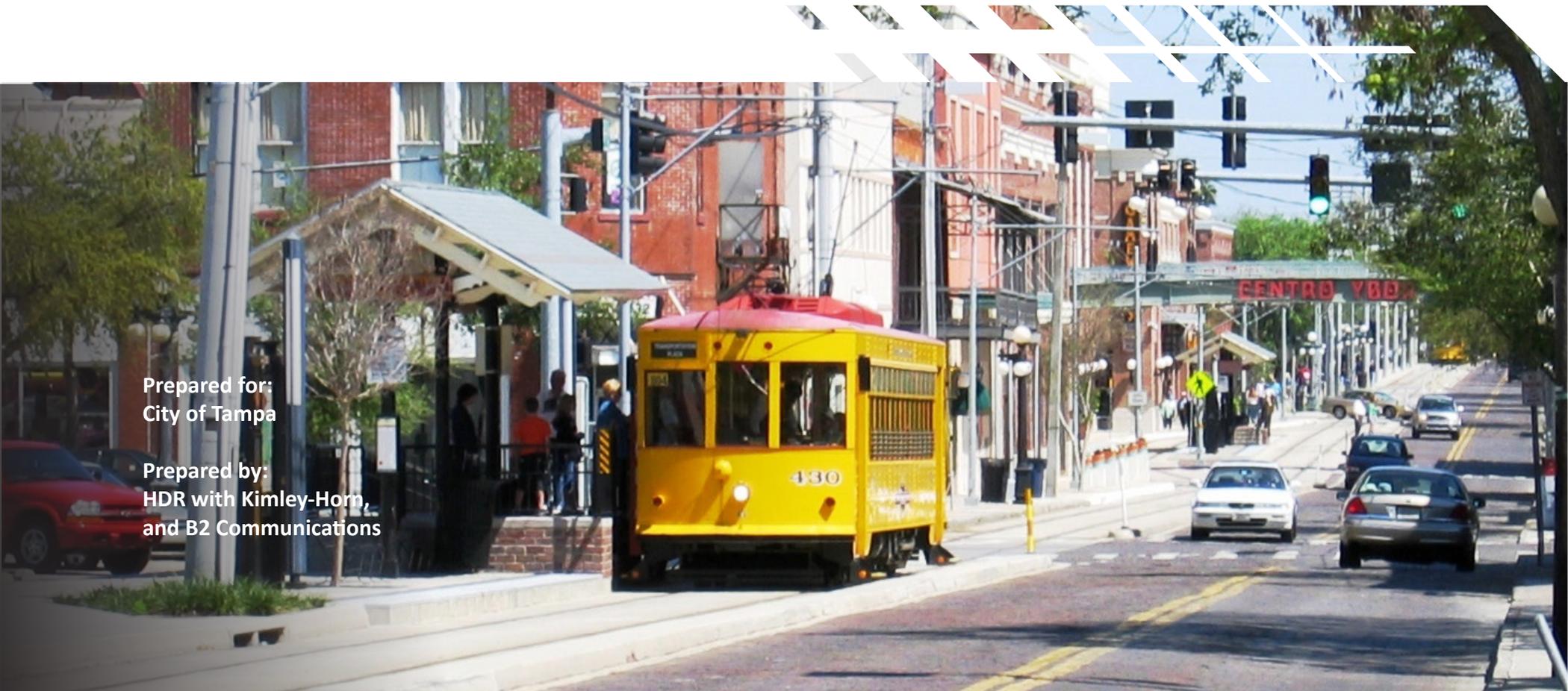


DEFINITION & EVALUATION OF ALIGNMENT OPTIONS

FINAL – November 1, 2017

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City of Tampa

Prepared by:
HDR with Kimley-Horn,
and B2 Communications



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Definition & Evaluation of Alignment Options

1. INTRODUCTION

1.1 Report Contents

The City of Tampa is conducting the InVision: Tampa Streetcar Feasibility Study (Streetcar Feasibility Study) to evaluate the potential modernization and extension of the Tampa Historic Streetcar system to better serve the mobility needs of residents, workers, visitors, and students in the Downtown Core, Ybor City, the Channel District, and surrounding urban neighborhoods. The planning effort is designed to advance mobility, livability, and economic development goals presented in the *InVision: Tampa Center City Plan* from 2015 and build on previous studies assessing transportation needs for the Center City.

This report describes alignment options and the evaluation results for the potential extension of the existing Tampa Historic Streetcar system. The report provides background on how the alignment options were defined and includes a description of each with a brief narrative and map. The report also reviews evaluation methodologies and measures, and provides a preliminary report on the evaluation of each alignment option. A detailed Evaluation Matrix is provided in Appendix A.

The evaluation methodology and measures described in the report serve as the basis for a comparative assessment of alignment options, and thus will be used in the process of selecting a preferred alignment option. Once a preferred option is selected, the city will assess the performance and impacts of different guideway configurations, vehicle technologies, operational characteristics, and design alternatives within the preferred alignment.

1.2 Study Overview

The purpose of the Streetcar Feasibility Study is to define and evaluate the modernization options for the existing streetcar system and facilities, assess the potential for an extension of the system, and evaluate vehicle technology alternatives to improve ridership, operations, cost effectiveness, and overall quality of service. The City is conducting the study in partnership with other agencies including the Florida Department of Transportation (FDOT) and Hillsborough Area Regional Transit Authority (HART) and in coordination with other regional transit initiatives that are underway, such as the HART *Regional Transit Feasibility Plan*. The study will proceed under two distinct phases of work as described below.

PHASE 1: CONCEPT DEVELOPMENT AND FEASIBILITY ANALYSIS

The goal of Phase 1 is to define the project, identify alignment options, estimate preliminary capital and operating/maintenance costs, develop a preliminary financial plan, and to submit a request for entry into project development under the Federal Transit Administration (FTA) Small Starts program. Phase 1 includes a significant program of public engagement to ensure residents and stakeholders have opportunities to participate in the process of defining and evaluating modernization and extension concepts. During Phase 1, the project's purpose and need will be developed and alignment options will be defined and evaluated using a set of measures that relate to the Purpose and Need and performance and potential impacts. Preliminary costs and ridership estimates will be established and an initial evaluation of impacts will be completed to support the selection of a preferred alignment option. It is anticipated that the proposed streetcar extension project would likely undergo the Small Starts review process for funding under the FTA Capital Investment Grant (CIG) program. The Phase 1 work program and engagement process is designed to define a highly competitive project that can satisfy the CIG project justification requirements.

PHASE 2: PROJECT DEVELOPMENT

During Phase 2 of the study, the City will refine the preferred alignment option and more detailed plans for extension and modernization will be prepared. This effort will include:

- » an evaluation of alternative vehicle technologies;
- » development of guideway, station design, and modernization concepts;
- » preparation of updated ridership projections and capital and operating cost estimates;
- » completion of environmental review and documentation; and
- » development of funding and financing plans.

Phase 2 activities are focused towards refining the preferred alignment and preparing documentation to support requests for funding from local, state, or federal sources.

2. ALIGNMENT OPTIONS

2.1 Alignment Option Development

In collaboration with Center City stakeholders and the general public, seven alignment options were defined for the extension of the existing streetcar system. The alignment options describe a range of possible routes to better connect existing and emerging centers of activity, including the Downtown Core and areas surrounding the core with or planned to have transit-supportive land use and development characteristics. The study team developed a range of options, including:

- » North/South (N/S) alignment options that extend the streetcar alignment north from the end of the existing streetcar line at Franklin Street and Whiting Street through the Downtown Core into Tampa Heights;
- » East/West (E/W) alignment options that provide connections from the existing streetcar line in Ybor City, Channel District, or Convention Center area west through the Downtown Core, North Hyde Park, or Hyde Park; and
- » Loop alignment options that provide a direct connection between the terminus of the existing streetcar line at Franklin Street and Whiting Street, the Downtown Core, and either the Channel District or Ybor City (via Tampa Heights).

The alignment options were developed based on a review of previous studies and were shaped by public comments received during a series of public engagement activities supplemented by feedback from an on-line survey and comment form. In the Spring of 2017, the city held three public workshops to discuss project objectives, review corridor options, and define potential solutions. During the workshop in May 2017, the seven alignment options described later in this section were presented for initial public feedback, suggestions, and preferences.

The public engagement process leading to the definition and preliminary evaluation of the alignment options is documented in a report titled Public Engagement & Agency Outreach Summary, which is available for review on the City of Tampa website at www.tampagov.net/streetcar.

2.2 Alignment Option Characteristics

To facilitate comparisons among the extension options, it was assumed they would share similar characteristics, including design to accommodate modern streetcar vehicles, exclusive transit guideway operations, double tracking or couplet configurations, stations spaced approximately every one quarter to one-third mile apart as is typical of similar systems, and high levels of service with full-day and evening operations with 15-minute headways. The alignment options also represent an initial phase of investment to serve the Downtown Core and surrounding districts within the project study area. Extensions beyond the project study area to other areas of the city are considered a strong possibility and are assumed to be possible for all of the potential alignment options.

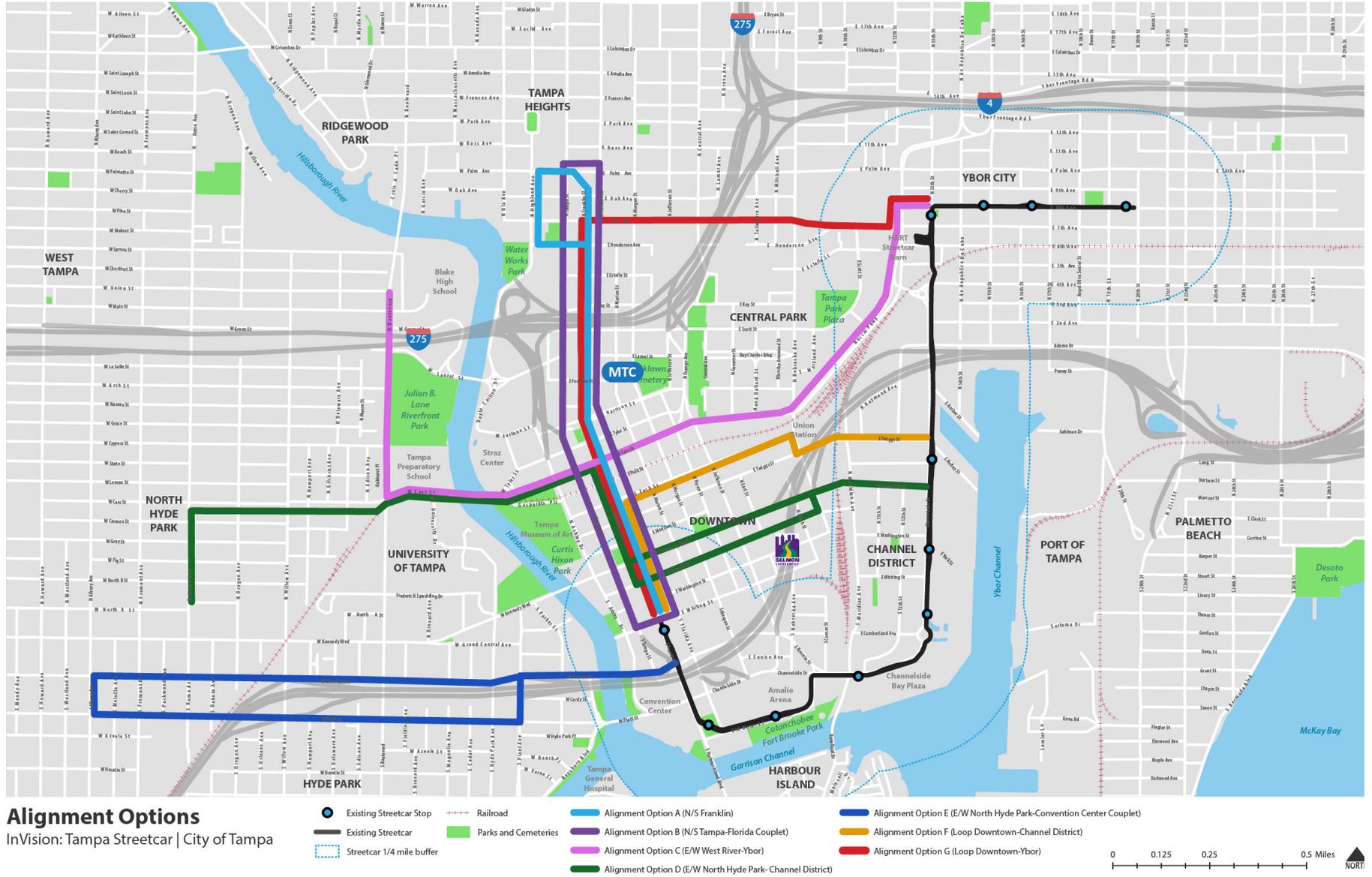
By holding characteristics of the alignment and potential service constant across the options, the city can more directly assess the relative performance of the options against the purpose and need statements and compare potential construction costs; ridership; and transportation, community, and environmental impacts. Once a preferred alignment is selected, the city will assess the performance and impacts of different vehicle technologies and operational characteristics.

2.3 Alignment Option Overview

The seven alignment options were developed and presented to stakeholders and at the Results Roundtable public workshop held on May 2, 2017. The following North/South (N/S), East/West (E/W), or Loop alignment options are shown in the Figure 1.

- » **Alignment A: N/S Franklin Street** – A bi-directional, north/south alignment along Franklin Street in the Downtown Core with a short one-way loop along Palm Avenue, N. Highland Street, and Henderson Avenue in Tampa Heights.
- » **Alignment B: N/S Tampa Street-Florida Avenue Couplet** – A north/south, one-way couplet along Tampa Street and Florida Avenue through the Downtown Core to Palm Avenue in Tampa Heights.
- » **Alignment C: E/W West River-Ybor City** – An east/west, bi-directional/two-way alignment along Nuccio Parkway and E Cass Street connecting North Hyde Park and West River to the northern extent of the Downtown Core to Central Park and Ybor City.
- » **Alignment D: E/W North Hyde Park-Channel District** – An east/west, bi-directional alignment connecting the Channel District to the Downtown Core along Kennedy Boulevard and Jackson Street and the Downtown Core to North Hyde Park along West Cass Street crossing the Hillsborough River.
- » **Alignment E: E/W North Hyde Park-Convention Center Couplet** – An east/west couplet along Brorein Street (over the river), W. Cleveland Street, and W. Platt Street connecting the southern edge of the Downtown Core near the Convention Center to Grand Central and North Hyde Park along the Selmon Expressway.
- » **Alignment F: Loop Downtown-Channel District** – A north/south and east/west bi-directional alignment connecting the Downtown Core to the Channel District along North Franklin Street and East Zack Street to East Twiggs Street.
- » **Alignment G: Loop Downtown-Ybor City** – A north/south and east/west bi-directional alignment connecting the Downtown Core to Tampa Heights and Ybor City along North Franklin Street and East 7th Avenue.

Figure 1. Alignment Options



2.4 Alignment A: N/S Franklin Street

Alignment A provides an efficient, bi-directional connection north/south along Franklin Street with a small loop at its north end in the Tampa Heights neighborhood. Alignment A provides access to Marion Transit Center (MTC), several parks, Tampa Theatre, and Brewster Technical College and is within walking distance of the Straz Center. Alignment photos shown in Figure 2 and Figure 3. The alignment map is shown in Figure 4 and alignment characteristics are summarized below.

ALIGNMENT OPTION CHARACTERISTICS

- » Track miles: 2.67
- » Number of stations: 8
- » CSX crossing
- » I-275 crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 5,150
- » 2020 projected employment within ¼ mile: 15,489
- » 2040 projected population within ¼ mile: 10,675
- » 2040 projected employment within ¼ mile: 21,791

Figure 2. North Franklin Street at East Madison Street looking north



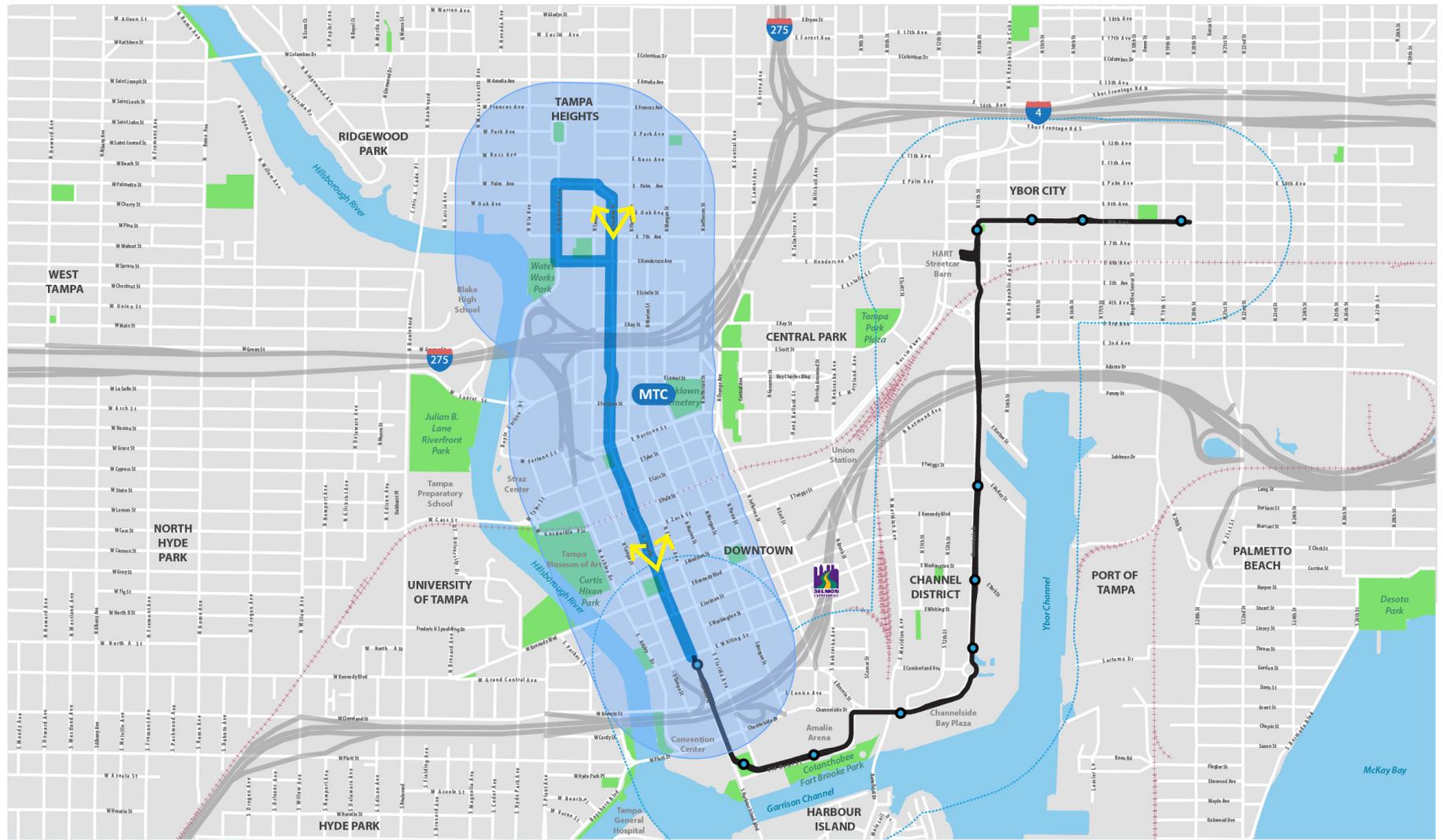
Photo taken June 26, 2017 (see location on Figure 4)

Figure 3. North Franklin Street at East 7th Avenue looking north



Photo taken June 26, 2017 (see location on Figure 4)

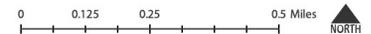
Figure 4. Alignment A: N/S Franklin Street



Alignment Option A

InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option A (N/S Franklin)
-  Photo Viewpoint (see Figure 2 and Figure 3)
-  Existing Streetcar
-  Parks and Cemeteries
-  Alignment Option A 1/4 mile buffer
-  Streetcar 1/4 mile buffer



2.5 Alignment B: N/S Tampa Street-Florida Avenue Couplet

Alignment B provides a similar, north/south connection as Alignment A, but extends the reach of its service area with a one-way couplet along Tampa Street and Florida Avenue. Alignment B also provides access to several parks, Tampa Theatre, Brewster Technical College, the Straz Center, and MTC. Alignment photos shown in Figure 5 and Figure 6. The alignment map is shown in Figure 7 and alignment characteristics are summarized below.

ALIGNMENT OPTION CHARACTERISTICS

- » Track Miles: 2.60
- » Number of Stations: 8
- » CSX crossing
- » I-275 crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 5,770
- » 2020 projected employment within ¼ mile: 18,310
- » 2040 projected population within ¼ mile: 12,464
- » 2040 projected employment within ¼ mile: 25,864

Figure 5. Tampa Street at Madison Street looking north



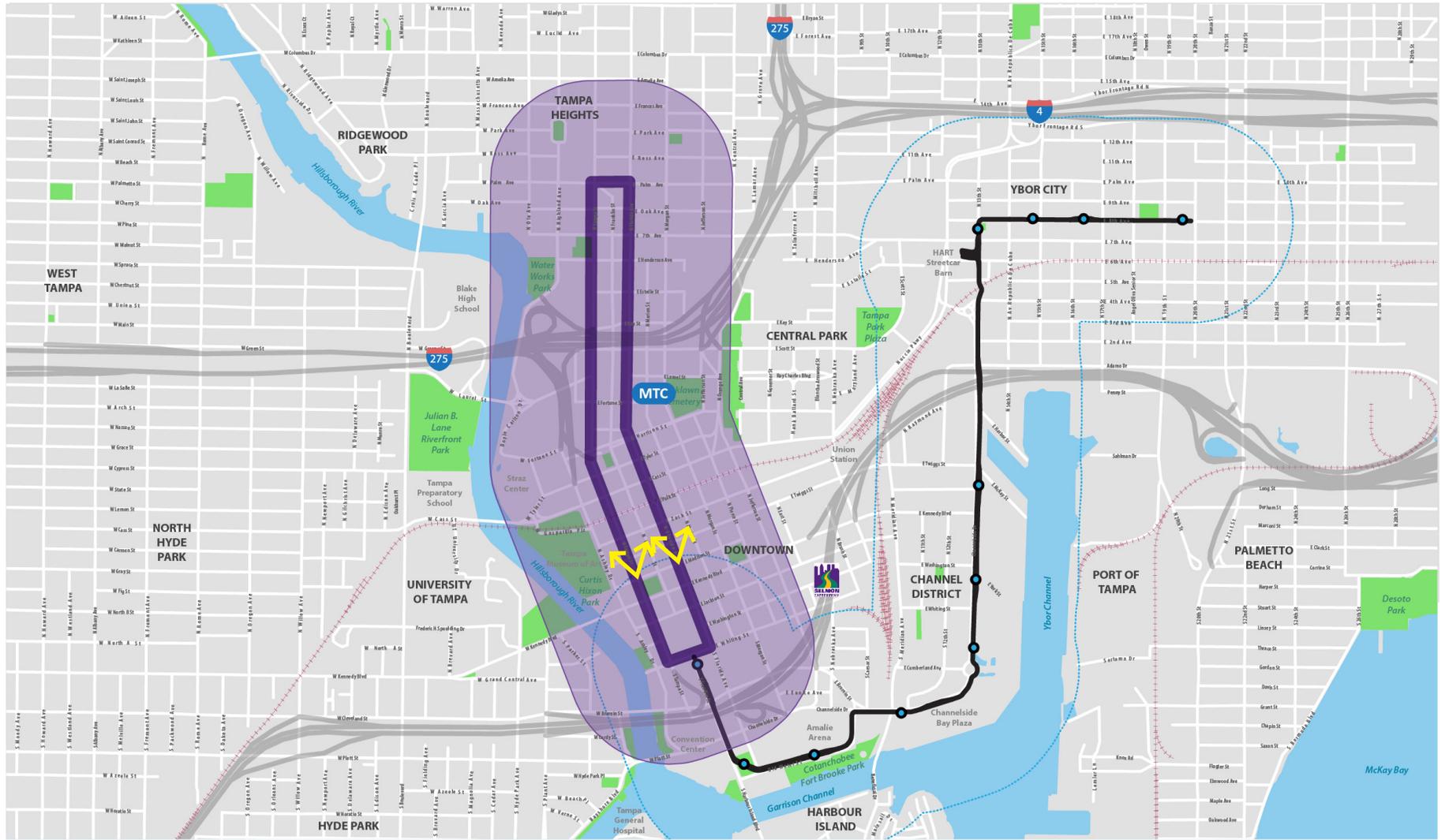
Photo taken June 26, 2017 (see location on Figure 7)

Figure 6. Florida Avenue at Madison looking north



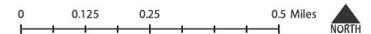
Photo taken June 26, 2017 (see location on Figure 7)

Figure 7. Alignment B: N/S Tampa Street-Florida Avenue Couplet



Alignment Option B
 InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option B (N/S Tampa-Florida Avenue Couplet) Photo Viewpoint (see Figure 5 and Figure 6)
-  Parks and Cemeteries
-  Existing Streetcar
-  Alignment Option B 1/4 mile buffer
-  Streetcar 1/4 mile buffer



2.6 Alignment C: E/W West River-Ybor City

Alignment C, is a secondary branch of the existing streetcar alignment, provides an east/west, bi-directional connection between Ybor City and West River neighborhoods along Nuccio Parkway and Cass Street. Alignment C provides access the Straz Center, Curtis Hixon Park, University of Tampa, and Julian B. Lane Riverfront Park and is within walking distance of MTC. Alignment photos shown in Figure 8 and Figure 9. The alignment map is shown in Figure 10 and alignment characteristics are summarized below.

ALIGNMENT OPTION CHARACTERISTICS

- » Track miles: 4.66
- » Number of stations: 13
- » River crossing
- » I-275 crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 8,929
- » 2020 projected employment within ¼ mile: 20,936
- » 2040 projected population within ¼ mile: 18,818
- » 2040 projected employment within ¼ mile: 32,069

Figure 8. North Boulevard at Julian B. Lane Riverfront Park looking north



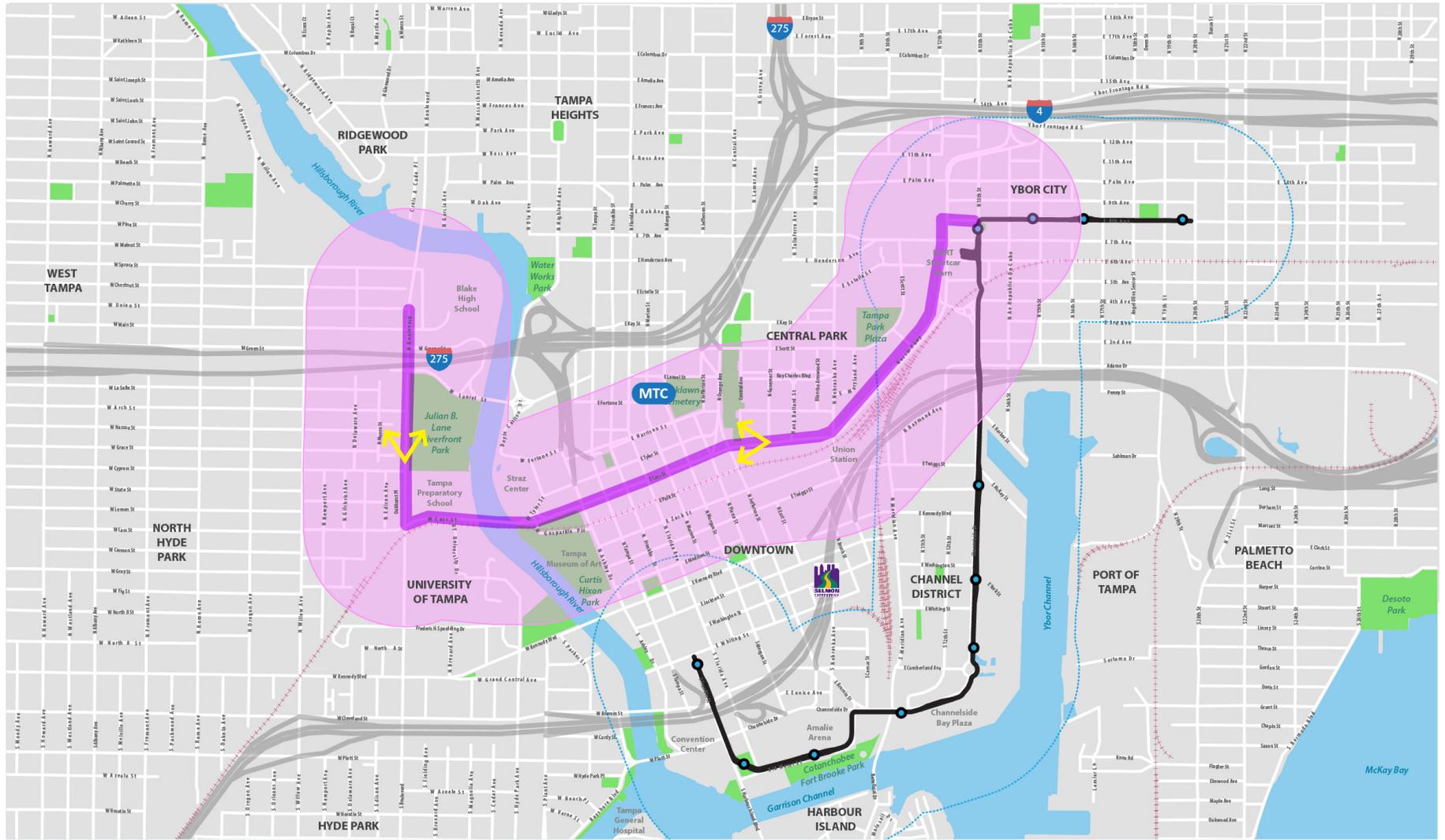
Photo taken June 28, 2017 (see location on Figure 10)

Figure 9. East Cass Street at Governor Street looking west



Photo taken June 28, 2017 (see location on Figure 10)

Figure 10. Alignment C: E/W West River-Ybor City



Alignment Option C
 InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option C (E/W West River-Ybor)
-  Photo Viewpoint (see Figure 5 and Figure 9)
-  Existing Streetcar
-  Parks and Cemeteries
-  Alignment Option C 1/4 mile buffer
-  Streetcar 1/4 mile buffer



2.7 Alignment D: E/W North Hyde Park-Channel District

Alignment D, a secondary branch of the existing Streetcar alignment, provides an east/west, bi-directional connection between Channel District center and North Hyde Park neighborhoods along Kennedy Blvd and Jackson Street in the Downtown Core and Cass Street over the river. Alignment D provides residential connection to the Downtown Core, access to several parks, the Straz Center, and University of Tampa. Alignment photos shown in Figure 11 and Figure 12. The alignment map is shown in Figure 13 and alignment characteristics are summarized below.

ALIGNMENT OPTION CHARACTERISTICS

- » Track miles: 4.94
- » Number of stations: 13
- » River crossing
- » CSX crossings
- » Selmon Expressway crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 7,318
- » 2020 projected employment within ¼ mile: 23,884
- » 2040 projected population within ¼ mile: 16,009
- » 2040 projected employment within ¼ mile: 34,015

Figure 11. North Rome Avenue at West North B Street looking north



Photo taken June 28, 2017 (see location on Figure 13)

Figure 12. East Kennedy Boulevard at North Florida Avenue looking west

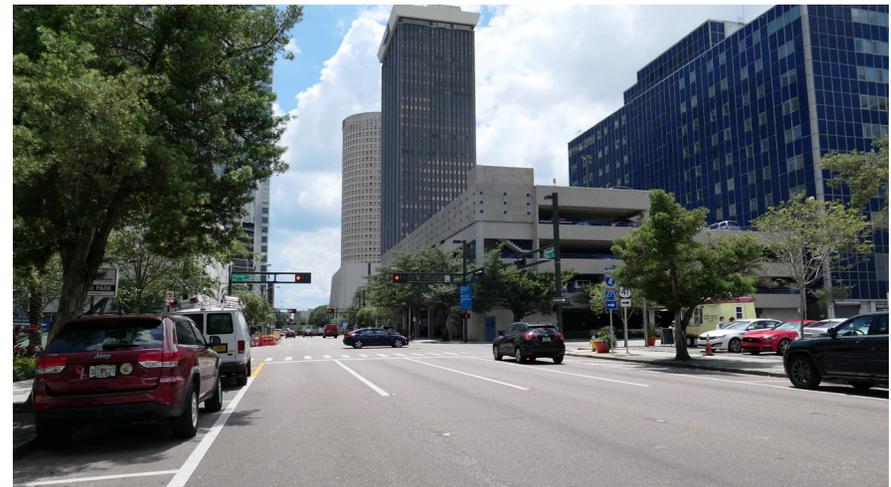
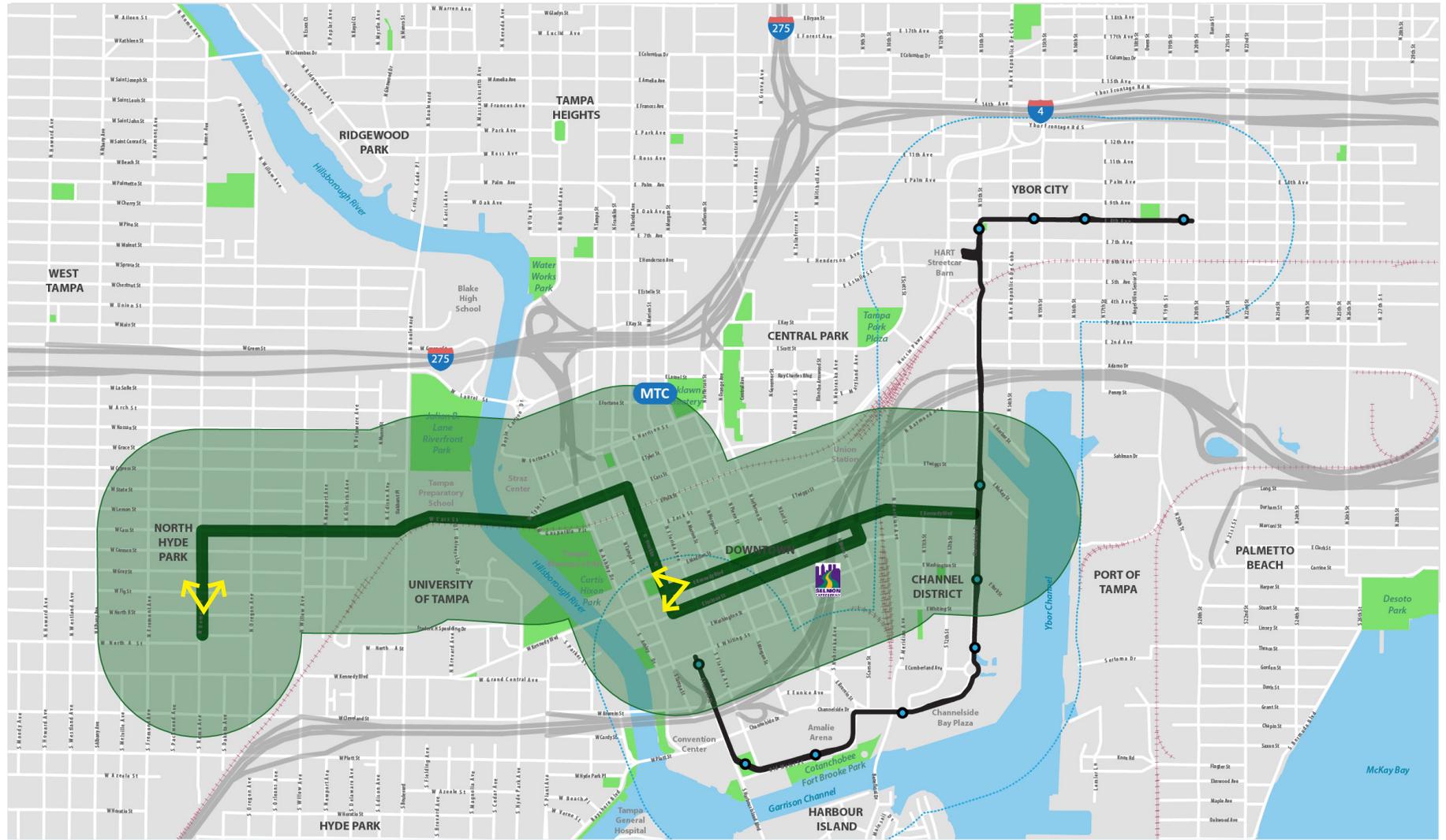


Photo taken June 28, 2017 (see location on Figure 13)

Figure 13. Alignment D: E/W North Hyde Park-Channel District



Alignment Option D
 InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option D (E/W North Hyde Park-Channel District)
-  Photo Viewpoint (see Figure 11 and Figure 12)
-  Existing Streetcar
-  Parks and Cemeteries
-  Alignment Option D 1/4 mile buffer
-  Streetcar 1/4 mile buffer



2.8 Alignment E: E/W North Hyde Park-Convention Center Couplet

Alignment E, provides an east/west loop between Channel District south (Tampa Convention Center) and North Hyde Park neighborhoods along Brorein Street (over the river), W. Cleveland Street, and W. Platt Street. Alignment E provides an extension of the existing alignment, connecting the residential and commercial areas of North Hyde Park to Channel District and Ybor City and is within walking distance of University of Tampa. Alignment photos shown in Figure 14 and Figure 15. The alignment map is shown in Figure 16 and alignment characteristics are summarized below.

ALIGNMENT CHARACTERISTICS

- » Track miles: 3.27
- » Number of stations: 9
- » CSX crossing
- » River crossing
- » Selmon Expressway crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 4,748
- » 2020 projected employment within ¼ mile: 10,327
- » 2040 projected population within ¼ mile: 6,472
- » 2040 projected employment within ¼ mile: 12,965

Figure 14. West Platt Street and South Edison Avenue looking east



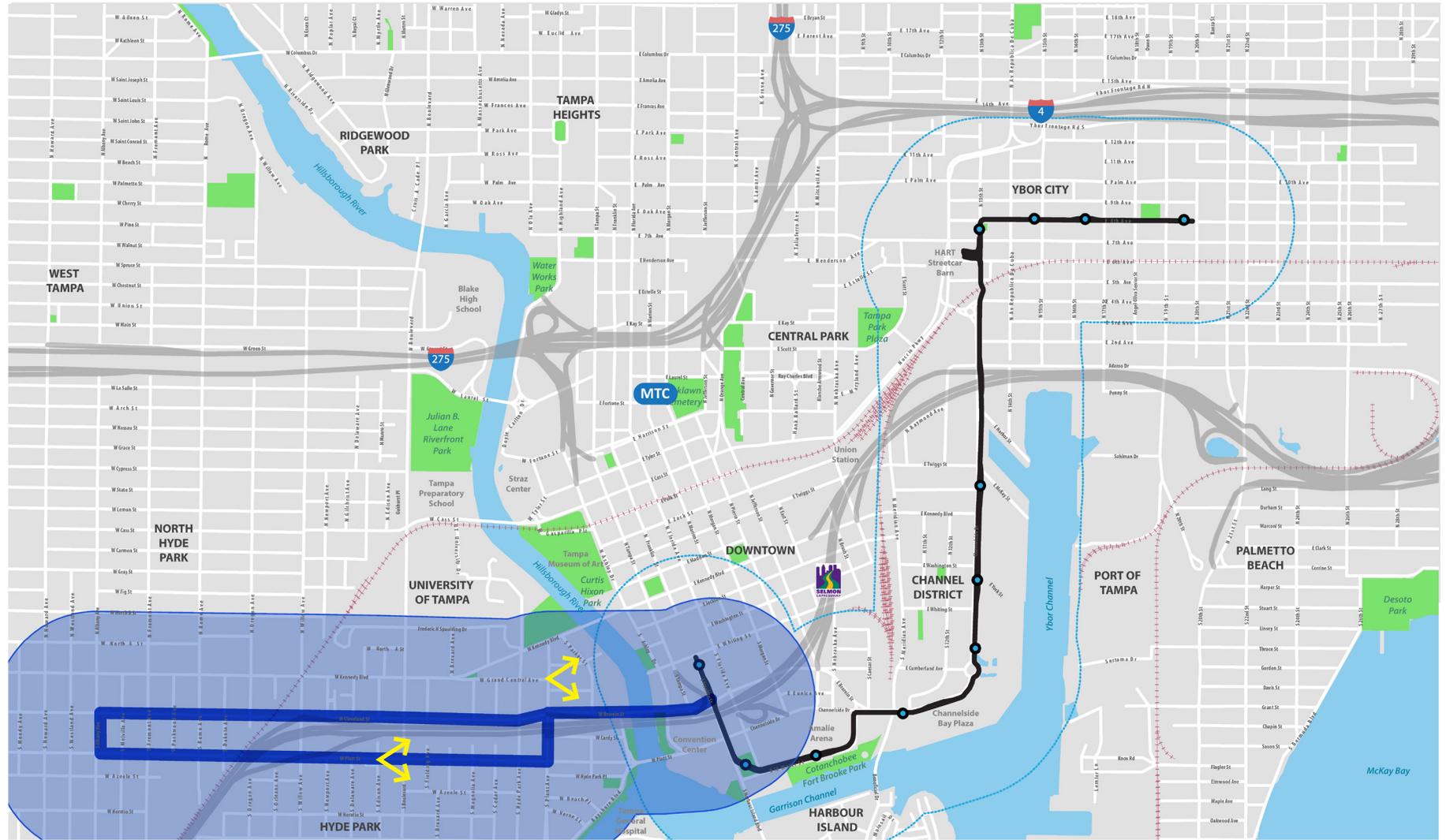
Photo taken June 28, 2017 (see location on Figure 16)

Figure 15. West Grand Central Avenue overlooking Tampa Tribune construction site



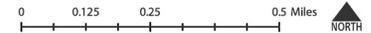
Photo taken June 28, 2017 (see location on Figure 16)

Figure 16. Alignment E: E/W North Hyde Park-Convention Center Couplet



Alignment Option E
 InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option E (E/W North Hyde Park-Convention Center Couplet)
-  Photo Viewpoint (see Figure 14 and Figure 15)
-  Existing Streetcar
-  Parks and Cemeteries
-  Alignment Option E 1/4 mile buffer
-  Streetcar 1/4 mile buffer



2.9 Alignment F: Loop Downtown-Channel District

Alignment F is a Downtown loop connecting the southern terminus of the existing alignment to the Channel District center segment of the existing alignment and traveling along N Franklin Street and E Zack Street to E Twiggs Street. Alignment F completes the circuit of the existing alignment and provides closer access to Downtown Core destinations such as Curtis Hixon Park, residential and office uses, the government district, and Union Station. Alignment photos shown in Figure 17 and Figure 18. The alignment map is shown in Figure 19 and alignment characteristics are summarized below.

ALIGNMENT CHARACTERISTICS

- » Track miles: 2.46
- » Number of stations: 8
- » CSX crossing
- » Selmon Expressway crossing

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 3,907
- » 2020 projected employment within ¼ mile: 16,486
- » 2040 projected population within ¼ mile: 9,639
- » 2040 projected employment within ¼ mile: 23,023

Figure 17. East Zack Street at North Florida Avenue looking east



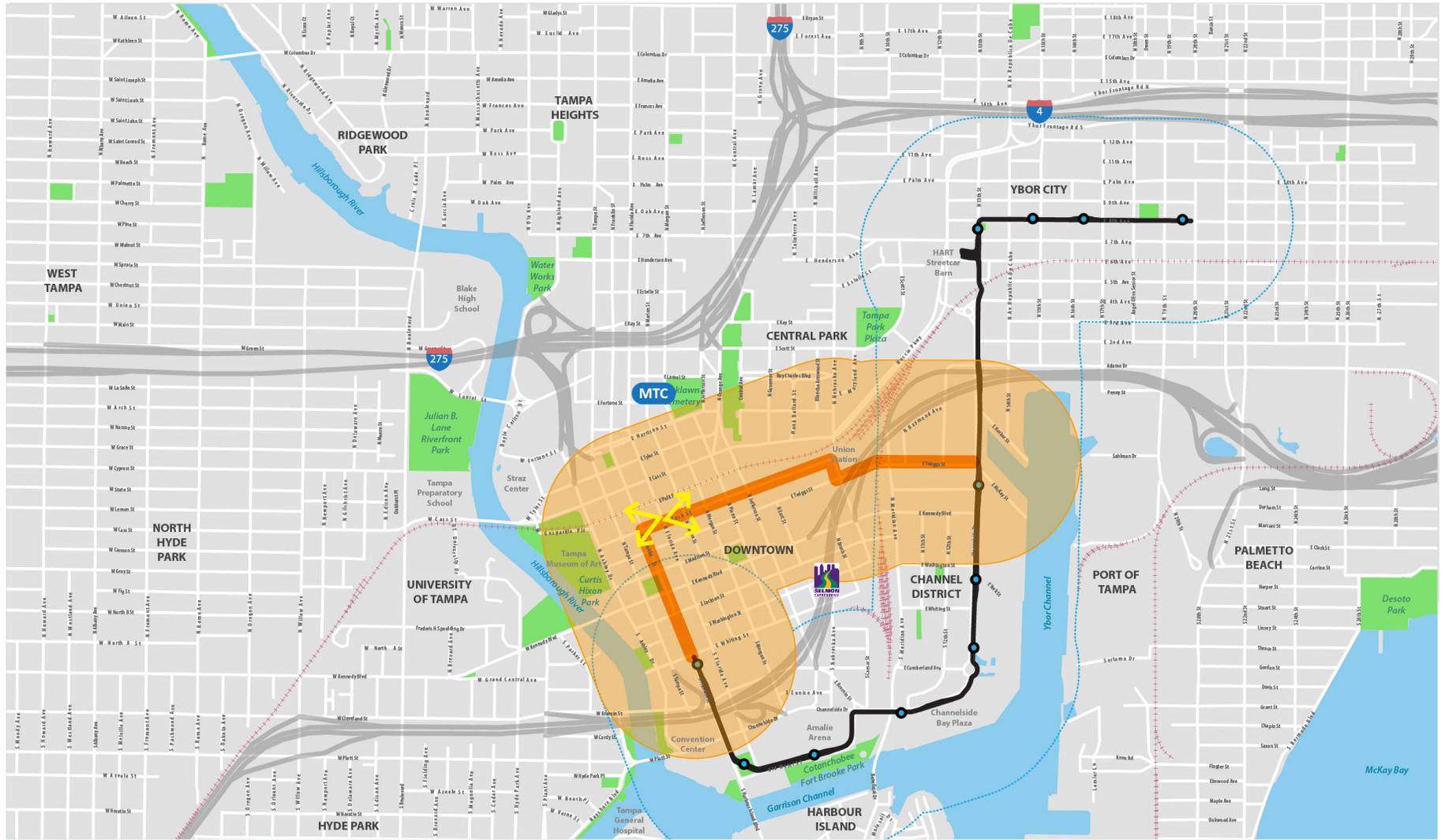
Photo taken June 28, 2017 (see location on Figure 19)

Figure 18. East Zack Street at North Florida Avenue looking west



Photo taken June 28, 2017 (see location on Figure 19)

Figure 19. Alignment F: Loop Downtown-Channel District



Alignment Option F
 InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Existing Streetcar
-  Railroad
-  Parks and Cemeteries
-  Alignment Option F (Loop Downtown-Channel District)
-  Alignment Option F 1/4 mile buffer
-  Photo Viewpoint (see Figure 17 and Figure 18)

-  Streetcar 1/4 mile buffer



2.10 Alignment G: Loop Downtown-Ybor City

Alignment G also completes the existing alignment circuit by extending from the southern terminus northward, along N Franklin Street, to E 7th Avenue in Tampa Heights. The loop is completed at the existing alignment in Ybor City. Alignment G provides closer access to Downtown Core destinations such as Curtis Hixon Park, residential and office uses, the government district, MTC as well as a connection between Tampa Heights neighborhoods and Ybor City. Alignment photos shown in Figure 20 and Figure 21. The alignment map is shown in Figure 22 and alignment characteristics are summarized below.

ALIGNMENT CHARACTERISTICS

- » Track miles: 4.12
- » Number of stations: 12
- » CSX crossing
- » I-275 crossings

ALIGNMENT OPTION DEMOGRAPHICS (EXTENSION ONLY)

- » 2020 projected population within ¼ mile: 5,606
- » 2020 projected employment within ¼ mile: 16,356
- » 2040 projected population within ¼ mile: 11,743
- » 2040 projected employment within ¼ mile: 23,450

Figure 20. North Franklin Street at Kennedy Boulevard looking north



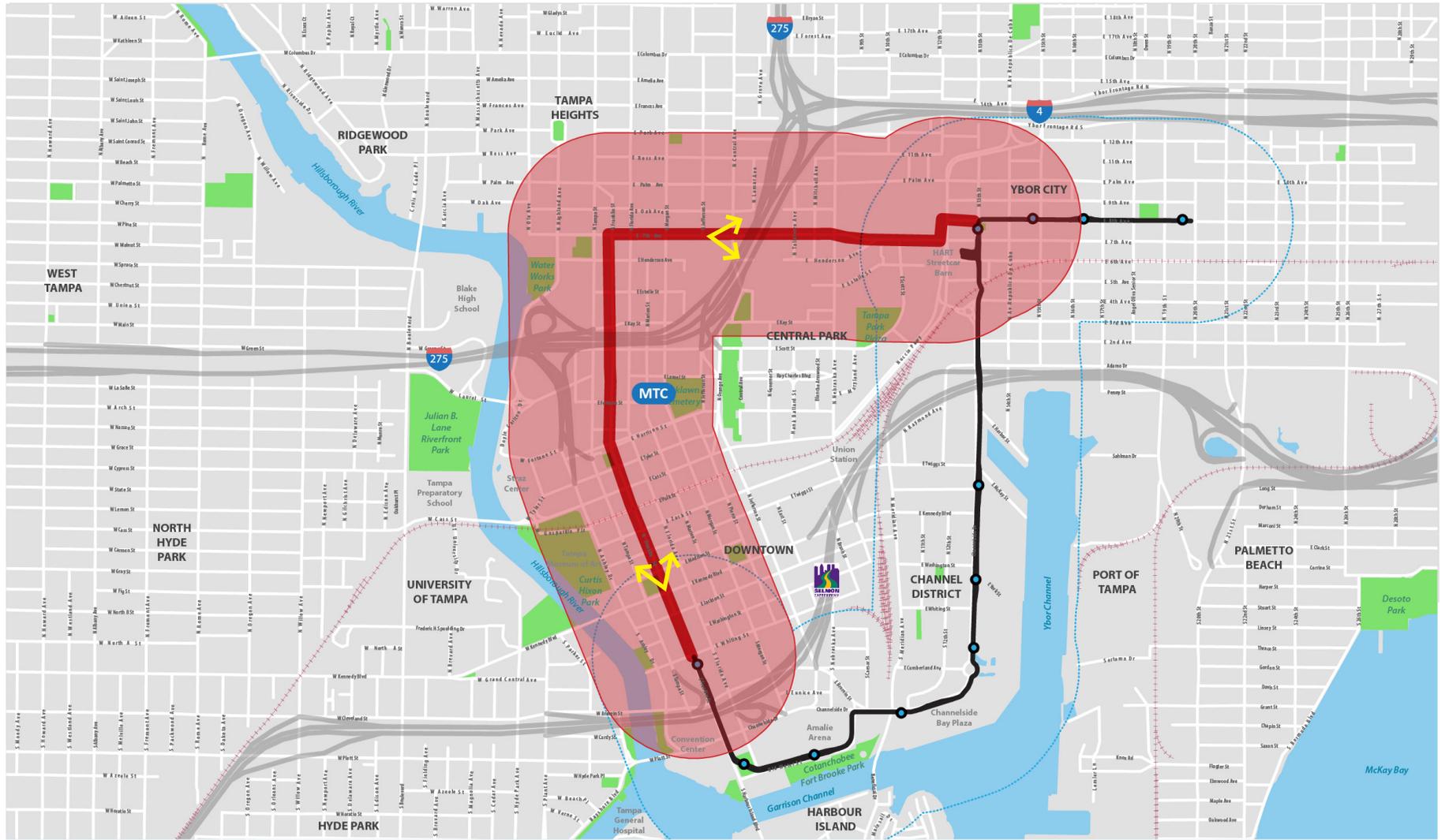
Photo taken June 26, 2017 (see location on Figure 22)

Figure 21. East 7th Avenue at North Central Avenue looking west



Photo taken June 26, 2017 (see location on Figure 22)

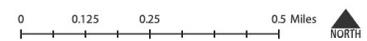
Figure 22. Alignment G: Loop Downtown-Ybor City



Alignment Option G

InVision: Tampa Streetcar | City of Tampa

-  Existing Streetcar Stop
-  Railroad
-  Alignment Option G (Loop Downtown-Ybor)
-  Photo Viewpoint (see Figure 20 and Figure 21)
-  Existing Streetcar
-  Parks and Cemeteries
-  Alignment Option G 1/4 mile buffer
-  Streetcar 1/4 mile buffer



3. EVALUATION METHODOLOGY

3.1 Evaluation Summary

This section of the report provides a review of evaluation methodologies and measures and describes in detail how the various measures have been used to assess the potential performance and impacts of the alignment options.

The evaluation methodology and measures described below serve as the basis for a comparative assessment of the seven alignment options and will be used in selecting a preferred alignment option. Once a preferred option is selected, the city will assess the performance and impacts of different guideway configurations, vehicle technologies, operational characteristics, and design alternatives within the preferred alignment.

The evaluation methodology for rating the alignment options is based on five Purpose and Need categories (see Purpose & Need, Context & Evaluation Plan report) and six Performance and Impact categories. The measures identified for each of the Purpose and Need categories are shown in Table 2 and the measures identified for each of the Performance and Impact categories are shown in Table 3. The overall evaluation matrix with details and ratings for each evaluation measure is provided as Appendix A. A summary evaluation table is provided at the end of this section along with a comparison of the key information for each alignment option.

3.2 Purpose & Need Categories

A set of Purpose and Need statements have been identified to define the expanded and/or modernized streetcar service, frame the characteristics of that service, and guide the selection and evaluation process. As such, these needs will be used as the first set of categories by which the alignments will be rated.

CONNECT DOWNTOWN DISTRICTS

In the past decade, the Streetcar Feasibility Study area has seen a dramatic increase in its population and employment. The number of residents in the Downtown Core, Channel District, and north Harbour Island has reached 10,000 people, with another 40,000 residing in emerging sub districts including Central Park, Ybor City, North Hyde Park, Grand Central, and Tampa Heights. Additionally, the number of businesses and employees has intensified in the study area. Currently, approximately 100,000 people work in the study area, with another 34,000 people projected between 2020 and 2040.

With increased densities in the Downtown Core and emerging sub districts come a number of residents, employment centers, and destinations not currently served by the existing streetcar. Connectivity to these current land uses and future land uses via convenient and modern means of travel is vital to the Center City's long term success.

The measures used to rate connection to Center City districts for each alignment are:

- » Serves Downtown Core: The Downtown Core is where the highest population and employment densities are found. It is bound by Tyler Street to the north, Jefferson Street to the east, Brorein Street to the south, and Ashley Street to the west. The alignment options were rated based on connection to the core.
- » Serves emerging subdistricts: Tampa Heights, Central Park/Encore!, Grand Central/UT, North Hyde Park, and West River are all emerging subdistricts that are located just outside the Downtown core. Alignments were rated based on connection to subdistricts.

SERVE DIVERSE TRAVEL MARKETS

The Center City is increasingly chosen as a desirable location to live and work for a diverse population ranging from young professionals to empty nesters, long-time residents, and transit-dependent people. Population and employment within the study area are projected to increase by 65,000 between 2020 and 2040. Additionally, with this intensification has come an increased demand for access to major cultural, sports, entertainment, institutional, and educational destinations. This level of transit-supportive activity strengthens the potential to successfully introduce an expanded streetcar to the area. The Center City's competitiveness and livability will be directly influenced by its ability to serve these diverse travel markets.

The measures used to rate the service to diverse travel markets for each alignment are:

- » Serves the greatest population/employment within ¼ mile (2020) - extension only: Population and employment estimates can be used to indicate whether an area's activity density (employment and population per acre) is supportive of transit service. Using data from the Hillsborough County MPO's Tampa Bay Regional Planning Model (TBRPM), the study team identified the projected number of residents and workers in 2020 within a ¼-mile buffer of each alignment.
- » Provides access for transit-dependent populations within ¼ mile: To identify areas with high concentrations of transit dependent populations, the study team evaluated several demographic factors using U.S. Census Bureau 2015 American Community Survey block group data. The factors considered included block groups with low median household income (less than \$30,000), high rates of unemployment (greater than 12 percent), high concentrations of zero car households (more than 35 percent), high concentrations of rental households (more than 50 percent), and high concentrations of workers who use public transit to commute to work (more than 20 percent). Four general locations were identified as being highly transit dependent (Central Park/Encore and West River) or moderately transit dependent (Tampa Heights and North Hyde Park). Each alignment was rated based on the potential service it would provide to these transit dependent populations.

Table 1. Purpose and Need Evaluation Categories and Measures

Category	Measure
Connect Downtown Districts	Serves Downtown core
	Serves emerging subdistricts
Serve Diverse Travel Markets	Serves the greatest population/employment within 1/4 mile (2020) - extension only
	Provides access for transit-dependent population within 1/4 mile
	Connects major destinations and parks within 1/4 mile
Improve First/Last Mile Service	Provides connection to existing regional transit hubs (MTC)
	Provides connection existing regional and local transit services
	Provides connection to potential new regional transit hubs
Support Economic Development	Supports population/employment with 1/4 mile (2040) - extension only
	Provides access to developments that are under construction/planned/proposed within 1/4 mile
	Serves areas with potential for transit-induced development
Expand Sustainable Transportation Options	Enhances connections to local mobility options

- » Connects major destinations and parks within ¼ mile: Many of Tampa's premier cultural, sports, entertainment, institutional, and educational destinations are located within the study area. Each alignment was rated based on the proximity (within ¼ mile) to these parks or cultural, entertainment, and educational venues.

IMPROVE FIRST MILE/LAST MILE CONNECTIONS

Measures under this section quantify the alignment options' potential to improve the first/ last mile services in Center City. Though several on-demand and circulator services currently exist in the study area, these modes do not have the intermediate capacity and high frequency service characteristics that can move large populations of regional commuters and visitors to high-demand destinations during the daily and intermittent peak periods. A streetcar in an exclusive guideway can by-pass traffic congestion while providing seamless transitions to regional mobility options. Therefore, the preferred alignment route should include connections to the Downtown Core's existing and planned regional hubs and large capacity parking facilities to facilitate and enhance first/ last mile services.

The measures used to rate the first/last mile service of each alignments are:

- » Provides connection to existing regional transit hubs: The Marion Transit Center (MTC) is the primary gateway to the Downtown Core via regional travel by Hillsborough Area Regional Transit (HART) routes, Red Coach, and Megabus. The alignment options were rated based on their proximity (in blocks) to MTC.
- » Provides connection to existing regional and local transit services: The alignment options were rated based on connectivity to the following, existing regional transit services that are not served at MTC: Amtrak (Tampa Union Station) and Greyhound Station. Connectivity to these services were based on the proximity (in blocks) to the respective service stations. Connectivity to HART routes was also based on the number of bus stops that were located within two blocks of each alignment.
- » Provides connection to potential new regional transit hubs: FDOT and HART are currently preparing a Regional Transit Feasibility Plan that will identify a top regional transit corridor in Hillsborough and/ or Pinellas Counties. Thus far, the study has identified five potential corridors, four of which connect to the Downtown Core. The alignment options were rated by the number intersecting regional transit corridors.

SUPPORT ECONOMIC DEVELOPMENT

The current and projected population and employment for the Center City and surrounding areas indicates the potential for sizeable increase in building development within the study area. Recent development has included everything from small residential projects to large-scale, multi-block, mixed-use projects throughout the study area. These currently under construction, planned, and proposed projects will have a dramatic impact on the future of the City and region. A high-capacity circulator service has the potential to support economic development by linking new development areas to each other and the Downtown Core.

The measures used to rate economic development support for each alignment are:

- » Supports population/employment within ¼ mile (2040) - extension only: In addition to existing estimates, population and employment projections can be used to indicate if an area's activity density (employment and population per acre) has the potential to support even higher levels of transit service in the future. Using data from the Hillsborough County MPO's TBRPM, the study team identified the projected number of residents and workers in 2040 within a ¼-mile buffer of each alignment.
- » Provides access to developments that are under construction/ planned/proposed development within ¼ mile: The alignment options were rated based on the number of under construction, planned, and proposed development projects that fell within a ¼-mile buffer of each line. Each alignment was also rated based on proximity to the three master planned developments within the Center City.
- » Serves areas with potential for transit-induced development: Using the City of Tampa's Future Land Use Map, the alignments were rated based on acreage and percentage of the area within ¼ mile of the alignment fell within an area with an existing Future Land Use designation that permits high residential density. For the purpose of this evaluation, this included Future Land Use categories that permit more than 35 residential dwelling units per acre were included.

EXPAND SUSTAINABLE TRANSPORTATION OPTIONS

As residential and employment density increases, transit and transportation should continue to advance at the same rate. These services will be inherently constrained by the finite capacity for travel within the Downtown Core as well as shaped by the geospatial patterns of growth occurring. A network that primarily supports single-occupancy vehicles for local trips is not sustainable. An efficient, sustainable transportation system will necessarily adapt to growth within the limits and confines of historic and developing neighborhoods.

Existing and emerging transportation options are available in the Downtown Core as alternatives to single-occupancy vehicle trips. However, there is no core service with intermediate-capacity that effectively serves internal trips by bypassing peak hour and event-related congestion. A well-connected Streetcar service can provide an attractive option for traveling from Center City origins to destinations, and vice versa.

The measures used to rate the first/last mile service of each alignments are:

- » Enhances connections to local mobility options: A network of local-trip mobility options exists in the Downtown Core, including HART's fixed routes, Metro Rapid and In-Towner trolley, as well as the Pirate Water Taxi and Coast Bike Share. A sustainable streetcar service should support and operate in tandem with these services to the greatest extent possible.

The alignment's connection to MetroRapid was measured based on the average distance (in blocks) to the two closest MetroRapid stops; connection to HART's other fixed route service was rated based on the number of buses per hour that run on HART routes within 2 blocks of the alignment. Connection to the In-Towner was based on the number of In-Towner stops that are on the alignment. Connection to the Pirate Water Taxi was rated based on the number of blocks from the alignment to the water taxi station. Connection to Coast Bike Share facilities was based on the number of bike hubs located directly along the alignment.

3.3 Performance & Impacts Categories

The measures and data used to rate the alignments based on the performance and impacts category are presented in the following sections.

POPULATION & EMPLOYMENT SERVED

- » Population/employment within ¼ mile per track mile (2020 and 2040): Alignments that serve areas of dense population or employment are preferable to those areas that are less dense. Dense areas tend to be more transit supportive and therefore more cost effective. A longer alignment may make more sense if it reaches dense, transit-supportive neighborhoods. Conversely, shorter alignments that serve less dense areas within the Downtown Core may be less cost effective. Each alignment has been analyzed to determine the population and employment numbers per track mile.

CAPITAL & OPERATING COSTS

- » Total capital cost (2017\$) - mid-range estimate: Consistent methodologies and unit prices were applied in capital cost estimates for each of the alignment options considered. The cost estimates include modern streetcar vehicles and spare parts; streetcar tracks; required relocation of public water, sewer, and stormwater infrastructure; repaving of roadways; traffic signalization; traction power substations; overhead power system for streetcar; bridge modifications; and CSX railroad crossings. Costs are not included for the vehicle maintenance and storage facility, for real estate, nor for modernization of the existing streetcar system. Capital costs are reported in 2017 dollars and the mid-range estimate was applied.
- » Annual O&M costs (2017\$) – extension only: Consistent methodologies and unit prices were applied in preparation of a preliminary operating plan and annual operating and maintenance cost estimate for each of the alignment options considered as well as the existing streetcar system. Operating plan and O&M costs assume a 15 minute headway and set span of service daily for the extension and the existing streetcar system, and are factored to reflect current Tampa Historic Streetcar operating unit costs, reported in 2017 dollars.

Table 2. Performance & Impact Evaluation Categories and Measures

Category	Measure
Population & Employment Served	Population/employment within 1/4 mile per track mile (2020)
	Population/employment within 1/4 mile per track mile (2024)
Capital & Operating Costs	Total capital cost (2017\$) - mid-range (extension & new vehicle cost only)
	Annual O&M costs (2017\$) - extension only
Cost Effectiveness	Capital cost (2017\$) per track mile
	Annualized capital & O&M cost (2017\$) per rider (2020)
Constructability /Operational Constraints	Avoids CSX railroad crossings
	Avoids river crossings
	Avoids Esplanade crossing
	Minimizes or avoids other constraints that would affect streetcar operations
	Avoids or minimizes impacts to major utilities
Traffic & Parking Impacts	Minimizes or avoids increases in roadway congestion (2020 existing roadway capacity)
	Provides potential for dedicated guideway based on adjusted roadway capacity
	Avoids or minimizes reduction in on-street parking
	Avoids or minimizes potential for intersection failure
Community & Environmental Impacts	Serves Environmental Justice (EJ) populations with minimal impacts
	Minimizes impacts to business access
	Minimizes or avoids impacts to noise/vibration-sensitive uses
	Minimizes potential impacts to historic districts
	Avoids potential impacts to parklands or other Section 4(f) resources

COST EFFECTIVENESS

The cost-effectiveness of transit service not only improves its viability, but also enhances the attractiveness of the proposed service to stakeholders and the public. The following measures were evaluated to estimate a overall cost effectiveness of each alignment.

- » Capital cost per track mile: Measures of the mid-range estimated capital cost of each alignment, including vehicles, divided by the track miles. The estimated capital cost of either a new maintenance facility and/or modifications to the existing facility are not included in these measures, as those costs are currently independent of the alignment options. Track miles vary among the routes.
- » Annualized capital and O&M cost per rider (2020): Measures of the annualized capital cost (applying annualization useful life of asset factors consistent with FTA standard reporting practices) plus the annual O&M cost for each alignment option divided by the estimated annual streetcar boardings for each alignment. Annual boardings reflect the estimated trips on the existing streetcar system as well as the extension alignment option. This measure is consistent with FTA methodologies to report annual capital and operating costs per annual riders.

CONSTRUCTABILITY/OPERATIONAL CONSTRAINTS

Physical and operational constraints will be a critical factor in deciding where and how to align the extension of the streetcar. While the presence of any one of these factors is not a fatal flaw, these characteristics will require special consideration due to the additional coordination, planning, engineering, and/or operational costs associated with mitigation.

- » Avoids CSX railroad crossings: The CSX heavy freight railroad lies at the heart of the Downtown Core and cuts a southwest to northeast path across the study area. A rail spur owned by THEA connects to the CSX rail line and divides the Downtown Core and Channel District. The technical and logistical challenges associated with a streetcar crossing the railroad are complex and would require an additional level of engineering and planning to accomplish. Identifying the number of railroad crossings for each alignment is a critical piece of each route's ultimate feasibility.

- Coordination with CSX is ongoing and encompasses issues and matters beyond a streetcar extension, issues which nonetheless will impact alignment. For example, the City of Tampa is currently working with CSX to implement a train horn “quiet zone” through the Downtown Core. To achieve a horn-free quiet zone, public street crossings will be upgraded with coordinated safety features such as barriers, signals, and signage. This project, currently in the planning and engineering stage, could incorporate and consider technology that would accommodate a streetcar crossing at one or more of the nine intersections that are planned for motorist and pedestrian safety upgrades.
- Early discussions with CSX have also revealed that CSX would prefer railroad crossings by rubber tire streetcars to a rail over rail crossing. The concern with rail over rail crossings is that the electric wiring of the streetcar may interfere with CSX communications. A potential compromise has been discussed and involves outfitting rail streetcars with off-wire, battery operations at railroad crossings. Nonetheless, an alignment that minimizes or avoids CSX crossings will be preferred by CSX to alignments that cross the railroad one or more times.
- The number of railroad crossings were identified for each alignment, rated as a measure of overall physical/operational constraints. It was also factored into each alignment’s cost estimate.
- » Avoids river crossings: Streetcar bridge crossings occur along various proposed alignments and only include bascule bridges. This bridge type will require modifications and/or replacement of the movable bridge leaf and the associated mechanical and electrical equipment that operates the bridge. It is also possible that the bridge approaches will need significant modification to accept the new streetcar tracks. It is currently unknown if additional foundation strengthening will be required, but it is a possibility. A bridge crossing of this type will also require an interlocking system between the bridge controls and train controls, which is considered in the capital cost estimates. The nearby Wave Streetcar in Fort Lauderdale, Florida will also cross a bascule bridge, and has completed an advanced design and cost estimate for their proposed modifications. Without having further information or design for this system, the current cost estimates for these bridge modifications and system interlocking are based on the Wave Streetcar design and estimate.
- » Avoids Esplanade crossing: While access to the Esplanade on Franklin Avenue is a benefit to pedestrians, avoiding the facilities is advantageous due to the limited right-of-way. If the Esplanade were to be impacted, there would likely need to be total reconstruction of the corridor including the roadway, sidewalk, and adjacent landscaping. The measures were rated on whether or not they avoid the Esplanade crossing.
- » Minimizes or avoids other constraints that would affect streetcar operations: The alignments were rated based on how well the following factors were involved:
 - Signalized and non-signalized intersections: The number of currently signalized and un-signalized intersections the streetcar will cross is identified for each alignment option. The level of engineering and signal modifications will vary from intersection to intersection. This depends upon the type of intersection, the extent of existing signalization, and/or if the streetcar will need a dedicated phase to complete a movement through an intersection.
 - FDOT or THEA overpasses: The clearance height of a streetcar includes the rail wheels, vehicle, and Overhead Contact System (OCS). The ideal clearance height for the streetcar to pass under an overpass is a minimum of 18’, but a streetcar may operate beneath an overpass that is less than the 16’-6” FDOT standard. If the streetcars are outfitted with batteries, the pantograph can be raised and lowered, which will decrease the amount of clearance required for an underpass. The roadways that will require an underpass evaluation are I-275 and the Selmon Expressway. Each alignment was rated based on whether it had an underpass that was below the minimum acceptable height.
- » Avoids or minimizes impacts to major utilities: utility impacts will be important in completing project design. Based on the nature and extent of utility conflicts, impacts could have a significant influence on construction costs and constructability. To evaluate impacts, a

screening was completed to evaluate locations where larger scale underground civil and utility infrastructure could be impacted under each alignment. The level of potential impacts were compared and rated on a low, medium, and high risk of impacts.

TRAFFIC & PARKING IMPACTS

Streetcar extension within an existing network of infrastructure and signalization will affect traffic flow patterns and may reduce the amount of available parking. Existing roadway capacity, on-street parking, and signalized/non-signalized intersections along each alignment option were analyzed to determine overall transportation impacts.

- » Minimizes or avoids increase in roadway congestion (2020 existing roadway capacity): The existing annual average volume to capacity ratio (V/C) of the roadways within the study area were grown to estimate future traffic volumes in 2020. The future no-build V/C estimates were used to evaluate individual roadway segments' abilities to accommodating a transit service operating in mixed traffic. The alignments were rated based on their length along the roadway operating at an acceptable or unacceptable volume to capacity ratio. An additional qualitative assessment was used to measure the alignments avoidance of roadway congestion based on the FDOT functional class of the roadway that the alignment travels on.
- » Provides potential for dedicated guideway based on adjusted roadway capacity: Roadway capacity was adjusted to account for a lane reduction in each direction in which a streetcar or other dedicated transitway would operate. This was done through an adjustment of the previously calculated, estimated V/C ratio to account for a lane reduction. The alignments were rated based on their length along the roadway with lane reduction operating at an acceptable or unacceptable volume to capacity ratio. An additional qualitative assessment was used to measure the alignments avoidance of roadway congestion based on the FDOT functional class of the roadway that the alignment travels on.
- » Avoids or minimizes reduction in on-street parking: A streetcar operating along roadways with on-street parking may be affected by the taking of that parking for an additional travel lane. The

percentage of impact to on-street parking was measured based on the length of roadway where the alignment affects the parking over the total length of roadway with on-street parking.

- » Avoids or minimizes potential for intersection failure: The number of impacted intersections was identified including signalized intersections (due to the additional queue that is required by the vehicle), intersections that require turns and therefore reconfiguration, and intersections where the streetcar alignment is along a minor street that intersects a major roadway. The alignments were rated based on the number of impacted intersections along that route.

COMMUNITY & ENVIRONMENT IMPACTS

The streetcar extension could impact the community in a variety of ways. By connecting the minority and low income areas to other parts of the city, the streetcar is giving more transit opportunities to those residents. The streetcar can also affect security measures for government buildings and access to businesses. Population, government security, and business access along each alignment were analyzed to determine the community impacts.

- » Serves Environmental Justice (EJ) populations with minimal impacts: The impacts of an expanded Streetcar to concentrations of EJ populations were measured based on the percentage of minorities and low-income residents within ¼ mile of each alignment. Since these populations tend to be transit dependent, an alignment that served a higher concentration of EJ populations rated better than an alignment that served lower EJ populations.
- » Minimizes impact to business access: As the streetcar traverses its route and reaches stops along the way, it will impact the entrance and exit driveways along the alignment. The impact to business access was measured based on the number of single access driveways along the alignment.

The environmental impacts assessed include noise/vibration impacts, parks impacts, and historical/cultural impacts.

- » Minimizes or avoids impacts to noise/vibration-sensitive uses: The Federal Transit Administration recognizes the environmental impacts

caused by the inherent noise and vibrations produced by various forms of transit. Noise impact occurs when it interrupts ongoing activities and can result in community annoyance. Vibration impacts typically occur at vibration-sensitive buildings such as laboratories or hospitals. Relative noise and vibration produced by streetcars is comparable to local buses - levels are generally not significant for either the steel wheel or rubber wheel streetcar types. Any noise and vibration produced by additional transit to the study area will contribute to background levels, but these contributions (ultimately determined by the type of tire system and operating speeds) will be relatively minor from a streetcar. However, acute noise and vibration impacts (those that may be noticeable above background levels) have been assessed for each alignment to determine the adjacency of any noise or vibration-sensitive venues.

- » Minimizes potential impacts to historic districts: Interference from various forms of transit in an area that holds historical significance can disturb the character of that area and the historic buildings that exist there. The study area includes three areas with local and/or national historic districts. This includes areas within Hyde Park, Tampa Heights, and Ybor City. Each alignment was evaluated to identify the number of designated districts that would be potentially affected. Other historic, archaeological, or cultural resources including cemeteries, churches, and other sites likely exist along the alignments. Impacts to these resources will be evaluated during Phase 2.
- » Avoids potential impacts to parklands or other Section 4(f) resources: Section 4(f) of 49 U.S.C. 303 – Policy on Lands, wildlife and waterfowl refuges, and historic sites states that special effort must be made to preserve the natural beauty of all land under Section 4(f) authority. The alignments were rated based on whether they avoid impact to Section 4(f) resources.

3.4 Public Input

Along with an overview of the alignment options screening process including evaluation measures and preliminary ratings, the seven alignment options were presented to the public at the Results Roundtable held on May 2, 2017. Using the online survey tool MentiMeter, approximately 80 meeting participants were asked to provide input on several topics, including how they would prioritize the five purpose and need rating factors and their preference for each of the alignment option presented.

Meeting participants indicated that out of the Purpose and Need statements, Connect Downtown Districts is the most important, followed by Support Economic Development and Expand Sustainable Transportation Options. Serve Diverse Travel Markets and Improve First Mile/Last Mile Connections were identified as being slightly less important.

Alignment A (N/S Franklin Street) was identified as having the highest favorability from meeting attendees, followed closely by Alignment B (N/S Tampa Street-Florida Avenue Couplet) and Alignment G (Loop Downtown-Ybor City). These three alignments all generally follow the same corridor-an extension from the existing terminus just south of the Downtown Core north to Tampa Heights. Alignment G continues eastward to complete the loop back to Ybor City. Alignment G was identified as the top choice, followed by Alignment A and Alignment B. The lowest level of support was for Alignment E (E/W North Hyde Park-Convention Center Couplet).

3.5 Evaluation Results Summary

For each of the evaluation measures described above, a rating from 1 to 5 (low to high) was assigned to describe how well each alignment meets a specific measure. An average rating of the evaluation measures was calculated for each category. The average rating for each evaluation category, including the five Purpose and Need categories and the six Performance and Impacts categories is provided in Table 3. This summary table also includes some key information for each alignment, including track miles, capital costs, O&M costs, projected average weekday boardings (2020), and projected population/employment within ¼ mile of the alignment (2020). The complete evaluation matrix with details and ratings for each evaluation measure is provided as Appendix A.

Overall, the two north-south alignments, Alignment Options A and B, perform the best. Both of these alignments perform above average in the Purpose and Need evaluation categories and are rated highly in the Performance and Impacts categories. Both of these options serve residents, employees, and special event venues in the Downtown Core, but do not serve as many of the surrounding emerging districts. These two alignments provide service to many existing and potential regional transit hubs, including the Marion Transit Center. Both alignments rate highly due to lower capital and operating costs than other alignments, but Alignment A rates higher in several areas since it requires a single CSX railroad crossing and has less impacts on local roadways and adjacent land uses since its path is along Franklin Street instead of Tampa Street and Florida Avenue. Alignment B rates higher in other areas since it would not require a crossing of the Esplanade and has a larger service area due to its alignment along two parallel roadways.

The three east-west alignment options do not rate highly overall. While Alignment C and Alignment D perform very well on many of the Purpose and Need categories because they would provide service to the existing and emerging districts with high concentrations of residents, employees and transit dependent populations, they do not perform well in the Performance and Impact categories. This is due to high capital and operating costs associated with river crossings and longer alignments, as well as higher potential impacts to major utilities. The lack of connection to the Downtown Core, other areas with high population and employment, and other existing

and potential transit services results in low Purpose and Need ratings for Alignment E. This alignment option also rates the lowest for Performance and Impact categories since the ridership potential would likely not support capital and operating expenses required and the river crossings and other operational constraints would limit the constructability of this option.

The two loop options perform better than the east-west options, but not as well as the north-south options. Alignment G rates highly for Purpose and Need due to providing a connection between the Downtown Core , Tampa Heights, Central Park and Ybor City, existing and potential regional transit hubs, and multiple planned and potential redevelopment sites. Since Alignment F only provides connections to the Downtown Core and fewer subdistricts, it does not rate as highly in the Purpose and Need categories because fewer transit dependent populations are served and less connections would be provided to other existing and proposed transit services. However, Alignment F does rate highly in several Performance and Impact categories, due to its cost effectiveness, lack of CSX or river crossings, and limited operational constraints. While Alignment G best serves transit dependent areas, the overall population and employment per track mile served is lower because it serves a smaller area of Tampa Heights subdistrict and is a longer alignment. Overall, Alignment G rates lower on Performance and Impacts categories due to higher potentials of impact to historic districts, and higher capital and O&M costs.

Table 3. Evaluation Summary Table

	North/South			East/West		Loop	
							
	A	B	C	D	E	F	G
	N/S Franklin Street	N/S Tampa Street-Florida Avenue Couplet	E/W West River-Ybor City	E/W North Hyde Park-Channel District	E/W North Hyde Park-Convention Center Couplet	Loop Downtown-Channel District	Loop Downtown-Ybor City
Evaluation Category							
Alignment Information							
Track Miles	2.67	2.60	4.66	4.94	3.27	2.46	4.12
Number of Vehicles	4	4	7	7	5	4	6
Capital Costs (\$2017)	\$94 million	\$97 million	\$174 million	\$180 million	\$124 million	\$91 million	\$138 million
Annual O&M Costs	\$3.6 million	\$3.6 million	\$6.2 million	\$6.2 million	\$4.4 million	\$3.6 million	\$5.3 million
Average Weekday Boardings (2020)	2,200	2,200	2,450	2,700	1,500	2,300	2,300
Population & Employment within 1/4 mile (2020)	20,600	24,100	29,900	31,200	15,100	20,400	22,000
Purpose & Need Considerations							
Connect Downtown Districts	●	●	●	●	●	●	●
Serve Diverse Travel Markets	●	●	●	●	●	●	●
Improve First Mile/Last Mile Connections	●	●	●	●	●	●	●
Support Economic Development	●	●	●	●	●	●	●
Expand Sustainable Transportation Options	●	●	●	●	●	●	●

	North/South			East/West		Loop	
							
	A N/S Franklin Street	B N/S Tampa Street- Florida Avenue Couplet	C E/W West River- Ybor City	D E/W North Hyde Park-Channel District	E E/W North Hyde Park-Convention Center Couplet	F Loop Downtown- Channel District	G Loop Downtown- Ybor City
Evaluation Category							
Performance & Impact							
Population & Employment Served							
Capital & Operating Costs							
Cost Effectiveness							
Constructability/ Operational Constraints							
Traffic & Parking Impacts							
Community & Environment Impacts							
OVERALL RATING							

See Appendix A for the complete evaluation matrix.

Rating Key:



4. SOURCES

- » Cornell Law School, “36 CFR Appendix A to Part 1234, Minimum Security Standards for Level III Federal Facilities.” https://www.law.cornell.edu/cfr/text/36/appendix-A_to_part_1234
- » Department of Transportation, “Transit Noise and Vibration Impact Assessment.” https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf

APPENDIX A - EVALUATION MATRIX

CATEGORY MEASURES SUBMEASURES	Alignment A N/S Franklin		Alignment B N/S Tampa-Florida Couplet		Alignment C E/W West River-Ybor		Alignment D E/W North Hyde Park-Channel District		Alignment E E/W North Hyde Park-Convention Center Couplet		Alignment F Loop Downtown-Channel District		Alignment G Loop Downtown-Ybor	
	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING
Purpose & Need Considerations														
Connect Downtown Districts														
Serves Downtown Core	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	no	1.0 ●	yes	5.0 ●	yes	5.0 ●
Serves emerging subdistricts		1.8 ●		1.8 ●		3.0 ●		2.6 ●		1.8 ●		1.8 ●		2.2 ●
<i>Tampa Heights</i>	yes	5	yes	5	no	1	no	1	no	1	no	1	yes	5
<i>Grand Central/UT</i>	no	1	no	1	partial	3	partial	3	partial	3	no	1	no	1
<i>Central Park/Encore!</i>	no	1	no	1	partial	3	partial	3	no	1	yes	5	partial	3
<i>North Hyde Park</i>	no	1	no	1	partial	3	yes	5	partial	3	no	1	no	1
<i>West River</i>	no	1	no	1	yes	5	no	1	no	1	no	1	no	1
AVERAGE RATING		3.4 ●		3.4 ●		4.0 ●		3.8 ●		1.4 ●		3.4 ●		3.6 ●
Serve Diverse Travel Markets														
Serves the greatest population/employment within 1/4 mile (2020) - extension only		3.0 ●		3.0 ●		4.0 ●		4.0 ●		1.0 ●		4.0 ●		3.0 ●
<i>Population/employment within 1/4 mile (2020) - extension only</i>	20,639	3	24,080	3	29,865	5	31,202	5	15,075	1	20,393	3	21,962	3
<i>Acreage within 1/4 mile buffer - extension only</i>	434	*	483	*	626	*	640	*	569	*	231	*	486	*
<i>Average Activity Density within 1/4 mile (2020) - extension only</i>	48	3	50	3	48	3	49	3	26	1	88	5	45	3
Provides access for transit-dependent population within 1/4 mile		2.0 ●		2.0 ●		3.0 ●		2.0 ●		1.0 ●		1.5 ●		2.5 ●
<i>High (Central Park/Encore)</i>	no	1	no	1	partial	3	no	1	no	1	partial	3	partial	3
<i>High (West River)</i>	no	1	no	1	yes	5	no	1	no	1	no	1	no	1
<i>Moderate (Tampa Heights)</i>	yes	5	yes	5	no	1	no	1	no	1	no	1	yes	5
<i>Moderate (North Hyde Park)</i>	no	1	no	1	partial	3	yes	5	no	1	no	1	no	1
Connects major destinations and parks within 1/4 mile	11	5.0 ●	12	5.0 ●	12	5.0 ●	11	5.0 ●	3	1.0 ●	8	3.0 ●	11	5.0 ●
<i># cultural/entertainment/tourism venues</i>	6	*	6	*	7	*	7	*	2	*	5	*	6	*
<i># educational institutions (UT, Stetson, Brewster)</i>	2	*	2	*	1	*	1	*	0	*	0	*	2	*
<i># parks</i>	3	*	4	*	4	*	3	*	1	*	3	*	3	*
AVERAGE RATING		3.3 ●		3.3 ●		4.0 ●		3.7 ●		1.0 ●		2.8 ●		3.5 ●
Improve First Mile/Last Mile Connections														
Provides connection to existing regional transit hubs		5.0 ●		5.0 ●		4.0 ●		2.0 ●		1.0 ●		2.0 ●		5.0 ●
<i># blocks from Marion Transit Center (MTC)</i>	2	5	1	5	3	4	6	2	12	1	6	2	2	5
Provides connection to existing regional & local transit services		2.7 ●		4.0 ●		4.7 ●		4.0 ●		2.3 ●		3.7 ●		3.7 ●
<i># blocks from Tampa Union Station</i>	6	2	5	3	1	5	1	5	12	1	0	5	6	2
<i># blocks from Greyhound station</i>	3	4	2	5	1	5	4	4	10	1	1	5	3	4
<i># bus stops located within 2 blocks of alignment</i>	23	2	30	4	33	4	26	3	39	5	16	1	38	5
Provides connection to potential new regional transit hubs		5.0 ●		5.0 ●		4.0 ●		4.0 ●		2.0 ●		3.0 ●		5.0 ●
<i># regional transit corridors serving Downtown intersected (4 max)</i>	4	5	4	5	3	4	3	4	1	2	2	3	4	5
AVERAGE RATING		4.2 ●		4.7 ●		4.2 ●		3.3 ●		1.8 ●		2.9 ●		4.6 ●

CATEGORY MEASURES SUBMEASURES	Alignment A N/S Franklin		Alignment B N/S Tampa-Florida Couplet		Alignment C E/W West River-Ybor		Alignment D E/W North Hyde Park-Channel District		Alignment E E/W North Hyde Park- Convention Center Couplet		Alignment F Loop Downtown-Channel District		Alignment G Loop Downtown-Ybor	
	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING
Support Economic Development														
Supports population/employment within 1/4 mile (2040) - extension only		3.0 ●		3.0 ●		4.0 ●		4.0 ●		1.0 ●		4.0 ●		3.0 ●
Population/employment within 1/4 mile (2040) - extension only	32,466	3	38,328	3	50,887	5	50,024	5	19,437	1	32,662	3	35,193	3
Acreage within 1/4 mile buffer (extension only)	434	*	483	*	626	*	640	*	569	*	231	*	486	*
Average Activity Density within 1/4 mile (2040) - extension only	75	3	79	3	81	3	78	3	34	1	141	5	72	3
Provides access to developments that are under construction/planned/proposed within 1/4 mile		5.0 ●		5.0 ●		2.0 ●		4.5 ●		2.5 ●		3.0 ●		4.5 ●
Under construction/planned/proposed - # residential units	1,805	5	1,805	5	1,319	3	1,827	5	689	1	1,007	2	1,491	4
Under construction/planned/proposed - # commercial SF	878,100	5	878,100	5	21,600	1	778,300	4	759,750	4	758,000	4	849,600	5
Serves areas with potential for transit-induced development		3.5 ●		3.5 ●		4.5 ●		2.0 ●		3.0 ●		3.0 ●		4.5 ●
Estimated acreage of area within 1/4 mile (excludes ROW)	414	*	460	*	789	*	1774	*	534	*	373	*	537	*
Estimated acreage of area within 1/4 mile with an existing FLU category that permits high-density residential (> or = 35 du/ac)	392	2	405	2	574	5	463	3	404	2	344	1	509	4
% of area within 1/4 mile with an existing FLU category that permits high residential density (> or = 35 du/ac)	95%	5	88%	5	73%	4	26%	1	76%	4	92%	5	95%	5
AVERAGE RATING		3.8 ●		3.8 ●		3.5 ●		3.5 ●		2.2 ●		3.3 ●		4.0 ●
Expand Sustainable Transportation Options														
Enhances connections to local mobility options		3.6 ●		3.4 ●		2.2 ●		3.8 ●		1.6 ●		3.8 ●		3.8 ●
Average distance (blocks) to two closest MetroRapid transit stops	2.5 blocks	3	1.5 blocks	3	1.5 blocks	3	0 blocks	5	8 blocks	1	1 block	4	2.5 blocks	3
# buses/hour (routes within 2 blocks)	26 buses	4	26 buses	4	29 buses	4	15 buses	3	5 buses	1	32 buses	5	32 buses	5
access to In-Towner route/stops	1	2	3	4	1	2	3	4	0	1	2	3	1	2
# blocks from water taxi station	3	4	3	4	10	1	4	3	2	4	3	4	3	4
# adjacent existing/proposed Coast Bike Share hubs	5	5	2	2	0	1	4	4	0	1	3	3	5	5
AVERAGE RATING		3.6 ●		3.4 ●		2.2 ●		3.8 ●		1.6 ●		3.8 ●		3.8 ●
Performance & Impact														
Alignment Information														
Track Miles	2.67	* *	2.6	* *	4.66	* *	4.94	* *	3.27	* *	2.46	* *	4.12	* *
Average Weekday Boardings (2020) - existing and extension	2,200	* *	2,200	* *	2,450	* *	2,700	* *	1,500	* *	2,300	* *	2,300	* *
Average Weekday Boardings (2040) - existing and extension	3,650	* *	3,750	* *	4,400	* *	4,650	* *	1,950	* *	4,050	* *	3,800	* *
Population & Employment Served														
Population/employment within 1/4 mile per track mile (2020)	7,730	4.0 ●	9,262	5.0 ●	6,409	3.0 ●	6,316	3.0 ●	4,610	1.0 ●	8,290	4.0 ●	5,331	2.0 ●
Population/employment within 1/4 mile per track mile (2040)	12,160	4.0 ●	14,742	5.0 ●	10,920	3.0 ●	10,126	3.0 ●	5,944	1.0 ●	13,277	4.0 ●	8,542	2.0 ●
AVERAGE RATING		4.0 ●		5.0 ●		3.0 ●		3.0 ●		1.0 ●		4.0 ●		2.0 ●
Capital & Operating Costs														
Total capital cost (2017\$) - mid-range (extension & new vehicle cost only)**	\$94,000,000	5.0 ●	\$97,000,000	5.0 ●	\$174,000,000	1.0 ●	\$180,000,000	1.0 ●	\$124,000,000	3.0 ●	\$91,000,000	5.0 ●	\$138,000,000	3.0 ●
Annual O&M costs (2017\$) - extension only	\$3,550,000	5.0 ●	\$3,550,000	5.0 ●	\$6,220,000	1.0 ●	\$6,220,000	1.0 ●	\$4,440,000	4.0 ●	\$3,550,000	5.0 ●	\$5,330,000	2.0 ●
AVERAGE RATING		5.0 ●		5.0 ●		1.0 ●		1.0 ●		3.5 ●		5.0 ●		2.5 ●
Cost Effectiveness														
Capital Cost (2017\$) per track mile	\$35,200,000	3.0 ●	\$37,300,000	1.0 ●	\$37,300,000	1.0 ●	\$36,400,000	2.0 ●	\$37,900,000	1.0 ●	\$37,000,000	2.0 ●	\$33,500,000	5.0 ●
Annualized Capital & O&M Cost (2017\$) per rider (2020)	\$11.41	5.0 ●	\$11.61	5.0 ●	\$18.50	2.0 ●	\$17.11	3.0 ●	\$21.55	1.0 ●	\$10.73	5.0 ●	\$16.19	3.0 ●
AVERAGE RATING		4.0 ●		3.0 ●		1.5 ●		2.5 ●		1.0 ●		3.5 ●		4.0 ●

CATEGORY MEASURES SUBMEASURES	Alignment A N/S Franklin		Alignment B N/S Tampa-Florida Couplet		Alignment C E/W West River-Ybor		Alignment D E/W North Hyde Park-Channel District		Alignment E E/W North Hyde Park- Convention Center Couplet		Alignment F Loop Downtown-Channel District		Alignment G Loop Downtown-Ybor	
	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING
Constructability/Operational Constraints														
Avoids CSX railroad crossings	1 crossing	3.0 ●	2 crossings	1.0 ●	0 crossings	5.0 ●	1 crossing	3.0 ●	2 crossings	1.0 ●	1 crossing	3.0 ●	1 crossing	3.0 ●
Avoids river crossings	0 crossings	5.0 ●	0 crossings	5.0 ●	1 crossing	1.0 ●	1 crossing	1.0 ●	1 crossing	1.0 ●	0 crossings	5.0 ●	0 crossings	5.0 ●
Avoids Esplanade crossing	no	1.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	no	1.0 ●	no	1.0 ●
Minimizes or avoids other constraints that would affect streetcar operations		2.3 ●		1.3 ●		2.7 ●		1.3 ●		2.0 ●		2.7 ●		2.3 ●
# signalized intersections	10	4	25	1	16	3	25	1	11	4	15	3	12	4
# non-signalized intersections	16	2	18	2	9	4	22	2	29	1	6	4	19	2
overpass vertical clearances	14'6" (Franklin)	*	14'6" (Tampa/Florida)	*	14'6" (Boulevard)	*	16'6" (Kennedy/Jackson)	*	15'1" (Plant) 15' (Platt)	*	16'6" (Twiggs)	*	14'6" (Franklin) 14'3" (7th)	*
FDOT or THEA overpass	yes	1	yes	1	yes	1	yes	1	yes	1	yes	1	yes	1
Avoids or minimizes impacts to major utilities	Low Risk	5.0 ●	Low Risk	5.0 ●	High Risk	1.0 ●	Medium Risk	3.0 ●	High Risk	1.0 ●	Medium Risk	3.0 ●	Medium Risk	3.0 ●
AVERAGE RATING		3.3 ●		3.5 ●		2.9 ●		2.7 ●		2.0 ●		2.9 ●		2.9 ●
Traffic & Parking Impacts														
Minimizes or avoids increase in roadway congestion (2020 existing roadway capacity)		4.0 ●		3.5 ●		3.5 ●		2.5 ●		2.7 ●		3.5 ●		3.7 ●
Total alignment length along roadways with v/c > 0.9	0	-	0	5	0	-	7%	3	0	-	0	-	0	-
Total alignment length along roadways with 0.6 < v/c <= 0.9	0	-	40%	3	0	-	10%	2	27%	2	0	-	13%	3
Total alignment length along roadways with v/c <= 0.6	19%	3	56%	4	33%	4	44%	4	15%	3	31%	4	11%	3
Qualitative Assessment (FDOT Functional Class)	Local	5	Minor Arterial	2	Major Collector	3	Principal Arterial	1	Major Collector	3	Major Collector	3	Local	5
Overall capacity rating		4.0		3.5		3.5		2.5		2.7		3.5		3.7
Provides potential for dedicated guideway based on adjusted roadway capacity		4.0 ●		3.0 ●		3.0 ●		2.3 ●		2.3 ●		3.0 ●		3.0 ●
Total alignment length along roadways with v/c > 1.0	0	-	4000 ft (30%)	2	0	-	1168 ft (7%)	2	4376 ft (27%)	1	0	-	0	-
Total alignment length along roadways with 0.9 < v/c <= 1.0	0	-	0	-	0	-	1637 ft (13%)	2	0	-	0	-	0	-
Total alignment length along roadways with v/c <= 0.9	471 ft (6%)	3	9332 ft (68%)	5	0	-	3965 ft (25%)	4	2573 ft (15%)	3	0	-	0	-
Qualitative Assessment (FDOT Functional Class)	Local	5	Minor Arterial	2	Major Collector	3	Principal Arterial	1	Major Collector	3	Major Collector	3	Local ¹	3
Overall capacity rating		4.0		3.0		3.0		2.3		2.3		3.0		3.0
Avoids or minimizes reduction in on-street parking		2.0 ●		3.0 ●		5.0 ●		3.0 ●		4.0 ●		2.0 ●		3.0 ●
% on-street parking affected	75%	2	50%	3	10%	5	50%	3	25%	4	75%	2	50%	3
Avoids or minimizes potential for intersection failure		3.0 ●		2.0 ●		3.0 ●		1.0 ●		5.0 ●		4.0 ●		3.0 ●
# signalized intersections, intersections where turns are required, and minor streets crossing major roadway intersections	17	3	25	2	18	3	26	1	13	5	15	4	18	3
AVERAGE RATING		3.3 ●		2.9 ●		3.6 ●		2.2 ●		3.5 ●		3.1 ●		3.2 ●
Community & Environment Impacts														
Serves Environmental Justice (EJ) populations with minimal impacts		3.5 ●		3.5 ●		4.5 ●		3.5 ●		3.5 ●		1.5 ●		4.0 ●
% minorities within 1/4 mile of alignment	53%	5	47%	4	58%	5	37%	3	20%	2	26%	2	59%	5
% low-income within 1/4 mile of alignment	14%	2	17%	3	21%	4	22%	4	24%	5	3%	1	18%	3
Minimizes impact to business access		4.0 ●		4.0 ●		5.0 ●		5.0 ●		1.0 ●		5.0 ●		4.0 ●
# of primary access driveways	5	4	5	4	2	5	4	5	20	1	3	5	7	4
Minimizes or avoids impacts to noise/vibration-sensitive uses		5.0 ●		1.0 ●		4.0 ●		2.0 ●		5.0 ●		3.0 ●		5.0 ●
# adjacent noise-sensitive or vibration sensitive (<350 feet) venues	4	5	10	1	5	4	9	2	4	5	7	3	4	5
Minimizes potential impacts to historic districts		3.0 ●		3.0 ●		3.0 ●		5.0 ●		3.0 ●		5.0 ●		1.0 ●
# adjacent historic districts (local or national Tampa Heights, Ybor City, or Hyde Park historic districts)	1	3	1	3	1	3	0	5	1	3	0	5	2	1
Avoids potential impacts to parklands or other Section 4(f) resources	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●	yes	5.0 ●
AVERAGE RATING		4.1 ●		3.3 ●		4.3 ●		4.1 ●		3.5 ●		3.9 ●		3.8 ●

Notes:

* Not Rated

** Capital cost estimates are reported in 2017 dollars.

CATEGORY MEASURES SUBMEASURES	Alignment A N/S Franklin		Alignment B N/S Tampa-Florida Couplet		Alignment C E/W West River-Ybor		Alignment D E/W North Hyde Park-Channel District		Alignment E E/W North Hyde Park- Convention Center Couplet		Alignment F Loop Downtown-Channel District		Alignment G Loop Downtown-Ybor	
	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING	MEASURE	RATING
Purpose & Need Considerations														
Connect Downtown Districts		3.4 ●		3.4 ●		4.0 ●		3.8 ●		1.4 ●		3.4 ●		3.6 ●
Serve Diverse Travel Markets		3.3 ●		3.3 ●		4.0 ●		3.7 ●		1.0 ●		2.8 ●		3.5 ●
Improve First Mile/Last Mile Connections		4.2 ●		4.7 ●		4.2 ●		3.3 ●		1.8 ●		2.9 ●		4.6 ●
Support Economic Development		3.8 ●		3.8 ●		3.5 ●		3.5 ●		2.2 ●		3.3 ●		4.0 ●
Expand Sustainable Transportation Options		3.6 ●		3.4 ●		2.2 ●		3.8 ●		1.6 ●		3.8 ●		3.8 ●
Performance & Impact														
Population & Employment Served		4.0 ●		5.0 ●		3.0 ●		3.0 ●		1.0 ●		4.0 ●		2.0 ●
Capital & Operating Costs		5.0 ●		5.0 ●		1.0 ●		1.0 ●		3.5 ●		5.0 ●		2.5 ●
Cost Effectiveness		4.0 ●		3.0 ●		1.5 ●		2.5 ●		1.0 ●		3.5 ●		4.0 ●
Constructability/Operational Constraints		3.3 ●		3.5 ●		2.9 ●		2.7 ●		2.0 ●		2.9 ●		2.9 ●
Traffic & Parking Impacts		3.3 ●		2.9 ●		3.6 ●		2.2 ●		3.5 ●		3.1 ●		3.2 ●
Community & Environment Impacts		4.1 ●		3.3 ●		4.3 ●		4.1 ●		3.5 ●		3.9 ●		3.8 ●
Summary Rating		3.8 ●		3.8 ●		3.1 ●		3.1 ●		2.0 ●		3.5 ●		3.4 ●