CAGE Code 81205

777-200/ -200ER/ -300
Airplane Characteristics for Airport Planning

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Boeing Commercial Airplanes

All revisions to this document must be approved by the content owner before release.

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Changes in This Revision	Pages 1 to 156
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Changes in This Revision	Pages 1 to 164
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Revision Letter	**E**
Revision Date	**December 2024**
Changes in This Revision	Section 7: Updated ACR information

Table of Contents

1.0 SCOPE AND INTRODUCTION

1.1 SCOPE

This document provides, in a standardized format, airplane characteristics data for general airport planning. Since operational practices vary among airlines, specific data should be coordinated with the using airlines prior to facility design. Boeing Commercial Airplanes should be contacted for any additional information required.

Content of the document reflects the results of a coordinated effort by representatives from the following organizations:

- Aerospace Industries Association
- Airports Council International - North America
- International Industry Working Group
- International Air Transport Association

The airport planner may also want to consider the information presented in the "Commercial Aircraft Design Characteristics – Trends and Growth Projections," for long range planning needs and can be accessed via the following web site:

http://www.boeing.com/airports

The document is updated periodically and represents the coordinated efforts of the following organizations regarding future aircraft growth trends:

- International Civil Aviation Organization
- International Coordinating Council of Aerospace Industries Associations
- Airports Council International - North American and World Organizations
- International Industry Working Group
- International Air Transport Association

1.2 INTRODUCTION

This document conforms to NAS 3601. It provides characteristics of the Boeing Model 777 family of airplanes for airport planners and operators, airlines, architectural and engineering consultant organizations, and other interested industry agencies. Airplane changes and available options may alter model characteristics; the data presented herein reflect typical airplanes in each model category.

For additional information contact:

Boeing Commercial Airplanes
2201 Seal Beach Blvd. M/C: 110-SB02
Seal Beach, CA 90740-1515
U.S.A.

Attention: Manager, Airport Compatibility Engineering

Phone: 562-797-1172

Email: AirportCompatibility@boeing.com

1.3 A BRIEF DESCRIPTION OF THE MODEL 777 FAMILY OF AIRPLANES

777-200 Airplane

The 777-200 is a twin-engine airplane designed for medium to long range flights. It is powered by advanced high bypass ratio engines. Characteristics unique to the 777 include:

- Two-crew cockpit with digital avionics
- Circular cross-section
- Lightweight aluminum and composite alloys
- Structural carbon brakes
- Six-wheel main landing gears
- Main gear aft axle steering
- High bypass ratio engines
- Fly-by-wire system

777-300 Airplane

The 777-300 is a second-generation derivative of the 777-200. Two body sections are added to the fuselage to provide additional passenger seating and cargo capacity.

Main Gear Aft Axle Steering

The main gear axle steering is automatically engaged based on the nose gear steering angle. This allows for less tire scrubbing and easier maneuvering into gates with limited parking clearances.

High Bypass Ratio Engines

The 777 airplane is powered by two high bypass ratio engines. The following table shows the available engine options.

ENGINE MANUFACTURER	ENGINE MODEL	ENGINE THRUST	MAX TAXI WEIGHT (LBS)	
			777-200/-200ER	777-300
GENERAL ELECTRIC	GE 90-B3/-B4	74,500 LB	537,000	
	GE 90-B5	76,400 LB	537,000	
	GE 90-B1	84,100 LB	634,000	
	GE 90-B4	84,700 LB	634,000	
	GE 90-92B	90,500 LB		662,000
	GE 90-98B	98,000 LB		662,000
PRATT & WHITNEY	PW 4073/4073A	73,500 LB	537,000	
	PW 4077	77,200 LB	537,000	
	PW 4082	82,200 LB	634,000	
	PW 4084	84,600 LB	634,000	
	PW 4090	90,500 LB		662,000
	PW 4098	98,000 LB		662,000
ROLLS ROYCE	TRENT 870/871	71,200 LB	537,000	
	TRENT 877	74,900 LB	537,000	
	TRENT 882	82,200 LB	634,000	
	TRENT 884	84,300 LB	634,000	
	TRENT 890	90,000 LB		662,000
	TRENT 898	98,000 LB		662,000

2.0 AIRPLANE DESCRIPTION

2.1 GENERAL CHARACTERISTICS

Maximum Design Taxi Weight (MTW). Maximum weight for ground maneuver as limited by aircraft strength and airworthiness requirements. (It includes weight of taxi and run-up fuel.)

Maximum Design Landing Weight (MLW). Maximum weight for landing as limited by aircraft strength and airworthiness requirements.

Maximum Design Takeoff Weight (MTOW). Maximum weight for takeoff as limited by aircraft strength and airworthiness requirements. (This is the maximum weight at start of the takeoff run.)

Operating Empty Weight (OEW). Weight of structure, powerplant, furnishing systems, unusable fuel and other unusable propulsion agents, and other items of equipment that are considered an integral part of a particular airplane configuration. Also included are certain standard items, personnel, equipment, and supplies necessary for full operations, excluding usable fuel and payload.

Maximum Design Zero Fuel Weight (MZFW). Maximum weight allowed before usable fuel and other specified usable agents must be loaded in defined sections of the aircraft as limited by strength and airworthiness requirements.

Maximum Payload. Maximum design zero fuel weight minus operational empty weight.

Maximum Seating Capacity. The maximum number of passengers specifically certificated or anticipated for certification.

Maximum Cargo Volume. The maximum space available for cargo.

Usable Fuel. Fuel available for aircraft propulsion.

2.1.1 General Characteristics: Model 777-200 (General Electric Engines)

CHARACTERISTICS	UNITS	BASELINE AIRPLANE			HIGH GROSS WEIGHT OPTION		
MAX DESIGN TAXI WEIGHT	POUNDS	508,000	517,000	537,000	582,000	592,000	634,500
	KILOGRAMS	230,424	234,507	243,579	263,990	268,526	287,804
MAX DESIGN TAKEOFF WEIGHT	POUNDS	506,000	515,000	535,000	580,000	590,000	632,500
	KILOGRAMS	229,517	233,600	242,671	263,083	267,619	286,897
MAX DESIGN LANDING WEIGHT	POUNDS	441,000	445,000	445,000	460,000	460,000	460,000
	KILOGRAMS	200,034	201,848	201,848	208,652	208,652	208,652
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	420,000	420,000	420,000	430,000	430,000	430,000
	KILOGRAMS	190,508	190,508	190,508	195,044	195,044	195,044
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	298,900	298,900	299,550	304,500	304,500	304,500
	KILOGRAMS	135,578	135,578	135,873	138,118	138,118	138,118
MAX STRUCTURAL PAYLOAD (1)	POUNDS	121,100	121,100	120,450	125,550	125,550	125,550
	KILOGRAMS	54,930	54,930	54,635	56,948	56,948	56,948
SEATING CAPACITY (1)	TWO-CLASS	375 - 30 FIRST + 345 ECONOMY					
	THREE-CLASS	305 - 24 FIRST + 54 BUSINESS + 227 ECONOMY					
MAX CARGO - LOWER DECK	CUBIC FEET	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)
	CUBIC METERS	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)
USABLE FUEL	U.S. GALLONS	31,000	31,000	31,000	45,220	45,220	45,220
	LITERS	117,347	117,347	117,347	117,347	117,347	117,347
	POUNDS	207,700	207,700	207,700	207,700	207,700	207,700
	KILOGRAMS	94,230	94,230	94,230	94,230	94,230	94,230

NOTES:

1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 375 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 18 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 14 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.1.2 General Characteristics: Model 777-200 (Pratt & Whitney Engines)

CHARACTERISTICS	UNITS	BASELINE AIRPLANE			HIGH GROSS WEIGHT OPTION		
MAX DESIGN TAXI WEIGHT	POUNDS	508,000	517,000	537,000	582,000	592,000	634,500
	KILOGRAMS	230,424	234,507	243,579	263,990	268,526	287,804
MAX DESIGN TAKEOFF WEIGHT	POUNDS	506,000	515,000	535,000	580,000	590,000	632,500
	KILOGRAMS	229,517	233,600	242,671	263,083	267,619	286,897
MAX DESIGN LANDING WEIGHT	POUNDS	441,000	445,000	445,000	450,000	455,000	455,000
	KILOGRAMS	200,034	201,848	201,848	204,116	206,384	206,384
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	420,000	420,000	420,000	430,000	430,000	430,000
	KILOGRAMS	190,508	190,508	190,508	195,044	195,044	195,044
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	296,600	296,600	297,250	302,200	302,200	302,200
	KILOGRAMS	134,535	134,535	134,830	137,075	137,075	137,075
MAX STRUCTURAL PAYLOAD	POUNDS	123,400	123,400	122,750	127,800	127,800	127,800
	KILOGRAMS	55,973	55,973	55,678	57,969	57,969	57,969
SEATING CAPACITY (1)	TWO-CLASS	375 - 30 FIRST + 345 ECONOMY					
	THREE-CLASS	305 - 24 FIRST + 54 BUSINESS + 227 ECONOMY					
MAX CARGO - LOWER DECK	CUBIC FEET	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)
	CUBIC METERS	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)
USABLE FUEL	U.S. GALLONS	31,000	31,000	31,000	45,220	45,220	45,220
	LITERS	117,347	117,347	117,347	171,176	171,176	171,176
	POUNDS	207,700	207,700	207,700	302,974	302,974	302,974
	KILOGRAMS	94,230	94,230	94,230	137,454	137,454	137,454

NOTES:

1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 375 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 18 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 14 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.1.3 General Characteristics: Model 777-200 (Rolls-Royce Engines)

CHARACTERISTICS	UNITS	BASELINE AIRPLANE			HIGH GROSS WEIGHT		
MAX DESIGN TAXI WEIGHT	POUNDS	508,000	517,000	537,000	582,000	592,000	634,500
	KILOGRAMS	230,424	234,507	243,579	263,990	268,526	287,804
MAX DESIGN TAKEOFF WEIGHT	POUNDS	506,000	515,000	535,000	580,000	590,000	632,500
	KILOGRAMS	229,517	233,600	242,671	263,083	267,619	286,897
MAX DESIGN LANDING WEIGHT	POUNDS	441,000	445,000	445,000	450,000	455,000	455,000
	KILOGRAMS	200,034	201,848	201,848	204,116	206,384	206,384
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	420,000	420,000	420,000	430,000	430,000	430,000
	KILOGRAMS	190,508	190,508	190,508	195,044	195,044	195,044
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	293,400	293,400	294,050	299,000	299,000	299,000
	KILOGRAMS	133,084	133,084	133,378	135,624	135,624	135,624
MAX STRUCTURAL PAYLOAD (1)	POUNDS	126,600	126,600	125,950	131,000	131,000	131,000
	KILOGRAMS	57,424	57,424	57,129	59,420	59,420	59,420
SEATING CAPACITY (1)	TWO-CLASS	375 - 30 FIRST + 345 ECONOMY					
	THREE-CLASS	305 - 24 FIRST + 54 BUSINESS + 227 ECONOMY					
MAX CARGO - LOWER DECK	CUBIC FEET	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)	5,656 (2)
	CUBIC METERS	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)	160.3 (2)
USABLE FUEL	U.S. GALLONS	31,000	31,000	31,000	45,220	45,220	45,220
	LITERS	117,347	117,347	117,347	117,347	117,347	117,347
	POUNDS	207,700	207,700	207,700	207,700	207,700	207,700
	KILOGRAMS	94,230	94,230	94,230	94,230	94,230	94,230

NOTES:

1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 375 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 18 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 14 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.1.4 General Characteristics: Model 777-300 (General Electric Engines)

CHARACTERISTICS	UNITS	BASELINE AIRPLANE			
MAX DESIGN TAXI WEIGHT	POUNDS	582,000	592,000	634,500	662,000
	KILOGRAMS	263,990	268,526	287,804	300,278
MAX DESIGN TAKEOFF WEIGHT	POUNDS	580,000	590,000	632,500	660,000
	KILOGRAMS	263,083	267,619	286,897	299,370
MAX DESIGN LANDING WEIGHT	POUNDS	524,000	524,000	524,000	524,000
	KILOGRAMS	237,682	237,682	237,682	237,682
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	495,000	495,000	495,000	495,000
	KILOGRAMS	224,528	224,528	224,528	224,528
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	353,800	353,800	353,800	353,800
	KILOGRAMS	160,480	160,480	160,480	160,480
MAX STRUCTURAL PAYLOAD	POUNDS	141,200	141,200	141,200	141,200
	KILOGRAMS	64,047	64,047	64,047	64,047
SEATING CAPACITY (1)	TWO-CLASS	451 - 40 FIRST + 411 ECONOMY			
	THREE-CLASS	368 - 30 FIRST + 84 BUSINESS + 254 ECONOMY			
MAX CARGO - LOWER DECK	CUBIC FEET	7,552 (2)	7,552 (2)	7,552 (2)	7,552 (2)
	CUBIC METERS	213.9 (2)	213.9 (2)	213.9 (2)	213.9 (2)
USABLE FUEL	U.S. GALLONS	44,700	44,700	44,700	44,700
	LITERS	169,207	169,207	169,207	169,207
	POUNDS	299,490	299,490	299,490	299,490
	KILOGRAMS	135,873	135,873	135,873	135,873

NOTES:

1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 451 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 24 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 20 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.1.5 General Characteristics: Model 777-300 (Pratt & Whitney Engines)

CHARACTERISTICS	UNITS	BASELINE AIRPLANE			
MAX DESIGN TAXI WEIGHT	POUNDS	582,000	592,000	634,500	662,000
	KILOGRAMS	263,990	268,526	287,804	300,278
MAX DESIGN TAKEOFF WEIGHT	POUNDS	580,000	590,000	632,500	660,000
	KILOGRAMS	263,083	267,619	286,897	299,370
MAX DESIGN LANDING WEIGHT	POUNDS	524,000	524,000	524,000	524,000
	KILOGRAMS	237,682	237,682	237,682	237,682
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	495,000	495,000	495,000	495,000
	KILOGRAMS	224,528	224,528	224,528	224,528
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	351,700	351,700	351,700	351,700
	KILOGRAMS	159,528	159,528	159,528	159,528
MAX STRUCTURAL PAYLOAD	POUNDS	143,300	143,300	143,300	143,300
	KILOGRAMS	64,999	64,999	64,999	64,999
SEATING CAPACITY (1)	TWO-CLASS	451 - 40 FIRST + 411 ECONOMY			
	THREE-CLASS	368 - 30 FIRST + 84 BUSINESS + 254 ECONOMY			
MAX CARGO - LOWER DECK	CUBIC FEET	7,552 (2)	7,552 (2)	7,552 (2)	7,552 (2)
	CUBIC METERS	213.9 (2)	213.9 (2)	213.9 (2)	213.9 (2)
USABLE FUEL	U.S. GALLONS	44,700	44,700	44,700	44,700
	LITERS	169,207	169,207	169,207	169,207
	POUNDS	299,490	299,490	299,490	299,490
	KILOGRAMS	135,873	135,873	135,873	135,873

NOTES:

1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 451 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 24 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 20 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.1.6 General Characteristics: Model 777-300 (Rolls-Royce Engines)

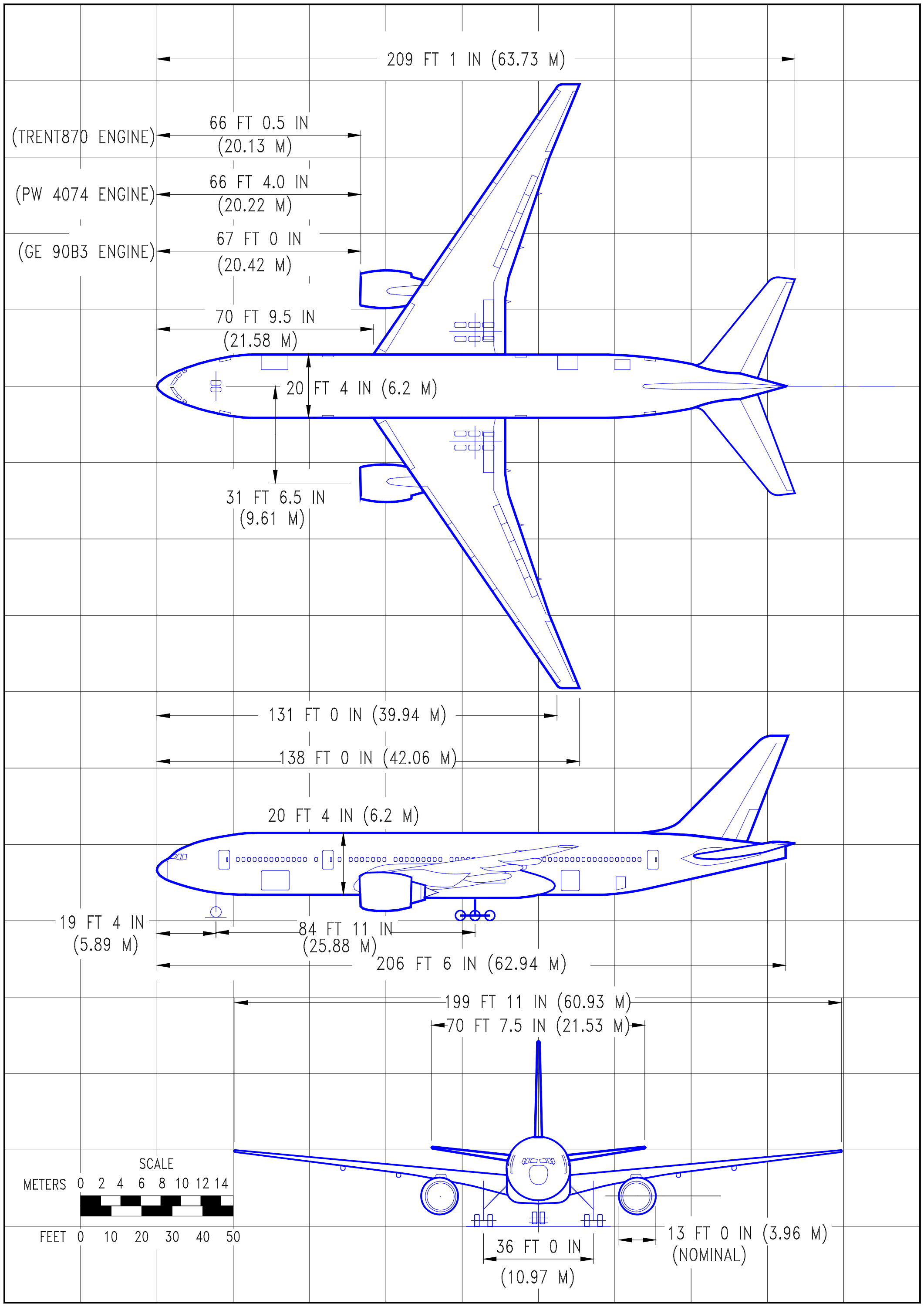
CHARACTERISTICS	UNITS	BASELINE AIRPLANE			
MAX DESIGN TAXI WEIGHT	POUNDS	582,000	592,000	634,500	662,000
	KILOGRAMS	263,990	268,526	287,804	300,278
MAX DESIGN TAKEOFF WEIGHT	POUNDS	580,000	590,000	632,500	660,000
	KILOGRAMS	263,083	267,619	286,897	299,370
MAX DESIGN LANDING WEIGHT	POUNDS	524,000	524,000	524,000	524,000
	KILOGRAMS	237,682	237,682	237,682	237,682
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	495,000	495,000	495,000	495,000
	KILOGRAMS	224,528	224,528	224,528	224,528
SPEC OPERATING EMPTY WEIGHT (1)	POUNDS	347,800	347,800	347,800	347,800
	KILOGRAMS	157,759	157,759	157,759	157,759
MAX STRUCTURAL PAYLOAD	POUNDS	147,200	147,200	147,200	147,200
	KILOGRAMS	66,768	66,768	66,768	66,768
SEATING CAPACITY (1)	TWO-CLASS	451 - 40 FIRST + 411 ECONOMY			
	THREE-CLASS	368 - 30 FIRST + 84 BUSINESS + 254 ECONOMY			
MAX CARGO - LOWER DECK	CUBIC FEET	7,552 (2)	7,552 (2)	7,552 (2)	7,552 (2)
	CUBIC METERS	213.9 (2)	213.9 (2)	213.9 (2)	213.9 (2)
USABLE FUEL	U.S. GALLONS	44,700	44,700	44,700	44,700
	LITERS	169,207	169,207	169,207	169,207
	POUNDS	299,490	299,490	299,490	299,490
	KILOGRAMS	135,873	135,873	135,873	135,873

NOTES:

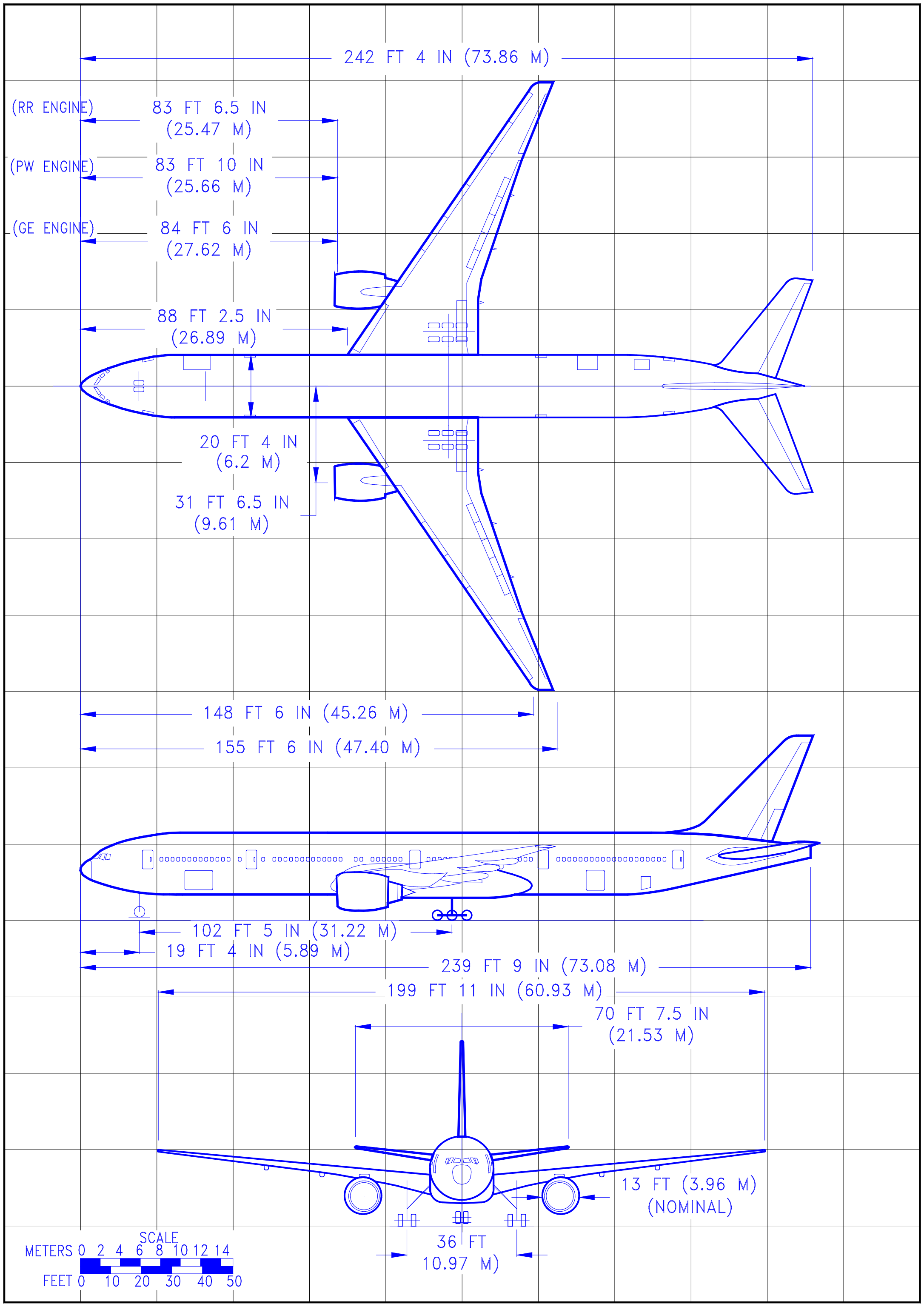
1. SPEC WEIGHT FOR BASELINE CONFIGURATION OF 451 PASSENGERS. CONSULT WITH AIRLINE FOR SPECIFIC WEIGHTS AND CONFIGURATIONS.
2. FWD CARGO = 24 LD3'S AT 158 CU FT EACH.
   AFT CARGO = 20 LD3'S AT 158 CU FT EACH.
   BULK CARGO = 600 CU FT

2.2 GENERAL DIMENSIONS

2.2.1 General Dimensions: Model 777-200

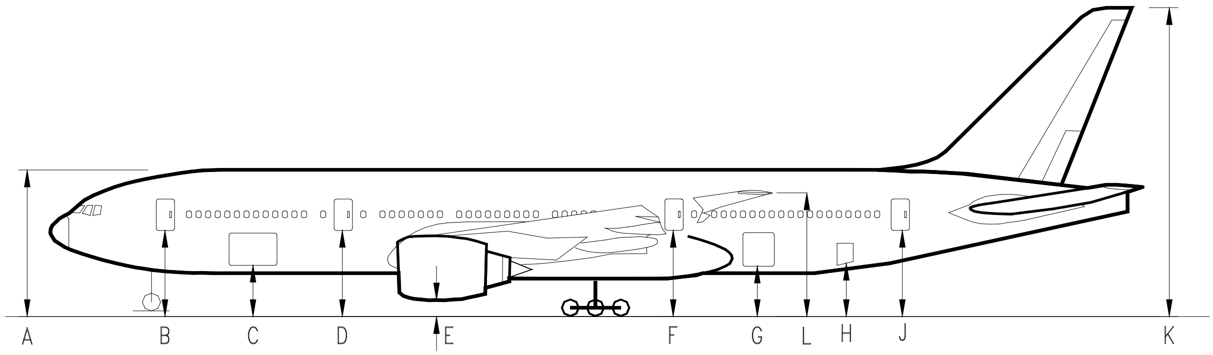


2.2.2 General Dimensions: Model 777-300



2.3 GROUND CLEARANCES

2.3.1 Ground Clearances: Model 777-200



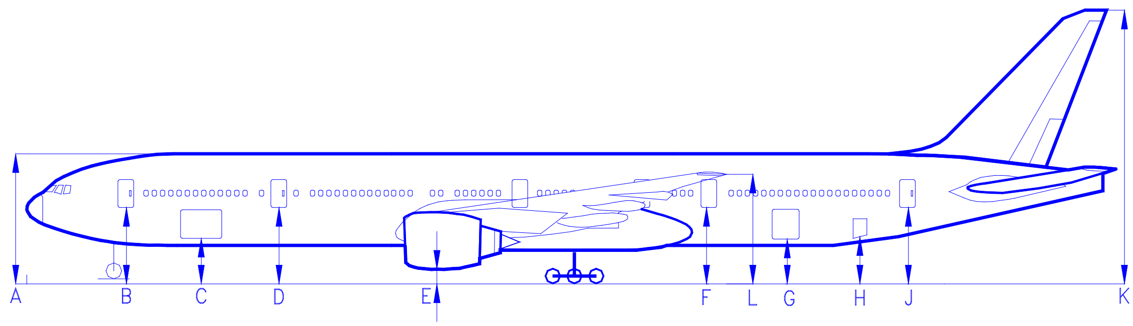
Dimension	MINIMUM*		MAXIMUM*	
	FT - IN	M	FT - IN	M
A	27 -6	8.39	28 - 6	8.68
B	15 - 5	4.71	16 - 5	5.00
C	9 - 3	2.81	10 - 0	3.05
D	16 - 0	4.88	16 - 7	5.07
E (PW)	3 - 2	0.96	3 - 5	1.04
E (GE)	2 - 10	0.85	3 - 1	0.93
E (RR)	3 - 7	1.09	3 - 10	1.17
F	16 - 10	5.14	17 - 4	5.28
G(LARGE DOOR)	10 - 7	3.23	11 - 2	3.41
G(SMALL DOOR)	10 - 6	3.22	11 - 2	3.40
H	10 - 7	3.23	11 - 5	3.48
J	17 - 4	5.28	18 - 2	5.54
K	60 - 5	18.42	61 - 6	18.76
L	23 - 6	7.16	24 - 6	7.49

NOTES: VERTICAL CLEARANCES SHOWN OCCUR DURING MAXIMUM VARIATIONS OF AIRPLANE ATTITUDE. COMBINATIONS OF AIRPLANE LOADING AND UNLOADING ACTIVITIES THAT PRODUCE THE GREATEST POSSIBLE VARIATIONS IN ATTITUDE WERE USED TO ESTABLISH THE VARIATIONS SHOWN.

DURING ROUTINE SERVICING, THE AIRPLANE REMAINS RELATIVELY STABLE, PITCH AND ELEVATION CHANGES OCCURRING SLOWLY.

* NOMINAL DIMENSIONS

2.3.2 Ground Clearances: Model 777-300



Dimension	MINIMUM		MAXIMUM	
	FT - IN	M	FT - IN	M
A	27 -6	8.39	28 - 6	8.68
B	15 - 5	4.71	16 - 5	5.00
C	9 - 3	2.81	10 - 0	3.05
D	16 - 0	4.88	16 - 7	5.07
E (PW)	3 - 2	0.96	3 - 5	1.04
E (GE)	2 - 10	0.85	3 - 1	0.93
E (RR)	3 - 7	1.09	3 - 10	1.17
F	16 - 10	5.14	17 - 4	5.28
G(LARGE DOOR)	10 - 7	3.23	11 - 2	3.41
G(SMALL DOOR)	10 - 6	3.22	11 - 2	3.40
H	10 - 7	3.23	11 - 5	3.48
J	17 - 4	5.28	18 - 2	5.54
K	60 - 5	18.42	61 - 6	18.76
L	23 - 6	7.16	24 - 6	7.49

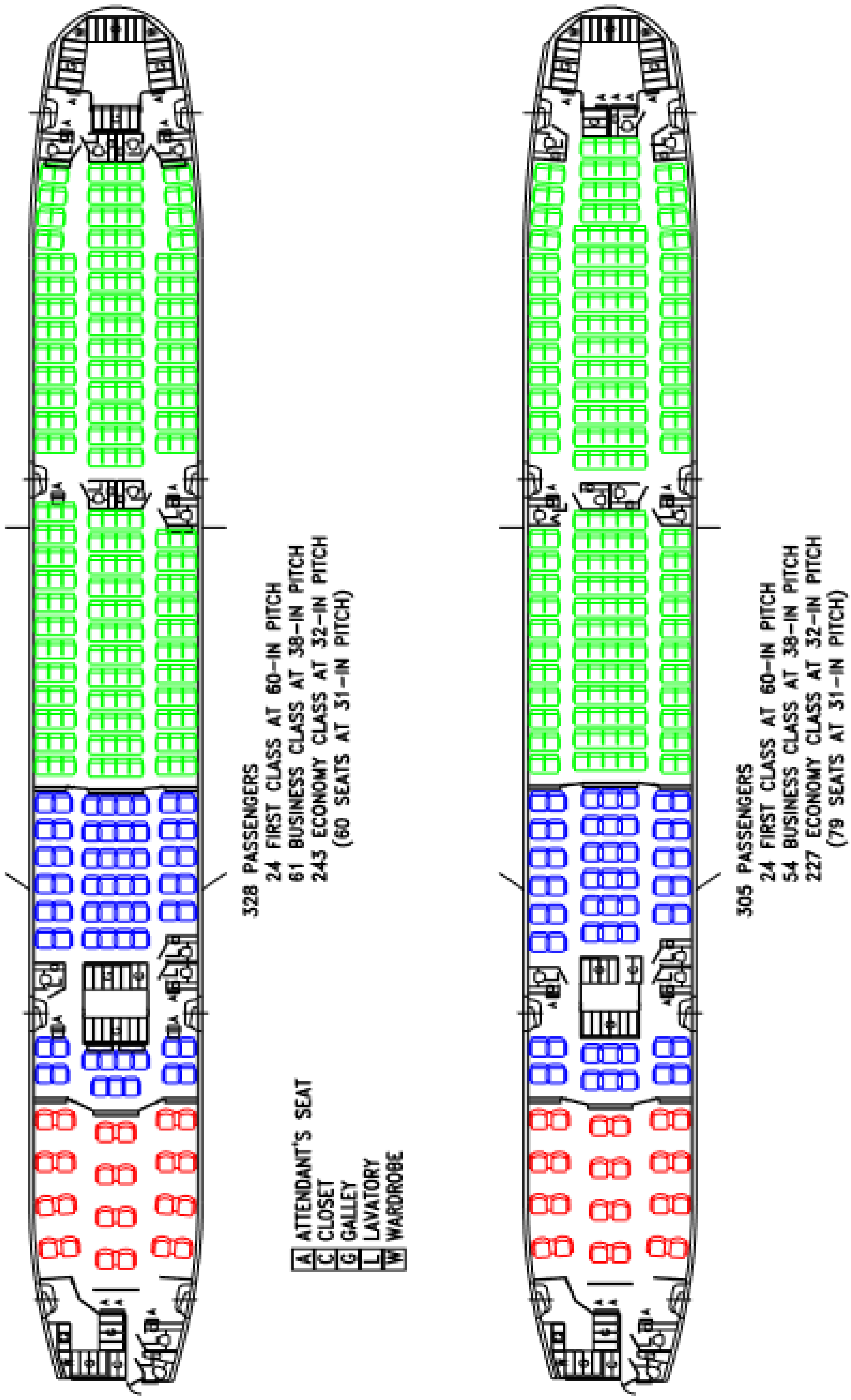
NOTES: VERTICAL CLEARANCES SHOWN OCCUR DURING MAXIMUM VARIATIONS OF AIRPLANE ATTITUDE. COMBINATIONS OF AIRPLANE LOADING AND UNLOADING ACTIVITIES THAT PRODUCE THE GREATEST POSSIBLE VARIATIONS IN ATTITUDE WERE USED TO ESTABLISH THE VARIATIONS SHOWN.

DURING ROUTINE SERVICING, THE AIRPLANE REMAINS RELATIVELY STABLE, PITCH AND ELEVATION CHANGES OCCURRING SLOWLY.

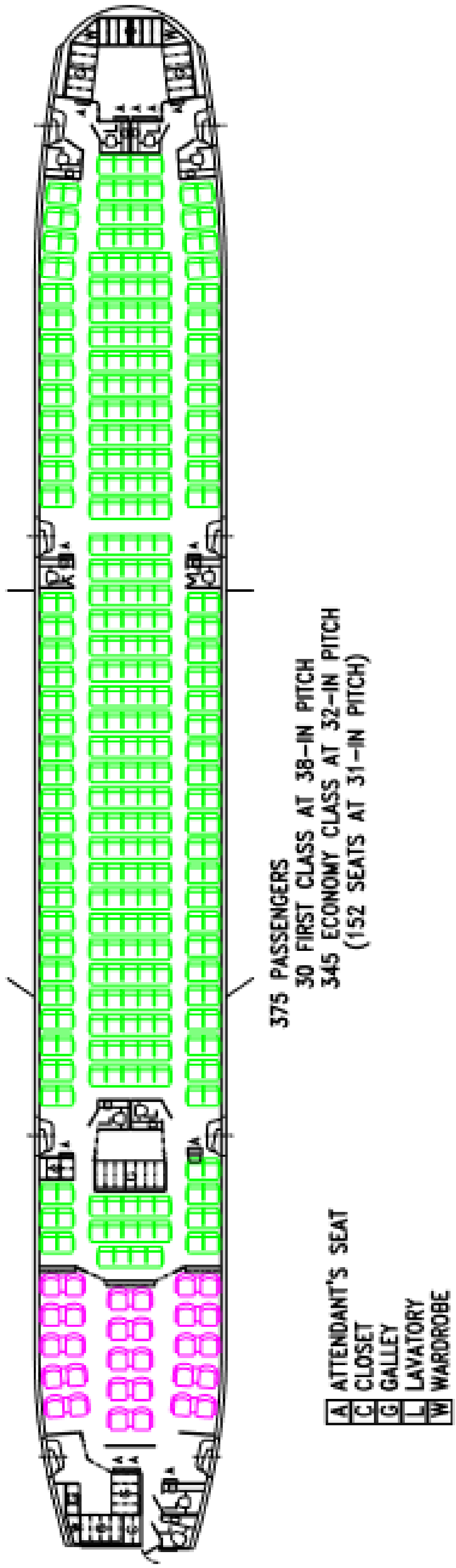
* NOMINAL DIMENSIONS

2.4 INTERIOR ARRANGEMENTS

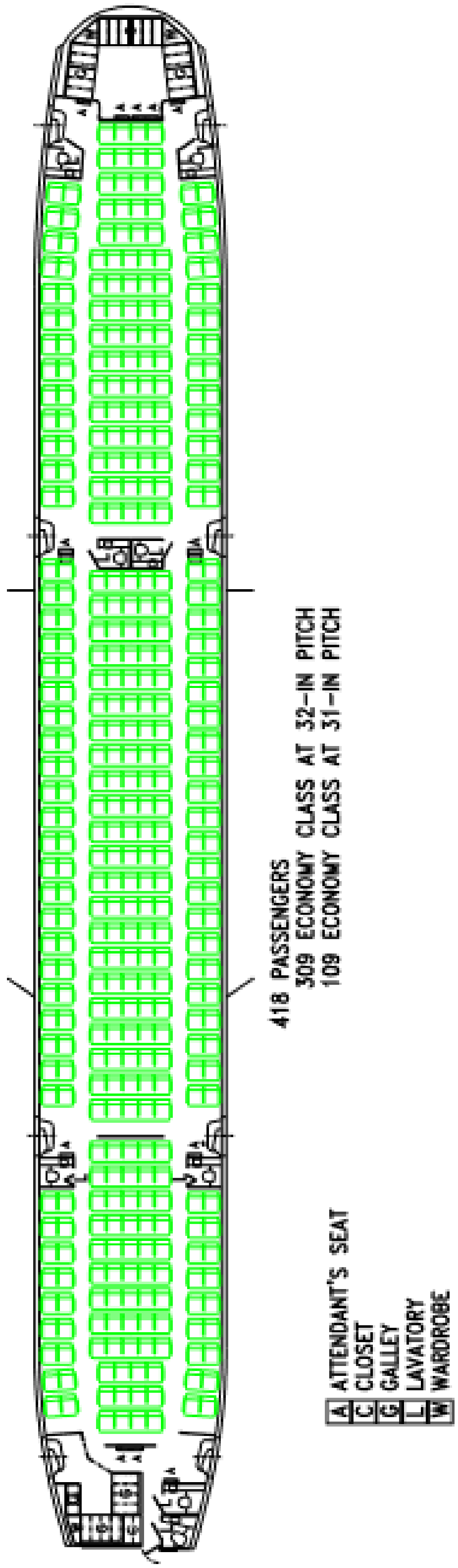
2.4.1 Interior Arrangements: Model 737-200, Tri-Class Configuration

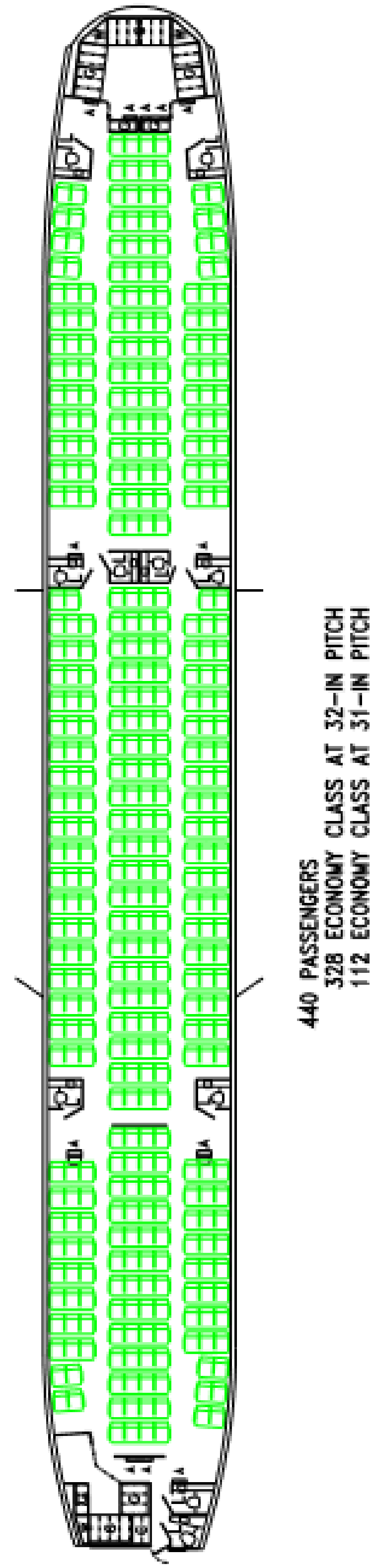


2.4.2 Interior Arrangements: Model 777-200, Two- Class Configuration

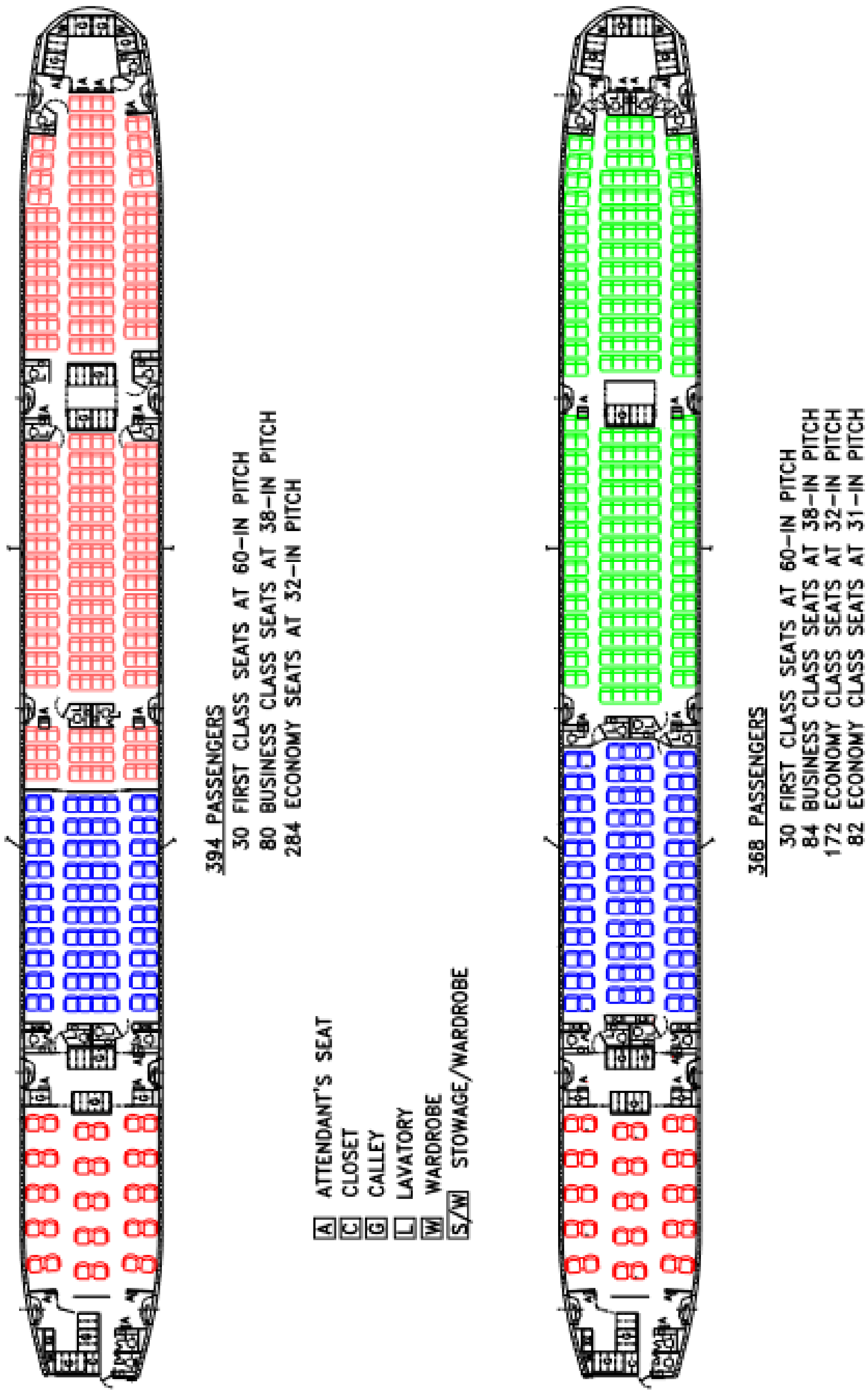


2.4.3 Interior Arrangements: Model 777-200, All-Economy Configuration

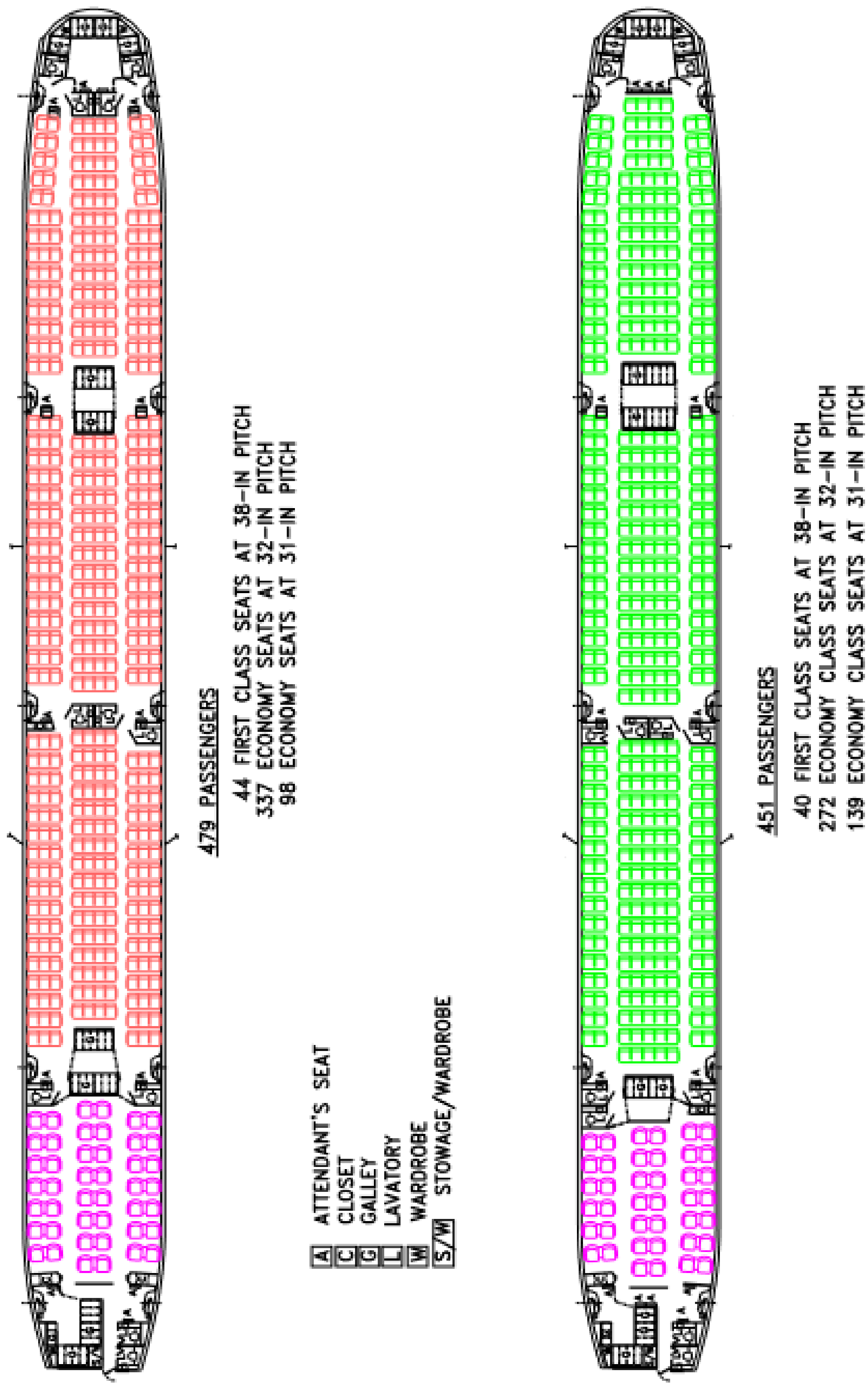




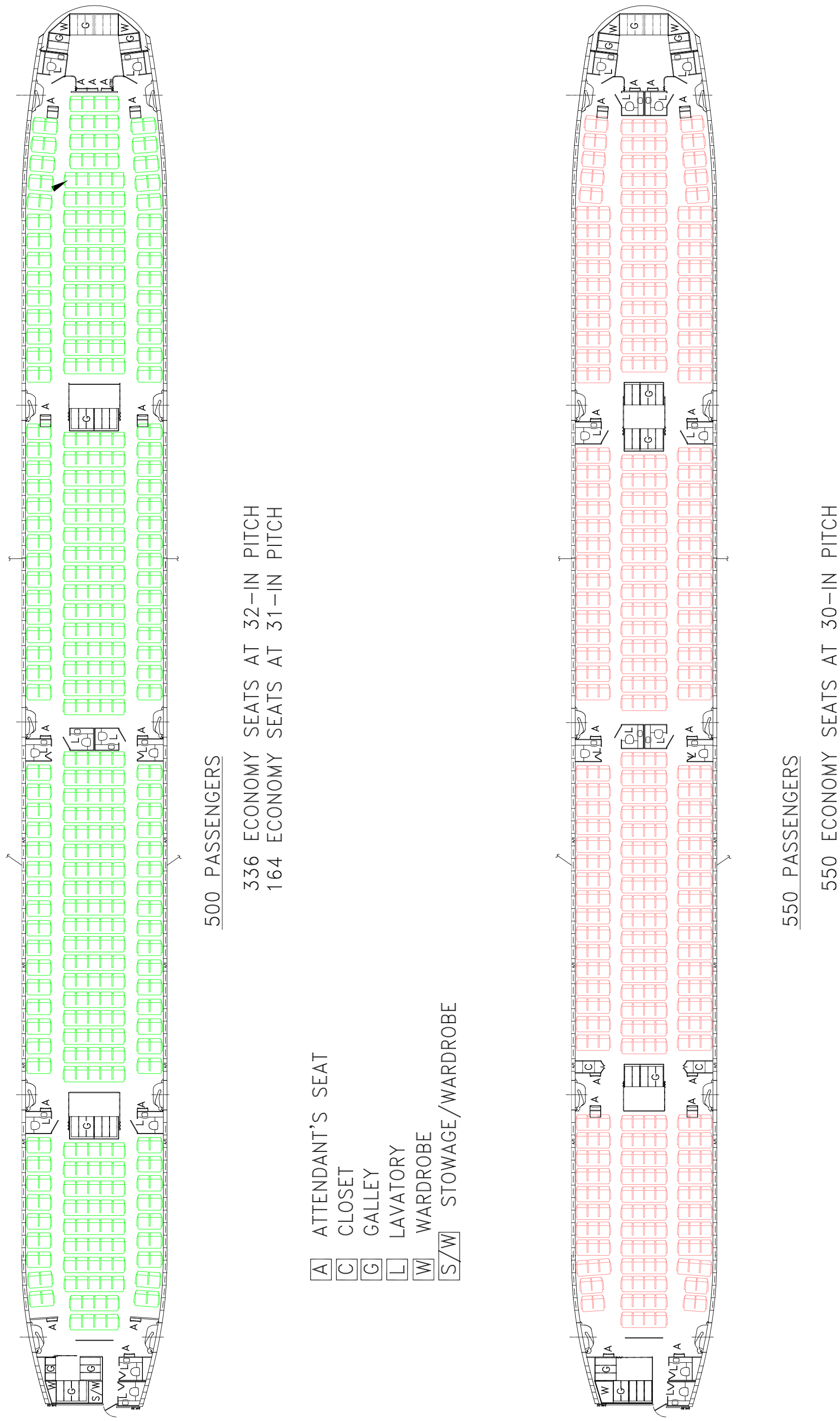
2.4.4 Interior Arrangements: Model 777-300, Tri-Class Configuration



2.4.5 Interior Arrangements: Model 777-300, Two-Class Configuration

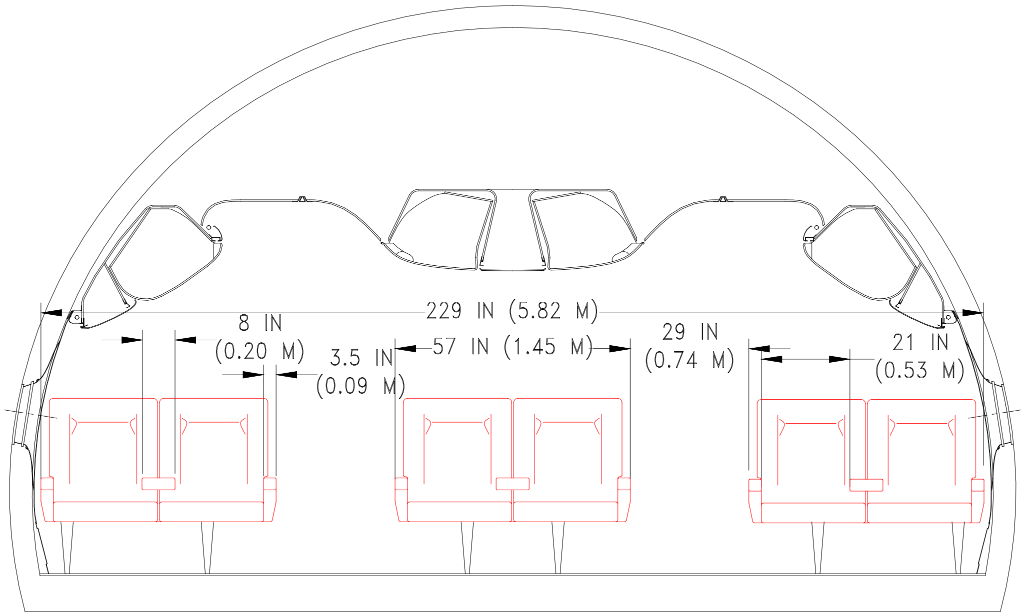


2.4.6 Typical Interior Arrangements: Model 777-300, All-Economy Configuration

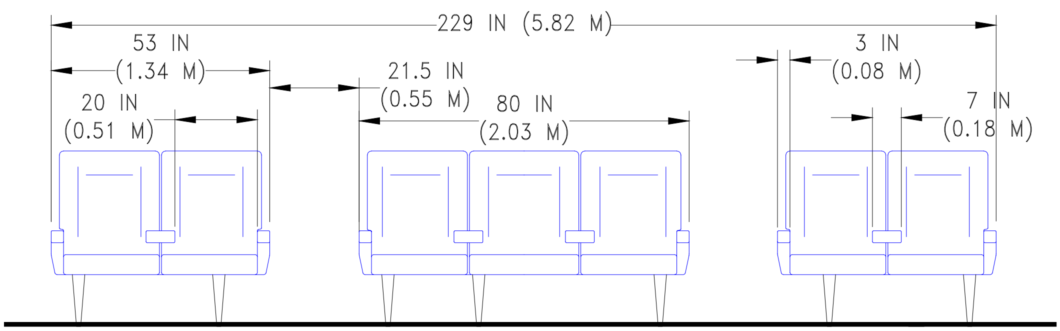


2.5 CABIN CROSS SECTIONS

2.5.1 Cabin Cross-Sections: Model 777-200, -300, First and Business Class Seats

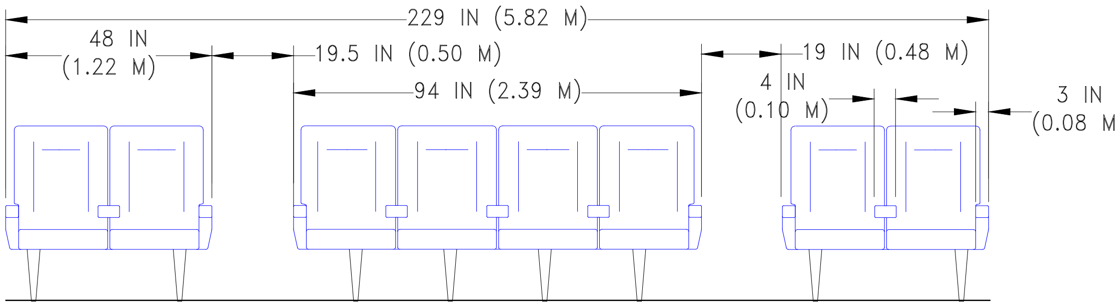


FIRST CLASS SEATING
SIX ABREAST

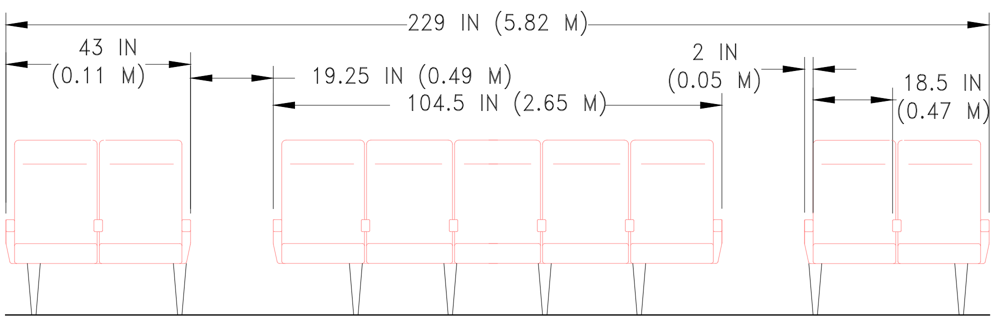


BUSINESS CLASS SEATING
SEVEN–ABREAST

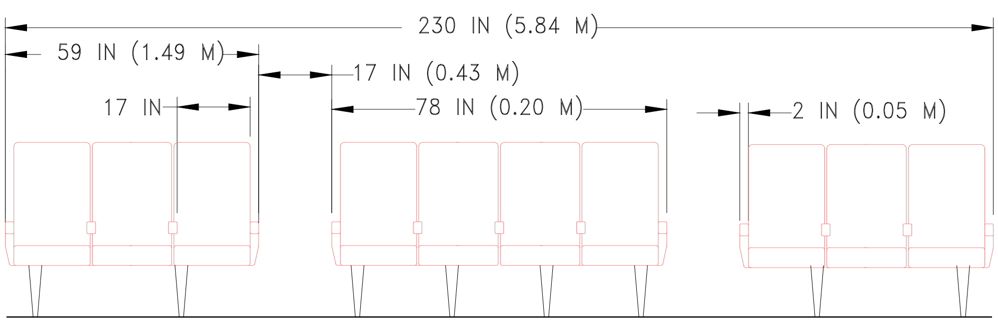
2.5.2 Cabin Cross-Sections: Model 777-200, -300, Business and Economy Class Seats



BUSINESS CLASS SEATING
EIGHT–ABREAST



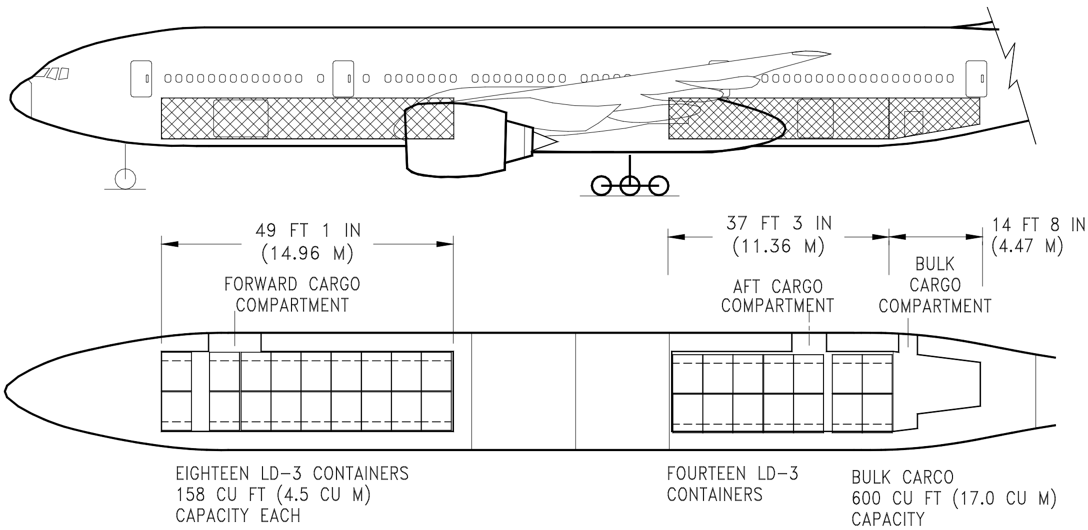
ECONOMY CLASS SEATING
NINE–ABREAST



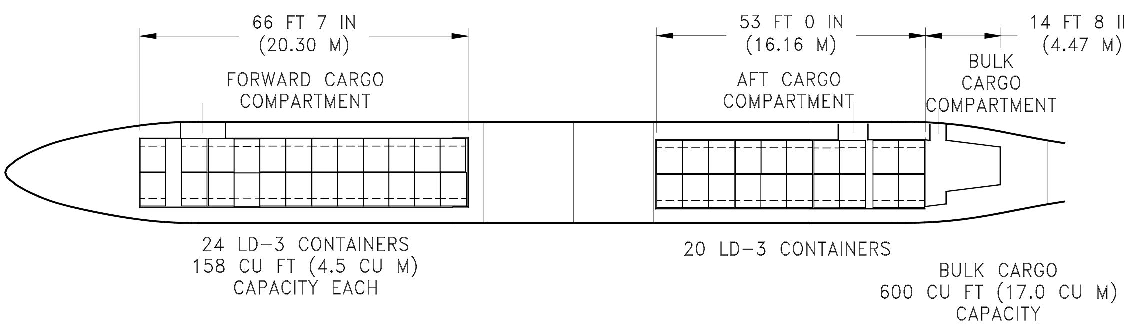
ECONOMY CLASS SEATING
TEN–ABREAST

2.6 LOWER CARGO COMPARTMENTS

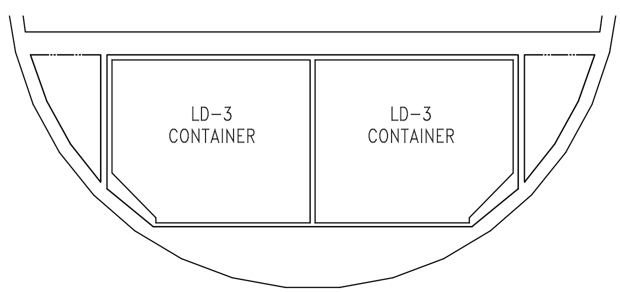
2.6.1 Lower Cargo Compartments: Model 777-200, -300, Containers and Bulk Cargo



MODEL 777-200

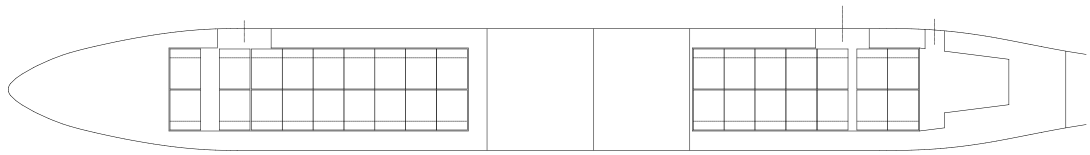


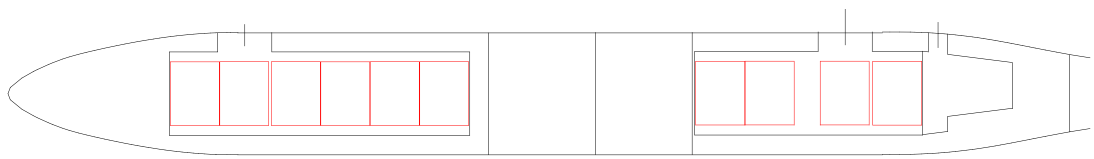
MODEL 777-300

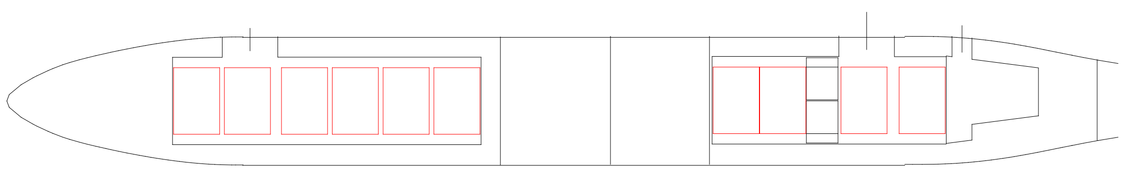


CROSS SECTION

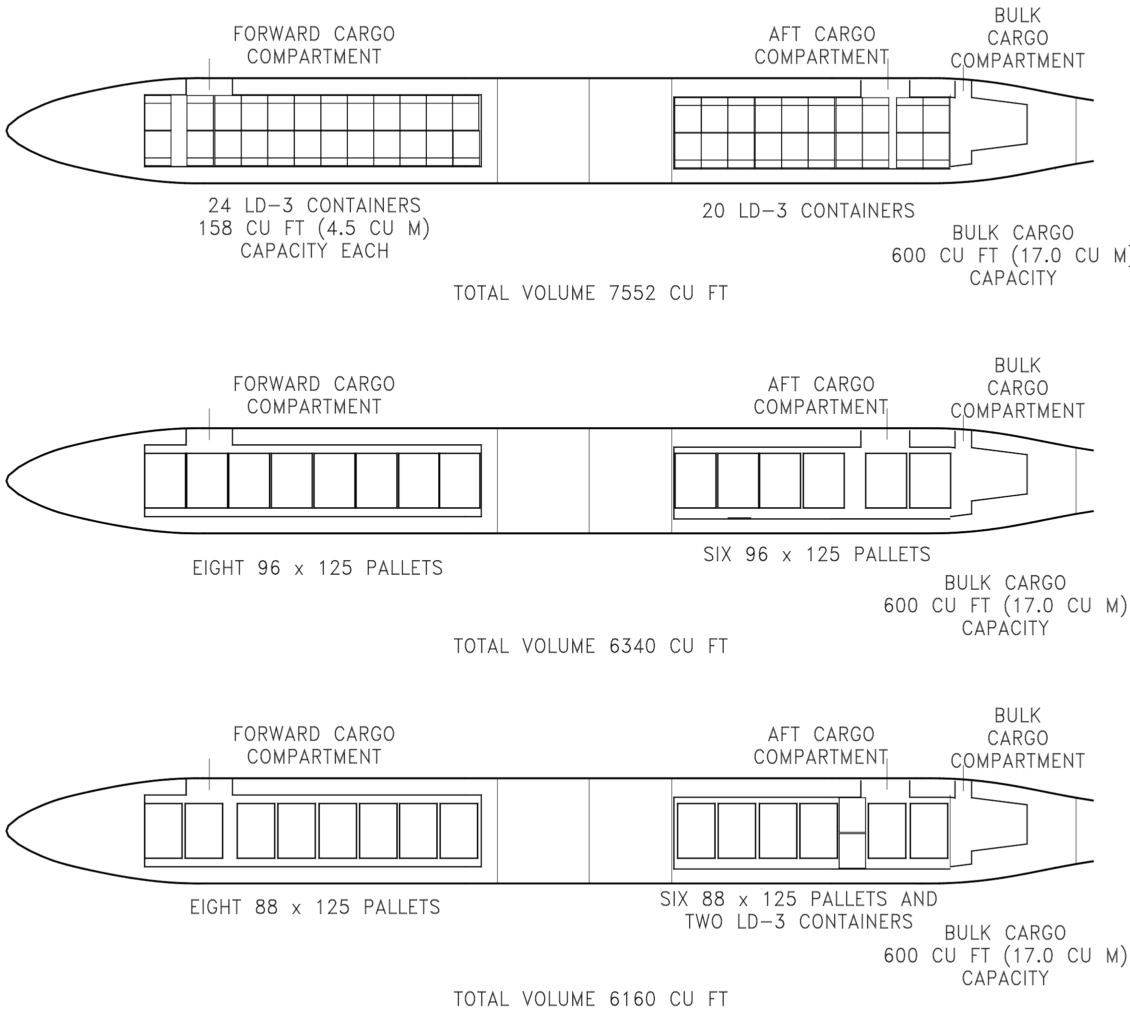
2.6.2 Lower Cargo Compartments: Model 777-200, Optional Aft Large Cargo Door





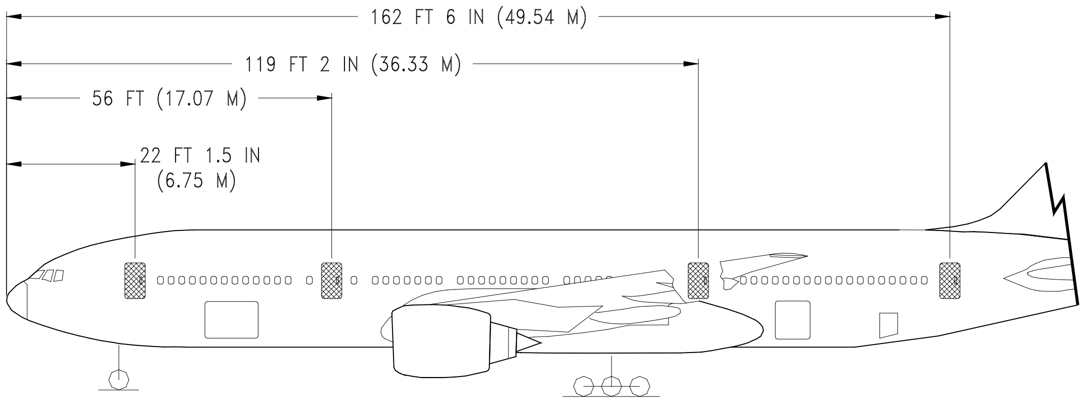


2.6.3 Lower Cargo Compartments: Model 777-300, Optional Aft Large Cargo Door

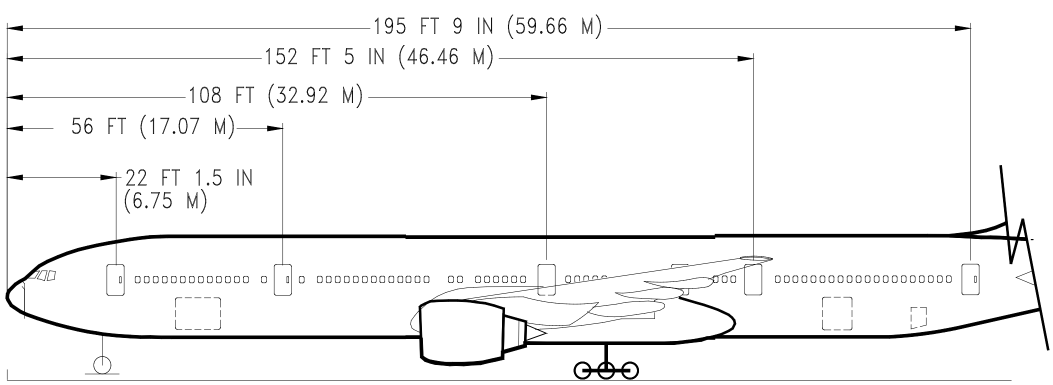


2.7 DOOR CLEARANCES

2.7.1 Door Clearances: Model 777-300, Main Entry Door Locations



MODEL 777-200

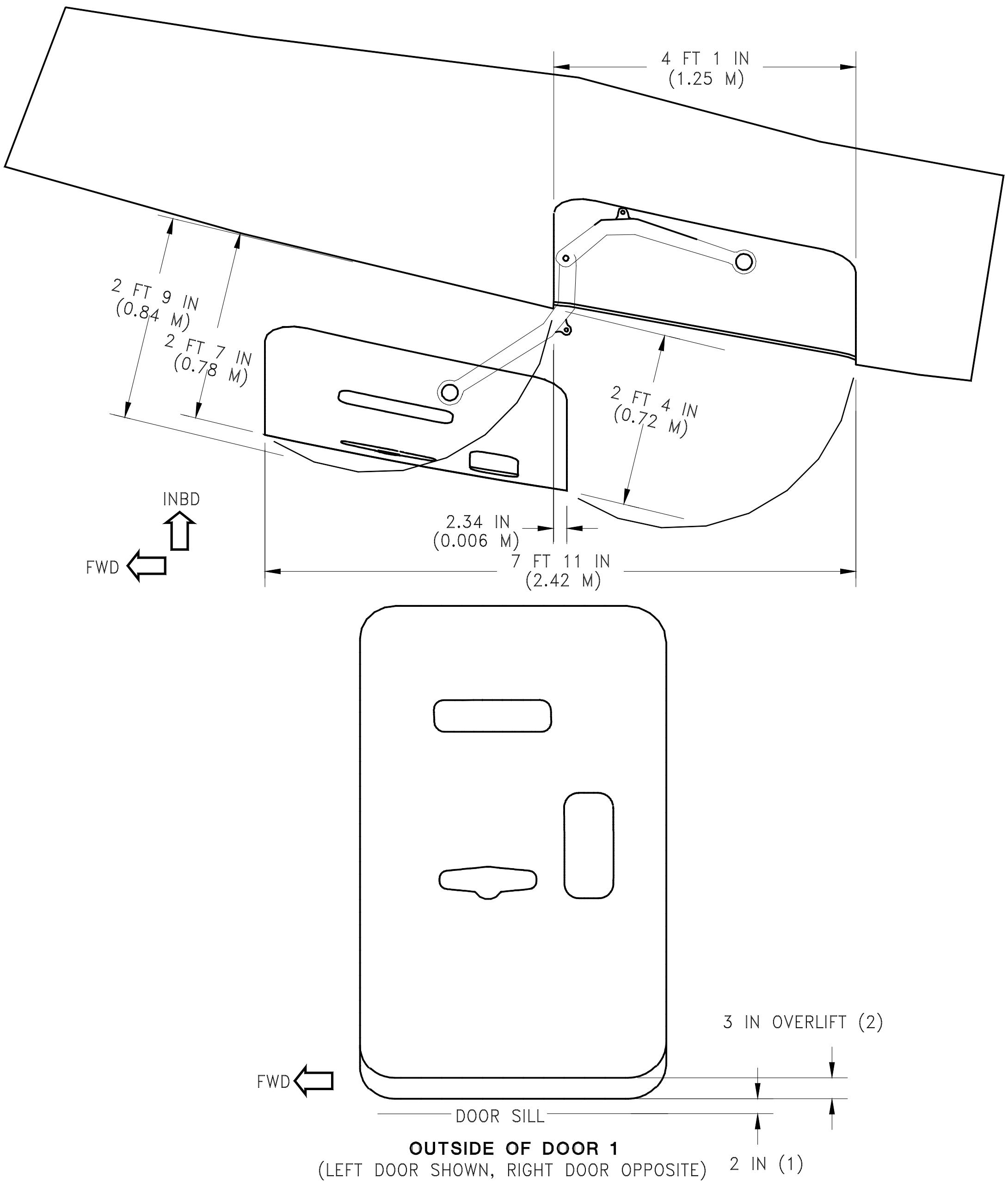


MODEL 777-300

NOTES:

1. MODEL 777-200 - EIGHT PASSENGER DOORS, 4 ON EACH SIDE DOOR OPENING SIZE = 42 BY 74 IN (1.07 M BY 1.88 M) DOOR SIZE = 42 BY 74 IN (1.07 BY 1.88 M)
2. MODEL 777-300 - TEN PASSENGER DOORS, 5 ON EACH SIDE DOOR OPENING AND SIZE SAME AS IN 777-200.
3. DOORS ARE TRANSLATING TYPE A DOORS
4. SEE SECTION 2.3 FOR DOOR SILL HEIGHTS.

2.7.2 Door Clearances: Model 777-200, -300, Main Entry Door No 1

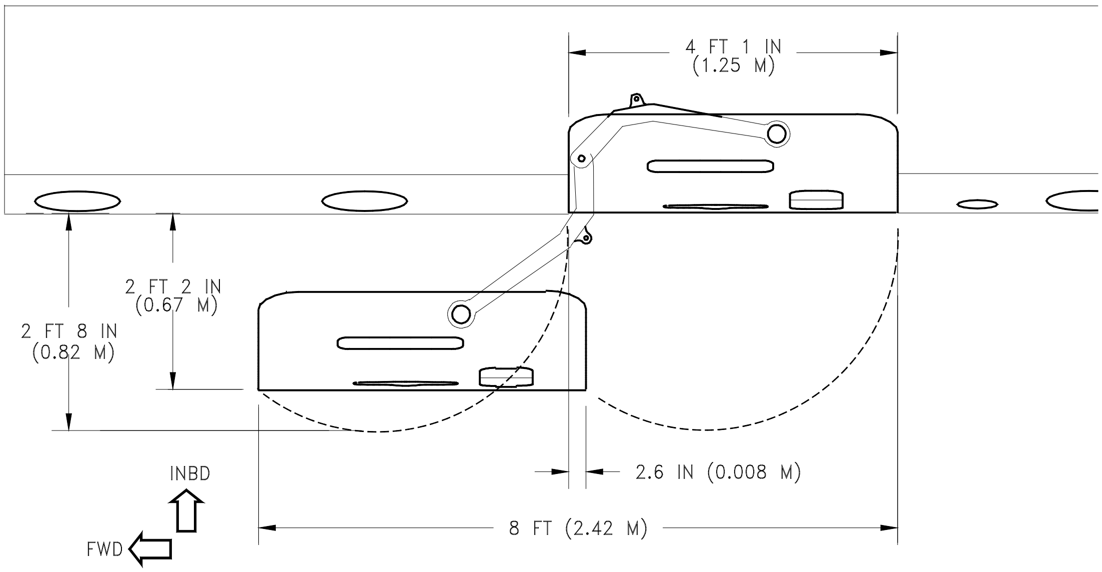


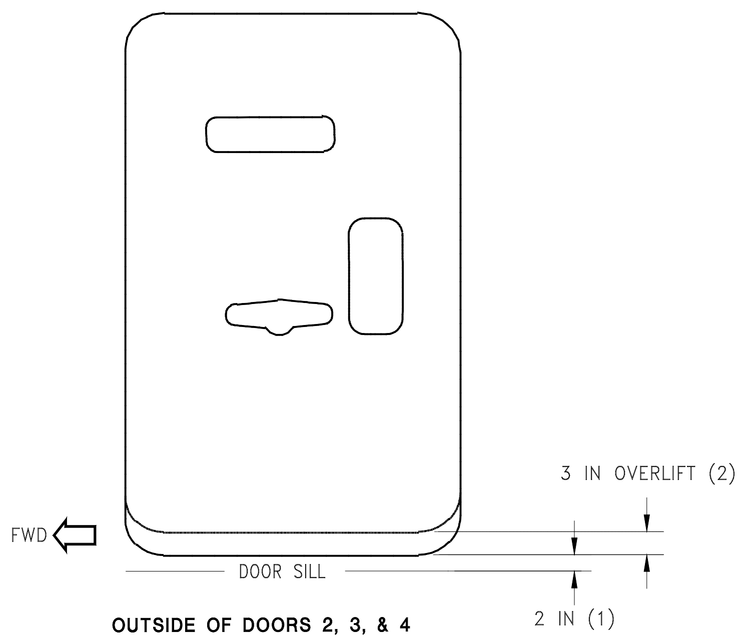
NOTES:

(1) DOOR MOVES UPWARD 2 IN. AND INWARD 0.4 IN. TO CLEAR STOPS BEFORE OPENING OUTWARD

(2) DOOR CAPABLE OF MOVING AN ADDITIONAL 3 IN VERTICALLY (OVERLIFT) TO PRECLUDE DAMAGE FROM CONTACT WITH LOADING BRIDGE

2.7.3 Door Clearances: Model 777-200, -300, Main Entry Door No 2, No 3, and No 4



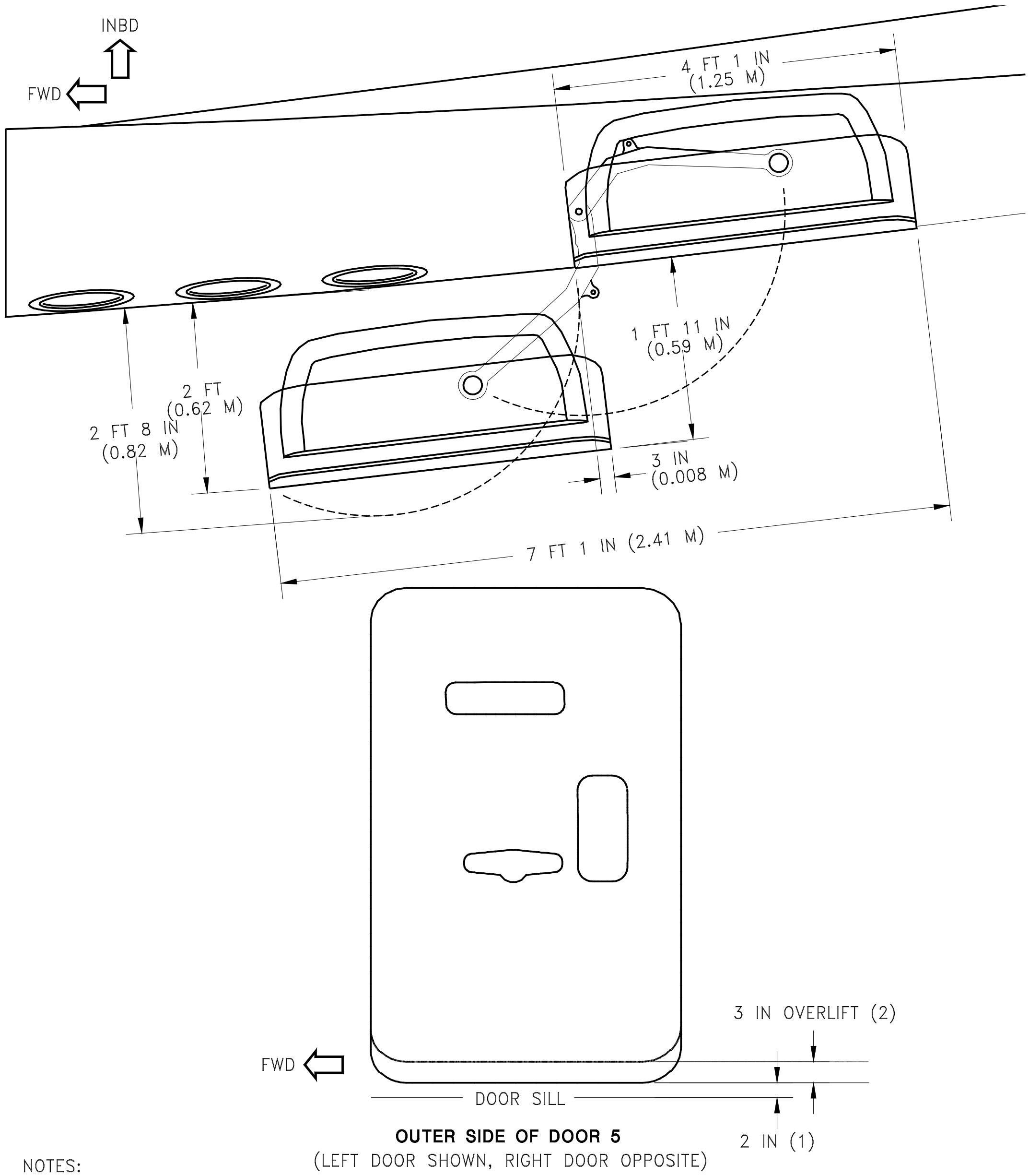


OUTSIDE OF DOORS 2, 3, & 4
(LEFT DOORS SHOWN, RIGHT DOORS OPPOSITE)

NOTES:

1. DOOR MOVES UPWARD 2 IN AND INWARD 0.4 IN TO CLEAR STOPS BEFORE OPENING OUTWARD
2. DOOR CAPABLE OF MOVING AN ADDITIONAL 3 IN VERTICALLY (OVERLIFT) TO PRECLUDE DAMAGE FROM CONTACT WITH LOADING BRIDGE.
3. DOOR NO 2 AND 3 ON 777-200, DOOR NO 2, 3, AND 4 ON 777-300

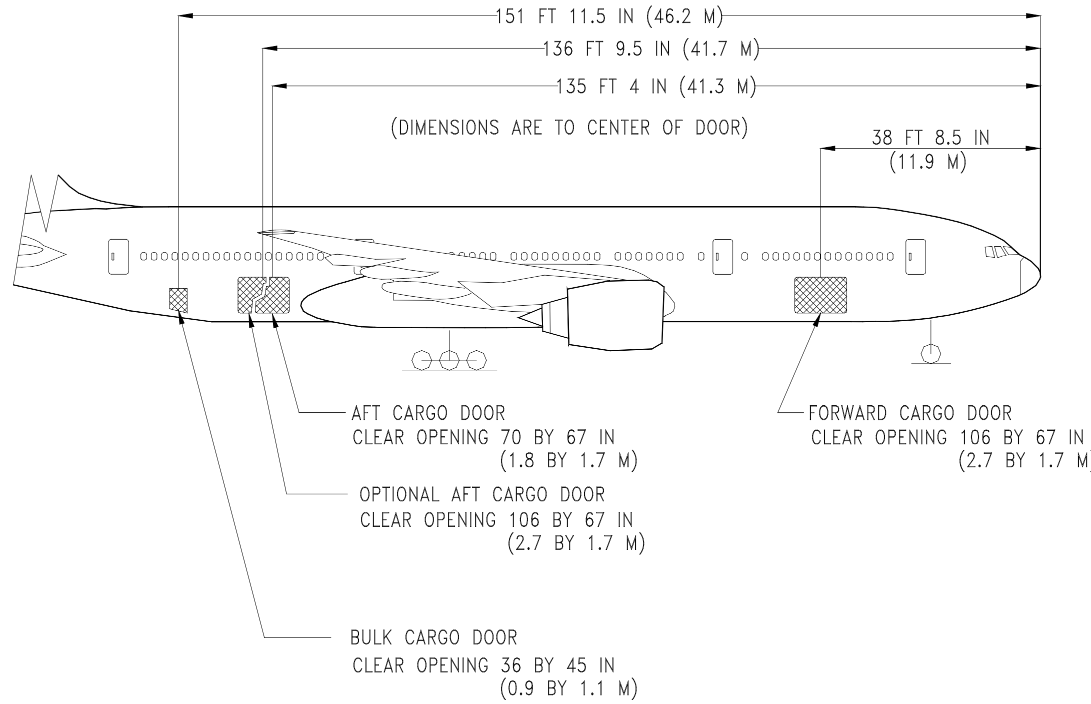
2.7.4 Door Clearances: Model 777-200, -300, Main Entry Door No 4, or No 5



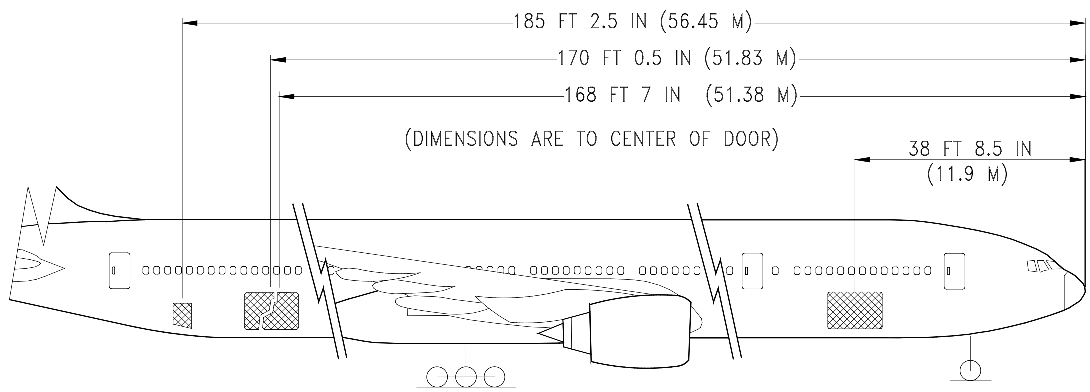
NOTES:

1. DOOR MOVES UPWARD 2 IN AND INWARD 0.4 IN TO CLEAR STOPS BEFORE OPENING OUTWARD
2. DOOR CAPABLE OF MOVING AN ADDITIONAL 3 IN VERTICALLY (OVERLIFT) TO PRECLUDE DAMAGE FROM CONTACT WITH LOADING BRIDGE.
3. DOOR NO 4 ON 777-200, DOOR NO 5 ON 777-300

2.7.5 Door Clearances: Model 777-300, Cargo Door Locations

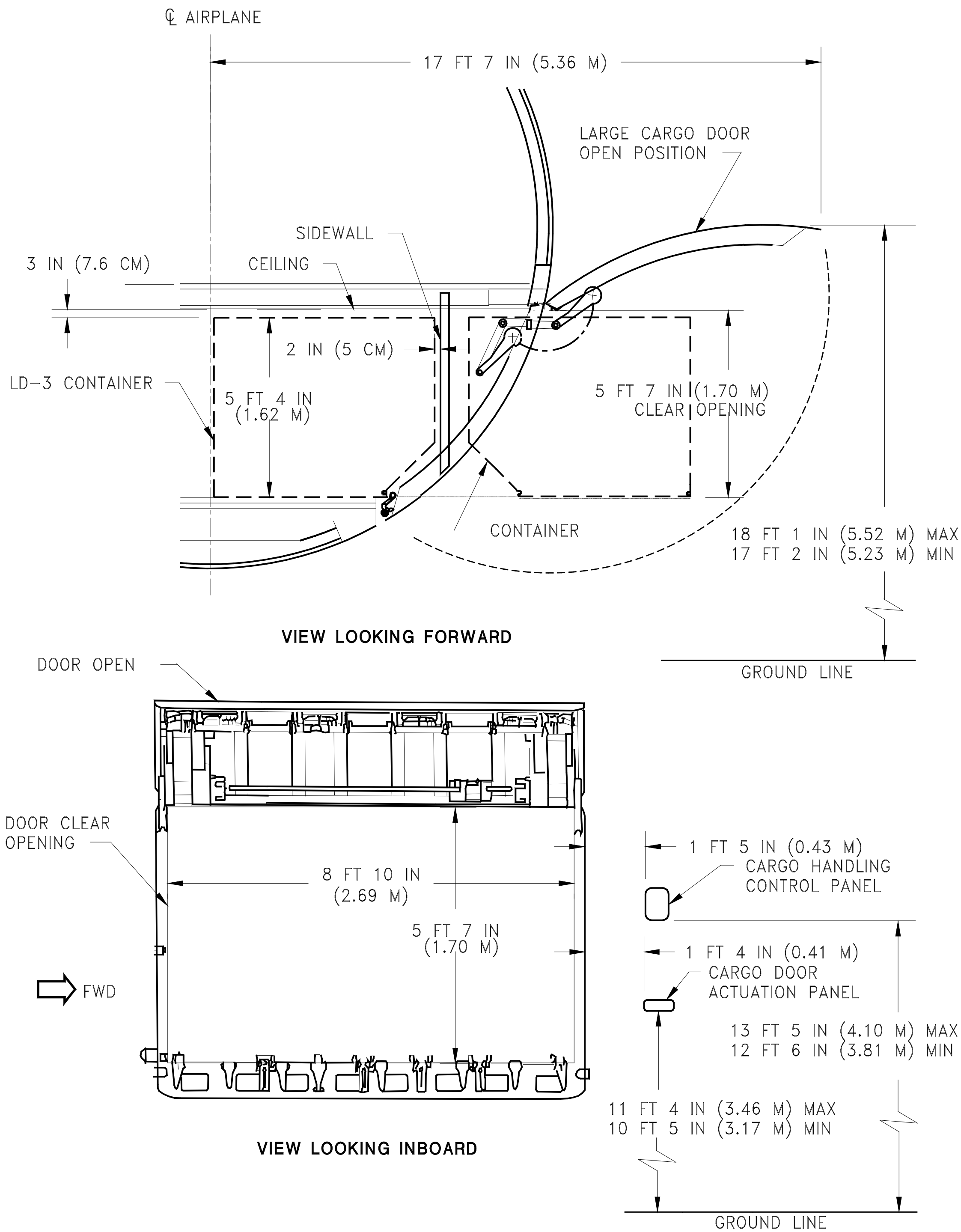


MODEL 777-200

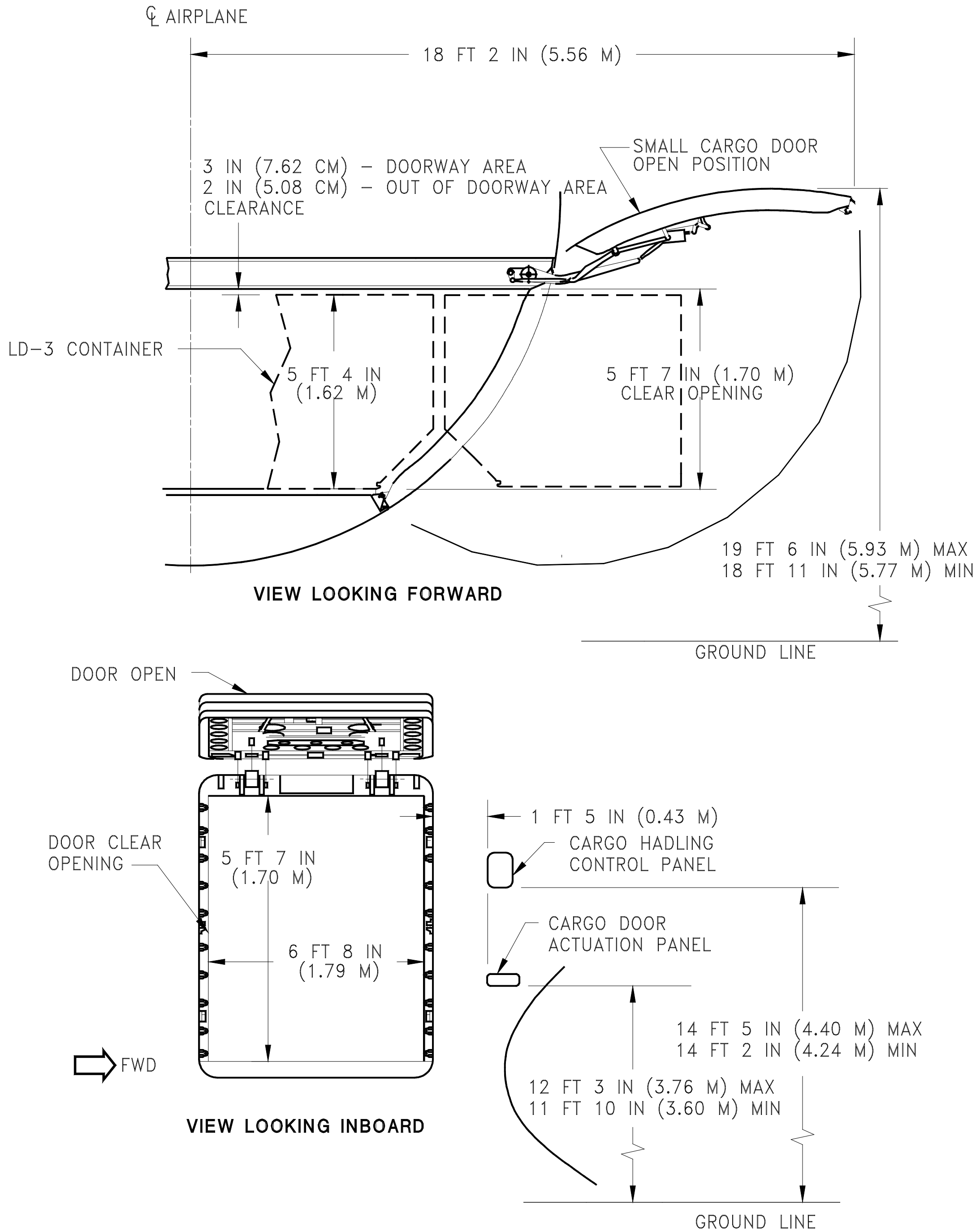


MODEL 777-300

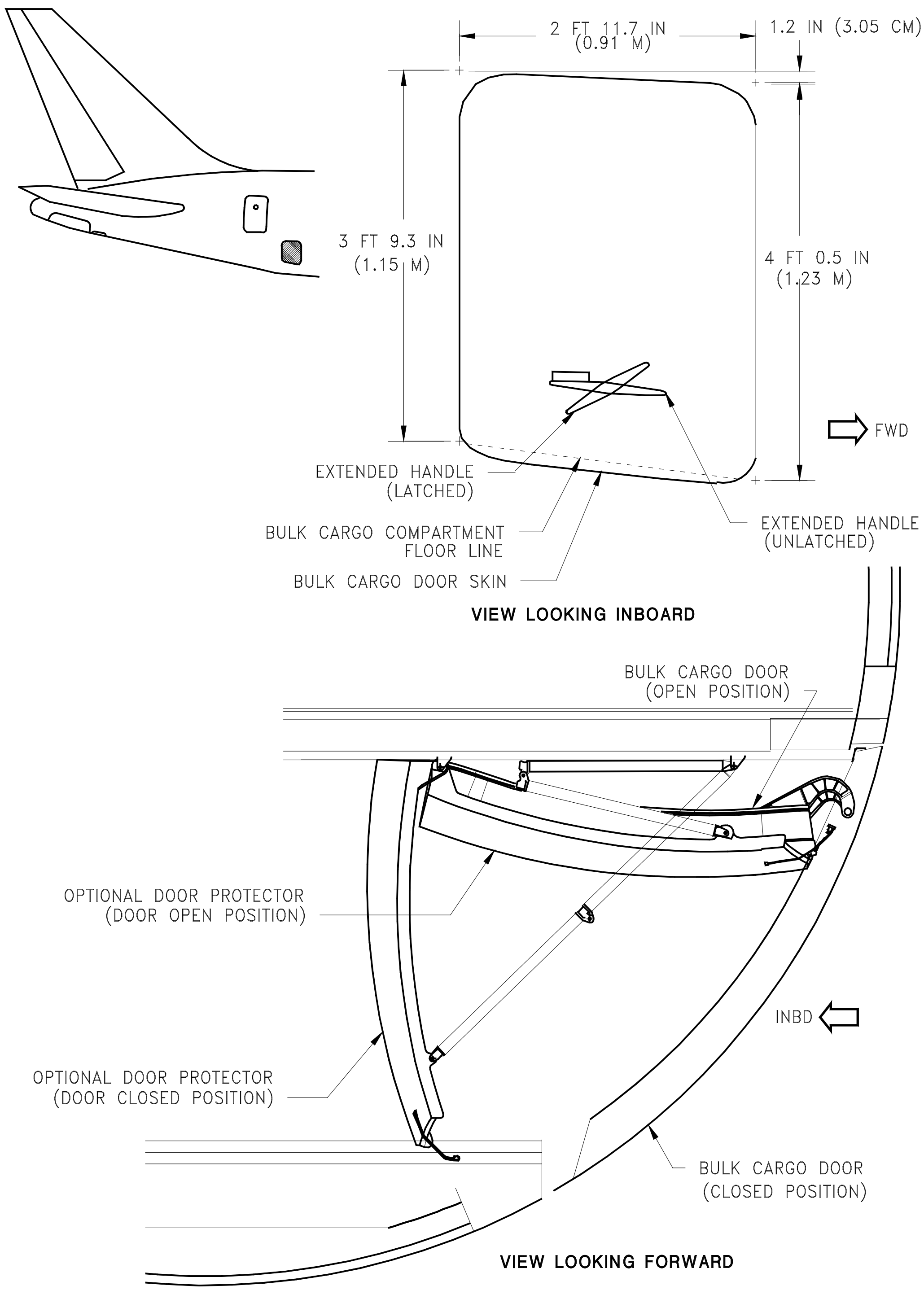
2.7.6 Door Clearances: Model 777-200, -300, Forward Cargo Door



2.7.7 Door Clearances: Model 777-200, -300, Aft Cargo Door



2.7.8 Door Clearances: Model 777-200, -300, Bulk Cargo Door



3.0 AIRPLANE PERFORMANCE

3.1 GENERAL INFORMATION

The graphs in Section 3.2 provide information on operational empty weight (OEW) and payload, trip range, brake release gross weight, and fuel limits for airplane models with the different engine options. To use these graphs, if the trip range and zero fuel weight (OEW + payload) are known, the approximate brake release weight can be found.

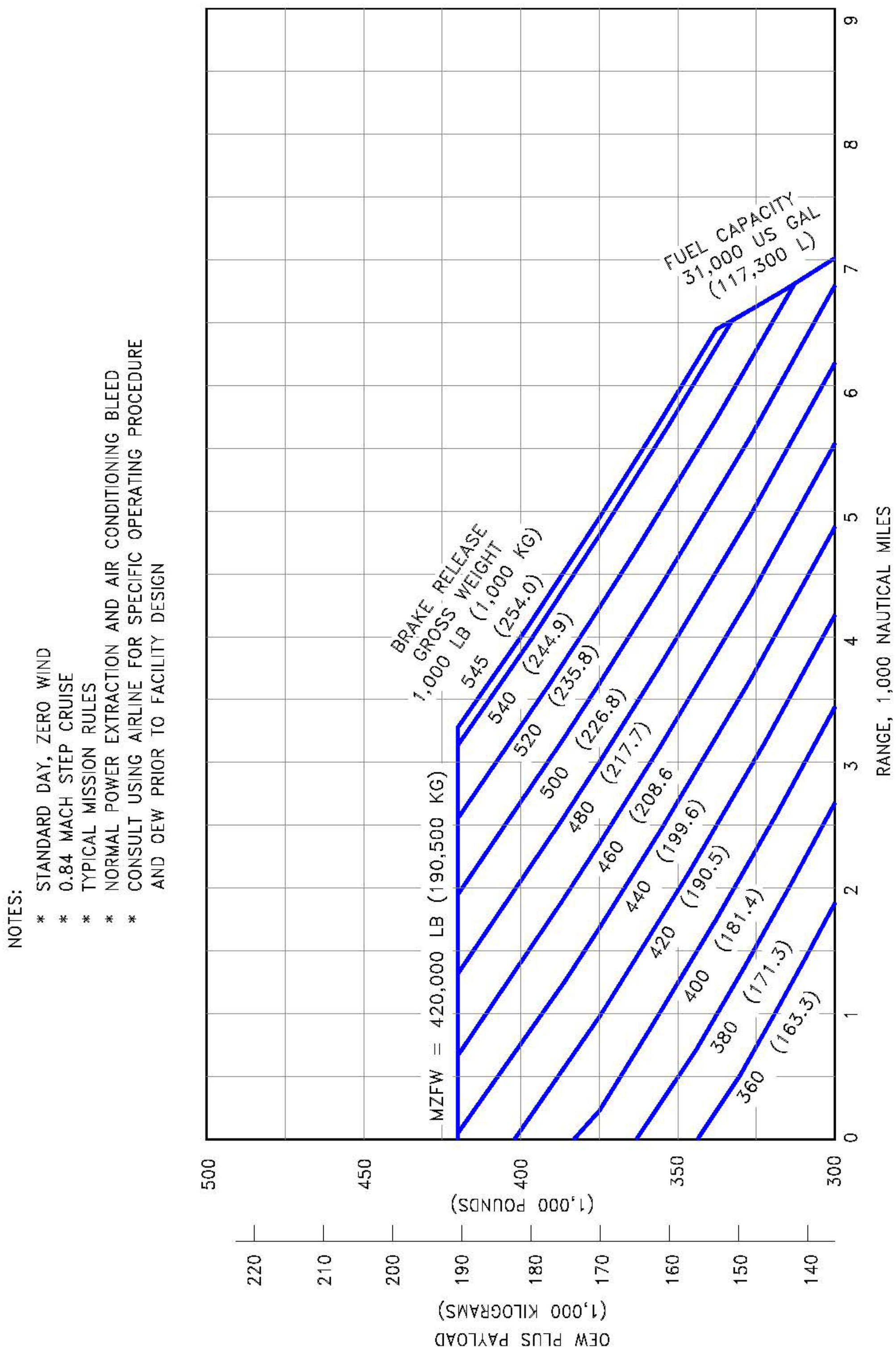
The graphs in Section 3.3 provide information on F.A.R. takeoff runway length requirements with the different engines at different pressure altitudes. Maximum takeoff weights shown on the graphs are the heaviest for the particular airplane models with the corresponding engines. Standard day temperatures for pressure altitudes shown on the F.A.R. takeoff graphs are given below:

PRESSURE ALTITUDE		STANDARD DAY TEMP	
FEET	METERS	°F	°C
0	0	59.0	15.00
2,000	609	51.9	11.04
4,000	1,219	44.7	7.06
6,000	1,828	37.6	3.11
8,000	2,438	30.5	-0.85
9,000	2,743	26.9	-2.83

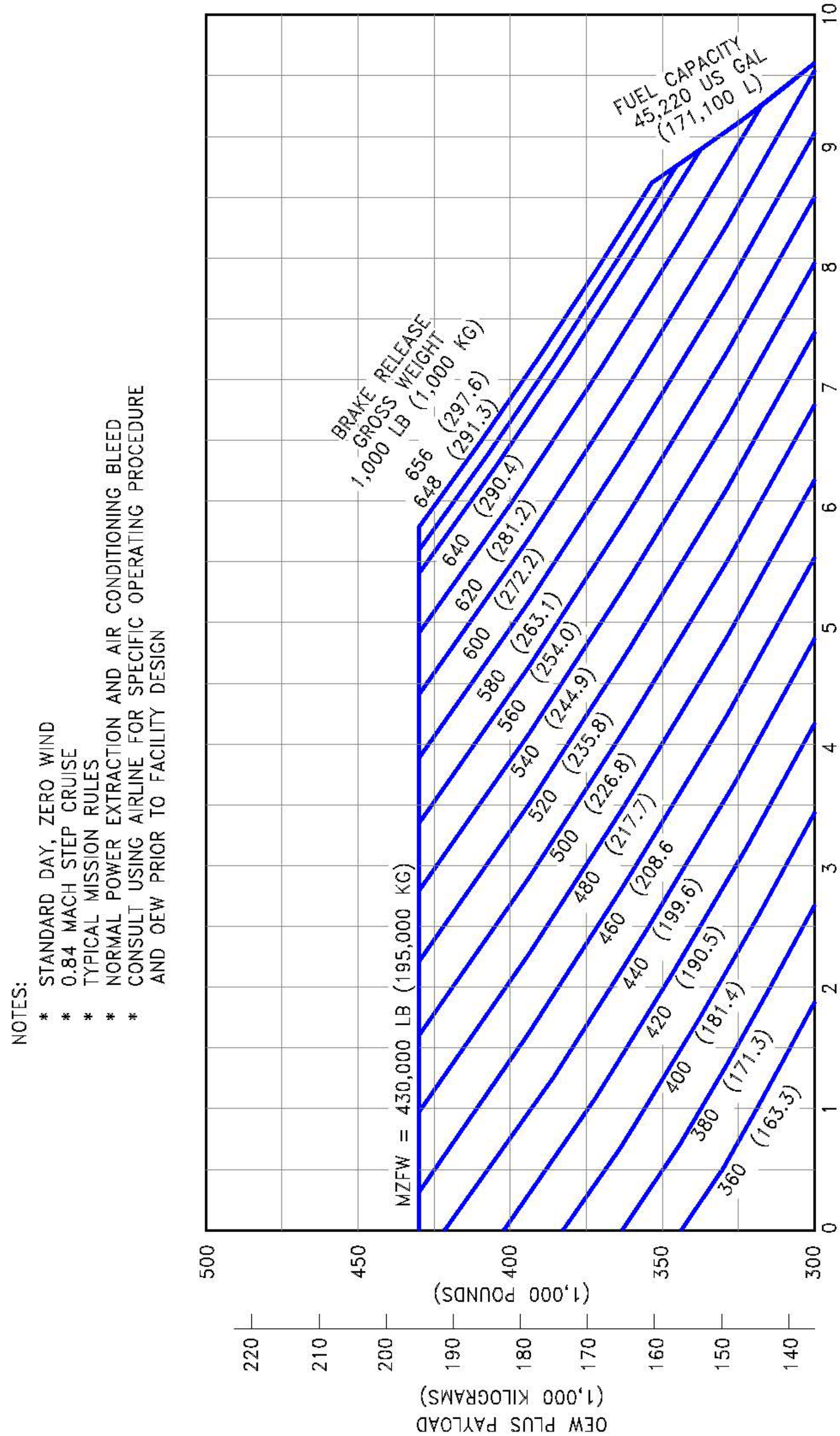
The graphs in Section 3.4 provide information on landing runway length requirements for different airplane weights and airport altitudes. The maximum landing weights shown are the heaviest for the particular airplane model.

3.2 PAYLOAD/RANGE FOR 0.84 MACH CRUISE

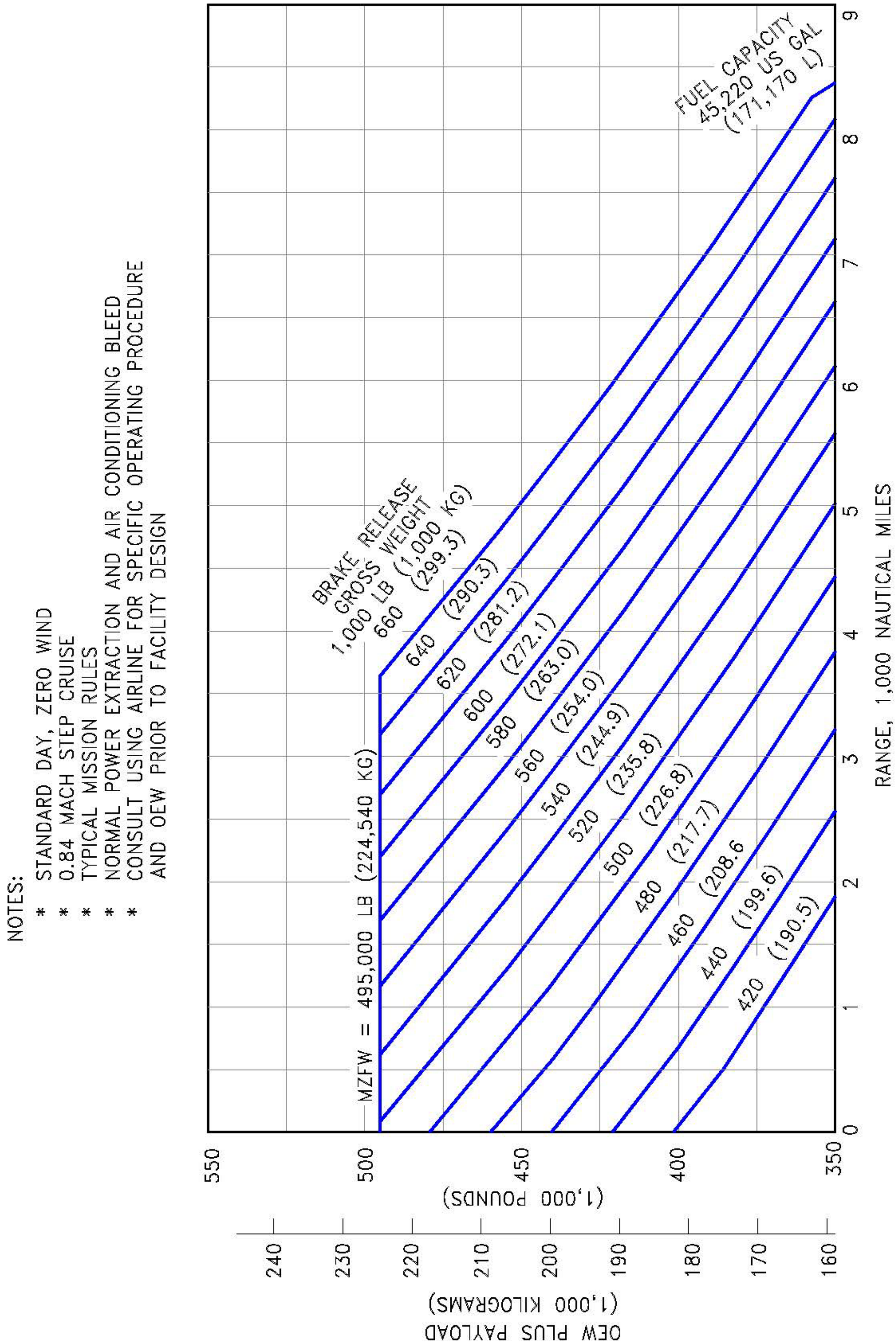
3.2.1 Payload/Range for 0.84 Mach Cruise: Model 777-200 (Baseline Airplane)



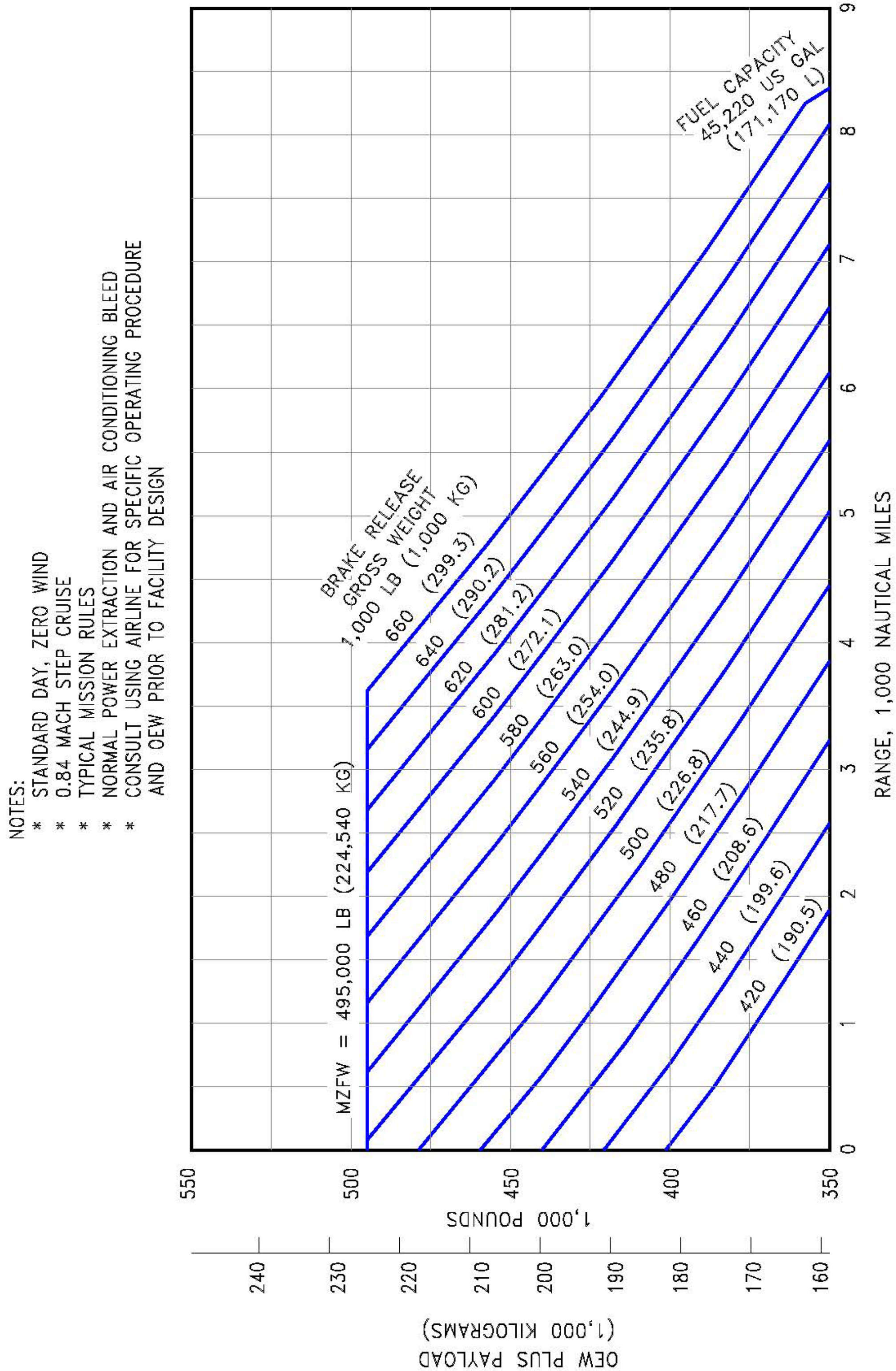
3.2.2 Payload/Range for 0.84 Mach Cruise: Model 777-200 (High Gross Weight Airplane)



3.2.3 Payload/Range for 0.84 Mach Cruise: Model 777-300 (Typical 90K Engine)

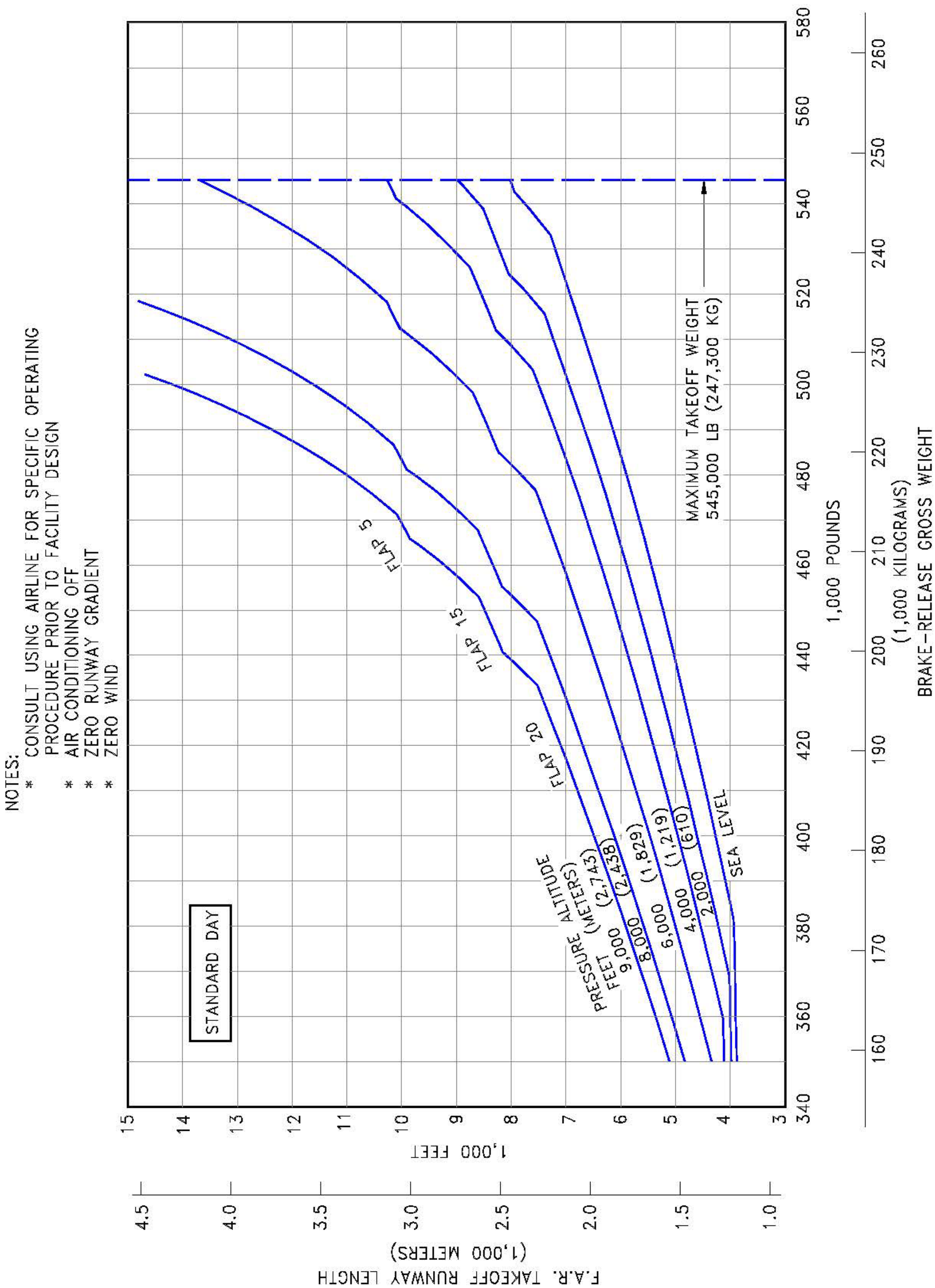


3.2.4 Payload/Range for 0.84 Mach Cruise: Model 777-300 (Typical 98K Engine)

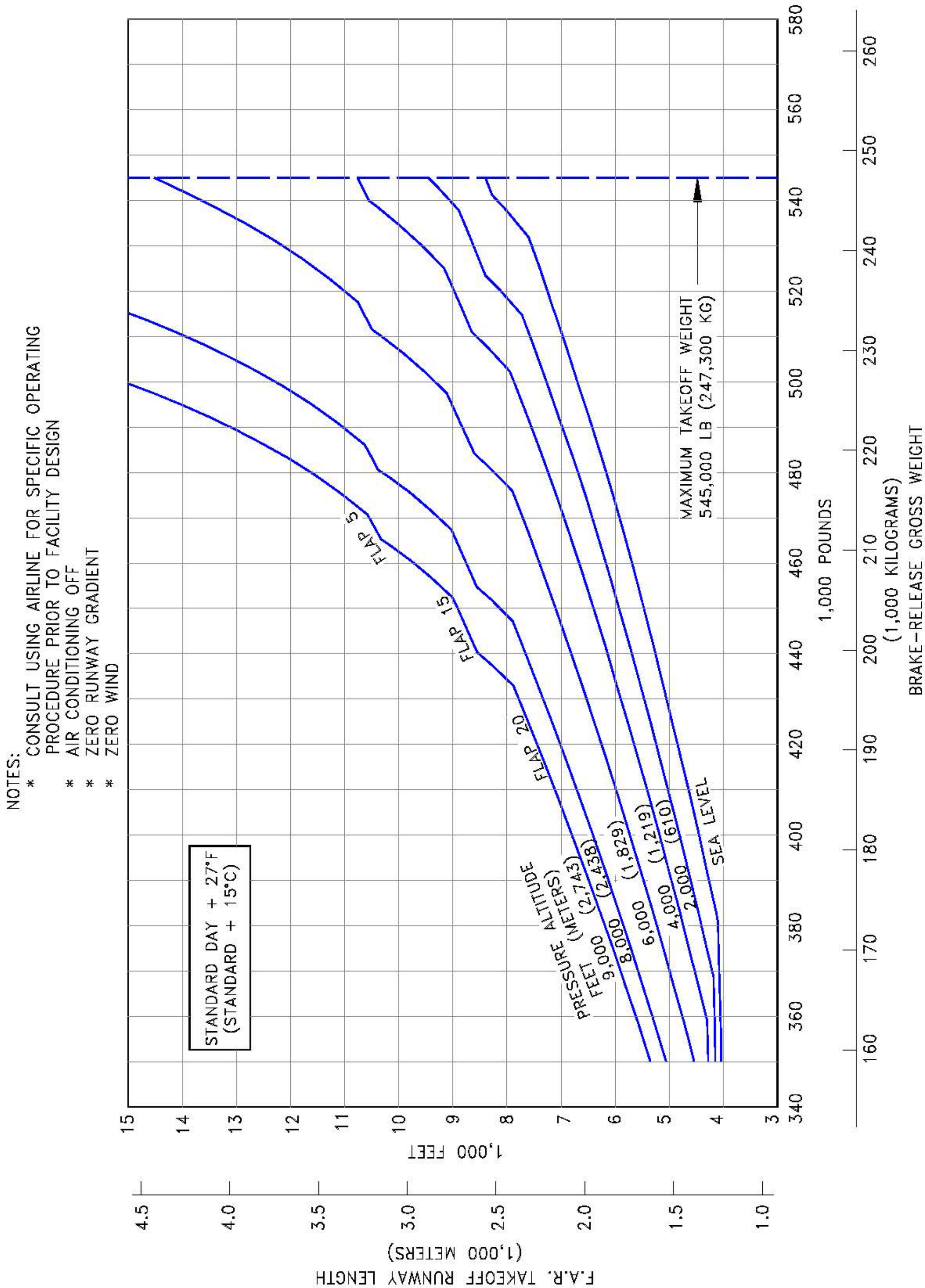


3.3 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS

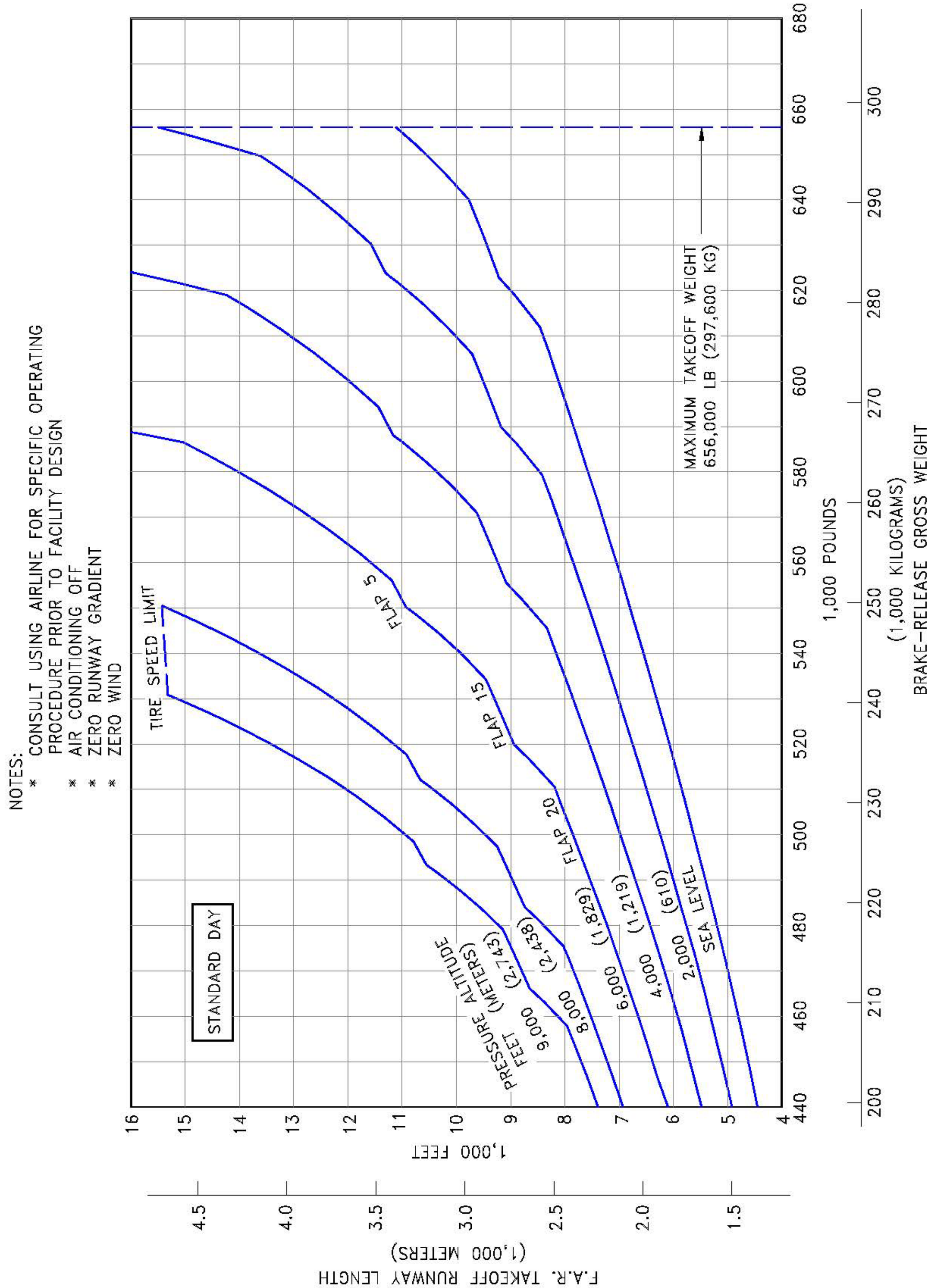
3.3.1 F.A.R. Takeoff Runway Length Requirements - Standard Day: Model 777-200 (Baseline Airplane)



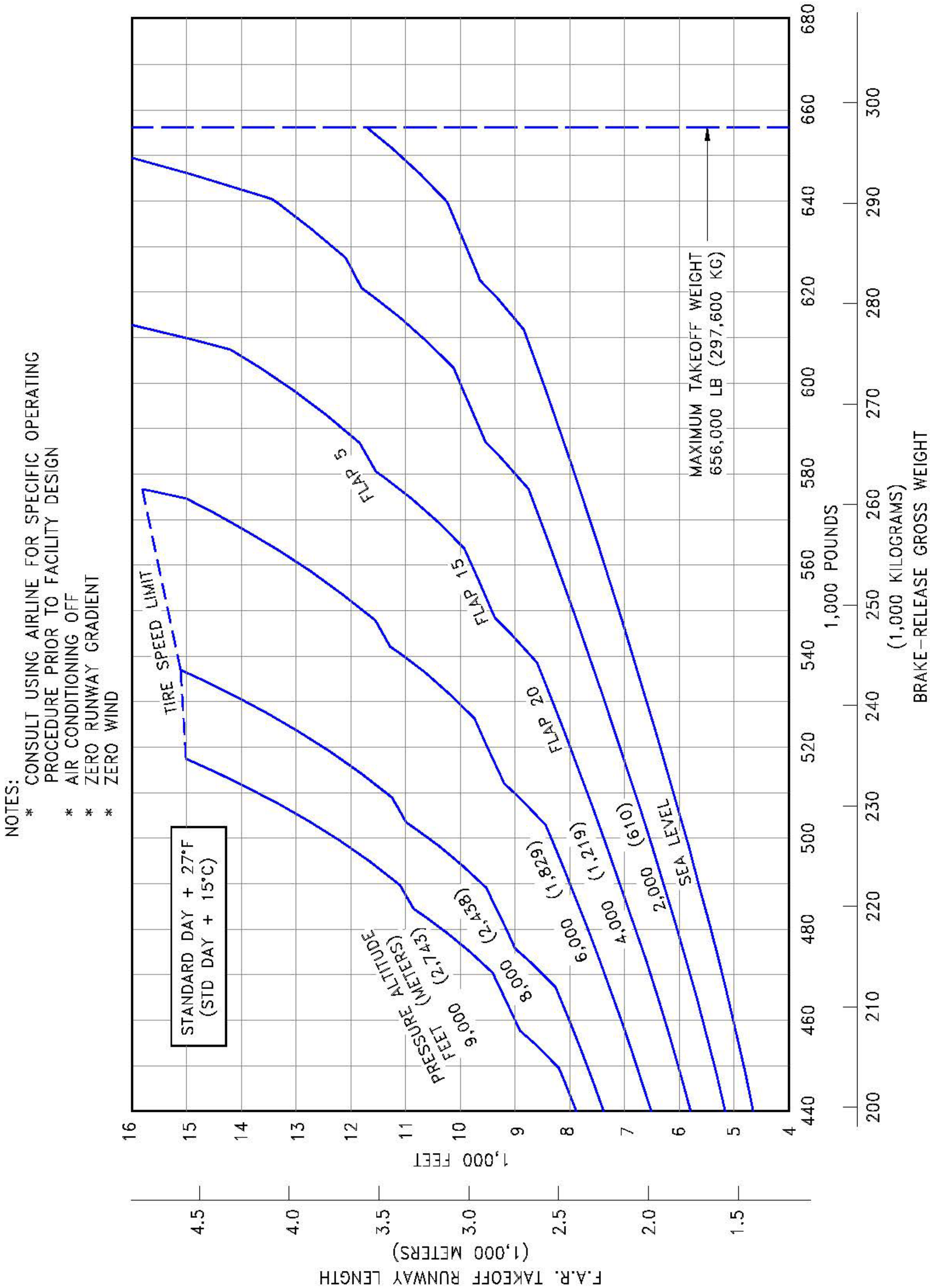
3.3.2 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C): Model 777-200 (Baseline Airplane)



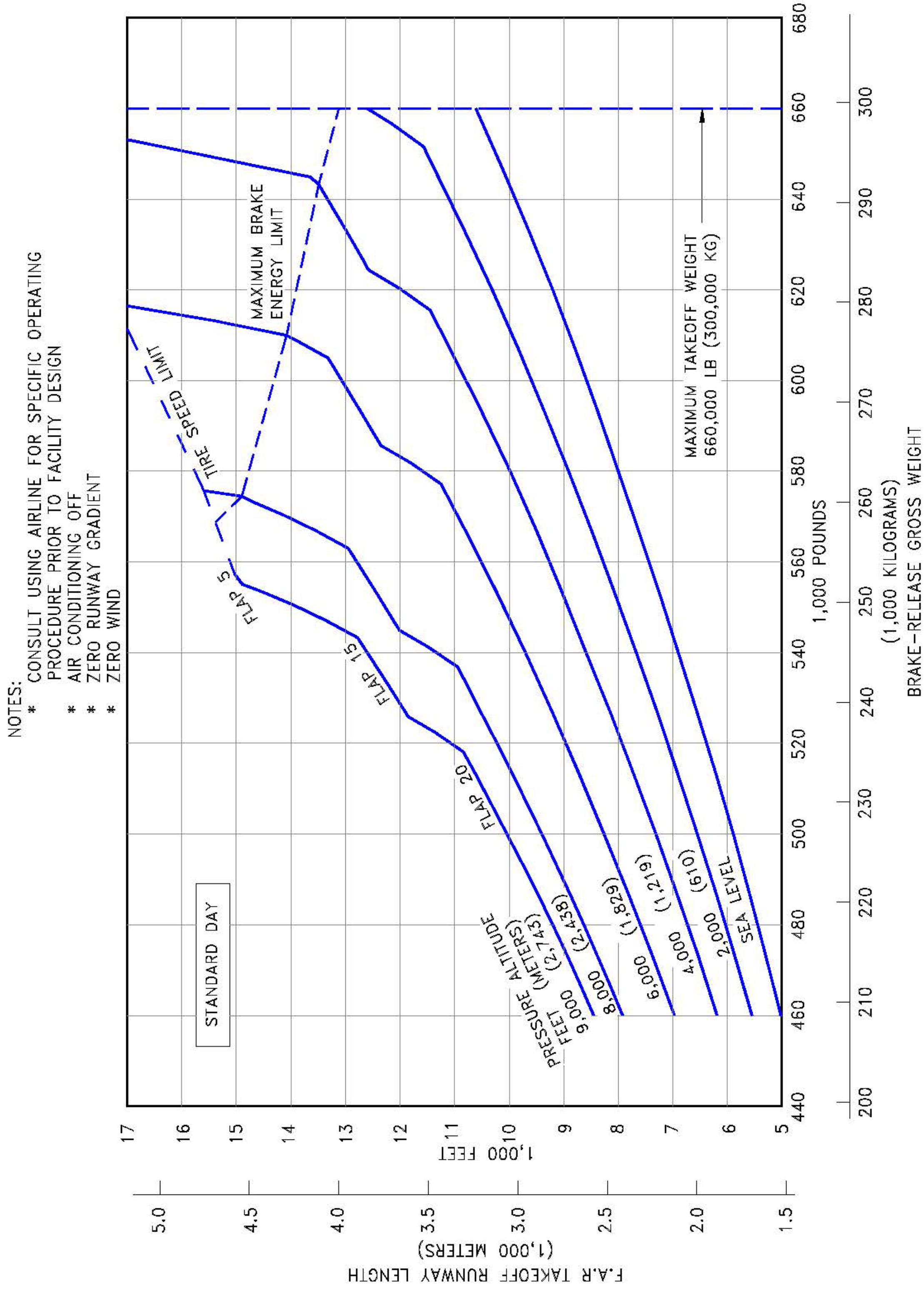
3.3.3 F.A.R. Takeoff Runway Length Requirements - Standard Day: Model 777-200 (High Gross Weight Airplane)



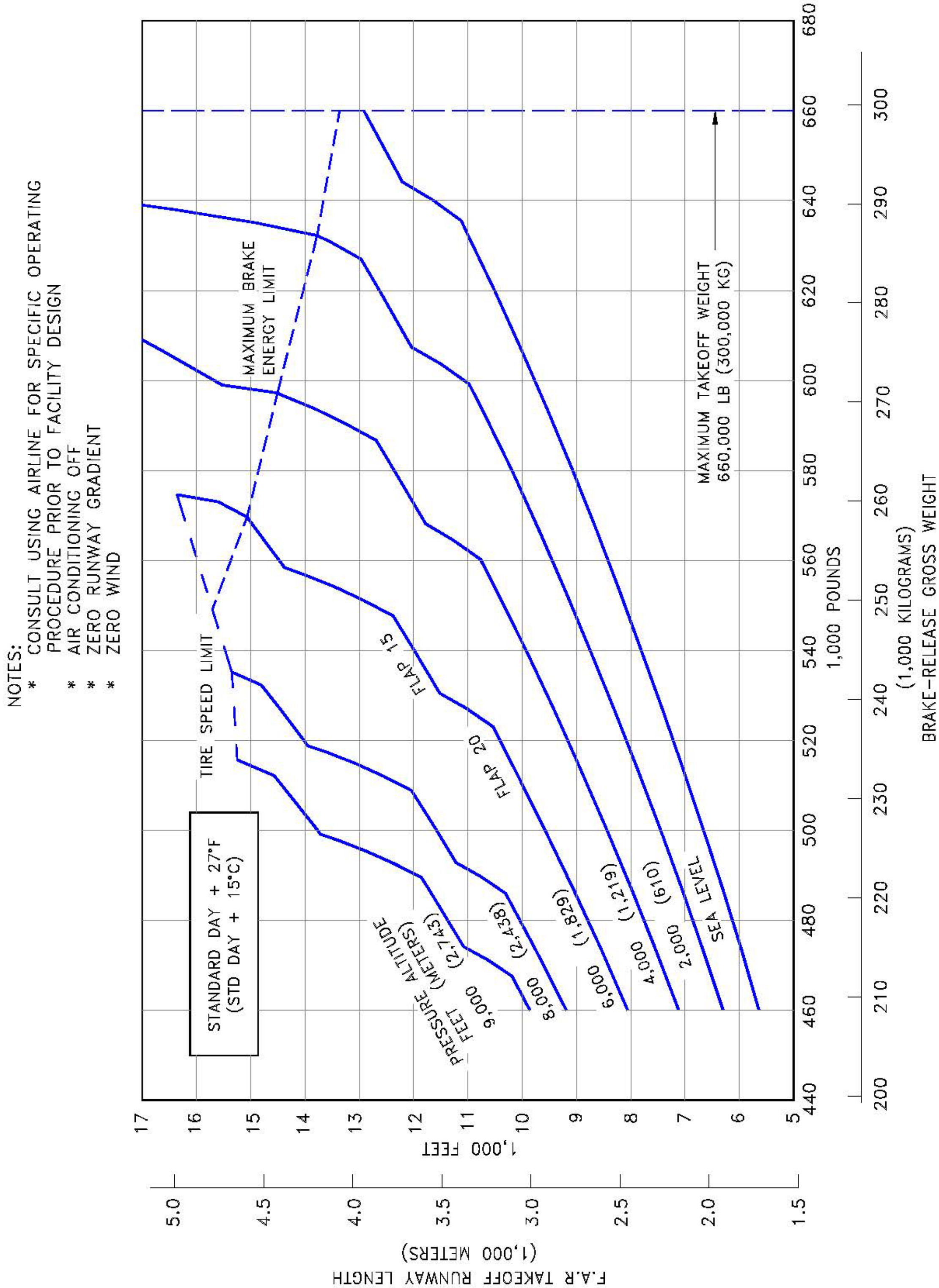
3.3.4 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C): Model 777-200 (High Gross Weight Airplane)



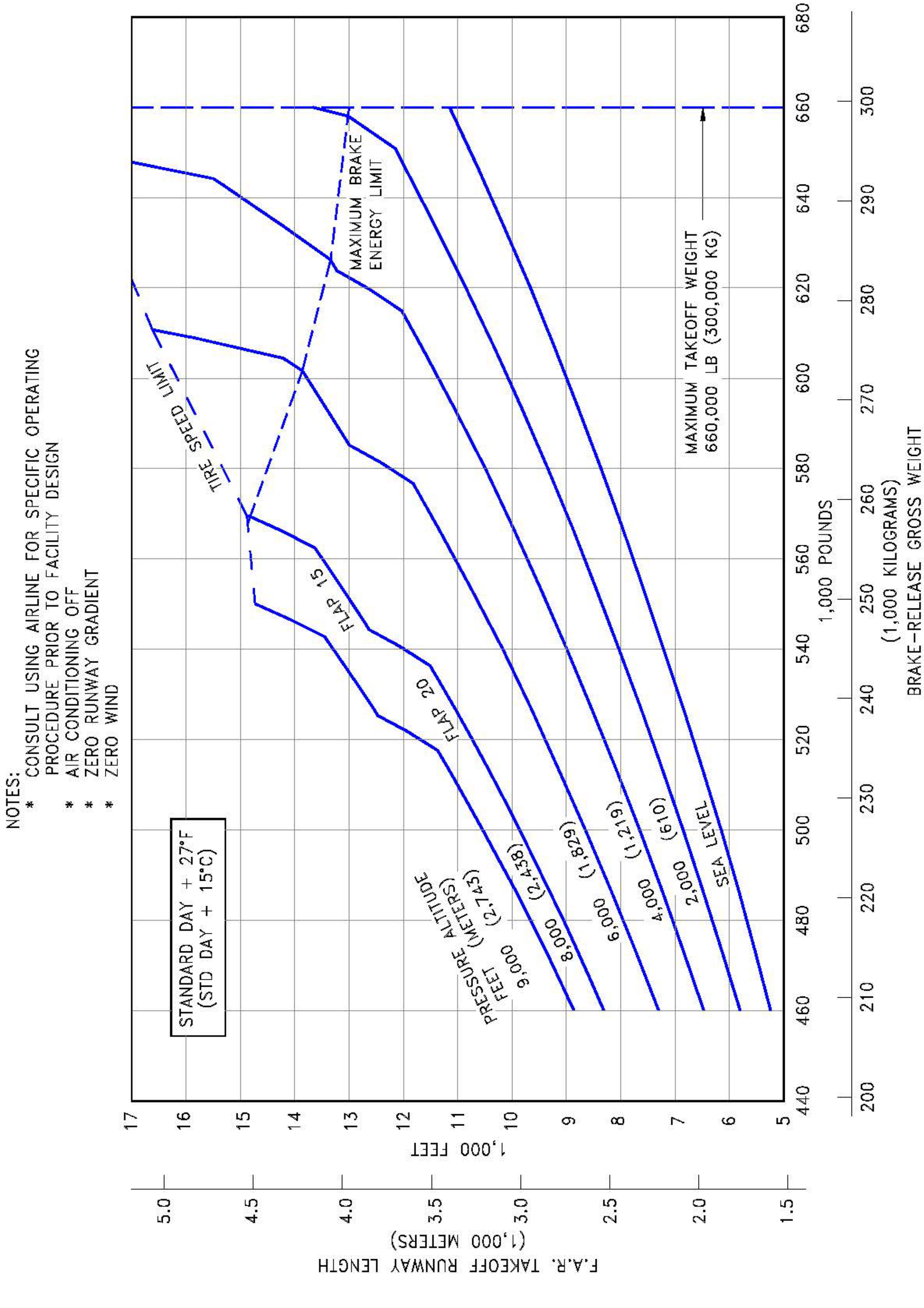
3.3.5 F.A.R. Takeoff Runway Length Requirements - Standard Day: Model 777-300 (Typical 90K Engine)



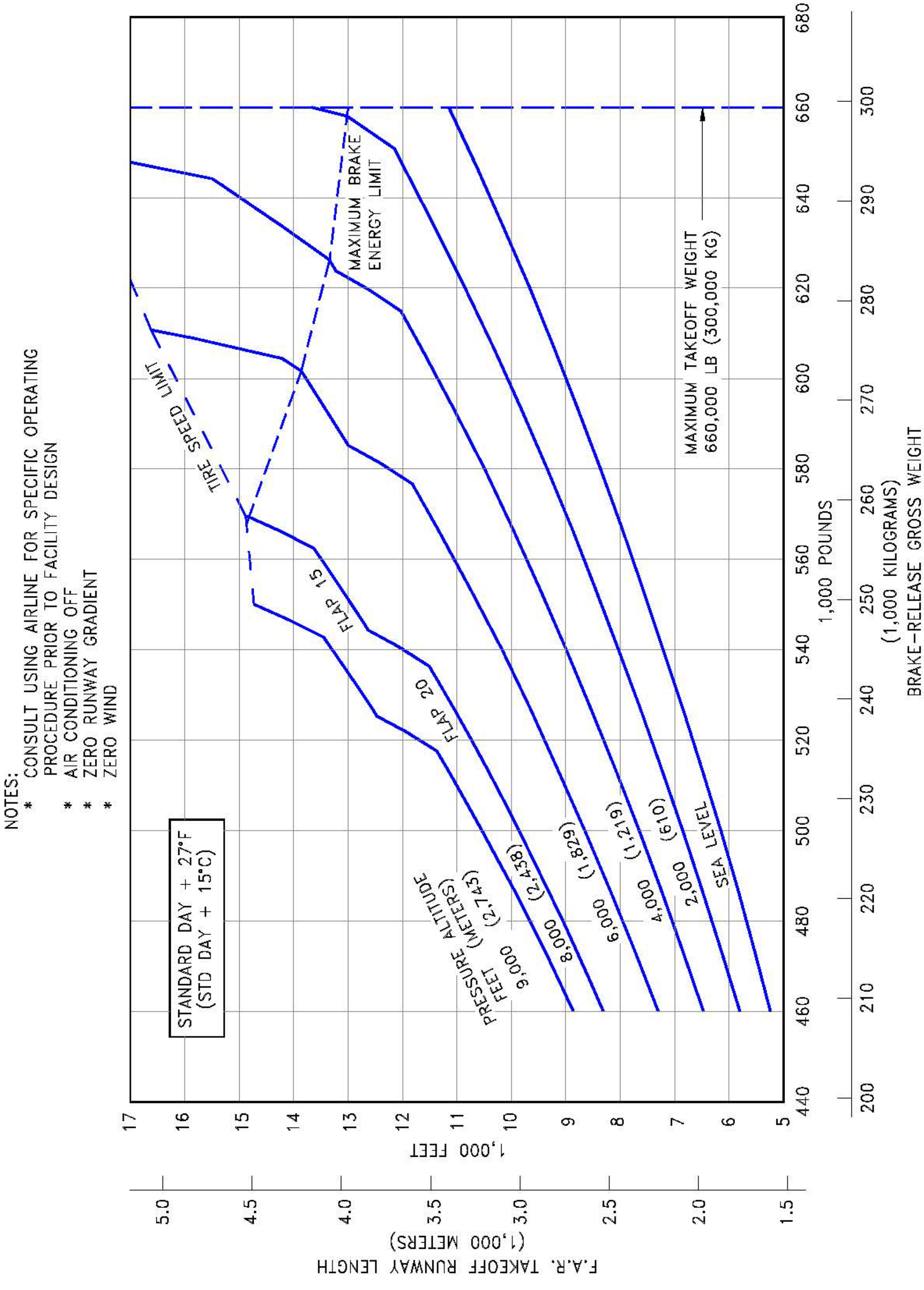
3.3.6 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C): Model 777-300 (Typical 90K Engine)



3.3.7 F.A.R. Takeoff Runway Length Requirements - Standard Day: Model 777-300 (Typical 98K Engine)

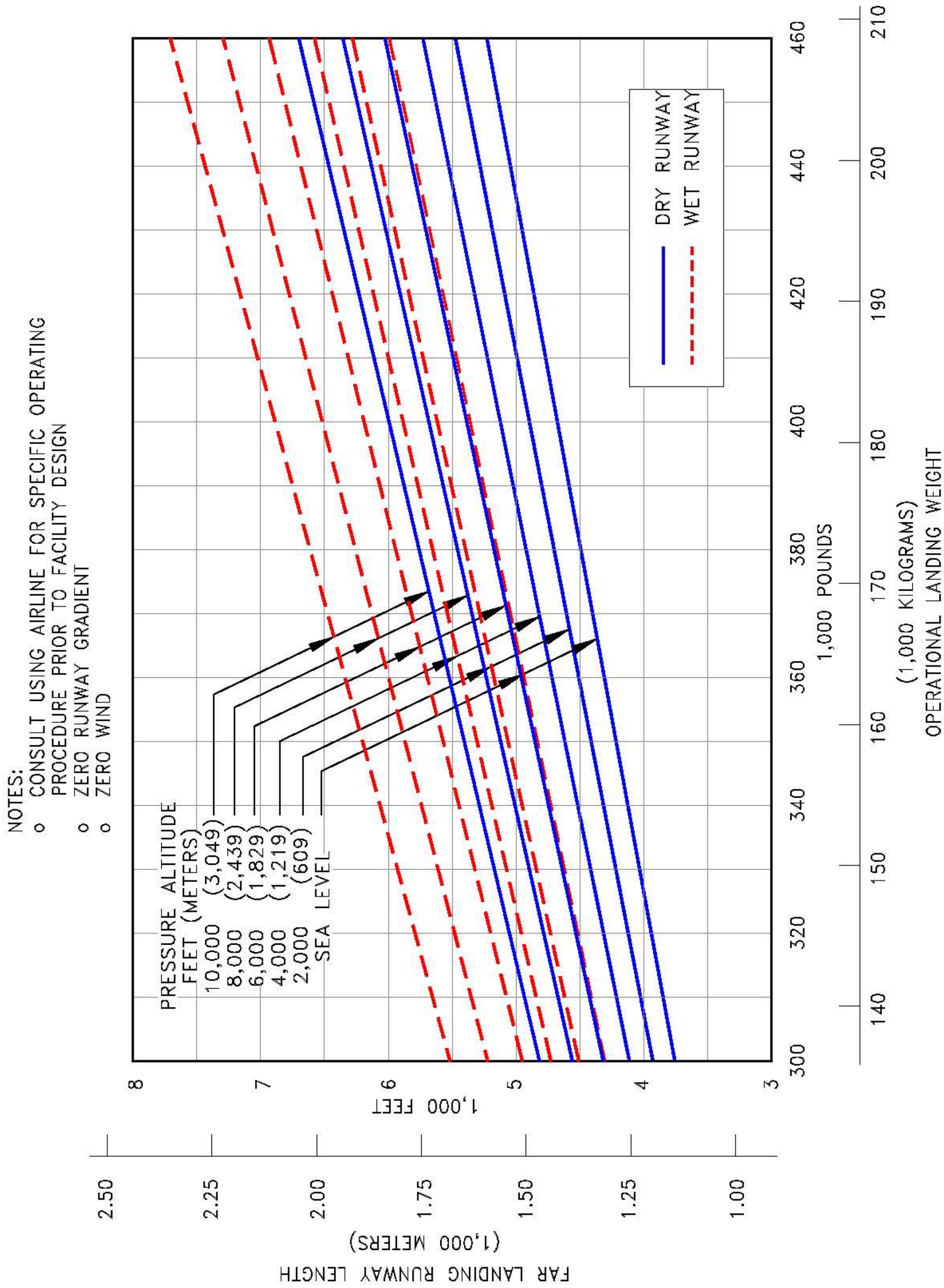


3.3.8 F.A.R. Takeoff Runway Length Requirements - Standard Day + 27°F (STD + 15°C): Model 777-300 (Typical 98K Engine)

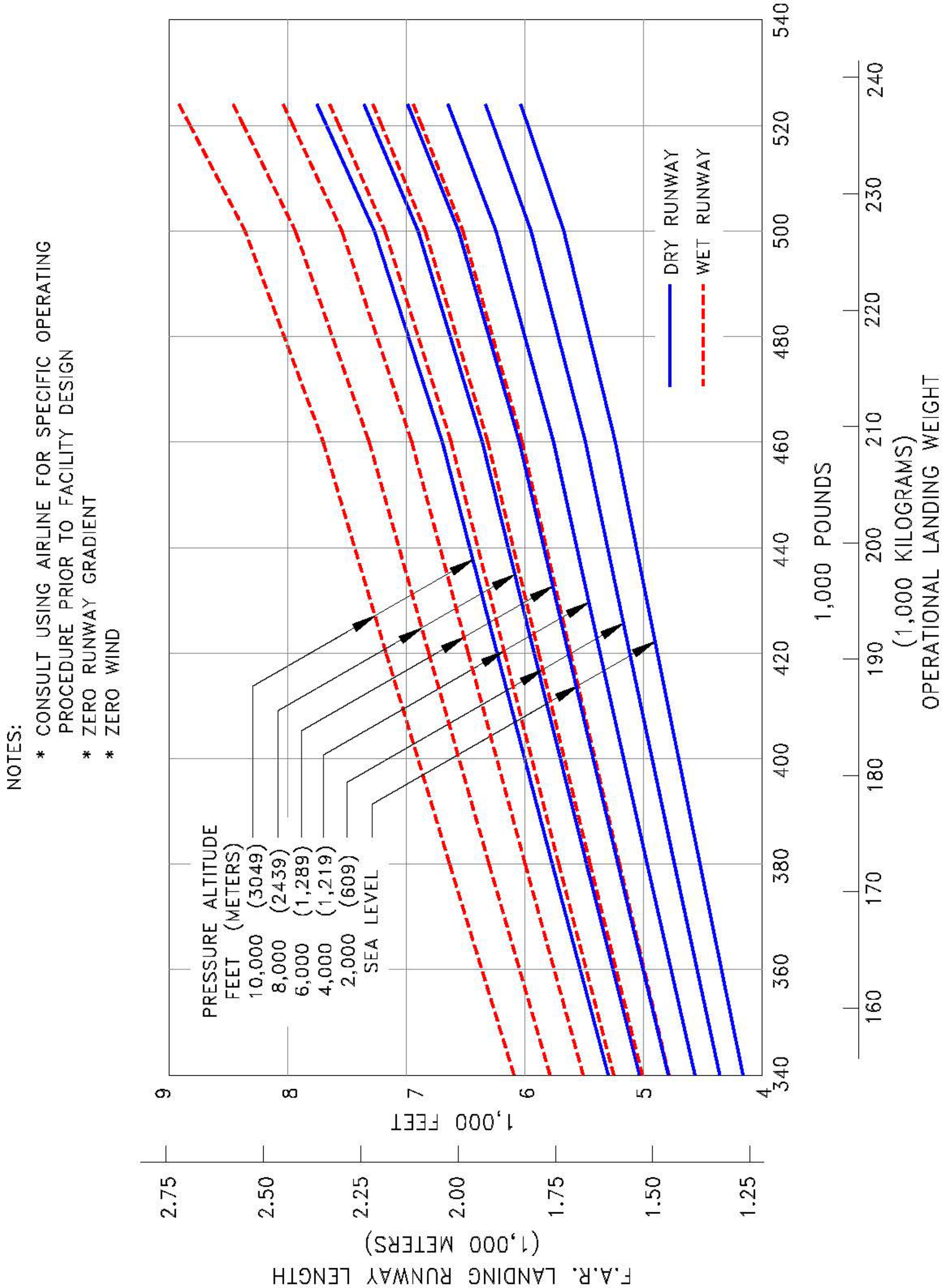


3.4 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS

3.4.1 F.A.R. Landing Runway Length Requirements: Model 777-200



3.4.2 F.A.R. Landing Runway Length Requirements: Model 777-300



4.0 GROUND MANEUVERING

4.1 GENERAL INFORMATION

The 777 main landing gear consists of two main struts, each strut with six wheels. The steering system incorporates aft axle steering of the main landing gear in addition to the nose gear steering. The aft axle steering system is hydraulically actuated and programmed to provide steering ratios proportionate to the nose gear steering angles. During takeoff and landing, the aft axle steering system is centered, mechanically locked, and depressurized.

The turning radii and turning curves shown in this section are derived from airplane geometry. Other factors that could influence the geometry of the turn include:

1. Engine power settings
2. Center of gravity location
3. Airplane weight
4. Pavement surface conditions
5. Amount of differential braking
6. Ground speed

This section provides airplane turning capability and maneuvering characteristics.

For ease of presentation, these data have been determined from the theoretical limits imposed by the geometry of the aircraft, and where noted, provide for a normal allowance for tire slippage. As such, they reflect the turning capability of the aircraft in favorable operating circumstances. These data should be used only as guidelines for the method of determination of such parameters and for the maneuvering characteristics of this aircraft.

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 procedures will vary in the level of performance over a wide range of operating circumstances throughout the world. 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.

Section 4.2 presents turning radii for various nose gear steering angles. Radii for the main and nose gears are measured from the turn center to the outside of the tire.

Section 4.3 shows data on minimum width of pavement required for 180° turn.

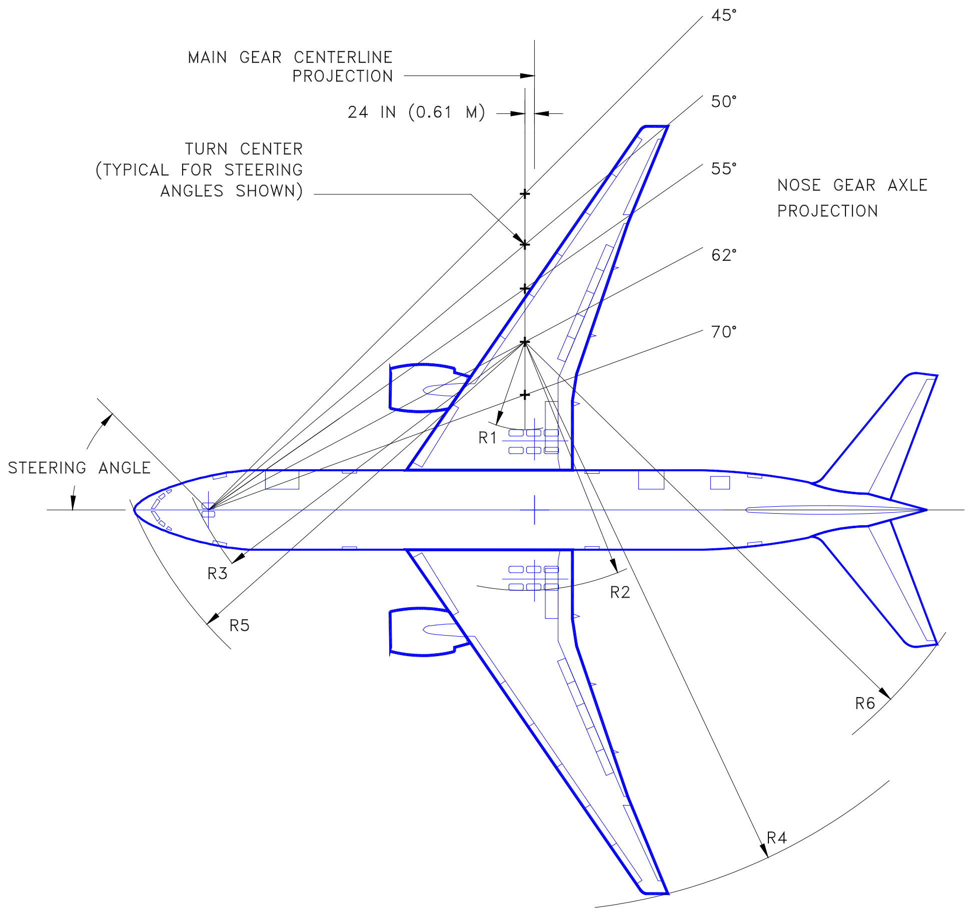
Section 4.4 provides pilot visibility data from the cockpit and the limits of ambinocular vision through the windows. Ambinocular vision is defined as the total field of vision seen simultaneously by both eyes.

Section 4.5 shows approximate wheel paths for various runway and taxiway turn scenarios. The pavement fillet geometries are based on the FAA's Advisory Circular (AC) 150/5300-13 (thru change 16). They represent typical fillet geometries built at many airports worldwide. ICAO and other civil aviation authorities publish many different fillet design methods. Prior to determining the size of fillets, airports are advised to check with the airlines regarding the operating procedures and aircraft types they expect to use at the airport. Further, given the cost of modifying fillets and the operational impact to ground movement and air traffic during construction, airports may want to design critical fillets for larger aircraft types to minimize future operational impacts.

Section 4.6 illustrates a typical runway holding bay configuration.

4.2 TURNING RADII

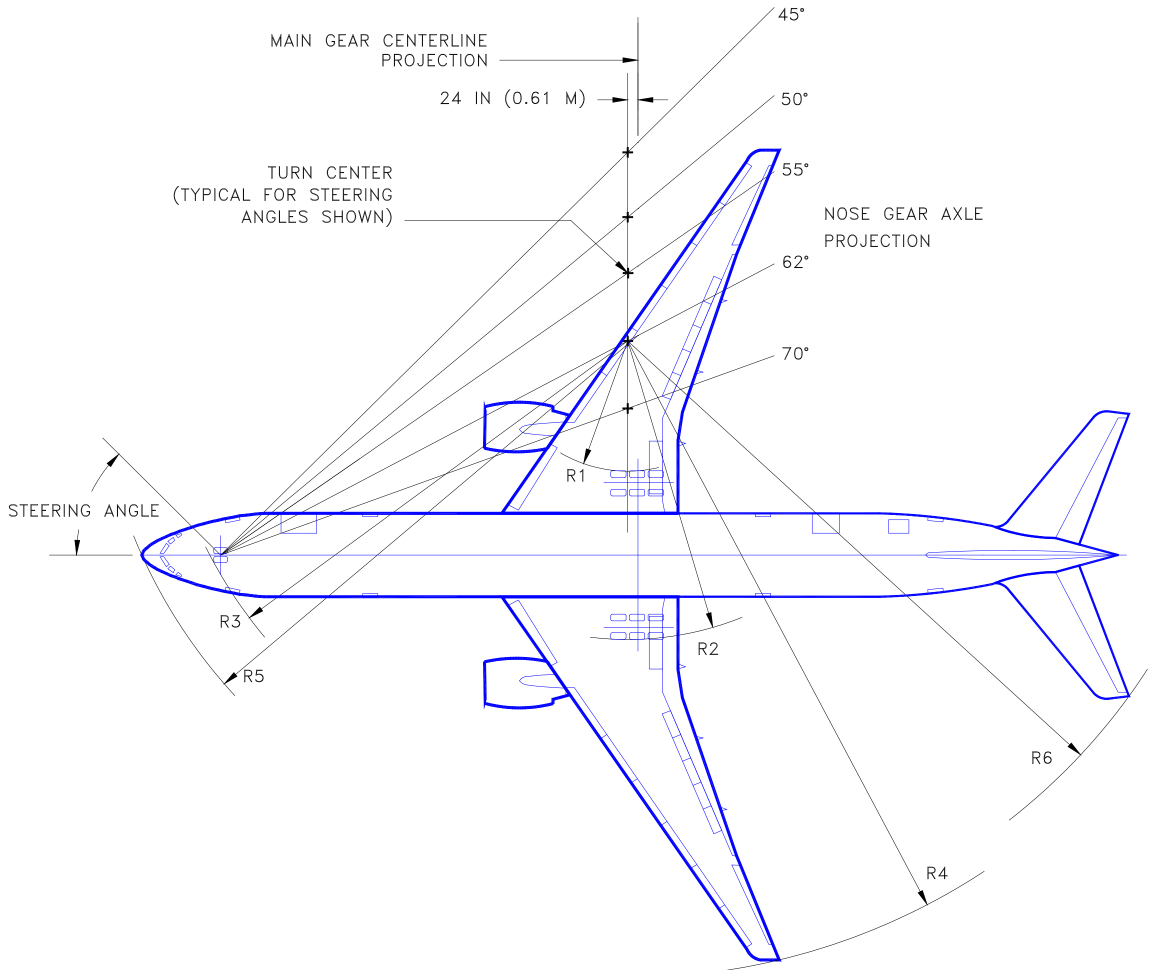
4.2.1 Turning Radii – No Slip Angle: Model 777-200



NOTES: *DATA SHOWN FOR AIRPLANE WITH AFT AXLE STEERING.
*ACTUAL OPERATING TURNING RADII MAY BE GREATER THAN SHOWN.
*CONSULT WITH AIRLINE FOR SPECIFIC OPERATING PROCEDURE.
*DIMENSIONS ROUNDED TO NEAREST FOOT AND 0.1 METER.

STEERING ANGLE	R1 INNER GEAR		R2 OUTER GEAR		R3 NOSE GEAR		R4 WINGTIP		R5 NOSE		R6 TAIL	
(DEG)	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
30	123	37.5	165	50.3	168	51.3	247	75.3	177	53.8	209	63.6
35	98	29.7	140	42.6	147	44.8	222	67.6	157	47.8	187	57.1
40	78	23.7	120	36.6	131	40.0	202	61.7	142	43.4	171	52.2
45	62	18.9	104	31.7	120	36.4	187	56.9	132	40.2	159	48.5
50	49	14.8	91	27.7	111	33.7	174	52.9	124	37.7	150	45.6
55	37	11.2	79	24.1	103	31.5	162	49.5	118	35.8	142	43.2
60	27	8.1	69	21.0	98	29.9	152	46.5	113	34.4	135	41.2
65	17	5.3	60	18.2	94	28.6	143	43.7	109	33.3	130	39.5
70 (MAX)	9	2.7	51	15.6	90	27.6	135	41.2	107	32.5	125	38.1

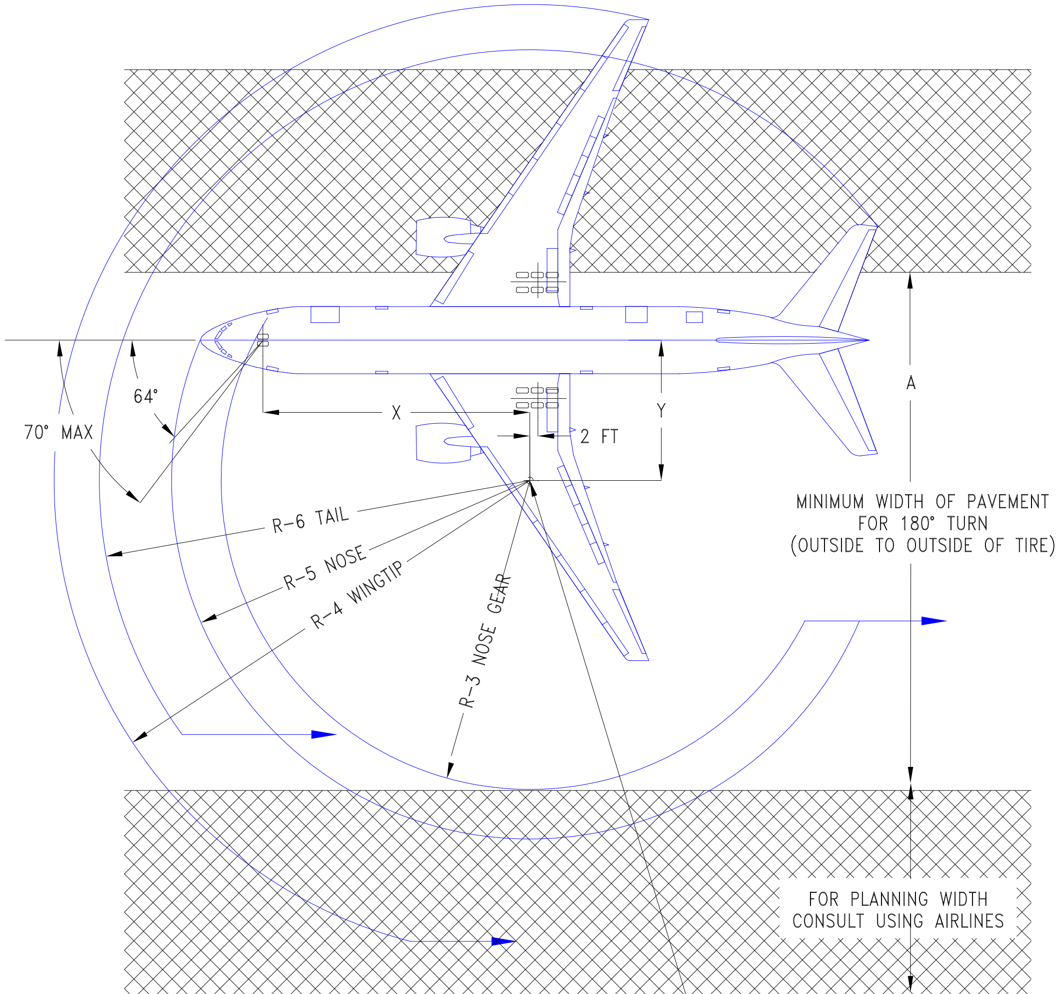
4.2.2 Turning Radii – No Slip Angle: Model 777-300



NOTES: *DATA SHOWN FOR AIRPLANE WITH AFT AXLE STEERING.
*ACTUAL OPERATING TURNING RADII MAY BE GREATER THAN SHOWN.
*CONSULT WITH AIRLINE FOR SPECIFIC OPERATING PROCEDURE.
*DIMENSIONS ROUNDED TO NEAREST FOOT AND 0.1 METER.

STEERING ANGLE	R1 INNER GEAR		R2 OUTER GEAR		R3 NOSE GEAR		R4 WINGTIP		R5 NOSE		R6 TAIL	
(DEG)	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
30	153	46.6	195	59.4	203	61.8	276	84.2	211	64.3	243	73.9
35	122	37.3	165	50.1	177	53.9	246	75.0	188	56.9	217	66.1
40	99	30.0	141	42.9	158	48.2	223	67.8	169	51.6	198	60.2
45	79	24.2	122	37.0	144	43.9	204	62.0	156	47.6	183	55.7
50	63	19.2	105	32.1	133	40.5	188	57.2	146	44.6	171	52.2
55	49	15.0	91	27.9	125	37.9	174	53.0	139	42.3	162	49.3
60	37	11.2	79	24.1	118	35.9	162	49.4	133	40.5	154	47.0
65	26	7.8	68	20.7	113	34.3	151	46.0	129	39.2	148	45.0
70 (MAX)	15	4.7	58	17.6	109	33.1	132	43.0	125	38.1	142	43.3

4.3 CLEARANCE RADII: MODEL 777-200, -300



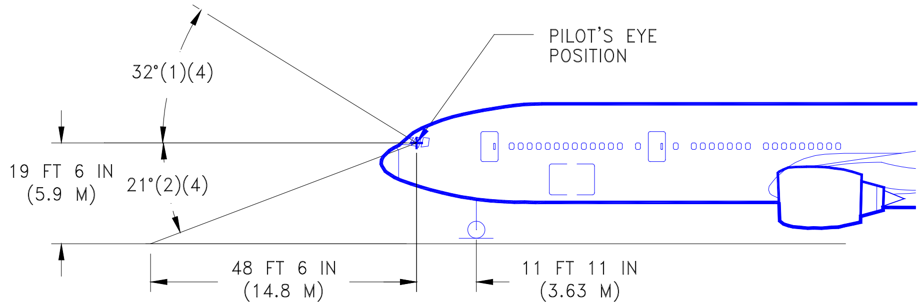
NOTES:
1. 6° TIRE SLIP ANGLE APPROXIMATE FOR 64° TURN ANGLE.
2. CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE.
3. DIMENSIONS ARE ROUNDED TO THE NEAREST 0.1 FOOT AND 0.1 METER.

AIRPLANE MODEL	EFFECTIVE TURNING ANGLE (DEG)	X		Y		A		R3		R4		R5		R6	
		FT	M	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
777-200	64	82.9	25.3	40.4	12.3	155.8	47.5	94.3	28.7	144.9	44.2	110.0	33.5	131.0	39.9
777-300	64	100.4	30.6	49.0	14.9	183.8	56.0	113.7	34.7	152.5	46.7	129.4	39.4	148.8	45.3

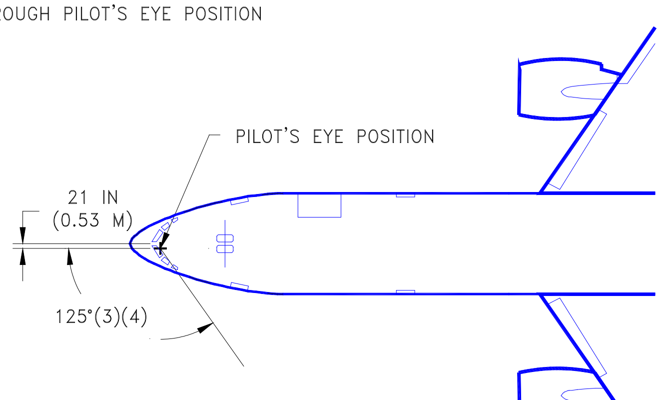
4.4 VISIBILITY FROM COCKPIT IN STATIC POSITION: MODEL 777-200, -300

NOT TO SCALE

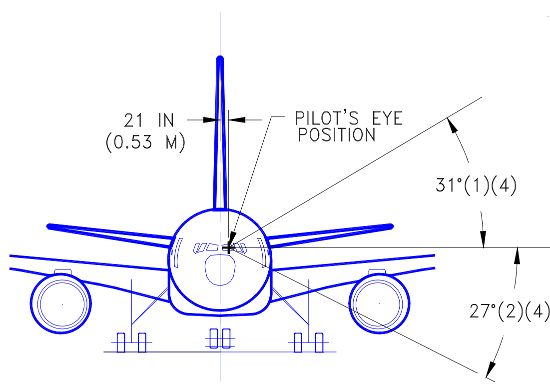
NOT TO BE USED FOR LANDING APPROACH VISIBILITY



VISUAL ANGLES IN VERTICAL PLANE THROUGH PILOT'S EYE POSITION



VISUAL ANGLES IN HORIZONTAL PLANE THROUGH PILOT'S EYE POSITION



VISUAL ANGLES IN A PLANE PERPENDICULAR TO LONGITUDINAL AXIS THROUGH PILOT'S EYE POSITION

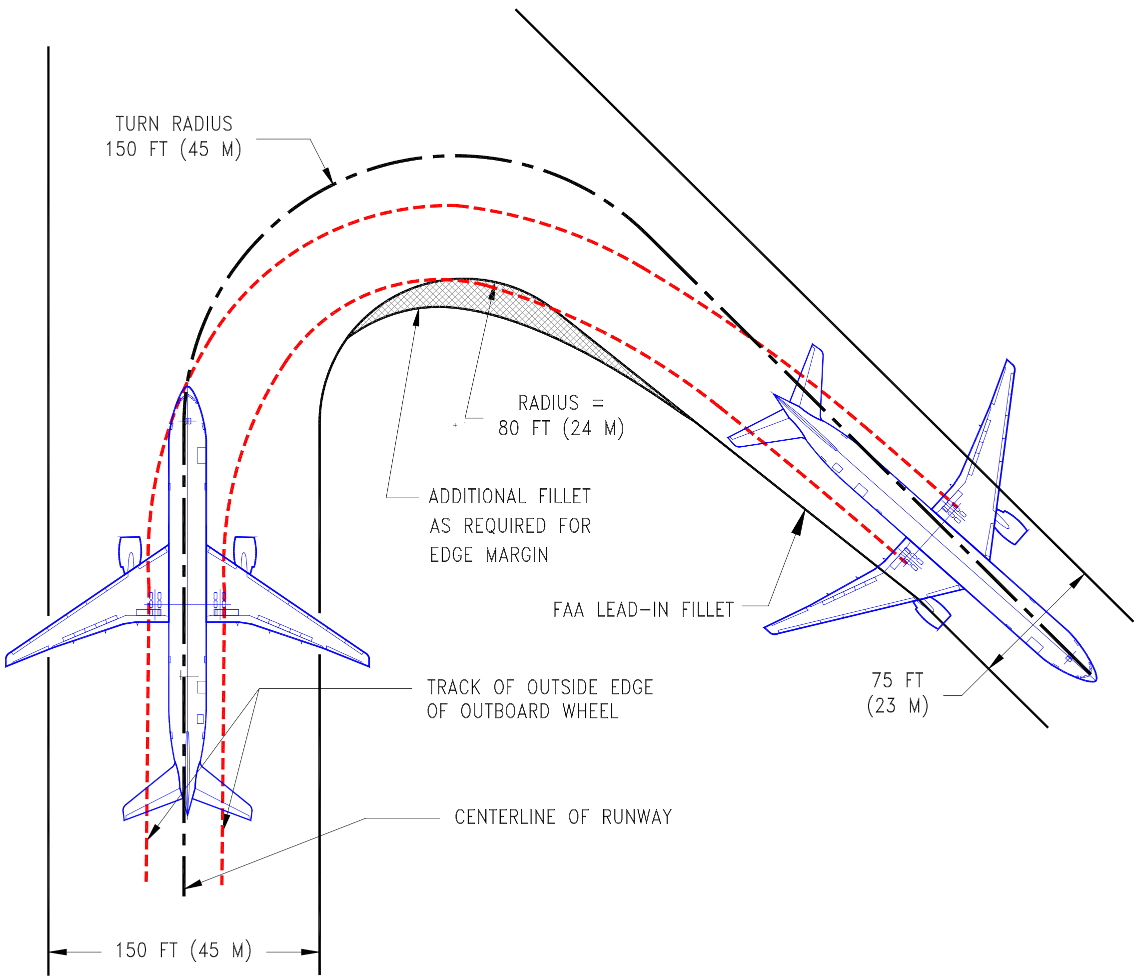
NOTES:
(1) UPWARD THROUGH MAIN WINDOW
(2) DOWNWARD THROUGH MAIN WINDOW
(3) VISION THROUGH SIDE WINDOW
(4) HEAD ROTATED ABOUT POINT 3.3 IN (0.08 M) AFT OF PILOT'S REFERENCE EYE POSITION.

4.5 RUNWAY AND TAXIWAY TURN PATHS

4.5.1 Runway and Taxiway Turn Paths - Runway-to-Taxiway, More Than 90 Degrees: Model 777-200, -300

NOTES:

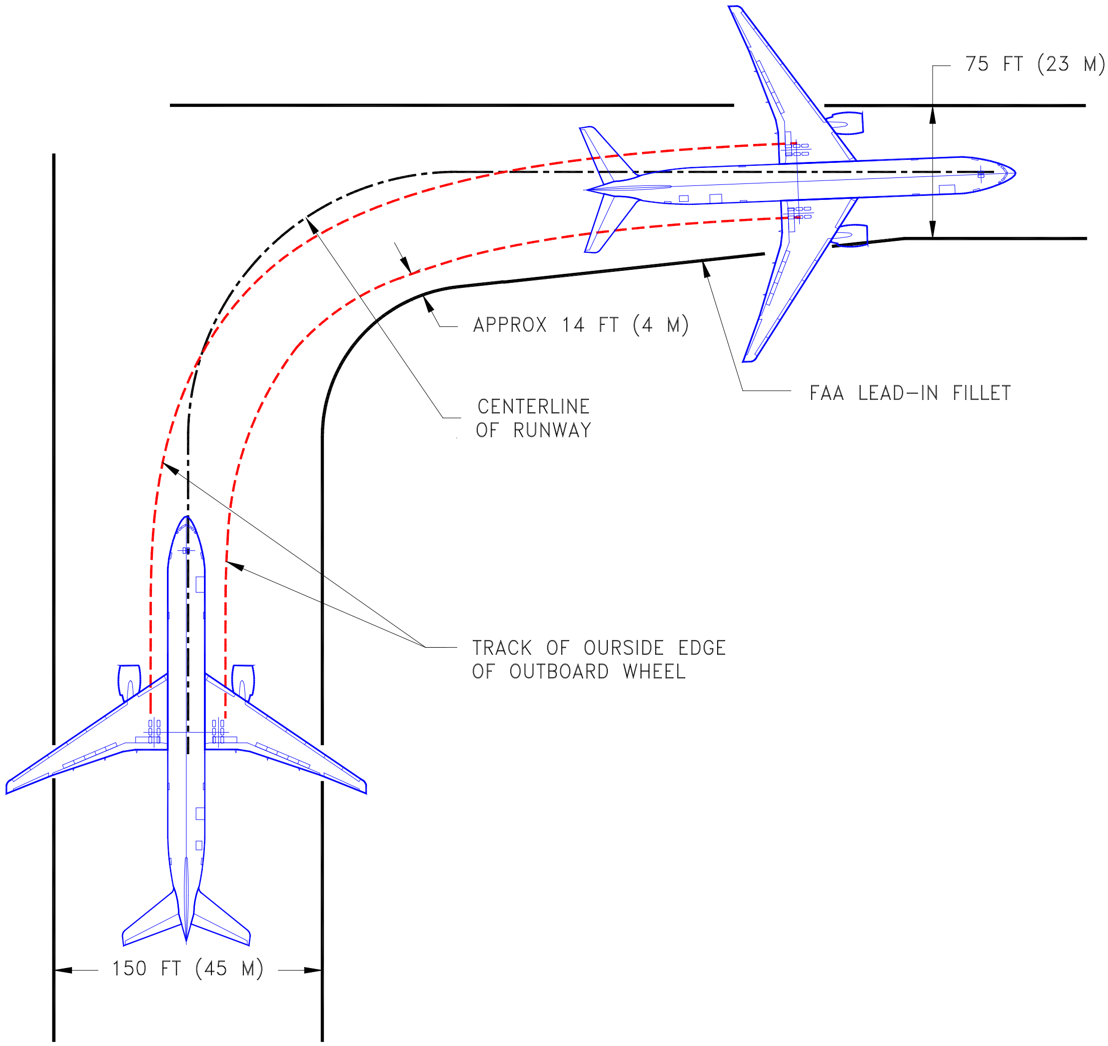
- BEFORE DETERMINING THE SIZE OF THE INTERSECTION FILLET, CHECK WITH THE AIRLINES REGARDING THE OPERATING PROCEDURES THAT THEY USE AND THE AIRCRAFT TYPES THEY ARE EXPECTED TO USE AT THE AIRPORT
- 777-300 DATA SHOWN. 777-200 DATA WOULD BE LESS STRINGENT.



4.5.2 Runway and Taxiway Turn Paths - Runway-to-Taxiway, 90 Degrees: Model 777-200, -300

NOTES:

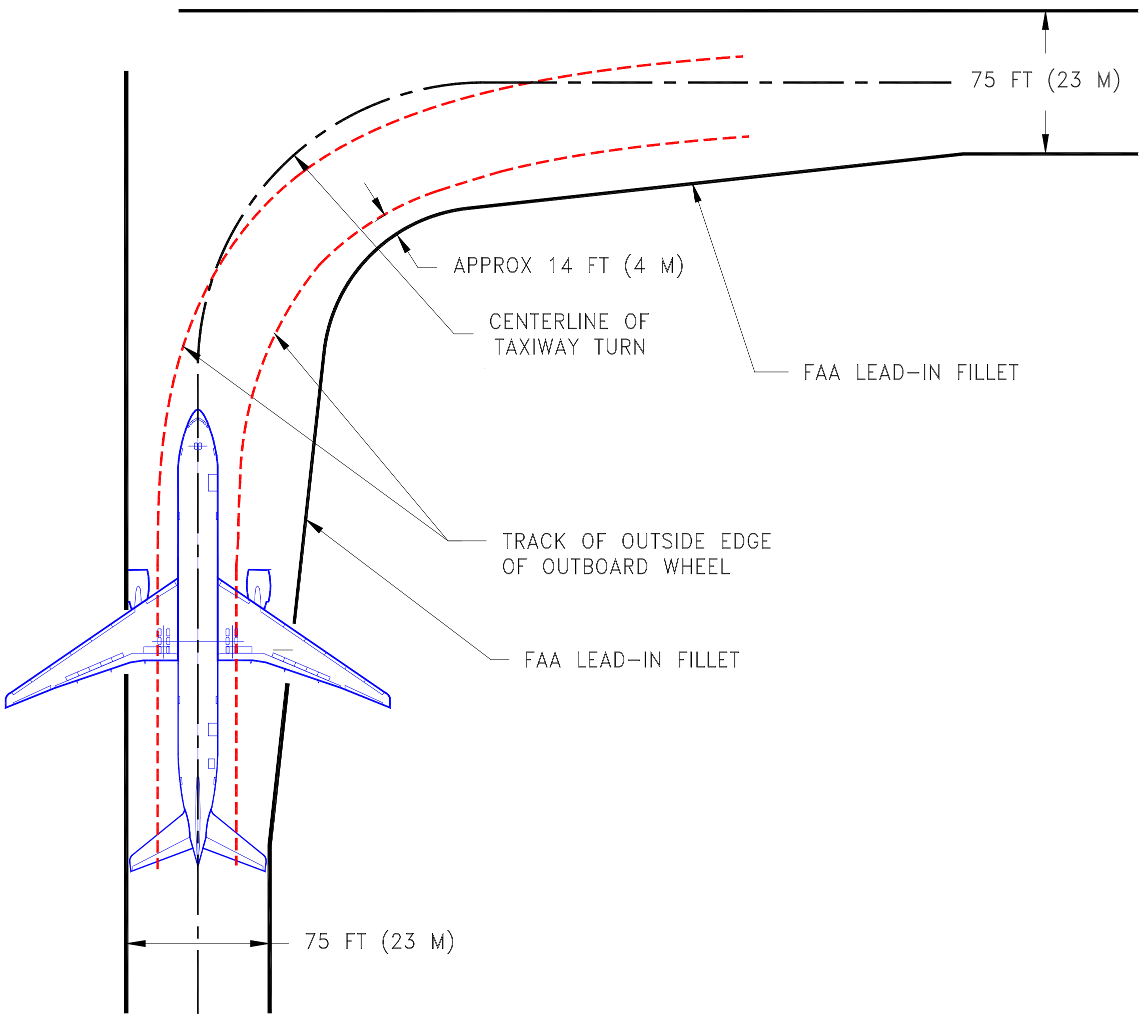
- BEFORE DETERMINING THE SIZE OF THE INTERSECTION FILLET, CHECK WITH THE AIRLINES REGARDING THE OPERATING PROCEDURES THAT THEY USE AND THE AIRCRAFT TYPES THEY ARE EXPECTED TO USE AT THE AIRPORT.
- 777-300 DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200 WOULD BE APPROXIMATELY 20 FT (6 M) INSTEAD OF 14 FT AS SHOWN.



4.5.3 Runway and Taxiway Turn Paths - Taxiway-to-Taxiway, 90 Degrees, Nose Gear Tracks Centerline: Model 777-200, -300

NOTES:

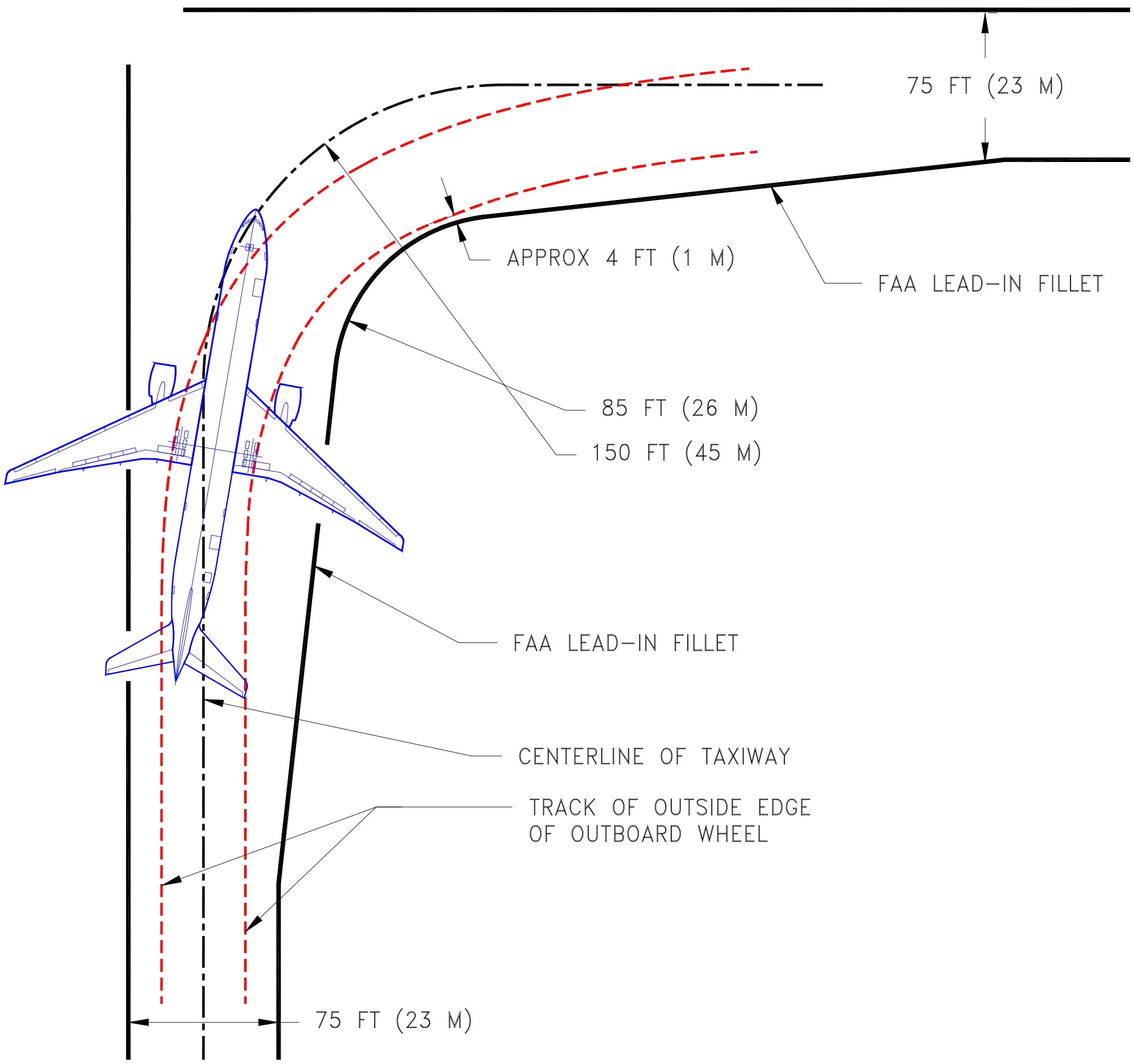
- BEFORE DETERMINING THE SIZE OF THE INTERSECTION FILLET, CHECK WITH THE AIRLINES REGARDING THE OPERATING PROCEDURES THAT THEY USE AND THE AIRCRAFT TYPES THEY ARE EXPECTED TO USE AT THE AIRPORT
- 777-300 DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200 WOULD BE APPROXIMATELY 22 FT (6.7 M) INSTEAD OF 14 FT AS SHOWN.



4.5.4 Runway and Taxiway Turn Paths - Taxiway-to-Taxiway, 90 Degrees, Cockpit Tracks Centerline: Model 777-200, -300

NOTES:

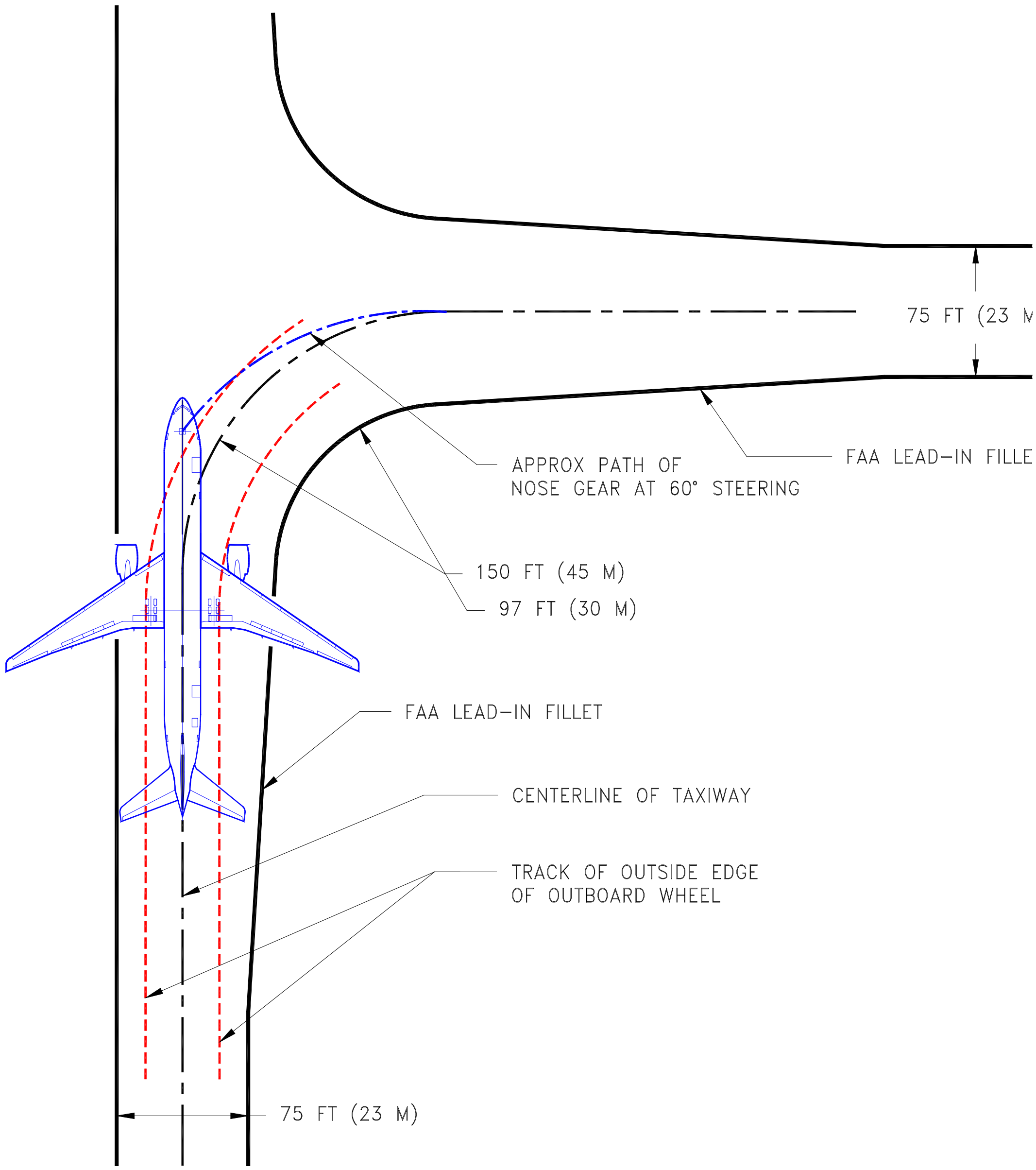
- BEFORE DETERMINING THE SIZE OF THE INTERSECTION FILLET, CHECK WITH THE AIRLINES REGARDING THE OPERATING PROCEDURES THAT THEY USE AND THE AIRCRAFT TYPES THEY ARE EXPECTED TO USE AT THE AIRPORT
- 777-300 DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200 WOULD BE APPROXIMATELY 17 FT (5.2 M) INSTEAD OF 4 FT AS SHOWN.



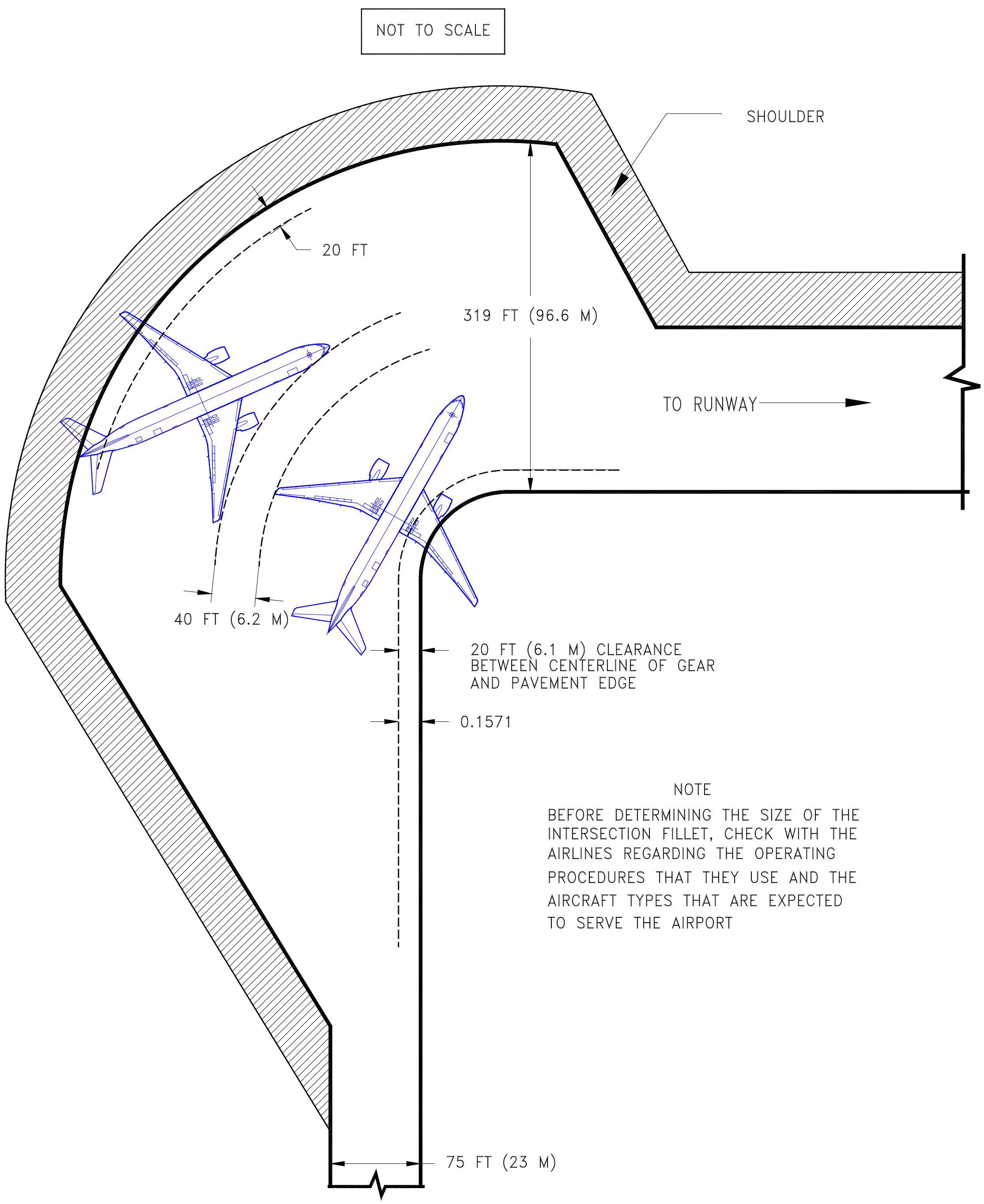
4.5.5 Runway and Taxiway Turn Paths - Taxiway-to-Taxiway, 90 Degrees, Judgmental Oversteering: Model 777-200, -300

NOTES:

- BEFORE DETERMINING THE SIZE OF THE INTERSECTION FILLET, CHECK WITH THE AIRLINES REGARDING THE OPERATING PROCEDURES THAT THEY USE AND THE AIRCRAFT TYPES THEY ARE EXPECTED TO USE AT THE AIRPORT
- 777-300 DATA SHOWN. 777-200 DATA WOULD BE LESS STRINGENT



4.6 RUNWAY HOLDING BAY: MODEL 777-200, -300



5.0 TERMINAL SERVICING

During turnaround at the terminal, certain services must be performed on the aircraft, usually within a given time, to meet flight schedules. This section shows service vehicle arrangements, schedules, locations of service points, and typical service requirements. The data presented in this section reflect ideal conditions for a single airplane. Service requirements may vary according to airplane condition and airline procedure.

Section 5.1 shows typical arrangements of ground support equipment during turnaround. As noted, if the auxiliary power unit (APU) is used, the electrical, air start, and air-conditioning service vehicles would not be required. Passenger loading bridges or portable passenger stairs could be used to load or unload passengers.

Sections 5.2 and 5.3 show typical service times at the terminal. These charts give typical schedules for performing service on the airplane within a given time. Service times could be rearranged to suit availability of personnel, airplane configuration, and degree of service required.

Section 5.4 shows the locations of ground service connections in graphic and in tabular forms. Typical capacities and service requirements are shown in the tables. Services with requirements that vary with conditions are described in subsequent sections.

Section 5.5 shows typical sea level air pressure and flow requirements for starting different engines. The curves are based on an engine start time of 90 seconds.

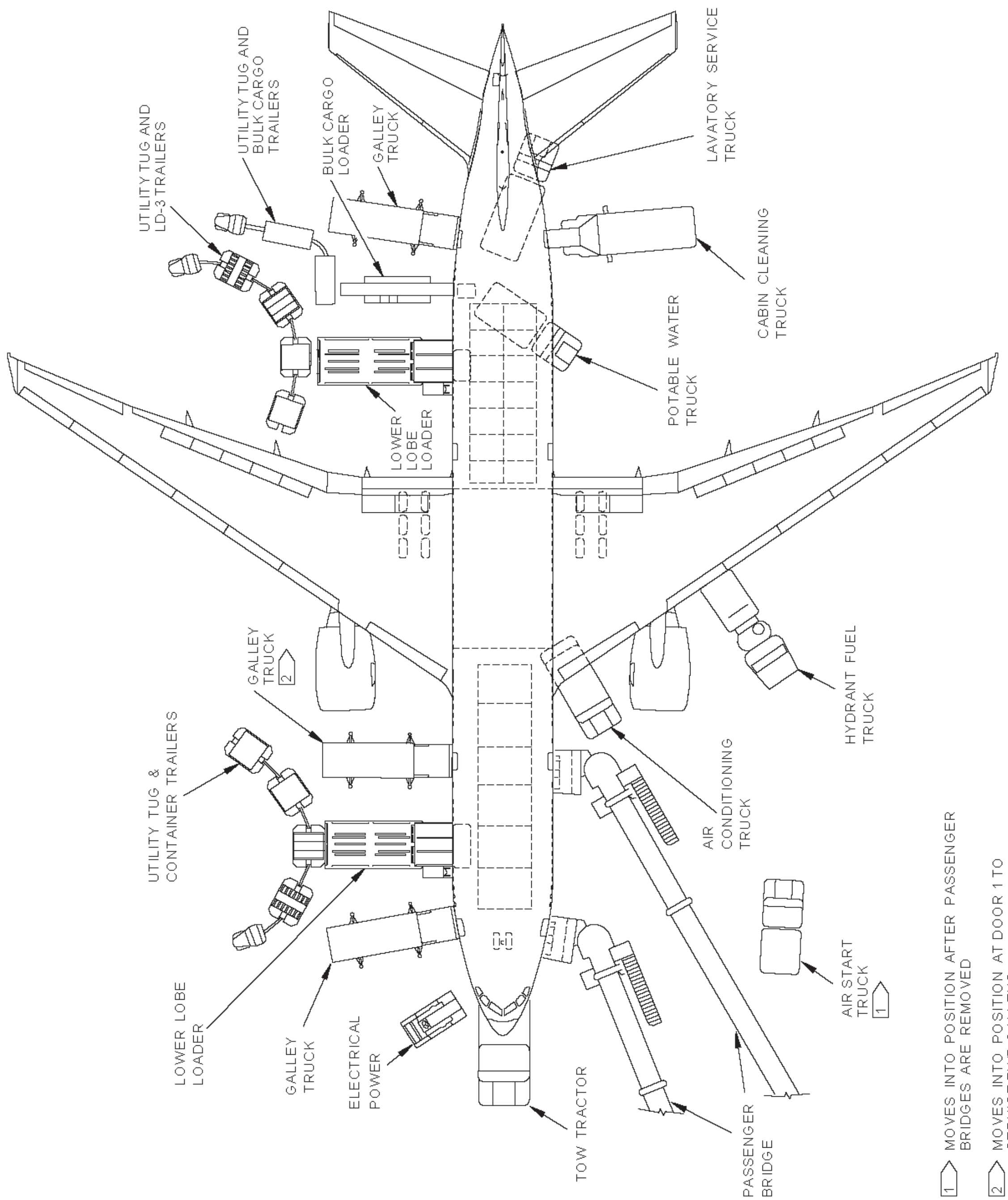
Section 5.6 shows air conditioning requirements for heating and cooling (pull-down and pull-up) using ground conditioned air. The curves show airflow requirements to heat or cool the airplane within a given time at ambient conditions.

Section 5.7 shows air conditioning requirements for heating and cooling to maintain a constant cabin air temperature using low pressure conditioned air. This conditioned air is supplied through an 8-in ground air connection (GAC) directly to the passenger cabin, bypassing the air cycle machines.

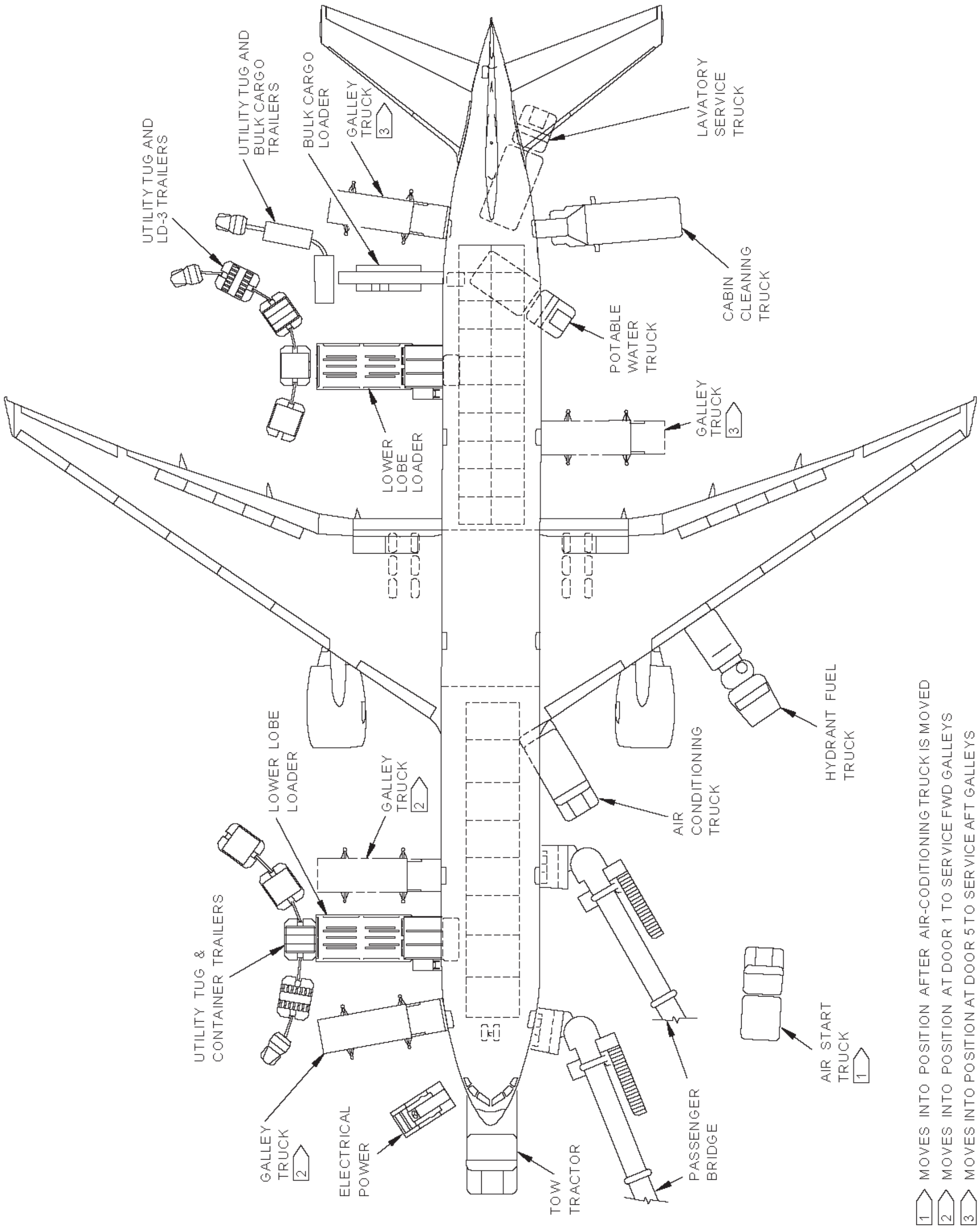
Section 5.8 shows ground towing requirements for various ground surface conditions.

5.1 AIRPLANE SERVICING ARRANGEMENT - TYPICAL TURNAROUND

5.1.1 Airplane Servicing Arrangement - Typical Turnaround: Model 777-200 / -200ER / -200LR

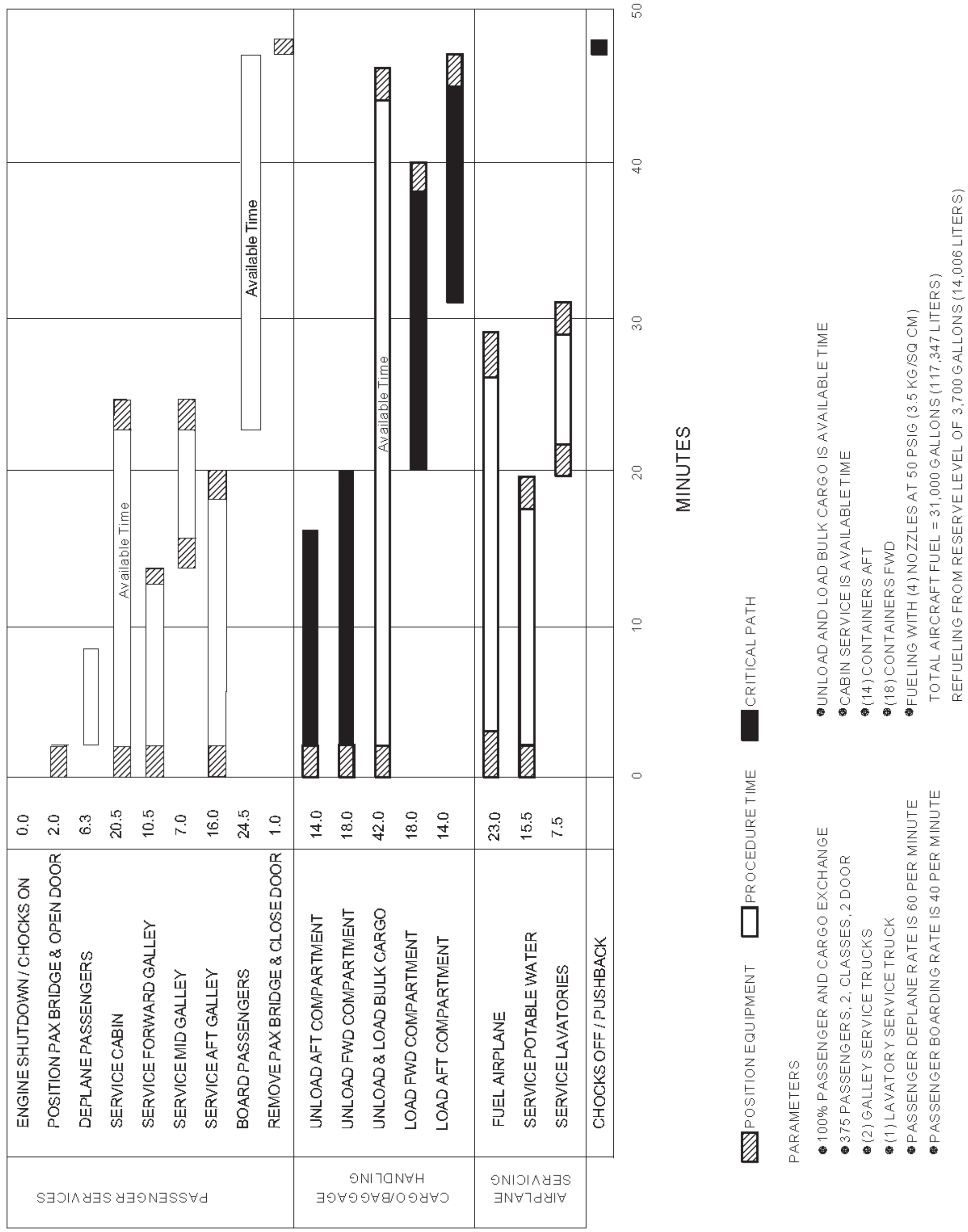


5.1.2 Airplane Servicing Arrangement - Typical Turnaround: Model 777-300 / -300ER

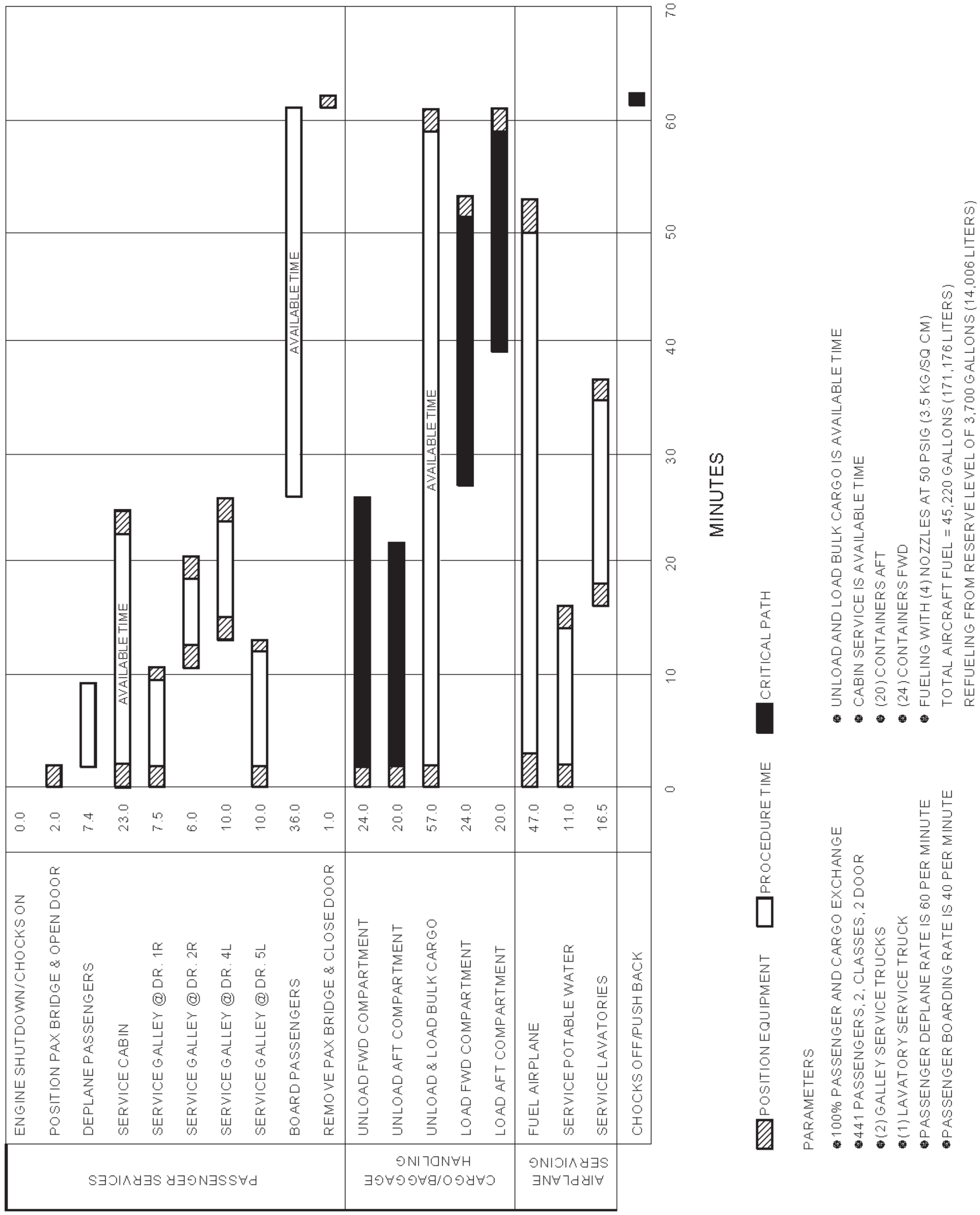


5.2 TERMINAL OPERATIONS - TURNAROUND STATION

5.2.1 Terminal Operations - Turnaround Station: Model 777-200

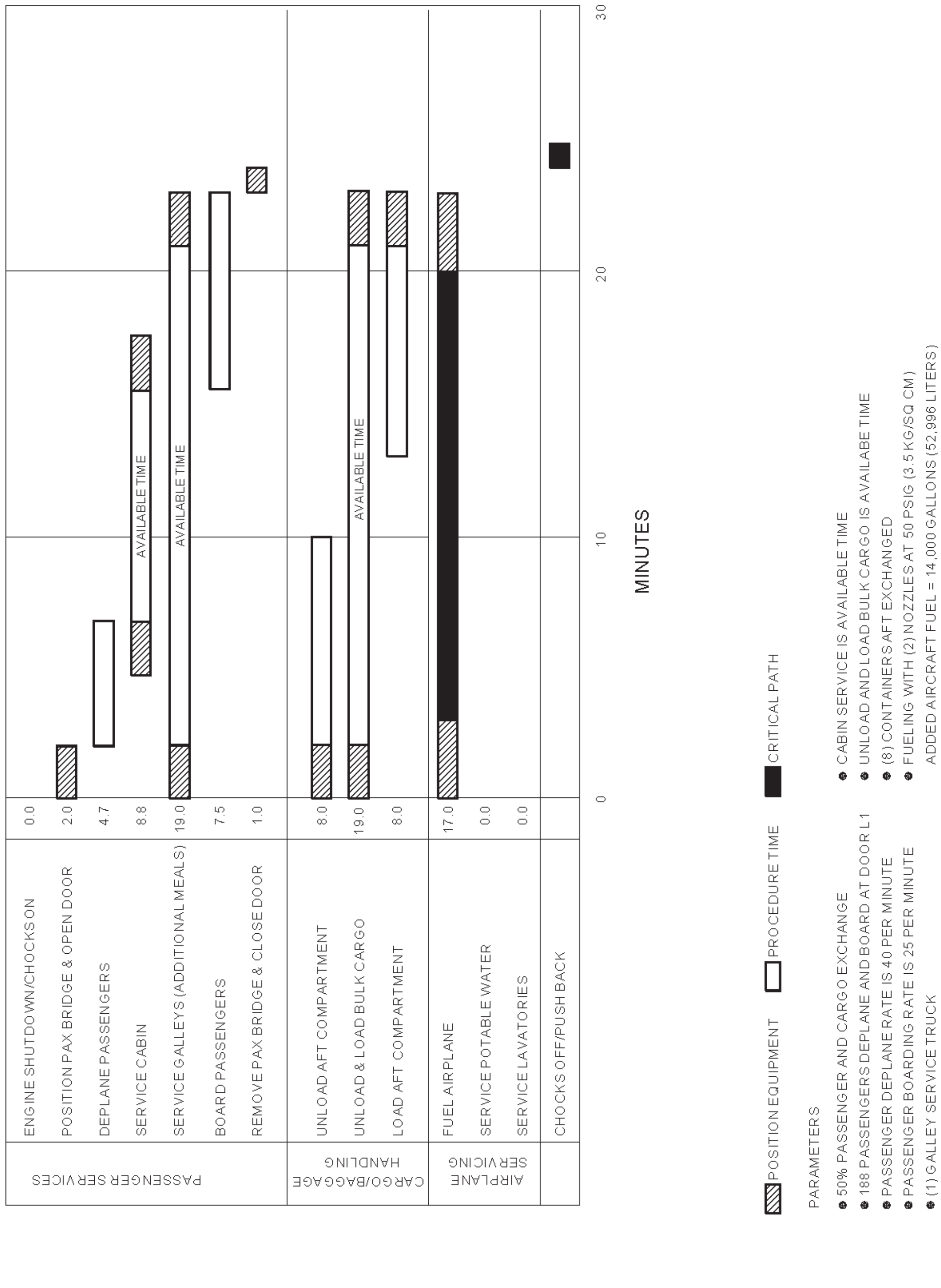


5.2.2 Terminal Operations - Turnaround Station: Model 777-300

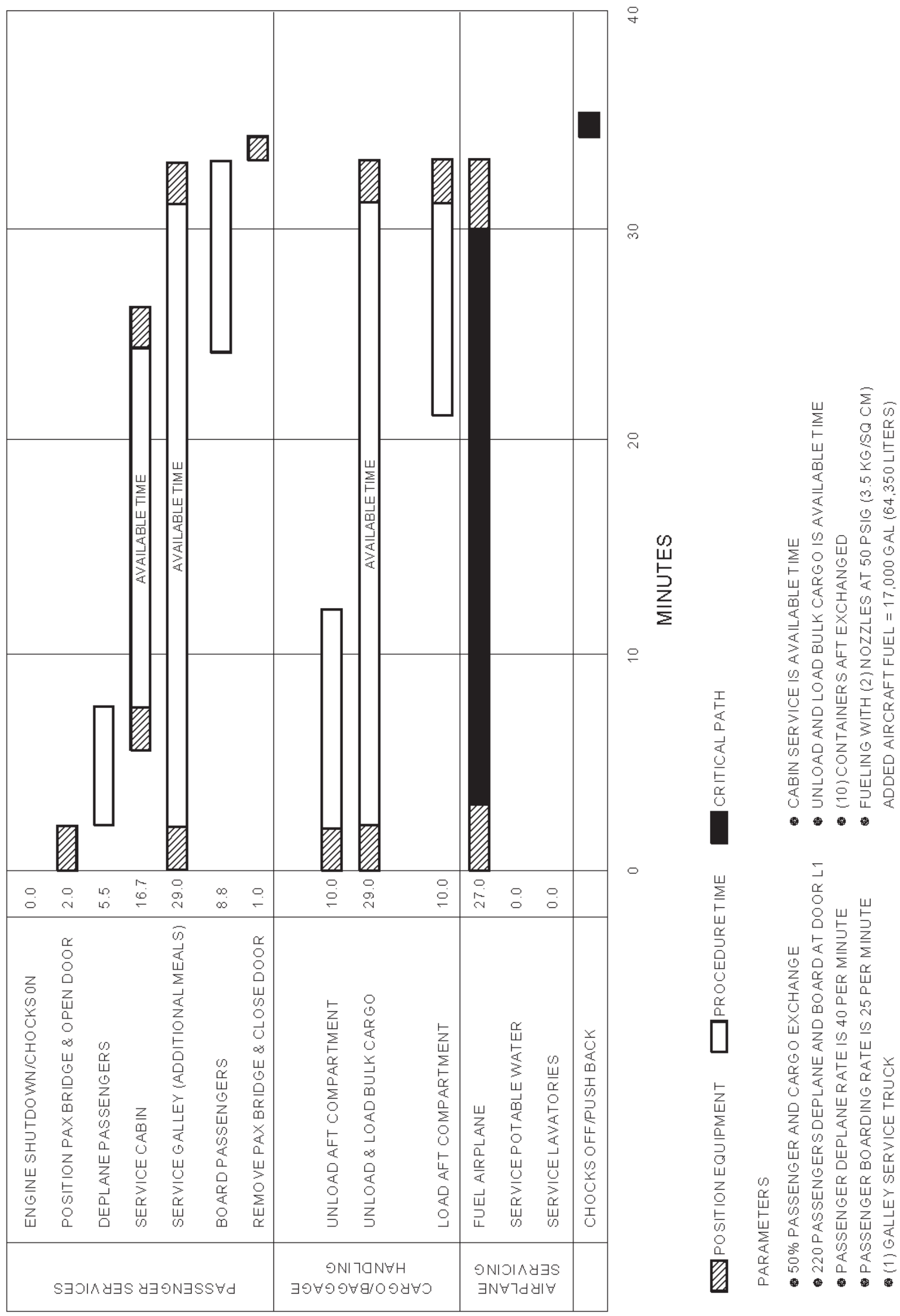


5.3 TERMINAL OPERATIONS - EN ROUTE STATION

5.3.1 Terminal Operations - En Route Station: Model 777-200

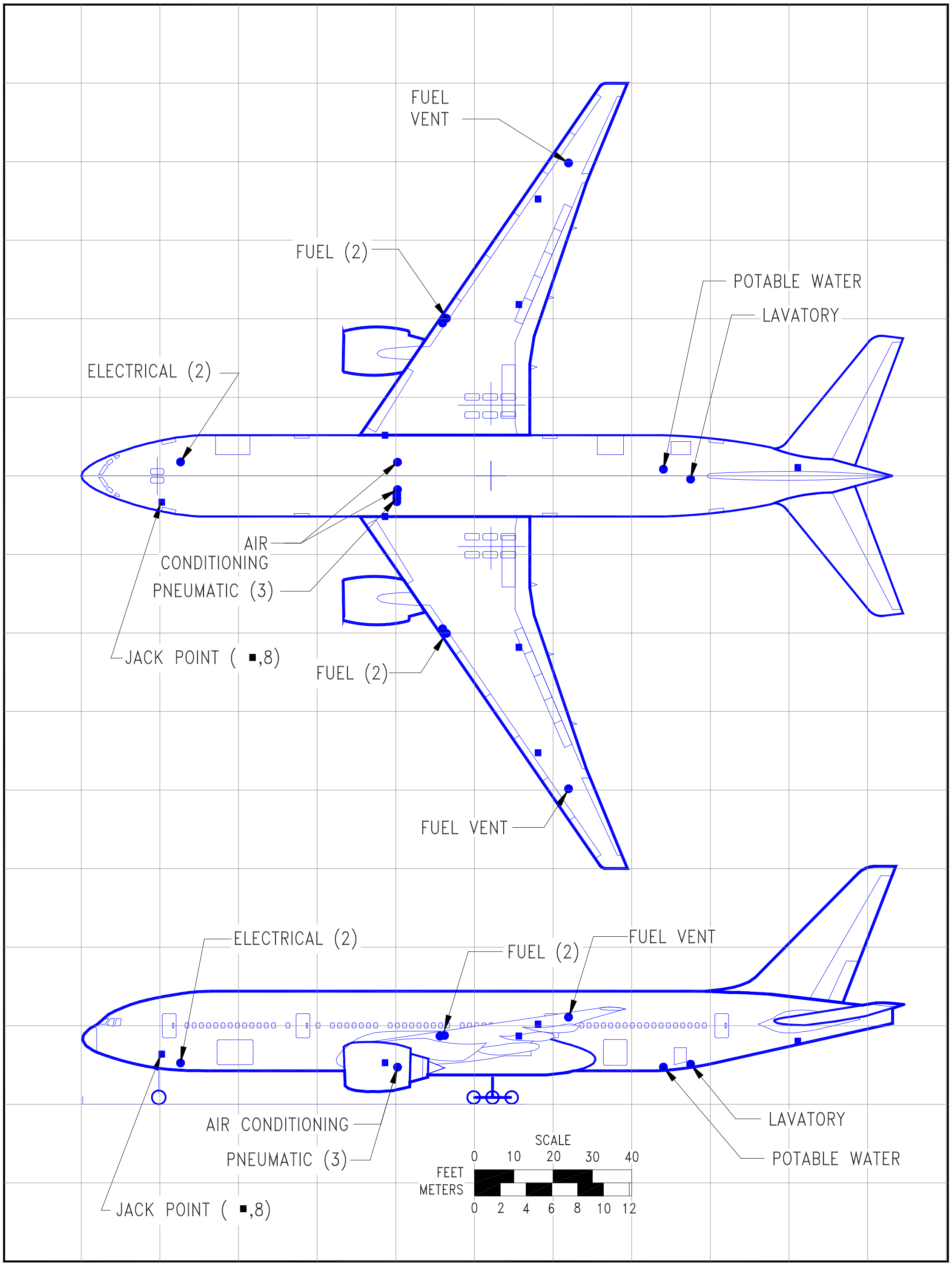


5.3.2 Terminal Operations - En Route Station: Model 777-300

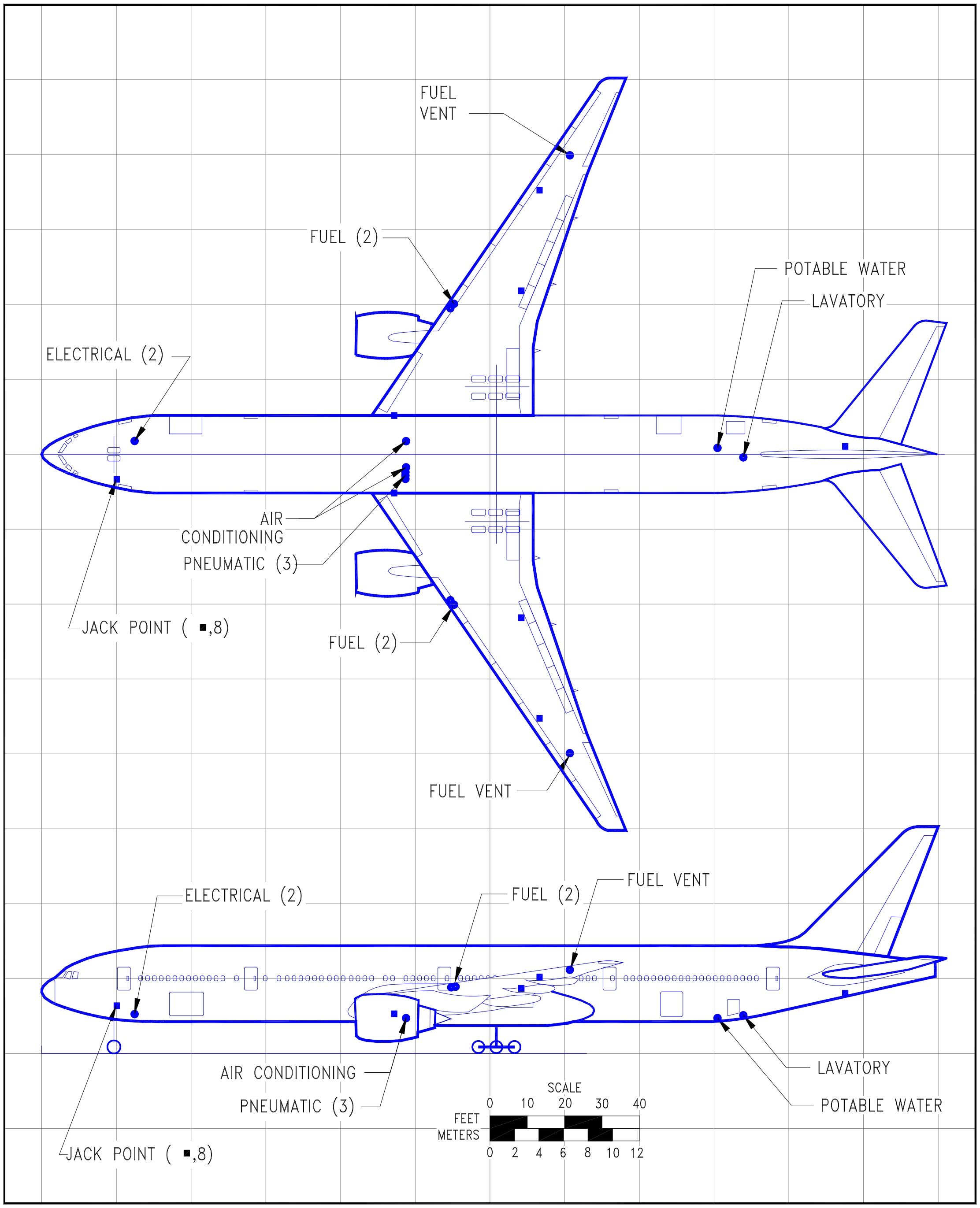


5.4 GROUND SERVICING CONNECTIONS

5.4.1 Ground Service Connections: Model 777-200



5.4.2 Ground Service Connections: Model 777-300



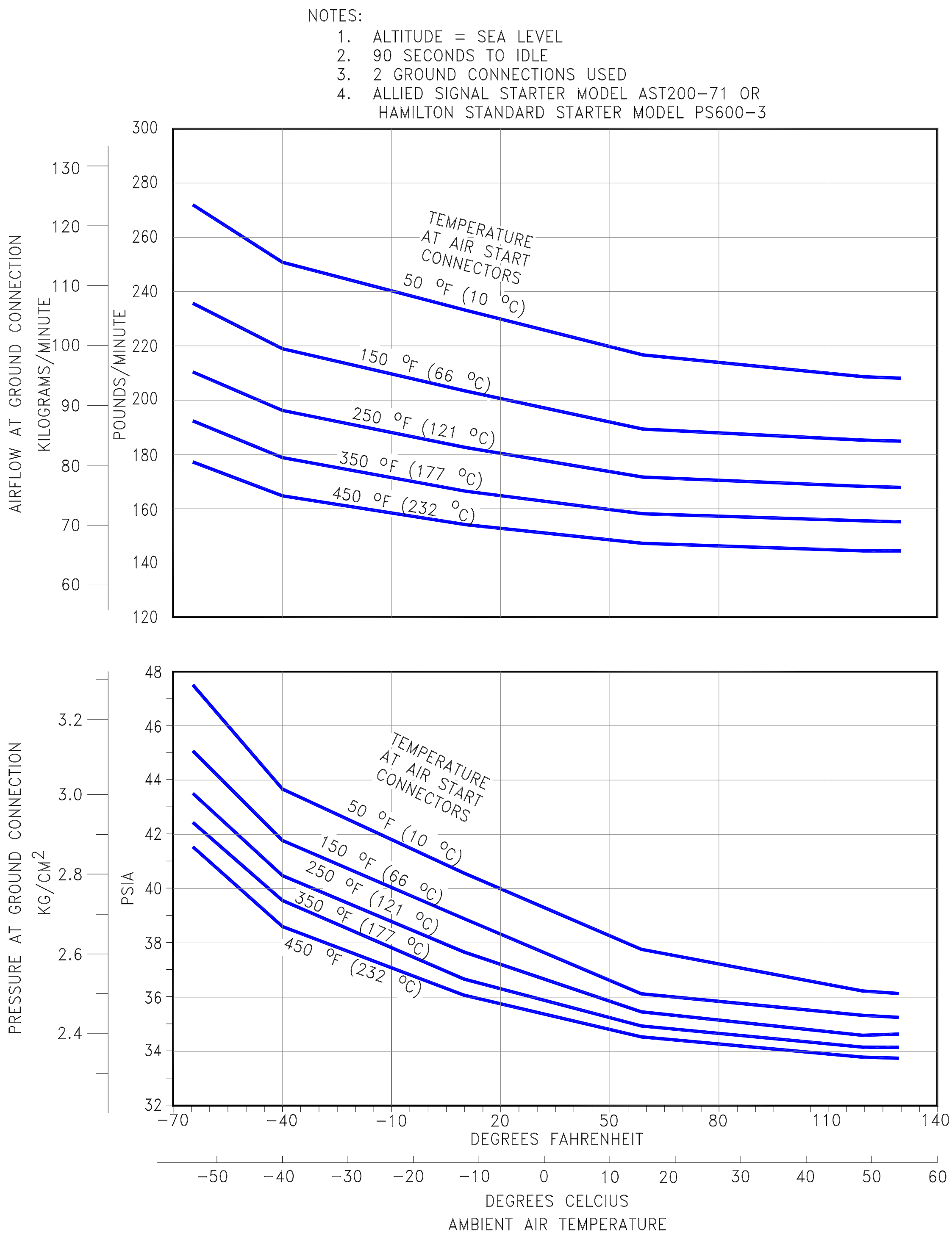
5.4.3 Ground Service Connections and Capacities: Model 777-200, -300

SYSTEM	MODEL	DISTANCE AFT OF		DISTANCE FROM AIRPLANE CENTERLINE				MAX HEIGHT ABOVE	
		NOSE		LH SIDE		RH SIDE		GROUND	
		FT-IN	M	FT-IN	M	FT-IN	M	FT-IN	M
CONDITIONED AIR TWO 8-IN (20.3 CM) PORT	777-200	80	24.4	3	1.1	3	1.1	8	2.4
	777-300	97	29.6	3	1.1	3	1.1	8	2.4
ELECTRICAL TWO CONNECTION - 90 KVA, 200/115 V AC 400 HZ, 3-PHASE EACH	777-200	23	7.1	-	-	4	1.2	9	2.8
	777-300	23	7.1	-	-	4	1.2	9	2.8
FUEL TWO UNDERWING-PRESSURE CONNECTOR ON EACH WING TANK CAPACITIES (BASIC 777-200)	777-200	92	28.1	39	11.9	39	11.9	19	5.6
LEFT MAIN = 9,300 GAL (35,200 L) CENTER = 12,400 GAL (46,900 L) RIGHT MAIN = 9,300 GAL (35,200 L) TOTAL = 31,000 GAL (117,300 L		94	28.5	41	12.5	41	12.5	19	5.6
TANK CAPACITIES (HIGH GR. WT 777-200 AND ALL 777-300) LEFT MAIN = 9,300 GAL (35,200 L) CENTER = 12,400 GAL (46,900 L)	777-300	110	33.5	39	11.9	39	11.9	19	5.6
CTR WING = 13,700 GAL (51,800 L) RIGHT MAIN = 9,300 GAL (35,200 L) TOTAL = 44,700 GAL (169,200 L)		111	33.9	41	12.5	41	12.5	19	5.6
FUEL VENTS	777-200	125	38.1	80	24.4	80	24.4	22	6.7
	777-300	142	43.3	80	24.4	80	24.4	22	6.7
LAVATORY ONE SERVICE CONNECTION	777-200	155	47.1	1	0.3	-	-	11	3.3
	777-300	181	55.2	1	0.3	-	-	11	3.3
PNEUMATIC THREE 3-IN (7.6-CM) PORTS	777-200	80	24.4	5	1.5	-	-	8	2.4
		80	24.4	6	1.7	-	-	8	2.4
		80	24.4	7	2.0	-	-	8	2.4
	777-300	97	29.6	5	1.5	-	-	8	2.4
		97	29.6	6	1.7	-	-	8	2.4
		97	29.6	7	2.0	-	-	8	2.4
POTABLE WATER ONE SERVICE CONNECTION	777-200	29	8.8	4	1.3	-	-	9	2.8
		147	44.9	-	-	3	1.0	10	3.0
FWD LOCATION (OPTIONAL)	777-300	29	8.8	4	1.3	-	-	9	2.8
AFT LOCATION (BASIC)		181	55.1	-	-	3	1.0	10	3.0

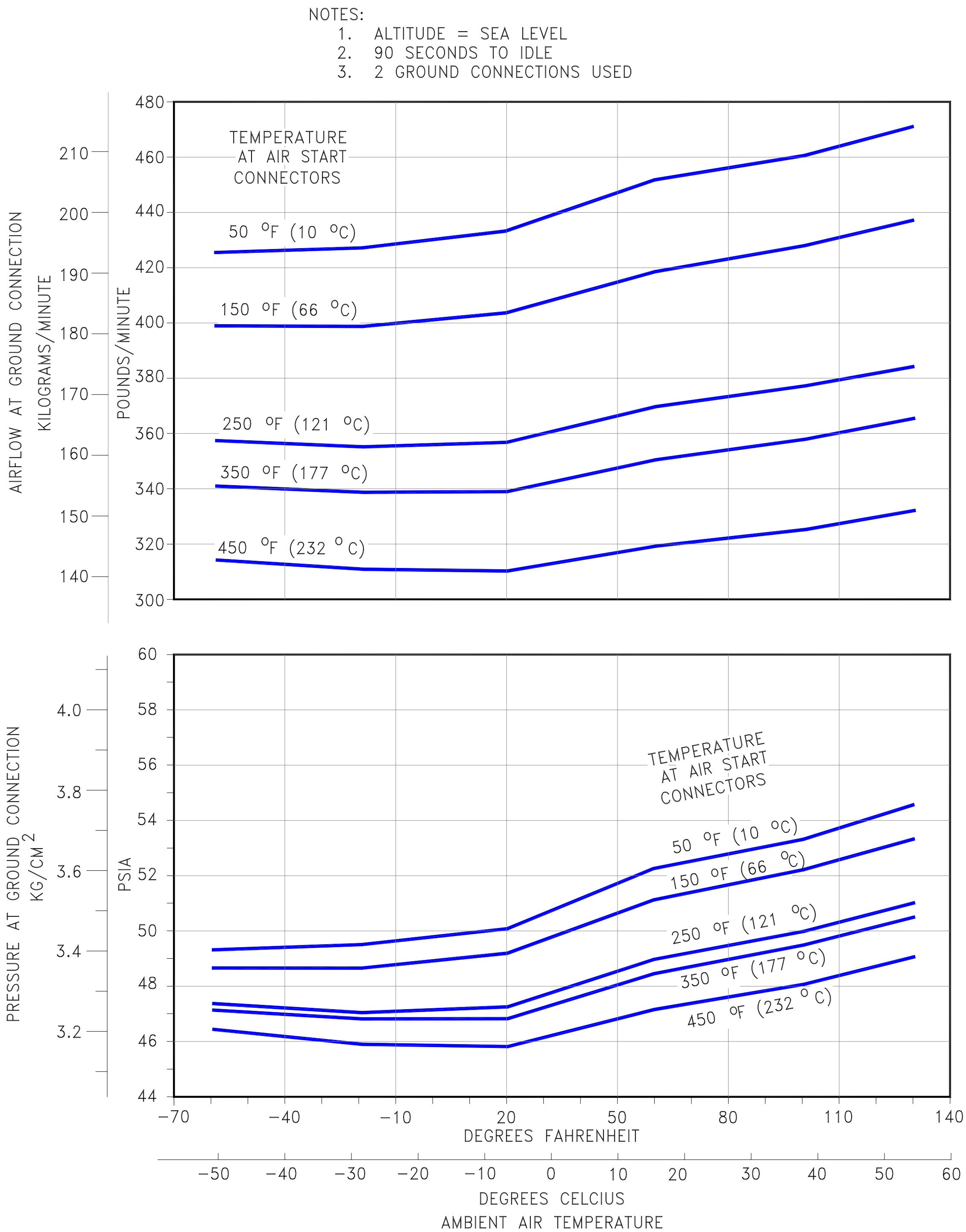
NOTE: DISTANCES ROUNDED TO THE NEAREST FOOT AND 0.1 METER.

5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS

5.5.1 Engine Start Pneumatic Requirements - Sea Level: Model 777-200, -300 (Pratt & Whitney Engines)

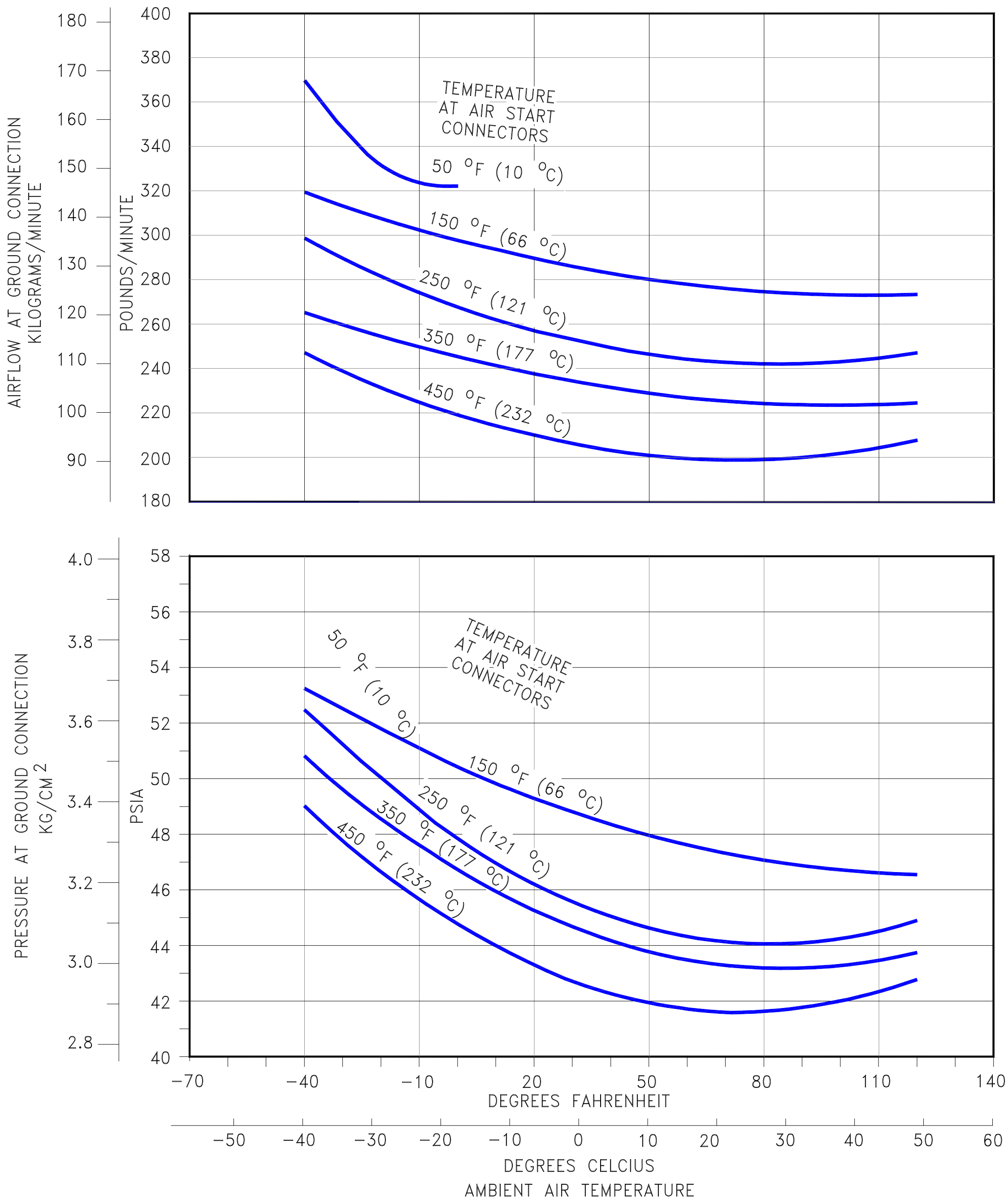


5.5.2 Engine Start Pneumatic Requirements - Sea Level: Model 777-200, -300 (General Electric Engines)



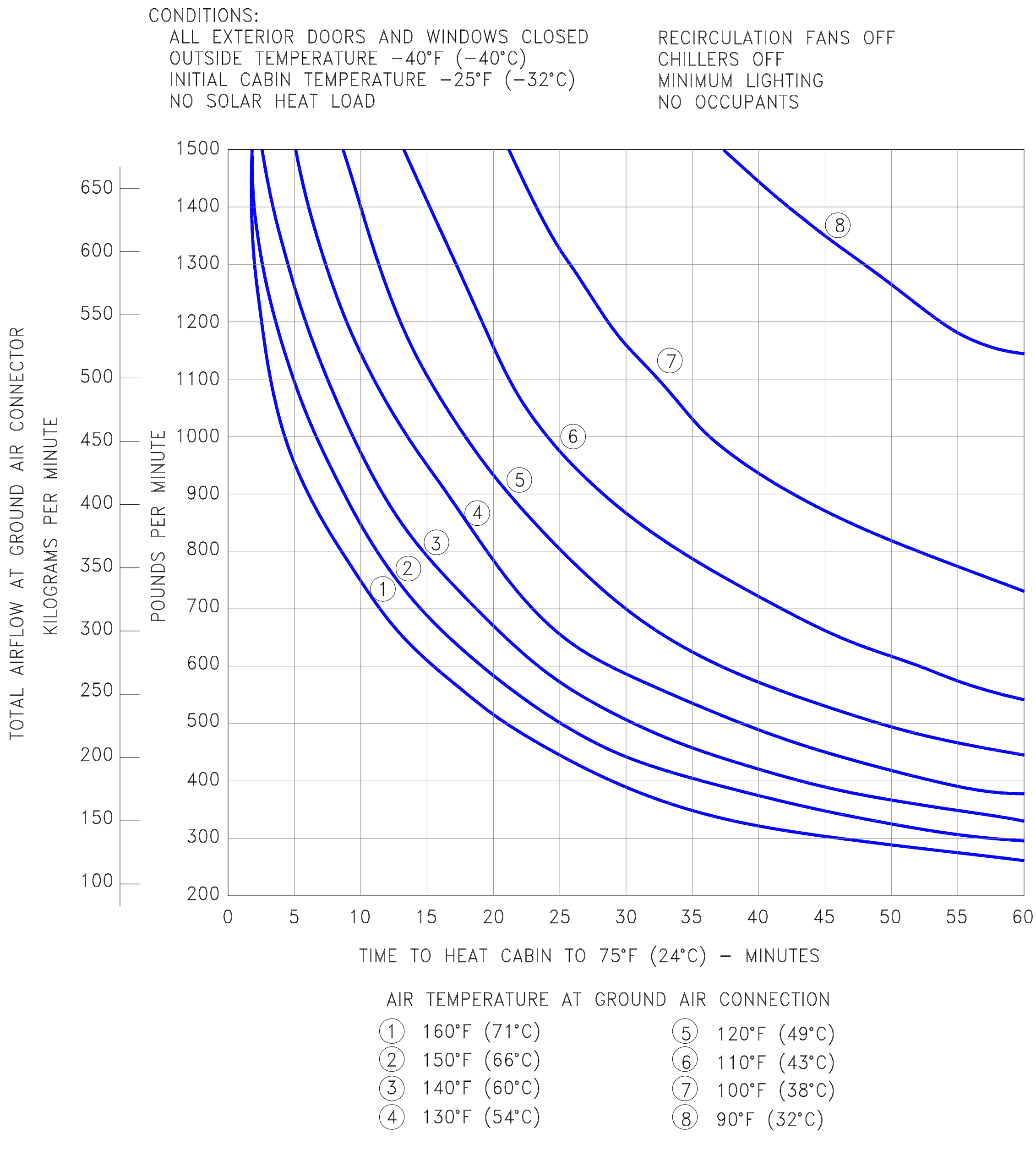
5.5.3 Engine Start Pneumatic Requirements - Sea Level: Model 777-200, -300 (Rolls-Royce Engines)

NOTES:
1. ALTITUDE = SEA LEVEL
2. 90 SECONDS TO IDLE
3. 2 GROUND CONNECTORS USED
4. ALLIED SIGNAL STARTER MODEL AST200-71 OR HAMILTON STANDARD STARTER MODEL PS600-3



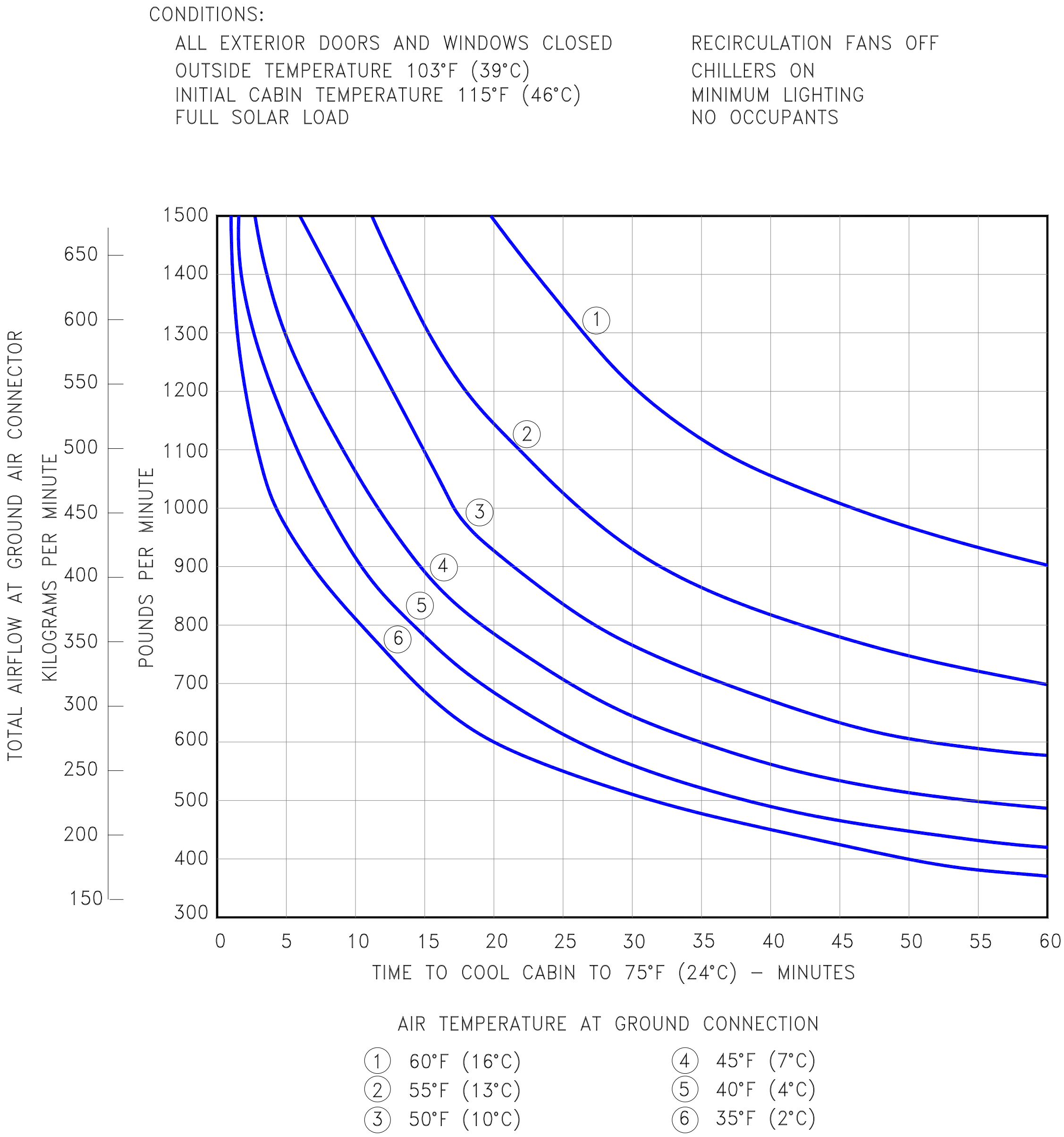
5.6 GROUND PNEUMATIC POWER REQUIREMENTS

5.6.1 Ground Conditioned Air Requirements – Heating, Pull-Up: Model 777-200



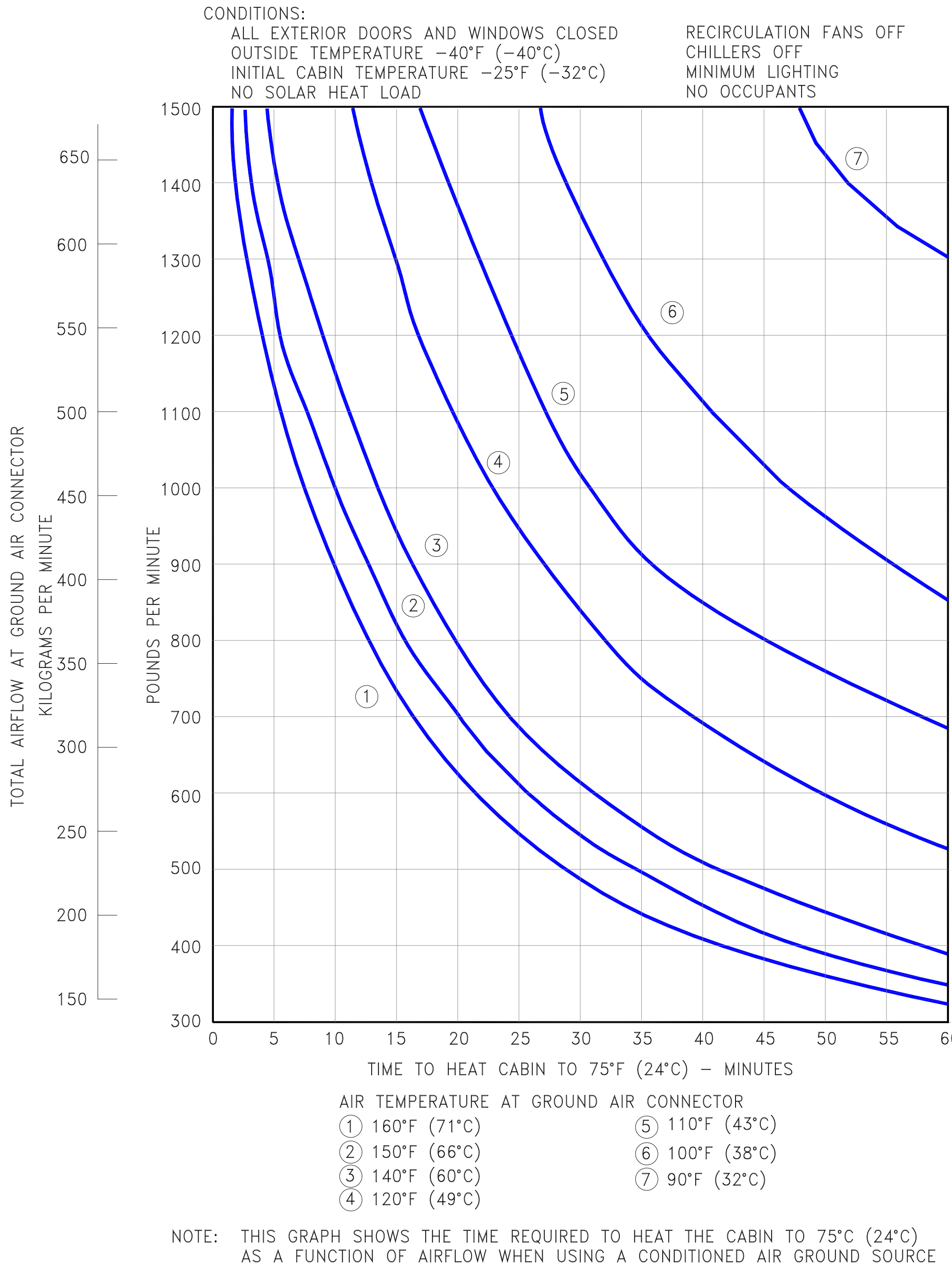
NOTE: THIS GRAPH SHOWS THE TIME REQUIRED TO HEAT THE CABIN TO 75°F (24°C) AS A FUNCTION OF AIRFLOW WHEN USING A CONDITIONED AIR GROUND SOURCE

5.6.2 Ground Conditioned Air Requirements – Cooling, Pull-Down: Model 777-200

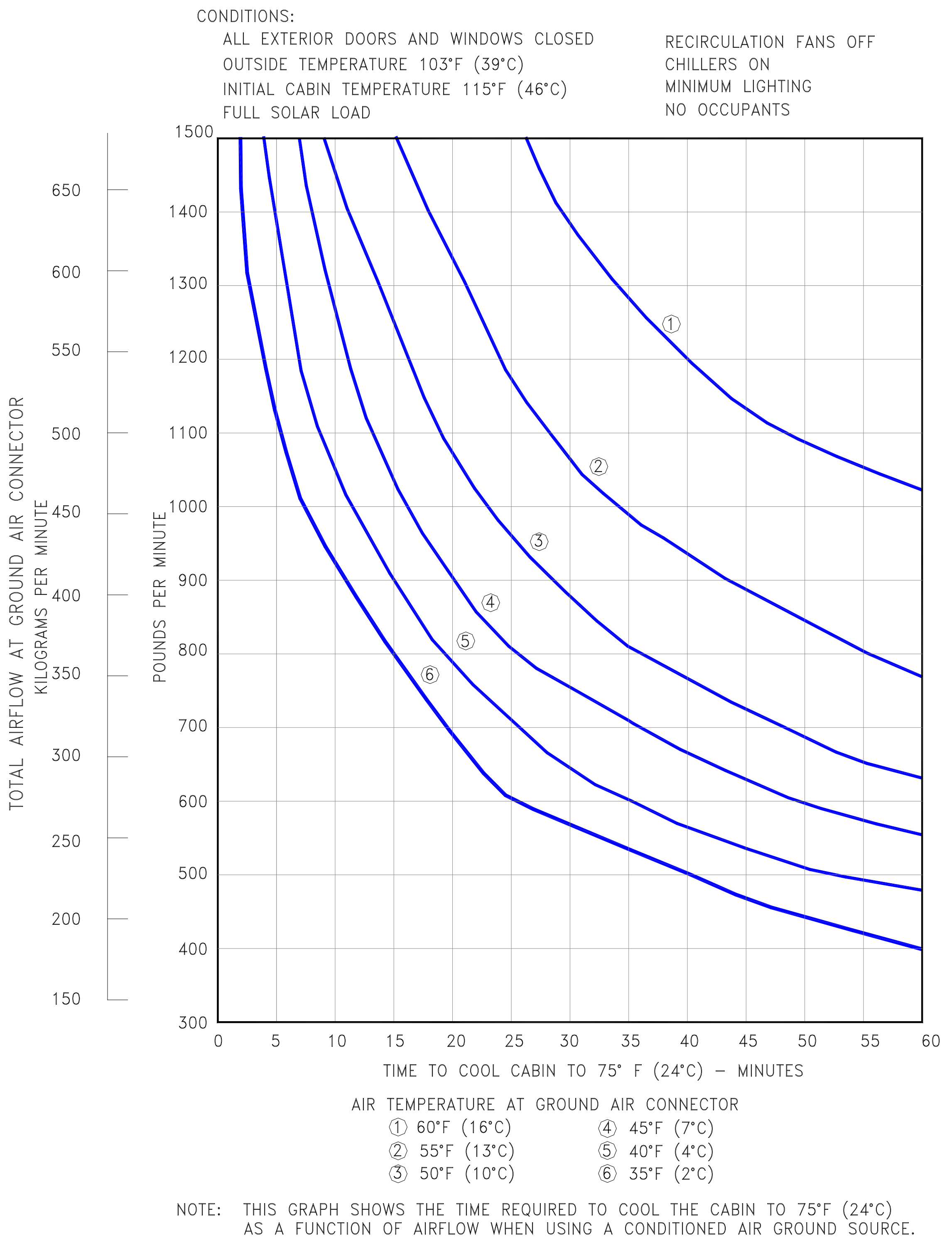


NOTE: THIS GRAPH SHOWS THE TIME REQUIRED TO COOL THE CABIN TO 75°F (24°C) AS A FUNCTION OF AIRFLOW WHEN USING A CONDITIONED AIR GROUND SOURCE.

5.6.3 Ground Conditioned Air Requirements – Heating, Pull-Up: Model 777-300

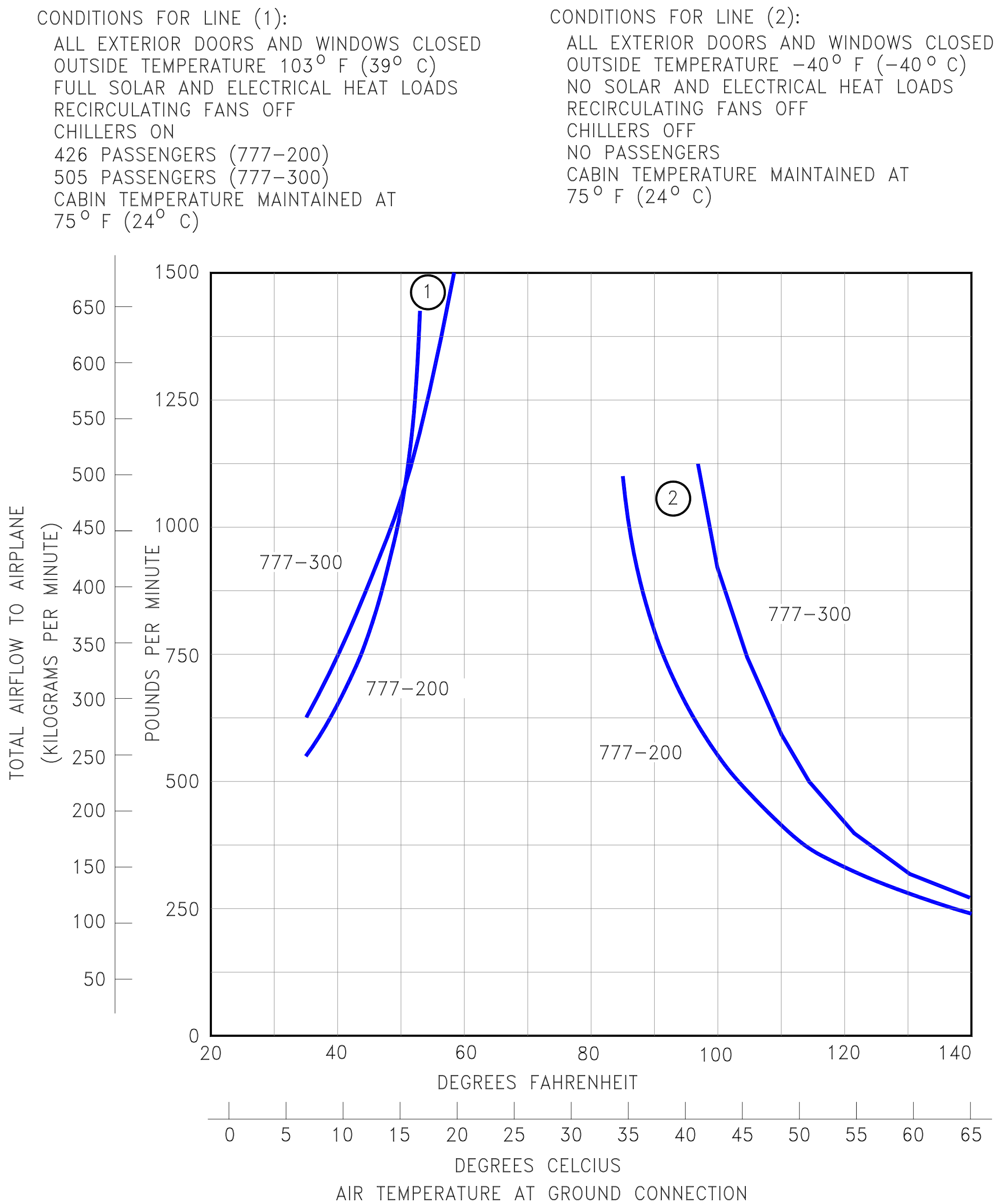


5.6.4 Ground Conditioned Air Requirements – Cooling, Pull-Down: Model 777-300



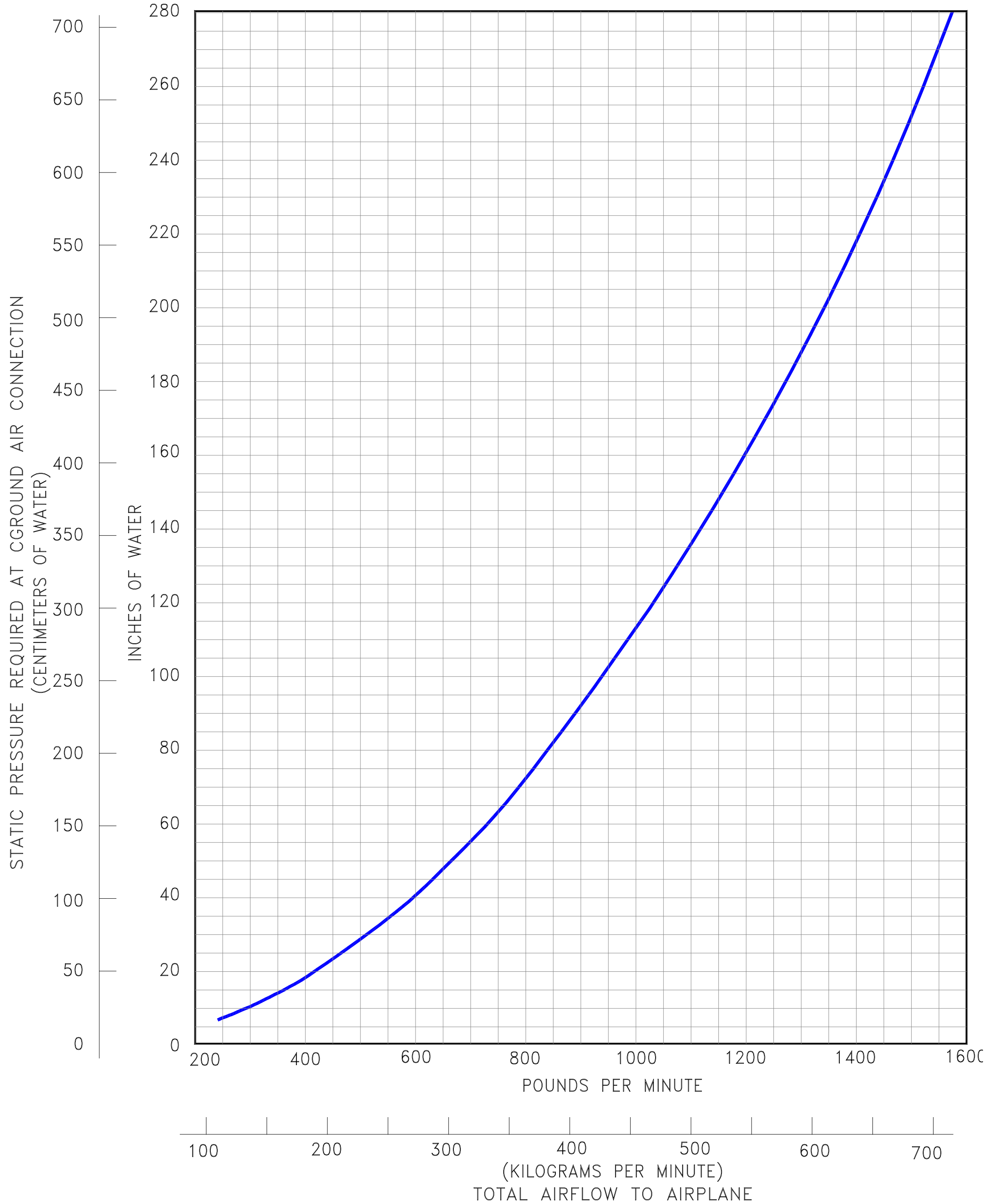
5.7 CONDITIONED AIR REQUIREMENTS

5.7.1 Conditioned Air Flow Requirements - Steady State Airflow: Model 777-200, -300

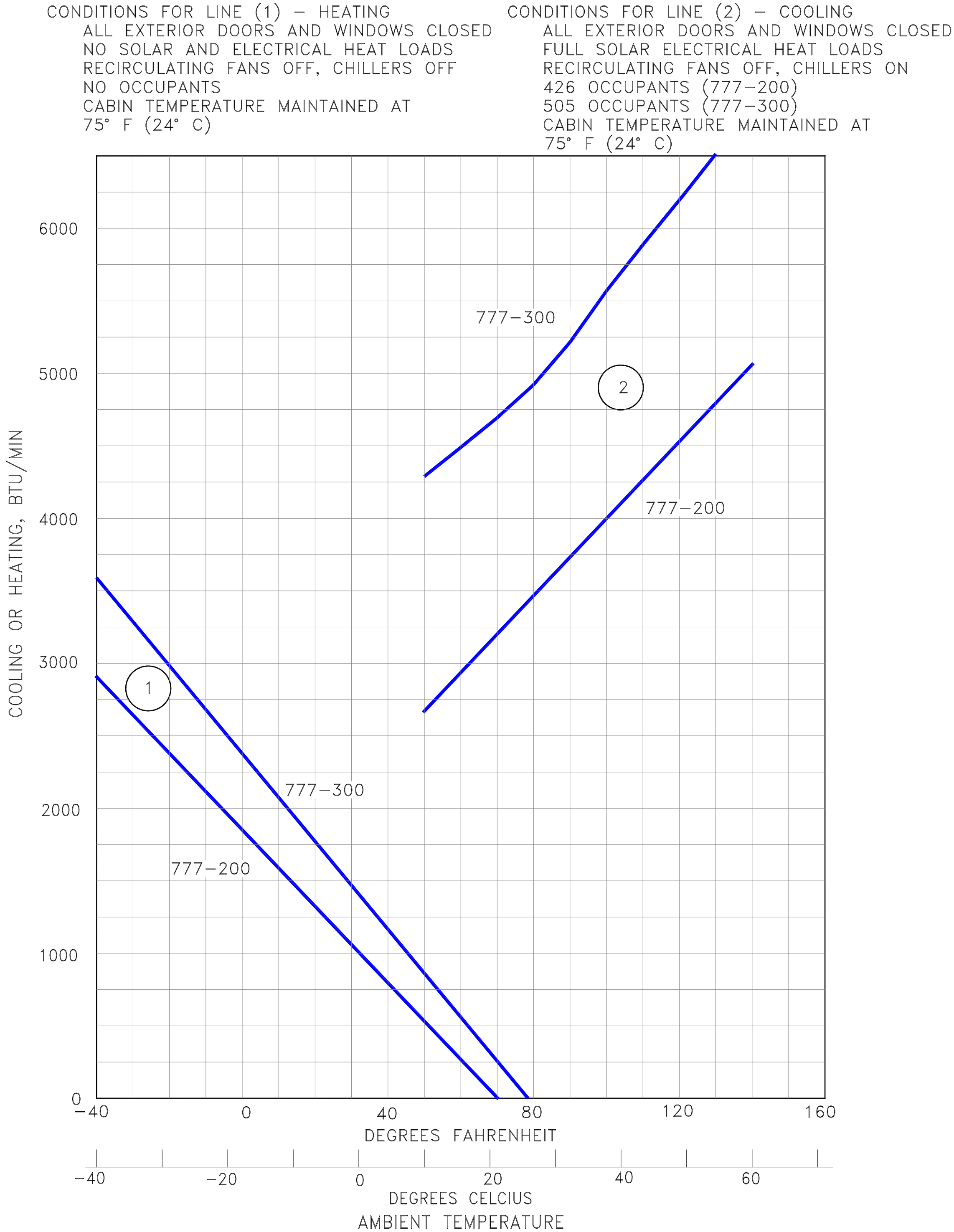


NOTE:
THIS GRAPH SHOWS REQUIRED AIR TEMPERATURES AT THE GROUND AIR CONNECTION IN ORDER TO MAINTAIN CABIN TEMPERATURE AT 75°F (24°C)

5.7.2 Air Conditioning Gauge Pressure Requirements - Steady State Airflow: Model 777-200, -300



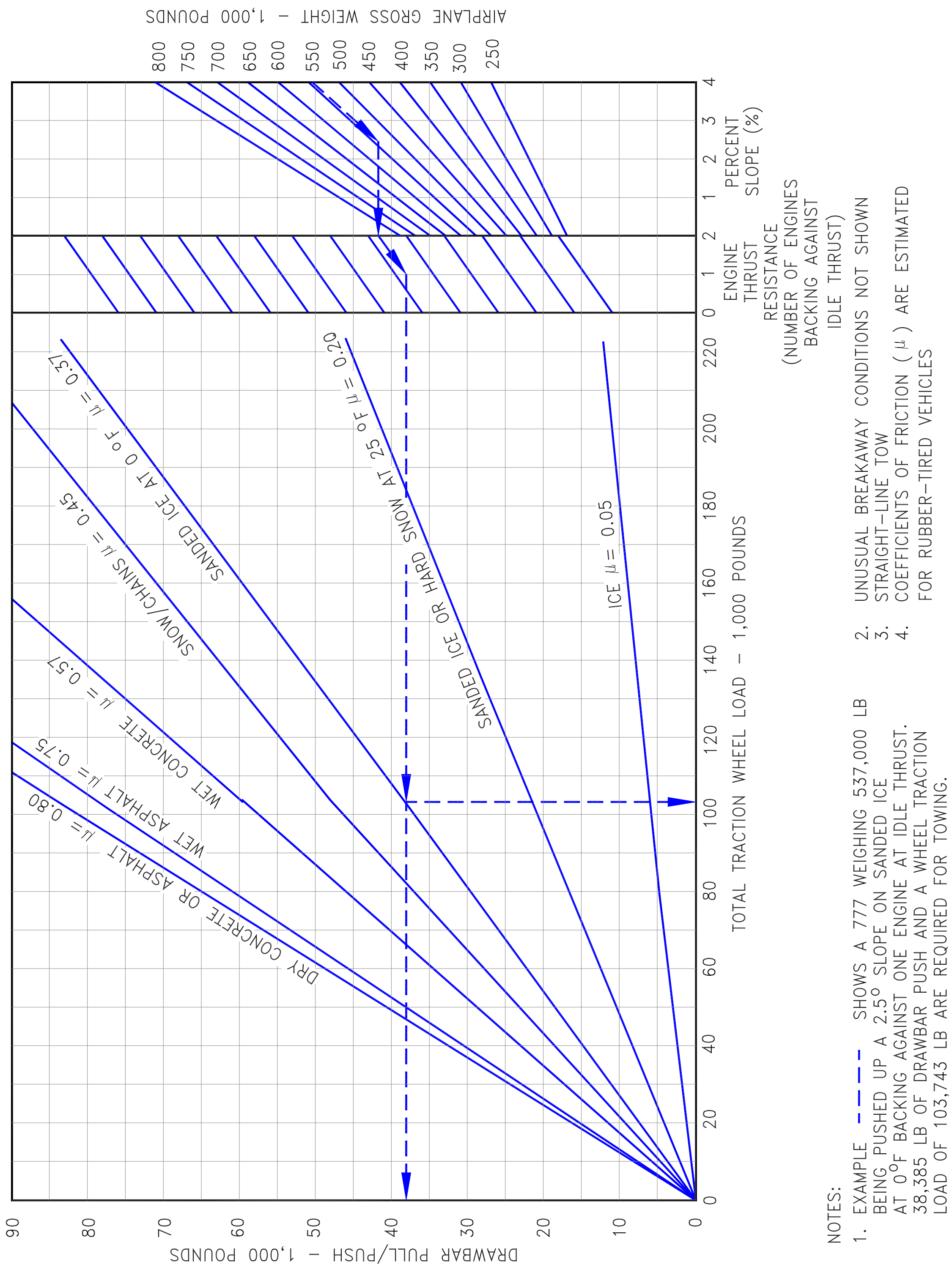
5.7.3 Conditioned Air Flow Requirements - Steady State BTU's: Model 777-200, -300



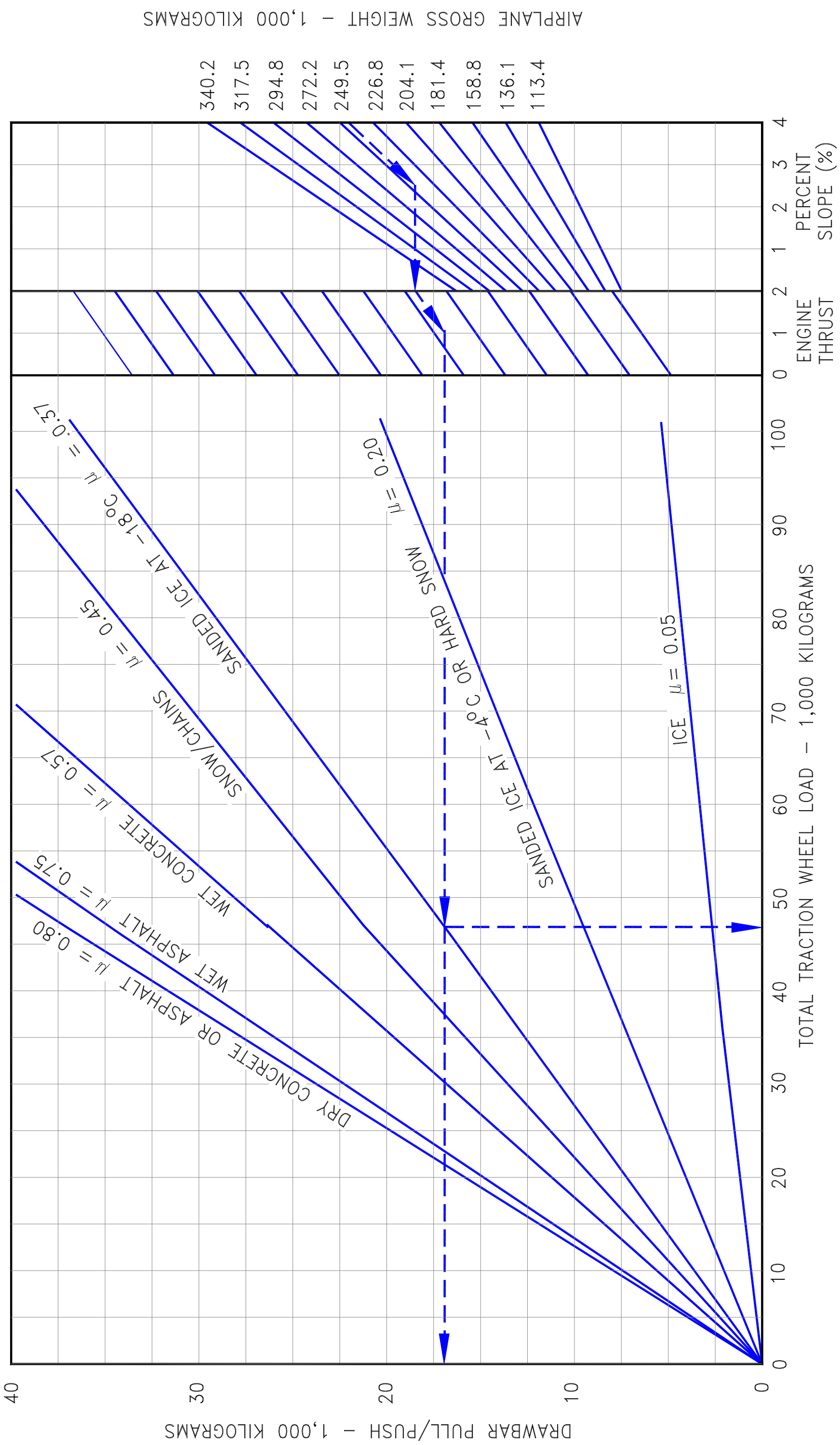
NOTE: THIS GRAPH SHOWS REQUIRED COOLING AND HEATING BTU'S AS A FUNCTION OF AMBIENT TEMPERATURE TO MAINTAIN CABIN TEMPERATURE AT 75°F (24°C)

5.8 GROUND TOWING REQUIREMENTS

5.8.1 Ground Towing Requirements - English Units: Model 777-200, -300



5.8.2 Ground Towing Requirements - Metric Units: Model 777-200, -300



NOTES:

1. EXAMPLE — — — SHOWS A 777 WEIGHING 243,500 KG BEING PUSHED UP A 2.5% SLOPE ON SANDED ICE AT 0°C BACKING AGAINST ONE ENGINE AT IDLE THRUST. 17,400 KG OF DRAWBAR PUSH AND A WHEEL TRACTION LOAD OF 47,100 KG ARE REQUIRED FOR TOWING.
2. UNUSUAL BREAKAWAY CONDITIONS NOT SHOWN
3. STRAIGHT-LINE TOW
4. COEFFICIENTS OF FRICTION (μ) ARE ESTIMATED FOR RUBBER-TIRED VEHICLES

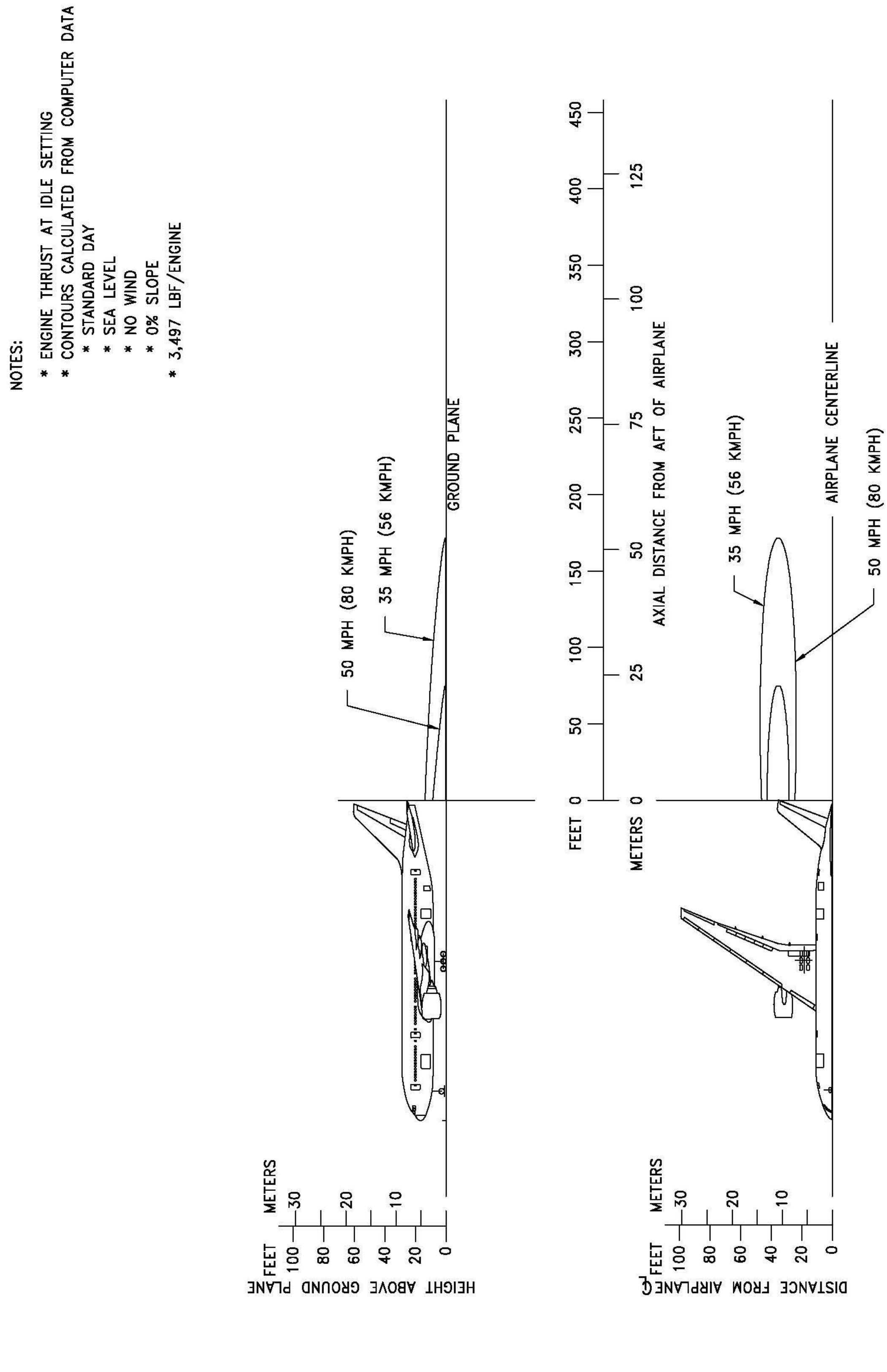
6.0 JET ENGINE WAKE AND NOISE DATA

6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES

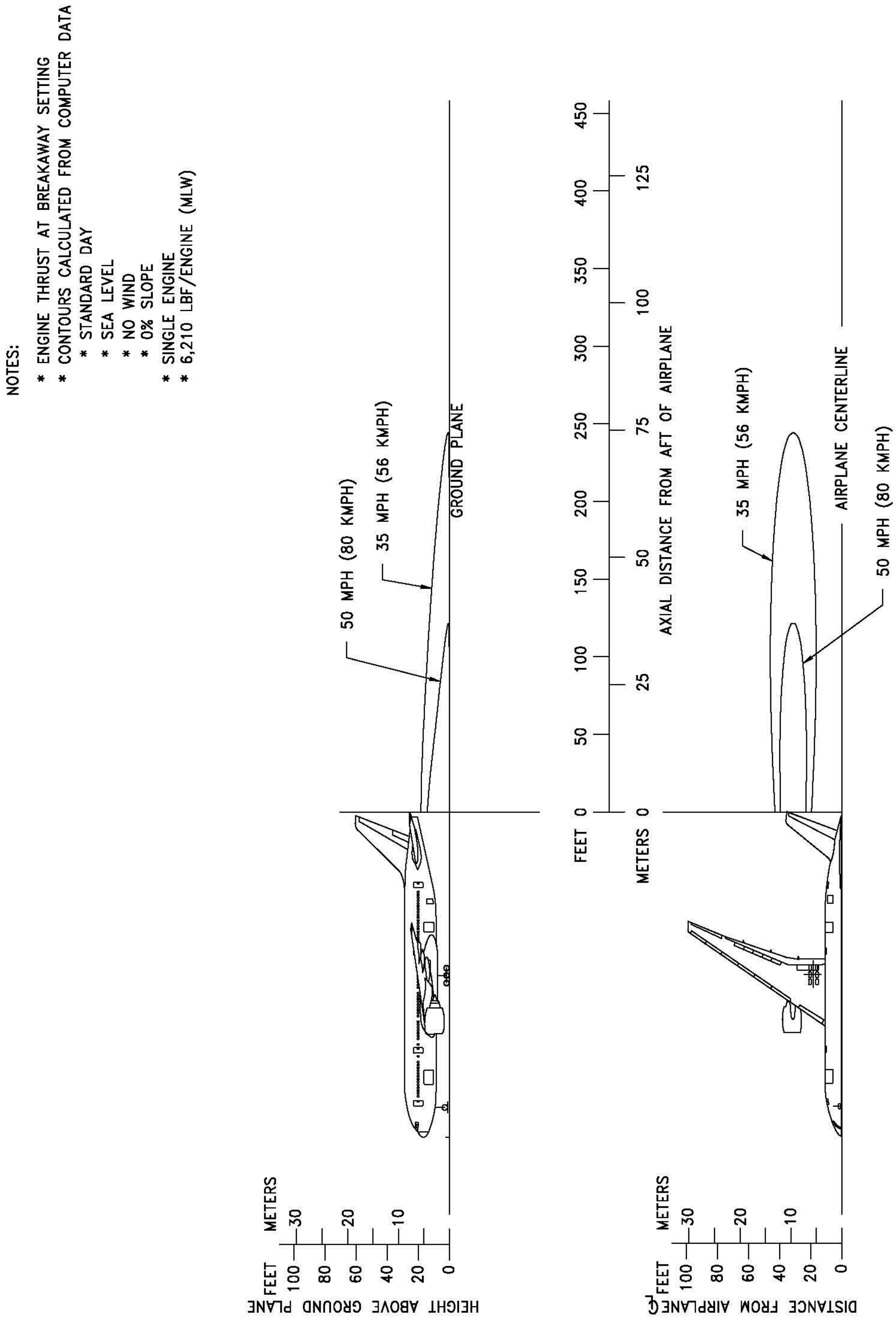
This section shows exhaust velocity and temperature contours aft of the 777-300. The contours were calculated from a standard computer analysis using three-dimensional viscous flow equations with mixing of primary, fan, and free-stream flow. The presence of the ground plane is included in the calculations as well as engine tilt and toe-in. Mixing of flows from the engines is also calculated. The analysis does not include thermal buoyancy effects which tend to elevate the jet wake above the ground plane. The buoyancy effects are considered to be small relative to the lateral velocity and therefore are not included.

The graphs show jet wake velocity and temperature contours for a representative engine. The results are valid for sea level, static, standard day conditions. The effect of wind on jet wakes was not included. There is evidence to show that a downwind or an upwind component does not simply add or subtract from the jet wake velocity, but rather carries the whole envelope in the direction of the wind. Crosswinds may carry the jet wake contour far to the side at large distances behind the airplane.

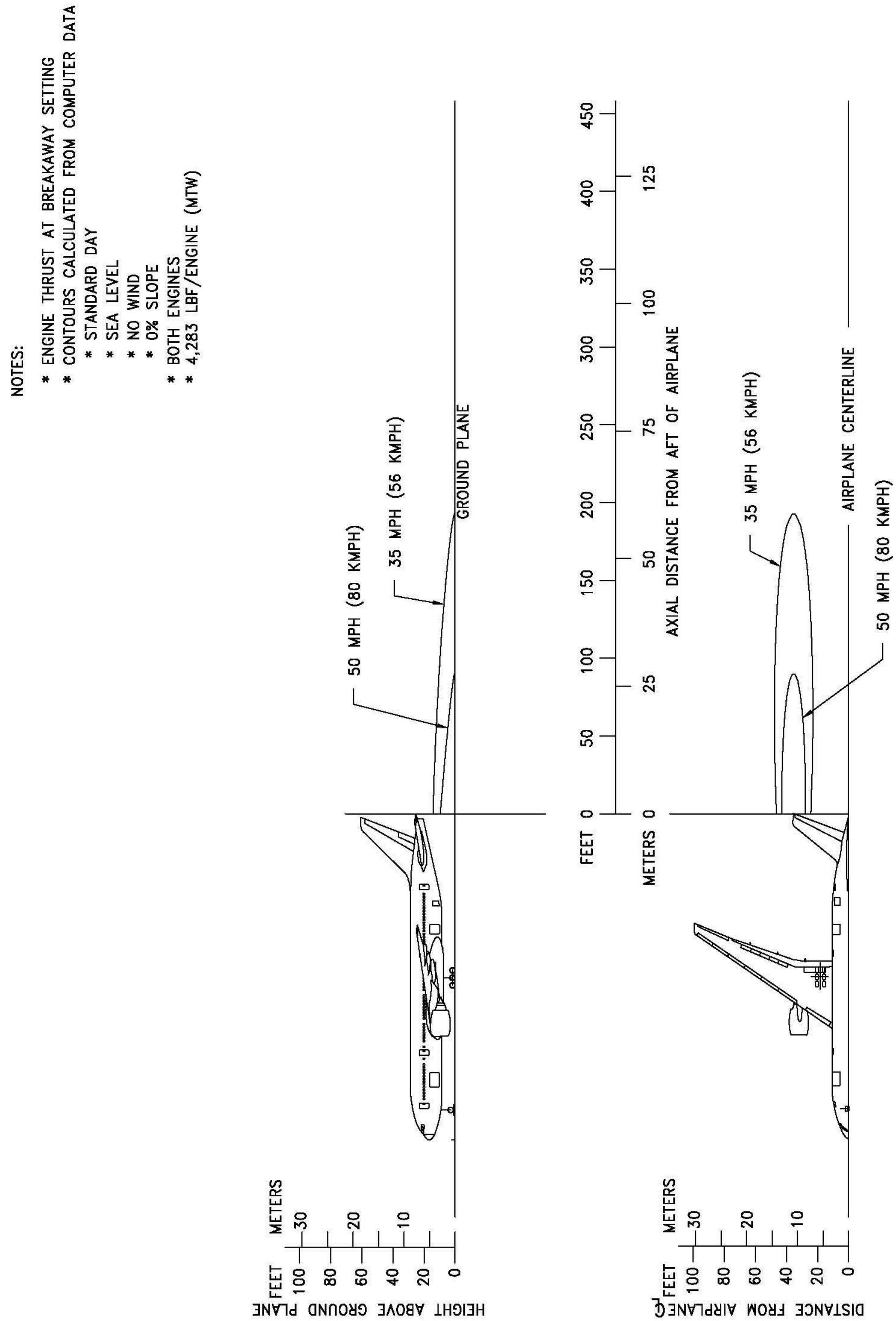
6.1.1 Jet Engine Exhaust Velocity Contours – Idle Thrust: Model 777-200



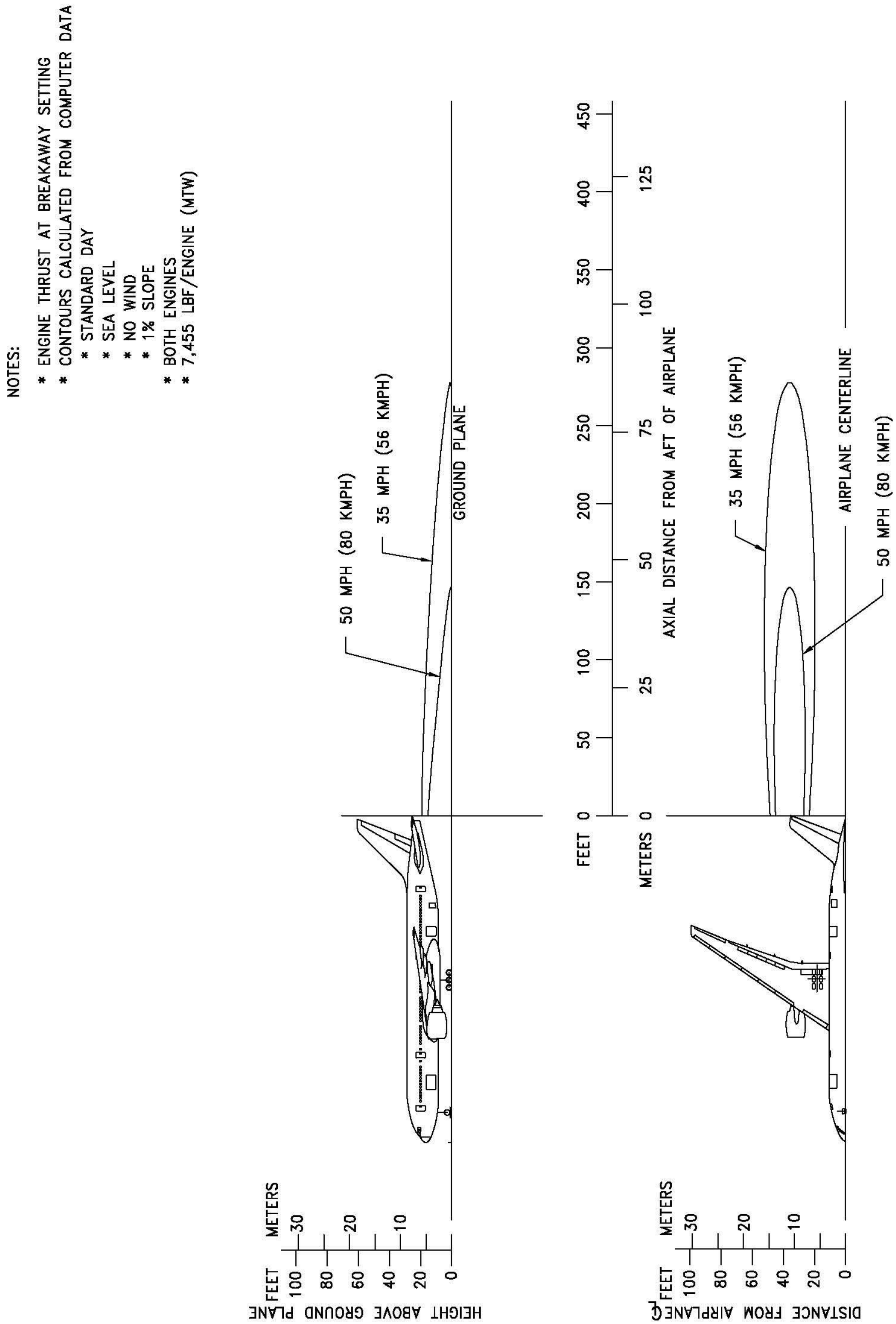
6.1.2 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Single Engine / MLW: Model 777-200



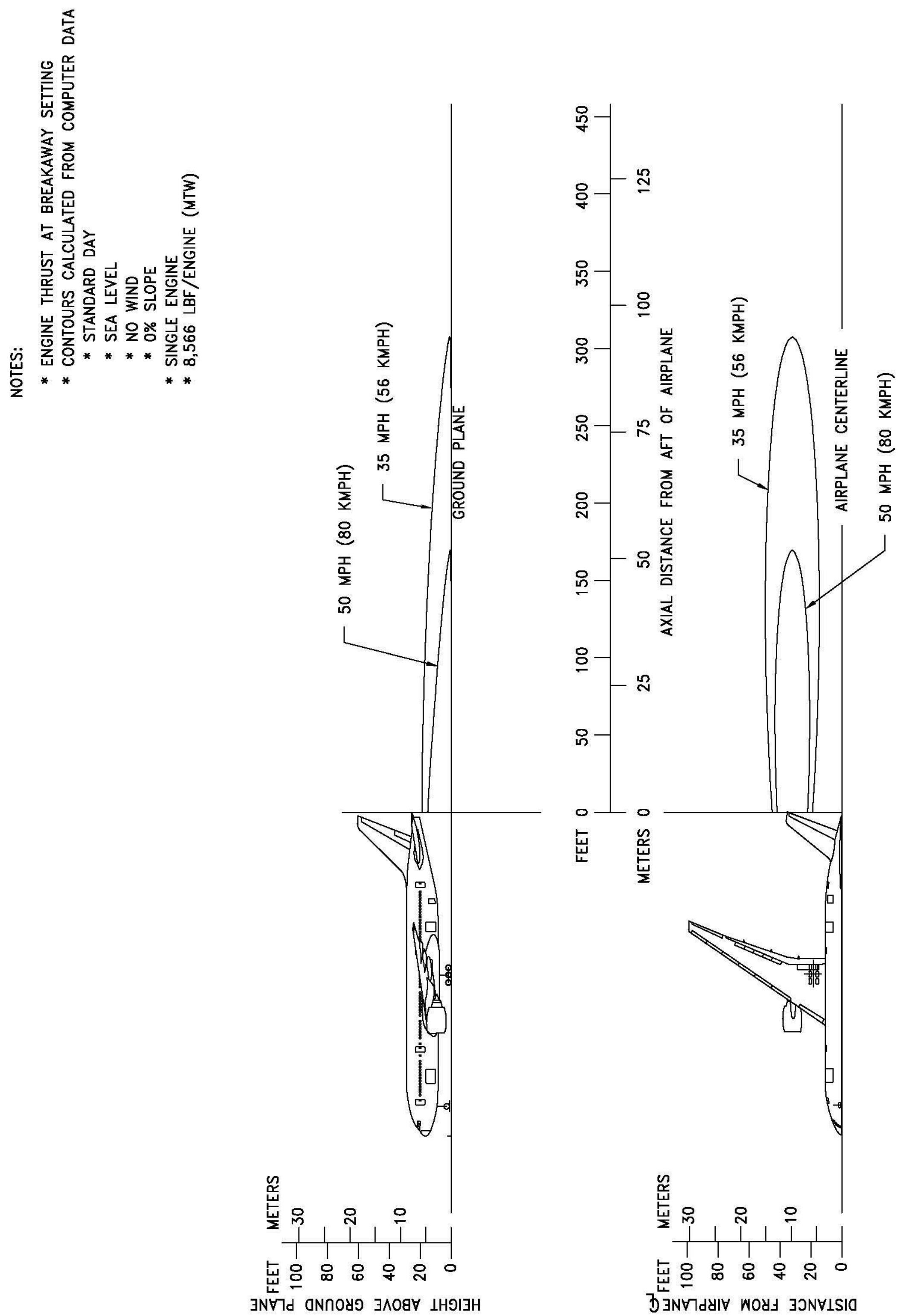
6.1.3 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Both Engines / MTW: Model 777-200



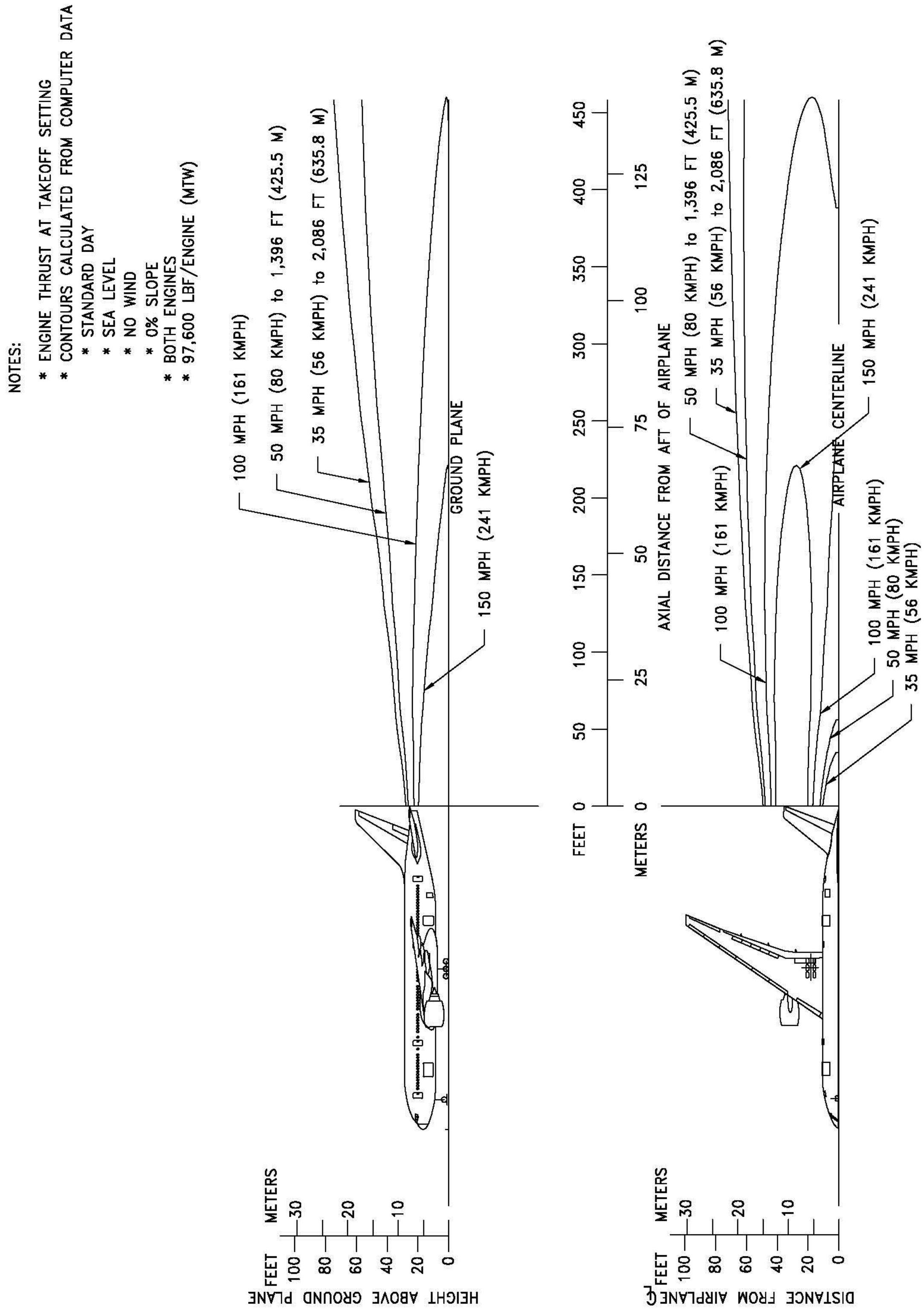
6.1.4 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 1% Slope / Both Engines / MTW: Model 777-200



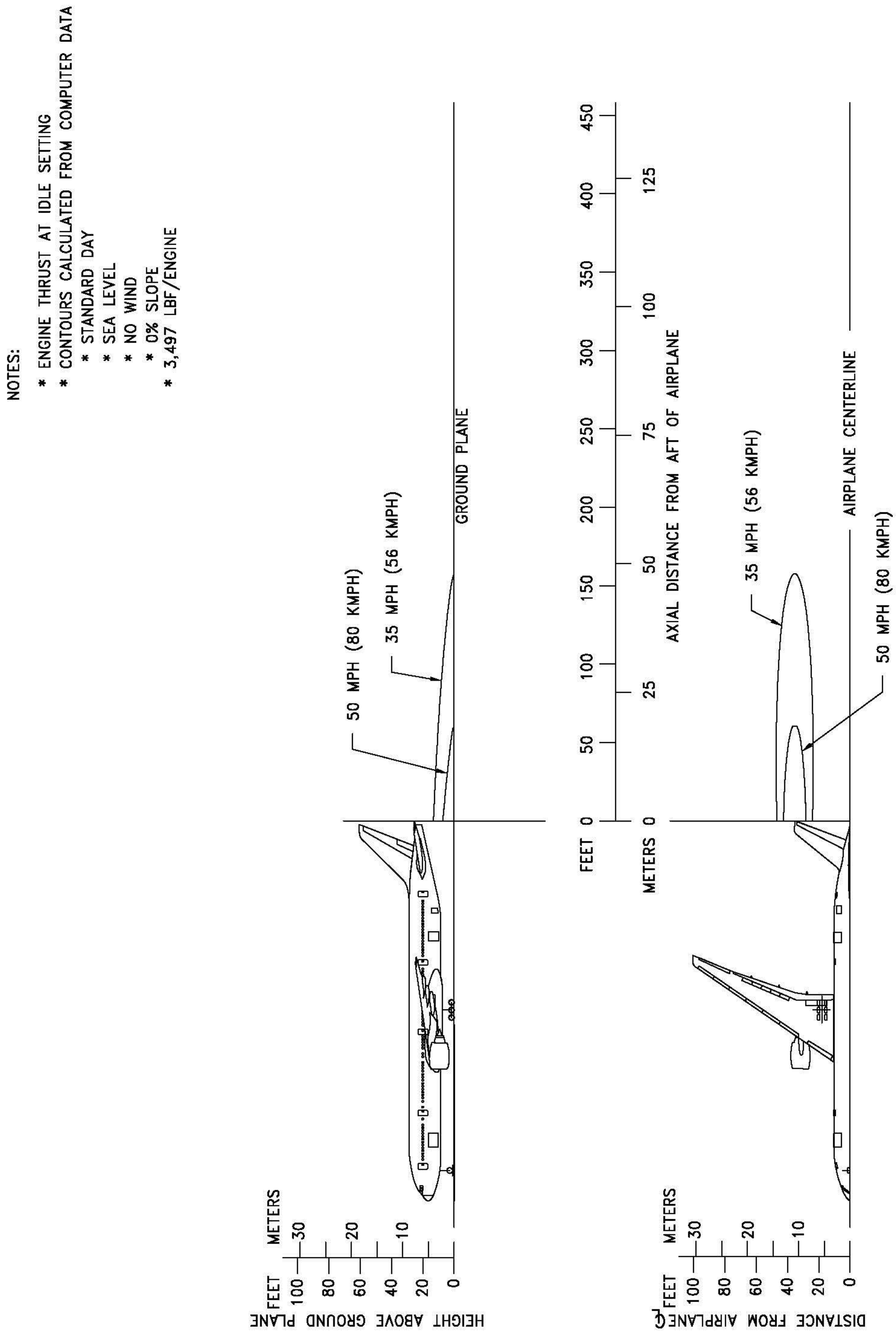
6.1.5 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Single Engine / MTW: Model 777-200



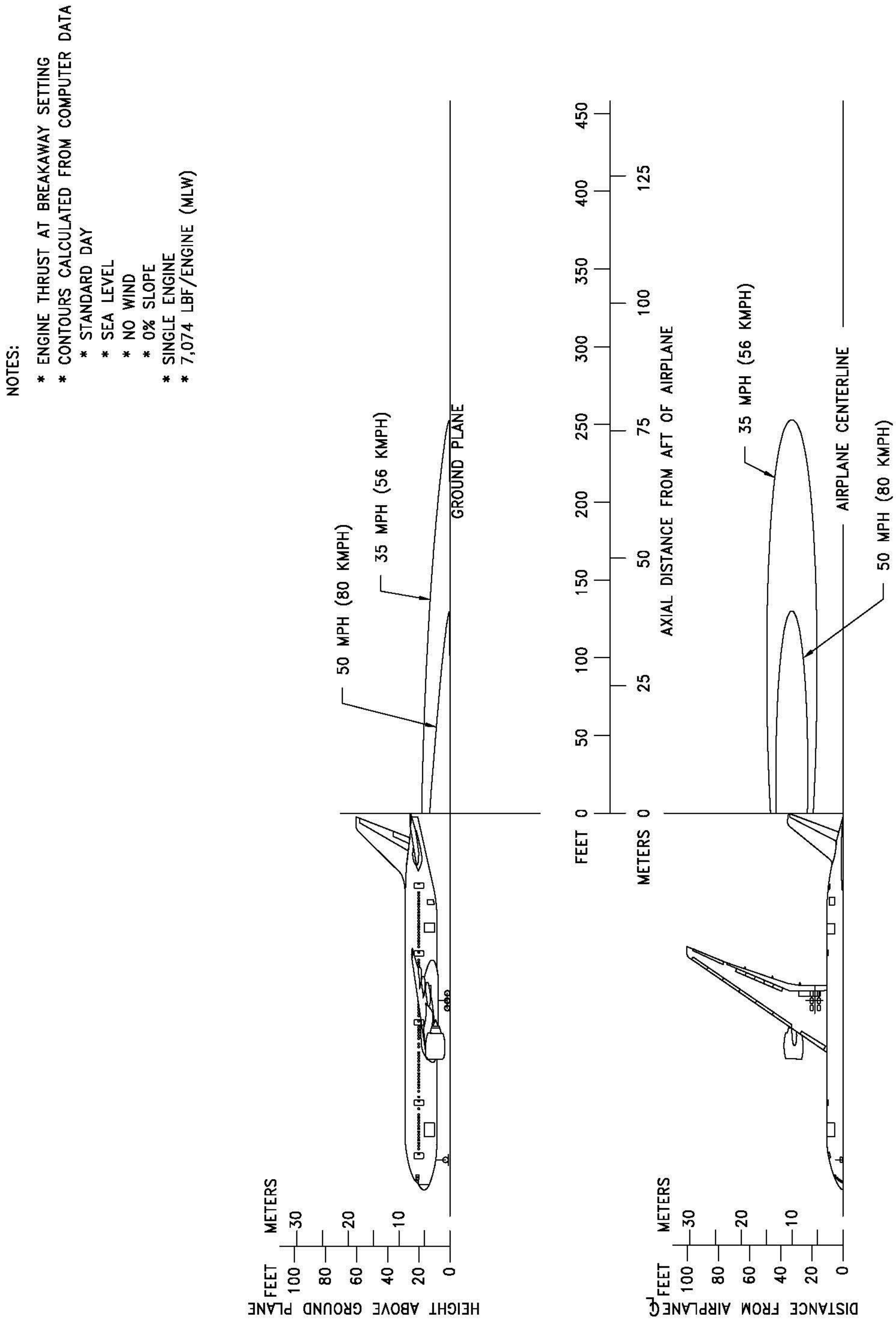
6.1.6 Jet Engine Exhaust Velocity Contours – Takeoff Thrust: Model 777-200



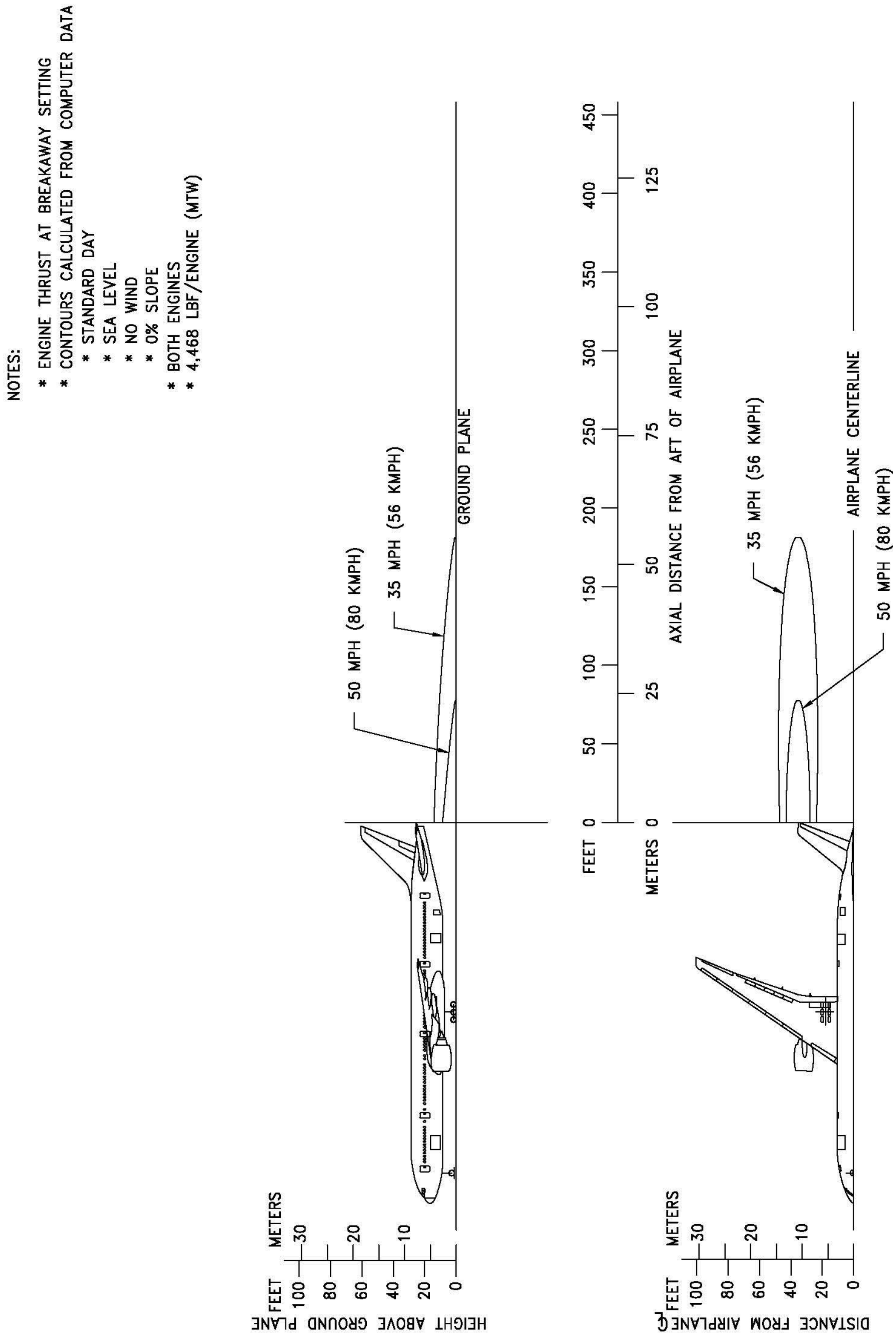
6.1.7 Jet Engine Exhaust Velocity Contours – Idle Thrust: Model 777-300



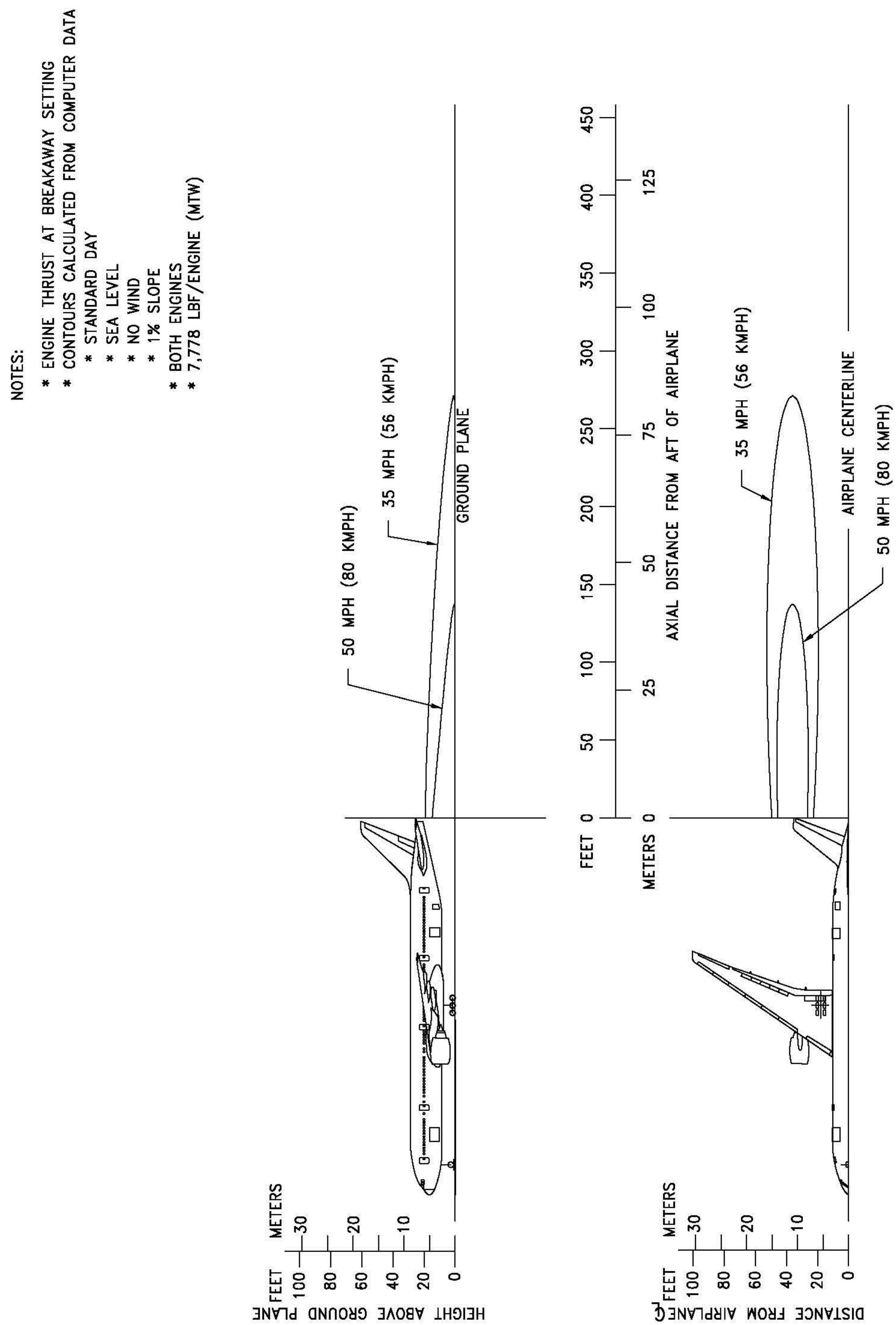
6.1.8 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Single Engine / MLW: Model 777-300



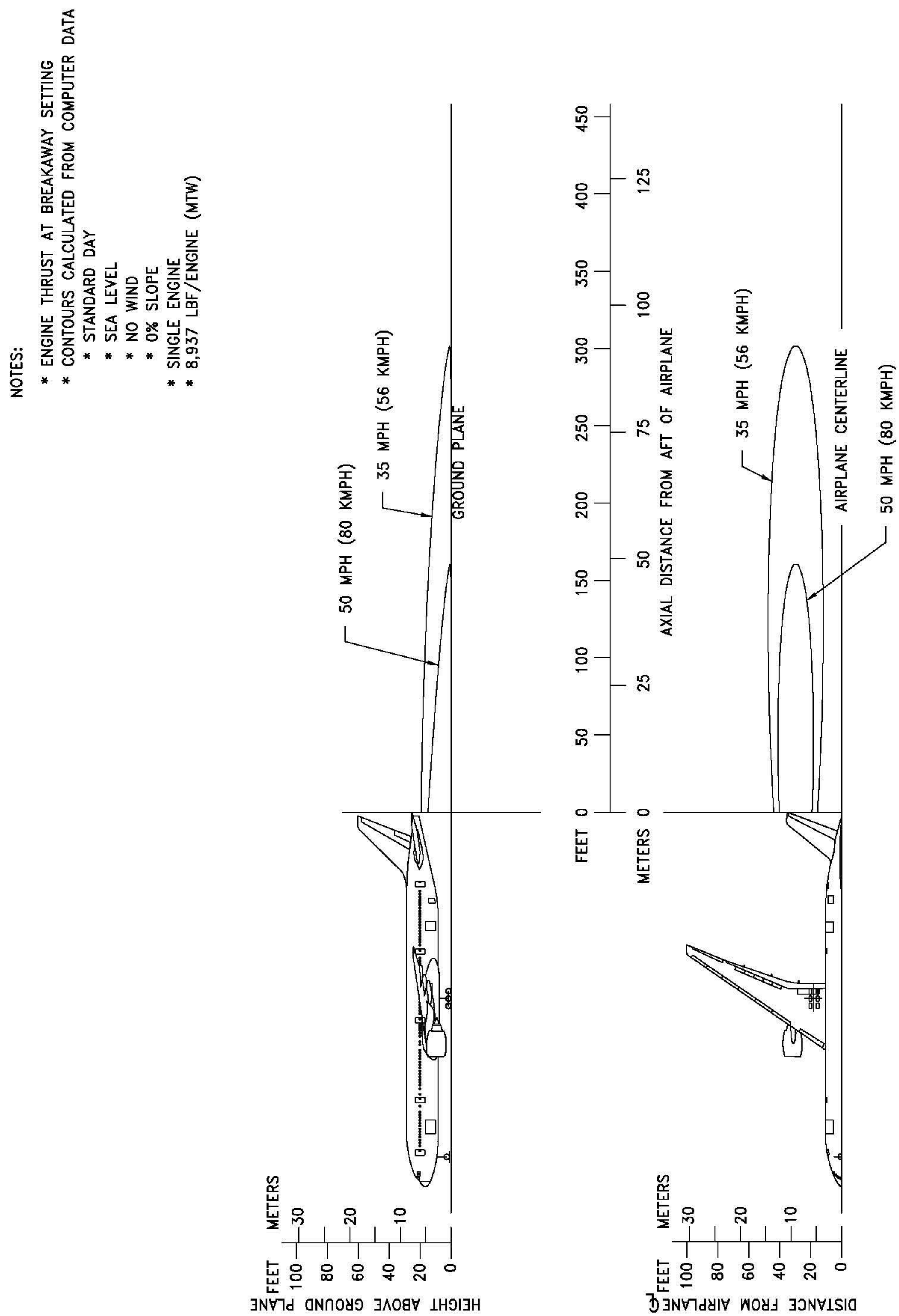
6.1.9 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Both Engines / MTW: Model 777-300



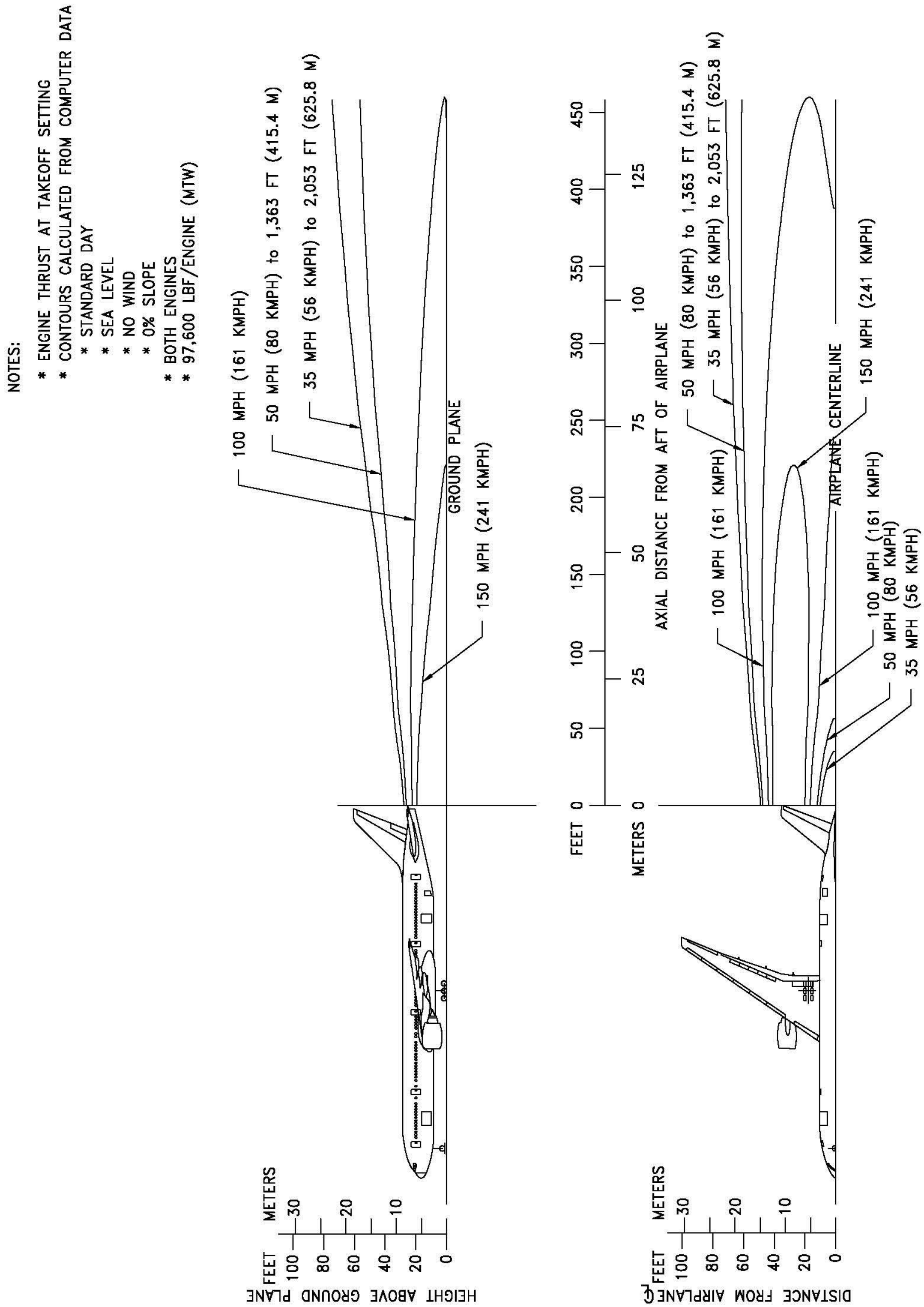
6.1.10 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 1% Slope / Both Engines / MTW: Model 777-300



6.1.11 Jet Engine Exhaust Velocity Contours – Breakaway Thrust / 0% Slope / Single Engine / MTW: Model 777-300



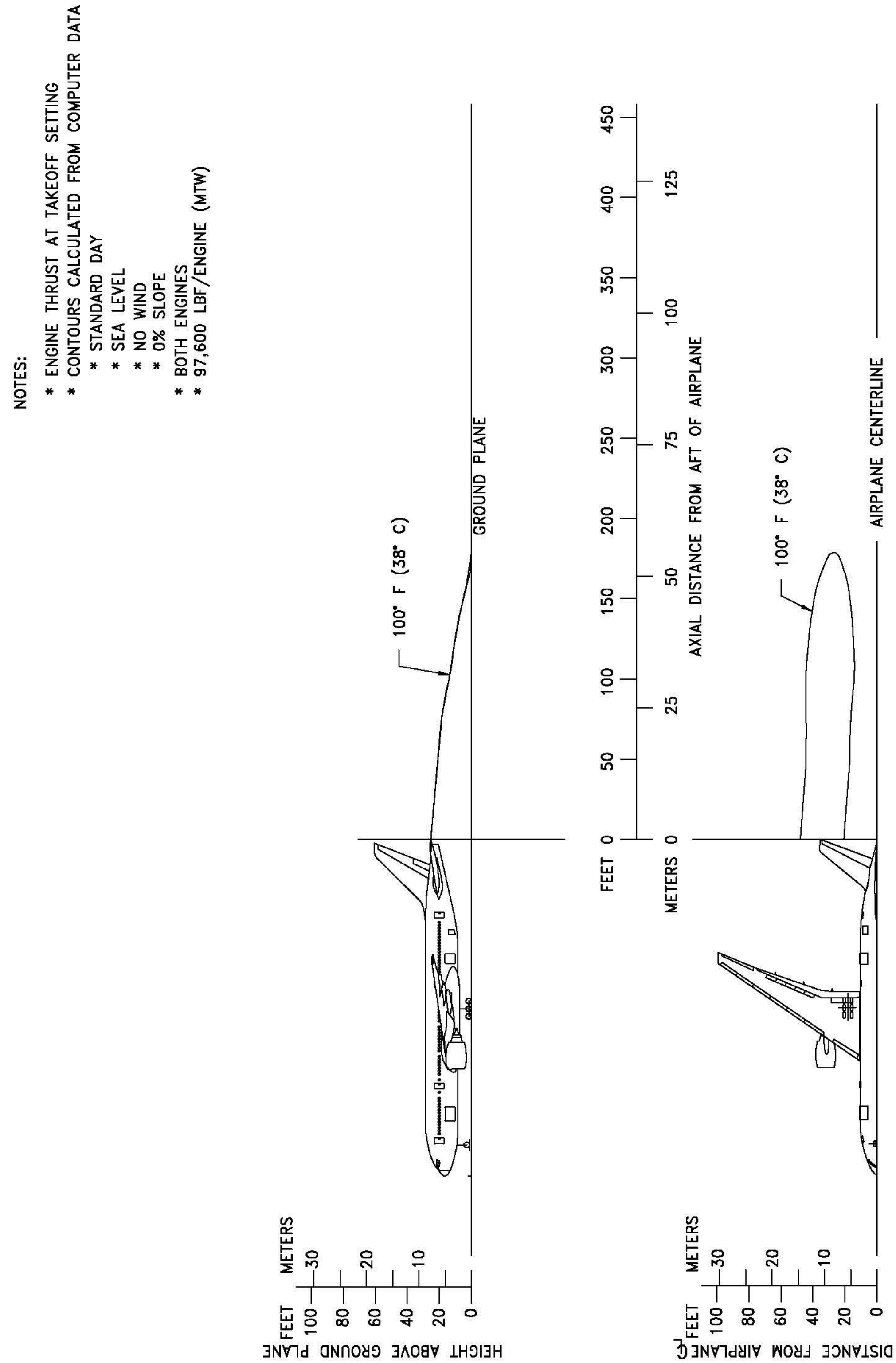
6.1.12 Jet Engine Exhaust Velocity Contours – Takeoff Thrust: Model 777-300



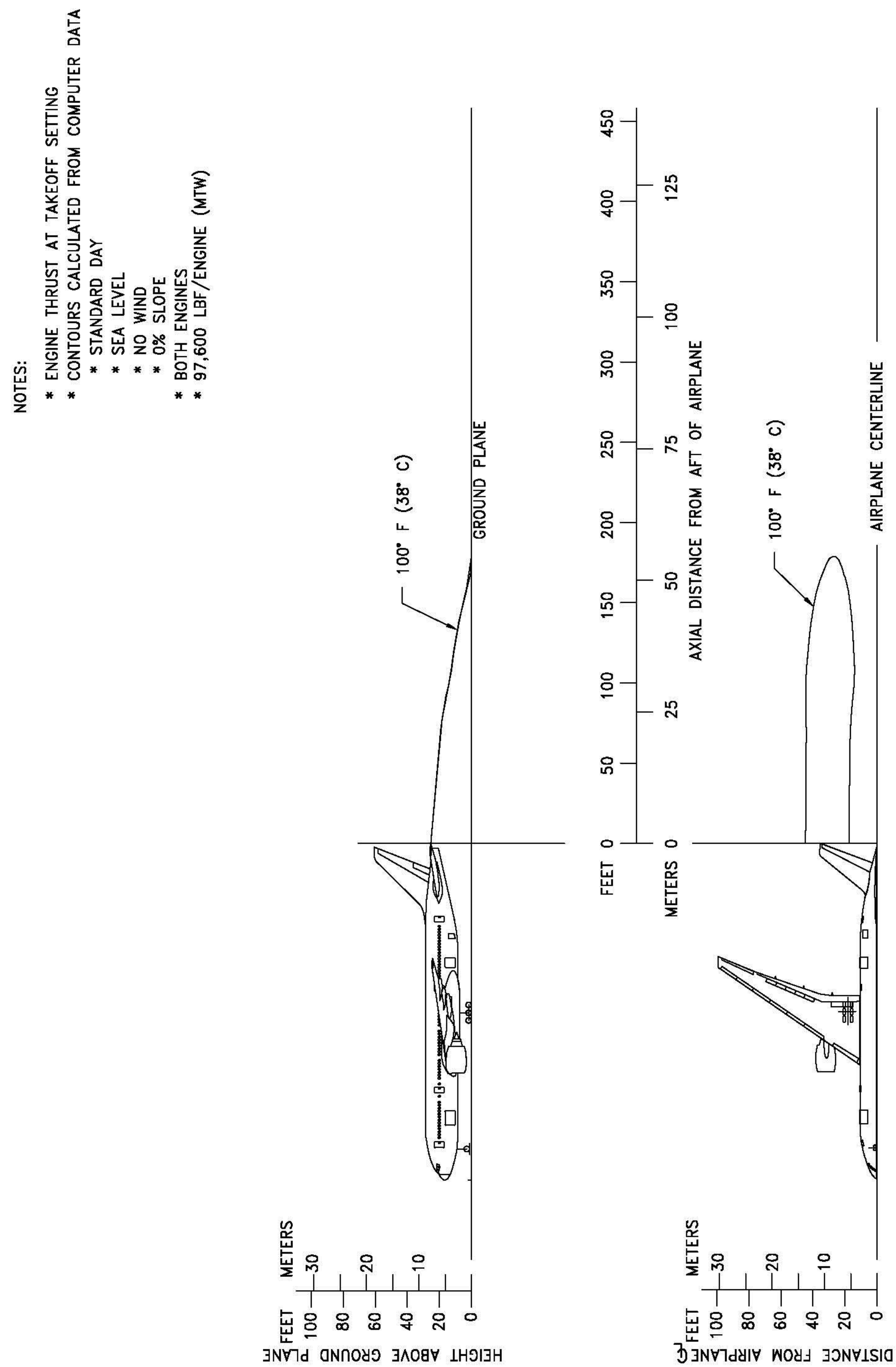
6.1.13 Jet Engine Exhaust Temperature Contours – Idle/Breakaway Thrust: All Models

Temperature contours for idle/breakaway power conditions are not shown as the maximum temperature aft of all 777 models is predicated to be less than 100ºF (38ºC) for standard day conditions of 59ºF (15ºC).

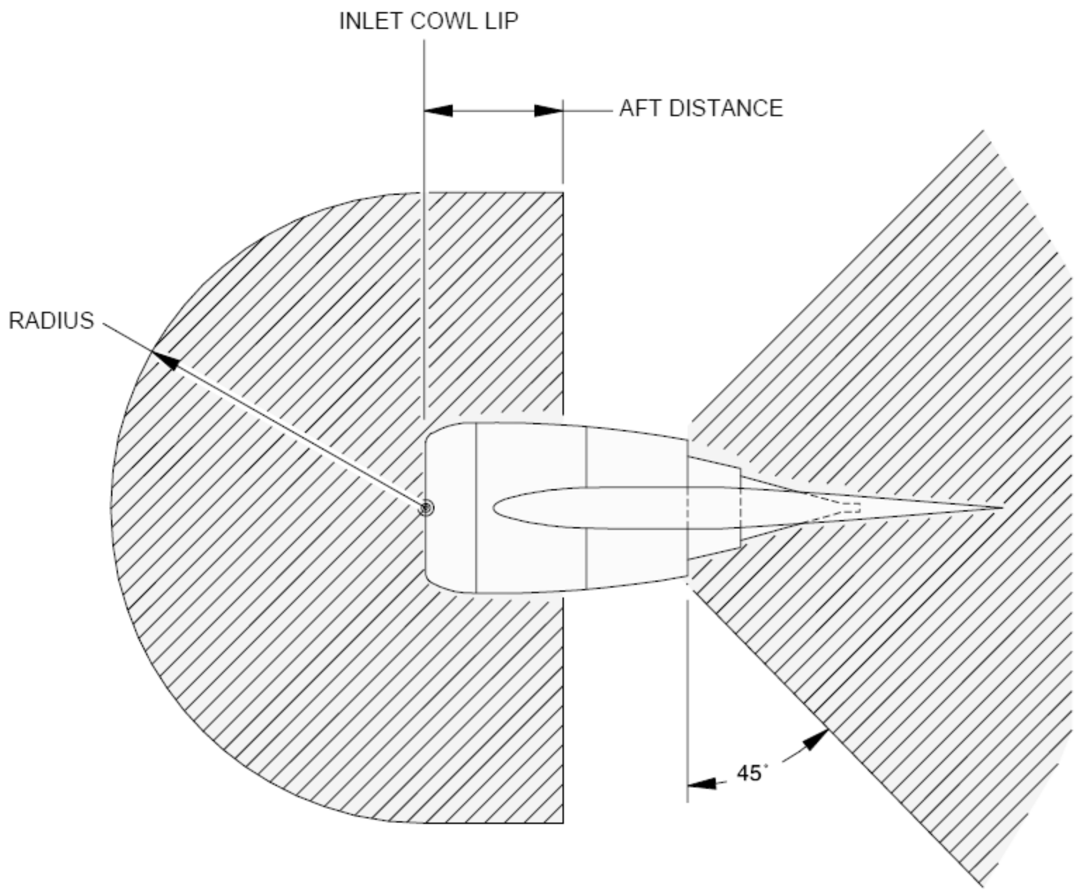
6.1.14 Jet Engine Exhaust Temperature Contours – Takeoff Thrust: 777-200



6.1.15 Jet Engine Exhaust Temperature Contours – Takeoff Thrust: 777-300



6.1.16 Inlet Hazard Areas: All Models



INLET HAZARD AREA

GE 90-100 Series Engines

	RADIUS		AFT DISTANCE	
IDLE THRUST	15.0 FT	4.6 M	5.0 FT	1.5 M
BREAKAWAY THRUST	28.5 FT	8.7 M	11.0 FT	3.3 M
TAKEOFF THRUST	63.0 FT	19.2 M	11.0 FT	3.3 M

Trent 800 Series Engines

	RADIUS		AFT DISTANCE	
IDLE THRUST	15.0 FT	4.6 M	4.00 FT	1.2 M
BREAKAWAY THRUST	27.0 FT	8.2 M	10.0 FT	3.0 M
TAKEOFF THRUST	63.0 FT	19.2 M	10.0 FT	3.0 M

6.2 AIRPORT AND COMMUNITY NOISE

Airport noise is of major concern to the airport and community planner. The airport is a major element in the community's transportation system and, as such, is vital to its growth. However, the airport must also be a good neighbor, and this can be accomplished only with proper planning. Since aircraft noise extends beyond the boundaries of the airport, it is vital to consider the impact on surrounding communities. Many means have been devised to provide the planner with a tool to estimate the impact of airport operations. Too often they oversimplify noise to the point where the results become erroneous. Noise is not a simple subject; therefore, there are no simple answers.

The cumulative noise contour is an effective tool. However, care must be exercised to ensure that the contours, used correctly, estimate the noise resulting from aircraft operations conducted at an airport.

The size and shape of the single-event contours, which are inputs into the cumulative noise contours, are dependent upon numerous factors. They include the following:

1. Operational Factors

   a. Aircraft Weight-Aircraft weight is dependent on distance to be traveled, en route winds, payload, and anticipated aircraft delay upon reaching the destination.

   b. Engine Power Settings-The rates of ascent and descent and the noise levels emitted at the source are influenced by the power setting used.

   c. Airport Altitude-Higher airport altitude will affect engine performance and thus can influence noise.

2. Atmospheric Conditions-Sound Propagation

   a. Wind-With stronger headwinds, the aircraft can take off and climb more rapidly relative to the ground. Also, winds can influence the distribution of noise in surrounding communities.

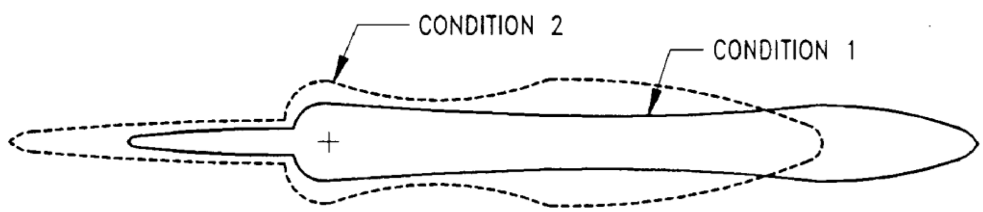
   b. Temperature and Relative Humidity-The absorption of noise in the atmosphere along the transmission path between the aircraft and the ground observer varies with both temperature and relative humidity.

3. Surface Condition-Shielding, Extra Ground Attenuation (EGA)

   a. Terrain-If the ground slopes down after takeoff or up before landing, noise will be reduced since the aircraft will be at a higher altitude above ground. Additionally, hills, shrubs, trees, and large buildings can act as sound buffers.

Condition 1

Landing	Takeoff
Maximum Structural Landing Weight	Maximum Gross Takeoff Weight
10-knot Headwind	Zero Wind
3° Approach	84 °F
84 °F	Humidity 15%
Humidity 15%	



Condition 2

Landing	Takeoff
85% of Maximum Structural Landing Weight	80% of Maximum Gross Takeoff Weight
10-knot Headwind	10-knot Headwind
3° Approach	59 °F
59 °F	Humidity 70%
Humidity 70%	

As indicated from these data, the contour size varies substantially with operating and atmospheric conditions. Most aircraft operations are, of course, conducted at less than maximum gross weights because average flight distances are much shorter than maximum aircraft range capability and average load factors are less than 100%. Therefore, in developing cumulative contours for planning purposes, it is recommended that the airlines serving a particular city be contacted to provide operational information.

In addition, there are no universally accepted methods for developing aircraft noise contours or for relating the acceptability of specific zones to specific land uses. It is therefore expected that noise contour data for particular aircraft and the impact assessment methodology will be changing. To ensure that the best currently available information of this type is used in any planning study, it is recommended that it be obtained directly from the Office of Environmental Quality in the Federal Aviation Administration in Washington, D.C.

It should be noted that the contours shown herein are only for illustrating the impact of operating and atmospheric conditions and do not represent the single-event contour of the family of aircraft described in this document. It is expected that the cumulative contours will be developed as required by planners using the data and methodology applicable to their specific study.

7.0 PAVEMENT DATA

7.1 GENERAL INFORMATION

A brief description of the pavement charts that follow will help in their use for airport planning. A brief description of the pavement charts that follow will help in their use for airport planning. Each airplane configuration is depicted with a minimum range of five loads imposed on the main landing gear to aid in interpolation between the discrete values shown. All curves for any single chart represent data based on rated loads and tire pressures considered normal and acceptable by current aircraft tire manufacturer's standards. Tire pressures, where specifically designated on tables and charts, are at values obtained under loaded conditions as certificated for commercial use.

Section 7.2 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-to-ground interface are shown in Section 7.3, with the tires having equal loads on the struts.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The charts in Section 7.4 are 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 as the point of entry to the pavement design charts, interpolating load values where necessary.

The flexible pavement design curves (Section 7.5) are based on procedures set forth in Instruction Report No. S-77-1, Procedures for Development of CBR Design Curves, June 1977, and as modified according to the methods described in FAA Advisory Circular 150/5320-6D, Airport Pavement Design and Evaluation, July 1995. Instruction Report No. S-77-1 was prepared by the U.S. Army Corps of Engineers Waterways Experiment Station, Soils and Pavements Laboratory, Vicksburg, Mississippi. The line showing 10,000 coverages is used to calculate Aircraft Classification Number (ACN).

The following procedure is used to develop the curves, such as shown in Section 7.5:

1. Having established the scale for pavement depth at the bottom and the scale for CBR at the top, an arbitrary line is drawn representing 5,000 annual departures.

2. Values of the aircraft gross weight are then plotted.

3. Additional annual departure lines are drawn based on the load lines of the aircraft gross weights already established.

4. An additional line representing 10,000 coverages (used to calculate the flexible pavement Aircraft Classification Number) is also placed.

All Load Classification Number (LCN) curves (Sections 7.6 and 7.8) have been developed from a computer program based on data provided in International Civil Aviation

Organization (ICAO) Document 9157-AN/901, Aerodrome Design Manual, Part 3, “Pavements”, Second Edition, 1983. LCN values are shown directly for parameters of weight on main landing gear, tire pressure, and radius of relative stiffness (ℓ) for rigid pavement or pavement thickness or depth factor (h) for flexible pavement.

Rigid pavement design curves (Section 7.7) have been prepared with the Westergaard equation in general accordance with the procedures outlined in the Design of Concrete Airport Pavement, 1955 edition, by Robert G. Packard, published by the Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60077-1083. These curves are modified to the format described in the Portland Cement Association publication XP6705-2, Computer Program for Airport Pavement Design (Program PDILB), 1968, by Robert G. Packard.

The following procedure is used to develop the rigid pavement design curves shown in Section 7.7:

5. Having established the scale for pavement thickness to the left and the scale for allowable working stress to the right, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown.

6. Values of the subgrade modulus (k) are then plotted.

7. Additional load lines for the incremental values of weight on the main landing gear are drawn on the basis of the curve for k = 300, already established.

The rigid pavement design curves (Section 7.9) have been developed based on methods used in the FAA Advisory Circular AC 150/5320-6D, July 1995. The following procedure is used to develop the curves, such as shown in Section 7.9:

8. Having established the scale for pavement flexure strength on the left and temporary scale for pavement thickness on the right, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown at 5,000 coverages.

9. Values of the subgrade modulus (k) are then plotted.

10. Additional load lines for the incremental values of weight are then drawn on the basis of the subgrade modulus curves already established.

11. The permanent scale for the rigid-pavement thickness is then placed. Lines for other than 5,000 coverages are established based on the aircraft pass-to-coverage ratio.

The ACN/PCN system (Section 7.10) as referenced in ICAO Annex 14, Aerodromes, Volume I, “Aerodrome Design and Operations,” Ninth Edition, July 2022, provides a standardized international airplane/pavement rating system replacing the various S, T, TT, LCN, AUW, ISWL, etc., rating systems used throughout the world. ACN is the Aircraft Classification Number and PCN is the Pavement Classification Number. An aircraft having an ACN equal to or less than the PCN can operate on the pavement subject to any limitation on the tire pressure. Numerically, the ACN is two times the derived single-wheel load expressed in thousands of kilograms, where the derived single wheel load is defined as the load on a single tire inflated to 181 psi (1.25 MPa) that would have the same pavement requirements as the aircraft. Computationally, the ACN/PCN system uses the PCA program PDILB for rigid pavements and S-77-1 for flexible pavements to calculate ACN values.

The ACR-PCR system (Section 7.11) follows ICAO Annex 14, Aerodromes, Volume I, “Aerodrome Design and Operations,” Ninth Edition, July 2022, and guidance from ICAO Doc 9157-AN/901, Aerodrome Design Manual, Part 3, “Pavements,” Third Edition, 2022, replacing the ACN/PCN system used throughout the world. ACR is the Aircraft Classification Rating and PCR is the Pavement Classification Rating. The ACR-PCR system allows an aircraft having an ACR equal to or less than the PCR to operate on the pavement subject to any limitation on the tire pressure. Numerically, the ACR is two times the derived single-wheel load expressed in hundreds of kilograms, where the derived single wheel load is defined as the load on a single tire inflated to 218 psi (1.5 MPa) that would have the same pavement requirements as the aircraft.

The method of pavement evaluation is left up to the airport with the results of their evaluation presented as follows:

PCN/PCR	PAVEMENT TYPE	SUBGRADE CATEGORY	TIRE PRESSURE CATGORY	EVALUATION METHOD
	R = Rigid	A = High	W = No Limit	T = Technical
	F = Flexible	B = Medium	X = To 254 psi (1.75 MPa)	U = Using Aircraft
		C = Low	Y = To 181 psi (1.25 MPa)	
		D = Ultra Low	Z = To 73 psi (0.5 MPa)	

ACN values for flexible pavements are calculated for the following four subgrade categories:

Code A - High strength; characterized by CBR 15 and representing all CBR values above 13.

Code B - Medium strength; characterized by CBR 10 and representing a range in CBR of 8 to 13.

Code C - Low strength; characterized by CBR 6 and representing a range in CBR of 4 to 8.

Code D - Ultra-low strength; characterized by CBR 3 and representing all CBR values below 4.

ACN values for rigid pavements are calculated for the following four subgrade categories:

Code A - High strength; characterized by k = 150 MN/m^3 (552.6 pci) and representing all k values above 120 MN/m^3.

Code B - Medium strength; characterized by k = 80 MN/m^3 (294.7 pci) and representing a range in k values of 60 to 120 MN/m^3.

Code C - Low strength; characterized by k = 40 MN/m^3 (147.4 pci) and representing a range in k values of 25 to 60 MN/m^3.

Code D - characterized by k = 20 MN/m^3 (73.7 pci) and representing all k values below 25 MN/m^3.

ACR values at any mass on rigid and flexible pavements are calculated for the following four subgrade categories:

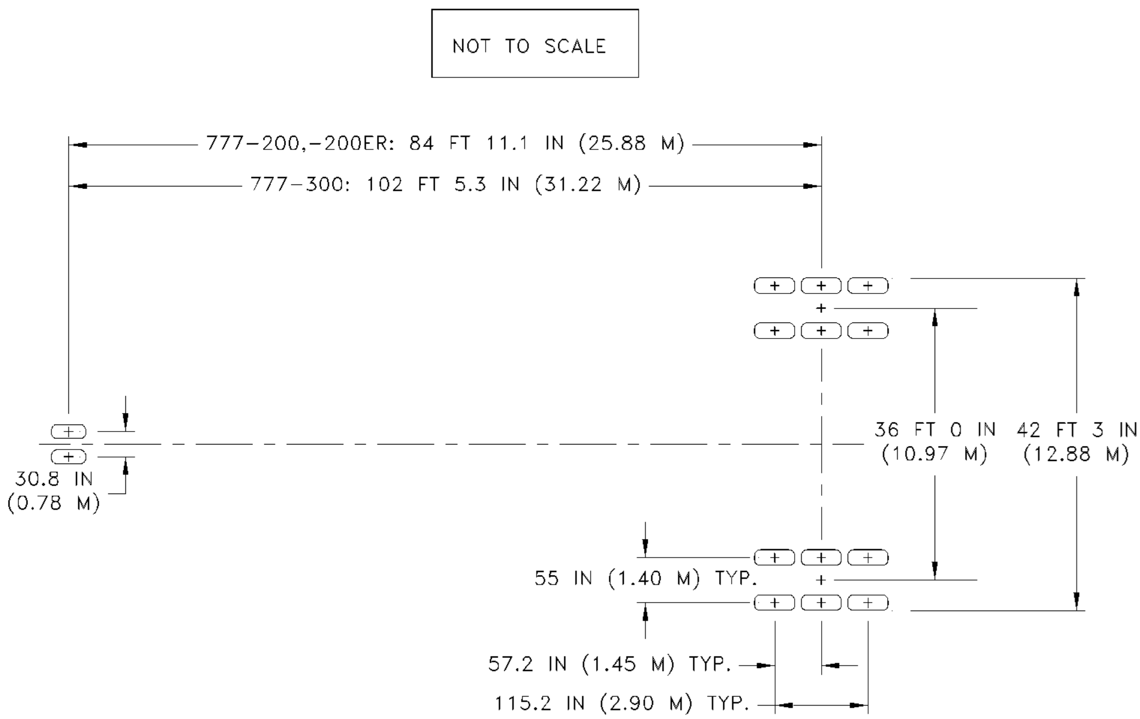
Code A - High strength; characterized by E = 200 MPa (29,008 psi) and representing all E values equal to or above 150 MPa, for rigid and flexible pavements.

Code B - Medium strength; characterized by E = 120 MPa (17,405 psi) and representing a range in E equal to or above 100 MPa and strictly less than 150 MPa, for rigid and flexible pavements.

Code C - Low strength; characterized by E = 80 MPa (11,603 psi) and representing a range in E equal to or above 60 MPa and strictly less than 100 MPa, for rigid and flexible pavements.

Code D - Ultra-low strength; characterized by E = 50 MPa (7,252 psi) and representing all E values strictly less than 60 MPa, for rigid and flexible pavements.

7.2 LANDING GEAR FOOTPRINT: MODEL 777-200, -200ER, -300



	UNITS	777-200		777-200 ER				777-300	
MAX DESIGN TAXI WEIGHT	LB	447,000	547,000	557,000	634,000	650,000	658,000	517,800	662,000
	KG	202,755	248,115	252,650	287,577	294,835	298,463	234,870	300,278
PERCENT OF WEIGHT ON MAIN GEAR	%	SEE SECTION 7.4							
NOSE GEAR TIRE SIZE	IN.	42x17.0R18, 26PR							
NOSE GEAR TIRE PRESSURE	PSI	190	195	200	200	200	200	205	205
	MPa	1.31	1.34	1.38	1.38	1.38	1.38	1.41	1.41
MAIN GEAR TIRE SIZE	IN.	50x20.0R22, 26PR	50x20.0R22, 32PR	50x20.0R22, 32PR				50x20.0R22, 32PR	
MAIN GEAR TIRE PRESSURE	PSI	149	182	186	205	205	205	171	215
	MPa	1.03	1.25	1.28	1.41	1.41	1.41	1.18	1.48

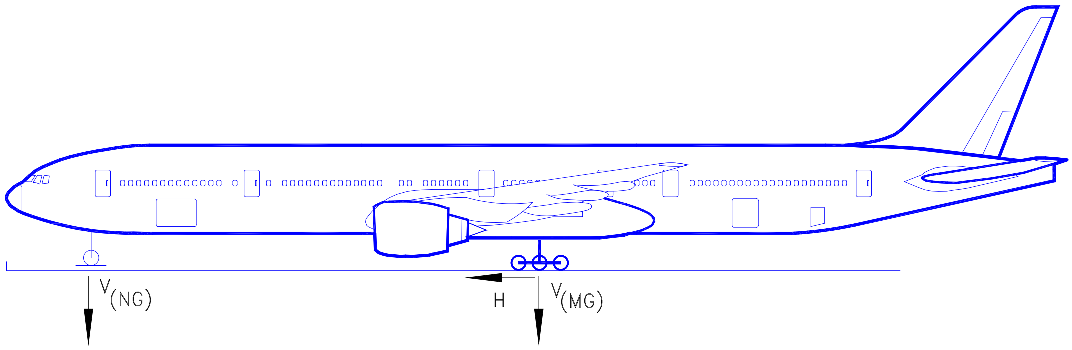
7.3 MAXIMUM PAVEMENT LOADS: MODEL 777-200, -200ER, -300

V_{NG} = MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD CENTER OF GRAVITY

V_{MG} = MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT CENTER OF GRAVITY

H = MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING

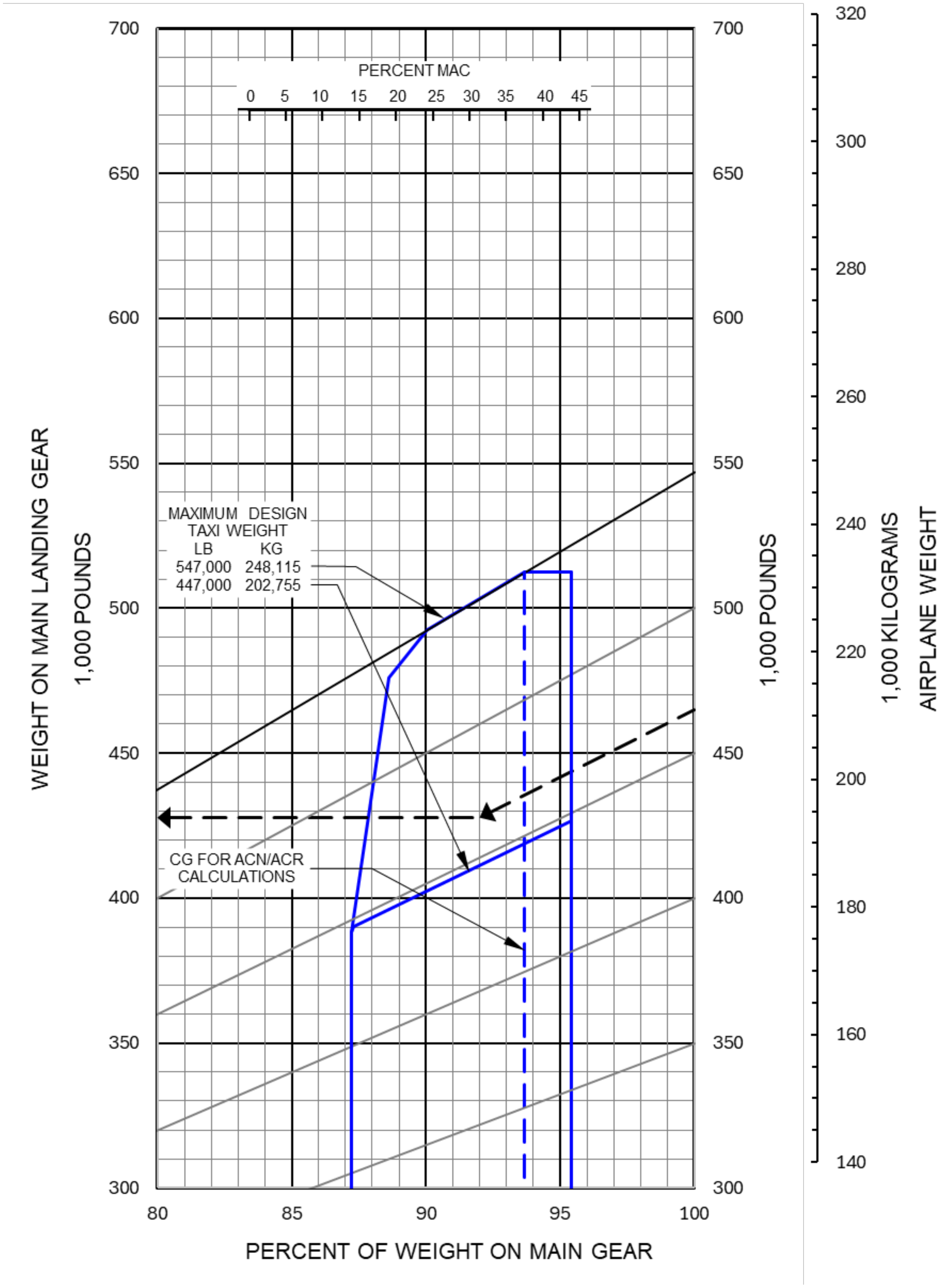
NOTE: ALL LOADS CALCULATED USING AIRPLANE MAXIMUM DESIGN TAXI WEIGHT



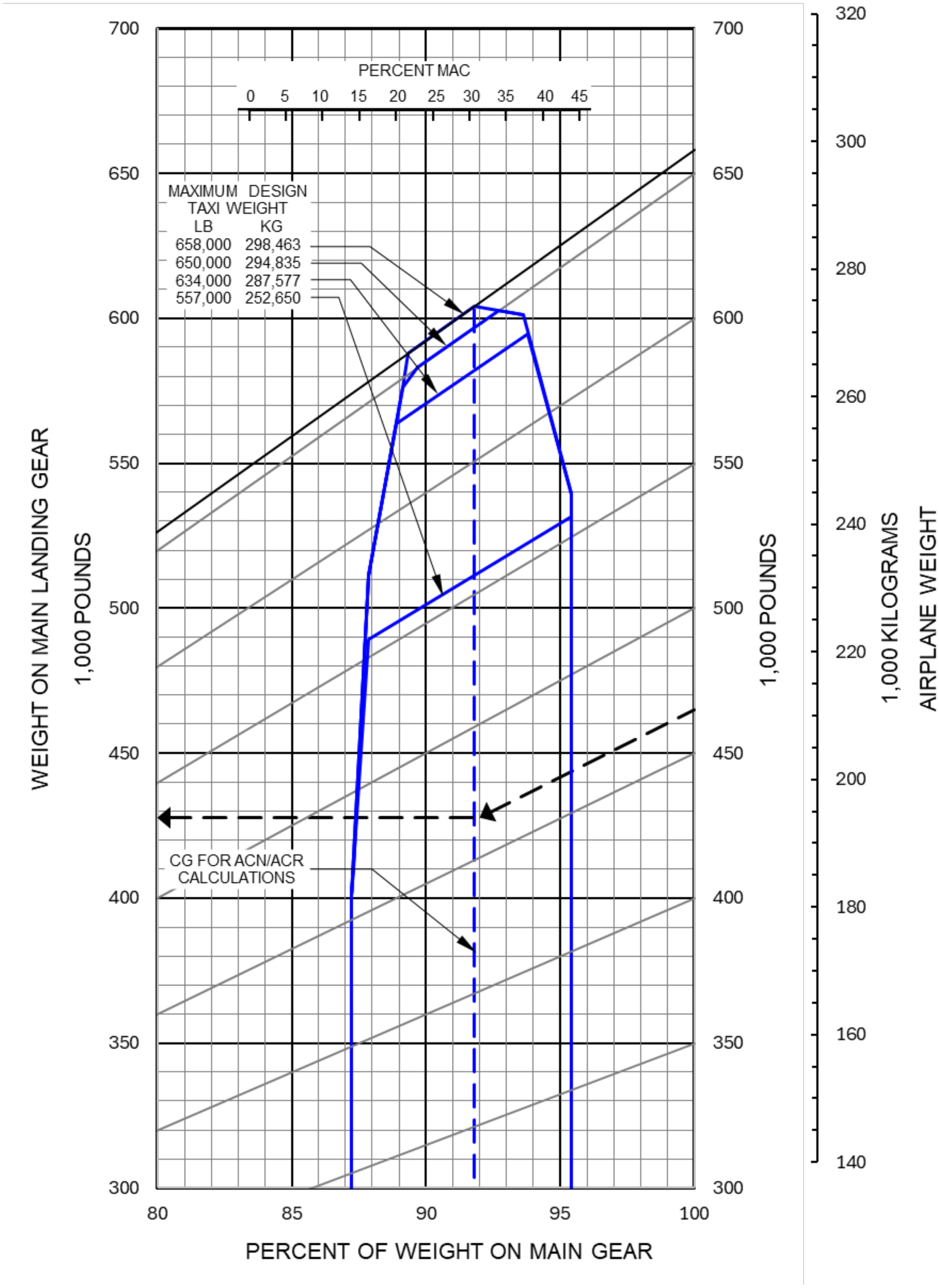
AIRPLANE MODEL	UNITS	MAX DESIGN TAXI WEIGHT	V_{NG}		V_{MG} PER STRUT AT MAX LOAD AT STATIC AFT C.G.	H PER STRUT (4)	
			STATIC AT MOST FWD C.G.	STATIC + BRAKING 10 FT/SEC² DECEL		STEADY BRAKING 10 FT/SEC² DECEL	AT INSTANTANEOUS BRAKING (μ = 0.8)
777-200	LB	447,000	56,800	84,000	213,300	69,400	170,600
	KG	202,755	25,800	38,300	96,800	31,500	77,400
777-200	LB	547,000	54,500	88,000	256,200	84,900	204,900
	KG	248,115	24,700	39,900	116,200	38,500	93,000
777-200 ER	LB	557,000	68,200	102,300	265,800	86,500	212,600
	KG	252,650	30,950	46,400	120,600	39,200	96,600
777-200 ER	LB	634,500	70,400	109,200	297,600	98,400	238,100
	KG	287,804	31,900	49,500	134,900	44,700	107,900
777-200 ER	LB	650,000	66,900	106,700	301,300	100,900	241,000
	KG	294,835	30,340	48,400	136,700	45,800	109,400
777-200 ER	LB	658,000	70,100	110,400	302,000	102,200	241,600
	KG	298,463	31,760	50,000	137,000	46,300	109,600
777-300	LB	517,800	61,500	93,200	249,100	80,400	199,300
	KG	234,870	27,900	42,300	113,000	36,500	90,400
777-300	LB	662,000	70,000	110,600	313,900	102,800	251,100
	KG	300,278	31,800	50,200	142,400	46,650	113,900

7.4 LANDING GEAR LOADING ON PAVEMENT

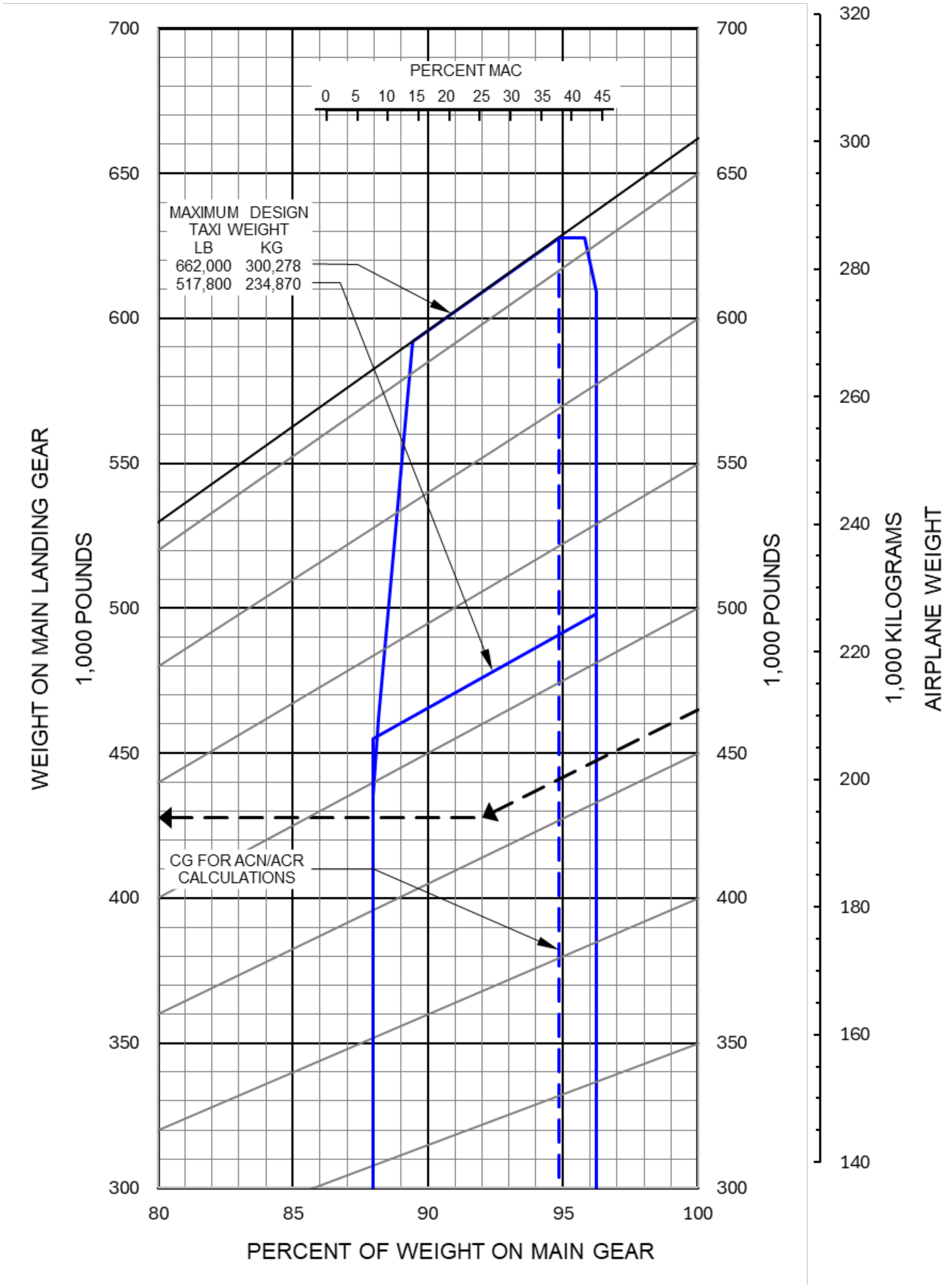
7.4.1 Landing Gear Loading on Pavement: Model 777-200



7.4.2 Landing Gear Loading on Pavement: Model 777-200ER



7.4.3 Landing Gear Loading on Pavement: Model 777-300



7.5 FLEXIBLE PAVEMENT REQUIREMENTS - U.S. ARMY CORPS OF ENGINEERS METHOD S-77-1

The following flexible-pavement design chart presents the data of six incremental main-gear loads at the minimum tire pressure required at the maximum design taxi weight.

In the example shown in Section 7.5.1, for a CBR of 25 and an annual departure level of 6,000, the required flexible pavement thickness for a 777-200 airplane with a main gear loading of 450,000 pounds is 12.2 inches. Likewise, the required flexible pavement thickness for the 777-200ER and 777-300 under the same conditions, is also 12.2 inches as shown in Section 7.5.2 and Section 7.5.3.

The line showing 10,000 coverages is used for ACN calculations (see Section 7.10).

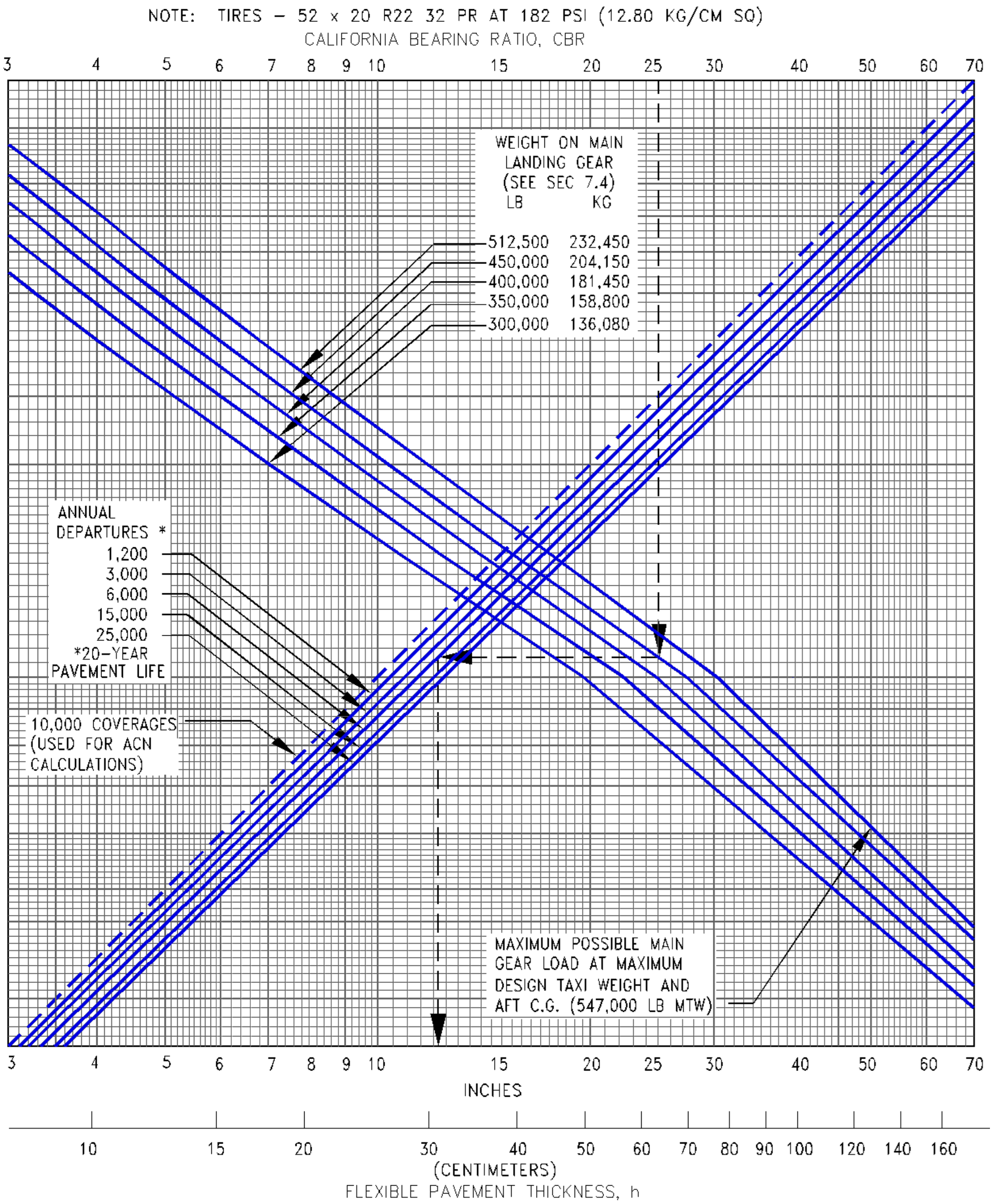
The FAA does not officially recognize the validity of the S77-1 flexible pavement design calculation for individual six-wheel gear aircraft. At the time this document (D6-58329) was printed, the FAA was recommending a multi-layer pavement thickness design method for the 777 airplane when considered as a component of the traffic mix. Consequently, the charts presented on the following two pages are provided as an estimate of the design thickness for general guidance purposes only.

For the flexible pavement design refer to the FAA AC 150/5320-6 "Airport Pavement Design and Evaluation" and pavement design program FAARFIELD. Both are available on the FAA website:

FAA AC 150/5320-6: https://www.faa.gov/airports/resources/advisory_circulars/
FAARFIELD: https://www.faa.gov/airports/engineering/design_software/

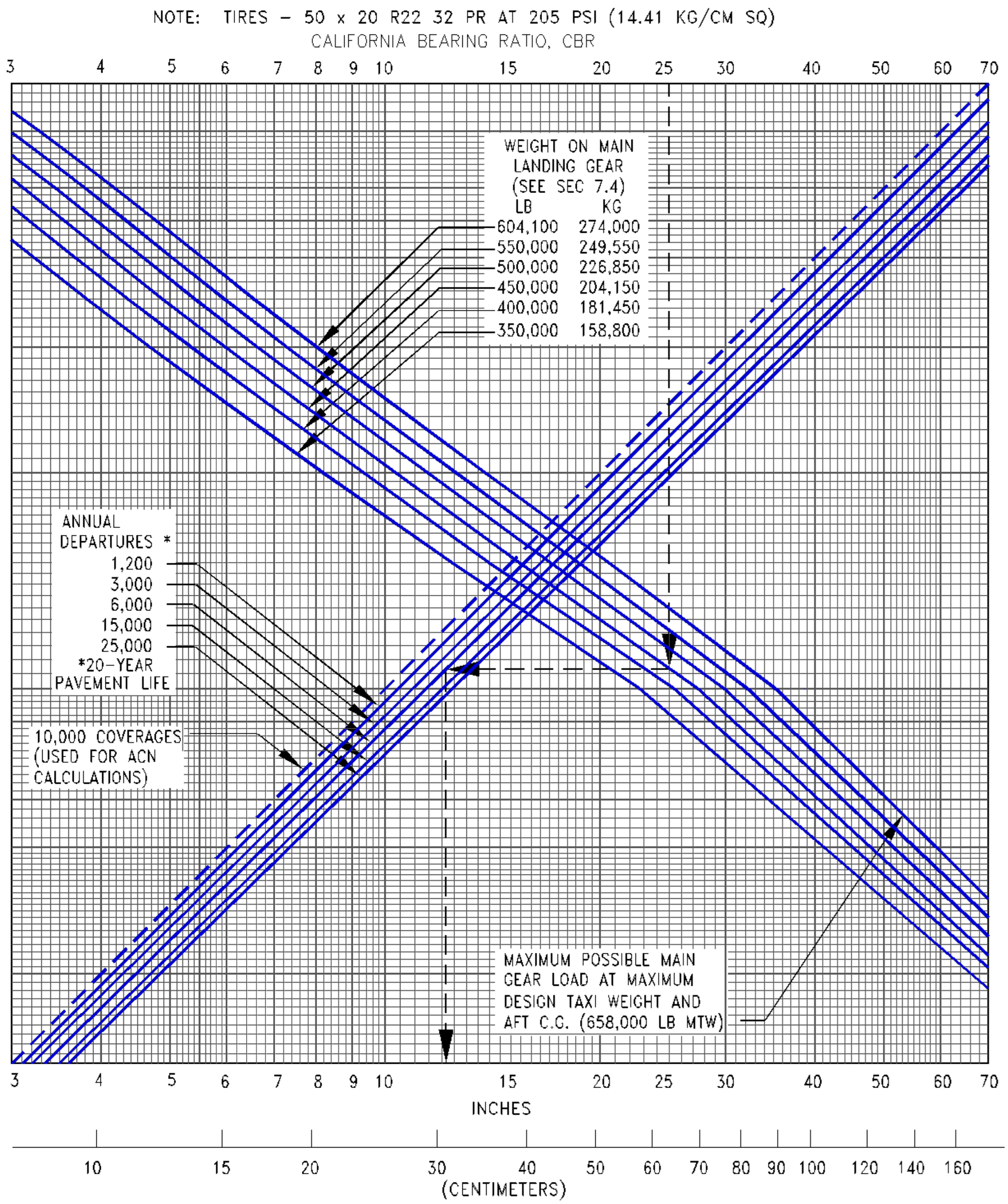
7.5.1 Flexible Pavement Requirements - U.S. Army Corps of Engineers Design Method (S-77-1): Model 777-200

THIS CHART IS AN ESTIMATE OF PAVEMENT REQUIREMENTS BASED ON THE S77-1 METHOD. THICKNESSES DETERMINED HEREIN ARE NOT APPROVED BY THE FAA FOR PAVEMENT DESIGN.



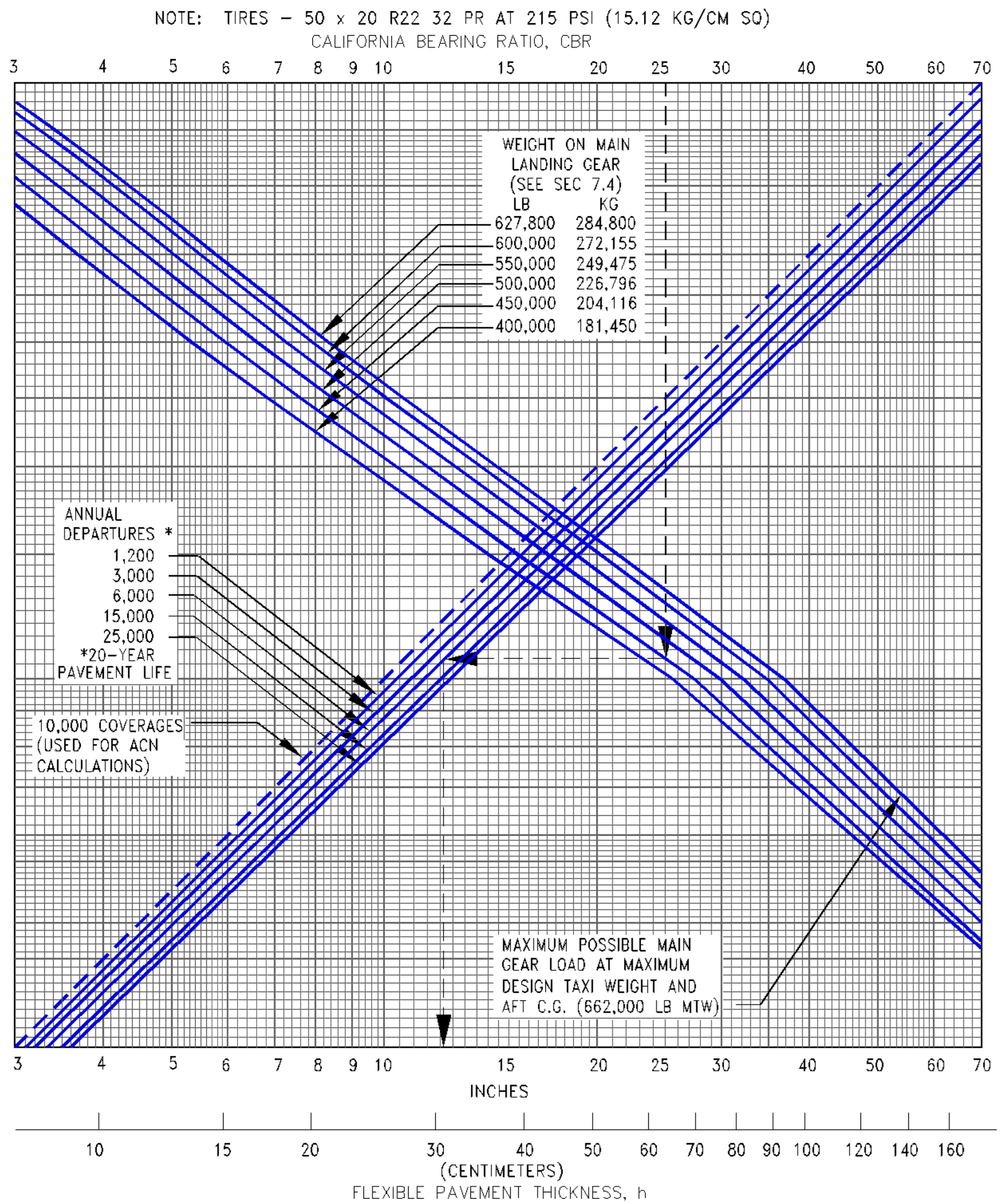
7.5.2 Flexible Pavement Requirements - U.S. Army Corps of Engineers Design Method (S-77-1): Model 777-200ER

THIS CHART IS AN ESTIMATE OF PAVEMENT REQUIREMENTS BASED ON THE S77-1 METHOD. THICKNESSES DETERMINED HEREIN ARE NOT APPROVED BY THE FAA FOR PAVEMENT DESIGN.



7.5.3 Flexible Pavement Requirements - U.S. Army Corps of Engineers Design Method (S-77-1): Model 777-300

THIS CHART IS AN ESTIMATE OF PAVEMENT REQUIREMENTS BASED ON THE S77-1 METHOD. THICKNESSES DETERMINED HEREIN ARE NOT APPROVED BY THE FAA FOR PAVEMENT DESIGN.



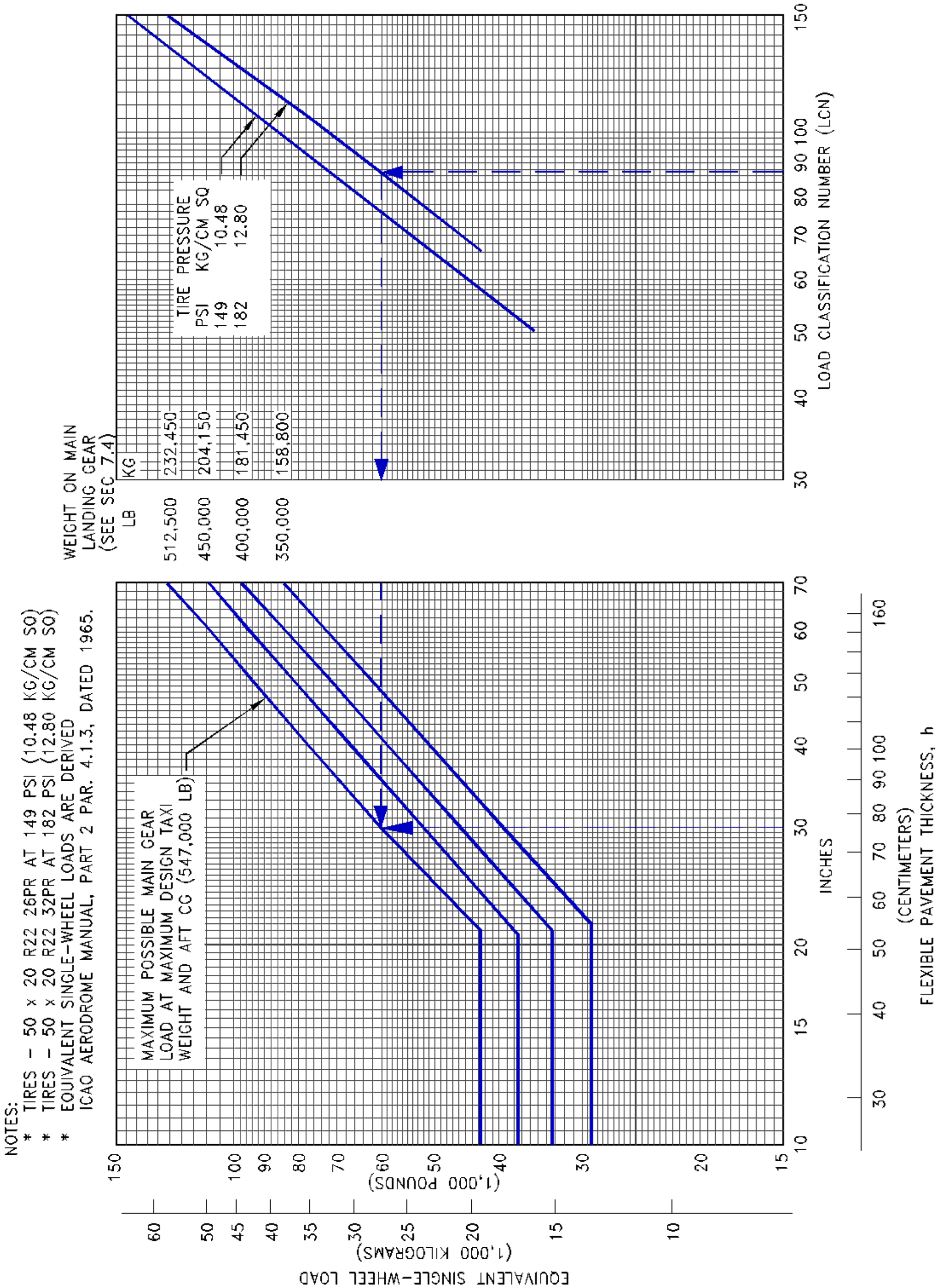
7.6 FLEXIBLE PAVEMENT REQUIREMENTS - LCN METHOD

To determine the airplane weight that can be accommodated on a particular flexible pavement, both the Load Classification Number (LCN) of the pavement and the thickness must be known.

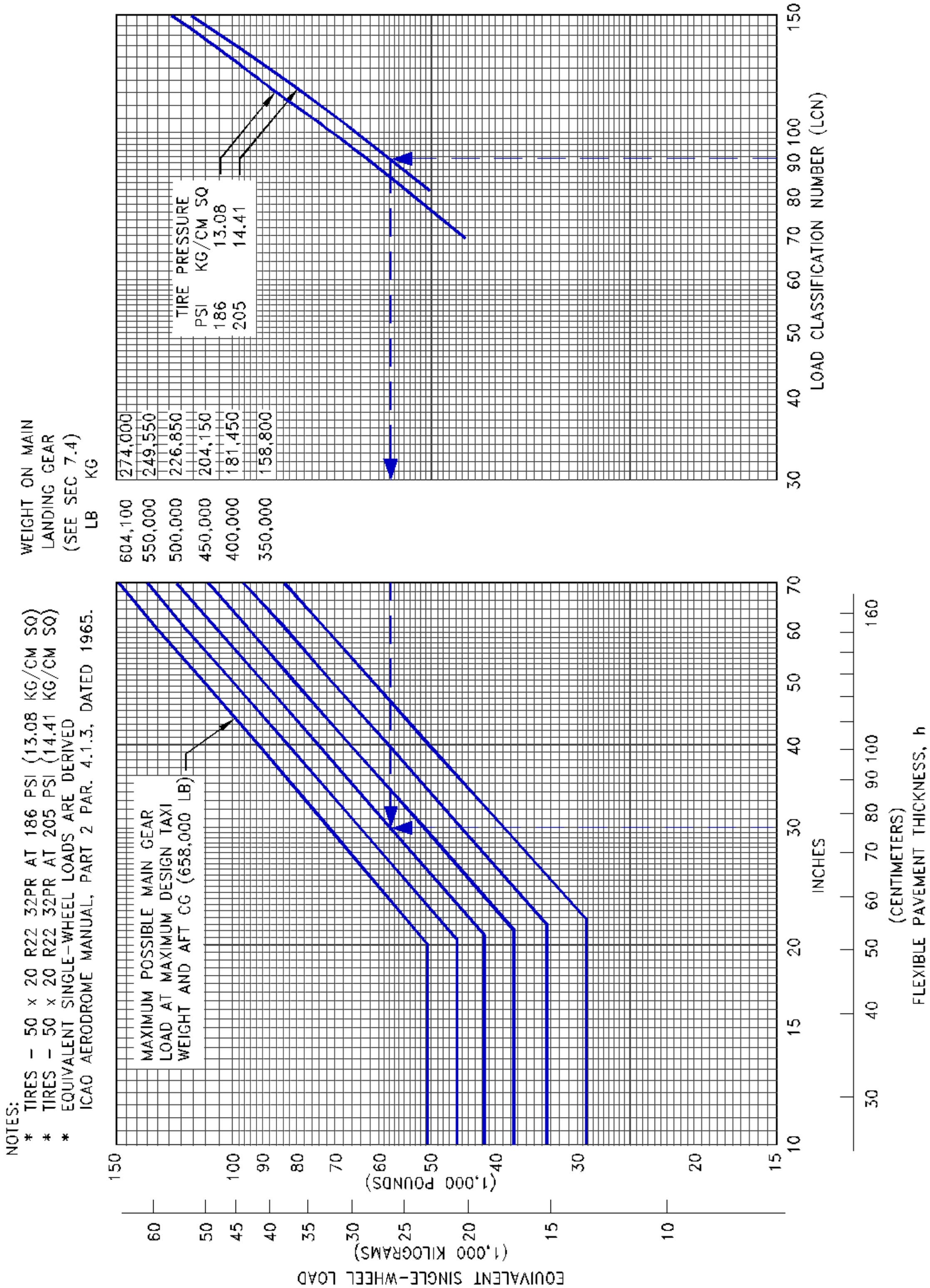
In the example shown in Section 7.6.1, flexible pavement thickness is shown at 30 inches with an LCN of 87.5. For these conditions, the maximum allowable weight on the main landing gear is 512,500 lb for a 777-200 airplane with 182-psi main gear tires. In the second example shown in Section 7.6.2, the flexible pavement thickness is shown at 30 inches and the LCN is 91.5. For these conditions, the maximum allowable weight on the main landing gear is 500,000 lb for a 777-200ER airplane with 205-psi main gear tires. Likewise, in the third example shown in Section 7.6.3, the flexible pavement thickness is shown at 30 inches and the LCN is 101. For these conditions, the maximum allowable weight on the main landing gear is 550,000 lb for a 777-300 airplane with 215-psi main gear tires.

Note: If the resultant aircraft LCN is not more that 10% above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure 10% has been chosen as representing the lowest degree of variation in LCN that is significant (reference: ICAO Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v, 2nd Edition dated 1965).

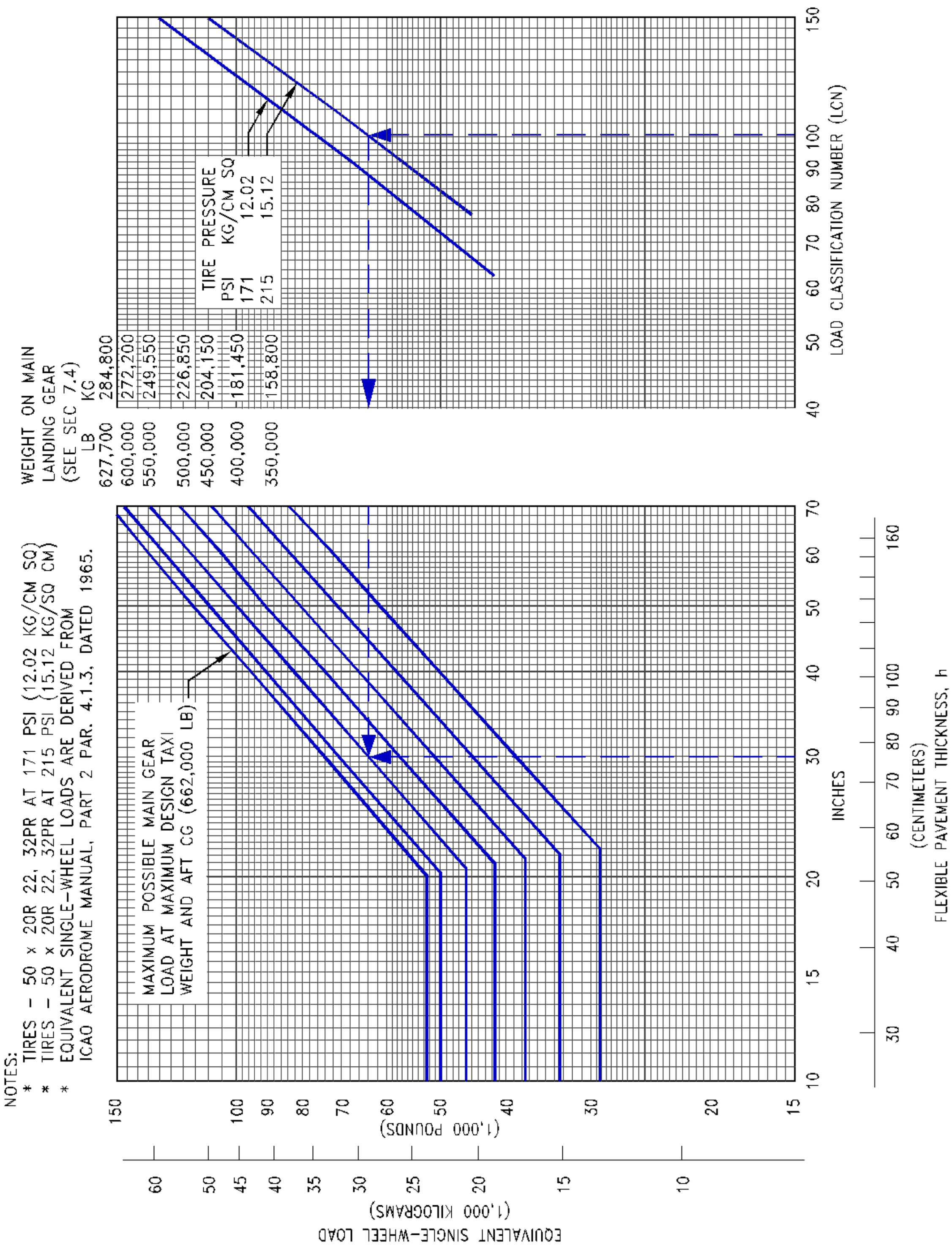
7.6.1 Flexible Pavement Requirements - LCN Method: Model 777-200



7.6.2 Flexible Pavement Requirements - LCN Method: Model 777-200ER



7.6.3 Flexible Pavement Requirements - LCN Method: Model 777-300



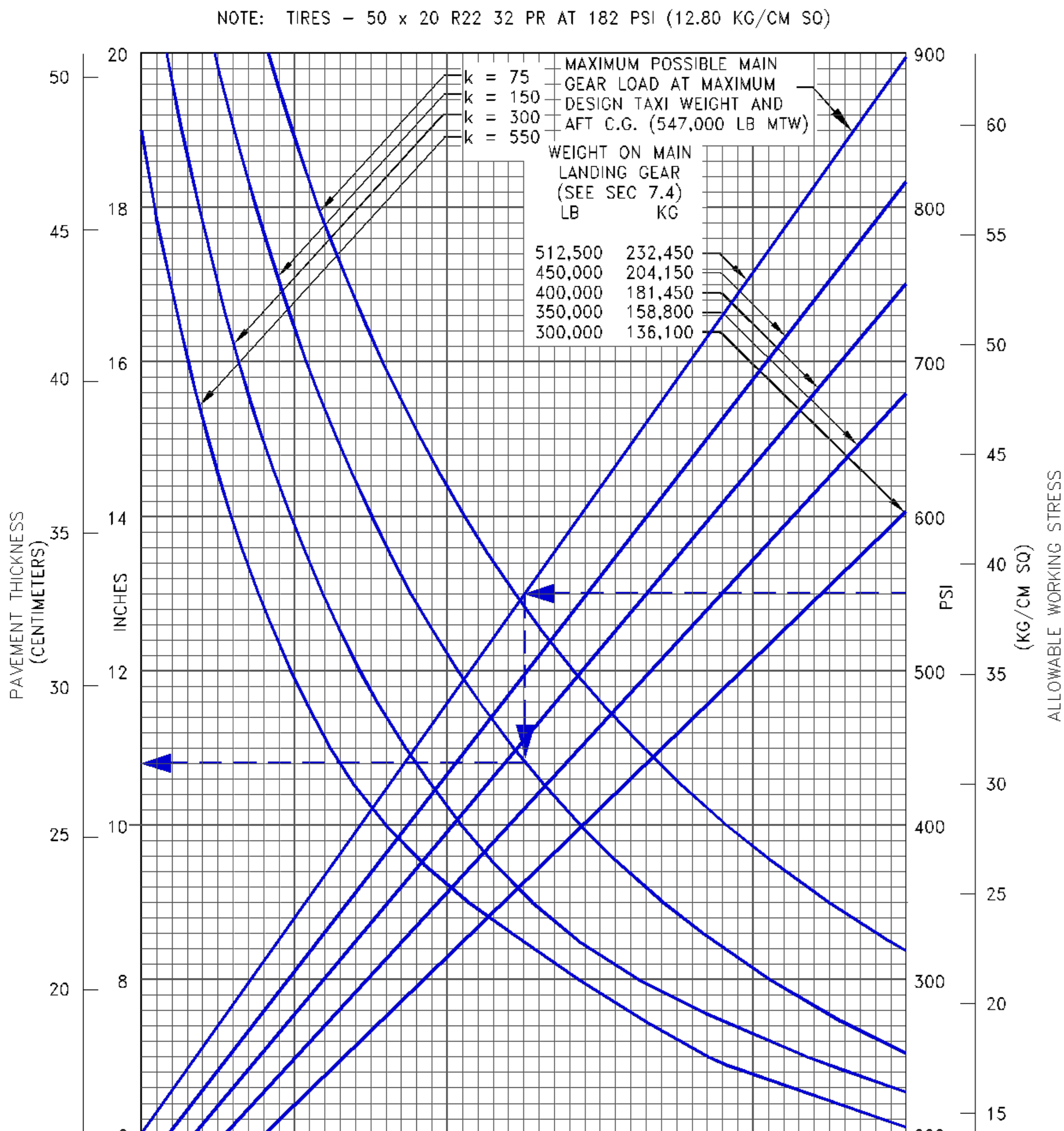
7.7 RIGID PAVEMENT REQUIREMENTS - PORTLAND CEMENT ASSOCIATION DESIGN METHOD

The Portland Cement Association method of calculating rigid pavement requirements is based on the computerized version of "Design of Concrete Airport Pavement" (Portland Cement Association, 1955) as described in XP6705-2, "Computer Program for Airport Pavement Design" by Robert G. Packard, Portland Cement Association, 1968.

The following rigid pavement design chart presents the data for six incremental main gear loads at the minimum tire pressure required at the maximum design taxi weight.

In the example shown in Section 7.7.1, for an allowable working stress of 550 psi, and a subgrade strength (k) of 150, the required rigid pavement thickness is 10.8 inches for a 777-200 airplane with a main gear load of 512,500 lb. In the second example, for the same pavement conditions, the required pavement thickness for a 777-200ER airplane with a main gear load of 550,000 lb is 11.7 inches as shown in Section 7.7.2 In the third example, for the same pavement conditions, the required pavement thickness for a 777-300 airplane with a main gear load of 550,000 lb is 11.8 inches as shown in Section 7.7.3.

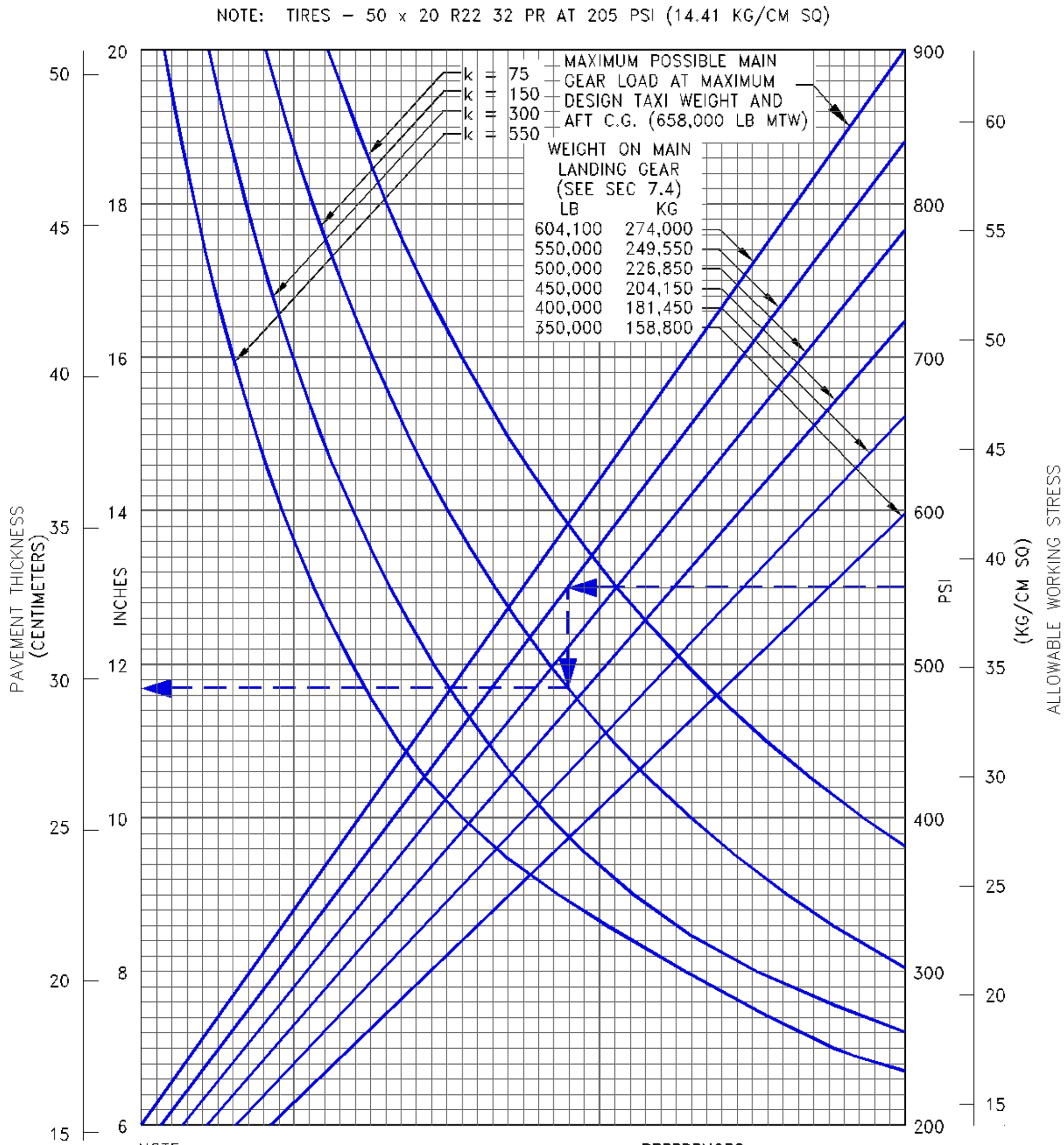
7.7.1 Rigid Pavement Requirements - Portland Cement Association Design Method: Model 777-200



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 BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF k.

REFERENCES:
"DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN – PROGRAM PDILB"
PORTLAND CEMENT ASSOCIATION.

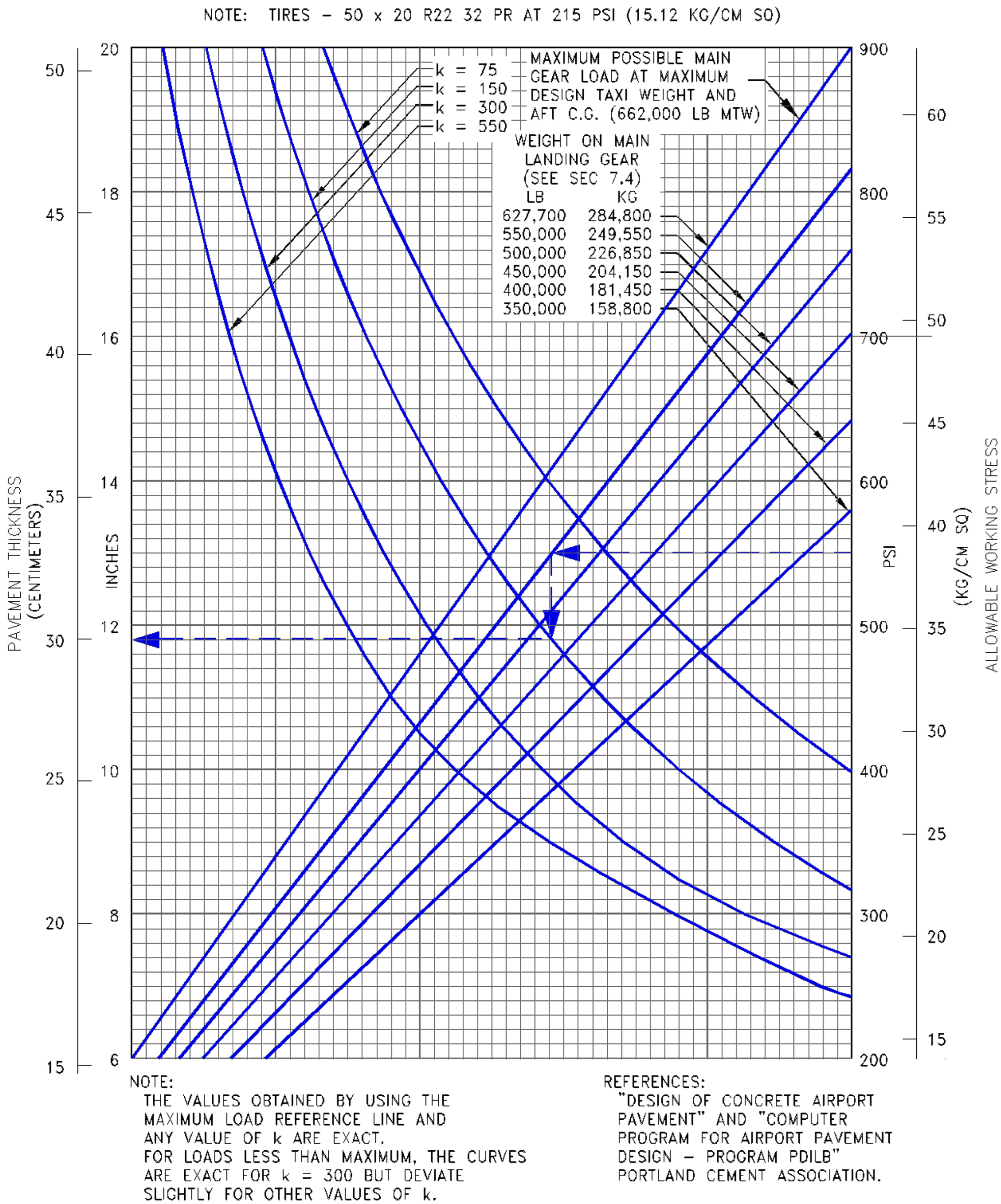
7.7.2 Rigid Pavement Requirements - Portland Cement Association Design Method: Model 777-200ER



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 BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF k.

REFERENCES:
"DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN – PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.

7.7.3 Rigid Pavement Requirements - Portland Cement Association Design Method: Model 777-300



7.8 RIGID PAVEMENT REQUIREMENTS - LCN CONVERSION

To determine the airplane weight that can be accommodated on a particular rigid pavement, both the LCN of the pavement and the radius of relative stiffness (ℓ) of the pavement must be known.

In the example shown in Section 7.8.2, for a rigid pavement with a radius of relative stiffness of 40 with an LCN of 78, the maximum allowable weight permissible on the main landing gear is 547,000 lb for an airplane with 182-psi main tires. In the second example shown in Section 7.8.3, for a rigid pavement with a radius of relative stiffness of 38 with an LCN of 84.5, the maximum allowable weight permissible on the main landing gear is 550,000 lb for an airplane with 205-psi main tires. In the third example shown in Section 7.8.4, for a rigid pavement with a radius of relative stiffness of 38 with an LCN of 87.5, the maximum allowable weight permissible on the main landing gear is 550,000 lb for an airplane with 215-psi main tires.

Note: If the resultant aircraft LCN is not more that 10% above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure 10% has been chosen as representing the lowest degree of variation in LCN that is significant (reference: ICAO Aerodrome Design Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v, 2nd Edition dated 1965).

7.8.1 Radius of Relative Stiffness (Reference: Portland Cement Association)

RADIUS OF RELATIVE STIFFNESS (ℓ)

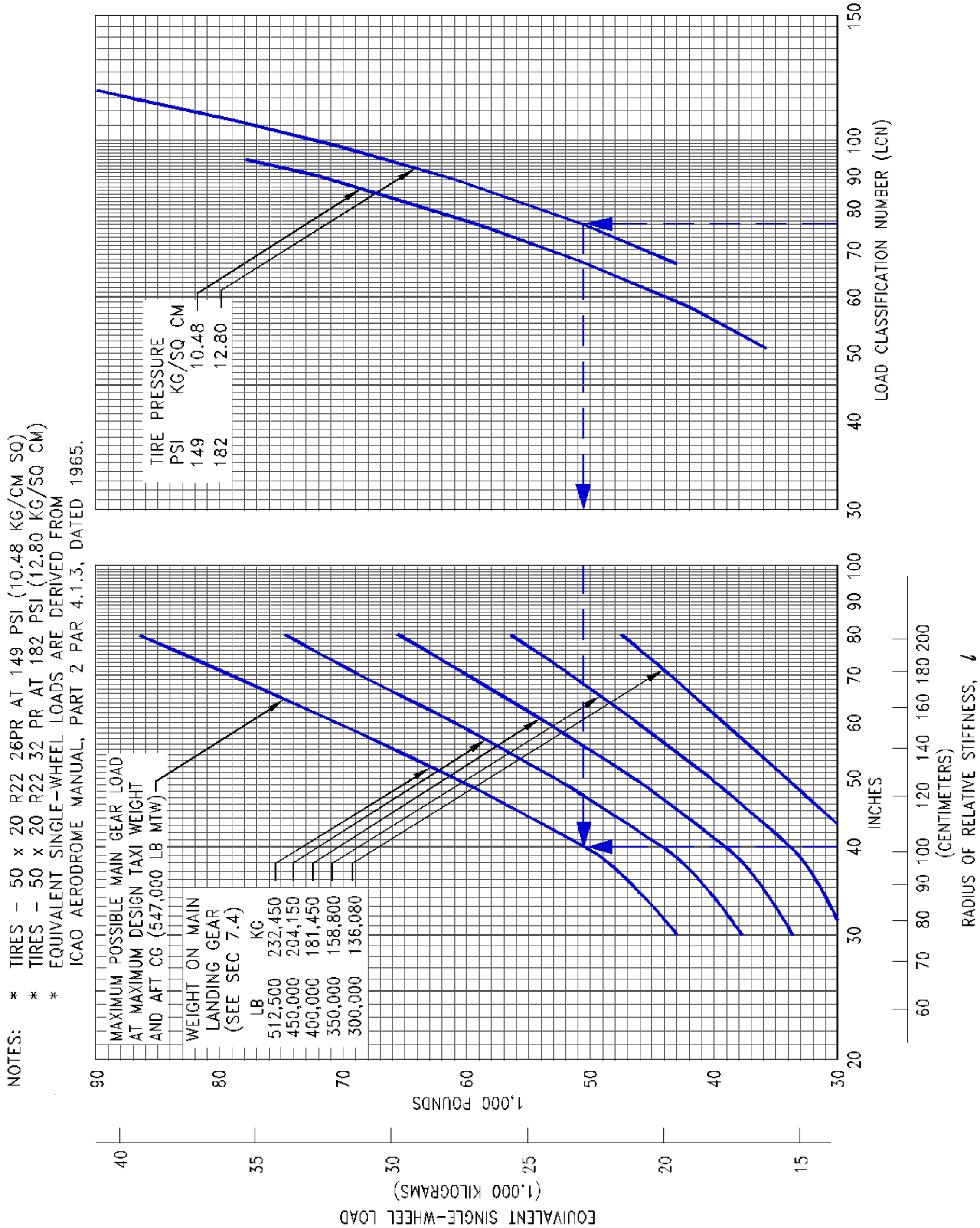
VALUES IN INCHES

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

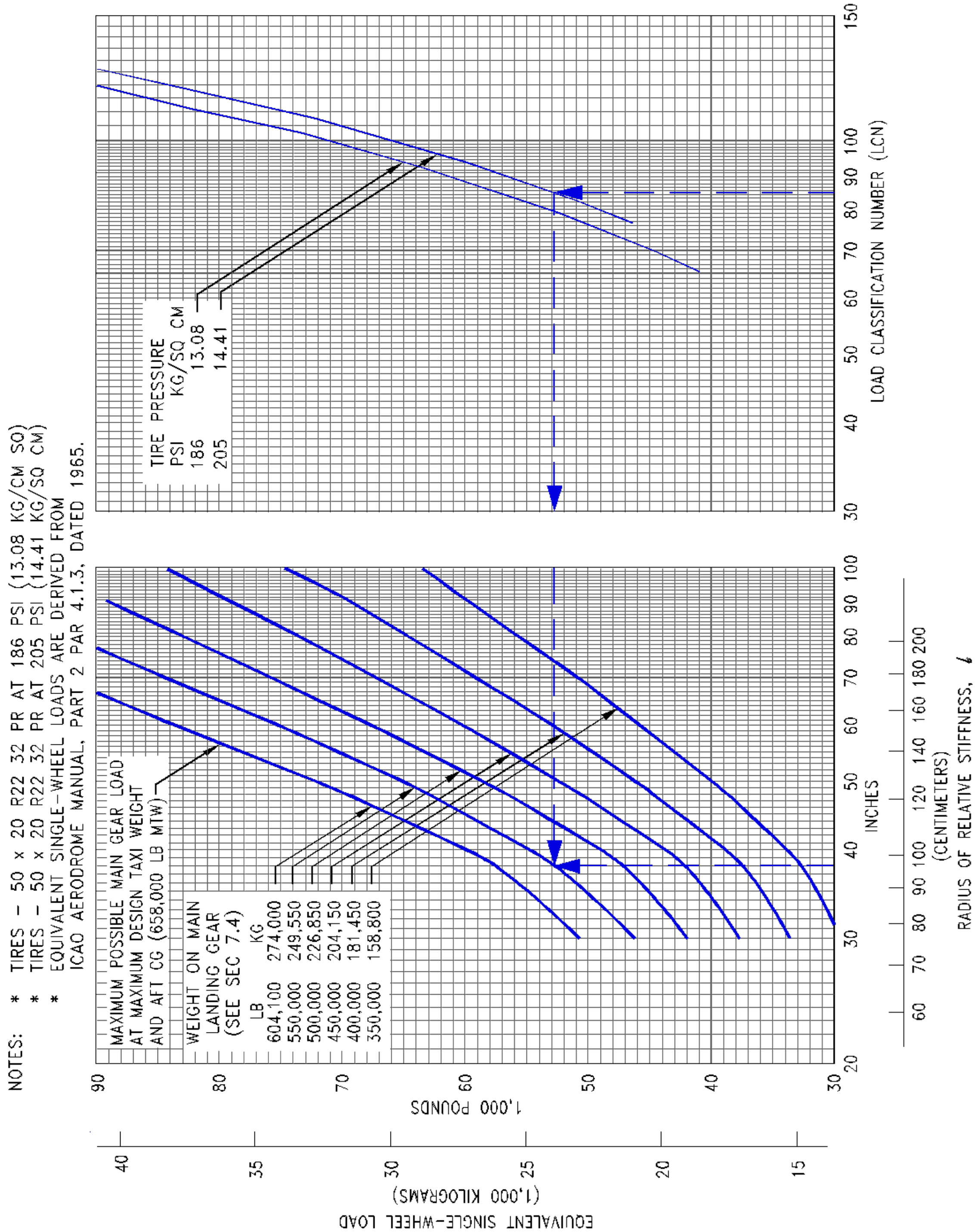
WHERE: E = YOUNG'S MODULUS OF ELASTICITY = 4 x 10^6 psi
k = SUBGRADE MODULUS, LB PER CU IN
d = RIGID PAVEMENT THICKNESS, IN
μ = POISSON'S RATIO = 0.15

d	k = 75	k = 100	k = 150	k = 200	k = 250	k = 300	k = 350	k = 400	k = 500	k = 550
6.0	31.48	29.29	26.47	24.63	23.30	22.26	21.42	20.71	19.59	19.13
6.5	33.42	31.10	28.11	26.16	24.74	23.63	22.74	21.99	20.80	20.31
7.0	35.33	32.88	29.71	27.65	26.15	24.99	24.04	23.25	21.99	21.47
7.5	37.21	34.63	31.29	29.12	27.54	26.31	25.32	24.49	23.16	22.61
8.0	39.06	36.35	32.84	30.56	28.91	27.62	26.57	25.70	24.31	23.73
8.5	40.87	38.04	34.37	31.99	30.25	28.90	27.81	26.90	25.44	24.84
9.0	42.66	39.70	35.88	33.39	31.57	30.17	29.03	28.07	26.55	25.93
9.5	44.43	41.35	37.36	34.77	32.88	31.42	30.23	29.24	27.65	27.00
10.0	46.17	42.97	38.83	36.13	34.17	32.65	31.41	30.38	28.73	28.06
10.5	47.89	44.57	40.27	37.48	35.44	33.87	32.58	31.52	29.81	29.10
11.0	49.59	46.15	41.70	38.81	36.70	35.07	33.74	32.63	30.86	30.14
11.5	51.27	47.72	43.12	40.12	37.95	36.26	34.89	33.74	31.91	31.16
12.0	52.94	49.26	44.51	41.43	39.18	37.43	36.02	34.83	32.94	32.17
12.5	54.58	50.80	45.90	42.71	40.40	38.60	37.14	35.92	33.97	33.17
13.0	56.21	52.31	47.27	43.99	41.60	39.75	38.25	36.99	34.98	34.16
13.5	57.83	53.81	48.63	45.25	42.80	40.89	39.34	38.05	35.99	35.14
14.0	59.43	55.30	49.97	46.50	43.98	42.02	40.43	39.10	36.98	36.11
14.5	61.01	56.78	51.30	47.74	45.15	43.14	41.51	40.15	37.97	37.07
15.0	62.58	58.24	52.62	48.97	46.32	44.25	42.58	41.18	38.95	38.03
15.5	64.14	59.69	53.93	50.19	47.47	45.35	43.64	42.21	39.92	38.98
16.0	65.69	61.13	55.23	51.40	48.61	46.45	44.69	43.22	40.88	39.92
16.5	67.22	62.55	56.52	52.60	49.75	47.53	45.73	44.23	41.83	40.85
17.0	68.74	63.97	57.80	53.79	50.87	48.61	46.77	45.23	42.78	41.77
17.5	70.25	65.38	59.07	54.97	51.99	49.68	47.80	46.23	43.72	42.69
18.0	71.75	66.77	60.34	56.15	53.10	50.74	48.82	47.22	44.65	43.60
19.0	74.72	69.54	62.83	58.47	55.30	52.84	50.84	49.17	46.50	45.41
20.0	77.65	72.26	65.30	60.77	57.47	54.91	52.83	51.10	48.33	47.19
21.0	80.55	74.96	67.73	63.03	59.61	56.95	54.80	53.00	50.13	48.95
22.0	83.41	77.62	70.14	65.27	61.73	58.98	56.75	54.88	51.91	50.68
23.0	86.23	80.25	72.51	67.48	63.82	60.98	58.67	56.74	53.67	52.40
24.0	89.03	82.85	74.86	69.67	65.89	62.95	60.57	58.58	55.41	54.10
25.0	91.80	85.43	77.19	71.84	67.94	64.91	62.46	60.41	57.13	55.78

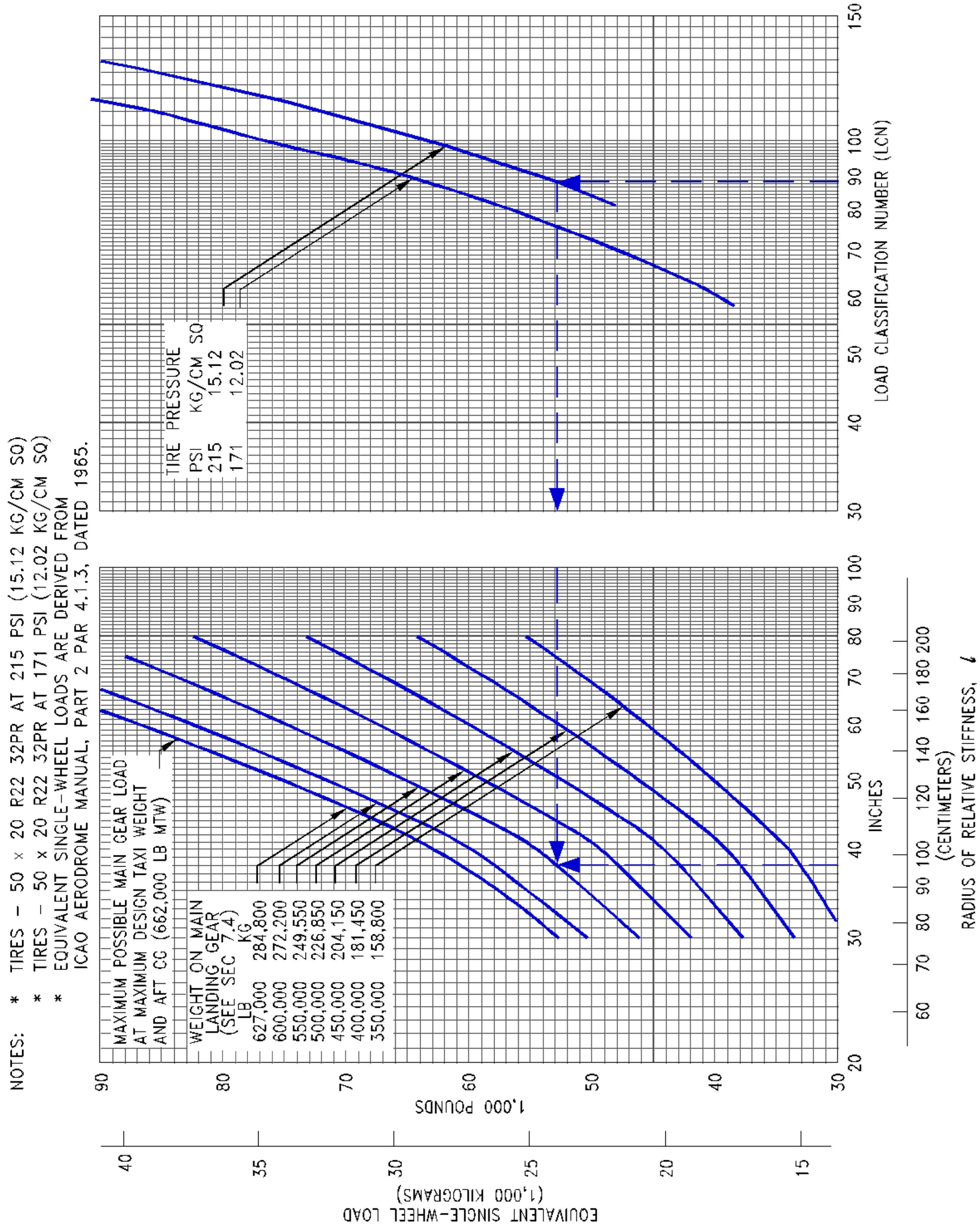
7.8.2 Rigid Pavement Requirements - LCN Conversion: Model 777-200



7.8.3 Rigid Pavement Requirements - LCN Conversion: Model 777-200ER



7.8.4 Rigid Pavement Requirements - LCN Conversion: Model 777-300



7.9 RIGID PAVEMENT REQUIREMENTS - FAA DESIGN METHOD

The following rigid-pavement design chart presents data on six incremental main gear loads at the minimum tire pressure required at the maximum design taxi weight.

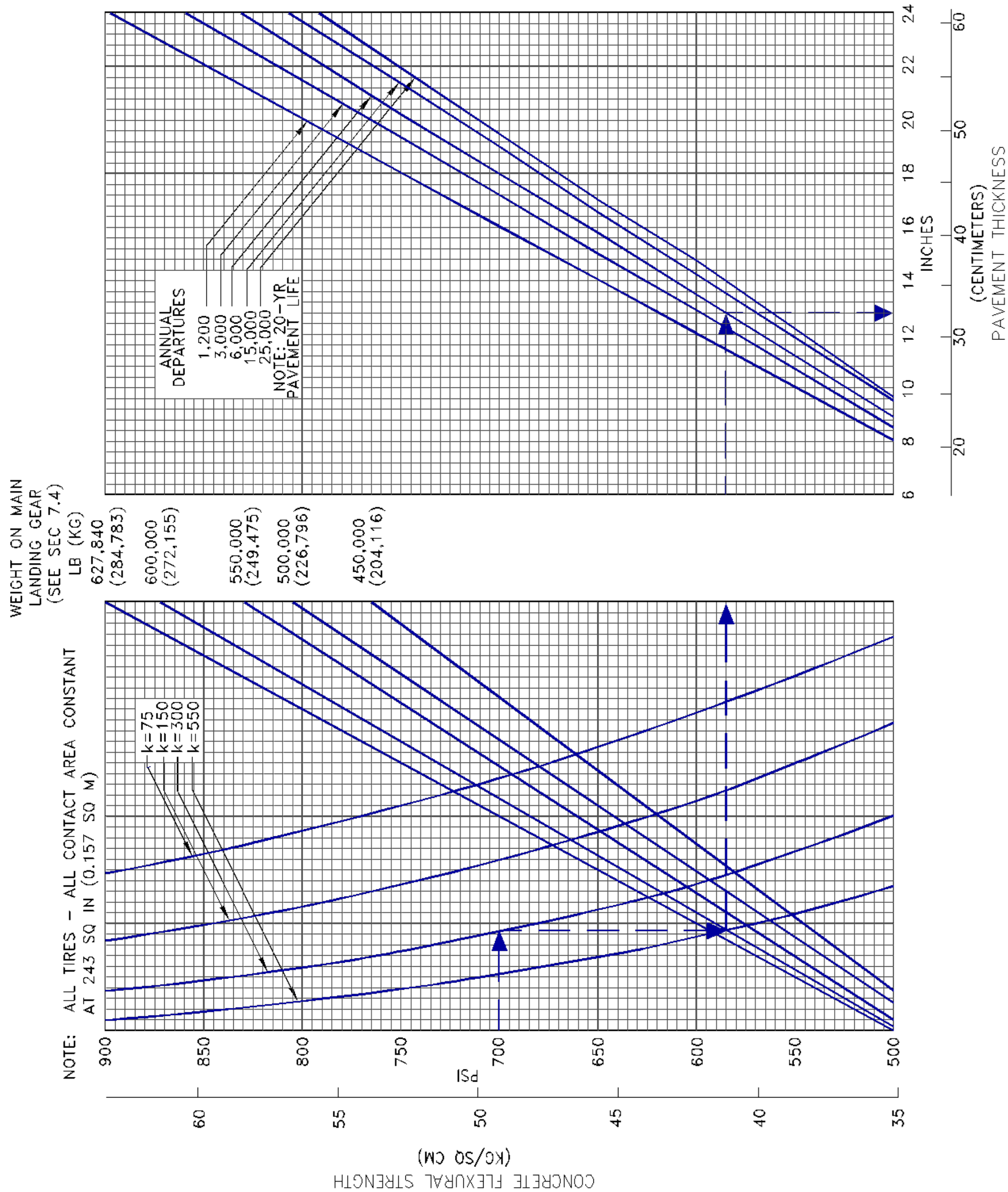
In the example shown, for a pavement flexural strength of 700 psi, a subgrade strength of k = 300, and an annual departure level of 6,000, the required pavement thickness for a 777-200, 777-200ER or 777-300 airplane with a main gear load of 600,00 lb is 12.8 inches.

The FAA does not officially recognize the validity of rigid pavement thickness design calculations for individual six-wheel gear aircraft. At the time this document (D6-58329) was printed, the FAA was recommending a multi-layer pavement thickness design method for the 777 airplane when considered as a component of the traffic mix. Consequently, the chart presented in Section 7.9.1 is provided as an estimate of the design thickness for general guidance purposes only.

For the rigid pavement design refer to the FAA AC 150/5320-6 "Airport Pavement Design and Evaluation" and pavement design program FAARFIELD. Both are available on the FAA website:

FAA AC 150/5320-6: https://www.faa.gov/airports/resources/advisory_circulars/
FAARFIELD: https://www.faa.gov/airports/engineering/design_software/

7.9.1 Rigid Pavement Requirements: Model 777-200, -200ER, -300



7.10 ACN/PCN REPORTING SYSTEM - FLEXIBLE AND RIGID PAVEMENTS

To determine the ACN of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength category must be known. The chart in Section 7.10.1 shows that for a 777-200 aircraft with gross weight of 425,000 lb on a medium strength subgrade (Code B), the flexible pavement ACN is 30.9, which rounded to the nearest whole number is reported as 31. In Section 7.10.2, for the same aircraft weight and medium subgrade strength (Code B), the rigid pavement ACN is 32.4, which rounded to the nearest whole number is reported as 32.

The following table provides ACN data in tabular format similar to the one used by ICAO in Doc 9157-AN/901, Aerodrome Design Manual, Part 3, "Pavements," Second Edition, 1983. If the ACN for an intermediate weight between the maximum taxi weight and the minimum weight specified in the table is required, Sections 7.10.1 through 7.10.6 should be consulted.

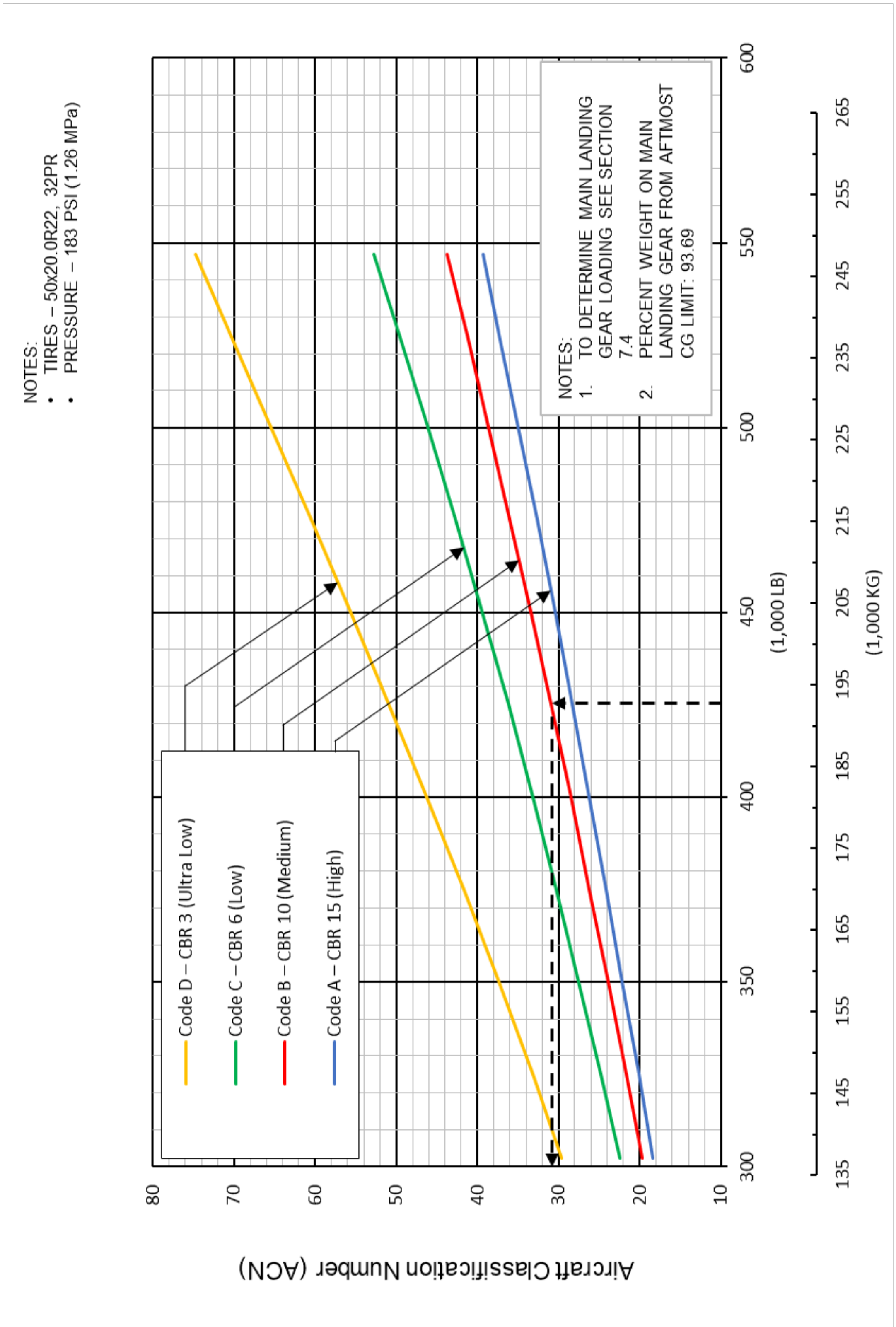
The ACN curve graphs were developed based on standard recommended practices from ICAO Annex 14, Aerodromes, Volume I, "Aerodrome Design and Operations," Ninth Edition, July 2022, and guidance material from ICAO Doc 9157-AN/901, Aerodrome Design Manual, Part 3, "Pavements," Second Edition, 1983. The Federal Aviation Administration has developed the "ICAO-ACN 1.0" program to calculate the ACN values for aircraft on flexible and rigid airport pavements, and it is available for download at:

https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/icao-acn-10.

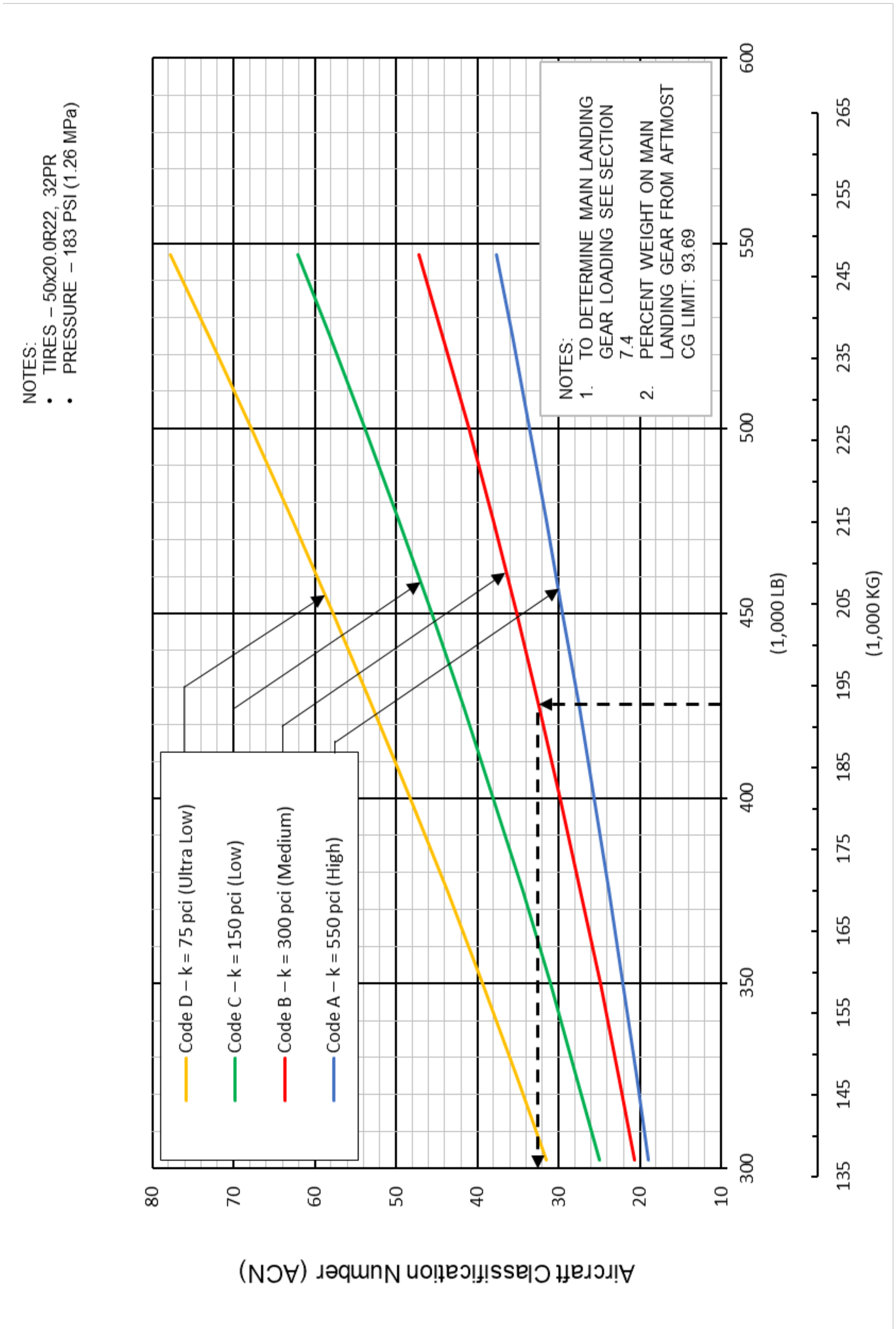
				ACN FOR FLEXIBLE PAVEMENT SUBGRADES CBR				ACN FOR RIGID PAVEMENT SUBGRADES k, pci (MN/m^3)			
AIRCRAFT TYPE	MAXIMUM TAXI WEIGHT MINIMUM WEIGHT *[1] lb (kg)	LOAD ON ONE MAIN GEAR LEG (%)	TIRE PRESSURE psi (MPa)	HIGH (A) 15	MEDIUM (B) 10	LOW (C) 6	ULTRA LOW (D) 3	HIGH (A) 550 (150)	MEDIUM (B) 300 (80)	LOW (C) 150 (40)	ULTRA LOW (D) 75 (20)
777-200	547,000 (248,115)	46.85	183 (1.26)	39	44	53	75	38	47	62	78
	302,170 (137,062)			18	20	22	30	19	21	25	32
777-200ER	658,000 (298,463)	45.91	205 (1.41)	49	56	68	95	50	64	83	102
	313,500 (142,201)			19	20	23	30	20	22	27	33
777-300	662,000 (300,278)	47.42	215 (1.48)	53	59	73	100	54	69	89	108
	350,870 (159,151)			23	25	28	38	24	27	33	42

*[1] Minimum weight used solely as a baseline for ACN curve generation.

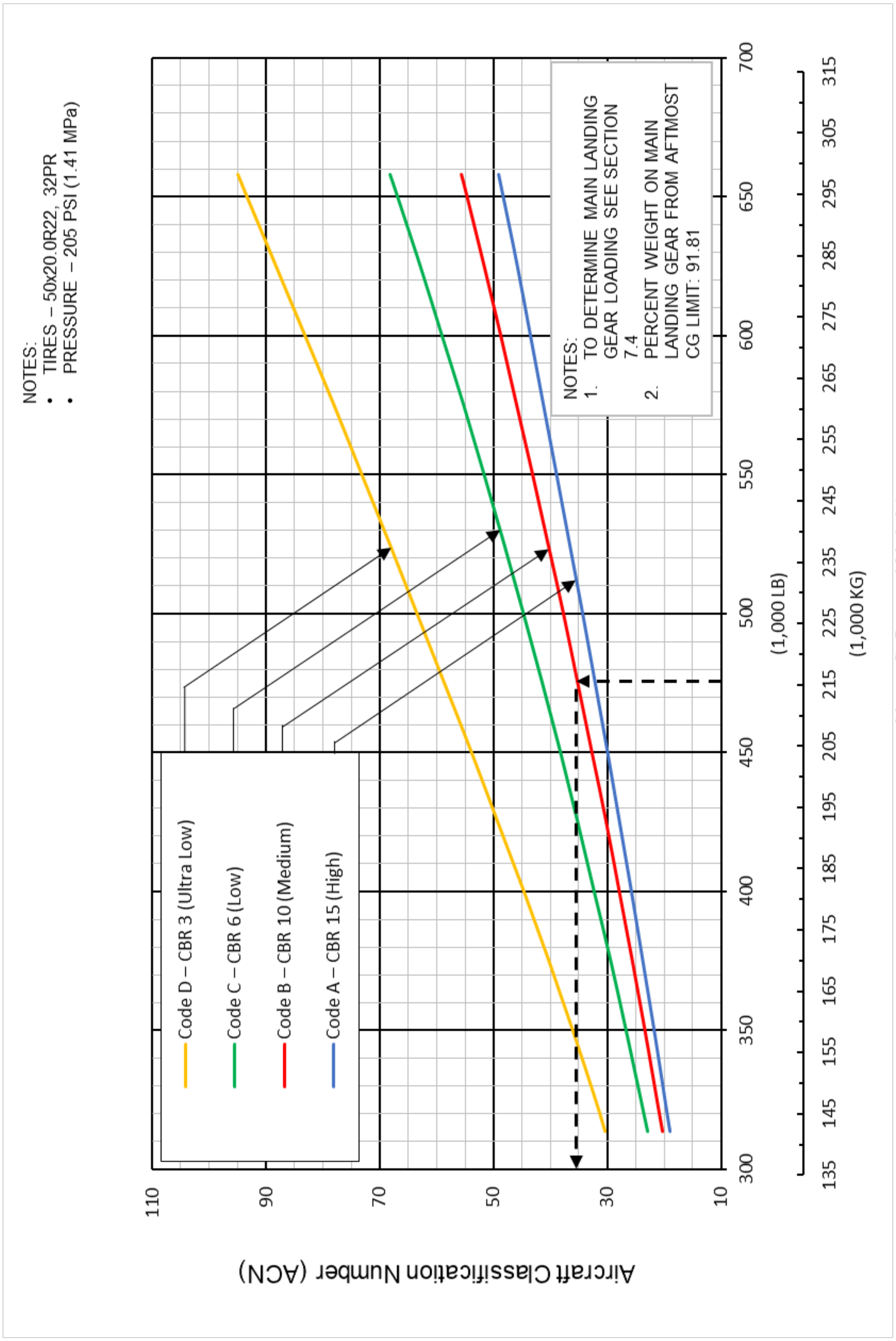
7.10.1 Aircraft Classification Number - Flexible Pavement: Model 777-200



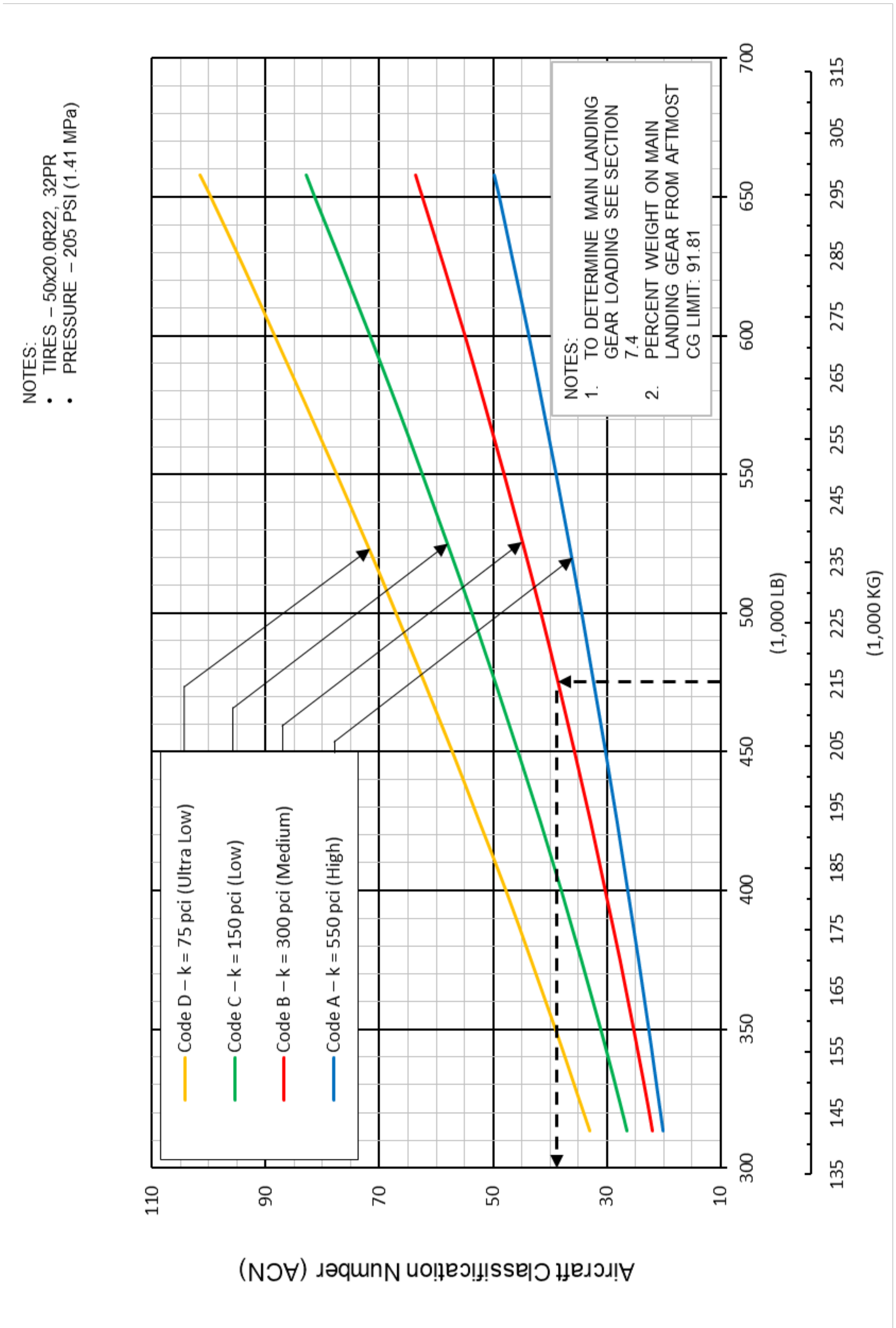
7.10.2 Aircraft Classification Number - Rigid Pavement: Model 777-200



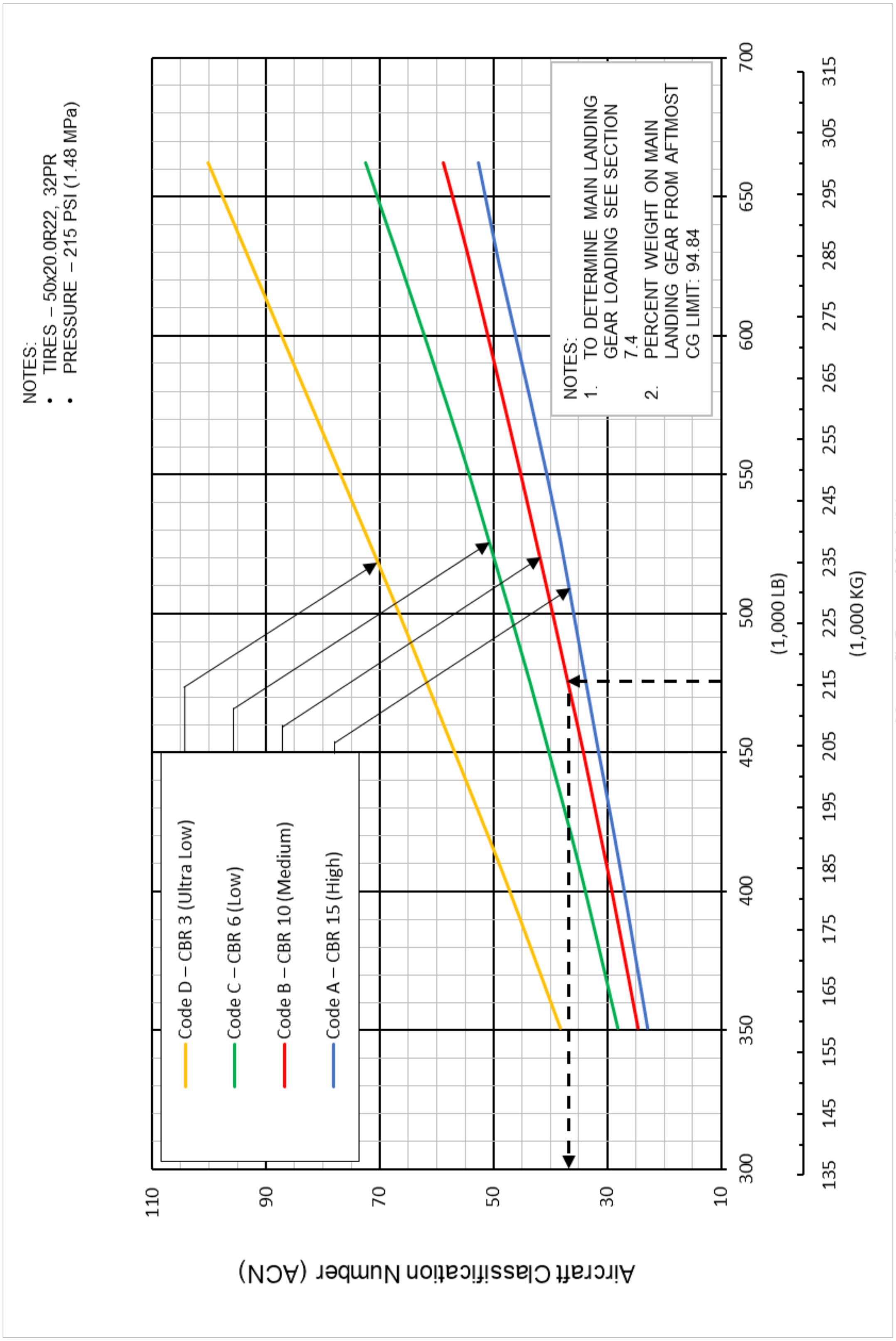
7.10.3 Aircraft Classification Number - Flexible Pavement: Model 777-200ER



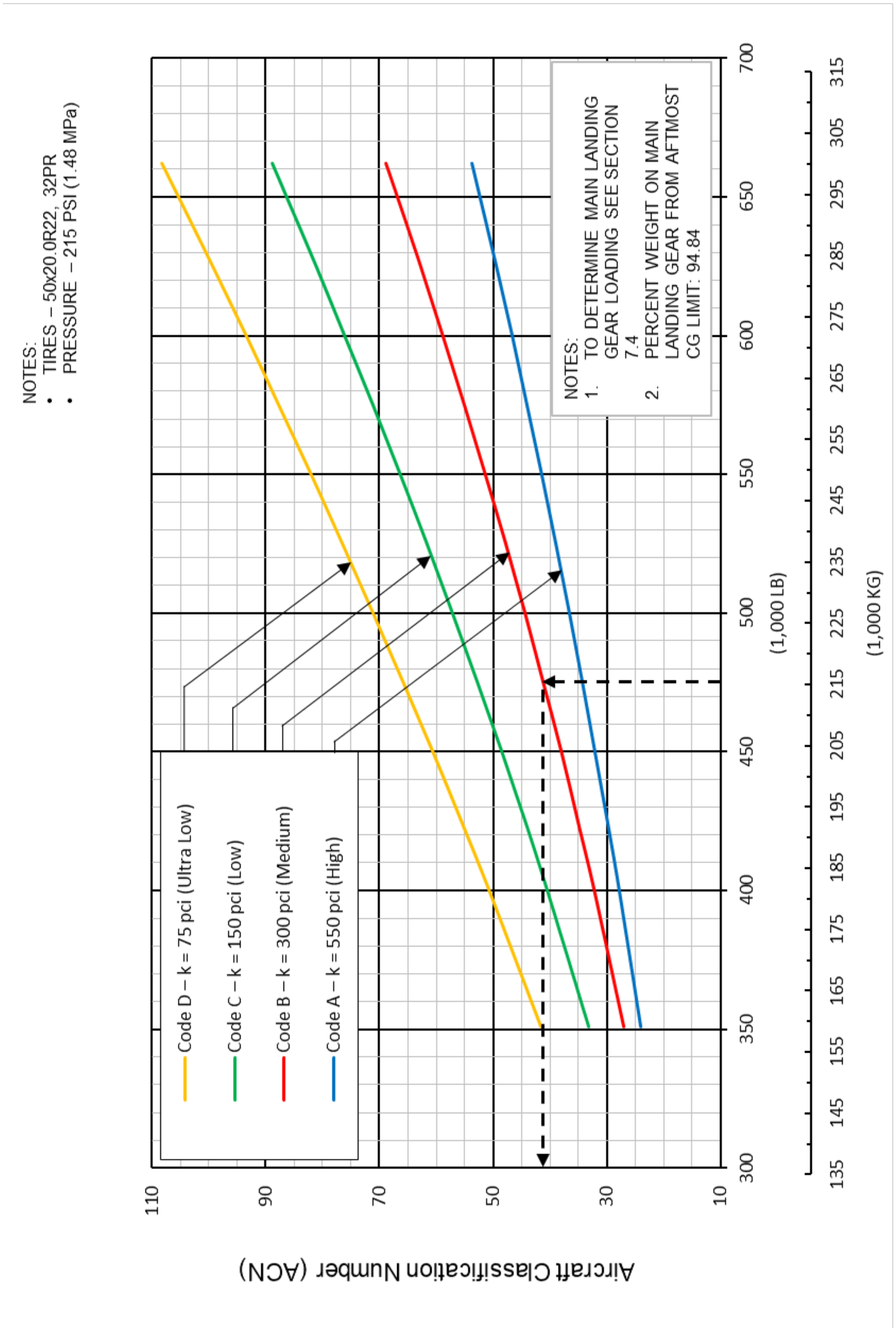
7.10.4 Aircraft Classification Number - Rigid Pavement: Model 777-200ER



7.10.5 Aircraft Classification Number - Flexible Pavement: Model 777-300



7.10.6 Aircraft Classification Number - Rigid Pavement: Model 777-300



7.11 ACR/PCR REPORTING SYSTEM - FLEXIBLE AND RIGID PAVEMENTS

To determine the ACR of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength category must be known. The chart in Section 7.11.1 shows that for a 777-200 aircraft with gross weight of 425,000 lb on a medium strength subgrade (Code B), the flexible pavement ACR is 309, which rounded to the nearest multiple of ten is reported as 310. In Section 7.11.2, for the same aircraft weight and medium subgrade strength (Code B), the rigid pavement ACR is 355, which rounded to the nearest multiple of ten is reported as 360.

The following table provides ACR data in tabular format. If the ACR for an intermediate weight between the maximum taxi weight and the minimum weight specified in the table is required, Sections 7.11.1 through 7.11.6 can be consulted.

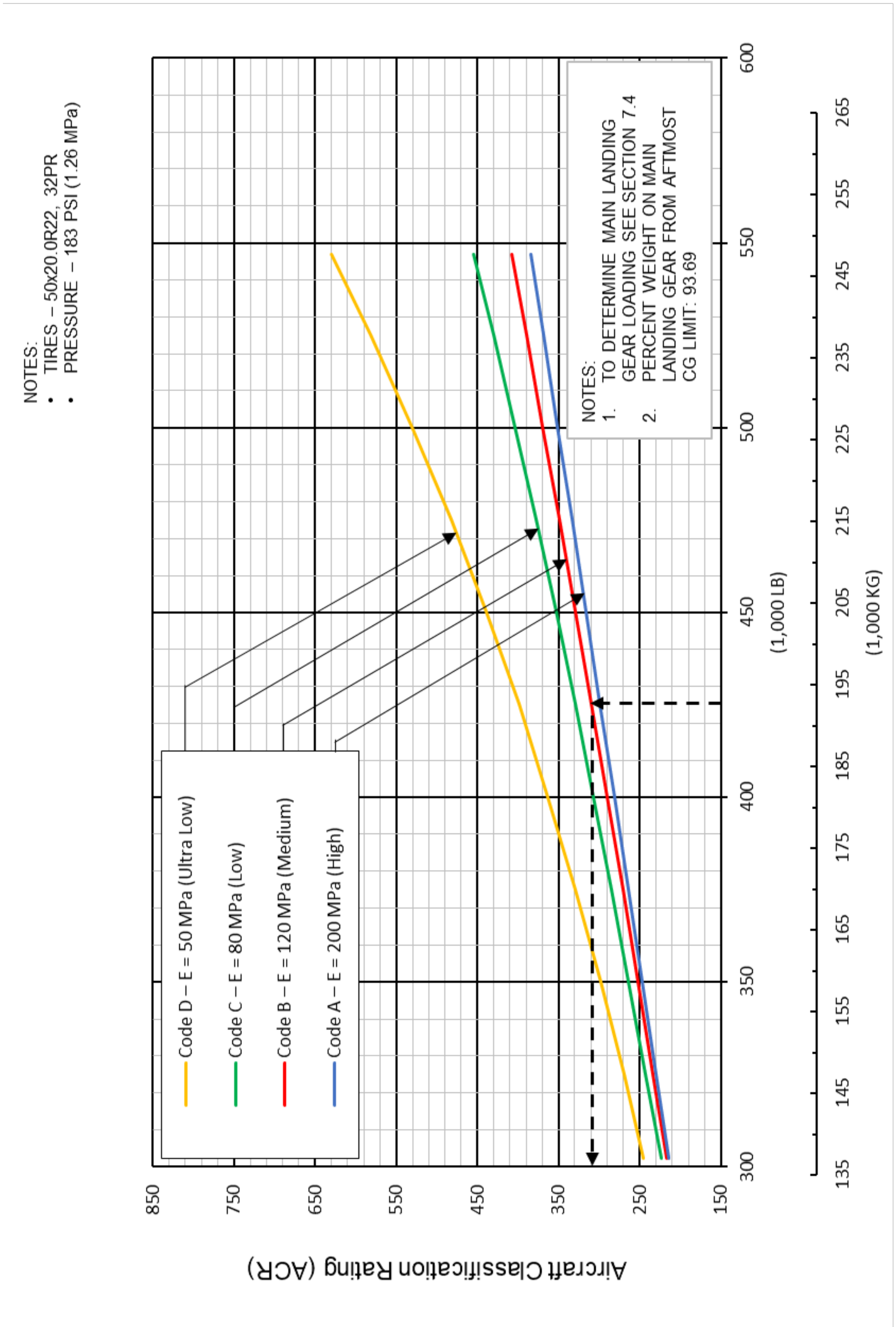
The ACR curve graphs were developed based on standard recommended practices from ICAO Annex 14, Aerodromes, Volume I, "Aerodrome Design and Operations," Ninth Edition, July 2022, and guidance material from ICAO Doc 9157-AN/901, Aerodrome Design Manual, Part 3, "Pavements," Third Edition, 2022. The Federal Aviation Administration has developed the "ICAO-ACR 1.4" program to calculate the ACR values for aircraft on flexible and rigid airport pavements", and it is available for download at:

https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ICAO-ACR-14.

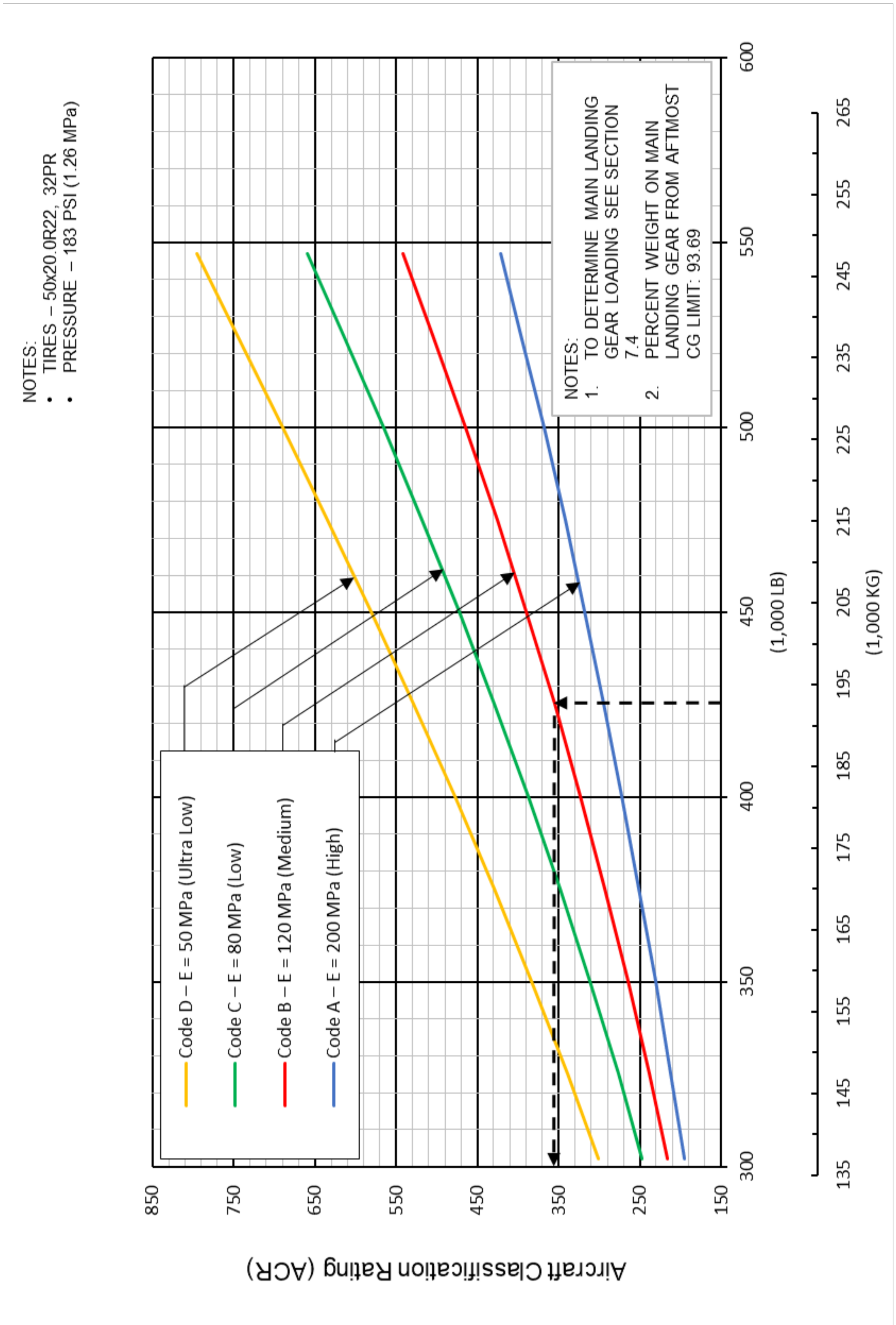
				ACR FOR FLEXIBLE PAVEMENT SUBGRADES				ACR FOR RIGID PAVEMENT SUBGRADES			
AIRCRAFT TYPE	MAXIMUM TAXI WEIGHT MINIMUM WEIGHT *[1] lb (kg)	LOAD ON ONE MAIN GEAR LEG (%)	TIRE PRESSURE psi (MPa)	HIGH (A) E = 200 MPa	MEDIUM (B) E = 120 MPa	LOW (C) E = 80 MPa	ULTRA LOW (D) E = 50 MPa	HIGH (A) E = 200 MPa	MEDIUM (B) E = 120 MPa	LOW (C) E = 80 MPa	ULTRA LOW (D) E = 50 MPa
777-200	547,000 (248,115)	46.85	183 (1.26)	380	410	450	630	420	540	660	800
	302,170 (137,062)			210	220	220	240	200	220	250	300
777-200ER	658,000 (298,463)	45.91	205 (1.41)	470	500	590	880	570	740	890	1040
	313,500 (142,201)			220	220	230	250	210	230	260	320
777-300	662,000 (300,278)	47.42	215 (1.48)	500	530	630	950	620	800	950	1110
	350,870 (159,151)			260	260	270	310	250	290	330	400

*[1] Minimum weight used solely as a baseline for ACR curve generation.

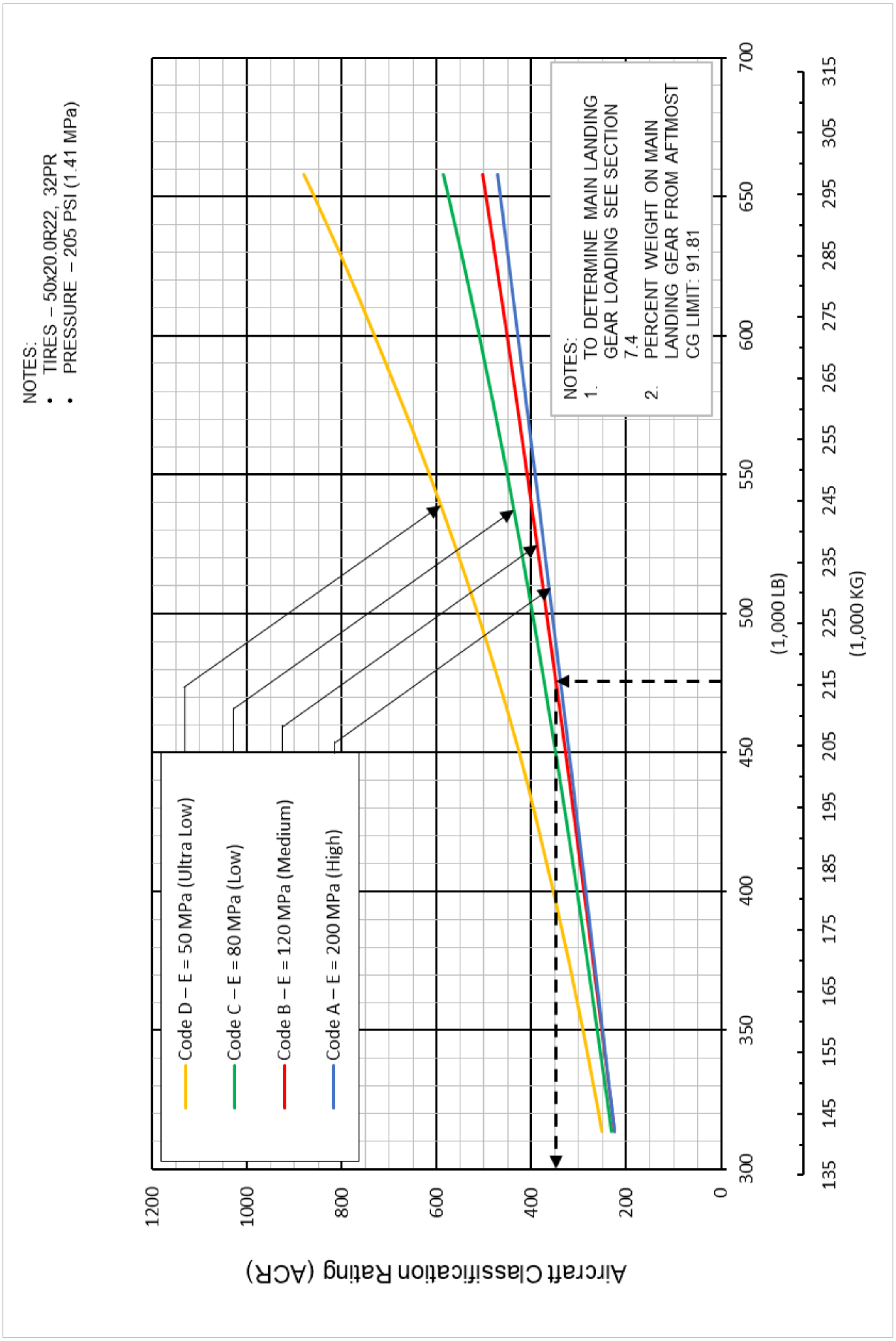
7.11.1 Aircraft Classification Rating - Flexible Pavement: Model 777-200



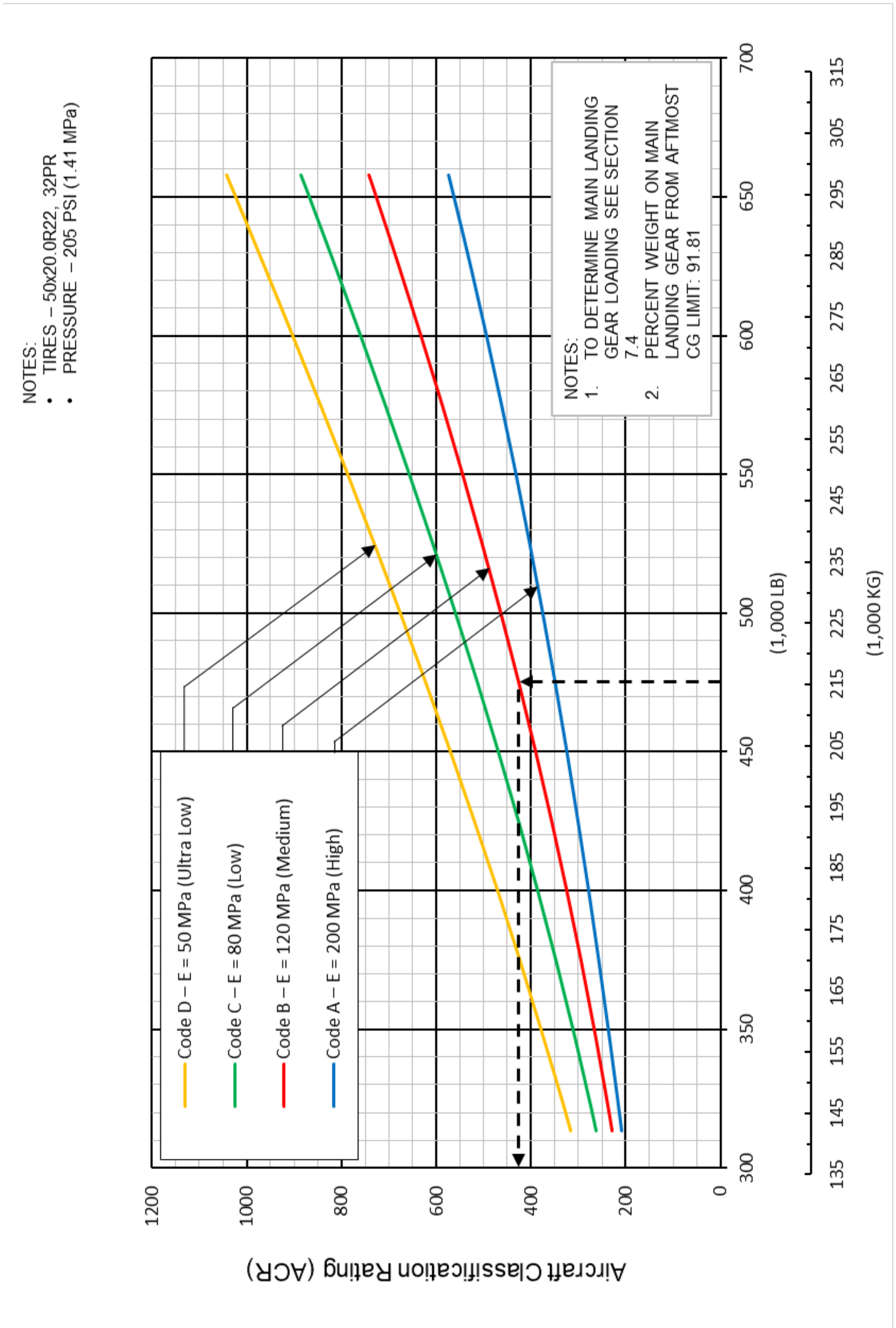
7.11.2 Aircraft Classification Rating - Rigid Pavement: Model 777-200



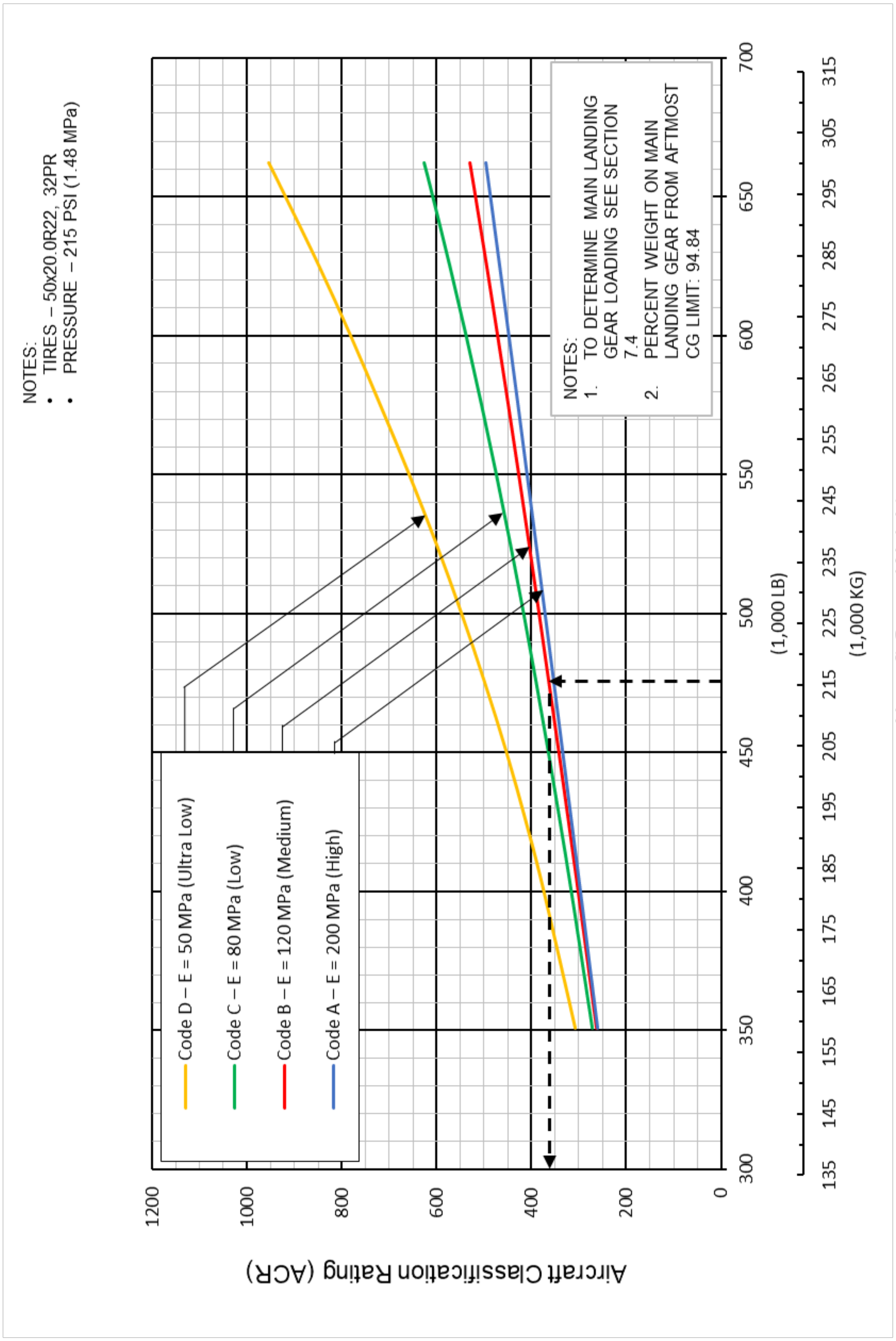
7.11.3 Aircraft Classification Rating - Flexible Pavement: Model 777-200ER



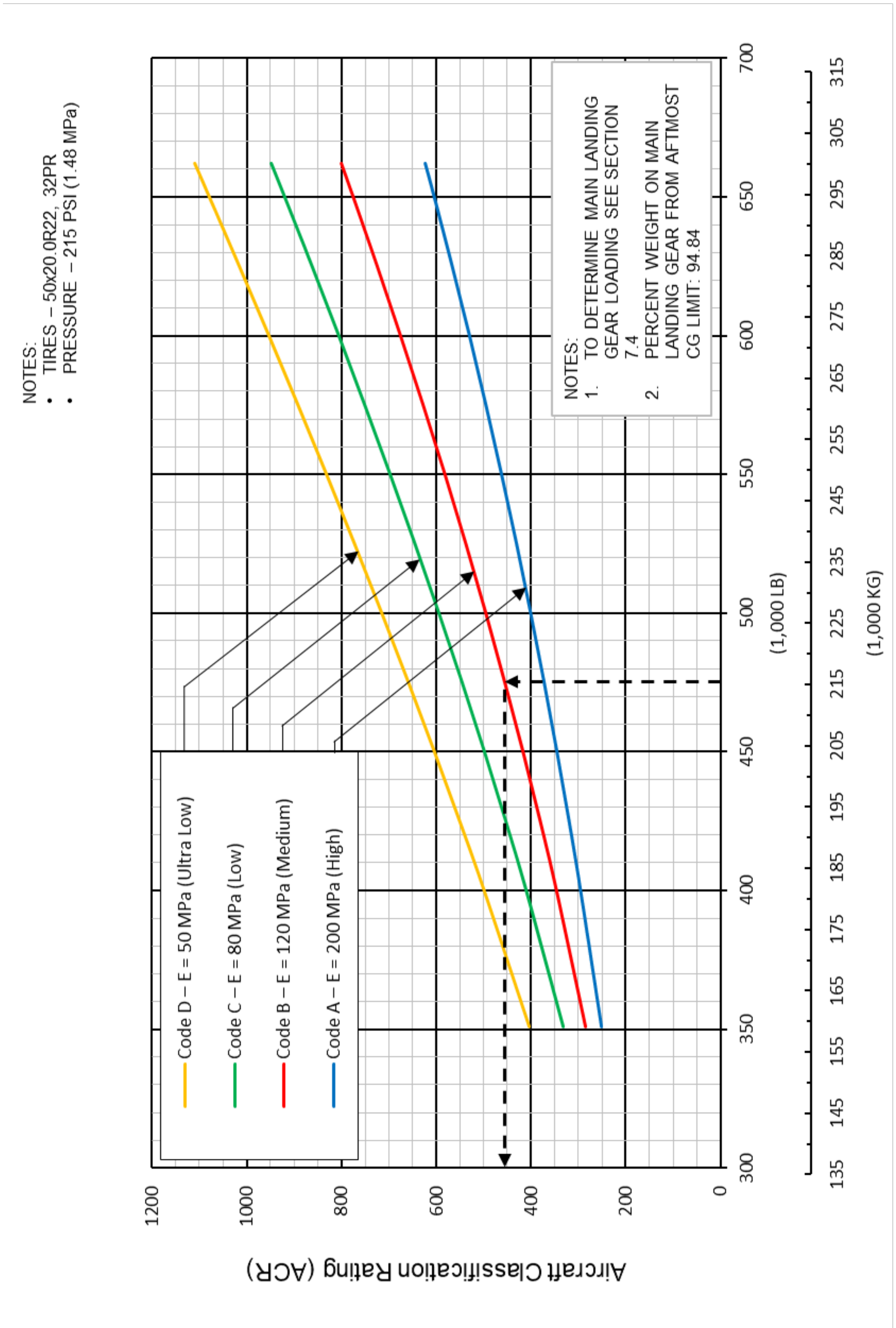
7.11.4 Aircraft Classification Rating - Rigid Pavement: Model 777-200ER



7.11.5 Aircraft Classification Rating - Flexible Pavement: Model 777-300



7.11.6 Aircraft Classification Rating - Rigid Pavement: Model 777-300



8.0 FUTURE MODEL 777 DERIVATIVE AIRPLANES

Several derivatives are being studied to provide additional capabilities of the 777 family of airplanes. Future growth versions could require additional passenger capacity or increased range or both. Whether these growth versions could be built would depend entirely on airline requirements. In any event, impact on airport facilities will be a consideration in the configuration and design.

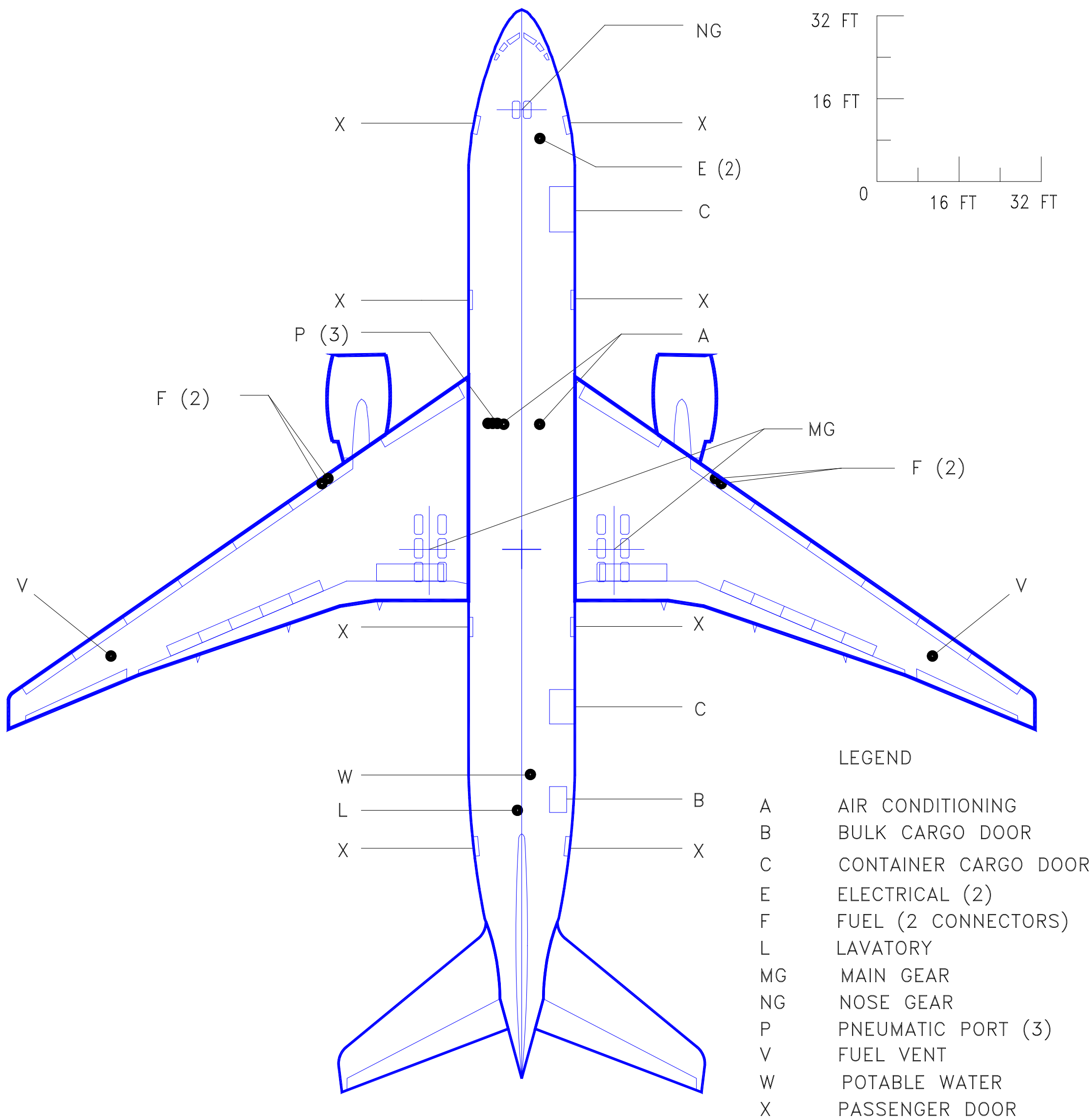
9.0 SCALED MODEL 777 DRAWINGS

The drawings in the following pages show airplane plan view drawings, drawn to approximate scale as noted. The drawings may not come out to exact scale when printed or copied from this document. Printing scale should be adjusted when attempting to reproduce these drawings. Three-view drawing files of the 777 airplane models, along with other Boeing airplane models, can be downloaded from the following website:

http://www.boeing.com/airports

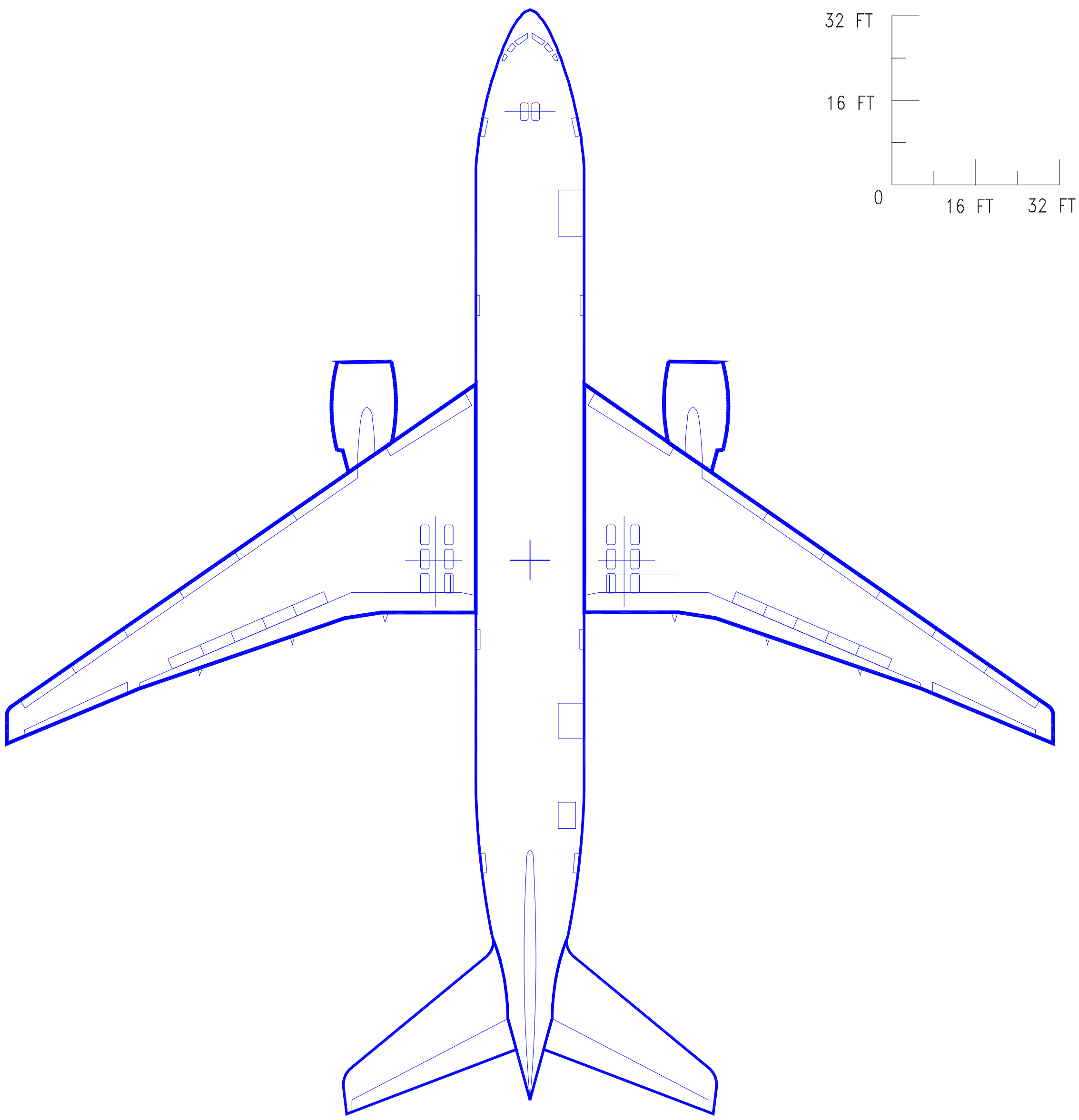
9.1 MODEL 777-200

9.1.1 Scaled Drawings – 1 IN. = 32 FT: Model 777-200



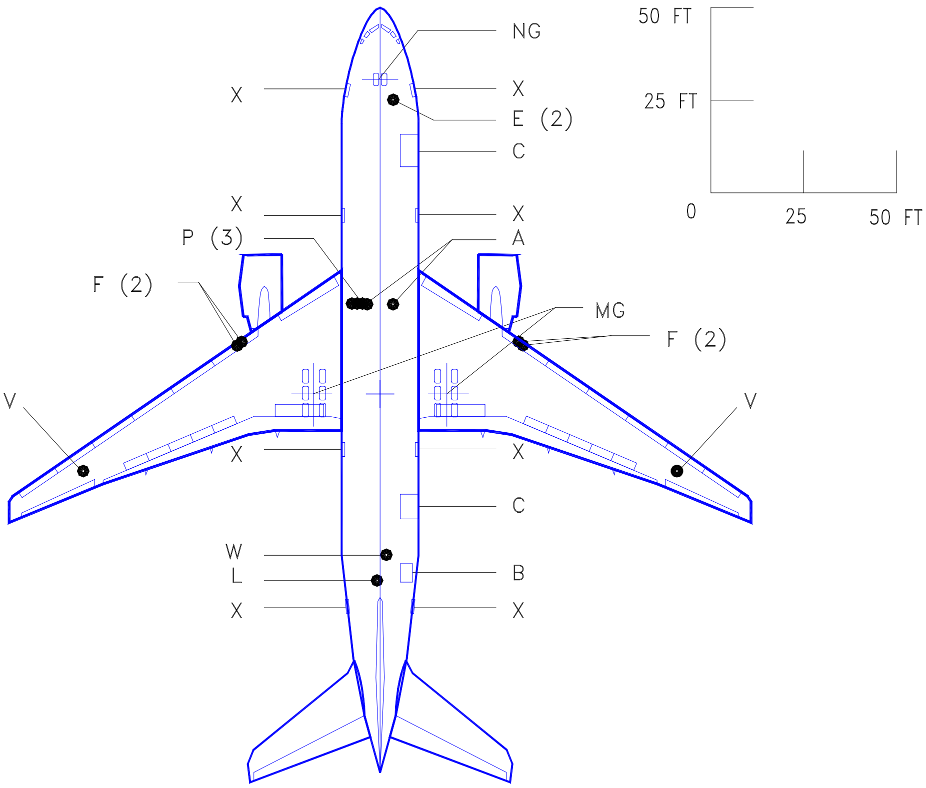
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.2 Scaled Drawings – 1 IN. = 32 FT: Model 777-200



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.3 Scaled Drawings – 1 IN. = 50 FT: Model 777-200

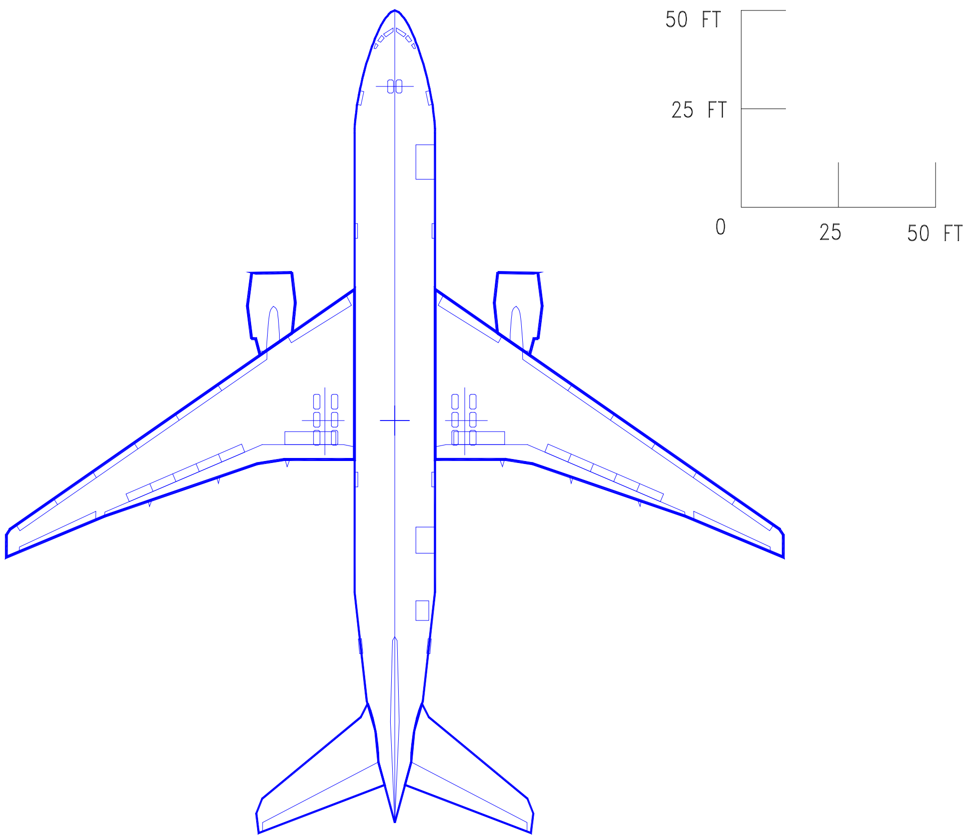


LEGEND

A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

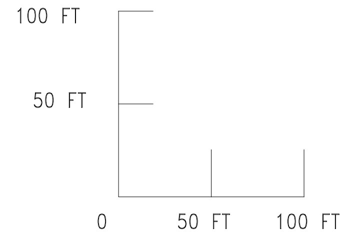
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

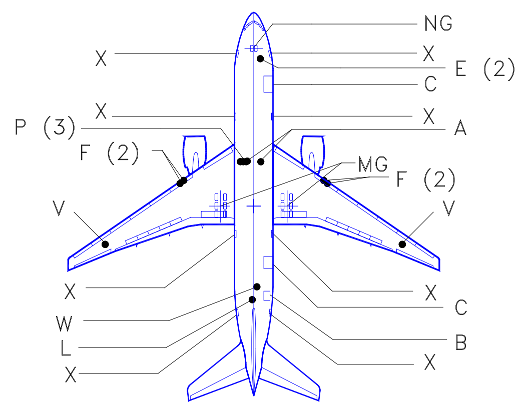
9.1.4 Scaled Drawings – 1 IN. = 50 FT: Model 777-200



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.5 Scaled Drawings – 1 IN. = 100 FT: Model 777-200



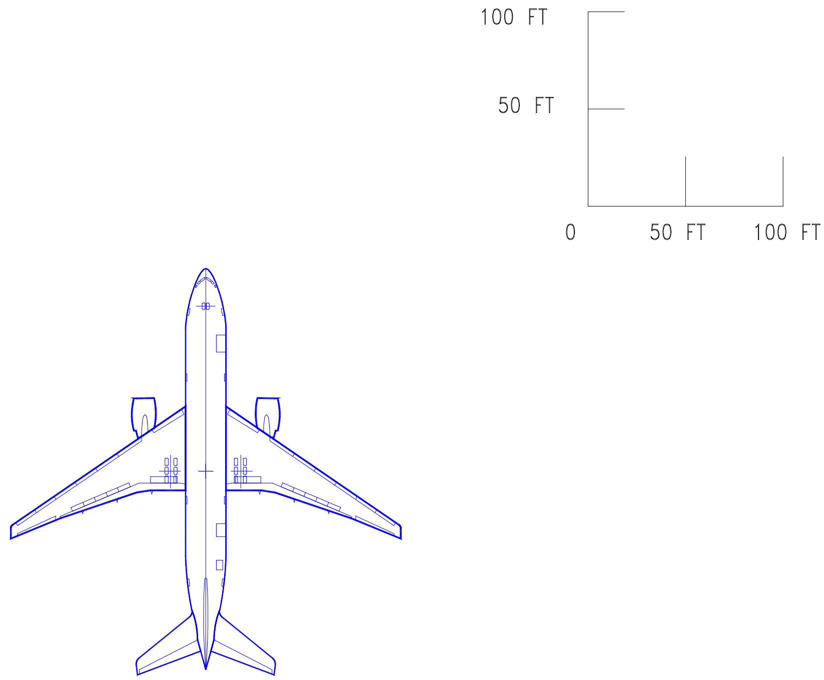


LEGEND

A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

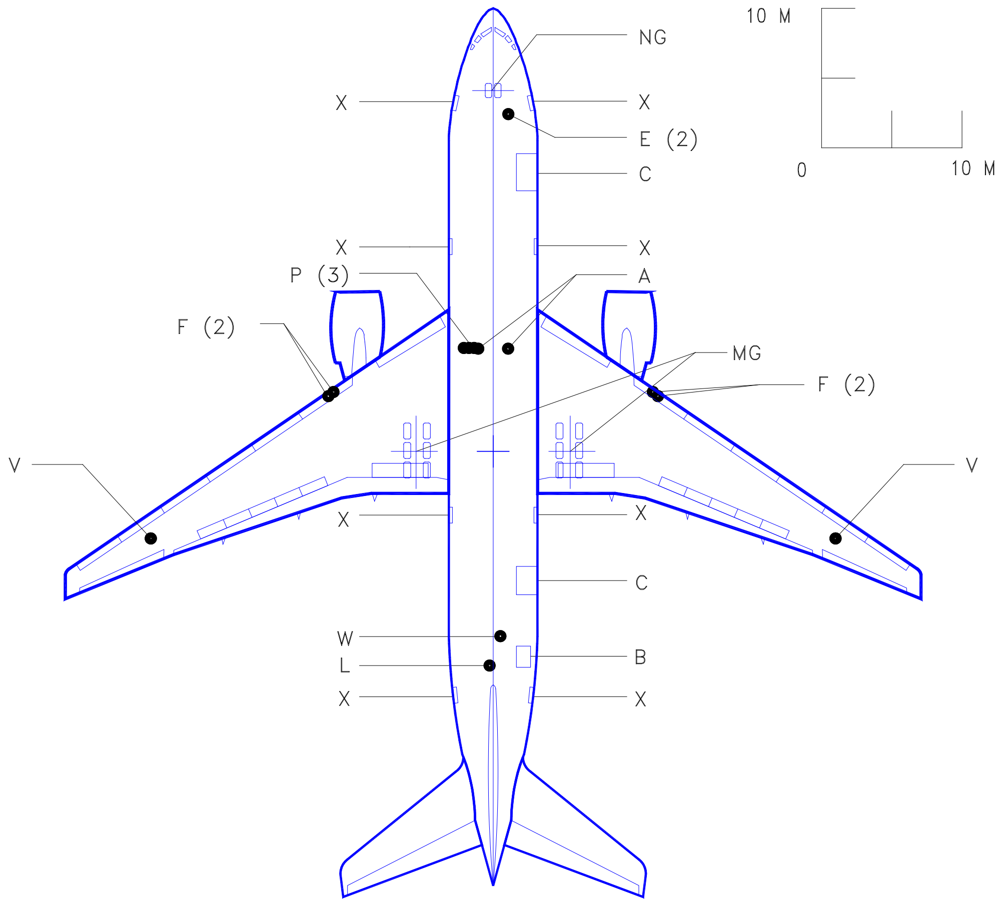
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.6 Scaled Drawings – 1 IN. = 100 FT: Model 777-200



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.7 Scaled Drawings – 1:500: Model 777-200

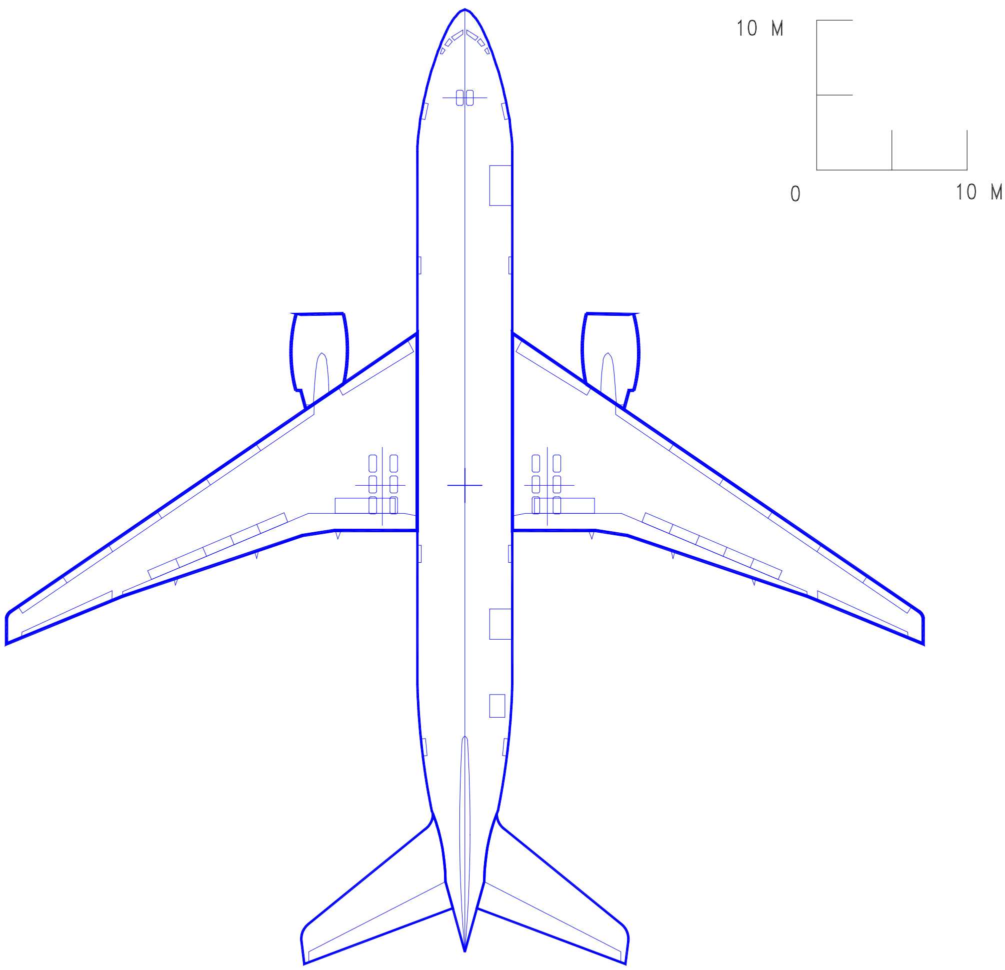


LEGEND

A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

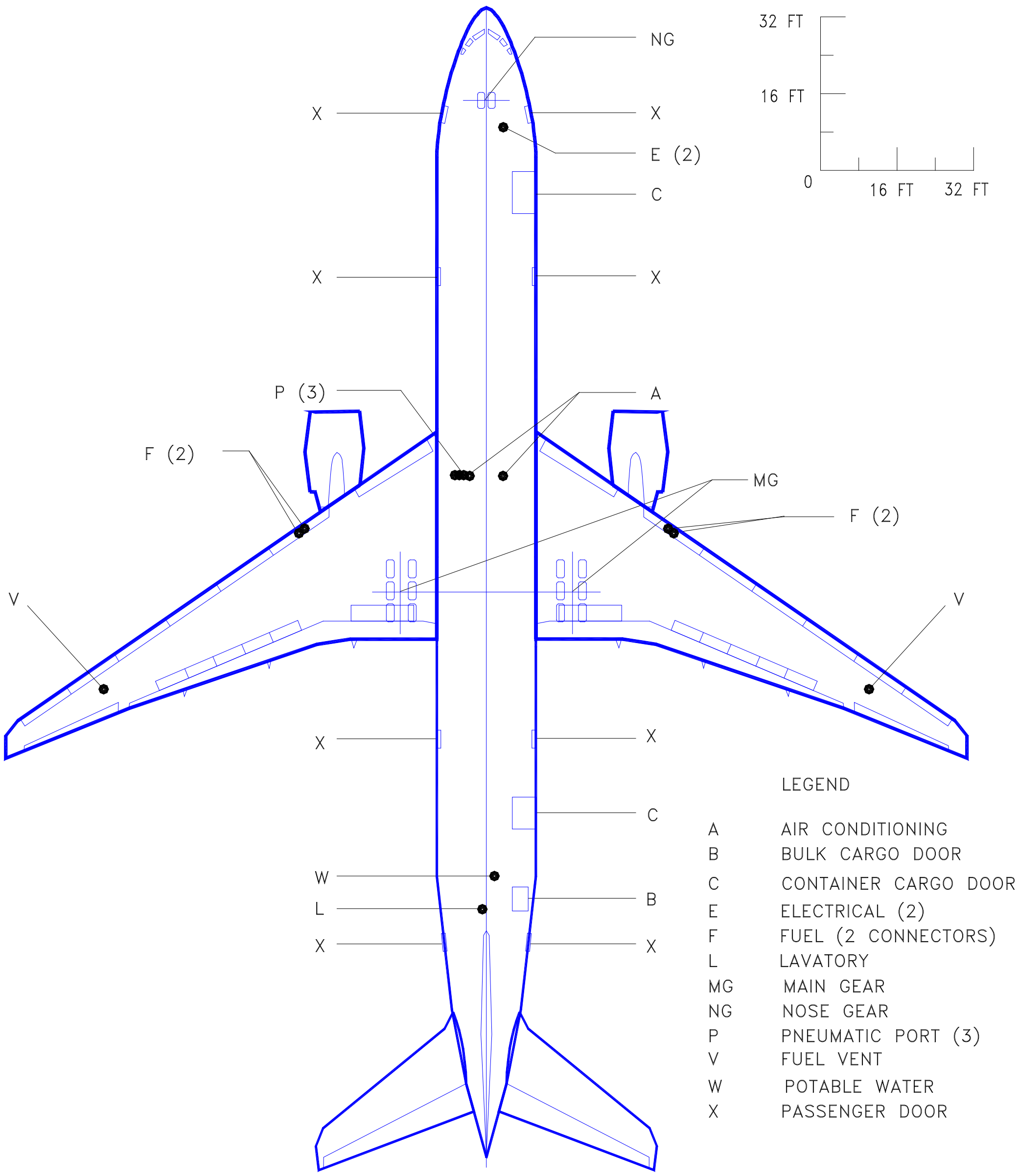
9.1.8 Scaled Drawings – 1:500: Model 777-200



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

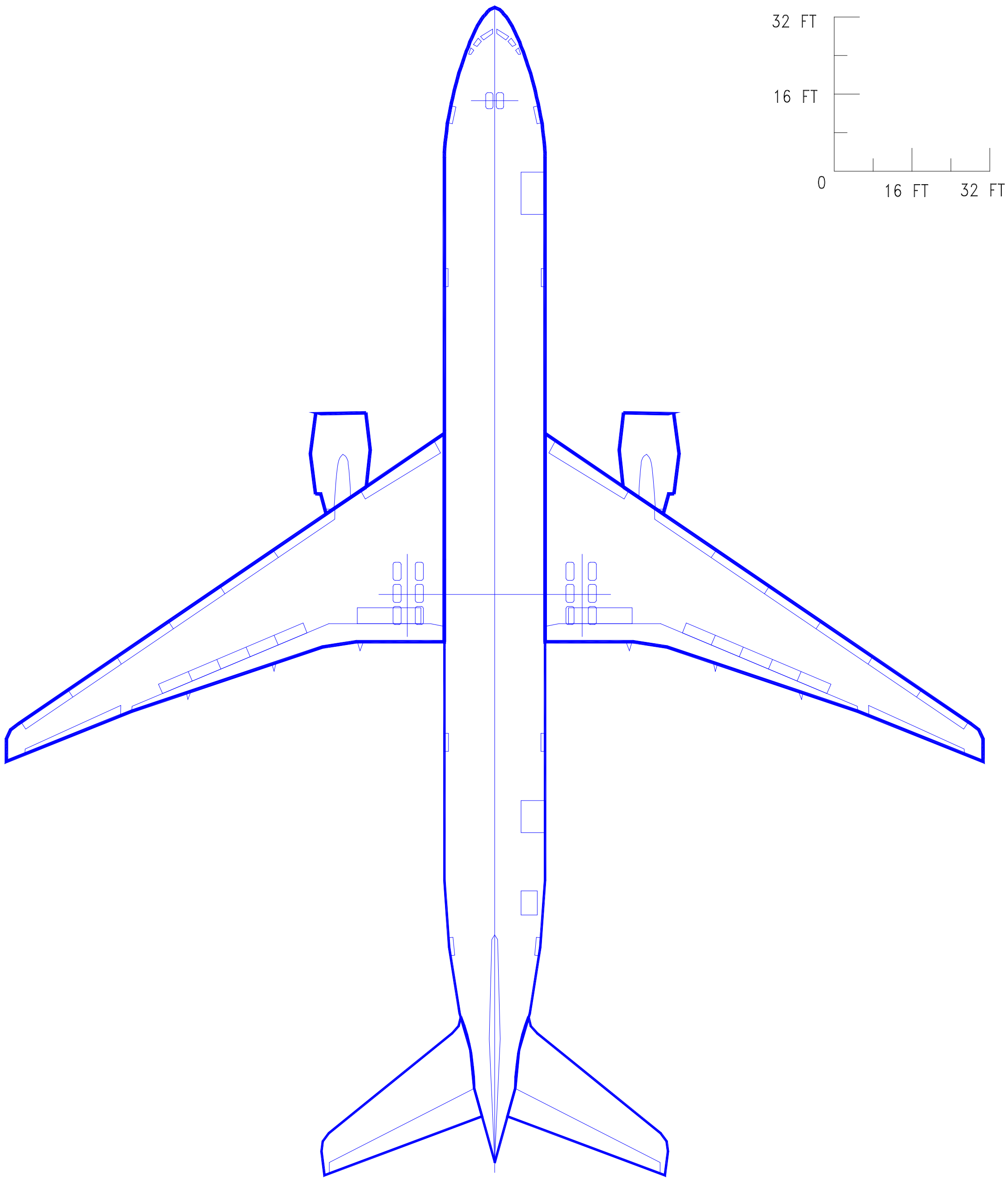
9.2 MODEL 777-300

9.2.1 Scaled Drawings – 1 IN. = 32 FT: Model 777-300



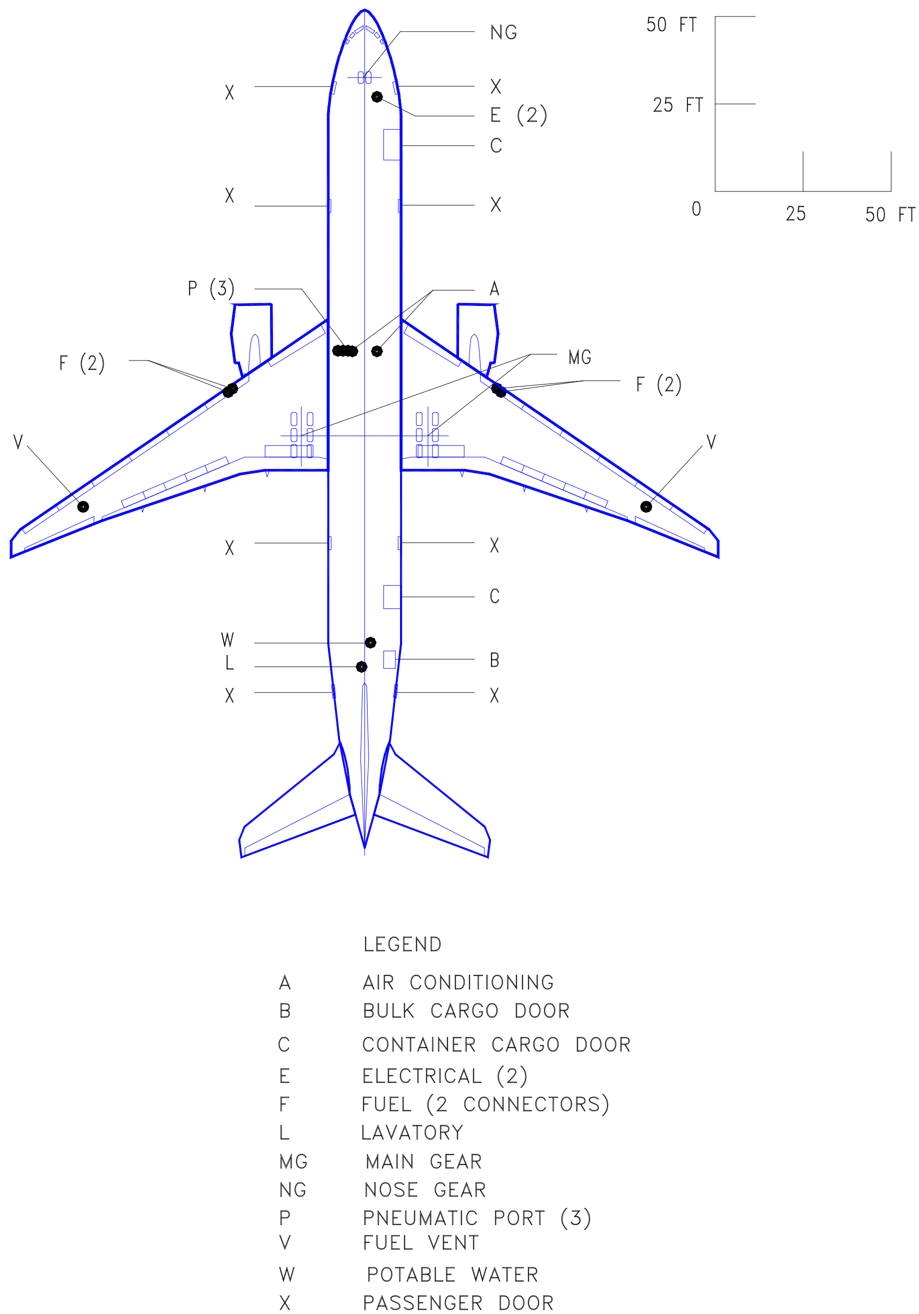
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.2 Scaled Drawings – 1 IN. = 32 FT: Model 777-300



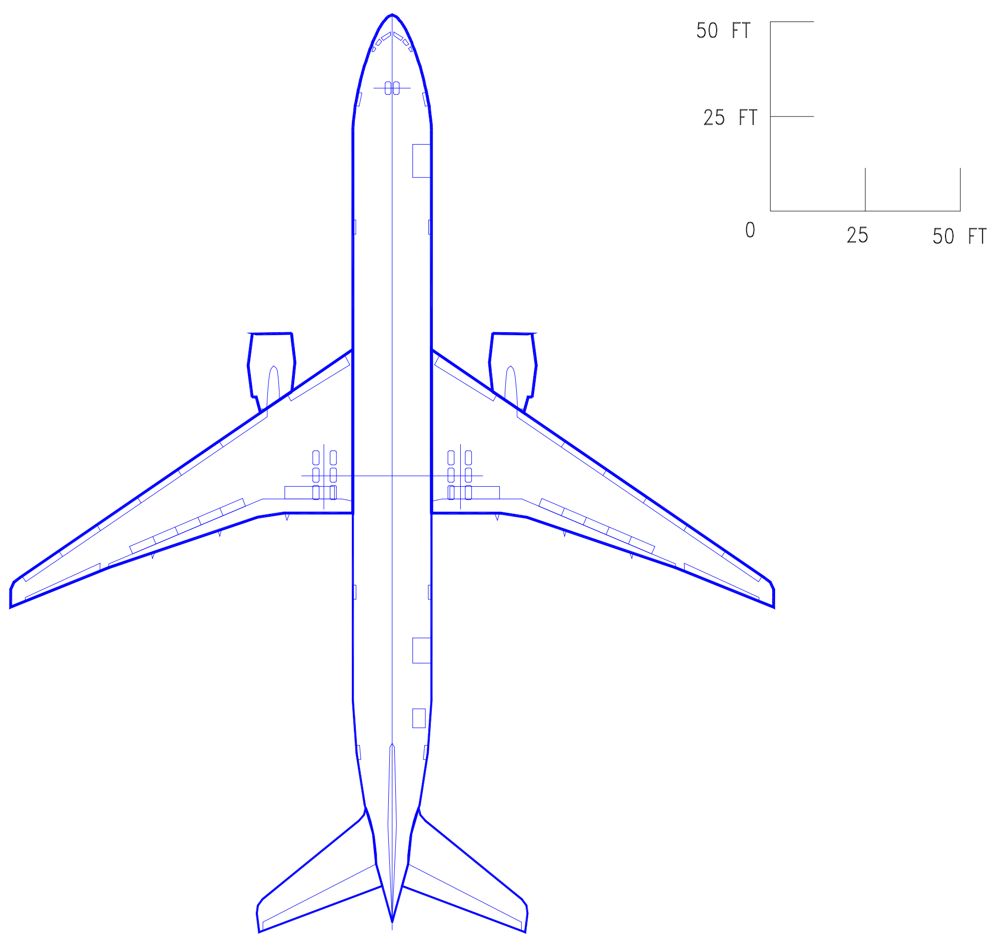
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.3 Scaled Drawings – 1 IN. = 50 FT: Model 777-300



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.4 Scaled Drawings – 1 IN. = 50 FT: Model 777-300



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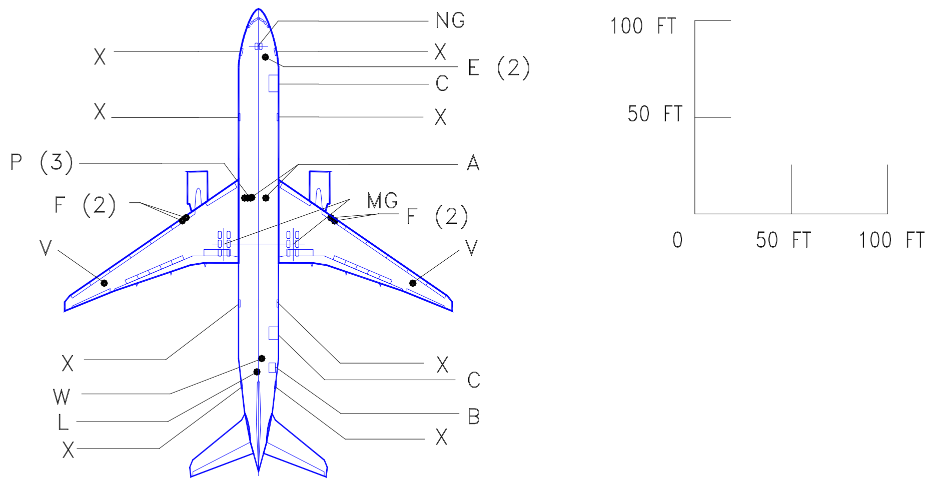
9.2.5 Scaled Drawings – 1 IN. = 100 FT: Model 777-300

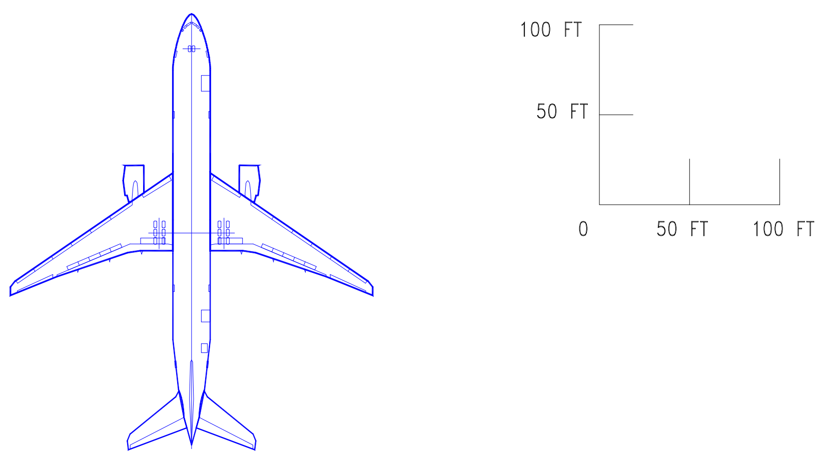


LEGEND

A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.6 Scaled Drawings – 1 IN. = 100 FT: Model 777-300



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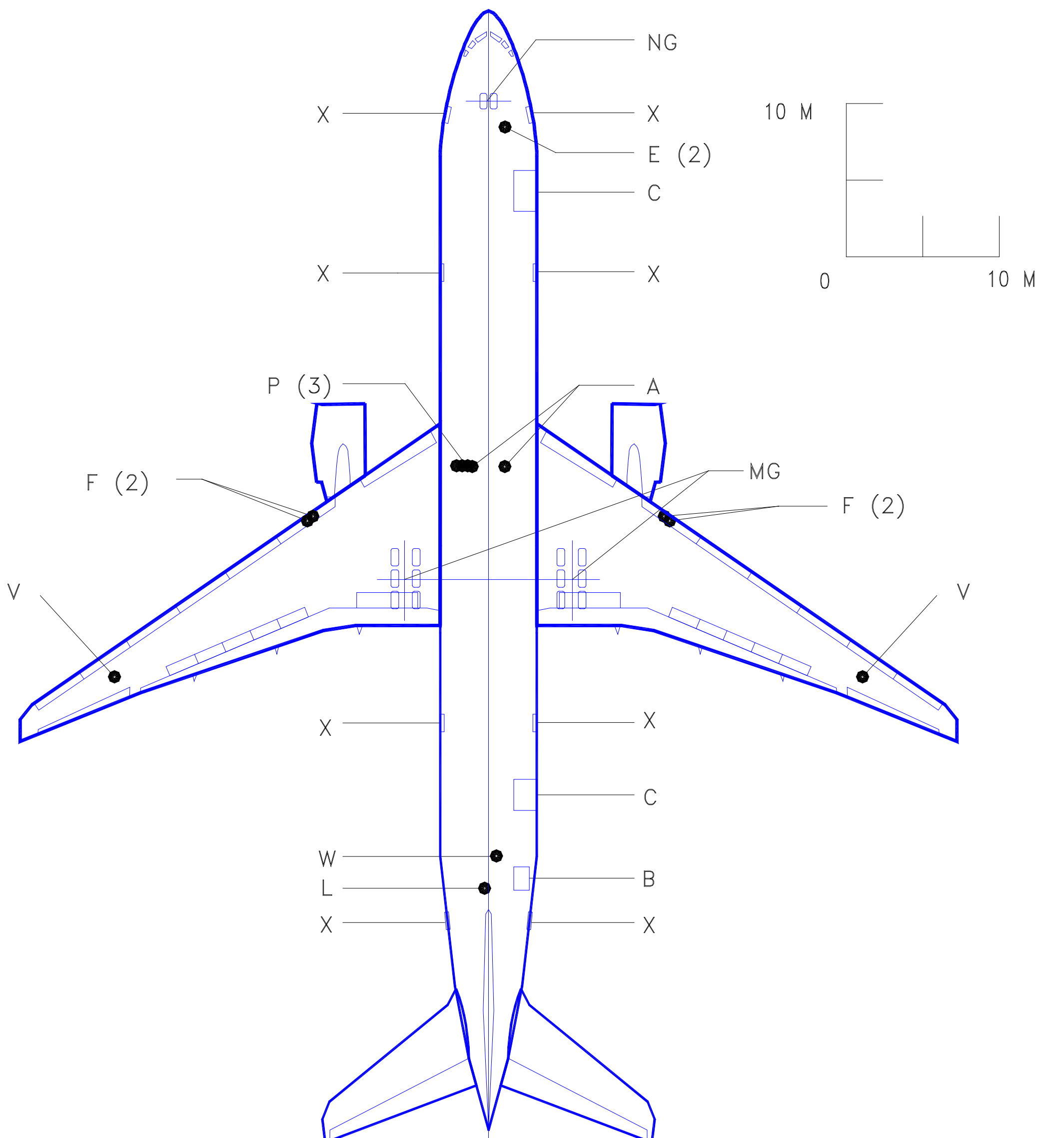
9.2.7 Scaled Drawings – 1:500: Model 777-300

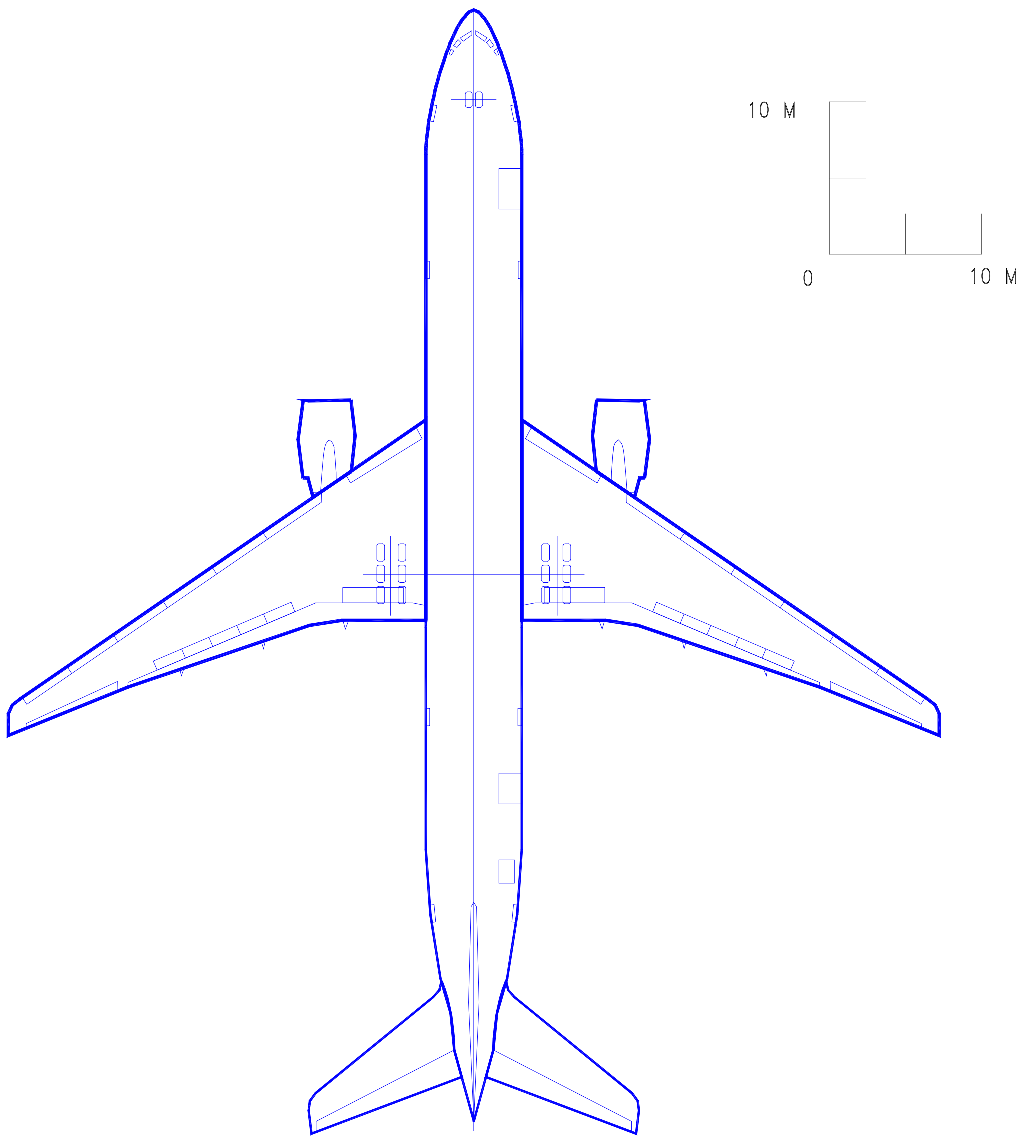


LEGEND

A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.8 Scaled Drawings – 1:500: Model 777-300



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