

## **Appendix E**

### **Fuel Consumption with Additional Taxi Distance Due to Construction Component**

## Appendix E - Fuel Consumption with Additional Taxi Distance and Change in Stage Length Due to Construction Component

This Appendix describes the methodology that provided the estimates of aircraft-related fuel consumed with the additional taxi distance that would result from the extension of Runway 27R (the Construction Component of the Proposed Project). Also described is the methodology used to estimate the amount of fuel consumed from a potential change in aircraft stage (trip) length for select aircraft departures that may also result from implementing the Construction Component.

### Additional Taxi Distance on 27R

The EDMS provides estimates of fuel consumption for the aircraft taxi mode. The Construction Component would lengthen Runway 27R a distance of 500 feet. Assuming an aircraft taxi speed of 17 miles-per-hour, aircraft would taxi an approximate and additional 20 seconds more to the end of Runway 27R prior to departure. To be consistent with the aircraft noise analysis prepared in support of this EA, the departure data assigned to Runway 27R in the INM was extracted and used in the EDMS. Notably, because the EDMS database has different data than the INM with respect to aircraft engines, the distribution of aircraft types and respective engine assignments was made using data from the DOA's Noise and Operations Monitoring System (NOMS). The aircraft/engine distribution used in the EDMS is provided in **Table E-1**. Additionally, because the input for the INM assumes aircraft operational values to six decimal places representing the number of departures on an annual average day and the EDMS requires whole numbers representing data for an entire year, the INM's fractional average day data was converted to whole numbers representing activity over an entire year. The calculation that was used to convert the Runway 27R INM departures to EDMS departures is provided below:

$$\text{Number of INM Daily Departures} \times \% \text{ of Aircraft Type in NOMS database} \times 365 \text{ Days per Year} = \text{Number of EDMS Annual Departures (Rounded to the Nearest Whole Number)}$$

### Stage Length Difference

The extension of Runway 27R would also allow certain aircraft to depart HJAIA with more fuel allowing aircraft to travel to farther destinations without refueling. To estimate the additional fuel consumption that would result from the additional takeoff weight of these few aircraft, the amount of fuel consumed with and without the Construction Component were estimated. For the purpose of the analysis, it was assumed that only the airlines operating Boeing 747-400, 767-300, 767-400 and 777-200 series aircraft would take advantage of the additional runway length (and only the aircraft that would depart from Runway 27R). The base data (the number of departures and stage length) for the No Action Alternative were extracted from the INM input file prepared in support of this EA. As described above, the INM fractional average day values were converted and rounded to represent annual whole departures. This calculated departure data is provided in **Tables E-2** and **E-3** for the years 2010 and 2015, respectively. The stage lengths with the No Action Alternative and the assumed stage lengths with the Construction Component are also provided in Tables E-2 and E-3. These data were used as input to the EDMS to obtain the estimated amount of fuel consumed.

**Table E-1  
Fuel Consumption -- Additional Taxi Distance Component**

EDMS Aircraft	EDMS Engine Assignment	Number of Annual Departures With/Without Proposed Project		Additional Fuel Consumption (gallons) With Proposed Project	
		2010	2015	2010	2015
B717-200	BR700-715A1-30	17,775	17,187	25,220	24,385
B737-500	CFM56-3C-1	675	0	1,188	0
B737-700	CFM56-7B22	11,726	13,287	17,469	19,795
B737-800	CFM56-7B26	9,811	17,710	15,730	28,394
B737-200	JT8D-9	0	0	0	0
B737-300	CFM56-3-B1	0	0	0	0
B747-400	CF6-80C2B5F 1862 M39	630	840	3,683	4,910
B757-200	PW2037	19,675	20,618	42,432	44,465
B767-300	CF6-80C2B7F 1862M39	9,172	9,182	26,417	26,446
B767-400	CF6-80C2B8FA 1862M39	1,942	2,240	5,649	6,515
B777-200	Trent 892	1,499	2,435	6,380	10,365
A318-100 Series	CFM56-5B8/P SAC	2	2	3	3
A319-100 Series	CFM56-5B6/P	390	624	537	859
A320-100 Series	V2500-A1	930	1,477	1,636	2,599
A320-200 Series	CFM56-5B3/2P DAC-II	90	143	166	264
A330-200 Series	CF6-80E1A3 Standard	185	2,592	596	8,348
A340-300 Series	CFM56-5C4	213	213	749	749
DC9-30	JT8D-7 Series	12	0	22	0
DC9-40	JT8D-11	12	0	25	0
DC9-50	JT8D-17	0	0	0	0
MD-82	JT8D-217C	510	392	991	762
MD-81	JT8D-217C	20	16	39	31
MD-83	JT8D-219	260	198	496	378
MD-88	JT8D-219	21,484	16,345	40,968	31,168
MD-90	V2525-D5	97	74	176	134
A340-300 Series	CFM56-5C4	0	555	0	1,953
AT72-200	PW127	0	0	0	0
Bombardier CRJ-100	CF34-3A1 LEC II	705	715	496	503
Bombardier CRJ-200	CF34-3B	20,253	20,558	14,052	14,263
Bombardier CRJ-700	CF34-8C1	6,563	6,662	6,425	6,522
Bombardier CRJ-900	CF34-8C5 LEC	1,707	1,733	1,557	1,581

**Table E-1  
Fuel Consumption -- Additional Taxi Distance Component**

EDMS Aircraft	EDMS Engine Assignment	Number of Annual Departures With/Without Proposed Project		Additional Fuel Consumption (gallons) With Proposed Project	
		2010	2015	2010	2015
Embraer ERJ135	AE3007A1/3 Type 3	95	56	780	461
Embraer ERJ145	AE3007A1E Type 3	1,157	684	2,849	3,362
Embraer ERJ 175	CF34-8E5 LEC	7	4	61	36
Embraer ERJ170	CF34-8E5 LEC	3,118	3,679	6	4
Embraer ERJ190	CF34-10E	106	125	122	144
Antonov 12 Cub	T56 Series I	4	6	11	16
B747-200	CF56-50E2	205	308	948	1,425
B727-100	JT8D-7 Series	23	0	63	0
B727-200	JT8D-17R	335	0	1,105	0
B747-400	CF6-80C2B5F 1862 M39	226	339	1,321	1,982
B757-200	PW2037	54	75	116	162
B767-200	CF6-80A	37	55	79	117
B767-300	CF6-80C2B7F 1862M39	5	8	14	23
A300B4-600 Series	PW4158	17	17	51	51
A310-200 Series	CF6-80A3	11	11	23	23
MD-10-1	CF6-6D	36	36	132	132
DC8-70	CFM56-2-C5	47	24	171	87
DC9-30	JT8D-7 Series	0	0	0	0
DC9-40	JT8D-11	0	0	0	0
MD-11	CF6-80C2D1F 1862M39	340	567	1,483	2,474
B777-200	Trent 892	74	223	315	949
Raytheon Beechjet 400	JT15D-5, -5A, -5B	26	26	11	11
Raytheon Beech Baron 58	TIO-540-J2B2	32	32	1	1
Cessna 310	TIO-540-J2B2	2	2	0	0
Mitsubishi MU-2	TPE331-10	127	127	30	30
Piaggio P.180 Avanti	PT64-66	2	2	0	0
Cessna 210 Centurion	TIO-540-J2B2	0	0	0	0
Cessna 560 Citation V	JT15D-5, -5A, -5B	197	197	83	83
Mitsubishi MU-300 Diamond	JT15D-4 series	3	3	1	1
Cessna 208 Caravan	PT61-114A	101	101	7	7

**Table E-1  
Fuel Consumption -- Additional Taxi Distance Component**

EDMS Aircraft	EDMS Engine Assignment	Number of Annual Departures With/Without Proposed Project		Additional Fuel Consumption (gallons) With Proposed Project	
		2010	2015	2010	2015
Bombardier Learjet 25	CJ610-6	34	34	31	31
Cessna 750 Citation X	AE3007C Type 2	3	3	2	2
Dassault Falcon 2000	PW308C Annular	0	0	0	0
Gulfstream V-SP	BR700-710A1-10	1	1	1	1
Hawker HS-125 Series 700	TFE731-3	3	3	1	1
Bombardier Learjet 35A-36A (C-21A)	TFE731-2-2B	71	71	24	24
Raytheon Beech Baron 58	TIO-540-J2B2	163	163	7	7
Raytheon King Air 90	PT6A-28	32	32	7	7
Cessna 414	TIO-540-J2B2	30	30	1	1
Piper Pa-32 Cherokee Six	TIO-540-J2B2	62	62	1	1
Cessna 172 Skyhawk	O-320	75	75	1	1
Cessna 560 Citation V	JT15D-5, -5A, -5B	200	200	84	84
Dassault Falcon 2000	PW308C Annular	181	181	115	115
Israel IAI-1126 Galaxy	PW306A Annular	113	113	68	68
Cessna 750 Citation X	AE3007C Type 2	14	14	7	7
Dassault Falcon 2000	PW308C Annular	11	11	7	7
Gulfstream IV-SP	TAY Mk611-8	34	34	53	53
Gulfstream V-SP	BR700-710A1-10	15	15	19	19
Hawker HS-125 Series 700	TFE731-3	33	33	12	12
Bombardier Learjet 35A-36A (C-21A)	TFE731-2-2B	107	107	36	36
TOTAL		133,907	143,687	223,364	247,452

Source: KB Environmental Sciences, Inc. 2009.

**Table E-2  
Fuel Consumption -- Changes in Stage (Trip) Lengths Component - 2010**

Scenario	INM Aircraft	Stage (Trip) Length	Takeoff Weight	EDMS Aircraft	EDMS Engine	Daily Departures	Annual Departures*	
No Action	747400	6	720,900	B747-400	CF6-80C2B5F 1862 M39	1.726211	630	
	767300	3	286,400	B767-300	CF6-80C2B7F 1862M39	0.929773	339	
		4	305,700			13.041939	4,760	
		6	355,900			9.29772	3,394	
		7	367,700			1.859543	679	
		767400	3			310,125	B767-400	CF6-80C2B8FA 1862M39
	4	329,861	1.877393	686				
	5	354,427	0.626153	229				
	6	380,906	2.503546	914				
	777200	6	551,700	B777-200	Trent 892	1.17296	429	
		8	629,500			1.759644	642	
		9	656,000			1.17296	429	
	Total						36.28065	13,245
	With Construction Component	747400	6	720,900	B747-400	CF6-80C2B5F 1862 M39	0.863105	315
			7	776,600			0.863105	315
767300		3	286,400	B767-300	CF6-80C2B7F 1862M39	0.929772	340	
		4	305,700			13.041938	4,761	
		6	355,900			3.518056	1,284	
		7	367,700			7.639209	2,789	
		767400	3			310,125	B767-400	CF6-80C2B8FA 1862M39
4		329,861	1.877394	686				
5		354,427	0.626153	229				
6		380,906	1.17357	428				
7		422,420	1.329975	486				
777200		6	551,700	B777-200	Trent 892	1.170086	427	
		8	629,500			1.087975	397	
		9	656,000			1.847504	675	
Total						36.28065	13,246	

Source: KB Environmental Sciences, Inc. 2009.

**Table E-3  
Fuel Consumption -- Changes in Stage (Trip) Lengths Component - 2015**

Scenario	INM Aircraft ID	Stage (Trip) Length	Takeoff Weight	EDMS Aircraft	EDMS Engine	Daily Departures	Annual Departures*	
No Action Alternative	747400	6	720,900	B747-400	CF6-80C2B5F 1862 M39	2.301615	840	
	767300	3	286,400	B767-300	CF6-80C2B7F 1862M39	0.930795	339	
		4	305,700			13.056278	4,766	
		6	355,900			9.307943	3,397	
		7	367,700			1.861588	679	
	767400	3	310,125	B767-400	CF6-80C2B8FA 1862M39	0.360935	131	
		4	329,861			2.166224	791	
		5	354,427			0.722483	264	
		6	380,906			2.888707	1,055	
	777200	6	551,700	B777-200	Trent 892	1.90606	696	
		8	629,500			2.859423	1,044	
		9	656,000			1.90606	696	
	Total						40.268111	14,698
	With Construction Component	747400	6	720,900	B747-400	CF6-80C2B5F 1862 M39	1.150806	420
			7	776,600			1.150806	420
767300		3	286,400	B767-300	CF6-80C2B7F 1862M39	0.930795	340	
		4	305,700			13.056277	4,765	
		6	355,900			3.521925	1,285	
		7	367,700			7.647608	2,791	
767400		3	310,125	B767-400	CF6-80C2B8FA 1862M39	0.360935	132	
		4	329,861			2.166224	791	
		5	354,427			0.722483	263	
		6	380,906			1.35412	495	
777200		6	551,700	B777-200	Trent 892	1.868031	682	
		8	629,500			1.801316	657	
		9	656,000			3.002193	1,095	
Total						40.268106	14,696	

Source: KB Environmental Sciences, Inc. 2009.