



Tampa Innovation District

Mobility Master Plan



Mobility Master Plan

October 2017

Kimley»Horn

“The Tampa !p ... is a place where our mind grows, our people engage, our businesses flourish, our soul heals, and our energy thrives.”

– Mark Sharpe,
Chief Potential Officer



Table of Contents

Executive Summary	vii
Overview	1
Mobility Solutions	3
Introduction and Vision	12
Innovation Districts Defined	13
The Emergence of the !p	14
Stakeholder Outreach	18
Existing Conditions Analysis	20
Study Area Location & Characteristics	21
Existing Transit Services	22
Existing Travel Markets	36
Mobility Solutions	46
Mobility Solutions Overview	47
Expanded !p Bike Share	60
!p Transit Circulator	68
Autonomous Transit Shuttles	73
!p Digital & Technology Solutions	81
Implementation Timeline	84
Plan Coordination and Next Steps	90



List of Figures

Figure 1: Illustrative rendering	1
Figure 2: University Area Transit Center	2
Figure 3: !p Mobility Plan	3
Figure 4: Proposed !p Bike Share Expansion Plan.....	4
Figure 5: Proposed !p Circulator Plan	5
Figure 6: Proposed !p AV Shuttle Plan	6
Figure 7: A one-click, !p Gateway Website Portal	7
Figure 8: HART HyperLINK.....	8
Figure 9: Expanded HART HyperLINK Service Area	9
Figure 10: HART MetroRapid.....	10
Figure 11: Fremont, CA Innovation District; Rendering.....	15
Figure 12: IBM, Yorktown	16
Figure 13: Moffitt Cancer Center Magnolia Campus	18
Figure 14: Mobility Stakeholder Meeting (!p Advisory Board Meeting, October 19, 2017)	21
Figure 15: Study Area - !p.....	23
Figure 16: Existing Transit Service.....	24
Figure 17: Moffitt Cancer Center McKinley Campus shuttle stop	25
Figure 18: HART bus shelter currently utilized by Moffitt employee shuttles	27
Figure 19: USF Bull Runner System Map	29
Figure 20: HART Tesla HyperLINK.....	31
Figure 21: HART MetroRapid transit station	33
Figure 22: Bikes in downtown Tampa.....	35
Figure 23: Share-a-Bull bike on campus	35
Figure 24: USF Bike Share Trip Heat Map - Oct. 2016	37

Figure 25: Existing Land Use.....	39
Figure 26: USF 10-Year Campus Master Plan.....	41
Figure 27: Major Existing & Proposed USF Destinations.....	42
Figure 28: Major Medical Community Destinations	43
Figure 29: Area Development and Destinations.....	46
Figure 30: Flow Patterns and Employment & Population Density	47
Figure 31: !p Mobility Plan.....	51
Figure 32: Bike Share concept.....	52
Figure 33: Share-a-Bull bikes on USF campus.....	53
Figure 34: Coast Bikes in downtown Tampa	53
Figure 35: !p Circulator concept.....	54
Figure 36: DC Circulator	55
Figure 37: !p Autonomous Vehicle Shuttle concept	56
Figure 38: AV Shuttle	57
Figure 39: Multimodal Strategies for Improved Safety.....	58
Figure 40: Existing E Fowler Ave	59
Figure 41: Tesla Model X vehicle.....	60
Figure 42: Sample Web Portal	61
Figure 43: Share-a-Bull bike on USF campus	62
Figure 44: !p Population and Employment Density	65
Figure 45: Development Projects.....	66
Figure 46: AV/CV Transit Activities.....	75
Figure 47: The EZ10; an example of an SAE Level 4 transit vehicle.....	76
Figure 48: How AV Vehicles “See” Their Environment.....	78
Figure 49: City Mobil2 AV shuttles	79
Figure 50: !p Fowler Avenue transitway concept	81



List of Tables

Table 1: Bull Runner Typical Weekday Ridership by Route	26
Table 2: HART Typical Weekday Activity in the !p Core	28
Table 3: HyperLINK Trips Since Service Began in November 2016.....	30
Table 4: USF Bike Share Data Summary	34
Table 5: USF Travel Market Characteristics	38
Table 6: Medical Community Travel Market Characteristics	42
Table 7: !p Population & Local Businesses Travel Market Characteristics.....	43
Table 8: Recommended !p Mobility Modes	48
Table 10: !p Circulator Fleet Breakdown	69
Table 11: !p Circulator Hours of Operation.....	70
Table 12: !p Bike Share Implementation.....	86
Table 13: !p Circulator Implementation	87
Table 14: !p AV Shuttle Implementation	88
Table 15: Other Recommendations	89

Appendices

(under separate cover)

APPENDIX A: *Stakeholder Meeting Materials*

APPENDIX B: *Circulator Cost Estimates and Metrics*

APPENDIX C: *Autonomous Vehicle Shuttle Cost Estimates and Metrics*



Executive Summary

Tampa Innovation District

Mobility Master Plan



Overview

The Tampa Innovation District (!p) is an emerging district comprised of nationally renowned medical, research, technology and educational institutions, and destination attractions. The !p is defined by preeminent innovation and technology, creative energy, entrepreneurial and community spirit. The !p is undergoing a major transformation to reflect a sense of place that represents the level of investment, inspiration and commitment to quality championed by anchor partners and community partners. With a strong employment base and investment potential, and a diversity of people and places, the !p is poised to become a **live-work-learn-wellness-play** district where people want to be and to interact.

This vision of **live-work-learn-wellness-play** will be achieved by providing physical and virtual connections to hubs of activity in the !p. A range of mobility solutions will enable workers, residents, and visitors to arrive, park-once and seamlessly move around without needing access to their own car. The !p's Mobility Plan (Plan) is based on a network of integrated mobility solutions:

- Enhanced multimodal transportation infrastructure
- Connected and accessible technology
- Place-making and !p development



Figure 1: Illustrative rendering

To address the wide range of travel needs in the !p, this Plan presents an overall suite of mobility solutions that are forward thinking, and embraces technology and disruptive approaches. The !p embodies the mission to innovate, create, and collaborate; therefore, our problem-solving approach is multi-dimensional and dynamic. The mobility solutions

Tampa Innovation District

Mobility Master Plan



are a mixture of first/last mile and district circulation, ranging from fixed-route to on-demand shared services, including both traditional services and those on the very edge of technological advancements. The solutions range from the immediate to near-term realities, while others are phased over the next 2+ years and will require additional coordination and funding from partner sources.

The Plan builds upon existing strengths and assets. A wide range of transit and mobility services are currently provided independently by anchor institutions, hospitality and businesses in the !p. The University of South Florida (USF) Bull Runner shuttle buses provide an average of 5,700 daily rides to their 55,000 faculty, staff, and students. USF's Share-A-Bull bike share program, at 20 rides/bike/day, experienced over three times the typical bike share usage rate experienced by other successful systems, and in January 2017, implemented a new fee structure to manage the demands of over usage. The Hillsborough Area Regional Transit (HART) in partnership with the !p piloted HyperLINK – a first/last mile service that provides on-call shared rides within a 3-mile radius using Tesla Model X vehicles with autonomous vehicle technology capabilities; this program represents Tesla's first partnership with a public transit agency in the US. HART also provides regional travel connections with their fleet of buses serving 10 routes throughout the !p and connecting at the University Area Transit Center (UATC) with USF Bull Runner. Hotel visitors have access to on-demand shuttle services within a 2-3 mile radius, while both Moffitt and Busch Gardens run dedicated shuttles for employees. But these services are largely restricted to either specific users, geography, or both. To expand these services to a wider market and to introduce exciting new forms of transit is the primary objective of this Plan.



Figure 2: University Area Transit Center

Mobility Solutions

Ultimately, every trip begins with a walking trip and we are developing a multimodal transportation network to extend the reach of every person by providing seamless and efficient connections to/from and within the !p. Moreover, the !p recognizes the need for practical alternatives to single-occupancy-vehicles within the district. The following are recommended enhancements to the existing transit and mobility services operating in the !p.

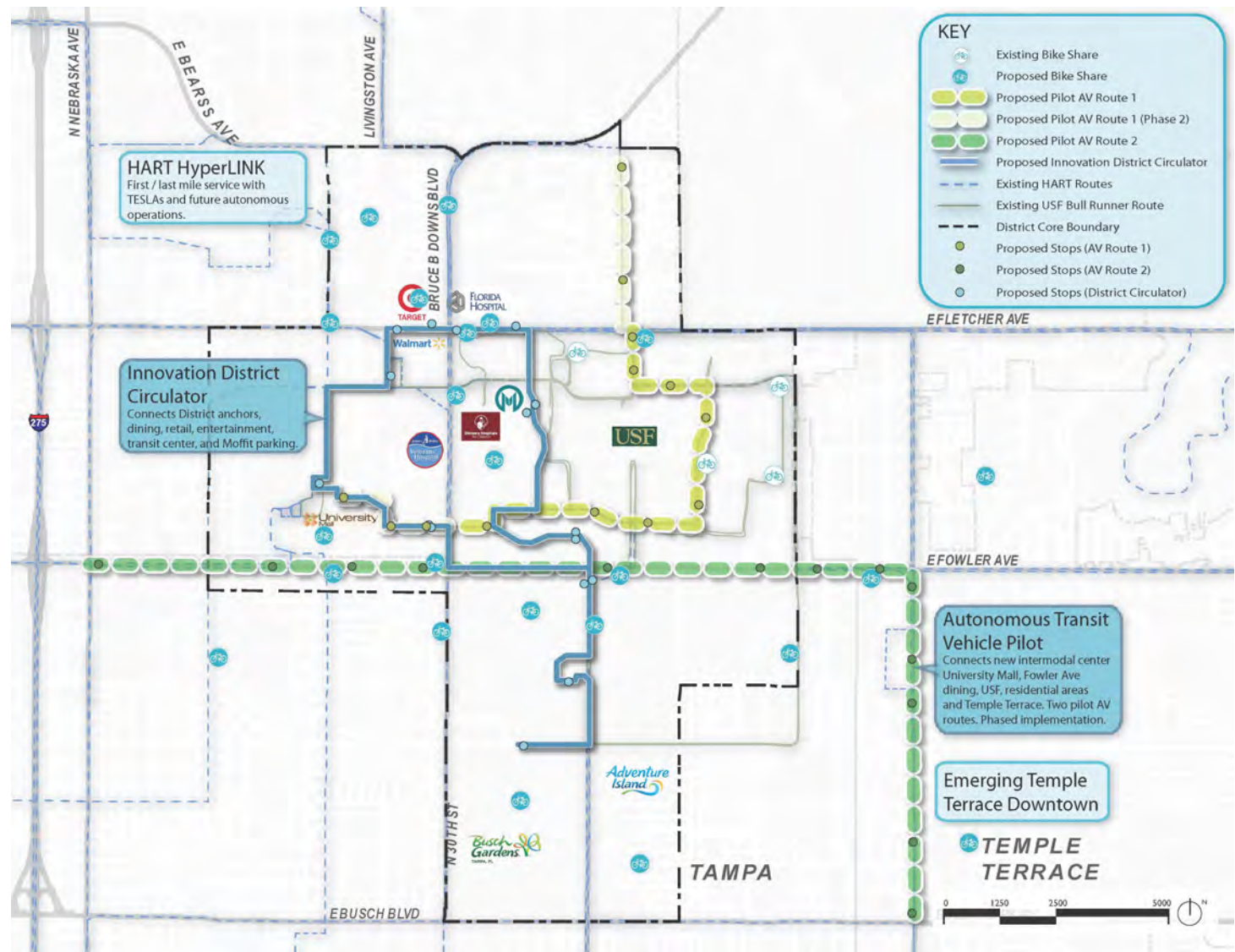


Figure 3: !p Mobility Plan



!p Bike Share

!p Bike Share will involve the phased transition from the existing USF Share-A-Bull to an !p Bike Share program operated by Tampa Coast Bike. Phase 1 will allow USF students, and !p residents and visitors within the expanded service area, to access a high-quality, well-maintained bike service within the !p. To continue expanding service, !p anchors, businesses and developments have the opportunity to sponsor new bike share stations outward from USF campus. Bike share members will have access to the larger, regional Tampa Coast Bike network of bike share programs.

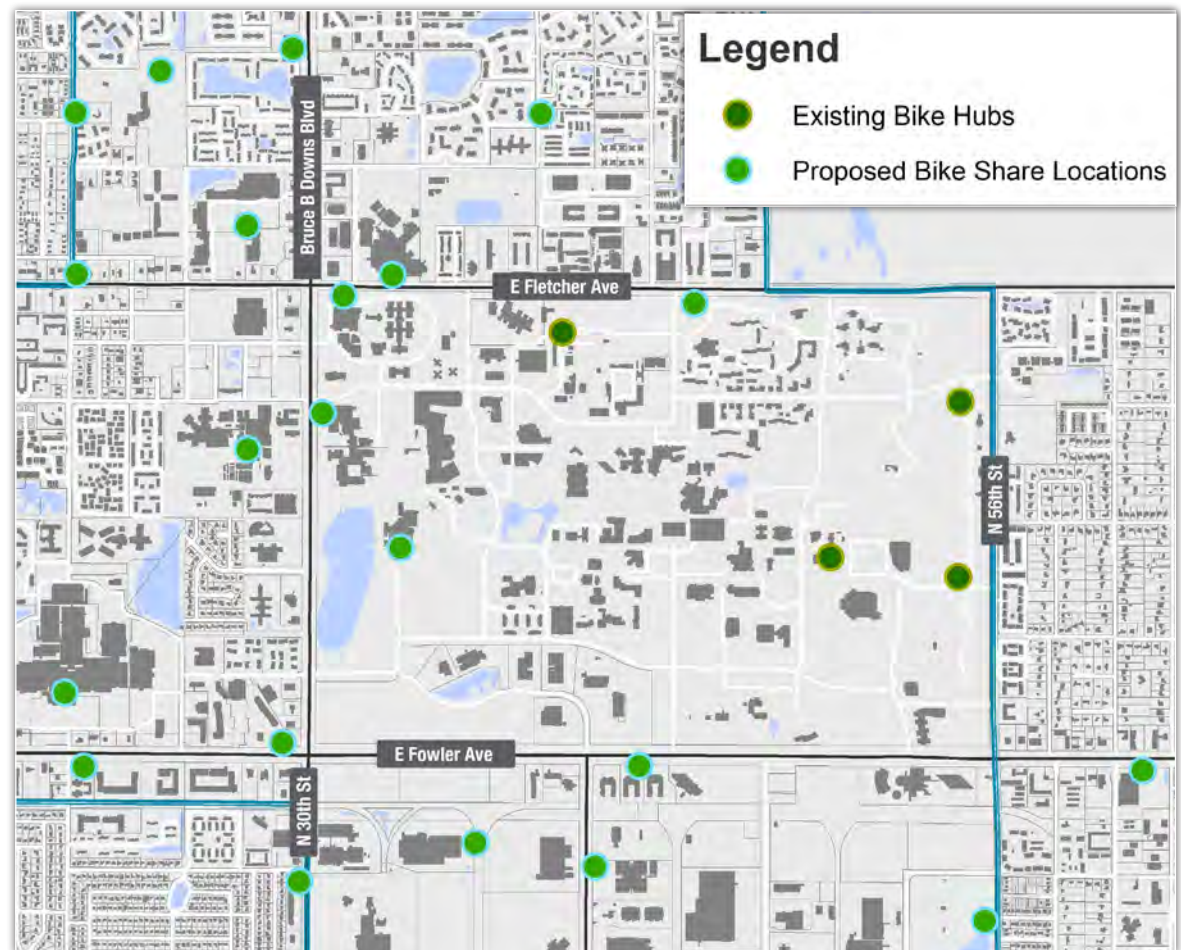


Figure 4: Proposed !p Bike Share Expansion Plan

PROGRESS UPDATE

Subsequent to our mobility plan coordination, USF completed the transfer of operations for the Share-a-Bull program to Tampa Coast Bike for the start of the Fall 2017 academic year.

!p Circulator

The !p Circulator will connect the major destinations in the !p Core, an area generally bounded by 15th Street to the east, Bearss Avenue to the north, 50th Street to the west and Busch Boulevard to the south. The Circulator will provide fast, efficient and regular service, while offering a comfortable, convenient option for local trips between various destinations, including key parking locations at Moffitt, USF, etc.. The Circulator is planned to provide bi-directional service with a service frequency of 12-15 minutes during the peak periods and 15-20 minutes during off-peak periods. The Circulator would operate similar to HART's Flex Service with fixed stops but provide the flexibility to deviate from the route to final destinations based on pre-planned requests. The Circulator shuttle service may operate using electric and compressed natural gas vehicles, as well as the potential to incorporating future technologies, and range from smaller-sized vans to larger buses depending on the service plans. The Circulator system is anticipated to be branded to be clearly identifiable by riders and represent the !p brand. While the service could be operated by USF, as an expansion of the Bull Runner service, it will likely be operated by a third-party transportation provider to allow for more flexibility for service delivery.

An alternative to the flexible Circulator service would involve expansion of HART's HyperLINK service to provide expanded flexible, on-demand service. This alternative would need to establish service standards to ensure acceptable wait time to serve key locations, such as the Moffitt employee parking facilities.

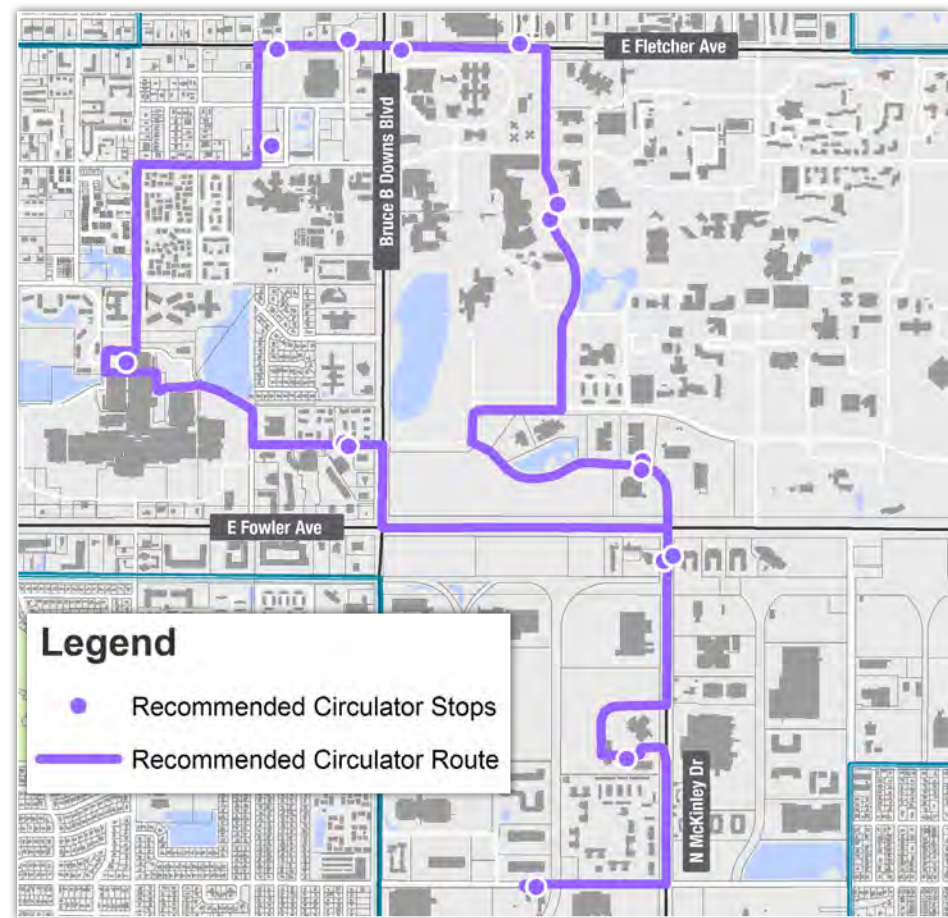


Figure 5: Proposed !p Circulator Plan

PROGRESS UPDATE

On October 8, 2017, the HyperLINK service was expanded to better serve a larger area covering the area adjacent to the USF campus and the City of Temple Terrace.



Autonomous Vehicle Shuttles

!p Autonomous (AV) pilot transit shuttles will likely be 12-15 passenger vehicles equipped with advanced sensors and computing abilities to perceive and communicate with their surroundings. The shuttles will perform all critical functions (steering, acceleration, and braking) without an operator, while carrying students, staff, and visitors along fixed guideways at relatively low speeds. The USF campus will function as a tech proving-ground for the pilot AV. The pilot will demonstrate how AV performs on a large campus. Students, staff, and University visitors, already accustomed to parking once and finding alternative means for local trips, are a natural “fit” for AV shuttles operating in mixed traffic situations at lower speeds. Future expansion of the AV shuttles will build upon existing relationships among transit partners in the study area.

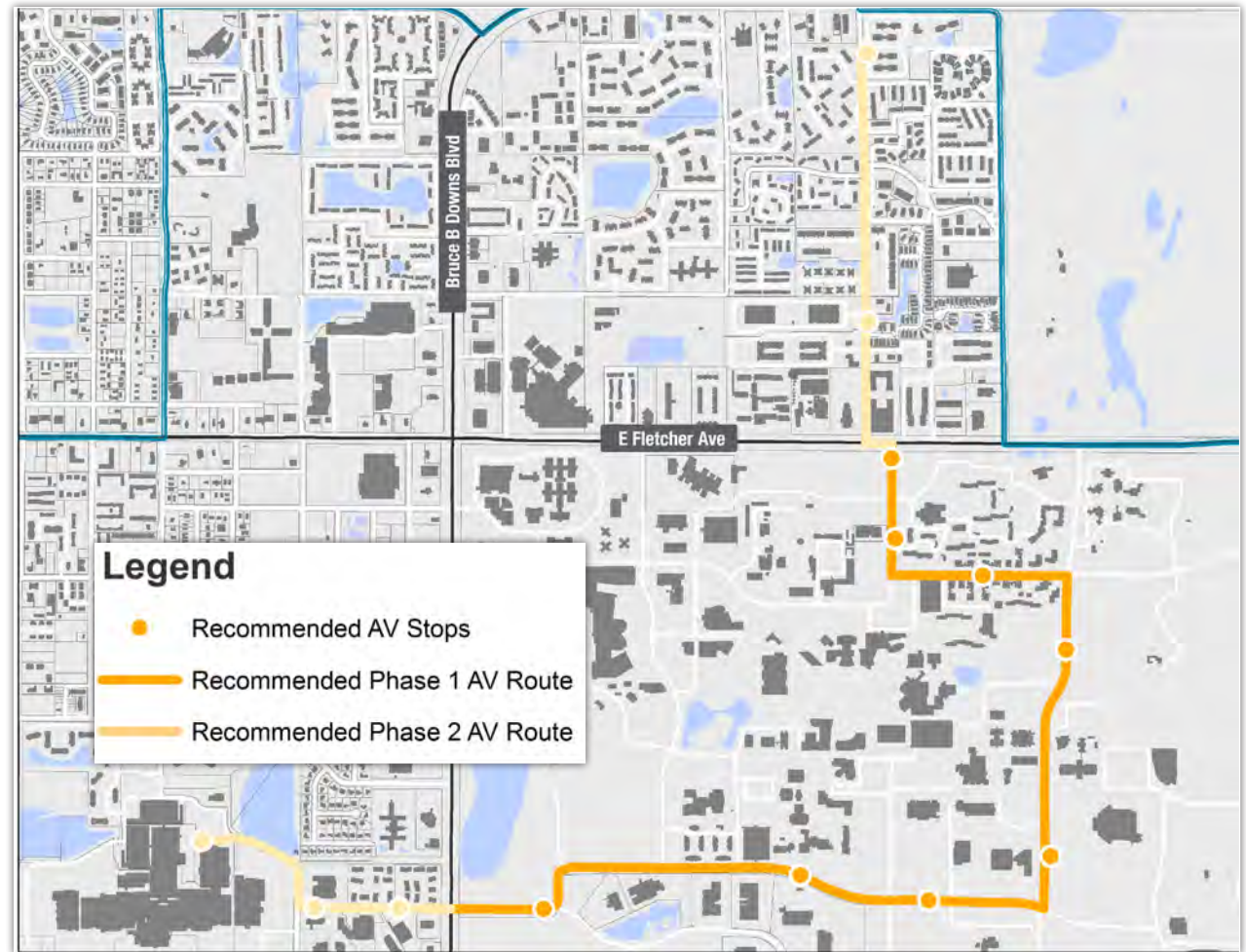


Figure 6: Proposed !p AV Shuttle Plan

PROGRESS UPDATE

Subsequent to our mobility plan coordination, the Hillsborough MPO has initiated an assessment study on Autonomous Vehicle Transit on the USF Campus with the USF Center for Urban Transportation Research.

!p Digital & Technology Solutions

Existing and proposed transit services in the !p will operate best in an environment that is as flexible, accessible, connected, and intuitive as the transit itself. In particular, AV transit will depend on the user and infrastructure connections that require fiber, wireless technology, and integrated apps to function. As part of the suite of mobility solutions, we are recommending !p Wi-Fi and a one-click, !p resources website. These components will function as portals of information and a backbone of technology and communication for the !p.



Figure 7: A one-click, !p Gateway Website Portal

PROGRESS UPDATE

The !p Advisory Board has initiated the evaluation of the district Wi-Fi implementation.



HyperLINK

In November 2016, HART introduced HyperLINK, a first/last mile, on-demand service in the !p that provides door-to-bus stop or a bus stop-to-door service within a 3-mile radius service area. The pilot program was established to encourage the use of transit, expand HART's bus service area, and improve access to transit patrons whose final destination is not adjacent to a bus stop or transit terminal. On April 24, 2017, HART and the !p unveiled a new partnership between HART and Tesla Motors, and deployed four Tesla Model X electric vehicles with full self-driving hardware and a 295-mile range using one charge to service the !p. The Tesla vehicle service was underwritten by the !p and through private sponsorships, and has not been deployed outside the !p where HART operates HyperLINK service. A fifth vehicle to transport patrons with disabilities, and accommodations to transport a wheelchair is available. A private transportation contractor, provides all operations and maintenance, and can supply up to 10 additional vehicles, if needed. Passenger travel requests are completed either using an on-demand mobile application or through a call center.

The HART and !p partnership to enhance HyperLINK service is part of a continued strategy to provide shared mobility. The Mobility Plan recommends that HART and !p work towards expanding HyperLINK service as an area circulator combined with a flexible route service. Additional funding support should be derived by consolidating the individual shuttles operated various !p businesses, such as hotels.



Figure 8: HART HyperLINK

PROGRESS UPDATE

Beginning on October 8, 2017, HART HyperLINK will serve an expanded 3-mile radius service area around the University Area Transit Center and the Temple Terrace City Hall. HyperLINK will provide connections to designated transit stops for a \$1 fare and also anywhere within the designated !p service area for a \$3 fare.

HART HyperLINK - University/Temple Terrace Areas

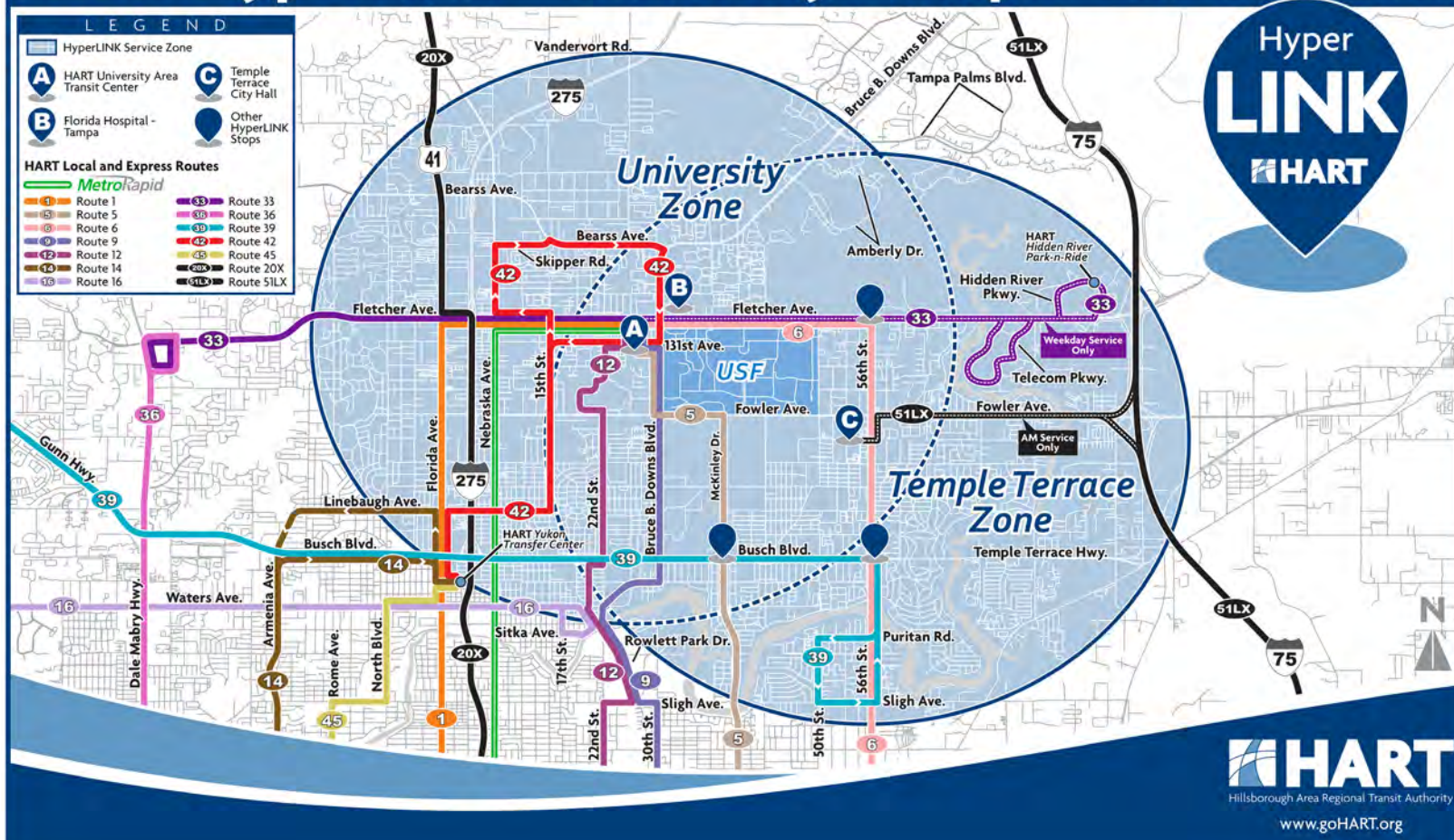


Figure 9: Expanded HART HyperLINK Service Area



Other Recommendations

HART Downtown USF CAMLS Express

In addition to the internal trip modes, an express bus that provides a fast, efficient connection between the main USF, Downtown Tampa medical campus, the USF CAMLS medical center and new medical building located in Downtown Tampa is recommended for regional connectivity. The Express route would be operated by HART as an overlay to the existing local and MetroRapid service during weekdays from 5 AM and 8 PM. The Express Route would reduce travel times for the longer distance trips between USF and Downtown as compared to the existing Metrorapid and local service. The existing routes would continue to provide supporting service allowing for flexibility for riders covering the daily span of service, and even help support ridership growth along the corridor.

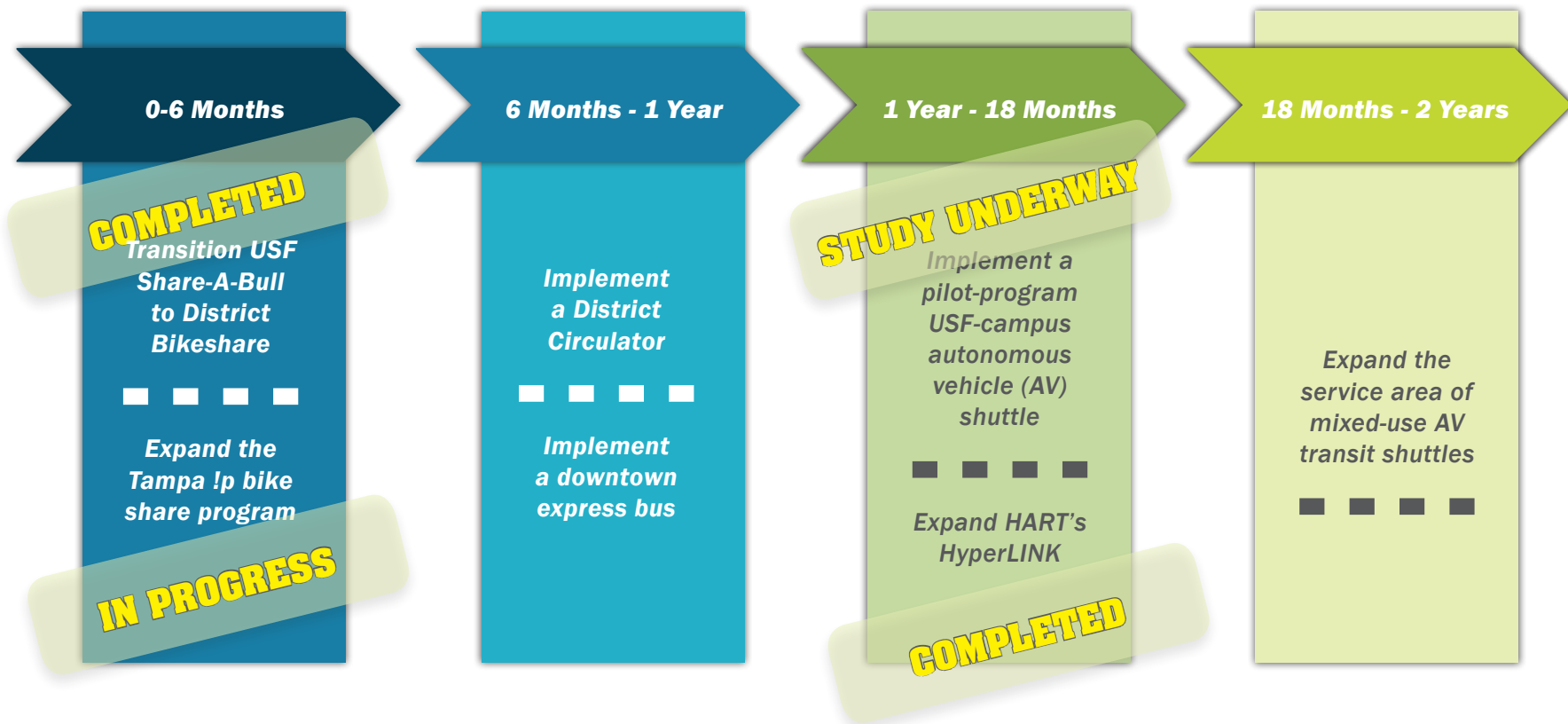


Figure 10: HART MetroRapid

Timeline

The Ip Mobility Master Plan was prepared with a focus on immediate, short-term implementation through the combined efforts of the Ip, our Anchors and key Partners, such as the HART, FDOT District 7, Hillsborough MPO, Hillsborough County, and the Cities of Tampa and Temple Terrace.

The recommended timeline for implementation is summarized below:





Next Steps

The next steps for the district are important to the success of the !p community. To maximize potential solutions, ideas need to be shared between the !p Anchors, County, Cities, and transit and transportation agencies. This coordination is critical to the success of projects, plans, and studies working in tandem. By developing innovative ideas and planning for implementation, the !p community can become a **live-work-learn-wellness-play** district.



“ To address the wide range of travel needs in the !p, this Plan presents an overall suite of mobility solutions that are forward thinking, and embraces technology and disruptive approaches. ”



Introduction and Vision



Innovation Districts Defined

The Brookings Institution defines innovation districts as:

*“dense enclaves that merge the innovation and employment potential of research-oriented anchor institutions, high-growth firms, and tech and creative start-ups in well-designed, amenity-rich residential and commercial environments.”*¹

These innovative-rich enclaves, catering to talent and aspiration, are beginning to spring up in cities all over the U.S. They represent a new geography. They are “the ultimate mash up of entrepreneurs and educational institutions, start-ups and schools, mixed-use development and medical innovations, bike-sharing and bankable investments—all connected by transit, powered by clean energy, wired for digital technology, and fueled by caffeine.”² And while no two innovation districts are exactly alike, they all share three, common elements:

- Anchor institutions that are driven by a common purpose to cultivate talent and creativity
- A walkable, livable environment; a place where people want to live, work, and play (**Figure 11**)³
- Collaboration and networking; districts function best when people and firms within the district connect and share ideas



Figure 11: Fremont, CA Innovation District; Rendering

1 Brookings Institute. <https://www.brookings.edu/innovation-districts/> (accessed April 2017).

2 Bruce Katz and Julie Wagner, *The Rise of Innovation Districts*, Brookings Institute. <https://www.brookings.edu/essay/rise-of-innovation-districts/> (accessed January 2017).

3 City of Fremont, CA. *Warm Springs/South Fremont Community Plan*. <https://fremont.gov/1093/Warm-SpringsSouth-Fremont> (accessed April 2017)



In short, when we talk about the Tampa !p (!p) in the context of placemaking, we refer to the above three elements. And it can be summed up with the following vision: **live-work-learn-wellness-play**.

The Emergence of the !p

Innovation has historically resulted from a diverse group of individuals who supported and challenged each other to define, refine or design a new construct. Think Thomas Edison's West Orange lab complex where scientists and intellectuals from around the world gathered to bounce ideas and inventions off one another. In these environments, an idea or problem was transformed into a new product, service, application or tool through their creativity and collaboration addressing real life issues.

In more modern times, innovation has been housed in university laboratories and corporate research parks under controlled environments with secured networks. These silos of industry and thought fueled new research and ideas within pillars of large research parks or campuses (think IBM's Thomas J. Watson Research Center). These isolated environments operated independently of one another and of their surrounding communities.



Figure 12: IBM, Yorktown

Contemporary innovators have emerged from real or metaphorical garages and coffee shops and are thriving in a very different environment than those that have come before. Innovation is now found in social networks and virtual laboratories. Entrepreneurs and established businesses are gravitating to the locations where talented workers choose to congregate. Most often, this means compact, transit-accessible, technically-wired, urban places with an emphasis on a quality of life, where they can conveniently integrate work, housing, and recreation. Innovation districts are simply the manifestation of these locational preferences. Think the Cortex Innovation Community in St. Louis – a 200-acre corridor of bioscience labs, cafes, and office space taking root between the district's anchors: St. Louis University, Washington University

Medical School, and Barnes Jewish Hospital. People and ideas flow freely in these environments, where innovation and community come together.

2011: Enter the !p (formerly the Tampa Innovation Alliance District) – a community of stellar anchors and local businesses, non-profits, students, and residents that are transforming a former “thoroughfare” into a high-tech mecca with the potential to generate \$11 billion of investment impact. With 41,000 students, 13,900 USF faculty and staff, 13,000 medical employees, over 9,000 other workers, and 8,500 residents, the !p is a diverse and vibrant, real-world laboratory of placemaking and mobility. And each of these groups have or are developing their own master plans. On October 24, 2017, the !p anchor institutions announced a combined \$1.5 billion in investment over the next 10 years and this Mobility Plan ties together them together.

The !p Vision

Where successful, the Tampa !p’s economic value increases exponentially from the cumulative effects of the principals and strategies of innovation. The concentration and proximity of a highly productive talent pool and business enterprises spurs competition and collaboration. And their mutual investment in the community through the demand and support of services (i.e., housing, retail, transportation, etc.) creates a sense of place. So, if the idea of concentrating a critical mass of start-ups, incubators, and lab space is a good idea, the next question is: what changes need to be put in place to best enable these groups to maximize their energy and produce results

People. Place. Connections.

In its most basic form, the vision of the !p is to create highly desirable neighborhoods – places where people actually want live, work, play, and move around. The business strategies for technology companies, health science sectors, and green technology enterprises are now aligned with the urban redevelopment of dense, walkable, bike-friendly, transit-oriented areas having a strong sense of place unencumbered by the needs of an auto-dominated space. Although there are countless strategies to achieving such places, common design principals adopted by innovation districts in places such as South Fremont/Warm Springs, Boston, and West Philadelphia include some form of the following:

- Leverage transit to provide connections and choices
- Transform to mixed-uses to encourage and enable walking and biking
- Engage and connect the major institutions
- Connect with the history and residents of the !p

In many ways, the !p is already making great strides toward creating a **live-work-learn-wellness-play** district, utilizing (consciously or not) the strategies listed above. The diverse, vibrant population of the !p characterize the !p as a place to be. TechHire talks in Temple Terrace, renaissance art in the University Mall, a public/private partnership between HART and Tesla are all evidence of a district finding its identity. Residents, local governments, and institutions are increasingly collaborative and engaged.

One of the remaining challenges for the !p is to bring together the vibrancies of technology and mobility. To achieve the shared vision of a sense of place, the !p must provide convenient, accessible modes of transportation to its broad customer base. The diverse, !p community is comprised of an eclectic mix of people (students, health workers, patients, researchers, technology startups, neighborhood and community action leaders, and tourists from around the world) with a complicated array of preferred mobility modes:

- Daily trips across campus for classes
- Periodic, lunchtime trips to food and beverage locations up and down Fowler Avenue
- Daily commute to and from remote parking
- Monthly trips to Walmart to stock the pantry
- Occasional trips to the airport, each time presenting its own challenges
- A venture out from a loved-one's hospital room to run errands and explore the area



Figure 13: Moffitt Cancer Center Magnolia Campus

Tampa Innovation District

Mobility Master Plan



Mobility solutions that work for a **live-work-learn-wellness-play** district will weave together these travel mode layers, complimenting the strengths in transit that already exist. They will also be multi-dimensional and dynamic, focusing on alternatives to single-occupancy-vehicle (SOV) auto trips within !p. The mixture of first/last mile solutions, on-demand and fixed route services, and integrated digital technology will be based on the following, guiding attributes:

- An enhanced transportation infrastructure
- Connected and accessible technology
- Place-making and !p development

By fostering a mobility system whole that is greater than the sum of parts, the outcome will go beyond simply moving people from place to place. A phased, layered mobility strategy with traditional and leading innovation in transportation planning that prepares the !p for the future and implements results in the present will go a long way towards creating a place from which innovation stems.





Stakeholder Outreach

Tampa Innovation District

Mobility Master Plan



This Plan was developed between September 2016 and June 2017, incorporating input from extensive stakeholder outreach over that timeframe. Outreach included large, group discussions and one-on-one conference calls; they included collaborative, facilitating check-ins as well as intense, fact-finding missions regarding current and project mobility needs and interests of the individual anchor institutions.

More than thirty meetings were held with 18 individual stakeholders over nine months; three group stakeholder meetings were held during Tampa !p Advisory Board Meetings (**Figure 14**); and numerous draft documents and concepts were distributed and comments received. Stakeholder outreach included, but was not limited to, the following groups:

- Busch Gardens
- Coast Bike Share
- FDOT District 7
- Florida Hospital Tampa
- James A Haley Veterans' Hospital
- HART
- Hillsborough County
- Hillsborough County MPO
- Moffitt Cancer Center
- New North Transportation Alliance (NNTA)
- University of South Florida
- University Mall



Meeting materials are provided herein as **Appendix A**.

Figure 14: Mobility Stakeholder Meeting (!p Advisory Board Meeting, October 19, 2017)



Existing Conditions Analysis



Study Area Location & Characteristics

The !p is located in northwest Hillsborough County and is bound by I-275 to the west, I-75 to the east, Bearss Avenue/ E Fletcher Avenue to the north, and Busch Boulevard/ Bullard Parkway to the south. Both the Core (generally bounded by 15th Street to the east, Bearss Avenue to the north, 50th Street to the west and Busch Boulevard to the south) and the larger, planning area overlay several jurisdictions (City of Tampa, Temple Terrace, Hillsborough County, the federally operated VA Hospital, and USF – a part of the State University System of Florida), which contributes to both the strength in collaborative efforts as well as the challenge of balancing differing priorities.

The !p is further characterized (and strengthened by) the its economic might. The !p's focus on high-tech jobs has the potential to generate around \$11 billion in annual sales. Success stories from USF's Tampa Bay Innovation Incubator in fields such as bio/life sciences, engineering, and software and information technology are indicators that the !p could achieve its potential. The high usage experienced at the !p's new Community Engagement Lab (CEL) housed at University Mall indicates the same.

Another important characteristic is the regional, national and even global recognition of some of its anchor institutions. Moffitt Cancer Center, University of South Florida, and Busch Gardens draw millions of visitors annually from around the world. Busch Gardens alone draws 5 million visitors each year, half of which come from outside the state of Florida. And the !p hospitals are major activity centers as well. The James A. Haley Veteran's Hospital (VA Hospital) serves approximately 1.3 million outpatient visitors annually. Florida Hospital admits 22,000 inpatient visitors annually and is actively investing in its existing infrastructure to maximize space and facilities.

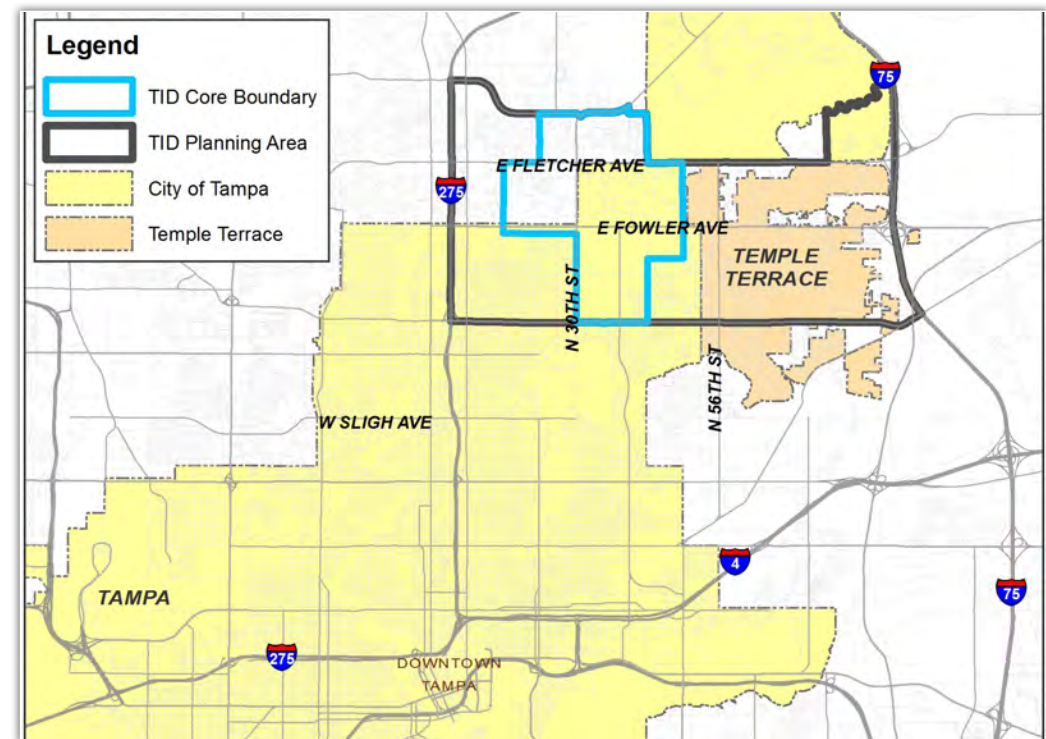


Figure 15: Study Area - !p



Existing Transit Services

Currently, people moving about within the District have limited mobility options, depending on their travel purpose. A comprehensive analysis of the existing transit services (**Figure 16**) illustrates the following major take-aways:

- **5,700** average weekday riders – USF Bull Runner service
- **7,900** average weekday riders – HART bus service
- **6,000** Share-A-Bull bike share members prior to fee implementation in 2017; approximately 3,500 members after fee implemented
- **490** average daily riders – Moffitt employee shuttle buses
- **5,300** boardings and alightings per day at the University Area Transit Center
- **4,411** riders during the first 3 full months of the new HART HyperLINK service

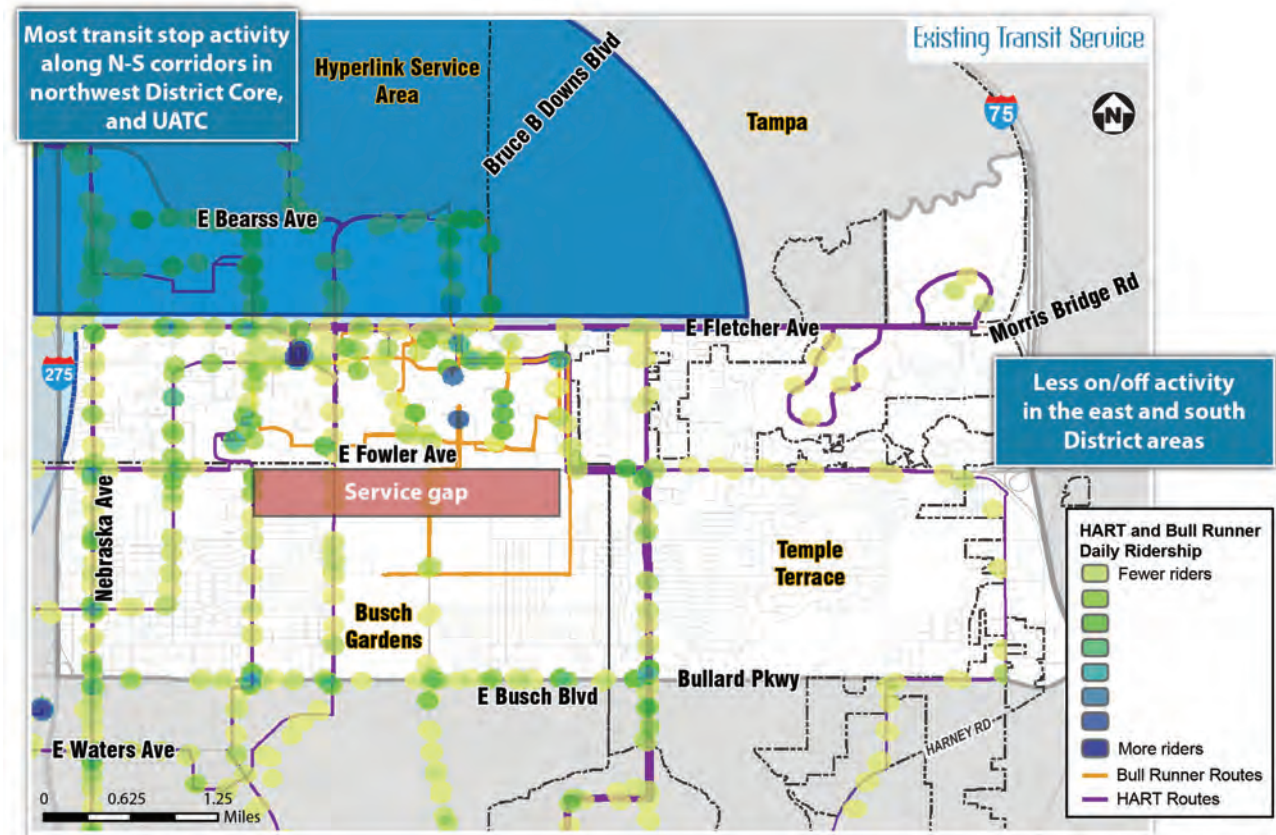


Figure 16: Existing Transit Service

Moffitt Cancer Center Shuttles

Moffitt Cancer Center's transit features serve the needs of its employees, patients, and the daily, unplanned localized runs unique to healthcare services (such as STAT runs). Moffitt is comprised of a main campus on Magnolia Drive, an outpatient and research facility on McKinley Drive, and employee health services on E Fowler Avenue. In addition, Moffitt continues to expand their acute care facilities within the Isp. Movements to and among these campuses and buildings predominate Moffitt's movements.



Figure 17: Moffitt Cancer Center McKinley Campus shuttle stop



Service:

Moffitt maintains or rents over 30 vehicles, including trucks, golf carts, vans, patient transfer cars, and two, third-party employee shuttle buses. The high-frequency employee shuttle service to and from its main, Magnolia Drive Campus and its remote parking facility on McKinley Drive (a distance of less than 2 miles), functions to transport employees quickly and reliably. Employee shuttle characteristics:

- Shuttles are owned and operated by ESCOT bus services. Current contract is set to expire in summer 2017; contract negotiations are set to begin in early-summer.
- Shuttles operate with peak service times around 7:45 AM – 9:00 AM and 3:00 PM – 5:30 PM (when Moffitt employees are typically arriving to and leaving from work) on business days.
- Average of 490 riders/day; average of 10,000 riders/month.
- Frequent service with 8-12 minute headways.
- Current cost to operate service is approximately \$40,000/month (\$500,000/year).
- Midday service is typically low and Moffitt is currently exploring options to increase ridership during low-peak times

Travel Markets:

The Moffitt shuttles serve two travel markets within their domain: employee trips and patient trips. The focus within the Mobility Plan are the quick, localized trips for employees who are utilizing remote parking or other services. Various patient trip purposes including transfers and home-to-hospital service, are not intended to be addressed in this Mobility Plan.

Opportunities:

Currently, two other transit services (HART buses and USF Bull Runner buses) are providing service along the Moffitt employee shuttle route. An opportunity exists to consolidate some of these services and reallocate resources along the McKinley to campus corridor. By portioning these services into a larger, more efficient *!p* circulator, Moffitt could recognize transportation cost savings. And Moffitt employees would have access to the other major *!p* anchors. It is recommended that any new or altered services proposed for the *!p* consider and look to ways to incorporate and improve Moffitt employee shuttle services in the area.



Figure 18: HART bus shelter currently utilized by Moffitt employee shuttles



USF Bull Runner

USF's 1,500-acre campus lies at the center of the !p; it houses about 250 buildings, employs 13,900 faculty and staff, and is attended by 41,000 students. The task of moving these people around the campus and beyond, is by the USF Parking and Transportation Department's Bull Runner bus service.

Service:

Bull Runner is a traditional, fixed-stop bus service in and around campus that is free to ride for students, staff, and visitors to the University. USF Bull Runner currently maintains a fleet of 43 vehicles including 31 route buses. System wide ridership on a typical weekday in 2016 was about 5,737 riders (**Table 1**). Currently, six routes are in service that utilize bi-directional buses to decrease headways. Headways are lower for the shorter routes on campus (12-15 minutes) and higher for the routes that extend out into neighboring residential and employment areas (up to 45 minutes for Route F).

Table 1: Bull Runner Typical Weekday Ridership by Route

Route	Description	Average Frequency* (minutes)	Number Weekday Riders
Route A	Campus Loop	15	262
Route B	USF Health	12	394
Route C	Off-Campus North	13	3,185
Route D	Off-Campus West	13	1,228
Route E	Campus Loop	23	74
Route F	Off-Campus South	35	594
		TOTAL	5,737

**Posted headways on all 6 routes is 10 minutes with a late threshold of 21 minutes*

Travel Market:

Students' needs are the primary focus of the Bull Runner service. Service is primarily restricted to USF, but also serves students traveling to other !p locations, including the UATC, University Mall, and residential areas.

Opportunities:

Since students' needs are the top priority of the Bull Runner service, any modifications to that service will need to first consider the impact to students. However, there are opportunities to expand access to Bull Runner without negatively impacting service to students. For example, allowing Moffitt employees access to Bull Runner buses would allow consolidation of Moffitt's employee shuttle buses and much of Bull Runner's F Route. Pooling these resources could increase the efficiency and frequency of the F Route (currently operating with 25-45 minute headways) and possibly allow reallocation of other Bull Runner resources to expand access to students. It is recommended that any new or altered services proposed for the Bull Runner consider and look to ways to reduce Bull Runner's longer headways and improve student access to major destinations.

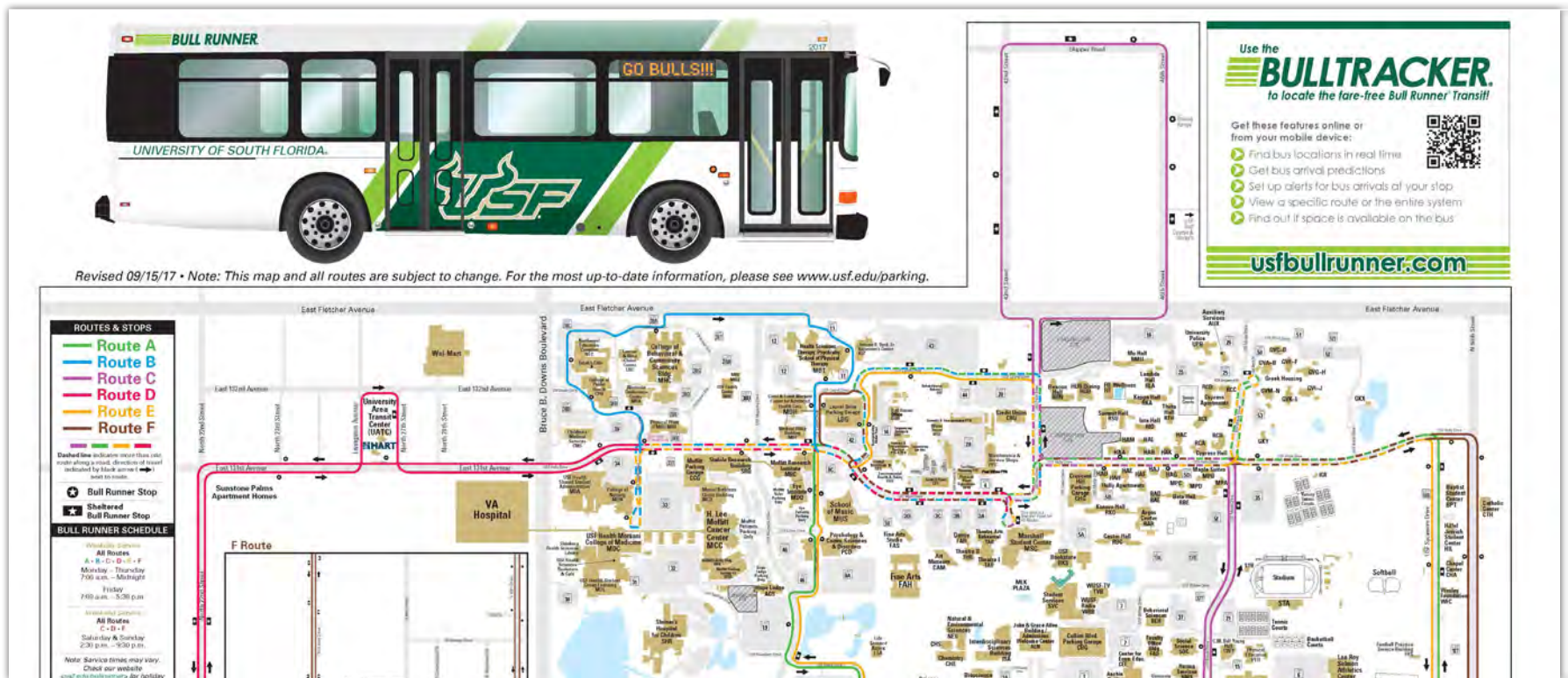


Figure 19: USF Bull Runner System Map



HART Traditional Buses

HART operates traditional, fixed-stop buses throughout Hillsborough County. HART buses include value-added services such as OneBusAway and HyperLink to expand convenience and accessibility.

Service:

Ten HART routes operate within the !p and brings more than 3,100 riders into the !p on an average weekday (**Table 2**). HART buses provide service along major, trunk corridors in the !p, provide regional transfers at the University Area Transfer Center (UATC), and support the USF Bull Runner bus network. The MetroRapid route experiences higher ridership (an average of 1,000 boardings and alightings per day) and higher frequencies and provides an important east-west service in the !p. The UATC experiences an average of 5,300 boardings and alightings per day.

Travel Market:

HART routes provide traditional regional bus service as well as MetroRapid services.

Route	Average Daily Ridership within the !p Core	Daily Load into !p Core
2	407	286
5	458	298
6	808	473
9	913	393
12	709	454
18	707	196
33	322	226
45	455	261
57	291	154
400	481	441
Total	5,551	3,182

Table 2: HART Typical Weekday Activity in the !p Core

Opportunities:

Opportunities may exist to modify or reallocate existing HART routes within the !p to improve efficiencies or reduce transfers. The relocation of the UATC is also a considered opportunity. It is recommended that any new or altered services proposed for the !p consider and look to ways to improve HART services in the area.

PLAN UPDATE

In October 2017, HART adopted Mission , a system and route restructuring for the bus network to improve overall operational service, operations, and cost efficiencies.

HyperLINK

HART recently unveiled HyperLINK, a first/last mile pilot shuttle service that operates in a select service area that includes the area of the I-4 north of E Fletcher Avenue. The service will provide numerous benefits to its service area, including encouraging the use of transit, expanding HART's bus service area, and improving access to transit.

Service:

HyperLINK is a shared-ride service that provides an on-demand, door-to-bus stop or a bus stop-to-door service. The service includes a smartphone app that allows users to book a ride while on-the-go. HyperLINK is fast gaining traction. Talks are already underway to expand the service to areas like downtown Tampa. In addition, on April 24, 2017, HART rolled out a fleet of Teslas, connecting riders to traditional transit with high-tech, autonomous technology (**Figure 20**).



Figure 20: HART Tesla HyperLINK



Travel Market:

HyperLINK serves existing public transportation users that may desire more direct access to their local transit route.

Opportunities:

HyperLINK is already proving to be a highly visible, successful transit solution for the area. Prior to the introduction of the Teslas, HyperLINK made over 4,000 trips between November 2016 and end of February 2017; more than half of those trips occurred in the UATC/Carrollwood zone that overlaps the !p.

Month	Total Passengers	UATC / Carrollwood Zone
November	39	39
December	646	427
January	2,459	1,305
February	1,306	663
TOTAL	4,411	2,395

Table 3: HyperLINK Trips Since Service Began in November 2016

There is an opportunity for HyperLINK to serve the remainder of the !p Core, south of E Fletcher Avenue to provide first/last mile service to an !p that is actively pursuing more transit-oriented development and policies. In addition to the thousands of residents living in the !p, HyperLINK vehicles could serve numerous hotel and hospital visitors that may not currently have easy access to transit. It is recommended that HART and the !p work together to expand the HyperLINK service within the !p Core.

PROGRESS UPDATE

Beginning on October 8, 2017, HART HyperLINK will serve an expanded 3-mile radius service area around the University Area Transit Center and the Temple Terrace City Hall. HyperLINK will provide connections to designated transit stops for a \$1 fare and also anywhere within the designated !p service area for a \$3 fare.

USF to Downtown Express

Medical and educational developments in downtown will provide additional resources and opportunities to USF medical students. Talks are currently underway regarding a USF campus to downtown express bus that builds upon existing agreements and services in the area.

Service:

The express bus would provide a fast, efficient connection between the main USF, Tampa campus medical center and the downtown USF CAMLS medical center. The Express route would be operated by HART as an overlay to the existing local and Metrorapid service during noontime and 5 PM. The Express Route would reduce travel times for the longer distance trips between USF and Downtown as compared to the existing Metrorapid and local service. The existing routes would continue to provide supporting service allowing for flexibility for riders covering the daily span of service, and even help support ridership growth along the corridor.

Travel Market:

This express service will focus on the mobility needs of USF medical staff, faculty, and students who need exceedingly convenient transit service between USF's main campus and downtown.

Opportunities:

Currently, USF students do not pay a fare to board HART buses, as part of an agreement between HART and USF (students pay a transit fee as part of their tuition). This existing partnership should be fostered and expanded to improve student access to regional destinations.



Figure 21: HART MetroRapid transit station



USF Share-A-Bull Bike Share

In addition to the Bull Runner bus service, USF offers the “Share-A-Bull” bike share program to its students for shorter trips between classes, dorms, and recreation.

Service:

Share-A-Bull allows students to check out a high-quality, well-maintained bike to travel short distances within the USF boundary. The service is a flexible, on-demand people-accelerator, allowing users to travel door-to-door without having to wait. In order to maintain and fund the program, USF charges a monthly membership fee as well as penalty fees for bike damage or leaving the bikes outside of the geofenced hubs. These recently implemented fees also function to ensure that more bikes are available to students that are responsibly and regularly using the service. The program is additionally funded by student recreation fees and operated by USF Campus Recreation.

Travel Market:

Safety and accessibility are important factors in placing bike share stations. Well-connected (grid) street systems within the !p allow cyclists to navigate between stations. Lower traffic speeds, signalized intersections, and bicycle infrastructure such as shared-use paths and bike lanes, all contribute to safer bike trips.

Opportunities:

The bike share program has been wildly successful. Prior to implementation of a monthly fee, the program’s success – operating at 20 rides/bike/day, 3 times the optimal ratio–was partly due to its being over-used. There were roughly 6,000 Share-A-Bull members last year and only about 40-60 bikes available at any time. USF owns 100 bikes, but during peak usage in Fall 2016, up to 56% of the bikes were either in need of repair or lost at any time.

Because of this high usage and the demands of maintaining a steady stream of bikes in disrepair, USF implemented Share-A-Bull fees (offering Monthly Plan or Pay As You Go options). These fees were implemented to curb misuse of the bikes and to ensure that responsible users of the program had better access to available bikes.

After January 10, 2017, when the fee was first implemented, Share-A-Bull membership dropped by 97%. Active memberships continue to increase since January; current membership is about 375 members. But although membership decreased after the fee was implemented, average trips/member increased threefold. The reasons for this may be that the students that were willing to pay for bike share were more regular users of the service. And with more bikes available (because less bikes were in disrepair and because the ratio of members to bikes was greatly reduced), these regular users had more opportunities to use a bike. This is a strong, supporting indicator of continued demand for bike share. There is an opportunity, by partnering with the third-party bike share provider, Coast Bike, to lower this monthly fee for students, which will further revive demand.



Figure 22: Bikes in downtown Tampa



Figure 23: Share-a-Bull bike on campus



	Month	Payment Plan	Total Trips	Average Trips per day	Active members	Bike availability	Members/ Student Population
Prior to fee	Sep-16	Student Green Energy Fund Initial Operations	10,108	337	6,255	56%	15%
	Oct-16	Student Green Energy Fund Initial Operations	11,828	382	6,098	50%	15%
	Nov-16	Student Green Energy Fund Initial Operations	9,584	319	5,922	45%	14%
	Dec-16	Short academic calendar month / not enough data					
After fee implemented	Jan-17	Student Green Energy Fund Initial Operations	3				
		USF Pay As You Go	799				
		USF Monthly Plan	163	44	186	83%	0.5%
	Feb-17	USF Pay As You Go	1,215				
		USF Monthly Plan	167	49	259	88%	0.6%
	Mar-17	USF Pay As You Go	1,132				
		USF Monthly Plan	170	42	312	88%	0.8%

Table 4: USF Bike Share Data Summary

Geographically, bike share is limited to the University campus and is available only to students. Existing USF bike trip activity shows that students regularly ride the bikes beyond the USF campus. Destinations outside of campus include the University Square retail center, Walmart, Target, residential apartments north of campus, Publix, and the residential uses east of campus. *It is recommended that the USF program transition to an !p Bike Share program to improve access to students and fill first/last mile gaps within the !p.*

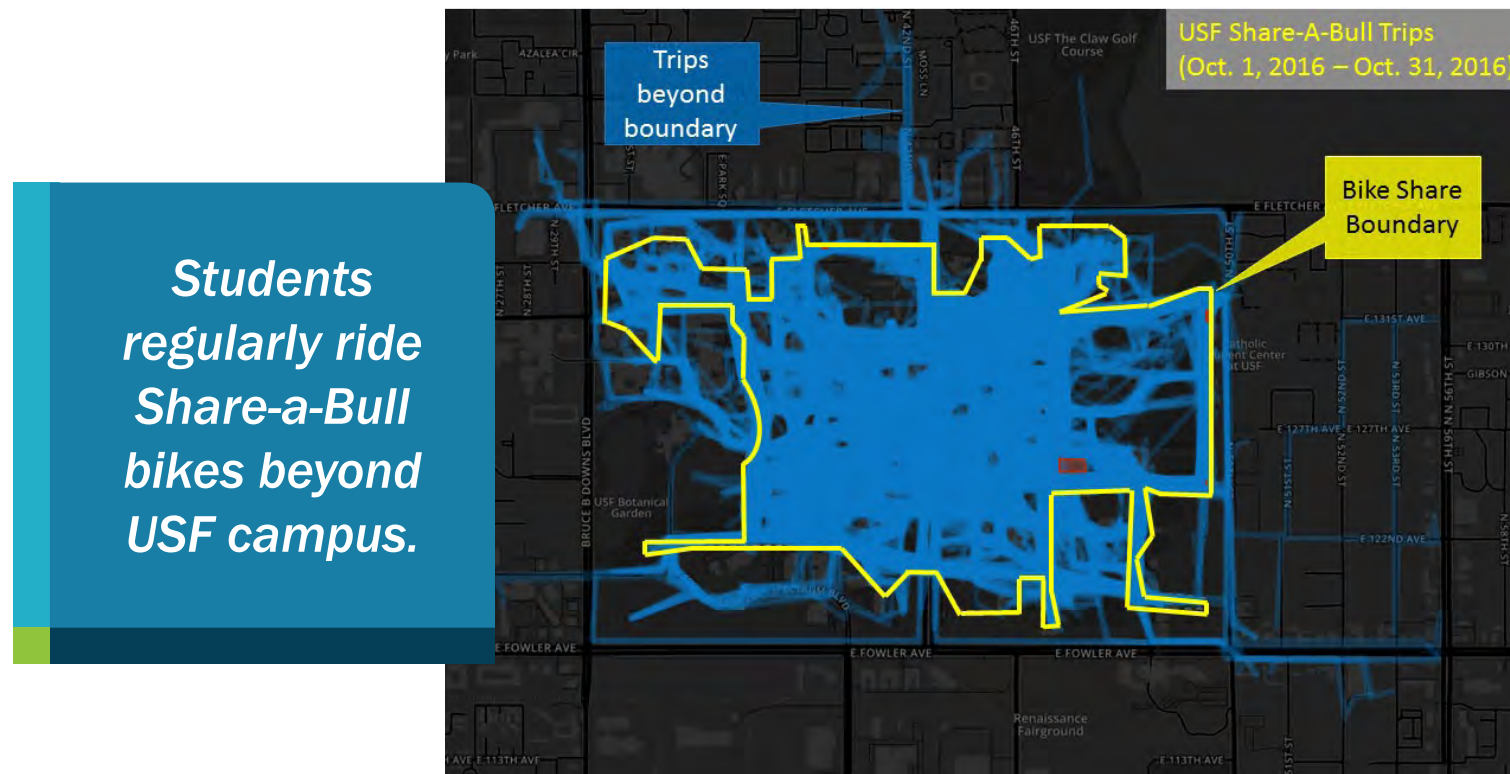


Figure 24: USF Bike Share Trip Heat Map - Oct. 2016

**PROGRESS
UPDATE**

Subsequent to our mobility plan coordination, USF completed the transfer of operations for the Share-a-Bull program to Tampa Coast Bike for the start of the Fall 2017 academic year.



Existing Travel Markets

In planning transit for an innovation district, it's important to get the people equation right. Mobility solutions in the !p should physically connect and integrate these mixed-use, commercial, residential, office, and parks/recreation uses (**Figure 25**). The diverse populations, employment patterns, and traffic flows within the !p interact and specific travel markets emerge. Understanding these travel markets (groups of people and their movements) is important in a complex service area, such as the !p, which is laid out on a grid versus a simple corridor. In a grid, major destinations create high density movements throughout the area that are most evident during peak traffic times (think of the USF intersections along E Fowler Avenue during the evening rush hour). Streetlight GPS data can assist in finding patterns in movements among the major !p destinations and paint a picture of major internal traffic flows.

Three major !p travel markets, characterized by populations, employment, and major traffic flows, emerged from our analysis of demographics, land use, and Streetlight data:

- The University of South Florida Travel Market
- Medical Community Travel Market
- !p Population & Local Businesses Travel Market

These are areas of dense employment/population that define the travel patterns. Specifically, traffic flows from the residential and commercial areas north of E Fletcher Avenue to and from USF; and from the commercial centers around the University Mall to and from USF. Shown as a simple crescent in **Figure 25**, this major back-and-forth flow is actually made up of countless smaller trips, connecting housing, employment and shopping destinations. The major travel markets are explained in further detail below.

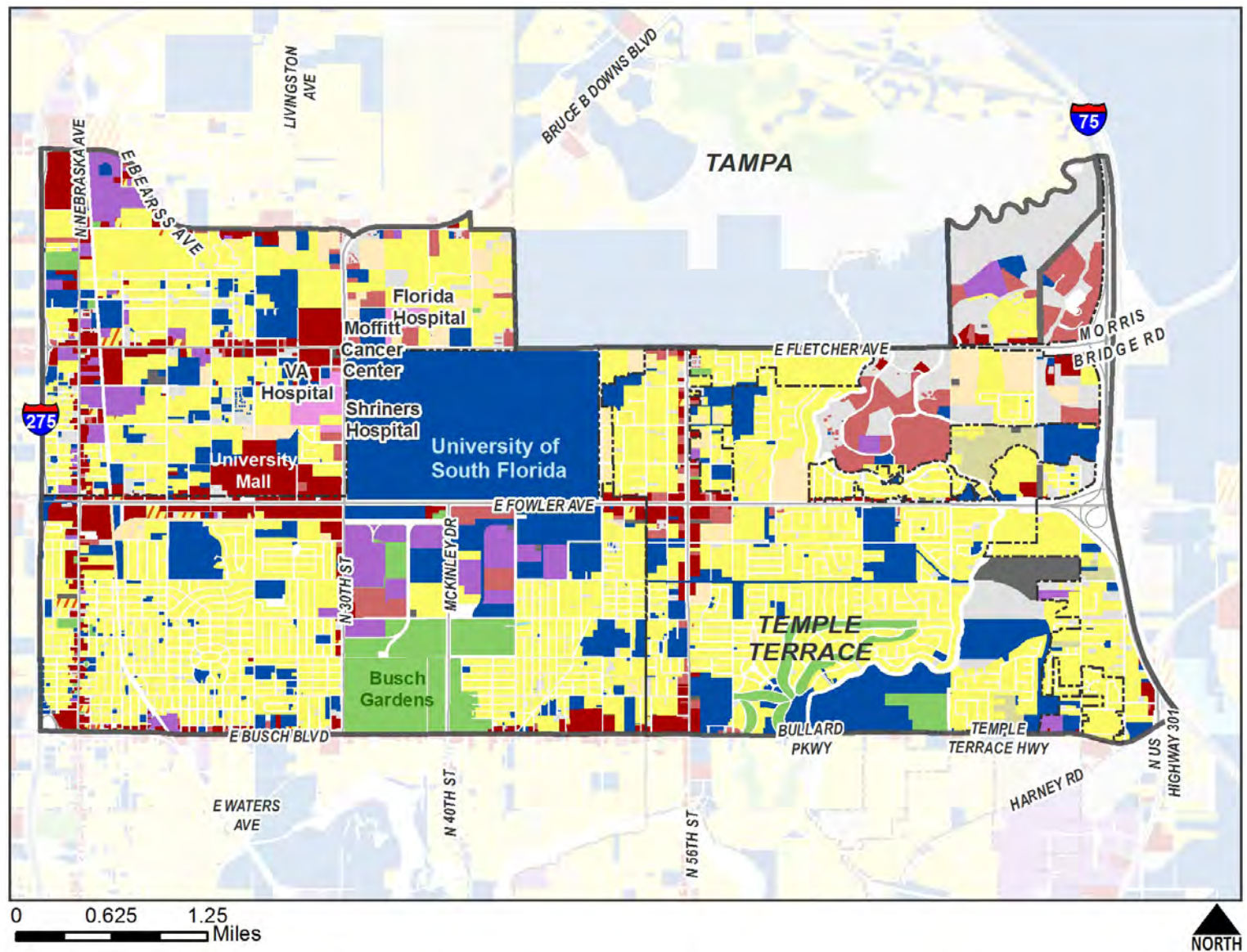


Figure 25: Existing Land Use



The University of South Florida Travel Market

Located in the heart of the !p, the University of South Florida, Tampa is a thriving, public university with over 40,000 students enrolled (2016-2017). The University is comprised of 14 colleges, research facilities, a complex parking facilities network, green spaces and botanical gardens, sports complexes and athletic centers, health and commercial facilities and residential buildings, among other uses typical of a large, 4-year campus. And the campus continues to grow. New developments on campus include The Village, a 2,171-resident student housing complex, a new Publix grocery store – both located near Fletcher Avenue and USF Palm Drive (**Figure 26-Figure 27**).

Characteristics	Description
Land Use	Institutional (includes residential and recreational uses)
Trip Patterns / Traffic Flow	<ul style="list-style-type: none"> On-campus, internal movements Off-campus, local trips include nearby student housing and commercial centers
Population size	Over 60,000 (41,000 students; 13,900 faculty and staff)
Number employed	13,900 faculty and staff

Table 5: USF Travel Market Characteristics

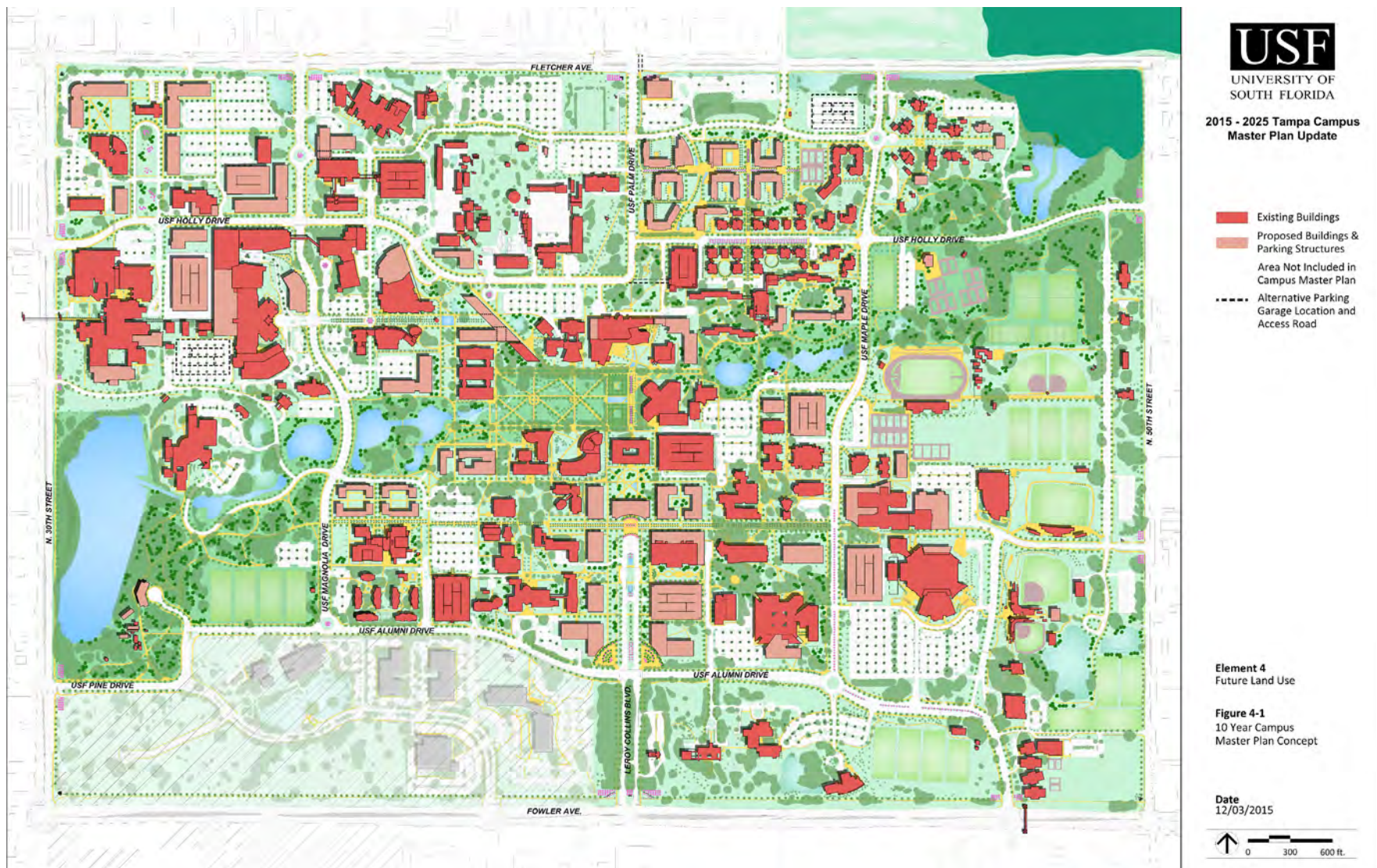


Figure 26: USF 10-Year Campus Master Plan



The USF campus population benefits from an organized set of mobility solutions. USF students, faculty, staff and recognized affiliates have access to a full range of on- and off-campus transportation services (e.g., Bull Runner, Share-a-Bull, Enterprise car share, Zimride, HART U-Pass, etc.). Additionally, USF visitors have limited access to USF transportation services (Bull Runner). While USF provides an extensive set of transportation services funded primarily through student fees, access to these services are not available to non-campus populations.

Mobility to, from, and within the USF campus will be a critical factor in improving mobility within the !p. Mobility solutions should plan for future USF growth.

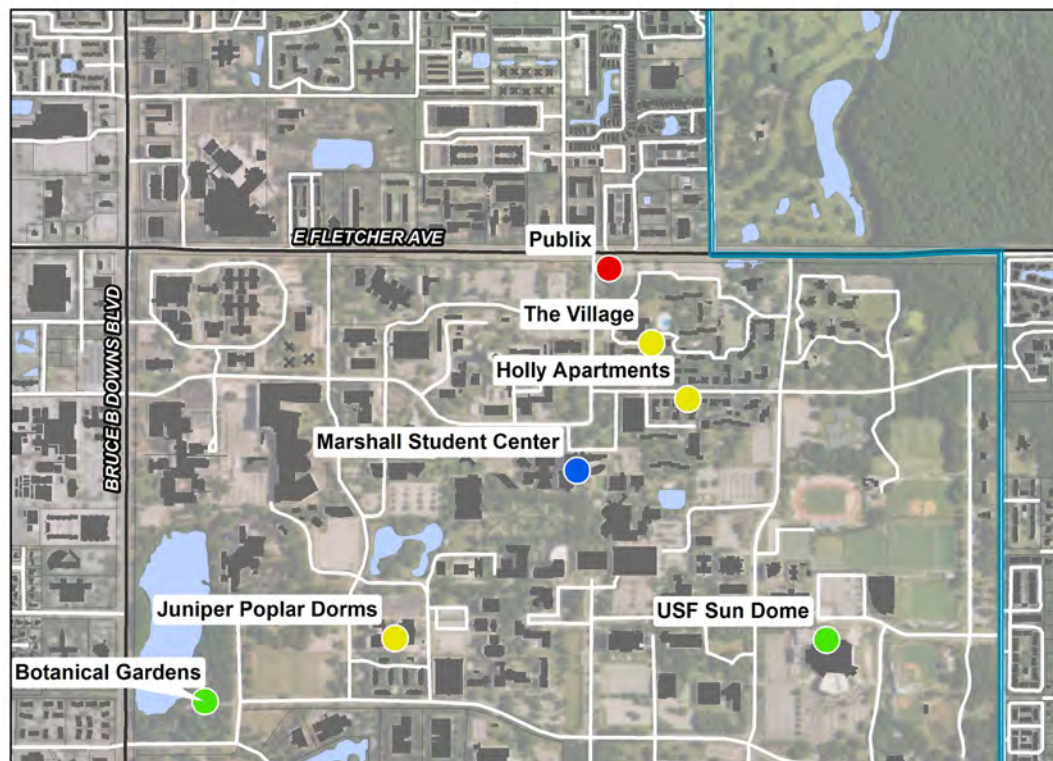


Figure 27: Major Existing & Proposed USF Destinations

The Medical Community Travel Market

Health care providers in the !p include five major hospitals/ medical centers (i.e., Florida Hospital, James A. Haley VA Hospital, John Hopkin's All Children's outpatient center, Moffitt Cancer Center, and Shriners Hospital for Children), and numerous outpatient and private practices.

The !p's medical community play an important role locally and within the larger region as major employment centers and sources of medical research and advancement. And their influence in the !p is growing – Moffitt Cancer Centers new outpatient facility is one example of a growing medical community presence.

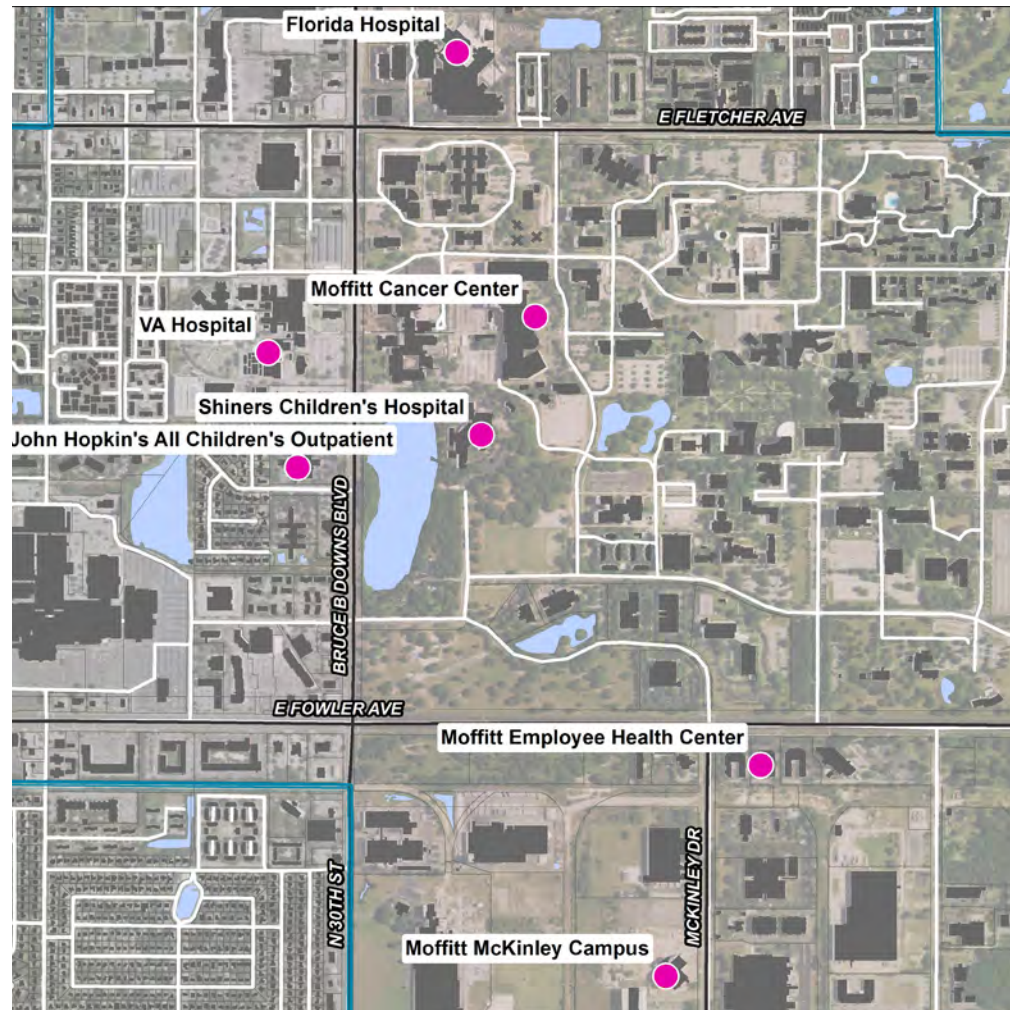


Figure 28: Major Medical Community Destinations



Medical staff have no or limited access to USF transportation services (e.g., Moffitt McKinley Campus). They are currently served by shuttles operated by the various institutions. While there are many non-USF and off-campus affiliates, their mobility services are provided individually and are not coordinated between affiliates. HART currently provides local and rapid bus service and launched HyperLINK in November 2016, the pilot first/last mile service to bus stops north of E Fletcher Avenue. HyperLINK will provide added connections to local and regional transit network. And TBARTA operates vanpools for workers completing their daily commutes.

A master mobility plan should address the specific needs and opportunities of the !p's hospitals and medical centers.

Characteristics	Description
Land Use	Hospital and Institutional (where affiliated with USF)
Trip Patterns / Traffic Flow	<ul style="list-style-type: none"> ▪ Regular trips between medical facilities (staff and patients) ▪ Trips between parking facilities and medical facilities ▪ !p Core to business districts in larger !p planning area
Number employed	Approximately 12,900 employees

Table 6: Medical Community Travel Market Characteristics



The !p Population & Local Businesses Travel Market

The third major travel market in the !p is characterized by the !p residents, visitors, and local businesses that occupy much of the rest of the !p and interact regularly with the other major anchors. Increasingly, these uses are becoming denser in the !p Core, as new development and redevelopment changes the face of the !p. Since transit is dependent, in part, on density, understanding where and how these people move is critical.

The local business community in the !p ranges from high tech software companies to retail shops and restaurants to large amusement parks. Much of the existing commercial and office uses in the !p are located along the major corridors (University Mall, University Square, and World of Beer lie along E Fowler Avenue, for example). Businesses new to the !p largely include restaurants (Portillo’s, Starbucks, and Miller’s Ale House).

But perhaps the fastest growing travel market in the !p are the student-housing developments, which are emerging as high-demand destinations for transit. New developments in the !p include:

- The Standard – Bruce B. Downs Boulevard and University Square Drive (Student housing/765 residents)
- IQ Apartments – 12708 Bruce B. Downs Blvd. (Student housing/183 units)
- Haven 46 – 14500 N. 46th Street (Student housing/158 units; 542 beds)
- Uncommon Apartments – 14202 42nd Street (Student housing/161 units)
- Birchmore Apartments/Tampa Retreat – 11326 46th Street (Student housing)

Characteristics	Description
Land Use	<ul style="list-style-type: none">▪ Residential, Mixed-use, Commercial, Office, Parks/Recreation
Trip Patterns / Traffic Flow	<ul style="list-style-type: none">▪ Major traffic flows between !p commercial uses and USF▪ Major traffic flows between !p residential north of E Fletcher Avenue and USF
Population size	31,000 people live in the !p Core
Number employed	Approximately 9,100 employed in the !p (non-USF and non-hospital workers)

Table 7: !p Population & Local Businesses Travel Market Characteristics

Tampa Innovation District

Mobility Master Plan

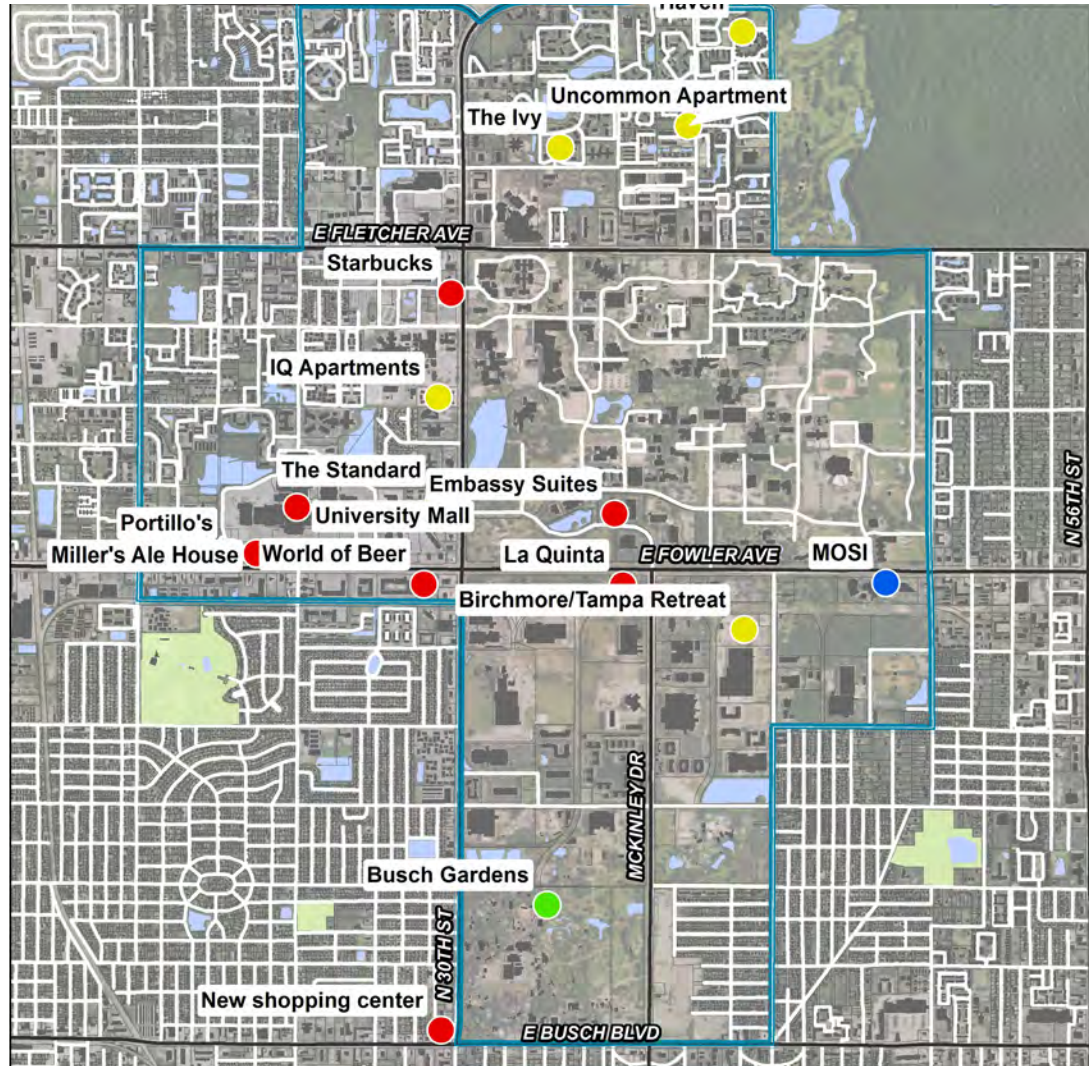


Figure 29: Area Development and Destinations

While multi-family residential development in the !p is primarily student housing, non-student housing developments are also emerging. One example is The Ivy at 3424 Jefferson Commons, an apartment community renovation of 1,002 units.

!p workers, visitors and residents have access to all city/county transportation services (HART, TBARTA, private operators) but no access to USF Campus transportation services. Various employers and businesses operate shuttle services independently, including the Busch Gardens employee shuttle service providing pickup/drop-offs at the University Mall area, visitor shuttles operating between their campus facilities, and area hotels operating within an approximate 3-mile radius of the !p.

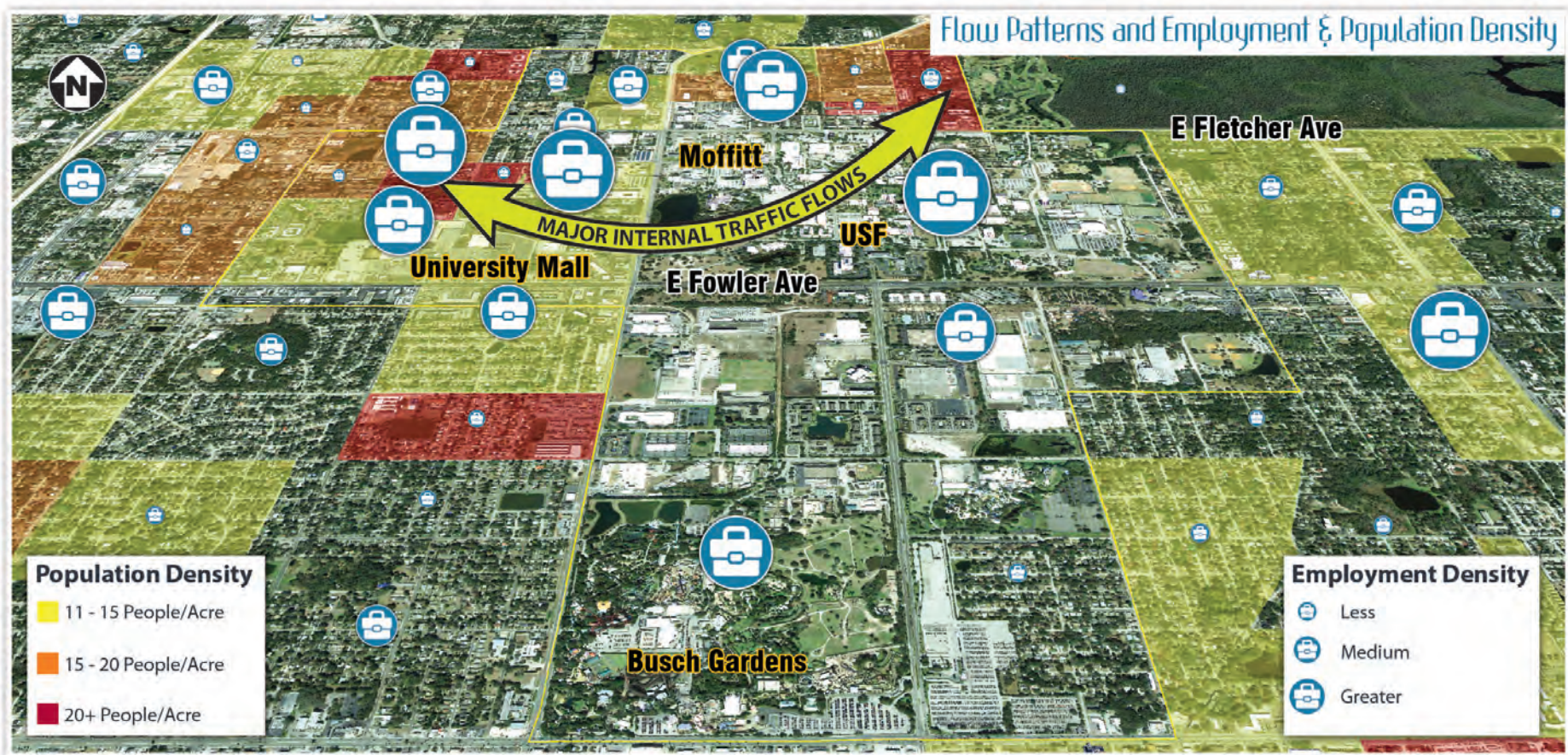


Figure 30: Flow Patterns and Employment & Population Density



Mobility Solutions



Mobility Solutions Overview

The mobility solutions presented herein are born of the cross-currents of people, institutions, and ideas in the !p. The solutions are agile and evidence-based. They reflect the innovative spirit of the !p and the forward-thinking atmosphere of this place. The solutions will fit into the wider picture of the !p: they work in tandem with the community engagement activities and the transformative placemaking projects.

Solutions for a “Smart City” District

In December 2015, US DOT launched the Smart City Challenge which asked mid-size cities to develop and submit ideas for innovative, smart transportation systems that use technology and creativity to move people and goods quickly, cheaply and efficiently. The City of Tampa submitted last year and plans to do so again. !p, with its community of innovative and creative people and businesses united in their effort to transform their place, is a natural engine for such initiatives. In other words, !p intends to be ground zero regionally and a leader nationally for implementing smart city initiatives. This Plan is aligned with that vision. By including guidance and recommendations for implementing “future-proofing” technologies such as !p Wi-Fi and autonomous vehicle shuttles, this Plan poises the !p to evolve and embrace the changes occurring around the Country.

Short- and Mid-term Solutions

In many ways, innovation districts tend to grow and evolve using an almost scientific method: the experiment, observe, repeat. The solutions presented in this Plan are flexible, light, and achievable, designed for immediate (expanded bike share) to mid-term (AV shuttle) implementation. It is intended that this plan be used for immediate action, as well as long-term growth and evolution.

Solutions Based on Leveraging

One of the core characteristics of an innovation district is collaboration and networking. The solutions presented in this Plan are as much about the what and the how, as they are about the who. The !p’s major anchors will be looked upon to be funding partners for improved transit and mobility in the !p, while new developments and up-and-coming tech and bio-med industries will play supportive, sponsorship roles. The !p will facilitate and guide implementation, using this Plan as a roadmap. An example of this dynamic is the !p Circulator financial plan. The proposed Circulator route will connect the major anchors, who in turn will fund a portion of the service. As new destinations arise, smaller businesses could sponsor stops for a monthly fee. Ultimately, the !p will oversee any minor or major service changes and tracks financials.



Solutions for the !p Travel Markets

Three main, equally important, internal travel markets exist in the !p and are the primary force behind the what, where, and how of the !p mobility solutions. The main travel markets identified (University of South Florida, medical community, and !p population/local businesses) can be further divided into sub-markets. For example, “USF student” can be looked at in more detail as “USF student traveling to work” sub-market. These sub-market movements can be tracked in the grid-like !p market. Unlike the movement found along a corridor, traffic flow in the !p is complicated. Our approach, therefore, was to divide the !p into discrete pieces, analyze movement among these pieces, and identify patterns. This amalgam of trips made it clear that all three major travel markets in the !p are equally influential to over key patterns of movement. And thus, any improvements to mobility would necessarily address the specific needs of all three main travel markets.

A summary of existing and proposed mobility modes, with descriptions is provided in **Table 8**.








Target Market	Regional & Local Travel	USF Campus	Anchors and Destinations	Live, Work Shop	Transit First-Last Mile	Regional & Local Travel	Point-to-Point
Service Area							
Patrons	All	Students, Faculty and Staff	Staff and Visitors	Residents, Campus, Staff and Visitors	Transit Patrons	All	Members
Basis of Operations	County fixed route, regular scheduled service	USF campus, fixed route, frequency based schedules; coordinated with student calendars	Scheduled, frequent, direct service connecting District Core anchors	On-demand and scheduled service connecting District Core extents	On-demand, door-to-door service to transit facilities	Personal vehicle availability	Supports first-last mile and fixed route service area
Mobility Modes	HART	USF Bull Runner	Innovation District Circulator	Autonomous Transit Vehicle	HART HyperLINK	Personal Vehicle	Bike Share

Table 8: Recommended !p Mobility Modes

Most of the trips described by the above travel markets are internal to the !p. While this Mobility Plan, and our recommendations, focus on internal movements, we recognize the importance of and challenges associated with external, commuter movements. With this Plan we are creating an internal network of mobility to encourage local travel. The Mobility Plan, presented in **Figure 31**, illustrates the complete concept. Notably, the Plan connects major destinations in the !p, provides a range of mobility options, and leverages existing transit services in the area. Following this Figure is a brief description of each of the recommended solutions.

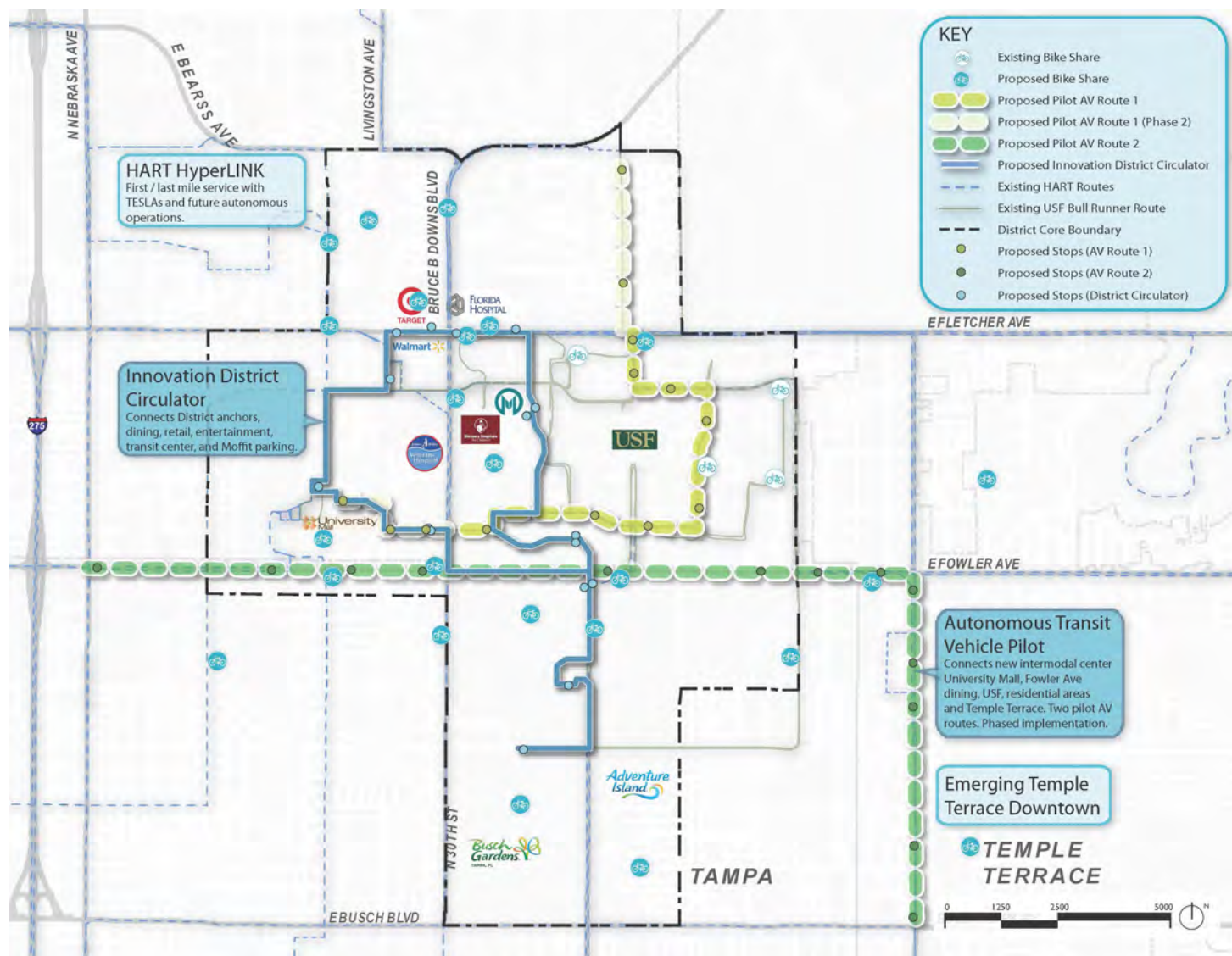


Figure 31: !p Mobility Plan

Tampa Innovation District

Mobility Master Plan



!p Bike Share

!p Bike Share will involve the phased transition from the USF service to a !p Bike Share program. Phase 1 will allow USF students initially, and !p residents and visitors ultimately, to check out a high-quality, well-maintained bike to travel short distances within the !p. Local businesses and new developments will have the opportunity to host bike share stations as the service area grows outward from USF campus. And bike share members will have access to the Tampa Bay network of bike share programs.

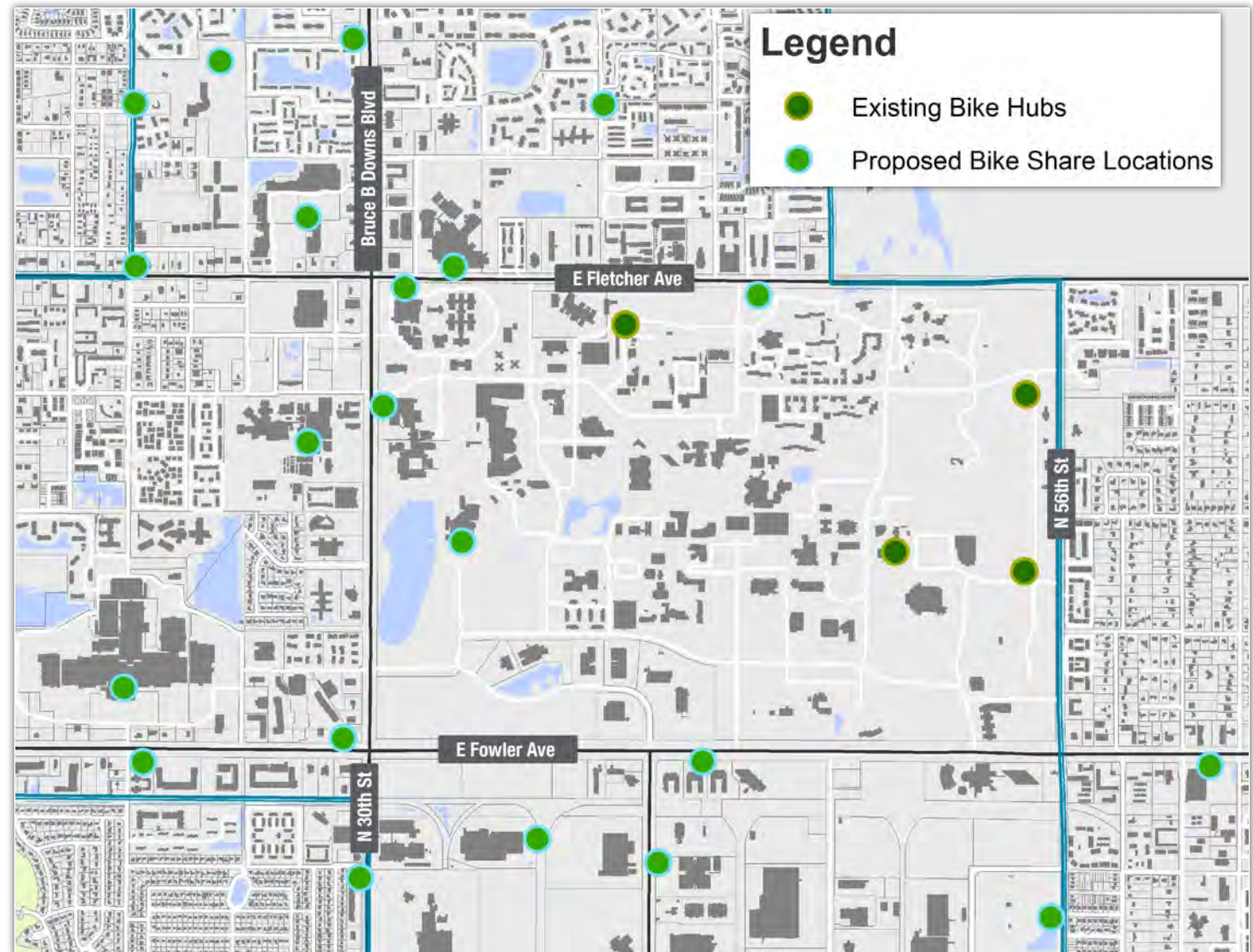


Figure 32: Bike Share concept

Additional benefits of Ip bike share include:

- Fills the first/last mile transit gaps in the Ip.
- Fosters the redevelopment of the Ip into a walkable, mixed-use, high-density environment.
- Promotes local trips and a sense of community & placemaking.
- Reduces environmental impacts from private/individual transportation.
- Cultivates a successful, existing bike share program (Share-A-Bull) and expands the service for access to work, play, and home.
- Access to regional Coast Bike Share network.
- Would reduce cost to students (monthly fee) and reduce maintenance costs over time.



Figure 33: Share-a-Bull bikes on USF campus



Figure 34: Coast Bikes in downtown Tampa



!p Circulator

The !p Circulator will connect the major destinations in the !p Core. The Circulator will provide fast, efficient service while offering a comfortable, convenient option for local trips. The type of bus will likely be similar to the buses used by HART and Bull Runner, but can include electric and compressed natural gas vehicles, with the potential to accommodate future technologies. The Circulator system is anticipated to be branded to be clearly identifiable by riders and represent the !p brand. While the service could be operated by USF, as an expansion of the Bull Runner service, it will likely be operated by a third-party.

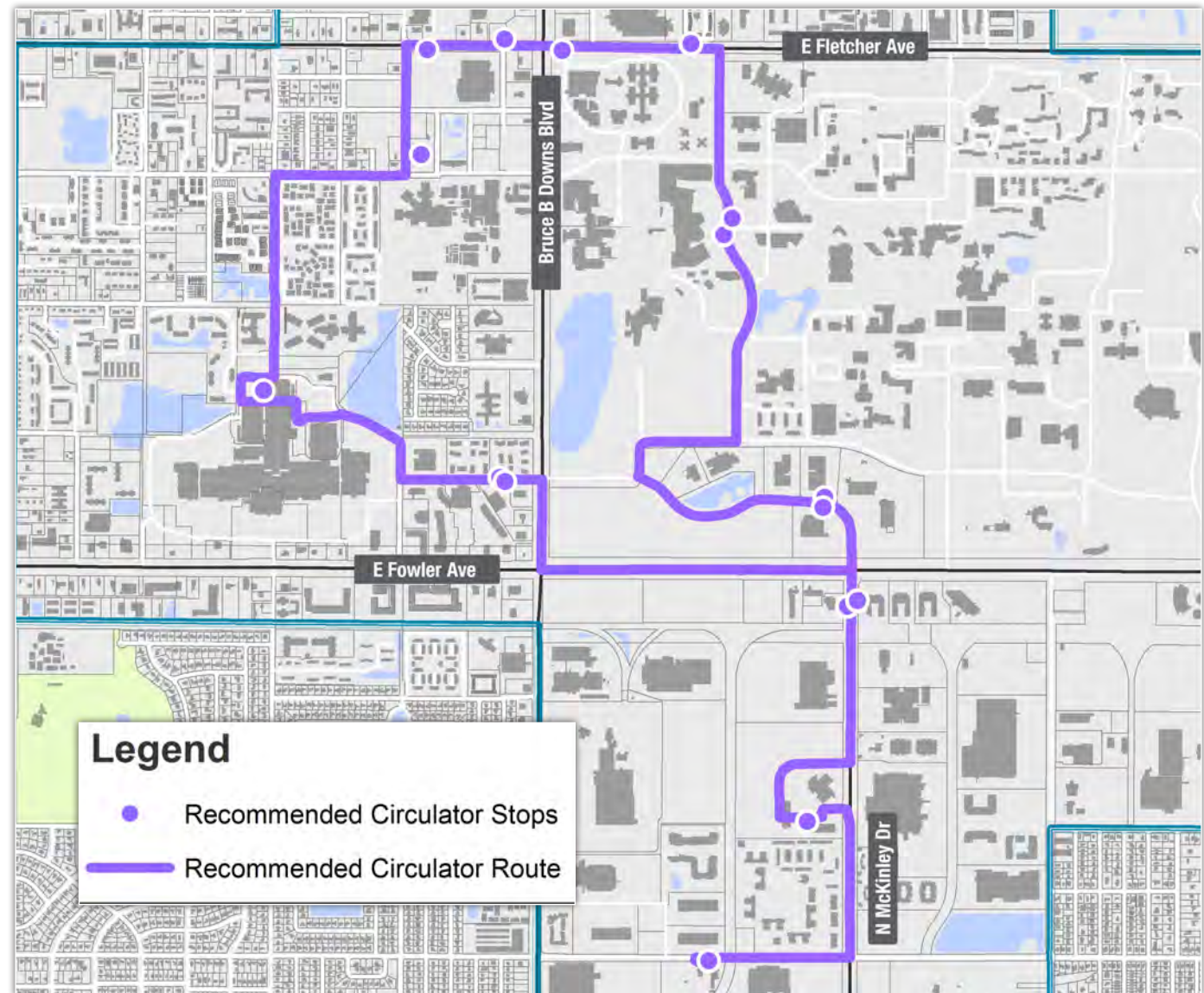


Figure 35: !p Circulator concept

Additional benefits of !p Circulator include:

- Improves mobility and circulation in the !p Core area.
- Fosters the redevelopment of the !p suburban spaces into walkable, mixed-use, high-density environments.
- Improves access to available parking in areas with shortages.
- Promotes internal, local trips and a sense of community and placemaking.
- Reduces environmental impacts from private/individual transportation.

*The !p Circulator
will function
as a downtown
circulator, traveling
within a network
of live, work, play,
create*



Figure 36: DC Circulator



Autonomous Vehicle Shuttle

!p Autonomous Vehicle (AV) pilot transit shuttles will likely be 12-15 passenger vehicles equipped with advanced sensors and computing abilities to perceive and communicate with their surroundings. The shuttles will perform all critical functions (steering, acceleration, and braking) without an operator, while carrying students, staff, and visitors along fixed guideways at relatively low speeds. The recommended route connects the major recreation, residential, commercial, and research facilities.

The USF campus will function as a tech proving-ground for the pilot AV. The pilot will demonstrate how AV performs on a large campus. Students, staff, and University visitors, already accustomed to parking once and finding alternative means for local trips, are a natural “fit” for AV shuttles operating in mixed traffic situations at lower speeds. Future expansion of the AV shuttles will build upon existing relationships. For example, the !p could partner with HART, who is piloting Tesla AV first/last mile shuttles in the area via their HyperLINK service. Tampa !p may also have the opportunity to partner with Tampa Hillsborough Expressway Authority who is employing the Tampa Connected Vehicle Pilot with vehicle-to-vehicle and vehicle-to-infrastructure communication technology.

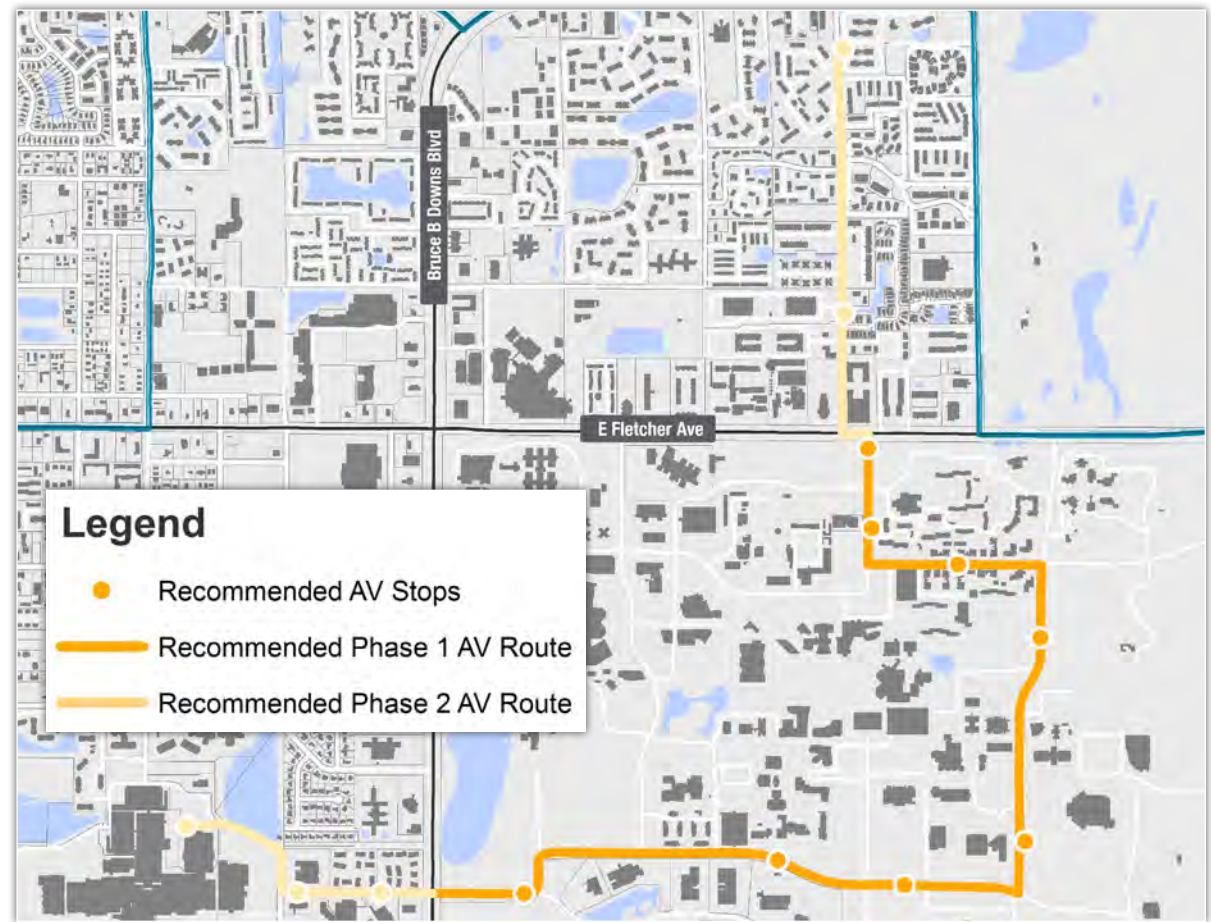


Figure 37: !p Autonomous Vehicle Shuttle concept

Additional benefits of an AV shuttle include:

- AV Technology has the potential to reduce collisions drastically and improve pedestrian and bicyclist safety.
- Promotes internal, local trips and a sense of community and placemaking.
- Places the Ip on the map as a leader in transit technologies.



Figure 38: AV Shuttle



Multimodal Strategies for Safety Improvements

The success of the recommended mobility solutions will depend, in part, on the environment in which they are operating. Safe crossings, sidewalks, and bike lanes are critical features of a transit system. That is: safe crossings, safe sidewalks, and safe bike lanes. The simple existence of these features is not enough to support pedestrian/bicyclist safety and the multimodal rigor of the Ip. A planned strategy for safety improvements that complement existing and future mobility options be essential. This Plan provides a high-level overview of multimodal strategies and safety improvement recommendations.

The identified areas for safety improvements are shown in **Figure 39**. Intuitively, we know that crossing E Fowler Avenue by foot feels unsafe. Similarly, while

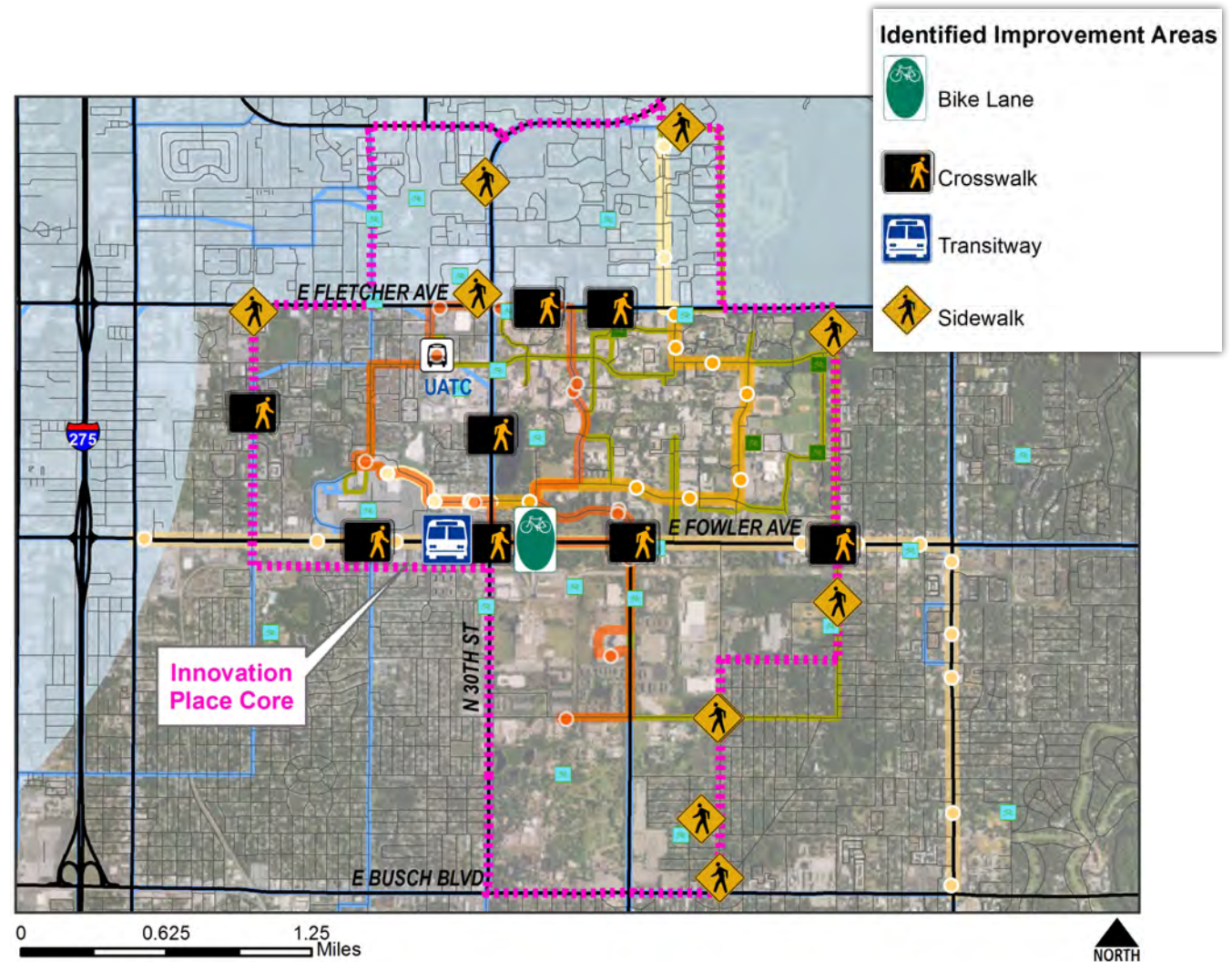


Figure 39: Multimodal Strategies for Improved Safety

E Fowler Avenue has a designated bike lane, even the most seasoned bicyclists agree that it does not feel safe to bike there. Safety features that exist in an otherwise car-centric environment will not be enough to encourage walking, biking, and using transit. Therefore, the identified areas safety improvements are a mix of new features (a crosswalk with signalization on Bruce B Downs Blvd near the VA Hospital and new student housing) and features to be improved (a wider, separated, and/or color-highlighted bike lane along E Fowler Avenue). The recommendations are based on observations of pedestrian movements, aerial analysis, and the location of existing and proposed bike share stations:

- Shortened crosswalks across E Fowler Avenue
- Wider, separated, and/or color-highlighted bike lane along E Fowler Avenue
- Crosswalk with signalization on Bruce B Downs Blvd near the VA Hospital and new student housing
- Complete sidewalk network in residential areas along major roads
- Designated transit lane or guideway along E Fowler Avenue
- Connecting sidewalks into commercial centers (e.g. University Plaza)
- Mid-block crossings with signalization along E Fletcher Avenue
 - *At Florida Hospital and USF*
 - *At student apartments between USF Magnolia Drive and N 42nd Street*



Figure 40: Existing E Fowler Ave



The !p developed design concepts for streetscape improvements along E Fowler Avenue that would enhance safety and multimodal options and provide a gateway befitting a major innovation district. This Plan recommends that a working group, made up of members from NNTA, FDOT, City of Tampa, Temple Terrace, Hillsborough County MPO, and engineering and planning consultants, be organized to coordinate efforts and facilitate future implementation.

USF to Downtown Express

With the planned development of a downtown USF CAMLS medical center, there will be an opportunity to connect the USF medical campus to the downtown USF Health, TGH, and CAMLS medical centers. These connections will strengthen the technological and innovative endeavors of the !p. A USF to Downtown Express bus would provide that connection with a fast, efficient ride between the main USF, Tampa campus medical center and the downtown USF CAMLS medical center. The Express route would be operated by HART as an overlay to the existing local and Metrorapid service, likely operating during morning and afternoon peak periods, and noontime. Service will cater to USF medical staff, faculty and students needing to travel between USF's main campus and downtown.

The opportunity to foster the existing partnership between USF and HART should be seized to improve student access to regional destinations.



Figure 41: Tesla Model X vehicle

Expanded HART HyperLINK

HART recently unveiled HyperLINK, a first/last mile pilot shuttle service that operates in select service areas, providing an on-demand, door-to-bus stop or a bus stop-to-door service. And recently, the HyperLINK has begun to expand to destinations to locations other than bus stops. The service will provide numerous benefits to its service area, including encouraging the use of transit, expanding HART's bus service area, and improving access to transit. On April 24, 2017, HART and Tesla kicked off a partnership by unleashing Tesla HyperLINK vehicles. This Plan recommends that HART and the !p work together to expand the HyperLINK service.

Digital & Technology Solutions

Existing and proposed transit services in the !p will operate best in an environment that is as flexible, accessible, connected, and intuitive as the transit itself. In particular, AV transit will depend on the user and infrastructure connections that require fiber, wireless technology, and integrated apps to function. So as part of the suite of mobility solutions, we are recommending !p Wi-Fi and a one-click, !p resources website. These components will function as portals of information and a backbone of technology and communication for the !p.

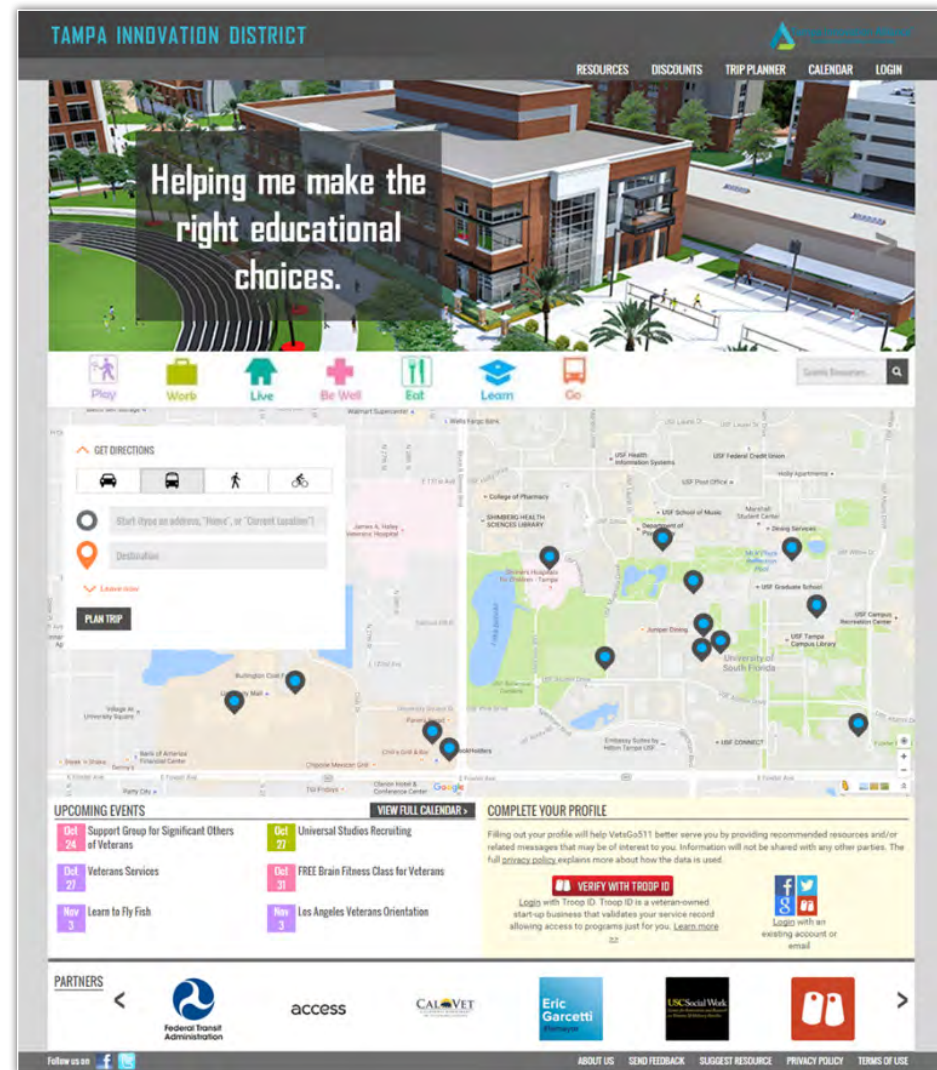


Figure 42: Sample Web Portal



Expanded !p Bike Share

The University's Share-A-Bull bike share program is both highly successful and over-used. The result is that when bike share users (students) login to the bike share app, SoBi, to find a nearby bike, often there is not one available. Additionally, trip patterns show that students are often riding the bikes off-campus and outside the geofence that defines the bike share service area, despite penalty fines that were first implemented in early 2016. And in early 2017, USF implemented further fees: a monthly membership of \$12/month. The result was a dramatic drop in memberships – a reaction to the subscription cost that the department responsible for maintenance of the bikes, USF, Outdoor Recreation, says will likely be short-lived. Demand for bike share will continue to increase. The challenges will also remain:

- How to improve bike-share access to students
- How to improve program operations
- How to reduce costs to both the users and operators



Figure 43: Share-a-Bull bike on USF campus

And unless the above challenges are addressed in a meaningful way in the short term, the Share-A-Bull program may not continue to operate beyond the Spring 2017 semester.

Expanding bike share (meaning adding more bikes and a larger service area) is the first step in addressing these challenges. There are currently about 3,000 - 4,000 Share-A-Bull members (down from a peak of over 6,000 members prior to implementing the monthly fee) and only about 60 bikes available at any time. USF owns 100 bikes, but at least 40% of the bikes are either in need of repair or lost at any time. Adding more bikes in the short would reduce wear and tear and required maintenance on the bikes. And adding connections to off-campus housing, work, shopping, and recreation uses would improve student accessibility to the program and increase membership.

Short-term expansion can best be accomplished by a phased transition of the program from USF to a third-party vendor, Coast Bikes. Coast Bikes can effectively facilitate a better service to users. In addition, student members of Coast Bike's bike share service would have access to a larger network of programs including downtown Tampa and St. Pete. Implementation would involve two phases. The following is a summary of the phases and recommendations.

Phase 1 – *Transition to Coast Bikes*

Phase 1 of implementation will identify and address the legal hurdles to implementing a third-party bike share program. This includes existing bike transfer and lease agreements between USF and Coast Bike; determining funding for the new, approximately 200 bikes needed to transition; and developing a fee-structure. The fee structure should address the different programs that Coast Bike could offer as well as the annual, daily and reduced cost options.

Phase 2 – *!p Bike Share*

Phase 2 will involve the expansion of the bike share service area and membership to the wider !p Core area. Advertising and bike stations sponsorships will be key to this Phase. The large, anchor institutions in the !p will be important, potential sponsors; however, new developments in the area (particularly the numerous new student housing developments) provide significant opportunities to sponsor and host new bikes stations to complete a dense, viable bike network. Therefore, it is recommended that every new development agreement in the !p Core should include bike share station sponsorship as part of the agreement.





Projected Membership

Projected membership is difficult to calculate, but there are many known factors that will impact demand for bike share in the District.

Existing bike share conditions in the District have operated under a range of members/total population ratios, depending on fee structure. When USF's Share-A-Bull program was free for students, the percentage of the total student population that were active members was 15%. That percentage dropped to 0.5% after a \$12/month fee was imposed. We can expect that since a Coast Bike Share program in the District would cost less than USF is currently charging students, the member/total population ratio will be somewhere between 0.5% - 15%. The workforce population that either lives or works within !p Core is 43,411. So it can be estimated that up to 2,170 – 6,511 additional members can be gained by expanding bike share in the !p Core.

Other factors that could impact bike share demand include:

- **22%** of households in the !p Core and **16%** of households in the larger !p planning area do not own a vehicle and would benefit from the bike share option.
- Demand for parking the !p is growing. For example, according to the July 2016 AECOM Existing Conditions Report, USF anticipates growth in parking demand by **11%**, with weekly average parking demand during peak periods to increase by **91.1%**, bringing the parking to near capacity. However, while limited parking availability could boost demand for bike share, it is also driving the prioritization and development of ever more parking facilities. USF, for example, includes 1.1 million square feet of parking garages in its 2010 Campus Master Plan. And Busch Gardens is considering a 5-6 story parking garage on McKinley Avenue.
- Traffic can be correlated to bike share demand, since higher levels of traffic congestion will entice people to use bikes for shorter, local trips to avoid the hassles of navigating traffic (and, as stated above, finding a new parking spot). FDOT 2015 Level of Service (LOS) data indicate poor to failing levels for most the major roads in the !p.
- The combined densities of population and employment on the USF campus can be used as predictors for how population and employment densities of the rest of the !p will support bike share. USF campus has high employment densities and low population densities (**Figure 44**). This dynamic exists throughout much of the !p Core. In addition, there are isolated areas of !p (north of E Fletcher Avenue, for example) that have both high population density and employment density.

Proposed Bike Share Locations

Bike share locations beyond USF will be determined on a case-by-case basis as demand for the program expands geographically. Ideally, an Ip Bike Share would operate with a station density of about seven (7) stations per square mile (or with a spacing of ¼- to ½-mile between stations). New multi-family residential and student housing developments (see **Figure 44**) will be valuable opportunities to place stations a higher density locations, where it makes sense to do so.

Technical Specifications

Standard urban stations are approximately 15 rack units housing approximately 10 bikes. The Ip is in a more suburban setting, which may require larger racks in some areas. An example of Bike Share operating in a more suburban setting is Curtis Hixon near downtown Tampa. The technical specs for standards bike stations are as follows:

- 15 rack units and accompanying sign require a paved pad measuring approximately 48 ft x 6 ft including ADA buffers. An additional 2-4 ft paved space (such as a sidewalk) is needed behind the hub to provide space for backing up the bike to start the ride.
- 30 rack units (housing approximately 20 bikes) and sign require a paved pad measuring approximately 86 ft x 6 ft with the same additional space considerations.

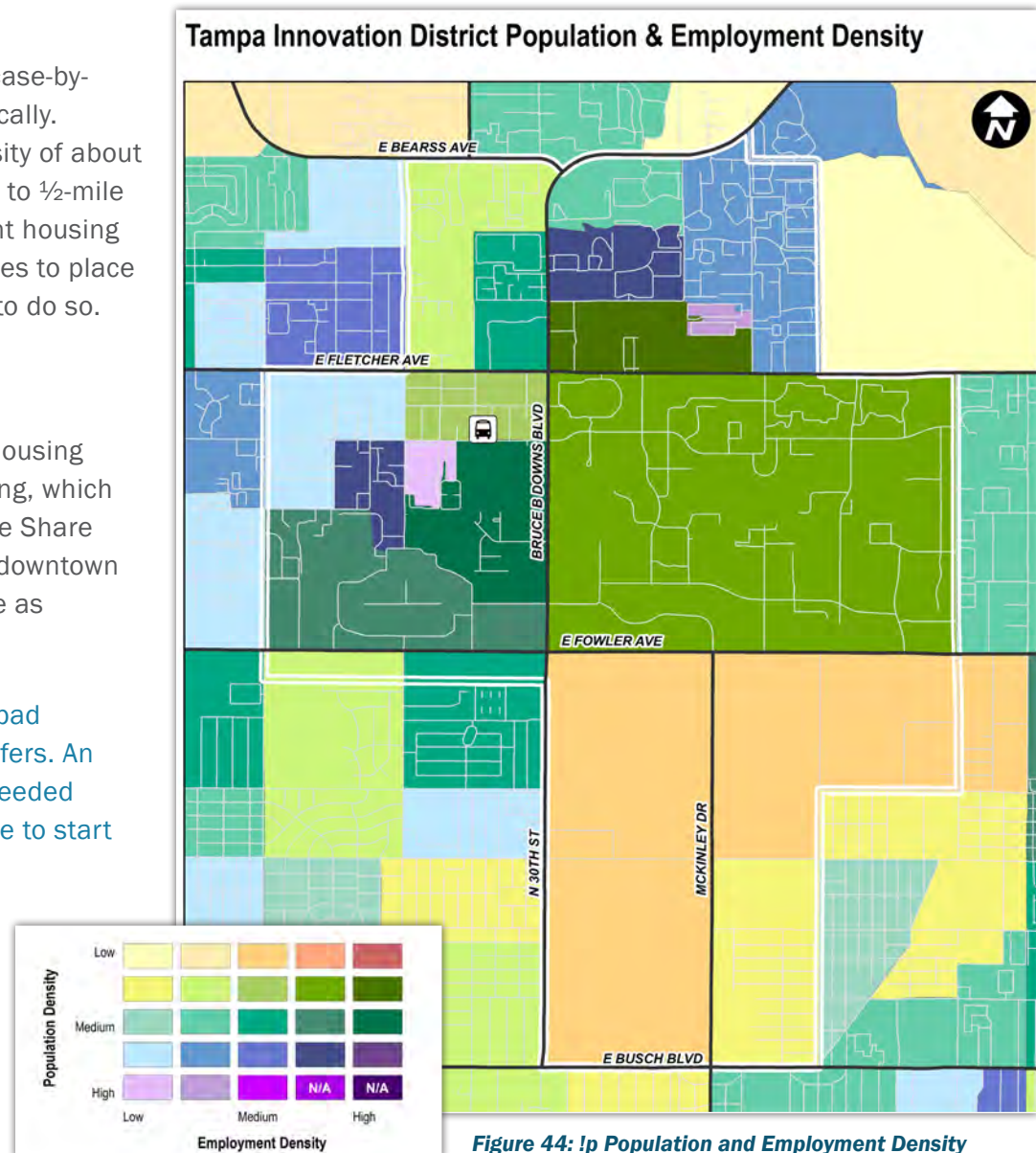


Figure 44: Ip Population and Employment Density

Tampa Innovation District

Mobility Master Plan

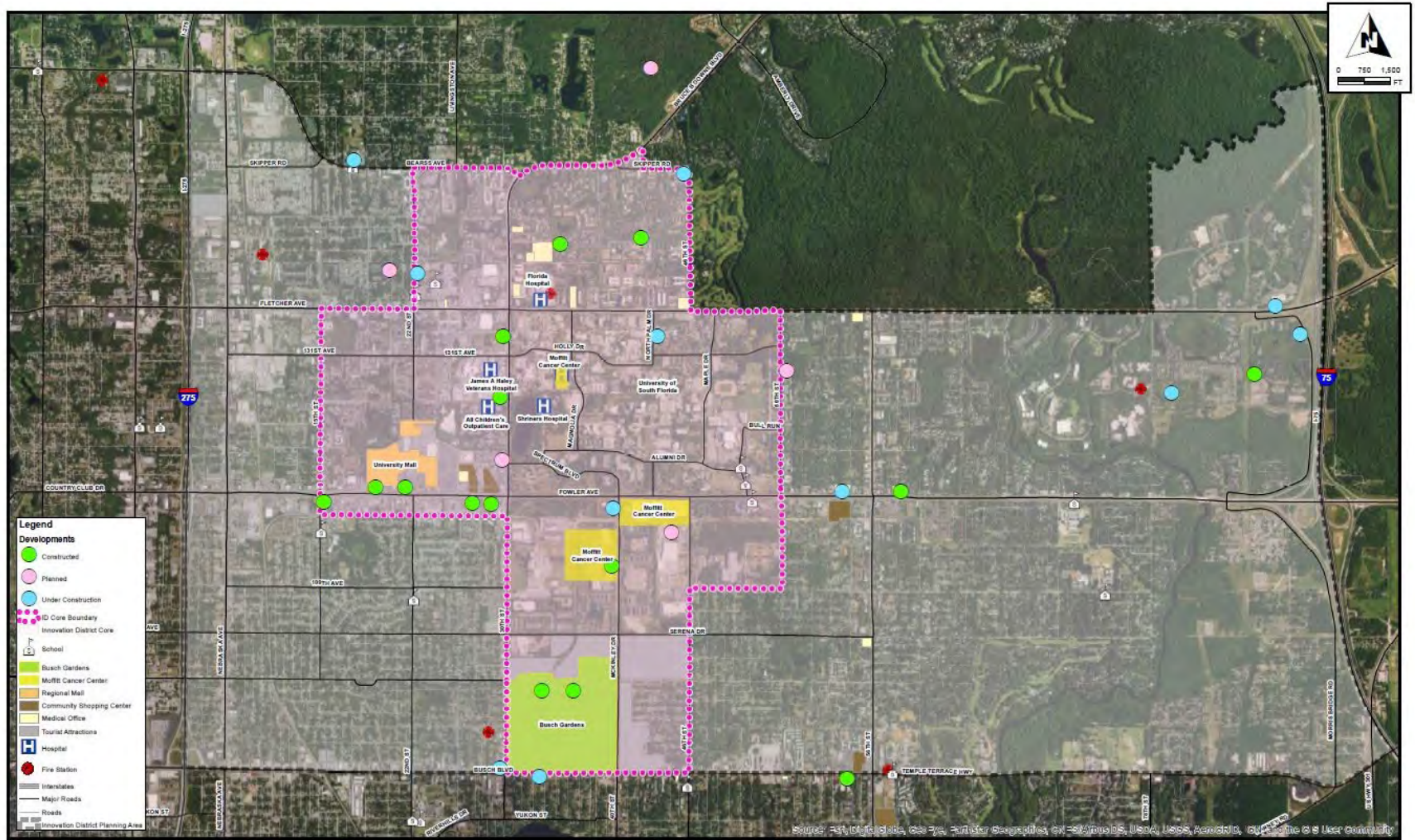


Figure 45: Development Projects

Management Plan

Management and governance of the Share-A-Bull Bike Share program would be transitioned to Coast Bikes based on a contract amendment process. The amended contract would address bike ownership, sponsorship rights, and program naming rights, among other things.

Coast Bike would assume the risks and liability of a Bike Share program that extends beyond the USF campus and will work with City of Tampa, Temple Terrace, Hillsborough County, and private landowners to permit and place bike stations. Coast Bikes has also expressed interest in hiring interested USF students for program and bike maintenance which would help to facilitate the transition of the program from the students' Campus Recreation Department to a third party.

Critical path elements include the purchase of 300-400 additional Share-A-Bull bikes to bring the program up to an acceptable level of functionality and a contract amendment agreement between USF and Coast Bike Share. City of Temple Terrace and City of Tampa are already either in discussions with Coast Bike or have agreements with Coast Bike – it's not anticipated that locating bike hubs on City land would be an issue. There is no precedent yet with Hillsborough County regarding bike share; however, it is not anticipated to be an issue.

Cost Estimates

!p Bike Share costs will vary based on infrastructure upgrades required and availability of existing amenities. For example, Phase 1 will require only the purchase of the bikes because USF is currently installing additional bike racks around campus to be utilized by Bike Share. Phase 2 will require the purchase of the additional bikes, stations, and possible infrastructure upgrades specific to each hub location; see the cost breakout in **Table 9: !p Bike Share Cost Breakout** below.





BIKE SHARE COST BREAKOUT			
Phase 1			
CAPITAL PURCHASE	COST	QUANTITY	TOTAL
Bike (includes engineering, permitting, station racks and sign)	\$2,500 - \$3,500 / bike	300	\$750,000 - \$1,050,000
TOTAL COST PHASE 1		\$750,000 - \$1,050,000	
Phase 2			
CAPITAL PURCHASE	COST	QUANTITY	TOTAL
Bike (includes engineering, permitting, station racks and sign)	\$2,500 - \$3,500 / bike	300	\$750,000 - \$1,050,000
Possible, additional upgrades (paving, parking space upgrades, etc.)	\$5,000 - \$10,000 / hub	45	\$225,000 - \$450,000
TOTAL COSTS PHASE 2		\$750,000 - \$1,500,000	
TOTAL COST		\$1,500,000 - \$2,550,000	

Table 9: !p Bike Share Cost Breakout

Funding Sources

Capital purchases (including bikes and bike stations) should be funded by a combination of public and private purchases, grants, and agreements with a third-party Bike Share vendor, such as Coast Bike Share, that include a portion of the capital expenditures being provided by the vendor, conditional upon anticipated demands.

Bike Share memberships, pay-per-ride, and misuse fee policies will generate revenue for the operation and maintenance of the program by a third party. Additional revenue could be generated by program sponsorships. USF recently implemented a pay-per-ride fee-based system and increasing misuse fees. Memberships initially dropped dramatically in response to the new fee. However, USF surveys of Share-A-Bull riders show that heavy users of the program support greater fees if it increases the availability of bikes. If the program is transitioned to Coast Bikes, the anticipated cost for USF students is around \$8/month, which is less than the \$12/month student fee that is currently in place.

Additional funding should come from new developments in the Ip that have access to the service. It is recommended that developer agreements include a transportation fee for Ip services such as the Circulator and Bike Share.





!p Transit Circulator

Almost ironically, the trend in innovative transit is a back-to-basics approach . Lighter, Quicker, Cheaper (LQC) is the modus operandi of innovative districts and cities around the Country, evidence that a transit project doesn't need to be expensive and complicated to be successful. Essentially, the !p Circulator will connect the major, !p anchors, providing efficient transit along the major traffic flow routes. But what the Circulator service will ultimately look like in that space is not as critical as how it will get done. There is a real and legitimate argument for the near-term implementation of an experimental service, funded by the key !p partners.

Experiment, observe, and adjust. This Plan outlines a flexible, adaptable approach to an existing problem in the !p: local mobility. It provides both tangible, service characteristic recommendations (e.g. route alignment, hours of operation, etc.) as well as strategies for implementation and funding. The recommendations are based on the results of the existing conditions analysis, extensive stakeholder input, and initial route evaluations. They are meant to guide near-term implementation and far-term tweaks to a successful Circulator.

Route Alignment

Route alignment for the !p Circulator serves several purposes. The route loops through the !p Core, providing north-south and east-west connections. It is designed to:

- Provide convenient and efficient connections among key Activity Centers
- Complement existing shuttle services that may be consolidated and provides opportunities for transfers
- Fill existing transit gaps
- Utilize, where possible, existing transit amenities and features
- Be located along calmer, pedestrian-oriented roads
- Be located where priority amenities such as a pad or sidewalk already exists or may be more easily located or are planned.

The Circulator would operate like HART's Flex Service with fixed stops, but could provide the flexibility to deviate from the route to final destinations based on pre-planned requests. The Circulator bus will be similar to HART and Bull Runner shuttle vehicles, but may include electric and compressed natural gas vehicles, with the potential to accommodate future technologies. The Circulator system is anticipated to

be branded to be clearly identifiable by riders and represent the !p brand. While the service could be operated by USF, as an expansion of the Bull Runner service, it will likely be operated by a third-party transportation service provider.

An alternative to the flexible Circulator service would involve expansion of HART’s HyperLINK service to provide expanded flexible, on-demand service. This alternative would need to establish service standards to ensure acceptable wait time to serve key locations, such as the Moffitt employee parking facilities.

Vehicle Options

Circulator possibilities abound – there is traditional, fixed service; on-demand service; electric vehicles; connected vehicles; compressed natural gas buses; rubber-tire trolleys. What works best in the !p will likely be determined by the unique brand of the place. An example, anticipated fleet breakdown (assuming 30-foot buses are utilized) is shown in **Table 10**.

Table 10: !p Circulator Fleet Breakdown

Fleet Breakdown		
VEHICLE SIZE	QUANTITY*	SPARE
30-foot	4	1

** Peak ridership periods will operate with 4 shuttles to maintain headways of approximately 12-15 minutes.
A 15% or one bus, whichever is greater, spare ratio is recommended.*

30-foot buses, the type typically used on fixed-route systems, with front and center doors are an easy fit for the !p Circulator service. These vehicles can transport about 30 riders and are designed for frequent-stop service. Green options, such as diesel-hybrid and all-electric models, are available and may make sense in the !p.

Variants of the typical 30-foot bus are also available for consideration. Trolley replicas, vintage-style buses with wood-like trim, pinstriping, brass handrails and leather hand straps, would be highly visible and recognizable to visitors.

Additional options such as smaller-occupancy electric vehicles may also do well in the !p Core, in areas of higher density. The Downtowner, an electric 6-person shuttle that provides a fare-free service to downtown Tampa, has been successful in a similar space.



Schedule and Hours of Operation

Existing shuttle services in the area operate based on specific ridership demands. The Bull Runner, for example, operates largely based on the University's academic calendar and Library hours. The Moffitt employee shuttles operate during regular business hours and experience peak ridership demand in the early morning and later afternoon.

The recommended Circulator hours of operation are based on a variety of mode purposes; ridership demand is anticipated to fluctuate throughout the day and week. The early, weekday hours will serve the employees and staff of the University and medical institutions. The weekend hours will serve the employees and guests of the entertainment and retail venues.

The Circulator is planned to provide bi-directional service with a service frequency of 12-15 minutes during the peak periods (anticipated to be 7:00 AM-9:00 AM and 3:00 PM – 6:00 PM) and 15-20 minutes during off-peak periods.

Table 11: !p Circulator Hours of Operation

Day	Hours	Total Service Hours
MONDAY – THURSDAY*	6:00 AM – 9:00 PM	16
FRIDAY*	6:00 AM – 10:00 PM	17
SATURDAY	9:00 AM – 10:00 PM	13
SUNDAY	9:00 AM – 7:00 PM	10

**Shuttle will operate at a higher frequency during peak weekday hours of 7:00 AM – 9:00 AM and 3:00 PM – 6:00 PM.*

Fare Structure

The fare policy for the !p Circulator should consider the primary functions of the service – encouraging the use of transit over personal vehicles for local trips, providing a fast, efficient connection among the major !p anchors, and improving access to transit for staff, residents, and visitors of the !p. To entice non-bus users and to consolidate or duplicate some of the existing fare-free services that currently operate in the !p such as the Bull-Runner and Moffitt employee shuttles, the !p should consider a fare-free policy. Operating without fare recovery may be an acceptable tradeoff in the pursuit of the Circulator's primary goals. However, this policy will require a greater financial commitment in providing the service.

Management Plan Options

Two management options have arisen over the course of several months of intense stakeholder outreach. Option 1 is to expand or modify existing Bull Runner services. Option 2 is a third-party operated Circulator.

Option 1: *!p Expanded Bull Runner Service*

A USF-operated expanded Bull Runner service would increase accessibility of the shuttle service by opening the Bull Runner buses to non-USF riders and modifying Routes D and F or adding a route. This approach would need to be phased and careful monitoring of the level of service to students would need to be maintained. Since the Bull Runner's priority is serving USF students, any modification to that service would need to maintain or improve student access.

Phase 1 of this option would open the Bull Runner service to Moffitt Cancer Center employees. Currently, the Bull Runner F Route passes by Moffitt's McKinley parking facility and travels north to campus. There is an opportunity to consolidate these overlapping services by either rerouting the F Route to accommodate these riders or adding a route. Funding for this phase would be provided by the funds currently used by Moffitt for their employee shuttles.

Phase 2 would further modify the Moffitt/USF Bull Runner route to accommodate other major !p destinations and open access to the service to the wider !p population.

The primary constraint to implementing option 1 is maintaining accessibility to USF students. Frequency and bus availability will be critical factors to the Circulator's success. Additionally, since sponsorship of the service is iterative in this option, the cost to maintain the service may be high to the initial funders (i.e. USF and Moffitt), particularly in the early stages of Phase 2.



Option 2: *Third-Party Operated Circulator*

In this scenario, USF would continue to operate Bull Runner independently of a new !p Circulator, with opportunities for possible Bull Runner route modifications where services overlap. The !p Circulator would be operated by a third party and would be governed by the !p and/or HART. The Circulator would operate along the proposed route and include collaboration with Moffitt's employee shuttles to consolidate these services. In addition, opportunities exist to collaborate with HART to determine whether resources could be reallocated to better serve the !p and surrounding areas.

Funding for this option would need to come from the key !p partners from the beginning. Since the Circulator will primarily be connecting the major destinations, it is the employees, visitors, and students of these institutions that will benefit the most. However, while Option 2 relies on a coordinated funding effort to be implemented, it also provides flexibility and the ability for the !p to tailor the service to its needs.

Cost Estimates

Assuming a traditional, fixed-stop Circulator service operating on the service characteristics described above, the estimated annual expenditures is \$865,000; estimate monthly expenditures is \$72,000. Detailed cost estimates and metrics can be found in Appendix B.

Funding Sources

An !p Circulator works best by leveraging the combined funding of the !p's anchors to provide a mutually beneficial service to employees, visitors, students, and residents. The service is designed around the !p Core demographics, employment densities, major internal flow patterns, and stakeholder feedback – particularly in that it expands upon and enhances existing services to replace less efficient services and connect uses that are not currently connected. The goal is to aggregate services and redirect those funds. In this way, funding for the Circulator could come from existing transportation and employee benefits budgets, where available.

Additional funding should come from new developments in the !p that have access to the service. It is recommended that developer agreements include a transportation fee for !p services such as the Circulator and Bike Share.

Autonomous Transit Shuttles

Autonomous vehicles (AV) and connected vehicle (CV) are becoming the most heavily researched automotive technologies. Only a fraction of the capabilities that can be deployed in the future are currently available and entities are striving to be at the forefront of deployment. As the !p evolves, the opportunity to capitalize on this growing trend and implement automated vehicle technology in upcoming projects would align with the !p's vision of being a national leader in transit technologies. This Section provides an overview of AV Transit technology for context purposes, as well as recommendations and strategies for implementation.

AV Transit Technology Overview

Automated vehicle is the umbrella term that includes both AV and CV technologies. An autonomous vehicle is any vehicle equipped with advanced sensors and computing abilities to perceive its surroundings and make decisions for the vehicle operator that affect safety critical functions (steering, acceleration, and braking). Connected vehicles are vehicles that use different technologies to communicate with the driver, other cars on the road, roadside infrastructure, bicyclists, pedestrians, and cloud services. This technology can be used to not only improve vehicle safety, but also to improve vehicle efficiency and commute times.

The AV/CV industry in regards to public transit is slowly emerging in the United States. A 2016 National Center for Transit Research report found that unlike the automotive industry, which has invested heavily in the research and

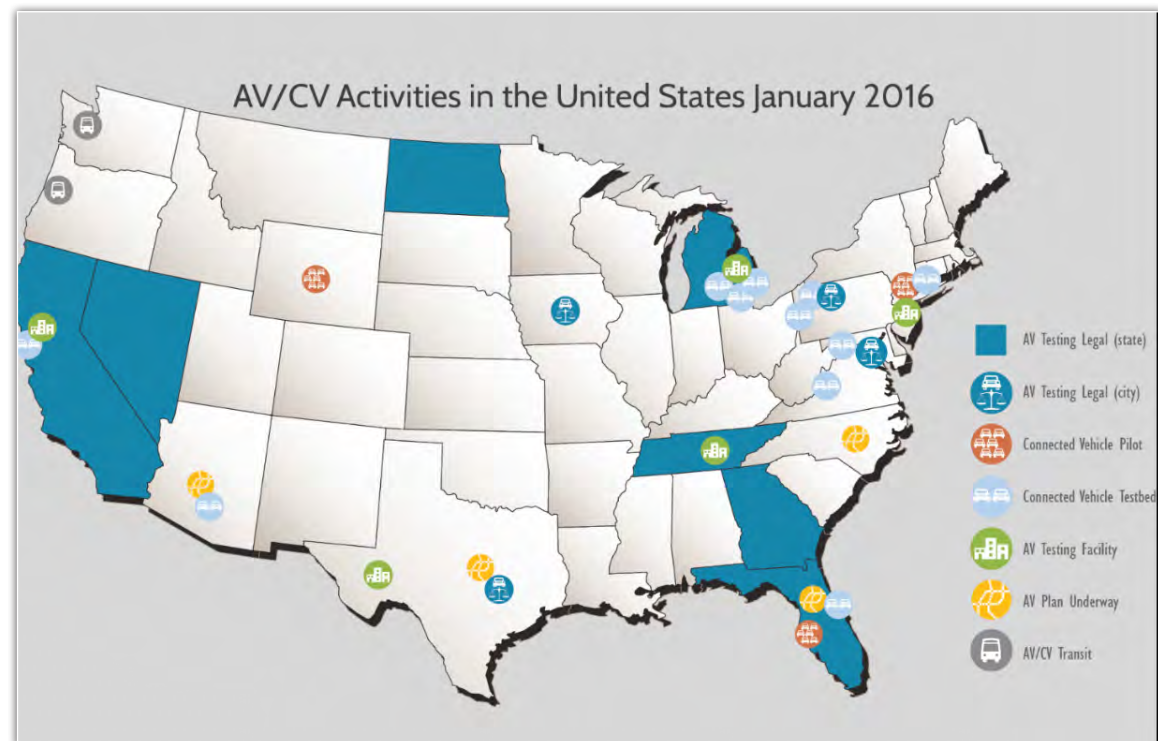


Figure 46: AV/CV Transit Activities



development of AV technology applications in personal automobiles, neither public transit agencies nor bus manufacturers in America have expressed a similar level of interest. And yet, because of the newness of the industry, the race to implement autonomous transit vehicles is an incredibly competitive one. AV transit need not even be fully established to place an entity like !p on the national map – a simple pilot program would garner national (if not global) attention. For this reason, some of the most coveted innovation to come from !p in the next couple years could be its transportation system.



Figure 47: The EZIO; an example of an SAE Level 4 transit vehicle

Vehicles with varying levels of automation are already on the road. In October 2016, the National Highway Traffic Safety Administration (NHTSA) adopted the six levels of autonomy outlined in the Society of Automotive Engineers (SAE) International. The biggest difference is that, starting at Level 3, the automated driving system becomes able to monitor the driving environment.

- SAE Level 0: The driver is in control of both steering and braking.

➤ *Example: sensor technology that warns the driver*

- SAE Level 1: Automates either the steering function, or the throttle function, but not both.

➤ *Example: adaptive cruise control*

- SAE Level 2: Automation allows the vehicle to control both steering and throttle/braking, but assumes the driver will always be vigilant and available to take control in a matter of seconds.

➤ *Example: Tesla AutoPilot*

- SAE Level 3: Automation allows the vehicle to control both steering and throttle/braking and can perform more complicated maneuvers for path planning and perhaps more complicated route planning from a given origin to a destination. The driver is given “ample” time to in “rare” conditions take back control when the automated system is incapable of driving in the approaching environment.

➤ *Example: Audi’s prototype A7*

- SAE Level 4: Automation allows the vehicle to operate with or without a driver on a complete trip on an approved roadway.

➤ *Example: Ligier’s Easymile EZ10 transit shuttle (Figure 47).*

- SAE Level 5: Automation allows the vehicle to operate with or without a driver on a complete trip “anywhere”.

➤ *Example: Google’s ambition. There are no known automated vehicles with this capability today.*





Autonomous transit vehicles interact with their environment in a number of ways. Information is sent and gathered via the following connections:

- Vehicle-to-Infrastructure (V2I)
- Vehicle-to-Vehicle (V2V)
- Vehicle-to-Bike/Ped/Other (V2X)

V2I connections are particularly important to mobility improvement plans because of the numerous infrastructure upgrades that can be put into place before AV even hits the road. These upgrades can be divided into two types:

- Supportive infrastructure upgrades
- Dedicated infrastructure upgrades

Infrastructure itself can consist of the materials, design, construction, and intelligent traffic systems (ITS) of our transportation network. Supportive infrastructure refers to upgrades that enhance existing infrastructure elements. An example would be high-contrast lane markings – enhancing the existing lane markings to be more “visible” to AV can be done during regular roadway improvement projects.

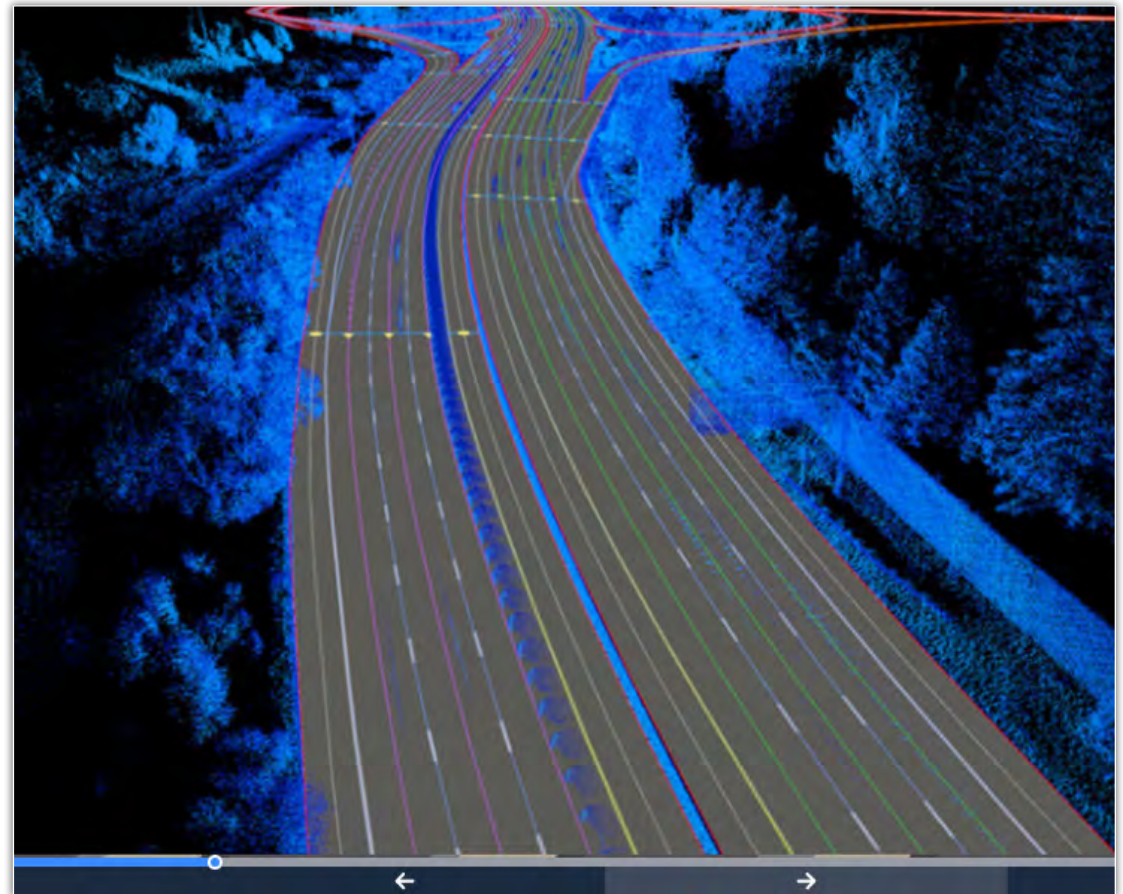


Figure 48: How AV Vehicles “See” Their Environment

Dedicated infrastructure refers to upgrades that specifically serve AV. An example would be a dedicated AV guideway along an existing roadway. Because these upgrades are typically more costly and labor-intensive, they would likely occur only when AV implementation is imminent and a specific infrastructure need is identified.

Supportive infrastructure upgrades can be done independently and in limited areas in the !p and still be a major enticement to AV companies like Google and Delphi Automotive who are currently installing their own upgrades to infrastructure. For example, Delphi Automotive in Las Vegas has outfitted a small circuit of about six intersections close to the city's convention center with hardware that lets traffic signals communicate directly with smart cars. So if an AV were driving through the area, it wouldn't have to rely on a camera "watching" the traffic lights. Instead it could connect with the traffic signal and read how much longer the light will stay green. An upgrade such as retro reflective markings on !p infrastructure such as signs and light posts that would aid the AV in localizing would go a long way to reducing the computing power needed for an AV to operate in that environment.



Figure 49: City Mobil2 AV shuttles



!p AV Shuttles

AV transit shuttles operating in the !p would energize transit use, accelerate people movements while eliminating short-distance trips, and would be a safer alternative to just about any other form of mobility in the !p. We envision these 12-15 person shuttles operating in both mixed-use and dedicated guideway environments as pilot and proving ground programs, initially. The phased approach below is based on the relative amount of time required to implement each shuttle.

Phase 1 – USF Campus Shuttle

The phase 1 !p AV shuttle will be a pilot program which operates on the USF campus. The shuttle will be the result of the collaborative efforts of numerous parties. Project partners will include, but may not be limited to: FDOT, CUTR, Hillsborough MPO, HART, and the !p. For example, a partnership opportunity among the !p, HART, and FDOT exists in building upon on the downtown Tampa CV pilot program results. Ongoing efforts to coordinate at both the local and state level on AV and CV technology pilot programs will allow for the sharing of insights and resources, accelerating the reality of these emerging technologies.

This Plan has identified an initial route within the campus boundaries that will connect the major residential, recreation, research, and student research facility uses. The route is also designed with future expansions beyond the campus in mind. The route stretches from the north edge of campus at USF Palm Drive and E Fletcher Avenue, south the center of campus, circumnavigating Marshal Student Center, several colleges and student services buildings and heads west along USF Alumni Drive. This route terminates at the western edge of campus, near the University Square commercial center. The USF Palm Drive/E Fletcher Avenue terminus is important for a number of reasons: it is located near (and in the future, could crossover into) student housing to the north of campus; and this area will be an increasingly important destination as a new Publix and new student housing complex (The Village) are planned here.

Because of the slower roadway speeds and heightened awareness by motorists on campus for bicyclists and pedestrians, an AV shuttle on campus would operate in mixed traffic. The pilot will provide valuable information about how AV transit could work, long-term on a large, suburban campus. As AV technology improves and demand dictates, the shuttle could be piloted in mixed traffic off-campus.

Phase 2 – E Fowler Avenue to Temple Terrace Shuttle

The Phase 2 AV transit shuttle would fill the transit gap along E Fowler Avenue and connect the Ip Core to the emerging Temple Terrace. Operating along a route that stretches from the emerging Temple Terrace downtown on N 56th Street to the (future) multimodal center E Fowler Avenue, the Phase 2 shuttle will provide point-to-point service along the major commercial corridor in the Ip. It is also the first step in expanding transit options beyond the Ip Core.

While the USF campus AV shuttle would operate in mixed-traffic, sharing the road with other vehicles, bicycles, and pedestrians, a later-phase AV transit shuttle operating along E Fowler Avenue would necessarily operate within a protected guideway (with curbs, bumpers, or both). The greater speed differentials on E Fowler Avenue would make an AV shuttle cruising at 15 mph vulnerable to collisions. While the need for infrastructure upgrades pushes the implementation timeline back to at least 2 years, there are strategies to prepare E Fowler Avenue (in the shorter term) and N 56th Street (in the longer term) ahead of AV transit. Currently, E Fowler Avenue is undergoing a streetscape study which could include, in its design, a dedicated, AV guideway. By planning for and installing infrastructure upgrades in the short-term (6 months to 1 year), the Ip can effectively futureproof these efforts.

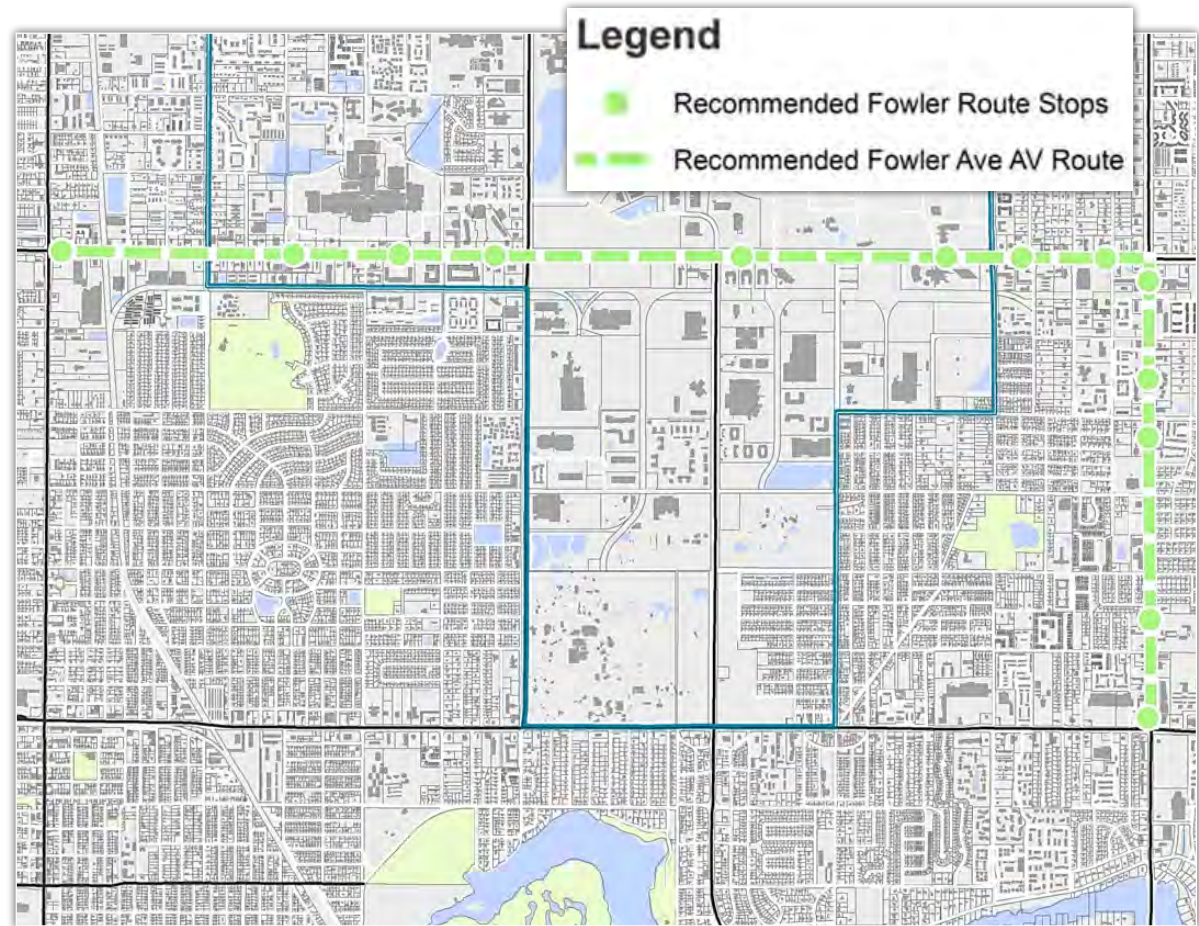


Figure 50: Ip Fowler Avenue transitway concept



Cost Estimates

Cost estimate for AV transit shuttles are based on limited sources, since the technology is still in its infancy and not widely deployed or even piloted. The Phase 1 Campus Route estimated annual cost is \$ 2.8 million. The Phase 2 Fowler Route Projected Year 1 Cost is \$34 million. Detailed cost estimates and metrics can be found in Appendix C.

Funding Sources

The pilot AV transit program will be funded by a combination of grants and public/private investments. Given the current positive, atmosphere surrounding AV transit, securing grant funding for a proving-ground phase should be a collaborative priority of the project partners. But while a grant could kick-start AV service in the !p, continued investment, by USF, FDOT, !p partners, HART, City of Tampa, Temple Terrace, and the County, will be necessary.

Unlike the Circulator, which will operate throughout the !p and serve all the major anchors, the AV shuttle will operate entirely within USF campus for its first phase. But a pilot AV transit program should be viewed as an asset for the entire region – the program would work in collaboration with other autonomous pilot programs, such as HART's HyperLINK Teslas, to support and promote this technology over a wider geography. Regardless of where AV ultimately carries its first rider, the local businesses, institutions, cities, county, and state will have contributed that historic achievement.



!p Digital & Technology Solutions

Existing and proposed transit services in the !p will operate best in an environment that is as flexible, accessible, connected, and intuitive as the transit itself. In particular, AV transit will depend on the user and infrastructure connections that require fiber, wireless technology, and integrated apps to function. So as part of the suite of mobility solutions, we are recommending:

- [!p Wi-Fi A one-click](#)
- [!p resources website.](#)

These components will function as portals of information and a backbone of technology and communication for the !p. And because of AV transit's reliance on these technological upgrades, these solutions are a first phase of AV implementation in the !p.

!p Website

An essential element to improving !p connections and mobility is to improve access to internet and information. The !p is allocating a portion of the DEO grant funding to design a One-Click Website that will aggregate !p resources and transportation services for a wide range of users, including residents and visitors.

The website is being designed following system engineering principles in two phases:

Phase 1 includes:

- [Stakeholder outreach and engagement](#)
- [Needs assessment](#)
- [Concept of Operations](#)
- [Functional requirements](#)
- [Matrix of options](#)

Following the completion of Phase 1 and subject to funding, Phase 2 would include software development, validation and testing, beta operations, and implementation of the solution. Ultimately, the website will be maintained by the !p and will function as a “welcoming” platform to visitors to the !p.

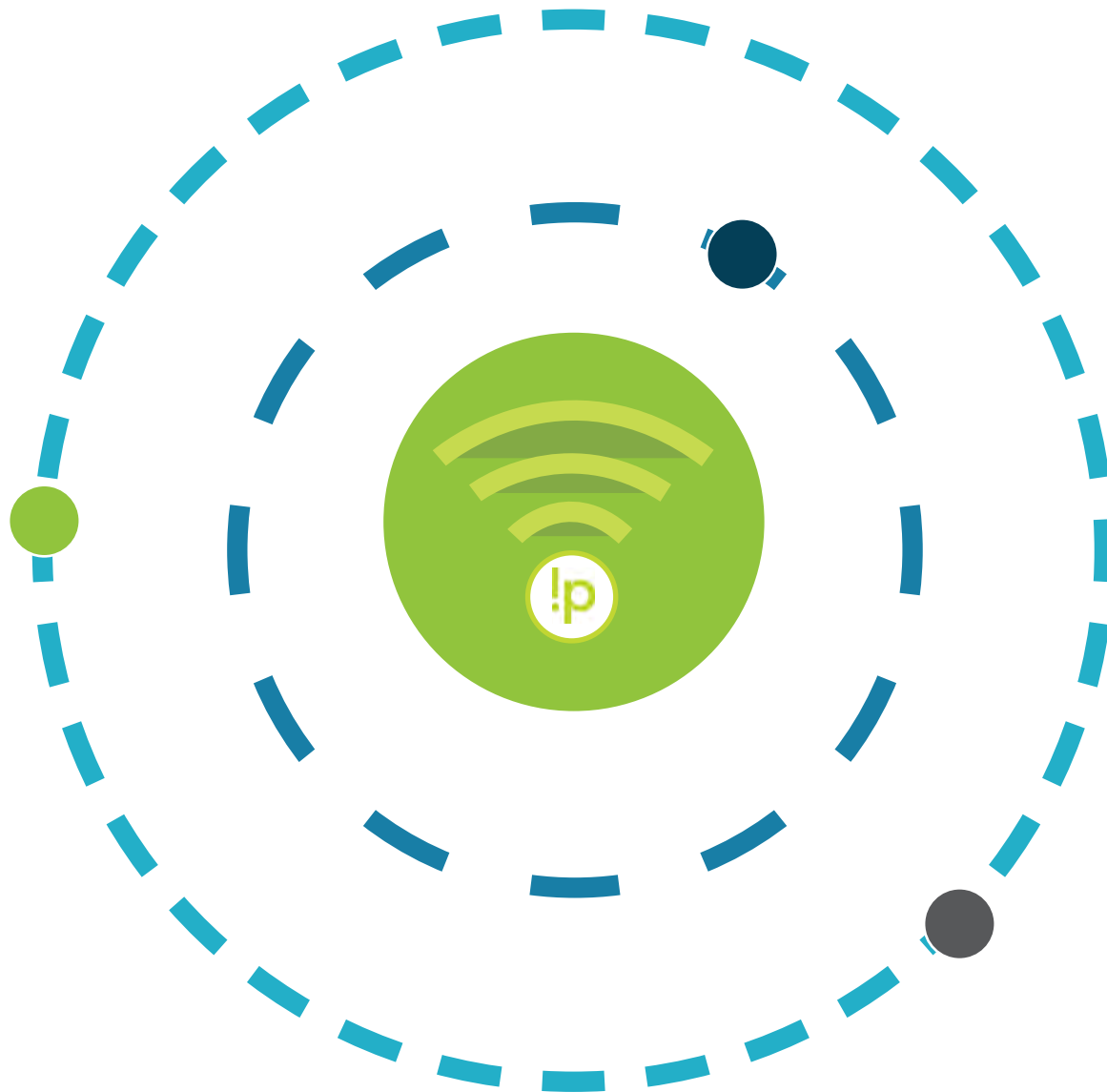


!p Free Wi-Fi

!p free Wi-Fi will provide several benefits to the !p and its anchor institutions, residents, and visitors beyond supporting the welcome platform and trip-planning functions of the !p One-Click website. Free, high-speed internet will support the numerous smaller businesses throughout the !p and will be an invaluable resource to residents living in the !p that would not otherwise have direct access to the internet.

The !p, with its alliance of anchor intuitions and strong network of like-minded individuals, is well-situated to provide area-wide free Wi-Fi by partnering with third-party vendors that can provide the infrastructure and maintenance of Wi-Fi and small-cell technology in exchange for a coordinated property-access effort.

While additional evaluation is required, an example vendor includes Neutral Connect Networks, whose group has developed the !p Wi-Fi for Downtown Brooklyn, Boston Greenway and Staten Island Ferry (on which, passengers connect at either terminal at the beginning of the trip and have access to seamless Wi-Fi during their travel over the water). Neutral Connect Networks has expressed interest in partnering with the !p and there is the opportunity for revenue sharing. In return, !p would need to help secure access to free installation locations (buildings, poles, etc.). Such a partnership would also build community support; if the project expands to serve the local neighborhoods, free Wi-Fi will be available to those who may not be able to afford unlimited data or high-speed connections. The Brooklyn example was spearheaded by the Downtown Brooklyn Partnership and is an example of how such a project could be easily implemented in the !p.





Implementation Timeline



The recommended projects will require public, private, and joint public/private efforts over the short to mid-term. The following charts set forth general recommendations concerning proposed projects timelines. It is important that the mobility plan is flexible enough to take advantage of unforeseen opportunities such as private sector development initiatives or newly created government programs and funding sources which may provide additional leverage for financing.





Table 12: !p Bike Share Implementation

Phase 1 – Expand USF Bike Share		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Identify revenue source for additional capital equipment purchases	USF/ Coast Bike partnership, Use CUTR resources to apply for grants	Summer/Fall 2017
Improve bike/user ratio – purchase of additional bikes	USF/Coast Bike partnership	Summer/Fall 2017
USF/Coast Bike Share partnership/agreement	USF/ Coast Bike partnership	Summer 2017
Implement Coast Bike fee to support operating costs	Coast Bike	Summer 2017
Phase 2 – Establish !p Bike Share		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Identify appropriate locations for new bike stations	Coast Bike /!p anchors partnerships	6 months
Formalize agreements with !p Partners to provide bike stations	!p to facilitate, Coast Bike, !p anchors	6 months
Identify potential sponsorships	!p to provide initial suggestions and help solicit, Coast Bike to solicit, Coordinate with USF	6 months

Table 13: !p Circulator Implementation

Selection of Preferred Option (To Be Coordinated by Tampa !p and Anchors)		
Option 1 – !p Expanded Bull Runner Service		
Phase 1		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Expand access to Bull Runner buses to Moffitt employees	USF/Moffitt partnership	6 months
Redirect funds/resources from existing Moffitt employee shuttles to Bull Runner service	USF/Moffitt partnership	6 months
Modify Route F or add a route to create direct link between Moffitt campuses	USF/Moffitt partnership	6 months
Phase 2		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Expand access to new/modified Bull Runner route to !p employees, visitors, and residents	USF/Moffitt/other anchors partnership, !p to facilitate	1 year
Identify new stops and modified route opportunities	USF/Moffitt/other anchors partnership, !p to facilitate	1 year
Formalize agreements with !p Partners to provide expanded service	USF/Moffitt/other anchors partnership, !p to facilitate	1 year
Option 2 – Third-Party Operated Circulator		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Moffitt/ESCOT agreement revisions to expand service OR identify other third party service provider	Moffitt/ESCOT/!p partnership	6 months
Secure funding and formalize agreements with !p partners	!p partners, !p to facilitate	6 months
Collaborate with USF and HART to identify opportunities to reallocate resources	!p partners, HART, !p to facilitate	6 months
Implement service as outlined in this Plan	!p/HART, Third-party to operate	6 months - 1 year



Table 14: !p AV Shuttle Implementation

Phase 1 – USF Campus Shuttle		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Identify funding source for pilot program	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	1 year
Identify service provider	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	1 year
Initiate limited service on-campus	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	1 year
Identify revenue source for service after pilot program completion	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	1 year – 18 months
Transition pilot program to permanent AV shuttle service	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	18 months – 2 years
Identify opportunities to expand service to off-campus destinations	Public/private partnership: FDOT, CUTR, Hillsborough MPO, USF, !p, Partners	18 months – 2 years
Phase 2 – E Fowler to Temple Terrace Shuttle		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Implement short-term infrastructure/traffic changes to E Fowler Avenue and N 56th Street	Public/private partnership: FDOT, !p, City of Tampa and Temple Terrace, Hillsborough County, Hillsborough MPO, Partners	6 months to 2 years
Identify funding source for “proving ground” project	Public/private partnership: FDOT, !p, City of Tampa and Temple Terrace, Hillsborough County, Hillsborough MPO, Partners	1 to 2 years
Identify service provider	Public/private partnership: FDOT, !p, City of Tampa and Temple Terrace, Hillsborough County, Hillsborough MPO, Partners	1 to 2 years
Initiate limited, E Fowler Avenue service	Public/private partnership: FDOT, !p, City of Tampa and Temple Terrace, Hillsborough County, Hillsborough MPO, Partners	2 years
Transition proving ground program to permanent AV shuttle service	Public/private partnership: FDOT, CUTR, Hillsborough MPO, HART, !p, Other interested parties	2 years and beyond
Identify opportunities to expand service (e.g. Temple Terrace)	Public/private partnership: FDOT, !p, City of Tampa and Temple Terrace, Hillsborough County, Hillsborough MPO, Partners	2 years and beyond

Table 15: Other Recommendations

Expanded HART HyperLINK		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Identify areas within the Isp to expand HyperLINK service	HART	Summer 2017
Secure funding for capital costs	HART, Isp partners	Summer 2017
Expand first/last mile service in the Isp Core	HART	6 months
Downtown Express		
TASK DESCRIPTION	RESPONSIBLE PARTIES	PROJECT COMPLETION
Develop Service Plan for express service between USF campus and downtown medical campuses	HART input from: USF, FDOT, and Hillsborough MPO	6 months
Identify opportunities to reallocate services and resources	HART, FDOT	6 months
Secure funding and formalize agreements to implement service	Public/private partnership: HART, USF	6 months to 1 year



Plan Coordination and Next Steps

Tampa Innovation District

Mobility Master Plan



The !p Mobility Master Plan was developed specifically to improve mobility within an emerging innovation district. The comprehensive set of solutions and recommendations were developed in the context of the !p. The Plan will continue to serve the growth and development of the area as innovation takes hold and the community thrives. As such, it not only endorses connectivity and placemaking – it also strongly encourages collaboration and networking to achieve its ends. In order to maximize the potential of these solutions, ideas will need to be shared and projects, plans, and studies should work in tandem.

Continued coordination among the !p, !p Anchors, FDOT, Hillsborough, County, Cities of Tampa and Temple Terrace, and transit and transportation agencies will be critical to the on-going momentum documented and promoted by this Plan. Just a few examples of potential coordination include:

- Connect, physically and socially, the emerging medical and biotechnology research centers, which will support these engines of economic growth and promote placemaking.
- Assemble a working group, made up of members from !p Anchors, NNTA, FDOT, City of Tampa, Temple Terrace, Hillsborough County MPO, and to synchronize the numerous projects, including the FDOT's University Area Multimodal Feasibility Study and Intermodal Center Study, Fowler Avenue Streetscape and Gateway projects efforts, facilitate implementation, and identify opportunities for multimodal improvements described in the Plan.
- Partner with FDOT and HART to expand HyperLINK, and/or other First-Last mile on-demand circulator service, and incorporate AV technology into subsequent phases of implementation to further showcase !p and HART as leaders in innovative transit technology. !p and Partners should also align needs and aspirations with HART to best determine any relocation of amenities and services, such as the UATC, to best serve !p's residents and visitors.
- Leverage the energy and excitement surrounding AV shuttles by deliberately coordinating efforts and visions today, taking advantage of pilot program grants and community support.

The !p is making great strides toward creating a live-work-learn-wellness-play district, in part by utilizing the strategies described in this Plan. A renaissance of ideas and invention is beginning to benefit the !p community in countless ways. Planning for and implementing a complete set of mobility solutions to support that renaissance is the next big step.

Acknowledgments

We would like to acknowledge the contributions of the following individuals and agencies for their support in preparing the Mobility Master Plan, and for their ongoing efforts in creating a **live-work-learn-wellness-play district**:

!p Executive Board

Brian Adams, President/CEO, Florida Hospital Tampa – Chairman
Stewart Clark, President, Busch Gardens
Dr. Judy Genshaft, President/CEO, University of South Florida
Roger Hirschorn, COO, RD Management, LLC
John A. (Jack) Kolosky, COO, Moffitt Cancer Center

!p Advisory Board

Clarence Eng, Kimley-Horn – Chairman
Sarah Combs, University Area CDC – Secretary
Rick Bennett, Florida Blue – Vice-Chair
Pastor Tommy Kyllonen, Crossover Church – Vice-Chair
Jennifer Murphy, BBVA – Vice-Chair

!p Staff

Mark Sharpe, Executive Director/Chief Potential Officer
Eric Larson, Chief Operating Officer
Kelley Sims, Lead Idea Engineer
Bonnie Ingram, Engagement Architect

Hillsborough County Economic Development Department

Rebecca Hessinger, Industry Strategic Initiatives, Manager
Lindsey Kimball, Economic Development, Director

Kimley-Horn

Clarence Eng, AICP, Project Manager
Amy Henry, Project Analyst

Project Sponsor

State of Florida Department of Economic Opportunity

!p Anchors

Busch Gardens & Adventure Island
Florida Hospital Tampa
Moffitt Cancer Center
University of South Florida
University Mall

Stakeholders

Florida Department of Transportation
Hillsborough Area Regional Transit
Hillsborough County Economic Development
Hillsborough County Transportation
Hillsborough County Metropolitan Planning Organization
New North Transportation Alliance
James A. Haley VA Hospital
Johns Hopkins All Children's Outpatient Care
Shriners Hospital for Children
Tampa Bay Area Regional Transportation Authority
Tampa Coast Bike Share
University Area Community Development Corporation
USF Campus Recreation
USF Center for Urban Transportation Research
USF Parking and Transportation Services



“We view this as a doubling down on unleashing the potential of this community.”

*- Brian Adams
!p Board Chairman*



For more information:

!p POTENTIAL UNLEASHED

PO Box 82497
Tampa, FL 33682
813.279.5231

<http://tampainnovation.com/>



potential: *unleashed*