	6349 Jack Rabbit Lane
P59	15210 Durnford Drive
P61	15440 Durnford Drive
P69	8210 Dundee Terrace
P70	8295 Balgowan Road
P75	14961 Dunbarton Place
P77	8441 Ardoch Road
P78	8620 Ardoch Road
P79	14965 Balgowan Road
P80	14962 Renock Lane
P82	14708 Breckness Place
P83	8445 Glencairn Terrace
P84	8901 NW 148 Terrace
P86	7815 NW 165 Street
P87	8767 NW 139 Street
P88	8901 NW 169 Terrace
Rotary Park	13890 NW 67th Avenue
P7	14320 Lake Saranac Ave.
P25	7030 Miami Lakeway S.
P26	14000 NW 67 Ave.
P33	15200 Miami Lakeway S.
P34 A & B	15220 Miami Lakeway E.
P36	7050 Miami Lakes Drive
P37	14480 Dade Pine Ave.
P38	14844 Dade Pine Ave.
P39	6880 Miami Lakes Drive
P40	7014 Crown Gate Place
P41	15520 Turnberry Drive
P42 A & B	15017 Coconut Court
P43	7420 Miami Lakeway S.
P44	6640 Ludlam Drive
P45 & P46	6550 Miami Lakes Drive E.
P47	6480 Miami Lakes Drive
P48	6850 Fern Drive
P49	15500 NW 67 Ave.
P51	6970 Loch Ness Drive
P52	6700 Loch Ness Drive
P53	7281 Fairway Drive
P55	6699 Windmill Gate Road
P56	16331 Ravenwood Place
P57	6402 Turkey Run Terrace
P60	15341 Turnbull Drive
Tract A	7000 Green Tree Lane
P62	15180 Loch Isle Drive
P63	15250 Loch Isle Drive
P64	15310 Loch Isle Drive
P65	15300 Loch Isle Drive
P66	15132 Menteith Terrace
P68	8560 Menteith Terrace
P71	8335 Rednock Lane
P72	8461 Rednock Lane
P73	8460 Dundee Terrace
P74 East	15690 Bull Run Road
P76	8422 Rednock Lane
P85	9206 NW 144 Terrace
Lot D	7237 Bamboo Street
P27	6786 Crooked Palm Terrace
P32	7320 Twin Sabal Drive
P67	8560 Menteith Terrace
P8	14105 Lake Childs Court
P21	6890 White Oak Drive
P81	8560 Breckness Place
P91	8630 NW 166 TER
P90 (Dog Park)	NW 77 Court
P89	NW 170 Sreet
Optimist Park	6411 NW 162 ST
Royal Oaks Park	16500 NW 87 AVE
Picnic Park West	15151 NW 82 AVE
Picnic Park East	6075 Miami Lakes Dr

Miami Lakes Fleet Inventory List			
Model	**Year**	**Description**	**Type of Engine**
Champion Bus	2006	Bus >20 Pass, No Lift	gasoline
Custom Signature-Smart Variable Message Sign Trailer	2005	Trailer- NO CHARGE	gasoline
Custom Signature-Smart Variable Message Sign Trailer	2005	Trailer- NO CHARGE	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Chevrolet Silverado	2007	Light Truck	gasoline
Ford Expedition	2008	Light truck	gasoline
Ford F150 Std Cab P/U	2010	Light Truck	gasoline
International Truck W/Sewer Vacuum Body	2013	Heavy Truck	gasoline
Toyota Tacoma PU	2013	Light Truck	gasoline
Ford Crown Victoria	2008	Private Passenger	gasoline
Ford Crown Victoria	2008	Private Passenger	gasoline
Ford Crown Victoria	2009	Private Passenger	gasoline
Freebee Vehicles			
XL Freebee: Zenith Motors Electric Passenger Shuttle	2019	10 passenger shuttle	electric
Regular Freebee: Polaris GEM e6	2019	5 passenger shuttle	electric
Regular Freebee: Polaris GEM e6	2019	5 passenger shuttle	electric

Miami Lakes Public Wifi Locations
Locations
Mary Collins
Optimist Park
Royal Oaks Park

Future Intersection or Crosswalk Improvements			
Project Name	**Roadway Location**	**Type of Project**	**Governing Agency**
1.1.3 Incorporate Greenway Path (0.67 miles) Along NW77th Ct from NW163th to NW154 Avenue - Phase 1 (North)	NW 77th Ct & NW 154 Avenue	Greenway Path	Town of Miami Lakes
1.1.4 Incorporate Greenway Path (1.21 miles) Along NW77th Ct from NW154th to NW82 Av (Dog Park) - Phase 2 (South)	NW 77th Ct & NW 82nd Avenue	Greenway Path	Town of Miami Lakes
1.1.5 Incorporate Greenway Path (0.25 miles) Along NW 146th St from NW89th Avenue to NW 87th Avenue (aka M. Lakes Green 2.0 NW 146th St)	Nw 146th St & 87th Ave	Greenway Path	Town of Miami Lakes
	Nw 146th St & 89th Ave		
1.1.7 Incorporate Greenway Path (3.50 miles) Along NW 154th St from NW89th Ave to NW57th Ave (children of 1.4.5)	NW 154th St & NW 57th Ave	Greenway Path	Town of Miami Lakes
	NW 154th St & NW 60th Ave		
	NW 154th St & Miami Lakeway		
	NW 154th St & NW 67th Ave		
	NW 154th St & NW 77th Ave		
	NW 154th St & NW 77th Ct		
	NW 154th St & NW 79th Ave		
	NW 154th St & NW 82nd Ave		
	NW 154th St & NW 87th Ave		
1.1.8 Incorporate Greenway Path (0.58 miles) Along 139th Canal from NW60th Av to NW142nd St	Nw 139th St & NW 60th Ave	Greenway Path	Town of Miami Lakes
1.1.9 Incorporate Greenway Path (1.00 miles) Along NW87th Av South from NW154th St to NW 138th - Phase 2 (South)	NW 154th St & NW 87th Ave	Greenway Path	Town of Miami Lakes
1.1.10 Incorporate Greenway Path (1.76 miles) Along NW67th Av from NW167th St to NW 138th St	NW 67th Av & NW 167th St	Greenway Path	Town of Miami Lakes
	NW 67th Av & Miami Lakeway N		
	NW 67th Av & Cow Pen Rd		
	NW 67th Av & NW 138th St		
1.1.11a Incorporate Greenway Path (0.86 miles) Along Miami Lakeway Southwest from NW154th St to NW 67th Av.	Miami Lakeway South & NW 154th	Greenway Path	Town of Miami Lakes
	Miami Lakeway South & NW 67th Av		
1.1.11b Incorporate Greenway Path (0.86 miles) Along Miami Lakeway Northwest from NW154th St to NW 67th Av.	Miami Lakeway North & NW 154th	Greenway Path	Town of Miami Lakes
	Miami Lakeway North & NW 64th Ave		
1.1.12 Incorporate Greenway Path (0.57 miles) Along 138th St Canal from NW67th Av to Bamboo Street.	Miami Lakeway North & NW 67th Ave	Greenway Path	Town of Miami Lakes
1.1.14 Incorporate Final Network Connections and Signage Town wide		Network and Signage	Town of Miami Lakes
1.2.12 Extend Palmetto South Bound Left Turn Lane at NW 154 St.	SR 826 South & 154th St	Turn Lane Project	Town of Miami Lakes
1.4.2 Implement Complete Streets at Town Center District		Complete Streets	Town of Miami Lakes
1.4.3 Implement Complete Streets (0.61 miles) at Royal Oaks Center - Phase 1 (at NW79th Av from NW 167th St to NW154th St) (B. Graham)	NW 79th Av & NW 154th St	Safe Routes to Schools	Town of Miami Lakes
1.4.4 Implement Complete Streets (0.61 miles) at Royal Oaks Center - Phase 2 (at NW 82nd Av from 170th St. to NW154th St.)	NW 170th St. & NW 82nd Av	Complete Streets	Town of Miami Lakes
	NW 154th St. & NW 82nd Av		
1.4.5 Implement Complete Streets (1.00 miles) on NW 154th Street Corridor from NW89th Av to NW 57th Av (Parent of 1.1.7)	NW 154th Street & NW 87th Av	Complete Streets	Town of Miami Lakes
	NW 154th Street & NW 82nd Av		
	NW 154th Street & NW 79th Av		
	NW 154th Street & NW 77th Ct		
	NW 154th Street & NW 60th Ave		
	NW 154th Street & NW 57th Ave		
1.4.6 Implement Complete St. (0.38 miles) at NW60 Av from NW154 (MLDrive) to NW138 - Phase 2	NW 60th Ave & NW 138th Street	Complete Streets	Town of Miami Lakes
1.4.7 Implement Complete Streets (0.26 miles) at NW 158th Street from NW 59th Av to NW57th Av	NW 158th Street & NW 57th Ave	Complete Streets	Town of Miami Lakes
1.4.9 Implement Complete Street (0.53 miles) at Main St. East from M. Lakeway N to NW57Ct aka. NW 151&153 (Lakewalk)	NW 57th Ct & Miami Lakes Drive	Complete Streets	Town of Miami Lakes
1.4.10 Implement Complete Streets (0.36 miles) at NW 142nd St from NW57th Av to NW60th Avenue	NW 142nd St & NW 57th Av	Complete Streets	Town of Miami Lakes
1.4.11 Implement Completes Streets (0.74 miles) at Business Park West (NW79th Ct to NW146th St)	NW 79th Ct & 154th St	Complete Streets	Town of Miami Lakes
1.4.12 Implement Complete Streets (0.74 miles) Along NW 59th Avenue from NW167th St to NW 154st	NW 59th Av & NW 165th St	Complete Streets	Town of Miami Lakes
1.5.1 Construct Park & Ride Facility at NW154th St and NW77th Av.	NW 154th St & NW 77th Ave	Park & Ride	Town of Miami Lakes
1.9.2 Extend (bridge) South NW59th Ave to M.L Drive, Boat and Storage Yard	NW 59th Av & NW 151st St	Roadway Project	Town of Miami Lakes
	NW 59th Av & NW 154th St		
1.10.2 Build MDX Connection at NW67th Avenue	NW 67th Ave & NW 154th St	Partial Interchange	MDX
	Nw 67th Ave & Miami Lakeway S		
	NW 67th Ave & 138th St		
1.10.3 Build MDX Connection at NW87th Avenue		On Ramps	MDX

Miami Lakes Crosswalk Locations		
Intersection	**Crosswalks Location**	**Crosswalk Type**
Miami Lakes Dr & NW 57th Ct	North (E-W)	Standard
Miami Lakes Dr & NW 59th Ct	North (E-W)	Standard
Miami Lakes Dr & NW 60th Ave	South (E-W), East (N-S), West (N-S)	Standard
Miami Lakes Dr & Miami Lakeway N	South (E-W), East (N-S), West (N-S), North (E-W)	Ladder (S, E and W) and Standard (N)
Miami Lakes Dr & Egan Ln	South (E-W)	Standard
Miami Lakes Dr & Pent Pl	North (E-W)	Standard
Miami Lakes Dr & NW 6600 Block	East (N-S)	Standard
Miami Lakes Dr & NW 67th Ave	South (E-W), East (N-S), West (N-S), North (E-W)	Standard
Miami Lakes Dr & Mahogany Ct	South (E-W)	Standard
Miami Lakes Dr & Palmetto Palm Ave	South (E-W)	Standard
Miami Lakes Dr & Miami Lakeway N	West (N-S) and North (E-W)	Standard
Miami Lakes Dr & Holly Rd	South (E-W)	Standard
Miami Lakes Dr & Laurel Ln	South (E-W)	Standard
Miami Lakes Dr & Jacaranda Ln	South (E-W)	Standard
Miami Lakes Dr & Miami Lakeway S	South (E-W) and East (N-S)	Standard
Miami Lakes Dr & Fairway Dr	North (E-W)	Standard
Miami Lakes Dr & NW 77th Ave	South (E-W)	Standard
Miami Lakes Dr & NW 77th Ct	South (E-W), West (N-S), North (E-W)	Standard
Miami Lakes Dr & NW 79th Ave	South (E-W) and West (N-S)	Standard
Miami Lakes Dr & NW 79th Ct	South (E-W)	Standard
Miami Lakes Dr & NW 82nd Ave	South (E-W), East (N-S), West (N-S), North (E-W)	Standard
Miami Lakes Dr & NW 83rd Ave	North (E-W)	Standard
Miami Lakes Dr & NW 87th Ave	South (E-W), East (N-S), West (N-S), North (E-W)	Ladder
NW 67th Ave and Crooked Palm Terr	West (N-S)	Standard
NW 67th Ave and Lake Patricia Dr	East (N-S)	Standard
NW 67th Ave and White Oak Dr	West (N-S)	Standard
NW 67th Ave and Miami Lakeway S	South (E-W), East (N-S), West (N-S), North (E-W)	Ladder
NW 67th Ave and Eagle Nest Ln	West (N-S)	Standard
NW 67th Ave and New Barn Rd	East (N-S) and West (N-S)	Standard (W) and Continental (E)
NW 67th Ave and Main St	South (E-W), East (N-S), West (N-S), North (E-W)	Ladder (N and S) and Solid/Brick (E and W)
NW 67th Ave and New Barn Rd	East (N-S) and West (N-S)	Standard
NW 67th Ave and Bull Run Rd	West (N-S)	Standard
NW 67th Ave and Miami Lakeway N	South (E-W), East (N-S), West (N-S), North (E-W)	Ladder
NW 67th Ave and Kingsmoor Way	West (N-S)	Standard
NW 67th Ave and Lochness Dr	West (N-S)	Standard
NW 67th Ave and Windmill Gate Rd	South (E-W) and East (N-S) and North (E-W)	Standard
NW 67th Ave and NW 167th St	East (N-S) and West (N-S)	Standard (W) and Ladder (E)
NW 60th Ave and NW 139th St	West (N-S) and North (E-W)	Ladder
NW 60th Ave and Pedestrian Crossing	North (E-W)	Continental
Main St and Bull Run Rd	South (E-W), East (N-S), West (N-S), North (E-W)	Solid/Brick
Main St and New Bard Rd	East (N-S) and West (N-S)	Solid/Brick
Cow Pen Rd and Simmons St	East (N-S)	Standard
Bull Run Rd and Meadow Walk	West (N-S)	Standard
Miami Lakeway N and Fairway Dr	West (N-S)	Standard
Miami Lakeway N and Turnberry Dr	West (N-S)	Standard
Miami Lakeway N and NW 64th Avenue	North (E-W)	Continental
Miami Lakeway N and Durnford Dr	West (N-S)	Standard
Miami Lakeway N and Simmons St	West (N-S)	Standard
Miami Lakeway N and NW 153rd St	East (N-S)	Standard
Miami Lakeway N and Egan Ln	West (N-S)	Standard
Miami Lakeway S and Tabebuia Ln	North (E-W)	Solid/Brick
Miami Lakeway S and Mahogany Ct	North (E-W)	Solid/Brick
Miami Lakeway S and Silver Oak Dr	South (E-W)	Solid/Brick
Miami Lakeway S and Marginada Ct	South (E-W)	Solid/Brick
Miami Lakeway S and Cypress Ct	South (E-W)	Solid/Brick
Miami Lakeway S and Leaning Pine Dr	South (E-W)	Solid/Brick
Miami Lakeway S and Dade Pine Ave	North (E-W)	Solid/Brick
Miami Lakeway S and Poinciana Ct	South (E-W)	Solid/Brick
Miami Lakeway S and Rosewood Rd	East (N-S)	Solid/Brick
Miami Lakeway S and Twin Sabal Dr	West (N-S)	Solid/Brick
Miami Lakeway S and Big Cypress Dr	West (N-S)	Standard
Lochness Dr and Stonhaven Rd	North (E-W)	Standard
Lochness Dr and Stonhaven Rd	East (N-S) and West (N-S)	Continental
Gleneagle Dr an E Troon Cir	South (E-W)	Standard
Rosewood Rd and Dade Pine Ct	South (E-W)	Standard
Dade Pine Ave and Dade Pine Ct	North (E-W)	Standard
Maple Terr and Cedar Ct	West (N-S)	Standard
Maple Terr and Willow Ln	West (N-S)	Standard
Maple Terr and Palmetto Palm Ave	East (N-S)	Standard
Maple Terr and Mahogany Ct	North (E-W)	Standard
Palmetto Palm Ave and Bottle Brush Dr	West (N-S)	Standard
Palmetto Palm Ave and Bottle Brush Dr	West (N-S)	Standard
Palmetto Palm Ave and Cassia Pl	West (N-S)	Standard
Palmetto Palm Ave and Queen Palm Terr	West (N-S)	Standard
Mahogany Ct and Parkinsonia Dr	East (N-S)	Standard
Mahogany Ct and Parkinsonia Dr	East (N-S)	Standard
Mahogany Ct and Orchid Dr	East (N-S)	Standard
Mahogany Ct and Orchid Dr	East (N-S)	Standard
Mahogany Ct and Willow Ln	West (N-S)	Standard
Orchid Drive and Tabebuia Ln	West (N-S)	Standard
Balgowan Rd and Montrose Rd	East (N-S) and North (E-W)	Standard
NW 87th Ave and Commerce Way	East (N-S) and North (E-W)	Standard
NW 87th Ave and NW 142nd St	West (N-S)	Standard
NW 87th Ave and NW 142nd Ln	West (N-S)	Standard
NW 87th Ave and NW 143rd St	West (N-S)	Standard
NW 87th Ave and NW 144th Terr	West (N-S)	Standard
NW 87th Ave and NW 146th St	West (N-S) and South (E-W)	Standard
NW 87th Ave and NW 146th Ln	West (N-S)	Standard
NW 87th Ave and NW 147th Ln	West (N-S)	Standard
NW 87th Ave and NW 148th Terr	West (N-S)	Standard
NW 87th Ave and NW 149th Terr	West (N-S)	Standard
NW 87th Ave and NW 150th Terr	West (N-S)	Standard
NW 87th Ave and NW 151st Terr	West (N-S)	Standard
NW 87th Ave and NW 152nd Terr	West (N-S)	Standard
NW 87th Ave and NW 153rd Terr	West (N-S)	Standard
NW 89th Ave and NW 143rd St	East (N-S) and South (E-W)	Ladder
NW 89th Ave and NW 144th St	East (N-S)	Continental
NW 89th Ave and NW 144th Terr	West (N-S) and South (E-W)	Ladder
NW 89th Ave and NW 145th St	East (N-S)	Ladder
NW 89th Ave and NW 145th Ln	East (N-S)	Ladder
NW 89th Ave and NW 146th St	East (N-S)	Standard
NW 89th Ave and NW 146th Terr	West (N-S)	Ladder
NW 89th Ave and NW 147th Terr	West (N-S)	Standard
NW 89th Ave and NW 147th Ln	East (N-S)	Standard
NW 89th Ave and NW 148th St	West (N-S)	Standard
NW 89th Ave and NW 148th Terr	East (N-S) and West (N-S)	Standard
NW 89th Ave and NW 149th Terr	East (N-S) and West (N-S)	Standard
NW 89th Ave and NW 150th St	East (N-S)	Standard
NW 89th Ave and NW 150th Terr	West (N-S)	Standard
NW 89th Ave and NW 151st St	East (N-S)	Standard
NW 89th Ave and NW 151st Terr	East (N-S)	Standard
NW 89th Ave and NW 152nd Terr	East (N-S)	Standard
NW 89th Ave and NW 153rd Terr	East (N-S) and West (N-S)	Standard
Commerce Way and South of NW 80th Ave	Midblock	Ladder
NW 82nd Ave and NW 155th St	East (N-S)	Solid/Brick
NW 82nd Ave and NW 157th Terr	East (N-S)	Standard
NW 82nd Ave and NW 158th Terr	West (N-S)	Standard
NW 82nd Ave and NW 160th St	East (N-S)	Standard
NW 82nd Ave and NW 161st Terr	West (N-S)	Standard
NW 82nd Ave and NW 162nd St	North (E-W) and West (N-S)	Standard
NW 82nd Ave and NW 164th Terr	East (N-S)	Standard
NW 82nd Ave and NW 165th Terr	West (N-S)	Standard
NW 82nd Ave and NW 166th St	East (N-S)	Standard
NW 82nd Ave and NW 170th St	South (E-W), East (N-S), West (N-S), North (E-W)	Standard
NW 79th Ave and NW 155th St	South (E-W)	Ladder
NW 79th Ave and NW 159th Terr	East (N-S) and North (E-W)	Ladder
NW 79th Ave and NW 160th Terr	East (N-S) and West (N-S)	Standard

Miami Lakes Traffic Signal System Locations	
Intersection	**Type of Signal System**
Miami Lakes Dr & NW 60th Ave	3 Mast Arms, 2 Signal Heads each
Miami Lakes Dr & Miami Lakeway N	4 Mast Arms 2 Signal Heads each
Miami Lakes Dr & NW 6600 Block	2 Mast Arms, 2 Signal Heads South side and 4 Signal Heads on East side
Miami Lakes Dr & NW 67th Ave	4 Mast Arms, 3 Signal Heads South side, East side and West side and 2 Signal Heads on the North side
Miami Lakes Dr & Miami Lakeway N	3 Mast Arms, 2 Signal Heads South side and 3 Signal Heads on East side and West side
Miami Lakes Dr & NW 77th Ct	4 Mast Arms, 2 Signal Heads on North side, 3 Signal Heads on East and West side and 4 Signal Heads on South Side
Miami Lakes Dr & NW 79th Ave	4 Mast Arms, 2 Signal Heads each
Miami Lakes Dr & NW 82nd Ave	4 Mast Arms, 2 Signal Heads on North and South side and 3 Signal Heads on East and West side
Miami Lakes Dr & NW 87th Ave	4 Mast Arms, 2 Signal Heads on South, East and West side and 3 Signal Heads on North side
NW 67th Ave and Miami Lakeway S	Overhead on Span Wire, 2 Signal Heads on each side
NW 67th Ave and Main St	4 Mast Arms, 2 Signal Heads Each
NW 67th Ave and Miami Lakeway N	Overhead on Span Wire, 2 Signal Heads on each side
NW 67th Ave and Windmill Gate Rd	Overhead on Span Wire, 2 Signal Heads on North and West side and 3 Signal Heads on South side
NW 67th Ave and NW 167th St	3 Mast Arms, 2 Signal Heads on North Side, 3 Signal Heads on East Side and 4 Signal Heads on South Side
NW 60th Ave and Pedestrian Crossing	1 Mast Arm, 4 Signal Heads (2 facing each side)
NW 87th Ave and Commerce Way	3 Mast Arms, 2 Signal Heads each
NW 87th Ave and NW 146th St	3 Mast Arms, 2 Signal Heads each
NW 82nd Ave and NW 162nd St	2 Mast Arms, 2 Signal Heads each and 2 Single Posts with a Signal Head each
NW 82nd Ave and NW 170th St	4 Mast Arms, 2 Signal Heads each

Miami Lakes Adaptive Traffic Signal System Locations	
Location	**Type of Adaptive System**
NW 154th St & NW 87 Ave	Econolite BlueTOAD
NW 154th St & NW 82nd Ave	Econolite BlueTOAD
NW 154th St & NW 79th Ave	Econolite BlueTOAD
NW 154th ST & NW 77th CT	Econolite BlueTOAD
NW 154th ST & NW 77th Ave	Econolite BlueTOAD
NW 154th St & SR 826 Interchange	Econolite BlueTOAD

Miami Lakes CCTV Camera Inventory List		
Type of CCTV Camera System	**Location**	**Number of Cameras**
HDTVI BULLET, HD (1280x720), 2.8-12mm VF LENS	Mary Collins	4
HDTVI BULLET, HD (1280x720), 2.8-12mm VF LENS	Youth Center	8
HDTVI BULLET, HD (1280x720), 2.8-12mm VF LENS	Optimist Park	6
HDTVI BULLET, HD (1280x720), 2.8-12mm VF LENS	Roberto Alonso Center	8
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154 & NW 87 Ave	1
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154 & NW 82nd Ave	1
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154th St & NW 79th Ave	1
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154th St & NW 77th CT	1
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154th St & NW 77th Ave	1
CT Model 1616C2 Aluminium CCTV Termination Enclosure	NW 154th ST & SR 286 Palmetto Interchange	1
Miami Lakes LPR Camera Locations		
Locations		**Number of Cameras**
NW 167 St & NW 67 Ave		(3) NB, (2) SB cameras
NW 150 St & NW 157 Ave		(2) EB, (2) WB cameras
NW 138 St & NW 67 Ave		(2) NB, (2) SB cameras
NW 154 St & NW 77 Ave		(1) NB (2 lanes with single cam), (2) SB, (2) WB cameras
SR 826 South & NW 154 St		(3) WB cameras
NW 77 Ct & NW 154 St		(2) EB cameras
NW 170 St & NW 87 Ave		(2) NB, (2) SB cameras
NW140 St & NW 87 Ave		(2) NB, (2) SB, (1) WB cameras

Notes: LPR Cameras will be purchased over a 3 year period and the Town has allocated about $200K/year for purchasing the equipment.

Miami Lakes EV Charger Locations			
Type of Charger	**Location**	**Accessibility**	**Ownership**
110-volt outlet (not sure the exact station)	Royal Oaks Park	Private	TOML
JuiceBox (input: 100-250VAC, 50-60HZ)	Miami Lakes Optimist	Private	TOML
ChargePoint	Main Street Parking Garage	Public	Grahams