Model CL–600–2B19

Series 100/200/440

AIRPORT PLANNING MANUAL

CSP A–020

MASTER

CRJ SERIES TECHNICAL PUBLICATIONS

12655 Henri–Fabre Boulevard
Mirabel, Québec, J7N 1E1
Canada

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TRANSMITTAL LETTER – REVISION 11

This package contains the CRJ100/200/440 Airport Planning Manual, CSP A–020, Revision 11, dated Dec 10/2021.

Please note that this revision is a full re–issue due to the MHIRJ logo being introduced.

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AIRPORT PLANNING MANUAL

REMOVE:		INSERT:	
Chapter Section Subject	Page	Chapter Section Subject	Page
		Effective Pages	1–2
00–01–01	1	00–01–01	1
00–07–01	14	00–07–01	14
00–08–01	1	00–08–01	1

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REV. NO.	ISSUE DATE	DATE INSERTED	INSERTED BY
Rev.7	Nov 07/2003	Nov 07/2003	BCSG
Rev.8	Jan 10/2016	Jan 10/2016	BCSG
Rev.9	Dec 10/2018	Dec 10/2018	BCSG
Rev.10	Dec 10/2019	Dec 10/2019	BCSG
Rev.11	Dec 10/2021	Dec 10/2021	MHIRJ

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Chapter Section Subject	Page		Date
00–07–01	1		Jan 10/2016
	2		Jan 10/2016
	3		Jan 10/2016
	4		Jan 10/2016
	5		Jan 10/2016
	6		Jan 10/2016
	7		Jan 10/2016
	8		Jan 10/2016
	9		Jan 10/2016
	10		Jan 10/2016
	11		Jan 10/2016
	12		Jan 10/2016
	13		Jan 10/2016
	14	*	Dec 10/2021
	15		Jan 10/2016
	16		Jan 10/2016
	17		Jan 10/2016
	18		Jan 10/2016
	19		Jan 10/2016
	20		Jan 10/2016
	21		Jan 10/2016
	22		Jan 10/2016
00–08–01	1	*	Dec 10/2021
00–09–01	1		Jan 10/2016
	2		Jan 10/2016
	3		Jan 10/2016

* The asterisk indicates pages changed, added or deleted.

TABLE OF CONTENTS

SCOPE

1. SCOPE

A. Purpose

This document provides standardized airplane characteristics data for use in general airport planning for the CRJ Series Model CL–600–2B19. This planning manual includes data for the CRJ100, CRJ100 ER, CRJ100 LR, CRJ 200 ER and CRJ200 LR.

Since operational practices vary among airlines, specific data should be coordinated with the user airlines prior to facility design. For additional information, please contact MHI RJ Aviation.

Contents of this document reflect the results of a coordinated effort by representatives from the following organizations:

- Aerospace Industries Association
- Airport Operators Council International
- Air Transport Association of America (ATA)
- International Air Transport Association (IATA).

B. Introduction

The content of this document is generally in accordance with Airport Planning Standards Document NAS 3601, Revision 6.

It provides airplane characteristics for airport operators, airlines and engineering consultant organizations. Since airplane changes and available options may alter the information, the data presented herein must be regarded as subject to change.

C. Please send an electronic Technical Manual Change Request (MCR) form via the World Wide Web internet address at “www.iflybombardier.com” for any changes to the manual.

Send all other correspondence about this manual to the address below:

MHI RJ Aviation ULC
MHIRJ Customer Support
12655, boul. Henri–Fabre
Mirabel, QC, J7N 1E1, Canada
Phone: (514) 855–8500

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AIRCRAFT DESCRIPTION

1. AIRPLANE DESCRIPTION

A. Section Contents

This section includes information on:

- General airplane characteristics such as maximum take-off weights
- Airplane dimensions and ground clearances
- Cabin configurations and compartment cross-sections
- Passenger and service door clearances
- Cargo compartment dimensions and cargo door clearances.

B. Standard Term Definitions and Abbreviations

The following definitions are used throughout this document:

Maximum Design Taxi Weight (MTW).	The maximum weight at which an aircraft can move safely on the ground. It includes the fuel for these displacements and the takeoff run.
Maximum Design Landing Weight (MLW).	The maximum approved weight at which an aircraft can land.
Maximum Design Takeoff Weight (MTOW).	The maximum approved weight at which an aircraft can start a takeoff run.
Operational Empty Weight (OWE).	The basic empty weight or the fleet empty weight, added to the operational items.
Maximum Design Zero Fuel Weight (MZFW).	The maximum weight of an aircraft before the usable fuel is loaded on the aircraft.
Maximum Payload.	Result of OWE subtracted from the MZFW.
Maximum Cargo Volume.	The maximum space available for cargo.
Seating Capacity.	The maximum number of passengers specifically certified or anticipated for certification.

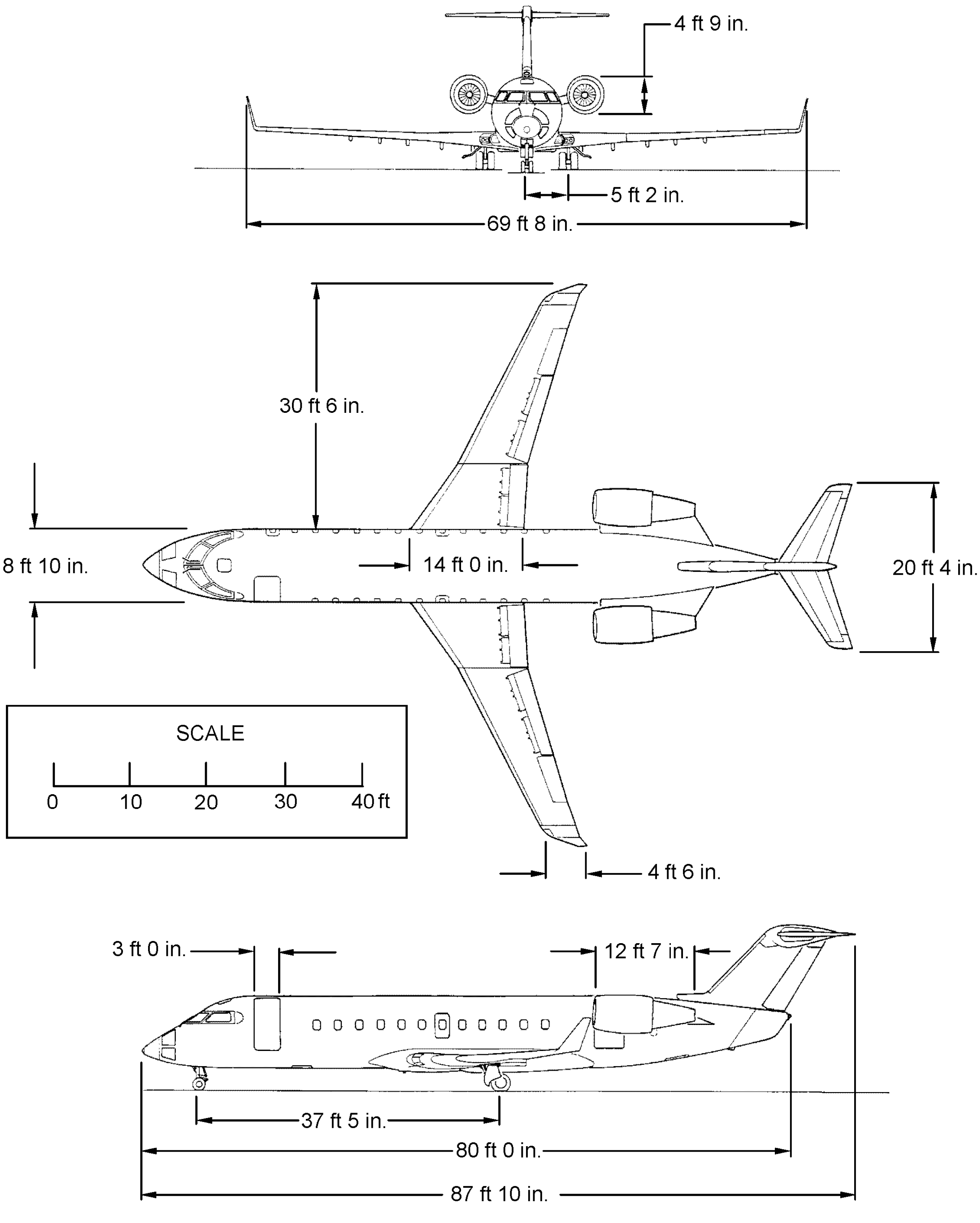
Usable Fuel.	The usable fuel available for the aircraft engines.

C. General Airplane Characteristics

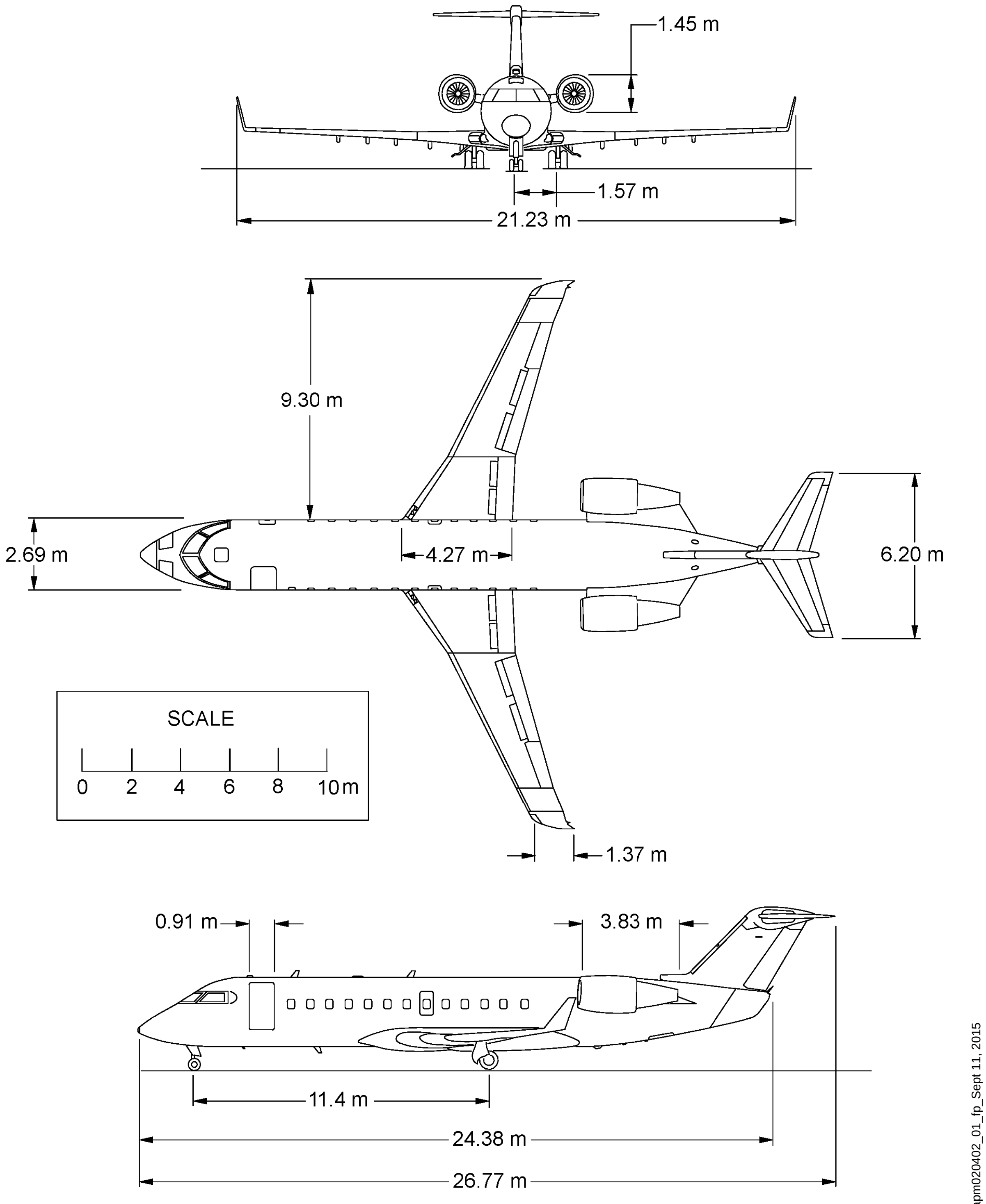
Table 1 – Aircraft Characteristics

Model CL–600–2B19		CRJ100/200	CRJ100 ER	CRJ100 LR	CRJ200 ER	CRJ200 LR
Engines		2 GE CF34 –3A1/–3B1	2 GE CF34 –3A1	2 GE CF34 –3A1	2 GE CF34 –3B1	2 GE CF34 –3B1
Mode		Passenger	Passenger	Passenger	Passenger	Passenger
Maximum Seating Capacity		50	50	50	50	50
Maximum Design Taxi Weight (MTW)	Pounds Kilograms	47700 21636	51250 23247	53250 24154	51250 23247	53250 24154
Maximum Design Landing Weight (MLW)	Pounds Kilograms	44700 20276	47000 21319	47000 21319	47000 21319	47000 21319
Maximum Design Take–Off Weight (MTOW)	Pounds Kilograms	47450 21523	51000 23133	53000 24041	51000 23133	53000 24041
Operating Empty Weight (OWE)	Pounds Kilograms	30500 13835	30500 13835	30500 13835	30500 13835	30500 13835
Maximum Design Zero Fuel Weight (MZFW)	Pounds Kilograms	42200 19142	44000 19958	44000 19958	44000 19958	44000 19958
Usable Fuel	US Gallons Liters	1400 5300	2135 8081	2135 8081	2135 8081	2135 8081
Maximum Payload [1]	Pounds Kilograms	11700 5307	13500 6124	13500 6124	13500 6124	13500 6124

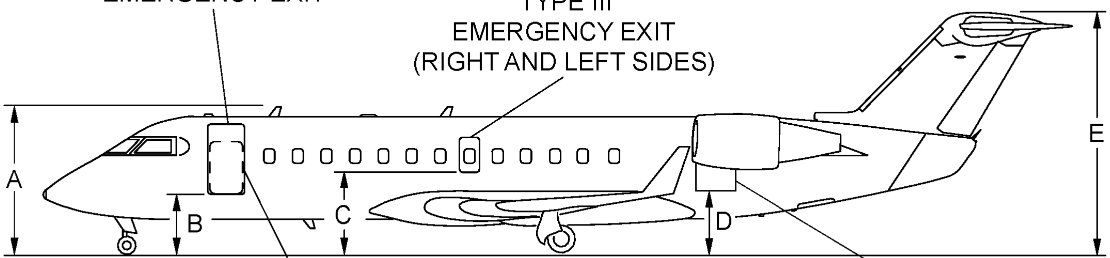
Model CL–600–2B19	CRJ100/200	CRJ100 ER	CRJ100 LR	CRJ200 ER	CRJ200 LR
Maximum Cargo Volume [2]					
[1]Please note that the maximum payload weight changes from flight to flight, as the OWE changes. (MZFW – OWE = Max. Payload) [2]Cargo volume varies according to cabin layout.					



General Airplane Dimensions (US Standard)
Figure 1

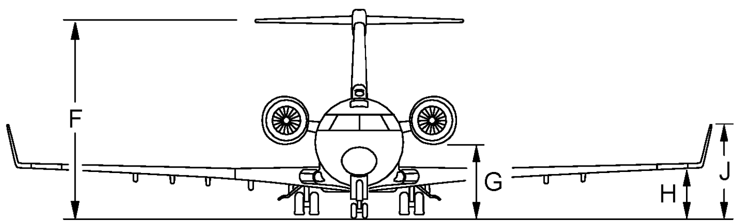


General Airplane Dimensions (Metric)
Figure 2



NOTE

Maximum and minimum clearances of individual locations are given for combinations of airplane loading/unloading activities that produce the greatest variation at each location. Zero roll angle assumed for analysis.



DIMENSIONS	VERTICAL CLEARANCES							
	CRJ100 ER/200 ER				CRJ100 LR/ 200 LR			
	MAXIMUM 30 122 lb (13 663 kg)		MINIMUM 51 250 lb (23 247 kg)		MAXIMUM 30 122 lb (13 663 kg)		MINIMUM 53 250 lb (24 154 kg)	
	ft – in.	meters	ft – in.	meters	ft – in.	meters	ft – in.	meters
A	13 – 3	4.04	12 – 8	3.86	13 – 3	4.04	12 – 7	3.84
B	5 – 8	1.73	5 – 0	1.52	5 – 8	1.73	4 – 11	1.50
C	7 – 1	2.16	6 – 7	2.01	7 – 1	2.16	6 – 6	1.99
D	5 – 8	1.73	5 – 2	1.57	5 – 8	1.73	5 – 1	1.55
E	20 – 9	6.32	20 – 4	6.20	20 – 9	6.32	20 – 3	6.18
F	19 – 7	5.97	19 – 2	5.84	19 – 7	5.97	19 – 1	5.82
G	7 – 5	2.26	6 – 11	2.11	7 – 5	2.26	6 – 10	2.09
H	5 – 1	1.55	4 – 9	1.45	5 – 1	1.55	4 – 8	1.44
J	9 – 4	2.84	8 – 11	2.71	9 – 4	2.84	8 – 10	2.70

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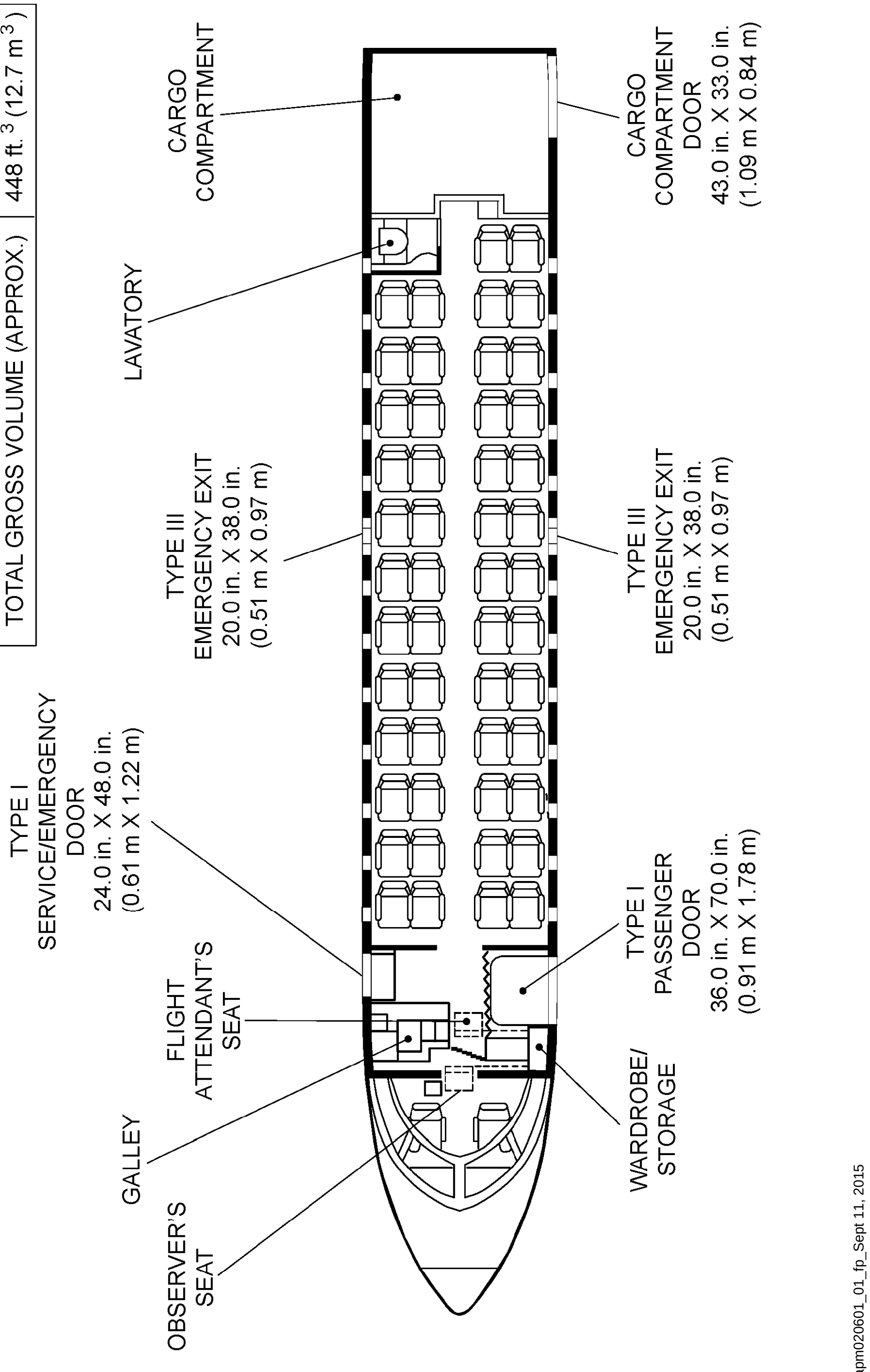
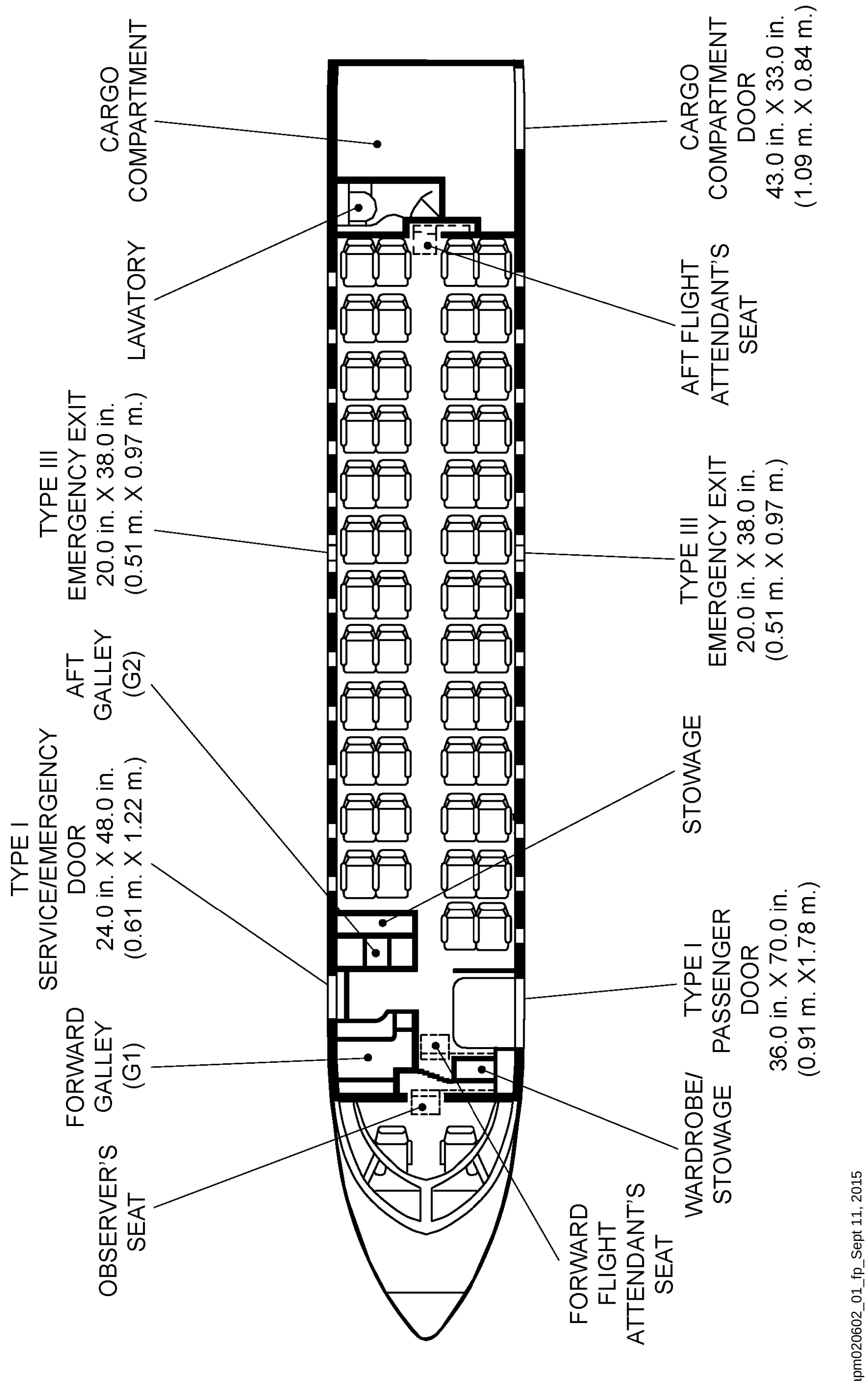
Ground Clearances
Figure 3

CARGO/BAGGAGE VOLUME	
WARDROBE	8 ft.^{3} (0.23 m^3)
GALLEY/STOWAGE	10 ft.^{3} (0.28 m^3)
OVERHEAD STORAGE BIN	71 ft.^{3} (2.02 m^3)
UNDER SEAT BAGGAGE	45 ft^3 (1.28 m^3)
CARGO COMPARTMENT	314 ft.^{3} (8.89 m^3)
TOTAL GROSS VOLUME (APPROX.)	448 ft.^{3} (12.7 m^3)



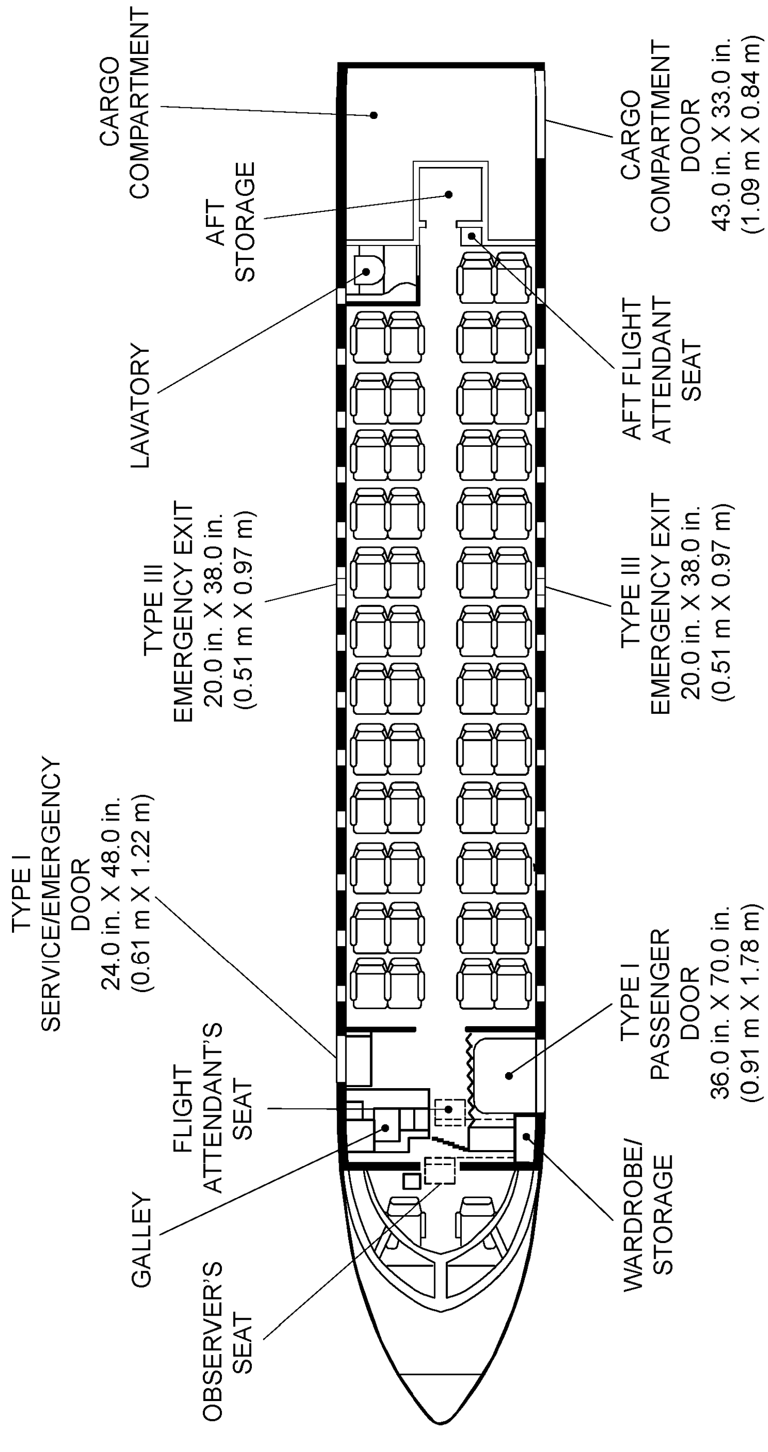
Interior Configuration – North American Universal Layout
Figure 4

CARGO/BAGGAGE VOLUME	
WARDROBE/STORAGE	8 ft.^{3} (0.23 m.^{3})
OVERHEAD STORAGE BIN	71 ft.^{3} (2.02 m.^{3})
UNDER SEAT BAGGAGE	45 ft.^{3} (1.28 m.^{3})
CARGO COMPARTMENT	229 ft.^{3} (6.48 m.^{3})
TOTAL GROSS VOLUME (APPROX.)	353 ft.^{3} (10.0 m.^{3})



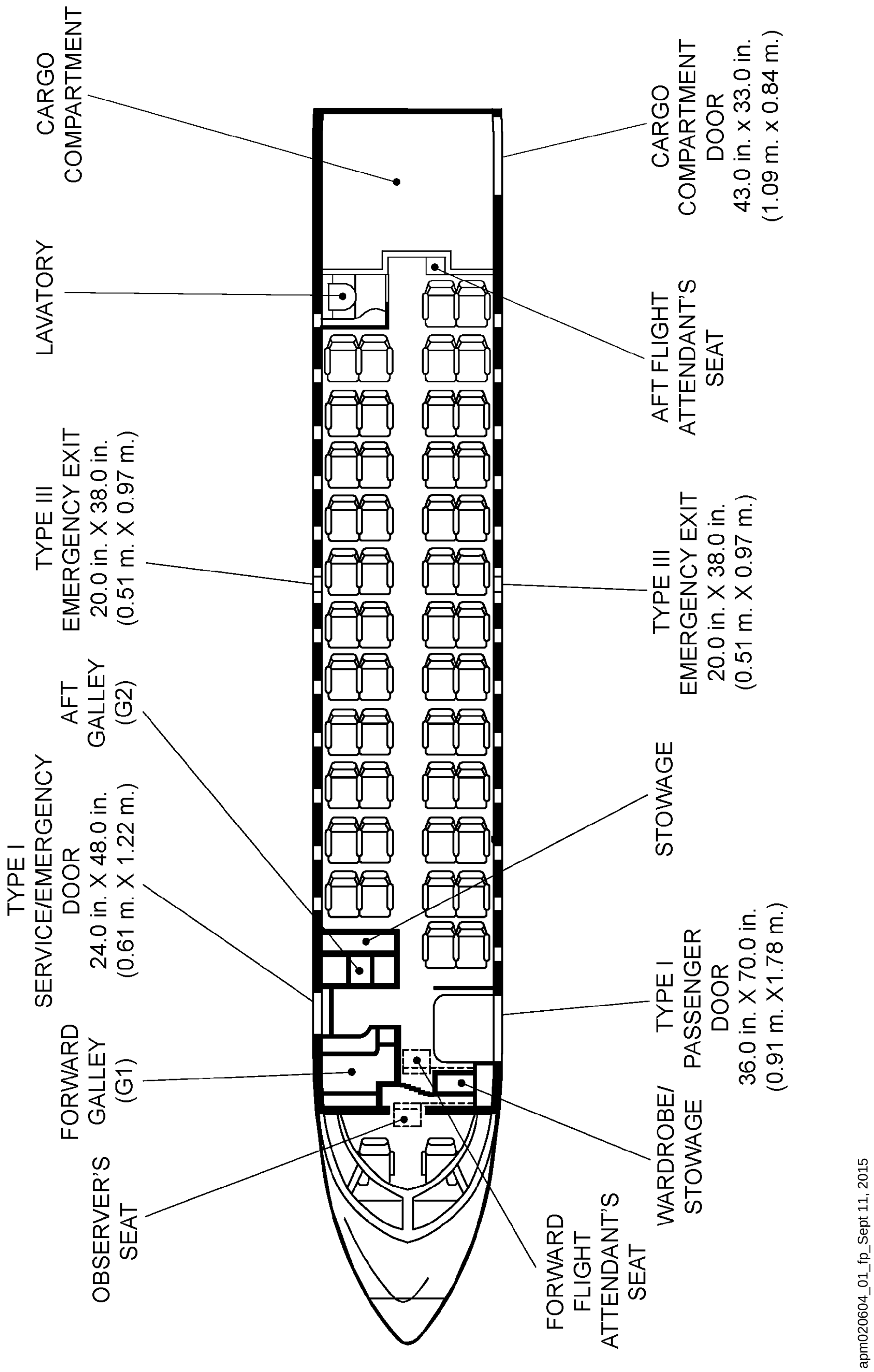
Interior Configuration – European Universal Layout
Figure 5

CARGO/BAGGAGE VOLUME	
WARDROBE/STORAGE	8 ft^3 (0.23 m^3)
OVERHEAD STORAGE BIN	71 ft.^{3} (2.02 m^3)
UNDER SEAT BAGGAGE	45 ft.^{3} (1.28 m^3)
CARGO COMPARTMENT	277 ft.^{3} (7.84 m^3)
TOTAL GROSS VOLUME (APPROX.)	400 ft.^{3} (11.33 m^3)

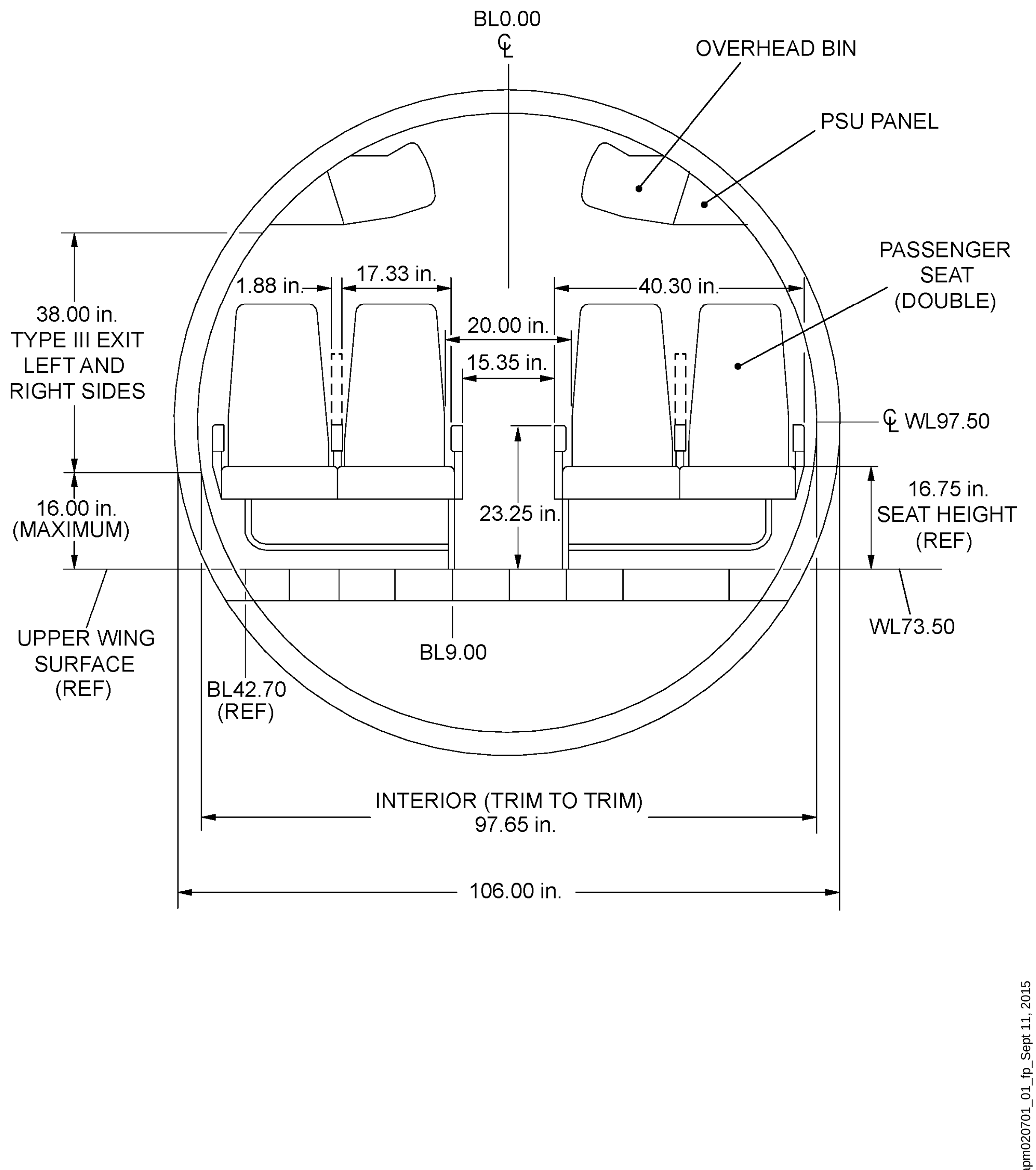


Interior Configuration – Custom Layout with Expanded Aft Storage
Figure 6

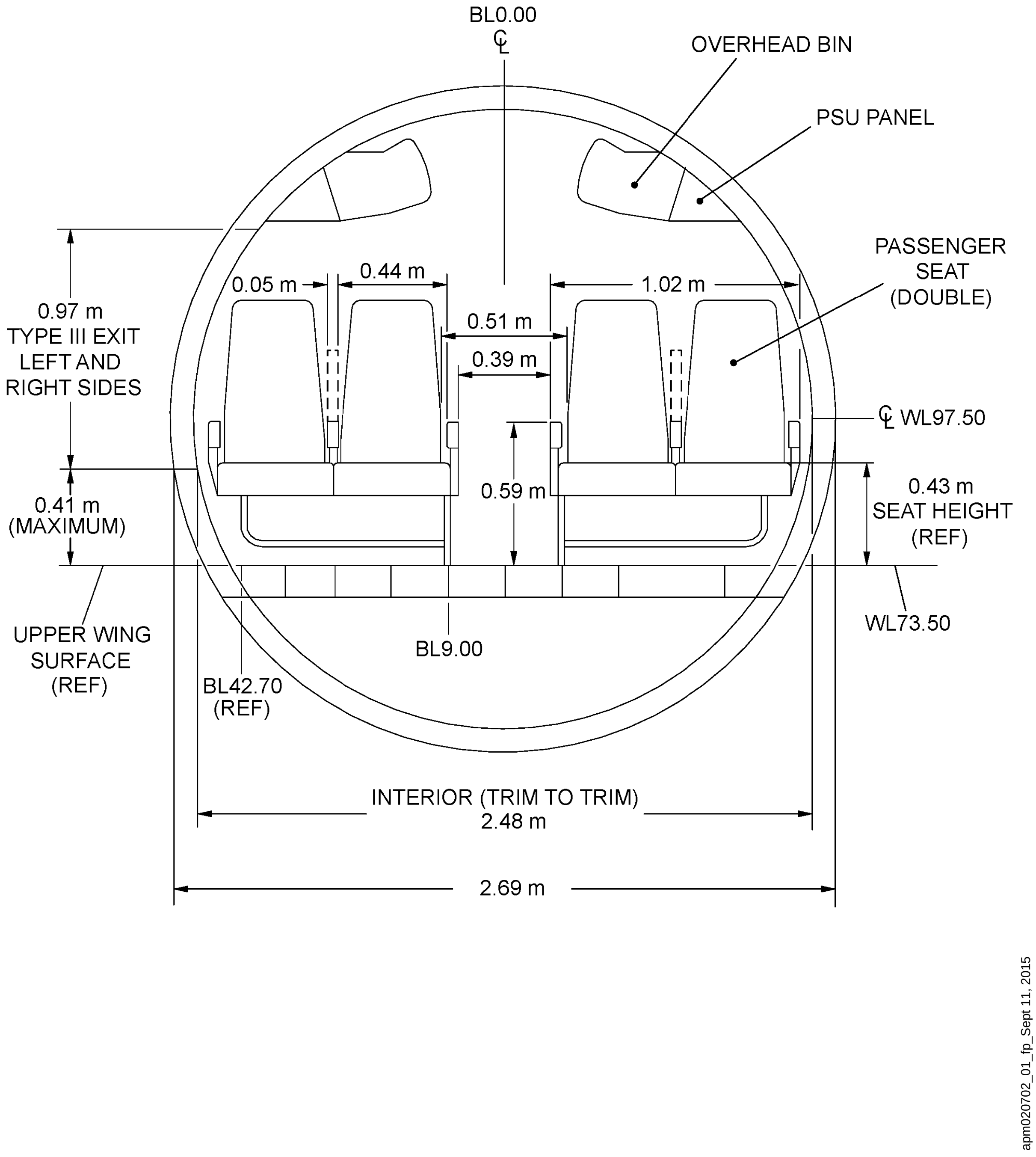
CARGO/BAGGAGE VOLUME	
WARDROBE/STORAGE	8 ft.^{3} (0.23 m.^{3})
OVERHEAD STORAGE BIN	71 ft.^{3} (2.02 m.^{3})
UNDER SEAT BAGGAGE	45 ft.^{3} (1.28 m.^{3})
CARGO COMPARTMENT	306 ft.^{3} (8.66 m.^{3})
TOTAL GROSS VOLUME (APPROX.)	440 ft.^{3} (12.19 m.^{3})



Interior Configuration – Custom Layout for 48 Passengers
Figure 7



Passenger Compartment Cross Section (US Standard)
Figure 8



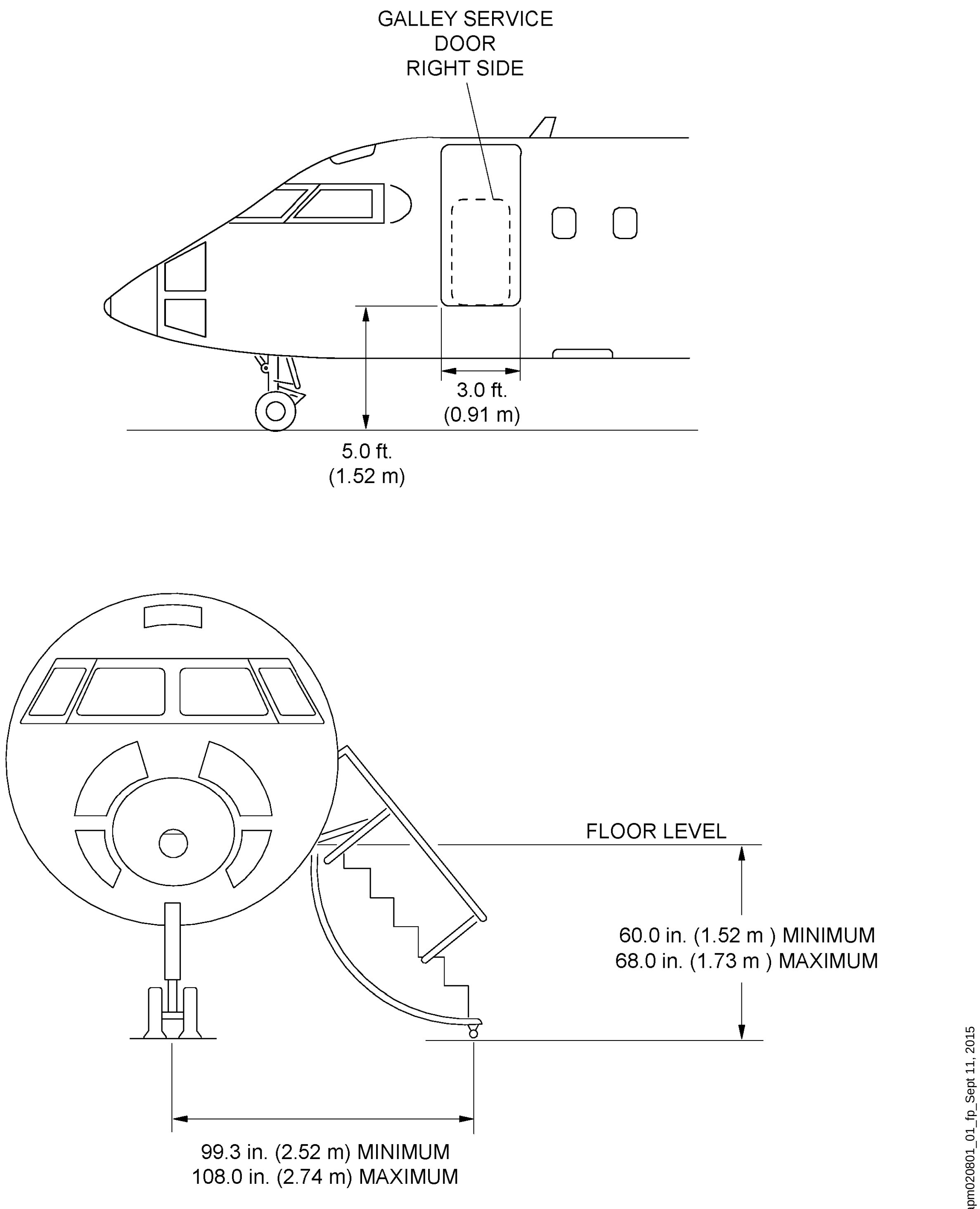
Passenger Compartment Cross Section (Metric)
Figure 9

D. Door Clearances

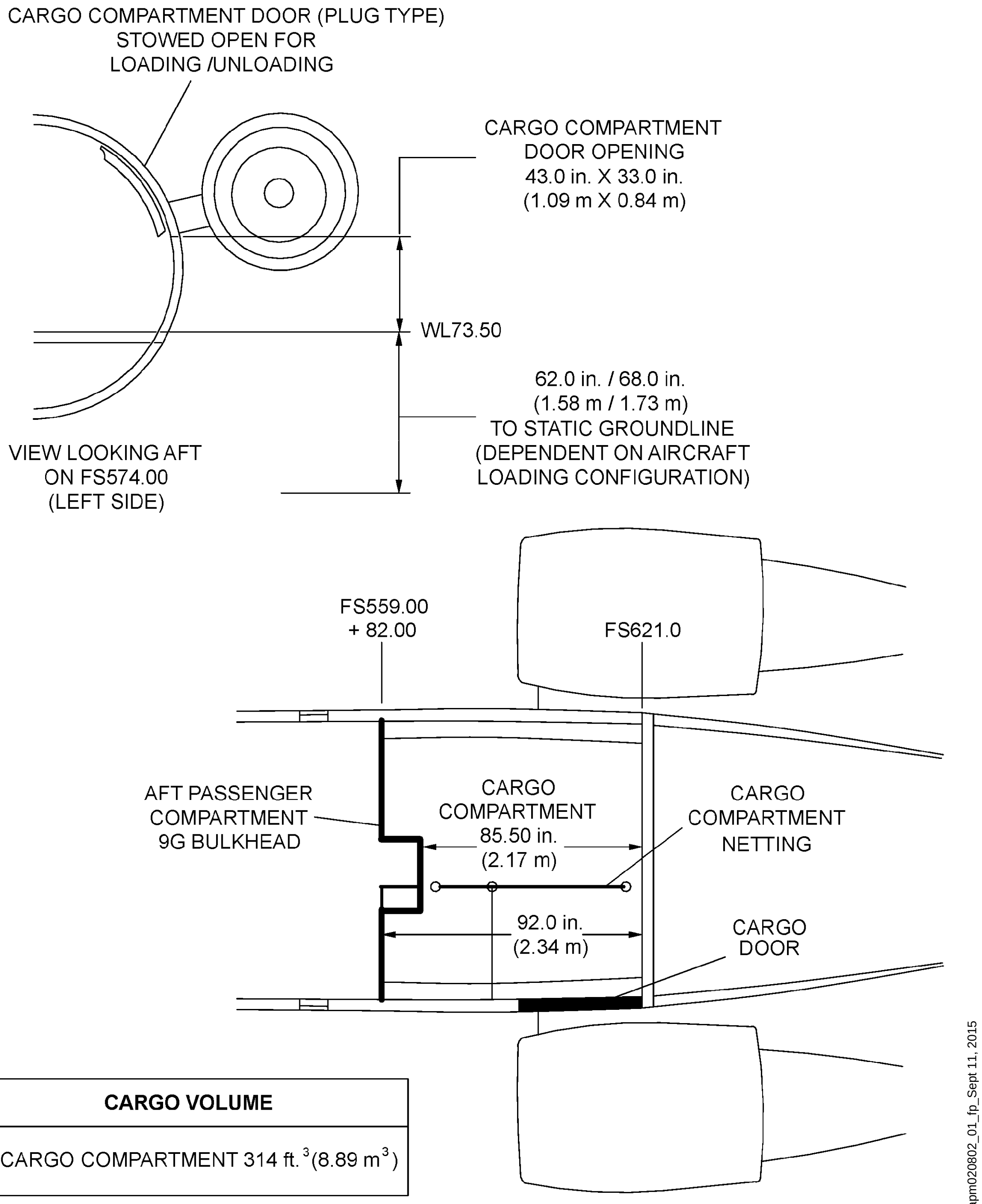
The following door clearance data sheets provide the door size and location of the passenger and cargo compartment doors.

The passenger door opens outward and downward and is manually controlled from inside or outside the aircraft. In the fully-open position, the door is supported on the ground by a support wheel assembly.

The cargo compartment door is a flush-fitting, plug-type door that opens inward and upward on one set of tracks.

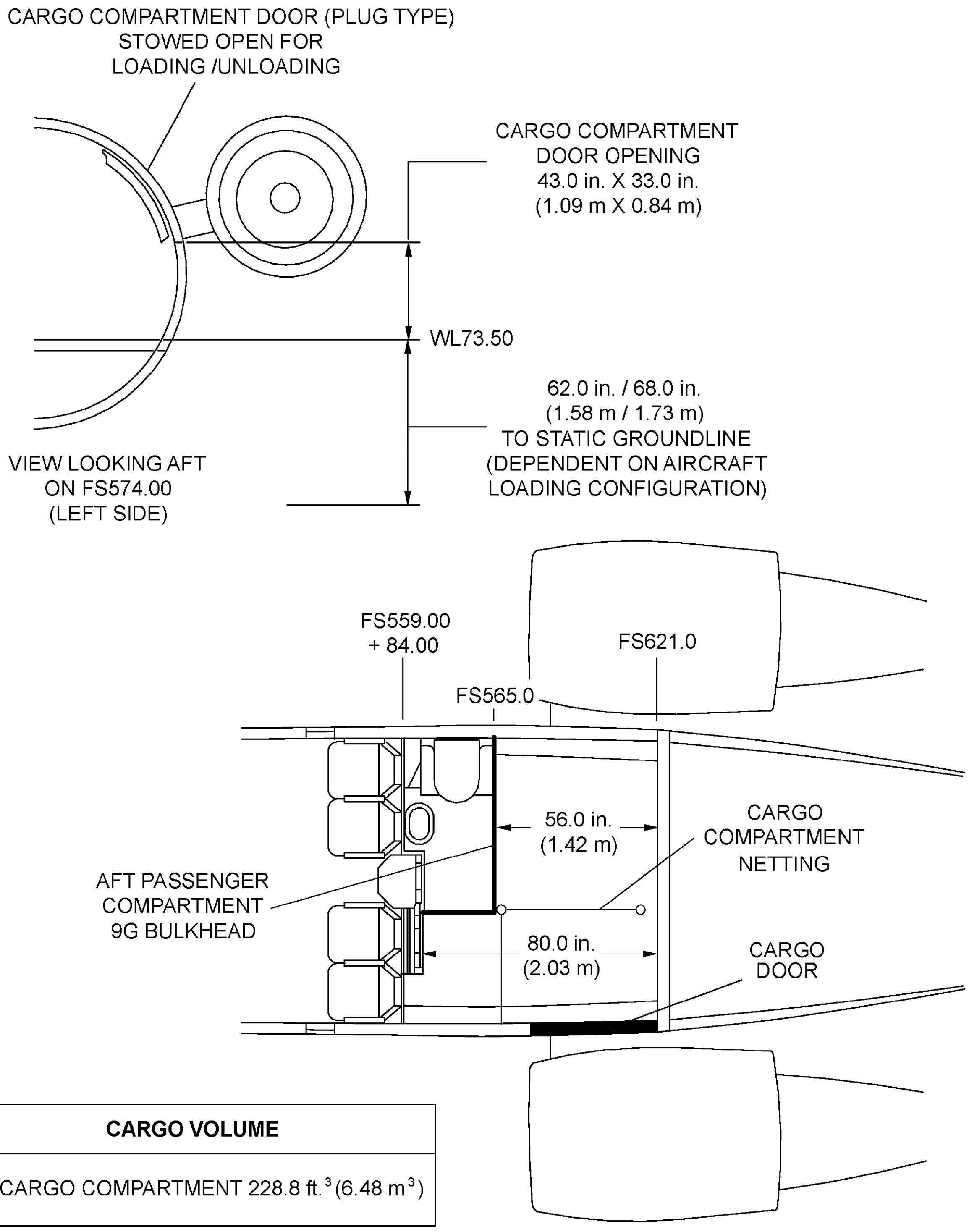


Passsenger Door and Service Door Clearances
Figure 10



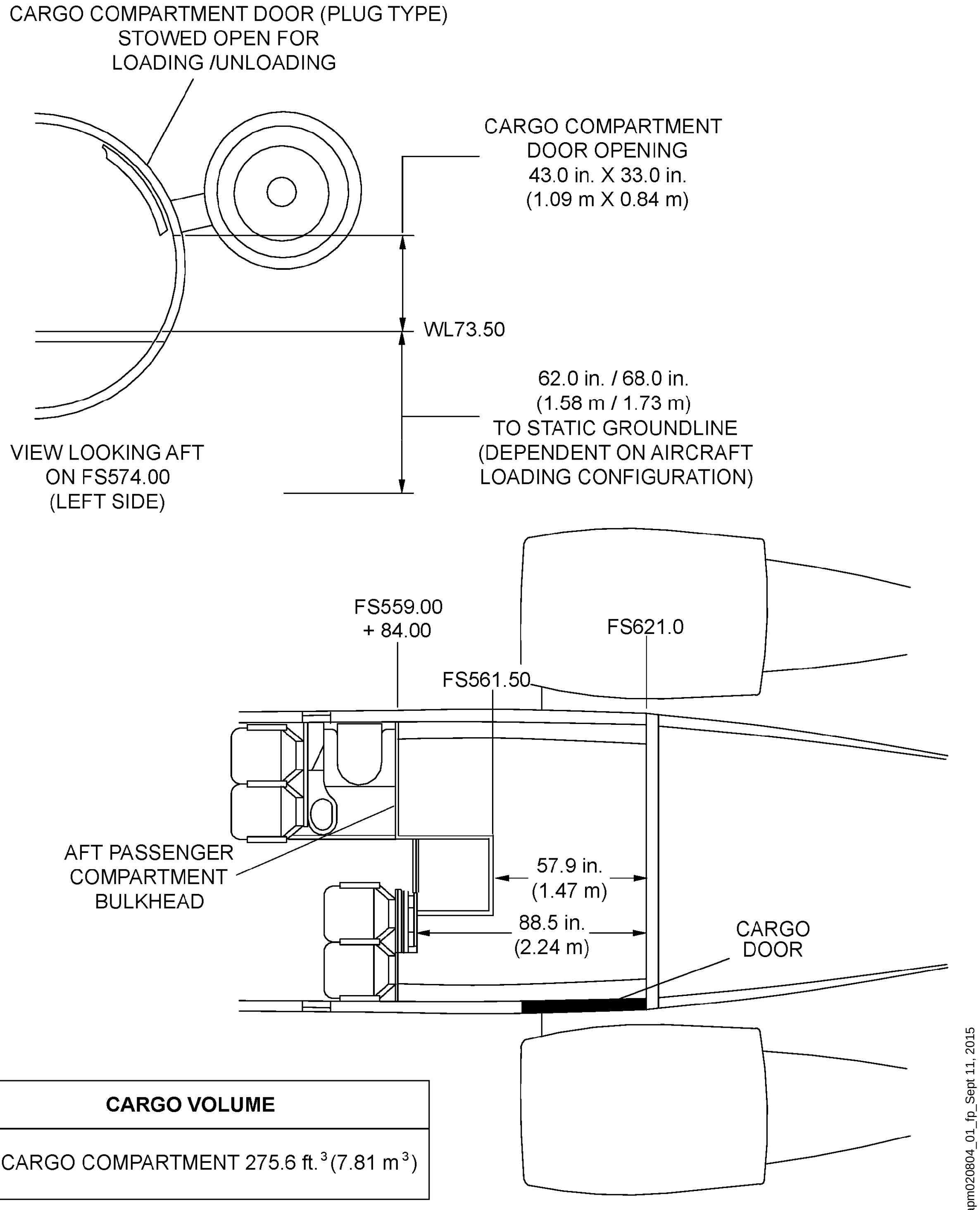
CARGO VOLUME
CARGO COMPARTMENT 314 ft.^{3} (8.89 m^3)

Cargo Compartment Door Clearance (for North American Universal Layout)
Figure 11



CARGO VOLUME
CARGO COMPARTMENT 228.8 ft.^{3} (6.48 m^3)

Cargo Compartment Door Clearance (for Euro. Univ. Layout/48 Pax Cust. Layout)
Figure 12



CARGO VOLUME
CARGO COMPARTMENT 275.6 ft.^{3} (7.81 m^3)

Cargo Compartment Door Clearance (for Custom Layout with Exp. Aft Storage)
Figure 13

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AIRCRAFT PERFORMANCE

1. AIRPLANE PERFORMANCE

A. Section Contents

This section includes information on:

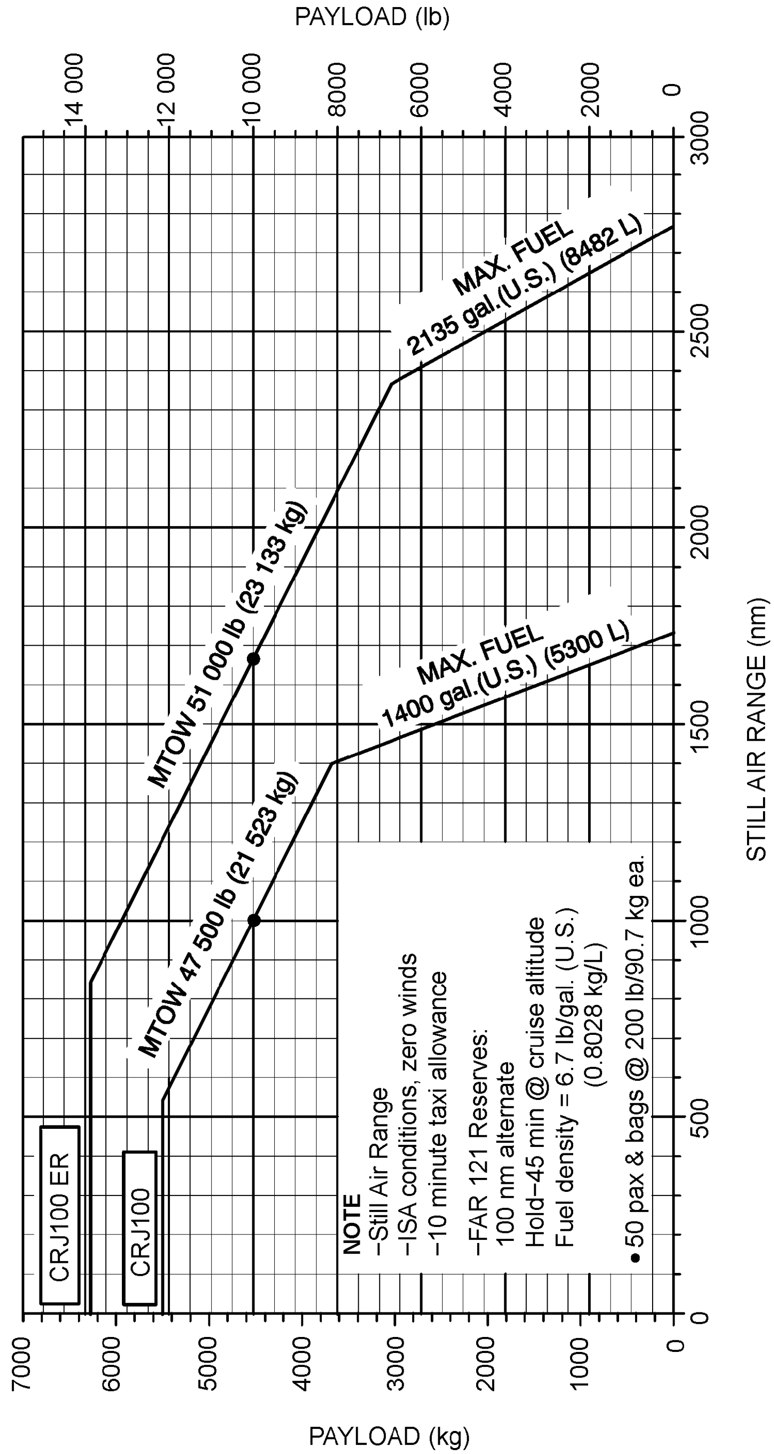
- Payload-range information for specific cruise altitudes and speeds
- Maximum permissible takeoff weight with takeoff flaps at 20 degrees
- FAR takeoff and landing field length requirements
- Maximum permissible landing weight (approach flaps at 20 deg. /landing flaps at 45 deg.)
- FAR landing runway length requirements with landing flaps at 45 degrees
- Landing speed (1.3 VS) with landing flaps at 45 degrees.

B. Standard Day Temperature Chart

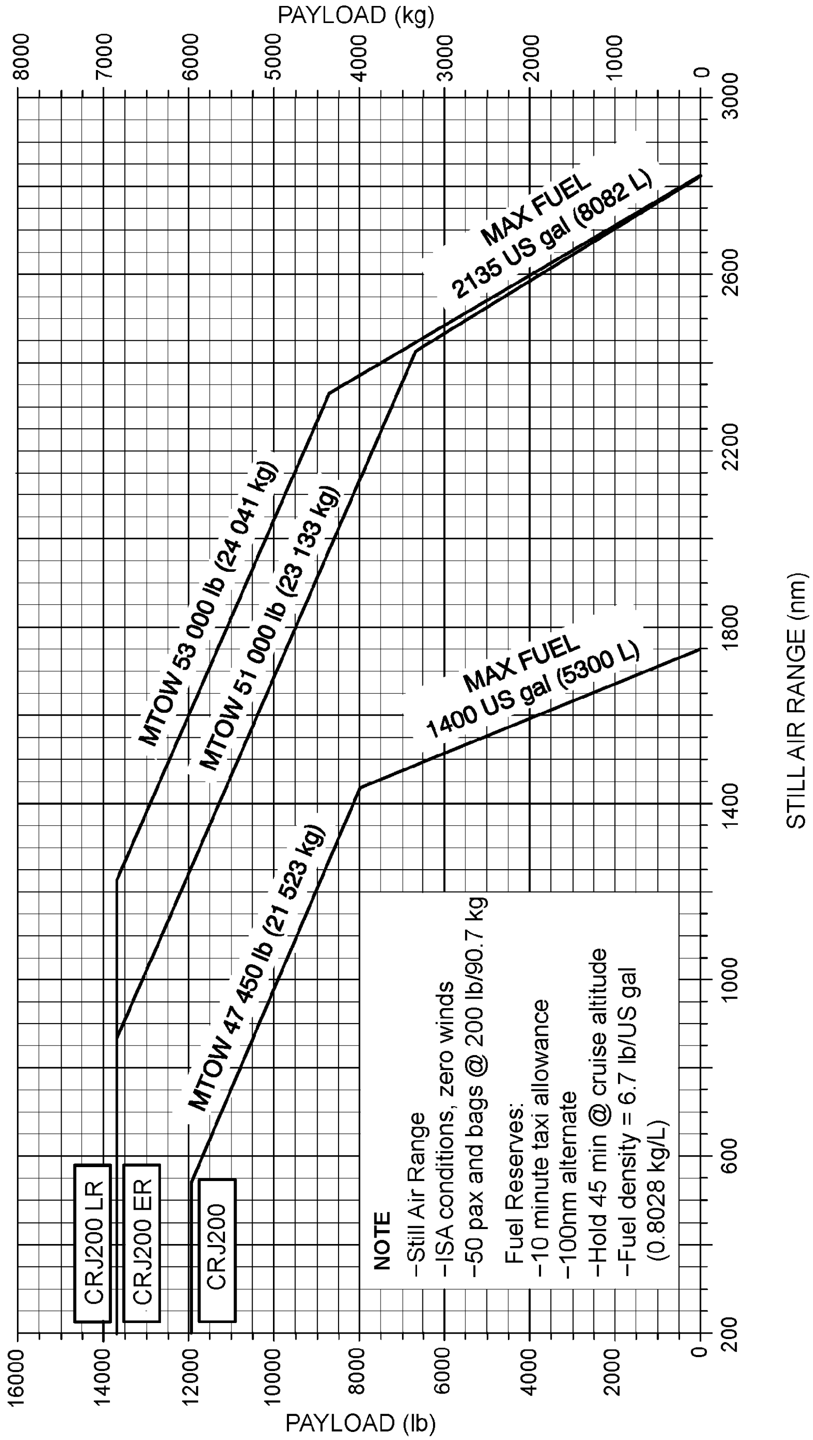
Standard day temperatures for the altitudes shown in this section are tabulated below:

Standard Day Temperature Chart

Elevation		Standard Day Temperature	
Feet (ft)	Meters (m)	°F	°C
0	0	59	15
2000	610	51.9	11.1
4000	1220	44.7	7.1
6000	1830	37.6	3.1
8000	2440	30.5	–0.8
10000	3050	23.3	–4.8



Payload/Range for Long Range Cruise at 37 000 ft. (11 300 m) CRJ100
Figure 1



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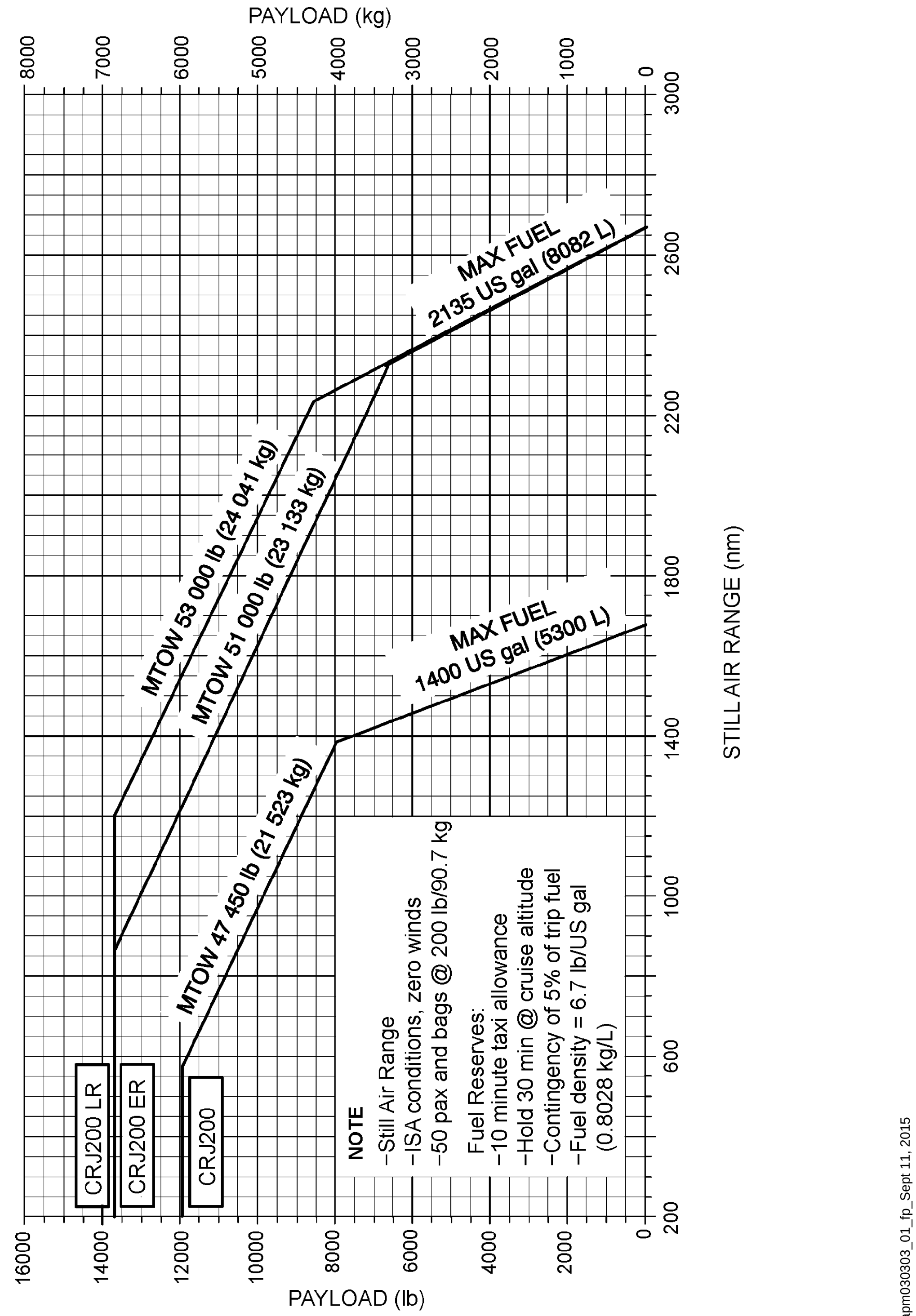
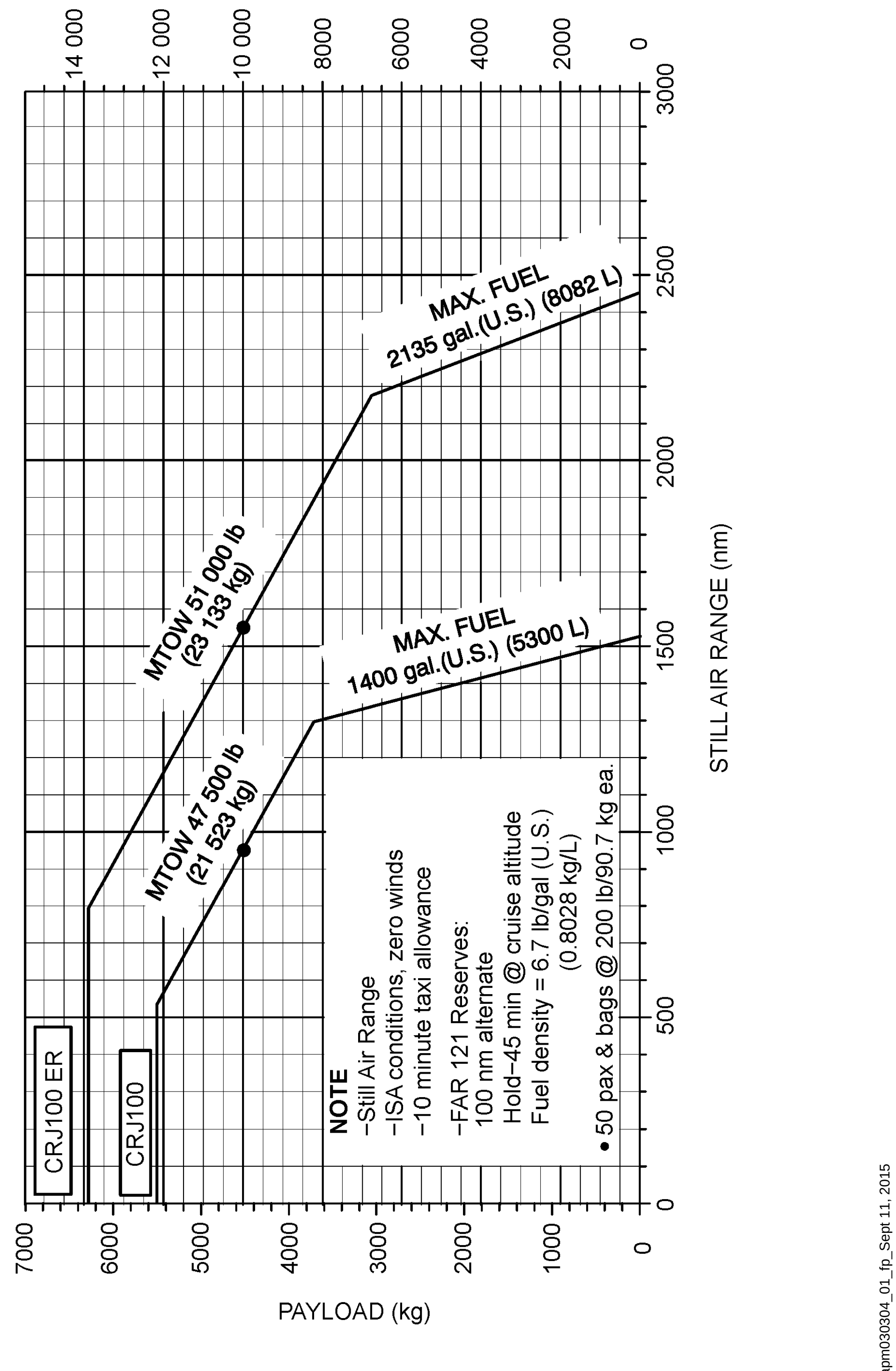
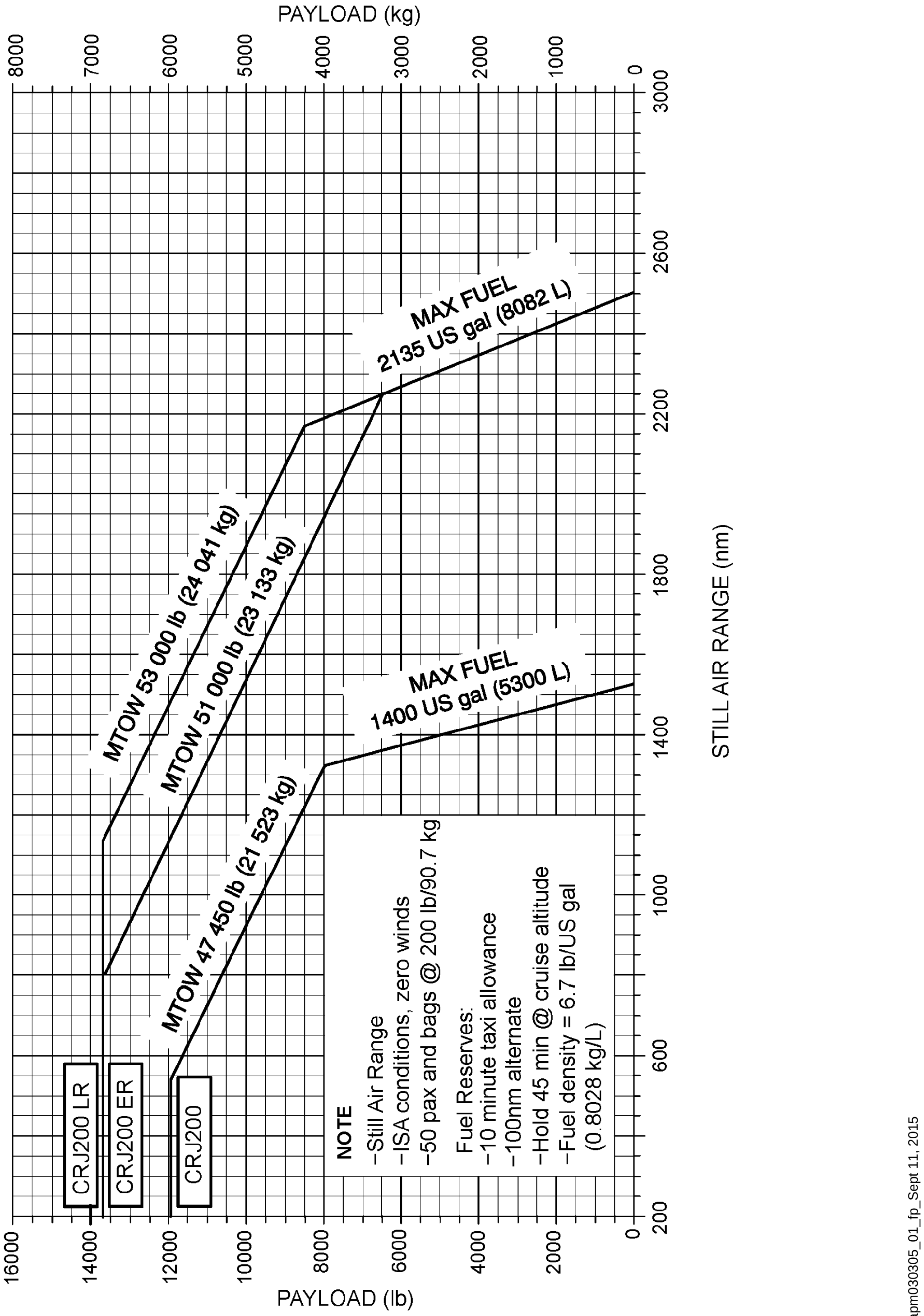
Payload/Range for Long Range Cruise at 37 000 ft. (11 300 m) CRJ200 US (FAA) Requirements
Figure 2



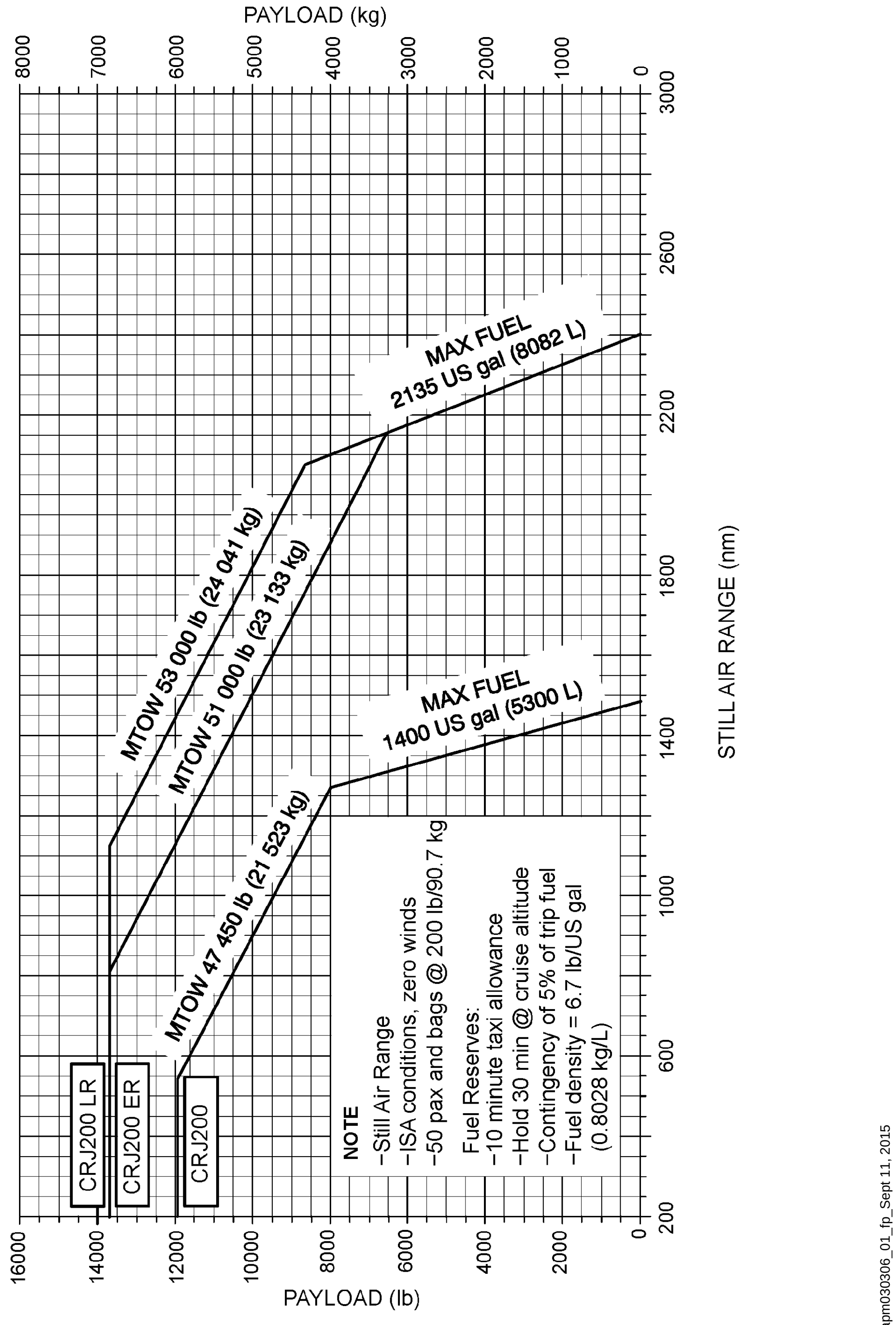
Payload/Range for Long Range Cruise at 37 000 ft. (11 300 m) CRJ200 EU (JAA) Requirements
Figure 3



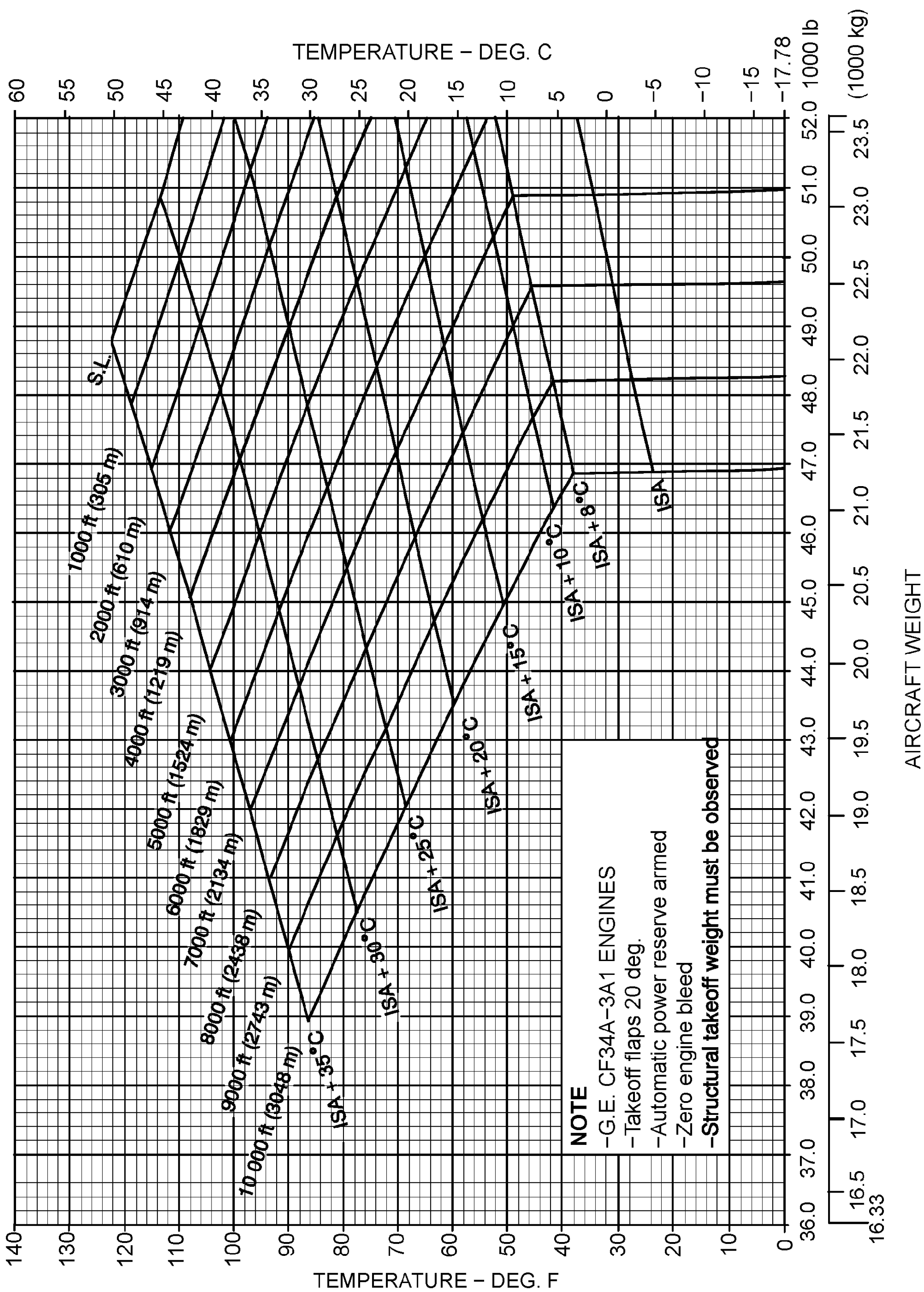
Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11300 m) CRJ100
Figure 4



Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200 US (FAA) Requirements
Figure 5



Payload/Range for Mach 0.80 Cruise at 37 000 ft. (11 300 m) CRJ200 EU (JAA) Requirements
Figure 6



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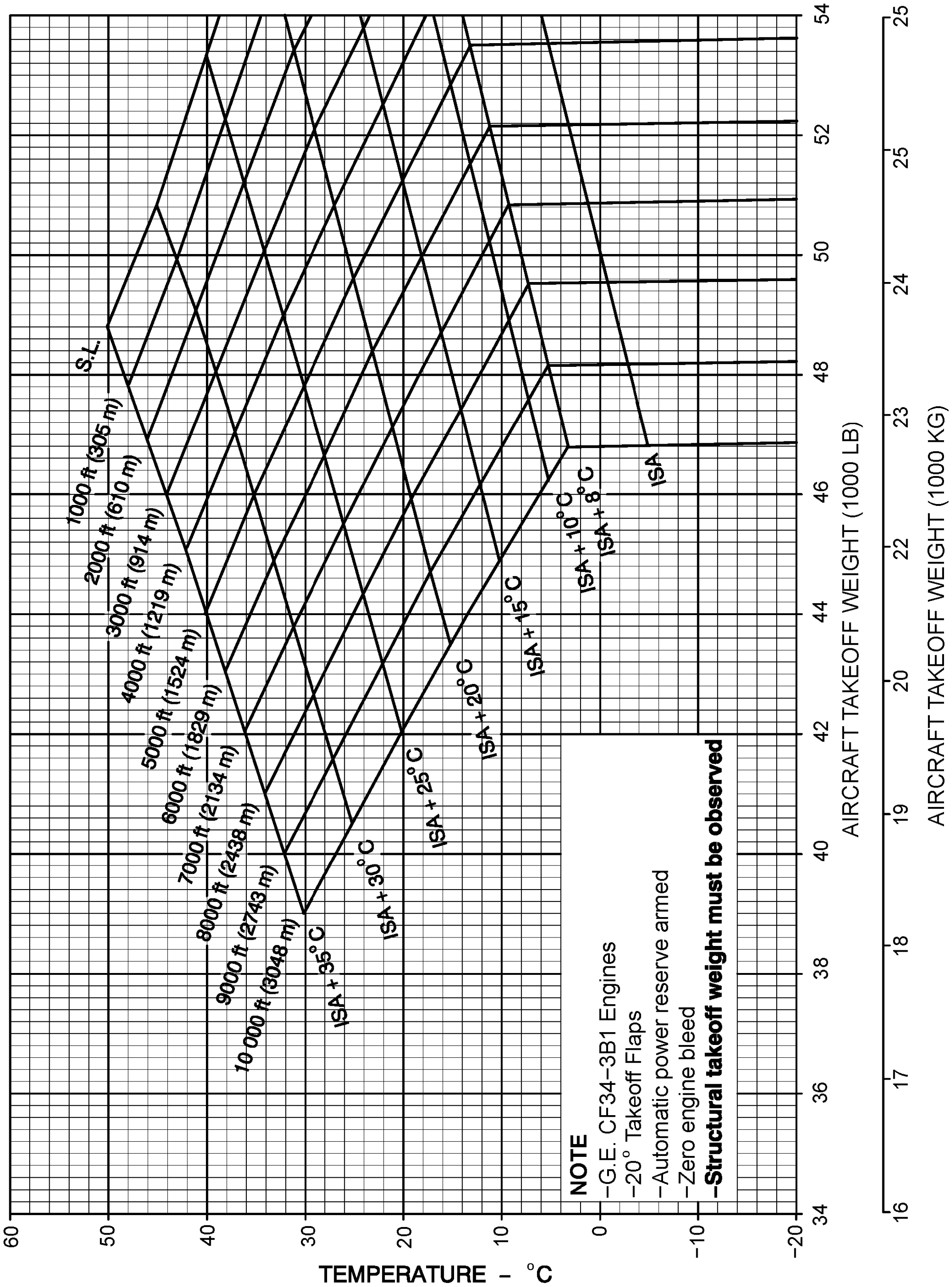
Max. Perm. Takeoff Weight (WAT Limit) − Takeoff Weight at 20 Deg. − CRJ100
Figure 7



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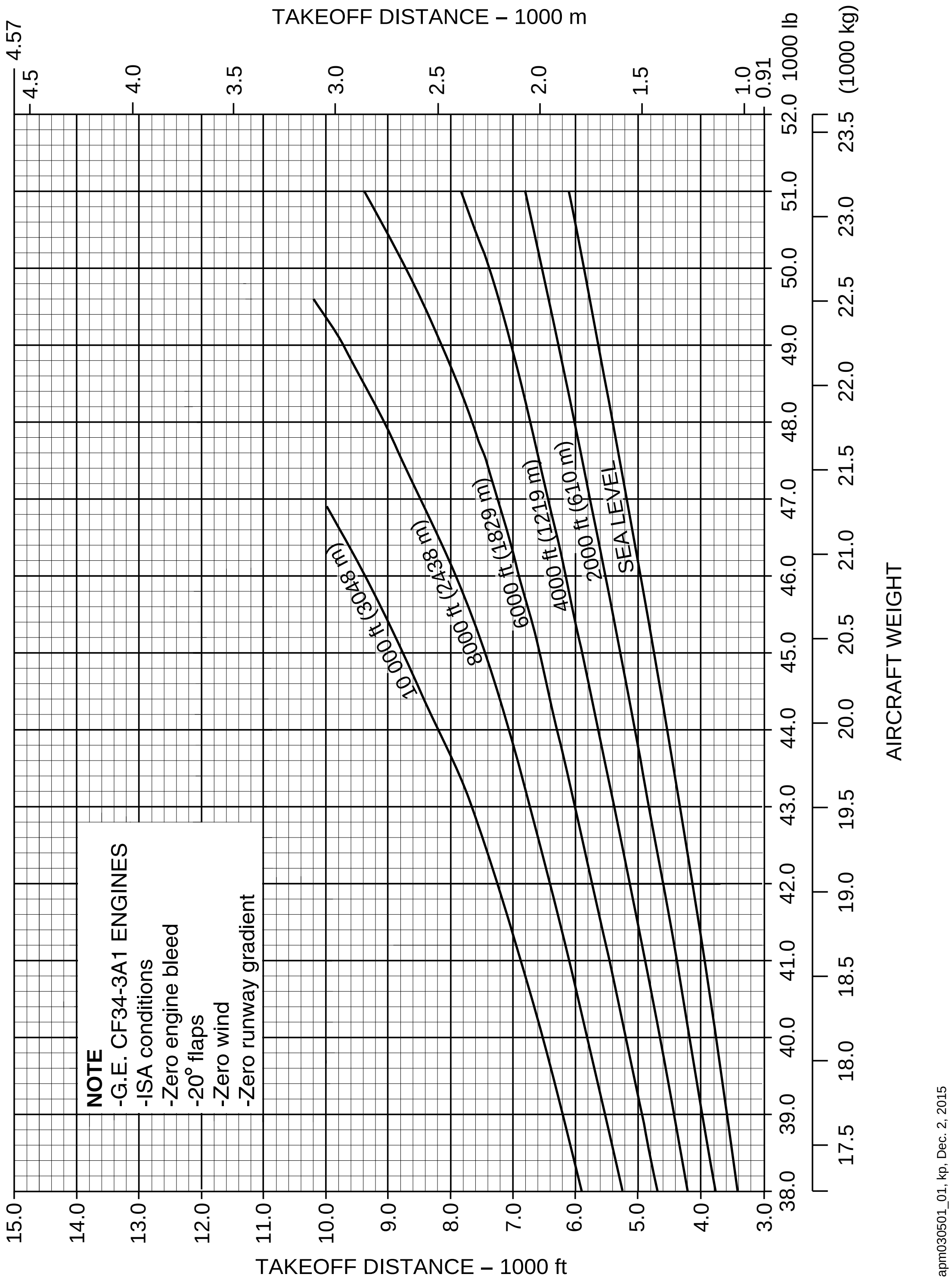
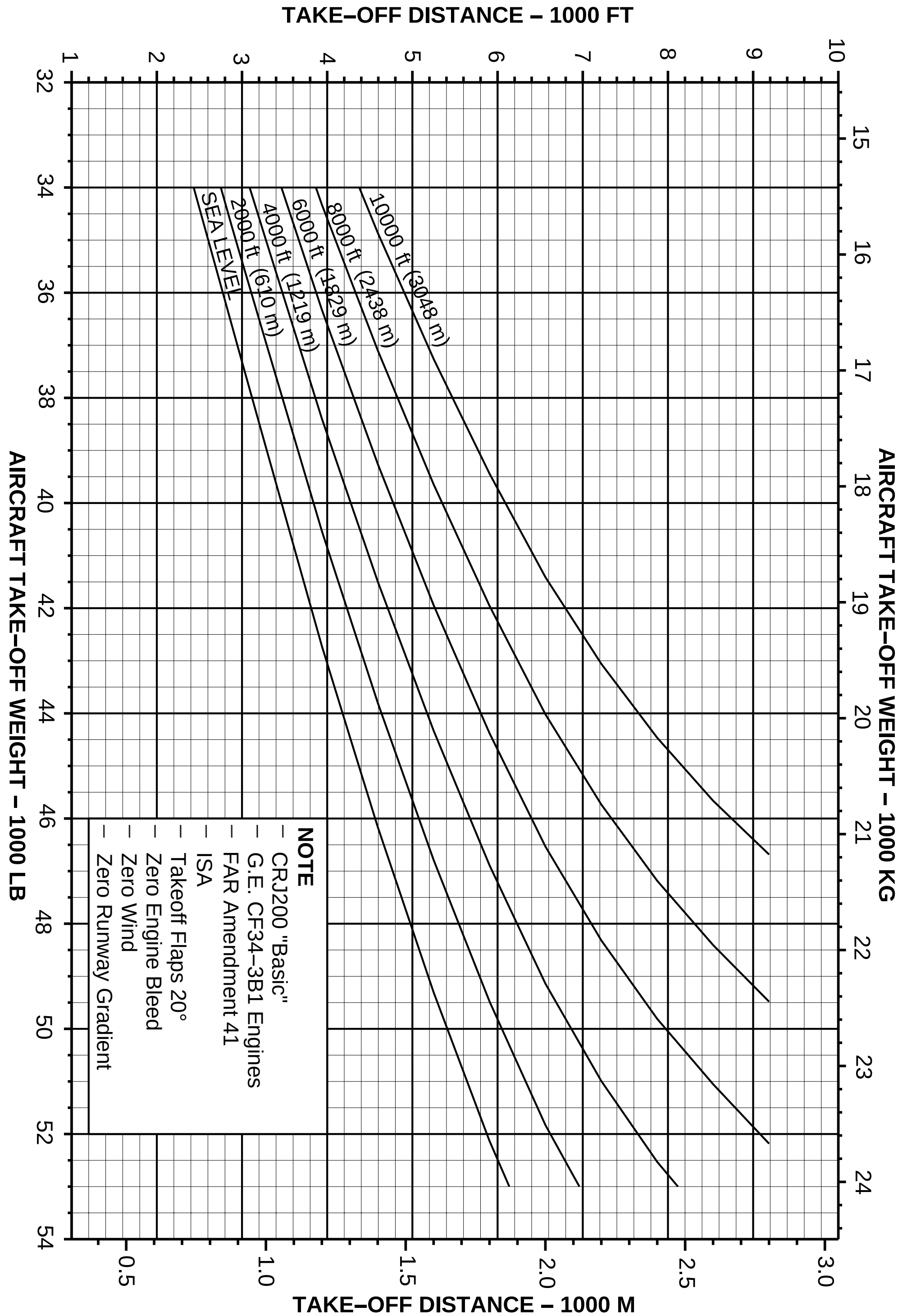
Maximum Permissible Takeoff Weight (WAT Limit) – Takeoff Flaps at 20 Degrees CRJ200
Figure 8



FAR Takeoff Runway Length Requirements – ISA Conditions – CRJ100
Figure 9



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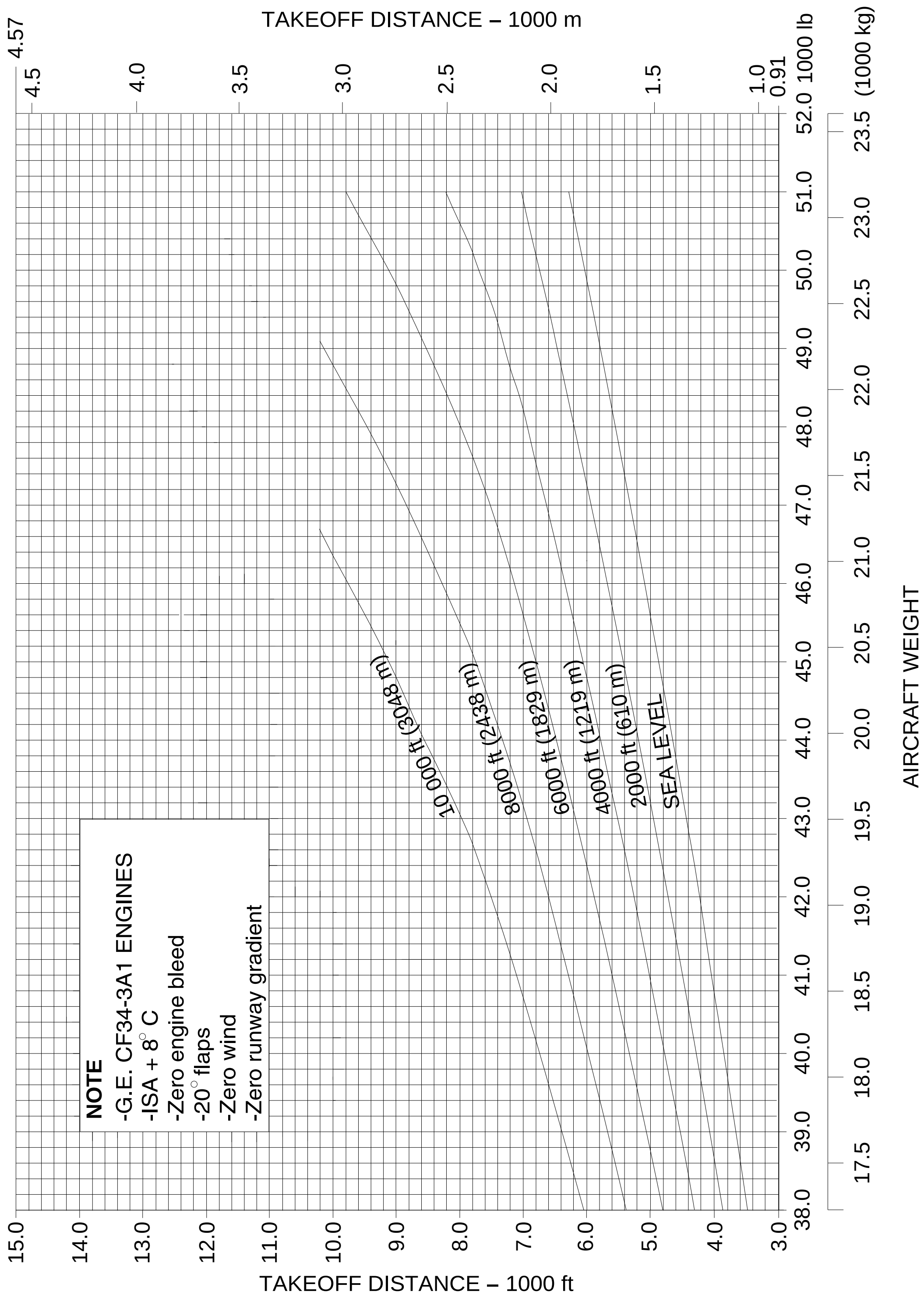
FAR Takeoff Runway Length Requirements – ISA Conditions – CRJ200
Figure 10



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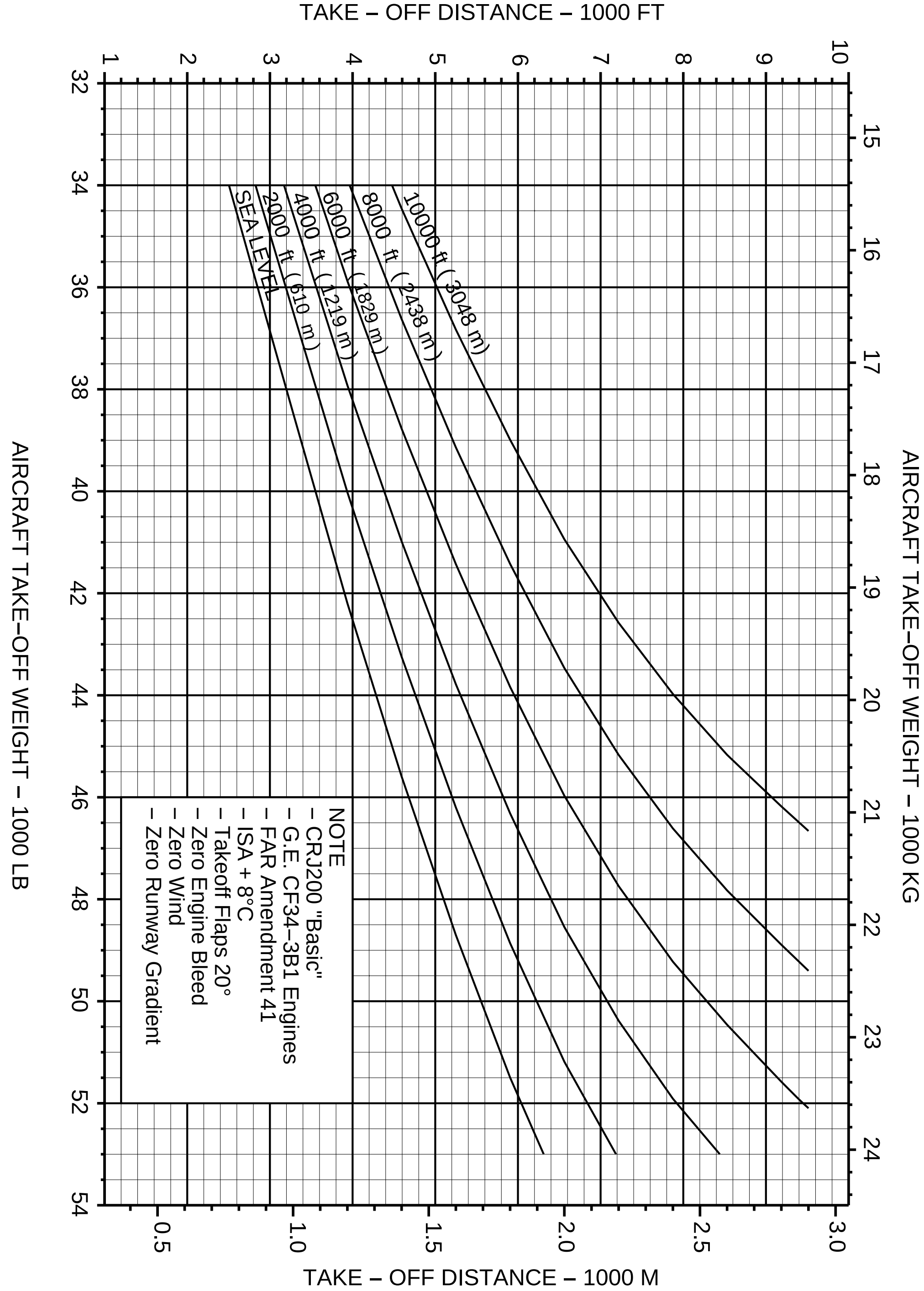
FAR Takeoff Runway Length Requirements – ISA + 8 C – CRJ100
Figure 11



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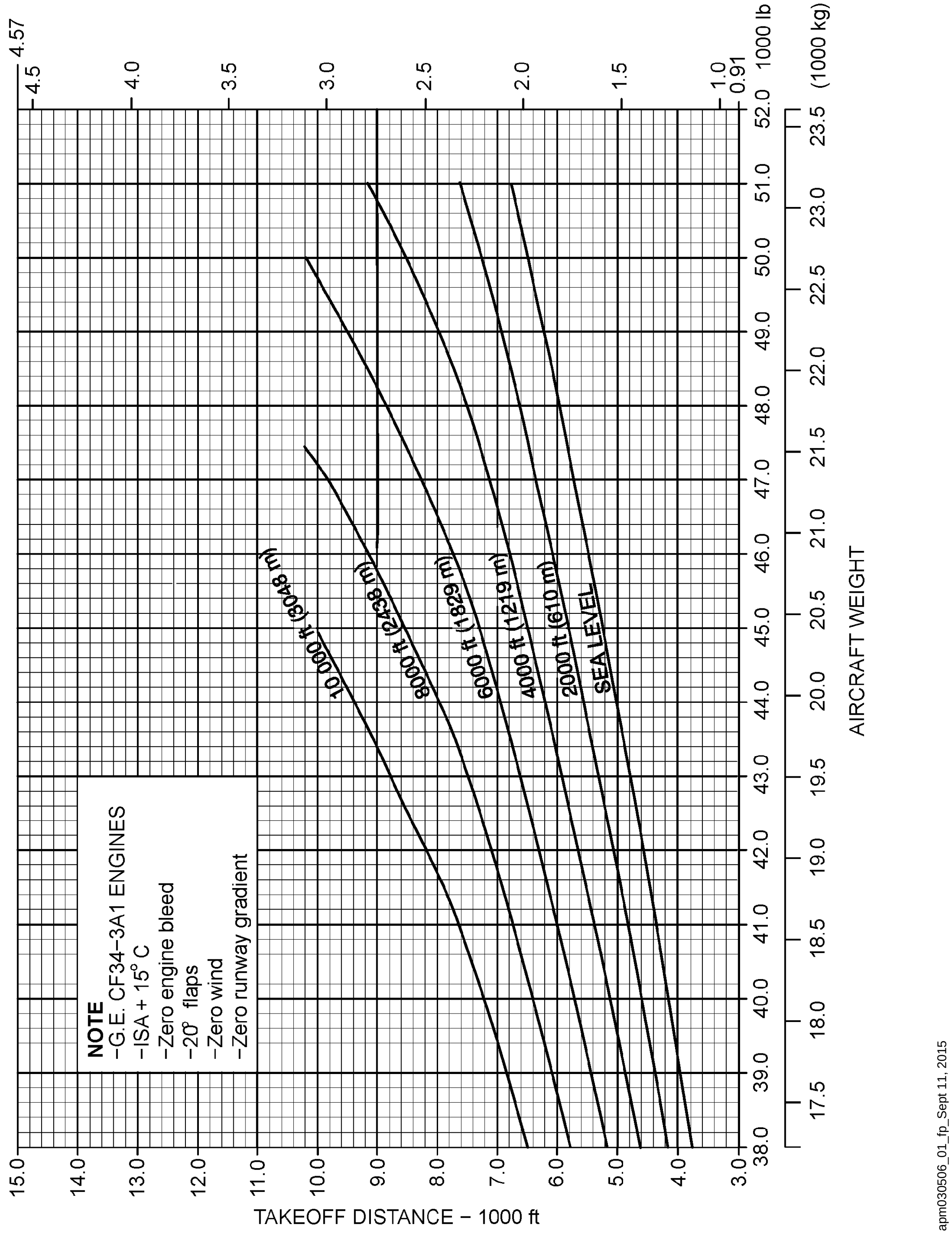
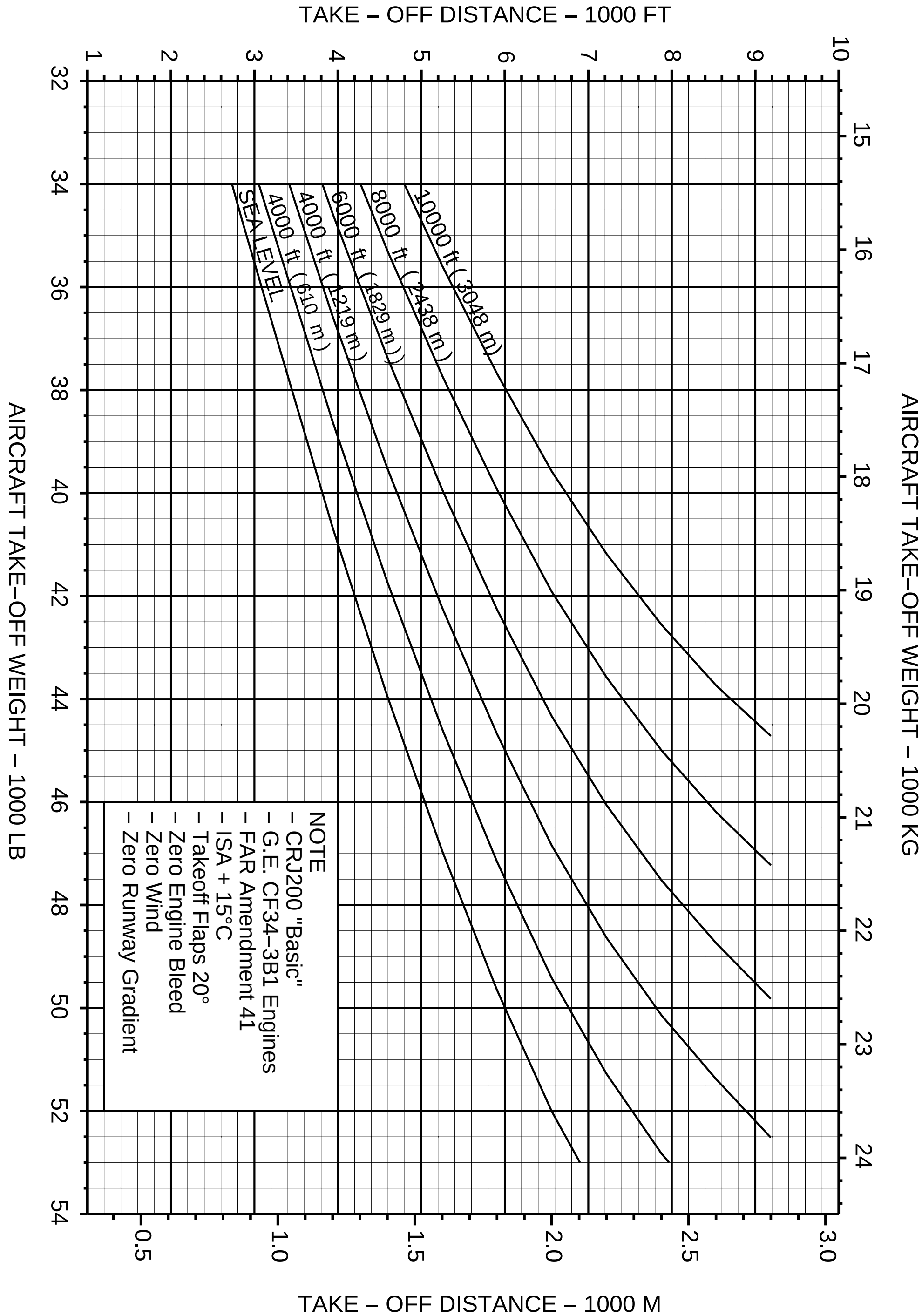
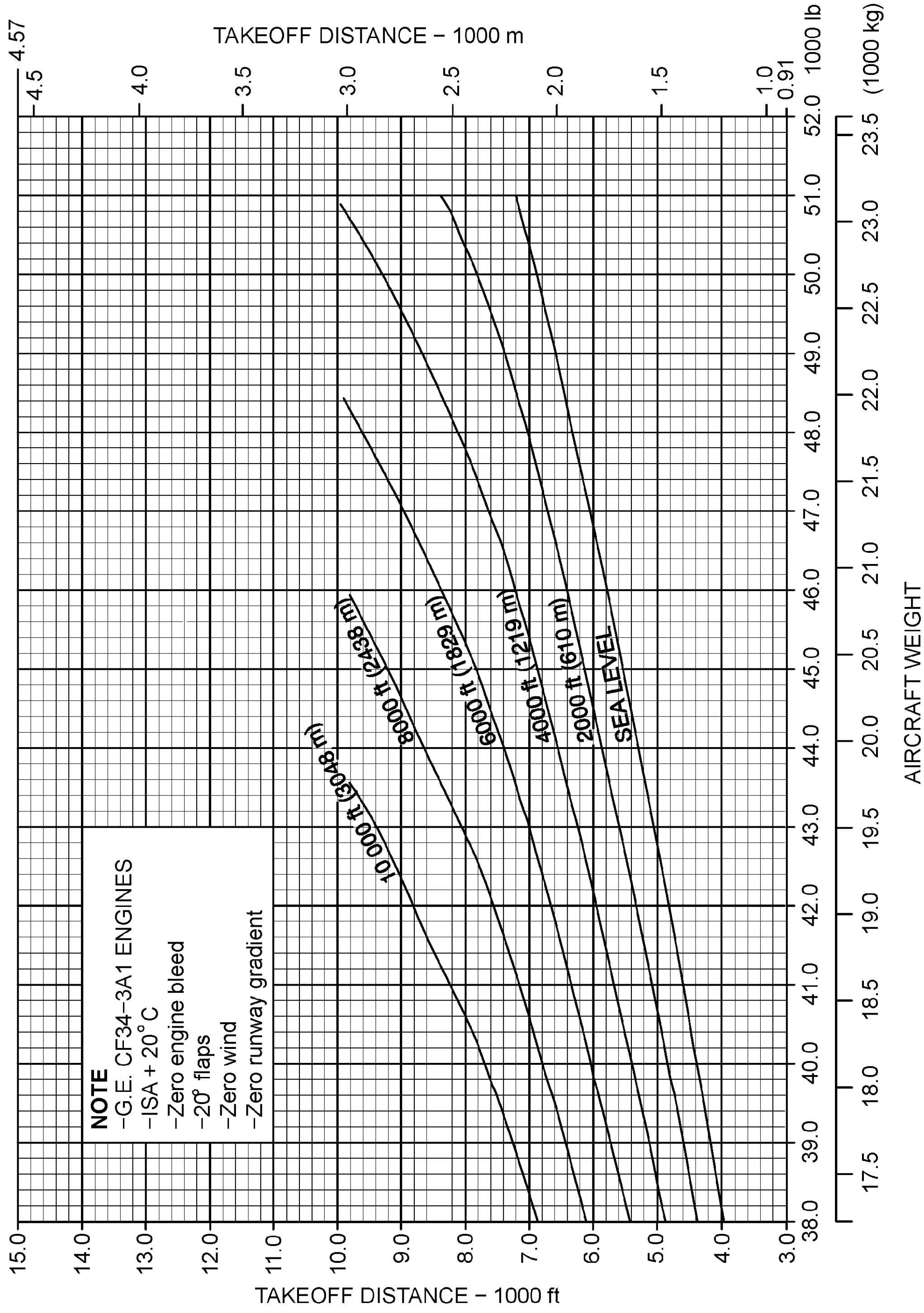
FAR Takeoff Runway Length Requirements – ISA + 8 C – CRJ200
Figure 12



FAR Takeoff Runway Length Requirements − ISA + 15 C − CRJ100
Figure 13



FAR Takeoff Runway Length Requirements – ISA + 15 C – CRJ200
Figure 14



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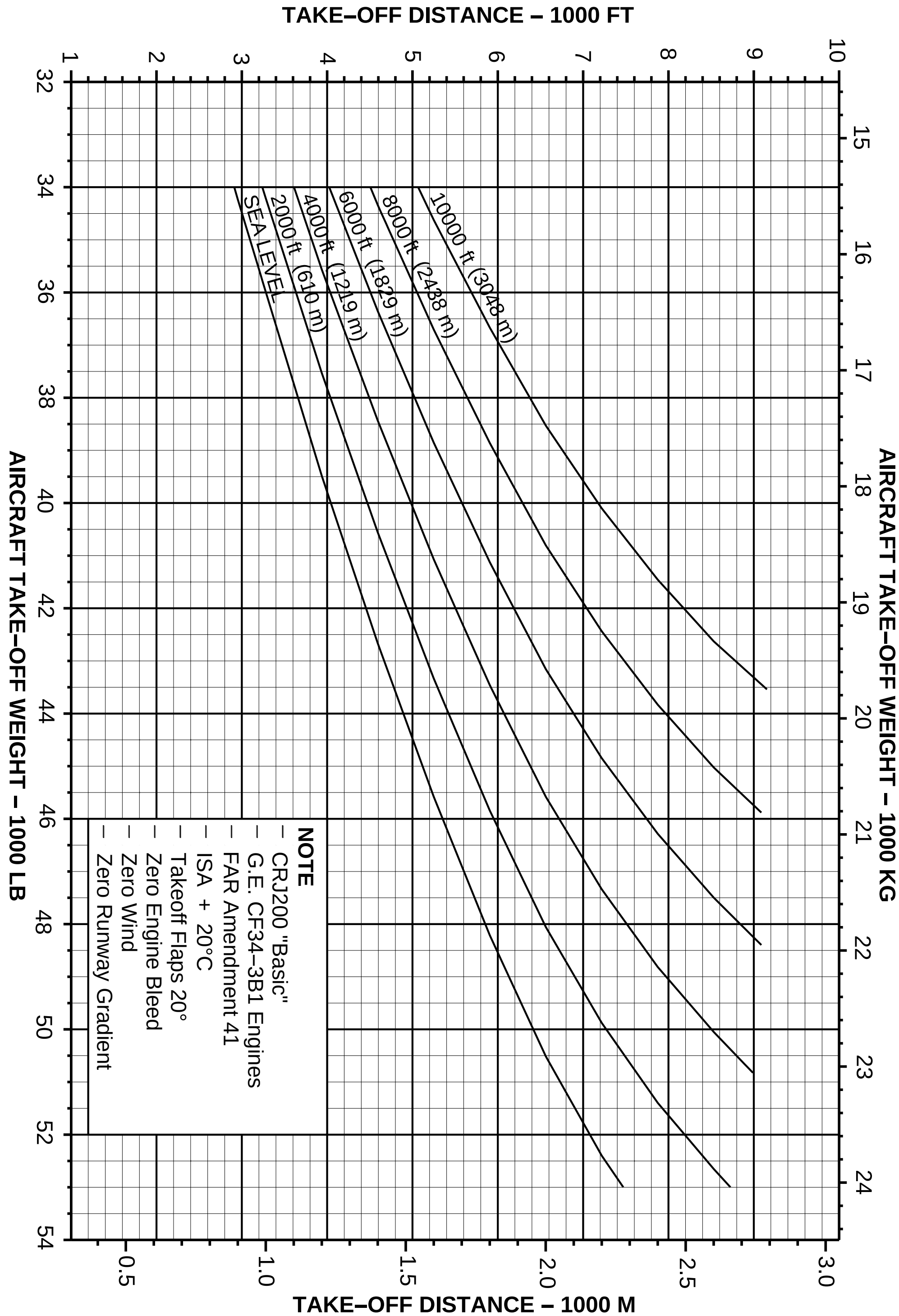
FAR Takeoff Runway Length Requirements – ISA + 20 C – CRJ100
Figure 15



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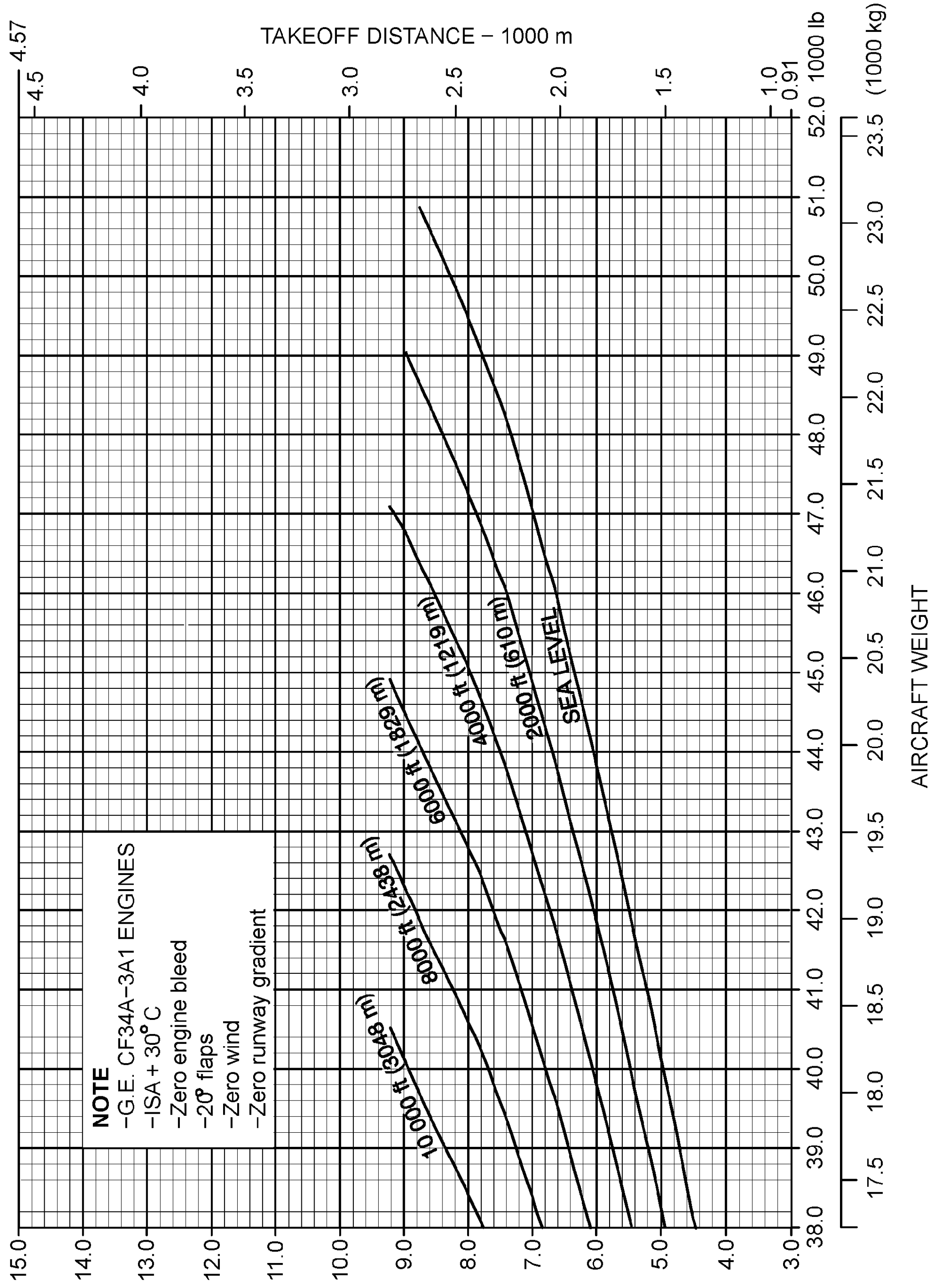
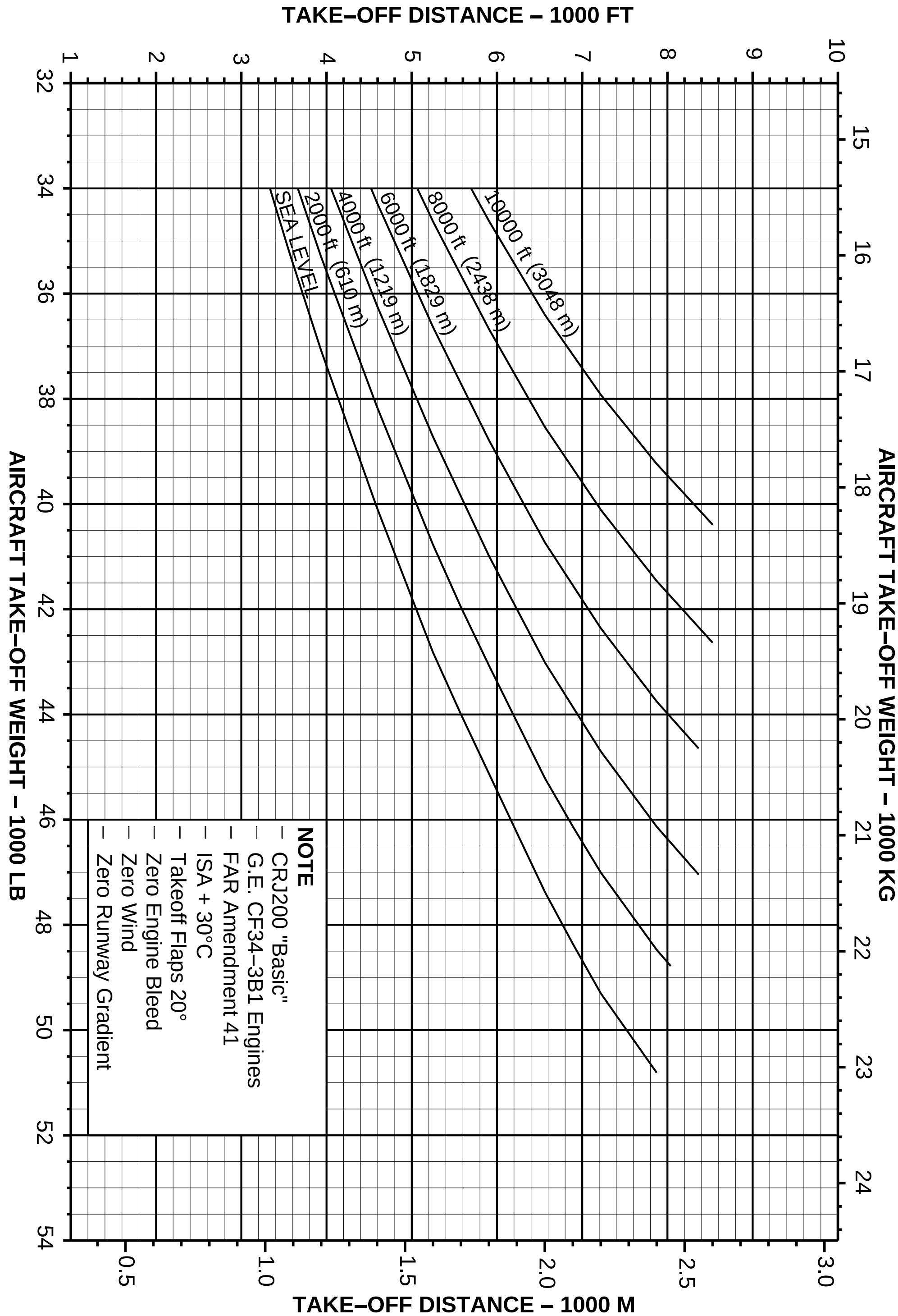
FAR Takeoff Runway Length Requirements – ISA + 20 C – CRJ200
Figure 16



FAR Takeoff Runway Length Requirements – ISA + 30 C – CRJ100
Figure 17



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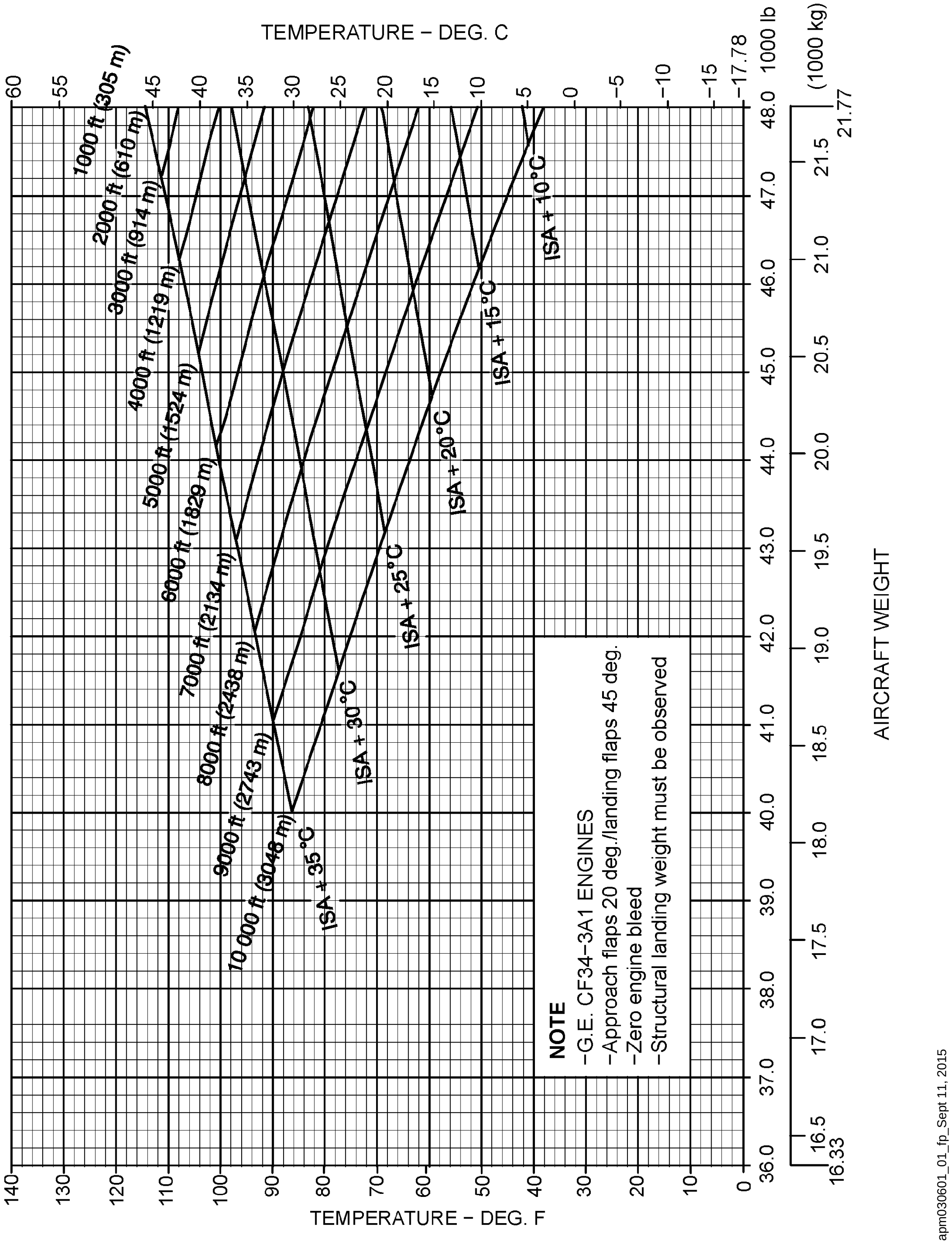
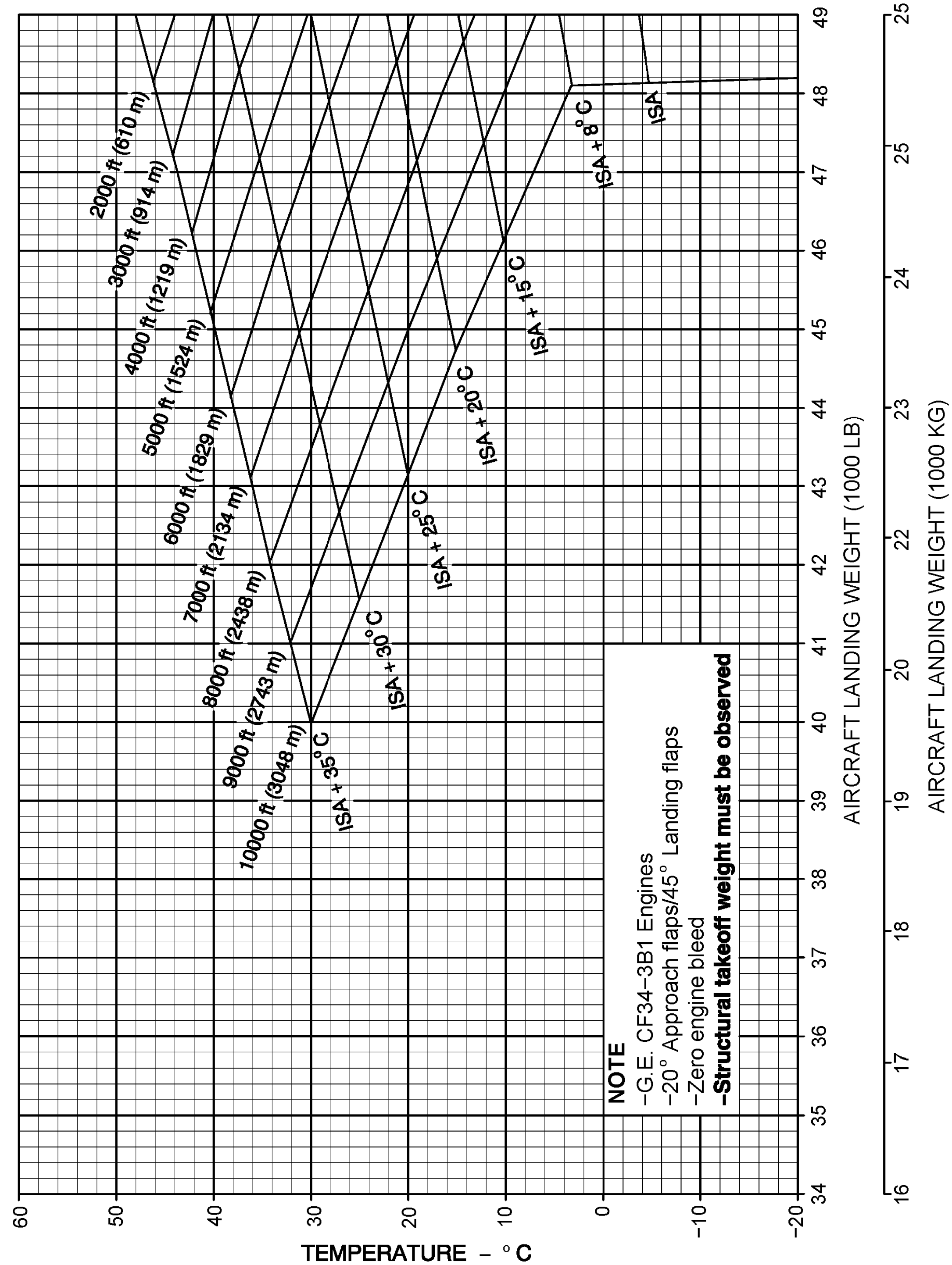
FAR Takeoff Runway Length Requirements – ISA + 30 C – CRJ200
Figure 18



Max. Perm. Land. Weight – App. Flaps 20 Deg./Land. Flaps 45 Deg. – CRJ100
Figure 19



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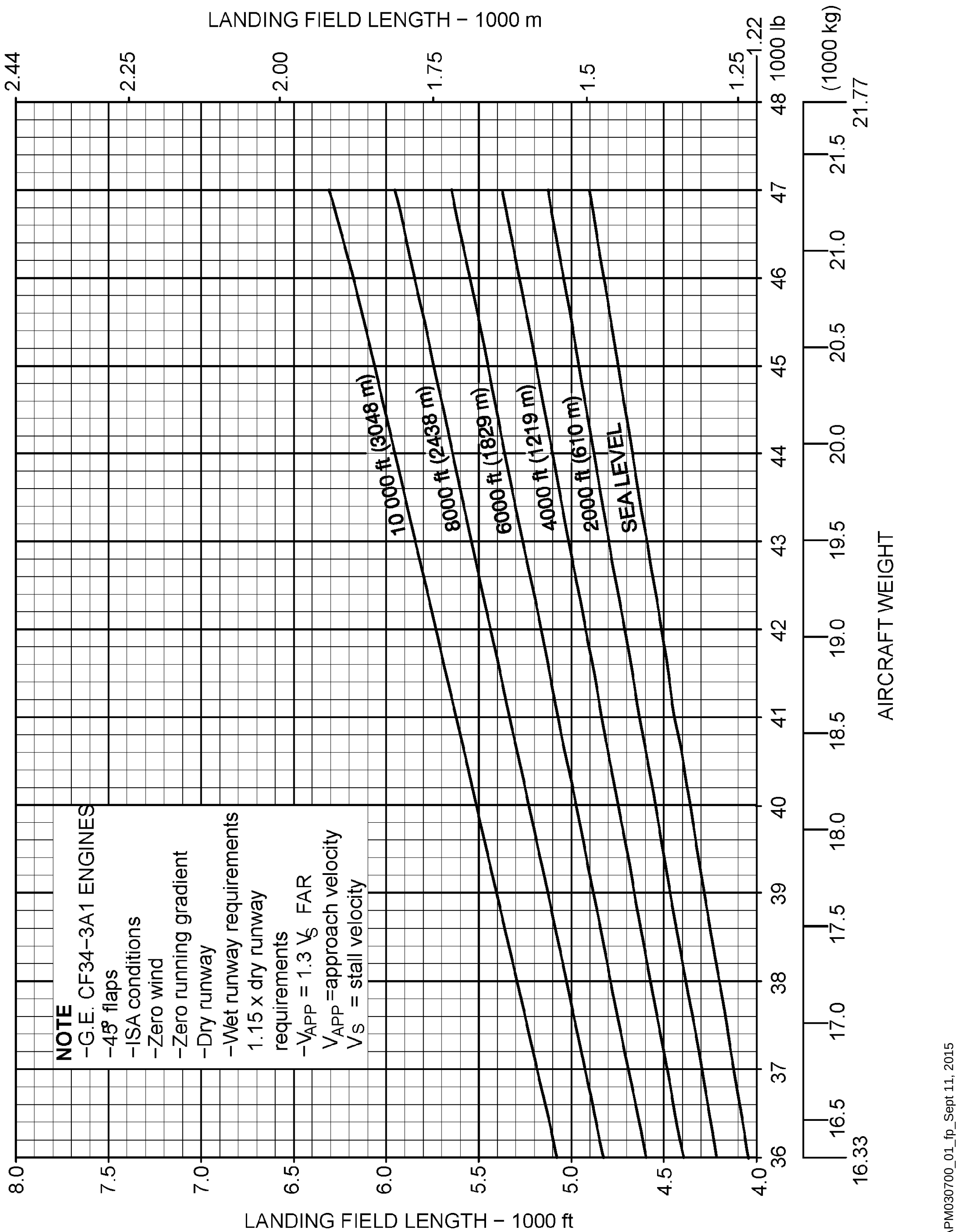
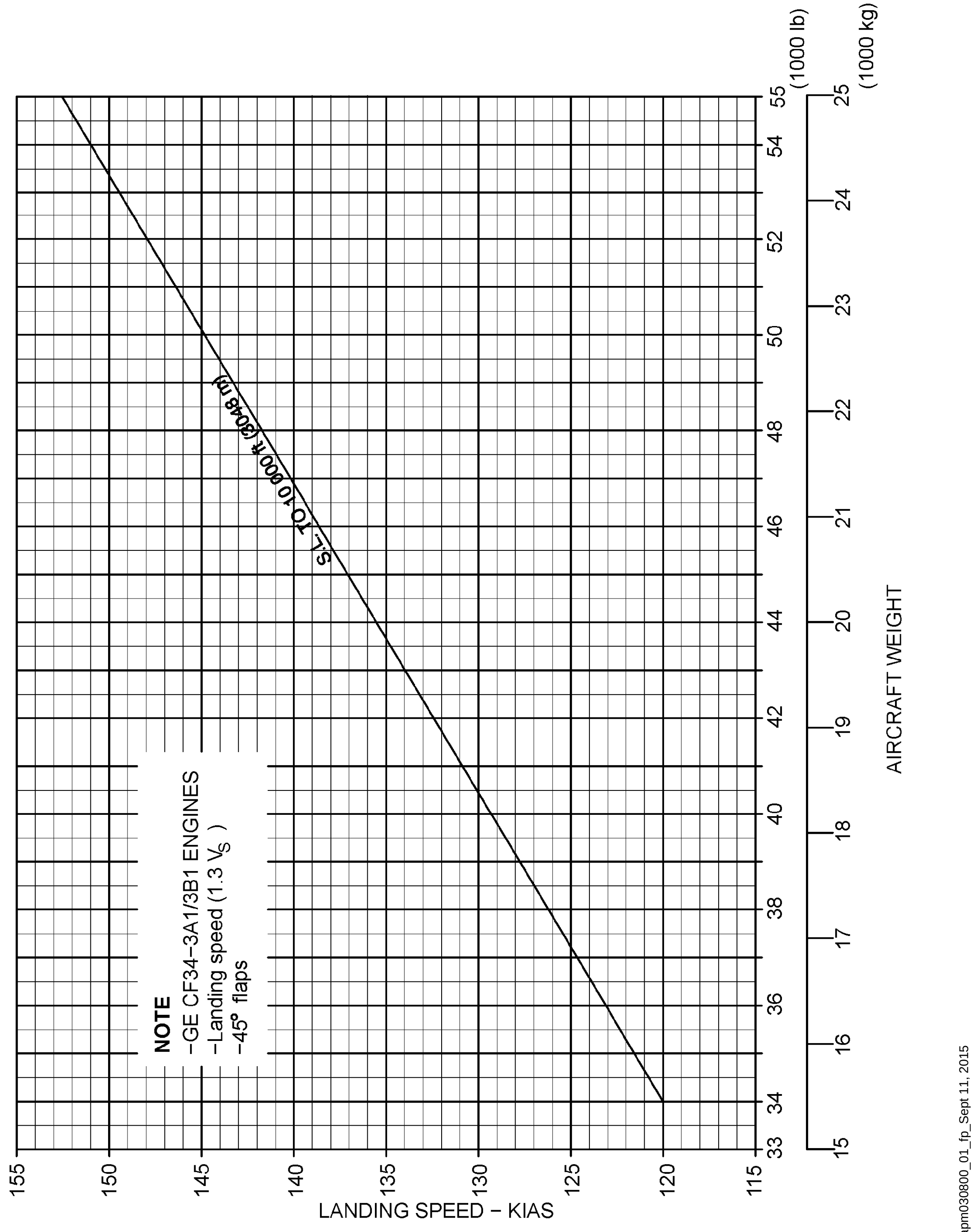
Maximum Permissible Landing Weight (WAT Limit) – Approach Flaps at 20 Degrees/Landing Flaps at 45 Degrees – CRJ200
Figure 20



FAR Landing Runway Length Requirements − Landing Flaps at 45 Degrees
Figure 21



Landing Speed (1.3 VS) – Landing Flaps at 45 Degrees
Figure 22

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GROUND MANEUVERING

1. GROUND MANEUVERING

A. Section Contents

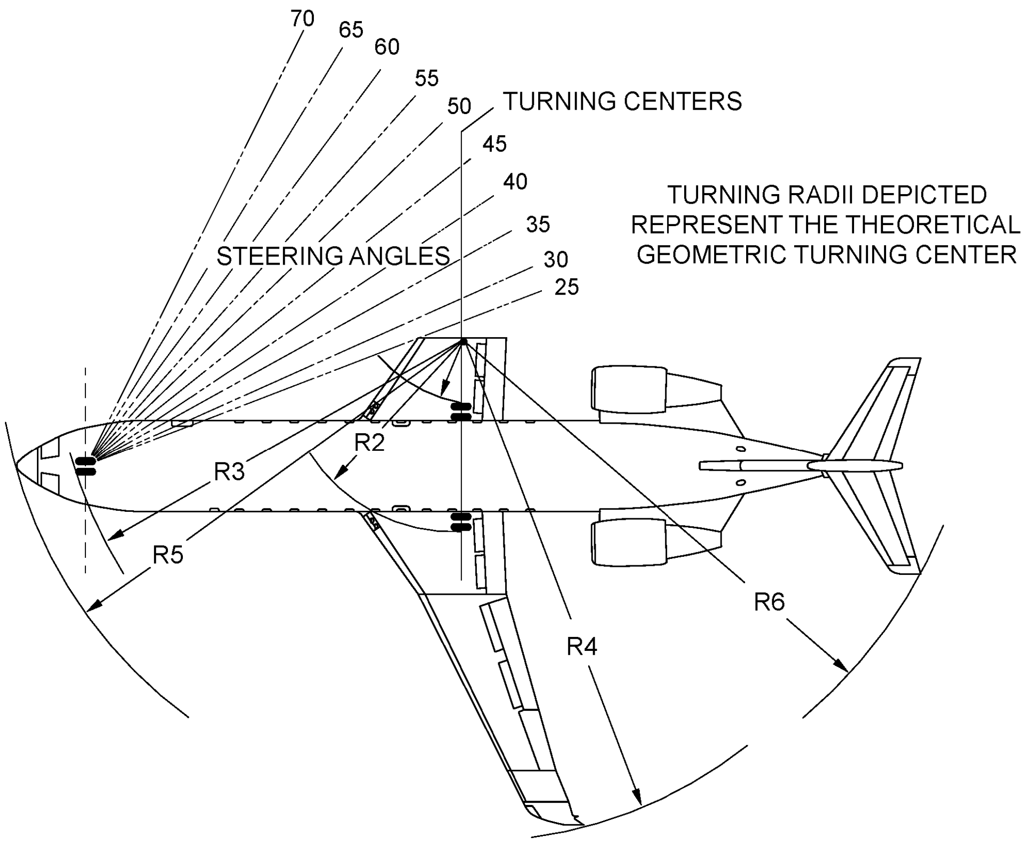
This section includes information on:

- Landing gear turning radii, including minimum turning radii
- Angles of visibility from the flight compartment
- Runway and taxiway turn paths
- Minimum holding bay (apron) widths.

B. Notes on Section Four Data

For ease of presentation, this data is derived from the theoretical limits imposed by the geometry of the aircraft and, where noted, provides for the normal allowance of tire slippage. As such, the data reflects the turning capability of the aircraft in favorable operating circumstances. This data should only be used as a guideline for the method of determining turning capabilities and maneuvering characteristics of the Regional Jet Model CL–600–2B19.

In the ground operating mode, varying airline practices may demand that more conservative turning procedures be adopted to avoid excessive tire wear and reduce possible maintenance problems. Airline operating technique performance levels will vary over a wide range of operating circumstances. Variations from standard aircraft operating patterns may be necessary to satisfy physical constraints within the maneuvering area, such as adverse grades, limited area or high risk of jet blast damage. For these reasons, ground maneuvering requirements should be coordinated with the using airlines prior to layout planning.



NOTE

Tire slippage is not considered in these calculations.
Actual operating data will be greater than the values shown.
Consult the operating airline for operating procedures.

Steering Angle	R1		R2		R3		R4		R5		R6	
	ft – in.	m	ft – in.	m	ft – in.	m	ft – in.	m	ft – in.	m	ft – in.	m
25°	73–10	22.51	86–5	26–35	88–5	26.95	115–7	35.23	91–8	27.93	100–2	30.54
30°	58–5	17.81	71–0	21.65	74–9	22.78	100–3	30.56	78–6	23.93	86–7	26.39
35°	47–1	14.35	59–8	18.19	65–2	19.86	89–0	27.12	69–5	21.16	77–0	23.46
40°	38–3	11.66	50–10	15.50	58–2	17.72	80–3	24.45	62–11	19.17	69–10	21.29
45°	31–1	9.48	43–8	13.32	52–10	16.11	73–2	22.29	58–0	17.69	64–5	19.63
50°	25–1	7.64	37–8	11.48	48–9	14.87	67–2	20.48	54–4	16.57	60–1	18.31
55°	19–11	6.06	32–6	9.90	45–8	13.91	62–1	18.92	51–7	15.71	56–8	17.26
60°	15–4	4.67	27–11	8.50	43–2	13.15	57–7	17.55	49–5	15.05	53–10	16.40
65°	11–2	3.41	23–9	7.24	41–3	12.57	53–6	16.31	47–9	14.54	51–5	15.68

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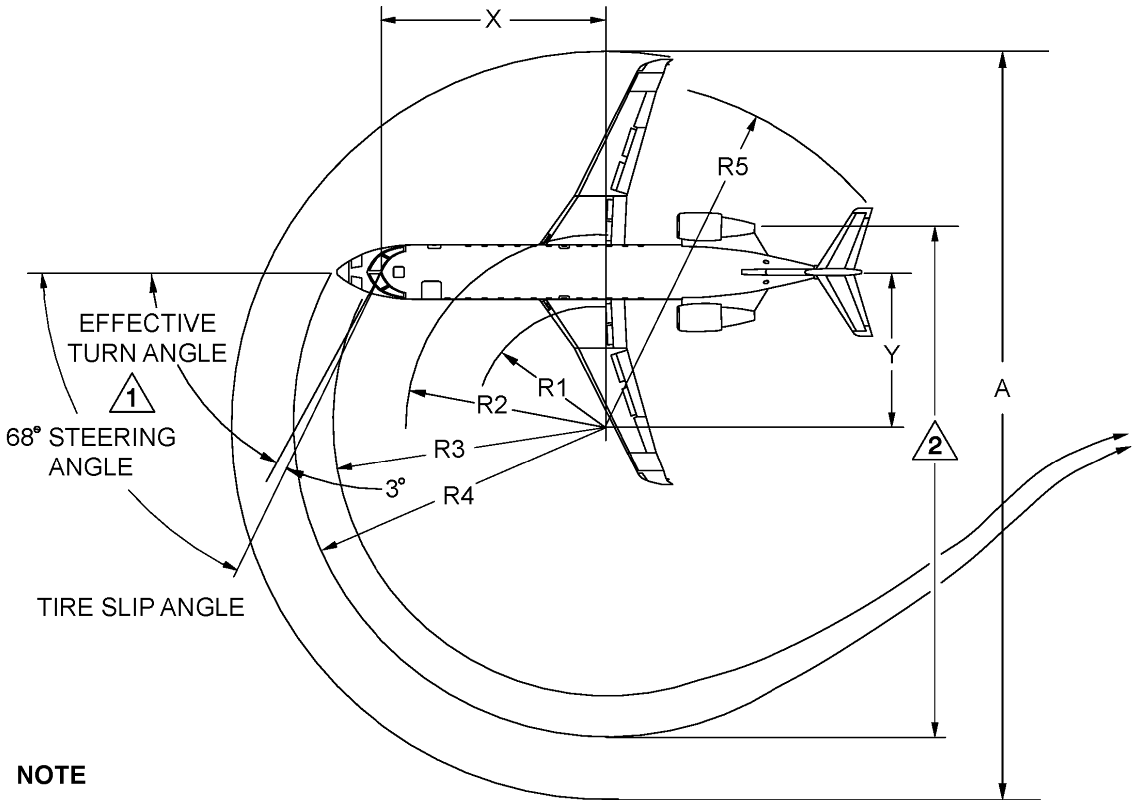
Turning Radii, No Slip Angle
Figure 1



NOTE

Actual operating data will be greater than values shown since tire slippage is not considered in these calculations. Consult the operating airline for operating procedures.

△1 A 3° tire slip is for a 68° turn angle only.

△2 75.0 feet (22.90 m) minimum for 180° turn. 10 feet (3.05 m) margin.

EFFECTIVE TURN ANGLE		X	Y	A	R1	R2	R3	R4	R5
65°	ft–in.	37–4	17–5	107–0	11–2	23–9	41–3	47–8	51–5
	m	11.39	5.31	32.61	3.41	7.24	12.57	14.54	15.68

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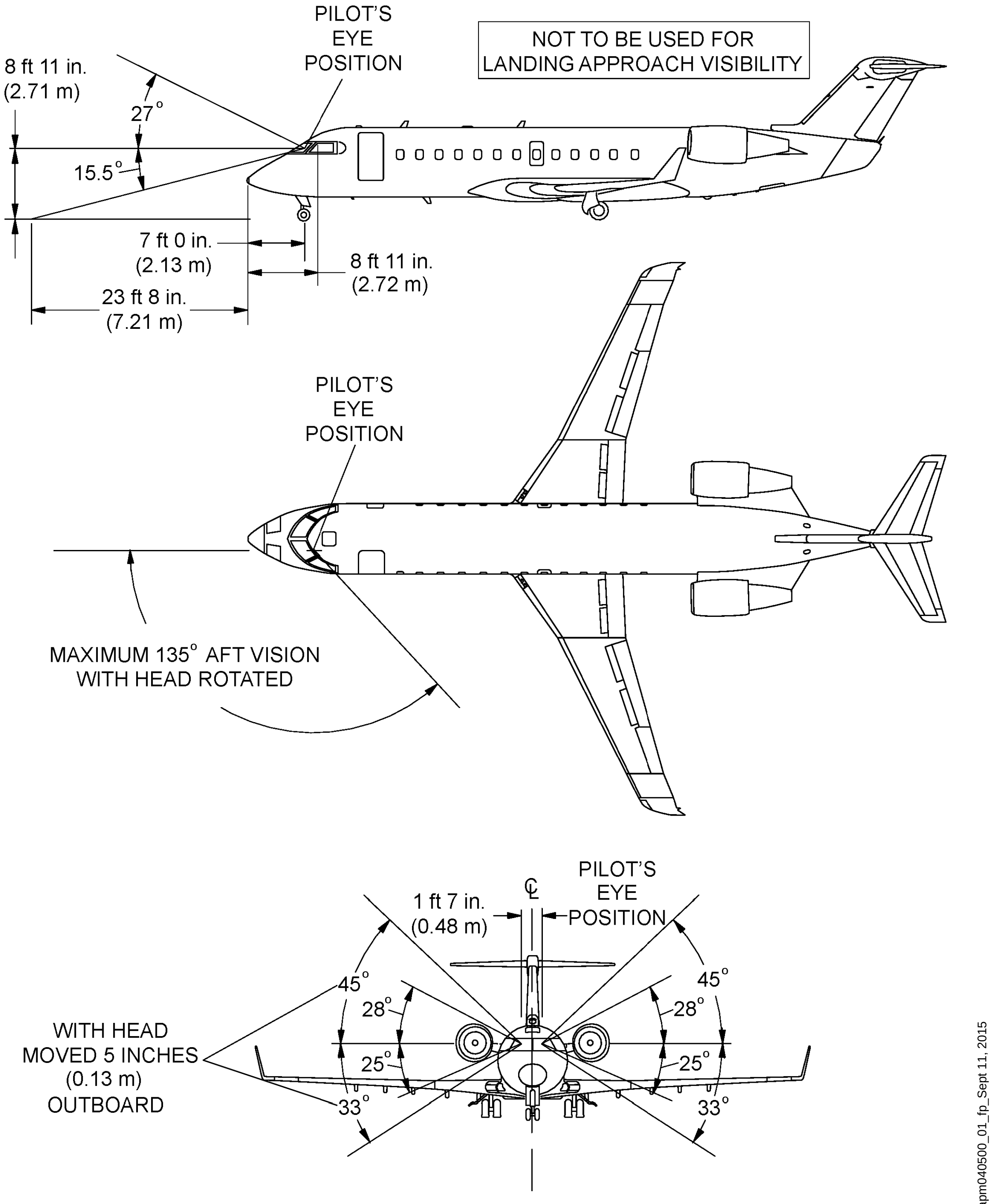
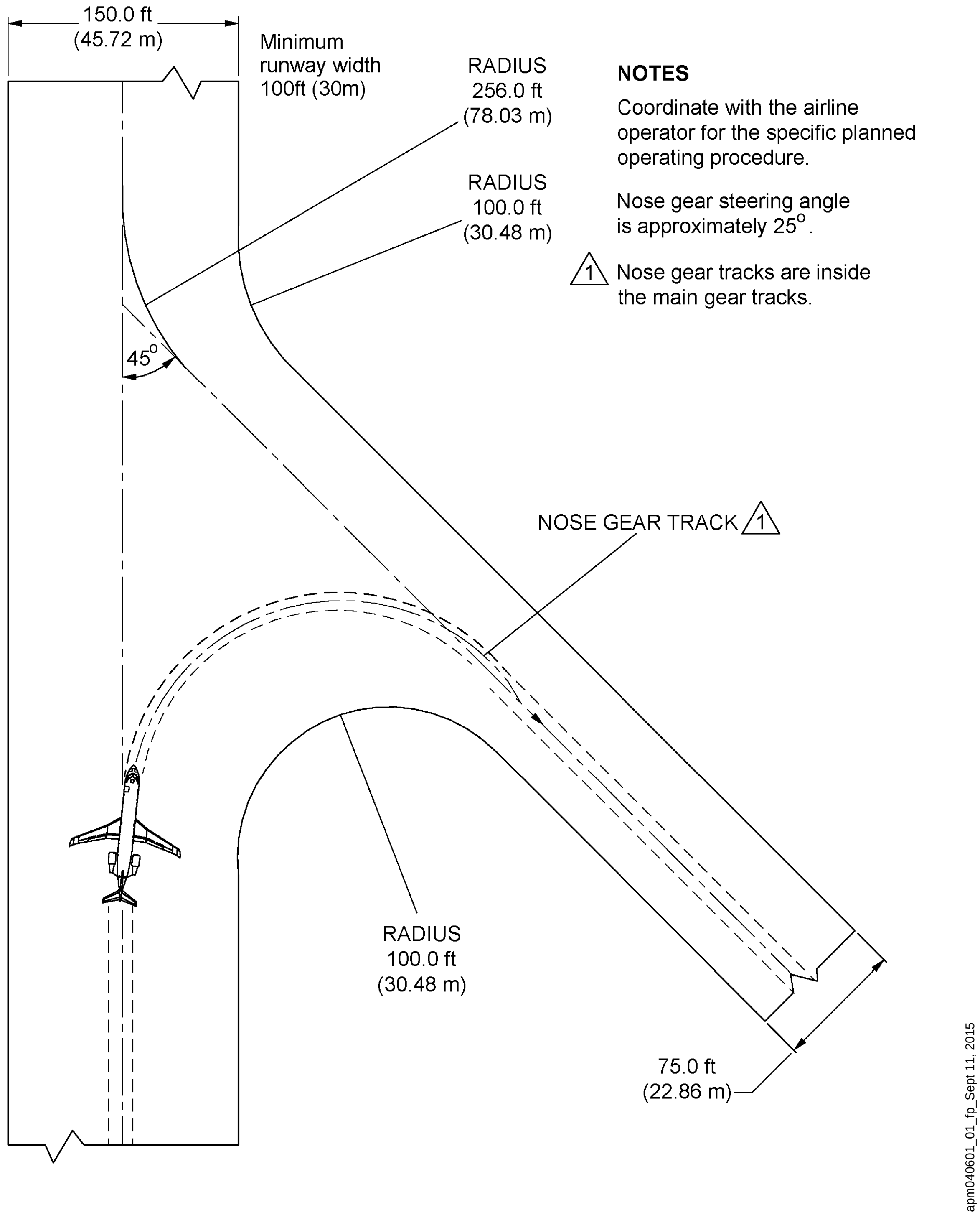
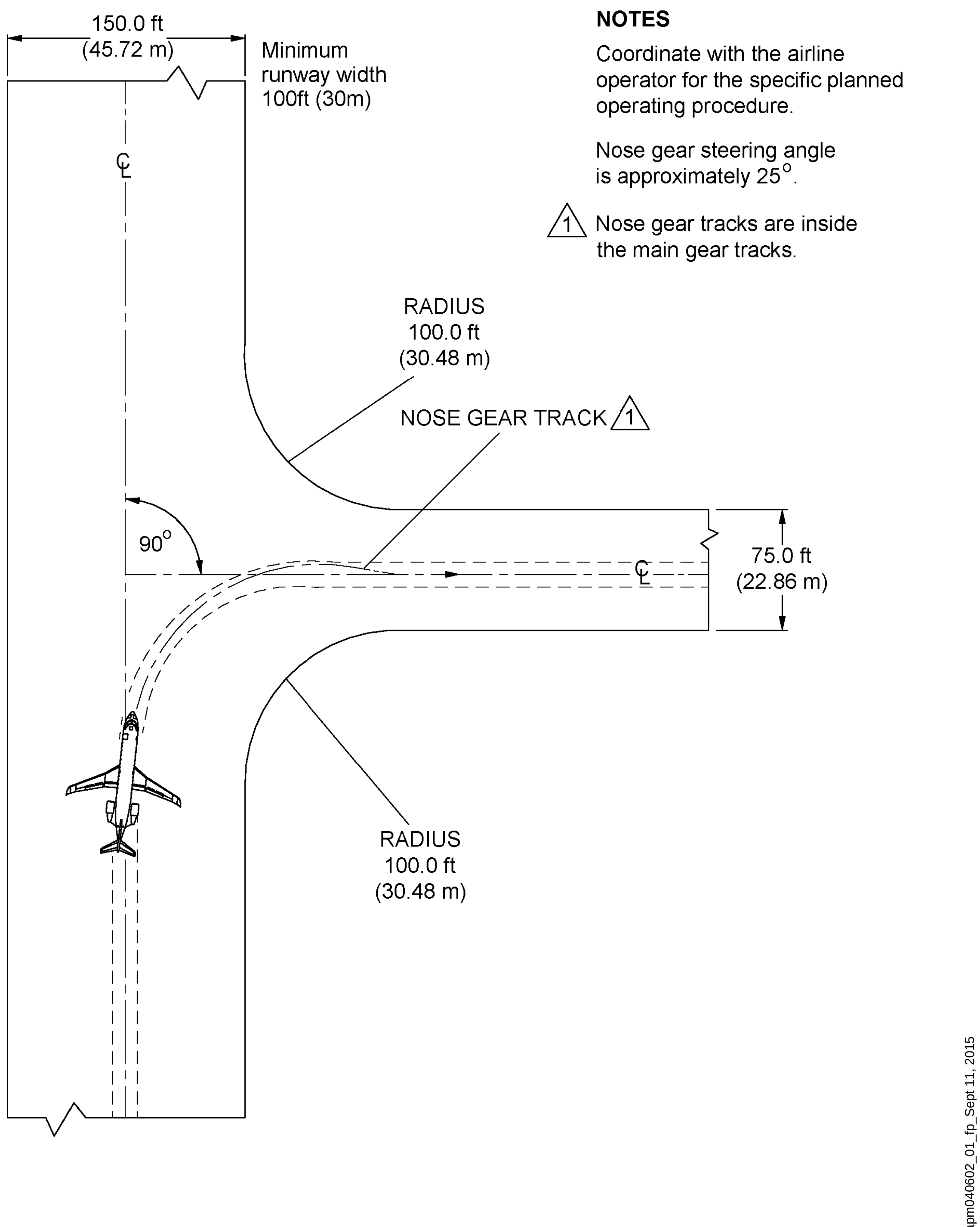
Minimum Turning Radii
Figure 2



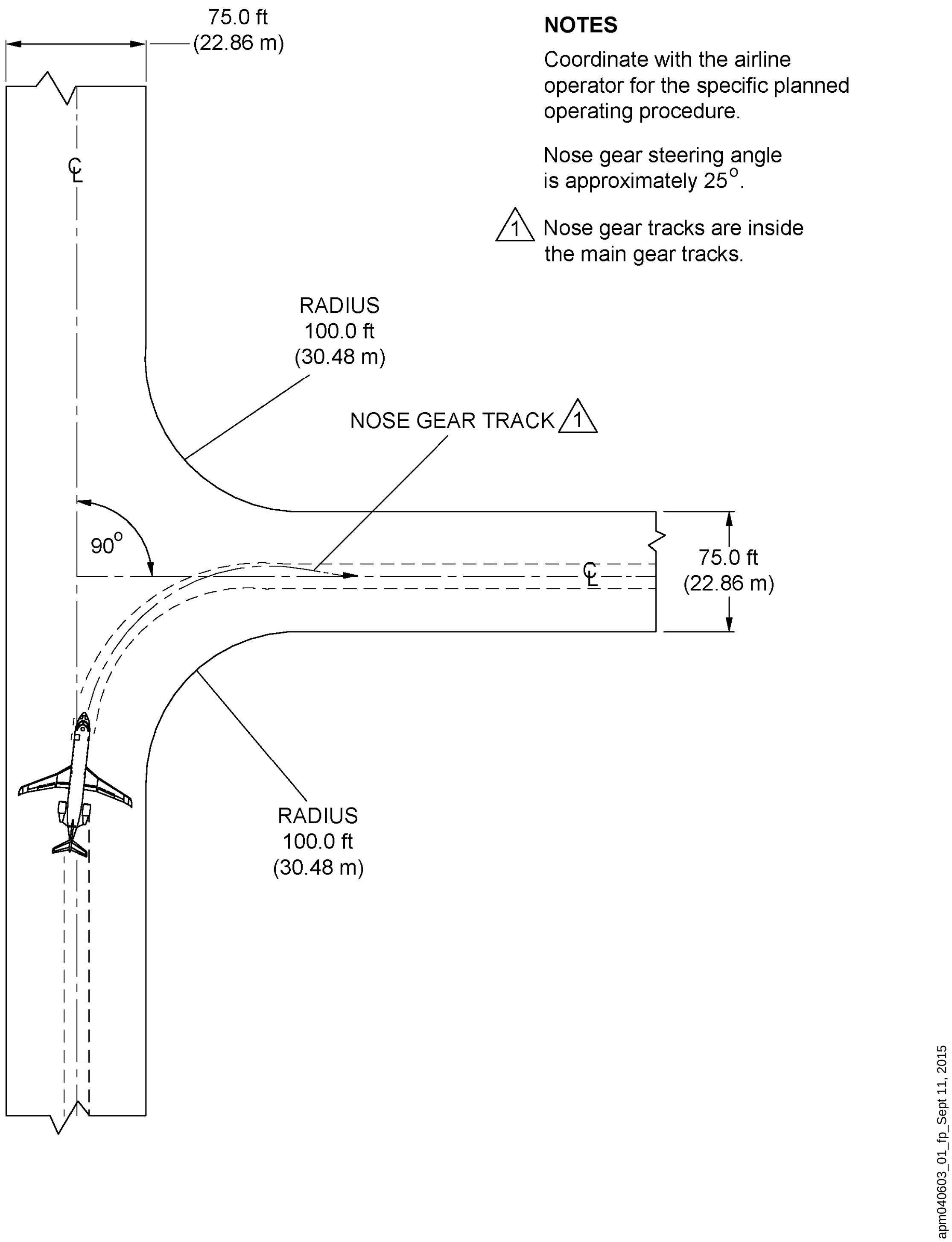
Visibility from Flight Compartment in Static Position
Figure 3



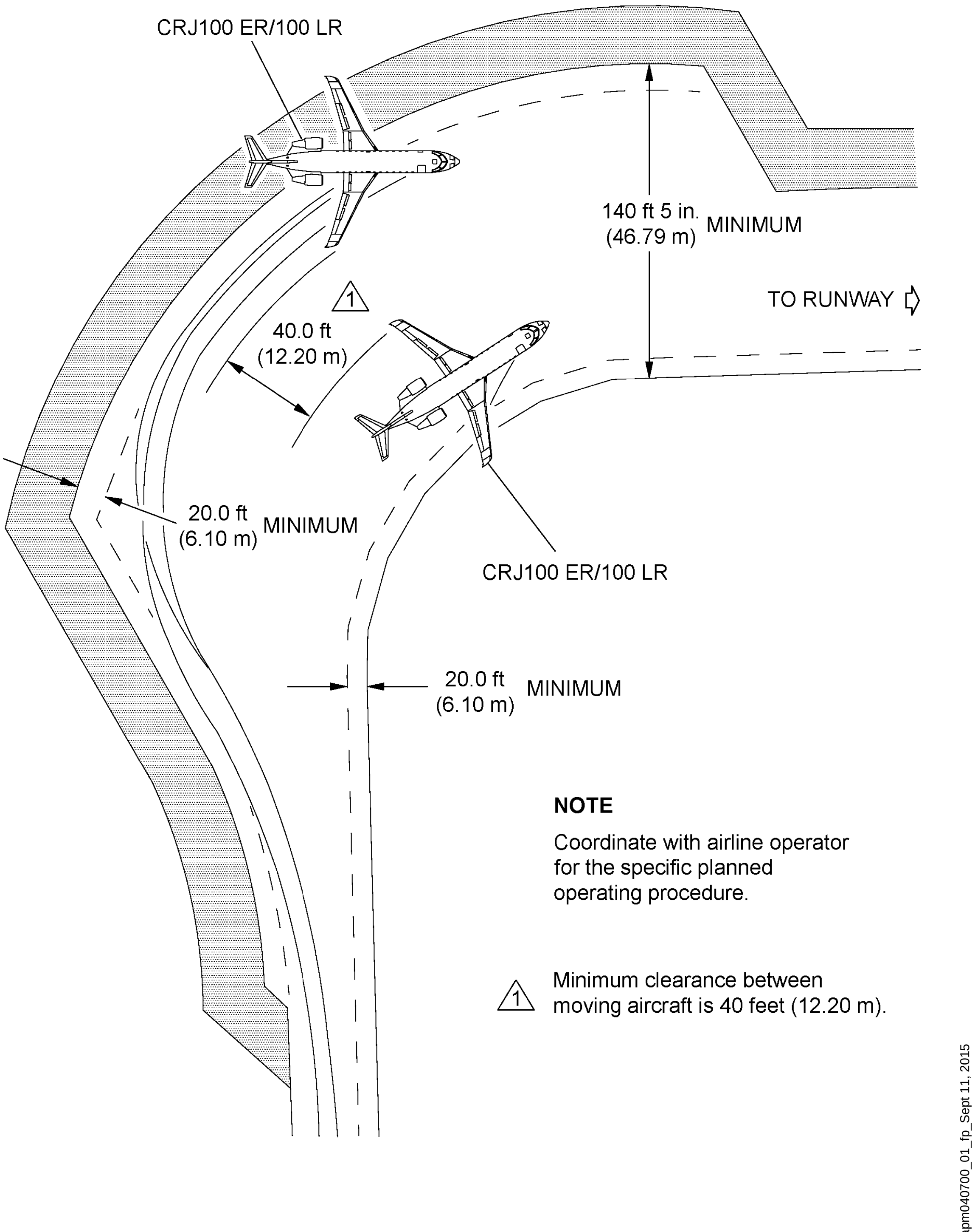
More Than 90 Degree Turn – Runway to Taxiway
Figure 4



90 Degree Turn – Runway to Taxiway
Figure 5



90 Degree Turn – Taxiway to Taxiway
Figure 6



Runway Holding Bay (Apron)
Figure 7

**ON A/C ALL

TERMINAL SERVICING

1. TERMINAL SERVICING

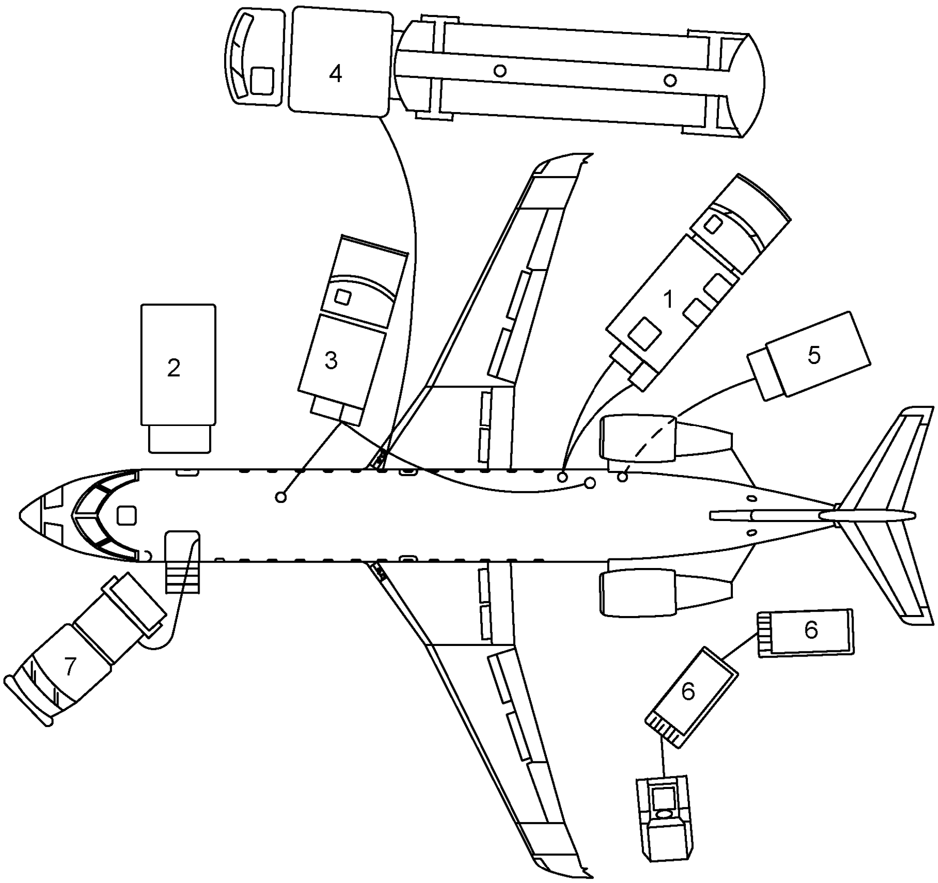
A. Section Contents

This section contains the data related to the preparation of an aircraft for flight from a terminal. This data is provided to show the general types of tasks involved in terminal operations. Each airline is special and can operate under have different operating conditions and practices, which can result in changes in the operating procedures and time intervals to do the tasks specified. Because of this, requirements for ground operations should be approved with the specified airline(s) before ramp planning is started. This section is divided into the subsections that follow:

- Aircraft Servicing Arrangement
- Terminal Operations
- Ground Service Connection Locations
- Ground Service Connection Data
- Pneumatic Requirements
- Ground Electrical Power Requirements
- Preconditioned Airflow Requirements – Air Conditioning
- Ground Towing Requirements.

B. Aircraft Servicing Arrangement

Refer to Figure 1 for the aircraft servicing arrangement



SERVICE VEHICLES

1. Toilet servicing
2. Galley catering
3. Potable water
4. Refueling
5. Air conditioning cart (optional)
6. Baggage and cargo
7. Cabin cleaning

TURN−AROUND TIMES

Terminal stop	20 minutes
En route stop	12 minutes

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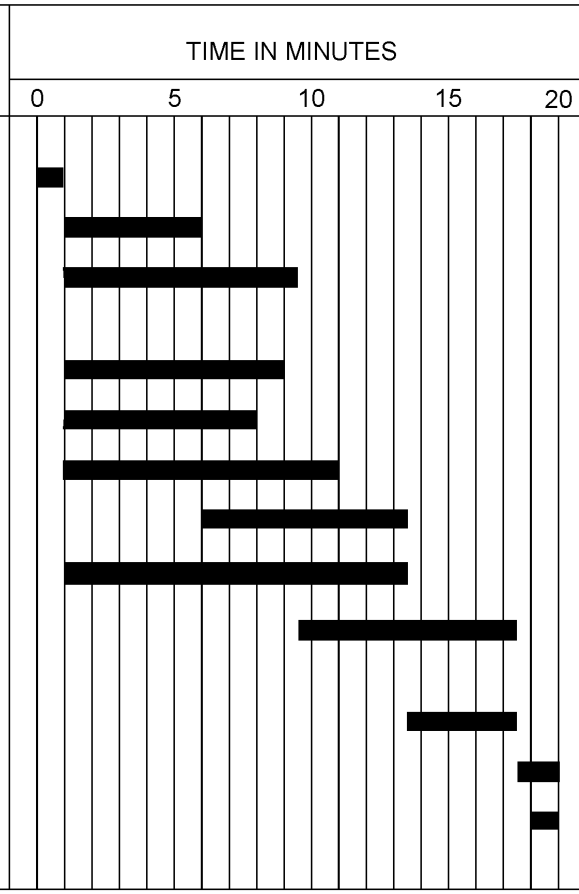
Airplane Servicing Arrangement
Figure 1

C. Terminal Operation

Refer to Figure 2 and Refer to Figure 3 for the turnaround station or en route station operations.

NOTE: Turnaround time on a maximum of 48 to 50 passengers that disembark and embark the aircraft with typical numbers of pieces of baggage unloaded and loaded.



TURNAROUND STATION OPERATIONS	TASK TIME
ENGINES RUNDOWN	1.0
DEPLANE PASSENGERS	5.0
UNLOAD BAGGAGE/CARGO	8.5
SERVICE WASTE TANK	8.0
SERVICE POTABLE WATER	7.0
SERVICE GALLEY	10.0
SERVICE AIRPLANE INTERIOR	7.5
FUEL AIRPLANE *	12.5
LOAD CARGO/BAGGAGE	9.0
ENPLANE PASSENGERS	5.0
MONITOR ENGINE START	1.5
CLEAR AIRPLANE FOR DEPARTURE	1.0
TOTAL TURNAROUND TIME (Includes equipment positioning and removal)	20 Minutes

* 85% FUEL UPLIFT, REFUELING PRESSURE 50 ± 5 PSI (344 kPa) AT 125 gpm (473 Lpm).

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Terminal Operations – Turnaround Station
Figure 2

ENROUTE STATION OPERATIONS	TASK TIME
ENGINES RUNDOWN	1.0
DEPLANE PASSENGERS *	4.0
UNLOAD BAGGAGE/CARGO *	4.5
SERVICE WASTE TANK	8.0
SERVICE POTABLE WATER	7.0
SERVICE GALLEY	8.0
SERVICE AIRPLANE INTERIOR	2.0
LOAD CARGO/BAGGAGE	5.0
ENPLANE PASSENGERS	4.0
MONITOR ENGINE START	1.5
CLEAR AIRPLANE FOR DEPARTURE	1.0
TOTAL TURNAROUND TIME (Includes equipment positioning and removal)	12.0 Minutes

* BASED ON 24 PASSENGERS THAT DISEMBARK AND EMBARK, 36 PIECES OF BAGGAGE UNLOADED AND LOADED.

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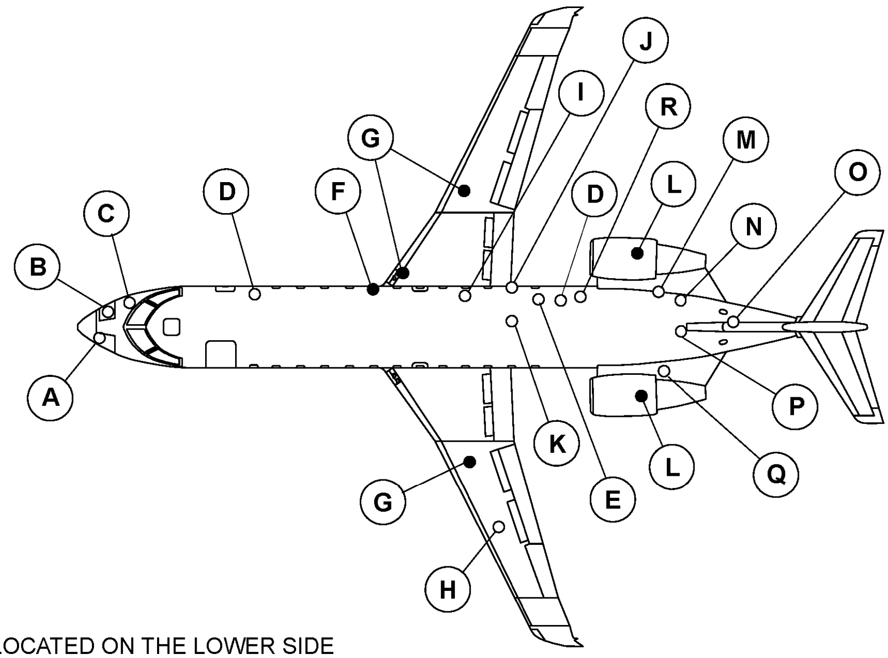
Terminal Operations – En Route Station
Figure 3

D. Ground Service Connection Locations

Refer to Figure 4 for the ground connection points. For servicing procedures, refer to the Aircraft Maintenance Manual (CSP–A–001).



○ LOCATED ON THE LOWER SIDE

● LOCATED ON THE UPPER SIDE

LOCATOR	DESCRIPTION	LOCATOR	DESCRIPTION
A	BRAKE ACCUMULATOR CHARGE POINTS	J	HYDRAULIC SYSTEM No. 3
		K	HYDRAULIC SYSTEM No. 3 RESERVOIR FILLER CONNECTION
B	AC EXTERNAL POWER AND INTERPHONE	L	OIL STORAGE TANK
C	OXYGEN SYSTEM CHARGING VALVE AND GAUGE	M	DC EXTERNAL POWER
		N	HYDRAULIC SYSTEM No. 2
D	POTABLE WATER SERVICING	O	ENGINE OIL LEVEL CONTROL PANEL AND REPLENISHING TANK
E	TOILET SERVICING		
F	PRESSURE REFUEL/DEFUEL PANEL AND ADAPTER	P	HYDRAULIC SYSTEM No. 1 AND REAR INTERPHONE
G	OVERWING GRAVITY FUEL FILLER	Q	GROUND AIR START
H	FUEL TANK WATER DRAIN (TOTAL OF 11)	R	AIR CONDITIONING (OPTIONAL)
I	HYDRAULIC SYSTEM No. 3 ACCUMULATOR CHARGING POINT AND PRESSURE GAUGE		

Ground Service Connection Locations
Figure 4

2. GROUND SERVICE CONNECTION DATA

Aircraft Connection			Mating Ground Connector		ITEM Ref.[1]
System	**Description**	**Part #**	**Supplier**	**Part #**	**ATA**
AC External Power	AC External Connector	MS90362–4	MIL SPEC	MS25486–17	24–00–00
DC EXTERNAL POWER	DC EXTERNAL RECEPTACLE	MS3506–1	MIL SPEC	MS25488	24–00–00
Oxygen	Oxygen Fill Valve	170080	PURITAN BENNETT CORP AERO SYSTEMS	173784 173785 173773 OR 173778	12–00–00
Potable Water	FILL Adapter	0071–0037–3	KAISER ELECTROPRECISION	0031–0119	12–14–00
Lavatory Waste	NIPPLE ASSEMBLY	10101B577–1	KAISER ELECTROPRECISION	M2651–133–3	12–15–00
Refuel/ Defuel	FUEL/ DEFUEL ADAPTER ASSEMBLY	2770082–101	MIL SPEC	MIL–N–5877D (SAE–AS5877) AND MS24484–2	(Standard Commercial Part)
HEATING/ AIR CONDITIONING	CONNECTOR	601R96170–9	LIEBHERR–AEROSPACE TOULOUSE SAS	MIL SPEC	12–00–00
ENGINE STARTING	(USE SAME CONNECTIONS AS HEATING/AIR CONDITIONING)				12–30–00
HYDRAULIC POWER	QUICK DISCONNECT ASSEMBLY	AE99147E AE99118G AE99147J	AEROQUIP CORP AEROSPACE DIVISION	AE99148E AE99119G AE99148J	12–13–00

Aircraft Connection			Mating Ground Connector		ITEM Ref.[1]
System	Description	Part #	Supplier	Part #	ATA
GROUNDING	GROUNDIND STUD RECEPTACLE	MS90298–2	MIL SPEC	MS3493–4	(Standard Commercial Part)
[1]ITEM refers to the Illustrated Tool and Equipment Manual (CSP–A–007), available from Bombardier. It contains data on ground support equipment that is approved for this aircraft.					

Ground Service Connection Location

	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTERLINE				HEIGHT ABOVE GROUND	
			RIGHT SIDE		LEFT SIDE		NOMINAL	
	ft — in	m	ft — in	m	ft — in	m	ft — in	m
HYDRAULIC SYSTEMS [1]								
System No.1	67 – 0	20.42	–	–	1 – 4	0.41	4 – 8	1.42
System No.2	67 – 0	20.42	1 – 4	0.41	–	–	4 –8	1.42
System No.3	56 – 2	17.12	3 – 7	1.09	–	–	4 –1	1.25
ELECTRICAL SYSTEMS								
AC	4 – 5	1.35	1 – 3	0.38	–	–	3 – 8	1.12
DC	62 – 11	19.17	3 – 6	1.07	–	–	5 – 4	1.63
FUEL SYSTEM [2]								
Pressure Fuel/Defuel Adapter	34 – 6	10.52	3 – 10	1.17	–	–	3 – 10	1.17
Fuel/Defuel Control Filler	29 – 5	8.97	3 – 7	1.09	–	–	4 – 9	1.45
Right Side Gravity Filler	42 – 7	12.98	15 – 8	4.78	–	–	4 – 5	1.35

	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTERLINE				HEIGHT ABOVE GROUND	
			RIGHT SIDE		LEFT SIDE		NOMINAL	
	ft — in	m	ft — in	m	ft — in	m	ft — in	m
Left Side Gravity Filler	42 – 7	12.98	–	–	15 – 8	4.78	4 – 5	1.35
Center Tank Gravity Filler	35 – 10	11.18	4 – 10	1.47	–	–	4 – 8	1.42
PNEUMATIC SYSTEM								
High Pressure Connection	57 – 0	17.37	–	–	1 – 10	0.56	4 – 3	1.29
Preconditioned Air Service Connection	56 – 6	17.22	1 – 10	0.56	–	–	3 – 5	1.04
POTABLE WATER SYSTEM [3]								
Forward Service Connection	17 – 10	5.44	3 – 2	0.97	–	–	4 – 4	1.32
AFT Service Connection	56.5	17.20	3 – 7	1.09	–	–	4 – 9	1.45
LAVATORY SYSTEM [4]								
Toilet Service Connection	53 – 7	16.33	2 – 7	0.79	–	–	3 – 8	1.12

	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTERLINE				HEIGHT ABOVE GROUND	
			RIGHT SIDE		LEFT SIDE		NOMINAL	
	ft — in	m	ft — in	m	ft — in	m	ft — in	m

[1] Service panels containing pressure and test stand connections and reservoir fill connections.

[2] Pressure service point in right wing leading edge at 50±5 psi (±344kPa) at 125 gpm (473 Lpm).±

[3] Total tank capacity

- Forward tank U.S. gallons (18.93 liters) – Optional 8 U.S. gallons (30.08 liters)
- Aft tank 5 U.S. gallons (18.93 liters)

[4] Maximum holding capacity 18.50 U.S. gallons (70.0 liters)

Fluid quantity per flush 1.85 U.S. gallons (7.0 liters)

Chemical per charge 2.30 U.S. gallons (8.7 liters).

A. Pneumatic Requirements

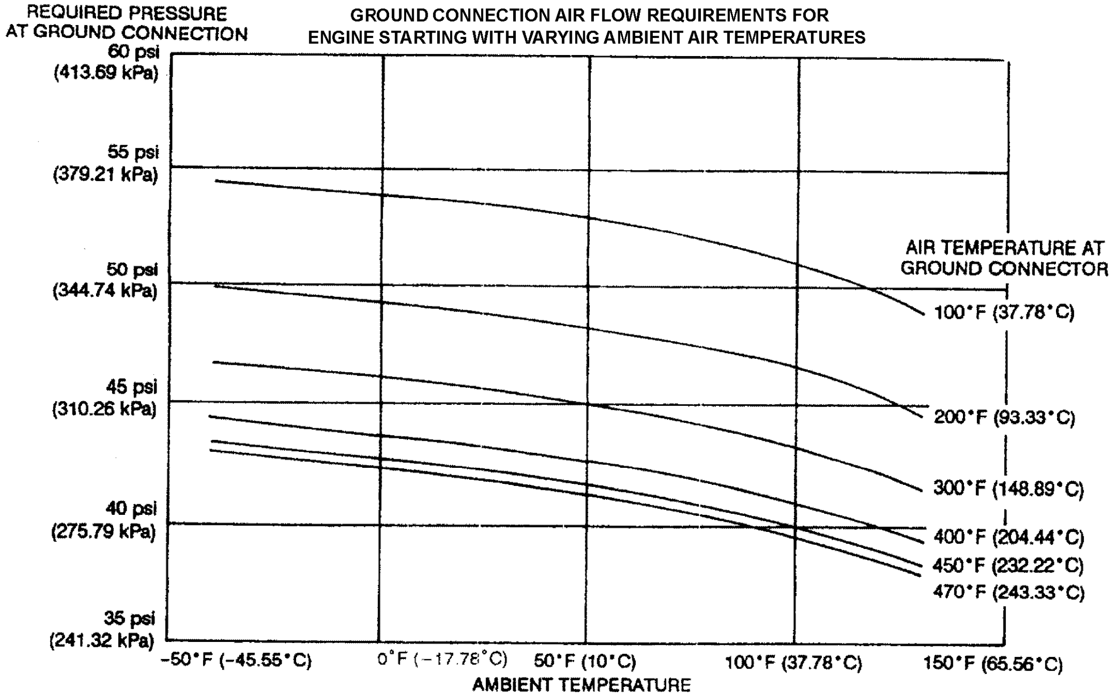
Refer to Figure 5 for the ground air supply requirements for engine starting. Refer to AMM 71–00–00–868–806 – Engine Start (with external air) for more details.

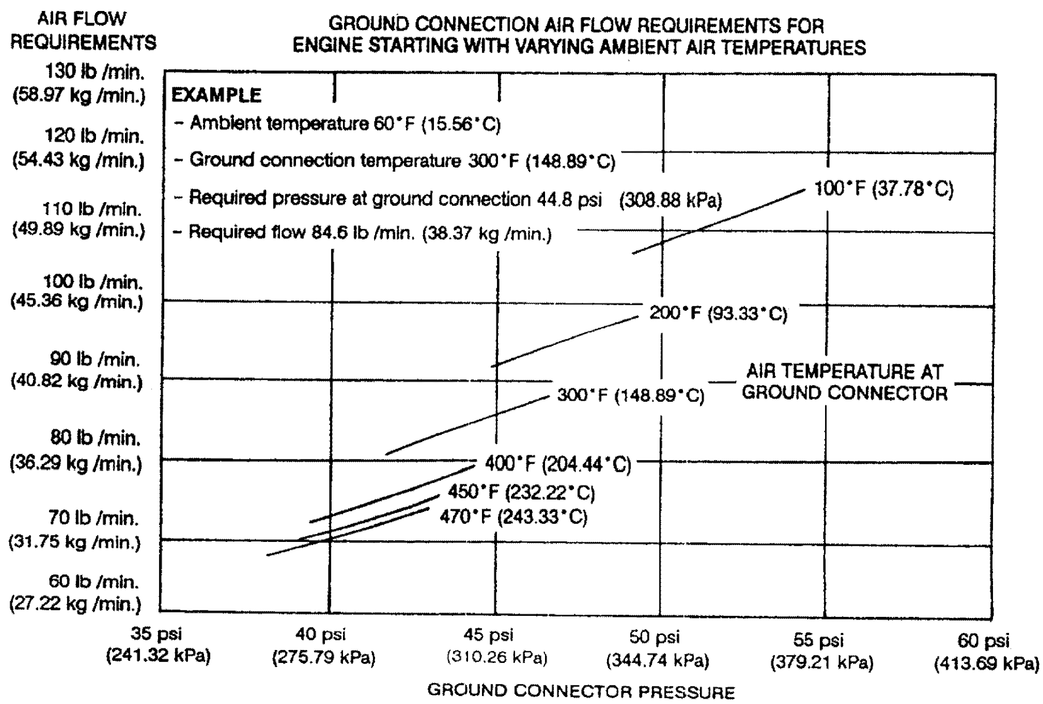
Ground Pneumatic Power Requirements – Engine Starting

Ground Air Supply – Requirements for cooling and Heating

NOTE: **Reference to Figure 7 for applicable limitations to the aircraft LP Ground Cart Connection.**

Requirements	Pressure	Airflow	Temperature
To Provide Starter Air Pressure Condition: 1. Time allowed during start (to starter cutout) is 60 seconds. 2. Time–to–IDLE on ground 45 seconds minimum. 3. No bleed air extraction is permitted during start sequence.	45 psi (310.26 kPa) maximum		





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Engine Starting Pneumatic Requirements
Figure 5

B. Ground Electrical Power Requirements

The external power system is used to connect AC electrical power from a ground power connection. External AC can be used to power the complete AC distribution system or only those buses that provide power to the passenger compartment. The tables show the external AC power requirements data, and the external power quality limitations.

Refer to table 1 for the External AC Power Requirements.

Refer to table 2 for the External Power Quantity Limitations.

Refer to table 3 for the External DC Power Requirements.

Table 1 – External AC Power Requirements

VOLTAGE	FREQUENCY	PHASE	KVA
115/200Vac	400Hz	3–PHASE	30KVA minimum
NOTE: 3–Phase power input is required to the external AC power receptacle.			

Table 2 – External Power Quantity Limitations

PARAMETER	SETTING LIMIT	RESPONSE TIME
Overvoltage (High)	150V±2%	<0.25 Sec
Overvoltage (Normal)	124V±2%	0.75±0.25 Sec
Undervoltage	106V±2%	6.00±0.75 Sec
Overfrequency	430 Hz±2%	<0.25 Sec
Underfrequency	370 Hz±2%	<0.25 Sec
Phase Sequence	A–B–C	<0.25 Sec

Table 3 – External DC Power Requirements

VOLTAGE	Amperage
28Vdc	150A (continuous 1500A peak)

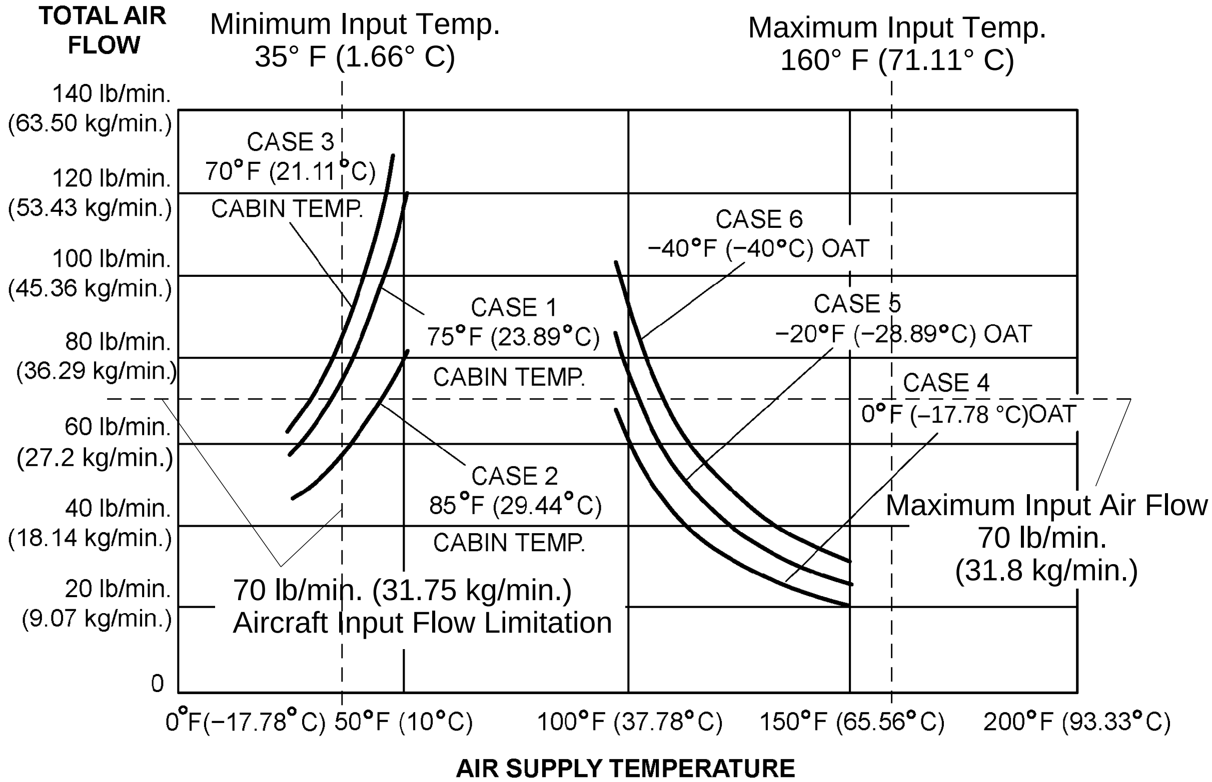
C. Preconditioned Airflow Requirements – Air Conditioning

The air supply requirements for air conditioning and airflow requirements are shown in the Ground Air Supply – Requirements for Cooling and Heating table 1.

.

Table 1 – Ground Air Supply – Requirements for Cooling and Heating

Air Conditioning Ground Cart Outlet Setting			
REQUIREMENT	**PRESSURE**	**AIRFLOW**	**TEMPERATURE**
TO COOL CABIN TO 80°F (26.67°C)	**1.5 psig Maximum** **(10.3 kPa) Maximum**	**60 lb/min** **(27.2 kg/min)**	**35°F to 50°F** **(1.7°C to 10°C)**
Conditions: • Initial cabin temp. is 103°F (39.44°C) • Outside air temp. is 103°F (39.44°C) • Galley is off • Full Solar load • Total of 54 crew and passengers			
TO HEAT CABIN TO 75°F (23.89°C)	**1.5 PSIG Maximum** **(10.3 kPa Maximum)**	**70 lb/min** **(31.75 kg/min)**	**95°F to 150°F** **(35°C to 65.6°C)**
Conditions: • Initial cabin temp. is 0°F (–17.78°C) • Outside air temp. is 0°F (–17.78°C) • Cloudy day • No other heat load • No crew and passengers			



NOTE

CASE 1, 2 & 3

−54 crew and passengers.
−Full solar load.
−Ground connection at
1.3 psig (9 kPa) at Aircraft Inlet.
− OAT is 103° F (39.44° C)

CASE 4, 5 & 6

−No passenger or crew.
−No other heat loads.
−Ground connection at
1.3 psig (9 kPa) at Aircraft Inlet.
− Cabin temperature to be at 75° F (23.89° C).

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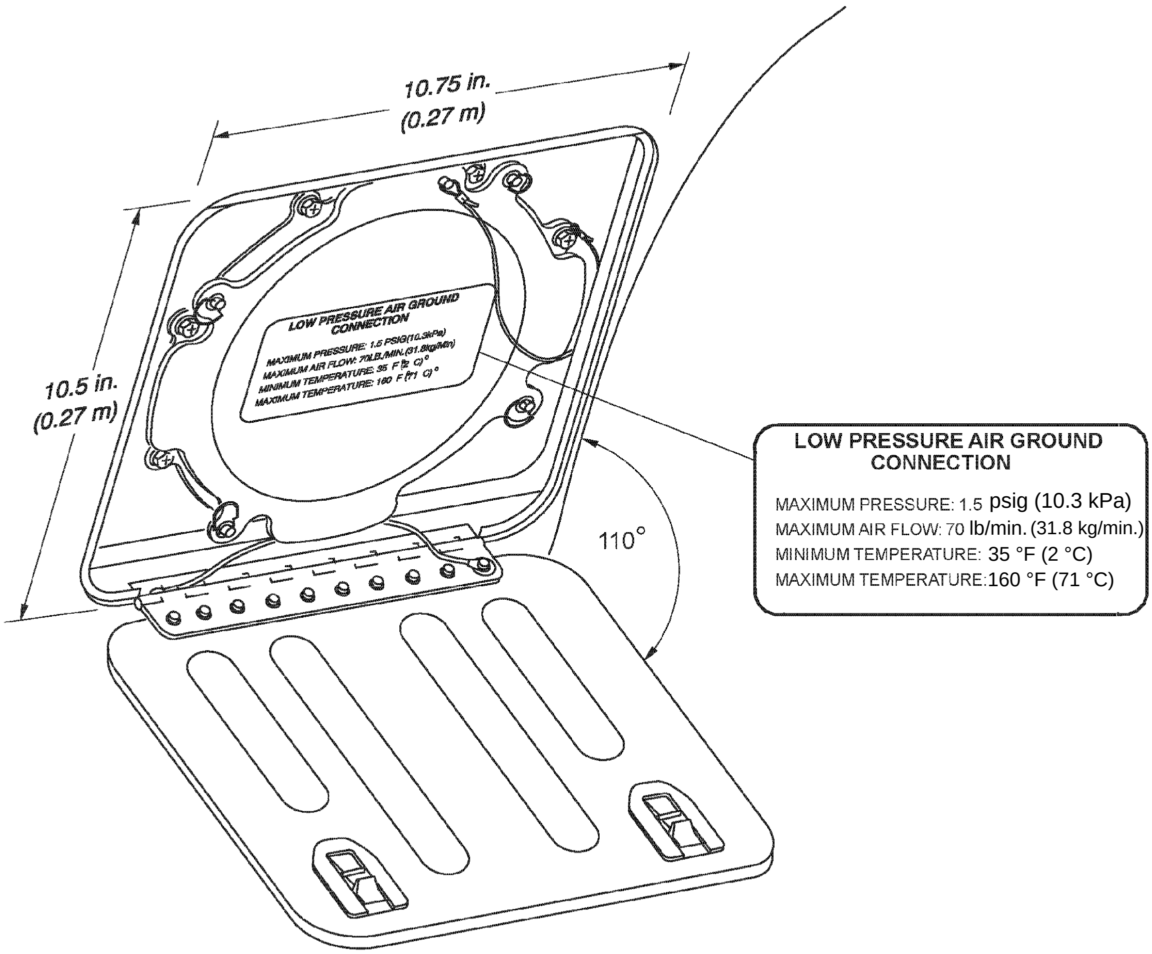
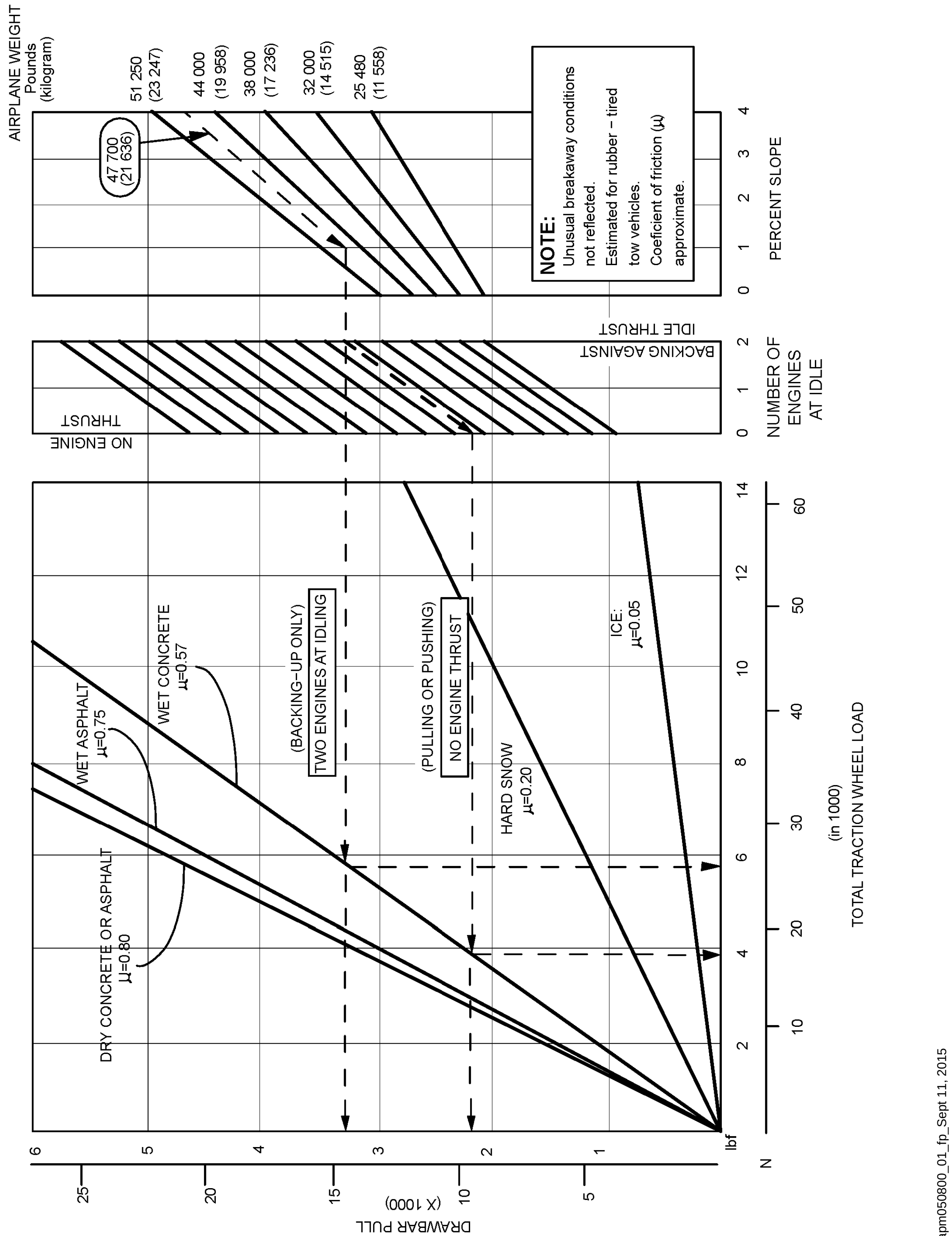
Preconditioned Airflow Requirements
Figure 6



Aircraft Limitations for PreConditioned Air Connection
Figure 7

D. Ground Towing Requirements

Refer to Figure 8 for the ground towing requirements.



Ground Towing Requirements
Figure 8

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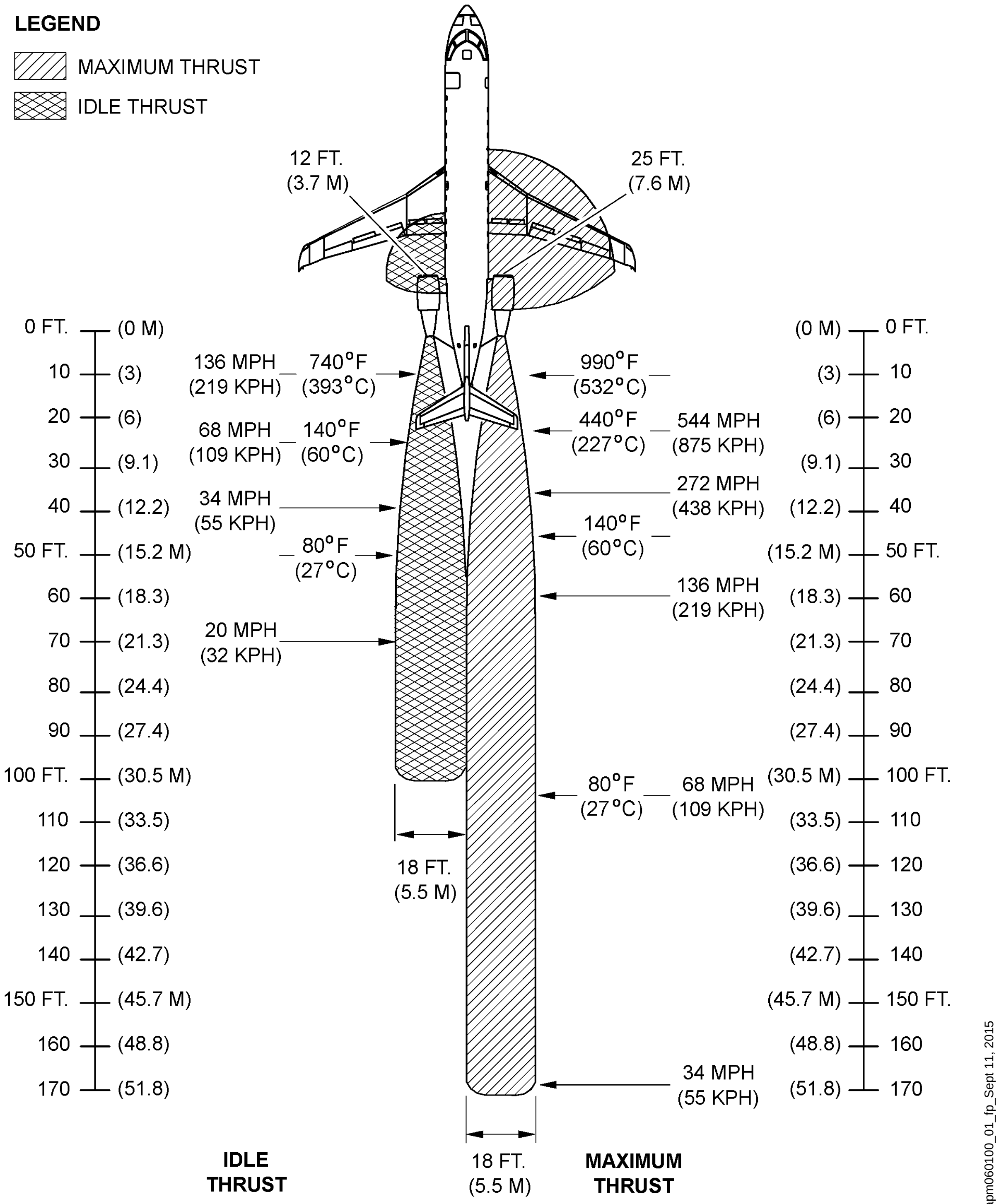
OPERATING CONDITIONS

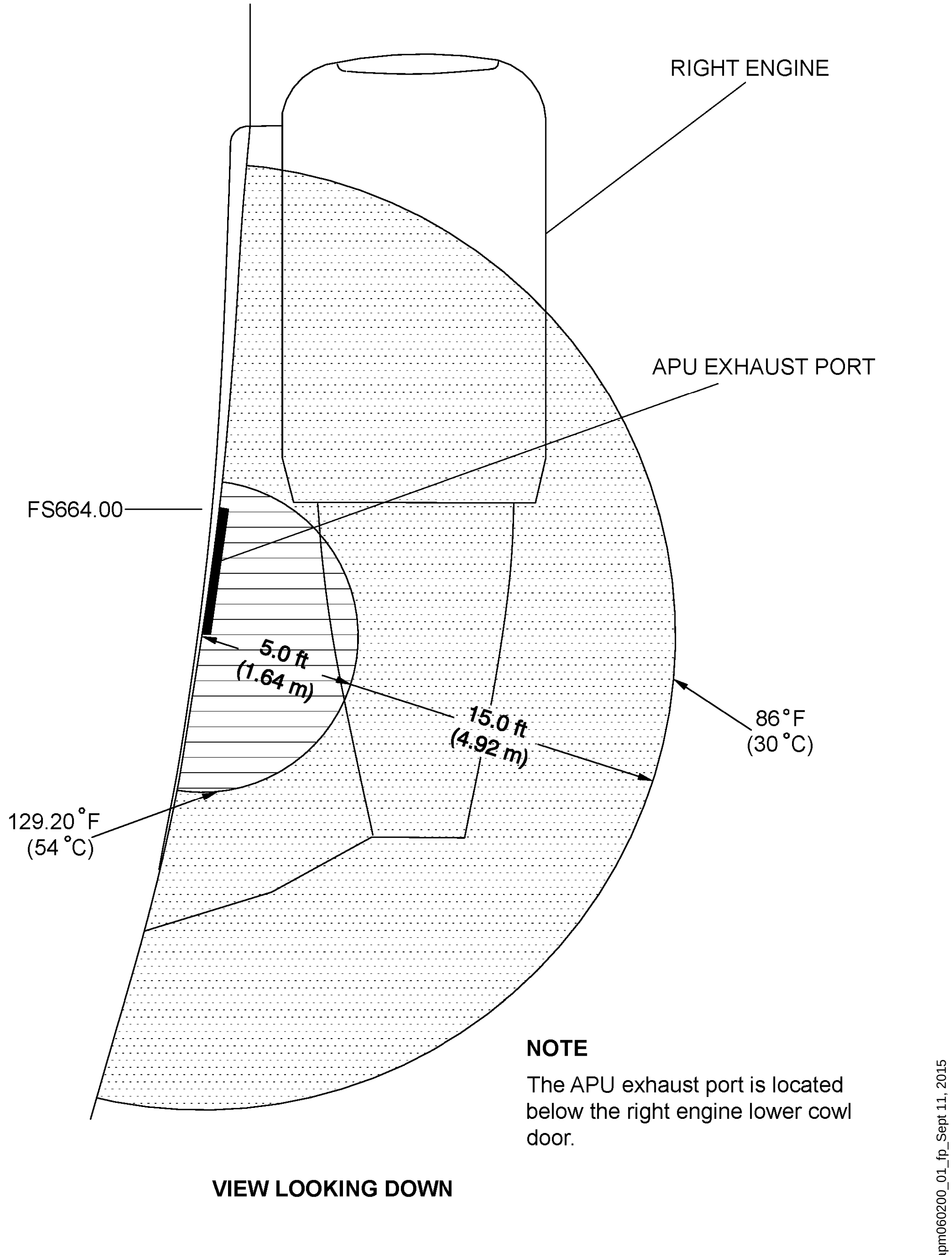
1. OPERATING CONDITIONS

This section contains data on the engine intake and exhaust dangerous areas.

Refer to Figure 1 for the zones and distances that should be considered dangerous during engine operation.



Jet Engine Danger Areas (GE CF34–3A1/3B1 Engines)
Figure 1



Auxiliary Power Unit (APU) Exhaust Danger Areas
Figure 2

A. Community Noise Levels

The community noise levels shall comply with the requirements of FAR 36 Stage 3, ICAO Annex 16, Chapter 3; and CAM Chapter 516.

Certificated noise levels, divided by Maximum Design Take-Off Weight (MTOW) and engine type, are listed in the tables below. Tables include effective perceived noise levels (EPNdB), noise limits and margins of compliance.

Compliance was tested under the following conditions:

TAKE–OFF and SIDELINE NOISE		APPROACH NOISE	
Climb speed	V_2+10 KIAS	Glideslope	3 degrees
Flaps	20 degrees	Landing Gear	Down
APU	OFF	Approach speed	V_{REF}+10 KIAS
A/C Packs	OFF	Flaps	45 degrees
Wing Cowl Anti ice	OFF	APU	OFF
Thrust	Normal	A/C Packs	OFF
		Wing Cowl Anti-Ice	OFF

No thrust cut-back was required and no special noise abatement procedures were used during testing.

All noise level values are stated for reference conditions of standard atmospheric pressure at sea level, 25°C (77°F) ambient temperature, 70% relative humidity, and zero wind.

Community Noise Levels

CRJ100/200						
47450 lb / 21523 kg MTOW – 44700 lb / 20276 kg MLW						
	with GE CF34–3A1 Engines			**with GE CF34–3B1 Engines**		
Phase of Flight –>	**Takeoff/ Flyover**	**Sideline/ Lateral**	**Approach**	**Takeoff/ Flyover**	**Sideline/ Latera**	**Approach**
Actual Noise Level in EPNdB	76.3	82.4	92.4	75.5	82.6	92.3
Maximum Allowable Requirement (dB)	89.0	94.0	98.0	89.0	94.0	98.0
Margin (dB)	–12.7	–11.6	–5.6	–13.5	–11.4	–5.7
CRJ100 ER/200 ER						
51000 lb / 23133 kg MTOW – 47000 lb / 21319 kg MLW						
	with GE CF34–3A1 Engines			**with GE CF34–3B1 Engines**		
Phase of Flight –>	**Takeoff/ Flyover**	**Sideline/ Lateral**	**Approach**	**Takeoff/ Flyover**	**Sideline/ Latera**	**Approach**
Actual Noise Level in EPNdB	78.6	82.2	92.1	77.6	82.4	92.1
Maximum Allowable Requirement (dB)	89.0	94.0	98.0	89.0	94.0	98.0
Margin (dB)	–10.4	–11.6	–5.9	–11.4	–11.6	–5.9

CRJ100 LR/200 LR						
53000 lb / 23995 kg MTOW – 47000 lb / 21319 kg MLW						
	with GE CF34–3A1 Engines			with GE CF34–3B1 Engines		
Phase of Flight –>	**Takeoff/ Flyover**	**Sideline/ Lateral**	**Approach**	**Takeoff/ Flyover**	**Sideline/ Latera**	**Approach**
Actual Noise Level in EPNdB	79.8	82.2	92.1	78.7	82.4	92.1
Maximum Allowable Requirement (dB)	89.0	94.0	98.0	89.0	94.0	98.0
Margin (dB)	–9.2	–11.8	–5.9	–10.3	–11.6	–5.9

1. PAVEMENT DATA

A. Section Contents/Chart Explanations

This section provides information on a variety of pavement–related data including; aircraft footprints, pavement loading during standard operations, and airplane/pavement rating systems.

Figure 1 presents basic data on the landing gear footprint configuration, maximum design taxi loads and tire sizes and pressures.

Maximum pavement loads for certain critical conditions at the tire-ground interfaces are shown in Figure 2.

In the charts presented in Figure 3 to paragraph 3. each airplane configuration is depicted with a variety of standard operating loads imposed on the main landing gear to aid in the interpolation between the discrete values shown. All curves for any single chart represents data at a constant tire pressure which will produce a tire deflection of 32 percent at the maximum design taxi weight shown.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The chart in Figure 3 is provided in order to determine these loads throughout the stability limits of the airplane at rest on the pavement. These main landing gear loads are used to enter the pavement design charts which follow, interpolating load values where necessary.

Rigid pavement design curves presented in Figure 5 have been prepared with the use of the Westergaard Equation in general accordance with the procedures outlined in the 1955 edition of "Design of Concrete Airport Pavement" published by the Portland Cement Association, 5420 Old Orchard Rd. Skokie, IL 60077, but modified to the new format described in the 1968 Portland Cement Association (PCA) publication, Operation Instructions "Computer Program for Concrete Airport Pavement Design" (Program PDILB) By Robert G. Packard.

The following procedure is used to develop rigid pavement design curves shown in Figure 5.

- Having established the scale for pavement thickness to the left and the scale for the allowable working stress to the right, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown.
- All values of the subgrade modulus (k-values) are then plotted.
- Additional load lines for the incremental values of weight on the main landing gear are then established on the basis of the curve for k=300 lbf/in^3 (80 MN/m^3), already established.

All Load Classification Number (LCN) curves where shown have been plotted from data in the International Civil Aviation Organization (ICAO) Document 7290–AN/865/2, Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics", 2nd Edition, 1965.

On the same charts showing LCN versus equivalent single wheel load (ESWL), there are load plots for the CL–600–2B19. The charts show the ESWL versus the pavement thickness for flexible pavements and versus the radius of relative stiffness for rigid pavements.

Procedures and curves provided in the ICAO Aerodrome Manual – Part 2, Chapter 4 are used to determine ESWL for use in making LCN conversion of rigid pavement requirements.

NOTE: Pavement requirements are presented for loads, tires and tire pressures presently certified for commercial usage. All curves represent data at a constant specified tire pressure.

The ACN/PCN system as referenced in Amendment 35 to ICAO Annex 14, "Aerodromes", 7th Edition, June 1976, provides a standardized international airplane/pavement rating system replacing the various S, T, TT, LCN, AUW, ISWL, etc., rating systems used throughout the world.

Paragraph 5. introduces the basic ACN–PCN (aircraft/pavement) rating system and analysis procedure.

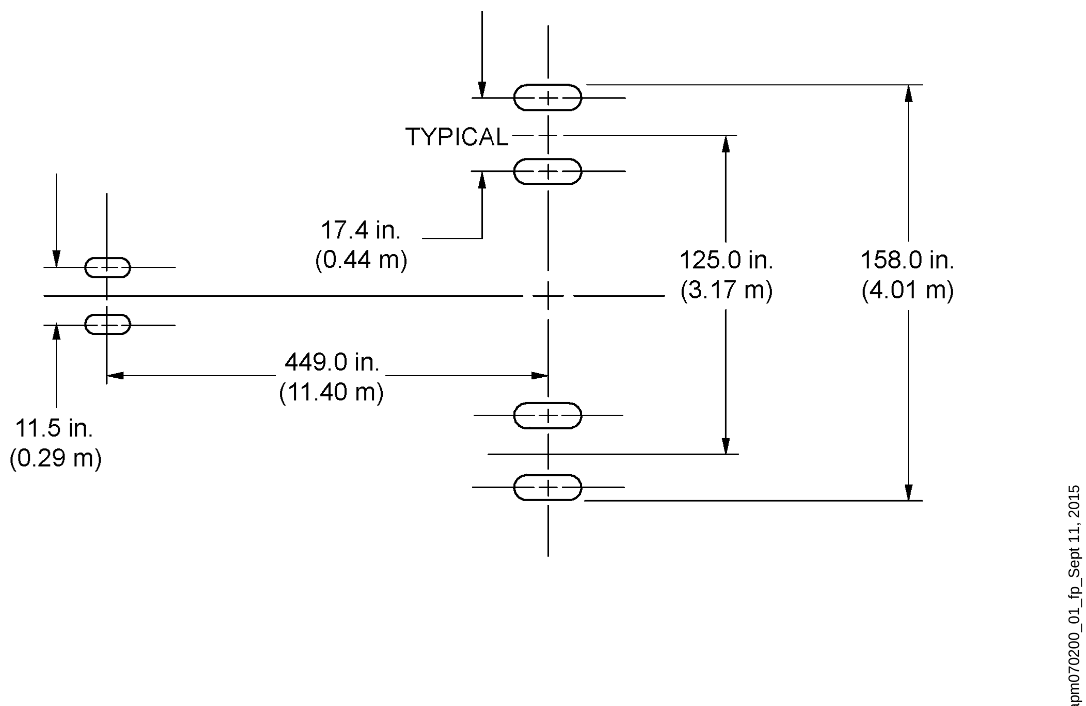
Paragraph 5.B. provides a quick reference table for ACN data for flexible pavements. This information is presented in a graph format in Figure 9.

Background information on the determination of ACNs for flexible pavements is presented in paragraph 5.D. and Figure 11.

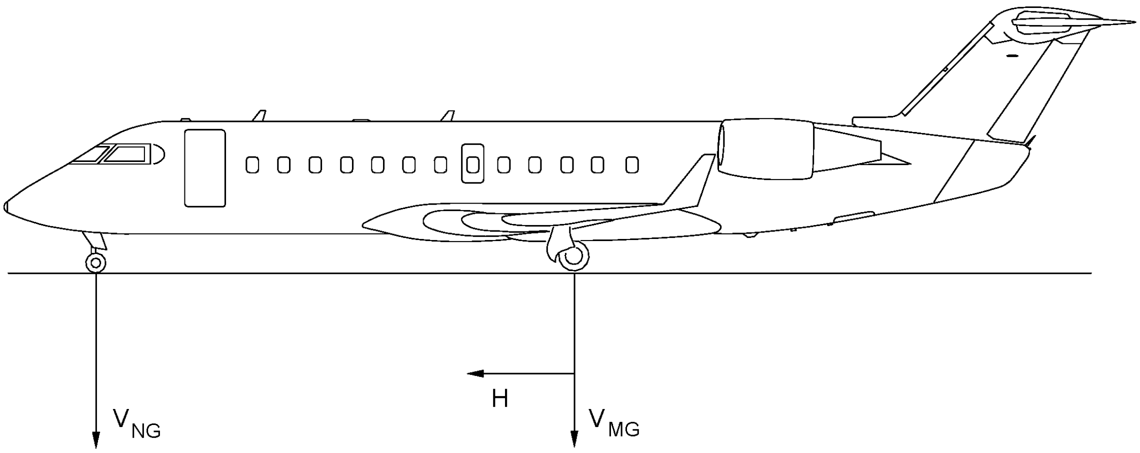
Paragraph 5.C. provides a quick reference table for ACN data for rigid pavements. This information is presented in a graph format in Figure 10.

Background information on the determination of ACNs for rigid pavements is presented in paragraph 5.E. and Figure 12.

	CRJ100/200	CRJ100 ER/ 200 ER	CRJ100 LR/ 200 LR
Maximum Design Taxi Weight	47 700 lb (21 636 kg)	51 250 lb (23 247 kg)	53 250 lb (24 154 kg)
Nose Tire Size	18 x 4.4 – 12 12 PR		
Nose Tire Pressure *(Loaded, or in–service)	125 psi (862 kPa)	146 – 153 psi (1.00–1.05 MPa)	149–156 psi (1.02–1.07 MPa)
Main Gear Tire Size	H29 x 9 – 15 16 PR		
Main Gear Tire Pressure *(Loaded, or in–service)	160 psi (1.10 MPa)	169–177 psi (1.16–1.22 MPa)	175–183 psi (1.20–1.26 MPa)
* A loaded, or in–service, condition is when the tire assembly is installed on the aircraft and the weight of the aircraft is on the tire (the aircraft is not on jacks).			



Footprint
Figure 1



NOTE

All loads are calculated using the airplanes maximum design taxi weight.

V_{NG} = Maximum vertical nose gear ground load at most forward center of gravity.

V_{MG} = Maximum vertical main gear ground load at the most aft center of gravity.

H = Maximum horizontal ground load from braking.

		V_{NG}		V_{MG} (PER STRUT)	H (PER STRUT)	
	MAXIMUM DESIGN TAXI WEIGHT	STATIC AT MOST FORWARD CG	STATIC + BRAKING 16 ft/sec.^{2} (4.88 m/sec.^{2}) DECELERATION	MAXIMUM LOAD OCCURRING AT STATIC AFT CG	AT STEADY BRAKING 10 ft/sec.^{2} (3.05 m/sec.^{2}) DECELERATION	AT INSTANTANEOUS BRAKING (COEFFICIENT OF FRICTION 0.8)
CRJ100/200	47 700 lb (21 636 kg)	4728 lb (2145 kg)	8302 lb (3766 kg)	22 800 lb (10 342 kg)	21 680 lb (9834 kg)	16 120 lb (7312 kg)
CRJ100 ER CRJ200 ER	51 250 lb (23 247 kg)	5083 lb (2306 kg)	8839 lb (4009 kg)	23 892 lb (10 837 kg)	22 711 lb (10 302 kg)	16 857 lb (7646 kg)

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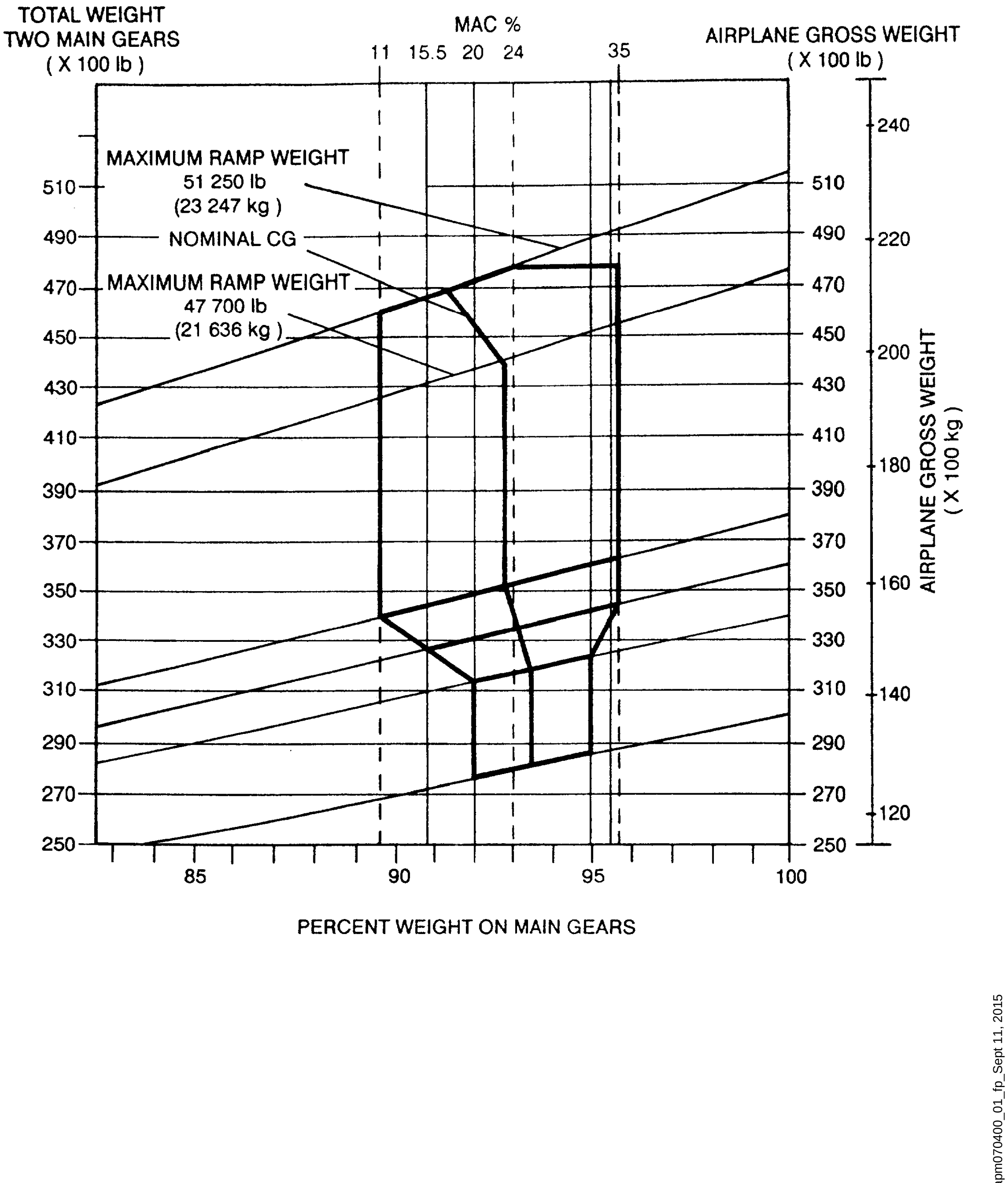
Maximum Pavement Load
Figure 2



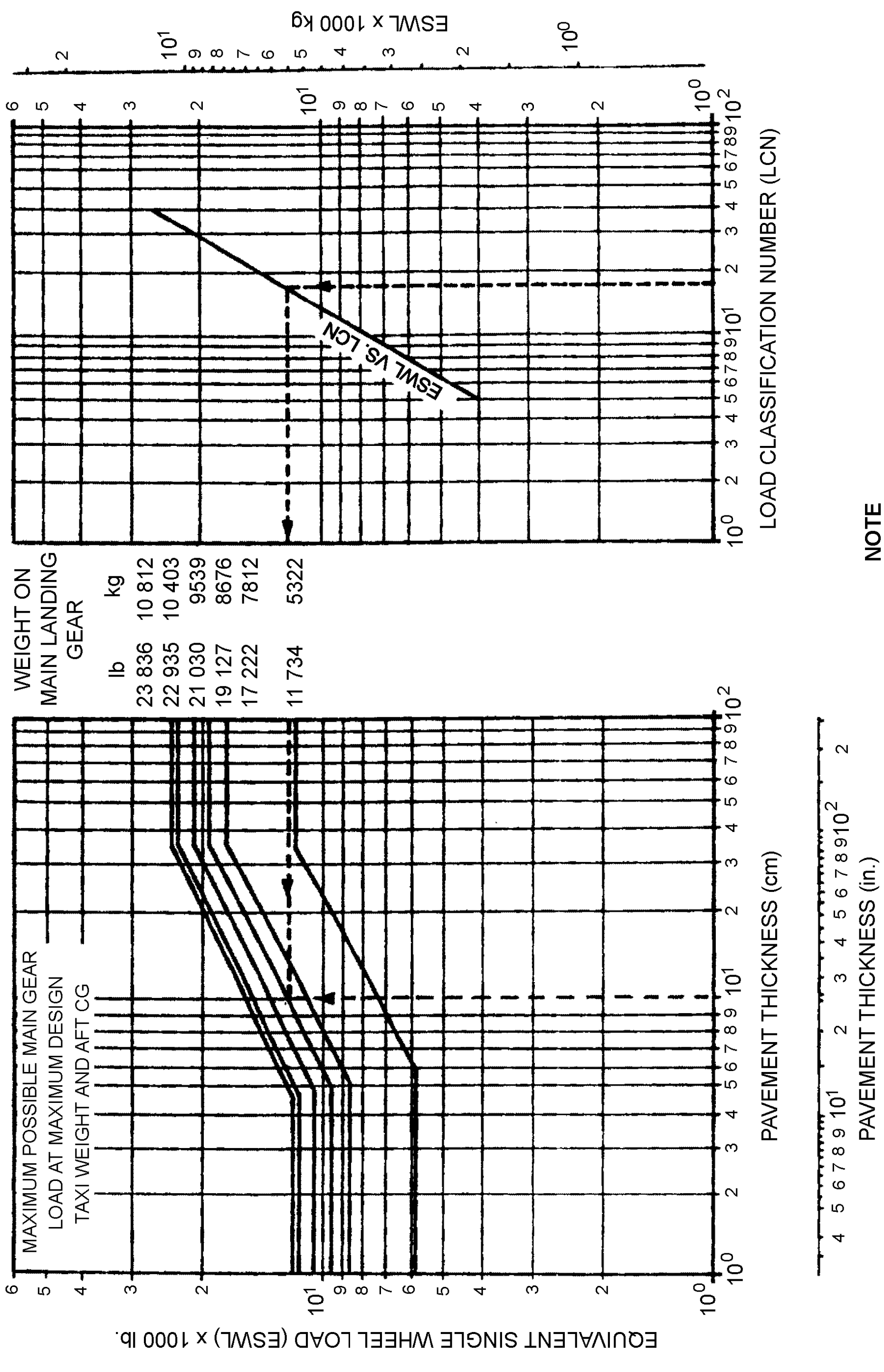
Landing Gear Load on Pavement
Figure 3

2. FLEXIBLE PAVEMENT REQUIREMENTS – LCN CONVERSION

In order to determine the airplane weight that can be accommodated on a particular flexible airport pavement, both the LCN of the pavement and the thickness (p) of the pavement must be known.

In the example shown in Figure 4, the flexible pavement thickness = 10, and the LCN = 18.

For this condition the weight on the main landing gear is 19127 pounds (8676 kg).



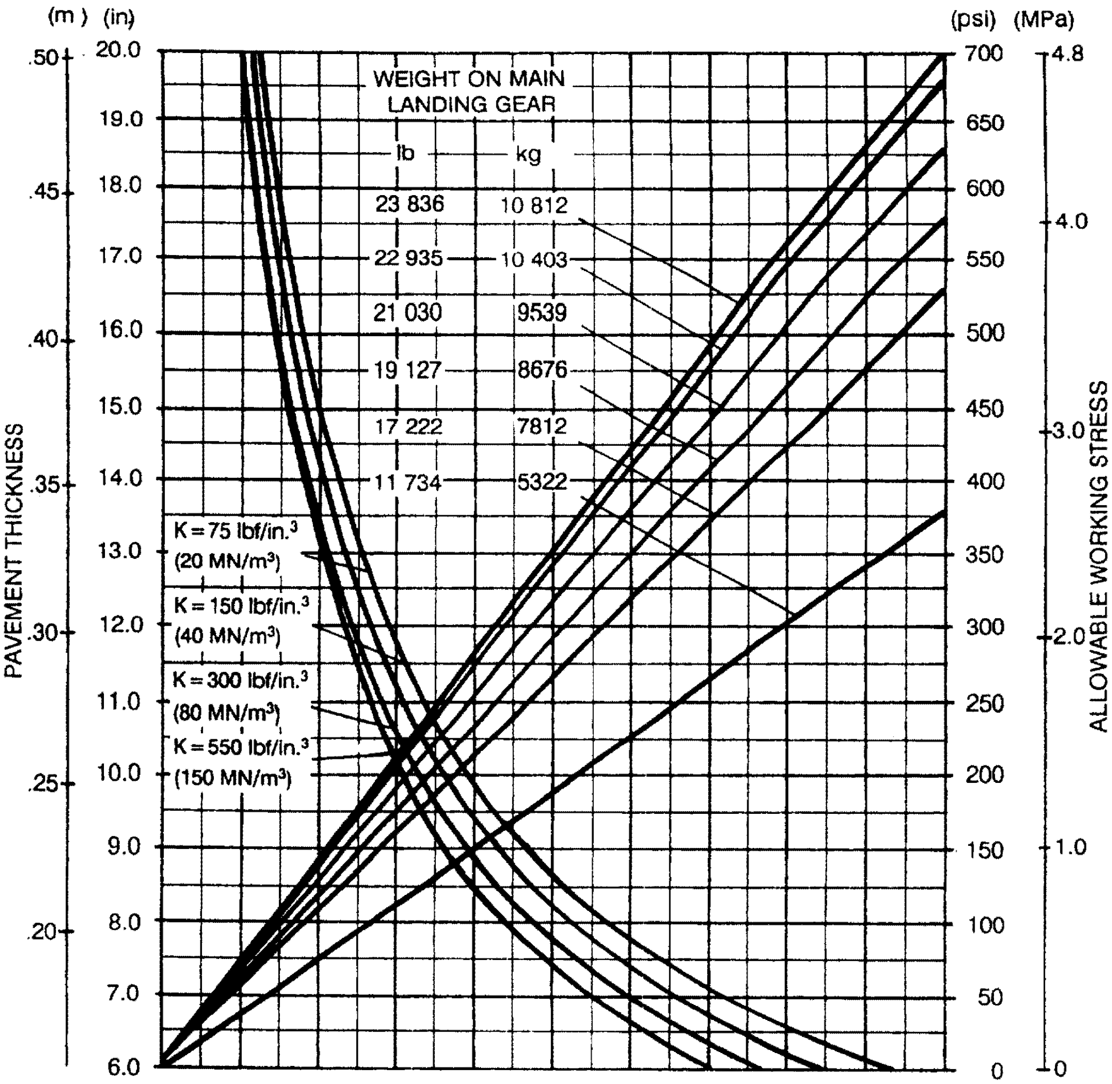
NOTE

Equivalent single wheel loads are derived by methods shown in ICAO Aerodrome Manual, part 2, paragraph 4.1.3.

Tires – H29 x 9.0 – 15.

Tire pressure constant at 168 psi (1.16 MPa) (loaded).

Flexible Pavement Requirements – LCN Conversion
Figure 4



REFERENCE: DESIGN OF CONCRETE AIRPORT PAVEMENT ASSOCIATION COMPUTER PROGRAM FOR PAVEMENT DESIGN, 1968

NOTE

The values obtained by using the maximum load reference line and any value of K are exact. For loads less than maximum, the curves are exact for K = 300 lbf/in³ (80 MN/m³) but deviate slightly for other values of K.

Tires − H29 x 9.0 − 15.
Tire pressure constant at 168 psi (1.16 MPa).

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Rigid Pavement Requirements – Portland Association Design
Figure 5

3. RIGID PAVEMENT REQUIREMENTS – LCN CONVERSION

In order to determine the airplane weight that can be accommodated on a particular rigid airport pavement, both the LCN of the pavement and the radius of relative stiffness must be known.

In the example shown in Figure 7, the radius of relative stiffness = 30, and the LCN = 19.

For these conditions the weight on the main landing gear is 38254 pounds (17352 kg).

RADIUS OF RELATIVE STIFFNESS
VALUES IN INCHES

d(in.)	K=75	K=100	K=150	K=200	K=250	K=300	K=350	K=400	K=500	K=550
6.0	31.48	29.30	26.47	24.63	23.30	22.26	21.42	20.72	19.59	19.13
6.5	33.43	31.11	28.11	26.16	24.74	23.64	22.74	22.00	20.80	20.31
7.0	35.34	32.89	29.72	27.65	26.15	24.99	24.04	23.25	21.99	21.47
7.5	37.22	34.63	31.29	29.12	27.54	26.32	25.32	24.49	23.16	22.61
8.0	39.06	36.35	32.85	30.57	28.91	27.62	26.58	26.58	24.31	23.74
8.5	40.88	38.04	34.37	31.99	30.25	28.91	27.81	27.81	25.44	24.84
9.0	42.67	39.71	35.88	33.39	31.58	30.17	29.03	29.03	26.55	25.93
9.5	44.43	41.35	37.36	34.77	32.89	31.42	30.23	30.23	27.65	27.00
10.0	46.18	42.97	38.83	36.14	34.17	32.65	31.42	30.39	28.74	28.06
10.5	47.90	44.57	40.28	37.48	35.45	33.87	32.59	31.52	29.81	29.11
11.0	49.60	46.16	41.71	38.81	36.71	35.07	33.75	32.64	30.87	30.14
11.5	51.28	47.72	43.12	40.13	37.95	36.26	34.89	33.74	31.91	31.16
12.0	52.94	49.27	44.52	41.43	39.18	37.44	36.02	34.84	32.95	32.17
12.5	54.59	50.80	45.90	42.72	40.40	38.60	37.14	35.92	33.97	33.17
13.0	56.22	52.32	47.27	43.99	41.61	39.75	38.25	36.99	34.99	34.16
13.5	57.83	53.82	48.63	45.26	42.80	40.89	39.35	38.06	35.99	35.14
14.0	59.43	55.31	49.98	46.51	43.98	42.02	40.44	39.11	36.99	36.12
14.5	61.02	56.78	51.31	47.75	45.16	43.15	41.51	40.15	37.97	37.08
15.0	62.59	58.25	52.63	48.98	46.32	44.26	42.58	41.19	38.95	38.03
15.5	64.15	59.70	53.94	50.20	47.47	45.36	43.64	42.21	39.92	38.98
16.0	65.69	61.13	55.24	51.41	48.62	46.45	44.70	43.23	40.88	39.92
16.5	67.23	62.56	56.53	52.61	49.75	47.54	45.74	44.24	41.84	40.85
17.0	68.75	63.98	57.81	53.80	50.88	48.61	46.77	45.24	42.78	41.78
17.5	70.26	65.38	59.48	54.98	52.00	49.68	47.80	46.23	43.72	42.70
18.0	71.76	66.78	60.35	56.16	53.11	50.74	48.82	47.22	44.66	43.61
19.0	74.73	69.54	62.84	58.48	55.31	52.84	50.84	49.17	46.51	45.41
20.0	77.66	72.27	65.30	60.77	57.47	54.92	52.84	51.10	48.33	47.19
21.0	80.55	74.97	67.74	63.04	59.62	56.96	54.81	53.01	50.13	48.95
22.0	83.41	77.63	70.14	65.28	61.73	58.98	56.75	54.89	51.91	50.69
23.0	86.24	80.26	72.52	67.49	63.83	60.98	58.68	56.75	53.67	52.41
24.0	89.04	82.86	74.87	69.68	65.90	62.96	60.58	58.59	55.41	54.11
25.0	91.81	85.44	77.20	71.84	67.95	64.92	62.46	60.41	57.14	55.79

RADIUS OF RELATIVE STIFFNESS (L)
VALUE OF (L) IN INCHES

$$L = \sqrt[4]{\frac{Ed^3}{12(1-\mu^2)K}} = 24.1652 \sqrt{\frac{d^3}{K}}$$

WHERE:
- E = YOUNG'S MODULUS = 4 X 10^6 psi
- K = SUBGRADE MODULUS, lbf/in.^{3}
- d = RIGID–PAVEMENT THICKNESS, in.
- μ = POISSON'S RATIO = 0.15

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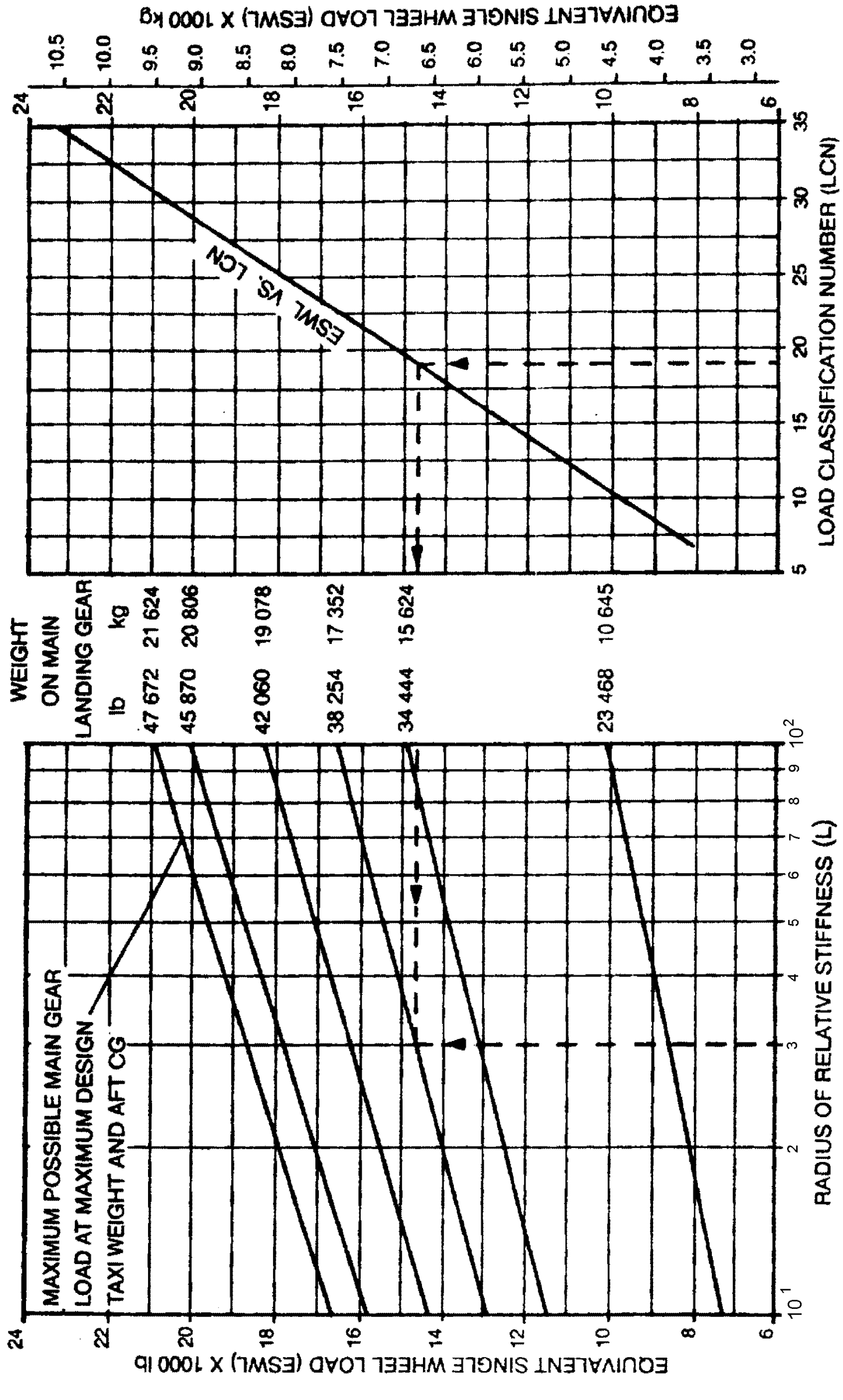
Radius of Relative Stiffness – Table
Figure 6



NOTE

LCN Requirments are based on center of slab loading.

Tires – H29.0 x 9.0 – 15.

Tire pressure constant at 168 psi (1.16 MPa) (loaded).

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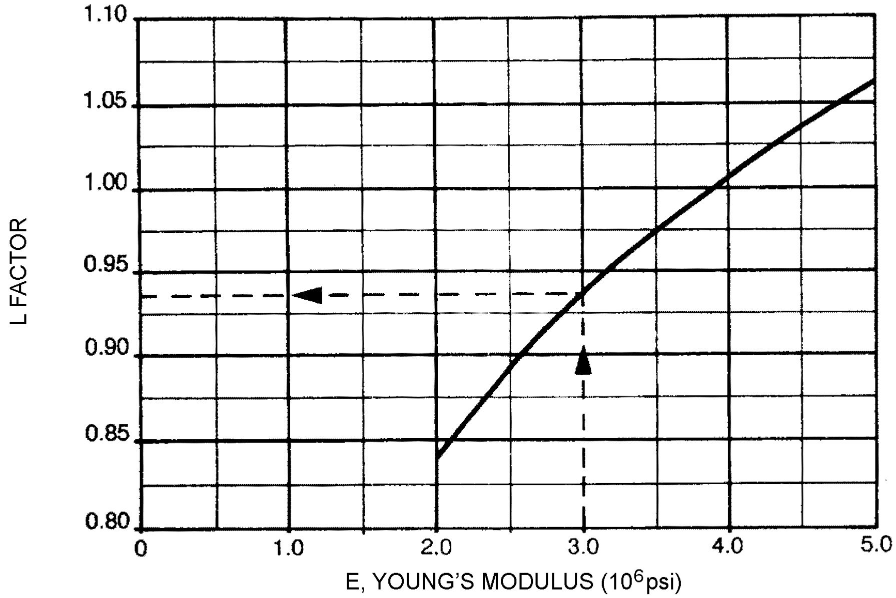
Rigid Pavement Requirements – LCN Conversion
Figure 7

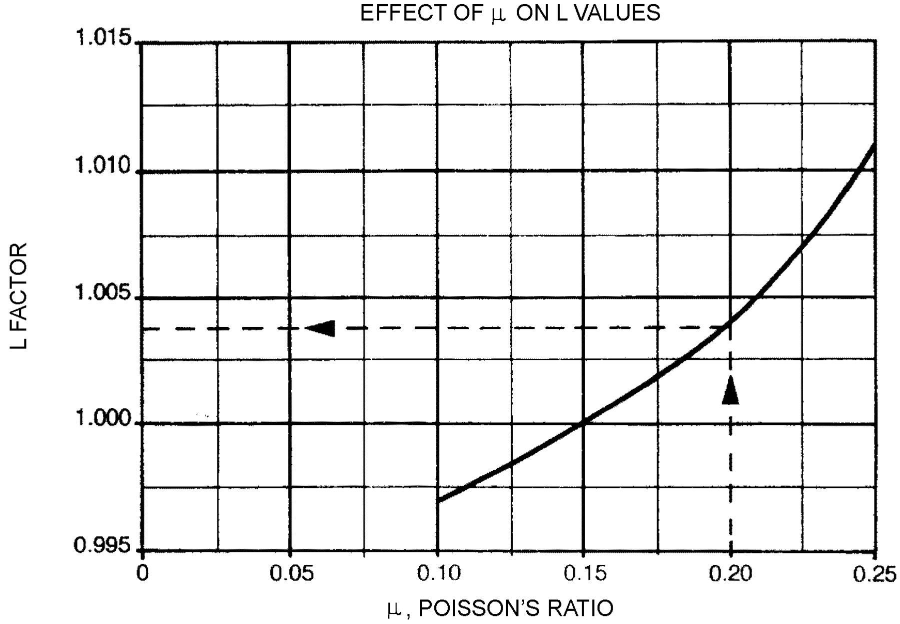
4. RADIUS OF RELATIVE STIFFNESS (OTHER VALUES of E and L)

The table of Figure 8 presents L–values based on Young’s modulus (E) of 4000000 psi and Poisson’s ratio (μ) of 0.15. For convenience in finding L–values based on other values of E and μ, the curves of Figure 8 are included. For example, to find an L–value based on an E of 3000000 psi, the ’E’ factor 0.931 is multiplied by the L–value found in the table of Figure 8. The effect of variations of μ on the L–value is treated in a similar manner.

EFFECT OF E ON L VALUES



EFFECT OF μ ON L VALUES



NOTE

The above curves are used to adjust the Load Values of the Table in Section 7.8.1.

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Radius of Relative Stiffness – Chart
Figure 8

5. ACN–PCN REPORTING SYSTEM

The ACN value (Aircraft Classification Number) is a number which expresses the relative structural effect of an aircraft on different pavement types for specified standard subgrade strengths in terms of a standard single wheel load. The PCN value (Pavement Classification Number) is a number which expresses the relative load carrying capacity of a pavement in terms of a standard single wheel load.

The computation of ACN values will rarely, if ever, be required by anyone other than aircraft manufacturers. Although ACN calculation materials are presented in this manual, airport planners are cautioned that these materials are not to be used to calculate ACNs.

Pavement evaluation and calculation using the PCN method is, however, left to the airport planner. The eventual results of their evaluation appear as a PCN code combination with a numeric value followed by the PCN codes.

Full PCN Code Format

PCN	Pavement Type	Subgrade Category	Tire Pressure Category	Evaluation Method
Numerical value	R – Rigid	A – High	W – No limit	T – Technical
		B – Medium	X – To 217 psi (1.5 MPa)	
	F – Flexible	C – Low	Y – To 145 psi (1.0 MPa)	U – Using Aircraft
		D – Ultra Low	Z – To 73 psi (0.5 MPa)	

The PCN value is for reporting pavement strength only. The PCN value cannot be used for pavement design or as a substitute for evaluation. Pavement design and evaluation are complex engineering problems which require detailed analysis. They cannot be reduced to a single number.

Once a PCN number has been determined and published, it can be compared with an aircraft's ACN. An aircraft that has an ACN equal to or less than the PCN of a given pavement can operate without restriction on the pavement. (Ref: ICAO State Letter AN 4/1.1.17–80/9. Ref: US FAA Advisory Circular 150/5335–5 15/06/83).

A. Aircraft Parameters for ACN Determination

The following parameters were used the determination of the ACNs of the CRJ Series Model CL–600–2B19

Aircraft Type	Aircraft Weight		Load on one main gear leg	Standard Aircraft Tire pressure			
				Loaded		Unloaded	
	lbs	kgs	%	psi	MPa	psi	MPa
CRJ100/200	44000	19958	46.5	161	1.10	168	1.16
CRJ100 ER/200 ER	51250	23246	46.5	162	1.11	169	1.16
CRJ100 LR/200 LR	53250	24154	46.5	168	1.16	175	1.20

B. ACN Quick Reference Table – Flexible Pavement

See paragraph 5.D. for more information on the development of ACNs for flexible pavement.

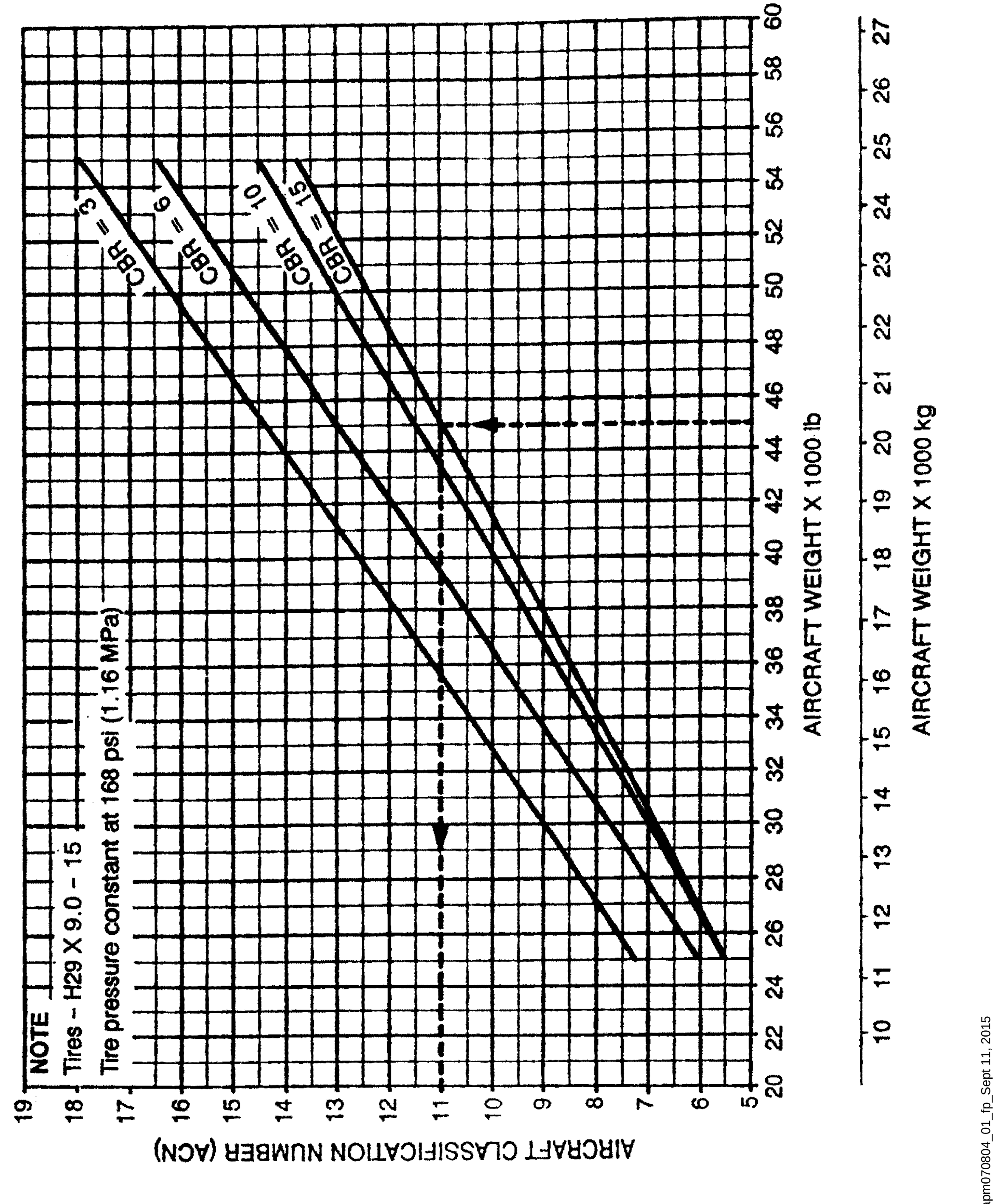
Aircraft Type	ACN relative to Flexible Pavement subgrades			
	High CBR=15%	Medium CBR=10%	Low CBR=6%	Very Low CBR=3%
CRJ100/200	10.8	11.3	12.8	14.1
CRJ100 ER/200 ER	12.5	13.2	14.9	16.2
CRJ100 LR/200 LR	13.2	14.0	15.8	17.0

C. ACN Quick Reference Table – Rigid Pavement

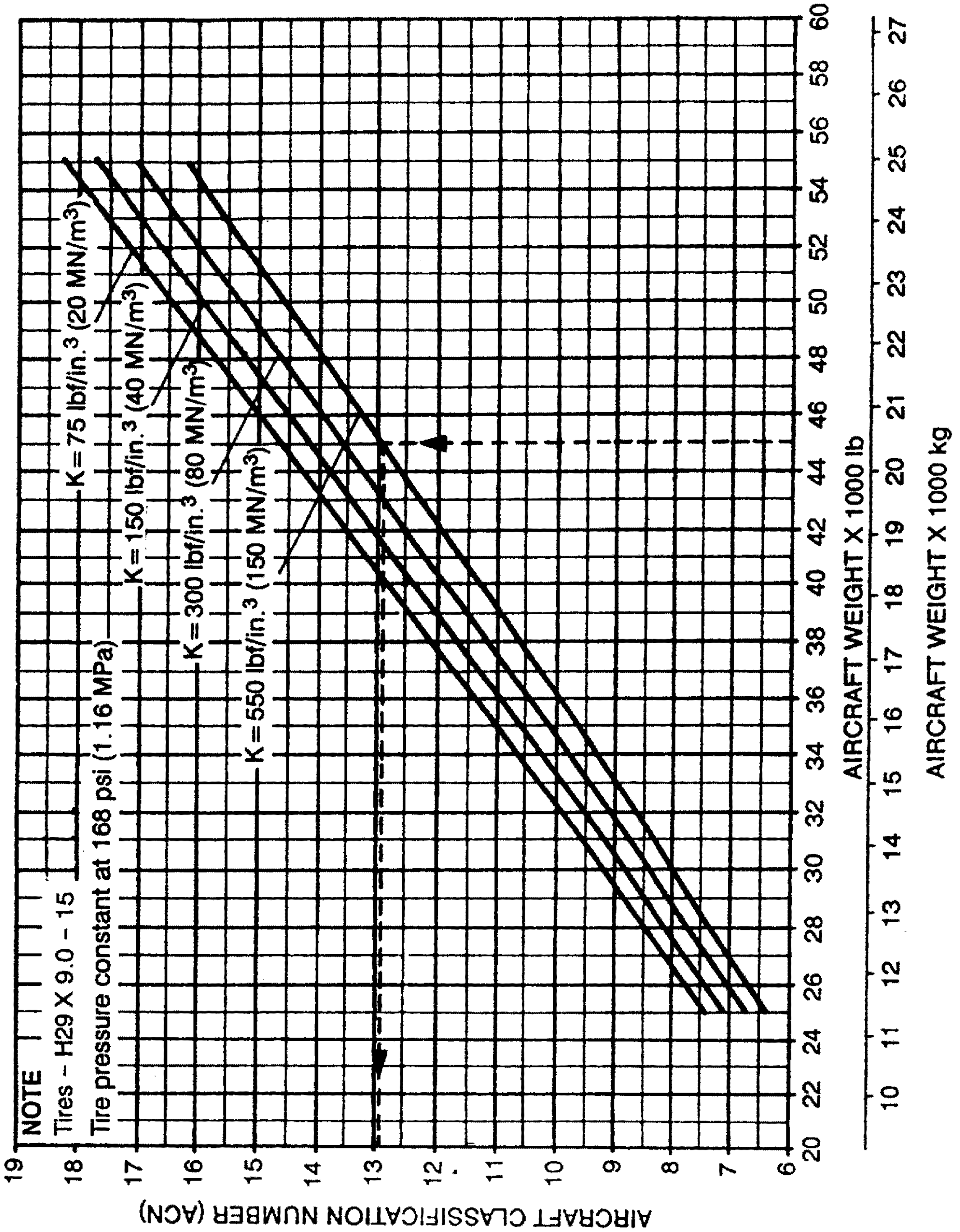
See paragraph 5.E. for more information on the development of ACNs for rigid pavement.

Aircraft Type	ACN relative to Rigid Pavement subgrades			
	High K=150 MN/m^2	Medium K=80 MN/m^2	Low K=40 MN/m^2	Very Low K=20 MN/m^2
CRJ100/200	12.2	13.0	13.6	14.0
CRJ100 ER/200 ER	14.2	15.0	15.7	16.2
CRJ100 LR/200 LR	15.6	16.3	16.9	17.5

Aircraft Type	ACN relative to Rigid Pavement subgrades			
	High **K=150 MN/m²**	**Medium** **K=80 MN/m²**	**Low** **K=40 MN/m²**	**Very Low** **K=20 MN/m²**
NOTE: The ACN for the CJR100/200 standard version was calculated using a taxi weight of 44 000 pounds (19 958 kg). The published maximum taxi weight (MTW) of the CRJ100/200 is 47 700 pounds (21 636 kg).				



Aircraft Classification Number – Flexible Pavement Chart
Figure 9



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Aircraft Classification Number – Rigid Pavement Chart
Figure 10

D. Development of ACN – Flexible Pavement

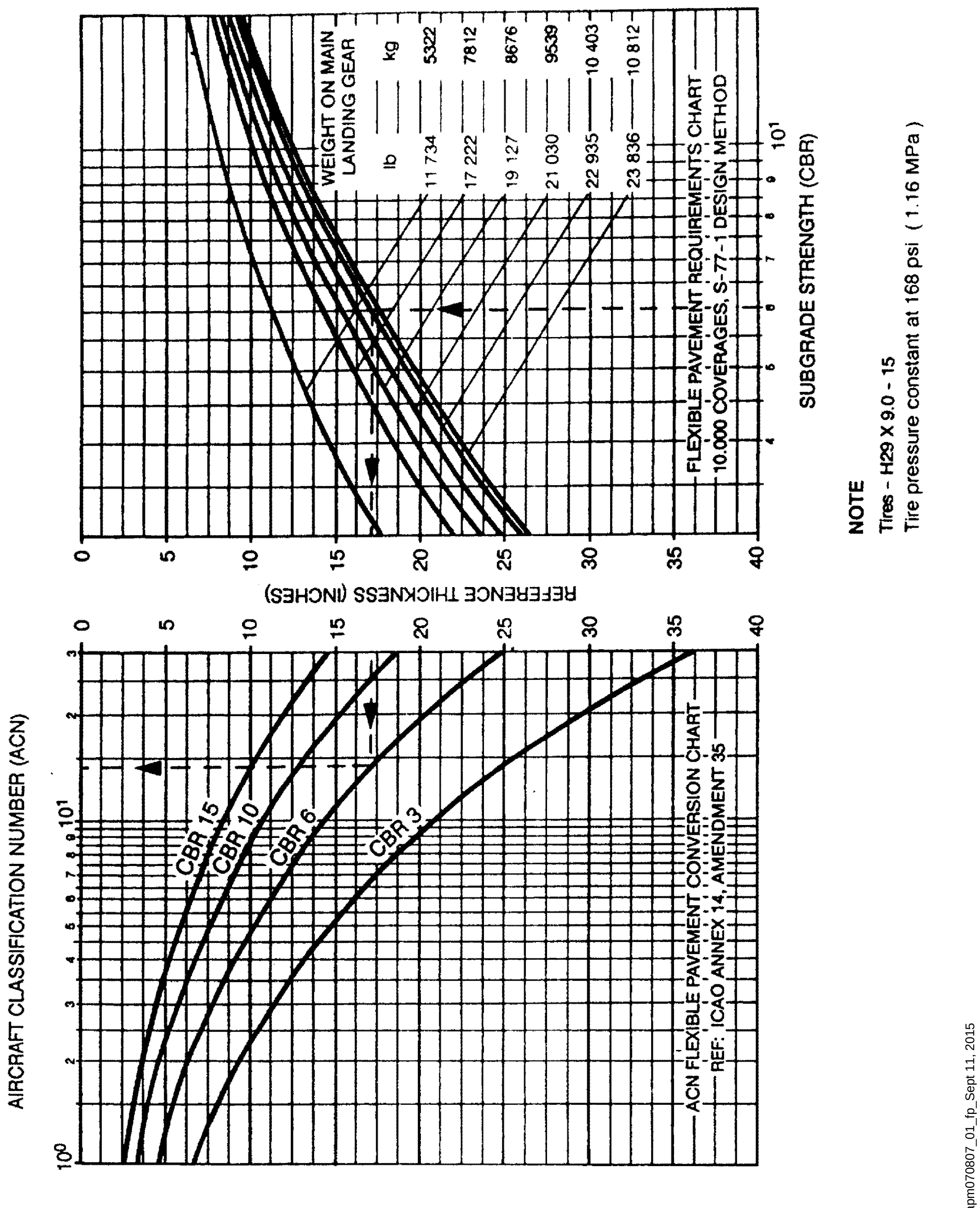
The following procedure is used to develop the flexible pavement ACN charts such as that shown in Figure 9.

(1) Determine the percent of weight on the main gear to be used in steps (2), (3), and (4) below. It is the maximum aft center of gravity (cg) position which yields the critical loading on the critical gear Refer to Figure 3. This cg position is used to determine the main gear loads at all gross weights of the model being considered.

(2) Establish a flexible pavement requirements chart using the S–77–1 design method such as shown on the right hand side of Figure 11. Use standard subgrade strengths of CBR 3, 5, 10, and 15 percent and 10000 coverages.

(3) Determine reference thickness values from the pavement requirement chart of step (2) for each standard subgrade strength and gear loading.

(4) Enter the reference thickness values into the ACN Flexible Pavement Conversion Chart shown on the left hand side of Figure 11 to determine the ACN. This chart was developed using the S–77–1 design method with a single tire inflated to 168 psi (1.16 MPa) pressure and 10000 coverages. The ACN is two times the derived single wheel load expressed in thousands of kilograms. These values of ACN are then plotted as a function of aircraft gross weight such as shown in Figure 9.



Development of ACN – Flexible Pavement
Figure 11

E. Development of ACN Charts – Rigid Pavement

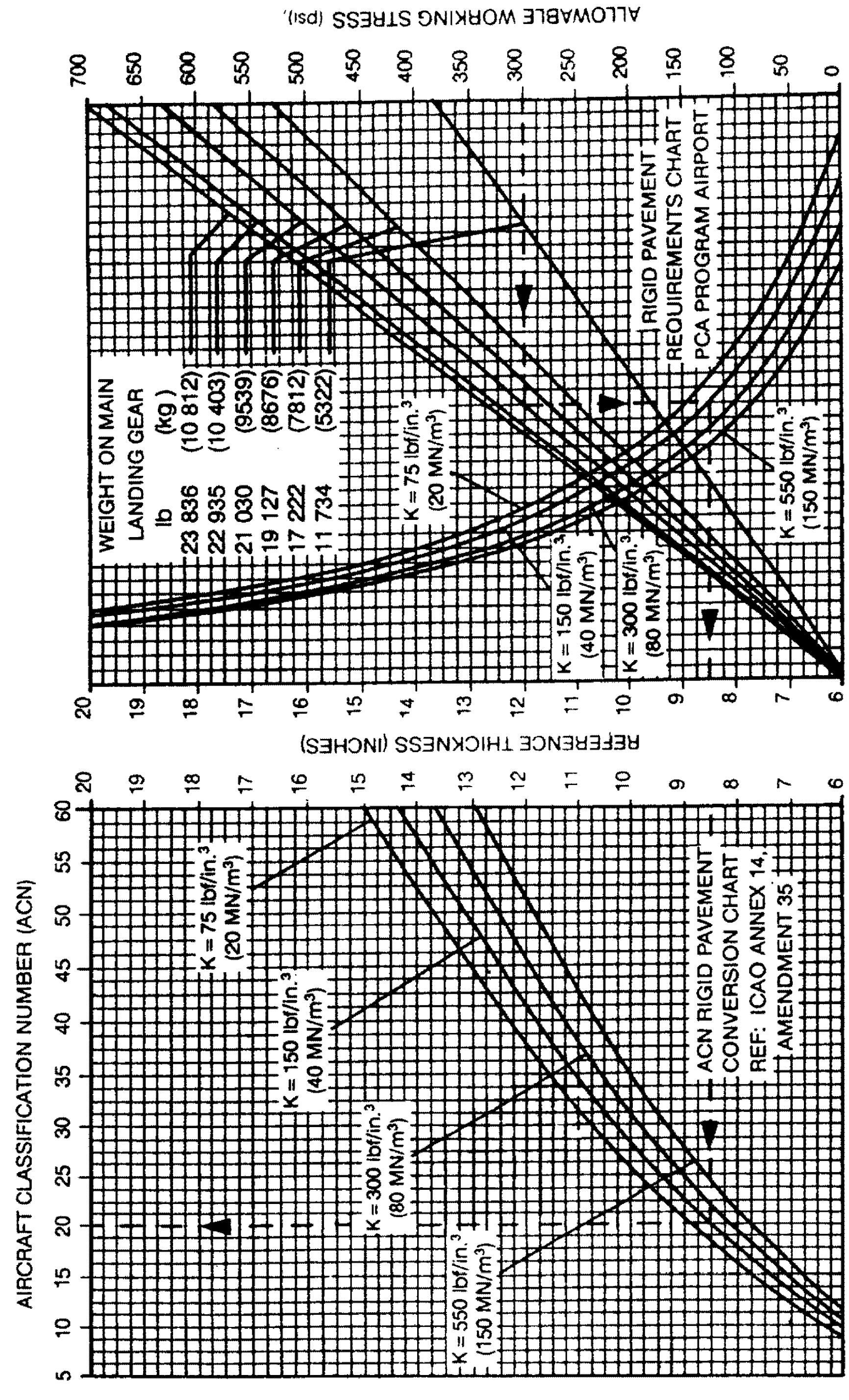
The following procedure is used to develop the rigid pavement ACN chart shown in Figure 9.

(1) Determine the percentage of weight on the main gear to be used in steps (2), (3), and (4). It is the maximum aft center of gravity (cg) position which yields the critical loading on the critical gear Refer to Figure 3. This cg position is used to determine main gear loads at all gross weights of the model being considered.

(2) Establish a rigid pavement requirements chart using the PCA computer program PDILB shown on the right hand side of Figure 12. Use standard subgrade strengths of k = 75, 150, 300 and 550 lbf/in^3 (nominal values for k = 20, 40, 80 and 150 MN/m^3). This chart provides the same thickness values as that of Figure 5.

(3) Determine reference thickness values from the pavement requirements chart of step (2) for each standard subgrade strength and gear loading at 300 psi working stress (nominal value for 2.07 MPa working stress).

(4) Enter the reference thickness values into the ACN Rigid Pavement Conversion Chart shown on the left hand side of Figure 12 to determine ACN. This chart was developed using the PCA computer program PDILB with a single tire inflated to 168 psi (1.16 MPa) pressure and working stress of 300 psi (2.07 MPa). The ACN is twice the derived single wheel load expressed in thousands of kilograms. These values of ACN are then plotted as a function of aircraft gross weight as shown in Figure 10.



NOTE

Tires - H29 X 9.0 - 15

Tire pressure constant at 168 psi (1.16 MPa)

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Development of ACN – Rigid Pavement Chart
Figure 12

**ON A/C ALL

DERIVATIVE AIRCRAFT

1. DERIVATIVE AIRCRAFT

CRJ Series 700.

The CRJ700 is the most recent addition to the CRJ Series family. Although not a linear derivative of the CRJ100/200, the 70 – passenger CRJ700 maintains significant design commonalities with the other members of the family, while offering greater range and increased passenger capacity.

For more information on airport planning for the CRJ700, refer to the CRJ Series 700 Airport Planning Manual, or contact MHI RJ Aviation.

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**ON A/C ALL

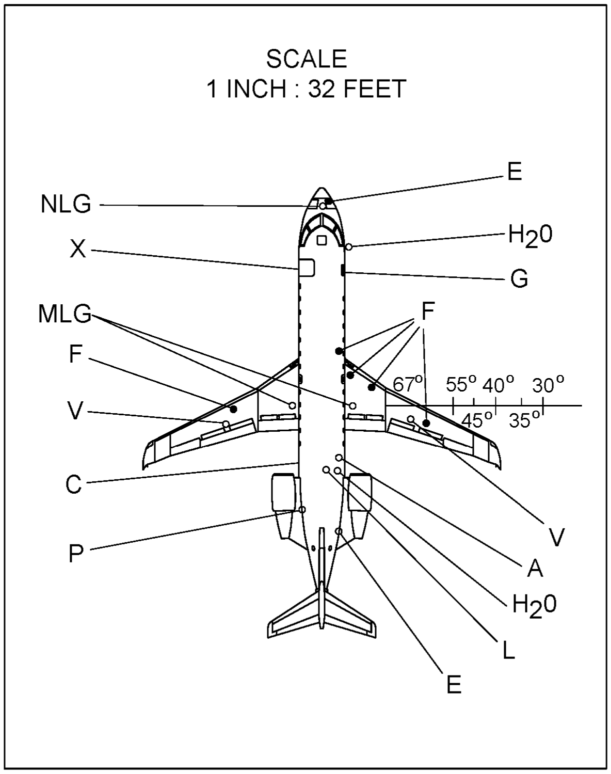
SCALED DRAWINGS

1. SCALED DRAWINGS

This section contains the scaled drawings. They can be used to plan and to verify runway, ramp and maintenance facility layouts.

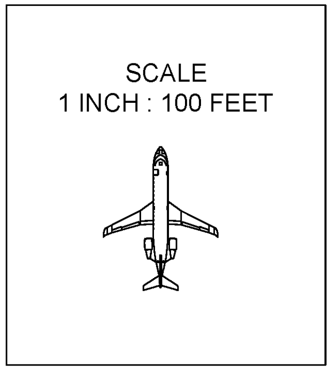
Refer to Figure 1 for the US Standard scaled drawing.

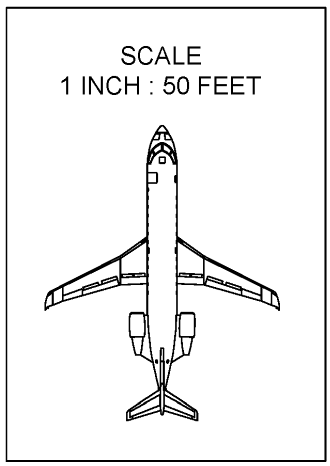
Refer to Figure 2 for the Metric scaled drawing.



NOTE

MINIMUM WIDTH FOR 180° TURN IS 75 FEET





○ LOCATED ON THE LOWER SIDE

● LOCATED ON THE UPPER SIDE

LEGEND

A	AIR CONDITIONING
C	CARGO DOOR
E (2)	ELECTRICAL (2 CONNECTIONS)
F	FUEL SYSTEM SERVICING POINTS
G	SERVICE DOOR
H_20 (2)	POTABLE WATER (2 CONNECTIONS)
L	LAVATORY
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
P	PNEUMATIC CONNECTION
V (2)	FUEL SYSTEM VENT (NACA SCOOP)
X	PASSENGER DOOR
+	TURNING RADIUS POINTS 67°, 55°, 50°, 45°, 40°, 35°, 30°

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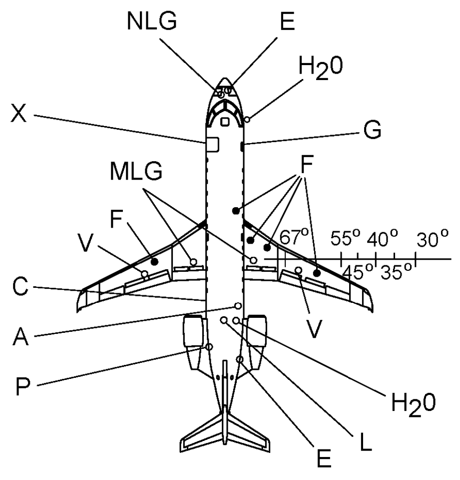
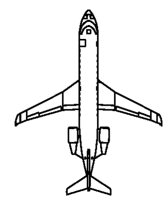
Scaled Drawing (US Standard)
Figure 1



NOTE

MINIMUM WIDTH FOR
180° TURN IS 22.86 METERS



LEGEND

A	AIR CONDITIONING
C	CARGO DOOR
E (2)	ELECTRICAL (2 CONNECTIONS)
F	FUEL SYSTEM SERVICING POINTS
G	SERVICE DOOR
H_20 (2)	POTABLE WATER (2 CONNECTIONS)
L	LAVATORY
MLG	MAIN LANDING GEAR
NLG	NOSE LANDING GEAR
P	PNEUMATIC CONNECTION
V (2)	FUEL SYSTEM VENT (NACA SCOOP)
X	PASSENGER DOOR
+	TURNING RADIUS POINTS 67°, 55°, 50°, 45°, 40°, 35°, 30°

○ LOCATED ON THE LOWER SIDE

● LOCATED ON THE UPPER SIDE

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Scaled Drawing (Metric)
Figure 2

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