Appendix C
Regional Guidance Letter

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Airports Division, Southern Region

Number: RGL 01-2

Line of Business: Airport Planning

Date: August 2001

Subject: Runway Length and Strength Requirements for Business Jet Aircraft

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Purpose: This Regional Guidance Letter supplements RGL 00-1, Standard Development for "Business Jet" Aircraft, and Advisory Circular (AC) 150/5325-4A, Runway Length Requirements for Airport Design, and provides additional guidance for determining the appropriate runway length and strength for airports expected to serve business jet aircraft.

Background: There has been a rapid increase in the business jet aircraft fleet over the past few years. Many new models and several new manufacturers have been introduced into the marketplace. There has also been a general increase in the size of business jet aircraft. As a result, AC 150/5325-4A, and therefore the runway length portion of the Airport Design for Microcomputers program which is based on this AC, is out of date with regard to business jet aircraft. Most of the business jets listed in the AC are now obsolete. While the AC or the microcomputer program should still be used as a general guide in determining the appropriate runway length for airports serving business jet aircraft, additional guidance is needed to ensure the runway length is adequate for the specific makes and models of business jets expected to use the airport on a regular basis.

The FAA's Central Region Airports Division reviewed the performance characteristics of 64 different makes and models of business jet aircraft, 57 of which are listed in the attached table (ref: Table 1. Business Jet Statistics). There was not enough information available to determine the performance characteristics of the remaining models. An analysis of the information in Table 1 revealed the following:

Category B Business Jets: 23 of the models studied have approach speeds of 91 knots or more, but less than 121 knots. All of these jets have a wingspan of less than 79 feet, thus fall in Airplane Design Groups I or II. About 5,500 of these jets have been manufactured to date. These aircraft typically weigh between 10,000 and 45,000 pounds, with most weighing less than 30,000 pounds. The takeoff distance required at sea level, standard temperature, and maximum takeoff weight is between 3,200 and 5,500 feet. The landing distance required in dry conditions at sea level, standard temperature, and maximum landing weight ranges from 2,500 to 5,900 feet.

Category C Business Jets: 28 of the models studied have approach speeds of 121 knots or more, but less than 141 knots. All but one of these jets have wingspans of less than 79 feet, thus fall in Airplane Design Groups I or II. One jet has a wingspan of 94 feet, thus falls in Airplane Design

Group III. There have been about 5,400 of these jets manufactured to date. Most of them weigh between 13,000 and 45,000 pounds. The takeoff distance required at sea level, standard temperature, and maximum takeoff weight is between 3,200 and 5,700 feet. The landing distance required in dry conditions at sea level, standard temperature, and maximum landing weight ranges from 2,400 to 5,900 feet.

Category D Business Jets: Only 4 of the models studied have approach speeds greater than 141 knots. One of them has a wingspan less than 49 feet, thus falls in Airplane Design Group I. Two of them have wingspans greater than 49 feet, but less than 79 feet, thus fall in Airplane Design Group II. One of them has a wingspan greater than 79 feet, but less than 118 feet, thus falls in Airplane Design Group III. There have been about 1,100 of these jets manufactured to date. Three of these aircraft weigh between 60,000 and 95,000 pounds. The fourth weighs 23,500 pounds. The takeoff distance required at sea level, standard temperature, and maximum takeoff weight is between 5,500 and 6,000 feet. The landing distance required in dry conditions at sea level, standard temperature, and maximum landing weight ranges from 3,000 to 3,500 feet.

Guidance:

Determinations of Required Runway Length for Business Jets: ADO Program Managers should determine the required runway length based on AC 5325-4A or the Airport Design for Microcomputers program. However, this should be supplemented by checking the runway length required for the specific makes and models of business jet aircraft expected to use the airport on a regular basis (regular basis being defined as at least 250 annual takeoff operations).

The runway length required for specific business jets may be determined by adjusting the takeoff and landing runway lengths listed in Table 1 for altitude, temperature, maximum difference in runway centerline elevations, i.e., effective gradient (takeoff length only), and wet runway conditions (landing length only). Note that takeoff and landing lengths for some of the aircraft were not available in the data used to compile the table and must be obtained from the manufacturer. The attached spreadsheets (ref: Takeoff Runway Length Adjustment.xls and Landing Runway Length Adjustment.xls) are available electronically in the Airports Reference System to aid Program Managers in making the runway length adjustment calculations. Program Managers may enter the values for takeoff and landing runway length from Table 1, airport elevation, mean maximum daily temperature, and difference between the high and low points of the runway (takeoff runway length only), and have the spreadsheets calculate the adjusted takeoff and landing runway lengths required. The greater of the adjusted takeoff or landing lengths is the recommended runway length for airport design.

Note that the takeoff runway lengths in the table are based on the aircraft operating at maximum takeoff weight, i.e., 100 percent useful load. In determining the adjusted takeoff runway length, consideration should be given to the stage length (non-stop haul distance) of the aircraft using the airport on a regular basis. This affects the fuel load to be carried, thus the weight of the aircraft. It may not be appropriate to assume that the aircraft operates at the maximum takeoff weight, i.e., 100 percent useful load. Therefore, the calculated takeoff runway length may be longer than actually required. The use of judgment is necessary in such cases.

The longer of the adjusted runway length calculated for the specific critical business jet aircraft or the runway length obtained from the AC or microcomputer program should be used as the required runway length.

Determinations of Required Runway Strength for Business Jets: ADO Program Managers should determine the required runway strength for the specific critical business jet aircraft expected to use the airport on a regular basis (regular basis defined as at least 250 annual takeoff operations). The required strength may be determined based on the maximum takeoff weight listed in Table 1.

In general, runways should have a dual wheel pavement strength of 30,000 pounds if they accommodate only category B business jets, 60,000 pounds if they accommodate category B and C business jets, and 90,000 pounds if they accommodate category B, C, and D business jets. However, these are broad generalizations and some category B business jets have a maximum takeoff weight of more than 30,000 pounds. Likewise, some category C business jets have a maximum takeoff weight of more than 60,000 pounds. Therefore, in practice, the pavement strength required for the specific critical aircraft should be used.

Point of Contact: Troy Butler, ASO-610B, (404) 305-6722

Robert B. Chapman
Acting Manager, Airports Division

Table 1. Business Jet Statistics

BUSINESS JETS	# MFG.	ARC	1.3 X STALL SPEED KNOTS	WING SPAN FEET	MAX T.O. LBS.	T.O. DIST. ISO	LAND. DIST. ISO
AEROSPATIALE SN-601 CORVETTE	40	B-I	118	42.2	14550	NA	NA
BEECHJET 400A/T/ T-1A JAYHAWK**	581	C-I	121	43.5	16100	4169	2960
BOMBARDIER CL-600 CHALLENGER	85	C-II	125	61.8	41250	5700	2775
BOMBARDIER CL-601 CHALLENGER	66	C-II	125	61.8	41250	5700	2775
BOMBARDIER CL-601-3A/3R CHALLENGER	194	C-II	125	61.8	41250	5700	2775
BOMBARDIER CL-604 CHALLENGER	180	C-II	125	61.8	47600	5700	2775
BOMBARDIER BD-700 GLOBAL EXPRESS	85	C-III	126	94	96000	6300	2700
CESSNA 500 CITATION	418	B-I	108	47.1	11850	2930	2270
CESSNA 501 CITATION I/SP	325	B-I	112	46.8	10600	2830	2350
CESSNA 525 CITATIONJET (CJ-1)	430	B-I	107	46.7	10400	3080	2750
CESSNA 525A CITATIONJET II (CJ-2)	30	B-II	118	49.5	12500	3420	2980
CESSNA 550 CITATION II	733	B-II	108	51.7	13300	2990	2270
CESSNA 550 CITATION BRAVO	161	B-II	112	52.2	14800	3600	3180
CESSNA 551 CITATION II/SP	94	B-II	108	51.8	12500	2650	2210
CESSNA 552/T-47A	15	B-II	107	52.2	16300	3180	2800
CESSNA S550 CITATION S/II**	162	B-II	NA	52.2	15900	NA	NA
CESSNA 560 CITATION V Ultra**	538	B-II	108	52.2	16300	3180	NA
CESSNA 560 CITATION ENCORE	25	B-II	108	52.2	16830	3560	2865
CESSNA 560 CITATION EXCEL**	160	B-II	107	55.7	20000	3590	3180
CESSNA 650 CITATION III/VI	241	C-II	131	53.3	21000	5150	2900
CESSNA 650 CITATION VII	119	C-II	126	53.6	23000	4850	3220
CESSNA 750 CITATION X	160	C-II	131	63.6	36100	5140	3410
DASSAULT FALCON 10**	226	B-I	104	42.9	18740	NA	NA
DASSAULT FALCON 20	515	B-II	107	53.5	28660	NA	NA
DASSAULT FALCON 2000	140	B-II	114	63.5	35800	5240	5220
DASSAULT FALCON 50	310	B-II	113	61.9	37480	4715	4875
DASSAULT FALCON 900	190	B-II	100	63.4	45500	4680	5880
DASSAULT FALCON 900 EX	85	C-II	126	63.5	48300	4985	5880
GULFSTREAM II	258	D-II	141	68.8	65300	NA	NA
GULFSTREAM III	199	C-II	136	77.8	68700	NA	NA
GULFSTREAM IV	469	D-II	149	77.8	71780	5450	3190
GULFSTREAM V	160	D-III	NA	98.6	89000	5990	2950
HAWKER-SIDDELEY 125-400	291	C-I	124	47	23300	NA	NA
HAWKER-SIDDELEY 125-600	71	C-I	125	47	25000	NA	NA
BAE 125-700	212	C-I	125	47	24200	NA	NA
RAYTHEON/HAWKER 125-800	533	B-I	120	51.3	28000	5380	4500
RAYTHEON/HAWKER 125-1000 HORIZON	50	C-II	130	61.9	36000	5250	2340

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BUISNESS JETS	# MFG.	ARC	1.3 X STALL SPEED KNOTS	WING SPAN FEET	MAX T.O. LBS.	T.O. DIST. ISO	LAND. DIST. ISO
ISRAEL AIRCRAFT INDUSTRIES							
JET COMMANDER 1121 & WESTWIND 1123/1124	442	C-I	130	43.3	23500	NA	NA
ASTRA 1125	135	C-II	126	52.8	23500	5300	3500
GALAXY 1126	33	C-II	140	58.2	34850	5500	3500
LEARJET 23	100	C-I	124	NA	12500	4000	4300
LEARJET 24**	257	C-I	128	35.6	13000	NA	NA
LEARJET 25**	373	C-I	137	35.6	15000	NA	NA
LEARJET 28/29**	9	B-I	120	43.7	15000	NA	NA
LEARJET 31**	220	C-I	124	43.1	16500	3410	2870
LEARJET 35/36	739	C-I	133	39.5	18300	5000	2900
LEARJET 45	145	C-I	129	47.1	20200	4220	3140
LEARJET 55	147	C-I	138	43.7	21500	5310	3250
LEARJET 60	210	D-I	149	43.9	23500	5360	3420
MITSUBISHI MU-300 DIAMOND	111	B-I	109	43.5	14630	4300	3200
RAYTHEON 390 PREMIER	42	B-I	120	44	12500	3792	3300
SABRELINER T-39	140	NA	NA	NA	NA	NA	NA
SABRELINER 40	137	B-I	120	44.5	18650	4900	2950
SABRELINER 60	146	C-I	134	44.6	20200	3500	3400
SABRELINER 65	76	C-II	124	50.5	24000	5450	3345
SABRELINER 75	9	C-I	137	44.5	23300	5500	3750
SABRELINER 75a/80	72	C-II	128	50.4	24500	4460	3450

Notes:
** Denotes Aircraft currently using or expected to use HEG during the twenty year planning period.
Additional aircraft expected to use HEG are listed on Table 5-3 of this report.
NA = Not Available
Takeoff Distance is based on maximum takeoff weight and no effective gradient.
Landing Distance is based on maximum landing weight and dry pavement and no wind conditions.
ISO = Sea Level at 59 Degrees Fahrenheit
Some, but not all data has been checked against the approved aircraft flight manual.