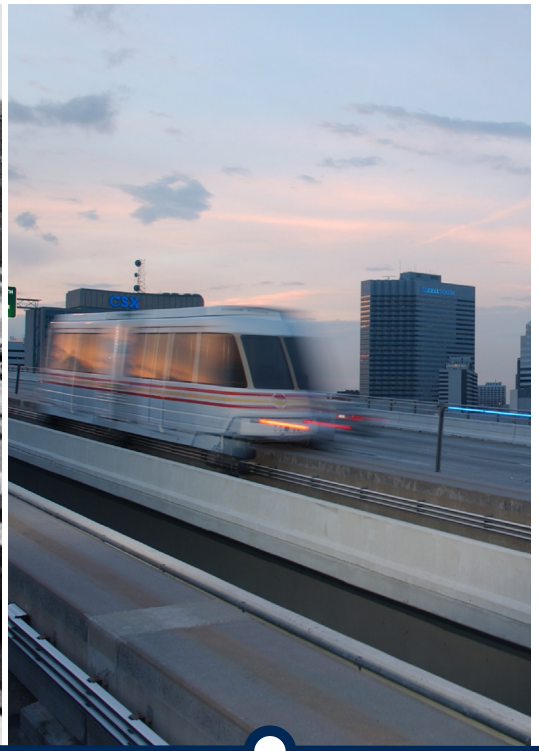
JTA SKYWAY MODERNIZATION PROGRAM

Creating the Ultimate Urban Circulator



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JACKSONVILLE TRANSPORTATION AUTHORITY

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Executive Summary

The *Skyway Modernization Program* report provides the path forward for the future of the Jacksonville Automated Skyway Express (Skyway). It recommends the desired downtown circulator system to support the vision for a vibrant and growing downtown Jacksonville. It also answers the questions: *What is the future of the Skyway? What is the ultimate urban circulator?* This report identifies the preferred vehicle technology to achieve the circulator system plan and initial steps for system expansion and project development.

After extensive analysis, this report finds that JTA, along with support and participation of its partner agencies, is uniquely positioned to transform the Skyway into the **Ultimate Urban Circulator (U^2C)**. The **U^2C** program will provide mobility, connectivity and sustained economic growth, enhancing overall livability of Jacksonville. This transformation can be achieved by making the best use of the investment in the existing elevated Skyway, expanding the area it serves, and employing rapidly emerging autonomous vehicle technology for its future.

Conceptual Rendering of Ultimate Urban Circulator

The transformation of downtown mobility and creating the ultimate urban circulator presents an exciting opportunity for Jacksonville. A fully built out **U^2C** can cost effectively reach beyond the limits of the current Skyway system to serve existing neighborhoods, as well as planned and emerging development. The proposed **U^2C** system would achieve the purpose of a downtown circulator system by:

- Providing high frequency service and accessibility
- Offering service flexibility
- Including extensions to the system that can be elevated or at street level

The new urban circulator will connect to more destinations than the Skyway does today. The **U^2C System Plan** recommends extensions to reach existing and planned development that will allow it to function as a true circulator system and also connect to the larger public transit system including local bus, bus rapid transit (BRT), and future commuter rail. These extensions would connect downtown to nearby neighborhoods and allow people in the urban core to reach key employment, residential, retail, medical and educational centers.

The extensions recommended include the following areas, also illustrated in **Figure ES-1**:

- Five Points
- Brooklyn/Riverside
- Sports Complex/Shipyards
- San Marco
- Southbank Medical Complex
- Redeveloped Southside Generating Station
- Springfield
- UF Health/Shands

To enhance connectivity, it is recommended that a new crossing of the St. Johns River be included as part of the **U²C System Plan** to connect developing areas on the eastern ends on the Northbank and Southbank. It is envisioned that the proposed river crossing would be for transit, bicycles and pedestrians only, creating an inner loop for the U²C and connecting to the Northbank and Southbank Riverwalk.

Autonomous Vehicle technology has the greatest potential for meeting the desired attributes of the U²C. Autonomous vehicle technology is advanced enough to function on the elevated guideway today and at the street level in the future. The U²C concept envisions:

- A larger fleet of vehicles providing higher frequency service
- Vehicles large enough to handle peak passenger loads
- Vehicles that could operate individually or be connected to provide high capacity during times of peak travel demand
- Street level extensions in dedicated transit lanes with signal priority
- As technology advances, the capacity for extensions into mixed traffic

Conceptual Rendering of Ultimate Urban Circulator AV

Other potential advantages of autonomous vehicles include:

- Supports street level extensions with less infrastructure cost as compared to elevated or fixed guideway rail systems
- Cost of an autonomous vehicle is expected to be significantly less costly than the current automated people mover vehicle
- By incorporating wireless technology, the operating system cost for autonomous vehicles is expected to be less than for the current system
- Because the autonomous vehicle does not require a fixed guideway or rail, it offers greater flexibility in adapting routes to better serve future development patterns

AV Example (Olli)

Figure ES-1: Skyway Overview with Exiting Route and Potential Extensions

The proposed **U²C** plan integrates feedback from stakeholders, partner agencies and the community. Multiple workshops and open house style public forums were held throughout the Skyway assessment phase. An online public opinion survey, resulting in more than 1250 responses, provided insight into where people want to go and when they want to use the Skyway. This input was valuable in assessing possible system expansion options for the future. The proposed plans have received strong support from the community. Additionally, expansion of operating hours and days is currently under consideration to make improvements to the existing system while future technologies are evaluated. More detail on the stakeholder and community feedback are described later in this report. Key to the continued success of the project will be ongoing dialogue with partner agencies in subsequent project development activities to ensure all areas of design, construction and system integration are addressed.

Skyway Public Forum

To further assess the viability of the autonomous vehicle solutions for the Skyway, the following steps should be taken to implement the **U²C** program:

- Maintain existing vehicles and operating systems to align with a transition to the new technology
- Identify the preferred vehicle and operating characteristics
- Develop a plan to convert the existing infrastructure for the new vehicle
- Prepare a project implementation phasing plan to coordinate the design and construction of the system extensions
- Work with partner agencies to develop a funding strategy
- Continue stakeholder engagement and community outreach to build support for the project

A critical step in the forthcoming project development process will be the evaluation of potential funding opportunities associated with various phases of the program. While there are limited sources of funding for overhaul or like-kind replacement of the existing vehicles, system expansion and technology conversion that improves the function and capacity of the system may have the potential to access a variety of state and federal funding opportunities. It is critical that the project development process is conducted in a manner that positions all components of the program for state and federal funding. This may be achieved using the Florida Department of Transportation (FDOT) developed Transit Concepts and Alternatives Review (TCAR) process as an initial step for the further examination of the **U²C System Plan** expansion corridors.

Minimum requirements must be met in order to secure state and federal funding. The project will be required to undergo a project development process that conforms to National Environmental Policy Act (NEPA) that includes the following key elements:

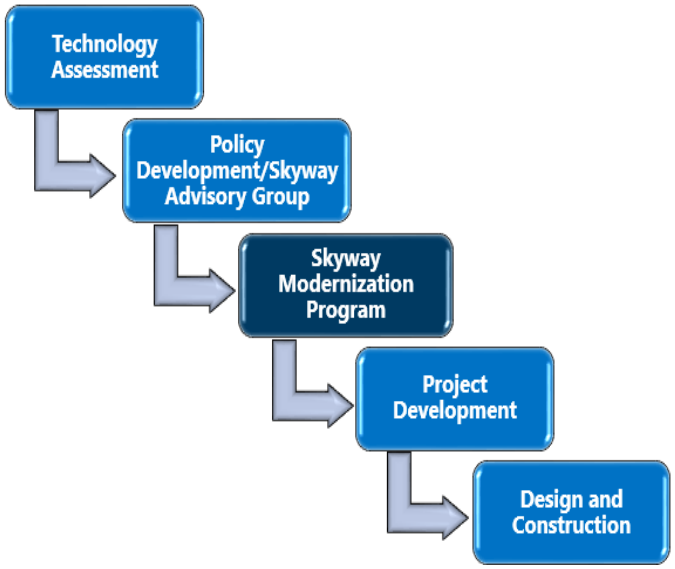
- Forecast of system ridership
- Location of system stops for riders
- Alternatives for the location of system extensions

- Community impacts such as noise, land required, traffic changes, and other key attributes
- Capital costs (land acquisition, roadway modifications, vehicles and operating system)
- Annual Operations and Maintenance estimated costs for the expanded system
- Additional public involvement with community meetings as the project is advanced for the public to provide input
- Finalize the preferred alignment, system technology, and funding options for the project.

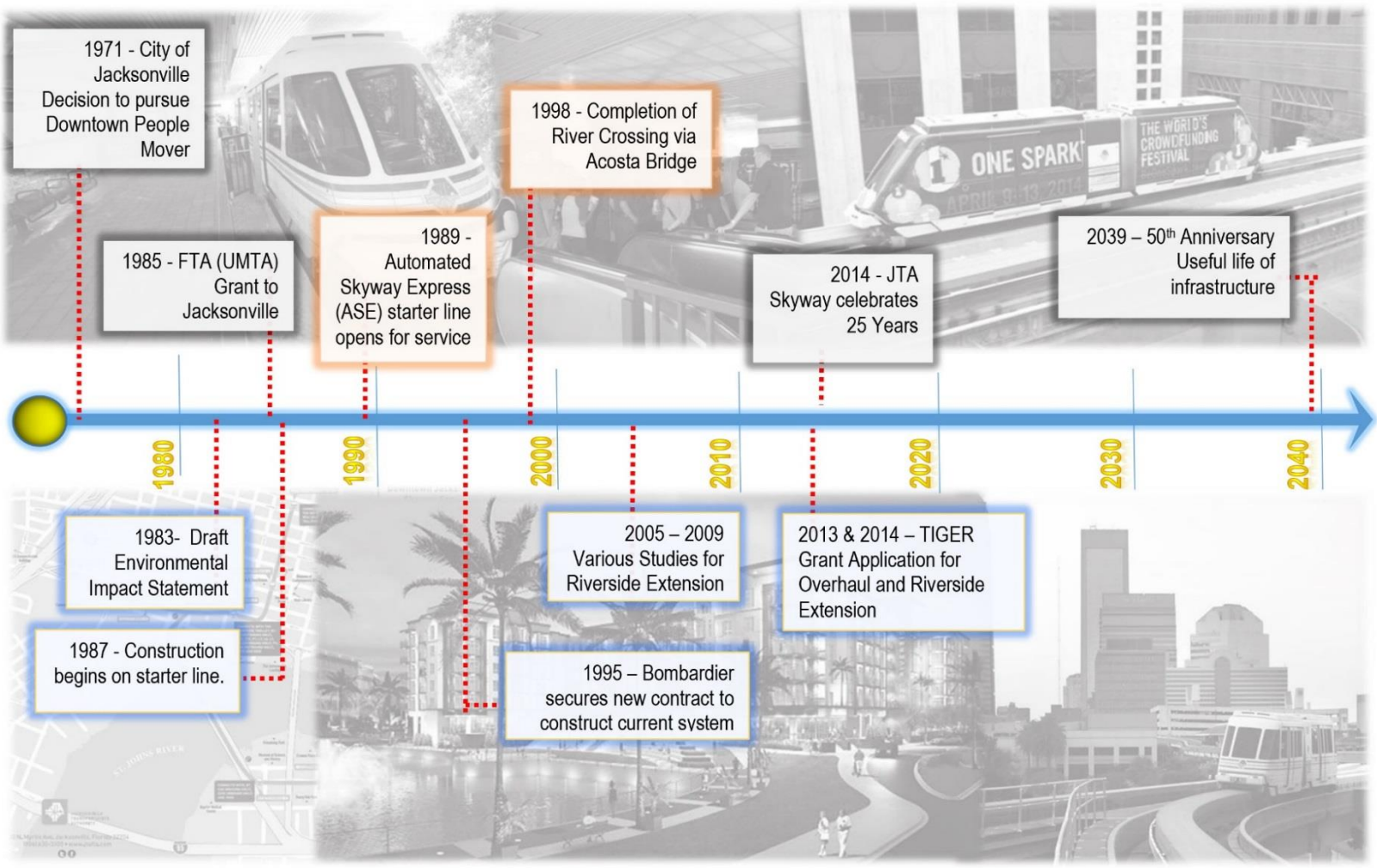
The *Skyway Modernization Program* serves as a means for the careful facilitation of a transition from the existing Skyway system to appropriate emerging mobility technologies to ensure Jacksonville is not saddled with disconnected and obsolete transportation infrastructure and systems. This transition is critical for supporting growth, economic development, and improved quality of life in Jacksonville. The next phase of the *Skyway Modernization Program* will be designed to define and transition mobility in downtown Jacksonville over the next 20 plus years.

This report outlines the history and process used to reach the recommendations outlined above. More details of the evaluation process are provided in the **Recommendations and Next Steps** section of this report. Additional research is also contained in a series of technical memoranda prepared as part of the *Skyway Modernization Program.* The technical memoranda, listed in the **References** section, provide more detailed analyses for key components of the Skyway evaluation and system expansion.

The next steps in project development will ensure that all project components leading to design and construction comply with federal environmental processes, address city and state requirements, and achieve the support of the community and stakeholders. This is an exciting time for Jacksonville, and the region, as we embrace a new generation of transportation…..**so get on board the U²C**!



Skyway Modernization Program Process Flow Chart



Skyway System Development Timeline

Context | The Skyway Story

On December 10, 2015, the Jacksonville Transportation Authority (JTA) Board approved RESOLUTION NO. 2015-30 supporting the continued operation of the Automated Skyway Express (Skyway) and development of a *Skyway Modernization Program*. The *Skyway Modernization Program* includes the evaluation of vehicle technology options and a vision for expanding the downtown circulator system.

System Development

The Skyway is an automated downtown people mover. It is a 2.5 mile bi-directional system with eight stations and a 25,000 square foot operations and maintenance facility. Today, the Skyway supports approximately 5,000 passenger trips per weekday.

Original Skyway Vehicle (DATES)

Planning for the Skyway started in the early 1970s to address traffic congestion, air quality and downtown parking issues. Construction of a starter line from the Prime Osborn Convention Center to Central Station, on Bay Street, just east of Pearl Street, began in 1987 and operations on the line began in 1989. The current configuration of the Skyway, including the Acosta Bridge crossing, was completed in 2000.

The Skyway has not met original ridership expectations for several reasons. First, and perhaps most significantly, the downtown circulator system was never fully built out. As a result, from time to time, there are calls to either expand or shut down the Skyway. Second, many of the conditions that prompted the need for the Skyway no longer existed once it was completed, primarily because of the flight of employment and retail to suburban settings. In order to attract employment downtown, the City of Jacksonville largely abandoned the peripheral parking strategy that supported the Skyway. Lastly, bus operations were not coordinated effectively with the Skyway.

Skyway O&M Center near Brooklyn Area

JTA has studied extending the system multiple times, and most recently in 2013 and 2014, applied for federal funding to extend the system to the Brooklyn area near the Skyway Operations and Maintenance (O&M) facility in Riverside. This extension would have been a cost effective extension since much of the track already exists but is used only for access to the O&M center.

While the grant was not awarded for the Brooklyn Station and System Extension, the process of seeking funding prompted JTA to engage in a more global examination of the future of the Skyway as the system celebrated its 25th Anniversary. A key issue to examine was the condition of the vehicles which have passed their mid-life and are due for a major overhaul.

Skyway Technology Assessment

Beginning in August 2014, a study was initiated to assess the condition of the Skyway vehicles, operating system and infrastructure; and subsequently, develop options to address the needs of the Skyway in preparation for the mid-life overhaul of the vehicles. The current Skyway vehicles are not used elsewhere and are no longer supported or produced by the manufacturer, making it difficult to service and secure parts. Therefore, the *Skyway Technology Assessment* explored new options, in addition to an overhaul of the existing vehicles.

Second Skyway Vehicle (DATES)

The *Skyway Technology Assessment* identified various needs for the infrastructure, operating system and vehicles. The assessment found the Skyway infrastructure to be generally in good condition with some items in need of addressing. With proper maintenance, the assessment determined the infrastructure could be expected to last beyond its 50-year design life.

The operating system is also experiencing obsolescence issues; the most significant is the power supply distribution, which is called Supervisory Control and Data Acquisition (SCADA). Programmable Logic Controllers (PLCs) are a key component of this system and are also obsolete.

The most significant issues facing the Skyway involve the condition of the vehicles and the ability to overhaul them to extend their service life. Currently, four of the ten vehicles are not in service due to an issue known as the permissive movement authority failure. Even more critical, the propulsion control system is obsolete and it is unclear whether it can be upgraded or replaced. JTA purchased 25 of the main controller boards needed to keep the propulsion system operating. JTA continues to look for alternative solutions for replacement of the controller boards to keep the system operating. Another issue plaguing the vehicle system is motor repairs. The Skyway's motor is a special unit, which is not commercially available on the market. The lead time of motor repair at present time is four to six months. However, working with a local firm, JTA has developed an alternative solution to repair motors quicker and at a reduced cost.

Technology Review/Industry Feedback

Because of concerns about the ability to overhaul the vehicles, the assessment also explored various technologies and modes to determine if any were suitable as replacements for the current technology. The assessment also involved a formal Request for Industry Feedback (RFIF) to gauge interest and feasibility of the following three options:

- Overhaul of Vehicles
- Like-kind replacement of Skyway vehicles
- Replacement with new vehicles allowing for minor modifications to the guideway infrastructure

Responses to the RFIF by industry experts and manufacturers offered the following insights:

- The feasibility of an overhaul of the vehicles was not seen favorably
- No interest was expressed for the like-kind vehicle replacement (subsequent to the initial response, one manufacturer expressed interest.)
- The option of modifying the structure to accommodate a new vehicle requires further assessment and modifying an existing vehicle to fit the existing structure may also be a viable option
- One firm expressed interest in replacing the system (or potentially using the existing infrastructure) to implement a personal rapid transit system

Inside Skyway O&M Center

Skyway Subcommittee and Skyway Advisory Group

Following the *Skyway Technology Assessment*, technology research and industry feedback, the JTA Board of Directors established a Skyway Subcommittee and Skyway Advisory Group to assist with the decisions regarding the future of the Skyway. The Subcommittee and Advisory Group were created to gain essential stakeholder input and develop policy recommendations for the future of the Skyway. Four options were identified for consideration by the Subcommittee and Advisory Group. These included:

Skyway Advisory Group Members

1. Overhaul vehicles
2. Replace vehicles
3. Decommission and replace Skyway with Streetcar, Trolley, Bus Rapid Transit or Personal Rapid Transit
4. Decommission Skyway, replace with Streetcar, Trolley, Bus Rapid Transit or Personal Rapid Transit and repurpose Skyway infrastructure as an elevated bicycle and pedestrian path

A life cycle cost analysis was performed on each of these options and high-level planning level cost estimates were presented. After extensive deliberation and public feedback, agreement was reached on the following policy recommendations:

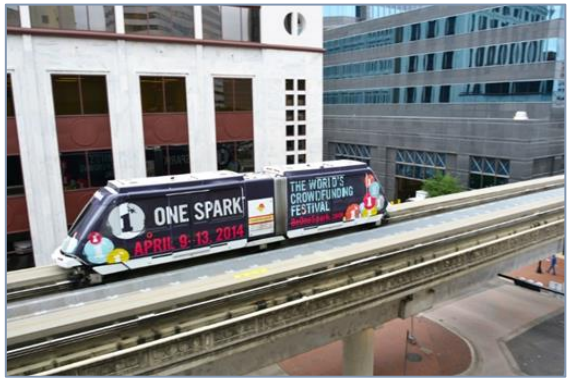
1. It is important to have a high quality downtown transit circulator.
2. The Skyway represents a significant investment by the taxpayers. JTA and the City should carefully consider that investment when making its decision about the future of the Skyway.

3. The transportation system should be modernized, including improvements to the operating system, stations, guideways and vehicles.
4. Future plans must support the vision for downtown development consistent with the Downtown Investment Authority's, and that vision should drive decision-making for downtown transportation investments.
5. To reach its full potential, various extensions, without being specific to mode and including expansion of operating hours, should be considered to support the Downtown Investment Authority's vision for downtown Jacksonville and to connect to a regional transportation plan.
6. The ultimate Skyway solution should be a collective effort among multiple stakeholders (e.g., federal, state, local, and private sector).

Skyway Infrastructure at Bay and Hogan

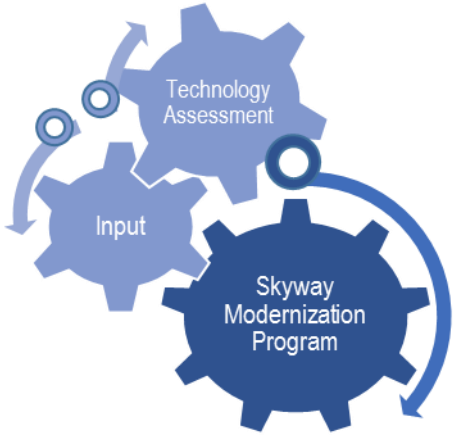
Concurrent with the meetings of the Skyway Advisory Group, an online public opinion survey during fall of 2015, received more than 1100 responses in approximately 45 days, with a majority of responses supporting the concept of building upon the investment in the Skyway for the future needs of downtown mobility. More details on the survey and public outreach are included later in this section.

Based on technical analysis, consensus policy statements and public input; formal recommendations were presented to the JTA Skyway Committee and JTA Board of Directors to consider at the December 2015 Board meeting. The JTA Board of Directors adopted a resolution (Resolution 2015-30) supporting the continued operation of the Automated Skyway Express and development of a *Skyway Modernization Program*. As envisioned, the *Skyway Modernization Program* provides a more thorough exploration of automated people mover and transit vehicle technologies; and ultimately, defines a plan for the replacement of the existing vehicles and evaluation of future extensions.



Skyway One Spark Wrapped Vehicle

The focus of the *Skyway Modernization Program* is to propose a *System Plan* and an *Operating Plan*, including the preferred technology for the future expanded circulator system. Additionally, *Capital and Funding Plans* will support implementation of the desired path forward and adhere to the policy direction to: "**Keep, Modernize and Expand the Skyway**."



Going Places | System Expansion

The Downtown Landscape

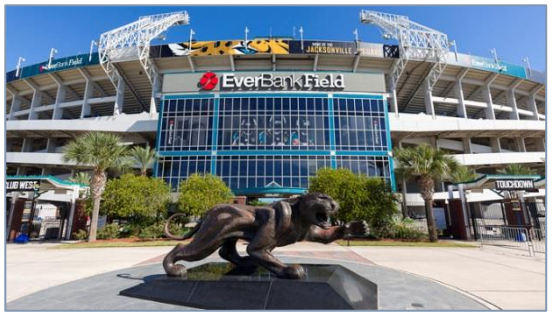
The renewed focus on downtown development and elevating Jacksonville's image as a great place to live, work and play, parallels JTA's multi-year campaign to transform transportation in Jacksonville. As part of the JTA's family of services, the Skyway functions as a downtown circulator connecting the core business district with business, retail, education facilities, and well known critical care and specialized medical facilities within close proximity to downtown.

The Skyway also provides an important last mile link for residents within the region commuting to downtown and making connections at peripheral parking facilities or from other JTA services such as First Coast Flyer BRT, local or commuter bus, or community shuttles. However, the extent of the existing Skyway is limited, and does not reach many popular, established neighborhoods or rapidly developing areas adjacent to or just outside the limits of downtown's core business district (see **Figure 1**). Neighborhoods such as Riverside, Springfield or San Marco, and developing areas near EverBank Field, Metropolitan Park and along the Southbank are just beyond the service areas provided by the existing Skyway and its eight stations. **Figure 2** illustrates some of the major planned developments within downtown Jacksonville in relation to the existing Skyway route. Connecting to these new and planned developments is an important aspect of assessing downtown mobility and fulfilling the vision to make it easier for people to work, play and move around downtown, so they want to be in downtown.

To this point, an important component of the *Skyway Modernization Program* is the development of a *System Plan and Operating Plan* to define the overall future "footprint" of an expanded downtown circulator to enhance mobility and promote economic development to support the vision for downtown Jacksonville. Determining *where it needs to go* and *how it will operate* is the focus of these plans. The following section provides a general overview of the System Plan development. Details of evaluation, including data analyses, are contained in the *Skyway Modernization Program* technical memorandums prepared as background to this report.

Expansion of the Skyway could be a catalyst for growth and economic development opportunities in downtown Jacksonville.

Brooklyn/Riverside Development



EverBank Field

San Marco Theater

Figure 1: Downtown Neighborhoods

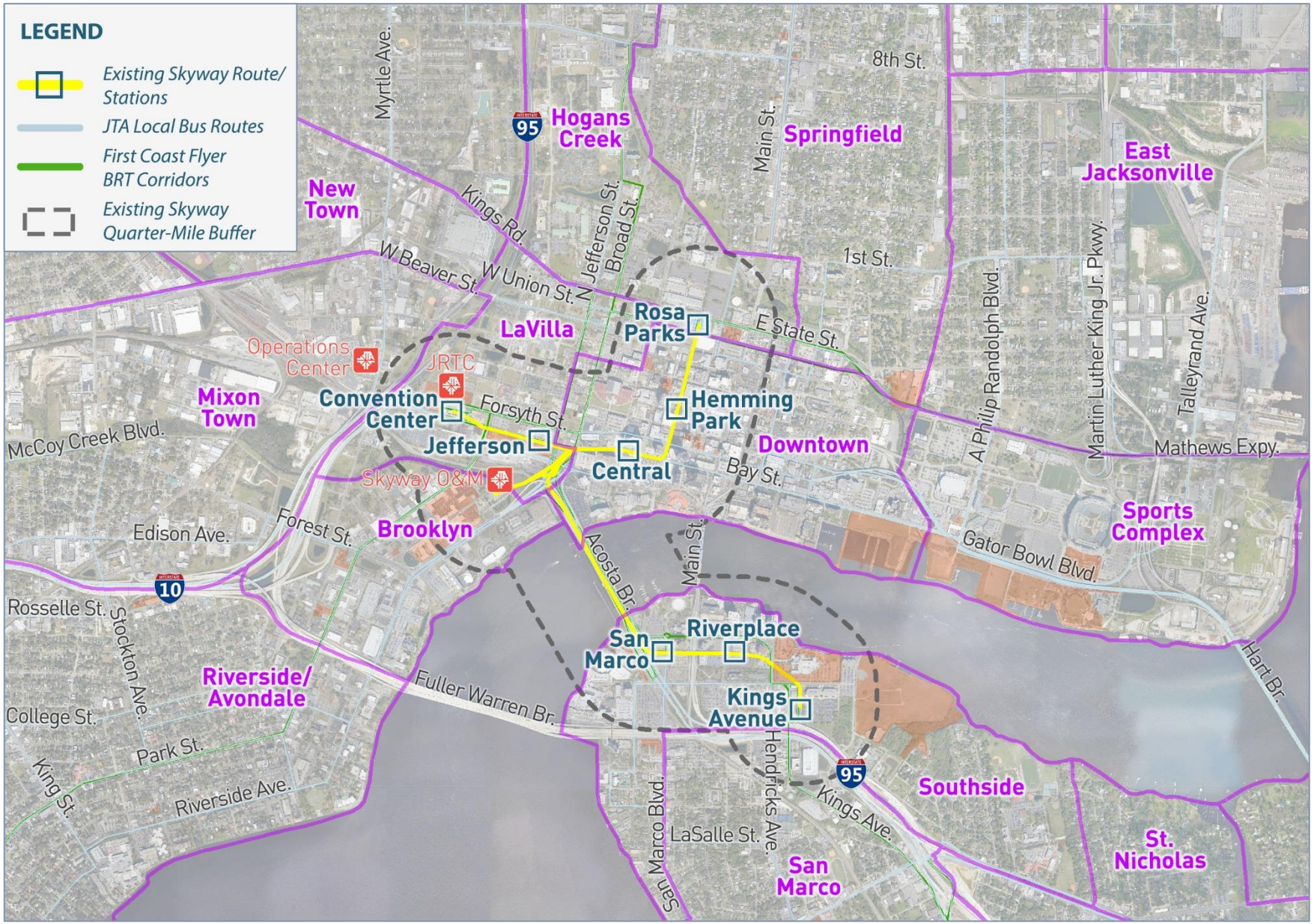


Figure 2: Planned Developments within Downtown

System Plan Development

The development of the *System Plan* includes valuable input from the evaluation of peer systems, technology research, stakeholder feedback, public involvement, as well as, an assessment of future transportation needs based on a review of population and employment growth data and travel patterns. As a component of the *Skyway System Plan,* the *Future Needs Assessment* examined data to further define the limits of the optimal downtown circulator system necessary to improve connectivity to existing and emerging downtown developments. The *Future Needs Assessment* included data analysis, identification of travel demand within the study area, developing realistic options for future expansion, and supporting the Downtown Investment Authority (DIA) plans for future development. The study area included the evaluation of an East-West corridor from Five Points/Riverside immediately southwest of downtown Jacksonville to the Sports/Entertainment Complex/Shipyards district along eastern edge of downtown, as well as extensions to the Southbank, including the northern area of San Marco and to the north to UF Health medical complex on 8th Street.

A review of anticipated population and employment growth data through the year 2040 was conducted to understand projected growth patterns and to better assess future transportation needs. As downtown Jacksonville continues to recover from the recent recession, and as the demographics change within the region, the area is expected to add additional housing units, more commercial retail and mixed-use developments, as well as a continued healthy employment growth. With respect to population growth, some areas are expected to experience more growth than others as redevelopment occurs and residential units are added to downtown. Areas with highest population growth potential include the Bay Street corridor (Sports/Entertainment complex, Shipyards, and old City Hall), Riverside (Brooklyn, Riverside, and Five Points) and San Marco (Jackson Square, Kings Avenue, Hendricks Ave/Atlantic Blvd). Significant growth is also expected north of Rosa Parks (UF Health and 8th & Main).

Skyway at Rosa Parks Station

Based on the data examined, the most concentrated employment growth is expected at San Marco (near the connection to a potential Southeast Commuter Rail corridor currently under a separate study) and old City Hall/Bay Street corridor redevelopment. Hemming Plaza and areas adjacent to Central Station are also expected to double employment by 2040.

In addition to determining anticipated population and employment growth, the *Future Needs Assessment* also examined available data identifying low income populations within the study area that may benefit from improved transportation options in downtown Jacksonville. Improving mobility and access to jobs, education, shopping, entertainment and medical care for all transportation users will ultimately benefit the community as a whole.

System Expansion Options

Based upon previous studies, guidance from the Skyway Advisory Group, and the feedback obtained through the initial public input, it is evident that the current Skyway circulator system requires expansion to adequately meet existing and future transportation needs, specifically, to connect key areas within close proximity to the existing Skyway. As documented and seen at various places along the existing Skyway infrastructure, the Skyway was never fully built out to reach key areas of downtown.

Supported by the data analyses and ongoing stakeholder and public input, the following key findings are put forward for consideration during the next phase of project development.

- Expansions to the system have been identified to connect to existing neighborhoods and emerging developments. (see **Figure 3**):
  - Five Points to Sports/Entertainment Complex (see **Figures 4**, **5, and 6**)
  - Rosa Parks Transit Station north through Springfield to UF Health/VA Medical Complex
  - Urban Core south to San Marco/Baptist Center Medical Complex
  - Riverplace Station east to the planned “District” development
- Nearly 90,000 people are expected to live within a quarter mile of the existing and proposed Skyway stations by 2040, a 22% increase from 2015.
- Over 233,000 workers are expected to be working within a quarter mile of the existing and proposed Skyway Stations in 2040, an increase of nearly 4% from 2015.
- Development and redevelopment in the study area will drive an increase in population and employment. Several large redevelopment projects are either underway or proposed in three of the expansion areas including Brooklyn, Riverside Avenue, The Shipyards, former Metropolitan Park redevelopment sites near the Sports and Entertainment Complex, the District on the Southbank, and the UF Health/VA complex north of the Springfield area.
- An effective transit system can serve as a driver of economic development.

Consistency with Other Plans

Important to this process is the recognition of the ongoing efforts by the Downtown Investment Authority (DIA) to revitalize Jacksonville’s urban core and spur economic development. In 2014, the DIA adopted their current redevelopment plan for the Northbank and Southbank Redevelopment Areas. One of the key objectives of the plan is a “Park Once” strategy to encourage use of mobility options in the downtown core. This philosophy is consistent with the goals and objectives of expanding the Skyway and creating a more usable downtown circulator system.

Consistency with the DIA’s plans and objectives, including initiatives by the City of Jacksonville, has been a focus of numerous meetings and workshops throughout this Skyway study process. These concepts and design elements will continue to be an emphasis in future proejct development phases.

Figure 3: Skyway Overview with Existing Route and Potential Extensions

Figure 4: Riverside/Five Points to Sports Complex Overview

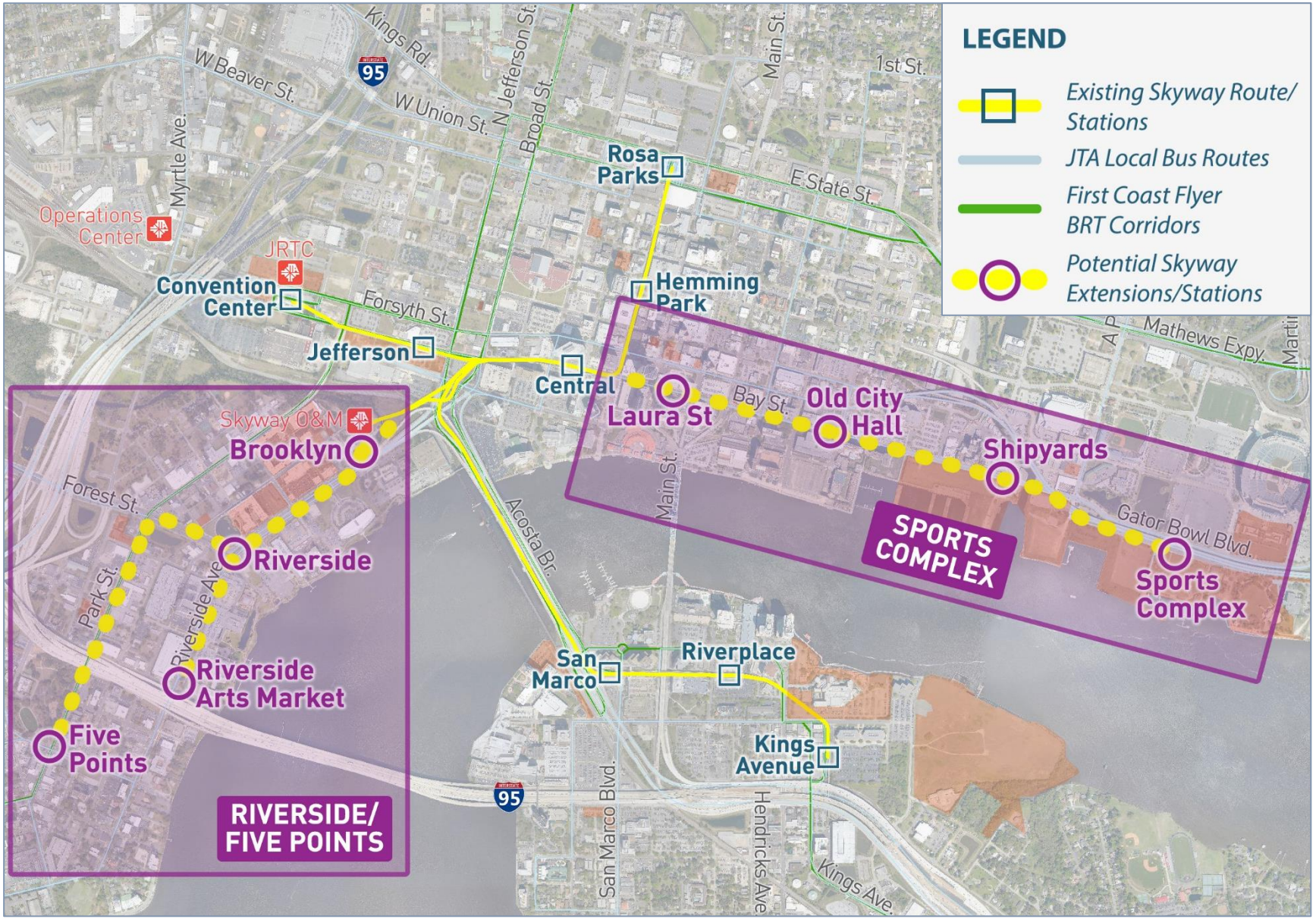


Figure 5: Riverside/Five Points Overview with Brooklyn Inset

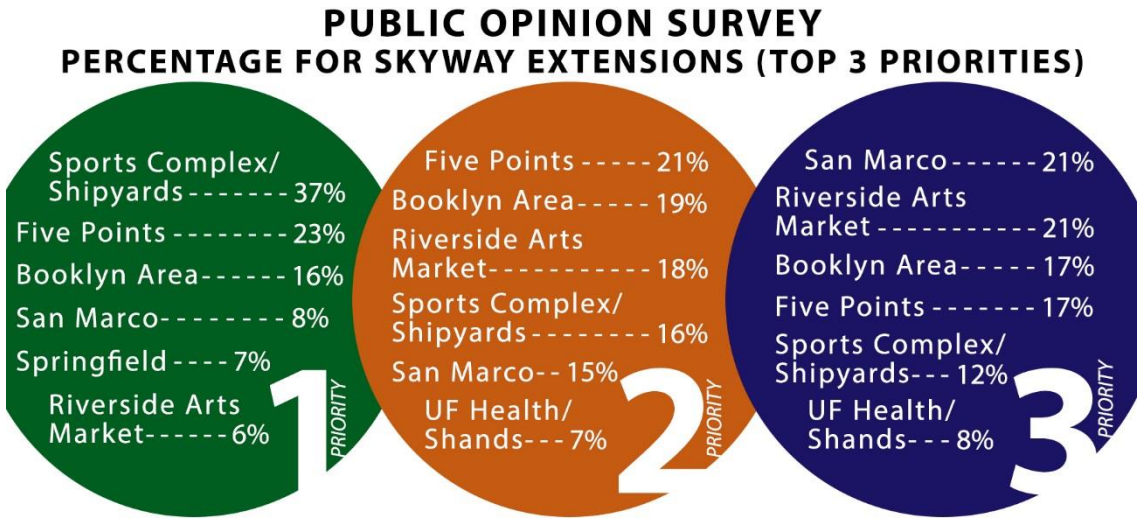
Figure 6: Central to Sports Complex Overview

Outreach and Community Input

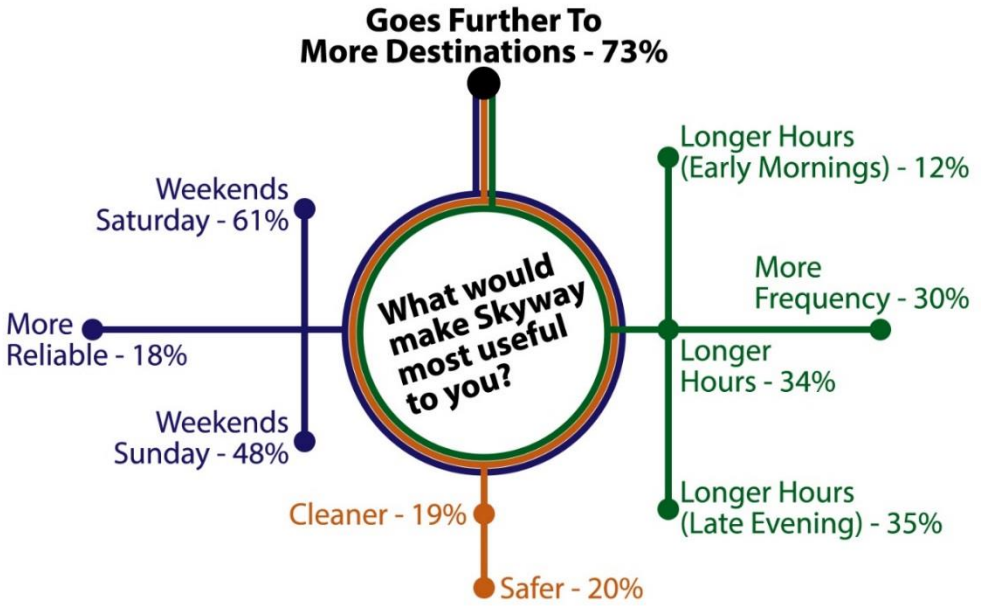
Essential to the System Plan development was the feedback from the community. The JTA encouraged community and stakeholder input throughout the planning studies focused on the future of the Skyway. As an iconic feature of the downtown Jacksonville skyline, the Skyway has always intrigued the community, with its value often debated in many conversations concerning downtown development and mobility. Multiple opportunities for public engagement were provided throughout the ongoing examination of the Skyway to gather input on use of the Skyway, **hours of operation** and **where it needs to go** to be a viable transportation option now and in the future. Project information has been posted on the JTA's website and shared through social media.

In the fall of 2015, a public opinion survey was launched and two public forums were held to provide input to the Skyway Advisory Group and Skyway Subcommittee. The initial survey was vital to gauge the stakeholder support to continue with planning for a new and expanded Skyway as directed by the JTA Board in December 2015. These public outreach activities continued as part of the *Skyway Modernization Program* during the fall/winter of 2016.

An updated public opinion survey was launched again in October 2016. More than 1250 people responded to the survey. The survey is valued as an important tool to reach both downtown residents and employees, as well as area residents, to obtain comments on the potential extensions, safety and operating features. The survey queried where people want to go and when they want to travel on the Skyway.



Public Opinion Survey Skyway Extension Priorities



Public Opinion Survey Skyway Usefulness

A majority of the survey responses indicated that the highest priority would be to extend the Skyway to the sports and entertainment complex along Bay Street and A. Philip Randolph Blvd., followed by the Five Points and Brooklyn areas. Additionally, many respondents expressed interest in having the Skyway operate longer in the evenings and on the weekends.

In addition to the survey, since June 2016, more than 20 presentations have been conducted for area business groups, professional societies and government agencies to update the community and obtain feedback on JTA's ideas for modernizing and expanding the existing Skyway.

Public Forums

Two public forums were held in the fall of 2015 and two additional forums were held (November 2016 and January 2017) to afford the public the opportunity to view plans, take the survey, speak with JTA and project team staff, and hear a presentation outlining the proposed concepts developed through the *Skyway Modernization Program.* Interactive feedback opportunities were successful in obtaining and documenting public interest and opinions on the expansion concepts.

Stakeholder Engagement

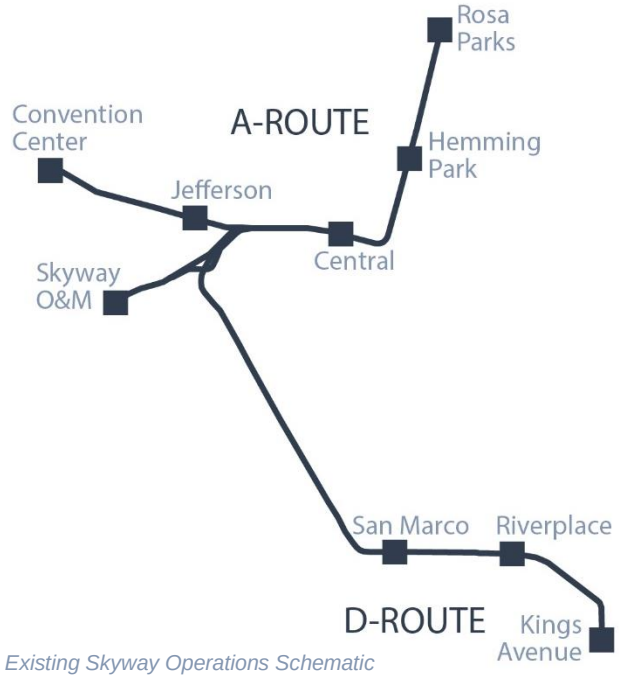
Important to the process was the inclusion and participation of agency partners and business stakeholders. Coordination with these groups provided valuable insight regarding other projects or initiatives which may compliment or could potentially be impacted by the proposed Skyway system expansion. Multiple workshops and one-on-one meetings were held with representatives of local, regional and state government agencies and downtown development entities.

Skyway Public Forum

Operations Assessment

As additional input into the development of the System Plan, a preliminary assessment of Skyway operations was undertaken to better understand operating features and examine system needs to accommodate service expansion. The existing Skyway system is considered an automated people mover which operates on an elevated guideway platform along a guidebeam. The existing Skyway generally operates with two service routes, the A-Route and the D-Route, utilizing five vehicles with one spare vehicle. The A-Route runs between the Convention Center station and the Rosa Parks Station. This route also serves the following stations: Jefferson, Central, and Hemming Plaza. The A-Route requires two vehicles and operates on a round trip cycle time of approximately 16 minutes.

The D-Route runs between the Kings Avenue station on the Southbank, to Rosa Parks Transit Station, a major transfer facility to other JTA services. The D-Route serves the following stations: Riverplace, San Marco, Central, and Hemming Plaza. The D-Route requires three vehicles and operates on a round trip cycle time of approximately 22 minutes. During special events and when customer demand warrants, JTA modifies Skyway operations to provide additional service routes. However, the primary operating patterns are the A and D routes illustrated in the schematic diagram.



Existing Skyway Operations Schematic

The existing Skyway system operates weekdays from 6:00 AM to 9:00 PM. Based on the average round trip time for the A-Route and the D-Route, a Skyway vehicle arrives approximately every 6 to 8 minutes which is known as the frequency or headway. Given five vehicles operating on weekdays between 6:00 AM and 9:00 PM, and a daily service span of 15 hours, existing Skyway operations results in approximately 75 vehicle service hours each weekday. The existing estimate to operate the Skyway is approximately $400 per service hour based on existing operations data. Therefore, the annual estimated cost to operate Skyway is approximately $6.3 million.

The initial evaluation of expansion of the current Skyway system includes the consideration of short term options to provide more service to the community such as:

- Expand hours of operation
- Expand operating days – specifically adding weekend service and some weekday evenings
- Increase frequency of service

Expanding service from the existing service period of 6:00 AM – 9:00 PM to 6:00 AM – 11:00 PM, providing an additional two hours Monday through Thursday; and operating until 2:00 AM on Fridays, to improve accessibility of the Skyway, align with existing bus service, and serve market demand was evaluated. If JTA were to expand the days and hours of operation as described, a fleet of six vehicles would be required based on current operating standards, assuming breakdowns are minimized through careful vehicle rotation and maintenance. In addition, expanding service on weekends to 6:00 AM – 2:00 AM Saturdays and 8:00 AM – 11:00 PM on Sundays would not require any additional vehicles. However, if JTA were to increase operating headways (or the frequency of service), then additional vehicles are required to meet the frequency parameters.

Increasing frequency on the A-Route and the D-Route from every 6 to 8 minutes, to every 6 minutes would likely require an increase in the number of service vehicles from six vehicles to nine vehicles. There are 10 Skyway vehicles in the existing fleet, but only six are operational at this time. Therefore, while there are enough vehicles in the current fleet, not all are operational, therefore, an alternate operating service plan will need to be considered.

In the next phases of project development, the operations assessment will become a more critical element for evaluating the various system expansion options.

The operational considerations addressed in the preliminary assessment and in the future analyses includes the existing Skyway operations, rolling stock, and infrastructure as well as opportunities for programming a phased service expansion and transition from obsolete technology to adopt and deploy a range of new transportation technologies. Central to the overall assessment of the role of the Skyway today and in the future is a balancing of maximizing existing investments and leveraging resources to develop a transportation system to serve the mobility needs of the future.

Operating scenarios include several time periods which correspond to the vision of enhancing and expanding mobility of the existing and future Skyway system. These scenario periods include the following system expansion options. However, these are subject to change based on next phase of system expansion concept development.

- Existing – existing Skyway services and operations
- Near Term (0 - 5 years) – enhanced service levels based on the existing Skyway infrastructure
- Near Term (0 - 5 years) – enhanced operations and initial expansion of services to Brooklyn
- Mid Term (5 - 10 years) – expansion of services to Five Points and Sports/Entertainment Complex
- Long Term (10 - 15 years) – expansion of services to Medical Complex and East San Marco

The estimated operating cost per hour for the Skyway is high when compared to peer systems. There may be opportunities to reduce this cost impact through improvements to the interim vehicle fleet. In addition, the cost per hour of operation is very high for Skyway because of the high overhead required – systems, infrastructure, maintenance, management – whether JTA operates 1 vehicle or 100. As the number of vehicles and vehicle service hours increase, the overhead cost per service hour will be reduced and system efficiency will increase.

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Modernization | Technology Options

Creating the ultimate urban circulator requires detailed assessment of the existing system and exploration of new and emerging vehicle technology. The existing infrastructure was evaluated to determine viability of modifications to accommodate new vehicles and operating systems. Equally essential was performing sufficient research to identify availability of potential replacement vehicles and systems. In order to identify the preferred vehicle technology the following questions were considered.

- What is the best vehicle to achieve desired system?
- What should be done with the existing vehicle?
- What are options to use the existing "Guidebeam" or remove it?
- Is there a vehicle that can run on the existing structure and then go to the street level?

Skyway New Wrapped Vehicle

Technology Options

Based on the recommendation to keep, modernize and expand the Skyway, the *Skyway Modernization Program* reviewed the following three technology options listed and described below.

1. **Replace with same type of vehicle on Guidebeam**

   This considers replacing the current vehicles with similar monorail type vehicles that will fit onto the existing guideway with minimal infrastructure modifications (other than rehabilitation costs where applicable). New vehicles will provide a service life up to 30 years. This option assumes an upgrade to the existing operating system.

2. **Replace with new vehicle without Guidebeam**

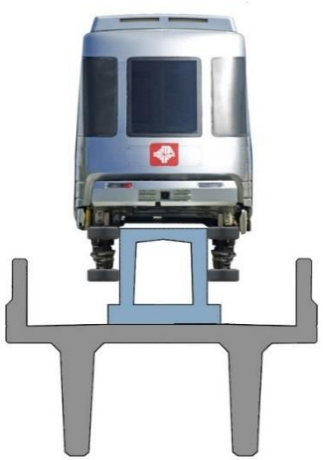
   This option considers replacing the current vehicles with new automated people mover (APM) vehicles that do not operate on a guidebeam. Because of this, there will be extensive modifications required to the existing guideway structure and the stations. The new vehicles will provide a service life up to 30 years, and a new operating system will be installed.

3. **Replace with new technology – Autonomous Vehicle**

   This rapidly emerging technology has a number of unknowns and has seen limited applications to date. Depending on the system selected, it will most likely require significant modifications at the stations and the guideway and will require different operating systems. These technologies however, have the potential to be very affordable and cost effective and provide a great deal of flexibility for future growth and extensions.

Overhaul Option

Overhaul of existing vehicles and operating system was initially considered as a technology option. However, there remain significant challenges related to the vehicle overhaul due to the fact that the current vehicle is a custom design and no longer supported by the manufacturer. It is uncertain whether a complete overhaul is feasible. If feasible, a complete overhaul of the vehicles provides an approximate additional service life of 10 to 15 years. At this time, this is not seen as a long-term solution and does not support system expansion. However, this scenario could allow for JTA to provide a short-term solution, while a more permanent, long-term solution (including possible system extensions) is developed. Ultimately, JTA will need to determine the appropriate level of enhanced preventive maintenance, or scaled overhaul, to align with the transition timeline for a new vehicle.



Skyway Existing Guidebeam

Existing Guidebeam

A major consideration of the technology conversion is the existence of the guidebeam that supports the existing vehicle. The existing system is an automated, driverless, people mover, which runs along a guidebeam. A change in vehicle type will either require the removal of the guidebeam and/or the modification of the guidebeam to support another “tracked” vehicle. The conversion of the guidebeam will result in the shutdown of the system for a significant time. The conversion could take as long as two years.

Street Level Considerations

The proposed System Plan recommends expanding service beyond the current service area to neighborhoods near downtown and areas where an elevated structure is likely to be viewed as undesirable. In addition, the elevated structure is costly and could make extensions cost prohibitive.

Overhead Catenary Example – Tampa TECO

While an elevated structure is desirable from the standpoint of speed and reliability, there is strong interest in migrating to a technology that allows extensions at the street level. There are important considerations that should be taken into account with an at-grade, or street level, option.

The first consideration is the system power supply. Assuming electric powered vehicles, options include a third rail providing power, overhead catenary or battery power. Third rail power supply limits the ability to cross the track and is not practical in urban setting with the desire to create a walkable environment. Overhead catenary is typical for streetcar systems but often viewed as a visual blight. Battery power can limit the range and propulsion capacity of vehicles. Battery technology is advancing and there are options for inductive charging at stations and even in the guideway which should be examined for cost effectiveness and reliability.

A second consideration is the feasibility of operating in a dedicated transit lane. Establishing a dedicated transit lane may require right-of-way acquisition which can be difficult and costly to secure in a downtown, urban environment. Even with a dedicated transit lane, there will be conflicts with other modes at intersections, such as other vehicles, bikes and pedestrians. Despite advances in autonomous vehicle technology, a vehicle operating at the street level would need an operator, at least initially. In some of the areas of the System Plan; there may be segments considered for "road diets" which reduce the number of vehicle travel lanes. This design strategy creates an excellent opportunity to explore dedicated transit lanes to support the **U²C System Plan**.

Dedicated Transit Lane Example – LYMMO

The third consideration is establishing connectivity with the elevated structure. It is undesirable to force transfers between the elevated and at-grade sections. Areas where ramps with acceptable grades should be explored. While it appears there are means to connect to street levels at most locations, the transition to an at-grade section on Bay Street east of Hogan appears to be the most challenging as illustrated in the following images.


Skyway at Bay Street and Hogan


Jefferson Station along Bay Street

Technology Evaluation

In evaluating the three future vehicle options, the questions listed above were considered along with key system attributes associated with the desired system. These include:

- **Frequency:** Considers ability to provide high frequency service to improve the customer experience and reduce overall trip times.
- **Transition Impacts**: Considers the degree to which existing service would be disrupted during transition to the new vehicle.
- **Operational Flexibility:** Evaluates the ability of the system to respond to changing demands. Examples of flexibility include the ability to have vehicles operate individually or couple up as a train set, or have point to point service capacity. Emerging technology and shared mobility trends place higher emphasis on flexibility and demand responsive transit.
- **Proven Technology**: Evaluates the degree to which vehicles have been deployed in service or are more conceptual.
- **Operates At-Grade:** Evaluates ability to function at street level given the desire for the system to reach nearby residential areas.
- **Operates Elevated**: Ability of system to function above grade is important to sustain reliable frequency and cross critical ground level constraints such as the FEC rail line. In the proper location, the elevated system is the best operational solution.
- **Capacity:** Measures the capacity of the vehicle to heavy loads associated with peak hour services and crush loads during events.
- **Speed:** Evaluates actual speed of vehicle.
- **Cost**
  - Vehicle: Evaluates the cost of vehicle and associated operating system.
  - Infrastructure (existing): Evaluates comparative cost of modifying infrastructure to accommodate new vehicle.
  - Infrastructure (new): Considers comparative cost of system expansion.
  - O&M: Evaluates likely impact on ongoing operation and maintenance costs.
- **Maintainability:** Vehicles in common use have a greater maintainability over the long-term.
- **Reliability:** Evaluates the ability to maintain a high level of service reliability.

The following section outlines the pros (advantages) and cons (disadvantages) of each of the three technology replacement options.

Technology Options Pros and Cons

1 Replace with similar vehicle on guidebeam

Pros: This vehicle technology option has a medium cost, at least as it relates to the near-term for the existing system. This medium cost is due to the fact that it would require minimal or no modifications to the existing infrastructure and operating system. As a result there would also be little or no disruption to the operations during transition. This type of vehicle could be expected to have a service life of up to 30 years assuming a mid-life major overhaul, and the system has high level of service reliability and potential for high frequency service.

Cons: Extensions would be the highest cost and new vehicles are more costly for expanding the fleet, therefore, achieving higher frequency service could be limited by cost feasibility. A significant concern with this option is the extended commitment (up to 30 years) to the current technology and reduced flexibility with the possibility of system expansions due to significant infrastructure costs. This option also has limited operational flexibility and is not a viable option for street level operations. Another major concern is the fact that, like the current vehicle, it would be special purpose vehicle with the potential for reduced maintenance and spare parts support over time.

Option 1 Examples – Similar Vehicle on Guidebeam

2 Replace with a new vehicle – remove the guidebeam

Pros: Similar to Option #1, this vehicle option expected is to have a service life of up to 30 years assuming a mid-life major overhaul. This technology option also has high level of service reliability and potential for high frequency service. As there are many suppliers in the marketplace, this option allows the JTA greater confidence that the system can be maintained for a longer period of time (parts are less likely to become obsolete). Another added value for Option #2 is that these vehicles have higher capacities and can travel at higher speeds, which allows for greater flexibility and options for future growth and expansion, at least in areas where above grade extensions are acceptable.

Cons: This is the most expensive option and will provide the most significant impact to the existing operations while the system is under construction. The larger and heavier vehicles could require extensive modifications to the existing guideway and stations. Similar to Option #1, a significant concern is the extended commitment (up to 30 years) to the current technology and there is a reduced flexibility with the possibility of system expansions due to significant infrastructure costs. This option also has limited operational flexibility and is not a viable option for street level operations.

Option 2 Examples – Replace Vehicle & No Guidebeam

Personal Rapid Transit

Personal Rapid Transit (PRT) using an elevated steel beam guideway was considered under this technology option. There are different approaches to PRT. For the purposes of this report, the Taxi 2000 concept was considered. It essentially would utilize the existing infrastructure with a modified guideway although it may not require the removal of the guidebeam. A separate set of pros and cons is noted below:

PRT Pros: PRT would have higher frequency service although the advertised ½ second headways have not been validated, however, the frequencies would be significantly higher than automated people mover. Point-to-point service combined with low headways would provide the fastest trip time and high operational flexibility. Proponents of the system contend its extensions would be less costly. Retrofit of the existing Skyway infrastructure could be less costly than other options since it is envisioned that a track could be installed without removing the beam. Savings with track infrastructure would be offset somewhat by higher costs associated with elevated stations with bypass capacity.

PRT cons: The version of PRT considered as part of this study was largely conceptual. An at-grade PRT has been in operation since 2000, however, the Taxi 200 version is unproven in transit operations. It would be a one-of-a-kind vehicle with limited options for maintaining the vehicles and operating system.

Option 2 Examples – PRT Pod

The vehicles are smaller than other options considered (2 to 4 passengers). The useful life of vehicles is also unknown at this time. While it is expected that vehicles would cost less there would need to be very large fleet and complex operating system. This larger fleet is expected to result in higher day to day vehicle maintenance costs and would likely require an addition to the existing operations and maintenance facility and may require a new vehicle storage facility. While proponents contend the system can carry large volumes of traffic associated with peak service and events, there are practical limitations with vehicle loading at the stations. To accommodate these volumes, significant modifications would be needed at high volume stations. The fixed, elevated infrastructure required lacks flexibility and cannot operate at street level, limiting the ability for access at key areas identified in the system plan. Transition to PRT would result in significant disruption to operations.

While PRT is an interesting concept, it remains too conceptual at this time. Significant questions remain regarding costs and operational feasibility.

3 New Technology – Autonomous Vehicles

Option 3 Examples – AV (Navya)

Pros: This vehicle technology option is expected to have a shorter service life so it does not require a long term commitment to the technology. Once past the initial infrastructure conversion, there would be a high level of flexibility to change vehicles at a later time. This option offers the highest level of flexibility and cost effectiveness of extensions. Autonomous vehicle technology is rapidly developing and there is significant private sector investment in it. By using a larger fleet of smaller vehicles that can be operated individually or in a train set, this option offers the highest level of operational flexibility. It also provides the option of operating at street level. While current application is limited, autonomous vehicle technology is expected to advance in a timeframe that would allow the U2C to have the most current, instead of obsolete, technology.

Option 3 Examples – AV (Ultra Global)

Cons: Autonomous vehicle technology has numerous unknowns and is relatively unproven in the current marketplace. At-grade extensions would require dedicated lanes and likely an operator in the near-term. This option would likely have significant conversion costs. Infrastructure and operating system conversion would be highly disruptive to operations. The service life of the vehicles is unknown but likely to be similar to a bus. Some of the current autonomous shuttle vehicles are smaller and slower than desirable. Vehciles will have to meet safety certification requirements by FDOT and FTA to be eligible for state and Federal funding. Since this is new technology that has not been previously certified it will take an investment and time for the industry to achieve proper certifications to operate as a public transit vehicle.

Preferred Technology Option -- Autonomous Vehicle

Autonomous Vehicle (AV) technology without a guidebeam or rail is the preferred technology option that enables the JTA to achieve the desired system attributes of the U²C. The operational flexibility provides high capacity and high frequency service. Extensions are more cost effective and can be at the street level or elevated. This flexibility is critical for the system to reach existing, emerging and planned residential, employment and retail centers. As the technology develops, the system would have the capacity to operate on-demand and even potentially offer point-to-point service where the infrastructure permits.

Option 3 Examples – AV (Easymile)

While the technology is relatively new and still in development, it is attracting significant private sector investment. The existence of this private sector investment increases the potential to attract a private sector partner willing to share the risk associated with a new and emerging technology.

It is also significant that the Skyway represents a unique opportunity to initially deploy AV technology in a separated closed loop system initially which should be attractive to private and public sector entities looking to implement this technology. In short, JTA is well positioned to catch the wave of an emerging technology that promises to transform how we move people.

Challenges with AV Conversion

While AV technology represents the best option for the future of the Skyway, there are important issues that need to be resolved at the front end of the project development process to confirm the successful conversion.

Option 3 Examples – AV (2getthere)

First, infrastructure modifications need to be further evaluated. Specifically, guidebeam removal must be considered for the impact on the structure integrity. Vehicle weight will be less than the current APM and is not expected to be an issue. However, the parapet walls need to be evaluated for crash worthiness.

If significant modifications are required for the parapet walls, it is expected the modifications will add weight to the guideway structure. Stations may need to be modified to allow level boarding for passenger access to the vehicles.

Another issue is transition ramps from elevated to at-grade or street level. These ramps will be several hundred feet in length and will be challenging to build in the urban downtown. Vehicles must be designed to safely climb and descend the steeper ramps.

Third, while autonomous vehicles can communicate with each other, it is expected that a new operating system and vehicle controls will be required. Appropriate levels of redundancy will need to be built in to ensure safe operations.

Elevated Skyway – Acosta Bridge

Vehicle Charging Example – Louisville Zero Bus

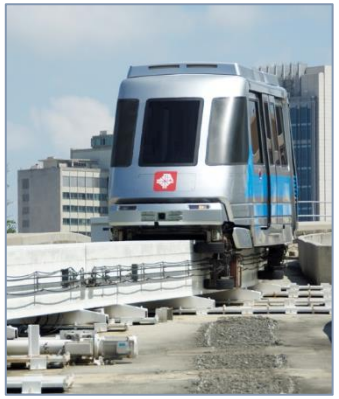
Another consideration will be the means to charge the vehicles assuming they are battery electric and may require some type of inductive charging at stations or other strategies to charge vehicles during daily operations.

Lastly, many of the advancements in autonomous transit vehicles is by foreign companies which will raise issues of Buy America compliance. JTA will need to work with the FTA regarding the transfer of the remaining useful life of the current vehicles for grant purposes. While this may be a challenge, addressing Buy America may also present an opportunity for local economic development such as local manufacturing of vehicles.

The recommended autonomous vehicle will undergo additional review as part of project development to define viable options, challenges and solutions necessary to implement this new technology.

Estimates | Capital Needs and Improvements Estimates

As part of the *Skyway Modernization Program*, conceptual estimates were developed for two options: First, for an Automated People Mover (APM) on an elevated, fixed track and second, for the Autonomous Vehicles (AV) that can operate elevated or at street level. The conceptual cost estimates provide a rough order of magnitude comparison of these vehicle options for street level or elevated system options. Actual costs could vary significantly depending on a variety of factors including right of way costs and other roadway improvements.



Skyway New Wrapped Vehicle

Planning level estimated cost ranges were prepared for the various project components including vehicles, operating system, elevated and at-grade extensions and stations to compare alternatives. The AV option may be 25% to 50% less expensive than the APM option, depending on the extension scenario. The AV is likely less expensive due to expected lower vehicle and operating system costs. It is also likely to require lower infrastructure investment since the AV can feasibly operate at street level.

AV Example (Navya)

AV Example (2getthere)

Estimates for the APM option tend to be higher primarily due to higher vehicle costs and the likelihood that extensions would have to be elevated. Elevated extensions require a fixed guideway and would create traffic obstruction if constructed at the street level.

Miami-Dade People Mover

AV is an emerging technology. Significant uncertainties exist related to the cost of operating systems, vehicle charging stations, as well as modifications to the existing JTA Operations and Maintenance Center, and long term operations and maintenance requirements.

Refined estimates will be prepared during future project development stages. These estimated will be considered during development of more detailed plans, environmental assessments, evaluation of right of way requirements and other factors. Findings from these efforts could significantly affect project cost estimates.

An important part of cost analysis includes not only up front capital costs but also long term annual operations and maintenance costs which are likely to be funded by JTA. A life cycle cost analysis will be performed as part of further project development.

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Funding | Options

Funding options for a project as large as the *Skyway Modernization Program* will often consist of a combination of federal, state and local sources. Specific sources can include federal formula and discretionary funds (Federal New Starts, Small Starts and Core Capacity Programs) through the FTA and the Federal Highway Administration (FHWA), with matching state funding for federal contributions from FDOT funding programs. Local funding may be secured from locally sourced programs with transportation specific spending allowances as well as local funding programs that may require new legislation or voter/City/County approval (Special Assessment Districts, new transportation taxes or fees or Tax Increment Districts). The specific funding sources typically require designated types of activities or project scopes as part of an eligibility test to secure the funding.

In the interest of providing the widest array of funding options from both state and federal sources, it is recommended the Transit Concepts and Alternatives Review approach be considered for the development of the system extensions. The purpose of the Transit Concept and Alternatives Review (TCAR) approach is to outline the FDOT Transit Office process for early planning and early evaluation of transit projects in Florida. The TCAR process is a uniform approach for advancing transit projects by linking early planning work to the FDOT Project Development and Environment (PD&E) and FTA Project Development processes. The primary purpose of the TCAR is to facilitate the most appropriate levels of effort and expense to bring the project to major decision points as defined in the federal funding process, the first of which is to fully qualify the project for entry into the project development phase.

As part of the TCAR process (see **Figure 7),** JTA will develop an initial funding plan which will be refined and detailed as the project is moved through the project development phase. This initial funding plan will identify local matching funds and propose specific State and Federal matching funding approaches for review by FTA and FDOT as part of the process to enter into the Project Development Phase.

Public Private Partnerships

One of the primary benefits of a public private partnership is the ability of the private sector partner to assume risks that may not be suitable for a public agency. The U^2C is based on emerging technology that involves a higher level of risk, therefore, it is strongly encouraged that JTA consider a long term public private partnership which may include the operation and maintenance of vehicles, operating system and infrastructure.

Potential Funding Partners:

FTA Federal Transit Administration

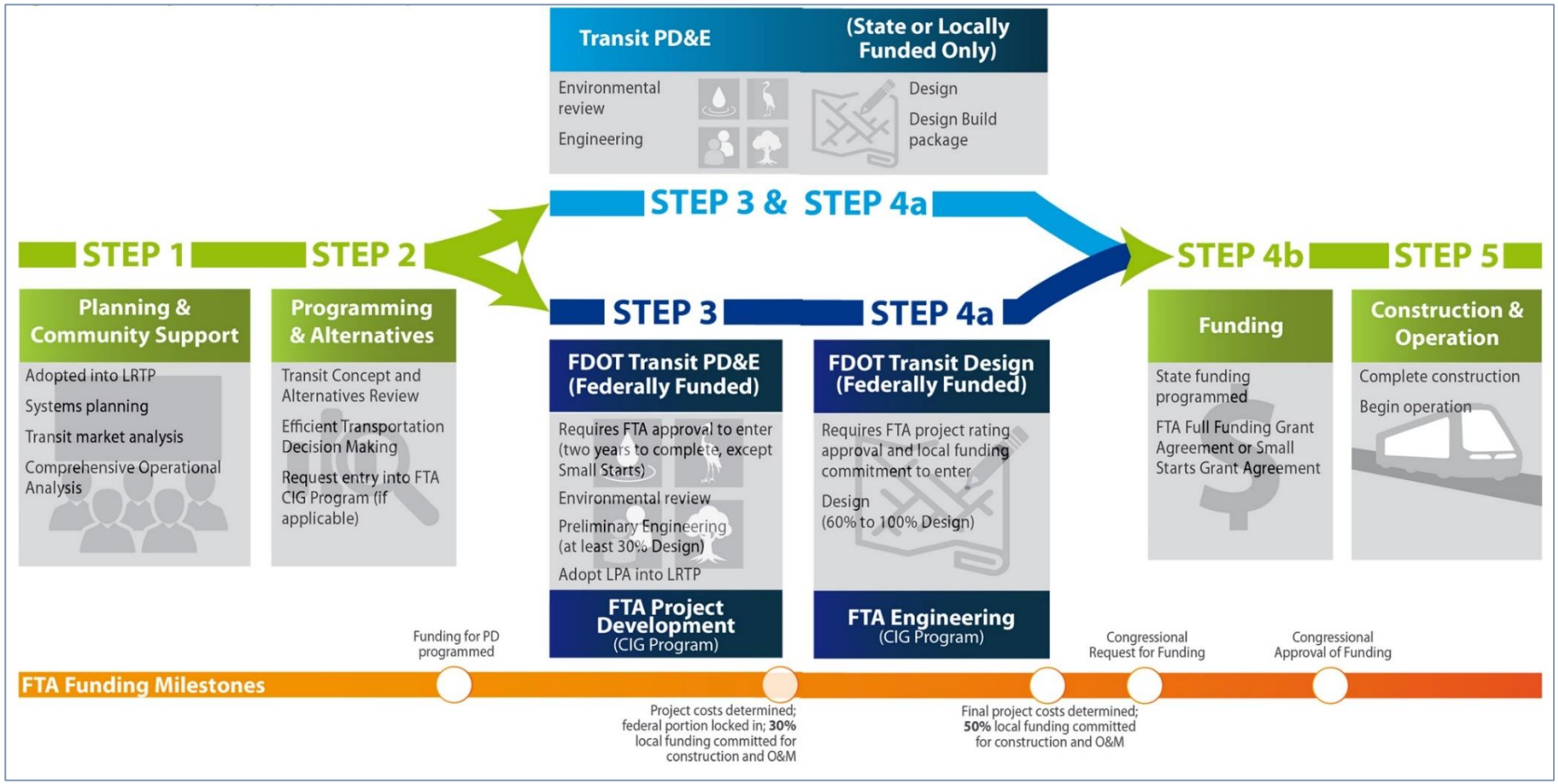
Department of Transportation United States of America

FDOT

North Florida TPO Transportation Planning Organization PLAN · FUND · MOBILIZE

City of Jacksonville, Florida

Figure 7: Sample FDOT Transit Concept Alternatives Review (TCAR) Process (source FDOT Guidance, November 2016)



Recommendations and Next Steps

Mobility improvements are required to drive economic growth and support a vibrant 24-7 downtown. These mobility improvements span a wide range of modes including auto, rail, freight, transit, pedestrian, and bicycle. Mobility improvements also need to be coordinated and leveraged, especially in and around downtown. The *Skyway Modernization Program* serves as a strategic platform for this transportation systems coordination and considering the future of the Skyway with land use, economic development, housing, mobility needs and modal integration.

The *Skyway Modernization Program* summary report finds that JTA is uniquely positioned to transform the Skyway to the **Ultimate Urban Circulator (U^2C)**. The **U^2C** program will provide mobility, connectivity, sustained economic growth and vibrancy for Jacksonville. By using the full potential of the investment in the existing elevated Skyway, expanding the areas it services, and employing emerging autonomous vehicle technology, this vibrancy can be achieved. It's a new era for the Skyway, an iconic feature of the Jacksonville skyline since the 1980's.

A fully built out **U^2C** will reach beyond the limits of the current Skyway system in a cost effective manner to provide transportation options to existing, planned and emerging development surrounding downtown. Autonomous vehicle technology has the greatest potential for meeting the desired attributes of the U^2C. AV technology is advanced enough to function on the elevated guideway today and at the street level in the future. The proposed U^2C system utilizing AV technology would achieve the purpose of a downtown circulator system by offering:

- More frequent service by using a larger fleet of vehicles arriving more often
- Vehicles large enough to meet the travel needs during peak periods
- Vehicles that could operate individually or be connected to provide high capacity during times of peak demand

Conceptual Rendering of Ultimate Urban Circulator System

- Street level extensions using dedicated transit lanes with signal priority to ensure reliability
- The capacity to operate in demand responsive and limited point to point service as technology develops

Conceptual Rendering of Ultimate Urban Circulator AV

The **U²C System Plan** recommends extensions of the current Skyway to existing and planned development that will allow it to function as a true urban circulator system and connect to the larger public transit system enhancing accessibility to bus, BRT (First Coast Flyer) and future commuter rail. These extensions would connect downtown to nearby neighborhoods and allow people in the urban core to reach key employment, residential, retail, medical and educational centers. The extensions recommended would connect to the following areas illustrated in **Figure 8**:

- Five Points
- Brooklyn
- Riverside
- Sports/Entertainment Complex
- Shipyards
- San Marco
- Southbank Medical Complex
- Redeveloped Southside Generating Station
- Springfield
- UF Health/Shands

The evaluation of extensions to the current Skyway will include extensive coordination with multiple agencies including the FTA, FDOT and the City of Jacksonville. Careful consideration of potential impact to ongoing projects and future improvements will be important. Specifically opportunities to improve access to transit and improve mobility options will be explored.

To enhance connectivity, it is recommended that a new crossing of the St. Johns River be included as part of the **U2C System Plan** to connect the developing areas on the eastern ends on the Northbank and Southbank of the river. It is envisioned that this crossing would be for transit, bicycles and pedestrians only and connect the Northbank and Southbank segments of the Riverwalk, creating an inner loop for the **U2C**, as illustrated in **Figure 8**. It is anticipated that the proposed river crossing would also reach required navigable elevation above the St. Johns River channel to allow water vessels to pass under the bridge. Details of the new bridge will be evaluated further during project development and environmental analyses required as part of federal funding requirements.

Figure 8: Proposed Ultimate Urban Circulator System

Conceptual Rendering of Ultimate Urban Circulator River Crossing

Implementation Strategy

The U^{2}C concept is a complex and multi-phase program. To ensure efficient and timely implementation, the following steps should be taken:

- Scale vehicle rehabilitation and maintenance efforts to align with a transition timeline
- Identify the preferred vehicle and operating system
  - Develop an autonomous vehicle demonstration project to test operations in the downtown environment
  - Identify potential vehicle manufacturers to develop vehicle
  - Identify required operations and control system
  - Vehicle replacement schedule
- Develop a plan to convert the existing infrastructure to accommodate the new vehicle to address the following key items
  - Guidebeam removal and guideway modification
  - Crash worthiness of parapet walls
  - Ramps to connect elevated sections to street level
- Utilize Transit Concepts and Alternatives Review (TCAR) process for the system extensions to position all projects phases to enter state and federal project development and environmental review process
- Prepare project development and implementation phasing plan to include the following elements:
  - Brooklyn Extension
  - Riverside/Five Points to Sports Complex Corridor
  - Work with City of Jacksonville to preserve public corridors and examine opportunities for dedicated transit lanes
- Develop a plan to modify the Rosa Parks Transit Station following the realignment of transit service to the new regional transportation center (JRTC)
- Develop a funding strategy and evaluate potential funding opportunities associated with various phases of the program

Conceptual Rendering of Ultimate Urban Circulator

References and Resources |

Website:

http://www.jtafla.com/

Related Documents and References:

Skyway Technology Assessment, December 2015

Skyway Modernization Program – Draft Technical Memorandum #1 – System Plan/Future Needs Assessment

Skyway Modernization Program – Draft Technical Memorandum #2 – Operating Assessment

Skyway Modernization Program – Draft Technical Memorandum #3 – Technology and Vehicle Assessment

Skyway Modernization Program – Draft Technical Memorandum #4 – Conceptual Cost Estimates

Skyway Modernization Program – Draft Technical Memorandum #5 – Funding

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The following agencies have contributed to the planning and development of the *Skyway Modernization Program*.

Additional coordination with following agencies was conducted to match consistencies with existing planned activities in downtown Jacksonville and the information obtained contributed to the planning and development of the *Skyway Modernization Program*.

Peer Transit Agencies

The development of the *Skyway Modernization Program* included valuable information and knowledge from exchanges with other transit agencies.

Central Florida Regional Transportation Authority

U2C
ULTIMATE URBAN CIRCULATOR

JACKSONVILLE
TRANSPORTATION
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