

# All Aboard Florida Ridership and Revenue Study

## *SUMMARY REPORT*

*Prepared for:*



*Prepared by:*



*Proprietary and Confidential*  
September 2013

*This Summary Report was prepared by The Louis Berger Group, Inc. (LBG) for the benefit of Florida East Coast Industries, LLC (Client) pursuant to a ridership and revenue study commissioned under a Professional Services Agreement dated January 1, 2012. The study is also documented in a more detailed report of methods and findings prepared for the Client.*

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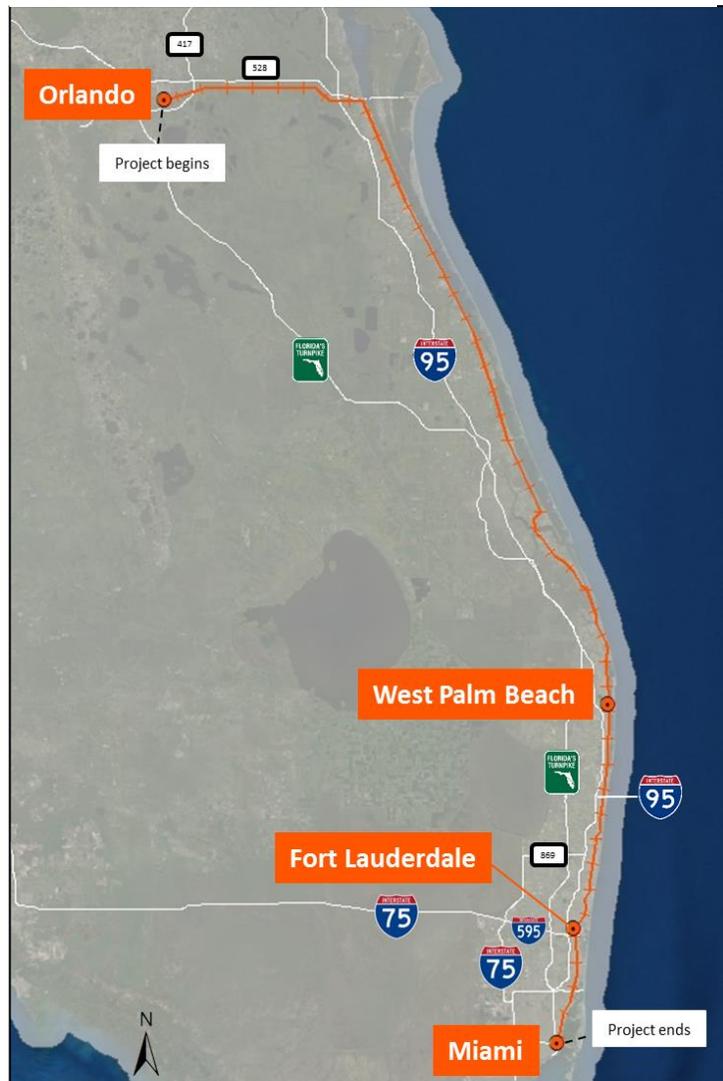
## 1. Introduction

Florida East Coast Industries, Inc. (FECI), the parent company to All Aboard Florida – Operations LLC (AAF), commissioned The Louis Berger Group, Inc. (LBG) to develop an investment grade ridership and revenue forecast for the re-introduction of passenger rail service on the existing rail right of way along Florida’s east coast (FEC Corridor). This report provides a summary of the methods and findings of that forecast study. The passenger rail service proposed by AAF, will be a privately owned and operated, intercity service that is intended to initially connect key cities in Southeast Florida (Miami, Fort Lauderdale, and West Palm Beach) with Orlando in Central Florida.

Each year, travelers make hundreds of millions of trips between the communities of Southeast and Central Florida, making the region one of the most actively traveled areas in the United States. The proposed AAF service will operate on a corridor running directly through some of the most densely populated communities in the State of Florida with stations located proximate to major sites and connected to local transit hubs (bus, commuter rail, etc.).

The restoration of passenger rail to serve the Miami-Orlando corridor has been carefully studied in the past by a number of public agencies and has long been recognized as a viable and needed service given the scale and demographics of the region, level of travel activity and the existing and growing congestion on Florida’s highways. Southeast Florida is the fourth most populous urbanized region in the U.S. The City of Orlando is the most visited city in the nation while Miami is home to the world’s largest cruise port and the travel gateway to Latin America. However, no intercity rail alternative comparable to the proposed AAF service exists currently. These factors, together with several of the key findings by LBG in conducting this study, support the potential for substantial ridership for the proposed AAF service.

**Figure 1: Proposed Route and Stations**



## 2. Summary of Key Findings

With frequent service between city centers within the corridor, AAF offers the prospect of substantial time savings to current users of auto, bus, traditional rail and even air. To determine how these time savings would alter travel behavior and generate ridership and revenue for AAF, LBG undertook a detailed examination of current travel activity and behavior, and conducted surveys that determined traveler preferences and willingness to pay. Best practices in discrete choice analysis and travel network modeling were employed and findings were tested and referenced to previous studies. The investment grade forecasts prepared for this feasibility study were intended to be conservative in nature. The analysis revealed that introduction of AAF service would complement existing modes of travel and draw a substantial number of business and non-business travelers.

### Key Findings

The thorough study effort resulted in the following key findings:

- *Substantial “Addressable Market”* – Hundreds of millions of trips are taken annually between Southeast and Central Florida. LBG’s study included a determination of the portion of these total trips that both originate *and* terminate within a defined distance of a proposed AAF station (a station “catchment area”). The AAF addressable market is assumed to include only those trips beginning *and* ending within station catchment areas. Based upon detailed analysis, LBG concluded that the addressable market for AAF intercity service amounts to over 50 million trips made by individuals annually.
- *Challenging Intercity Trip* – At a distance of approximately 230 miles, the journey from Orlando to Miami is relatively short for air travel (with total air travel time disproportionately long for the distance given airport security and delays); and relatively long for an auto trip, where traffic congestion can make the four to five hour trip unpleasant and unreliable. Travel time by car between Orlando and Miami on the I-95 route is generally 4 hour and 15 minutes, along the Florida Turnpike route it is general 3 hours and 50 minutes. Further, travel times during congested peak periods can be substantially greater. Travel volumes on key highways connecting Central and Southeast Florida are expected to exceed capacity by 2030, resulting in further delays and reduction in reliability.
- *Demonstrated Market Travel Growth* – Intercity travel on the Florida Turnpike between Orlando and Miami has grown by an average of 3.5 percent per year since 2000 and air travel between these cities has seen annual growth of 3.2 percent during the same period. LBG long-term growth rates for the AAF system are conservative and are below these historical travel levels.
- *Demonstrated Market Demographic Growth* – In the past 30 years, population in the market area has grown by an annual average of 2.5 percent and employment has grown by an annual average of 3 percent. Within one mile of proposed AAF stations, annual population growth has ranged from 2 percent to 5 percent since 1990 indicating strong growth in the urban core at the heart of the AAF alignment.
- *No Comparable Service* – AAF can provide travel time savings of 25% to 50% when compared to existing surface modes (auto, bus and rail). With a journey time of around three hours from Orlando to Miami, AAF’s proposed service is competitive with air on door-to-door travel times. There is no comparable service to AAF for intercity travel in the existing market.

- *Long-Standing Interest* – Given the profile of the travel market and the central location of the rail line, there has been long-standing interest among stakeholders and the public in developing passenger service on the Florida East Coast corridor for decades.

### *Estimated Ridership*

In connection with the investment grade evaluation, LBG prepared estimates for annual ridership in a Base Case forecast. LBG also developed a Business Plan Case that accounts for certain elements important to future ridership potential, which are not included in the Base Case. Following LBG's forecast, AAF management further refined its strategies and goals for ridership and revenue which are reflected in a Management Case scenario. These forecast scenarios can be summarized as follows:

- 1) *Base Case* – The Base Case scenario provides a conservative outlook for implementation of AAF service. The scenario does not include potential future changes to the proposed AAF service, such as additional future station locations; and does not include consideration of future changes to the relevant transportation network that are subject to some level of uncertainty, such as impact of the growth in congestion on major highways and arterials in the market area, or the impact of potential direct connections with local transit improvements planned by local and regional agencies.
- 2) *Business Plan Case* – An alternative scenario was prepared to account for elements of the AAF business plan under development at the time the forecast was prepared and known to LBG; and to reflect the impact of a number of specific items not included in the Base Case. The Business Plan Case includes: (i) future connections to other transit services, such as SunRail in Central Florida and the WAVE Streetcar in Fort Lauderdale; (ii) marketing initiatives targeted to resort customers and travel arrangers to enhance ridership.
- 3) *Management Case* – The Business Plan Case does not include the impact of certain strategies that are commonly employed by management of similar consumer-oriented rail operating companies and that could potentially further increase ridership and/or revenue such as (i) revenue yield management strategies; (ii) frequent rider loyalty programs; (iii) block ticket agreements with resorts and educational institutions; and (iv) plans for further local transit connections not known at the time of preparation of the Business Plan Case forecast. Following the preparation of the Base and Business Plan Case forecasts by LBG, AAF management developed an estimate of the ridership and revenue impact of these strategies through market soundings, discussions with regional businesses and institutions, and discussions with rail operators. Management Case estimates are presented herein to illustrate AAF management's expectation for the operation of passenger service.

Ridership and revenue forecast for each of the cases noted above are summarized in Table 1 below for 2019, the first year after stabilized ridership is expected to be achieved. Following this summary table, additional information is provided for the Base Case and Business Plan Case scenarios.

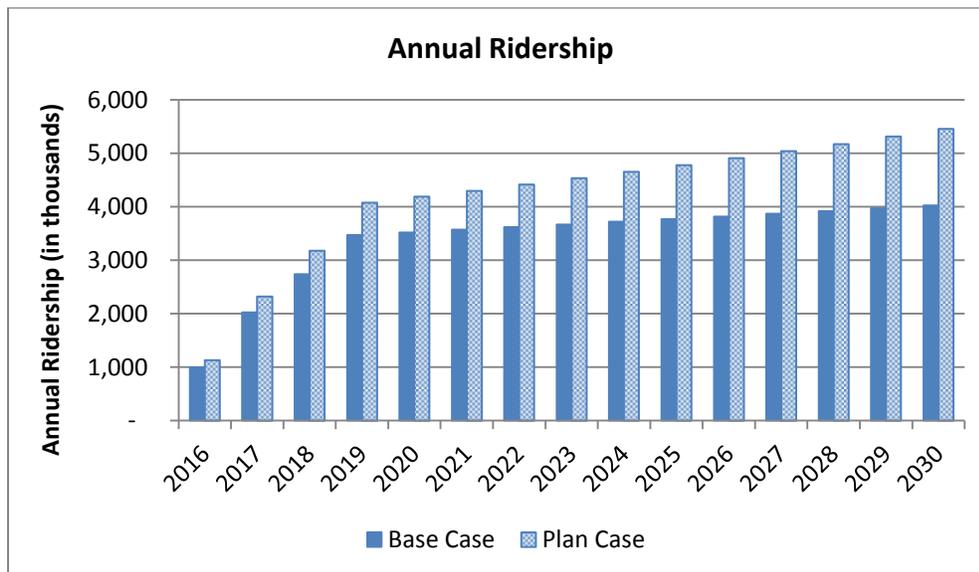
**Table 1: AAF Ridership Forecast Scenarios, 2019**

Base Case			
	<u>Short Distance</u> <sup>(1)</sup>	<u>Long Distance</u> <sup>(2)</sup>	<u>Total</u>
Ridership:	1,944,500	1,526,300	<b>3,470,800</b>
Business Plan Case			
	<u>Short Distance</u> <sup>(1)</sup>	<u>Long Distance</u> <sup>(2)</sup>	<u>Total</u>
Ridership:	2,010,900	2,002,100	<b>4,013,000</b>
Management Case			
	<u>Short Distance</u> <sup>(1)</sup>	<u>Long Distance</u> <sup>(2)</sup>	<u>Total</u>
Ridership:	2,671,556	2,434,300	<b>5,105,856</b>

<sup>(1)</sup> Short distance trips = Miami - Ft. Lauderdale, Miami-West Palm Beach, Ft. Lauderdale - West Palm Beach

<sup>(2)</sup> Long distance trips = South east Florida – Orlando

Under the Business Plan Case, the number of riders on AAF is expected to total over 4.01 million in 2019. This volume of riders, about 11,000 per day, includes riders who now travel by other modes, but would find AAF more desirable than auto, rail, and bus services now connecting the cities. As travel demand in the corridor grows, LBG projects that ridership will grow to over 5.45 million riders in 2030. Overall growth in the number of riders on AAF is expected to average 2.7% per year, keeping pace with the growth of the overall travel market and population and employment within Southeast Florida and Central Florida.

**Table 2: Base Case and Plan Case Annual Ridership Scenarios**


As shown in the forecast chart presented above, we expect ridership for the initial years of AAF to start at relatively low levels and grow to a stabilized volume after three years. This reflects a conservative

assumption for “ramp-up,” a period of time during which ridership is building up to long-term forecast levels as travelers become acquainted with the new rail service and adjust their trip-making habits. To ensure a conservative approach to estimation of initial year ridership and revenue, we have assumed a three year ramp-up period: the first year at 30 percent of forecasted volumes, second year at 60 percent, and third year at 80 percent of the forecast. This assumption is comparable and conservative when compared to previous rail service forecasts.

Introduction of a new mode of travel, particularly premium rail service which is more convenient and improves travel time, can often encourage travelers to make trips they may not have made in the absence of the new service. This is called induced ridership. Previous studies have found that the introduction of intercity rail service can result in levels of induced travel ranging from 5 percent to 30 percent. The highest levels of induced travel have been observed on high speed rail services serving multiple markets over distances of 200 to 500 miles. Our evaluation of induced ridership in the Base Case for AAF includes the potential for a 9 percent increase in trips and a total of 350,000 induced passengers have been included in our estimate for 2019.

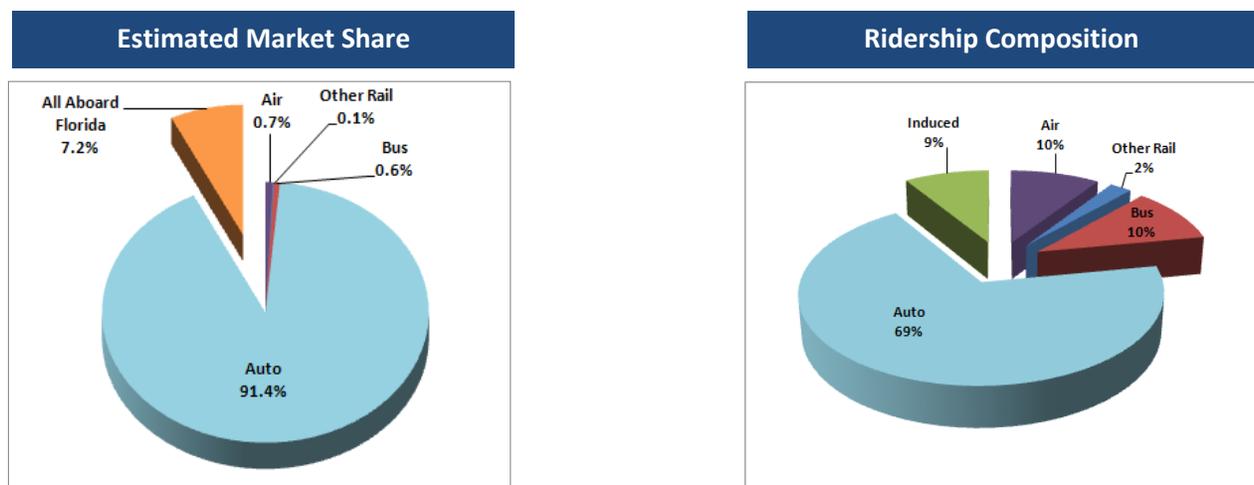
In the Business Plan Case, AAF business development plans also include marketing arrangements with resorts, cruise operators, and travel arrangers. These arrangements could also be expected to enhance ridership above the levels shown in the Base Case forecast.

#### *Estimated Market Share*

The central station locations offered by AAF will allow the railroad to provide an alternative source of transportation for travelers with origins or destinations near the urban cores of the three major cities in Southeast Florida and near major activity centers in Central Florida. The forecast shows that the addition of the AAF service will complement the existing modes of travel between these core locations.

The forecasts of our Base Case and Business Plan Case indicates that after the initial ramp up period, AAF will serve approximately 7 and 8 percent, respectively, of the overall market for travel between Southeast Florida and Central Florida (long-distance market).

**Figure 4: Estimated Market Share and Ridership Composition**



### Estimate of Auto Vehicle Trips Diverted to AAF

As noted in the foregoing discussion on the Estimated Market Share, AAF service is expected to draw a substantial portion of its ridership from trips that would otherwise be made by auto vehicles. This percentage is expected to range from 65 percent to 93 percent depending on the origin and destination of the trips, distance traveled, and the alternative modes of travel available. To provide input to the evaluation of the environmental effects of AAF service, an estimate of auto vehicle trips diverted to AAF (and therefore removed from the roadways) was developed for each forecast year. Table 3 shows the results of this estimate. In the initial year of service under the Base Case forecast, over 335,000 cars will be removed from roadways. In 2030, the number of vehicles diverted to AAF will exceed 1.345 million. The additional ridership estimated for the Business Plan Case and Management Case forecast scenarios is not expected to result in additional auto diversions. This is because the additional sources of ridership in these cases is best characterized as new or induced trips, or trips diverted from existing public modes of travel. Table 4 shows the assumption utilized in the auto diversion calculation including the proportion of auto diversions estimated by station pair and the average auto vehicle occupancy for short and long distance service used to estimate auto vehicle trips from total person-trips.

**Table 3: Estimate of Auto Vehicle Trips Diverted to AAF**

	Short Distance Service (within Southeast Florida)	Long Distance Service (between Southeast Florida and Central Florida)	Total AAF Service
<b><u>Base Case</u></b>			
2016	209,896	125,733	335,628
2019	723,005	442,937	1,165,942
2030	815,471	530,228	1,345,699
<b><u>Business Plan Case</u></b>			
2016	213,268	125,733	339,001
2019	747,689	442,937	1,190,626
2030	943,538	604,069	1,547,607
<b><u>Management Case</u></b>			
2016	213,268	125,733	339,001
2019	747,689	442,937	1,190,626
2030	943,538	604,069	1,547,607

**Table 4: Assumptions for Diversions from Autos Vehicle Trips**

Station Pairs	Riders Diverted from Auto as a Proportion of Total Ridership	Estimated Vehicle Occupancy
<i>Short Distance (within SEF)</i>		
Miami / Fort Lauderdale	0.84	2.2
Miami / West Palm Beach	0.93	2.2
Fort Lauderdale / West Palm Beach	0.69	2.2
<i>Long Distance (SEF-CF)</i>		
Miami / Orlando	0.65	2.38
Fort Lauderdale / Orlando	0.65	2.38
West Palm Beach / Orlando	0.76	2.38

### 3. Overview of the Investment Grade Study Process

An investment grade ridership study is one of the most rigorous and thorough forecasting processes. Investment grade studies are common in the finance and project development industries. Below is a summary of the key characteristics of LBG's investment grade process:

- New Primary Source Research – Over 1,800 stated-preference surveys and 10,800 origin and destination surveys were conducted to confirm travel behavior, preferences, and willingness to pay.
- Independent approach – The forecasting model was constructed from the bottom up using data gathered from regional planning agencies, stakeholder organizations, and recognized commercial sources.
- Accepted methods – Best practices in discrete choice analysis and network travel demand modeling were employed.
- Critical evaluation of economic growth assumptions – Outlook for growth in travel market was carefully evaluated and conservative assumptions were adopted.
- Thorough documentation – Detailed data collection, evaluation, and forecasting procedures were followed.
- Benchmarking and validation – Forecast assumptions and findings were validated against previous reports. Alternative mode choice models were developed and evaluated against known travel patterns.
- Peer review – Study process and findings were reviewed by Steer Davies Gleave, a highly respected global transportation forecasting firm. SDG performed an ongoing review of LBGs work and provided comments and suggestions along the way. LBG incorporated changes based on SDG's comments and suggestions resulting in updated versions of the results and models.

### 4. Study Purpose and Objective

Planning for implementation of AAF service in Southeast and Central Florida is well advanced. Preliminary engineering and operations planning have been conducted, station program development and design are underway and environmental review is partially complete with the remaining elements in progress. At this phase in the project development process, a thorough understanding of demand potential can contribute to the finalization of business planning activities that are underway. The objective of this study is to provide FECL with an independent overview of ridership and revenue that will inform and advance the project planning efforts and decisions of potential investors and funding partners.

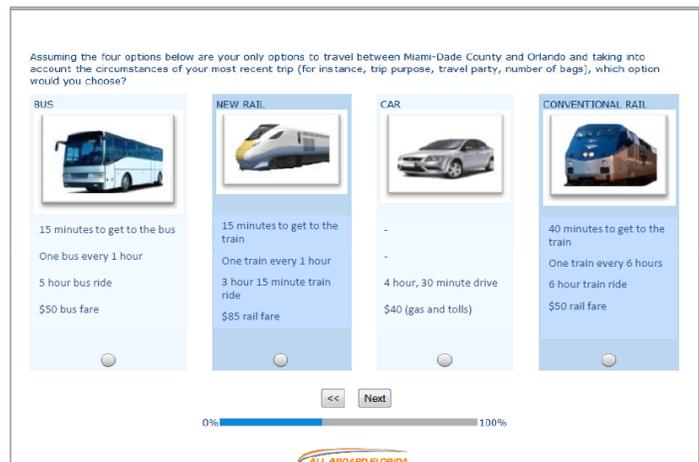
The study follows the objectives of an investment grade evaluation appropriate for project planning and development. It includes new primary source research for the understanding of travel patterns and travel behavior; a critical evaluation of input assumptions; and demonstration of the sensitivity of the forecast to those assumptions. A summary description of the study design and how it meets the objectives of an investment grade evaluation is presented in this report.

## 5. Study Process

To determine the extent and magnitude of the demand for a new mode of travel between Central Florida and Southeast Florida, LBG undertook a thorough assessment of the existing and potential future intercity travel market, the attributes of the current modes of travel in the corridor, and prospects for future growth. The study included the following key activities.

- Research to Establish Market Size and Catchment Area** – Residents and visitors to cities in the corridor make millions of trips per year, but only a select portion of these trips involve travel between the central business districts and surrounding activity centers that would be served by AAF stations. To identify the addressable market, LBG gathered extensive data on current levels of travel by auto, rail, air, and bus; and several sources of information on traveler origin and destination patterns. The research established a market of over 50 million intercity trips per year in areas reasonably served by the stations. These findings on the size and characteristics of the market are consistent with previous studies undertaken for rail projects in Florida, and provide a conservative base for the demand forecast.
- Identification of Travel Network and Competing Modes of Travel** – The demand forecasting process also requires a thorough understanding of the travel network and the schedule, journey time, and cost attributes of all modes of travel using the network. This report outlines the assumptions and data sources LBG used to establish the highway, rail, and air travel network. The report also documents the attributes of each mode of travel used as inputs to the demand forecast.
- Assessment of the Prospect for Growth in Travel** – An investment grade forecast requires thorough examination of the prospect for growth in the overall travel market. By gathering data from regional transportation planning agencies and other accepted public and commercial sources, LBG established conservative and reasonable growth rates for the overall market based on observed trends in each segment.

- Primary Research on Traveler Preferences and Willingness to Pay** – When travelers choose to make a journey by auto or by rail they weigh the time and money cost of travel and make a choice based in part on their travel budget and willingness to pay. Travel behavior is also influenced by trip purpose (e.g., business, leisure, commute, airport access) and other factors such as party size and need for a vehicle at the destination. The AAF system is an entirely new type of service for the region whose unique features can only be tested in hypothetical scenarios that pit AAF against other competing modes. The current state-of-the-practice uses mode choice Stated Preference surveys (SP) as the basis for understanding how individuals (or groups of individuals)



**Figure 2: Stated Preference Survey** - The study featured a Stated Preference survey to determine information on travel patterns, preferences, and traveler willingness to pay for travel time savings.

value individual attributes, such as access time, in-vehicle travel time, headways, and cost - of a transportation choice.

- **Demand Forecasting** – The LBG study team employed best practices in discrete choice analysis and network travel demand forecasting to determine diversions from existing modes of travel to AAF and ridership volumes on the AAF system by city-pair segment. SP survey data was used to develop estimates of the AAF market share and is the basis of the AAF ridership forecast.
- **Sensitivity Testing** – The report provides the findings of sensitivity tests demonstrating the effect of changes in key forecast assumptions (e.g., AAF fare prices) on ridership and revenue. These sensitivity tests are used to establish the stability of the forecast model and inform project planning.

## 6. Key Assumptions

To develop a conservative approach for forecasting AAF ridership that is appropriate for evaluation by lenders and investors during the planning stage of project development, the study team made several key assumptions for the Base Case. As planning for the project advances, these assumptions are likely to be altered or enhanced resulting in further refinement of the ridership and revenue forecast. To reflect the full potential for enhancements to ridership, LBG has been commissioned to provide FECL with a separate Business Plan Case forecast reflecting aspects of the AAF team's business planning. The conservative assumptions used in the Base Case presented in this report, include the following:

- The forecast study area is limited to the extent of the metropolitan areas in Central and Southeast Florida. Transfer connections to existing transit and bus services are assumed but future connections such as Sun Rail in Central Florida may enhance AAF ridership.
- The forecast team has utilized a base year and future year auto travel trip table prepared on behalf of a third party for general application in the study of interregional projects in the I-95 corridor including Florida. The study team has evaluated the trip table to ensure that it is consistent with the origin and destination patterns and assumptions for trip growth used by the MPOs in the corridor. Trips tables for other modes of travel were based on information obtained from MPOs and other relevant planning agencies and operators.
- Station market catchment areas and trip filters were developed to establish reasonable boundaries for the addressable market and to eliminate illogical station access patterns. This is the basis for establishing the size of the candidate market at over 50 million trips per year.
- Growth in the future auto travel market was assumed to keep pace with the regional outlook on population and household growth. LBG took the conservative assumption that any growth in income would not be considered in trip making. LBG utilized the official forecasts of Amtrak, Tri-Rail and the Federal Aviation Administration for rail and air modes of travel. These are conservative assumptions for growth outlook that are based on current fundamentals of the travel market. Future growth in income that outpaces the demographic rate of change, would most likely result in increased intercity travel overall and increased ridership for AAF in particular.
- The estimation of the future travel market does not include any changes in the location of households or employment related to transit-oriented development in the areas surrounding the stations.

- Congested auto travel times were accounted for in estimating station access and long-distance auto travel times. The AAF forecast is not predicated on future growth in congestion, however. This is a conservative approach as it is very likely that congestion within and between the regions will increase, making non-highway modes of travel more competitive.
- Induced demand potential was based on a method of evaluating the improvement in the generalized cost of travel that has been accepted in other studies for high speed transportation in the U.S. As a novel form of transportation in Florida, AAF is likely to experience ridership demand for tourism and leisure travel based on its convenience and amenities. For the purpose of developing a conservative base case forecast, cooperative marketing arrangements and potential tourist and convention marketing arrangements that are part of AAF business planning were not incorporated in the Base Case Forecast but were addressed in the Business Plan Case.

## 7. Forecast Sensitivity Testing

LBG conducted a variety of sensitivity tests to identify sources of forecast risk and evaluate the Base Case Forecast. Key findings include the following.

- Overall, a decrease in AAF running time of 10 percent (i.e., a reduction of 20 minutes in the running time from Miami to Orlando) could be expected to result in an increase of just over 7 percent in ridership. In the SEF market a similar decrease of 10 percent in run time (7 minutes) would result in a 5 percent increase in ridership. Should the running time need to be increased from the levels assumed in this study, a similar magnitude of decrease in ridership could be expected.
- An increase in the frequency of service by 20 percent (over the one departure per hour base assumption) would be expected to result in a 5.4 percent increase in ridership in the Miami to West Palm Beach short distance market, and a 1.4 percent increase for the longer distance city pairs.
- An increase in the amount of time to access an AAF station by 20 percent for long distance travel (due, for example, to congestion on local roadways) would be expected to result in an 8 percent decrease in ridership. For travelers making trips on AAF within Southeast Florida the impact would be greater: a 13 percent decrease in ridership.
- For long distance travel, an increase in auto travel time of 20 percent (attributable to an increase in intercity and intracity roadway congestion in the region) would be expected to result in an 8 percent increase in AAF ridership. For the short distance market where journey times are lower, the increase in AAF ridership would be 4 percent. If the increase in travel time were only to apply to intercity auto travel (in a scenario with heavy congestion on freeways but with little change in access times to stations via local roadways, for example), the increase in AAF ridership would be 16 percent in the long distance market and 12 percent for short distance riders.
- An increase in fuel prices of 20 percent would be expected to result in a 1.4 percent increase in AAF ridership for both long and short distance markets. Should AAF fares also increase to pass on the cost of higher AAF fuel related operating costs, there would likely be no net increase in ridership.

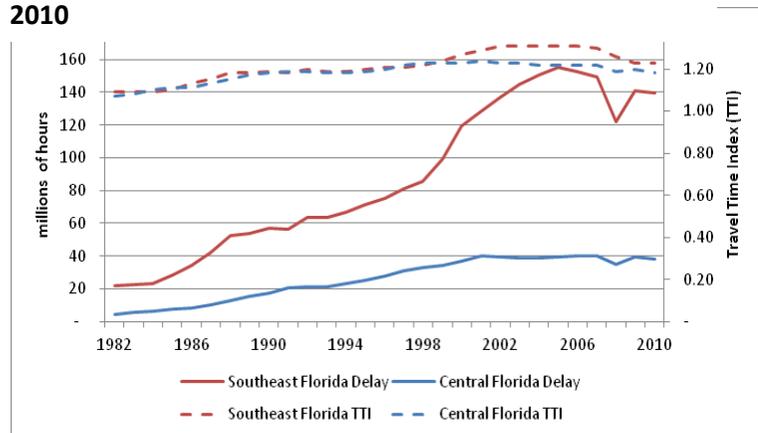
- An increase in air fares of 20 percent would be expected to result in a 1.7 percent increase in AAF ridership. Should air fares decrease by a similar magnitude, a decrease in AAF ridership of 2.6 percent would be expected.

## 8. Intercity Travel in Florida

With a population of 5.56 million in 2010, the South Florida metropolitan area is the most populous metropolitan area in the Southeastern United States and the eighth most populous metro area in the United States.<sup>1</sup> AAF will connect the downtowns of the region’s major cities: Miami, Fort Lauderdale, and West Palm Beach. Central Florida’s main city, Orlando and the surrounding region are home to over 2.5 million residents and 1.5 million jobs.<sup>2</sup> A leader nationally in resort and recreation activities, the region attracted 51 million visitors in 2010.<sup>3</sup>

According to Texas Transportation Institute’s *2010 Urban Mobility Report*, Central and South Florida highways are the most congested in the State, which results in millions of hours of travel delay and excessive fuel consumption and pollutant emissions. State and local agencies have been active in evaluating alternatives to the severe congestion on north-south roadway links. In June 2010, FDOT prepared the I-95 Transportation Alternatives Study, in consultation with the Department of

**Figure 3: Hours of Delay and Travel Time Index, 1982-2010**



*Highway travel times and hours of delay have been increasing in Southeast and Central Florida and alternatives to auto transport have been sought as a solution.*

Source: Texas Transportation Institute, Annual Urban Mobility Report, 2010

Law Enforcement, the Department of Environmental Protection, the Division of Emergency Management, the Office of Tourism, Trade and Economic Development and affected MPOs and regional planning councils located along the corridor. The study, which provides an assessment of concerns and proposed solutions related to I-95, found that “I-95 is overwhelmed with traffic demand” and that “[t]ravel within specific urban areas along the I-95 corridor is highly congested in peak travel periods due to single driver automobile use.” This study concluded, among other things, that “[p]assenger rail service presents a mobility option to serve Florida’s East Coast along the I-95 corridor” with multiple benefits including the reduction of “fossil fuel use and greenhouse gases (GHGs); job creation and economic development around station locations; and, better connectivity between northern and southern sections of Florida.”

The potential for intercity rail as a viable alternative has long been recognized by many, including FDOT, which developed the *Florida Intercity Passenger Rail “Vision Plan”* (FDOT, August 2006). Among other

<sup>1</sup> U.S. Census Bureau, 2010.

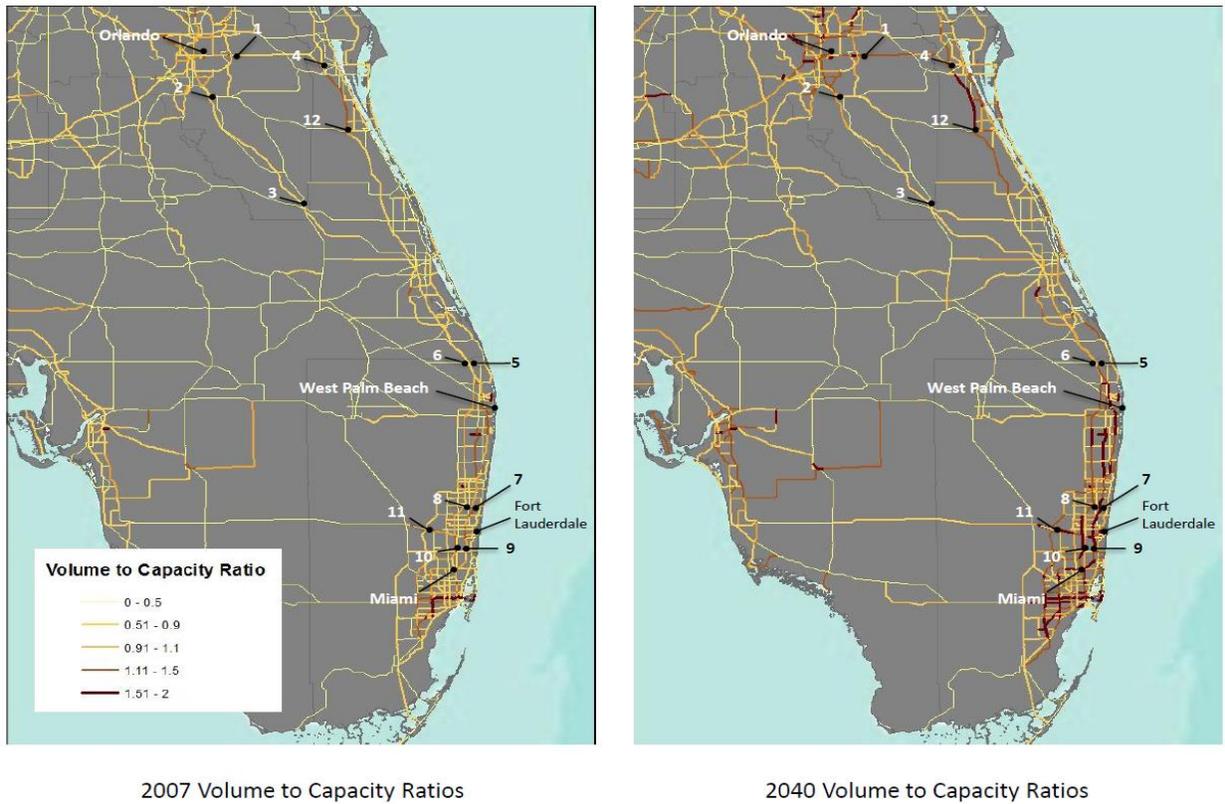
<sup>2</sup> Metroplan Orlando, 2030 Long Range Transportation Plan.

<sup>3</sup> Visit Florida, 2010 Florida Visitors Study.

things, the plan found that the state’s intercity travel market would grow from slightly more than 100 million trips in 2006 to nearly 200 million trips by 2020, and 320 million trips by 2040 (FDOT, August 2006). This increase will exacerbate existing transportation problems and require significant development of new infrastructure to meet the needs of this market.

Key highways linking Central and Southeast Florida are experiencing current issues with congestion as volume reaches the capacity of the roadway. State and regional transportation agencies expect this to worsen in the next 30 years. Figure 5 shows anticipated change in volume to capacity ratios for key regional highway links. As volumes approach or exceed a V/C ratio of 1.0 during the peak hour of travel, speeds and reliability are expected to diminish substantially.

**Figure 5: Anticipated Change in Volume to Capacity Ratios 2007-2040**



Map ID	Segment Name	State	2007 AADT*	2040 AADT*	2007 V/C Ratio	2040 V/C Ratio
1	State Route 528 east of State Route 417	FL	49,478	75,440	0.82	1.16
2	Florida Turnpike, State Route 91, south of US Route 441	FL	30,050	45,818	0.71	1.01
3	Florida Turnpike, State Route 91, north of State Route 60	FL	26,000	39,642	0.53	0.79
4	I-95 south of State Route 528	FL	48,500	73,949	0.87	1.25
5	I-95 north of State Route 706	FL	70,954	108,185	0.72	1.05
6	Florida Turnpike, State Route 91, north of State Route 706	FL	36,000	54,890	0.57	0.87
7	I-95 north of State Route 870	FL	274,277	418,198	1.31	2.00
8	Florida Turnpike, State Route 91, north of State Route 870	FL	94,200	143,629	0.94	1.42
9	I-95 north of State Route 820	FL	283,774	432,678	1.07	1.64
10	Florida Turnpike, State Route 91, north of State Route 820	FL	113,369	172,857	1.12	1.71
11	I-75 south of I-595	FL	111,352	169,781	0.80	1.15
12	US Route 192 west of I-95	FL	5,775	8,805	0.12	0.22

Source: Freight Analysis Framework, U.S. Federal Highway Administration, 2010; LBG, 2012.

Demand for intercity travel in the addressable market in Central and Southeast Florida to be served by AAF is expected to grow by 45 percent between 2010 and 2030. The following table shows the estimated level of annual person-trips by mode.

**Table 5: Anticipated Change in Volume to Capacity Ratios 2007-2040**

**Intercity Travel Market, Estimates of Person Trips by Mode**

	2010	2030
Auto	51,000,000	74,000,000
Air	250,000	360,000
Bus	660,000	950,000
Train	80,000	120,000
<b>Total</b>	<b>51,990,000</b>	<b>75,430,000</b>

Note: Person trips greater than 40 miles in length in the AAF addressable market. Air trips between Orlando and Southeast Florida do not include travelers connecting from or to other cities.

Other transit systems face challenges to meeting the region's transportation needs, as shown below:

- Auto Travel:** From 1982 to 2007 the daily vehicle miles traveled (VMT) had an annual average growth of 4.7 percent and 5.8 percent in Southeast Florida and Central Florida respectively. Due to the recession and credit crisis, the growth has leveled the VMT pattern but is predicted to resume growth as the population and employment growth resume. Even with the leveling of VMT, the increases have outpaced highway capacity. As the volume reaches capacity of the roadway, travel time increases due to congestion. State and regional transportation agencies expect this to worsen in the next 30 years. Currently, travel times range from 4 hours 45 minutes, I-95 Route, and 3 hours 50 minutes including

tolls, Florida Turnpike Route, with substantially greater times during congested peak periods. This leads to excessive fuel consumption and pollutant emissions.

- **Amtrak:** Amtrak includes travel points beyond Central and Southeast Florida. It has seen a steady growth rate through the recession, 1.8 percent average annual rate since 2000 and 8 percent compound average annual since 2006. Amtrak has 2 trains, Silver Meteor and Silver Star, that only run once daily between Orlando and Southeast Florida. The travel time is 3 hours 45 minutes for the Silver Meteor and 5 hours 45 minutes for the Silver Star and the headway, time between trains in transit, is 5 hours. Although Amtrak is an affordable rail system from Central Florida to Southeast Florida, it has a low frequency schedule and causes headway to be 5 times longer than the proposed rail service and has almost twice as long travel time.
- **Air Travel:** There are more than 30 flights a day between Orlando International Airport (MCO) and Miami International Airport/Fort Lauderdale-Hollywood International Airport. The travel time is low and the headway is about one third longer than the proposed rail. The cost of travel is almost twice the amount of the proposed rail. When eliminating the connecting passengers, the annual number of air passengers is limited. Volumes have declined 20 percent in 2008 to 2009 but have increased in 2010 and reaching new high in 2011.
- **Bus Travel:** There are 20 daily departures between Central and Southeast Florida. The travel time and headway are 4 hours 15minutes and 2 hours 7 minutes respectively. These times are greater than the proposed rail and can possibly be greater due to the constraints of highway travel.

## 9. Station Location Assessment

A key advantage to the use of the existing FEC Corridor in the development of new intercity passenger service in Southeast Florida is that the right-of-way passes through the most densely populated and highest growing areas in the region. The AAF development team determined station locations and the cities to be served by considering a variety of factors important to business planning for the institution of new passenger rail service: ridership demand potential, connectivity to local transit, and operational feasibility were key drivers in choosing the optimal locations. As such, the criteria considered during the evaluation included the following.

- Population and employment density
- Connection to surface transportation and transit
- Proximity to airport and seaport destinations
- Proximity to key Florida tourist destinations
- AAF travel time and efficiency in route and service planning
- Station development feasibility and cost

The table below demonstrates that the station areas in Miami, Fort Lauderdale, and West Palm Beach are well placed to provide access to potential passengers. Over 1 million people live within a 5-mile radius of the stations, nearly one-half million in Miami alone. The number of households in that area

stood at approximately 401,000 in 2010. Including vacant and seasonally occupied units, there were over 450,000 housing units within 5-miles of the proposed stations.

**Table 6: Population and Households within 5-mile Radius of AAF Stations (2010)**

	<b>West Palm Beach</b>	<b>Fort Lauderdale</b>	<b>Miami</b>	<b>Orlando Airport</b>
Total Population	170,944	232,800	469,842	58,439
Total Households	67,702	95,996	185,966	20,917
Total Housing Units	88,427	119,422	228,669	14,493

Source: ESRI Business Analyst, 2012

Although suburban portions of the three Southeast Florida counties have grown more quickly during the last decade than the urban core, the immediate areas around the proposed AAF station locations did see substantial growth and development from 2000 to 2010. Population in the 5-mile buffer area as a whole was level or slow growing (average of less than 1 percent per year), but within a one-mile distance of the Southeast stations average annual population growth ranged from 1.9 percent in Fort Lauderdale to 5.6 percent in Miami. Overall, an additional 20,500 persons moved into the Southeast station areas within 1-mile of the station locations from 2000 to 2010.

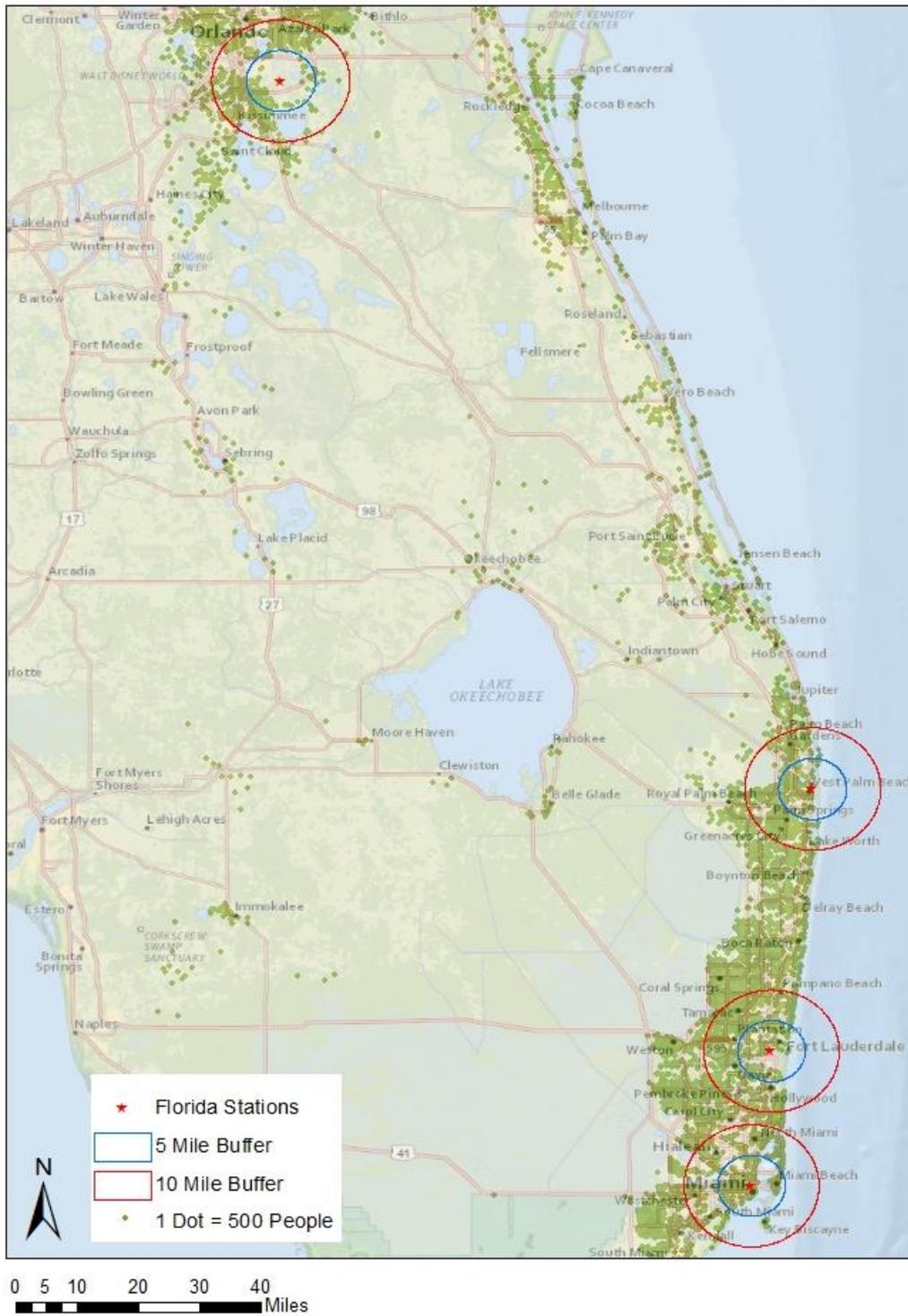
**Table 7: Average Annual Growth in Population, 2000-2010 by Radius around AAF Stations**

	<b>5-mile</b>	<b>3-mile</b>	<b>1-mile</b>
West Palm Beach	0.60%	0.50%	3.30%
Fort Lauderdale	-0.10%	-0.30%	1.90%
Miami	0.90%	1.50%	5.60%
Orlando Airport	5.10%	0.61%	N/A

Source: ESRI Business Analyst, 2012

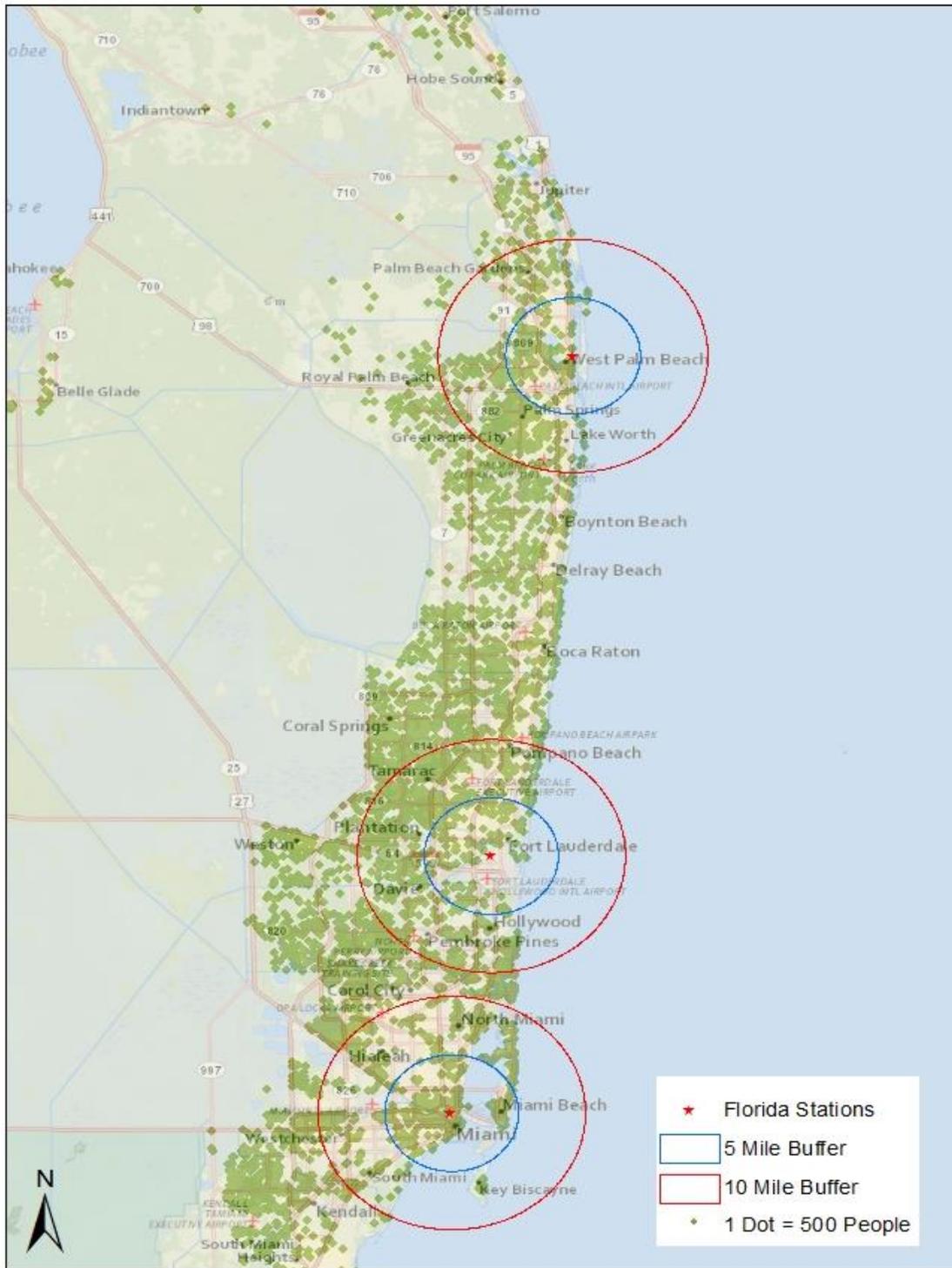
The maps on the following pages depict population density in the vicinity of the station locations and reveal the substantial density surrounding Orlando, West Palm Beach, Fort Lauderdale and Miami station locations.

**Figure 6: Population Density and Station Locations**



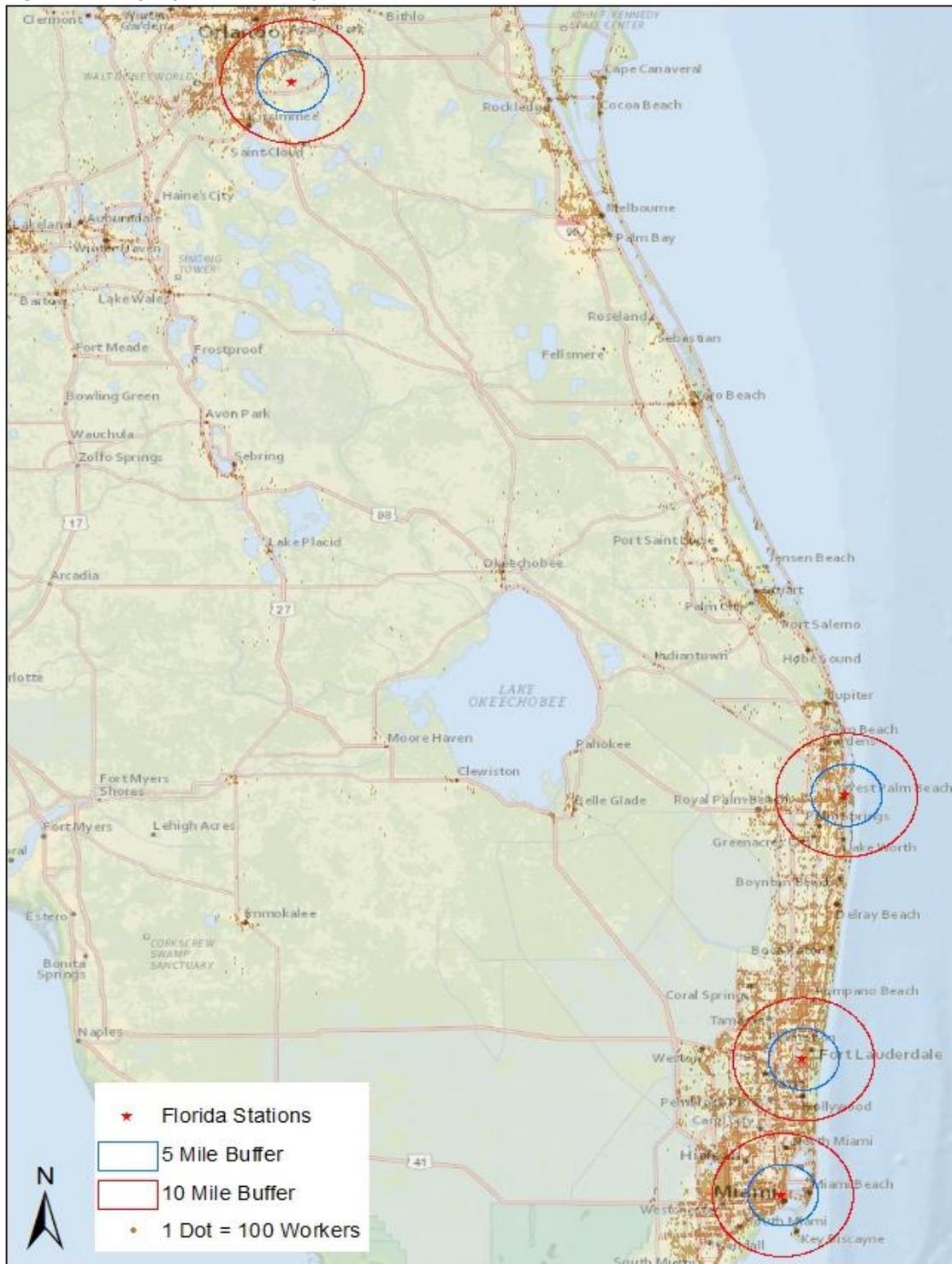
Source: LBG from 2010 U.S. Census

**Figure 7: Population Density and Station Locations (Southeast Florida)**



Source: LBG from 2010 U.S. Census

**Figure 8: Employment Density and Station Locations**



Source: U.S. Census County Business Patterns Zip Code Level 2010, LBG.

**Figure 9: Employment Density and Station Locations (Southeast Florida)**



Source: U.S. Census County Business Patterns Zip Code Level 2010, LBG.

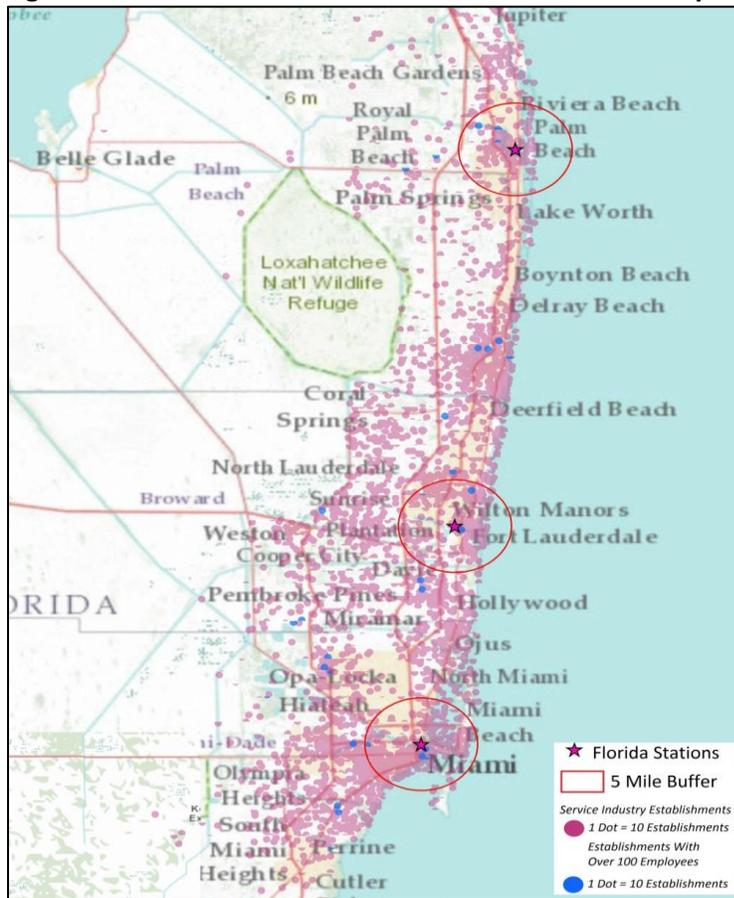
Along with the residential population, the economic composition of the area will be a significant driver of the demand for the rail service.

The industry composition of the areas surrounding each station location is varied. Fort Lauderdale’s composition is more diverse with a small retail industry leading the employment makeup. Both West Palm Beach and Miami have a high proportion of health care. Miami has a high proportion of professional services employment.

The industry composition for the areas can also provide an indication of the business travel market. Although there are no readily available statistics for this market, review of the Bureau of Economic Analysis’s 2002 Industry Make-Use tables provides insight into which industries use travel reservation (agent) services. This is a proxy for inter-regional trips made by either the industry’s employees during their course of work or potential clients.

A majority of the industries that use traveling services are service oriented industries that require traveling to site locations and clients. The following map provides a depiction of the number of establishments of these industries and their relation to the proposed stations. As reflected in the map, the West Palm Beach, Fort Lauderdale, and Miami station areas have high concentrations of travel-generating businesses.

**Figure 10: Concentrations of Establishments in Travel Dependent Industries**



Source: U.S. Census County Business Patterns Zip Code Level 2010, LBG.

## 10. Consideration of Alignment Alternatives

Operations and business planning for AAF is based on the return of passenger rail service to the FEC Corridor, which will allow AAF to serve some of the most densely populated and highest growing areas in the Southeast Florida region and connect to Orlando in a timely and cost efficient manner.

The proposed alignment provides an effective connection between the key city pairs and will allow AAF to provide travel time savings of 25 percent to 50 percent when compared to existing surface modes (i.e., auto, bus and rail). With a journey time of around three hours from Orlando to Miami, AAF's service will also be competitive with air travel based on door-to-door travel times.

The ridership evaluation included an analysis of the effect that alternative alignment with longer journey times would have on ridership. The analysis showed that an increase in AAF journey time of 10 percent would result in a 7 percent decrease in overall ridership and revenue. Any alternative alignment that will increase travel time, therefore, can be expected to result in a substantial reduction in AAF ridership. Amtrak's Silver Star, for example, which utilizes an alignment that runs through the central portion of the state through Winter Haven has a journey time of approximately 5 hours between Miami and Orlando (more than 60 percent longer than the journey that AAF plans to offer). More specifically, current Amtrak passenger volumes are 23,300 and current Amtrak travel times for the Silver Meteor is 3 hours 45 minutes and for the Silver Star is 5 hours 45 minutes. If AAF's service had a similar journey time between the four cities in Southeast and Central Florida, we estimate that AAF's ridership would decrease by 47 percent from the forecast presented in this summary report.

Given the importance of travel time to the ridership forecast findings, AAF has concluded that proposed alignments that would maintain the planned travel time would be the most favorable to development of the service.

## 11. Size of the Addressable Travel Market

LBG assembled a dataset of current intercity trips between the locations that would be served by the proposed service. This candidate market dataset serves as a primary input into the travel demand model as it represents the base from which potential AAF ridership would be drawn. The two primary market segments LBG identified were Business and Non-Business Travelers and the mix of travel modes operating between each individual intercity travel pair varied depending on the travel distance classification of long distance or short distance. Auto and air serve as the primary modes, with rail and bus making up the difference. The catchment area for the proposed All Aboard Florida service was determined based on the proposed station locations, which are Miami, Fort Lauderdale, West Palm Beach and Orlando. The study area consists of following counties or groups of counties:

- Miami-Dade County (Southeast Florida)
- Broward County (Southeast Florida)
- Palm Beach County (Southeast Florida)
- Greater Orlando – includes Lake, Orange, Osceola, Seminole and Brevard Counties (Central Florida)

### **Auto**

The study team conducted a thorough investigation to determine the level of intercity auto travel in both long and short distance travel markets, together with the distribution among the key origin and

destination pairs. LBG evaluated several independent sources of travel data including: ICAT auto trip data, regional travel demand models, and data collected from an O-D survey implemented for this AAF study.

The LBG forecast model for full implementation of AAF service from Miami to Orlando utilizes trip tables produced by the I-95 Corridor Coalition to profile the volume of long-distance auto travel. The coalition is an organization comprised of state departments of transportation and other stakeholders in the states on the eastern seaboard that are connected by Interstate 95. To aid in planning for intercity travel infrastructure in the corridor, the coalition commissioned the Integrated Corridor Analysis Tool (ICAT), a dataset containing trip tables and full highway networks for each of the states in the corridor, including Florida.

Unlike the travel data typically obtained from localized travel demand models, the ICAT dataset is one of the few transportation data sources that provide origin and destination patterns for the types of long-distance intercity trips of interest to this study. The ICAT trip tables have been calibrated to match 2005 base year traffic counts observed on I-95 and other major interstates and arterial roadways throughout the defined corridor.

The table below presents the ICAT long-distance auto trip volumes for the AAF market. The predicted change in the volume of auto vehicle trips implies a growth rate of approximately 9% between 2010 and 2015.

**Table 8: Long Distance Daily Auto Vehicle Trips, ICAT**

City Pair	Auto Trips	
	2010	2015
Central Florida to Miami	5,810	6,471
Central Florida to Fort Lauderdale	6,225	6,805
Central Florida to West Palm Beach	6,468	6,978
<b>TOTAL</b>	<b>18,503</b>	<b>20,254</b>

LBG estimated the volume of long-distance intercity person trips by applying vehicle occupancy rates (specific to each city-pair) obtained from the AAF Origin and Destination (O-D) survey that is discussed in subsequent sections of this report. The resulting volume of auto person trips is presented below.

**Table 9: Long Distance Daily Auto Person Trips**

City Pair	Auto Person Trips
Central Florida to Miami	14,414
Central Florida to Fort Lauderdale	14,505
Central Florida to West Palm Beach	14,311
<b>TOTAL</b>	<b>43,230</b>

To help evaluate the intercity trip data available through ICAT, LBG conducted an O-D survey covering the full AAF corridors. The direct comparison of O-D survey results to the ICAT data is not appropriate due to the broad geographic definitions used to describe intercity travel moments in the O-D survey instrument. Furthermore, the auto travel market area used in the mode choice model also required additional adjustments to address the potential overstatement of AAF ridership resulting from

backtracking (that is the mode choice model predictions of diversions by auto users making long AAF access trips in the opposite direction of their final destination).

The O-D survey does, however, provide a means of evaluating the distribution of long distance trips from the three distinct long distance city pairs. The following table provides a comparison of the city pair distributions from both data sources and shows a relatively even distribution across both datasets; the survey data does, however, show a slightly higher proportion of trips between Central Florida and Miami. This finding suggests that the ICAT trip table is relatively conservative from a revenue standpoint.

LBG further used data from the Florida Turnpike Enterprise and MPOs in Central and Southeast Florida to confirm the validity of the trip tables. Overall the traffic count and origin and destination data available from the MPOs and the Florida Turnpike Enterprise are consistent with the volume of auto trips assumed in the AAF trip table as well as the distribution of trips between Central Florida, West Palm Beach and points south.

**Air**

Air travel volumes for the long distance travel market were derived using data obtained from both the FAA 10% sample of tickets, as well as Orlando International Airport (IATA airport code MCO) air traffic reports published by Greater Orlando Aviation Authority (GOAA). Data from the 2010 FAA 10% Sample (below) shows the Orlando-Miami (IATA airport code MIA) and the Orlando-Fort Lauderdale (IATA airport code FLL) to be the primary air travel routes between Central and Southeast Florida; a negligible volume of travel is observed between Orlando and West Palm Beach airport (IATA airport code PBI). The 2011 GOAA data (below) provided a similar overall volume of long distance air travel, but also presented a more balanced picture of travel between the two key airport pairs. LBG adopted the more recent 2011 GOAA data for the air travel trip tables.

**Table 10: Annual Air Passenger Volumes, FAA 10% Ticket Sample 2010**

Airport Pair (Both Directions)	Air Passengers	
	Annual	Daily
Orlando (MCO) - Palm Beach (PBI)	40	<1
Orlando (MCO) - Fort Lauderdale (FLL)	163,500	448
Orlando (MCO) - Miami (MIA)	88,900	244
<b>TOTAL</b>	<b>252,440</b>	<b>692</b>

**Table 11: Daily Air Passenger Volumes, GOAA 2011**

Airport Pair (Both Directions)	2010	2015
Orlando (MCO) - Palm Beach (PBI)	0	0
Orlando (MCO) - Fort Lauderdale (FLL)	350	382
Orlando (MCO) - Miami (MIA)	302	330
<b>TOTAL</b>	<b>652</b>	<b>712</b>

***Rail and Bus***

The rail and bus travel markets analyzed in this study distinguished between the long and short distance markets. LBG examined Amtrak, commuter rail and bus data to obtain daily volumes for long and short distance trips for 2010 and projected for 2015. On the whole, rail and bus trips account for a substantially smaller share of inter-city trips in the AAF region, as compared to auto and air.

## 12. Peer Review

In keeping with best practices in the preparation of investment grade ridership and revenue studies, FECI engaged a peer review consultant (internationally recognized travel demand consultants Steer Davies Gleave) to conduct a thorough examination of the methods, assumptions and findings of the LBG Base Case Forecast presented in this summary report. The peer review process was enhanced by the early engagement of the review team, so that they could provide iterative review of assumptions and data sources from early stages of model development through finalization of the report.

## 13. Conclusion

With frequent service between city centers in the corridor, AAF offers the prospect of substantial time savings to current users of auto, bus, traditional rail, and even air. To determine how these time savings would alter travel behavior and generate ridership and revenue for AAF, LBG undertook a detailed examination of current travel behavior, and conducted surveys that determined traveler preferences and willingness to pay. Best practices in discrete choice analysis and travel network modeling were employed and findings were tested and referenced to previous studies. The investment grade forecasts prepared for this feasibility study were intended to be conservative in nature. The analysis revealed that introduction of AAF service would complement existing modes of travel and draw substantial number of business and non-business travelers.