Tampa International Airport/Westshore Multimodal Center

Technical Feasibility Study Report

Prepared for:

Florida Department of Transportation District Seven
Contract #C-8947
Tampa Bay Intermodal Centers
and in Coordination with:
Tampa International Airport

May 2014

Revisions

Revision No.	Date	Changes

Tampa International Airport/Westshore Multimodal Center
Technical Feasibility Study Report

Executive Summary

The Florida Department of Transportation (FDOT) District Seven, in cooperation with the Tampa International Airport (TIA), is undertaking a study to determine the configuration, benefits, costs, and impacts of developing and operating a Tampa Airport Connector (TAC) using automated people mover (APM) technology from the proposed TIA Consolidated Rental Car Facility (ConRAC) APM station to one or more of the four previously identified viable Westshore Multimodal Center (WMC) sites within the Westshore Business District.

The study is to be carried out in phases with a review of progress and direction at the end of each phase. The current phase was tasked with looking at the feasibility of the connection and identifying the viable TAC alignment(s) (route).

The study area (See **Figure 1, Section 1.1**) includes the core of the Westshore business district, two shopping malls, and several residential neighborhoods. Specifically, it is bounded by TIA's ConRAC Station and International Plaza and Bay Street to the north, Lois Avenue to the east, Kennedy Boulevard (State Road [SR] 60) to the south, and Reo Street to the west (shaded in blue). For the purposes of this phase of the study, it was determined that a more focused study area should also be examined. The alignment focus area (shaded in red) includes the ConRAC facility and is bounded by Spruce Street on the north, Manhattan Avenue on the east, Interstate 275 (I-275) on the south, and SR 60 on the west.

The progress of this phase was reviewed by the Project Management Team (PMT) in detail. The PMT is comprised of representatives of the FDOT, TIA, Tampa Bay Area Regional Transportation Authority (TBARTA) and the Consultant.

Prior to initiating this phase of the study process, a meeting was held with the PMT to ensure all members were in agreement as to the project approach, schedule, and study assumptions. The basic assumptions agreed upon by members of the PMT are:

1. A recommended alignment(s) will be identified that traverses from the ConRAC station to one or more of the four previously identified viable WMC sites within the study area. A description of the four WMC sites is discussed in Section 4.1 (See **Figure 2, Section 4.1**). The recommended alignment(s) will be studied further in the next phase of the project as part of the Project Development and Environment (PD&E) Study in order to identify the WMC location and uses along with identifying the final locally preferred alignment (LPA) option.

2. It is assumed a bus or rail station would be located in the median of I-275 between Trask Street and Manhattan Avenue. An elevated pedestrian walkway from the station in the median of I-275 would extend northward to allow access to one of the three proposed WMC sites located in the vicinity of Trask Street and Cypress Street. One of the suggested guiding design criteria is to limit passenger walking distance between the I-275 station and the APM station at the WMC to no more than 700 feet.
3. The long-term vision also assumes that the ultimate configuration of I-275 would be constructed and that Reo Street, Occident Street, and Trask Street would pass underneath I-275 offering additional north-south connectivity to the Westshore area.
4. The WMC will be designed to meet current and future regional modal and travel needs. Consideration of future projects within the study area is a critical step in identifying a site for a future intermodal center in the Westshore District.
5. The WMC will be a central hub for public and private local and regional transportation services, including: rail, buses, taxis, hotel shuttles, bicyclists and pedestrians. Plans for the multimodal center may include a park-and-ride facility, bus layover zone, kiss-and-ride facilities, operations control center, operator lounges, police substation, convenience store (as a part of the WMC joint development effort), public restrooms, and a customer service center that could provide information about local and regional public and private transportation services and to purchase transit passes.
6. The APM is expected to provide users a seamless connection between the TIA and the Tampa Bay region via a regional and local transit network that would serve the WMC.
7. The ConRAC and WMC stations will accommodate level platform boarding, high capacity vehicles with multi-door access, dedicated running way, and branded stations and platforms.
8. APM riders will include:
    a. Arriving and departing air passengers who park, are dropped off/picked up by a third party, or use public or commercial transportation at the WMC.
    b. Meeters/greeters and well-wishers who park at the WMC and ride to/from the TIA with their air passengers.
    c. Other TIA visitors.
    d. Employees (TIA, tenants, and airline employees who work at TIA and need to travel between the ConRAC facility and the WMC.
    e. TIA users traveling to and from the local hotels and other businesses in the Westshore District area that may use hotel shuttle buses of these establishments to travel to and from the WMC.

9. The assumed mode is an APM system that will be compatible with TIA's proposed landside upgraded APM system.
10. The APM would offer fast, convenient passenger connections by assuming no intermediate stations between the ConRAC and WMC stations.

The PMT then developed goals, objectives and screening criteria that allowed the study team to measure and compare the positive and negative characteristics of each TAC alignment alternative. The goals are:

- Goal 1: Enhance regional mobility and local accessibility
- Goal 2: Expand the effectiveness of transit service within the study corridor
- Goal 3: Provide a cost-effective and financially feasible transportation system
- Goal 4: Encourage transit-supportive land use and economic development
- Goal 5: Support sustainable communities and sound environmental practices/policies

This phase of the evaluation process was accomplished in three steps. First, during the development of TAC alignment options, a fatal flaws analysis was conducted to ensure that only viable candidate alignment options were carried into the Level I screening process. Second, a set of potentially viable alignment options were identified and screened during the fatal flaws analysis or Level I screening. The basis for the Level I screening was study goals and objectives discussed above. Scoring of the proposed alignment alternatives, against each performance objective established the extent to which a given alignment option supports or does not support a performance objective and, ultimately, its related goal. Finally, in step three, after alternatives advancing from the Level I screening process were further refined, the Level II screening process was conducted using precisely the same methodology described for Level I screening. This process of evaluating each detailed alternative with respect to each performance measure was replicated for each of the goals and the resulting weighted scores were summarized for each detailed alternative. The highest overall weighted scores were reflected by the best performing detailed alignment option. The best of the detailed alignment options are being recommended for further study during the next phase or the PD&E Study.

The following provides a description of the candidate conceptual TAC alignment alternatives (See **Figure 6, Section 7.3**) using APM technology considered in the Technical Feasibility Study.

1. **TAC Alignment Alternative A:** Segments of the APM guideway are at grade, below grade and elevated.

- **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road. Heading east on Airport Service Road the APM guideway drops below grade to go under the intersection of Airport Access Road and O'Brien Street. It stays below grade until it clears the runway protection zone (RPZ). The APM guideway gradually rises to grade level along Spruce Street and starts elevating in preparation to cross Spruce Street. At this point, the APM guideway has two options to reach the intersection at Cypress Street and Trask Street:

    - **Option A.1:** Prior to reaching the intersection at Spruce Street and Trask Street, the elevated APM guideway crosses over Spruce Street to Trask Street. The APM guideway then curves to the south on Trask Street to the intersection at Trask Street and Cypress Street.
    - **Option A.2:** Prior to reaching the intersection of Spruce Street and Westshore Boulevard the elevated APM guideway crosses over Spruce Street to Westshore Boulevard. The elevated APM guideway then proceeds south on Westshore Boulevard to the intersection at Westshore Boulevard and Cypress Street. The APM guideway then curves to the east on Cypress Street to the intersection at Cypress Street and Trask Street.

2. **TAC Alignment Alternative B:** The APM guideway is totally elevated.

    - **Alignment:** Starting at the ConRAC station, the elevated APM guideway travels south along the Airport Service Road and then curves to the east on Airport Service Road and crosses Spruce Street elevated to the corner of Spruce Street and O'Brien Street. It then precedes south on O'Brien Street to the intersection at O'Brien Street and Cypress Street.

        - **Option B.1:** The APM guideway then curves to the east on Cypress Street and continues to the intersection of Cypress Street and Trask Street.
        - **Option B.2:** The APM guideway then curves to the east on Cypress Street and then curves to the south at the intersection of Cypress Street and Ward Street. The APM guideway continues south on Ward Street and goes over I-275 to the Westshore Plaza.

3. **TAC Alignment Alternative C:** The APM guideway is totally elevated.

    - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road and then curves to the east on Airport Service Road and crosses Spruce Street and SR 60 landing elevated in the unimproved right-of-way (ROW) corridor west of the Homewood Suites.

The APM guideway then curves to the south and then east in the unimproved ROW corridor (behind the Hilton Gardens Inn) crossing O'Brien Street. At this point, the APM guideway has two options to reach the intersection at Cypress Street and Trask Street:

- **Option C.1:** The APM guideway turns south on O'Brien Street and then curves east on Cypress Street and continues to the intersection of Cypress Street and Trask Street.
- **Option C.2:** The APM guideway travels east on airport property to the intersection at Main Street and Westshore Boulevard. The elevated APM guideway crosses Westshore Boulevard and heads east to Trask Street. It then curves to the south on Trask Street to the intersection at Trask Street and Cypress Street.

4. **TAC Alignment Alternative D:** The APM guideway is totally elevated.

   - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road, crosses Spruce Street, and then continues south along the SR 60 Frontage Road until it reaches Cypress Street where it then curves to the east on Cypress Street and continues to the intersection at Cypress Street and Trask Street.

<u>TAC Alignment Alternative Options A.1 and A.2</u>

The TAC alignment for option A.1 and A.2 was originally planned to be elevated APM guideway from the ConRAC station but would then gradually decline heading east on Airport Service Road so the APM guideway would drop below grade to go under the intersection of Airport Access Road and O'Brien Street. The APM guideway would stay below grade until it clears the RPZ. The APM guideway would then gradually rise to grade level along Spruce Street and start elevating to cross Spruce Street to either travel south on Trask Street (Option A.1) or Spruce Street (Option A.2) to eventually reach Cypress Street.

Upon further investigation it was determined that the Federal Aviation Administration (FAA) would not allow an at-grade APM (passenger train line) along Spruce Street since it may result in interference to current and future aviation use at TIA and that the primary use of TIA property should be maintained for aeronautical uses. The at-grade APM guideway might, in the opinion of the FAA, adversely affect the safety, utility, or efficiency of TIA.

As an alternative, the study team investigated the concept of tunneling the APM along Spruce Street. This was also determined to be unfeasible since there is not enough

distance from the eastern edge of the RPZ to Westshore Boulevard to achieve the required change in elevation needed to clear Westshore Boulevard, while maintaining the maximum grade of 6% before travelling south on Trask Street (Option A.1) or Spruce Street (Option A.2).

As a result of this analysis, conceptual TAC alignment options A.1 and A.2 were deemed fatally flawed. These two TAC alignments may be reviewed again during the next phase or the PD&E Study to verify they are still in conflict with FAA guidelines

Results of the Level ll Screening

The remaining five alignment options were further evaluated based on 15 evaluation criteria directly related to the project goals. **Table ES-1** below summarizes the evaluation results. The criteria were:

- System linkages/integration
- Area traffic impacts/opportunities
- Number of high activity centers served
- Directness of route
- Trip travel time/travel time savings
- Planning level estimate to design and construct the guideway (only)
- ROW impacts
- Land use modification that support transit
- Consistency with future development plans
- Environmental impacts
- Residential and business impacts
- Historic resources
- Social impacts
- Business impacts
- On-street parking impacts

Some general comments about all of the TAC alignment options:

- There will be ROW requirements for traction power substations. The substations will be located along the APM guideway alignment at approximately 5,000-foot intervals.
- There will be minimal ROW impacts on the corners of intersections where the APM guideway crosses an intersection due to the requirement to provide APM guideway structural support.
- It is anticipated there will be an increase in traffic congestion in the vicinity of Cypress Street and Westshore Boulevard and Cypress Street and Trask Street due to vehicles (public and private buses, hotel shuttles, vanpool shuttles, taxis,

private automobiles) parking or dropping off/picking-up passengers who will utilize the transportation services at the WMC.

- Pedestrian safety improvements need to be evaluated at intersections in the vicinity of the WMC. Improvements to crosswalks and street lighting may be required at such intersections. Consideration should be given to installing pedestrian "countdown" signal heads at intersections near the WMC.
- Movement throughout the study area is stifled by daily congestion and a lack of a walkable pedestrian environment.

Table ES-1: Results of the Level ll Screening Process

Goals	Weight	B.1	B.2	C.1	C.2	D
1. Enhance regional mobility and local accessibility	40%	27.5%	17.5%	27.5%	30.0%	30.0%
2. Expand the effectiveness of transit service within the study corridor	10%	1.3%	5.0%	2.5%	2.5%	5.0%
3. Provide a cost-effective and financially feasible transportation system	20%	7.5%	17.5%	5.0%	12.5%	10.0%
4. Encourage transit-supportive land use and economic development	10%	7.5%	7.5%	5.0%	2.5%	7.5%
5. Support sustainable communities and sound environmental practices/policies	20%	16.7%	16.7%	15.0%	11.7%	20.0%
Total Weighted Points	**100%**	**60.4%**	**64.2%**	**55.0%**	**59.2%**	**72.5%**
Ranking of Alignment Options		**3**	**2**	**5**	**4**	**1**

The next phase will be to conduct a PD&E Study to identify the WMC location and uses along with identifying the TAC alignment. The analysis will include:

- Conceptual engineering
- Development of preliminary operating plans
- Travel demand forecasting
- Environmental impact assessment
- Public outreach and involvement
- Develop key transportation elements and connections
- Identify redevelopment opportunities and land use requirements
- Capital cost estimates, and
- Operating and maintenance cost estimates

This technical analysis will be followed by a financial analysis to determine the sources of potential funding to finance the LPA. This information will be presented in an

evaluation report so that decision-makers and the public can determine the relative benefits, costs and impacts of each alternative and which alternative (or combination of alternatives or elements of alternatives) best meets the purpose and need for major transportation investments in the study.

Table of Contents

Acronyms and Abbreviations

AA	Alternatives Analysis
AC	Acre(s)
APM	Automated People Mover
ConRAC	Consolidated Rental Car Facility
DRI	Development of Regional Impact
FAA	Federal Aviation Administration
FDOT	Florida Department of Transportation
FT	Foot/Feet
FY	Fiscal Year
GIS	Geographic Information System
HART	Hillsborough Area Regional Transit
HCAA	Hillsborough County Aviation Authority
HCMPO	Hillsborough County Metropolitan Planning Organization
I-275	Interstate 275
IN	Inch(es)
LPA	Locally Preferred Alternative
MPH	Miles Per Hour
PCMPO	Pinellas County Metropolitan Planning Organization
PD&E	Project Development and Environment
PMT	Project Management Team
PPHPD	Passengers Per Hour Per Direction
PSTA	Pinellas Suncoast Transit Authority
ROW	Right-of-Way
RPZ	Runway Protection Zone
SR	State Road
STSA	South Terminal Support Area
TAC	Tampa Airport Connector
TBARTA	Tampa Bay Area Regional Transportation Authority
TIA	Tampa International Airport
TOD	Transit Oriented Development
WMC	Westshore Multimodal Center

Tampa International Airport/Westshore Multimodal Center
Airport Connector Feasibility Study Phase l Report

1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) District Seven, in cooperation with the Tampa International Airport (TIA), is undertaking a study to determine the configuration, benefits, costs, and impacts of developing and operating a Tampa Airport Connector (TAC) using automated people mover (APM) technology from the proposed TIA Consolidated Rental Car Facility (ConRAC) APM station to one or more of the four previously identified viable Westshore Multimodal Center (WMC) sites within the Westshore Business District.

The study is to be carried out in phases, with a review of progress and direction at the end of each phase. The current phase was tasked with looking at the feasibility of the connection and identifying the viable TAC alignment(s) (route). Each of the phases will represent a milestone for the project as a whole. Progress to the following phase will be dependent on satisfactory outcomes for the study to date. Within each phase there will be a series of working papers produced to document the progress of the study

The progress of the study will be reviewed by the Project Management Team (PMT) in detail at the end of each stage. The PMT comprises representatives of the FDOT, TIA, Tampa Bay Area Regional Transportation Authority (TBARTA) and the Consultant. The PMT met six (6) times during this phase of the study (**Table 1**).

Table 1: A Summary of PMT Meetings

Date	Purpose of the Meeting
July 24, 2013	Discussed the TIA/WMC project goals and objectives, schedule, and an overview of the TIA/WMC study process
August 28, 2013	Provided a project status report
September 25, 2013	Provided a project status report
October 23, 2013	Provided a project status report
November 20, 2013	Discussed the alignment screening process including performance measures and evaluation methodology
January 15, 2014	Presented the alignment options and the results of the “Level l” and “Level ll” screening process

In addition, project updates were provided to FDOT District Seven traffic engineers and other District staff on November 11, 2013, December 18, 2013, and January 8, 2014 and to the Westshore Alliance Transportation Committee on November 13, 2013, December 11, 2013, and January 22, 2014.

1.1. Study Area

The study area (see **Figure 1**) includes the core of the Westshore business district, two shopping malls, and several residential neighborhoods. Specifically, it is bounded by TIA's ConRAC Station and International Plaza and Bay Street to the north, Lois Avenue to the east, Kennedy Boulevard (State Road [SR] 60) to the south, and Reo Street to the west (shaded in blue). For the purposes of this phase of the study, it was determined that a more focused study area should also be examined. The alignment focus area (shaded in red) includes the ConRAC facility and is bounded by Spruce Street on the north, Manhattan Avenue on the east, Interstate 275 (I-275) on the south, and SR 60 on the west.

1.2 Goals and Objectives

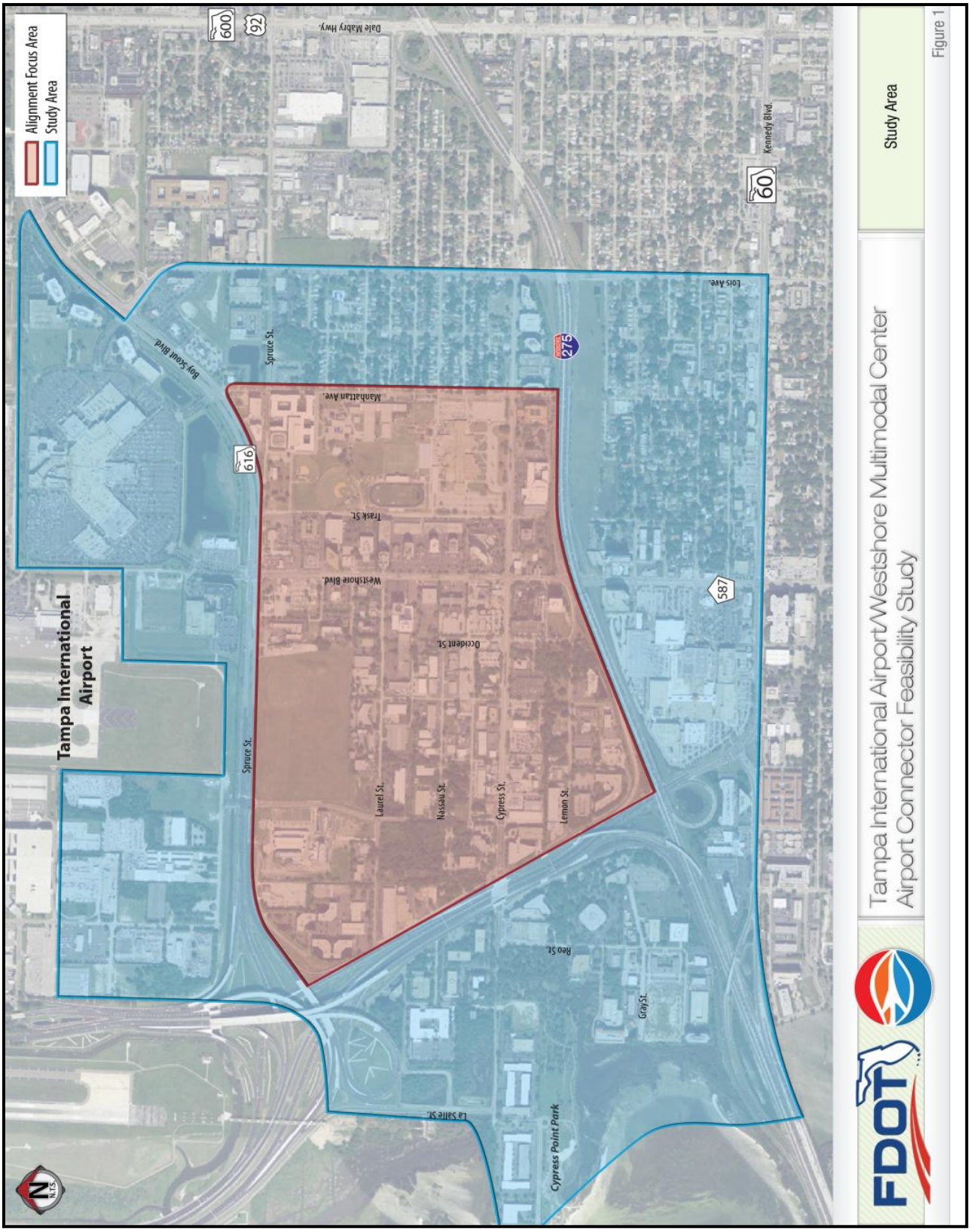
The PMT developed goals, objectives and screening criteria that allowed the study team to measure and compare the positive and negative characteristics of each TAC alignment alternative. The goals are:

- Goal 1: Enhance regional mobility and local accessibility
- Goal 2: Expand the effectiveness of transit service within the study corridor
- Goal 3: Provide a cost-effective and financially feasible transportation system
- Goal 4: Encourage transit-supportive land use and economic development
- Goal 5: Support sustainable communities and sound environmental practices/policies

1.3 Purpose of this Report

The purpose of this report is to document the results of this phase of the study in general and the results of the TAC alignment screening process, specifically. Section 2 of this report describes the study assumptions agreed upon by members of the PMT. It also provides an overview of an APM system. Section 3 provides background information about the TIA and its *2012 Master Plan Update*. Section 4 provides an overview of the Westshore District and the *Westshore Multimodal Study and Strategic Transportation Plan.* Section 5 provides an overview of the current local and regional transit service, while Section 6 highlights key local capital improvements projects that may impact the design and operation of the TAC and the WMC. Section 7 discusses the overall evaluation process and the screening of the TAC alignment options. A final section describes the next steps in the project development process.

Figure 1: Map of the Study Area



2.0 ASSUMPTIONS

Prior to initiating this phase of the study process, a meeting was held with the PMT to ensure all members were in agreement as to the project approach, schedule, and study assumptions. The basic assumptions agreed upon by members of the PMT are:

1. A recommended alignment(s) will be identified that traverses from the ConRAC station to one or more of the four previously identified viable WMC sites within the study area. A description of the four WMC sites is discussed in Section 4.1. The recommended alignment(s) will be studied further in the next phase of the project as part of the Project Development and Environment (PD&E) Study in order to identify the WMC location and uses along with identifying the final locally preferred alignment (LPA) option.
2. It is assumed a bus or rail station would be located in the median of l-275 between Trask Street and Manhattan Avenue. An elevated pedestrian walkway from the station in the median of I-275 would extend northward to allow access to one of the three proposed WMC sites located in the vicinity of Trask Street and Cypress Street. One of the suggested guiding design criteria is to limit passenger walking distance between the l-275 station and the APM station at the WMC to no more than 700 feet.
3. The long-term vision also assumes that the ultimate configuration of I-275 would be constructed and that Reo Street, Occident Street, and Trask Street would pass underneath I-275 offering additional north-south connectivity to the Westshore area.
4. The WMC will be designed to meet current and future regional modal and travel needs. Consideration of future projects within the study area is a critical step in identifying a site for a future intermodal center in the Westshore District.
5. The WMC will be a central hub for public and private local and regional transportation services, including: rail, buses, taxis, hotel shuttles, bicyclists and pedestrians. Plans for the multimodal center may include a park-and-ride facility, bus layover zone, kiss-and-ride facilities, operations control center, operator lounges, police substation, convenience store (as a part of the WMC joint development effort), public restrooms, and a customer service center that could provide information about local and regional public and private transportation services and to purchase transit passes.
6. The APM is expected to provide users a seamless connection between the TIA and the Tampa Bay region via a regional and local transit network that would serve the WMC.

7. The ConRAC and WMC stations will accommodate level platform boarding, high capacity vehicles with multi-door access, dedicated running way, and branded stations and platforms.
8. APM riders will include:
   a. Arriving and departing air passengers who park, are dropped off/picked up by a third party, or use public or commercial transportation at the WMC.
   b. Meeters/greeters and well-wishers who park at the WMC and ride to/from the TIA with their air passengers.
   c. Other TIA visitors.
   d. Employees (TIA, tenants, and airline employees) who work at TIA and need to travel between the ConRAC facility and the WMC.
   e. TIA users traveling to and from the local hotels and other businesses in the Westshore District area that may use hotel shuttle buses of these establishments to travel to and from the WMC.
9. The assumed mode is an APM system that will be compatible with TIA's proposed landside upgraded APM system.
10. The APM would offer fast, convenient passenger connections by assuming no intermediate stations between the ConRAC and WMC stations.

2.1. Definition of Multimodal and Intermodal

In previous WMC studies and in current planning efforts, the terms "multimodal" and "intermodal" have been used interchangeably. Typically, an intermodal facility can be defined as a place where interface occurs between transportation systems. In a passenger terminal, people enter the facility by one mode of access (e.g., on foot, riding a bicycle, by car, by bus or train, etc.) and leave by another.

The term "multimodal" facility is generally applied to a facility that serves multiple transit operators and/or modes, such as combined bus and rail (or APM) stations. For purposes of this study the term "multimodal" implies not only multiple transit modes and operators but also a high degree of connectivity and interchange between modes.

A well-designed multimodal facility will facilitate transfers and create a more "seamless" transit network. Transfers are optimized by minimizing distances between boarding and alighting points and by providing clearly marked routes for transfers and information. Although it is difficult to predict exactly how much intermodal transfers will increase by collocating transit functions, evidence suggests that transfers and ridership will increase if the system is easy to use.

A multimodal transportation facility, particularly one offering regional and intercity services, can become a major gateway to the Westshore District. In addition, it creates the first impression of the surrounding community to arriving passengers. Historically, major transportation centers have been signature civic buildings and public spaces that celebrate arrival, the city, and mobility.

2.2 Automated People Mover Systems

APMs are fully automated, driverless vehicles operating on a fixed guideway along an exclusive right-of-way (ROW). Self-propelled vehicles or trains use a two-rail guideway system with rubber tires on concrete or steel guideway or steel wheels on steel rail. System line capacity ranges from 5,000 to 20,000 passengers per hour per direction (pphpd). Vehicles may operate as single units, in married pairs, or coupled into trains. For safety and because stations are often not staffed, station platforms may be separated from the guideway by a barrier wall (airport applications have barrier walls while urban applications usually do not) with doors coordinated to operate with the doors of the stopped vehicles.

Service may be provided on a fixed schedule or on demand. Stations may be configured for vehicles/trains stopping either on the main line (on-line) or on a siding guideway (off-line). APMs can provide such inter-city transit service as intermediate line haul, shuttle/connectors, and major activity center circulators.

In North America, most APMs have been installed at airports for inter-terminal and intra-airport circulation. Only a few provide inter-city transit service. The Miami Metromover, Detroit People Mover, and Jacksonville Automated Skyway Express are examples of APM systems providing circulation in downtown areas.

Advantages of APMs include automation, short operating headways, high gradability, tight turning radii and high-tech image. The service flexibility of this technology allows it to provide transit solutions for a variety of transportation needs identified in a corridor planning process. Alternatives with multiple overlapping routes are ideal for APMs. Automation and shorter headways also allow an APM technology to carry an equivalent ridership with shorter trains and, thus, shorter station platforms, reducing ROW requirements and capital costs. Route alignments within a central business district or other major center often have extremely tight turning radius requirements, steep grades, and closely spaced stations to maximize ridership. All of these attributes can favor APMs over other technologies.

Disadvantages of APMs include slower cruising speeds (typically less than 31 miles per hour (mph), relatively high capital costs (due to usually elevated guideways and automation), and the lack of supplier competition for later phases or extensions of a

system. With proprietary vehicles and train control systems, any extension of an APM system is most easily accomplished with the original technology supplier. This translates into little to no competition for extension work, thus possibly higher extension costs. **Table 2** outlines the planning APM characteristics assumed for the Phase l study.

Table 2: Phase 1 Study Assumed APM Characteristics

Criteria	Comment
Design cruise speed	31 mph
Maximum train length	120 feet (ft.). An additional 50 ft. beyond the normal train stopping location (nose of train) will be provided at the end stations to accommodate end-of-line overrun and buffers.
Vehicle overall length	41- 42.6 ft. Based on generic large APM technology. Smaller car lengths may be possible; however, the number of cars per train is increased.
Vehicle overall width	9 – 9.8 ft.
Vehicle overall height	12 ft. - 6 inches (in). This is the height over running surface.
Top of running surface to top of platform	Approximately 43 in. This may vary between technologies.
Top of platform to top of guideway structure slab	5 ft. This is the maximum expected dimension. This may be reduced to approximately 4 ft. - 6 in. based on the selected technology to reduce the dead load from the depth of the running surface.
Centerline guideway to obstruction	6.25 ft. Centerline of guideway to edge of guideway + 5 ft. – 0 in. from edge of guideway to obstruction.
Tangent length of guideway entering/leaving station	One car length. At end-of-line stations, train stopping location should be such so that the tail end of the arriving train is as close to the end of the platform as possible yet inside the station. The tangent length of guideway beyond the end of platform to the beginning of the switch should be minimized with due consideration of the train vehicle chording into the switch/curves so that the headway of 90 seconds at the end stations can be supported.
Minimum tangent between curves	One car length.
Minimum curve radius (stations)	250 ft. The stations should be on tangents.
Minimum curve radius (mainline)	350 ft. (desirable)/150 ft. (absolute minimum).
Maximum Grade	4% desirable/6% maximum. Switches shall be 0% grade.

Table 2: Phase 1 Study Assumed APM Characteristics (cont'd)

Criteria	Comment
Centerline guideway to edge of platform	5 ft.- 4 in. Final dimension based on technology and clearance/gap requirements between vehicle floor and platform edge. Note that emergency walkway configuration must be considered. Emergency walkway access into the station must be addressed and coordinated with the respective design team.
Train configuration	Maximum length 4-car train configuration (in ultimate). Assuming a maximum 4-car train with each car having 2 doorways per side. A width of 6 ft. can be assumed for each doorway for preliminary planning purposes. Exact door locations and sizes are technology dependent.

Source: 2013 Airport Master Plan Update, Volume 3, July 10, 2013.

3.0 OVERVIEW OF THE TAMPA INTERNATIONAL AIRPORT

Tampa Bay has been credited with being the city where commercial airlines were born. In 1928, Drew Field Municipal Airport, a 130-acre (ac) general aviation facility, opened as a result of the City of Tampa negotiating a deal with John H. Drew, a farmer, land developer and aviation enthusiast. At the onset of World War ll, the United States Army Air Force leased Drew Field from the City of Tampa and expanded and modernized the airfield. The airfield was used by the Third Air Force and was referred to as Drew Army Airfield. The Third Air Force used the airfield as a training center for an estimated 50,000 to 120,000 combat air crews and flew antisubmarine patrols from the airfield. In 1946, Drew Field was inactivated by the Army and returned to the City of Tampa. In 1952, Drew Field was renamed Tampa International Airport.

Today, TIA is publicly owned by the Hillsborough County Aviation Authority (HCAA). It covers an area of approximately 3,300 ac and has three active runways. An estimated 17 million passengers pass through TIA facilities annually. It is anticipated TIA will sustain an increase of over 17,200 aircraft operations and 1.4 million passengers between 2011 and 2016. This increase in demand will substantially reduce the TIA's ability to serve the ground-based transportation needs of passengers, employees, and tenants. This reduced service will result in rental car facilities, employee/tenant parking, airport roadways, and terminal curbsides reaching their respective maximum capacities by 2016. If no action is taken to address this increase in demand, the following problems will occur:

- Existing rental car companies will find it difficult to provide acceptable levels of service and they would have an inability to handle the influx of rental cars due to facility constraints.
- Future airport employees and tenants who will serve the influx of passengers will experience a shortage of available parking.
- Existing car rental and parking areas will experience increased congestion, and lower levels of service on TIA's roadway system due to an overly congested roadway system.

Without the proposed improvements to passenger, employee, and tenant vehicle parking areas and the roads serving them, TIA users, employees, and tenants will experience diminished service levels. The consolidation of rental car facilities, expansion of employee and tenant parking, and improvements to TIA roadways will enable HCAA to maintain a high level of service demands for the next twenty-year planning horizon..

Of particular interest to this study is TIA's proposed landside and surface transportation improvements in the southern portion of TIA property. HCAA proposes to build support

facilities within the south terminal support area (STSA). The proposed project elements include:

- A multi-story ConRAC facility;
- An APM including three passenger stations and an APM maintenance facility;
- A multi-story garage west of the ConRAC for employee/tenant parking which is currently located in several lots throughout the TIA's property;
- Development of a quick turnaround facility and rental car storage and maintenance area east of the proposed ConRAC facility;
- Modification of connector Taxiway J Bridge to accommodate the APM and roadway improvements;
- Partial relocation of Bessie Coleman Boulevard (existing service road) from the existing U.S. Post Office to Airside A; and
- Roadway improvements in the STSA including transportation modifications along Airport Service Road at Spruce Street and the intersection of O'Brien Street.

The ConRAC is proposed to be a five-level parking garage with approximately 7,300 spaces. It would be located south of the existing Economy Parking garage and east of Airport Access Road. The APM would transport passengers to and from the ConRAC, Economy Parking, Employee/Tenant Parking, and the east side of the Main Terminal. The APM alignment would be located under the Taxiway J Bridge and over George Bean Parkway and Bessie Coleman Boulevard. This would prevent the APM from impeding on-airfield or surface traffic at TIA.

The proposed, relocated employee parking west of the proposed ConRAC would be a four to five-level parking garage with approximately 4,100 spaces. The garage would also be served by the APM.

Roadway improvements in the STSA would improve approximately 10,700 linear feet of roadways and require the installation of new signals and lighting. The improvements would include the following:

- Widening the portion of Airport Service Road running north to south in the STSA in order to provide a four-lane, undivided roadway section with auxiliary lanes for access to different sections of the STSA;
- Constructing a three-lane roadway at APM Station 2, which would provide a roadway segment dedicated to curb-side loading and unloading of the APM without delaying traffic on the main roadway segment;
- Realigning a segment of Bessie Coleman Boulevard from the northeast corner of the STSA to south of Airside A, east of its existing location (approximately 4,000 ft)

to facilitate the ability to access the aircraft rescue and fire fighting station while accommodating the interface from surface to elevation APM guideway;

- Converting the STSA north access roadway to a three-lane road with two westbound lanes and one eastbound lane; and
- Converting the STSA south access entry roadway from a two-way segment to a roadway serving only eastbound traffic.

4.0 OVERVIEW OF THE WESTSHORE DISTRICT

The Westshore District, is an area of ten square miles, is situated between six major arterials and two freeways and is a major business center in the City of Tampa. Its boundaries are Kennedy Boulevard on the south, Himes Avenue on the east, Hillsborough Avenue on the north, and the Tampa Bay shoreline to the west, including Rocky Point.

It is considered by many to be the center of activity in the Tampa Bay region. The Westshore business district is located within the City of Tampa and is Florida's largest office community with 12 million square feet (sq ft) of office space. It is home to upscale shopping with two high-end regional shopping malls (International Plaza and adjacent Bay Street, and WestShore Plaza) and two major sporting venues in Raymond James Stadium (home of the Tampa Bay Buccaneers) and Steinbrenner Field (spring training facility for the New York Yankees). The Westshore District has approximately 4,000 businesses employing over 93,000 people including AAA Auto Club South, Humana, IBM, Blue Cross Blue Shield, Price Waterhouse Cooper, and Time Warner. In addition, there are approximately 38 hotels and approximately 250 restaurants in the District. Westshore is also home to the TIA terminal, airfield, and associated facilities.

There are also approximately 13,800 permanent residents in the Westshore area. The residents enjoy a diverse mix of housing options including apartments, condominiums, town homes and single family homes. The area neighborhoods are also diverse. Beach Park, located south of Kennedy Boulevard from Lois Avenue to Tampa Bay, is one of Tampa's most exclusive neighborhoods. Westshore Palms is considered Westshore's hidden gem, bordered by Kennedy Boulevard, I-275, Lois Avenue, and Westshore Boulevard, offering a mix of traditional ranch style homes and small townhome developments. Residents are within a 5-minute walk to many restaurants and all of the shopping that WestShore Plaza offers, as well as Cypress Point Park.

Carver City/Lincoln Gardens is a historic neighborhood located in the heart of Westshore District. It is bounded by West Boy Scout Boulevard to the north, Westshore Boulevard to the west, Cypress Street to the south, and Dale Mabry Highway to the east. There are three neighborhood schools located within Carver City/Lincoln Gardens boundaries: Jefferson High School, Roland Park K-8 Magnet School, and Lavoy Exceptional Center.

In August 2009, the *Hillsborough County Transit Oriented Development Market Assessment and Development Potential Report* was completed for Hillsborough County Metropolitan Planning Organization (HCMPO). The Westshore District is outlined in this report as an area with major market potential as a mixed-use regional node. The market

study area consisted of a ½-mile radius around the intersection of Cypress Street and Trask Street, which subsequently is the area of the top candidate WMC sites identified in the *Westshore Multimodal Study and Strategic Transportation Plan* completed in February, 2012.

The report suggests that should premium rapid transit be built with a regional station in Westshore, there would be a market in this area for additional high density residential and commercial development. The presence of small, fragmented parcels (including underutilized and vacant lots) and large surface parking lots suggest that new development would occur on "in-fill" sites that may require assemblage. The Westshore District's competitive advantages include an established market identity, proximity/ adjacency to the TIA, a cluster of destination retail uses, and high density commercial employment nodes. According to the report, market potentials for the Westshore District include: 1,400 to 1,500 multi-family units through 2035, reflecting high density residential, and 1.7 to 2.0 million sq ft of new speculative/multi-tenant office space through 2035. Increases in retail space that would be driven by growth in office employment, visitation, and expansion/redevelopment associated with the area's two major retail centers – WestShore Plaza and the International Plaza and Bay Street.

4.1 Westshore Multimodal Study and Strategic Transportation Plan

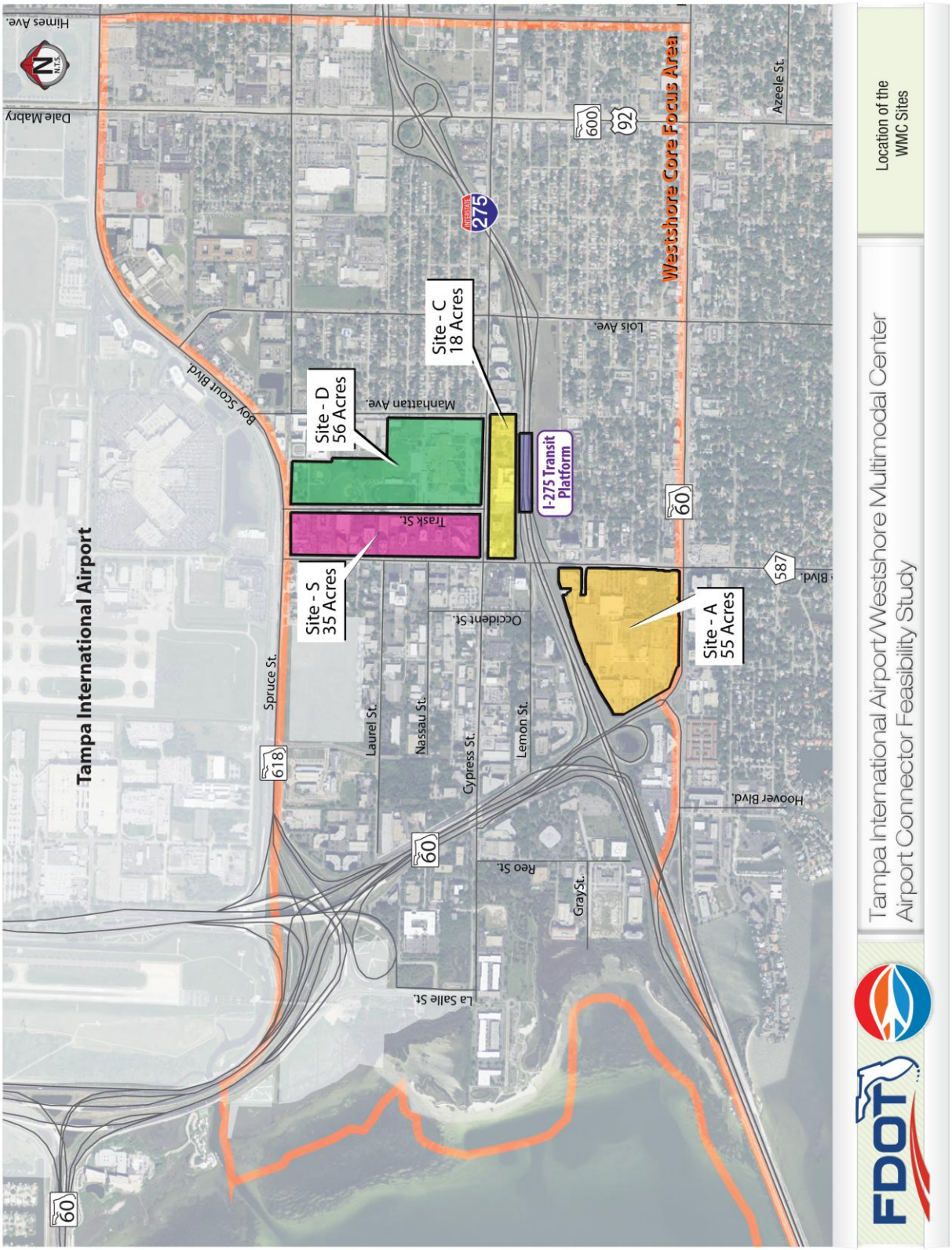
The "*Westshore Multimodal Study and Strategic Transportation Plan"*, sponsored by the HCMPO, FDOT, and TBARTA, was finalized in February 2012. The initial purpose of the study was to identify a multimodal site(s) within the core Westshore District area that would provide connectivity for all existing and future planned modes of transportation in the Tampa Bay region and to improve the quality of the intermodal passenger connection in Tampa Bay so that regional mobility and accessibility by means other than personal motor vehicles are significantly increased. The WMC would facilitate improved connections between Hillsborough and Pinellas Counties maximizing the effectiveness of the transit in both counties, and would enhance the existing and planned transportation systems in the entire Tampa Bay region.

The site evaluation and screening process involved a quantitative analysis, as well as a qualitative assessment of each of the ten candidate sites. Based on the study evaluation process and community coordination, four sites were identified as viable locations for the future WMC (see **Figure 2**).

A description of each of the identified viable WMC sites is provided below:

1. **Site A:** The proposed WMC would be located in the northeast corner of the WestShore Plaza shopping mall, which is located south of I-275 and west of Westshore Boulevard. The area is predominantly commercial with numerous office

Figure 2: Location of the Four WMC Sites



spaces and restaurants. The mall also abuts the Westshore Palms, North Bon Air, and Beach Park neighborhoods. The WMC would be located in the area where an existing Hillsborough Area Regional Transit (HART) transfer center and a parking garage are currently situated. It is assumed the parking garage would be replaced. It is important to note that this site would not provide a direct connection to the proposed I-275 station since the site is located too far to the west of the station. It was envisioned that the site would also accommodate 12 bus bays. Improvements would be needed at the intersection of Gray Street and Westshore Boulevard.

Site C: The WMC would be a part of a redevelopment of the strip of parcels north of I-275 between Trask Street and Manhattan Avenue: Site C would utilize the parcel where Charley's Restaurant is currently located. The WMC would be fronting Cypress Street with 12 bus bays and parking abutting I-275. The WMC and the I-275 station would be connected by an elevated pedestrian walkway.

2. **Site D:** The site is located between Trask Street and Manhattan Avenue along Cypress Street. It uses the Jefferson High School front parking area for the placement of the WMC and seven bus bays. To replace parking being taken from the school, a parking garage would be built on the east side (Manhattan Avenue and Cypress Street) of the school where currently a surface parking lot exists. The front of the school would be relocated to the east side of the building facing the adjoining neighborhood. The WMC and the I-275 station would be connected by an elevated pedestrian walkway. The pedestrian walkway would be constructed over or adjacent to the existing DoubleTree Hotel.
3. **Site S:** This site would utilize the parking garages on the west side of Trask Street behind the Austin Property buildings. The WMC would be located at the corner of Trask Street and Cypress Street. The existing parking garages would be replaced with a new parking structure that would also accommodate 14 bus bays. The WMC and the I-275 station would be connected by an elevated pedestrian walkway located on the west side of Trask Street.

4.2 Westshore Areawide Development of Regional Impact Overlay

The *Westshore Multimodal Study and Strategic Transportation Plan* is consistent with the improvements outlined in the *Westshore Mobility Strategy Action Plan* as well as the provisions for transit improvements and the residential component of transit oriented development (TOD) outlined in the *Westshore Areawide Development of Regional Impact* (DRI). The DRI states wherever possible, development within the Westshore Overlay District shall be designed to maximize the efficiency of mass transit. The developer shall coordinate with the City of Tampa and HART to determine if the site warrants transit stop improvements such as easement dedication or transit shelters. On April 25, 2008, the

DRI was amended to allow fees and contributions required by the Development Order to be applied to the transportation network for roadway and transit improvements, including transit operations and pedestrian improvements associated with such improvements.

The DRI boundaries (see **Figure 3**) consist of the area that commences on the northern boundary of Hillsborough Avenue at the City of Tampa's municipal boundary adjacent to the airport and runs east along the northern boundary of Hillsborough Avenue to the eastern boundary of Himes Avenue. It then runs south along the eastern boundary of Himes Avenue to the southern boundary of Kennedy Boulevard then runs west along the southern boundary of Kennedy Boulevard to I- 275 where it intersects with the shoreline of Old Tampa Bay. It then runs north along the shoreline of Old Tampa Bay to a point that would intersect with the southern extension of Eisenhower Boulevard. From this point, it runs north along the eastern boundary of Eisenhower Boulevard to the City of Tampa's municipal boundary adjacent to the airport and then northerly along the municipal boundary within the airport to the point of commencement.

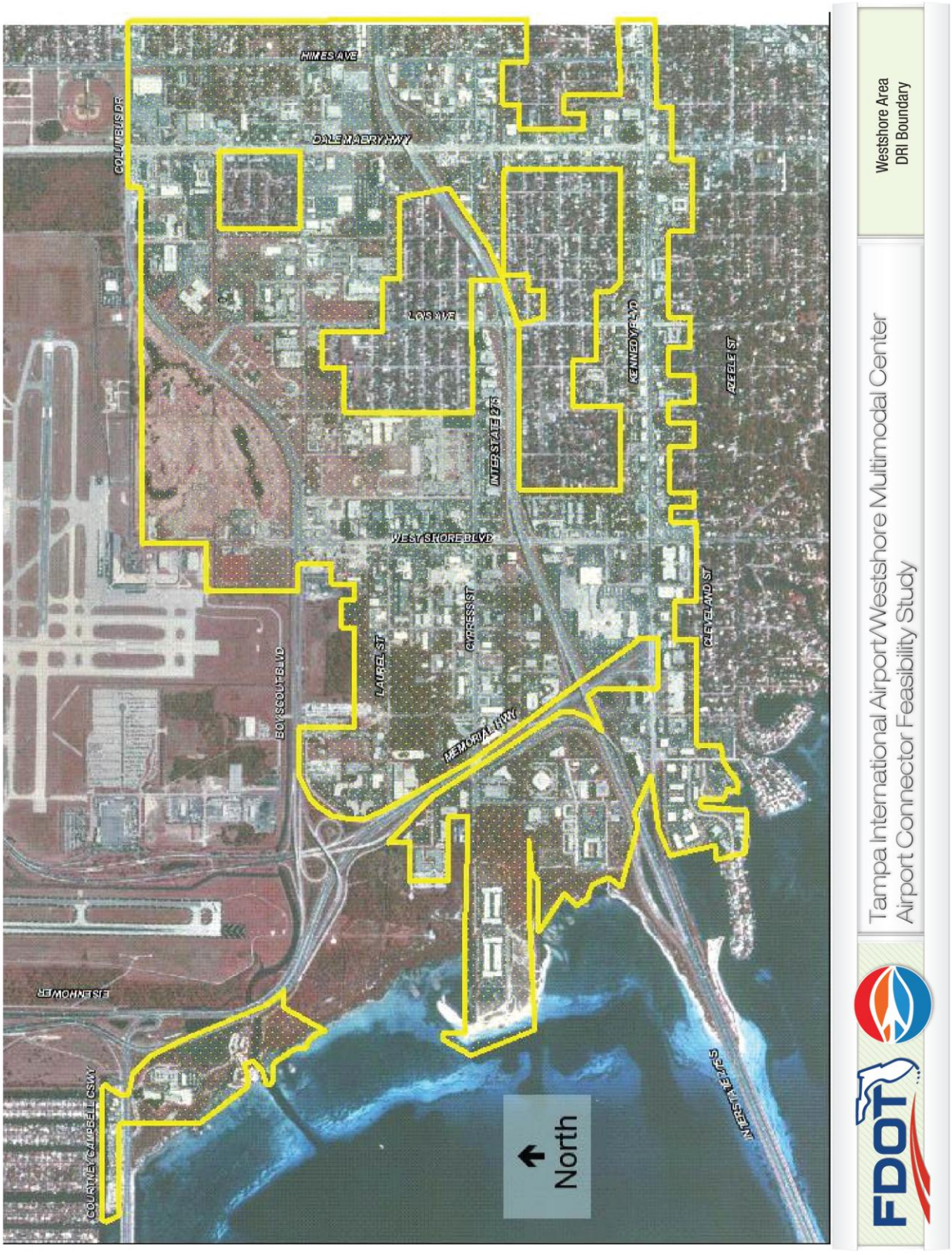
The DRI was also amended to exempt projects from fees which provide affordable housing. Affordable housing is defined as housing affordable to a person or families whose total annual household income does not exceed 120 percent of the area median income, adjusted for household size. Developers are encouraged to incorporate affordable housing in their projects, but it is not a requirement.

The Westshore Alliance provides information to developers regarding the opportunities and advantages of the provision of affordable housing in the Westshore area. Both the transportation and affordable housing components of the DRI strongly promote TOD. The placement of a multimodal center in the Westshore area would further promote these vital components to a livable community.

The Westshore Alliance has compiled a listing of property sites within the Westshore area that are available for either development or redevelopment. Sites currently available include:

- Cornerstone Plaza (Boy Scout Boulevard and Lois Avenue) - 12 ac currently entitled for 600,000 sq ft of office space.
- Highwoods Bay Center II (5444 Bay Center Drive) – Six (6) ac currently entitled for build to suit office- 207,966 sq ft.
- Metwest International (4040 W. Boy Scout Boulevard) - 22 ac currently entitled for office, hotel, retail, and/or residential.
- Highwoods Plaza at Avion Park (5332 Avion Park Drive) - Four (4) ac currently entitled for 300,000 sq ft office-build to suit.

Figure 3: Westshore Areawide DRI Boundary



- Avion Park Office Condos (Southwest Corner Spruce Street and O'Brien Street) - currently entitled for 134,542 sq ft of Class A office space.
- Tampa Bay 1 (3725 W. Grace Street) - 13 ac currently entitled for 1.2 million sq ft of mixed use space office, retail, and hotel.
- Westview Corporate Center (402 N. Reo Street) – eight (8) ac currently entitled for 580,000 sq ft of commercial office.
- Independence Park (Independence Parkway and George Road) - 33 ac currently entitled for build to suit for office development.

5.0 LOCAL AND REGIONAL PUBLIC TRANSPORTATION SERVICES

The Tampa Bay region currently has two major transit providers, HART and Pinellas Suncoast Transit Authority (PSTA), and one regional transportation authority, the TBARTA. HART, serving Hillsborough County, had 195 buses, 47 routes, and a ridership of 14.3 million for Fiscal Year (FY) 2013. PSTA provided service to approximately 13.0 million riders in FY 2013 on 37 routes utilizing 200 buses.

5.1 Hillsborough Area Regional Transit

The current HART bus system serves the unincorporated areas of Hillsborough County, and the cities of Tampa and Temple Terrace. HART provides the following public transportation services: local fixed route and express bus service, in-town trolleys (Green Line & Purple Line), TECO Line Streetcar, vanpools and guaranteed ride home service, flexible service, and Demand Responsive/Paratransit service. HART provides 23 park and ride facilities throughout the service area for passengers who do not live near bus routes.

HART currently operates 47 routes, which include: 32 local routes, 13 commuter express routes, and two flex service routes. It currently serves the Westshore area through local routes and express routes. Local routes serving Westshore include: 30, 45, 15, and 10; express routes 61X, 200X, and 300X utilize I-275. The MetroRapid East-West route, which is currently being studied, will connect TIA, the Westshore District and the HART Netpark bus transfer center at Hillsborough Avenue and 56th Street, with connections to the North-South line at Martin Luther King Jr. Boulevard. HART started the PD&E Study for the MetroRapid East-West Route in October of 2011.

HART's bus system operates seven days a week, including holidays. The hours of revenue service operation for the majority of the bus routes is from 5:00 A.M. to 10:00 P.M. on weekdays, with additional service on some routes as early as 4:00 A.M. to as late as 1:15 A.M. Weekend and holidays service hours for the majority of routes is from 6:00 A.M. to 9:00 P.M. However, a few routes start as early as 5:00 A.M. and run as late as 11:00 P.M. In general, headways for bus operations range from 15 to 60 minutes during the A.M. and P.M. peak periods, with the average service frequency of 15 to 30 minutes. Headways during the off-peak periods range from 20 to 120 minutes, with the average service frequency from 30 to 60 minutes. Weekend service frequencies primarily operate on 60-minute headways, with some of the most utilized routes operating at 30-minute or shorter intervals.

In addition to the HART transit service, Sunshine Line, operated by Hillsborough County Sunshine Line, provides door-to-door transportation and bus passes for elderly, low

income and disabled persons, including Hillsborough Healthcare clients, who do not have or cannot afford their own transportation.

5.2 Pinellas Suncoast Transit Authority

The primary transit service provider in Pinellas County is PSTA. The current PSTA bus system serves 21 of the 24 communities in Pinellas County. Additional service is provided to unincorporated areas. PSTA currently operates 37 routes, which include: 29 local routes, two shuttle/circulator routes, one trolley service, three commuter routes, and two commuter express routes to Tampa including the Westshore area. PSTA's current fixed-route system can be generally categorized as a hub-and spoke system with three major hubs: downtown St. Petersburg, Central Plaza, and downtown Clearwater. PSTA provides three park and ride facilities for passengers who do not live near bus routes.

PSTA's bus system operates seven days a week, including holidays. The hours of revenue service operation for the majority of the bus routes is from 5:30 A.M. to 8:30 P.M. on weekdays, with additional service on some routes as early as 4:55 A.M. to as late as 11:55 P.M. Weekend and holidays service for the majority of routes is from 6:00 A.M. to 7:00 P.M. However, a few routes start as early as 5:30 A.M. and run as late as 9:00 P.M. In general, headways for bus operations range from 15 to 75 minutes during the A.M. and P.M. peak periods, with the average service frequency of 30 minutes. Headways during the off-peak periods range from 30 to 60 minutes on average. Weekend service frequencies primarily operate on 60-minute headways, with some of the routes operating at 30-minute intervals.

In addition to the PSTA transit service, some local service is provided by other companies in Pinellas County. A summary of these transit services is as follows:

- Downtown Looper and Central Avenue Shuttle, operated by City of St. Petersburg.
- Jolley Trolley, operated by Clearwater Jolley Trolley and serving Clearwater, Dunedin, Palm Harbor, and Tarpon Springs.
- Gulfport/St. Pete Beach Connector Trolley, operated by City of Gulfport Leisure Services Department.
- East Lake Shuttle, privately operated and connecting service at the Shoppes of Boot Ranch to PSTA Route 62.

5.3 Tampa Bay Area Regional Transportation Authority

TBARTA was created by the Florida State Legislature in 2007 to develop and implement a Regional Transportation Master Plan for the seven-county West Central Florida region consisting of Citrus, Hernando, Hillsborough, Manatee, Pasco, Pinellas and Sarasota

Counties. The commute options provided by TBARTA within the study area include: carpooling, vanpooling, ride the bus, biking, walking and teleworking.

5.4 Local Alternatives Analysis Studies

Both HART and PSTA have conducted alternatives analysis (AA) studies. The AA process examines a set of transportation alternatives that have been shown to be promising solutions to the corridor's transportation problems. These alternatives are initially chosen on the basis of systems planning analyses that provide a preliminary review of, among other things, cost-effectiveness, financial feasibility, and potential fatal flaws.

5.4.1 Hillsborough Area Regional Transit Alternatives Analysis

HART conducted an AA to evaluate a range of alternative ways to address transportation problems and needs in a study area that contains two corridors that converge on downtown Tampa. The two corridors include the Northwest Corridor that extends about 10 miles from downtown Tampa to the Pasco County Line and the West Corridor, which extends about five miles from downtown Tampa to the Westshore Business District.

The purpose of AA was to identify an alternative that will provide the study area with enhanced transportation choices, additional transportation capacity, improved accessibility for residents and employees, higher transit mode share, support economic and community development, improved system efficiency, and intermodal connectivity.

In February 2011, the HART AA Study Summary of Findings and Recommendations Executive Summary identified a LPA for the Northeast and West Corridors. The recommended LPA for the Northeast Corridor is a light rail service between Downtown Tampa and New Tampa. The LPA would serve New Tampa, Tampa Palms, University of South Florida and surrounding medical facilities, East Tampa, and Downtown Tampa. The light rail alignment is approximately 17.5 miles in length via Fowler Avenue. The recommended LPA for the West Corridor is a light rail service between Downtown Tampa, the Westshore area and TIA. The system would serve the Westshore area, West Tampa, and Downtown Tampa. The light rail alignment is approximately nine miles in length via I-275 and Trask Street.

In May 2011, the HART AA effort was suspended by the HART Board.

5.4.2 Pinellas Suncoast Transit Authority Alternatives Analysis

The Pinellas AA study is an ongoing study that will identify transit options to improve Pinellas County's quality of life. The study is examining fixed-guideway transit service

connecting major residential, employment, and activity centers in Pinellas County to Hillsborough County. The evaluation of fixed-guideway options in the study are designed to connect people and places and offer transportation options that are safe, sustainable, affordable, and efficient. The purpose of the Pinellas AA is to:

- Encourage economic development and community revitalization,
- Engage the public in an open dialogue about transit needs and desires
- Promote the sustainability of the community,
- Connect to assets in the Tampa Bay Region and the Central Florida Super Region, and
- Provide Mobility Options for Future Riders.

A key objective of the Howard Frankland Bridge (I-275 / SR 93) PD&E Study (Northbound) and Regional Transit Corridor Evaluation study is to provide a link for the Pinellas AA system to Hillsborough County. This linkage would run from Hillsborough County's proposed WMC to Pinellas County's proposed Gateway station. These stations would not serve as termini, but would allow uninterrupted transit movements from the St. Petersburg and Clearwater areas across the Howard Frankland Bridge corridor to and through Tampa's Central Business District (and vice versa).

6.0 KEY LOCAL CAPITAL IMPROVEMENT PROJECTS

The following capital improvement projects may impact the design and operations of the WMC facility.

6.1 Howard Frankland Bridge (I-275 / SR 93) PD&E Study (Northbound) and Regional Transit Corridor Evaluation

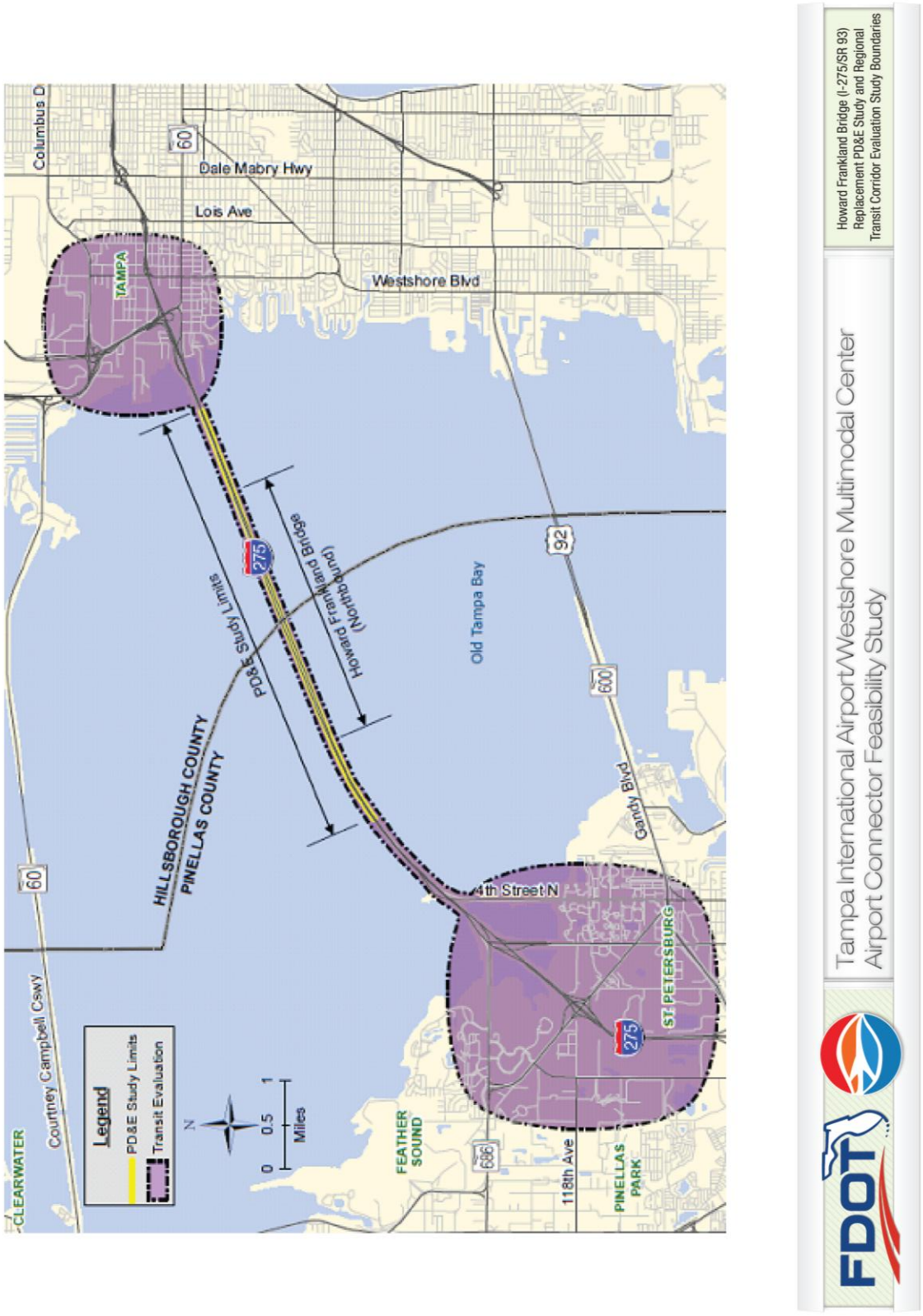
FDOT District Seven is also currently conducting a PD&E study in order to study the replacement of the Howard Frankland Bridge, which is approaching the end of its serviceable life. The PD&E study will identify the best replacement options for the bridge. The study limits for the PD&E study include the I-275 bridge over Old Tampa Bay and bridge approaches. The study limits for the transit evaluation are from the Pinellas County Gateway area to the Hillsborough County Westshore area (see **Figure 4**). Additionally, the TBARTA Master Plan calls for a transit connection across the Howard Frankland Bridge that will link Pinellas and Hillsborough Counties via transit stations. It is envisioned that this corridor would link Pinellas County's proposed Gateway Station, located near the St. Petersburg-Clearwater International Airport with Hillsborough County's proposed Westshore Multimodal Center. For this to be possible, the corridor must be capable of accommodating the appropriate transit provisions. Therefore, FDOT is also conducting a "*Transit Corridor Evaluation Study"* to determine the opportunities and constraints of providing a transit envelope in conjunction with the bridge replacement.

The transit study will examine engineering constraints and will identify feasible alternatives to accommodate transit in the design of the replacement bridge, or determine if a new structure would be required. The study will review data gathered during the Pinellas County AA, which looked at providing premium transit services from Pinellas County to Hillsborough County (including the Westshore District). The study will also analyze data from the Westshore Multimodal Center Study as well as the "*Westshore Area to Crystal River/Inverness Transit Corridor Evaluation Study"*. The Howard Frankland Bridge corridor must accommodate the appropriate transit provisions to connect all transit systems regionally.

6.2 Highway and Roadway Projects

Several projects are either ongoing or recently completed that affect the Westshore study area. Ongoing projects include the widening of I-275 from east of SR 60 to downtown Tampa/Hillsborough River. This 4.2-mile project began in July of 2012 and is projected to be completed in the fall of 2016, with an estimated construction cost of $215.4 million. This project will reconstruct all of the southbound interstate in that area, as well as northbound I-275 from east of SR 60 to Himes Avenue. When completed, there will be four through-lanes in each direction, a flatter roadway profile (eliminating steep humps at

Figure 4: Howard Frankland Bridge (I-275/SR 93) Replacement PD&E Study and Regional Transit Corridor Evaluation Study Boundaries



bridges over crossroads) to improve sight distance and operational safety, improved interchanges to help move traffic on and off I-275, and a wide median to decrease cost and public impact when future improvements are built, and to accommodate transit.

In March of 2010, the FDOT completed improvements to SR 60/Memorial Highway from I-275 to the Courtney Campbell Parkway interchange. The project also extended west one mile onto the Courtney Campbell Parkway (SR 60) and north to the tolled Veterans Expressway (SR 589). The Spruce Street/SR 60 interchange was improved to a four-level interchange and the Courtney Campbell/SR 60 interchange was improved to a three-level directional interchange. This configuration eliminated SR 60 traffic signals within the Courtney Campbell interchange and on the causeway at the Hyatt entrance (Bayport Drive). It also provided a two lane frontage road system for access to the Hyatt property. The new interchange configuration features the separation of local and express traffic with collector/distributor roads and express lanes. This system is also expected to help reduce congestion on the interstate ramps within the area and improve access to TIA.

In 2012, the SR 60 entrance ramps to southbound I-275 (onto the Howard Frankland Bridge) were modified, and drainage conditions for the eastbound entrance ramp were improved. Specifically, the merge conditions where the eastbound and westbound SR 60 entrance ramps meet were improved. Previously, westbound traffic merged to the right into the traffic coming from eastbound SR 60. This was changed to allow the westbound traffic to enter I-275 in its own lane. Westbound traffic now merges left into lane 4 of the Howard Frankland Bridge.

Finally, the widening of O’Brien Street by the City of Tampa to a four-lane facility between Spruce and Cypress Streets has several phases (drainage and wetland mitigation report, alignment concept, and capacity analysis) completed, with project design to begin in early 2014 and construction scheduled for 2016.

7.0 OVERVIEW OF EVALUATION PROCESS

The evaluation process was accomplished in three steps. First, during the development of TAC alignment options using APM technology, a fatal flaws analysis was conducted to ensure that only viable candidate alignment options were carried into the Level I screening process.

Second, a set of potentially viable TAC alignment options using APM technology were identified and screened during the fatal flaws analysis or Level I screening. The basis for the evaluation was the overarching study goals and objectives. The evaluation criteria take the form of five (5) generalized goals for identifying an alignment option in the study area; each generalized goal was further defined by a set of specific performance objectives. A metric (quantitative performance score or a qualitative performance score) was then defined for a set of performance measures (evaluation criteria) related to each specific objective. Scoring of the proposed alignment alternatives, against each performance objective establishes the extent to which a given alignment option supports or does not support a performance objective and, ultimately, its related goal.

Finally, in step three, after alternatives advancing from the Level I screening process were further refined, the Level II screening process was conducted using precisely the same methodology described for Level I screening.. Based upon the Phase 1 project goals and objectives, appropriate evaluation measures were then developed and each alignment option was then evaluated relative to the procedures described below. The relationship of performance objectives to the generalized goals also was defined.

7.1 Development of Performance Measures

A preliminary list of performance measures was identified based on the project's goals and objectives. The intent was that each of the performance measures provided a relative indication of how well an alignment option performed with respect to a particular goal and relative to the other alignment options under consideration. Performance measures were defined, ideally, so that a quantitative metric may be established; however, some measures were qualitative (e.g., good, moderate, poor) requiring the use of professional judgment by the study team.

An one-for-one relationship exists between each performance measure, and the specific objective associated with that performance measure. In the evaluation methodology, this relationship of performance measures and the objective associated with each grouping of performance measures is clear. The performance measures (that collectively provide the quantitative scores for evaluating the performance of a given alignment option) permit the assessment of the extent to which that alignment option

helped solve the defined corridor mobility issues. Such metrics span the range of concerns (such as travel time, impact to local business, and environmental impacts) for comparing and evaluating the alignment options. A listing of each of the proposed goals, objectives and performance measures are found in **Table 3** below.

Table 3: Study Corridor Goals, Objectives, and Performance Measures

Goals/Objectives	Performance Measures	Evaluation Methodology
Goal 1: Enhance regional mobility and local accessibility		
a) Provide a competitive transportation investment in terms of existing and proposed future alternatives. b) Improves regional and local mobility (intra and inter-corridor trips) during both peak and off peak travel times. c) Integrates with the multimodal transportation system on a local as well as regional level.	System linkages and integration	Defined as the alignment's ability to connect to existing and proposed future alternatives.
	Area traffic impacts/ opportunities	Defined as the alignment's anticipated impact to the local street network (e.g., intersection adversely impacted).
	Number of high activity centers served	Defined as the number and the ability of the proposed alignment to effectively serve defined corridor activity centers. Effectiveness can be defined as the ability to provide high quality transit connections, ability to physically and functionally be integrated into activity centers and ability to be accessible to pedestrians.
Goal 2: Expand the effectiveness of transit service within the study corridor		
a) Reliable in terms of service frequency, availability and predictability in terms of travel time. b) Effectively addresses corridor-wide transit connectivity/service needs (including feeder bus service) and multimodal connections.	Directness of route	Defined as the actual length of the overall alignment; or if determined applicable, the length of a particular section of an alternative where multiple alignment options are under consideration (e.g., defined point to point length).
	Trip travel times/travel-time savings	The estimated minutes between selected origin and destination points.

Table 3: Study Corridor Goals, Objectives, and Performance Measures (cont'd)

Goals/Objectives	Performance Measures	Evaluation Methodology
Goal 3: Provide a cost-effective and financially feasible transportation system		
a) Maximizes existing infrastructure and available right-of-way (ROW). b) Efficiently connects to transit systems within the study corridor. c) Reasonable/acceptable capital costs.	Capital costs	Capital costs are the one-time cost to construct the alternative's guideway structure (excluding stations, ROW, engineering, administrative and contingency costs).
	ROW acquisition	Defined as the anticipated number of businesses, residences and public properties (parcels), impacted as well as the estimated overall acreage of ROW required.
Goal 4: Encourage transit-supportive land use and economic development		
a) Encourages more efficient land use development and/or redevelopment patterns. b) Effectively links future local and regional growth areas. c) Consistent with local, regional, and statewide plans.	Land use modifications that support transit	Defined as the documentation of general transit-supportive development provisions in approved municipal comprehensive plans.
	Consistency with future development plans	Defined as the general assessment of the alignment's consistency with approved comprehensive plans (particular emphasis on proposed station locations).
Goal 5: Support sustainable communities and sound environmental practices/policies		
a) Supportive of environmental benefits. b) Minimizes impacts to surrounding properties, communities and sensitive environmental areas.	Environmental impacts	Defined as the number of wetlands, parklands, and floodplains within 100 feet of the center line of the proposed alternative.
	Residential and business Impacts	Defined as the number of dwelling units within 100 feet of the centerline of the proposed alternative which could potentially be affected by noise and vibration.
	Historic resources	Defined as the approximate number of historic resources potentially affected.
	Social Impacts	Defined as the ability of the alternative to not negatively impact a community.
	Business Impacts	Defined as the number of businesses potentially displaced.
	On-street parking impacts	Defined as the approximate number of on-street parking spaces lost.

7.2 Application of Evaluation Methodology

Quantitative procedures for conducting the multi-criteria evaluation of alignment options are described in Sections 7.2.1 and 7.2.2.

7.2.1 Level I Screening

The screening of TAC alignment options was conducted through an objective evaluation process coupled with a goal weighting process. A number of data sources were utilized to provide the necessary information to complete the evaluation. These sources include but are not limited to existing Geographic Information System (GIS) data, US Census Bureau data, and the professional expertise of project engineers and planners. Field reconnaissance supplemented these existing data sources where additional information was necessary.

Where quantitative evaluation information was possible (i.e., a metric exists such as the number of displacements required by an alignment option or traveler's time savings in minutes compared to an automobile), evaluations were based on the relative difference between the score for each alignment option within each performance measure.

The relative differences between the TAC alignment options were converted to a 0 - 4-point scale by interpolating the evaluation measure based on the best and worst performers, and then correlating that interpolated value to a rating between 0 and 4. The poorest performers for each performance measure were given a rating of “0” and the best performer(s) was given a rating of “4”. The remaining alignment options were assigned an interpolated rating based upon how well each performs relative to the best and worst performers.

Figure 5: Rating of Evaluation Measures

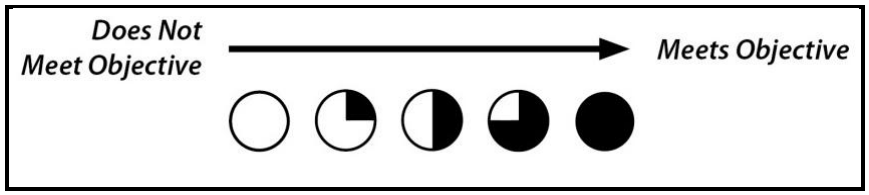


Table 4: Rating Score

Rating	Score
Circle Not Shaded	0 points
One-Quarter Shaded Circle	1 point
Half-Shaded Circle	2 points
Three-Quarter Shaded Circle	3 points
Fully Shaded Circle	4 points

Where quantitative evaluation is not possible, a qualitative evaluation approach was utilized. This methodology included performance measures generating a relative response of “Good,” “Moderate” or “Poor.” “Good” responses were given a rating of “4”, “moderate” responses a “3”, and “poor” responses a “0”. For example, no business displacements, indicating that an alignment option may be built with relative ease, would be given a “good” or “4”, whereas a significant level of (negative) impacts on street capacity would result in a designation of “poor” or a score of “0”.

The scores were tabulated for each goal. Then a “weighting factor” was utilized to weight the results relative to the overall evaluation of each goal. The “weighting factor,” expressed the PMT’s judgment of the relative importance of each goal.

The tabulated score for each goal was then multiplied by the weighting factor, which establishes the importance of that goal, resulting in a weighted scoring for each alignment option for each of the goals. These weighted scores were summed (the maximum possible score was 64) and the alignment option with the highest overall weighted scores was recommended for more refined analysis in the Level II screening of detailed alternatives.

7.2.2 Level II Screening

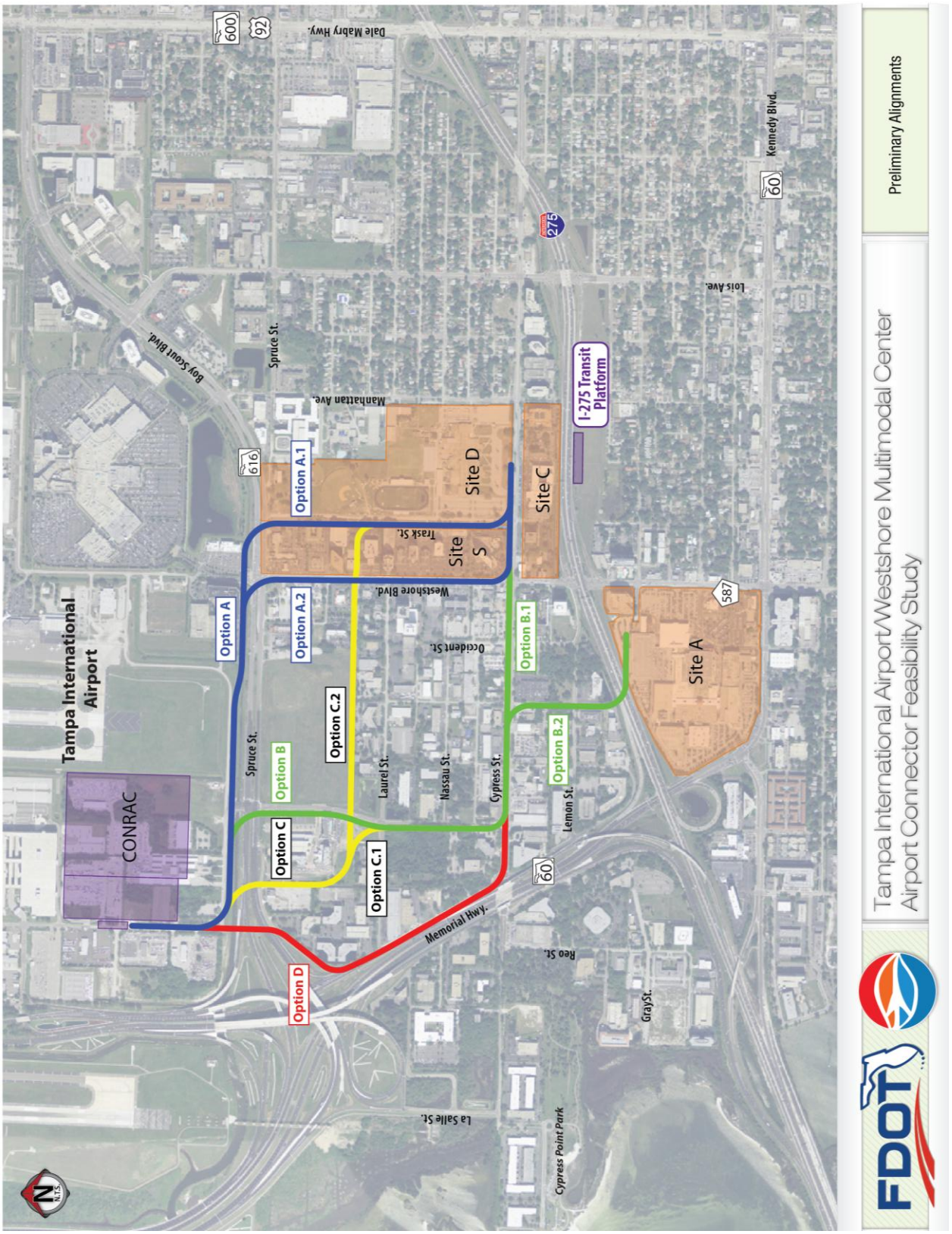
The Level II screening process employed precisely the same methodology described in Section 7.2.1 for Level I screening. The detailed TAC alignment options being evaluated in Level II screening were defined and analyzed in much greater detail. Accordingly, metrics quantifying the performance of these detailed alignment options were more refined than the metrics employed in the Level I screening process. The procedure for translating qualitative evaluation into a score for use in the evaluation matrix was the same for Level II screening as described above in Level I screening.

This process of evaluating each detailed alternatives with respect to each performance measure was replicated for each of the goals and the resulting weighted scores was summarized for each detailed alternative. The highest overall weighted scores were reflected the best performing detailed alignment option. The best of the detailed alignment options will be recommended to be further studied during the PD&E Phase II of the study.

7.3 Description of the Conceptual TAC Alignment Alternatives

The following provides a description of the candidate conceptual TAC alignment alternatives (see **Figure 6**) using APM technology considered for this Technical Feasibility Study.

Figure 6: TAC Conceptual Alignment Alternatives



1. **TAC Alignment Alternative A:** Segments of the APM guideway are at grade, below grade and elevated.

    - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road. Heading east on Airport Service Road the APM guideway drops below grade to go under the intersection of Airport Access Road and O'Brien Street. It stays below grade until it clears the RPZ. The APM guideway gradually rises to grade level along Spruce Street and starts elevating in preparation to cross Spruce Street. At this point, the APM guideway has two options to reach the intersection at Cypress Street and Trask Street:

        - **Option A.1:** Prior to reaching the intersection at Spruce Street and Trask Street the elevated APM guideway crosses over Spruce Street to Trask Street. The APM guideway then curves to the south on Trask Street to the intersection at Trask Street and Cypress Street.
        - **Option A.2:** Prior to reaching the intersection of Spruce Street and Westshore Boulevard the elevated APM guideway crosses over Spruce Street to Westshore Boulevard. The elevated APM guideway then proceeds south on Westshore Boulevard to the intersection at Westshore Boulevard and Cypress Street. The APM guideway then curves to the east on Cypress Street to the intersection at Cypress Street and Trask Street.

2. **TAC Alignment Alternative B:** The APM guideway is totally elevated.

    - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road and then curves to the east on Airport Service Road and crosses Spruce Street elevated to the corner of Spruce Street and O'Brien Street. It then proceeds south on O'Brien Street to the intersection at O'Brien Street and Cypress Street.

        - **Option B.1**: The APM guideway then curves to the east on Cypress Street and continues to the intersection of Cypress Street and Trask Street.
        - **Option B.2:** The APM guideway then curves to the east on Cypress Street and then curves to the south at the intersection of Cypress Street and Ward Street. The APM guideway continues south on Ward Street and goes over I-275 to the Westshore Plaza.

3. **TAC Alignment Alternative C:** The APM guideway is totally elevated.

    - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road and then curves to the east on Airport

Service Road and crosses Spruce Street and SR 60 landing elevated in the unimproved ROW corridor west of the Homewood Suits. The APM guideway then curves to the south and then east in the unimproved ROW corridor (behind the Hilton Gardens Inn) crossing O'Brien Street. At this point, the APM guideway has two options to reach the intersection at Cypress Street and Trask Street:

- **Option C.1:** The APM guideway turns south on O'Brien Street and then curves east on Cypress Street and continues to the intersection of Cypress Street and Trask Street.
- **Option C.2:** The APM guideway travels east on airport property to the intersection at Main Street and Westshore Boulevard. The elevated APM guideway crosses Westshore Boulevard and heads east to Trask Street. It then curves to the south on Trask Street to the intersection at Trask Street and Cypress Street.

4. **TAC Alignment Alternative D:** The APM guideway is totally elevated.

   - **Alignment:** Starting at the ConRAC station the elevated APM guideway travels south along the Airport Service Road, crosses Spruce Street, and then continues south along the SR 60 Frontage Road until it reaches Cypress Street where it then curves to the east on Cypress Street and continues to the intersection at Cypress Street and Trask Street.

7.4 Results of the Evaluation Process

7.4.1 TAC Alignment Alternative Options A.1 and A.2

The TAC alignment for options A.1 and A.2 was originally planned to be elevated APM guideway from the ConRAC station but would then gradually decline heading east on Airport Service Road so the APM guideway would drop below grade to go under the intersection of Airport Access Road and O'Brien Street. The APM guideway would stay below grade until it clears the RPZ. The APM guideway would then gradually rise to grade level along Spruce Street and start elevating to cross Spruce Street to either travel south on Trask Street (Option A.1) or Spruce Street (Option A.2) to eventually reach Cypress Street.

Upon further investigation it was determined that the Federal Aviation Administration (FAA) would not allow an at-grade APM (passenger train line) along Spruce Street since it may result in interference to current and future aviation use at TIA and that the primary use of TIA property should be maintained for aeronautical uses. The at-grade APM

guideway might, in the opinion of the FAA, adversely affect the safety, utility, or efficiency of TIA.

As an alternative, the study team investigated the concept of tunneling the APM along Spruce Street. This was also determined to be unfeasible since there is not enough distance from the eastern edge of the RPZ to Westshore Boulevard to achieve the required change in elevation needed to clear Westshore Boulevard, while maintaining the maximum grade of 6% before travelling south on Trask Street (Option A.1) or Spruce Street (Option A.2).

As a result of this analysis, conceptual TAC alignment options A.1 and A.2 were deemed fatally flawed. These two TAC alignments may be reviewed again during the next phase or the PD&E Study to verify they are still a conflict with FAA guidelines.

7.4.2 Results of the Level ll Screening

The remaining five TAC alignment options were further evaluated based on 15 evaluation criteria directly related to the project goals. These criteria were:

- System linkages/integration
- Area traffic impacts/opportunities
- Number of high activity centers served
- Directness of route
- Trip travel time/travel time savings
- Planning level estimate to design and construct the guideway (only)
- ROW impacts
- Land use modification that support transit
- Consistency with future development plans
- Environmental impacts
- Residential and business impacts
- Historic resources
- Social impacts
- Business impacts
- On-street parking impacts

Table 5 summarizes the evaluation results. A summary of each option's strengths and weaknesses relative to the project goals is highlighted in **Table 6**.

Table 5: Results of the Level II Screening Process

Goals	Weight	B.1	B.2	C.1	C.2	D
1. Enhance regional mobility and local accessibility	40%	27.5%	17.5%	27.5%	30.0%	30.0%
2. Expand the effectiveness of transit service within the study corridor	10%	1.3%	5.0%	2.5%	2.5%	5.0%
3. Provide a cost-effective and financially feasible transportation system	20%	7.5%	17.5%	5.0%	12.5%	10.0%
4. Encourage transit-supportive land use and economic development	10%	7.5%	7.5%	5.0%	2.5%	7.5%
5. Support sustainable communities and sound environmental practices/policies	20%	16.7%	16.7%	15.0%	11.7%	20.0%
Total Weighted Points	**100%**	**60.4%**	**64.2%**	**55.0%**	**59.2%**	**72.5%**
Ranking of Alignment Options		**3**	**2**	**5**	**4**	**1**

Table 6: Summary of Alignment Options Strengths and Weaknesses

Alignment Option	Strengths	Weaknesses
B.1	Provides a direct connection to the I-275 station. Minimal impact to ROW. Accessible to local and regional bus lines on Westshore Blvd.	Sections of the center left turn lane on Cypress St. will be channelized to allow for the construction of centered piers that will support the guideway. Estimated travel time 3 minutes and 49 seconds from the ConRAC facility to Cypress St/Trask St.
B.2	Provides access to the WestShore Plaza. Shortest linear alignment (1.54 miles) from the ConRAC facility to Westshore Plaza. The shortness of the alignment positively impacts the capital cost of the project.	Does not provide a direct connection to the I-275 station. Worst curve to tangent ratio – impacts rider comfort. Estimated travel time 3 minutes and 50 seconds from the ConRAC facility to Cypress St/Trask St.
C.1	Provides a direct connection to the I-275 station. Minimal impact to ROW. Accessible to local and regional bus lines on Westshore Blvd.	Sections of the center left turn lane on Cypress St. will be channelized to allow for the construction of centered piers that will support the guideway. Estimated travel time 3 minutes and 51 seconds from the ConRAC facility to Cypress St/Trask St.

Table 7: Summary of Alignment Options Strengths and Weaknesses (cont'd)

Alignment Option	Strengths	Weaknesses
C.2	Provides a direct connection to the I-275 station. Minimal impact to ROW. Accessible to local and regional bus lines on Westshore Blvd.	Sections of the center left turn lane on Cypress St. will be channelized to allow for the construction of centered piers that will support the guideway. Longest estimated travel time 3 minutes and 53 seconds from the ConRAC facility to Cypress St/Trask St.
D	Provides a direct connection to the I-275 station. Minimal impact to ROW. Accessible to local and regional bus lines on Westshore Blvd. Shortest estimated travel time 3 minutes and 37 seconds from the ConRAC facility to Cypress St/Trask St.	Sections of the center left turn lane on Cypress St. will be channelized to allow for the construction of centered piers that will support the guideway. The SR 60 Frontage Rd. will be modified to allow one-way circulation only.

Some general comments about all of the TAC alignment options:

- There will be ROW requirements for traction power substations. The substations will be located along the APM guideway alignment at approximately 5,000-foot intervals.
- There will be minimal ROW impacts on the corners of intersections where the APM guideway crosses an intersection due to the requirement to provide APM guideway structural support.
- It is anticipated there will be an increase in traffic congestion in the vicinity of Cypress Street and Westshore Boulevard and Cypress Street and Trask Street due to vehicles (public and private buses, hotel shuttles, vanpool shuttles, taxis, private automobiles) parking or dropping/picking-up passenger who will utilize the transportation services at the WMC.
- Pedestrian safety improvements need to be evaluated at intersections in the vicinity of the WMC. Improvements to crosswalks and street lighting may be required at such intersections. Consideration should be given to installing pedestrian "countdown" signal heads at intersections near the WMC.
- Movement throughout the study area is stifled by daily congestion and a lack of a walkable pedestrian environment.

Appendix A contains typical section drawings of the APM guideway structure at select intersections.

8.0 NEXT STEPS

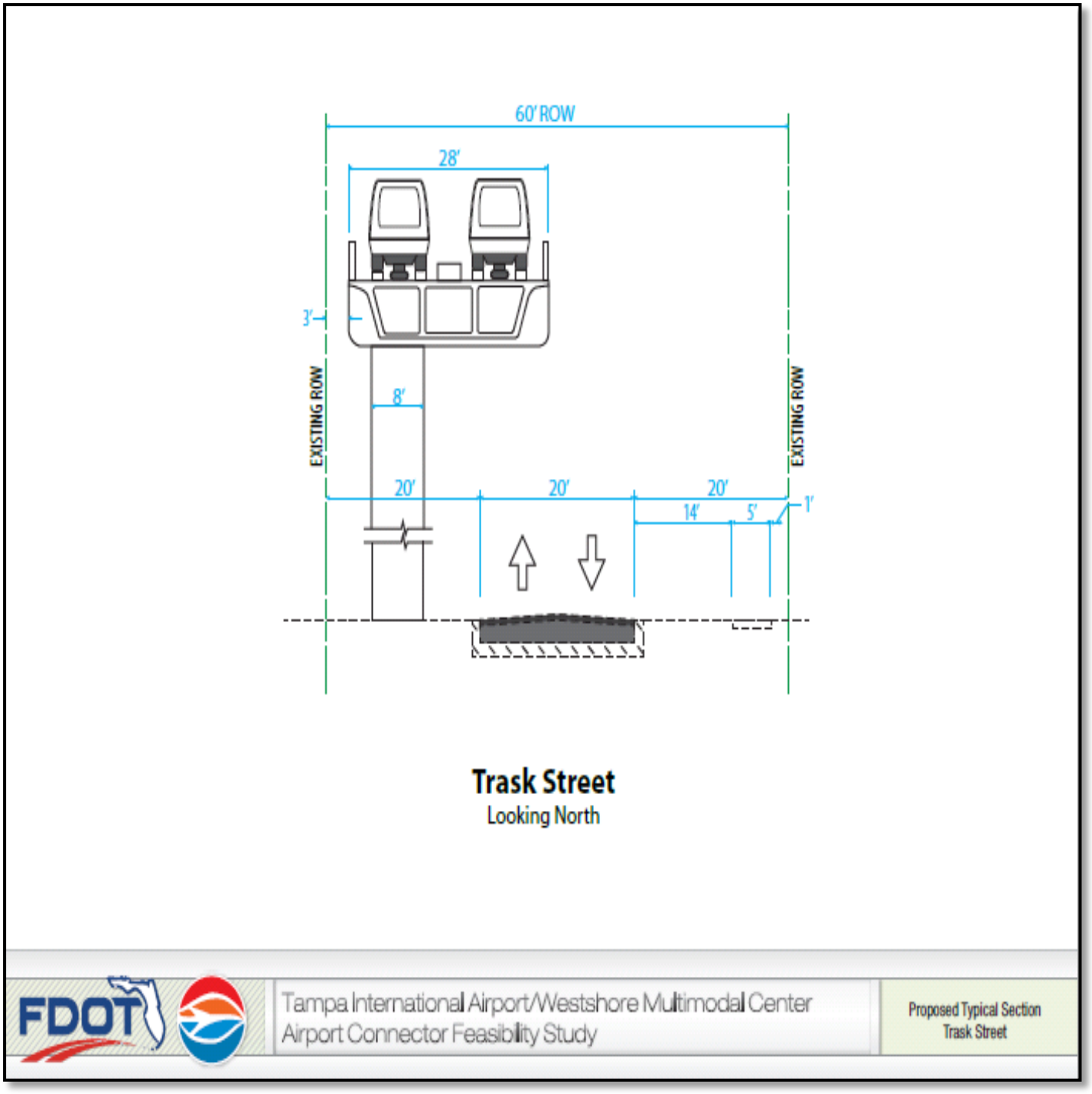
The next phase will be to conduct a PD&E Study which includes a more detailed technical analysis to identify the WMC location and uses along with identifying the TAC alignment option. The analysis will include:

- Conceptual engineering
- Development of preliminary operating plans
- Travel demand forecasting
- Environmental impact assessment
- Public outreach and involvement
- Develop key transportation elements and connections
- Identify redevelopment opportunities and land use requirements
- Capital cost estimates, and
- Operating and maintenance cost estimates

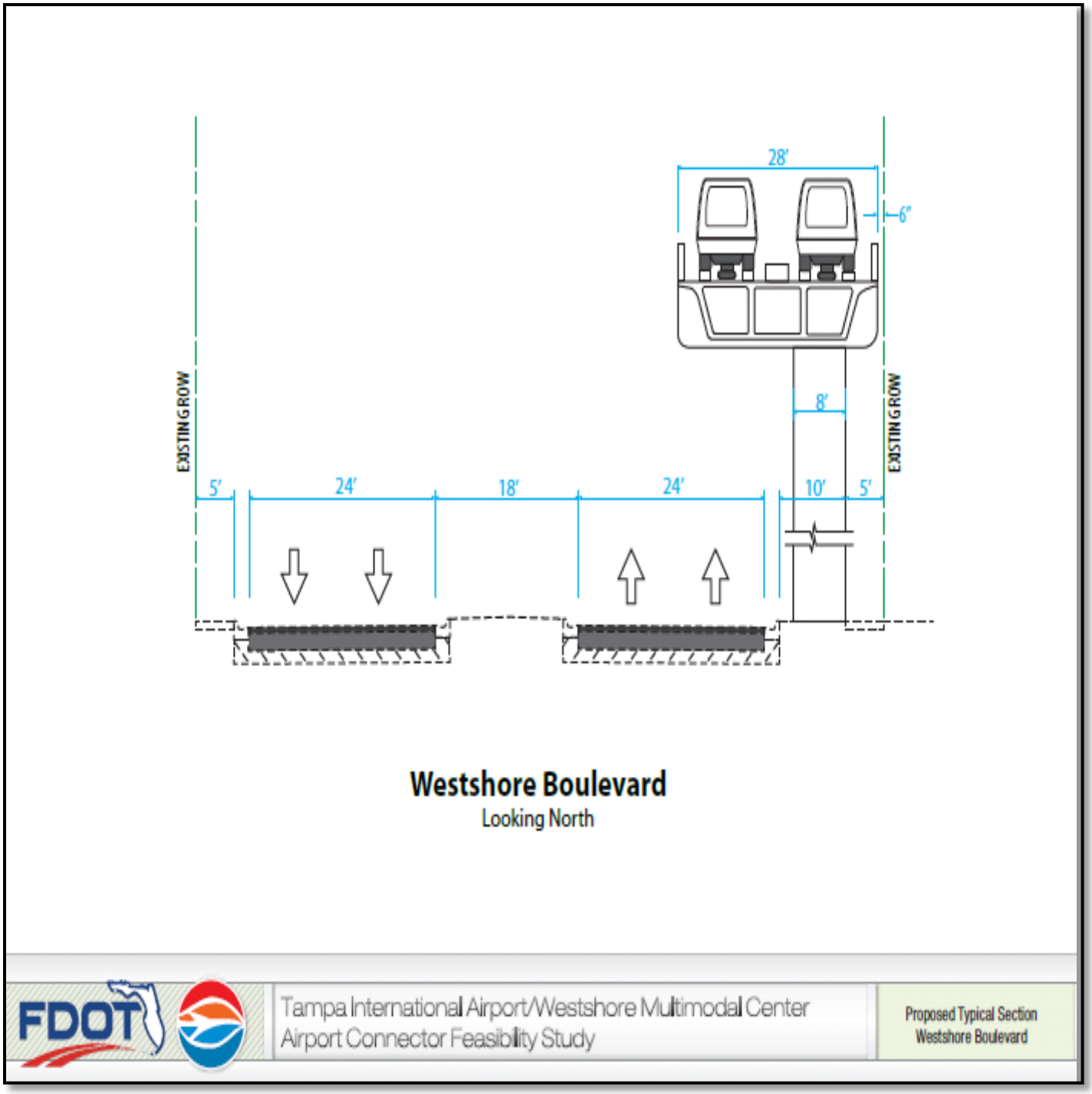
This technical analysis will be followed by a financial analysis to determine the sources of potential funding to finance the LPA. This information will be presented in an evaluation report so that decision-makers and the public can determine the relative benefits, costs and impacts of each alternative and which alternative (or combination of alternatives or elements of alternatives) best meets the purpose and need for major transportation investments in the study.

Appendix A: Typical Section Exhibits

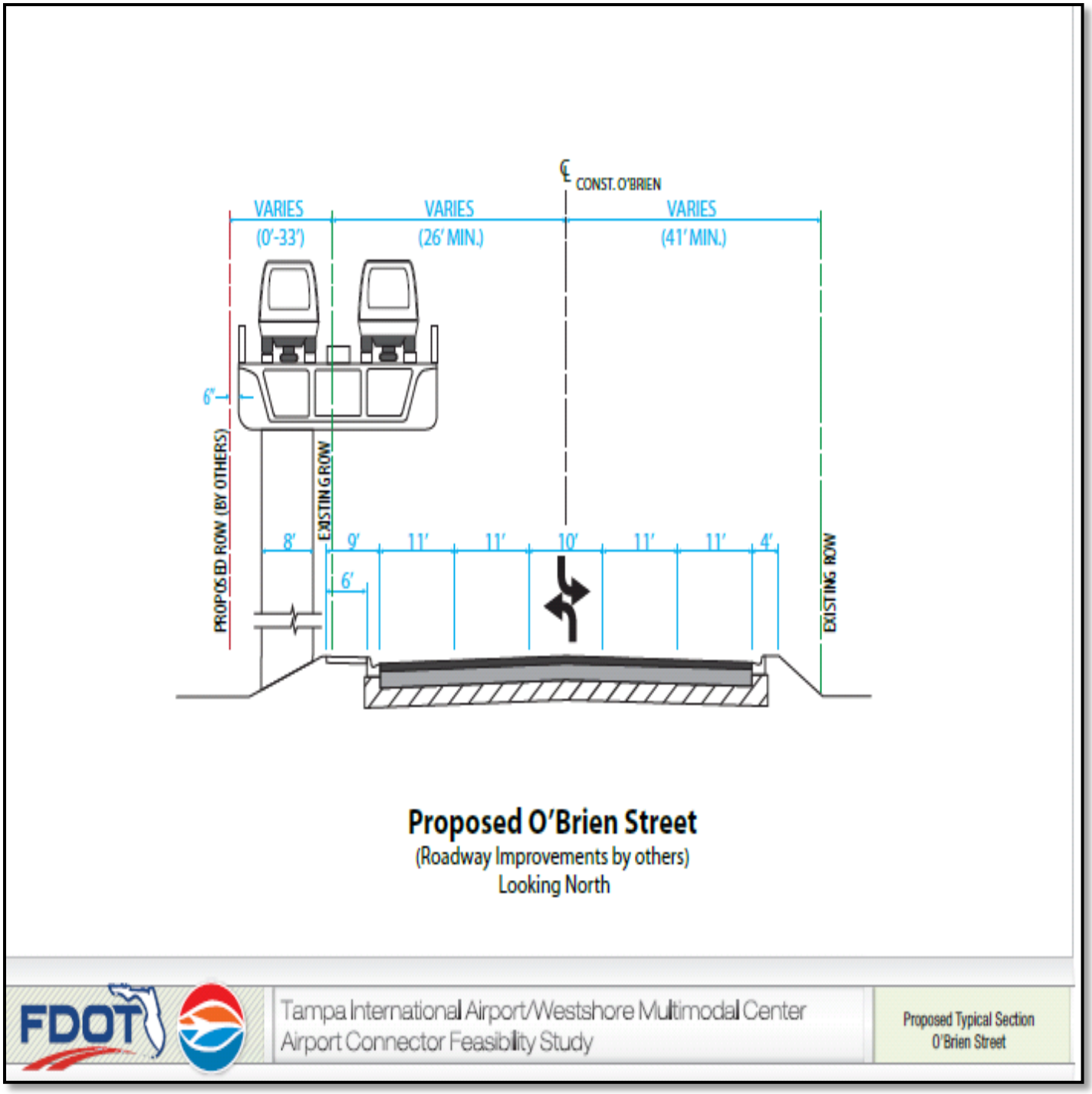
Appendix A-1: Trask Street Typical Section



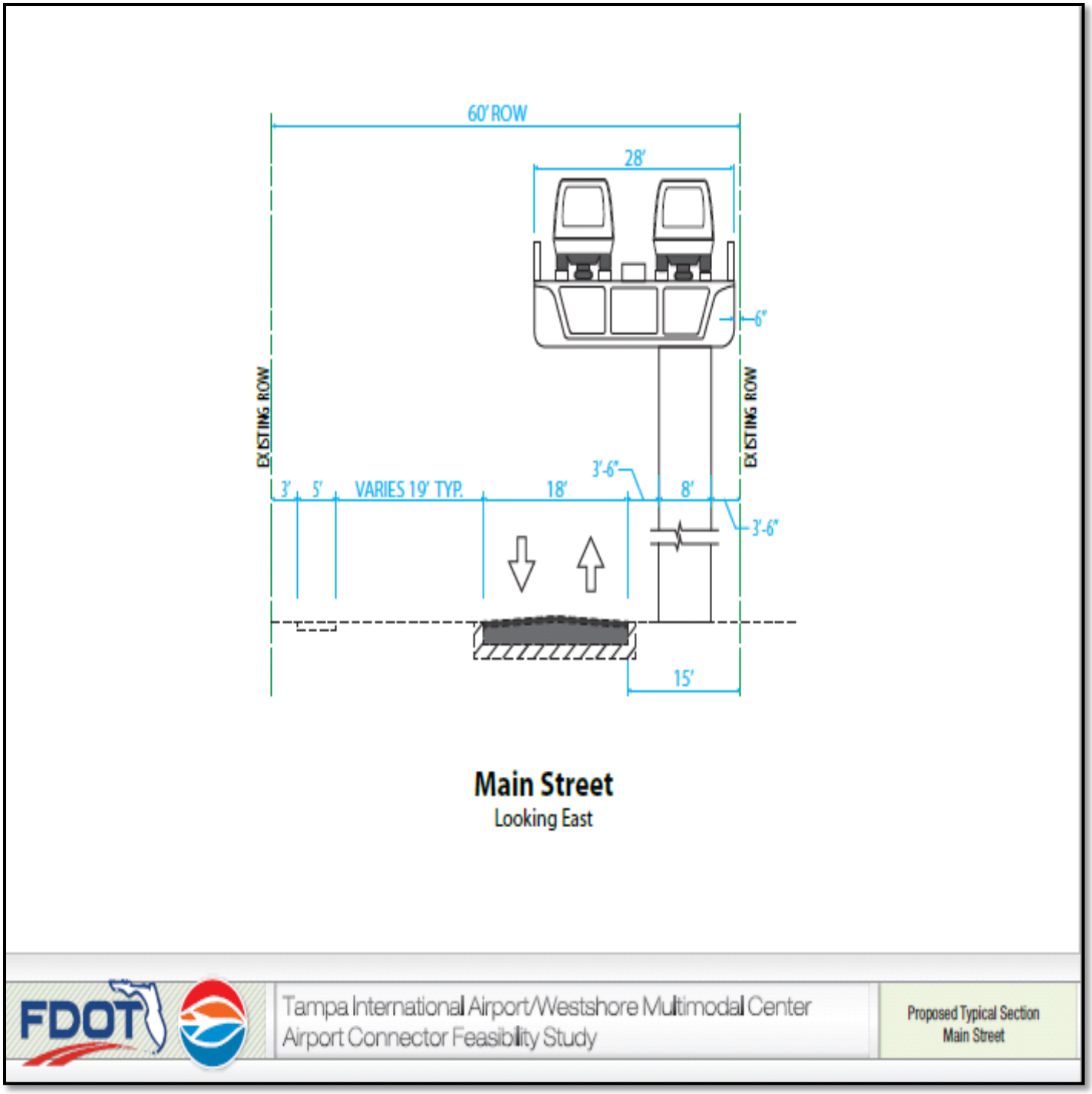
Appendix A-2: Westshore Boulevard Typical Section



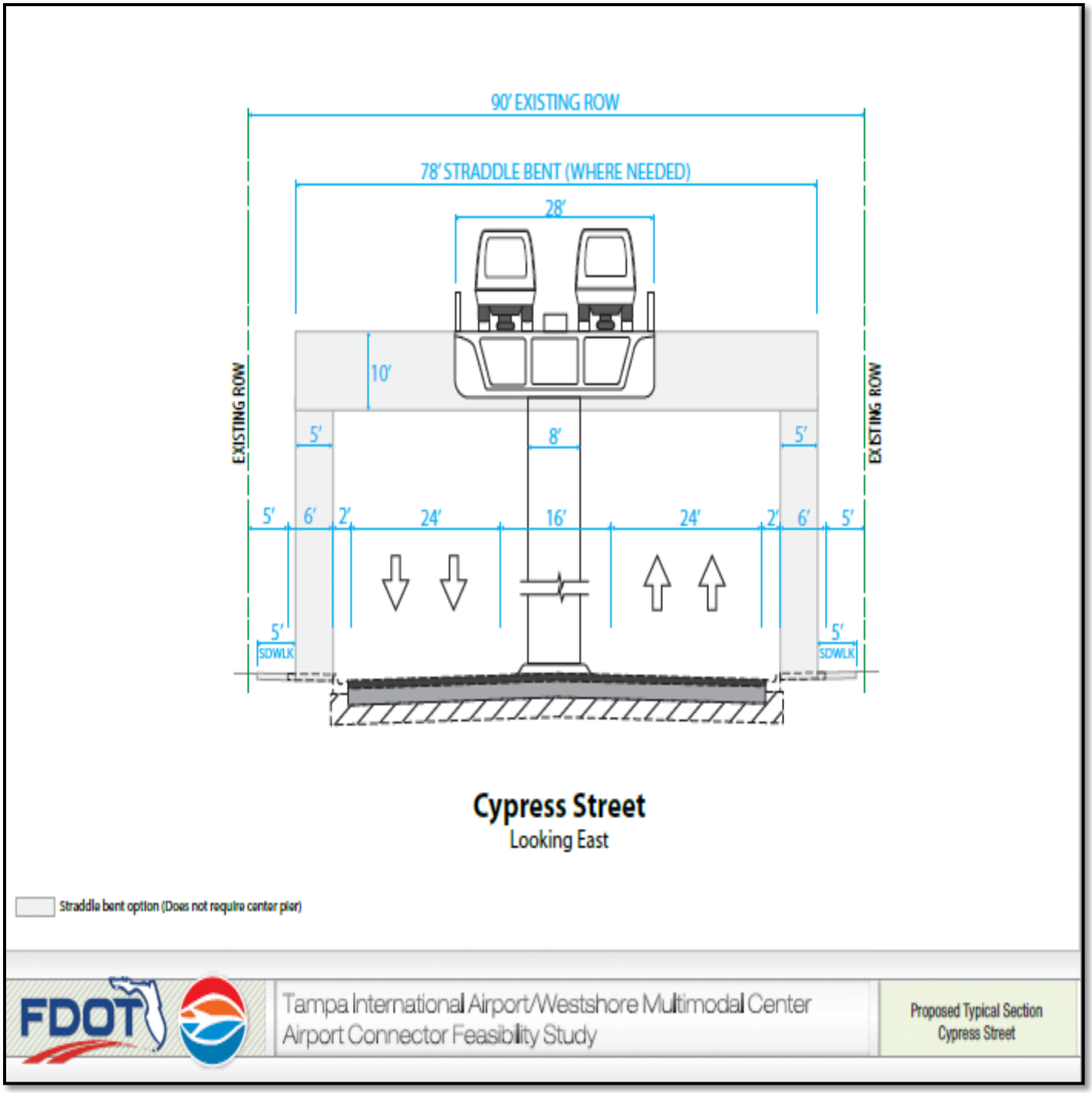
Appendix A-3: O'Brien Street Typical Section



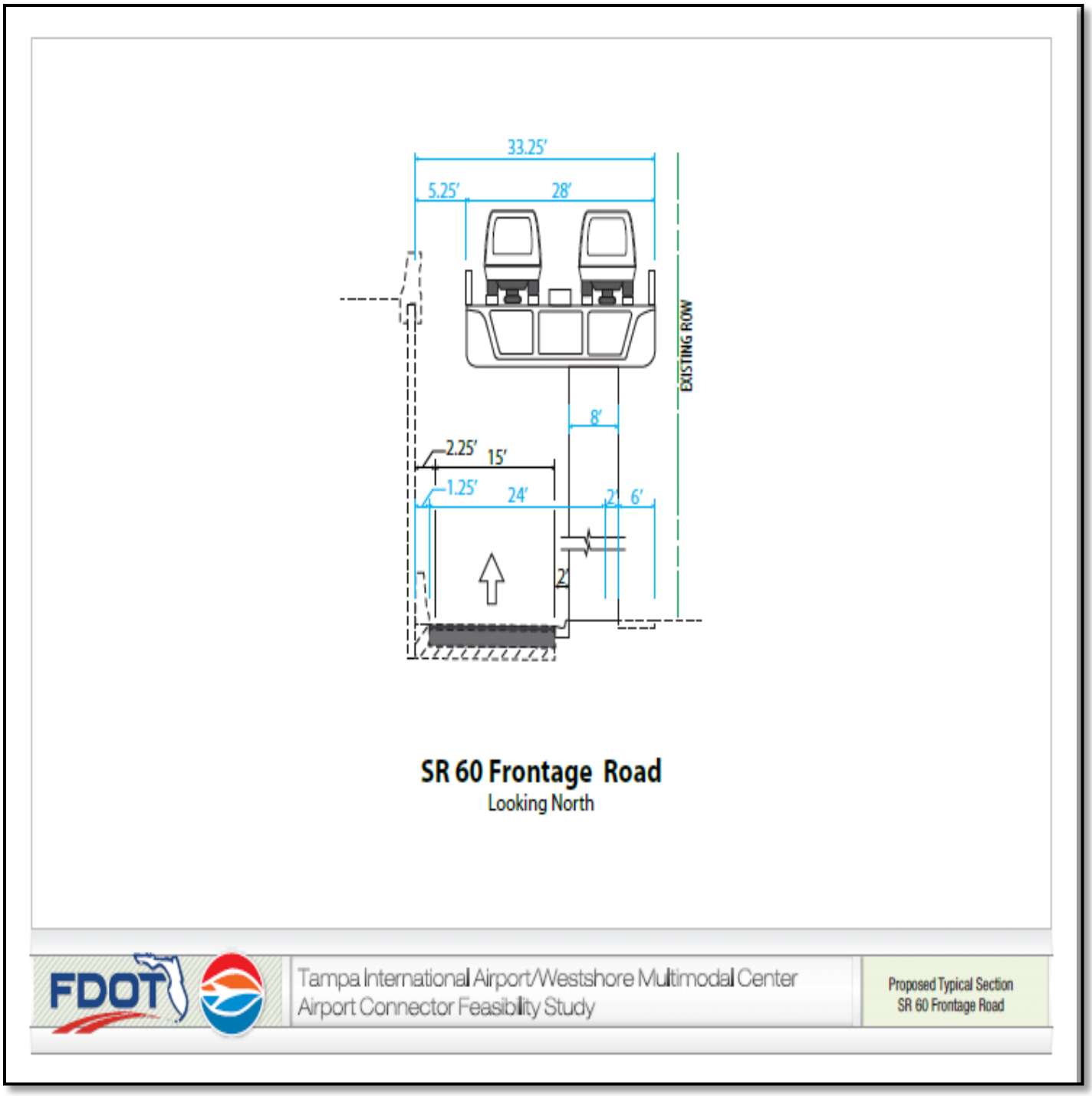
Appendix A-4: Main Street Typical Section



Appendix A-5: Cypress Street Typical Section



Appendix A-6: SR 60 Frontage Road Typical Section



Appendix B: List of Relevant Studies

Appendix B.1: List of Relevant Studies

The following pertinent documents were reviewed as a part of completing Phase l of the Tampa International Airport/Westshore Multimodal Study:

- *A Demonstration Urban Design Plan for the Westshore Business District* (Design Studio VI University of South Florida)
- *East-West MetroRapid PD&E Study* (HART)
- *Hillsborough County Transit Oriented Development Market Assessment and Development Potential Report* (HCMPO)
- *Howard Frankland Bridge PD&E Study* (FDOT, PSTA, Pinellas County Metropolitan Planning Organization (PCMPO and TBARTA)
- I-275/SR 60 Interchange Design (FDOT)
- *Model Regulations and Plan Amendments for Multimodal Transportation Districts* (FDOT and National Center for Transit Research at the Center for Urban Transportation Research, College of Engineering, University of South Florida)
- *Pinellas Alternatives Analysis* (PSTA, PCMPO, and TBARTA)
- *Tampa Bay Intermodal Center Feasibility Report* (FDOT)
- *Tampa Citywide Bicycle and Pedestrian Study* (HCMPO)
- *Tampa International Airport 2012 Master Plan Update* (HCAA)
- *Tampa International Airport Conceptual Planning for Transit Station and Access* (HCAA)
- *Walk-Bike Plan Phase l Final Report* (HCMPO and City of Tampa)
- *Westshore Area to Crystal River/Inverness Transit Corridor Evaluation Study* (FDOT and TBARTA)
- *Westshore Circulator Study Executive Summary* (HCMPO)
- *Westshore District June , 2013 Public Realm Master Plan* (Westshore Alliance)
- *Westshore Mobility Strategy Existing Conditions Report* (HCMPO)
- *Westshore Multimodal Study and Strategic Transportation Plan* (FDOT, (FDOT, HCMPO and TBARTA)
- *Westshore to Citrus/Inverness Transit Corridor Evaluation* (FDOT and TBARTA)