

## CHAPTER FOUR ALTERNATIVES

### 4.0 INTRODUCTION AND BACKGROUND

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), state that alternatives are the heart of the Environmental Impact Statement (EIS). Those regulations require that the Federal decision-maker perform the following tasks:

- Assess and objectively evaluate all *reasonable* alternatives, including alternatives not within the jurisdiction of the Federal agency; and for alternatives which were eliminated from the detailed study, briefly discuss the reasons for their having been eliminated; and
- Disclose the potential environmental consequences for each alternative, including the no action alternative and the airport sponsor's preferred alternative (Airport Sponsor's Proposed Project), so that reviewers may evaluate their comparative merits.

Federal guidelines concerning the environmental review process require that all reasonable, feasible, prudent, and practicable alternatives that might accomplish the objectives of a proposed project be identified and evaluated. Therefore, in compliance with NEPA<sup>1</sup> and other special purpose environmental laws, the FAA independently reviews and analyzes those alternatives that could achieve the established purposes and need for the project.

Reasonable alternatives include those that are practicable or feasible from the technical and economic standpoint.<sup>2</sup> Therefore, according to CEQ Section 1502.14(c) the FAA, as the lead agency, has a responsibility to explore and objectively evaluate all prudent, feasible, reasonable, and practicable alternatives, including those beyond the agency's jurisdiction.

The lead Federal agency bears the responsibility for defining at the outset the objectives of an action, and deciding which alternatives to consider in an EIS. The agency need only follow a "rule of reason" in preparing an EIS, and this rule of reason governs both *which* alternatives the agency must discuss, and the *extent* to which it must discuss them. The agency's definition of objectives and discussion of alternatives meet the NEPA requirements so long as the objectives the agency chooses are reasonable, the alternatives are reasonable, and the agency discusses the alternatives in reasonable detail.

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<sup>1</sup> NEPA alternatives evaluation: National Environmental Policy Act of 1969 (NEPA) Part 1502, *Environmental Impact Statement*, Section 1502.14.

<sup>2</sup> 46 Federal Register 18026, Memorandum: *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, March 16, 1981.

The examination of alternatives serves to establish the conclusion that an alternative, which addresses the agency's defined objective and might enhance environmental quality (or have a less detrimental effect), has not been inappropriately dismissed from consideration. An agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative from among the environmentally benign ones in the agency's power would accomplish the objectives. Nor may an agency frame its objectives in terms so unreasonably broad that an infinite number of alternatives would accomplish the objectives and the project would collapse under the weight of the possibilities.

In deciding which alternatives to consider, agencies must look hard at the factors relevant to the definition of purpose for the action. When an agency is asked to sanction a specific plan, it should take into account the needs and goals of the parties involved in the application. More importantly, the agency should always consider the views of Congress, expressed in the agency's statutory authorization to act, as well as in other pertinent congressional directives.

The scope of alternatives considered by a Federal agency, where the Federal government acts as a proprietor, is wide ranging and comprehensive. Where the Federal government acts not as a proprietor, but to approve and support a project being sponsored by a local government or private applicant, the agency is necessarily more limited. In the latter instance, the agency's consideration of alternatives may accord substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project.

Once an agency has considered the relevant factors, it must define objectives for its action that fall somewhere within the range of reasonable alternatives. This chapter describes the process of identifying and evaluating alternatives for meeting the established purposes and needs for the proposed project.

## **4.1 RANGE OF ALTERNATIVES**

The analysis of EIS alternatives is an independent examination by the FAA of all alternatives that could reasonably meet the identified purpose and needs for the Airport Sponsor's Proposed Project as described in detail in Chapter Three, *Purpose and Need*. The alternatives that the FAA considered in this analysis can be grouped into seven categories of off-site and on-site alternatives, and a no action alternative.

### **4.1.1 OFF-SITE ALTERNATIVES**

#### **4.1.1.1 Use of Other Airports/Regional Management Alternatives**

These alternatives would entail the transfer of aircraft operations from FLL to other airports within the region, thereby reducing the operational demand and need for additional capacity at FLL to accommodate existing and projected future aviation demand.

#### **4.1.1.2 Development of a New Off-Site Airport to Replace FLL**

This alternative entails the development and construction of a new airport at a new location to replace the existing airport.

#### **4.1.1.3 Other Modes of Transportation and/or Telecommunications**

These alternatives entail the use of other modes of transportation or communication technology (e.g., trucks, trains, rail, and telecommunications/video-conferencing), which could be used to reduce operational demand at FLL and reduce the need for additional capacity.

### **4.1.2 ON-SITE ALTERNATIVES**

#### **4.1.2.1 Non-Runway Development Alternatives**

These alternatives are designed to meet the need for additional capacity through physical airfield enhancements other than runway(s) development that would satisfy all, or a portion of, the established purpose and needs. Among the projects considered are the new construction, extension, and/or expansion of taxiways, runway exits, and hold pads.

#### **4.1.2.2 Other Technologies**

A number of technologies exist or are being developed, that may ultimately reduce aircraft delay during poor weather. The goal of these technologies is to increase capacity by aiding aircraft movement on approach, on the ground, and during departure. There are operational/air traffic procedural concepts that aim to make improvements through non-technological methods to postpone the need for physical improvements.

#### **4.1.2.3 Activity or Demand-Management Alternatives**

These alternatives consist of establishing guidelines and policies that attempt to balance aircraft operations with available airport capacity. This balance would be accomplished through measures such as pricing or regulatory actions implemented by the airport sponsor, that discourage or prevent airlines from scheduling flights during periods of limited capacity.

#### **4.1.2.4 Runway Development Alternatives**

The range of proposed development alternatives to expand the existing airfield (e.g., construction of new runways and/or extension of existing runways) and landside facilities<sup>3</sup> includes those identified on Broward County Airport Layout Plan

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<sup>3</sup> Landside development includes the passenger terminal complex and related airport infrastructure.

(ALP) drawings,<sup>4</sup> those projects defined in the FAA Memorandum to the Broward County Aviation Department, dated June 11, 2005,<sup>5</sup> and those development alternatives independently identified by FAA.

### **4.1.3 NO ACTION ALTERNATIVE**

As a requirement of NEPA, a No Action alternative must be carried forward in the assessment of environmental impacts.<sup>6</sup> To satisfy the intent of NEPA, FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instruction for Airport Projects, and other special purpose environmental laws, the No Action Alternative is carried forward in the analysis of environmental consequences provided in Chapter Six, *Environmental Consequences*. With the No Action Alternative, the airfield would remain as it is today, with no additional runways or extensions or improvements to any existing runways, and no new air traffic actions. Although not always reasonable, feasible, prudent, or practicable, the No Action Alternative is a potential alternative under NEPA and serves as the baseline for the assessment of future conditions/impacts.

## **4.2 ALTERNATIVES ANALYSIS**

The alternatives analysis identified and evaluated a range of reasonable alternatives that could substantially meet the stated purpose and need for the project. This analysis first qualitatively screened both the on-airport and off-airport options that could feasibly increase capacity and reduce delay at the Fort Lauderdale-Hollywood International Airport (FLL). The alternatives that could reasonably increase capacity and reduce delay were then subjected to further evaluation to consider runway length,<sup>7</sup> airfield throughput capacity, constructability, and possible "fatal flaws."

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<sup>4</sup> Broward County Aviation Department Revised Airport Layout Plan (ALP) conditionally approved by FAA in August 1999.

Broward County Aviation Department. ALP drawing approved by the Commission on October 26, 2004, which depicts the "footprint" of the proposed runway extension within the confines of the Dania Cut-Off Canal on the west and NE 7<sup>th</sup> Avenue on the east

<sup>5</sup> Memorandum from Virginia Lane, Environmental Specialist, FAA Orlando ADO to David Bjorneboe, Assistant to the Director of Aviation, Broward County Aviation Department; Subject: *FLL EIS – Clarification of the Sponsor's Proposed Project and List of Projects to Include in EIS*; dated June 8, 2005.

<sup>6</sup> FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*, April 28, 2006, Chapter 10, Section 1001. EIS PURPOSE. 40 CFR 1502.1 states the primary purpose of an EIS is to be an "action-forcing tool" to ensure Federal government programs and actions meet NEPA's goals and policies. The EIS allows the agency to take a "hard look" at the environmental impacts of the no action, the proposed action, and its reasonable alternatives.

<sup>7</sup> FAA held an information briefing with airline representatives on February 23, 2007, to discuss the FAA's range of runway development alternatives and the runway length analysis. The airlines invited to this meeting include: Air Tran Airways, Air Transat, American Airlines, Continental Airlines, Delta Air Lines, Frontier Airlines, jetBlue Airways, Northwest Airlines, Southwest Airlines, Spirit Airlines, and US Airways.

## **4.2.1 OFF-SITE ALTERNATIVES**

### **4.2.1.1 Use of Other Airports**

The use of other airports in southeast Florida is examined to determine if the relocation of passengers and operations to another airport is feasible and if it would postpone or reduce the need for additional capacity at FLL to accommodate existing and projected future demand. Two other southeast Florida airports presently accommodate air carrier operations in addition to FLL – Miami International Airport (MIA) and Palm Beach International Airport (PBI). Other smaller general aviation and reliever airports were also assessed as possible feasible alternatives to FLL including Homestead Air Reserve Base (HST), Dade-Collier Training and Transition Airport (Everglades Jetport) (TNT), Fort Lauderdale Executive (FXE), North Perry (HWO), Boca Raton (BCT), and Opa-Locka (OPF) airports.

This assessment describes the location of each airport in relation to FLL, the existing airport facilities, and the surrounding conditions that affect each airport. An indication of why using another airport would, or would not be, a reasonable alternative to the Airport Sponsor's Proposed Project is also described, specifically, why it was not carried forward for further consideration in the analysis of environmental consequences.

#### **4.2.1.1.1 PALM BEACH INTERNATIONAL AIRPORT (PBI)**

PBI is located approximately 43 miles north of FLL, an estimated 50 to 60 minute drive time from FLL during non-peak traffic conditions. During peak commuting traffic conditions, generally 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m., these travel times can be considerably longer.

The FAA initiated the NEPA process for a capacity improvement project at PBI on January 26, 2007 with the issuance of a Notice of Intent to Prepare an EIS. This proposed runway expansion project is intended to meet the projected demand forecast for the PBI market area, comprised of Palm Beach County, Martin County, St. Lucie County, and Indian River County. With this airfield development program, PBI should provide the capacity needed to serve its market area demand while complementing (not replacing) other airfield improvement programs at South Florida airports that, collectively, address the existing and projected regional air travel demand for South Florida. The market area for PBI does not overlap with the market area for FLL. Travel distance and distinct market areas make PBI an unattractive alternative for delay reduction and capacity enhancement at FLL.

#### **4.2.1.1.2 MIAMI INTERNATIONAL AIRPORT (MIA)**

MIA is located approximately 27 miles south of FLL, an estimated 30 to 40 minute drive from FLL during non-peak traffic flow times of the day or when traveling counter to the prevailing flow of traffic. MIA has four air carrier runways including a set of three parallel runways, two of which are closely spaced, and a third widely-spaced parallel runway, which provides for simultaneous arrival and departure operations. The fourth runway is a crosswind runway. The new closely-spaced east-west parallel air carrier runway became operational in 2003 to provide

capacity beyond the MIA Planning Level III year 2007 or 2008.<sup>8</sup> This runway, Runway 8L/26R, is 8,600 feet long. "Although the new runway is primarily used for arrivals, it does not increase the maximum airport arrival rate. Rather it allows for more departures without reducing the arrival rate."<sup>9</sup>

Miami-Dade Aviation officials<sup>10</sup> have indicated that the estimated annual service volume (ASV) of the airfield system is 680,000 operations with a design day capacity of 1,200 operations. Currently, MIA experiences approximately 500 average daily operations,<sup>11</sup> which is within the facility's design day capacity.

MIA is located in a heavily urbanized section of the Miami Metropolitan Area. The airport is surrounded on all sides by extensive urban development along with elements of the county and regional transportation network. Virtually all of the airport-owned property is developed so no property is available to further expand the airfield system. Extensive residential land uses are located immediately north of the airport across NW 36<sup>th</sup> Street in the City of Virginia Gardens and the City of Miami Springs. Located immediately south of the airport is the Dolphin Expressway and Florida East Coast (FEC) rail corridor, beyond which is a large concentration of office and hotel land use situated around an interconnected lake/stormwater management system commonly known as the Blue Lagoon area. Therefore, any expansion of MIA beyond its current airfield system would be significantly affected by the cost and impacts associated with the noted developments, roadways, and other related infrastructure systems.

A significant issue facing MIA is associated with the cost structure of the airport versus that of other airports in southeast Florida, as well as other airports in the U.S. The ongoing development of the South Terminal Complex, the Miami Intermodal Center (MIC/MIA) and associated roadway improvements, and the American Airlines North Terminal Complex have significantly increased the cost per enplaned passenger at MIA. This high cost structure is further exacerbated by cost overruns for the north terminal development.<sup>12</sup>

The cost structure of an airport is a significant issue for commercial airlines as it directly affects profitability within specific markets. An example of this was in 2005 when Southwest Airlines expressed interest in leaving Seattle-Tacoma International Airport (SEA) to relocate to Seattle's Boeing Field. The basis for considering that relocation was specifically tied to the high operating costs at SEA.<sup>13</sup>

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<sup>8</sup> *Miami International Airport Master Plan*, prepared for the Dade County Aviation Department (now the Miami-Dade Aviation Department, prepared by Landrum & Brown, approved June 29, 1994.

<sup>9</sup> *Airport Capacity Benchmark Report 2004*, U.S. Department of Transportation, Federal Aviation Administration

<sup>10</sup> Information obtained from Miami Dade Aviation Department, June 1, 2006.

<sup>11</sup> Information obtained from Miami Dade Aviation Department, June 1, 2006.

<sup>12</sup> *Miami Herald*, May 17, 2006, Page 1A, *Miami Herald*, May 21, 2006, Page 4L. Internet web site: <http://www.Miamitodaynews.com/news/050506>

<sup>13</sup> *ATW Daily News*, 7/22/05. Internet web site: <http://www.atwonline.com/news/story.html?StoryID=1847>

Airline cost per enplaned passenger at FLL was \$4.13 for Fiscal Year 2004 and is budgeted at \$3.96 for Fiscal Year 2006.<sup>14</sup> By comparison, SEA cost per enplaned passenger was slightly over \$10.00 per passenger. The enplaned passenger cost at MIA exceeds both FLL and SEA with a cost per passenger of \$16.90 in Fiscal Year 2004 and \$16.93 in 2005.<sup>15</sup> The average enplaned passenger cost at large and medium hub airports in the U.S. in 2005 was \$6.43.<sup>16</sup>

In today's low cost/low fare environment, an airport cost structure that negatively affects a carriers' "bottom line" (i.e., airline yields and profitability) can translate to the decision for a carrier not to operate in a particular market. A number of large hub airports with a large percentage of low cost/low fare service were inventoried to determine their operating costs on a per enplanement basis. That data is shown in Table 4-1, *Enplaned Passenger Costs at Large and Medium Hub Airports with Low Cost/Low Fare Service*.<sup>17</sup>

A commercial airline would need to choose to relocate operations from FLL to MIA. The U.S. Department of Transportation has no jurisdiction to require airlines to shift their operational activity from one airport to another. There is no current indication that the traffic would shift, given the cost issues discussed above.

**Table 4-1  
ENPLANED PASSENGER COSTS AT LARGE AND MEDIUM HUB AIRPORTS  
WITH LOW COST/LOW FARE SERVICE  
Fort Lauderdale-Hollywood International Airport**

Airport	Low Cost Carrier	Enplaned Passenger Cost
Atlanta Hartsfield Jackson International	AirTran	\$2.50 (est.)
Chicago Midway International	Southwest	\$3.00 (est.)
Kansas City International	Southwest	\$4.00 (est.)
Fort Lauderdale-Hollywood International	Southwest	\$4.13
Phoenix Sky Harbor International	Southwest/ US Airways	\$4.25 (est.)
Las Vegas McCarran International	US Airways/Southwest	\$4.75 (est.)
San Jose Norman Mineta International	Southwest	\$4.75 (est.)
Baltimore\Washington International	Southwest/AirTran	\$4.85 (est.)
Oakland International	Southwest	\$5.20 (est.)
Orlando International	Southwest/AirTran/ jetBlue	\$5.51
Miami International Airport	AirTran/ US Airways	\$16.93

Source: Internet web site: <http://www.airportcodes.us/> Copyright 2005. All airports listed in the table are designated as large hub airports except for Kansas City and San Jose, which are medium hub airports.  
Landrum & Brown, 2006

<sup>14</sup> *Airline – Airport Affairs Committee Meeting, June 22-23, 2006* (meeting presentation materials). Broward County Aviation Department, Fort Lauderdale-Hollywood International Airport, p. 13.  
<sup>15</sup> *Airline – Airport Affairs Committee Meeting, June 22-23, 2006* (meeting presentation materials). Broward County Aviation Department, Fort Lauderdale-Hollywood International Airport, p. 14.  
<sup>16</sup> *Financial Capacity Findings: Airline Cost per Enplaned Passenger (CPE)*, Broward County Board of County Commissioners, Workshop Briefing Package, October 18, 2005, p. 20.  
<sup>17</sup> Internet web site: <http://www.airportcodes.us/> Copyright 2005.

#### 4.2.1.1.3 HOMESTEAD AIR RESERVE BASE (HST)

HST is located approximately 60 highway miles south of FLL by interstate. Approximately halfway between FLL and HST is MIA, which is located an estimated 33 highway miles north of HST. HST is approximately 70 minutes (by automobile) from the population center of Broward County, assuming non-peak commute times, compared to a 20-minute drive from the population center of Broward County to FLL.

HST is comprised of a single 11,200-foot long by 300-foot wide runway with supporting taxiways and ramp areas. In the late 1990's the U.S. Air Force prepared an EIS proposing to convert HST to a public service airport. This proposal was not approved.<sup>18</sup> Based on the decision contained in the U.S. Air Force Record of Decision for the disposal of the former Homestead Air Force Base, approximately 717 acres of surplus property were offered to Miami-Dade County for mixed-use development, but not for the construction of a commercial airport. (The Air Force retained the runway and airfield areas for its own use.) This decision balanced the Federal interest in economic development for realigned military bases with the protection of environmental values in the two nearby national parks (Everglades National Park and the Biscayne Bay National Park).

*Because a Federal decision has determined that HST cannot be used as a public airport, relocating commercial activity from FLL to HST is not a reasonable alternative.*

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<sup>18</sup> *Second Supplemental Record of Decision (ROD) for the Disposal of Portions of the Former Homestead Air Force Base (AFB), FL* [Federal Register: March 1, 2001 (Volume 66, Number 41)] [Notices] [Page 12930] DEPARTMENT OF DEFENSE Department of the Air Force. On January 15, 2001, the Air Force signed the Second Supplemental ROD for Portions of the Former Homestead AFB. The ROD was developed based on consideration of the December 2000 Final Supplemental Environmental Impact Statement (SEIS), correspondence received by the Air Force, and other relevant factors. The Air Force decided in the ROD to offer approximately 717 acres of surplus property to Miami-Dade County for mixed-use development, but will not allow construction of a commercial airport at the site. The Air Force will retain the runway and airfield areas at the former base for its own use. Those areas will continue to be maintained by the Air Force and used by the Air Force Reserve, the Florida Air National Guard, Customs Service, and other federal agencies. If the county opts not to apply for the transfer or declines the surplus property, the Air Force then will act upon a request for the property from the Department of the Interior, which hopes to trade the land for other valuable property. This transaction also would be in support of mixed-use development of the Homestead property. This decision struck a balance between the federal interests in economic development of realigned military bases and the protection of environmental values in two nearby national parks. Although this decision is a reversal of one made by the Air Force in 1994, the new decision sought to protect the County's interests by giving the County the first opportunity to accept the land for redevelopment. The County is the local redevelopment authority under the base closure laws, and offering the property to the County first reflects policy that local redevelopment authorities be given a central role in the determination of how base closure property is to be reused.

#### **4.2.1.1.4 DADE-COLLIER TRAINING AND TRANSITION AIRPORT (EVERGLADES JETPORT) (TNT)**

TNT is located approximately 80 miles (by automobile) from FLL and 36 miles west of the Miami Central Business District (CBD). Constructed in the early 1970s, TNT was originally the Everglades Jetport and was planned as the replacement runway for MIA.<sup>19</sup> TNT has one runway, Runway 9/27, that is 10,499 feet long by 150 feet wide.

Due to its location, surrounded by the Big Cypress Swamp (now known as the Big Cypress National Preserve<sup>20</sup>) and six miles north of the Everglades National Park, the FAA signed the Everglades Jetport Pact on January 16, 1970, which permits the continued use of the single runway at TNT for training operations, but no further construction of the jetport. The present role of TNT is consistent with the Jetport Pact agreement, to provide a precision instrument landing and training facility in Southern Florida for commercial pilots, sporadic private training, a small number of government aircraft operations, and limited military touch-and-go operations. The airport requires pilots to receive prior permission from the Miami-Dade Aviation Department (MDAD) before conducting operations at TNT.<sup>21</sup>

Because of the previous actions of the Federal government to limit development of TNT, the recently approved restoration efforts for the Everglades ecosystem, the location of the facility inside a National Preserve, the environmental/ecological conditions of the surrounding environs, and its established role as a limited-use training facility, growth at TNT is not planned or anticipated. The airport is expected to stay the same regarding its significance to the aviation system and number of operations. The current ASV for TNT is approximately 175,500 annual operations. TNT does not have T-hangars, conventional hangars, fuel tanks, or tie-down areas.

*Based on the existing and anticipated future role of TNT, and considering its existing environmental issues, it is not a reasonable alternative.*

#### **4.2.1.1.5 SHIFT GENERAL AVIATION TO SURROUNDING RELIEVER AIRPORTS**

Shifting general aviation operations from FLL to surrounding reliever airports has been given consideration. Based on a review of public use airports in south Florida, four airports were identified as having the greatest potential to provide reasonably proximate alternatives to FLL for general aviation users. These airports are Fort Lauderdale Executive (FXE), North Perry (HWO), Boca Raton (BCT), and Opa-Locka (OPF). This action would not reduce air carrier demand at FLL. The

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<sup>19</sup> *History of the South Florida Environmental Study.* U.S. Department of the Interior, U.S. Geological Survey. Last updated: 16 July 2003. Internet web site: [http://sofia.usgs.gov/publications\\_papers/pp1011/studyhistory.html](http://sofia.usgs.gov/publications_papers/pp1011/studyhistory.html)

<sup>20</sup> National Park Service. Internet web site: <http://www.nps.gov>

<sup>21</sup> Internet web site: <http://www.airnav.com/airport/KTNT> KTNT Dade-Collier Training and Transition Airport Miami, Florida, USA. FAA Information Effective 08 June 2006.

aircraft demand (fleet mix) at FLL is such that air carrier demand cannot be accommodated on the existing available air carrier pavement. Shifting general aviation activity to other surrounding reliever airports would not enhance the air carrier capacity at FLL.

*Therefore, relocating general aviation activity from FLL is not a reasonable alternative.*

#### **4.2.1.2 Development of a New Off-Site Airport to Replace FLL**

The construction of a new replacement airport could be considered. However, previous attempts to develop a replacement or supplemental airport in southeast Florida have all met considerable opposition. This was the case with the Everglades Jetport in the early 1970's and again in the 1990's with the proposed reuse of HST.

Opposition to the proposed Everglades Jetport from environmental regulatory agencies resulted in the "Jetport Pact" which precludes any further development of this facility. The adverse public reaction to the potential reuse of HST as a commercial airport resulted in a U.S. Air Force decision not to convert HST to a commercial air carrier airport.

The development of a supplemental or replacement airport to FLL would require an extensive amount of land acquisition.<sup>22</sup> The only open area of available land is located in western Broward County, west of the Sawgrass Expressway, where potential impacts to wetlands could be substantial and likely render an airport development proposal, impracticable or infeasible, or otherwise unreasonable. Water from the wetland complex associated with this site flows into the ecosystem of Everglades National Park, which is a Section 4(f)/303(c) property.<sup>23</sup> It is anticipated that environmental impacts to this wetland complex could not reasonably be mitigated. A new airport site would require the construction of a major surface access system.

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<sup>22</sup> It is estimated that 5,000 to 10,000+ acres would be required to develop the facilities for a modern air carrier airport that would include a compatible land use buffer and possible land use mitigation.

<sup>23</sup> Section 4(f) of the Department of Transportation Act, as amended, now resides in the United States Code at 49 U.S.C. 303. It states: Sec. 303. Policy on lands, wildlife and waterfowl refuges, and historic sites – a. It is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. b. The Secretary of Transportation shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the states, in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of lands crossed by transportation activities or facilities. c. The Secretary may approve a transportation program or project (other than any project for a park road or parkway under Section 204 of Title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local officials having jurisdiction over the park, area, refuge, or site) only if - (1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

*The development of a new off-site airport to replace FLL was not considered reasonable due to the limited availability and cost of suitable land, the potential significant environmental impacts that could occur at a new location, the improbability of public acceptance, and the significant (and, as of yet, unfunded) capital investment necessary for development and construction.*

#### **4.2.1.3 Use of Other Modes of Transportation and/or Telecommunications**

Alternate modes of transportation, such as rail, bus, or automobile, may offer feasible alternatives to freight shippers and air travelers, particularly those traveling within a range of 500 miles or less from the airport.<sup>24</sup> This evaluation addresses the capability of alternative modes of transportation to meet the needs of freight shippers and travelers who currently use FLL. Of critical importance to the evaluation are such factors as trip characteristics and travel needs of the air passengers and freight shippers, and the feasibility of using automobile, rail and bus service, and telecommunications/video-conferencing to accommodate these transportation requirements. These evaluations typically take into account travel costs, time, and efficiency.

Florida's Strategic Intermodal System (SIS) was established in 2003 to enhance the state's economic competitiveness by focusing limited state resources on those transportation facilities that are critical to Florida's economy and quality of life. The SIS is a statewide network of high-priority transportation facilities, including Florida's largest and most significant commercial service airports, spaceport, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways, and highways. By 2020, over 30 of Florida's public airports are expected to be operating at greater than 80 percent of operational capacity (the capacity at which future expansions should be underway).<sup>25</sup>

##### **4.2.1.3.1 SURFACE ROADWAY TRANSPORTATION MODES**

Table 4-2, *Cities in Top 25 Markets of Domestic O&D Passengers 12 Months Ended March 2005*, lists the origin and destination (O&D) data of the top 25 markets for FLL travelers and compares the distances to these cities in air miles and highway miles. These top 25 markets serve more than 69 percent of the total scheduled FLL O&D passengers.

As shown in Table 4-2, only three of the top 25 market cities (Jacksonville, Orlando, and Tampa) are located within both a 250-air mile and 500-road mile radius from FLL. Beyond 250 air miles or 500 roadway miles, alternative modes of transportation become less desirable and of reduced viability.

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<sup>24</sup> U.S. Department of Transportation, Research and Special Programs Administration, *Origin-Destination. Survey of Airline Passenger Traffic – Domestic*, via Data Base Products, Inc. Rand McNally Road Atlas, [www.randmcnally.com](http://www.randmcnally.com), 2005. Data compiled by: Landrum & Brown, Inc., 2005.

<sup>25</sup> *Florida Strategic Intermodal System (SIS)*, Adopted January 20, 2005, [www.dot.state.fl.us/planning/sis](http://www.dot.state.fl.us/planning/sis).

**Table 4-2  
CITIES IN TOP 25 MARKETS OF DOMESTIC O&D PASSENGERS  
12 MONTHS ENDED MARCH 2005  
Fort Lauderdale-Hollywood International Airport**

Rank	Market	Average Air Miles	Average Road Miles	Passengers	Percent of Top 25	Percent of Total
1	New York <sup>1</sup>	1070	1281	3,980,950	29.2	22.2
2	Washington <sup>2</sup>	908	1056	1,252,520	9.2	7.0
3	Chicago <sup>3</sup>	1174	1440	1,007,810	7.4	5.6
4	Boston	1237	1492	841,830	6.2	4.7
5	Los Angeles <sup>4</sup>	2323	2721	708,880	5.2	4.0
6	Philadelphia	992	1178	662,060	4.9	3.7
7	Atlanta	581	673	580,810	4.3	3.2
8	Detroit	1127	1381	429,160	3.2	2.4
9	Tampa	197	267	376,220	2.8	2.1
10	San Juan, PR	1046	n/a	345,280	2.5	1.9
11	Las Vegas	2174	2684	315,580	2.3	1.8
12	Hartford-Bradley	1173	1405	311,160	2.3	1.7
13	Denver	1703	2077	291,280	2.1	1.6
14	Jacksonville	318	345	271,220	2.0	1.5
15	Dallas/Ft. Worth <sup>5</sup>	1114	1356	267,730	2.0	1.5
16	San Francisco <sup>6</sup>	2572	3152	245,290	1.8	1.4
17	Islip	1093	1328	212,140	1.6	1.2
18	Orlando	178	214	211,810	1.6	1.2
19	Atlantic City	977	1226	203,630	1.5	1.1
20	Providence	1188	1447	202,710	1.5	1.1
21	Pittsburgh	994	1208	188,750	1.4	1.1
22	St. Louis	1056	1249	184,310	1.4	1.0
23	Indianapolis	1005	1220	178,720	1.3	1.0
24	Nashville	793	929	172,590	1.3	1.0
25	Houston <sup>7</sup>	961	1207	171,880	1.3	1.0
<b>Top 25 Markets</b>				<b>13,614,320</b>	<b>100.0</b>	<b>76.1</b>
<b>All Other Markets</b>				<b>4,281,880</b>		<b>23.9</b>
<b>Total Domestic O&amp;D PAX</b>				<b>17,896,200</b>		<b>100.0</b>

Notes: Data includes total inbound and outbound O&D passengers

Bold text signifies cities that are located less than 500 air and road miles from FLL.

1. Includes Kennedy, Newark and LaGuardia airports
2. Includes Baltimore-Washington, Dulles, and National Airports
3. Includes O'Hare and Midway airports
4. Includes Los Angeles, Burbank, Long Beach, Orange County and Ontario airports
5. Includes Dallas/Ft. Worth and Love Field airports
6. Includes Oakland, San Jose and San Francisco airports
7. Includes Bush-Intercontinental and Hobby airports

Sources: DOT, *Air Passenger Origin-Destination Survey*.

Rand McNally Road Atlas (Road Miles); [www.randmcnally.com](http://www.randmcnally.com), 2005

[L&B File: H:\FLL Ft Lauderdale\Alternatives\FLL Top 25 05Q2.xls]Top 25 Mats]

Within these top 25 markets, approximately 5.1 percent of the total scheduled O&D passengers travel to destinations of fewer than 500 road miles. These passengers could opt to drive to these destinations, but would likely do so as a multi-day trip, where time is not so sensitive. Those figures indicate that FLL provides service primarily to destinations in excess of 500 miles from Broward County and the Fort Lauderdale-Hollywood area.

For the majority business fliers and many pleasure travelers, driving distances over 500 miles are too long (one day's travel) and sometimes too expensive (lost productivity, hotel costs, gasoline, other expenses, etc.) to make road travel competitive with air travel.

Much of today's airfreight is "Just-in-Time" supply delivery. This means that it is the supplier's responsibility to get the supplies to market at the last possible moment and at their expense. Non-overnight traffic is the fastest-growing segment of the domestic expedited cargo market.<sup>26</sup> Trucks are much cheaper to own and operate than aircraft and are capable of providing the type of time-definite service increasingly demanded by the market. As a result, trucks carry a growing share of domestic expedited freight. However, there remains a very large segment of domestic and international freight that is classified as "absolutely, positively overnight," high value, limited shelf life, or quick obsolescence delivery that would be shipped by cargo integrators, the "all cargo" carriers, or in the belly of commercial aircraft. Because meeting the delivery deadline is the business focus of the cargo industry, it is critical to client satisfaction and business reputation that the product arrive before or at the time promised. Further, while airfreight may be a more expensive mode of moving goods, much of the cost is offset by a reduction in inventory requirements with a corresponding reduction in the need for warehousing space, and potential loss due to spoilage or other issues. Thus, the use of air cargo transportation for the movement of time-certain delivery items both domestically and internationally will remain strong.

*The use of bus or automobile is not a reasonable alternative for most air travelers using FLL. Furthermore, while the use of other surface roadway transportation modes is feasible for some types of passenger travel and cargo delivery, it is not considered a reasonable alternative to meet the immediate demand and need for capacity at FLL.*

#### **4.2.1.3.2 RAIL TECHNOLOGY**

Existing passenger rail service to the Fort Lauderdale-Hollywood (Broward County) area is via conventional technology provided by Amtrak. The only direct rail competition with air travel out of FLL is Amtrak's Orlando and Jacksonville routes on *The Palmetto* and *Silver Service* trains (also referred to as the Silver Meteor and the Silver Star). Service is provided on these trains between Fort Lauderdale and New York City, and intermediate destinations in Georgia and Florida. Access to the western part of the U.S. is available by connecting to the *Sunset Limited* train in Orlando. The trains on each of these routes make numerous intermediate stops. Travel times by rail to Orlando and Jacksonville are 4.5 and 7.0 hours, respectively,

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<sup>26</sup> Airfreight is defined as a combination of air cargo and mail.

compared to 65 minutes and 80 minutes by air. In addition, the growth of low-cost air carriers has put air travel in a competitive price range with that of passenger rail, which further limits the potential of the existing passenger rail system to accommodate the travel demand at FLL.

In January 1999, Governor Jeb Bush terminated a state study that was considering the development of a high-speed rail system in Florida. In November 2000, voters in the State of Florida passed an amendment to the State Constitution that created the impetus, and set specific deadlines, for developing a high-speed rail system serving Tampa, Orlando, and Miami. In June 2001, the Florida Legislature enacted the Florida High Speed Rail Authority Act (F.S. 341-821–341-822). The act created the Florida High Speed Rail Authority and charged it with the responsibility for planning, administering, and implementing a high-speed rail system in Florida. This act also mandated that the initial segment of the system be developed and operated between St. Petersburg, Tampa, and Orlando, with future service to Miami.

Even with that constitutional amendment, considerable opposition to the high-speed rail amendment was generated by state leaders and efforts ensued to overturn the amendment. As noted in an open letter from the Governor's office it was the contention of state leaders that,

*“ . . . the State of Florida will pay an exorbitant price for high speed rail - a price that simply cannot be justified. We will spend billions of dollars before a single rider supports the system. Unlikely major federal assistance, unreliable ridership, and the lack of real private sector risk assumption places the cost of this project squarely on the shoulders of Florida taxpayers. Moreover, if this project moves forward, it will be to the detriment of ongoing and planned transportation projects that are critical to meeting this state's transportation needs.”<sup>27</sup>*

On November 2, 2004, the citizens of Florida voted to repeal the High Speed Rail Amendment to the Florida Constitution that was enacted in November of 2000. At its December 2004 meeting, the Florida High Speed Rail Authority determined that it is in the best interest of the State of Florida to complete the Final EIS and to pursue a Record of Decision for the initial segment of the project, preserving the work that had been accomplished to date.<sup>28</sup> The Final EIS was published in July 2005.<sup>29</sup>

*While high-speed rail may be potentially feasible at some undeterminable point in the future and continues to be deliberated in the State of Florida, public support for this type of public transportation service seems to no longer exist. Therefore, high-speed rail is not a reasonable alternative for travelers using FLL, and is not carried forward in the analysis of environmental consequences.*

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<sup>27</sup> *Governor's letter regarding high speed rail to the Legislature*, Jeb Bush, Governor of Florida. Copyright© 2000-2001 State Of Florida; The State of Florida, State Technology Office. Internet web site: <http://www.myflorida.com/myflorida/government/laws/>

<sup>28</sup> Florida High Speed Rail Authority, *2005 Report to the Governor and Legislature*, January 2005.

<sup>29</sup> Florida High Speed Rail FEIS – Tampa to Orlando. July 2005. Internet web site: <http://www.fra.dot.gov/us/content/1189>

#### 4.2.1.3.3 TELECOMMUNICATIONS: VIDEO-CONFERENCING

Two-way video technology has been around for almost 30 years and offers the potential to serve a portion of the air travel market throughout the country. With technology that has been developed, but available in limited quantities, videoconferencing and collaborative computing could serve as an alternative to some air travel activity. Teleconferencing can be defined as the use of telecommunications to facilitate contacts that might otherwise have involved business travel – such as meetings, training sessions, interviews, or information/data collection. It typically involves a multi-way telephone conversation or video link or web link.<sup>30</sup>

High-speed video communication technology is expected to be available to most companies by 2010 and to most workers by 2020. Industry-wide, it is anticipated that telecommunication has the potential to reduce business-related air travel demand. The results of a number of studies from the early 1990s concluded that videoconferencing could potentially reduce business air travel by 3.6 percent to 8.6 percent within the 2004 to 2007 period.<sup>31</sup> However, when the reduction in business travel is factored into total air travel demand, which includes both business and pleasure travel, the total reduction in demand may be less.<sup>32</sup> This value should be considered also in the context of the tourism destination market that FLL serves.

While communication technology may reduce the demand for air travel by a small amount, it would not replace the need for air travel. *Therefore, telecommunication technology would not provide a reasonable alternative to the demand for air service at FLL and is not carried forward in the analysis of environmental consequences.*

#### 4.2.2 ON-SITE ALTERNATIVES

##### 4.2.2.1 Non-Runway Development Alternatives

Additional airfield improvement alternatives were reviewed (excluding new runways or runway extensions) to determine their potential to reduce airfield delays at FLL. These types of improvements include taxiways, runway exits, aircraft hold pads, and revised taxiway flow directions. The airfield improvements, listed below as

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<sup>30</sup> Cairns S., Sloman L., Newson C., Anable J., Kirkbride A. and Goodwin P. (2004). *Smarter Choices—Changing the Way We Travel*. UCL, Transport for Quality of Life, The Robert Gordon University and Eco-Logica, Final report to the Department for Transport, London, UK. Chapter 11. Teleconferencing, p. 274.

<sup>31</sup> Cairns S., Sloman L., Newson C., Anable J., Kirkbride A. and Goodwin P. (2004). *Smarter Choices—Changing the Way We Travel*. UCL, Transport for Quality of Life, The Robert Gordon University and Eco-Logica, Final report to the Department for Transport, London, UK. Chapter 11. Teleconferencing, p. 284.

<sup>32</sup> *Making Connections, How Telecommunications Technologies Will Affect Business and Leisure Air Travel*, by Apogee Research, 1994.

items 1 through 4, were identified in the *FLL Runway Capacity and Use Alternatives Report* dated June 14, 2005;<sup>33</sup> items 5 and 6 are other non-runway development alternatives developed for analysis in this Draft EIS:

1. Construct Taxiway 'C'
2. Construct a Loop Taxiway around the east end of Runway 27R
3. Construct a north and south high-speed exit on Runway 9L/27R (north side only)
4. Construct aircraft hold apron areas
5. Increase the separation of Taxiways 'A' and 'B' from Runway 9L/27R
6. Increase the separation of Taxiways 'G' and 'H' from Runway 9R/27L

#### **4.2.2.1.1 CONSTRUCT TAXIWAY C**

This taxiway, located immediately south of existing Taxiway B, would function as a partial length outer parallel taxiway to Runway 9L/27R. The first phase of taxiway development would begin at the western end of Taxiway B extending east to Runway 13/31. The second phase of construction would be planned to extend the taxiway from Runway 13/31 to existing Taxiway D and from Taxiway Q to Taxiway T. The extension of Taxiway C between Taxiway D and Taxiway Q is not considered because it would require the relocation or decommissioning of the FLL Very High Frequency (VHF) Omni-Range (VOR) Beacon. *The construction of Taxiway C would not provide a sufficient capacity increase or the additional runway length needed to meet future operational demand requirements.*

#### **4.2.2.1.2 CONSTRUCT A LOOP TAXIWAY AROUND THE EAST END OF RUNWAY 27R**

The construction of a Loop Taxiway around the east end of Runway 27R is intended to provide unrestricted movement of aircraft between Taxiway A and the north terminal gates. This project is intended to provide additional taxi flow capability and reduce taxi delays between those areas. *The construction of a Loop Taxiway would not provide a sufficient capacity increase or the additional runway length needed to meet future operational demand requirements.*

#### **4.2.2.1.3 CONSTRUCT ANGLED TAXIWAY EXITS ON RUNWAY 9L/27R (NORTH SIDE ONLY)**

The development of new high-speed exits on the north side of Runway 9L/27R would help to reduce runway occupancy times during arrival operations. These two exits would be used predominantly by the north side cargo tenants and would provide a minimal increase in runway capacity. Typically, air cargo operations are not conducted at FLL during peak air carrier arrival and departure periods, which are the key drivers of the need for airfield capacity at FLL. Therefore, while high-speed runway exits would enhance the movement of cargo aircraft to and from the

<sup>33</sup> *Fort Lauderdale-Hollywood International Airport Runway Capacity and Use Alternatives Report*, Microsoft PowerPoint presentation prepared by URS Corporation and presented to the Broward County Board of County Commissioners, June 14, 2005.

north side of the airfield, it would not meet the need to accommodate air carrier operational demand. *The construction of angled taxiway exits would not provide a sufficient capacity increase or the additional runway length needed to meet future operational demand requirements.*

#### **4.2.2.1.4 AIRCRAFT HOLD APRON AREAS**

Aircraft apron hold areas generally provide additional flexibility during periods of "taxi and gate holds" that occur during peak arrival and departure periods. Hold pads at the runway ends provide taxi flexibility and sequencing of aircraft during peak departure periods. Hold pads located close to the terminal gates provide a staging area for arriving aircraft if a gate is not immediately available (i.e., with late departures). At FLL, hold pads would provide additional airfield flexibility during peak arrival and departure taxi flow operations; however, airfield capacity (i.e., runway throughput) would not increase sufficiently to meet existing and future aviation demand levels. *The construction of aircraft hold apron areas would not provide a sufficient capacity increase or the additional runway length needed to meet future operational demand requirements.*

#### **4.2.2.1.5 INCREASE THE SEPARATION OF TAXIWAYS 'A' AND 'B' FROM RUNWAY 9L/27R**

Runway 9L/27R has two full-length parallel taxiways. Taxiway 'A' is located 450 feet to the north and Taxiway 'B' is located 450 feet to the south. The separation of these two taxiways is adequate for Airplane Design Group V (B-747-400)<sup>34</sup> and Category I approach conditions.<sup>35</sup> *Therefore, there is no need to further separate these taxiways from the runway, and an increase in taxiway separation would not provide an increase in airfield capacity to meet existing and future aviation demand levels.*

#### **4.2.2.1.6 INCREASE THE SEPARATION OF TAXIWAYS 'G' AND 'H' FROM RUNWAY 9R/27L**

Runway 9R/27L has two parallel taxiways each with a 250-foot separation; Taxiway 'G' is on the north side and Taxiway 'H' is on the south side. The separation distance of these two taxiways complies with Airport Reference Code (ARC) B-II (aircraft with a wingspan up to, but not including 79 feet and approach speeds of 121 knots or less). Airplane Design Groups III, IV, and V cannot use this runway or taxiway system due to the reduced taxiway separation distance. By increasing the runway/taxiway separation distance to 400 feet, the minimum distance required to accommodate aircraft up to Airplane Design Group V, a minimal increase in runway capacity could be achieved. *However, increasing the taxiway separation distance would not provide a sufficient capacity increase or the additional runway length needed to meet future operational demand requirements.*

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<sup>34</sup> Advisory Circular 150/5300-13 Change 9 *Airport Design*.

<sup>35</sup> FAA Order 8260.3B *Change 19, United States Standards for Terminal Instrument Procedures (TERPS)*. May 12, 2002.

#### **4.2.1.1.7 Summary**

The non-runway development projects, while adding taxiway flexibility and reducing ground delays at FLL, would not provide the airfield capacity necessary to accommodate future aviation demand levels.

#### **4.2.2.2 Other Technologies**

Technological developments and resources were reviewed to determine their potential to reduce airfield delay at FLL. The *2003 Aviation Capacity Enhancement Plan* provided detailed summaries of technologies currently being evaluated by the FAA to reduce delay.<sup>36</sup> These technologies result in more efficient operations in the enroute, arrival, and departure phases of flight, and ultimately give pilots more flexibility in determining their route, altitude, speed, departure, and landing times. Although less expensive and more time-consuming than other capacity-enhancing solutions such as building new runways, the development and implementation of new flight procedures is a complex process.

##### **4.2.2.2.1 AIRPORT SURFACE CAPACITY TECHNOLOGY**

The purpose of the FAA's Airport Surface Traffic Automation (ASTA) program is to increase aviation safety by reducing runway incursions and surface collisions in the airport movement area. ASTA also provides controllers with automated aids to reduce delays and improve the efficiency of surface movement. The ASTA program is composed of five elements: (1) a runway status light system, (2) a surveillance data link, (3) aural and visual warnings, (4) data tags, and (5) a traffic planner. This program would be accomplished through implementation of the following systems:

- Airport Surface Detection Equipment (ASDE-3)
- Automated Radar Terminal System (ARTS)
- Differential Global Positioning System (DGPS)
- Airport Movement Safety System (AMASS)

At FLL, ASTA would provide controllers with automatically generated alerts and cautions as well as data tags to identify all aircraft and special vehicles on the airport movement area in all weather conditions. It would share information with the Terminal Air Traffic Control Automation (TATCA) program to create an interrelated runway incursion prevention system. The ASTA would provide an automated all weather system that allows for the safe movement of ground operations and improves efficiency. *However, airfield capacity itself is not increased by technical programs and the programs would not meet or satisfy the need to provide sufficient airfield capacity to accommodate future 2012 and 2020 aviation demand levels.*

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<sup>36</sup> FAA, *2003 Aviation Capacity Enhancement Plan*.

**Terminal Radar Approach Control (TRACON) Technology:** Terminal airspace is the controlled airspace normally associated with aircraft departure and arrival patterns to and from airports within a terminal system and between adjacent terminal systems. To permit more closely-spaced arrivals and departures, improvements would be required in precision navigation, enhanced vision, and improved surveillance capabilities. Such technology includes:

**Terminal Air Traffic Control Automation:** This program assists air traffic controllers with managing air traffic in the terminal area airspace to ensure the efficient use of airport facilities. *This technology would not increase the airfield capacity and therefore, would not meet or satisfy the need to provide sufficient airfield capacity to accommodate existing or future aviation demand levels.*

**Precision Runway Monitor/Simultaneous Offset Instrument Approach (PRM/SOIA):** During periods of low visibility, simultaneous approaches to closely-spaced parallel runways monitored by conventional airport surveillance radar are not permitted. For parallel runways separated by 2,500 feet to 4,300 feet, two arrival streams can be maintained, but operations are limited to parallel dependent instrument approaches using 1.5-mile staggered separation. (The two existing east-west parallel runways at FLL, Runways 9R/27L and 9L/27R, have a lateral separation of 3,960 feet.) To help reduce the negative effect of weather on arrival capacity, the FAA has developed the PRM/SOIA.<sup>37</sup>

PRM/SOIA operations are being conducted at San Francisco<sup>38</sup> and Cleveland International airports. St. Louis Lambert International Airport began PRM/SOIA operations in 2005 and Atlanta Hartsfield International Airport began PRM operations in 2006.

It is foreseeable that the use of PRM at FLL could provide an increase in runway capacity during poor weather conditions. However, due to the short length of Runway 9R/27L (5,276 feet) and the operational limitations described above, it is unlikely that the PRM would provide sufficient air carrier arrival capacity during peak Instrument Flight Rules (IFR) weather conditions. Based on the runway length analysis, the majority of current air carrier aircraft will need a minimum runway length of 6,000 feet for landing. *At FLL, PRM would only increase capacity during low visibility conditions. However, the need for additional capacity at FLL exists, not only during bad weather but during good weather conditions as well.*

**The Standard Terminal Automation Replacement System (STARS):** STARS is a joint FAA and Department of Defense (DOD) program to replace the ARTS and other capacity-constrained, older technology systems. The FAA deployment schedule for STARS only covers the Federal fiscal years of 2002 through 2008. Currently, there is no program beyond 2008. FLL is not slated to receive the

<sup>37</sup> Precision Runway Monitor (PRM) Training. Internet web site: [http://www.faa.gov/education\\_research/training/prm/](http://www.faa.gov/education_research/training/prm/) Updated: 11:53 am ET June 16, 2005.

<sup>38</sup> NBAA—Airspace/Air Traffic: FAA Seeks Higher Business Aviation Use of SOIA/PRM Approaches at SFO. Internet web site: <http://web.nbaa.org/public/ops/airspace/sfo20050307.php> Updated: March 7, 2005.

STARS program technology before 2008.<sup>39</sup> *This technology would not increase the airfield capacity and therefore would not meet or satisfy the need to provide sufficient airfield capacity to accommodate existing or future aviation demand levels.*

**Traffic Alert and Collision Avoidance System (TCAS):** The TCAS is designed to provide a set of electronic eyes so the pilot can maintain awareness of the traffic situation in the vicinity of the aircraft while in flight. The TCAS uses three separate systems to plot the positions of nearby aircraft: (1) Mode S transponder signals to provide a bearing to neighboring aircraft, (2) Mode C to plot the altitude of nearby aircraft, and (3) Mode S is used to measure the distance of an aircraft from the TCAS aircraft. TCAS provides safety measures independent of air traffic control (ATC) to supplement and enhance the ability to prevent air-to-air collisions. TCAS technology improvements, currently in development, would enable aircraft to accommodate reduced vertical separation above 29,000 feet and the ability to track multiple targets at longer ranges.<sup>40</sup> *The use of TCAS is an airspace safety tool and would not increase airfield capacity at FLL.*

**Localizer Directional Aid (LDA) Approaches:** An LDA is a Navigational Aid (NAVAID) that provides nonprecision approach capabilities, which is essentially a localizer.<sup>41</sup> The LDA provides an approach course between three degrees and six degrees, making it similar in accuracy to a localizer. The use of LDA approaches will change in the future because the FAA has developed new standards for SOIA. SOIAs allow simultaneous approaches to two parallel runways with a lateral separation of at least 750 feet and up to, but not including, 3,000 feet. One aircraft can fly a straight-in Instrument Landing System (ILS) approach to one runway, with a second aircraft flying an offset LDA plus glideslope antennae approach to the parallel runway. The use of PRM technology is required with these operations. *The use of LDA/SOIA would not provide any capacity benefit at FLL because the parallel 9/27 runways have greater separation than 3,000 feet.*

**Global Positioning System (GPS):** Developed by the U.S. DOD over the last 20 years, the GPS/GNSS (Global Navigation Satellite System) is expected to allow aircraft to fly flexible and highly accurate flight tracks. FAA has initiated a comprehensive satellite program involving government, industry, and users to expedite the research and development, and field implementation of these improved navigation services.

GPS has essentially replaced the Microwave Landing System (MLS) as the next-generation precision approach system. GPS has the capability to reduce delay and congestion at the surface of an airport, in addition to the terminal and enroute airspace. GPS is still not fully developed to the point of achieving the accuracy and availability of a standard ILS approach. The two systems being developed to improve GPS position accuracy and availability for instrument approaches are the Wide Area Augmentation System (WAAS) and Local Area Augmentation System

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<sup>39</sup> FAA STARS web site: <http://www.faa.gov/ats/atb/Sectors/Automation/STARS/waterfall.htm> Page Last Updated: January 17, 2003.

<sup>40</sup> FAA *Instrument Procedures Handbook*, FAA-H-8261-1, 2004.

<sup>41</sup> A localizer is the component of an Instrument Landing System (ILS) that provides course guidance to the runway.

(LAAS). These two systems would help keep additional runways open in poor weather conditions. Currently, FLL has Area Navigation (RNAV) GPS approach capability to Runway ends 9L, 9R, 27R, 13, and 31. *These GPS approach minimums are not as low as a typical ILS approach and would not provide the added poor weather runway capacity which will be needed in the future at FLL.*

**Required Navigation Performance (RNP) Approaches:**<sup>42</sup> The accuracy and integrity of RNP monitoring provides more precision than conventional RNAV procedures. Both RNP and RNAV free an aircraft from having to fly over a series of ground-based navigation aids. RNP involves procedures that rely on onboard avionics to keep an aircraft within a tightly specified airspace corridor. An aircraft relies on its GPS sensors backed up with inertial reference units to track its own position during any period when navigation signals are not adequate.

All new Boeing and Airbus aircraft are equipped with RNP capable Flight Management Systems (FMS). RNP approach and departure procedures would be used mainly at terrain-challenged airports. RNP has a value in terms of confining an aircraft to less airspace, thereby providing more capacity in the ATC airspace. RNP is already being used over the Pacific for enroute navigation. *At FLL, the use of RNP as an airspace enhancement tool would not provide an increase in airfield capacity to accommodate existing or future aviation demand levels.*

**Flight Management Systems (FMS):** A FMS is an onboard computer system that integrates inputs from various subsystems to aid the pilot in controlling the airplane's lateral and vertical paths during landing and takeoff operations. The FMS may accomplish performance functions such as thrust management and fuel flow monitoring. Benefits of FMS include a reduction in airspace conflicts, a reduction in controller workload, and possible energy reduction and improvement in the precision of noise abatement flight tracks. FMS is not expected to increase an airport's capacity because of its reliance on the use of other non-precision and precision navigational aid facilities such as Distance Measuring Equipment (DME), RNAV GPS, localizer, glidepath, and waypoints. *The FMS would only increase the accuracy of landing and takeoff operations, but would not increase airfield capacity at FLL.*

#### **4.2.2.3 Procedural Alternatives**

##### **4.2.2.3.1 REGIONAL AIRSPACE RESTRUCTURING**

The purpose of regional airspace restructuring is to accommodate more air traffic moving between airports, reduce travel times, and subsequently reduce fuel consumption. Providing more direct routing simplifies the air traffic controller's duties by reducing the need to sequence aircraft traveling between multiple cities along a single route. Regional airspace restructuring increases the capacity of the air traffic system to accommodate traffic between airports. *Restructuring regional airspace would not increase airport capacity, but rather, it would increase the ability of the airspace to "deliver" more traffic to the airport, which would allow the airport to fully realize the benefits of proposed runway improvements.*

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<sup>42</sup> *Aviation Week & Space Technology*, June 13, 2005.

#### **4.2.2.3.2 SUMMARY**

*The use of other technologies and resources could increase capacity during low visibility conditions, enhance safety, and increase accuracy of takeoffs and landings, and could potentially increase the ability of the airspace to deliver more air traffic to FLL, but would not increase airfield capacity at FLL.*

#### **4.2.2.4 Activity or Demand-Management Alternatives**

The primary objective of demand-management alternatives is to manage the efficient use of existing airport facilities through measures such as pricing or regulatory actions implemented by the airport sponsor. Demand-management measures do not increase airport capacity during periods that are already saturated, but assist airport sponsors in balancing aircraft operational demand with available capacity during off-peak periods.

Most airports in the U.S. operate without any limits on access other than those imposed by available facilities such as gates, or by the needs of the air traffic system under different weather conditions. This means that airlines schedule flights at an airport based on passengers' demands for air travel to desired destinations, and at passengers' preferred time to travel. When the volume of flights at an airport exceeds the capacity of the airport's facilities, flights are delayed to arrive or depart later in the day when there is less demand. Historically, high delay situations at U.S. airports have resulted in the following demand-management measures.

##### **4.2.2.4.1 HIGH DENSITY RULE (HDR)**

The High Density Rule (HDR), a form of demand-management, is used to manage the high delays resulting from the imbalance of demand and capacity. HDR was established at five U.S. airports in 1968 – New York Kennedy, New York La Guardia, Newark, Chicago O'Hare, and Ronald Reagan-Washington National Airport. The Rule has been amended several times to change operational limits and rules for granting access rights for new entrant airlines at these airports. (The Rule was not enforced at Newark within a few years after being established and is no longer in effect.) The AIR 21 legislation of 2001 mandated the elimination of the HDR effective January 1, 2007. Based on the history of demand far exceeding available airport capacity, the FAA has chosen to implement replacement demand management rules at Chicago O'Hare, Ronald Reagan-Washington National, and New York La Guardia airports.

The HDR (and its replacement rules) limit access to the airports by limiting the number of time slots (slots) available for landing at an airport, by hour or half hour, during certain hours of the day. These slots are allocated to airlines, which must 'use-them or lose-them'. "Slot rules" have been heavily debated in the aviation industry with regard to their effectiveness, and their impact on airline competition.

*Slot rules are a demand management policy of last resort, considered only when the FAA has clearly demonstrated that operational controls are insufficient to manage the daily flow of air traffic. Slot rules do not increase airfield capacity;*

*therefore, the use of slot rules would not provide an increase in airfield capacity to accommodate existing or future aviation demand levels. Moreover, new slot rules are prohibited by 14 CFR Part 161 because they would be considered an airport access restriction.*

#### **4.2.2.4.2 PERIMETER RULE**

The 'Perimeter Rule' is a demand-management measure that restricts the destinations that an airport can serve by placing geographic limits, such as distance, on destinations. Perimeter rules are used by airport sponsors to manage the distribution of demand between multiple airports and are currently in effect at New York La Guardia. Perimeter rules do not increase the capacity of an airport but balance demand with available capacity at multiple airports, typically operated by the same entity. Broward County does not operate multiple commercial passenger service airports. Further, the County has no authority over the use of other commercial airports and cannot impose any restrictions on their use. *The perimeter rule is not applicable to Broward County because there is no equivalent County-operated airport to use to balance demand with capacity. Moreover, destination restrictions would not increase capacity at FLL.*

#### **4.2.2.4.3 PEAK HOUR PRICING**

Peak hour pricing policies are another demand management strategy. Historically, airport sponsors have not been successful in changing the operating behavior of major airlines through pricing policies. An average of three to six percent of airline operating costs is associated with the operating fees charged at airports. The fees necessary to change airline-operating behavior, resulting in a reduction in operations with greater load factors, would increase airport revenue dramatically and raise legal issues.

*Therefore, an increase in fees that would affect the level or type of operations would be highly questionable; and could be viewed as imposing an undue burden on interstate commerce and being contrary to the tenets of airlines deregulation and the competitive market.*

#### **4.2.2.4.4 SUMMARY**

*Activity or demand-management alternatives would not provide the airfield capacity necessary to accommodate existing and future aviation demand levels.*

#### **4.2.2.5 Runway Development Alternatives**

A total of 19 runway development alternatives were initially identified for evaluation (including the No Action Alternative). To determine if these alternatives could substantially meet the stated purpose and need to increase capacity and reduce delay, these alternatives were further screened on runway length, airfield throughput capacity, constructability, and the consideration of a series of "fatal flaws." Alternatives were eliminated from further evaluation if they failed to meet one or more of these criteria.

The *runway length requirements* identified in the Purpose and Need established a minimum runway length of 6,000 feet to adequately serve the aircraft fleet mix projection for both 2012 and 2020. However, a runway exceeding this length would provide greater flexibility for aircraft operations and would allow aircraft operators to increase departure stage lengths (distance to destination) without restricting payload. Therefore, the ability to exceed the minimum runway length of 6,000 feet, while not exceeding the maximum runway length of 8,000 feet at grade, is considered adequate. (See Appendix D.3, *Runway Length Analysis*.)

*Airfield throughput capacity* identifies the total number of operations that the airfield could accommodate during a specific period. This includes the maximum hourly throughput capability associated with each airfield-operating configuration. Airfield configurations with parallel runways typically produce a higher throughput than those with intersecting runways or an "Open-V" configuration.<sup>43</sup> "With rare exception, capacity-justified runways are parallel to the primary runway."<sup>44</sup>

*Constructability* considers the physical characteristics of each alternative and its direct impact on existing facilities and structures, infrastructure, and natural features. These physical characteristics can affect engineering costs, project schedules, operational safety and efficiency, and construction sequencing or phasing.

Potential *fatal flaws* were identified that would automatically eliminate an alternative from further consideration. These fatal flaws are associated with direct impacts on existing facilities that would result in substantial redevelopment or inhibit development or maintenance of existing transportation infrastructure. The fatal flaws described below are graphically depicted on Exhibit 4-1, *Fatal Flaws*.

- **Encroachment of Dania Cut-Off Canal, Interstate-95 and/or Seaboard Coast (CSX) Railroad:** These three features are located immediately west of existing Runway 9R/27L. Because the Dania Cut-Off Canal is a primary access route to the intracoastal waterway in southern Broward County, an alternative to construct a runway across this canal would have a detrimental affect on navigable waterways. This would be further complicated by the extension of a runway across Interstate-95 and/or the CSX rail corridor to the west, as a superstructure spanning both the interstate and rail corridor would be necessary to accommodate the runway.

**Terminal Impacts:** Typically, alternatives that encroach upon an existing terminal core area would cause significant disruption of airline and passenger service and require substantial additional investment. At FLL, however, Broward County has already identified a planned redevelopment of Terminal 4, therefore, alternatives directly affecting this existing facility may be considered for further evaluation.

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<sup>43</sup> An Open-V runway configuration results when two runways are not parallel, but can be operated independently because the RSAs do not intersect.

<sup>44</sup> FAA Advisory Circular 150/5300-13 (Change 10), *Airport Design*.

**Florida Power and Light (FPL) Substations Impacts:** The FPL LaDania substation is a primary component of the electrical infrastructure providing service to southern Broward County and parts of Dade County. The relocation of this facility or any alternative that would cause a disruption of service would require significant investment and coordination.

#### **4.2.2.5.1 A ALTERNATIVE**

For the purposes of evaluating the range of runway development alternatives, the alternatives were grouped into categories by "like" design attributes. (The A Alternative is identified as the No Action Alternative in this Draft EIS.)

#### **4.2.2.5.2 B ALTERNATIVES – SOUTH AIRFIELD DEVELOPMENT**

Seven alternatives were identified for the redevelopment of existing Runway 9R/27L. Alternatives B1 and B5 would require that Runway 13/31 be permanently decommissioned, while it could remain operational under Alternatives B2, B3, B4, B6, and B7. Alternatives B1, B2, B3, and B6 propose options for the redevelopment of Runway 9R/27L along its approximate existing alignment. Alternatives B4 and B7 focus on the reconstruction of Runway 9R/27L approximately 340 feet north of its existing alignment; and Alternative B5 relocates Runway 9R/27L approximately 320 feet to the south. Exhibit 4-2 through Exhibit 4-8 graphically depict Alternatives B1 through B7.

#### **4.2.2.5.3 C ALTERNATIVES – NORTH AIRFIELD DEVELOPMENT**

Three alternatives were identified for a new closely-spaced parallel runway, Runway 8/26, on the north airfield, north of existing Runway 9L/27R. Runway 13/31 would need to be permanently decommissioned with a proposed airfield configuration of three east/west parallel runways due to multiple runway crossings. Multiple runway crossings tend to hinder overall airfield capacity and create safety issues. All of these alternatives maintain operations on existing Runway 9R/27L with the decommissioning of Runway 13/31. Exhibit 4-9 through Exhibit 4-11 graphically depict Alternatives C1 through C3.

#### **4.2.2.5.4 D ALTERNATIVES – SOUTH AND NORTH AIRFIELD DEVELOPMENT**

Two alternatives were identified combining the elements of the 'B' Alternatives and 'C' Alternatives to redevelop or reconstruct existing Runway 9R/27L on the south airfield; and develop a new closely-spaced parallel Runway 8/26, on the north airfield, north of existing Runway 9L/27R. Alternatives D1 and D2 are graphically depicted on Exhibits 4-12 and Exhibit 4-13.

#### **4.2.2.5.5 E ALTERNATIVES – CROSSWIND RUNWAY OR OPEN-V CONFIGURATION**

Six alternatives were identified to address the development of the crosswind runway or the airfield with an open-V configuration. Exhibit 4-14 through Exhibit 4-19 graphically depict Alternatives E1 through E6.

#### 4.2.2.6 Runway Development Alternatives Screening Results

Table 4-3, *Initial Screening of Runway Development Alternatives*, is a matrix of the screening analysis results for the 19 runway development alternatives. This matrix compares the ability of each alternative to satisfy the prescribed screening criteria and identifies those that are fatally flawed. No shading in the rows of Table 4-3 denotes alternatives eliminated from further consideration; the bold shaded text denotes the alternatives to be carried forward for further evaluation.

Although Alternative A (No Action) does not provide adequate throughput capacity or runway length, it is identified for further evaluation as required by NEPA.<sup>45</sup> Alternatives B1, B4, B5, C1, D1, and D2 all comply with the four screening criteria. On that basis, the six "build" alternatives and the No Action Alternative are carried forward for further evaluation in Chapter Six, *Environmental Consequences*.

*The following is a brief discussion of the alternatives eliminated from further consideration and the reasons for their having been eliminated, including fatal flaws, constructability issues, insufficient runway length, and insufficient airfield throughput capacity:*

##### 4.2.2.6.1 ALTERNATIVE B2:

Alternative B2, as described in the 2001 DEIS,<sup>46</sup> was deemed operationally infeasible due to the maintaining of Runway 13-31. Based on the proposed profile of Runway 9R-27L, elevating the south end of Runway 13/31 would be required to allow it to intersect Runway 9R/27L. The increased elevation of Runway 13/31 could inhibit aircraft movements between the south terminal area and the west side of the airfield. The runway length of this alternative also exceeds the range of runway lengths identified in Appendix D.3, *Runway Length Analysis*. *This alternative would result in an over development of the airfield due to excessive runway length. For that reason, and because of constructability issues, it is eliminated from further consideration.*

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<sup>45</sup> NEPA alternatives evaluation: National Environmental Policy Act of 1969 (NEPA) Part 1502, *Environmental Impact Statement*, Section 1502.14.

<sup>46</sup> *Federal Aviation Administration Intent To Prepare Environmental Impact Statement, Fort Lauderdale-Hollywood International Airport, Ft. Lauderdale, FL* – [Federal Register: March 29, 1996 (Volume 61, Number 62)], [Notices] [Page 14190-14191]. From the Federal Register Online via GPO Access [[wais.access.gpo.gov](http://wais.access.gpo.gov)]: SUMMARY: The Federal Aviation Administration (FAA) is issuing this notice to advertise to the public that an Environmental Impact Statement (EIS) will be prepared and considered for the proposed extension of Runway 9R/27L to 9,000 feet and widening to 150 feet at Ft. Lauderdale-Hollywood International Airport.

**Table 4-3  
INITIAL SCREENING OF RUNWAY DEVELOPMENT ALTERNATIVES  
Fort Lauderdale-Hollywood International Airport**

<b>Alternative</b>	<b>Throughput Capacity</b>	<b>Length</b>	<b>Constructability</b>	<b>Fatal Flaw</b>
<b>A</b>	<b>Inadequate</b>	<b>Inadequate</b>	<b>Practical</b>	<b>Not Flawed</b>
<b>B1</b> <sup>1/</sup>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
B2 <sup>2/</sup>	Adequate	Excessive	Not Practical	Not Flawed
B3 <sup>3/</sup>	Adequate	Adequate	Not Practical	Flawed
<b>B4</b>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
<b>B5</b>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
B6 <sup>3/</sup>	Adequate	Adequate	Not Practical	Flawed
B7	Adequate	Adequate	Not Practical	Flawed
<b>C1</b>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
C2 <sup>4/</sup>	Adequate	Adequate	Not Practical	Flawed
C3 <sup>4/</sup>	Adequate	Adequate	Not Practical	Flawed
<b>D1</b>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
<b>D2</b>	<b>Adequate</b>	<b>Adequate</b>	<b>Practical</b>	<b>Not Flawed</b>
E1	Inadequate	Adequate	Practical	Not Flawed
E2	Inadequate	Adequate	Practical	Not Flawed
E3	Inadequate	Adequate	Practical	Not Flawed
E4 <sup>5/</sup>	Inadequate	Adequate	Not Practical	Flawed
E5	Inadequate	Adequate	Not Practical	Not Flawed
E6	Inadequate	Adequate	Not Practical	Not Flawed

<sup>1/</sup> Alternative B1 corresponds with the Sponsor's Proposed Project.

<sup>2/</sup> Alternative B2 corresponds with the Sponsor's Proposed Project as assessed during the previous EIS.

<sup>3/</sup> Alternative B3 and B6 were eliminated from further consideration due to constructability issues associated with extending Runway 9R/27L over the Dania Cut-off Canal, Interstate 95, and/or the CSX railroad.

<sup>4/</sup> Alternatives C2 and C3 were eliminated from further consideration due to impacts to the terminal core associated with the construction of the proposed Runway 9C/27C.

<sup>5/</sup> Alternative E4 was eliminated from further consideration because the LaDania FP&L substation would need to be demolished and relocated.

Sources: Landrum & Brown; The Corradino Group.

Prepared By: The Corradino Group

#### 4.2.2.6.2 ALTERNATIVES B3 AND B6

With both of these alternatives, the expansion of Runway 9R/27L would extend across the Dania Cut-Off Canal, Interstate-95, or the CSX Railroad to the west. The detrimental effects on a navigable waterway and the superstructure that would be required to extend over Interstate-95 and the CSX railroad, constitute fatal flaws in Alternatives B3 and B6. *Due to these fatal flaws, Alternatives B3 and B6 have been eliminated from further consideration.*

#### 4.2.2.6.3 ALTERNATIVE B7

During the Draft EIS status briefing held on January 17, 2006, the Broward County Board of County Commissioners (the Commission) requested that the FAA assess the ability to increase the overall length of Runway 9R/27L proposed under Alternative B4. More specifically, options to further realign the FEC Railway and shift U.S. Highway 1 to the east were explored to determine if the overall length of Runway 9R/27L could be maximized. However, detailed analysis revealed that the further realignment of the FEC Railway would create significant impacts to existing residential areas and businesses in the City of Dania Beach. *Due to constructability issues, Alternative B7 was eliminated from further consideration.*

#### 4.2.2.6.4 ALTERNATIVES C2 AND C3

The development proposed with Alternatives C2 and C3 would encroach upon Terminals 1, 2, and 3, requiring their reconfiguration. The impacts on these terminals constitute fatal flaws in Alternatives C2 and C3. *Due to these fatal flaws, Alternatives C2 and C3 are eliminated from further consideration.*

#### 4.2.2.6.5 ALTERNATIVE E1

With the proposed realignment of Runway 13/31 the intersection with Runway 9L/27R would be eliminated and the crosswind runway would be renamed Runway 12/30. To allow independent operations and maintain airfield arrival capacity, the overall length of Runway 9R/27L would need to be reduced from 5,247 feet to approximately 4,000 feet.

In east flow, this configuration would increase airfield departure capacity. However, arrival capacity would decrease due to the diminished service capability of shortened Runway 9R/27L. Furthermore, simultaneous arrivals from the north on Runways 9 and 12 could not occur because of intersecting arrival corridors.

In west flow, the airfield arrival capacity would increase while the departure capacity would decrease due to the same operational capabilities. Airfield configurations with parallel runways typically produce a higher throughput than those with intersecting runways or an "Open-V" configuration.<sup>47</sup> AC 150/5300-13, Change 10, *Airport Design*, states that, "[w]ith rare exception, capacity-justified

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<sup>47</sup> An Open-V runway configuration results when two runways are not parallel, but can be operated independently because the RSAs do not intersect.

runways are parallel to the primary runway."<sup>48</sup> *Alternative E1 is eliminated from further consideration, because its insufficient runway length cannot accommodate the projected FLL aircraft fleet.*

#### 4.2.2.6.6 ALTERNATIVES E2 AND E3

Alternatives E2 and E3 would require the closure of both Runways 13/31 and 9R/27L. These closures would decrease the throughput capacity of the airfield, and neither alternative would adequately accommodate projected future operational demand levels. AC 150/5300-13, Change 10, *Airport Design*, states that, "[w]ith rare exception, capacity-justified runways are parallel to the primary runway."<sup>49</sup> *The airfield configuration of Alternatives E2 and E3 could not accommodate the projected aircraft fleet mix at FLL and provide the necessary airfield throughput capacity. Therefore, Alternative E2 and E3 are eliminated from further consideration.*

#### 4.2.2.6.7 ALTERNATIVE E4

Due to the encroachment of the proposed runway upon the FPL LaDania substation, Alternative E4 is considered fatally flawed and not constructible. *Therefore, Alternative E4 is eliminated from further consideration.*

#### 4.2.2.6.8 Alternatives E5 and E6

Alternatives E5 and E6 would not increase the overall throughput of the airfield, and would not adequately accommodate the projected future operational demand levels. Due to the encroachment of the U.S. Highway 1/ Griffin Road intersection and Interstate-595/Interstate-95 Interchange, respectively, the construction of these two alternatives would not be feasible. *Alternatives E5 and E6 are eliminated from further consideration due to lack of throughput and fatal flaws.*

*The following is a brief summary of the alternatives that survived the screening and fatal flaw analyses and will be carried forward for the analysis of environmental consequences:*

#### 4.2.2.6.9 A ALTERNATIVE—NO ACTION

FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*,<sup>50</sup> requires that the effects of a No Action alternative must be disclosed in the Draft EIS along with the potential environmental impacts of the proposed action and its reasonable alternatives.

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<sup>48</sup> FAA Advisory Circular 150/5300-13 (Change 10), *Airport Design*.

<sup>49</sup> FAA Advisory Circular 150/5300-13 (Change 10), *Airport Design*.

<sup>50</sup> FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*, April 28, 2006, Chapter 10, Section 1001. EIS PURPOSE. 40 CFR 1502.1 states the primary purpose of an EIS is to be an "action-forcing tool" to ensure Federal government programs and actions meet NEPA's goals and policies. The EIS allows the agency to take a "hard look" at the environmental impacts of the No Action, the proposed action, and its reasonable alternatives.

For this Draft EIS, the No Action Alternative presumes no runway or other major airfield improvements or development projects would occur;<sup>51</sup> and Runway 9R/27L remains at its existing length of 5,276 feet by 100 feet.

#### **4.2.2.6.10 B ALTERNATIVES – SOUTH AIRFIELD DEVELOPMENT**

**B1:** Alternative B1 includes the redevelopment and extension of the existing alignment of Runway 9R/27L to the east to a total length of 8,600 feet by 150 feet without encroaching onto NE 7th Avenue. This alternative maximizes the overall runway length by extending and elevating it to the east over the FEC Railway and U.S. Highway 1; the western extent of the runway would be the Dania Cut-Off Canal. Due to the increased elevation of the intersection of Runways 9R/27L and 13/31, Runway 13/31 would be closed permanently. Alternative B1 reflects the original configuration of the Airport Sponsor's Proposed Project based on information received from Broward County in November 2004.<sup>52</sup>

**B1b:** Under Alternative B1b, Runway 9R/27L would have the same physical alignment as Alternative B1. However, the overall length of Runway 9R/27L would be reduced to allow for the installation of EMAS. Runway 9R/27L would have an overall length of 8,000 feet and width of 150 feet to achieve full compliance with the runway safety area (RSA) design criteria. This avoids having a portion of the RSA for Runway 9R/27 in the Dania Cut-Off Canal. The runway extension would be to the east without encroaching onto NE 7th Avenue and it would be elevated over the FEC Railway and U.S. Highway 1; the western extent of the runway is the Dania Cut-Off Canal. Due to the increased elevation of the intersection of Runways 9R/27L and 13/31, Runway 13/31 would be closed permanently. Alternative B1b includes the use of EMAS on each end of the runway. Alternative B1b is based on information received from Broward County in December 2005.<sup>53</sup>

**B1c (Airport Sponsor's Proposed Project):** Alternative B1c has the same physical alignment, design conditions, and configuration as Alternative B1b. However, Alternative B1c considers the implementation of the operational noise abatement actions described in the *County's Airfield Development Program*

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<sup>51</sup> Previously approved taxiway and/or apron improvement projects are considered as part of the baseline conditions.

<sup>52</sup> Letter to FAA Manager, Orlando Airports District Office from FLL Director of Aviation Broward County Aviation Department, dated November 1, 2004. "This responds to your letter dated December 24, 2003 requesting information necessary for the preparation of the revised Environmental Impact Statement (EIS) for the proposed extension of Runway 9R/27L at the Fort Lauderdale-Hollywood International Airport."

<sup>53</sup> COMMISSION WORKSHOP NOTICE. Presentation of Alternatives to be considered by FAA in the Environmental Impacts statement for The Proposed Reconstruction of Runway 9R/27L at Fort Lauderdale-Hollywood International Airport. Internet web site posted 01/13/2006: [http://www.broward.org/airport/community\\_currentevents.htm](http://www.broward.org/airport/community_currentevents.htm)

*Objective Statement* (October 26, 2004).<sup>54</sup> Broward County provided the operational assumptions to the FAA in August 2006 based on the County Objective Statement.

**B4:** Alternative B4 includes shifting the alignment of Runway 9R/27L 340 feet to the north, and construction of a new 6,001-foot runway using the Dania Cut-Off Canal as the western limit for development. The new alignment of Runway 9R/27L would require the reconfiguration of Terminal 4. Because Runway 9R/27L would not extend over the FEC Railway and/or U.S. Highway 1, Alternative B4 uses EMAS on both runway ends, while Airport Perimeter Road and the FEC Railway are shifted to the east to achieve the 6,001-foot minimum runway length. Alternative B4 avoids decommissioning Runway 13/31.

**B5:** Under Alternative B5, the alignment of Runway 9R/27L would be shifted 300 feet to the south and a new 7,800-foot runway would be constructed without encroaching upon NE 7<sup>th</sup> Avenue. This new runway would be elevated over the FEC Railway and U.S. Highway 1 while the Dania Cut-Off Canal is the western limit for development. Alternative B5 uses EMAS on both runway ends. Runway 13/31 would be decommissioned. The intersection of Griffin Road and U.S. Highway 1 would be relocated approximately 950 feet south of its existing location to accommodate the Runway 9R/27L redevelopment.

#### **4.2.2.6.11 C ALTERNATIVES – NORTH AIRFIELD DEVELOPMENT**

**C1:** Alternative C1 includes the construction of a new closely-spaced parallel runway approximately 850 feet north of existing Runway 9L/27R for a total runway length of 7,721 feet. For purposes of the Draft EIS analysis, the proposed new north runway is referred to as Runway 8/26. The new runway would include standard RSAs on both ends without encroaching onto Interstate-95 to the west or the existing FEC Railway to the east. This alignment would require the displacement of multiple cargo and general aviation tenants located along the north side of the airfield. Runway 13/31 would be permanently decommissioned during the construction of Runway 8/26.

#### **4.2.2.6.12 D ALTERNATIVES – SOUTH AND NORTH AIRFIELD DEVELOPMENT**

Alternatives D1 and D2 combine the elements of the 'B' Alternatives and 'C' Alternatives with development proposed on both the south and north airfield (i.e., the redevelopment or reconstruction of existing Runway 9R/27L on the south airfield; and the development of a new closely-spaced parallel Runway 8/26 on the north airfield, north of existing Runway 9L/27R.).

**D1:** Alternative D1 combines the elements of Alternatives B1b and C1 and includes the following elements: the redevelopment of Runway 9R/27L to 8,000 feet by 150 feet, elevated over the FEC Railway and U.S. Highway 1 to the east, with the

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<sup>54</sup> Letter to FAA Manager, Orlando Airports District Office from FLL Director of Aviation Broward County Aviation Department, dated November 1, 2004. "This responds to your letter dated December 24, 2003 requesting information necessary for the preparation of the revised Environmental Impact Statement (EIS) for the proposed extension of Runway 9R/27L at the Fort Lauderdale-Hollywood International Airport."

western extent of the runway, the Dania Cut-Off Canal; the decommissioning of Runway 13/31; the installation of 600 feet of EMAS on each end of Runway 9R/27L; and the construction of a new north airfield runway (Runway 8/26) 7,721 feet long and located 850 feet north of existing Runway 9L/27R.

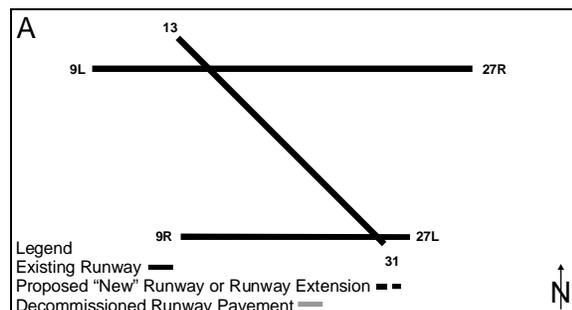
**D2:** Alternative D2 combines the elements of Alternatives B4 and C1 and includes the following elements: the redevelopment of Runway 9R/27L 340 feet north of the existing Runway 9R/27L, to 6,001 feet by 150 feet, with the Dania Cut-Off Canal the western limit for development; the decommissioning of Runway 13/31; the installation of 600 feet of EMAS on each end of Runway 9R/27L; and the construction of a new north airfield runway (Runway 8/26), 7,721 feet long and located 850 feet north of existing Runway 9L/27R.

### **4.3 ALTERNATIVES TO BE ASSESSED FOR ENVIRONMENTAL IMPACTS**

The alternatives to be assessed for environmental impacts include six build alternatives and the No Action Alternative, which is carried forward in the analysis per the requirements of NEPA<sup>55</sup> and as the basis for comparison. FAA has determined that these six build alternatives would substantially meet the stated purpose and need to increase capacity and reduce delay at FLL. Further, these alternatives satisfy runway length requirements, provide adequate airfield throughput capacity, are constructible, and have no "fatal flaws."

Each of these runway development alternatives were subject to additional configuration refinements to define airfield pavement geometry, the location of NAVAIDs, runway grades, direct facility impacts, the preliminary location of landing thresholds, and conformance to FAA design standards. This refinement of the runway development alternatives is based on preliminary data that was made available to the FAA during the preparation of the Draft EIS.

#### **4.3.1 ALTERNATIVE A – NO ACTION**



Alternative A reflects the No Action Alternative. This alternative incorporates already planned improvements or improvements currently under construction that include the extension of Taxiway C and two new angled taxiway exits. No additional improvements beyond 2008 are included in this alternative. These

<sup>55</sup> NEPA alternatives evaluation: National Environmental Policy Act of 1969 (NEPA) Part 1502, *Environmental Impact Statement*, Section 1502.14.

projects have independent utility from the Airport Sponsor's Proposed Project. Therefore, for this analysis, it is assumed these projects are complete and are incorporated as part of the baseline facility conditions for all of the alternatives. These improvements are graphically depicted in Exhibit 4-20, *Refined Alternative A - No Action*, along with the existing airfield configuration. The taxiway and angled taxiway exits are described as follows:

- **Taxiway C:** This taxiway, located immediately south of existing Taxiway B, will function as a partial length outer parallel taxiway to Runway 9L/27R. The first phase of development of this taxiway would begin at the western end of Taxiway B extending east to Runway 13/31. The second phase of construction is planned to extend the taxiway from Runway 13/31 to existing Taxiway D and from Taxiway Q to Taxiway T. The extension of Taxiway C between Taxiways D and Q is not planned because this would require the relocation or decommissioning of the FLL VHF VOR Beacon. The estimated timeframe for construction is 2008.
- **Acute Angled Runway 9L/27R Exits:** To reduce runway occupancy times on Runway 9L/27R, the construction of two additional angled taxiway exits are currently planned. These taxiway exits would be located along the north side of Runway 9L/27R to provide additional runway exit capability onto the north parallel Taxiway A. These exits would reduce runway occupancy time and decrease airfield congestion along Taxiways B and T within the north terminal complex. The estimated timeframe for construction is 2008.

#### **4.3.1.1 Capacity and Delay – Alternative A**

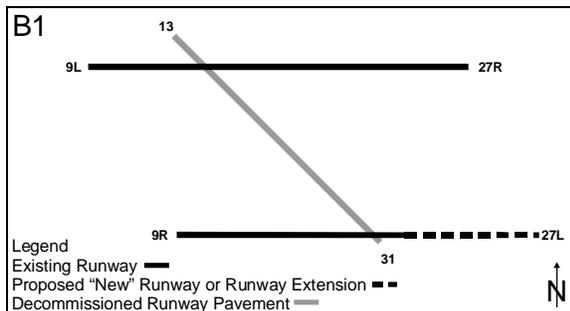
Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative A, during all weather conditions, is 84 operations per hour, or 310,000 annual operations at six minutes of annual average delay.

Aircraft operations delay was calculated for the 2012 and 2020 demand levels. Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (Visual Flight Rules (VFR)), and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative, per operation, is 10.7 minutes for 2012 and 26.2 minutes for 2020.

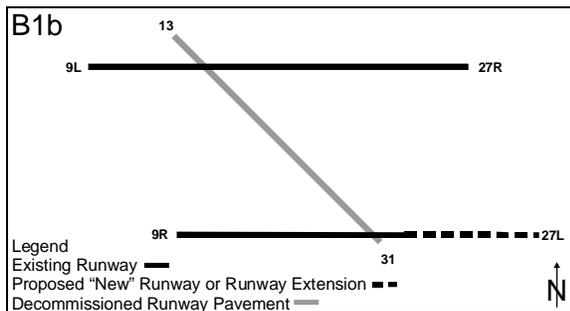
#### **4.3.1.2 Terminal Layout – Alternative A**

No changes would occur to the terminal area with Alternative A.

4.3.2 ALTERNATIVE B1: REDEVELOP AND EXTEND EXISTING  
 RUNWAY 9R/27L TO AN 8,600-FOOT BY 150-FOOT  
 ELEVATED RUNWAY



ALTERNATIVE B1b/B1c: REDEVELOP AND EXTEND EXISTING  
 RUNWAY 9R/27L TO AN 8,000-FOOT BY 150-FOOT ELEVATED  
 RUNWAY WITH EMAS



The refinement of Alternative B1 is graphically depicted on Exhibit 4-21, *Alternative B1 – East Extension/Widening of Runway 9R/27L*. These refinements are intended to configure Runway 9R/27L to be the same as the ALP that was approved by the Commission on October 26, 2004. This ALP drawing was subsequently submitted to the FAA for approval in November 2004 and is the basis of the configuration of Runway 9R/27L for this alternative. Furthermore, the *Preliminary Evaluation of Runway 9R/27L Lengths and Grades* report provides the basis for establishing the longitudinal and transverse grade requirements and location of the NAVAID facilities.

In January 2006, the Commission requested that the EIS evaluate, as a separate alternative, the Airport Sponsor’s Proposed Project with the use of EMAS at both ends of Runway 9R/27L rather than a standard RSA.<sup>56</sup> This scenario became Alternative B1b. With EMAS, the overall length of the proposed runway would be reduced, eliminating the need for declared distance and improving runway operational capability.

<sup>56</sup> January 17, 2006, Broward County Board of County Commissioners Workshop.

In July 2006, Broward County requested that the EIS also evaluate the implementation of the operational noise abatement actions as described in the *County's Airfield Development Program Objective Statement* (October 26, 2004).<sup>57</sup> Therefore, a second iteration of the Airport Sponsor's Proposed Project was developed and the FAA and the County mutually agreed that this iteration (Alternative B1c) would be identified as the Airport Sponsor's Proposed Project in this Draft EIS. Alternative B1c consists of the Alternative B1b airfield configuration with EMAS at both ends of Runway 9R/27L, and the implementation of the County's proposed operational noise abatement actions, including the runway use plan.

The airfield geometry, NAVAIDs, and potential facility impacts for Alternatives B1b and B1c are identical. The operating condition for Alternative B1b is unabated, meaning that the aircraft arrivals and departures on Runways 9R/27L and 9L/27R are unconstrained. For Alternative B1c, Runway 9L/27R would be the preferred runway during off-peak periods.

**Exhibit 4-22, *Refined Alternatives B1b/B1c – East Extension/Widening of Runway 9R/27L***, depicts Alternatives B1b and B1c with the redevelopment of Runway 9R/27L using EMAS. In accordance with FAA AC 150/5220-22A, *Engineered Materials Arresting Systems for Aircraft Overruns*, a standard EMAS bed length of 600 feet is considered off each runway end.

#### **4.3.2.1 Runway Geometry – Alternatives B1/B1b/B1c**

Consistent with the Broward County objective statement, the airfield configurations of Alternatives B1, B1b, and B1c do not encroach on the Dania Cut-Off Canal, nor do they extend beyond NE 7<sup>th</sup> Avenue. These constraints allow the overall runway length of Runway 9R/27L to be 8,600 feet for Alternative B1 and 8,000 feet for Alternatives B1b and B1c. At either of these lengths, Runway 9R/27L, along with a full-length parallel taxiway to the north, would extend over the existing FEC Railway and U.S. Highway 1 located east of the airport. This would require that Runway 9R/27L and its inner parallel taxiway be elevated to the east. The proposed runway alignment, longitudinal and transverse runway grades, and the taxiway extensions would be configured in accordance with the planning and design criteria described in the *Preliminary Evaluation of Runway 9R/27L Lengths and Grades* report.

In accordance with FAA design criteria for Airport Reference Code (ARC) D-IV, Runway 9R/27L and the associated taxiway infrastructure would have overall pavement width of 150 feet and 75 feet, respectively. The configuration of Runway 9R/27 also includes pavement shoulders extending laterally from each edge out 25 feet and a blast pad that extends beyond each runway end. Each blast pad meets the standard dimension of 200 feet wide by 200 feet long.

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<sup>57</sup> July 30, 2006, meeting with the FAA, FAA consultants, and staff of the Broward County Aviation Department.

#### **4.3.2.2 Taxiway/Taxilane and Holding Bay Geometry – Alternatives B1/B1b/B1c**

The configuration of Runway 9R/27L included in Alternative B1 corresponds to the County's most current ALP submittal. However, the taxiway infrastructure has been refined in this EIS analysis to enhance airfield circulation and the airfield throughput capacity. Similar infrastructure refinements were made to Alternatives B1b and B1c. These taxiway refinements were made in coordination with the FAA project team and ATC, and Broward County. These taxiway refinements include:

- **Full Length Inner Parallel Taxiway:** This proposed taxiway would be located north of Runway 9R/27L with a lateral centerline-to-centerline separation of 400 feet. The alignment and configuration of this taxiway corresponds to the original 2004 ALP submittal. The east end of the taxiway would be configured to include a holding bay. A holding bay is necessary to allow aircraft to reverse direction without encroaching on the runway system.
- **Partial Length Outer Parallel Taxiway:** This proposed taxiway would be located north of Runway 9R/27L with a lateral centerline-to-centerline separation of 267 feet. The alignment of this taxiway corresponds to the original 2004 ALP submittal, but would extend further west to connect to the west end of Runway 9R/27L.
- **Dual Cross-field Taxiway and Holding Bay:** To expedite aircraft taxi flows between the north and south airfield, Alternative B1 includes a proposed modification of existing Taxiway Q, which would comply with ARC D-IV design standards. This modification would require the widening of the southern portion of this taxiway, south of existing Runway 13/31. A second parallel taxiway would be constructed approximately 491 feet to the west of existing Taxiway Q. This new taxiway would comply with ARC D-IV design standards.

A holding bay is also considered between Taxiway Q and the new parallel taxiway to allow for the temporary staging of aircraft and/or aircraft hardstand parking positions. This modification to the dual cross-field taxiways was adopted at the request of ATC staff. It may be possible however, that this holding bay would be required only if the preferred terminal development option does not provide a dedicated aircraft staging area with adequate staging capacity. Otherwise, the dual cross-field taxiway system could be configured without the holding bay.

- **Partial Decommissioning of Taxiways D and E:** The proposed closure of Runway 13/31 could enhance the airport's ability to expand the existing terminal facilities by decommissioning portions of existing Taxiways D and E. Both taxiways would be decommissioned east of existing Taxiway Q.
- **Runway Exit Geometry:** Additional runway exits would be added to Runway 9R/27L to improve the throughput capacity of the extended runway. Without adequate runway exits, landing aircraft would occupy the runway for longer periods, compromising the efficiency of the runway. The new exits

would improve the operational efficiency of the airfield by reducing runway occupancy time. Acute angled taxiway exits would be constructed to handle landing aircraft from both directions.

In accordance with ARC D-IV design standards, all of the taxiway improvements would have an overall width of 75 feet and paved shoulders extending laterally 25 feet from the edge of full strength pavement.

#### **4.3.2.3 Proposed Temporary Runway 9R/27L – Alternatives B1/B1b/B1c**

Broward County has proposed converting the outer parallel taxiway to a temporary runway that would be used while Runway 9R/27L is under construction. The temporary runway would provide dual runway operational capability, eliminating the need to have only one runway operational during specific periods of construction. The temporary runway would comply with FAA design standards ARC B-II and operate during Visual Meteorological Conditions (VMC). This would restrict the runway to aircraft with a wingspan up to, but not including 79 feet and approach speeds of 121 knots or less. The minimum runway width for ARC B-II is 75 feet, which coincides with the ultimate width of the taxiway for ARC D-IV. A detailed description of the preliminary configuration of Temporary Runway 9R/27L is provided in Appendix E, *Airfield Planning, Design, and Constructability Review*.

#### **4.3.2.4 NAVAID Systems – Alternatives B1/B1b/B1c**

Alternatives B1, B1b, and B1c also include the installation of a Category I ILS for arrivals on both Runways 9R and 27L. The ILS configuration provides for a localizer antenna array, glideslope antennas, Precision Approach Path Indicators (PAPI), and approach light systems for both runway ends. Exhibit 4-23 *Preliminary NAVAID Siting Alternative B1*, and Exhibit 4-24, *Preliminary NAVAID Siting Alternative B1b/B1c*, graphically depict the proposed configuration of these facilities. A detailed description of the NAVAID systems associated with Alternatives B1, B1b, and B1c is provided in Appendix E, *Airfield Planning, Design, and Constructability Review*.

#### **4.3.2.5 Facility and Infrastructure Impacts – Alternatives B1/B1b/B1c**

The proposed redevelopment of Runway 9R/27L and the associated taxiway system would have direct permanent and temporary impacts on both on- and off-airport existing facilities. Permanent impacts result from construction activities. Temporary impacts result from the operation of the temporary runways and taxiways, which would provide air traffic with operational flexibility during the construction period. Exhibit 4-25, *Direct Facility and Infrastructure Impacts Alternatives B1/B1b/B1c*, depicts the direct facility impacts associated with Alternatives B1, B1b, and B1c and the potential relocation of airport facilities that could be accommodated on airport property. These impacts include:

**Permanent Impacts:**

- Relocation of the Gulfstream Airways Aircraft Maintenance Hangar
- Relocation of the Holland Sheltair (Jet Center) South Hangar and apron facilities
- Relocation or termination of Airport Perimeter Road
- Relocation or decommissioning of the Airport Surveillance Radar ASR 9
- Encroachment or relocation of the FEC Railway and Florida DOT Right-of-Way
- Acquisition and/or demolition of all or part of the Wyndham Fort Lauderdale Airport Hotel; RPZ impact off-airport
- Relocation or reconfiguration of Terminal 4; airside only
- Relocation or demolition of the Airport Administrative Offices
- Relocation or demolition of the FLL Vacant Rental Car Facility (former Alamo Facility)
- Relocation or demolition of the FLL vacant warehouse

**Temporary Impacts:**

- Encroachment or disruption of activities within the Holland Sheltair (Jet Center) east apron facilities
- Encroachment or occupation of the FEC Railway and Florida DOT Right-of-Way during airfield construction

Appendix E, *Airfield Planning, Design, and Constructability Review*, provides detailed summaries of the facility impacts associated with Alternatives B1, B1b, and B1c.

**4.3.2.6 Capacity and Delay – Alternatives B1/B1b/B1c**

Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*, and the methodology and assumptions are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternatives B1, B1b, and B1c during all weather conditions, is 107 operations per hour, or 445,000 annual operations at six minutes of annual average delay.

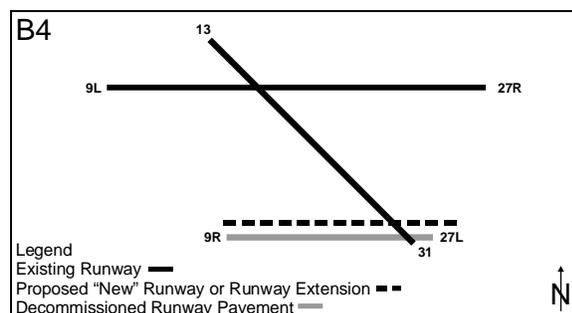
Aircraft operational delay was calculated for the 2012 and 2020 demand levels. Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (VFR), and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for Alternatives B1 and B1b, per operation, is 1.2 minutes for 2012 and 3.1 minutes for 2020. The resulting annual average delay for Alternative B1c per operation, is 3.9 minutes for 2012 and 3.1 minutes for 2020.

#### 4.3.2.7 Terminal Layout – Alternatives B1/B1b/B1c

This terminal redevelopment layout for Alternative B1 includes the expansion of Concourse E with six new gates, the construction of Concourse G with three gates, and the expansion of Terminal 4 with construction of Concourses I and J. These terminal elements are the same as the Airport Sponsor's Proposed Project that was assessed in the three previous FAA DEIS documents published in 2001<sup>58</sup> and 2002.<sup>59 60</sup>

The terminal redevelopment footprint for Alternatives B1b and B1c is Option 2B<sup>61</sup> of the FLL Phase 1 Master Plan Update (MPU). This footprint, supplied by Broward County,<sup>62</sup> could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment* provided in Appendix D.2., *Terminal Gate Verification*.) This development footprint includes the redevelopment of Terminals 2 and 3, the redevelopment and extension of Concourse F, and the redevelopment of Terminal 4 to create a linear flight line.

#### 4.3.3 ALTERNATIVE B4: BUILD A NEW 6,001-FOOT AT GRADE RUNWAY WITH EMAS LOCATED 340 FEET NORTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)



The alignment of Runway 9R/27L proposed under Alternative B4 has been refined to maximize its overall length, while maintaining an adequate land envelope to the

<sup>58</sup> FAA Draft Environmental Impact Statement for Proposed Expansion of Runway 9R-27L Fort Lauderdale-Hollywood International Airport, Broward County, Florida. FAA, February 2001.

<sup>59</sup> FAA Supplemental Draft Environmental Impact Statement for Proposed Expansion of Runway 9R-27L Fort Lauderdale-Hollywood International Airport, Broward County, Florida. FAA, November 2001.

<sup>60</sup> FAA Second Supplement to the Draft Environmental Impact Statement for Proposed Expansion of Runway 9R-27L Fort Lauderdale-Hollywood International Airport, Broward County, Florida. FAA, November 2002.

<sup>61</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

<sup>62</sup> MEMORANDUM to Bolfi Posadas, Broward County Aviation Department. From Larry Coleman, LFA (Leigh Fisher Associates). Subject: Gate Requirement Analysis for Master Plan Update, Phase 1. Dated January 20, 2006. This memorandum provides a description of the factors that were considered and the methodology that was used by LFA to derive these estimates followed by a review of the findings and results.

north to allow for Terminal 4 redevelopment. Runway 9R/27L would be reconstructed approximately 340 feet north of its current alignment with adequate clearance to preserve the existing terminal roadway.

#### 4.3.3.1 Runway Geometry – Alternative B4

Exhibit 4-26, *Refined Alternative B4 – New Runway 9R/27L (6,001 feet by 150 feet)*, depicts Alternative B4. To achieve an overall runway length of 6,001 feet, the use of modified EMAS beds would be required for each runway end, and the FEC Railway would need to be shifted slightly to the east. Shifting the FEC Railway to the east and using EMAS would create a land envelope so that the overall length of Runway 9R/27L would not extend over the FEC Railway or U.S. Highway 1. This would minimize the amount of fill required and eliminate the need to construct a Mechanically Stabilized Earth (MSE) retaining wall between Runway 9R/27L and the south terminal complex.

An EMAS bed length of 400 feet is required to accommodate a Boeing 757 aircraft; however, an EMAS bed length of 335 feet could be adequate for Runway 9R/27L as configured under Alternative B4.<sup>63</sup> See Appendix E, *Airfield Planning, Design, and Constructability Review*, for a detailed discussion of the Alternative B4 runway configuration.

#### 4.3.3.2 Taxiway Geometry – Alternative B4

Initially, Runway 9R/27L would have two full-length dual parallel taxiways to the north. Both taxiways would be configured in accordance with ARC D-IV. The inner parallel taxiway would be located 400 feet from the centerline of Runway 9R/27L, with the outer parallel taxiway located an additional 215 feet to the north. Both taxiways would have an overall pavement width of 75 feet with shoulder widths of 25 feet.

Should aviation-related facilities be developed south of Runway 9R/27L, a full-length southern parallel taxiway could be developed. Although the minimum runway-to-parallel taxiway separation for ARC D-IV is 400 feet, under the proposed configuration, the separation increases to 485 feet at both ends of the runway. This is necessary to allow taxiway operations to occur without encroaching on the glideslope antennae critical areas of Runway 9R and 27L arrivals.

Alternative B4 also includes the following taxiway infrastructure improvements:

- **Dual Cross-field Taxiway:** To expedite aircraft taxi flows between the north and south airfield, Alternative B4 proposes to modify existing Taxiway Q to comply with ARC D-IV design standards. The portion of the taxiway south of existing Runway 13/31 would be widened. A new, second parallel taxiway would be constructed 215 feet to the west of existing Taxiway Q. This new taxiway would comply with ARC D-IV design standards.

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<sup>63</sup> In consultation with Engineered Arresting Systems Corporation, the only manufacturer of EMAS currently approved by the FAA, it was determined that an EMAS bed of 335 feet would be adequate for the FLL fleet mix using Runway 9R/27L as it is configured under Alternative B4.

- **Runway Exit Geometry:** To provide access to both the north and south parallel taxiways, five new runway exits are proposed as part of the redevelopment of Runway 9R/27L. Taxiway E would remain as a full-length parallel taxiway along the west side of Runway 13/31 and could be used as an additional exit location for redeveloped Runway 9R/27L. Taxiway D would terminate at its intersection with the inner parallel taxiway immediately north of Runway 9R/27L. Taxiway D would not be used as an additional runway exit under Alternative B4.

#### 4.3.3.3 NAVAID Systems – Alternative B4

Exhibit 4-27, *Preliminary NAVAID Siting Alternatives B4/D2*, graphically depicts the proposed configuration of the Category I ILS NAVAIDS for Runway 9R/27L. This includes the installation of a localizer antenna array beyond both EMAS beds, glideslope antennas along the south side of the runway, visual approach guidance, and approach light systems.

Runway 27L would be configured with a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lighting System (MALSR), while Runway 9R would have only a Medium Intensity Approach Lighting System (MALS). This shorter approach lighting system is necessary to avoid encroachment into the marina basin located west of the airport. With the use of the MALSR, however, standard ILS landing minimums are not permitted. Therefore, Runway 9R would have landing visibility minimums of three-quarters of a mile or greater, in lieu of the standard one-half mile visibility minimums prescribed for Category I ILS.

The realigned FEC Railway to the east of Runway 9R/27L would encroach into the inner transitional Obstacle Free Zone (OFZ) of Runway 27L. Unless a modification to design standards is granted, this encroachment would restrict the landing visibility minimums associated with Runway 27L to be no lower than three-fourths of a mile.

The proposed MALSR and MALS associated with Runway 9R and 27L, respectively, are configured in accordance with FAA Order 6850.2A, *Visual Guidance Lighting Systems*. To avoid encroaching upon the Dania Cut-Off Canal and the adjacent marina basin, a non-standard spacing of 360 feet between the fourth and fifth light stations would be proposed for Runway 9R arrivals. This would require that a modification to design standards be requested and formally approved by the FAA.

#### 4.3.3.4 Facility and Infrastructure Impacts – Alternative B4

The proposed redevelopment of Runway 9R/27L and its associated taxiway system would have a direct impact on existing facilities, primarily within the existing airport property boundary. These impacts include both permanent and temporary impacts, with the former being primarily affected by temporary construction activities. Exhibit 4-28, *Direct Facility and Infrastructure Impacts Alternative B4*, graphically depicts the direct facility impacts associated with Alternative B4 and the potential relocation of airport facilities that would be accommodated on-airport.

**Permanent Impacts:**

- Relocation or reconfiguration of Terminal 4 (airside only)
- Relocation of the Holland Sheltair (Jet Center) South Hangar and apron facilities
- Relocation of the Gulfstream Airways Aircraft Maintenance Hangar
- Relocation or termination of Airport Perimeter Road
- Relocation or decommissioning of the Airport Surveillance Radar ASR 9
- Encroachment or relocation of the FEC Railway and Florida DOT Right-of-Way
- Relocation or demolition of the Airport Administrative Offices

**Temporary Impacts:**

- Encroachment or disruption of activities within the Holland Sheltair (Jet Center) east apron facilities

Appendix E, *Airfield Planning, Design, and Constructability Review*, provides detailed summaries of the facility impacts associated with Alternative B4.

**4.3.3.5 Terminal 4 Impacts – Alternative B4**

Shifting Runway 9R/27L and its associated taxiway system to the north would affect the redevelopment of Terminal 4. Exhibit 4-29, *Potential Terminal 4 Reconfiguration Alternative B4/D2*, depicts the potential redevelopment of a linear terminal with frontal gates located along the southern terminal perimeter to accommodate redevelopment of the runway. This layout demonstrates the potential for the reconfigured terminal to occur within a defined development footprint in the existing terminal area. (The actual configuration and terminal design would be the subject of an independent Broward County terminal planning and programming study.)

As shown, the Alternative B4 terminal envelope would allow for the redevelopment of Terminal 4 with 16 Narrowbody Equivalent Gates (NBEG). The NBEG is a consistent industry planning standard that represents a B757-200/300 aircraft with a wingtip separation of 25 feet. The dual taxiway system for Runway 9R/27L would provide taxiway access to the reconfigured Terminal 4 gates. The outer parallel taxiway of Runway 9R/27L would double as the apron edge taxiway, providing adequate space for aircraft pushback operations. The operational constraints associated with this taxiway infrastructure are presented in Appendix E, *Airfield Planning, Design, and Constructability Review*.

**4.3.3.6 Capacity and Delay – Alternative B4**

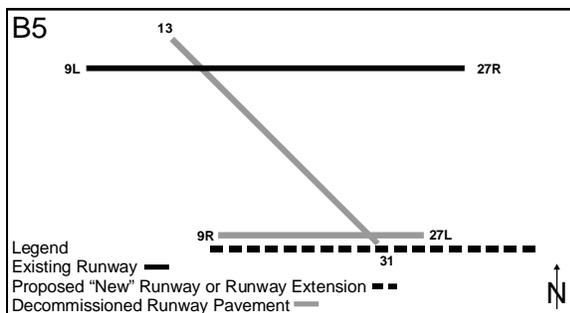
Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative B4, during all weather conditions, is 107 operations per hour, or 420,000 annual operations at six minutes of annual average delay.

Aircraft operations delay was calculated for the 2012 and 2020 demand levels. Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (VFR), and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative, per operation, is 2.2 minutes for 2012 and 4.7 minutes for 2020. While the hourly capacity of Alternative B4 is equivalent to that of Alternatives B1, B1b, B1c, and B5, the delays are greater due to limitations with the runway length; specifically, the reduced flexibility of ATC to make runway assignments to aircraft requiring take-off or landing distances in excess of 6,000 feet.

#### 4.3.3.7 Terminal Layout – Alternative B4

The terminal redevelopment footprint for Alternative B4 uses Option 2B<sup>64</sup> of the FLL Phase 1 MPU. However, because Runway 13/31 would remain operational under this alternative, the terminal development footprint was reduced by approximately 40 acres to 200 acres, as verified in terminal gate analysis prepared for this Draft EIS. This terminal layout option could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment* provided in Appendix D.2, *Terminal Gate Verification*.) Concourse F would be realigned to allow the continued operation of Runway 13/31.

#### 4.3.4 ALTERNATIVE B5: BUILD A 7,800-FOOT ELEVATED RUNWAY WITH EMAS LOCATED 320 FEET SOUTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)



**Exhibit 4-30, Refined Alternative B5 – New Runway 9R/27L (Simultaneous VFR/IFR Approaches)**, graphically depicts the proposed refinement to Alternative B5. As shown, the realignment of Runway 9R/27L would increase the lateral separation between existing Runway 9L/27R and Runway 9R/27L to 4,300 feet. Similar to the Airport Sponsor's Proposed Project (Alternative B1c), Runway 9R/27L would extend over the FEC Railway and U.S. Highway 1, requiring

<sup>64</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

the east end of the runway to be elevated. The runway length is also contained within the confines of the Dania Cut-Off Canal to the west and NE 7<sup>th</sup> Avenue to the east.

#### **4.3.4.1 Runway Geometry – Alternative B5**

To maximize the length of Runway 9R/27L, Alternative B5 provides for use of a standard EMAS at each end of the runway. The EMAS beds have an overall length of 600 feet, which would allow Runway 9R/27L to have a maximum length of 8,200 feet. EMAS would eliminate the need to use declared distance, thereby providing the entire runway length for landing and take-off in both directions. Based on available obstruction data, displacement of the landing thresholds is not anticipated. Runway 9R/27L would have an overall width of 150 feet with paved shoulders extending an additional 25 feet laterally.

#### **4.3.4.2 Taxiway Geometry – Alternative B5**

Alternative B5 proposes a dual parallel taxiway system for Runway 9R/27L. Both of these parallel taxiways would have an overall width of 75 feet, with paved shoulders extending 25 feet from the edge of full strength pavement.

- **Inner Parallel Taxiway:** The inner taxiway would be a full-length parallel taxiway with a lateral separation of 400 feet from the Runway 9R/27L centerline. Similar to Alternatives B1 and B1b, the east end of the taxiway would be configured with a holding bay. A holding bay is necessary to allow aircraft to reverse direction without encroaching on the runway system and it provides bypass capability.
- **Outer Parallel Taxiway:** A partial length outer taxiway would provide access to Runway 9R/27L.

Alternative B5 includes the following taxiway infrastructure improvements:

- **Dual Cross-field Taxiway and Holding Bay:** To expedite aircraft taxi flows between the north and south airfield, Alternative B5 proposes to modify existing Taxiway Q to comply with ARC D-IV design standards. This would require widening the portion of this taxiway south of existing Runway 13/31. A second parallel taxiway would be constructed 215 feet to the west of existing Taxiway Q. This new taxiway would comply with ARC D-IV design standards. A holding bay is configured between Taxiway Q and the new parallel taxiway to allow temporary staging of aircraft and aircraft hardstand parking positions.
- **Partial Decommissioning of Taxiways D and E:** The proposed closure of Runway 13/31 could enhance the airport's ability to expand the existing terminal facilities by decommissioning portions of existing Taxiways D and E. Both taxiways would be decommissioned east of existing Taxiway Q.

- **Runway Exit Geometry:** Alternative B5 includes three additional perpendicular runway exits and two acute angled runway exits, as well as the existing perpendicular exits at each end of Runway 9R/27L. This configuration provides four runway exit locations for landings on both Runways 9R and 27L.

#### 4.3.4.3 Proposed Temporary Runway 9R/27L – Alternative B5

As described in the discussion of Alternatives B1, B1b, and B1c, Broward County continues to explore the conversion of the outer parallel taxiway to a temporary runway that would be operational during the construction of an expanded Runway 9R/27L. The intent of the temporary runway would be to provide dual runway operational capability during the construction period. The temporary runway would be configured to comply with FAA design standards ARC B-II and operate during VMC. This would restrict the runway to aircraft with a wingspan up to, but not including 79 feet and approach speeds of 121 knots or less. The minimum runway width for ARC B-II is 75 feet, which corresponds to the ultimate width of the taxiway for ARC D-IV. A detailed description of the preliminary configuration of Temporary Runway 9R-27L is provided in Appendix E, *Airfield Planning, Design, and Constructability Review*.

#### 4.3.4.4 NAVAID Systems – Alternative B5

Exhibit 4-31, *Preliminary NAVAID Siting Alternative B5*, graphically depicts the proposed configuration of the Category I ILS for the new permanent Runway 9R/27L under Alternative B5. This includes the installation of a localizer antenna array beyond the ends of both EMAS beds, and glideslope antennas along the south side of the runway. Runway 9R would be equipped with a MALSR approach light system that extends 2,400 feet beyond the west end of the runway. To avoid impacts to West Lake Park to the east, however, Runway 27L would be equipped with a shorter MALS that extends 1,400 beyond the east end of the runway.

#### 4.3.4.5 Facility and Infrastructure Impacts – Alternative B5

The proposed redevelopment of Runway 9R/27L and its associated taxiway system would have a direct impact on existing facilities, primarily within the existing airport property boundary. These impacts include both permanent and temporary impacts, with the former being associated with temporary construction activities. Exhibit 4-32, *Direct Facility and Infrastructure Impacts Alternative B5*, graphically depicts the direct facility impacts associated with Alternative B1 and the potential relocation of airport facilities that would be accommodated on airport property. These impacts include:

##### Permanent Impacts:

- Relocation or termination of Airport Perimeter Road
- Relocation or decommissioning of the Airport Surveillance Radar ASR 9
- Encroachment or relocation of the FEC Railway and Florida DOT Right-of-Way

- Acquisition and/or demolition of all or part of the Wyndham Fort Lauderdale Airport Hotel (RPZ impact off-airport)
- Relocation or demolition of the FLL Vacant Rental Car Facility (former Alamo Facility)
- Relocation or demolition of the FLL vacant warehouse
- Encroachment or relocation of the remote Taxi Cab Staging Lot

**Temporary Impacts:**

- Encroachment or disruption of activities within the Gulfstream Airways Aircraft Maintenance Hangar
- Encroachment or disruption of activities within the Holland Sheltair (Jet Center) east apron facilities

Appendix E, *Airfield Planning, Design, and Constructability Review*, provides the detailed summaries of facility impacts associated with Alternative B5.

The design criteria for the minimum separation between a railroad tunnel structure and an at grade roadway crossing will be determined through consultation with the FEC Railway. This is necessary to ensure adequate line-of-sight for the identification of a potential conflict or malfunction at the crossing. The tunnel structure would be located 375 feet from the FEC Railway crossing at Griffin Road, causing line-of-sight issues. These issues could be addressed by relocating the intersection between Griffin Road and U.S. Highway 1 to the south, or replacing it with a grade-separated intersection at or near its present location. The entire realignment of Griffin Road could be achieved within existing airport property. Accordingly, this alternative would be less costly to implement and, therefore, it is considered and evaluated in this Draft EIS.

**4.3.4.6 Capacity and Delay – Alternative B5**

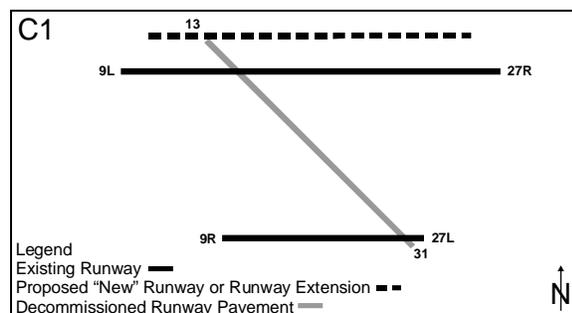
Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative B5, during all weather conditions, is 107 operations per hour, or 445,000 annual operations at six minutes of annual average delay.

Aircraft operations delay was calculated for the 2012 and 2020 demand levels. Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (VFR), and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative, per operation, is 1.2 minutes for 2012 and 3.1 minutes for 2020.

#### 4.3.4.7 Terminal Layout – Alternative B5

The terminal redevelopment footprint for Alternative B5 uses Option 2B<sup>65</sup> of the FLL Phase 1 MPU. This footprint, supplied by Broward County,<sup>66</sup> could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment*, provided in Appendix D.2, *Terminal Gate Verification*.) This development footprint includes the redevelopment of Terminal 2 and 3, the redevelopment and extension of Concourse F, and the redevelopment of Terminal 4 to create a linear flight line.

#### 4.3.5 ALTERNATIVE C1: BUILD A 7,721-FOOT AT GRADE RUNWAY LOCATED 850 FEET NORTH OF EXISTING RUNWAY 9L/27R (A DEPENDENT PARALLEL RUNWAY TO EXISTING RUNWAY 9L/27R)



Alternative C1 provides for the construction of a new at grade closely-spaced parallel runway, located approximately 850 feet north of existing Runway 9L/27R, with a total pavement length of 7,721 feet. This alternative would result in an ultimate airfield layout with three active east/west parallel runways: new Runway 8/26, existing Runway 9L/27R, and existing Runway 9R/27L. Runway 13/31 and its parallel taxiway infrastructure would be decommissioned.

For purposes of discussion in this Draft EIS analysis, the proposed new north parallel runway is referred to as Runway 8/26. Taxiway A, a full-length parallel taxiway, would be located 450 feet north of existing Runway 9L/27R. To reduce construction costs by maintaining the operation of this taxiway, the proposed alignment of Runway 8/26 would be shifted 50 feet to the north. This provides 400 feet of lateral separation from existing Taxiway A and an overall separation of 850 feet between existing Runway 9L/27R and new Runway 8/26.

<sup>65</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

<sup>66</sup> MEMORANDUM to Bolfi Posadas, Broward County Aviation Department. From Larry Coleman, LFA (Leigh Fisher Associates). Subject: Gate Requirement Analysis for Master Plan Update, Phase 1. Dated January 20, 2006. This memorandum provides a description of the factors that were considered and the methodology that was used by LFA to derive these estimates followed by a review of the findings and results.

#### 4.3.5.1 Runway Geometry – Alternative C1

Exhibit 4-33, *Refined Alternative C1 – New North Runway 8/26*, graphically depicts Alternative C1. To maximize the overall available departure length on both Runways 8 and 26, the use of declared distance is proposed to avoid obstructions created by the Interstate-95/Interstate-595 interchange to the west and the FEC Railway to the east. As a result, both landing thresholds are displaced 400 feet. The resulting take-off and landing distances are 7,321 and 6,921 feet, respectively. Runway 8/26 would have an overall width of 150 feet with paved shoulders extending 25 feet from both edges. A blast pad at each runway end would extend 200 feet from the physical end of Runway 8/26.

Due to its intersection with Runway 8/26, access to the northwest end of existing Runway 13/31 would be severed. Extending Runway 13/31 to the northwest would require realigning Interstate-595; therefore, it is not considered a feasible option (based on the “fatal flaw” analysis discussed in Section 4.2, *Alternatives Analysis*, of this Draft EIS). Shortening or shifting Runway 13/31 to the southeast is not feasible because it would require that Runway 13/31 be clear of Runway 8/26 and that it be relocated south of existing Runway 9L/27R. The overall length of Runway 13/31 would be reduced to approximately 4,800 feet, which would not be useable by the existing or projected aircraft fleet at FLL. Therefore, Runway 13/31 would be decommissioned under Alternative C1.

#### 4.3.5.2 Taxiway Geometry – Alternative C1

Existing Taxiway A would be used as a full-length parallel taxiway for Runway 8/26 requiring two perpendicular runway exits at both ends of the runway. To achieve adequate airfield capacity, three acute angled runway exits are proposed to reduce runway occupancy times. Additional perpendicular taxiway exits would be constructed across Runway 9L/27R to allow multiple aircraft to cross Runway 9L/27R simultaneously for access to or egress from Runway 8/26.

Alternative C1 also includes the following taxiway infrastructure improvements:

- **Dual Cross-field Taxiways and Holding Bay:** To expedite aircraft taxi flows between the north and south airfield, Alternative C1 would modify existing Taxiway Q to comply with ARC D-IV design standards. This requires the widening of the portion of the taxiway south of existing Runway 13/31. A second parallel taxiway would be constructed 215 feet to the west of existing Taxiway Q. This taxiway would comply with ARC D-IV design standards. A holding bay is configured between Taxiway Q and the new parallel taxiway to allow for the temporary staging of aircraft and aircraft hardstand parking positions.
- **Partial Decommissioning of Taxiways D, T, and E:** The proposed closure of Runway 13/31 could enhance the airport’s ability to expand the existing terminal and general aviation facilities by decommissioning portions of existing Taxiways D and E. Although both taxiways would be decommissioned east of existing Taxiway Q, only Taxiway E would be

decommissioned to the west of the new cross-field taxiways. This would provide the available development footprint to relocate tenant facilities displaced by the development of Runway 8/26.

- **Dual Taxiway to South Terminal Area:** The proposed decommissioning of Taxiways D and T in the south terminal area would require an alternate access route. Taxiway G would be realigned and widened for ARC D-IV aircraft and a parallel taxiway would be constructed 215 feet to the north of the realigned Taxiway G. The new dual taxiways would provide access between the south terminal area and the dual cross-field taxiways.

#### **4.3.5.3 NAVAID Systems – Alternative C1**

Exhibit 4-34, *Preliminary NAVAID Siting Alternatives C1/D1/D2*, graphically depicts the proposed configuration of the Category I ILS for the new permanent Runway 8/26 under Alternative C1. This includes the installation of a localizer antenna array beyond both runway ends, and glideslope antennas along the north side of the runway. Both ends of Runway 8/26 would be equipped with MALSR, extending 2,400 feet prior to their respective landing thresholds.

Consistent with the other alternatives, the glideslope antennas would be located at a lateral distance of 405 feet from the proposed Runway 8/26 centerline. This distance would ensure that both the glideslope antenna and associated equipment shelters would remain outside of the RSA and Object Free Area (OFA). The actual siting of the glideslope antennas and PAPIs, relative to the runway end, is dependant on the final longitudinal grade of the runway and threshold displacement. The glideslope antennas and PAPIs are assumed to be 1,000 feet beyond the Runway 8 and 26L landing thresholds.

The proposed MALSRs associated with Runway 8 and 26 are configured in accordance with FAA Order 6850.2A. Due to the presence of the FEC Railway immediately east of Runway 8/26, the inner approach Obstacle Free Zone (OFZ) would be penetrated, increasing the visibility minimums to three-quarter mile or greater for all instrument approaches to Runway 26. Due to the lack of obstruction data, it could not be determined if the Interstate-95/Interstate-595 interchange would have a similar impact on instrument approaches to Runway 8.

#### **4.3.5.4 Facility Impacts – Alternative C1**

The proposed development of Runway 8/26 and its associated taxiway system would have a direct permanent impact on existing on-airport facilities, primarily those on the north airfield. Approximately 90 percent of those facilities require airside access. A majority of the facilities could be relocated to the west side of the airfield and maintain functionality. Facilities could also be relocated south of Runway 9R/27L. Those facilities that do not require airside access could be relocated to other on-airport sites that are not contiguous to the airfield as configured under Alternative C1. This includes areas east of U.S. Highway 1 and west of Interstate-95.

The west side of the airfield has a variety of tenants comprising Fixed-Base Operators (FBO), aircraft maintenance, rental car storage, remote passenger parking, overflow parking, and various FLL and FAA facilities. Approximately 40 percent of the existing tenant leasehold facilities on the west side of the airfield do not require airside access. Relocating those facilities to other non-contiguous areas of FLL would be possible.

**Exhibit 4-35, *Direct Facility and Infrastructure Impacts Alternative C1***, graphically depicts those areas of airport property where tenants could be relocated. Those areas are the west development area, east of U.S. Highway 1, and immediately south of the remote public parking facilities located west of Interstate-95. The combined total footprint of those areas could not accommodate all the tenant facilities displaced by Runway 8/26. Additional property would need to be acquired or some tenants may be displaced from FLL to another Broward County facility.

The sum of displaced tenant leasehold areas was quantified using the tenant leasehold areas provided by the Broward County Aviation Department Properties Division. This data was used to identify the amount of vacant airport property that could be used for the relocation of displaced tenant facilities. Tenants were classified as those requiring access to the airfield (airside facilities) and those not requiring airfield access (non-airside).

This analysis identified a shortfall of nearly 40 acres of vacant airport property for those tenants requiring airside access. The replacement-in-kind is assumed for all tenant facilities, however, off-site relocation, termination of leaseholds, or the consolidation of tenant facilities was not assessed. A detailed summary of this analysis is contained in Appendix E, *Airfield Planning, Design, and Constructability Review*.

#### **4.3.5.5 Capacity and Delay – Alternative C1**

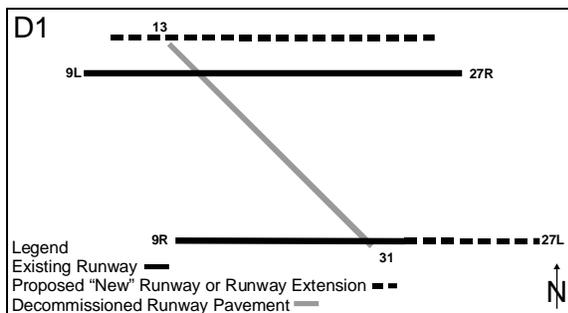
Hourly capacity was calculated according to FAA AC 150 5060-5 *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative C1, during all weather conditions, is 101 operations per hour, or 420,000 annual operations at six minutes of annual average delay.

Aircraft operations delay was calculated for the 2012 and 2020 demand levels. Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (VFR), and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative, per operation, is 1.9 minutes for 2012 and 5.0 minutes for 2020.

#### 4.3.5.6 Terminal Layout – Alternative C1

The terminal redevelopment footprint for Alternative C1 uses Option 2B<sup>67</sup> of the FLL Phase 1 MPU. This footprint, supplied by Broward County,<sup>68</sup> could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment*, provided in Appendix D.2, *Terminal Gate Verification*.) This development footprint includes the redevelopment of Terminals 2 and 3, the redevelopment and extension of Concourse F, and the redevelopment of Terminal 4 to create a linear flight line.

#### 4.3.6 ALTERNATIVE D1: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO 8,000 FEET AND BUILD A NEW 7,721-FOOT RUNWAY NORTH OF EXISTING RUNWAY 9L/27R (COMBINATION OF ALTERNATIVES B1b AND C1)



Alternative D1 is a combination of Alternatives B1b and C1, which results in an ultimate airfield layout with three active east/west parallel runways: new Runway 8/26, existing Runway 9L/27R, and expanded Runway 9R/27L. Runway 13/31 and its parallel taxiway infrastructure would be decommissioned. The first phase of construction assumes the expansion of Runway 9R/27L, during which the relocation of facilities in the north airfield development area could occur to prepare for the subsequent construction of Runway 8/26.

##### 4.3.6.1 Runway Geometry – Alternative D1

Exhibit 4-36, *Refined Alternative D1 – New Runways 8/26 and 9R/27L (Compilation of Alternatives B1b and C1)*, graphically depicts Alternative D1, which has the same pavement geometry as Alternatives B1b and C1 for Runway 9R/27L and Runway 8/26. With the use of EMAS, Runway 9R/27L would have an overall length of 8,200 feet. Runway 8/26 would have an overall length of

<sup>67</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

<sup>68</sup> MEMORANDUM to Bolfi Posadas, Broward County Aviation Department. From Larry Coleman, LFA (Leigh Fisher Associates). Subject: Gate Requirement Analysis for Master Plan Update, Phase 1. Dated January 20, 2006. This memorandum provides a description of the factors that were considered and the methodology that was used by LFA to derive these estimates followed by a review of the findings and results.

7,721 feet, with declared distance reducing the take-off/landing distances in both directions to 7,321 feet and 6,921 feet, respectively. Both runways would have a width of 150 feet with paved shoulders extending laterally a distance of 25 feet.

#### **4.3.6.2 Taxiway Geometry – Alternative D1**

The taxiway geometry associated with Alternative D1 includes the following:

- Dual parallel taxiways for Runway 9R/27L
- Runway 27L holding bay
- Dual cross-field taxiway and holding bay
- Full decommissioning of Taxiways D and E
- Additional Runway 9L/27R taxiway crossings

#### **4.3.6.3 NAVAID Systems – Alternative D1**

Both Runways 9R/27L and 8/26 would be equipped with a Category I ILS for arrivals in both directions. The NAVAID and approach lighting configurations would be the same as those proposed under Alternatives B1b and C1. Runway 27L would be equipped with a MALS. The inner approach OFZ for Runway 26 would be penetrated by the FEC Railway, and instrument approach minimums for these two runways would be limited to three-fourths mile or greater. Although there is not enough obstruction data to determine the approach minimums for Runway 8, Runway 9R could have standard CAT I ILS visibility minimums of one-half mile.

#### **4.3.6.4 Facility Impacts – Alternative D1**

The combined direct and indirect facility impacts identified for Alternatives B1b and C1 are identified for Alternative D1. The redevelopment of Runway 9R/27L, which would extend across the FEC Railway and U.S. Highway 1, would hamper the relocation of facilities to the noncontiguous airport property located east of U.S. Highway 1. The proposed elevating of Runway 9R/27L would impede facility development in the area immediately south of Runway 9R/27L. Thus, relocating all existing tenant facilities on airport property would not be possible because of the lack of sufficient available airport property. To accommodate all existing tenants on-airport, additional property would need to be acquired. *Exhibit 4-37, Direct Facility and Infrastructure Impacts Alternative D1*, graphically depicts available developable on-airport land areas and the area of tenant facilities that would need to be relocated, either directly or indirectly, by Alternative D1. The existing airport property could accommodate tenant relocations to the west of the development area and immediately south of the remote public parking facilities located west of Interstate-95. The size and footprint of these areas are not sufficient to accommodate all of the tenant facilities displaced by the development of Runway 8/26. Therefore, additional property would need to be acquired by the County or some tenants may need to be displaced from FLL. Appendix E, *Airfield Planning, Design, and Constructability Review*, provides the detailed summaries of facility impacts associated with Alternative D1.

A preliminary analysis of the tenant leasehold impacts associated with Alternative D1 serves to determine its ability to accommodate the tenants that would be displaced by Runways 9R/27L and 8/26. The sum of displaced tenant leasehold areas was quantified in accordance with the tenant leasehold areas provided by Broward County Aviation Department Properties Division. This data also served to determine the amount of vacant airport property that could be available for the relocation of the tenant facilities that would be displaced. This analysis involves independent assessments for those tenants requiring access to the airfield (airside facilities) and those not requiring airfield access (non-airside). A detailed summary of this analysis is contained in Appendix E, *Airfield Planning, Design and Constructability Review*.

This preliminary analysis has identified a deficiency of nearly 107 acres of airport property that may not be available for tenant relocations. This includes 75 acres of tenants requiring airside access, while the remaining 32 acres represent tenants not requiring access to the airfield. However, this assessment assumes replacement-in-kind for all tenant facilities, thereby representing full replacement of each tenants existing leasehold area. It does not consider any off-site relocation, termination of leaseholds, or consolidation of tenant facilities to determine the County's ability to accommodate these tenant facilities at FLL or another Broward County facility.

#### **4.3.6.5 Capacity and Delay – Alternative D1**

Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative D1, during all weather conditions, is 128 operations per hour, exceeding 510,000 annual operations at less than six minutes of annual average delay.

Aircraft operations delay was calculated for the 2020 demand levels.<sup>69</sup> Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good VFR, and poor IFR weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative, per operation, is 1.2 minutes for 2020.

#### **4.3.6.6 Terminal Layout – Alternative D1**

The terminal redevelopment footprint for Alternative D1 uses Option 2B<sup>70</sup> of the FLL Phase 1 MPU. This footprint, supplied by Broward County,<sup>71</sup> could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels

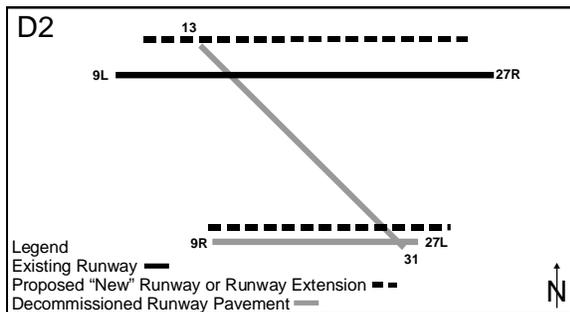
<sup>69</sup> Alternative D1 was only assessed for 2020 because it would not be fully operational by 2012. By 2012 only the first phase (i.e., B1 alternatives) would be operational.

<sup>70</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

<sup>71</sup> MEMORANDUM to Bolfi Posadas, Broward County Aviation Department. From Larry Coleman, LFA (Leigh Fisher Associates). Subject: Gate Requirement Analysis for Master Plan Update, Phase 1. Dated January 20, 2006. This memorandum provides a description of the factors that were considered and the methodology that was used by LFA to derive these estimates followed by a review of the findings and results.

of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment*, provided in Appendix D.2, *Terminal Gate Verification*.) This development footprint includes the redevelopment of Terminals 2 and 3, the redevelopment and extension of Concourse F, and the redevelopment of Terminal 4 to create a linear flight line.

**4.3.7 Alternative D2: Build A New 6,001-Foot At Grade Runway With EMAS Located 340 Feet North Of Existing South Runway And Build A 7,721-Foot At Grade Runway Located 850 Feet North Of Existing Runway 9L/27R (Combination Of Alternatives B4 And C1)**



Alternative D2 is a combination of Alternatives B4 and C1, which results in an ultimate airfield layout with three active east/west parallel runways: new Runway 8/26, existing Runway 9L/27R, and redeveloped Runway 9R/27L. Runway 13/31 and its parallel taxiway infrastructure would be decommissioned. As with Alternative D1, it is assumed that the first phase of construction would be the expansion of Runway 9R/27L, during which the relocation of facilities in the north airfield development area could occur to prepare for the subsequent construction of Runway 8/26.

**4.3.7.1 Runway Geometry – Alternative D2**

Exhibit 4-38, *Refined Alternative D2 – New Runways 8/26 and 9R/27L (Compilation of Alternatives B4 and C1)*, graphically depicts Alternative D2. The pavement geometry of Runways 9R/27L and 8/26 would be the same as those proposed with Alternatives B4 and C1. With the use of EMAS, Runway 9R/27L would have an overall length of 6,001 feet. The displacement of the Runway 9R and 27L thresholds would reduce the landing distances to 5,876 feet and 5,755 feet, respectively. Runway 8/26 would have an overall length of 7,721 feet, with declared distance reducing the take-off/landing distances in both directions to 7,321 feet and 6,921 feet respectively. Both runways would have a width of 150 feet with paved shoulders extending laterally a distance of 25 feet.

#### 4.3.7.2 Taxiway Geometry – Alternative D2

The taxiway geometry associated with Alternative D2 includes the following:

- Dual parallel north taxiways for Runway 9R/27L
- Single parallel south taxiway for Runway 9R/27L
- Dual cross-field taxiway and holding bay
- Full decommissioning of Taxiways D and E
- Additional Runway 9L/27R taxiway crossings

#### 4.3.7.3 NAVAID Systems – Alternative D2

Both Runways 9R/27L and 8/26 would be equipped with a Category I ILS for arrivals in both directions. The NAVAID and approach lighting configurations would be the same as those proposed under Alternatives B4 and C1. The FEC Railway would penetrate the inner approach OFZ for Runways 26 and 27L, and the instrument approach minimums for these two runways would be limited to three-quarter mile or greater. Although there is not enough data to determine the approach minimums for Runway 8, Runway 9R could have standard CAT I ILS visibility minimums of one-half mile.

#### 4.3.7.4 Facility Impacts – Alternative D2

The direct and indirect facility impacts for Alternative D2 are the same as the combined direct and indirect facility impacts for Alternatives B4 and C1. **Exhibit 4-39, *Direct Facility and Infrastructure Impacts Alternative D2***, graphically depicts where the various tenant facilities would be relocated. Alternative D2 identifies an area of land available for tenant facility relocations to the west of the development area, east of U.S. Highway 1, and immediately south of the remote public parking facilities that are located west of Interstate-95. The size and footprint of these areas are not sufficient to accommodate all of the tenant facilities displaced by the development of Runway 8/26. Therefore, additional property would need to be acquired by the County or some tenants may need to be displaced from FLL. Appendix E, *Airfield Planning, Design, and Constructability Review*, provides the detailed summaries of facility impacts associated with Alternative D1.

A preliminary analysis of the tenant leasehold impacts associated with Alternative D2 serves to determine its ability to accommodate the tenants that would be displaced by Runways 9R/27L and 8/26. The sum of displaced tenant leasehold areas was quantified in accordance with the tenant leasehold areas provided by Broward County Aviation Department Properties Division. This data also served to determine the amount of vacant airport property that could be available for the relocation of the tenant facilities that would be displaced. This analysis involves independent assessments for those tenants requiring access to the airfield (airside facilities) and those not requiring airfield access (non-airside). A detailed summary of this analysis is contained in Appendix E, *Airfield Planning, Design and Constructability Review*.

This preliminary analysis has identified a deficiency of nearly 70 acres of airport property that may not be available for tenant relocations. This includes 59 acres of tenants requiring airside access, while the remaining 10 acres represent tenants not requiring access to the airfield. However, this assessment assumes replacement-in-kind for all tenant facilities, thereby representing full replacement of each tenants existing leasehold area. It does not consider any off-site relocation, termination of leaseholds, or consolidation of tenant facilities to determine the County's ability to accommodate these tenant facilities at FLL or another Broward County Facility.

#### 4.3.7.5 Capacity and Delay – Alternative D2

Hourly capacity was calculated according to FAA AC 150 5060-5, *Airport Capacity and Delay*. The methodology and assumptions used are provided in Appendix F, *Net Benefits Analysis*. The hourly capacity estimate for Alternative D2, during all weather conditions, is 128 operations per hour, or 475,000 annual operations at six minutes of annual average delay.

Aircraft operations delay was calculated for the 2020 demand levels.<sup>72</sup> Delay was computed using a queue modeling methodology. Demand, defined in terms of the number of arrivals and departures at five-minute intervals, was modeled against the estimated capacity in good (VFR) and poor (IFR) weather conditions. Both east flow and west flow operating conditions were analyzed. The resulting annual average delay for this alternative per operation is 1.5 minutes for 2020. While the hourly capacity of Alternative D2 is equivalent to that of Alternative D1, the delays are greater due to limitations with the runway length; specifically, the reduced flexibility of ATC to make runway assignments to aircraft requiring take-off or landing distances in excess of 6,000 feet.

#### 4.3.7.6 Terminal Layout – Alternative D2

The terminal redevelopment footprint for Alternative D2 uses Option 2B<sup>73</sup> of the FLL Phase 1 MPU. This footprint, supplied by Broward County,<sup>74</sup> could accommodate a total of 67 to 77 gates, which FAA has projected is needed for the projected levels of passenger-related activity through 2020, as verified in this Draft EIS analysis. (See the *Future Terminal Gate Demand/Capacity Assessment*, provided in Appendix D.2, *Terminal Gate Verification*.) This development footprint includes the redevelopment of Terminals 2 and 3, the redevelopment and extension of Concourse F, and the redevelopment of Terminal 4 to create a linear flight line.

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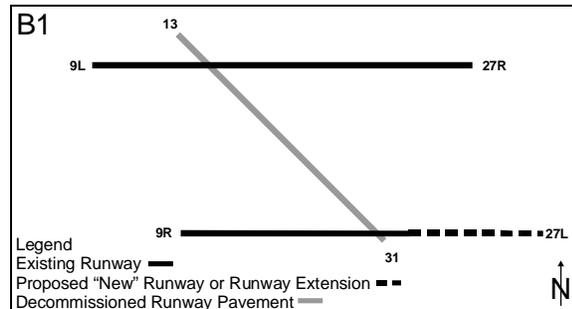
<sup>72</sup> Alternative D2 was only assessed for 2020 because it would not be fully operational by 2012. By 2012 only the first phase (i.e., Alternative B4) would be operational.

<sup>73</sup> Leigh Fisher Associates report dated January 2006, *Master Plan Update—Phase I, Draft Final Summary Report*. Development Option 2B, Figure 6-24, Figure 6-25 and pp. 6-18 to 6-23.

<sup>74</sup> MEMORANDUM to Bolfi Posadas, Broward County Aviation Department. From Larry Coleman, LFA (Leigh Fisher Associates). Subject: Gate Requirement Analysis for Master Plan Update, Phase 1. Dated January 20, 2006. This memorandum provides a description of the factors that were considered and the methodology that was used by LFA to derive these estimates followed by a review of the findings and results.

## 4.4 PROJECTED COSTS

### 4.4.1 ALTERNATIVE B1: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO AN 8,600-FOOT BY 150-FOOT ELEVATED RUNWAY



Broward County prepared a detailed cost estimate for the Airport Sponsor's Proposed Project.<sup>75</sup> To facilitate a comparative analysis among the various Draft EIS alternatives, a summary of this cost estimate and the assumed quantities was developed and provided by the County. The summary provides the basis for developing "order of magnitude" cost estimates for Alternative B1, as well as the other Draft EIS alternatives. The cost/quantity summaries, along with a graphic illustrating the geometry of the Airport Sponsor's Proposed Project is provided in Appendix E, *Airfield Planning, Design, and Constructability Review*.

The values in the cost estimate summary are provided in 2006 dollars and reflect the direct construction costs associated with the proposed airfield reconfiguration. The County's cost summary, however, does not consider the costs for facility relocation, land acquisition, or the construction of the cross-field taxiways. There are discrepancies between the cost items contained in the County's cost summary and those associated with Alternative B1. Therefore, some of the cost items have been modified for this Draft EIS analysis. It was necessary to modify the County's data to ensure that the estimated costs for Alternative B1 are consistent with current planning considerations for the Airport Sponsor's Proposed Project, specifically the airfield geometry, facility impacts, and construction sequencing.

The modifications made to the County's cost estimate summary, for the purposes of this Draft EIS analysis, include:

- Eliminate ILS equipment for temporary runway
- Revised airfield pavement geometry (includes runway exits, dual cross-field parallel taxiways, and holding bay)
- Eliminate elevated Griffin Road / U.S. Highway 1 intersection
- Include facility relocation and demolition costs
- Include land acquisition costs

<sup>75</sup> U.S. Cost, a consultant to the Broward County Board of County Commissioners, prepared the detailed cost estimate for the Airport Sponsor's Proposed Project. 2006

Table 4-4, *Summary of Costs – Alternative B1*, presents the resulting order-of-magnitude cost estimate for Alternative B1. The total estimated cost, in 2006 dollars, is \$689 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-4  
SUMMARY OF COSTS – ALTERNATIVE B1  
Fort Lauderdale-Hollywood International Airport**

<b>ITEM DESCRIPTION</b>	<b>COST</b>
<b>Construction Costs</b>	
Earthwork	\$60,058,600
Temporary Runway	\$20,700,900
Structures	\$309,830,200
Runway 9R-27L	\$ 85,976,110
Runway 8-26	\$-
Parallel Taxiways / Runway Exits	\$23,119,800
Cross-field Taxiways	\$ 14,154,700
Miscellaneous	\$25,487,600
Ancillary Development	\$34,013,300
<b>Sub-Total:</b>	<b>\$573,341,210</b>
<b>Design Costs</b>	<b>\$53,481,400</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$40,400,000
Facility Relocations	\$ 21,678,000
<b>Sub-Total:</b>	<b>\$62,078,000</b>
<b>Grand Total</b>	<b>\$688,900,610</b>

Sources: Broward County Aviation Department; The Corradino Group  
Prepared by: The Corradino Group

4.4.2 ALTERNATIVE B1b/B1c: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO AN 8,000-FOOT BY 150-FOOT ELEVATED RUNWAY WITH EMAS

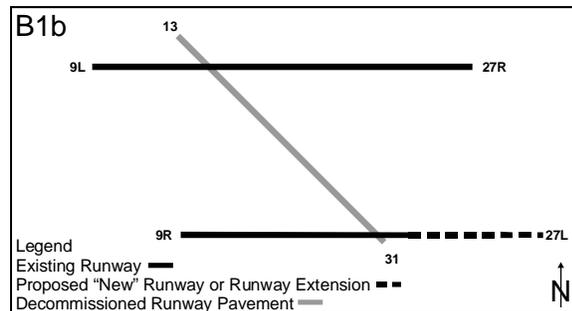


Table 4-5, *Summary of Costs – Alternative B1b/B1c*, presents the resulting order-of-magnitude cost estimate for Alternatives B1b and B1c. The total estimated cost, in 2006 dollars, is \$695 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs. The principal difference between the costs of Alternatives D2 and B1 is the revised airfield geometry and the use of EMAS at both ends of Runway 9R/27L

Table 4-5  
 SUMMARY OF COSTS ALTERNATIVES B1b/B1c  
 Fort Lauderdale - Hollywood International Airport

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$60,058,648
Temporary Runway	\$20,700,936
Structures	\$309,830,160
Runway 9R-27L	\$91,931,971
Runway 8-26	\$ -
Parallel Taxiways / Runway Exits	\$23,119,692
Cross-field Taxiways	\$14,154,682
Miscellaneous	\$25,487,570
Ancillary Development	\$34,013,222
<b>Sub-Total:</b>	<b>\$579,296,881</b>
<b>Design Costs</b>	<b>\$53,481,349</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$40,400,000
Facility Relocations	\$21,678,000
<b>Sub-Total:</b>	<b>\$62,078,000</b>
<b>Grand Total</b>	<b>\$694,856,230</b>

Sources: Broward County Aviation Department; The Corradino Group  
 Prepared by: The Corradino Group

**4.4.3 ALTERNATIVE B4: BUILD A NEW 6,001-FOOT AT GRADE RUNWAY WITH EMAS LOCATED 340 FEET NORTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)**

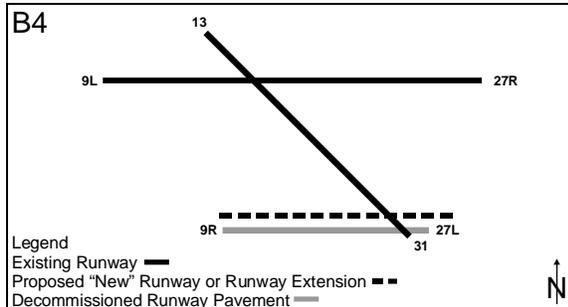


Table 4-6, *Summary of Costs – Alternative B4*, presents the resulting order-of-magnitude cost estimate for Alternative B4. The total estimated cost, in 2006 dollars, is \$523 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-6  
SUMMARY OF COSTS ALTERNATIVE B4  
Fort Lauderdale - Hollywood International Airport**

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$9,316,729
Temporary Runway	\$
Structures	\$-
Runway 9R-27L	\$44,623,713
Runway 8-26	\$-
Parallel Taxiways / Runway Exits	\$48,418,797
Cross-field Taxiways	\$7,289,548
Miscellaneous	\$14,315,229
Ancillary Development	\$322,462,222
<b>Sub-Total:</b>	<b>\$446,426,238</b>
<b>Design Costs</b>	<b>\$41,418,002</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$-
Facility Relocations	\$35,649,667
<b>Sub-Total:</b>	<b>\$35,649,667</b>
<b>Grand Total</b>	<b>\$523,493,907</b>

Sources: Broward County Aviation Department; The Corradino Group  
Prepared by: The Corradino Group

**4.4.4 ALTERNATIVE B5: BUILD A 7,800-FOOT ELEVATED RUNWAY WITH EMAS LOCATED 320 FEET SOUTH OF EXISTING SOUTH RUNWAY (TO REPLACE EXISTING RUNWAY 9R/27L)**

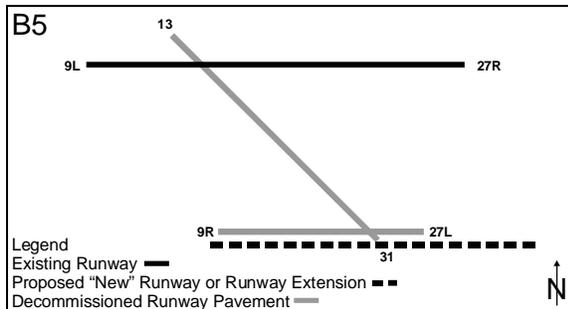


Table 4-7, *Summary of Costs – Alternative B5*, presents the resulting order-of-magnitude cost estimate for Alternative B5. The total estimated cost, in 2006 dollars, is \$707 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-7  
SUMMARY OF COSTS ALTERNATIVE B5  
Fort Lauderdale - Hollywood International Airport**

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$67,686,342
Temporary Runway	\$19,040,844
Structures	\$309,830,160
Runway 9R-27L	\$97,143,005
Runway 8-26	\$-
Parallel Taxiways / Runway Exits	\$20,815,709
Cross-field Taxiways	\$15,405,244
Miscellaneous	\$29,373,575
Ancillary Development	\$28,345,152
<b>Sub-Total:</b>	<b>\$587,640,031</b>
<b>Design Costs</b>	<b>\$54,004,323</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$60,000,000
Facility Relocations	\$5,430,000
<b>Sub-Total:</b>	<b>\$65,430,000</b>
<b>Grand Total</b>	<b>\$707,074,353</b>

Sources: Broward County Aviation Department; The Corradino Group  
 Prepared by: The Corradino Group

**4.4.5 ALTERNATIVE C1: BUILD A 7,721-FOOT AT GRADE RUNWAY LOCATED 850 FEET NORTH OF EXISTING RUNWAY 9L/27R (A DEPENDENT PARALLEL RUNWAY TO EXISTING RUNWAY 9L/27R)**

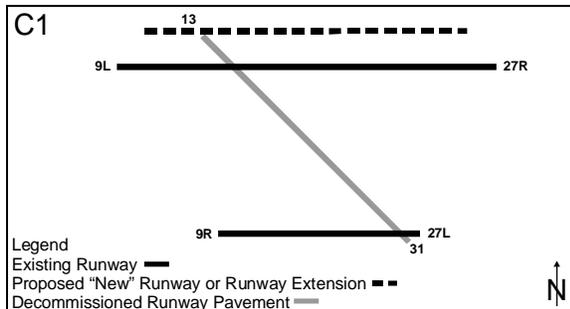


Table 4-8, *Summary of Costs – Alternative C1*, presents the resulting order-of-magnitude cost estimate for Alternative C1. The total estimated cost, in 2006 dollars, is \$463 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-8  
SUMMARY OF COSTS ALTERNATIVE C1  
Fort Lauderdale - Hollywood International Airport**

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$1,794,832
Temporary Runway	\$-
Structures	\$-
Runway 9R-27L	\$-
Runway 8-26	\$48,192,303
Parallel Taxiways / Runway Exits	\$21,965,838
Cross-field Taxiways	\$15,696,826
Miscellaneous	\$12,443,968
Ancillary Development	\$17,577,452
<b>Sub-Total:</b>	<b>\$117,671,219</b>
<b>Design Costs</b>	<b>\$10,888,249</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$16,343,800
Facility Relocations	\$317,819,667
<b>Sub-Total:</b>	<b>\$334,163,467</b>
<b>Grand Total</b>	<b>\$462,722,935</b>

Sources: Broward County Aviation Department; The Corradino Group  
 Prepared by: The Corradino Group

**4.4.6 ALTERNATIVE D1: REDEVELOP AND EXTEND EXISTING RUNWAY 9R/27L TO 8,000 FEET AND BUILD A NEW 7,721-FOOT RUNWAY NORTH OF EXISTING RUNWAY 9L/27R (COMBINATION OF ALTERNATIVES B1b AND C1)**

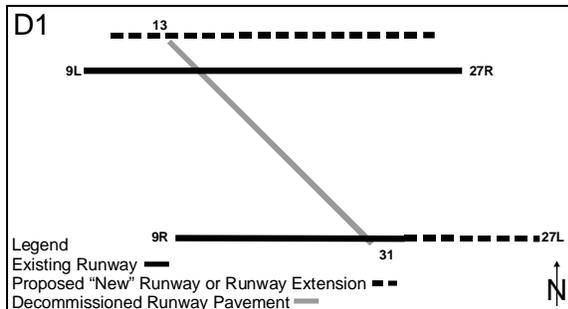


Table 4-9, *Summary of Costs – Alternative D1*, presents the resulting order-of-magnitude cost estimate for Alternative D1. The total estimated cost, in 2006 dollars, is \$1.2 billion. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-9  
SUMMARY OF COSTS ALTERNATIVE D1  
Fort Lauderdale - Hollywood International Airport**

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$61,853,870
Temporary Runway	\$20,700,936
Structures	\$309,830,160
Runway 9R-27L	\$ 91,931,971
Runway 8-26	\$48,192,303
Parallel Taxiways / Runway Exits	\$45,085,530
Cross-field Taxiways	\$14,919,275
Miscellaneous	\$37,942,003
Ancillary Development	\$45,569,822
<b>Sub-Total:</b>	<b>\$676,025,870</b>
<b>Design Costs</b>	
	<b>\$62,864,664</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$120,693,400
Facility Relocations	\$335,599,667
<b>Sub-Total:</b>	<b>\$456,293,067</b>
<b>Grand Total</b>	<b>\$1,195,183,601</b>

Sources: Broward County Aviation Department; The Corradino Group  
Prepared by: The Corradino Group

**4.4.7 Alternative D2: Build A New 6,001-Foot At Grade Runway With EMAS Located 340 Feet North Of Existing South Runway And Build A 7,721 Foot At Grade Runway Located 850 Feet North Of Existing Runway 9L/27R (Combination Of Alternatives B4 And C1)**

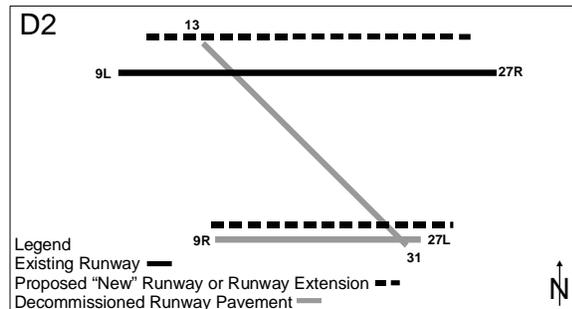


Table 4-10, *Summary of Costs – Alternative D2*, presents the resulting order-of-magnitude cost estimate for Alternative D2. The total estimated cost, in 2006 dollars, is \$995 million. This value includes consideration for both hard (construction, demolition, facility relocation) and soft (engineering, permitting, construction administration) costs.

**Table 4-10  
SUMMARY OF COSTS ALTERNATIVE D2  
Fort Lauderdale - Hollywood International Airport**

ITEM DESCRIPTION	COST
<b>Construction Costs</b>	
Earthwork	\$11,111,561
Temporary Runway	\$-
Structures	\$ -
Runway 9R-27L	\$44,623,713
Runway 8-26	\$48,192,303
Parallel Taxiways / Runway Exits	\$70,384,634
Cross-field Taxiways	\$13,088,788
Miscellaneous	\$26,759,198
Ancillary Development	\$334,018,822
<b>Sub-Total:</b>	<b>\$548,179,019</b>
<b>Design Costs</b>	<b>\$51,477,714</b>
<b>Indirect Costs</b>	
Land Acquisitions	\$41,987,000
Facility Relocations	\$353,469,333
<b>Sub-Total:</b>	<b>\$ 395,456,333</b>
<b>Grand Total</b>	<b>\$995,113,066</b>

Sources: Broward County Aviation Department; The Corradino Group  
Prepared by: The Corradino Group

## **4.5 CONSTRUCTION SEQUENCING**

A preliminary assessment of construction sequencing was prepared to evaluate the temporary impacts associated with implementing each of the runway development alternatives. This assessment identifies the potential impacts and cost associated with temporary construction activities, demonstrates the impact on airfield operations, and identifies the issues associated with relocating tenant facilities during the construction period. Appendix E, *Airfield Planning, Design, and Constructability Review*, provides the description and series of exhibits to graphically depict the preliminary construction sequencing activities identified for each of the runway development alternatives.

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