Eurailspeed 98

Analysis of the Economic Impacts of Florida High-speed Rail

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FINDINGS

- **Over** 67 million trips were made in 1997 along the Tampa-Orlando-Miami corridor.
- The travel demand is driven by socio-economic factors (such as population, employment, per-capita income and tourism growth) and is expected to increase at an annual growth rate of approximately 3.3% by 2010.
- The travel market that must be accommodated by the State of Florida in 2010, regardless of whether or not the Florida high-speed rail system is constructed, is over 103 million trips along the corridor.
- The expected ridership for the Florida high-speed rail system is about 8.5 million passengers in 2010, capturing 8% of the total travel market.
- The diversion of passengers from air to high-speed rail will result in 60 thousand fewer aircraft flights in 2010.
- Florida high-speed rail will serve 1.8 billion passenger-kilometers of travel in 2010.
- An average of 5,380 person-years of employment will be created and supported over the life of the high-speed rail franchise.
- During the four peak construction years, the project will increase economic activity by $1.7 billion (1997 dollars) per year in Florida.
- A traveler shifting from auto to high-speed rail from Tampa to Miami could be expected to save 2.7 hours of travel time per trip.
- An air or auto traveler shifting to high-speed rail between Miami and Orlando in 2010 would be expected to reduce pollutants by 36 kilograms and reduce energy consumption by the equivalent of 18 liters of gasoline.
- Based on the expected shifts of demand, the Florida high-speed rail project would be expected to prevent 389 auto accidents, 380 auto accident injuries and 5 auto fatalities annually.

INTRODUCTION TO THE PROBLEM

Florida has experienced a phenomenal population and tourist growth over the past few decades that is virtually unrivaled elsewhere in the U.S. Forecasts for the future indicate that these trends will continue well into the foreseeable future. Figure 1 illustrates that Florida’s population has surged by 91% over the 1970 to 1990 time period. This population is projected to experience an additional staggering 38% growth over the 1990-2010 time period from 13 million to almost 18 million. Florida’s population growth rate is roughly twice the national population growth rate. Florida’s population has continued to surge as growing waves of domestic and international tourists have outstripped population increases by more than two to one. Total tourist visits exceeded 44 million in 1997. Tourist growth is projected to increase by 82% over the same 1990 to 2010 time period. Air tourists alone are expected to grow from 20.7 to 37.7 million per year over the 1990 to 2010 time period (see Figure 1).

Florida’s rapidly increasing population and tourism trends have combined to lift the state’s growing economy and further stress the state’s overburdened infrastructure. This economic growth has resulted in people traveling far more than prior generations. Not surprisingly, these huge increases in travel demand have resulted in a need to expand transportation capacity to meet growing needs, but highway capacity increases have simply not kept pace resulting in increasing travel congestion, costly delays, environmental degradation and economic losses.
Growth in Florida population and tourism outstrips highway development
Considerable progress has been made in expanding Florida's highways, ports, airports and public transportation systems yet, growing demand has continued to outpace the supply of new transportation capacity. In addition, it is becoming increasingly clear that the costs and consequences of unending expansion of roadways are more than can be borne by taxpayers and our environment. We are approaching the physical, environmental and financial limits of endlessly expanding Florida’s highway capacity in many urban areas of the state. This is resulting in intensifying urban and inter-urban bottlenecks and congestion.

Figure 2 shows that while population and tourism increase by 38% and 82% respectively that, given current trends, Florida highway lane miles are projected to only expand by 18% over the 1990 to 2010 time period. Meanwhile to meet this growing travel demand over this period the number of registered vehicles in Florida is forecast to increase by almost 70% from 15.7 million to over 26.5 million.

The combination of this increase of driving population on slowly expanding state highways is resulting in rising automobile congestion across the entire state. As Figure 3 shows the number of registered motor vehicles per highway lane mile increased from 169 to 424 over the 1970 to 1990 time period. This represents an average increase in congestion of over 250% over that time period. This level of congestion will increase an additional 145% to over 608 motor vehicles per highway lane mile by 2010 given current trends.

Meanwhile Figure 4 shows that average vehicle miles traveled per highway lane mile increased from 3,735 to 5,070 (or 36%) from 1970 to 1990. These trends indicate that this critical average measure of congestion and delay will annually increase an additional 52% to 7,715 vehicle miles traveled per highway mile by 2010.
These increased automobile travel delays result in significantly delaying the movement of goods, services and individuals, stagnating economic growth and efficiency and increasingly serve as a drag on the Florida economy.

**Implementing the Florida high-speed rail project: a partial solution to the problem**

Florida has aggressively sought alternatives to meet the travel needs of the public while still being responsible stewards of our environment and public resources. In this search the prospect of implementing a high-speed rail system for Florida has surfaced repeatedly. Over time, as travel demand has grown, the costs and consequences of roadway and airport expansion have increased dramatically.

Meanwhile, the prospect of a high-speed rail investment has grown more attractive as this technology has proven itself in an increasing number of travel markets across the globe. Florida's rapid population and tourism growth, flat topography and cluster of large urbanized areas and growing densities have created a travel market that in part can be best served with a transportation system that includes high-speed rail.

A consortium of three of the world’s largest and most respected international engineering, construction and rail equipment companies intends to implement a high-speed rail system linking Tampa, Orlando and Miami. The Florida Department of Transportation and FOX are currently in the process of conducting comprehensive studies of ridership, operating and maintenance costs, route alignment, construction costs and financing.

The Florida high-speed rail system is designed to operate on 507 kilometers of new electrified track connecting Florida’s largest urban areas. The system proposes connections with five major airports, the highway system, and growing regional rail and bus transit systems across the State’s largest metropolitan areas.
Investments in Transportation
Transportation fulfills many social needs and is considered an essential component of the infrastructure of today’s society. Investments in transportation represent significant economic benefits to the community through the movement of people and goods. These benefits accrue directly to those who use the investment as well as indirectly to those who may not use a particular transportation facility. Some benefits, such as the economic stimulus and employment increases from construction, are a direct result of the decision to invest in Florida high-speed rail. Other benefits, such as savings in energy, travel time, safety and emissions, are dependent on the ridership and the actual performance of high-speed rail in comparison to alternative forms of transport over the life of the project. These benefits are determined based on the best current estimates of ridership and the performance characteristics of air, auto and high-speed rail travel.

Investment in this project by the state, private sector, and federal government is premised on effectively meeting transportation needs, minimizing negative impacts, and providing a financially sound program. This analysis looked at estimating the potential demand of high-speed rail system in Florida and the benefits to both the users of high-speed rail and the rest of Florida's population who will take advantage from the transportation option, congestion relief or economic development that results from this proposed high-speed rail investment.

AN ANALYSIS OF THE POTENTIAL DEMAND OF THE FLORIDA HIGH-SPEED RAIL TRANSPORTATION SYSTEM

The ridership study process
The Florida legislature, through The High-speed Rail Act of 1992, directed the Florida Department of Transportation (FDOT) to develop a statewide high-speed rail system. FDOT, the state agency mandated to implement the legislative policy on high-speed rail, and Florida Overland eXpress (FOX), the state’s franchisee selected by competitive procurement, are working together in a public/private partnership to develop a high-speed rail system in Florida, thereby fulfilling the legislative mandate.

An investment-grade ridership study is one of the critical elements in this project’s planning process. Such a study uses state-of-the-art technology in transportation modeling to forecast the number of riders who will
use the new mode of transport. The modeling approach also recognizes the unique conditions in the United States and in the State of Florida.

SYSTRA, the consulting arm of the French Railways, SNCF, conducted a ridership study to determine the number of passengers that could be expected to use the Florida high-speed rail system. Statistically valid data about today’s conditions and the patterns of travel were required for input into the ridership models. One of the most extensive surveys of highway and airport travelers undertaken in the United States was performed to take into account the unique travel patterns and conditions.

Figure 6: THE RIDERSHIP STUDY PROCESS

The ridership study process began with four components: highway and airport user surveys, focus group sessions with distinct types of travelers, socio-economic data collection, and assumptions relating to highway, air and high-speed rail characteristics (travel time, cost and level of service).

These components were used to develop a database consisting of existing intercity travel volumes, modal market shares, traveler characteristics and socio-economic data and were used to develop ridership estimates for the high-speed rail service

The Travel Survey Program
An extensive travel survey data collection program was conducted to estimate the size of the existing travel market and to collect data on traveler preferences on alternative modes of transportation. Existing air and auto intercity travelers were interviewed at airports and at six highway survey sites. The travel survey instruments consisted of a short interview and a longer mail-back survey.

The survey sites were selected to randomly intercept intercity travelers in the travel markets being served by the proposed high-speed rail system. In total, some 76,000 contacts were made with travelers in the study area. Over 24,000 highway and 8,000 airport survey interviews were conducted and over 44,000 questionnaires were distributed. The survey sample size achieved for this study represents one of the largest travel survey programs for this type of study and ensures a high degree of confidence in the results obtained using this database.
The 1997 travel market
The auto and air surveys provide an estimate of the travel volumes including several key segments such as trip origin and destination, mode of travel, resident or non-resident status, trip purpose, and travels by personal car or rental car.

Figure 7 summarizes the annual person trips by mode of travel for selected market segments in the FOX study area. The air trips shown in the figure include local and air connect trips. A local air trip is one that originates and ends within the study area. An air connect trip is one that has its origin or destination outside the FOX study area but requires a connecting flight within the study area.

Figure 7: THE 1997 TRAVEL MARKET

<table>
<thead>
<tr>
<th>Market Segment</th>
<th>Auto</th>
<th>Air</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long distance trips (100 miles or more)</td>
<td>22.7 million</td>
<td>2.8 million</td>
<td>25.5 million</td>
</tr>
<tr>
<td>Short distance trips (Less than 100 miles)</td>
<td>42.0 million</td>
<td>0.2 million</td>
<td>42.2 million</td>
</tr>
<tr>
<td>Total</td>
<td>64.7 million</td>
<td>3.0 million</td>
<td>67.7 million</td>
</tr>
</tbody>
</table>

The results clearly show the existence of a large intercity travel market in the FOX corridor with a total of over 67 million one-way trips in 1997. The travel market is also segmented by distance and shows that the long distance markets amount to approximately half of the short distance trips. As expected, travel by auto dominates in all major markets. The more significant air travel volumes and market shares exist only in the long distance markets such as Tampa Bay to Southeast Florida and Central Florida to Southeast Florida.

To better understand the travel market, trips were also segmented by trip purpose and place of residence. As one might expect in a corridor with a high concentration of recreational destinations, a large portion of the travel market is comprised of non-business travelers. Travelers in the corridor use different modes for different trip purposes. The air mode is primarily chosen by business passengers and visitors having an air connection to or from their Florida destinations.
The 2010 travel market without high-speed rail

A modeling approach, based on an analysis of the present travel market and expectations about the future, was used to forecast traffic volumes in the corridor, if FOX was not built. The calibration of the model was performed by determining the relationship between current traffic and population, tourism, employment, and income, as well as the characteristics of each mode of transportation. Forecasts of future population, employment, tourism, income and transportation mode characteristics were then developed and used to forecast total travel patterns.

The results of this projection define the size of the total travel market that must be accommodated by the State of Florida in 2010, regardless of whether or not the FOX system is constructed to satisfy some part of that future travel market.

Figure 8: THE 2010 TRAVEL MARKET WITHOUT HSR/FOX

<table>
<thead>
<tr>
<th>Market Segment</th>
<th>Auto</th>
<th>Air</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long distance trips</td>
<td>35.3 m</td>
<td>4.3 m</td>
<td>39.6 m</td>
</tr>
<tr>
<td>(100 miles or more)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short distance trips</td>
<td>63.8 m</td>
<td>0.3 m</td>
<td>64.1 m</td>
</tr>
<tr>
<td>(Less than 100 miles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99.1 m</td>
<td>4.6 m</td>
<td>103.7 m</td>
</tr>
</tbody>
</table>

The statistically estimated models showed a strong correlation between total intercity travel and the socio-economic characteristics of the region. The results show a substantial growth in the travel volumes, growing from 67 million in 1997 to 104 million in 2010, which translates into an annual growth rate of approximately 3.3%. This significant increase in the intercity travel market is a reflection of the expected population and tourism growth generating an induced rise in employment and income in the FOX corridor. The population in the FOX corridor is projected to grow at an annual average rate of 1.4% between 1997 and 2010, at a slower pace than the past decade but approximately twice the U.S. population growth rate. For the same time period, tourism is projected to grow annually approximately 3.1%.

Ridership forecast models

Once the total travel market without FOX for the year 2010 was established, high-speed rail service was introduced into the models. The travel forecasting methodology consisted of mode share and induced demand models that were used to estimate the traffic volumes of all the alternative modes available to travelers, including FOX, for travel in the future.

The “Mode Share Model” was used to estimate the market share of total intercity travel by mode (auto, air, and FOX) as a function of the level of service (e.g., travel time, cost to the user, and service frequency) provided by each mode. The “Induced Demand Model” addressed growth in the total intercity travel volumes resulting from improvement in the overall mobility provided by the introduction of the high-speed rail system.

The traffic forecasts take into account the various characteristics affecting the traveler’s decision, such as:

- the differing value of time between business and non-business travelers;
- the relationship between the cost of the travel and the length of time required for the travel;
- the influence of the income level of the traveler;
• the actual time of the trip including the time it takes to get to and from the mode (e.g., parking, moving through the station, baggage and ticketing time, etc.);
• and the impact of the availability of the mode, specifically the on-demand availability of the auto versus fixed departures and frequencies of other modes.

A modeling approach, based on analysis of the present market, the observed traveler behavior and expectations about the future, was used. When a high-speed rail project is placed in service it causes:

• A transfer of a portion of air and auto traffic - A “Price-Time-Schedule Model” estimates the number of people who will transfer from air and/or auto to FOX. Passengers may opt for air travel in the reference situation but prefer FOX service if the project goes through. Also, travelers decide against using their car and select FOX service instead because of the shorter journey times. This model is mainly based on the assumption that passengers choose between different modes in relation to the value they attach to their time, and the cost and journey time features of each mode concerned.
• A generation of more frequent trips on the part of existing travelers and the emergence of new types of trips. Induced demand is the ridership that develops because the service is there. These are people who would not travel to points if the FOX service did not exist. Induced traffic is highly dependent on the services offered by FOX in terms of travel time, fares, frequency, comfort, and accessibility to stations.

**Air-Rail Connection**

Cooperation through a code-share has been considered between FOX and one airline having its hub in Miami International Airport and one airline having its hub in Orlando International Airport. A code-share is an agreement between passenger carriers where one carrier (the airline in this case) purchases seats at a preferred price on selected routes on other carriers (FOX in this case) and markets these FOX seats as an airline flight.

Several major airline companies have developed a hub strategy for the different Florida destinations in order to optimize their seat allocation on long haul flights and to increase their profitability. The strategy mainly consists in carrying large flows of passengers by large aircraft to a major airport, then transferring passengers to small commuter planes to transport them to their different final destinations. The primary interest of the airline companies is to concentrate their business on the most profitable market, i.e., the long distance flight. But, the airlines also need to accommodate some passengers having a final destination beyond their hub. This connection is usually realized with small propeller or jet planes at relatively high operating costs.

A complementary relationship between the air and high-speed rail modes exists for trips composed of two segments, one being a long distance trip by air, and the other being a short connection that can be made by high-speed rail. In that case, the rail mode becomes a feeder of the air mode. The air-rail connection becomes apparent when its implementation results in a greater efficiency in the transportation system. There is a strong motivation for the alliance since all the partners (airlines, FOX, airport authorities, State of Florida and the travelers) stand to benefit from this alliance for the connecting trips. Following is how each of the partners will benefit from such an alliance:

• **For the passengers**, the air-rail connection offers more frequent departures than an air connection, lower or similar costs, a higher on-board comfort, and a direct accessibility to their final destination because of the multiplicity of served areas and stations, at a comparable travel time. Most particularly,
the passenger waiting time for the connection is significantly reduced and the on-time reliability of the air-rail connection ensures a good air connection.

- **For the airline companies**, the air-rail connection allows them to accommodate their connecting passengers at a lower operating cost than by small commuter planes, and at a high on-time reliability. The analysis of the airline load factors has demonstrated that the airline can make substantial operating cost savings by transferring their short-distance connecting passengers to a rail connection. This air-rail connection provides a very attractive low cost solution for the airlines having a hub in Miami or Orlando airports. Another impact of the air-rail connection is to increase the number of airline passengers by providing more convenient access to the airports connected to the high-speed rail network. This system enlarges the hinterland of the airports and represents a windfall of growth opportunities by increased feed of potential users.

- **For the airport authorities**, the air-rail connection provides more capacity to the airports, by reducing the number of small connecting aircraft required to feed long-haul flights. The freed-up gates can then be filled by larger capacity long-haul aircraft, making more efficient use of the airport facilities.

- **For the state of Florida**, the air-rail connection generates substantial socio-economic advantages by providing the best allocation of the existing transportation resources.

**The 2010 travel market with high-speed rail**

The proposed FOX route connects downtown Tampa to Miami International Airport, traveling through Lakeland, Orlando (two stations - Orlando Attractions, close to theme parks, and Orlando International Airport), Palm Beach and Fort Lauderdale.

FOX will travel at speeds up to 320 kilometers per hour providing a travel time, for example, from Orlando Airport to Miami Airport of about one hour and thirty minutes, with slightly longer times for trains making all intermediate stops and offering riders up to thirty-seven trains, each way, per day.

Traffic forecasts have been developed for the year 2010, four years after start of service from Tampa to Miami. The FOX ridership expected in 2010 is about 8.5 million passengers. This consensus forecast provides the highest likelihood of being realized. Recognition also was made that this forecasted volume of traffic rests in the percentile of the highest level of confidence to be achieved. A confidence interval was then determined and gave statistical errors in the estimates associated with the models.

**Figure 9: HSR/FOX RIDERSHIP IN 2010**

<table>
<thead>
<tr>
<th>Market Segment</th>
<th>HSR/FOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long distance trips</td>
<td>6.7 million</td>
</tr>
<tr>
<td>(100 miles or more)</td>
<td></td>
</tr>
<tr>
<td>Short distance trips</td>
<td>1.8 million</td>
</tr>
<tr>
<td>(Less than 100 miles)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8.5 million</td>
</tr>
</tbody>
</table>

**Figure 10: NORMAL DISTRIBUTION OF THE TRAFFIC FORECASTS**

- Probability = 95%
- Probability = 2.5%
- Probability = 2.5%
In addition to the forecast for the year 2010, ridership streams were developed for the entire forty-year franchise period of FOX, i.e., 2005 to 2044. Commercial operations between Orlando Attractions and Miami Airport are planned to begin in January 2005, and the downtown Tampa-Orlando Attractions leg is scheduled to open in January 2007.

AN ANALYSIS OF THE SOCIO-ECONOMIC IMPACTS OF THE FLORIDA HIGH-SPEED RAIL TRANSPORTATION SYSTEM

As a precursor to estimating the socio-economic impacts, the study looked at the transportation benefits expected from the project. These benefits depend on the number of expected riders and are of interest both because they contribute to economic impacts, and because safety, air quality and energy use are among the important considerations in making transportation investment decisions.

Transportation benefits accrue to persons choosing to use high-speed rail and to non-users that benefit from the presence of this transportation alternative. These benefits take two forms. The first is the benefit to the traveler, above and beyond the cost of the fare, including consumer surplus, safety, environmental and other savings. The second is the economic and other savings for travelers using existing transportation modes in the form of reductions in congestion as a result of some air and auto travelers switching to high-speed rail. The economic impacts measured in this report are only a portion of the total economic benefits that can accrue to Florida. An investment such as high-speed rail can deliver the transportation benefits and economic impacts as outlined in the remainder of this report and it can have other consequences beyond those easily estimated.

The full impact of such an investment is realized if the state and the individual communities embrace and fully leverage this investment with complementary policies and investments. High-speed rail can be:

- a stimulus for development of new industries in Florida;
- a motivating factor for economic development and growth management activities;
- a calling card to attract new business and additional tourists to Florida;
- serve as a critical element in a vision of a sustainable and economically vigorous Florida;
- symbolize a willingness to invest in new ideas;
- use creative public private partnerships and;
- demonstrate innovative approaches to problem solving.
The Analysis
This study, carried out in the first quarter of 1997, utilized the nationally recognized Regional Economic Model (REMI) as the analysis tool. The analysis also relies on financial data and ridership estimates produced and provided to researchers by both the FDOT and FOX team members. For this Florida application, the state was divided into six regions to determine the separate impacts on a number of the state’s largest urbanized areas.

This analysis evaluates the direct and indirect changes in employment, income and business activity that is directly attributable from implementing and operating the high-speed rail project in Florida. These impacts are new money stimulants to the Florida economy that would otherwise not exist in the state’s future.

The principle stimulus effects on the state of Florida comes from leveraging new funds entering the state and from the economic benefits associated with the transportation services that are provided. Thus, the leveraging of the equity investment by the FOX consortium, the contribution of federal funds and the economic benefits associated with the improved transportation are the principal positive stimulus effects. In addition, unlike other projects that need continued subsidies, this project is forecast to generate a return on the investment that is reinvested in later years.

TIME - High-speed rail travelers who shift from auto and air can be expected to save an annual average of 3.8 million hours of time over the 2004 to 2043 time period. The time savings reflect the sum of the estimated door-to-door travel time differences.

SAFETY - Internationally, high-speed rail has attained an exceptional safety record which is assumed to continue in Florida operations. Historical trends in air and auto safety are used as a basis for determining the number of accidents, injuries, and fatalities that might be avoided by the shifts of travelers to high-speed rail.

ENERGY - Based on forecasted 2010 and 2035 conditions, the presence of the high-speed rail service should reduce transportation energy consumption significantly. This saving is the equivalent of 61 million liters of gasoline (386,000 barrels of oil, 428 billion calories or 1.7 billion British Thermal Units-Btu) in 2010; and 80 million liters of gasoline (506,000 barrels of oil, 529 billion calories or 2.1 Btu) in 2035.

AIR QUALITY – High-speed rail will provide reduced pollutants due to travelers shifting from either auto or air travel. The following chart presents changes in tons of pollutants for 2010 and 2035 based on estimated modal characteristics for that time.

Figure 11: NET REDUCTION IN TONS OF AIR QUALITY POLLUTANTS - OPERATING YEARS 2010 AND 2035

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Auto</th>
<th>Airline</th>
<th>FOX/HSR</th>
<th>Net Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>69,658</td>
<td>65,260</td>
<td>41,257</td>
<td>93,661</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>4,414</td>
<td>17,220</td>
<td>9</td>
<td>21,625</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>595</td>
<td>13,499</td>
<td>1</td>
<td>14,093</td>
</tr>
<tr>
<td>Nitrous Oxides</td>
<td>307</td>
<td>654</td>
<td>191</td>
<td>770</td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>37</td>
<td>97</td>
<td>33</td>
<td>101</td>
</tr>
<tr>
<td>Sulfur Oxides</td>
<td>25</td>
<td>145</td>
<td>287</td>
<td>-117</td>
</tr>
<tr>
<td>Tire Wear Matter</td>
<td>38</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75,074</strong></td>
<td><strong>96,875</strong></td>
<td><strong>41,778</strong></td>
<td><strong>130,171</strong></td>
</tr>
</tbody>
</table>
### Annual 2035 Emissions

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Auto</th>
<th>Airline</th>
<th>FOX/HSR</th>
<th>Net Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>112,765</td>
<td>105,645</td>
<td>66,789</td>
<td>151,621</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>7,145</td>
<td>27,876</td>
<td>15</td>
<td>35,006</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>963</td>
<td>21,853</td>
<td>2</td>
<td>22,814</td>
</tr>
<tr>
<td>Nitrous Oxides</td>
<td>497</td>
<td>1,058</td>
<td>309</td>
<td>1,246</td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>61</td>
<td>157</td>
<td>54</td>
<td>164</td>
</tr>
<tr>
<td>Sulfur Oxides</td>
<td>40</td>
<td>235</td>
<td>465</td>
<td>-190</td>
</tr>
<tr>
<td>Tire Wear Matter</td>
<td>62</td>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>121,533</td>
<td>156,824</td>
<td>67,634</td>
<td>210,723</td>
</tr>
</tbody>
</table>

### STATEWIDE EMPLOYMENT

Results of the analysis indicate that about 78,100 job years will be created by the high-speed rail project during the planning and construction phase (8 years). Additional 174,800 job years will be created over the period of operation (39 years). These jobs would be distributed broadly across most sectors of the economy. Out of the average annual 5,380 jobs, the strongest job growth, at approximately 4,000 jobs per year, is in the non-manufacturing sector. This includes growth in services including tourism, transportation, retail trade, finance and government.

Additionally, an average annual increase of 200 jobs will be realized in the manufacturing sector during the years of high-speed rail operation. This overall increase in employment is attributable to the construction and operation of the high-speed rail system and subsequent economic impacts. The secondary impacts result from the increase in the competitiveness of Florida’s businesses and the attractiveness of Florida’s economy.

### Figure 12: FOX/HSR EMPLOYMENT WAGES AND ECONOMIC STIMULUS

<table>
<thead>
<tr>
<th>JOB YEARS</th>
<th>WAGES (Millions of dollars)</th>
<th>ECONOMIC STIMULUS (Millions of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tampa Bay</td>
<td>23,136</td>
<td>$731</td>
</tr>
<tr>
<td>East Central</td>
<td>58,681</td>
<td>$1,783</td>
</tr>
<tr>
<td>Palm Beach &amp; Treasure Coast</td>
<td>44,253</td>
<td>$1,285</td>
</tr>
<tr>
<td>Broward/Miami-Dade</td>
<td>30,777</td>
<td>$1,224</td>
</tr>
<tr>
<td>Other regions</td>
<td>96,043</td>
<td>$3,858</td>
</tr>
<tr>
<td>Total Florida</td>
<td>252,890</td>
<td>$8,881</td>
</tr>
</tbody>
</table>

### CONCLUSIONS

The Florida High-speed Rail Project will benefit travelers by:
- Reducing yearly highway travel by over 420 million vehicle kilometers, thus removing 1.4 million auto trips from the roads in 2010,
- Reducing yearly air travel by over 899 million passenger kilometers, thus enabling a reduction of 60 thousand aircraft flights annually in 2010,
- Reducing time spent in roadway congestion by over 1.6 million hours per year,
- Reducing yearly deaths and injuries by auto travel by 5 and 380.

The Florida High-speed Rail Project will benefit the environment by:
- Reducing annual fuel consumption by the equivalent of 61 million gallons of gas in 2010,
- Reducing annual pollutants by 130,171 tons in 2010.
The Florida High-speed Rail Project will also improve Florida’s economy by:

- Creating 78,100 full time jobs and $2.8 billion in wages and salaries over the first 8 years of the project (planning and construction phase),
- Creating 174,800 full time jobs and $6.04 billion in wages and salaries over the next 39 years (operations and reinvestment phase).

The Florida High-speed Rail Project will also provide a stimulus for development of new industries in Florida by:

- Motivating economic development and growth management activities,
- Attracting new business and additional tourists to Florida,
- Demonstrating a willingness to invest in new ideas, and
- Being a model of public/private partnership.

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