Appendix C

To:	VIRGINIA LANE, FAA ORLANDO AIRPORTS DISTRICT OFFICE
From:	Tom Cornell
Cc:	
Date:	April 15, 2011 *(revised 06-08-2011)*
Re:	Assessment of Changes in FLL Runway 10L/28R Design from ADG IV to ADG V

This memorandum documents an assessment of the changes in the design of Fort Lauderdale-Hollywood International Airport (FLL) Runway 10L/28R[1] Airplane Design Group (ADG) as part of the FAA's Written Re-evaluation analysis. The design of Runway 10L/28R was disclosed in the 2008 Final Environmental Impact Statement (2008 FEIS)[2] and specified on the 2008 Approved Airport Layout Plan (2008 Approved ALP)[3] as ADG IV. The 2011 Proposed Airport Layout Plan (2011 Proposed ALP)[4] depicts Runway 10L/28R at an ADG V standard.

With the FAA approval of the 2008 Approved ALP, Broward County Aviation Department (BCAD) initiated engineering and design studies for the construction of the expanded runway. The analyses in these studies resulted in refinements to the runway and taxiway system. Those refinements are reflected on the 2011 Proposed ALP.

Referenced Documents

- 2008 Approved Airport Layout Plan (Jacobs Consultancy, dated December 2008)
- 2011 Proposed Airport Layout Plan (Landrum & Brown, dated May 2011)

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1 On the 2008 Approved ALP, the expanded runway is named 9R/27L. On the 2011 Proposed ALP, the runway has been redesignated as 10R/28L.

2 *Final Environmental Impact Statement for the Development and Expansion of Runway 9R/27L and Other Associated Airport Projects at Fort Lauderdale-Hollywood International Airport*, Broward County, Florida. U.S. Department of Transportation, Federal Aviation Administration, February 2008.

3 The 2008 Approved ALP was prepared for the Broward County Aviation Department by Jacobs Consultancy (December 2008).

4 The 2011 Proposed ALP was prepared for the Broward County Aviation Department by Landrum & Brown (May 2011).

memo DRAFT

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- FAA Advisory Circular 150/5300-13, *Airport Design*
- FAA National Plan of Integrated Airport Systems (NPIAS), 2011-2015
- *Broward County Aviation Department Airport Expansion Program, Engineer's Report BP-1 60% Submittal for Consultant Design Services—Expansion of Runway 9R-27L, Fort Lauderdale-Hollywood International Airport (FLL)*, RLI No: R0729109R1, FAA Project No.: 3-12-0025-062-2009. Prepared by PBS&J, dated: February 4, 2011.

Definitions

Guidance: FAA airport design standards are primarily discussed in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*. Much of the design of an airport is based on the types of aircraft that are anticipated to use the airport. For airport design, aircraft are categorized by two criteria: approach speed and wingspan (which includes tail height).

- Approach speed is described as the Aircraft Approach Category (AAC). The AAC represents the operational characteristics of the aircraft at an airport. It is based on the aircraft speed on approach to the runway and is classified as A, B, C, D, or E. On the 2008 Approved ALP and the 2011 Proposed ALP, FLL is designed for AAC D, for an approach speed of 141 knots or more but less than 166 knots.

- Wingspan (and tail height) is described by the Airplane Design Group (ADG). The ADG represents the physical characteristics of the aircraft. It is based on wingspan and tail height and classified as I, II, III, IV, V, and VI.

  At FLL, the wingspan of the aircraft is the critical runway design element. Aircraft designated as ADG IV have a wingspan of 118 feet or more but less than 171 feet. ADG V aircraft have a wingspan of 171 feet or more but less than 214 feet. On the 2008 Approved ALP, FLL was designated as ADG IV but the new Runway 10R/28L is being proposed to meet ADG V standards.

Airport Reference Code (ARC): The ARC has two components, the AAC and the ADG. On the 2008 Approved ALP, the ARC for FLL was ARC D-IV. On the 2011 Proposed ALP, an ARC D-V is being proposed.

Runway Profile Changes

The BCAD engineering and design studies have refined the profile of the runway to: (1) achieve required clearances over the FEC Railway corridor and over U.S. Highway 1 and other roads near the east end of the runway, and (2) meet FAA design standards for the surface gradient (slope) of the runway and pilot's line of sight. The *Engineer's Report BP-1 60% Submittal* document, Section G, *Pavement Profiles and Gradients*, states that the proposed runway profile satisfies the criteria

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set forth in FAA AC 5300-13, paragraphs 502 "Surface Gradient Standards" and 503 "Line of Sight Standards." The document further indicates that:

> "These guiding documents establish the following runway longitudinal profile criteria for ADG D-V design standards, which were adhered to in the development of the runway profile."

There is an error in the above statement in its reference to "ADG D-V" design standards. Paragraph 502 only references AAC criteria, which for FLL the approach speed category would be AAC D. The criteria in Paragraph 503 is universal to all aircraft regardless of category. Therefore, the *Engineer's Report BP-1 60% Submittal* document should have referenced "AAC D design standards" rather than "ADG D-V design standards."

Note that the refined runway profile as shown on the 2011 Proposed ALP is based on an AAC D design standard and the AAC D classification has not changed since the FAA approval of the 2008 Approved ALP. Therefore, the proposed changes in the runway profile are not based on a change from ADG IV to ADG V standards.

ADG IV and ADG V Aircraft at FLL

While FLL is designated on the 2008 Approved ALP as ARC D-IV, ADG V aircraft have operated and do operate currently at the airport. The classification of an airport as ADG IV does not preclude the use of facilities by larger ADG V aircraft.

The primary ADG IV aircraft operating at FLL include the B-757, B-767, A300, A310, DC-10 and MD-11 aircraft. ADG V aircraft such as the A330 operated at FLL in 2009 and ADG V aircraft such as the A330, B-747, and B-777 aircraft have operated at FLL since 2000. However, these ADG V aircraft have not operated in sufficient numbers to reclassify the FLL as an ARC D-V airport, per the FAA NPIAS, Chapter 4, *Development Requirements, Standards,* which is quoted below.

> "Standards projects include development to bring existing airports up to design criteria recommended by FAA. This remains the largest development category, accounting for 29 percent of the NPIAS. Many commercial service airports were designed more than 50 years ago to serve relatively small and slow aircraft but are now being used by larger and faster turboprop and jet aircraft. As a result, runways and taxiways must be relocated to provide greater clearance for aircraft with larger wingspans, and aircraft parking areas must be adapted to accommodate larger aircraft. Standards development at general aviation and reliever airports is generally justified to accommodate a substantial number of operations by a "critical" aircraft with sizes and operating characteristics that were not foreseen at the time of original construction. If this work is not undertaken, aircraft may be required to limit fuel or passenger loads because of inadequate runway length. FAA usually requires an indication that an aircraft type will account for at least 500 annual itinerant operations at an airport before development is included in the NPIAS to accommodate it."

In 2000 and 2001 there were over 1,000 ADG V aircraft operations at FLL and over 400 operations of ADG V aircraft in the years 2005, 2006, and 2007.

Of the primary ADG IV aircraft at FLL, the B-757 ceased production in 2004 and the A300 and A310 ceased production in 2007. The DC-10 and MD-11 aircraft have been out of production since 1989 and 2001, respectively. Only the B-767 is still in production with plans by Boeing to cease production by 2013 to focus on its replacement aircraft, the B-787. No U.S. passenger carrier or leasing company has placed an order for the B-767 since 2001. The average age of B-767 aircraft for a sample of U.S. passenger carriers is shown in Table 1.

Table 1
Average Age of B-767 Fleet for a Sample of U.S. Carriers at FLL

Airline	Average Age of B-767 Fleet
Delta	14.2 years
Continental	9.4 years
United	15.4 years
US Airways	21.4 years

The B-787 and A350, the Airbus competitor to Boeings B-787, are new ADG V aircraft that are intended to replace the current ADG IV aircraft in passenger service. While the B-787 and A350 have a similar seating capability as the B-767 family of aircraft (see Table 2 below), they have a longer wingspan.

Table 2
Aircraft Characteristics

Aircraft	ADG	Wingspan	Seating Range
B-767-200	IV	156 feet	181-255
B-767-300	IV	156 feet	218-269
B-767-400	IV	170 feet	245-375
A330-200	V	198 feet	253-293
B-787-8 (proposed)	V	197 feet	210-250
B-787-9 (proposed)	V	197 feet	250-290
A350 (proposed)	V	212 feet	270-350

Aircraft manufacturers Boeing and Airbus have found that the longer wingspans provide greater fuel efficiency. Therefore, these same general number of passengers are being accommodated on aircraft with longer wingspans that are more economically and environmentally efficient. This has created a case where, within the next two years (~2012/2013), the only type of passenger aircraft that will be manufactured by these companies are ADG III, ADG V, or ADG VI.

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Continental/United, Delta, Air Canada, and Avianca, all of which are current carriers at FLL, have placed orders for the B-787. US Airways and Continental/United have placed orders for the A350.

Given this industry move away from ADG IV aircraft to ADG V aircraft, it is likely that more ADG V aircraft would be operating at FLL in the future and, therefore, it would be prudent to design the south runway for this condition.

Differences in ADG IV and ADG V Design Standards

Table 3 shows the difference in the airport design standards between ADG IV and ADG V. The "highlighted" criteria in the table shows the elements that are different between the ADG IV and ADG V requirements. The "bolded" text shows where there is a difference between the 2008 Approved ALP and the 2011 Proposed ALP.

Table 3
Runway/Taxiway Design Standard Differences for ADG IV and ADG V

Design Standards			ALP Conditions	
Design Criteria	**Group IV**	**Group V**	**2008 Approved ALP**	**2011 Proposed ALP**
Runway Width	150 feet	150 feet		
Runway Shoulder Width	25 feet	35 feet	Drawn to ADG IV	**Drawn to ADG V**
Runway Blast Pad Width	200 feet	220 feet	Drawn to ADG IV	**Drawn to ADG V**
Runway Blast Pad Length	200 feet	400 feet	EMAS Provided	Same
Runway Safety Area Width	500 feet	500 feet		
Runway Safety Area Length	1,000 feet	1,000 feet		
Runway Object Free Area Width	800 feet	800 feet		
Runway Object Free Area Length	1,000 feet	1,000 feet		
Runway/Taxiway Separation	400 feet	400 feet		
Taxiway/Taxiway Separation	215 feet	267 feet	Drawn to ADG V	Same
Taxiway Width	75 feet	75 feet		
Taxiway/Apron Shoulder Width	25 feet	35 feet	Drawn to ADG IV	**Drawn to ADG V**
Taxiway Safety Area Width	171 feet	214 feet	Not drawn on ALP	Same
Taxiway Object Free Area Width	259 feet	320 feet	Not drawn on ALP	Same
Taxiway Centerline Turning Radius	150 feet	150 feet		
Taxiway Edge Safety Margin	15 feet	15 feet		

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Table 3 ***(continued)***
Runway/Taxiway Design Standard Differences for ADG IV and ADG V

Design Standards			ALP Conditions	
Design Criteria	**Group IV**	**Group V**	**2008 Approved ALP**	**2011 Proposed ALP**
Taxilane Object Free Area Width	225 feet	276 feet	Not drawn on ALP	Same
Taxilane Centerline to Fixed or Movable Object	112.5 feet	138 feet	Not drawn on ALP	Same
Taxilane Wingtip Clearance	27 feet	31 Feet	Not drawn on ALP	Same

The only runway design standards that would change based on the engineering and design refinements for the expanded runway, as shown on the 2011 Proposed ALP, would be the runway shoulder width (increase from 25 to 35 feet) and the runway blast pad width (increase from 200 to 220 feet). The runway blast pad length is superseded by the installation of the Engineered Material Arresting System (EMAS), which has not changed. The taxiway separations remain the same as in the 2008 Approved ALP. The refinements to the taxiway design would increase the shoulder width from 25 to 35 feet. The remaining taxiway design elements are not drawn on the 2008 Approved ALP or the 2011 Proposed ALP, but these would not change the airport design.

Pavement Strength

The pavement strength criteria specified on the 2008 Approved ALP has not changed on the 2011 Proposed ALP. The pavement strength design standard is based on the type of landing gear used by the aircraft operating on that runway, taxiway, or ramp. The pavement strength criteria by landing gear wheel configuration in both the 2008 Approved ALP and 2011 Proposed ALP remain as shown in Table 4.

Table 4
Pavement Strength Requirements
from 2008 Approved ALP and 2011 Proposed ALP

Gear Configuration	Pavement Strength (thousands of pounds)
Single	115
Dual	200
Dual-Tandem	468
Double Dual-Tandem	800

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Validate Runway 9R/27L Length
Ft. Lauderdale-Hollywood International Airport (FLL)

Introduction

This memorandum documents the review of the affects of potential changes in runway end elevation for the Runway 27L threshold end from 45 feet to 65 feet above mean sea level (MSL) at Fort Lauderdale Hollywood International Airport (FLL). The elevation of the Runway 9R threshold is planned to be approximately 5 feet MSL. The change in runway end elevation affects the runway gradient for Runway 9R/27L. While the runway gradient may reduce aircraft payload capability due to potential reduced acceleration going "up hill," the increased runway end elevation could reduce the one-engine inoperative climb gradient to clear airspace obstructions, thereby increasing aircraft payload capability.

Methodology

Weight penalties for Runway 9R departures were calculated for a variety of aircraft types and routes in today's schedule as well as potential new aircraft/routes. The ICAO Annex 6 and FAA AC 120-91 OEI surface for departures on ultimate Runway 9R was used to determine the critical obstruction climb gradient for both the 45-foot and 65-foot runway ends for Runway 27L. Table 1 lists obstacles located within the boundaries of the ICAO OEI surface for Runway 9L departures. The critical obstacle identified applies for both the ICAO and FAA OEI procedure criteria.

The analysis determined that the controlling obstruction for calculating obstruction climb gradient clearance is a cargo ship vehicle clearance area (obstacle #54) which is located 5,788' east of the ultimate runway threshold for Runway 27R and directly on the extended run centerline. This obstruction is approximately 180' AMSL in elevation. The elevation of this obstruction would be 135' above the 45' runway elevation and 115' above the 65' runway elevation. Aircraft departing on Runway 9R would require a climb gradient of 2.33% to clear this obstruction at a 45' runway elevation and 1.99% climb gradient at the 65' elevation.

An aircraft "maximum takeoff weight analysis" was conducted for the majority of aircraft operating at FLL. Two types of analyses were conducted in this evaluation. The first evaluates the maximum takeoff weight assuming full fuel and passenger loads as well as some cargo. This assessment is used by some airlines when considering placing an aircraft in service at an airport. This technique reviews the worst case aircraft performance to the longest possible distances. The assumptions used in this analysis tend to maximize the potential differences in aircraft performance given the runway design and airspace obstructions.

The second type of analysis, sometimes referred to as an "aircraft payload/range analysis" reviews the potential number of passengers that could not be accommodated to a specific market on a flight. The assumptions used in this analysis tend to be more conservative and are more appropriate in computing the average direct economic loss to the airline as a result of a weight penalty. A weight penalty is defined as the need to offload passengers, cargo or fuel to allow an aircraft to takeoff safely. These differences tend to be less dramatic since most aircraft at FLL do not fly to markets at their maximum range limits. Therefore, aircraft carry less fuel and, the reduced weight of fuel can be used for maximizing passengers and cargo.

For the weight penalty calculations based on the proposed runway end elevations the following input data and assumptions were used for the runway length analysis:

- The runway elevations which were being analyzed were assumed to be 45 and 65 feet above mean sea level (AMSL)
- The aircraft weight was assumed to be the maximum certified takeoff weight (MTOW) for the specific aircraft type and model
- The temperature at takeoff was assumed to an average daily summer temperature of 91 degrees Fahrenheit (Boeing 95% reliability temp. for warmest month, July)
- The optimal flap settings were assumed
- Aircraft were assessed with full passenger load
- The 2010 departure fleet mix for FLL was used to determine the most frequently operated aircraft types for inclusion into the weight penalty analysis (see Table 2).

The aircraft listed below were the 13 aircraft types used in the weight penalty calculation analysis:

- Airbus A320-214, A319-112 and A321-200
- Boeing B717-200, B737-300, B737-700W, B737-800W, B767-300ER, B767-400ER, B777-200ER and B787-8
- Bombardier CRJ-700
- McDonnell Douglas MD-80

The aircraft selected were based on a review of predominate air carrier aircraft types that operated at FLL in 2010 or could reasonably enter service at FLL in the future. Several aircraft types that are particularly capable of operating on shorter runways, such as turbo-prop aircraft and the B-757 were not included in this analysis as they would likely show no difference in performance between the two runway end elevations.

Maximum Takeoff Weight Analysis

Table 3 presents the results of the analysis of the impact on the maximum takeoff weight due to an increase in the runway end elevation for Runway 27L. The results of the analysis concluded that:

- Additional weight penalties would be incurred on the A321-200, B767-400ER, B737-800W, MD82/83 and the B767-300 aircraft with an increase in runway elevation from 45 to 65 feet MSL. The runway length as well as the controlling obstructions was the primary limitations for these aircraft operating on Runway 9R/27L. These aircraft represent 13.8 percent of the 2010 operations but the majority of these operations serve markets at ranges that would likely not incur a weight penalty (see "aircraft payload/range analysis"

- The A320-214, B737-300, A319-112, B737-700W and B777-200ER would not experience a weight penalty and the 65 feet MSL runway elevations actually provides an advantage in terms of maximum allowable takeoff weight for these aircraft types. These aircraft represent 39.5 percent of the 2010 operations but the majority of these operations serve markets at ranges that would likely not incur a weight penalty (see "aircraft payload/range analysis" below).
- The B717-200 and the B787-8 aircrafts maximum allowable takeoff weight would not be impacted with a runway end elevation increase to 65 feet MSL. The 787-8 is not yet in service but the 717-200 represents 4.4 percent of the 2010 operations.

Aircraft Payload/Range Analysis

The second type of analysis, the "aircraft payload/range analysis," is presented in Table 4. This analysis is more appropriate to assessing the day-to-day affect of the change in runway end elevation to the airlines in terms of passengers that could not be accommodated on the flight (passengers left at the terminal). The specific airline/aircraft/markets selected for this analysis represent a cross section of the past, present, and potential future long-distance markets from FLL operated for each selected aircraft type. Other markets may have significantly higher annual operations but, because of the shorter flight distances, weight penalties would not be expected regardless of runway end elevation.

The results of the airline payload/range analysis are as follows:

- The majority of airline/aircraft/markets would likely not experience any reduction in the ability to accommodate full passenger loads with either the 45-foot or 65-foot runway end elevation.

- The B737-300 tended to have the largest weight penalties for both runway end elevations. The B737-700 and other similar aircraft are typically replacing the B737-300 for these longer-range markets.

- The 65-foot runway end elevation tended to result in accommodating more passengers or nearly the same passenger loads as the 45-foot runway end elevation in most cases.

- The 45-foot runway end elevation tended to be better for the A321 aircraft to markets on the west coast. It should be noted that these aircraft are not currently in service on these markets with the A319 tending to be the preferred aircraft to serve west coast destinations. In other cases where the

45-foot runway end elevation provided better performance, the number of operations of the specific aircraft/market were small (0.1% of total departures).

Conclusion

In conclusion, the analysis of the runway length/end elevations has yielded the following results:

- Based on the allowable takeoff weight limitations the B737-800W, MD-82/83, A321-200, B767-300ER and the B767-400ER aircraft will incur weight penalty restrictions and will be negatively impacted if the runway end is elevated to 65 feet MSL.

- Aircraft which will benefit from the increased runway end elevation include the A319-100, B737-300, B737-700W, A320-200 and the B777-200ER. The maximum allowable take off weight is increased with an increase to 65 feet MSL for Runway 27R.

- The CRJ-700, B717-200, and the B787-8 are limited by the aircraft maximum structural takeoff weight (MTOW) and not the increase in runway gradient due to the 65 feet elevation of the runway end. The MTOW is defined as the maximum weight which the pilot of the aircraft is allowed to attempt takeoff, due to structural or other limits.

The weight penalty differences between the two runway end elevations were relatively small and the actual impact to airline / market / passenger weight penalties would be similar for the vast majority of aircraft operations. This analysis evaluated aircraft types accounting for 89% of the total 2010 operations at FLL. Of these aircraft evaluated, less than 3% of these flights during the hot summer months would potentially have a weight penalty based on their existing markets served. These flights would likely request the use of the longer Runway 9L/27R. The difference in potential passengers affected by weight penalties for both runways end elevations is less than 0.5% during the hot summer months. Again, this would be mitigated by the few aircraft affected using Runway 9L/27R.

Based on this analysis, the 65-foot runway end elevation for the Runway 27L threshold provides slightly improved payload/range performance for the aircraft operating at FLL
over the 45-foot runway end elevation. It is anticipated that overall impact weight penalties in terms of passengers or cargo would not degrade to operational performance of FLL in either case.

TABLES

Table 1
Existing Obstruction with the ICAO Annex 6 OEI Surface Boundary for Ultimate Runway 9L Departures

ID	STRUCTURE	LATITUDE	LONGITUDE	NORTHING	EASTING	ELEVATION (FT. MSL)	OUT DISTANCE FROM 27R ULTIMATE RUNWAY END (FT.)	GRAD. % W/45 FT END	GRAD.% W/65 FT END	ICAO WIDTH	OVER DISTANCE FROM 27R ULTIMATE RUNWAY END (FT.)
20	MOBILE CRANE ENVELOPE	26 3' 58.010" N	80 7' 3.080" W	630700.47	945861.33	160	5403	2.13	1.76	971	172L
33	MOBILE CRANE ENVELOPE	26 3' 54.560" N	80 7' 5.030" W	630350.92	945685.86	165	5228	2.30	1.91	949	178R
38	TRANSMISSION TOWER	26 3' 57.039" N	80 7' 46.492" W	630575.83	941903.2	74	1445	2.01	0.62	476	47L
42	POLE	26 3' 54.453" N	80 7' 24.801" W	630328	943883	112	3425	1.96	1.37	723	201R
44	POLE	26 3' 54.360" N	80 7' 11.270" W	630326.88	945116.95	114	4659	1.48	1.05	878	202R
45	POLE	26 3' 54.400" N	80 7' 17.760" W	630326.93	944525.09	113	4067	1.67	1.18	804	202R
54	CARGO SHIP VEHICLE CLEARANCE	26 3' 56.280" N	80 6' 58.870" W	630528.39	946246.43	180	5788	2.33	1.99	1019	0R
61	CRANE	26 3' 56.572" N	80 7' 1.358" W	630556.29	946019.38	160	5561	2.07	1.71	990	28L
75	POLE	26 4' 0.310" N	80 7' 17.260" W	630923.96	944566.66	113	4108	1.66	1.17	809	395L
77	POLE	26 4' 0.293" N	80 7' 11.126" W	630926	945126	114	4668	1.48	1.05	879	397L
79	POLE	26 4' 0.380" N	80 7' 23.770" W	630927	943973	114	3515	1.96	1.39	735	398L
83	CARGO SHIP VEHICLE CLEARANCE	26 3' 52.630" N	80 7' 0.910" W	630158.6	946062.89	175	5605	2.32	1.96	996	370R
105	TRANSMISSION TOWER	26 3' 56.880" N	80 7' 46.580" W	630559.71	941895.25	70	1437	1.74	0.35	475	31L
110	POLE	26 3' 51.601" N	80 7' 26.401" W	630039	943739	112	3281	2.04	1.43	705	490R
113	POLE	26 3' 51.400" N	80 7' 14.570" W	630026	944818	113	4360	1.56	1.10	840	503R
115	POLE	26 3' 51.420" N	80 7' 21.161" W	630024	944217	113	3759	1.81	1.28	765	505R
119	LIGHT MAST	26 4' 2.512" N	80 7' 21.215" W	631143.88	944204.46	109	3746	1.71	1.17	764	615L
129	POLE	26 4' 3.309" N	80 7' 7.167" W	631233	945485	101	5027	1.11	0.72	924	704L
137	POLE	26 3' 57.353" N	80 7' 14.581" W	630627	944813	114	4355	1.58	1.13	840	98L
138	POLE	26 3' 57.393" N	80 7' 21.160" W	630627	944213	113	3755	1.81	1.28	765	98L
1A	CRANE BOOM	26 3' 54.317" N	80 7' 5.166" W	630326.33	945673.66	149	5215	1.99	1.61	947	202R
1B	CRANE CAB	26 3' 53.113" N	80 7' 2.400" W	630206.41	945926.68	159	5468	2.08	1.72	979	322R
1C	CRANE CAB	26 3' 52.598" N	80 7' 1.215" W	630155.15	946035.07	159	5577	2.04	1.69	992	374R
1D	CRANE BOOM	26 3' 51.736" N	80 6' 59.239" W	630069.35	946215.85	149	5758	1.81	1.46	1015	459R
2A	CRANE BOOM	26 4' 3.272" N	80 7' 0.384" W	631233.47	946103.62	149	5645	1.84	1.49	1001	705L
2B	CRANE CAB	26 4' 2.068" N	80 6' 57.618" W	631113.55	946356.64	159	5898	1.93	1.59	1033	585L
2C	CRANE CAB	26 4' 1.551" N	80 6' 56.433" W	631062.15	946465.07	159	6007	1.90	1.56	1046	533L
2D	CRANE BOOM	26 4' 0.691" N	80 6' 54.457" W	630976.49	946645.8	149	6188	1.68	1.36	1069	448L
33V	PANAMAX CARGO SHIP	26 3' 57.263" N	80 6' 57.725" W	630628.35	946350.18	159	5892	1.93	1.60	1032	100L
3A	CRANE BOOM	26 4' 3.672" N	80 7' 0.222" W	631273.95	946118.09	172	5660	2.24	1.89	1003	745L
3B	CRANE CAB	26 4' 3.612" N	80 6' 57.152" W	631269.79	946398.06	182	5940	2.31	1.97	1038	741L
3C	CRANE CAB	26 4' 3.587" N	80 6' 55.837" W	631268.01	946518.05	182	6060	2.26	1.93	1053	739L
3D	CRANE BOOM	26 4' 3.544" N	80 6' 53.644" W	631265.04	946718.03	172	6260	2.03	1.71	1078	736L
RC-S	PANAMAX CARGO SHIP	26 3' 56.260" N	80 6' 54.980" W	630528.78	946601.18	159	6143	1.86	1.53	1063	0L

Source: NGS/NOAA Obstruction Data, July 5, 1999 & July 6, 3007, FLL Port Cranes Obstruction Analysis – Jacobs Consulting – 2009 and 2008 FLL ALP Obstructions.

Table 2
2010 Departure Aircraft Operations Counts by Aircraft Type

AC/Group	Aircraft Type	2010 Total Departure Operations by Aicraft Type	% of Total 2010 Departures
B757	752	304	0.3%
	753	685	0.7%
	757	5,285	5.2%
B757 Total		**6,274**	**6.2%**
Heavy	310	82	0.1%
	330	16	0.0%
	762	1	0.0%
	763	90	0.1%
	764	3	0.0%
	767	12	0.0%
	76W	10	0.0%
	77L	1	0.0%
Heavy		**215**	**0.2%**
Large	319	17,717	17.5%
	320	18,736	18.5%
	321	3,436	3.4%
	717	4,421	4.4%
	733	2,615	2.6%
	734	2,705	2.7%
	735	681	0.7%
	736	2	0.0%
	737	1,018	1.0%
	738	5,157	5.1%
	739	1,181	1.2%
	73G	15,360	15.1%
	73H	349	0.3%
	73W	1,906	1.9%
	CR7	149	0.1%
	CRJ	363	0.4%
	E70	19	0.0%
	E75	5	0.0%
	E90	4,543	4.5%
	M80	1,900	1.9%
	M83	188	0.2%
	M88	3,266	3.2%
	M90	24	0.0%
Large Total		**85,741**	**84.6%**
Small	BE1	7,756	7.6%
	CNA	417	0.4%
	DH8	784	0.8%
	PA2	209	0.2%
Small Total		9,166	9.0%
Grand Total		**101,396**	**100.0%**

Source: Official Airline Guide (OAG), January 2011.

Table 3
Air Carrier / Aircraft Type Weight Penalty Analysis Summary

Airline(s)	Aircraft	Seats	Engines	Maximum Structural Takeoff Weight (lbs)	45-foot Runway End Elevation Option		65-foot Runway End Elevation Option		Option with Better Performance	Weight Advantage (lbs) of 65-ft End Elev.[a]	Total 2010 Departures
					Allowable Takeoff Weight	Performance Limit	Allowable Takeoff Weight	Performance Limit			
Virgin America, Delta, JetBlue, Spirit	A320-200	149	CFM56-5B4	169,754	**165,714**	OBS	**167,182**	OBS	65-foot	1,468	18,736
Virgin America, Spirit	A319-100	119	CFM56-5B6	166,447	**155,817**	OBS	**157,719**	OBS	65-foot	1,902	17,717
Southwest, United (Continental), AirTran	737-700W	137/124	CFM56-7B20	153,000	**140,909**	FLD/OBS	**143,128**	FLD/OBS	65-foot	2,219	15,360
Allegiant, American, Delta	MD-82/83	162	JT8D-217A&C	149,500	**143,664**	FLD/OBS	**142,936**	FLD/OBS	45-foot	-728	5,378
United (Continental)	737-800W	157	CFM56-7B24	172,500	**158,727**	FLD/OBS	**157,922**	FLD/OBS	45-foot	-805	5,157
AirTran	717-200	117	BR715	121,000	**121,000**	MAX	**121,000**	MAX	No difference	0	4,421
Virgin America (future), Air Canada, Spirit	A321-200	174	CFM56-5B3/3	206,000	**195,636**	FLD/OBS	**193,690**	FLD/OBS	45-foot	-1,946	3,436
Southwest, United	737-300	137/120	CFM56-3B1	130,000	**122,576**	FLD/OBS	**124,413**	FLD/OBS	65-foot	1,837	1,018
Comair	CRJ-700	70	CF34-8C1	75,000	**75,000**	MAX	**75,000**	MAX	No difference	0	363
Avianca, Condor, American	767-300ER	232	CF6-80C2B6	408,000	**366,651**	OBS	**366,383**	FLD	45-foot	-268	90
Alitalia, Continental	767-400ER	256	CF6-80C2B8F	450,000	**386,777**	FLD	**385,088**	FLD	45-foot	-1,689	3
American, Alitalia	777-200ER	247	GE90-94B	648,000	**562,520**	OBS	**567,724**	FLD/OBS	65-foot	5,204	1
United (Continental)	787-8[b]	224	GE or RR	484,000	**450,100**	FLD	**450,100**	FLD	No difference	0	0
									2010 Scheduled Air Carrier Departures:		101,396

Assumptions:
Takeoff Temperature 91F = Boeing 95% Reliability Temp. for warmest month (July)
Air conditioning OFF
Anti-Ice OFF
Optimum Flaps
FLD = Takeoff Weight Limited by Field Length
MAX = Takeoff Weight Limited by Maximum Structural Takeoff Weight
OBS = Takeoff Weight Limited by Obstacles
Allowable Takeoff Weight represents the allowed takeoff weight for an aircraft based on the runway gradients or obstruction gradient clearance restrictions.

(a) Positive number represents the increased weight capability of the 65-foot end elevation option compared with the 45-foot end elevation option.
Negative number represents the decreased weight capability of the 65-foot end elevation option compared with the 45-foot end elevation option.
Zero indicates that there is no difference between the 45-foot and 65-foot runway end options.
(b) 787 is based on Pre-Flight Test estimates from Boeing

Source: Flight Engineering and Landrum & Brown, January 2011.

Table 4
Aircraft Type / Payload / Range Analysis

					Pax Load			Potential Pax Not Accommodate			
Aircraft Type	**Carrier**	**Airport Code**	**Market**	**Range (SM)**	**45-ft End Elev**	**65-ft End Elev**	**Max Seats**	**45-ft End Elev**	**65-ft End Elev**	**Option with Better Performance**	**2010 Annual Operations**
A319	Virgin America	SFO	San Francisco, CA	2,577	119	119	119	0	0	No difference	707
	Spirit	LAX	Los Angeles, CA	2,335	119	119	119	0	0	No difference	**
A320	Virgin/jetBlue	SFO	San Francisco, CA	2,577	**122**	**128**	149	**27**	**21**	65-foot	**
A321	Air Canada	YUL	Montreal, Canada	1,386	174	174	174	0	0	No difference	194
	Spirit	DTW	Detroit, MI	1,130	174	174	174	0	0	No difference	155
	Virgin America	LAX	Los Angeles, CA	2,335	174	**170**	174	0	**4**	45-foot	**
	Virgin America	SFO	San Francisco, CA	2,577	**164**	**157**	174	**10**	**17**	45-foot	**
B737-300	Southwest	ALB	Albany, NY	1,206	**117**	**124**	137	**20**	**13**	65-foot	52
	United	DEN	Denver, CO	1,700	**82**	**91**	120	**38**	**29**	65-foot	*
B767-300	Avianca	BOG	Bogota, Colombia	1,528	232	232	232	0	0	No difference	14
	Condor	FRA	Frankfurt, Germany	4,801	**183**	**182**	232	**49**	**50**	45-foot	49
	American	GIG	Rio de Janeiro, Brazil	4,191	**213**	**212**	232	**19**	**20**	45-foot	**
	American	SFO	San Francisco, CA	2,580	232	232	232	0	0	No difference	*
B777-200ER	American	EZE	Buenos Aires, Argentina	4,408	247	247	247	0	0	No difference	**
	Alitalia	FCO	Rome, Italy	5,171	247	247	247	0	0	No difference	**
B787-800	Unknown	GIG	Rio de Janeiro, Brazil	4,191	224	224	224	0	0	No difference	**
	Unknown	FRA	Frankfurt, Germany	4,801	224	224	224	0	0	No difference	**
MD80	Allegiant	PBG	Plattsburg, NY	1,326	162	162	162	0	0	No difference	181
	American	BOS	Boston, MA	1,239	162	162	162	0	0	No difference	*
	American	ORD	Chicago, OH	1,183	162	162	162	0	0	No difference	266
	Delta	DTW	Detroit, MI	1,130	162	162	162	0	0	No difference	12
	Delta	MSP	Minneapolis, MN	1,502	**155**	**152**	162	**7**	**10**	45-foot	12
								2010 Scheduled Air Carrier Departures:			101,396

* Previous market served by this airline/aircraft.
** Potential future market to be served from FLL.

Rrepresents the increased weight capability of the 65-foot end elevation option compared with the 45-foot end elevation option.
Represents the decreased weight capability of the 65-foot end elevation option compared with the 45-foot end elevation option.
Indicates that there is no difference between the 45-foot and 65-foot runway end options.

Source: Flight Engineering and Landrum & Brown, January 2011.

From: Mccluskie, James [mailto:JMcCluskie@broward.org]
Sent: Tuesday, April 19, 2011 1:41 PM
To: Chris Babb
Cc: Virginia.Lane@faa.gov; Suzie Kleymeyer
Subject: RE: FLL

Chris/Virginia/Suzy

Based on a conversation with Program Manager and the Designer, the fill for the new south runway will be approximately similar or less than the estimate in the EIS with the realization of some savings of flattening out the midfield. This is in comparison to the previous layout in EIS which would have required the midfield to have grade changes to match the elevation of the runway. Other reductions in fill were realized with separation of the tunnel and bridge structure.

Attached is the presentation from the workshop.

Jamie

Aviation Planning at the Leading Edge

To: Jamie McCluskie, Director of Planning

From: Jon M. Woodward, Senior Vice President

Cc: Berta Fernandez, Sarah Potter, Tom Cornell

Date: November 17, 2010

Re: Noise Memo for 30% Design

As part of the Final Environmental Impact Statement (FEIS) for the Development and Expansion of Runway 9R/27L and other Associated Airport Projects at Fort Lauderdale-Hollywood International Airport (FLL), Landrum & Brown (L&B) conducted a noise assessment to determine potential impacts. That assessment included the evaluation of the noise effects of the proposed runway expansion, including raising the eastern end of the runway to an elevation of 45 feet Mean Sea Level (MSL). In December 2008, the FAA issued its Record of Decision (ROD) selecting Alternative B1b for approval and implementation at FLL.

For the FEIS, the Integrated Noise Model (INM), version 6.1, was used to compute the noise levels expected to be present in the 65+ Day–Night Average Sound Level (DNL). The INM model took into account the end elevations of the runway for each alternative and the model computed the effects of differences in runway end elevation using the slant-range distance (third-dimensional distance) between the noise source and the receiver for each alternative to compute the projected noise levels at the source.

As part of the design process, a 30% engineering plan has been developed by the runway designer that proposes the planned elevation of the east end of the runway to now be 65 feet MSL. This increase in elevation of the east runway end would have no effect on noise levels associated with departures to the east (Runway 9R) because they would begin departures from the west threshold of the runway and be airborne well before passing over the east runway end. Departures to the west (departing on Runway 27L) would be off of the ground by the time the aircraft reached the west end of the runway therefore there would be no increased noise

memo

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effect there with this proposed change in elevation. Furthermore, aircraft landing from the west would be at the same altitude along the descent to Runway 9R, but landings on Runway 27L would descend along a glide slope 20 feet higher than had been proposed by the FEIS documentation, landing at the 65 feet high eastern threshold. This would result in minimally quieter noise from each west flow arrival using the runway.

Regarding sideline noise effects, the proposed runway is approximately 1,000 feet north of the nearest line of homes in Melaleuca Gardens at the proposed mid-point of the runway. The eastern end of the subdivision is located at a point perpendicular to the mid-point of the proposed runway. As evaluated in the FEIS, the elevation of the mid-point of the proposed runway was projected to be 45 feet MSL. Under the 30% design, the proposed elevation of the mid-point of the runway is planned to be approximately 35 feet MSL. The difference of slant-range distance between the two scenarios is calculated to be approximately four inches to the nearest line of residences south of Griffin Road/Northwest 10th Street.

The difference between the noise levels computed by the INM for these two scenarios on the surrounding residential areas, including Melaleuca Gardens, would be neither perceptible, nor will it have any effect on the locations of the DNL noise contours and reported impacts computed for the FEIS, as long as all other assumptions provided in the FEIS are the same. Therefore, this proposed change in the eastern runway end elevation does not constitute significant new circumstances or information as it relates to noise and the noise impacts discussed in the FEIS and ROD remain applicable, accurate, and valid.

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ABBREVIATIONS

ARP	AIRPORT REFERENCE POINT	MI.	MILE	REIL	RUNWAY END IDENTIFIER LIGHTS
ASDA	ACCELERATE STOP DISTANCE AVAILABLE	MIRL	MEDIUM INTENSITY RUNWAY LIGHTS	R/W	RUNWAY
ASOS	AUTOMATED SURFACE OBSERVING SYSTEM	MITL	MEDIUM INTENSITY TAXIWAY LIGHTS	RPZ	RUNWAY PROTECTION ZONE
ATCT	AIRPORT TRAFFIC CONTROL TOWER	MSL	MEAN SEA LEVEL	ROFA	RUNWAY OBJECT FREE AREA
BRL	BUILDING RESTRICTION LINE	MM	MIDDLE MARKER	ROFZ	RUNWAY OBSTACLE FREE ZONE
EMAS	ENGINEERED MATERIALS ARRESTING SYSTEM	N/A	NON-APPLICABLE	RSA	RUNWAY SAFETY AREA
FT.	FEET	NAD83	NORTH AMERICAN DATUM OF 1983	RVR	RUNWAY VISUAL RANGE
GS	GLIDE SLOPE	NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988	SWL	SINGLE WHEEL LOAD
HIRL	HIGH INTENSITY RUNWAY LIGHTS	NAVAID	NAVIGATIONAL AID	TODA	TAKEOFF DISTANCE AVAILABLE
LDA	LANDING DISTANCE AVAILABLE	NDB	NON-DIRECTIONAL BEACON	TORA	TAKEOFF RUN AVAILABLE
LOC	LOCALIZER	NON-PRE	NON-PRECISION	T/W	TAXIWAY
MALS	MEDIUM INTENSITY APPROACH LIGHTING SYSTEM	OM	OUTER MARKER	UNL	UNLIGHTED
MALSR	MALS W/RUNWAY ALIGNMENT INDICATOR LIGHTS	PAPI	PRECISION APPROACH PATH INDICATOR	VOR	VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE TRANSMITTER

NORTH FACILITIES INVENTORY

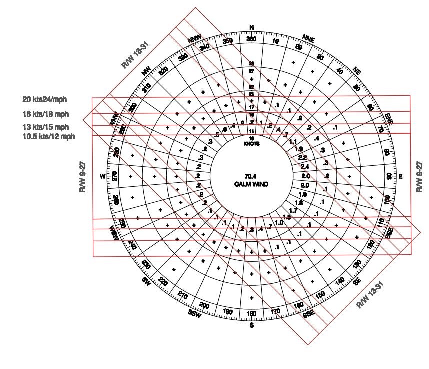
BLDG. No.	TENANT NAME	OPERATION
N-1	LYNX FORT LAUDERDALE CARGO PORT	AIR CARGO
N-2	VIRGINIA CAROLINA	AIR CARGO
N-3	VIRGINIA CAROLINA	AIR CARGO
N-4	CAROLINA AIRCRAFT	FUEL FACILITY
N-5	VIRGINIA CAROLINA	FIXED BASE OPERATOR
N-6	VIRGINIA CAROLINA	FIXED BASE OPERATOR
N-7	VIRGINIA CAROLINA	FIXED BASE OPERATOR
N-8	FLL-AIR, INC.	AIR CARGO
N-9	FLL-AIR, INC.	AIR CARGO
N-10	FLL-AIR, INC.	AIR CARGO
N-11	FLL-AIR, INC.	AIR CARGO
N-12	SHELTAIR AVIATION CENTER, LLC. (FUTURE BLDG.)	AIR CARGO / FIXED BASE OPERATOR
N-13	SHELTAIR AVIATION CENTER, LLC. (COLOMBIAN AIR FORCE)	AIR CARGO
N-14	SHELTAIR AVIATION CENTER, LLC. (AIRBORNE EXPRESS)	AIR CARGO
N-15	AERO-LADERDALE, LLC.	AIR CARGO
N-16	AERO-LADERDALE, LLC.	AIR CARGO
N-17	AERO-LADERDALE, LLC.	AIR CARGO
N-18	AERO-LADERDALE, LLC.	AIR CARGO
N-19	AERO-LADERDALE, LLC.	AIR CARGO
N-20	EMBRAER	AIRCRAFT SALES, MAINTENANCE, & TRAINING
N-21	EMBRAER	AIRCRAFT SALES, MAINTENANCE, & TRAINING
N-22	EMBRAER	AIRCRAFT SALES, MAINTENANCE, & TRAINING
N-23	EMBRAER (MAIN BLDG. 'A')	AIRCRAFT SALES, MAINTENANCE, & TRAINING
N-24	EMBRAER	
N-25	EMBRAER	
N-26	AZORRA AVIATION, LLC.	LIMITED SERVICE FIXED BASE OPERATOR
N-27	AZORRA AVIATION, LLC.	LIMITED SERVICE FIXED BASE OPERATOR
N-28A	B.C.A.D. (VACANT)	VACANT (TO BE DEMOLISHED)
N-28	LSG SKY CHEFS, INC.	AIRLINE CATERING KITCHENS
N-29	B.C.A.D. CARGO FACILITY	FUEL STORAGE
N-30	B.C.A.D. FUEL STORAGE (3 TANKS)	GROUND SERVICE FUEL FACILITY
N-31	B.C.A.D. FUEL FARM	GROUND SERVICE FUEL FACILITY
N-32	AIRPORT RECYCLING SPECIALIST	REFUSE FACILITY
N-33	ASIG, INC.	GROUND SERVICE EQUIPMENT FACILITY
N-34	DELTA GROUND SERVICES EQUIPMENT MAINTENANCE	GROUND SERVICE EQUIPMENT FACILITY
N-35	B.C.A.D. AIRPORT MAINTENANCE	
N-36		
N-37	EMBRAER (H-AVIATION)	HANGAR
N-38	EMBRAER (H-AVIATION)	OFFICE / MAINTENANCE FACILITY
N-39	URS/AEP TRAILERS	ENGINEERING OFFICES
N-40	EDGEWOOD PASSIVE PARK	PARKING

WEST FACILITIES INVENTORY

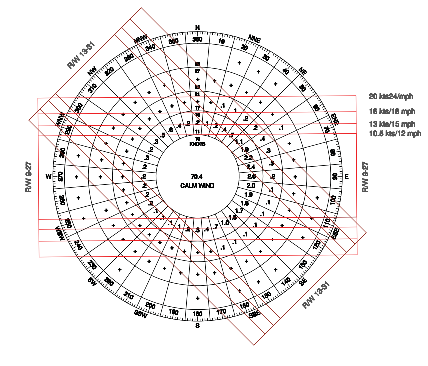
BLDG. No.	TENANT NAME	OPERATION
W-1	BROWARD COUNTY ANIMAL CARE AND REGULATION	COUNTY ANIMAL CONTROL
W-7	TROPICAL AVIATION GROUND SERVICES INC./AIR SUNSHINE	AIRCRAFT MAINTENANCE
W-11	WASTE WATER LIFT STATION (4) (B.C.O.E.S.)	SEWAGE LIFT STATION
W-12	SHUTTLE PORT	BUS MAINTENANCE
W-13	NAVAL AIR MUSEUM	
W-14	VACANT	TO BE DEMOLISHED
W-15	VACANT	TO BE DEMOLISHED
W-16	SIGNATURE FLIGHT SUPPORT	FULL SERVICE FIXED BASE OPERATOR
W-17	SIGNATURE (BOMBARDIER)	FULL SERVICE FIXED BASE OPERATOR
W-18	WASTE WATER LIFT STATION (B.C.O.E.S.)	SEWAGE PUMP STATION
W-19	LAUDERDALE SMALL BOAT CLUB	BOAT CLUB
W-20	LAUDERDALE SMALL BOAT CLUB	BOAT CLUB
W-21	SHELTAIR AVIATION CENTER, LLC. FUEL FARM	FUEL FARM
W-22	GULFSTREAM	EXECUTIVE OFFICES & AIRCRAFT MAINTENANCE
W-23	B.C.A.D. AIRPORT MAINTENANCE	MAINTENANCE & FUEL
W-24	SHELTAIR AVIATION CENTER, LLC.	OFFICE
W-25	SHELTAIR AVIATION CENTER, LLC.	GROUND SERVICE EQUIPMENT FACILITY
W-26	FEDERAL AVIATION ADMINISTRATION, A.T.C.T.	GOVERNMENTAL AGENCY
W-28	AIRFILED ELECTRICAL VAULT	AIRFIELD SUPPORT
W-29	SHELTAIR AVIATION CENTER, LLC. (GAFIS)	GAFIS
W-30	SHELTAIR AVIATION CENTER, LLC. (FT. LAUDERDALE JET CENTER)	FULL SERVICE FIXED BASE OPERATOR
W-31	SHELTAIR AVIATION CENTER	FULL SERVICE FIXED BASE OPERATOR
W-32	PARKING	PARKING
W-33	PARKING	PARKING
W-35	AVIS RENT-A-CAR SYSTEM, LLC.	RENTAL VEHICLE MAINTENANCE FACILITY
W-36	AIRPORT / SEAPORT EMS TRAINING FIRE STATION	
W-37	B.C.A.D. (VACANT)	

EAST FACILITIES INVENTORY

BLDG. No.	TENANT NAME	OPERATION
E-1	TERMINAL 2 - CONCOURSE D (9 GATES)	AIRLINE TERMINAL
E-2	TERMINAL 3 - CONCOURSE E (10 GATES)	AIRLINE TERMINAL
E-3	TERMINAL 3 - CONCOURSE F (10 GATES)	AIRLINE TERMINAL
E-4	TERMINAL 4 - CONCOURSE H (10 GATES)	AIRLINE TERMINAL
E-5	TERMINAL 4 - SPIRIT AIRLINES	AIRLINE TERMINAL
E-6	PARKING GARAGE (PALM)	PARKING
E-11	TERMINAL 1 - CONCOURSES B & C (18 GATES)	AIRLINE TERMINAL
E-12	WASTE WATER LIFT STATION (4) (B.C.O.E.S.)	SEWAGE LIFT STATION
E-13	WASTE WATER LIFT STATION (4) (B.C.O.E.S.)	SEWAGE LIFT STATION
E-14	WASTE WATER LIFT STATION (4) (B.C.O.E.S.)	SEWAGE LIFT STATION
E-15	COMMUTER TERMINAL	ADMINISTRATION
E-16	PARKING GARAGE (HIBISCUS)	PARKING
E-17	CONSOLIDATED RENTAL CAR FACILITY / CYPRESS GARAGE	CAR RENTAL
E-18	TOLL PLAZA	TOLL PLAZA
E-19	VACANT	CAR RENTAL
E-20	PORT ID OFFICE	OFFICE
E-21	USA PARKING	PARKING
E-22	USA PARKING	PARKING
E-23	USA PARKING	PARKING
E-24	B.C.A.D. ADMINISTRATION TRAILERS	ADMINISTRATION
E-25	ABANDONED	TOLL BARRIER
E-26	AIRPORT RESCUE FIREFIGHTERS (ARFF) STATION 10	BSO FIRE / EMS
E-29	B.C.A.D. (VACANT)	STORAGE
E-30	B.C.A.D. (VACANT)	STORAGE
E-31	B.C.A.D. (VACANT)	PARKING
E-32	B.C.A.D. (VACANT)	PARKING
E-33	B.C.A.D. (VACANT)	
E-34	B.C.A.D. TRAILER (OUTREACH)	



EXISTING VFR WIND ROSE



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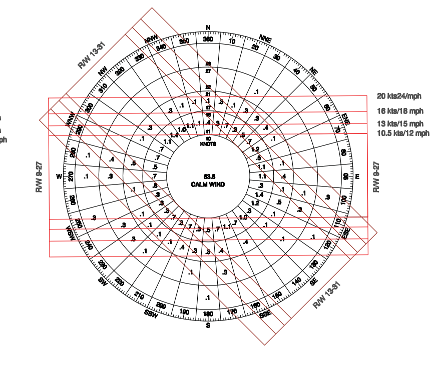

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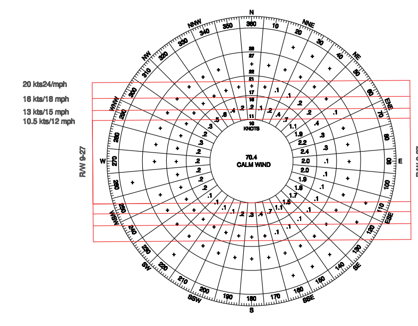
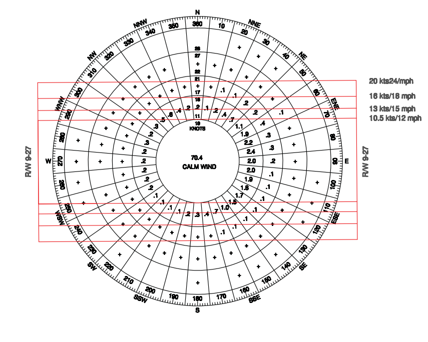
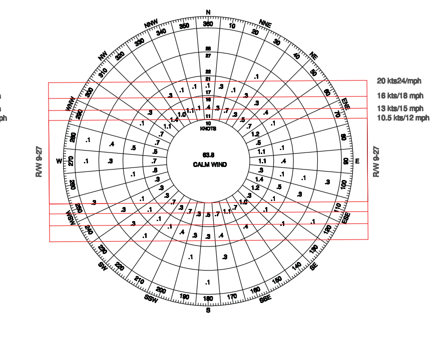


ULTIMATE VFR WIND ROSE



ULTIMATE ALL WEATHER WIND ROSE



ULTIMATE IFR WIND ROSE

WIND DATA SOURCE: NATIONAL CLIMATIC DATA CENTER
US DEPT OF COMMERCE
ASHEVILLE, NORTH CAROLINA

STATION: FT. LAUDERDALE - HOLLYWOOD INTERNATIONAL AIRPORT

PERIOD OF RECORD: JAN 1, 1998 - DEC 31, 2007

THE INFORMATION PRESENTED ON THIS DRAWING WAS PREPARED TO A DEGREE OF ACCURACY SUITABLE FOR PLANNING PURPOSES USING (1) FEDERAL AVIATION ADMINISTRATION STANDARDS AND RECOMMENDATIONS THAT WERE CURRENT AS OF THE DATE OF THIS DRAWING, (2) ASSUMPTIONS REVIEWED AND AGREED TO BY THE BROWARD COUNTY AVIATION DEPARTMENT. THIS DRAWING SHOULD NOT BE THE BASIS FOR CONSTRUCTION DECISIONS.

WIND ROSE CALCULATIONS & WIND COVERAGE DATA

RUNWAY	CROSSWIND COMPONENT											
	10.5 KTS/ 12 MPH			13 KTS/ 15 MPH			16 KTS/ 18 MPH			20 KTS/ 24 MPH		
	VFR	ALL	IFR	VFR	ALL	IFR	VFR	ALL	IFR	VFR	ALL	IFR
9-27	92.5%	92.4%	83.6%	96.8%	96.7%	90.1%	99.4%	99.3%	95.3%	99.9%	99.9%	98.3%
13-31	88.3%	88.3%	83.3%	93.8%	93.8%	89.4%	98.2%	98.2%	94.8%	99.6%	99.6%	97.6%
COMBINED	97.6%	97.5%	91.9%	99.1%	99.1%	95.4%	99.8%	99.8%	98.0%	100.0%	100.0%	99.4%
ULTIMATE 9-27	92.5%	92.4%	83.6%	96.8%	96.7%	90.1%	99.4%	99.3%	95.3%	99.9%	99.9%	98.3%

ABBREVIATIONS: VFR - VISUAL FLIGHT RULES
IFR - INSTRUMENT FLIGHT RULES

AIRPORT DATA

ITEM		EXISTING	ULTIMATE
AIRPORT ELEVATION (FEET AMSL)		9.0	45.4
AIRPORT REFERENCE POINT (ARP) (NAVD88)		LAT. 26°04'21.3" N	LAT. 26°04'17.78"
		LONG. 80°09'09.9" W	LONG. 80°09'2.14"
MEAN/MAX. TEMPERATURE		82.6° F	82.6° F
TERMINAL NAVAIDS		ATCT,LOC,TVOR/DME, ASR,ILS,NDB,GPS	ATCT,LOC, ASR,ILS,NDB,GPS
DESIGN AIRCRAFT (RW LENGTH)	9L-27R	DC 10-30	B 767-400*
	13-31	DC 10-30	DECOMISSIONED*
	9R-27L	FALCON 900	B 767-400*
AIRPORT REFERENCE CODE	9L-27R	D-IV	D-IV
	13-31	D-IV	DECOMISSIONED*
	9R-27L	B-II	D-IV
TAXIWAY MARKING		CENTERLINE	CENTERLINE
TAXIWAY LIGHTING		MITL	MITL

* DATA SOURCE: Draft Environmental Impact Statement (March, 2007)

RUNWAY DATA

DESCRIPTION		EXISTING		ULTIMATE		EXISTING		ULTIMATE		EXISTING		ULTIMATE	
RUNWAY NUMBER		9R	27L	9R	27L	9L	27R	9L	27R	13	31	13	31
RUNWAY LENGTH (FT.)		5,276	5,276	8,000	8,000	9,000	9,000	SAME	SAME	6,930	6,930	Decomissioned	Decomissioned
TRUE BEARING		S89°59'19"E	S89°59'19"E	SAME	SAME	N89°59'30"E	N89°59'30"E	SAME	SAME	S45°00'01"E	S45°00'01"E	Decomissioned	Decomissioned
DISPLACED THRESHOLD (FT.)		320	142	N/A	N/A	577	606	SAME	SAME	N/A	70	Decomissioned	Decomissioned
TORA (FT.)		5,276	5,276	8,000	8,000	9,000	9,000	SAME	SAME	6,930	6,930	Decomissioned	Decomissioned
TODA (FT.)		5,276	5,276	8,000	8,000	9,000	9,000	SAME	SAME	6,930	6,930	Decomissioned	Decomissioned
ASDA (FT.)		5,276	5,276	8,000	8,000	9,000	9,000	SAME	SAME	6,930	6,930	Decomissioned	Decomissioned
LDA (FT.)		4,956	5,134	8,000	8,000	8,423	8,394	SAME	SAME	6,930	6,860	Decomissioned	Decomissioned
RUNWAY WIDTH (FT.)		100	100	150	150	150	150	SAME	SAME	150	150	Decomissioned	Decomissioned
PAVEMENT TYPE		Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	SAME	SAME	Asphalt	Asphalt	Decomissioned	Decomissioned
PAVEMENT STRENGTH FOR (S) SINGLE, (D) DUAL, (DT) DUAL-TANDEM, AND (DDT) DOUBLE DUAL TANDEM GEARED AIRCRAFT		S-30	S-30	S-115 D-200 DT-468 DDT-800	S-115 D-200 DT-468 DDT-800	S-100 D-200 DT-468 DDT-800	S-100 D-200 DT-468 DDT-800	SAME	SAME	S-90 D-150 DT-350	S-90 D-150 DT-350	Decomissioned	Decomissioned
RUNWAY LIGHTING		MIRL	MIRL	HIRL	HIRL	HIRL	HIRL	SAME	SAME	MIRL	MIRL	Decomissioned	Decomissioned
RUNWAY MARKING		NON-PRE	NON-PRE	PRECISION	PRECISION	PRECISION	PRECISION	SAME	SAME	NON-PRE	NON-PRE	Decomissioned	Decomissioned
VISIBILITY MINIMUMS		1 Mi.	Visual	1/2 Mi.	3/4 Mi.	3/4 Mi.	1/2 Mi.	SAME	SAME	1 Mi.	Visual	Decomissioned	Decomissioned
NAVIGATIONAL AND VISUAL AIDS		GPS LOC PAPI	PAPI	GPS, GS, LOC, OM, VR,MALSR, PAPI	GPS, GS, LOC, OM, RVR,MALS, PAPI	GPS, GS, LOC, OM, RVR,MALSR, PAPI	GPS, GS, LOC, MM, RVR,MALSR, PAPI	SAME	SAME	GPS, NDB, LOC, REIL, PAPI	GPS, REIL, PAPI	Decomissioned	Decomissioned
AIRPORT REFERENCE CODE (ARC)		B - II	B - II	D - IV	D - IV	D - IV	D - IV	SAME	SAME	D - IV	D - IV	Decomissioned	Decomissioned
EFFECTIVE GRADIENT		0.000%	-0.000%	0.458%	-0.458%	-0.004%	0.004%	SAME	SAME	-0.003%	0.003%	Decomissioned	Decomissioned
INSTRUMENT APPROACH		LOC	N/A	ILS CAT- I	ILS CAT- I	ILS CAT- I	ILS CAT- I	SAME	SAME	LOC	N/A	Decomissioned	Decomissioned
FAR PART 77 APPROACH SLOPE		34:1	20:1	50:1	50:1	50:1	50:1	SAME	SAME	34:1	20:1	Decomissioned	Decomissioned
RUNWAY PROTECTION ZONE (RPZ)	LENGTH	1,000	1,000	2,500	1,700	1,700	2,500	SAME	SAME	1,700	1,700	Decomissioned	Decomissioned
	WIDTH 1	500	500	1,000	1,000	1,000	1,000	SAME	SAME	500	500	Decomissioned	Decomissioned
	WIDTH 2	700	700	1,750	1,510	1,510	1,750	SAME	SAME	1,010	1,010	Decomissioned	Decomissioned
RUNWAY SAFETY AREA (RSA) WIDTH (FT)		150	150	500	500	500	500	SAME	SAME	500	500	Decomissioned	Decomissioned
RSA LENGTH PRIOR TO LANDING THRESHOLD (FT)		300	300	600 [1]	600 [1]	600	600	SAME	SAME	600	600	Decomissioned	Decomissioned
RSA LENGTH BEYOND RUNWAY END (FT)		183	300	600 [1]	600 [1]	329	646	SAME	SAME	771	629	Decomissioned	Decomissioned
RUNWAY OBJECT FREE AREA (ROFA) WIDTH (FT)		500	500	800	800	800	800	SAME	SAME	800	800	Decomissioned	Decomissioned
ROFA LENGTH BEYOND RUNWAY END (FT) [2]		183	300	600	600	329	646	SAME	SAME	771	629	Decomissioned	Decomissioned
RUNWAY OBSTACLE FREE ZONE (ROFZ) WIDTH (FT)		250	250	400	400	400	400	SAME	SAME	400	400	Decomissioned	Decomissioned
RUNWAY END	LATITUDE	26°03'57.51"N	26°03'57.16"N	26°03'57.49"N	26°03'56.89"N	26°04'37.01"N	26°04'36.45"N	SAME	SAME	26°04'44.05"N	26°03'55.21"N	Decomissioned	Decomissioned
	LONGITUDE	80°09'37.14"W	80°08'39.29"W	80°09'33.09"W	80°07'55.28"W	80°09'59.54"W	80°08'20.84"W	SAME	SAME	80°09'37.40"W	80°08'44.00"W	Decomissioned	Decomissioned
RUNWAY END ELEVATION (NAVD88)(MSL)		6.98	7.00	8.10	45.42	6.88	6.48	SAME	SAME	7.38	7.20	Decomissioned	Decomissioned
DISPLACED THRESHOLD	LATITUDE	26°03'57.49"N	26°03'57.17"N	N/A	N/A	26°04'36.98"N	26°04'36.49"N	SAME	SAME	N/A	26°03'55.70"N	Decomissioned	Decomissioned
	LONGITUDE	80°09'33.64"W	80°08'40.84"W	N/A	N/A	80°09'53.22"W	80°08'27.48"W	SAME	SAME	N/A	80°08'44.54"W	Decomissioned	Decomissioned
DISPLACED THRESHOLD ELEVATION (NAVD88)(MSL)		7.00	7.00	N/A	N/A	7.00	6.50	SAME	SAME	N/A	7.30	Decomissioned	Decomissioned

[1] RSA LENGTH REDUCED DUE TO USE OF STANDARD EMAS
[2] ROFA MEASURED FROM END OF RUNWAY

DATA FROM: http://www.faa.gov/airports_airtraffic/airports/airport_safety/airportdata_5010/, FAA Advisory Circular 150-5300-13, Draft Environmental Impact Statement (March 2007), and BCAD FLL ALP 2000.
HORIZONTAL DATUM NAD83, VERTICAL DATUM NAVD88. Feet AMSL are the units of vertical elevation.

FORT LAUDERDALE-HOLLYWOOD INTERNATIONAL AIRPORT
AIRPORT LAYOUT PLAN
AIRPORT DATA SHEET

JACOBS CONSULTANCY

MONTGOMERY CONSULTING GROUP

No.	Date	REVISION	By
5			
4			
3			
2			
1			

BROWARD COUNTY FLORIDA
PREPARED FOR
AVIATION DEPARTMENT
100 AVIATION BLVD. FT. LAUDERDALE, FL 33315

Date: DECEMBER 9, 2008
Drawn: AHW
Checked: MG
Scale: NONE
CAD File: 05-8600

CONTRACT
BCAD RLI 20050307-AV-01

PROJECT
05-8600

SHEET
4 of 16

Comparison of FAA 2010 TAF versus FAA 2006 TAF
Fort Lauderdale Hollywood International Airport

	Enplanements			Air Carrier Operations			Total Operations		
	2006	2010	% Δ	2006	2010	% Δ	2006	2010	% Δ
2005	10,961,895	10,913,788	0%	183,252	183,252	0%	336,111	336,111	0%
2006	10,343,809	10,157,441	-2%	178,916	178,916	0%	300,479	300,479	0%
2007	10,620,847	10,814,990	2%	184,104	189,310	3%	306,085	304,627	0%
2008	10,927,952	11,289,443	3%	188,891	198,970	5%	312,917	304,816	-3%
2009	11,244,187	10,180,449	-9%	193,802	180,001	-7%	319,907	265,977	-17%
2010	11,569,837	10,486,677	-9%	198,841	185,625	-7%	327,062	272,282	-17%
2011	11,905,190	11,202,054	-6%	204,011	198,062	-3%	334,384	284,637	-15%
2012	12,250,548	11,752,994	-4%	209,315	207,172	-1%	341,877	298,791	-13%
2013	12,606,219	12,315,499	-2%	214,757	216,079	1%	349,547	311,716	-11%
2014	12,972,524	12,818,881	-1%	220,341	223,857	2%	357,398	323,290	-10%
2015	13,349,793	13,264,367	-1%	226,069	230,796	2%	365,432	333,840	-9%
2016	13,738,365	13,618,516	-1%	231,947	236,566	2%	373,657	341,821	-9%
2017	14,138,592	13,982,626	-1%	237,978	242,481	2%	382,075	349,993	-8%
2018	14,550,837	14,356,997	-1%	244,166	248,543	2%	390,691	358,361	-8%
2019	14,975,477	14,741,939	-2%	250,513	254,757	2%	399,509	366,932	-8%
2020	15,412,898	15,137,768	-2%	257,027	261,126	2%	408,536	375,709	-8%
2021	15,863,500	15,544,814	-2%	263,710	267,654	1%	417,778	384,698	-8%
2022	16,327,695	15,963,415	-2%	270,566	274,345	1%	427,237	393,902	-8%
2023	16,805,910	16,393,923	-2%	277,601	281,203	1%	436,921	403,329	-8%
2024	17,298,584	16,836,700	-3%	284,819	288,233	1%	446,834	412,984	-8%
2025	17,806,175	17,292,118	-3%	292,224	295,439	1%	456,980	422,872	-7%
2026		17,760,563			302,825			432,998	
2027		18,242,434			310,396			443,370	
2028		18,738,142			318,155			453,990	
2029		19,248,112			326,109			464,868	
2030		19,772,784			334,263			476,009	

Source: FAA, Terminal Area Forecasts. *APO Terminal Area Forecast Summary Report* , as of 06.06.2011
Web site accessed: 06/06/2011. http://aspm.faa.gov/main/taf.asp Select "Query Data" tab.