777-200LR/-300ER

Airplane Characteristics for

Airport Planning

Boeing Commercial Airplanes

D6-58329-2

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1.1 Scope

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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
- Air Transport Association of America
- International Air Transport Association

The airport planner may also want to consider the information presented by the International Industry Working Group, in the "Commercial Aircraft Design Characteristics – Trends and Growth Projections," available from the US AIA, 1250 Eye St., Washington DC 20005, or at www.boeing.com/airports for long-range planning needs. This document is updated periodically and represents the coordinated efforts of the following organizations regarding future aircraft growth trends:

- International Coordinating Council of Aerospace Industries Associations
- Airports Council International - North American and World Organizations
- Air Transport Association of America
- International Air Transport Association

1.2 Introduction

This document conforms to NAS 3601. It provides characteristics of the Boeing Model 777-200LR and 777-300ER 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
P.O. Box 3707
Seattle, Washington 98124-2207
U.S.A.

Attention: Manager, Airport Technology
Mail Code 67-KR

1.3 A Brief Description of the 777 Family of Airplanes

777-200/-200ER Airplane

The 777-200/-200ER 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

777-200LR Airplane

The 777-200LR is a derivative of the 777-200 airplane and is equipped with raked wingtips to provide additional cruise altitude and range. It is powered by high bypass ratio engines that develop higher thrusts than those used in the 777-200/-200ER airplanes. The 777-200LR has an identical fuselage as the 777-200/-200ER but has a wider wingspan due to raked wingtips.

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.

777-300ER Airplane

The 777-300ER is a derivative of the 777-300 airplane and is equipped with raked wingtips for additional cruise altidude and range. It is powered by high bypass ratio engines that develop higher thrusts than those used in the 777-200/-200ER/-300 airplanes. The 777-300ER has an identical fuselage as the 777-300, but has a wider wingspan due to the raked wingtips.

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 MFR	MODEL	THRUST	MAX TAXI WEIGHT (LB)			
			777-200/ER	777-300	777-200LR	777-300ER
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	-	-
	GE90-110B	110,000 LB	-	-	768,800	-
	GE90-110B1	110,000 LB	-	-	768,800	-
	GE90-115B1	115,300 LB	-	-	768,800	777,000
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	-	-

Document Applicability

This document contains data pertinent to the 777-200LR and 777-300ER.

Data for the 777-200, 777-200ER, and 777-300 airplanes are contained in document D6-58329.

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2.0 AIRPLANE DESCRIPTION

2.1 General Characteristics

2.2 General Dimensions

2.3 Ground Clearances

2.4 Interior Arrangements

2.5 Cabin Cross Sections

2.6 Lower Cargo Compartments

2.7 Door Clearances

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 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.)

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

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.

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 Structural 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.

CHARACTERISTICS	UNITS	777-200LR	
MAX DESIGN TAXI WEIGHT	POUNDS	768,800	768,800
	KILOGRAMS	348,721	348,721
MAX DESIGN TAKEOFF WEIGHT	POUNDS	766,800	766,800
	KILOGRAMS	347,814	347,814
MAX DESIGN LANDING WEIGHT	POUNDS	492,000	492,000
	KILOGRAMS	223,167	223,167
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	461,000	461,000
	KILOGRAMS	209,106	209,106
OPERATING EMPTY WEIGHT (1)	POUNDS	320,000	320,000
	KILOGRAMS	145,149	145,149
MAX STRUCTURAL PAYLOAD	POUNDS	141,000	141,000
	KILOGRAMS	63,956	63,956
TYPICAL SEATING CAPACITY	TWO-CLASS	279 - 42 FIRST + 237 ECONOMY	
	THREE-CLASS	301 - 16 FIRST + 58 BUSINESS + 227 ECONOMY	
MAX CARGO - LOWER DECK	CUBIC FEET	5,656(2)	4,708(3)
	CUBIC METERS	160.2 (2)	133.3 (3)
USABLE FUEL	US GALLONS	47,890	53,440 (3)
	LITERS	181,264	202,270 (3)
	POUNDS	320,863	358,048 (3)
	KILOGRAMS	145,541	162,408 (3)

NOTES: (1) APPROXIMATE SPEC OPERATING WEIGHT FOR A TYPICAL THREE-CLASS CONFIGURATION. 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

(3) INCLUDES OPTIONAL 3 X 1,850-US GAL BODY TANKS IN AFT CARGO COMPARTMENT. AFT CARGO COMPARTMENT CAPACITY REDUCED TO 8 LD3'S AT 158 CU FT EACH.

2.1.1 GENERAL CHARACTERISTICS
MODEL 777-200LR

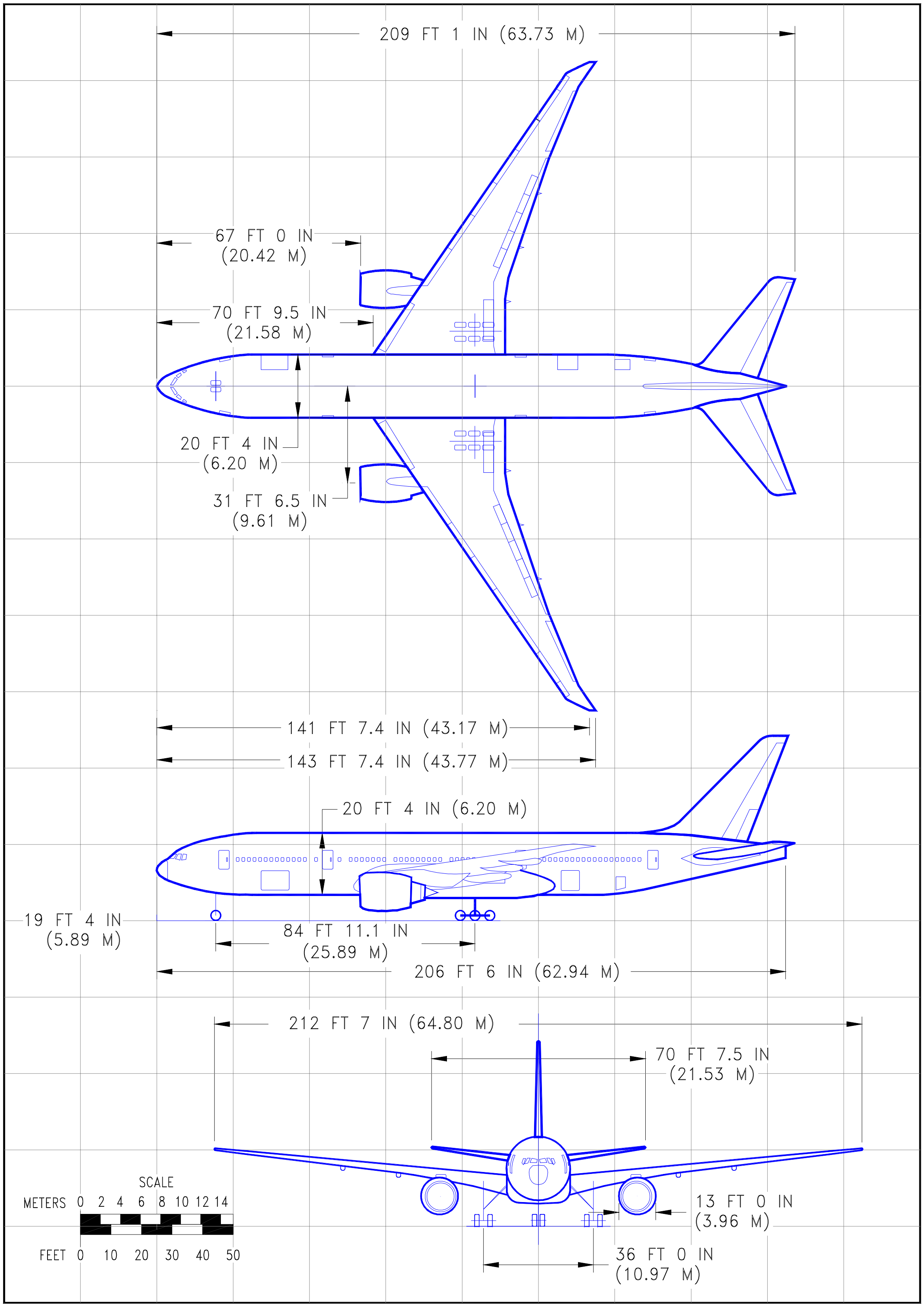
CHARACTERISTICS	UNITS	777-300ER	
MAX DESIGN TAXI WEIGHT	POUNDS	762,700	777,000
	KILOGRAMS	345,954	352,441
MAX DESIGN TAKEOFF WEIGHT	POUNDS	760,700	775,000
	KILOGRAMS	345,047	351,533
MAX DESIGN LANDING WEIGHT	POUNDS	554,000	554,000
	KILOGRAMS	251,290	251,290
MAX DESIGN ZERO FUEL WEIGHT	POUNDS	524,000	524,000
	KILOGRAMS	237,682	237,682
OPERATING EMPTY WEIGHT (1)	POUNDS	370,000	370,000
	KILOGRAMS	167,829	167,829
MAX STRUCTURAL PAYLOAD	POUNDS	154,000	154,000
	KILOGRAMS	69,853	69,853
TYPICAL SEATING CAPACITY	TWO-CLASS	339 - 56 FIRST + 283 ECONOMY	
	THREE-CLASS	370 - 12 FIRST + 42 BUSINESS + 316 ECONOMY	
MAX CARGO - LOWER DECK	CUBIC FEET	7,552 (2)	7,552 (2)
	CUBIC METERS	213.9 (2)	213.9 (2)
USABLE FUEL	US GALLONS	47,890	47,890
	LITERS	181,264	181,264
	POUNDS	320,863	320,863
	KILOGRAMS	145,541	145,541

NOTES: (1) APPROXIMATE SPEC OPERATING WEIGHT FOR A TYPICAL THREE-CLASS CONFIGURATION. 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

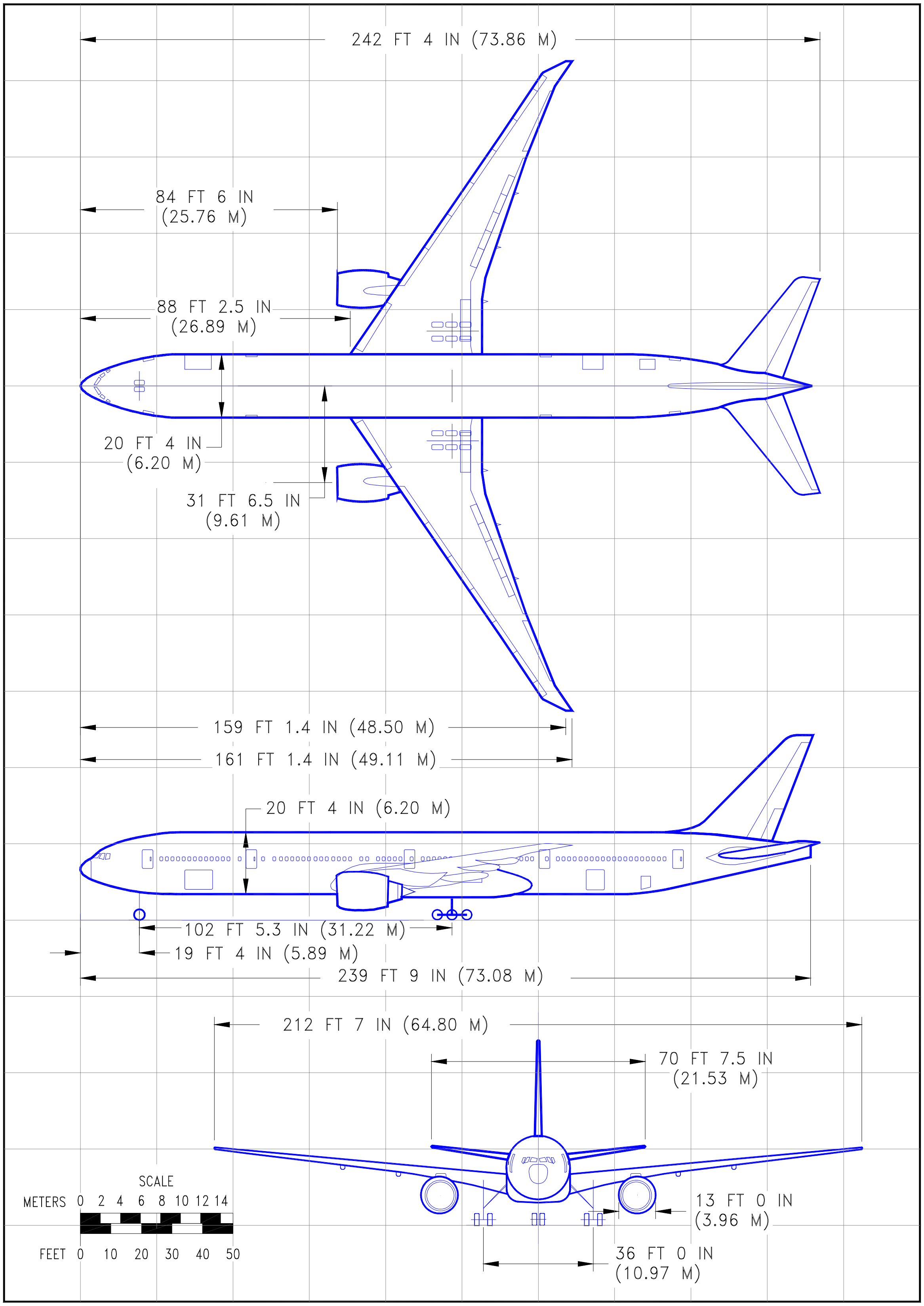
2.1.2 GENERAL CHARACTERISTICS

MODEL 777-300ER



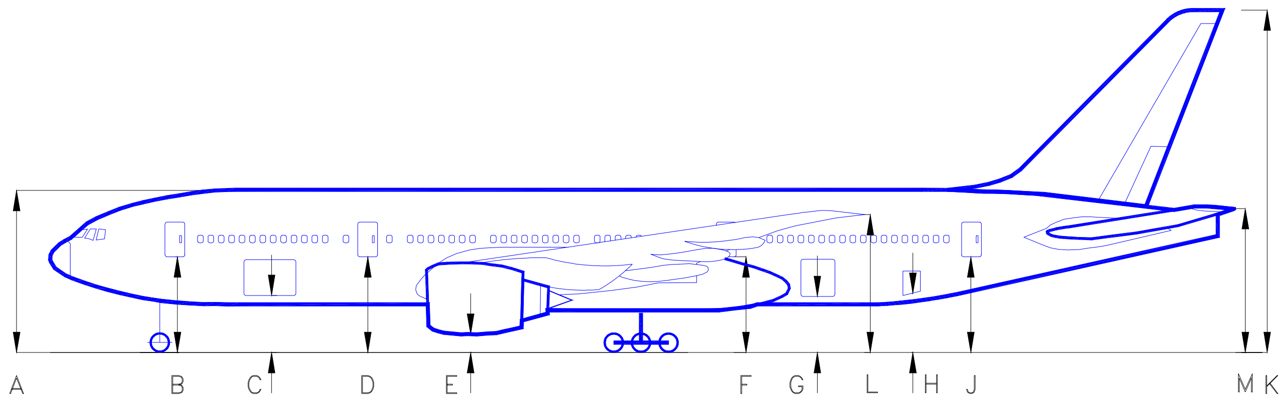
2.2.1 GENERAL DIMENSIONS

MODEL 777-200LR



2.2.2 GENERAL DIMENSIONS

MODEL 777-300ER



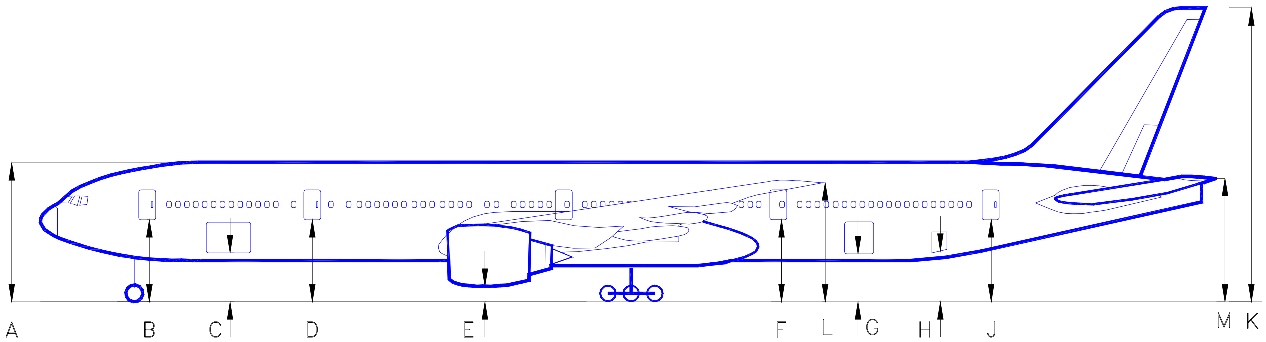
	MINIMUM*		MAXIMUM*	
	FT - INCHES	METERS	FT - INCHES	METERS
A	27 -5	8.36	28 - 7	8.70
B	15 - 5	4.69	16 - 7	5.06
C	9 - 2	2.79	10 - 2	3.11
D	15 - 11	4.85	16 - 10	5.11
E	2 - 6	0.77	3 - 3	0.99
F	16 - 10	5.14	17 - 5	5.30
G(LARGE DOOR)	10 - 7	3.22	11 - 2	3.40
G(SMALL DOOR)	10 - 7	3.22	11 - 2	3.40
H	11 - 2	3.40	11 - 10	3.61
J	17 - 5	5.31	18 - 1	5.52
K	60 - 8	18.48	61 - 6	18.75
L**	23 - 6	7.16	24 - 7	7.49
M	26 – 2	8.06	27 – 5	8.34

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 ROUNDED TO NEAREST INCH AND NEAREST CENTIMETER
** 777-200ER DATA SHOWN. 777-200LR DATA TO BE PROVIDED AT A LATER DATE

2.3.1 GROUND CLEARANCES
MODEL 777-200LR.



	MINIMUM*		MAXIMUM*	
	FEET - INCHES	METERS	FEET - INCHES	METERS
A	27 - 9	8.46	28 - 10	8.78
B	15 - 9	4.80	16 - 10	5.13
C	9 - 5	2.88	10 - 6	3.19
D	16 - 2	4.92	17 - 1	5.20
E	2 - 5	0.75	3 - 3	0.99
F	16 - 9	5.11	17 - 5	5.32
G(LARGE DOOR)	10 - 6	3.19	11 - 9	3.58
G(SMALL DOOR)	10 - 6	3.19	11 - 9	3.58
H	10 - 11	3.32	12 - 4	3.76
J	17 - 0	5.19	18 - 7	5.66
K	59 - 10	18.24	61 - 10	18.85
L	23 - 11	7.29	25 - 11	7.90
M	25 – 7	7.79	27 – 8	8.43

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.

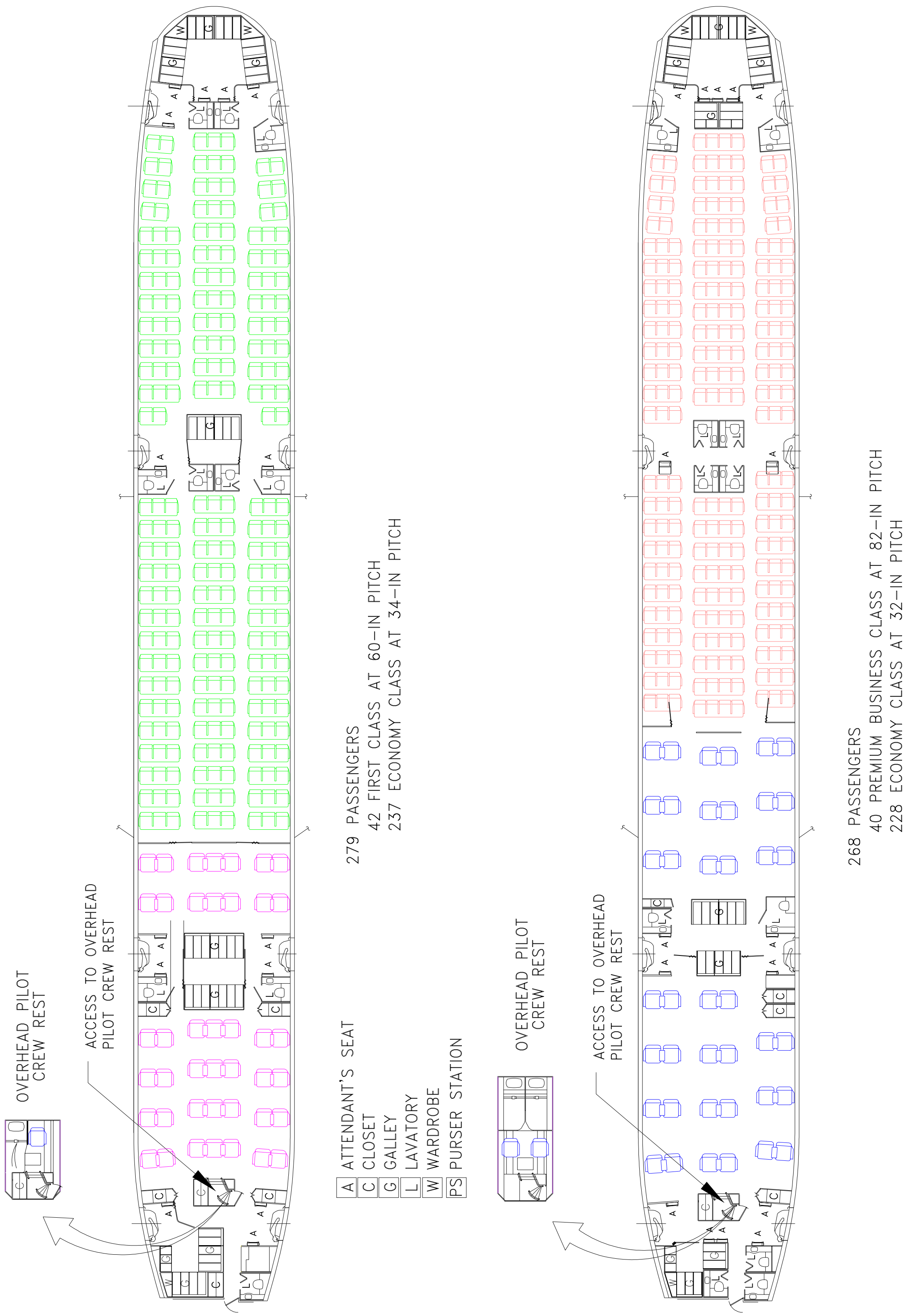
DURING ROUTINE SERVICING, THE AIRPLANE REMAINS RELATIVELY STABLE, PITCH AND ELEVATION CHANGES OCCURRING SLOWLY.

* NOMINAL DIMENSIONS ROUNDED TO NEAREST INCH AND NEAREST CENTIMETER

2.3.2 GROUND CLEARANCES

MODEL 777-300ER.

PRELIMINARY INFORMATION



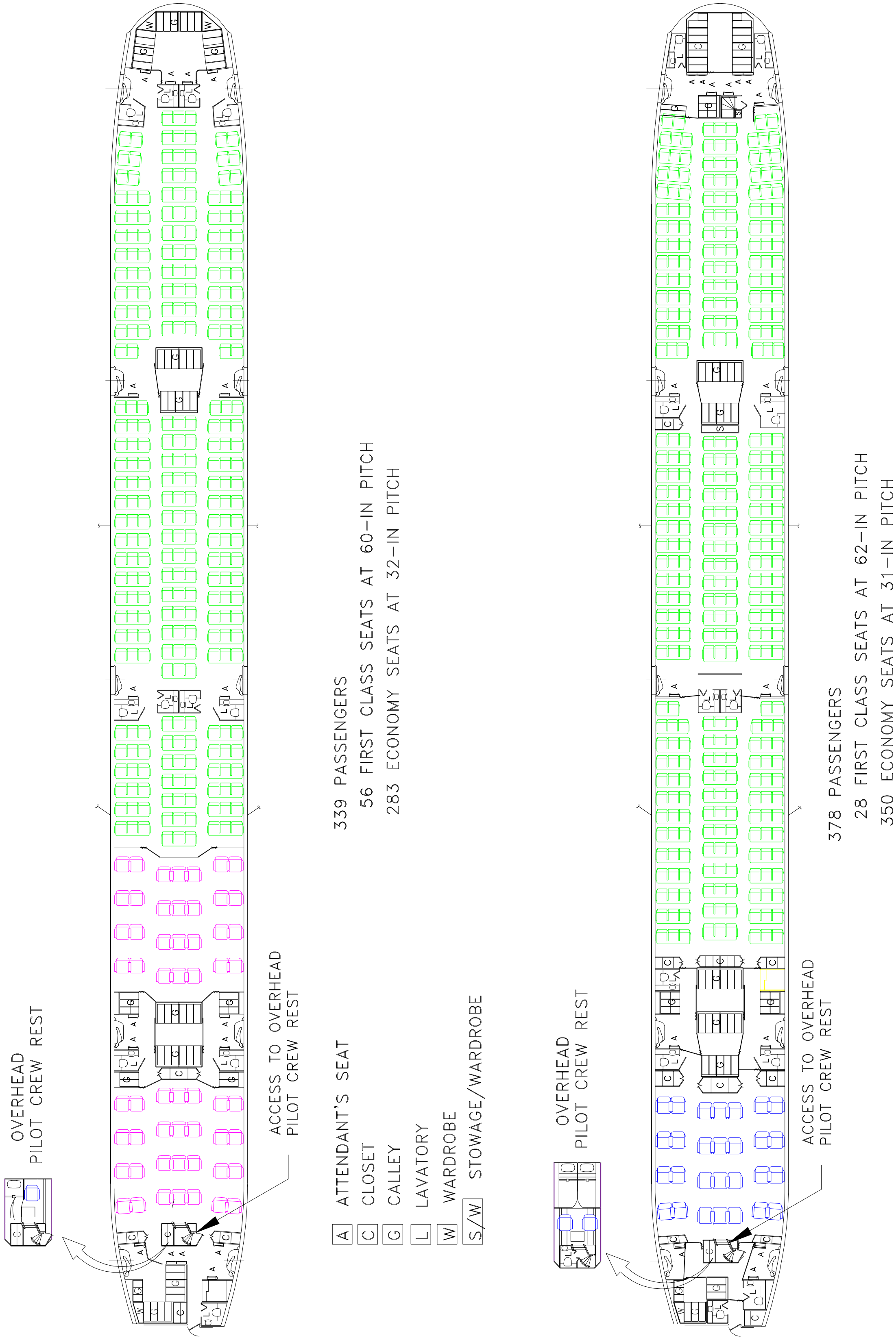
2.4.1 INTERIOR ARRANGEMENTS – TYPICAL TWO-CLASS CONFIGURATIONS

MODEL 777-200LR

PRELIMINARY INFORMATION

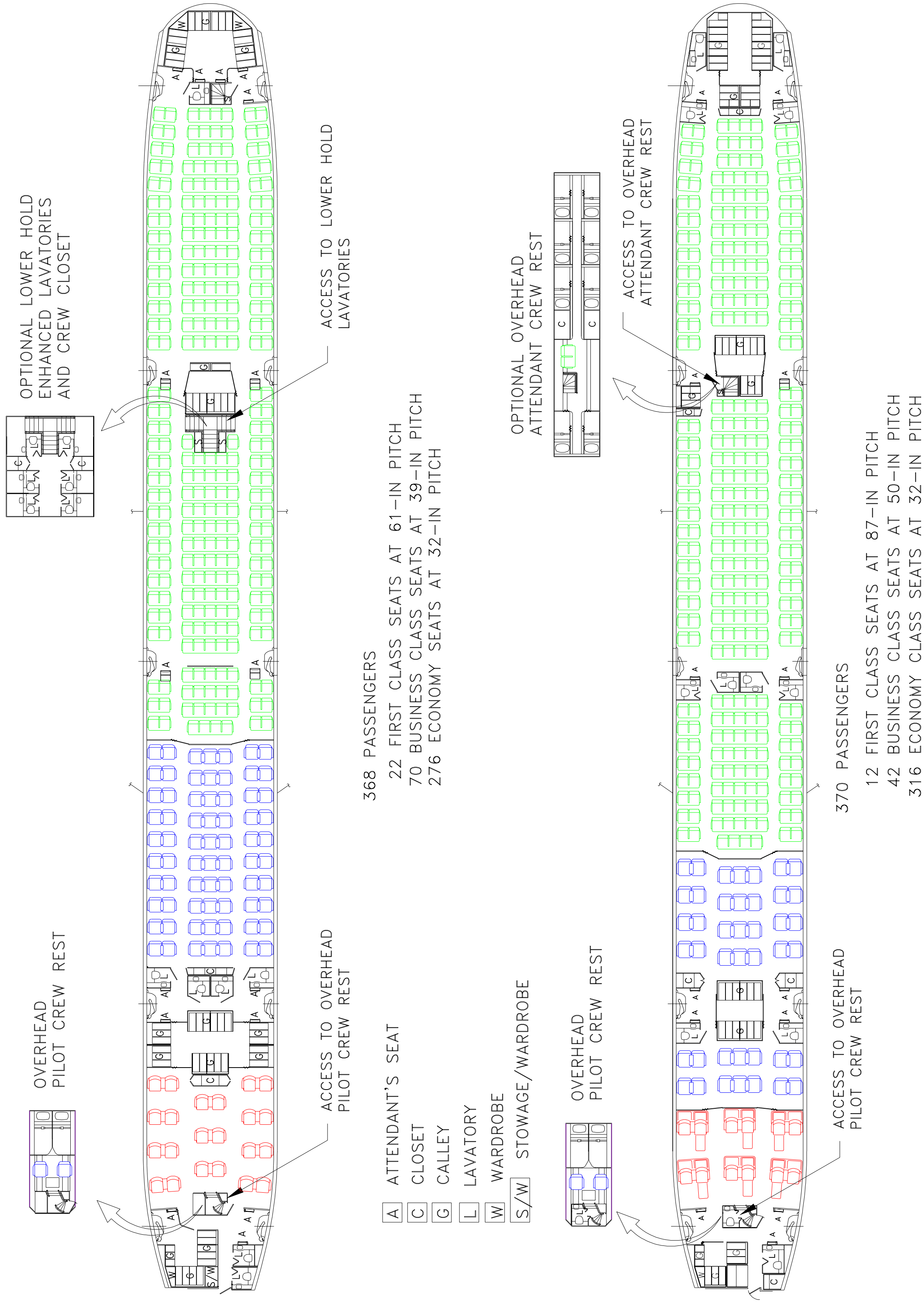
2.4.2 INTERIOR ARRANGEMENTS – TYPICAL THREE-CLASS CONFIGURATIONS

MODEL 777-200LR



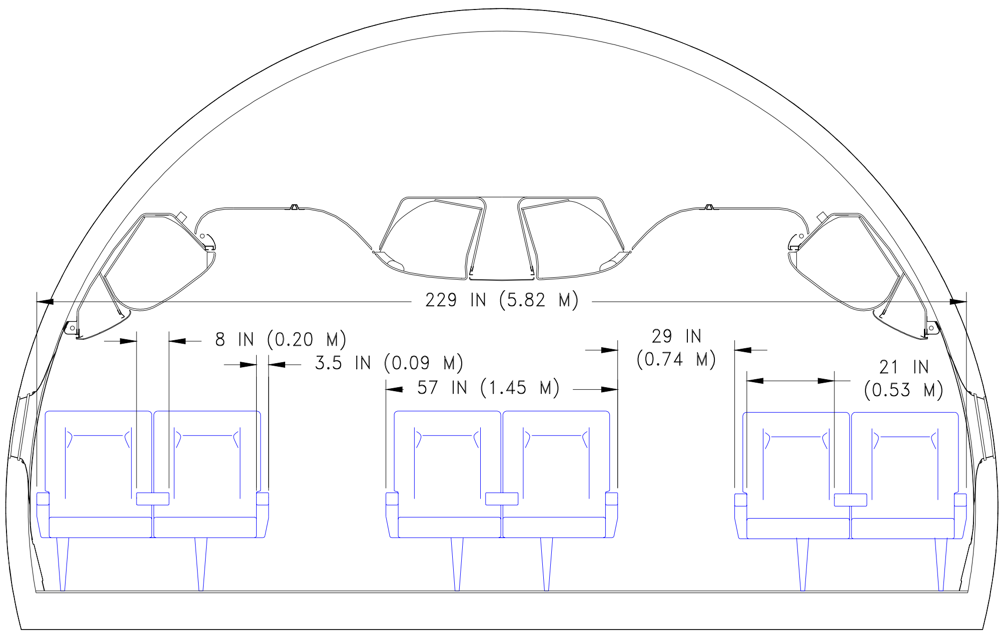
2.4.3 INTERIOR ARRANGEMENTS – TYPICAL TWO-CLASS CONFIGURATIONS

MODEL 777-300ER

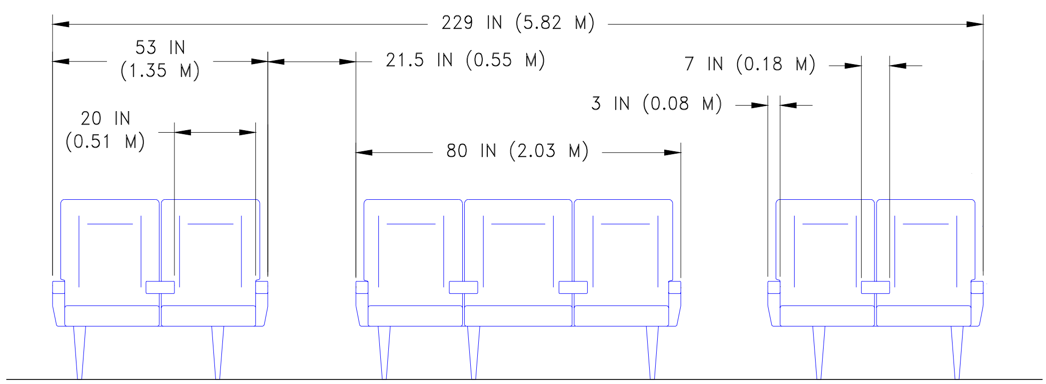


2.4.4 INTERIOR ARRANGEMENTS – TYPICAL THREE-CLASS CONFIGURATIONS

MODEL 777-300ER



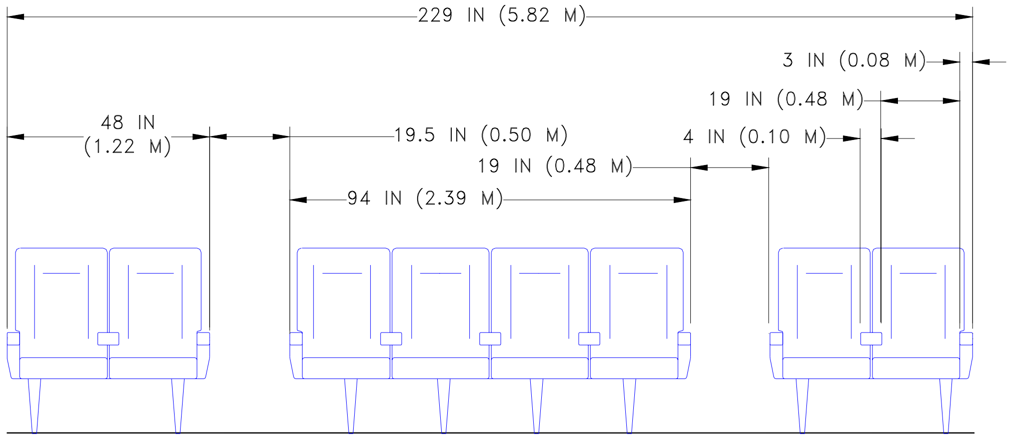
FIRST CLASS SEATING
SIX ABREAST



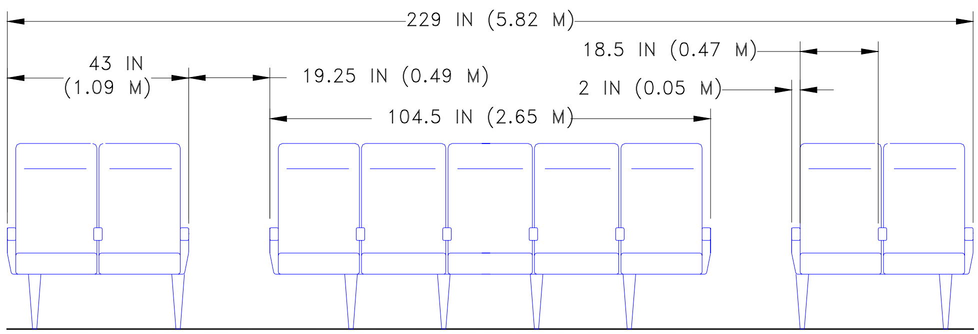
BUSINESS CLASS SEATING
SEVEN–ABREAST

2.5.1 CABIN CROSS-SECTIONS - FIRST AND BUSINESS CLASS SEATS

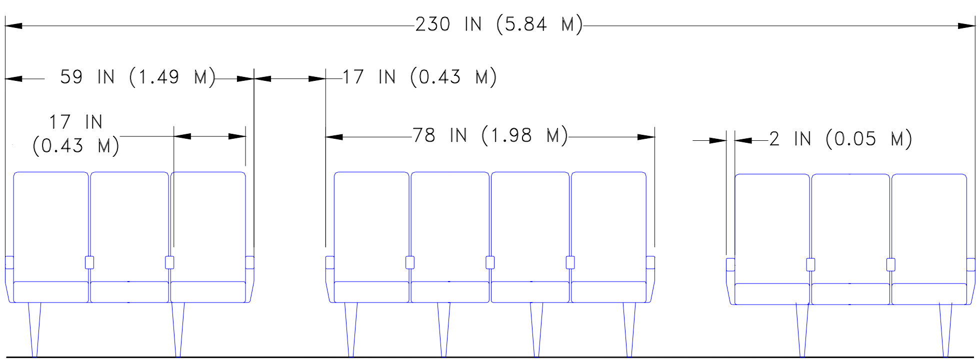
MODEL 777-200LR, -300ER



BUSINESS CLASS SEATING
EIGHT-ABREAST



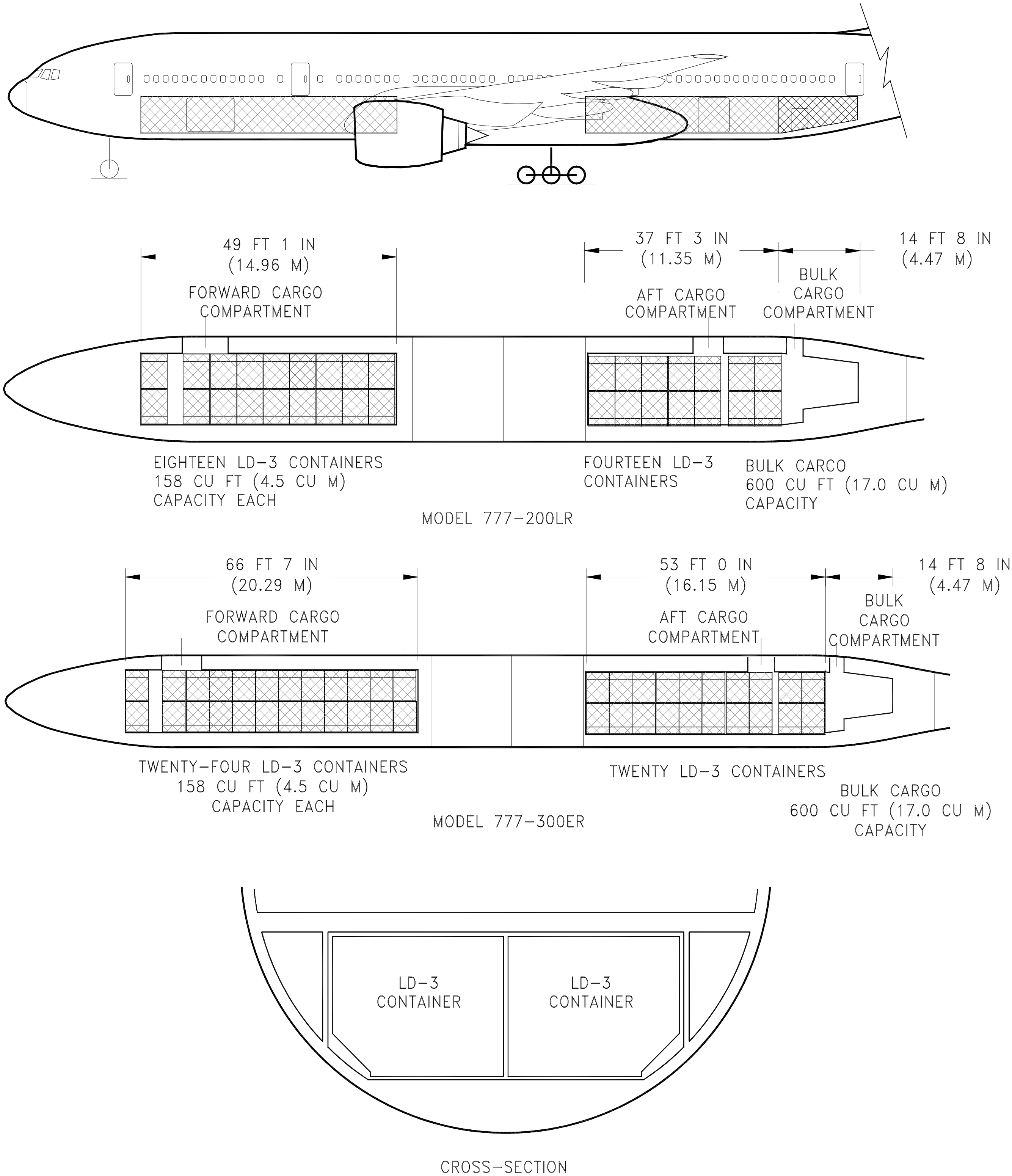
ECONOMY CLASS SEATING
NINE-ABREAST



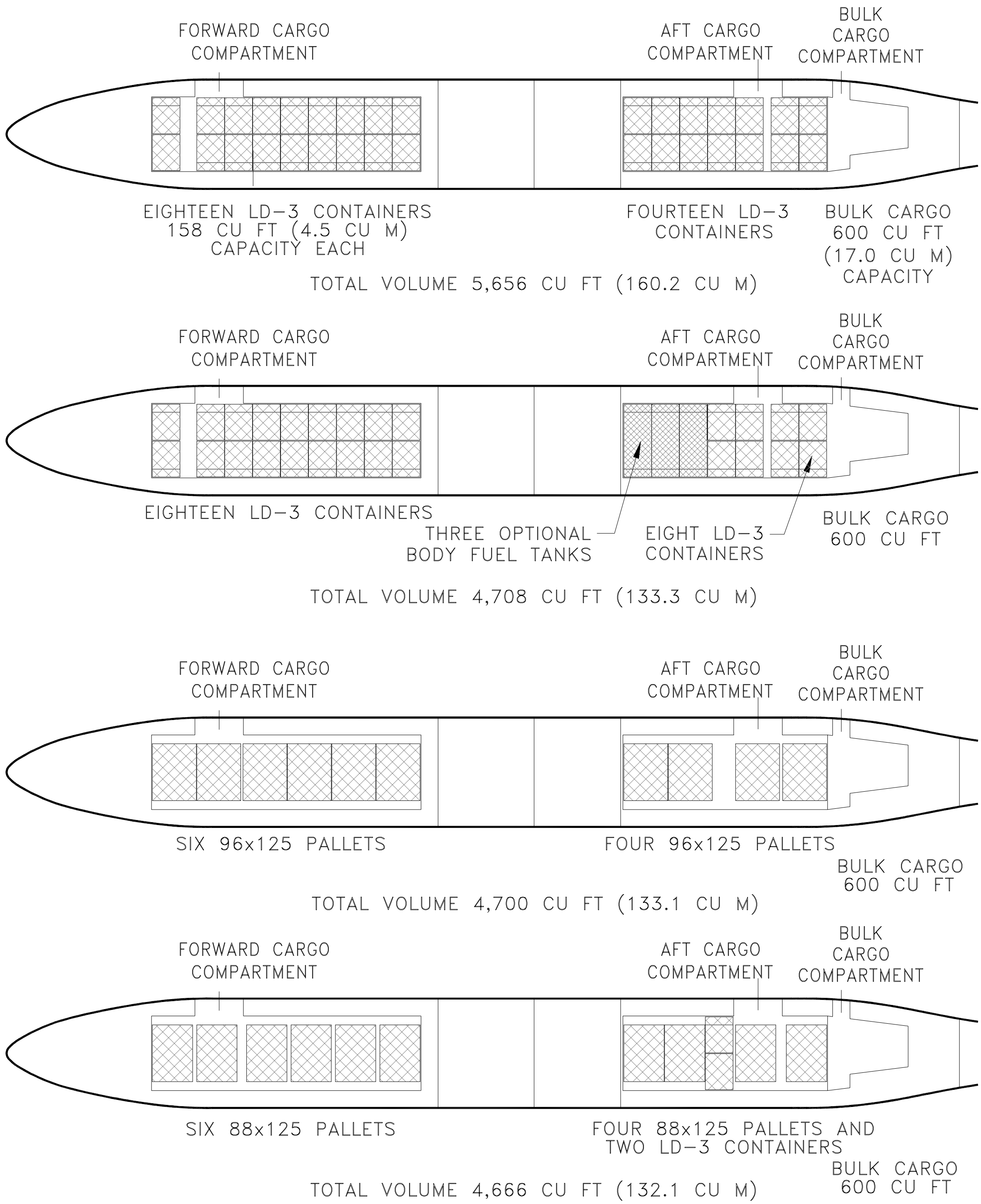
ECONOMY CLASS SEATING
TEN-ABREAST

2.5.2 CABIN CROSS-SECTIONS - BUSINESS AND ECONOMY CLASS SEATS

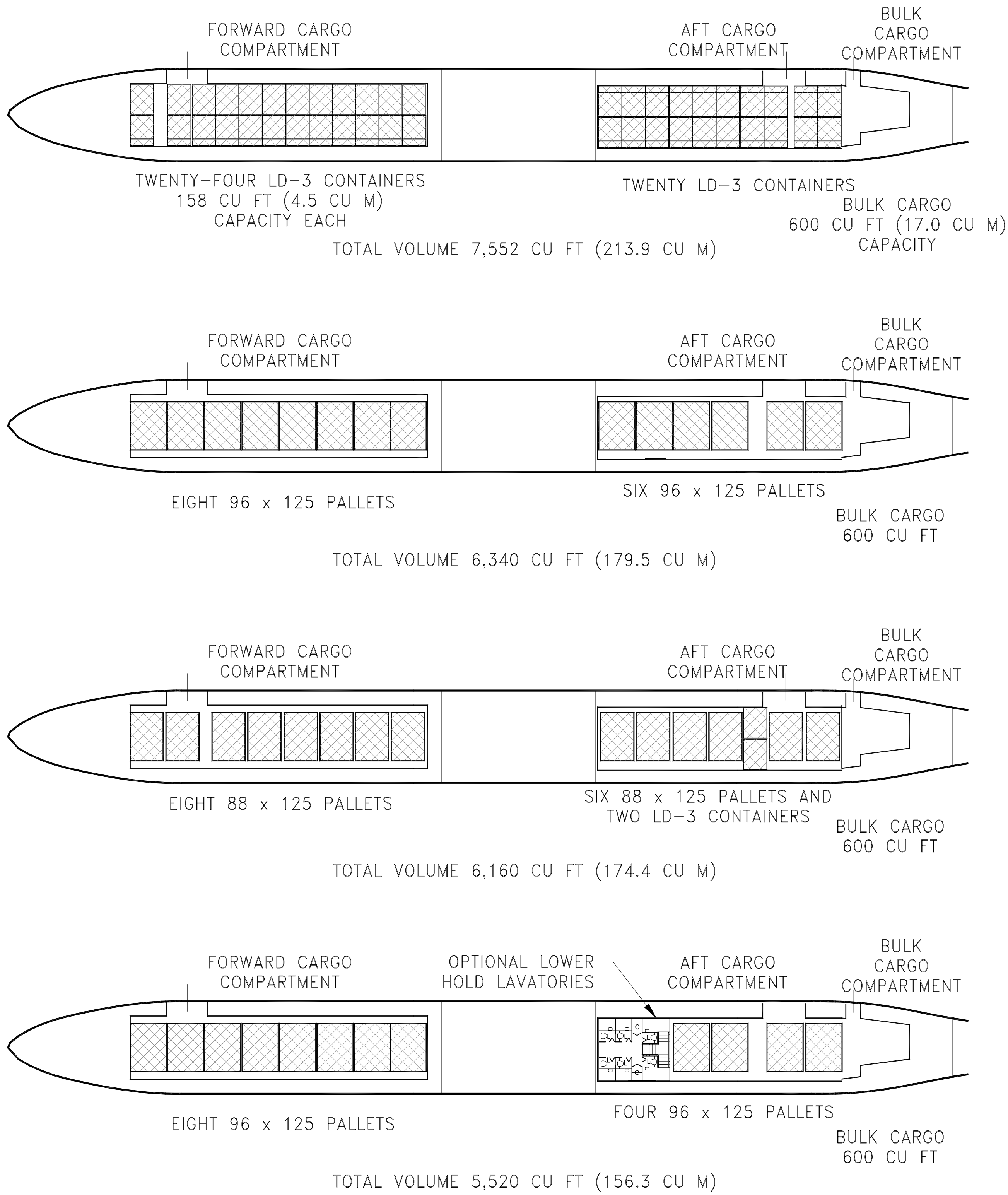
MODEL 777-200LR ,-300ER



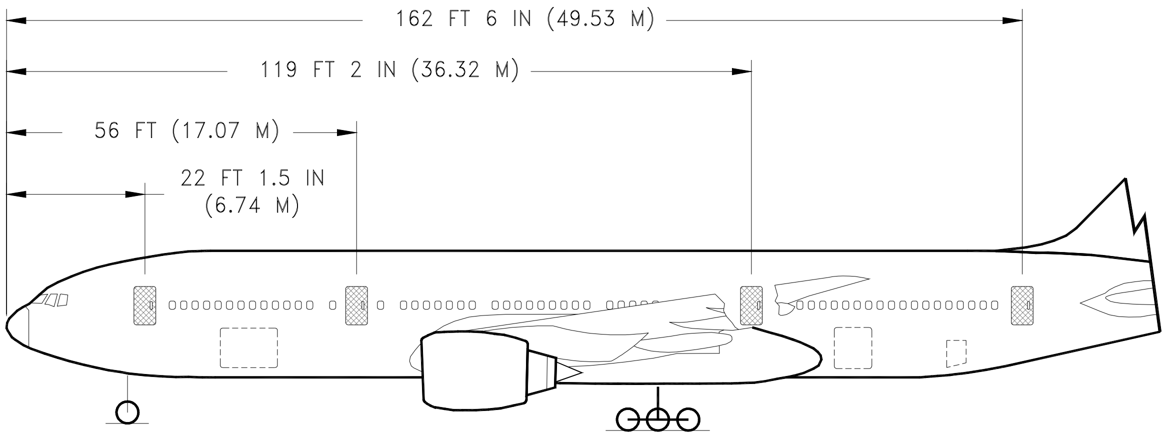
2.6.1 LOWER CARGO COMPARTMENTS - CONTAINERS AND BULK CARGO
MODEL 777-200LR, -300ER



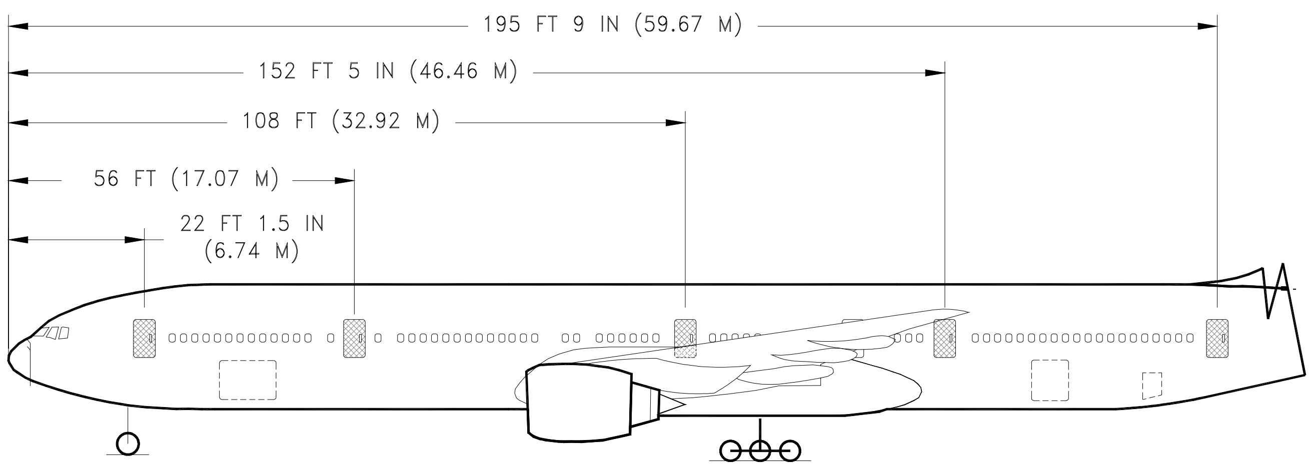
2.6.2 LOWER CARGO COMPARTMENTS - OPTIONAL AFT LARGE CARGO DOOR
MODEL 777-200LR



2.6.3 LOWER CARGO COMPARTMENTS - OPTIONAL AFT LARGE CARGO DOOR
MODEL 777-300ER



MODEL 777–200LR

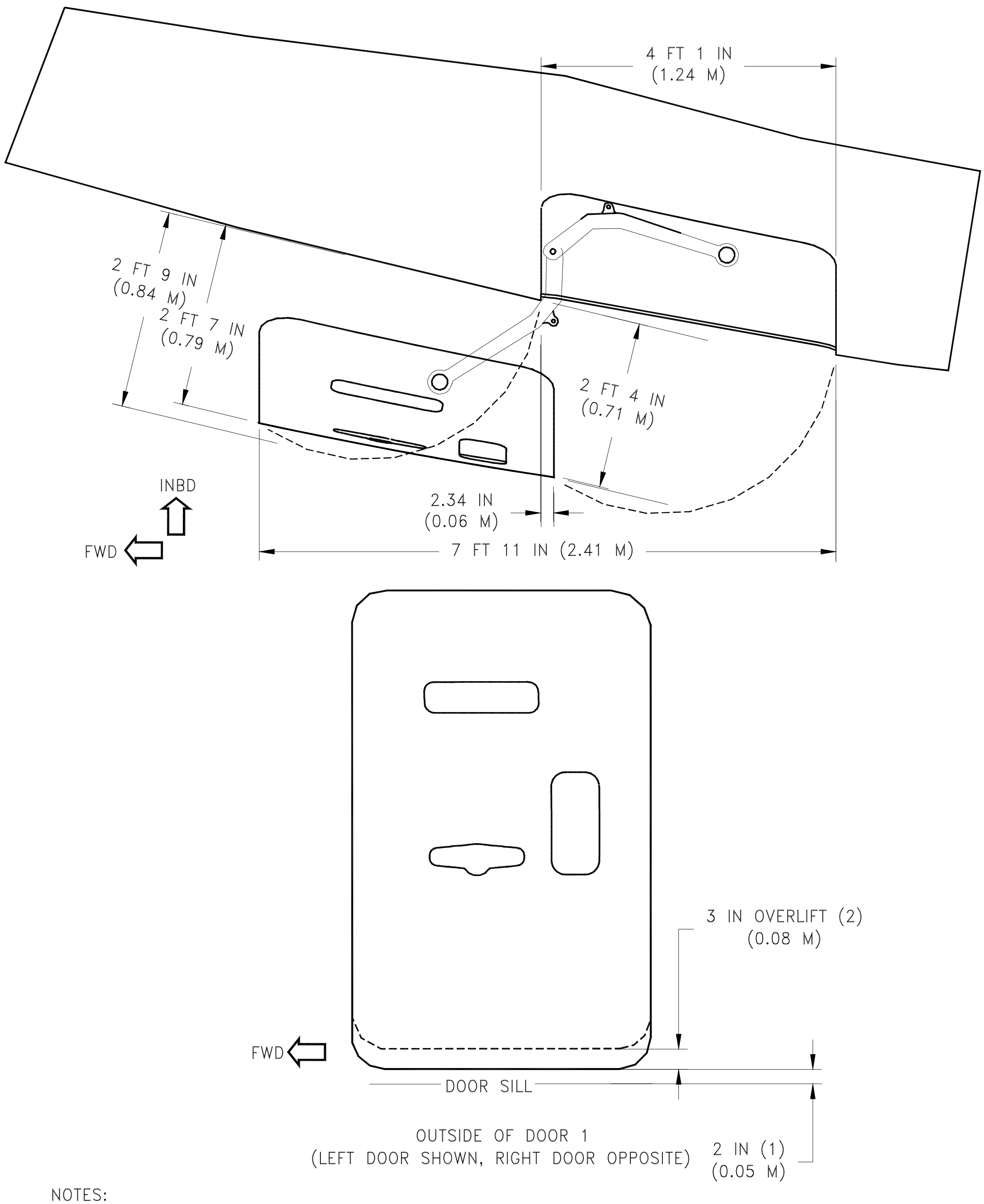


MODEL 777–300ER

NOTES:

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

2.7.1 DOOR CLEARANCES - MAIN ENTRY DOOR LOCATIONS
MODEL 777-200LR, -300ER



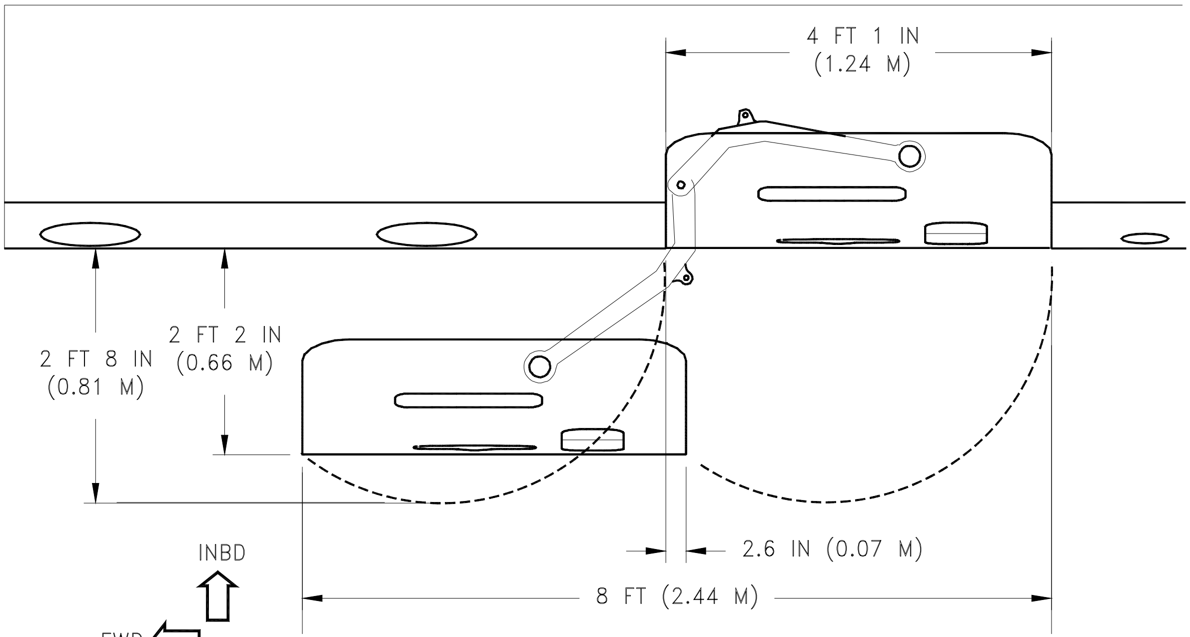
NOTES:

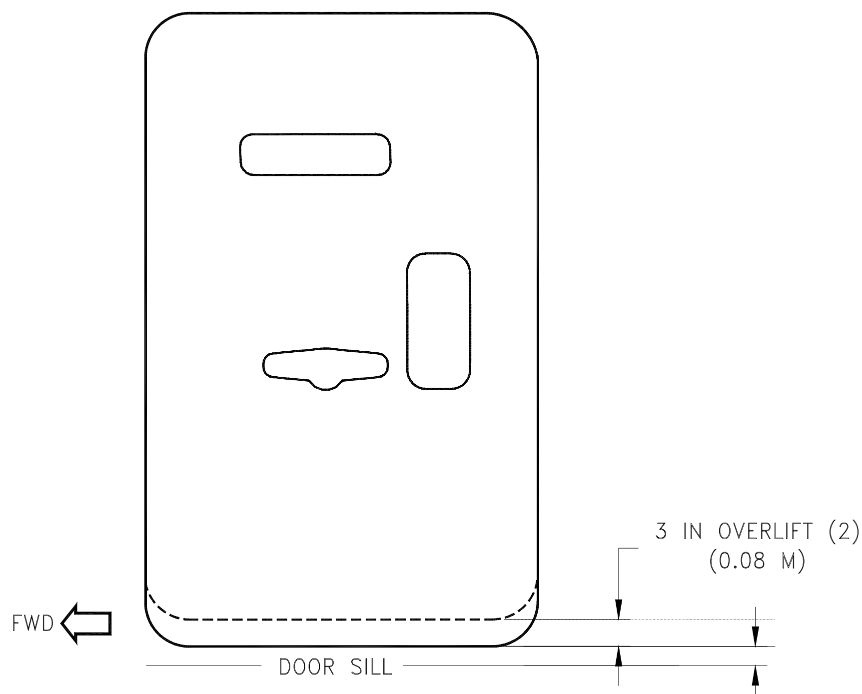
(1) DOOR MOVES UPWARD 2 IN. AND INWARD 0.4 IN. TO CLEAR STOPS BEFORE OPENING OUTWARD

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

2.7.2 DOOR CLEARANCES - MAIN ENTRY DOOR NO 1

MODEL 777-200LR, -300ER





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

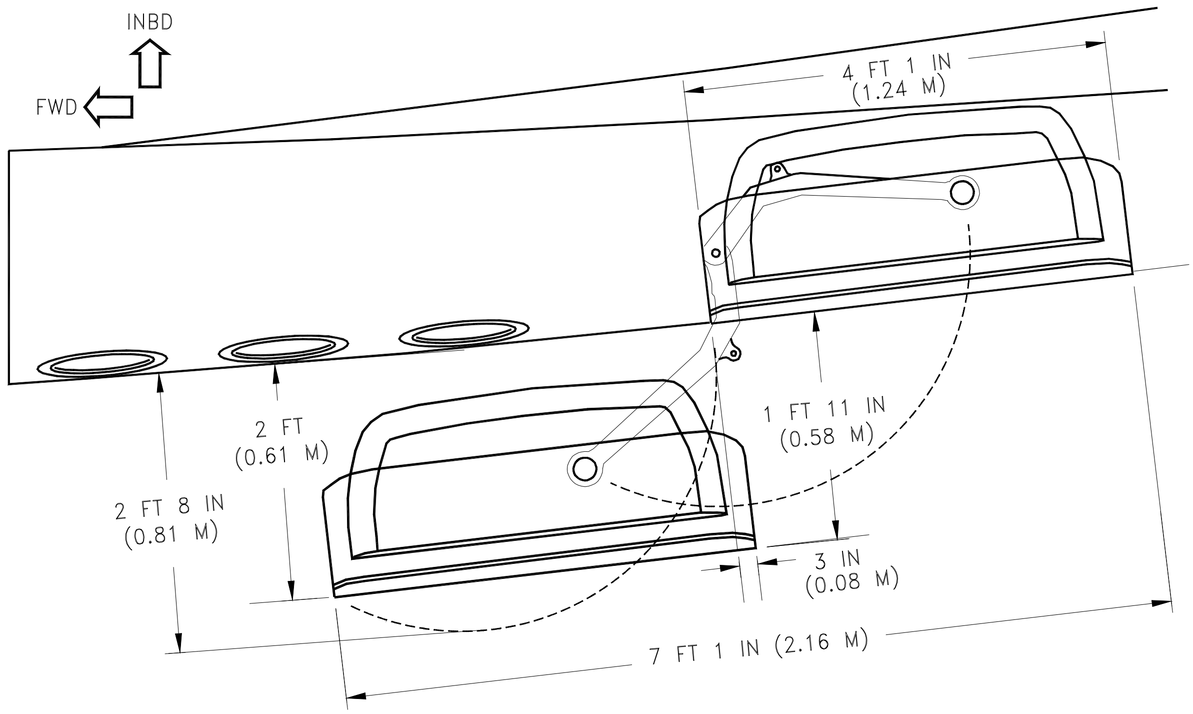
NOTES:

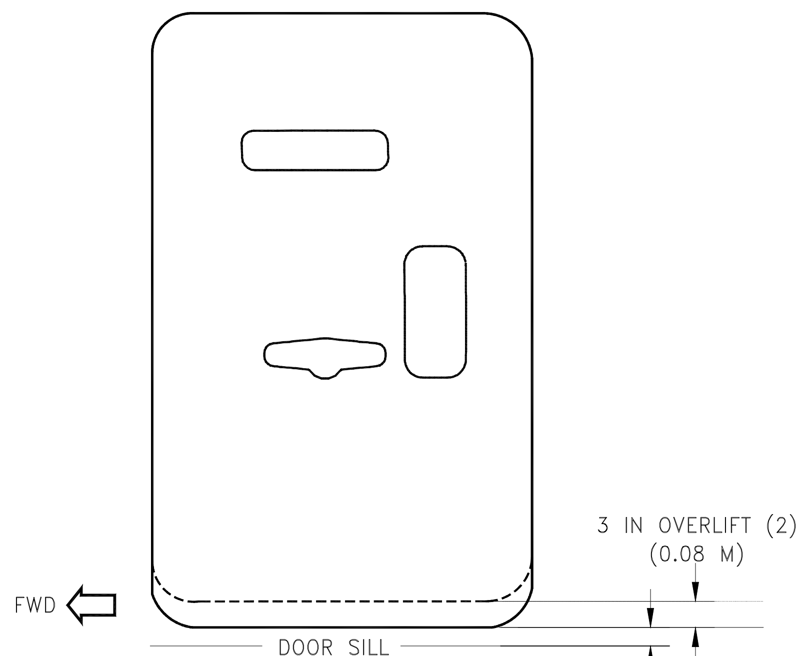
(1) DOOR MOVES UPWARD 2 IN. AND INWARD 0.4 IN TO CLEAR STOPS BEFORE OPENING OUTWARD

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

2.7.3 DOOR CLEARANCES - MAIN ENTRY DOOR NO 2, NO 3, AND NO 4

MODEL 777-200LR, -300ER





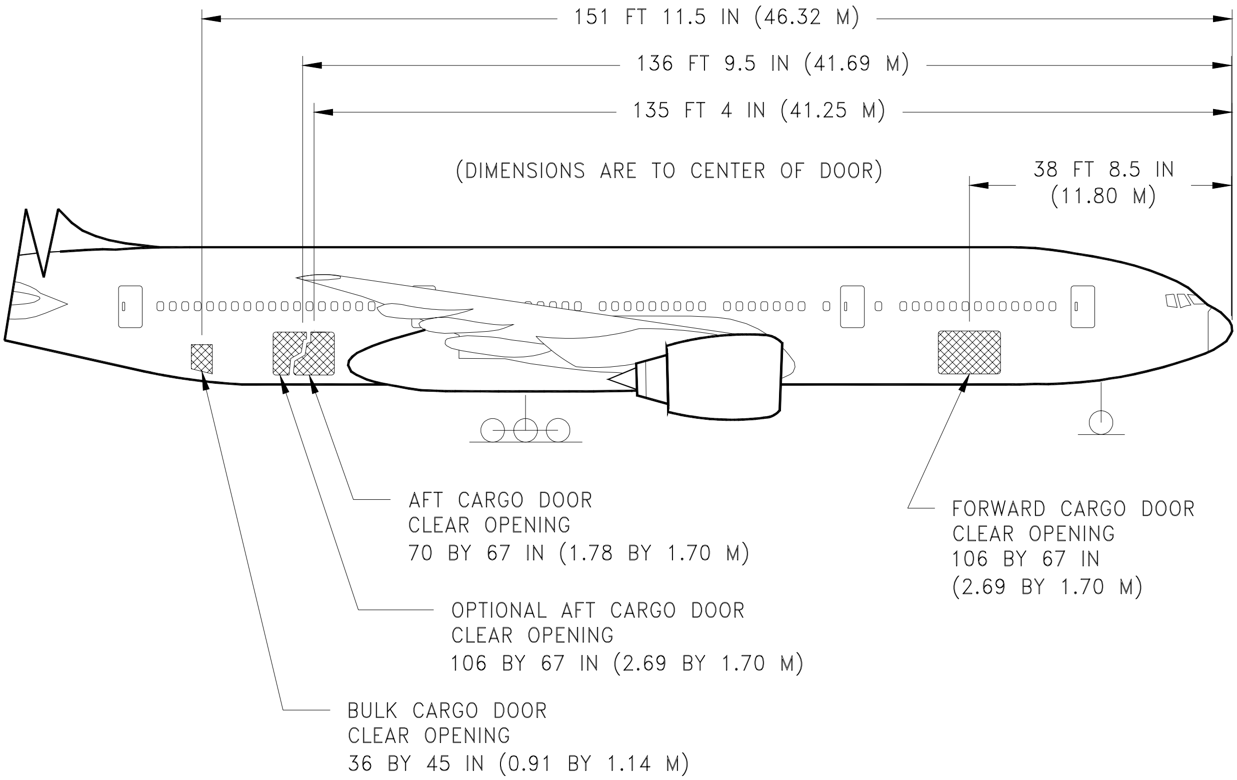
OUTER SIDE OF DOOR
(LEFT DOOR SHOWN, RIGHT DOOR OPPOSITE)

NOTES:

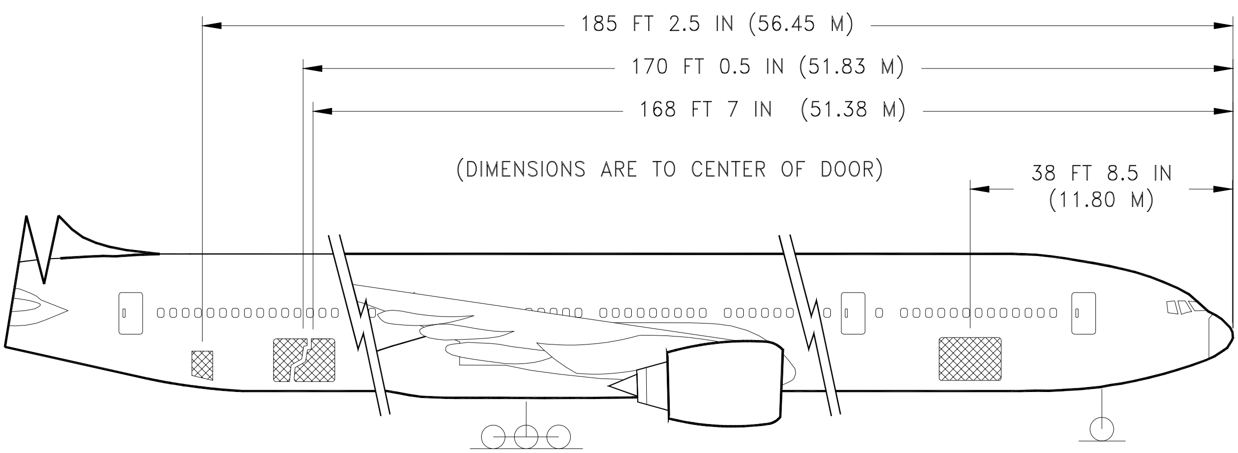
(1) DOOR MOVES UPWARD 2 IN. AND INWARD 0.4 IN. TO CLEAR STOPS BEFORE OPENING OUTWARD
(2) DOOR CAPABLE OF MOVING AN ADDITIONAL 3 IN VERTICALLY (OVERLIFT) TO PRECLUDE DAMAGE FROM CONTACT WITH LOADING BRIDGE
(3) DOOR NO 4 ON 777-200LR, DOOR NO 5 ON 777-300ER

2.7.4 DOOR CLEARANCES - MAIN ENTRY DOOR NO 4 OR NO 5

MODEL 777-200LR, -300ER



MODEL 777–200LR

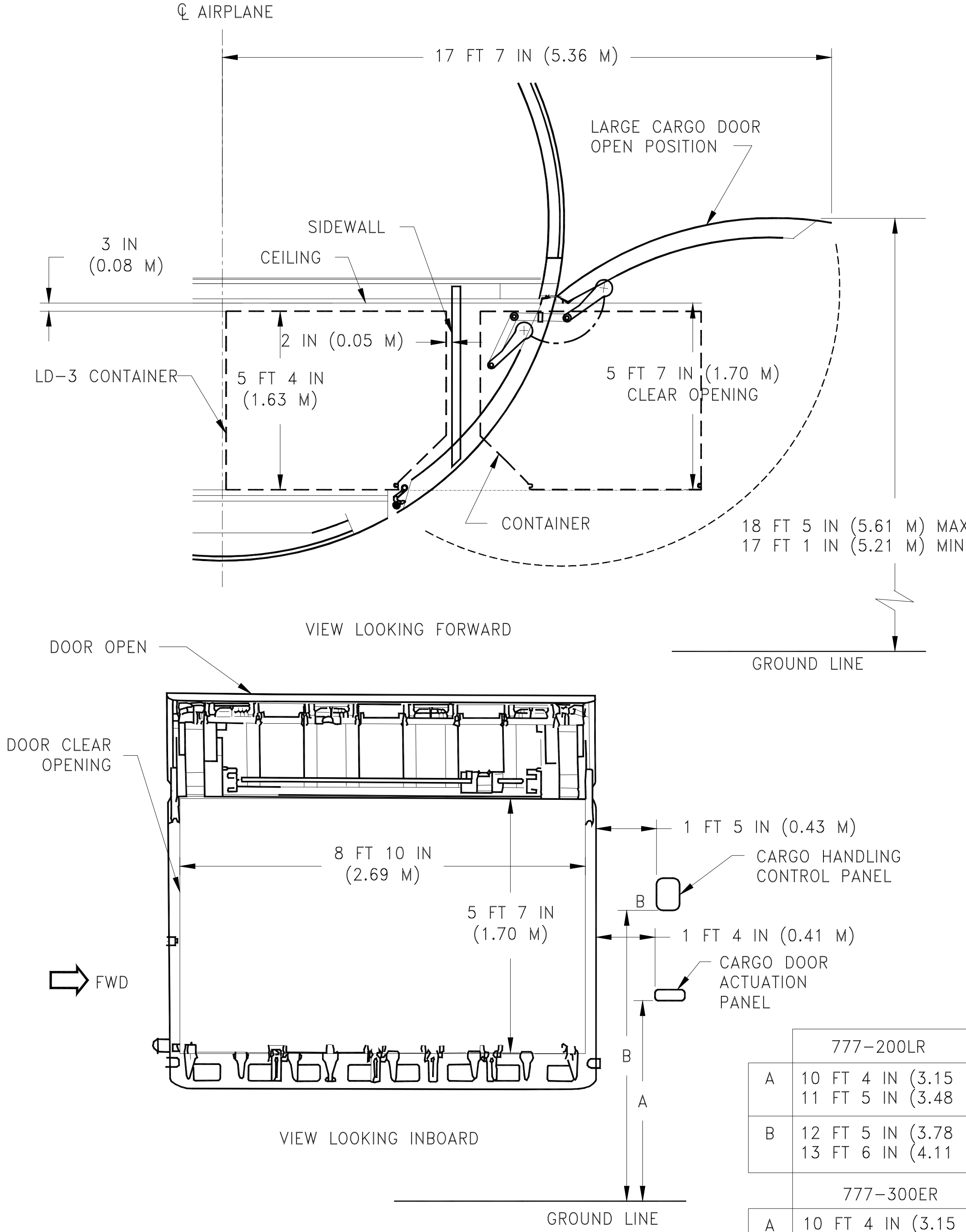


MODEL 777–300ER

(NOTE: DOOR DIMENSIONS SAME AS FOR 777–200LR)

2.7.5 DOOR CLEARANCES - CARGO DOOR LOCATIONS

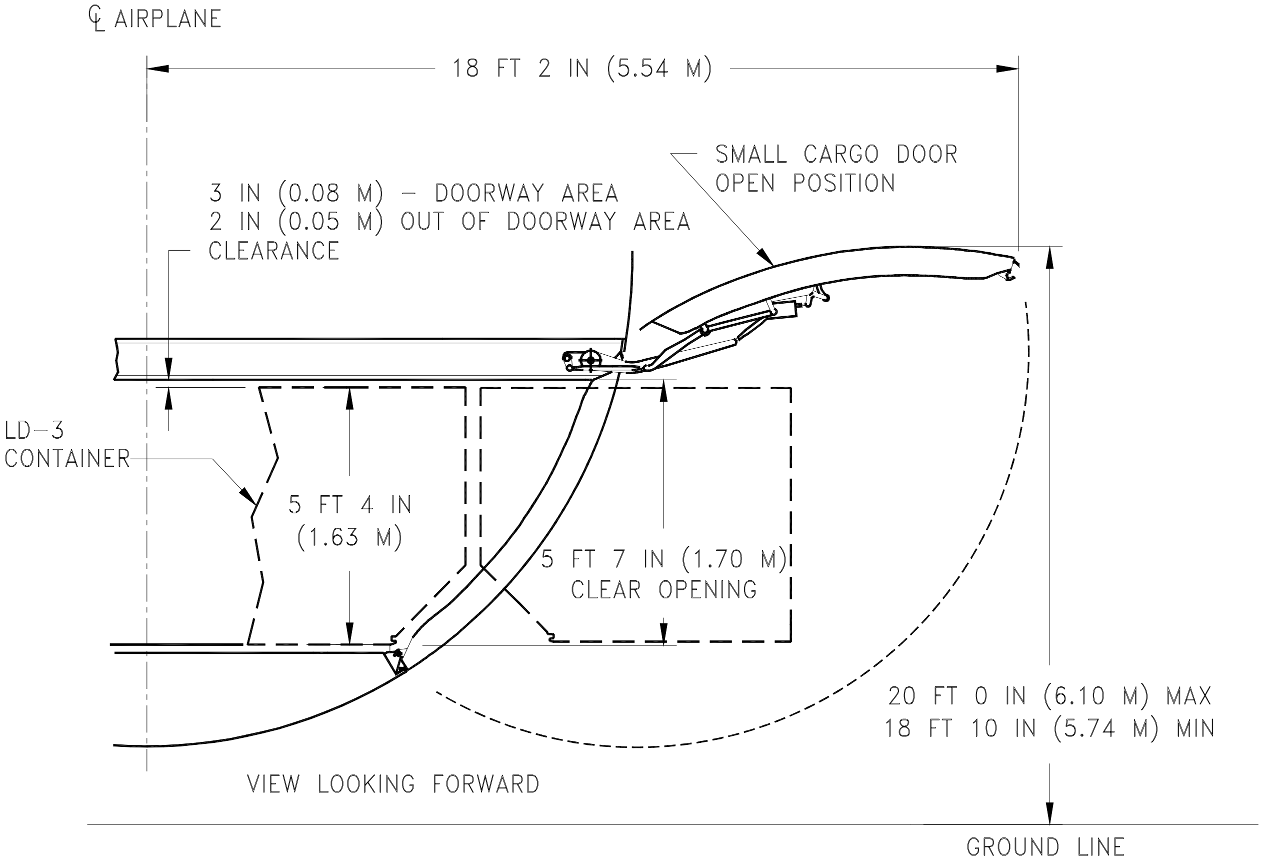
MODEL 777-200LR, -300ER

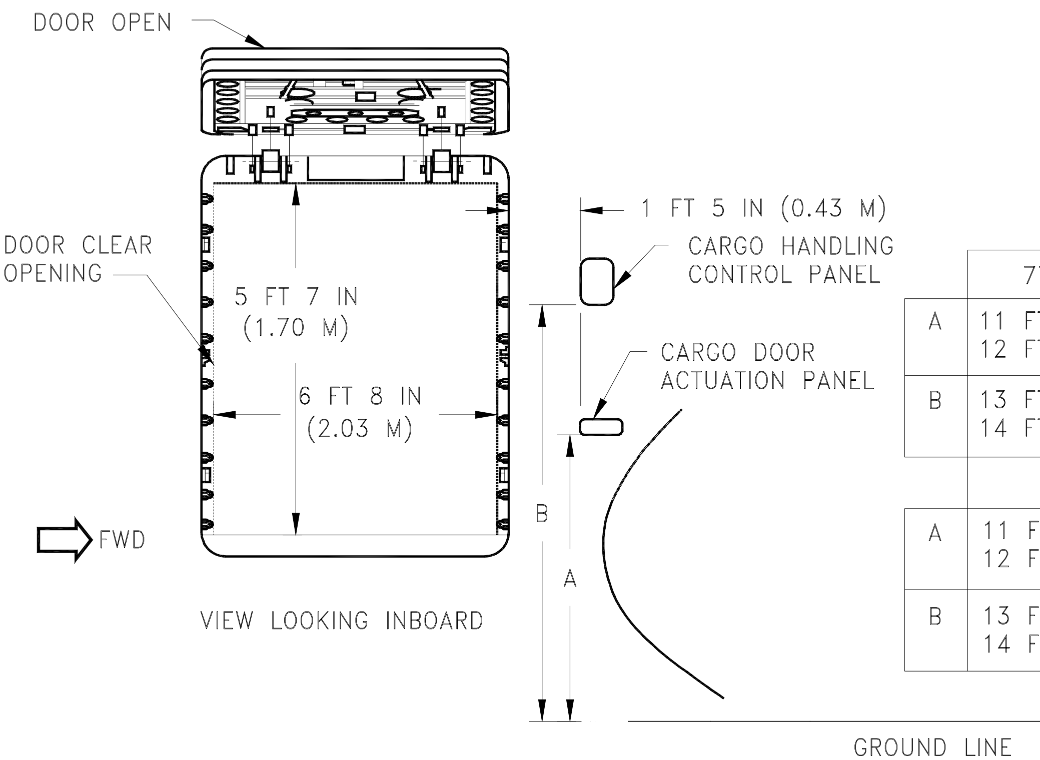


	777-200LR
A	10 FT 4 IN (3.15 M) MIN 11 FT 5 IN (3.48 M) MAX
B	12 FT 5 IN (3.78 M) MIN 13 FT 6 IN (4.11 M) MAX
	777-300ER
A	10 FT 4 IN (3.15 M) MIN 11 FT 7 IN (3.53 M) MAX
B	12 FT 5 IN (3.78 M) MIN 13 FT 8 IN (4.17 M) MAX

2.7.6 DOOR CLEARANCES - FORWARD CARGO DOOR

MODEL 777-200LR, -300ER

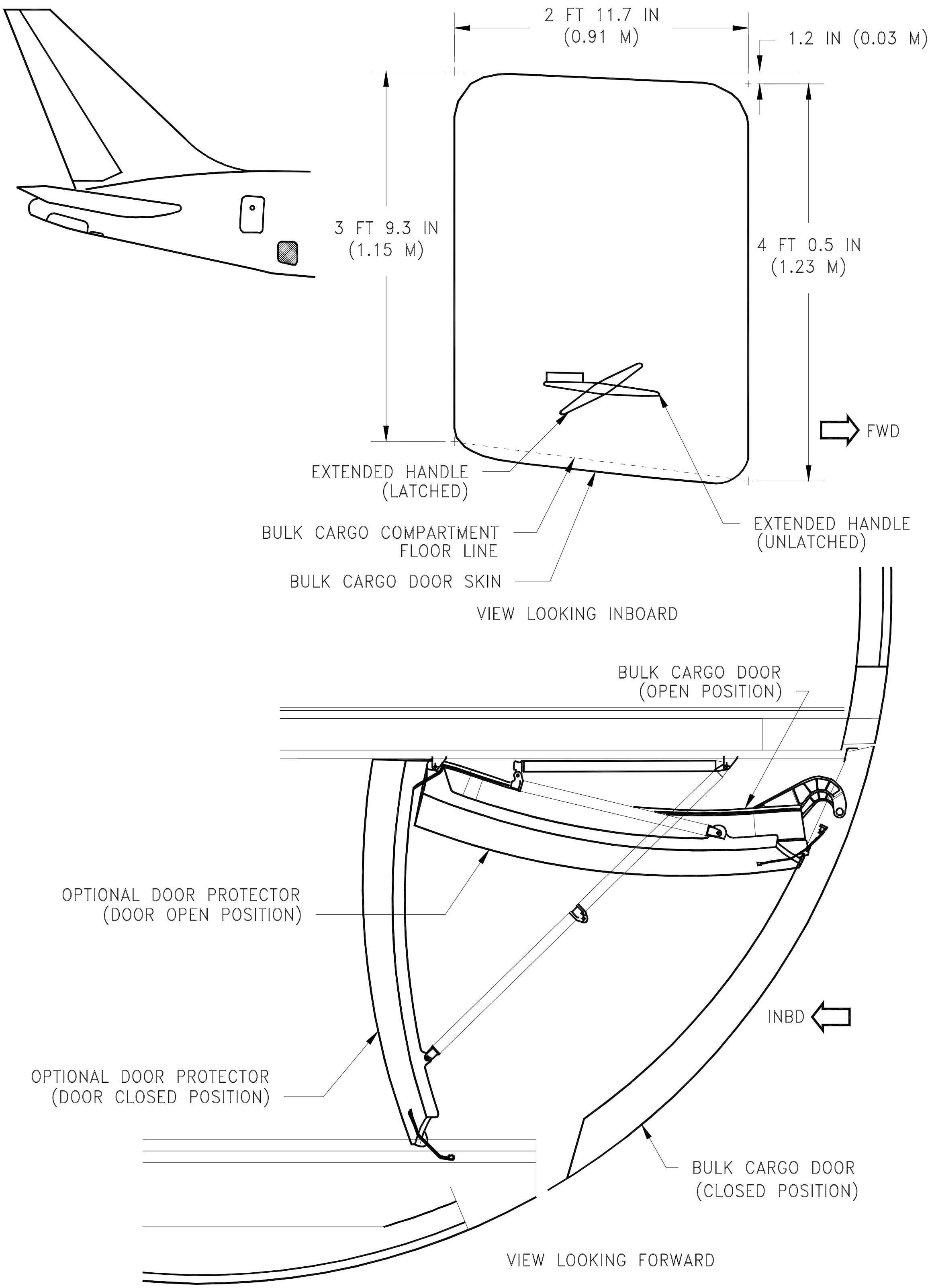




	777-200LR
A	11 FT 10 IN (3.61 M) MIN 12 FT 5 IN (3.78 M) MAX
B	13 FT 11 IN (4.24 M) MIN 14 FT 6 IN (4.42 M) MAX
	777-300ER
A	11 FT 9 IN (3.58 M) MIN 12 FT 6 IN (3.81 M) MAX
B	13 FT 10 IN (4.22 M) MIN 14 FT 7 IN (4.45 M) MAX

2.7.7 DOOR CLEARANCES – SMALL AFT CARGO DOOR

MODEL 777-200LR, -300ER



2.7.8 DOOR CLEARANCES - BULK CARGO DOOR
MODEL 777-200LR, -300ER

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3.0 AIRPLANE PERFORMANCE

3.1 General Information

3.2 Payload/Range for 0.84 Mach Cruise

3.3 F.A.R. Takeoff Runway Length Requirements

3.4 F.A.R. Landing Runway Length Requirements

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3.0 AIRPLANE PERFORMANCE

3.1 General Information

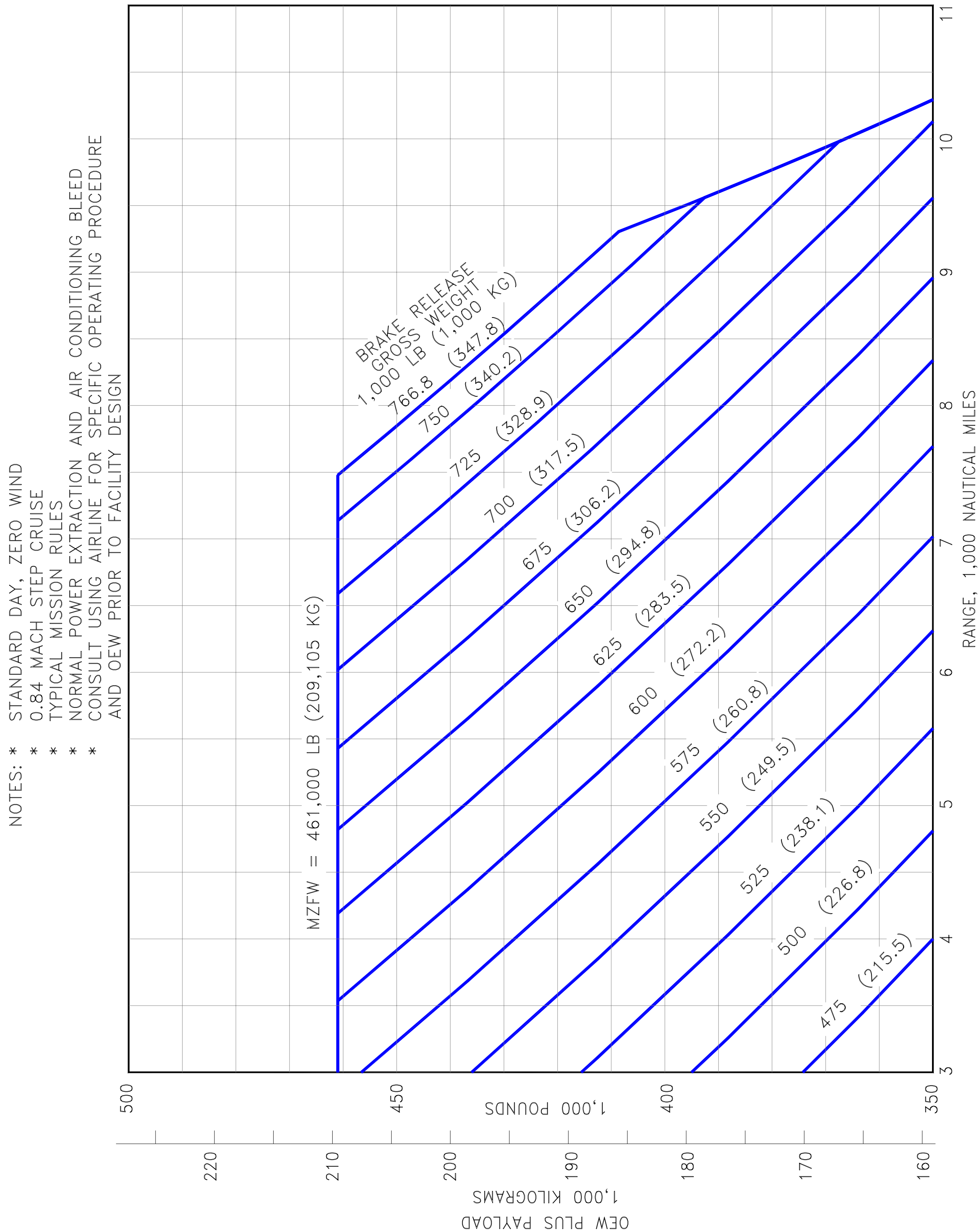
The graphs in Section 3.2 provide information on operational empty weight (OEW) and payload, trip range, brake release gross weight, and fuel limits for airplane models with the different engine options. To use these graphs, if the trip range and zero fuel weight (OEW + payload) are known, the approximate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

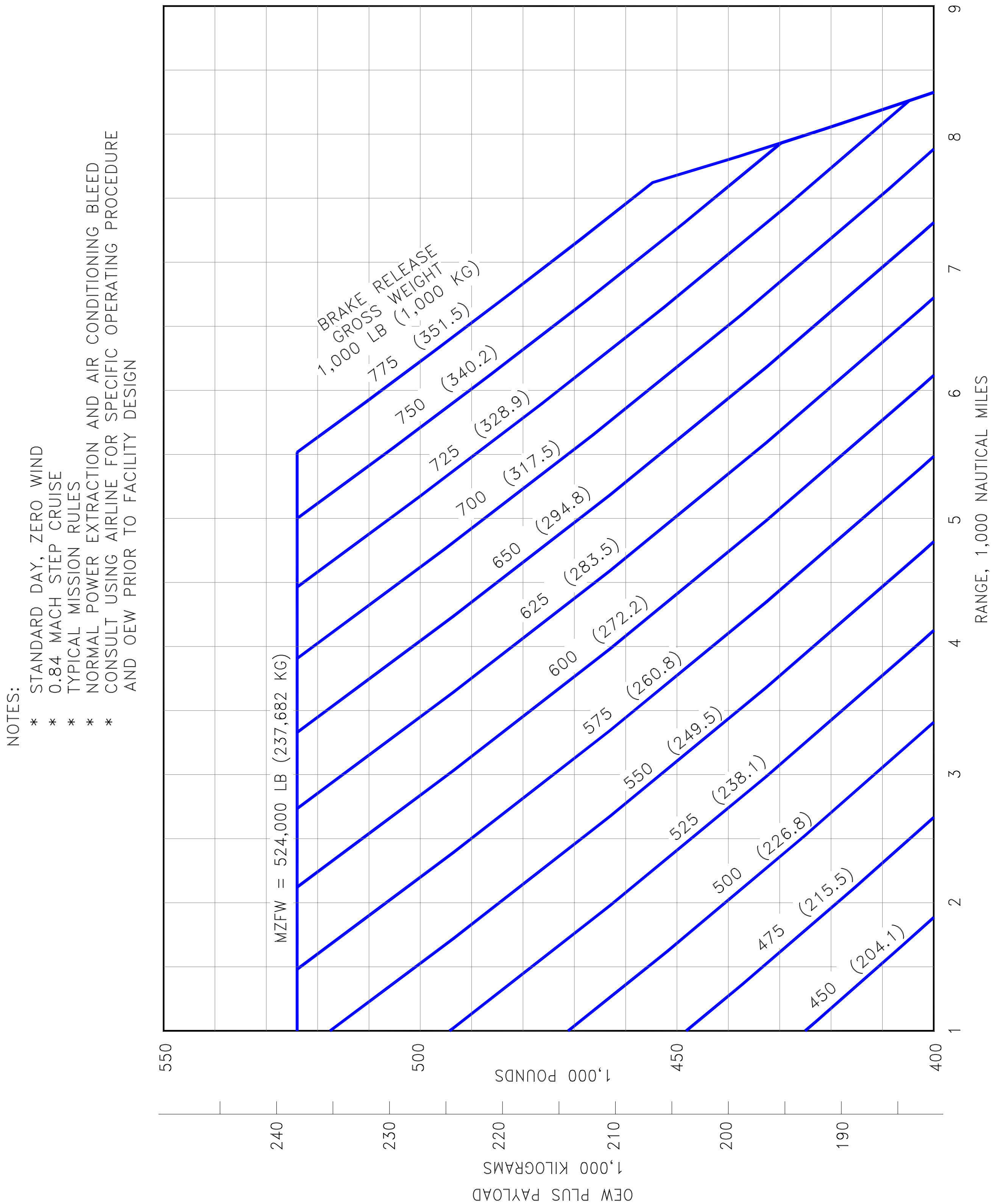
PRESSURE ALTITUDE		STANDARD DAY TEMP	
FEET	METERS	^{0} F	^{0} C
0	0	59.0	15.00
2,000	610	51.9	11.04
4,000	1,219	44.7	7.06
6,000	1,829	37.6	3.11
8,000	2,438	30.5	-0.85
8,800	2,682	31.2	-1.00
10,000	3,048	23.3	-4.81

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.

PRELIMINARY INFORMATION

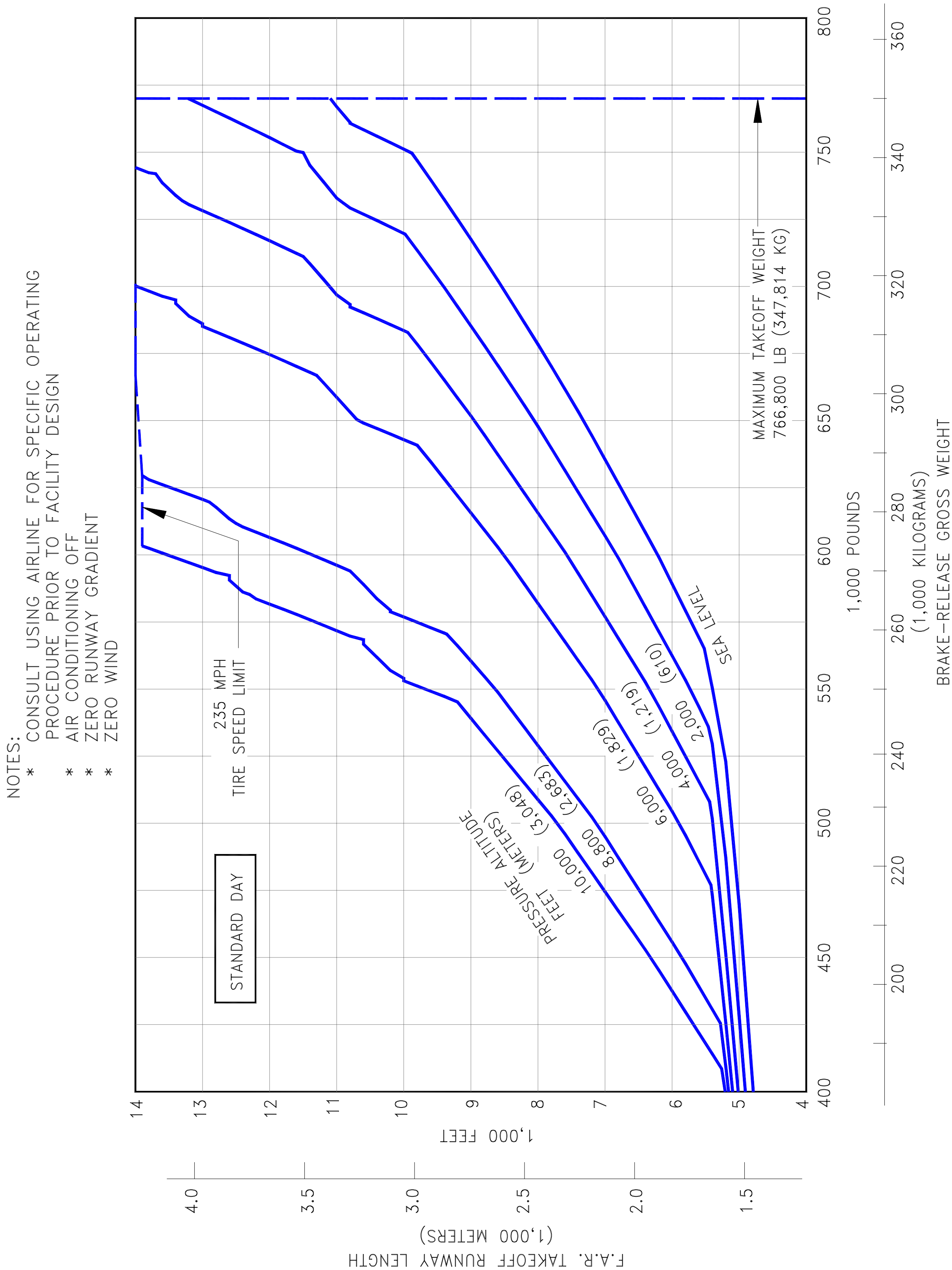


3.2.1 PAYLOAD/RANGE FOR 0.84 MACH CRUISE
MODEL 777-200LR



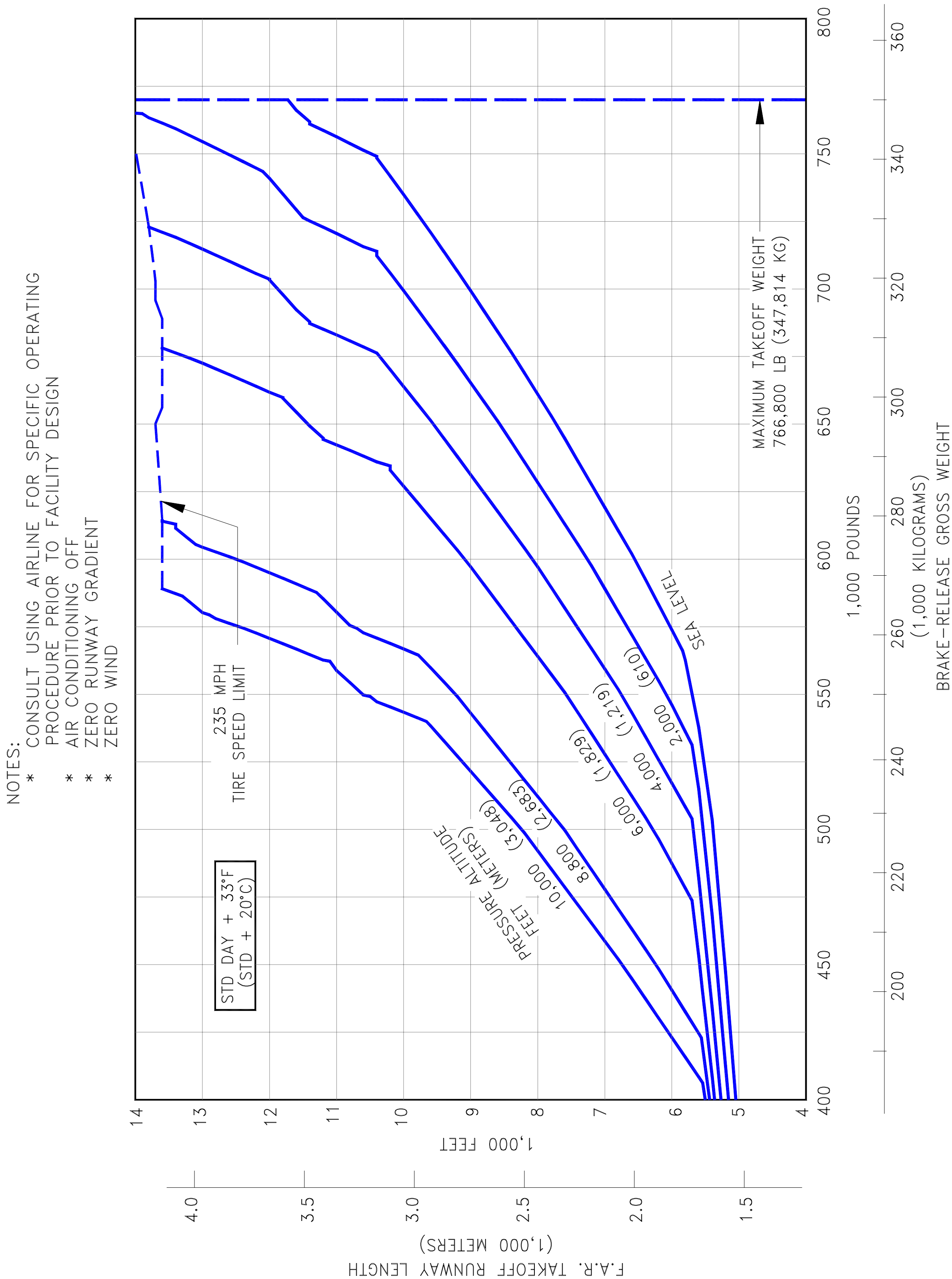
3.2.2 PAYLOAD/RANGE FOR 0.84 MACH CRUISE

MODEL 777-300ER

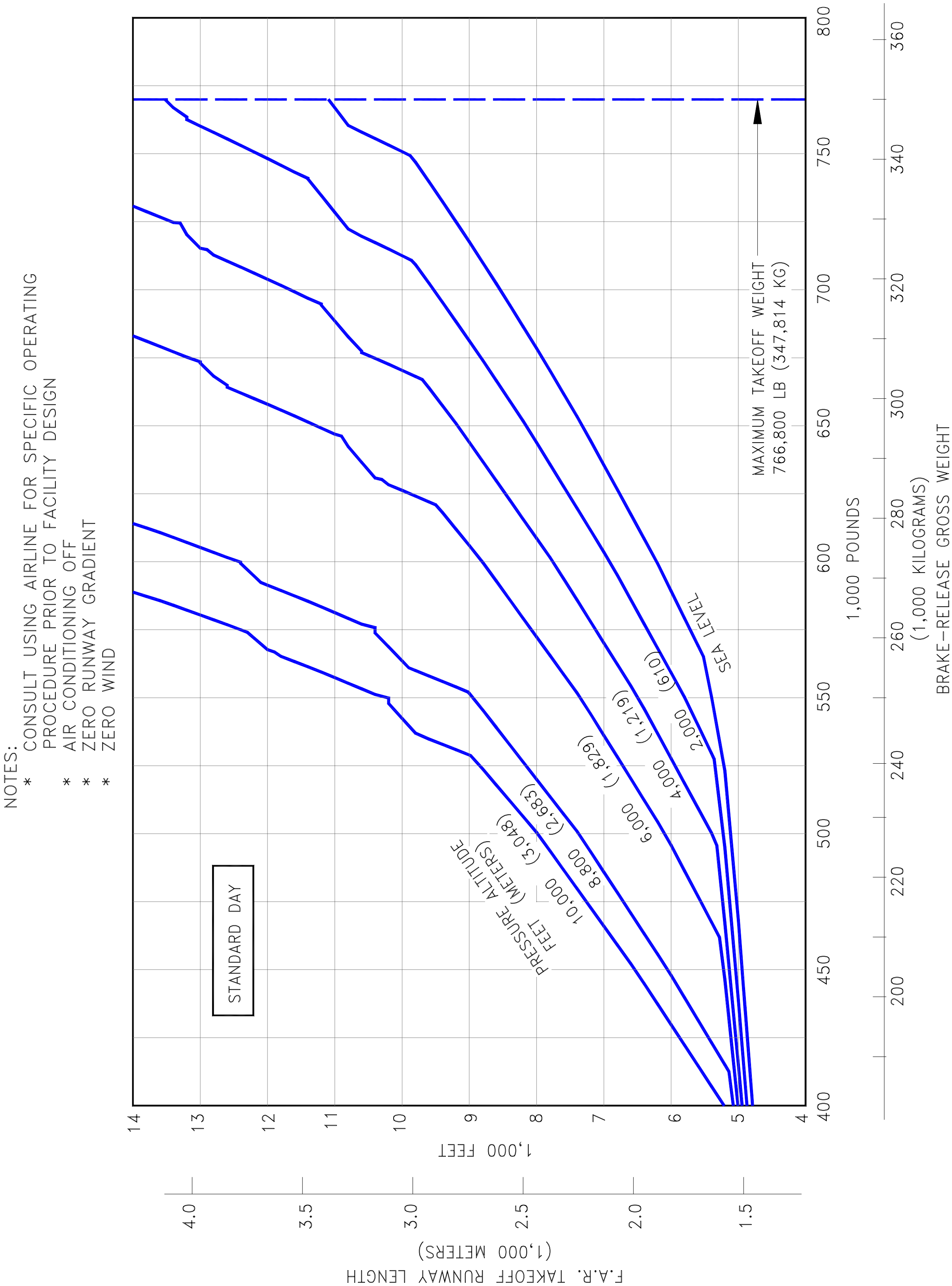


3.3.1 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY

MODEL 777-200LR (GE90-110B1 ENGINES)

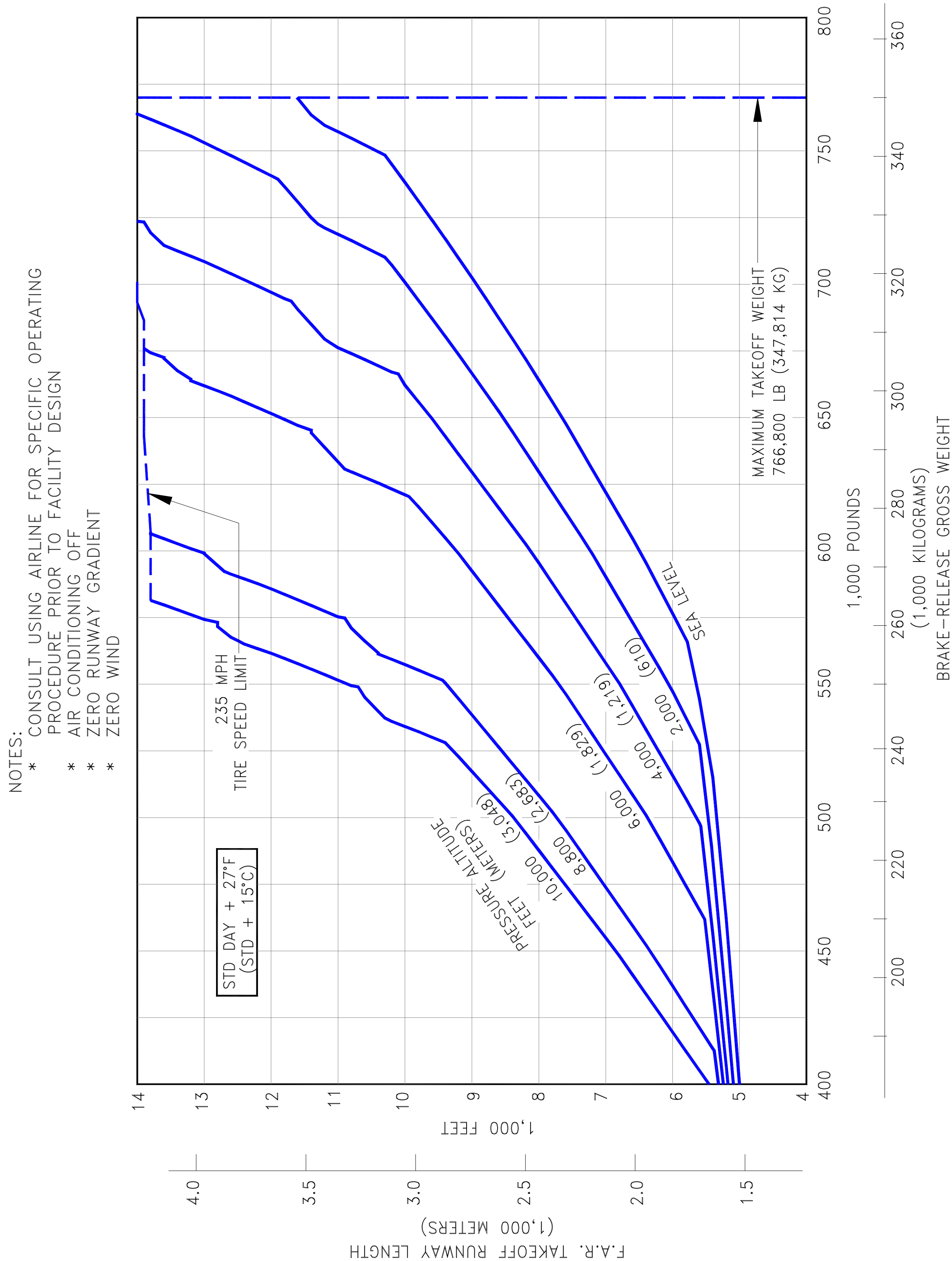


3.3.2 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +33°F (STD + 20°C)
MODEL 777-200LR (GE90-110B1 ENGINES)

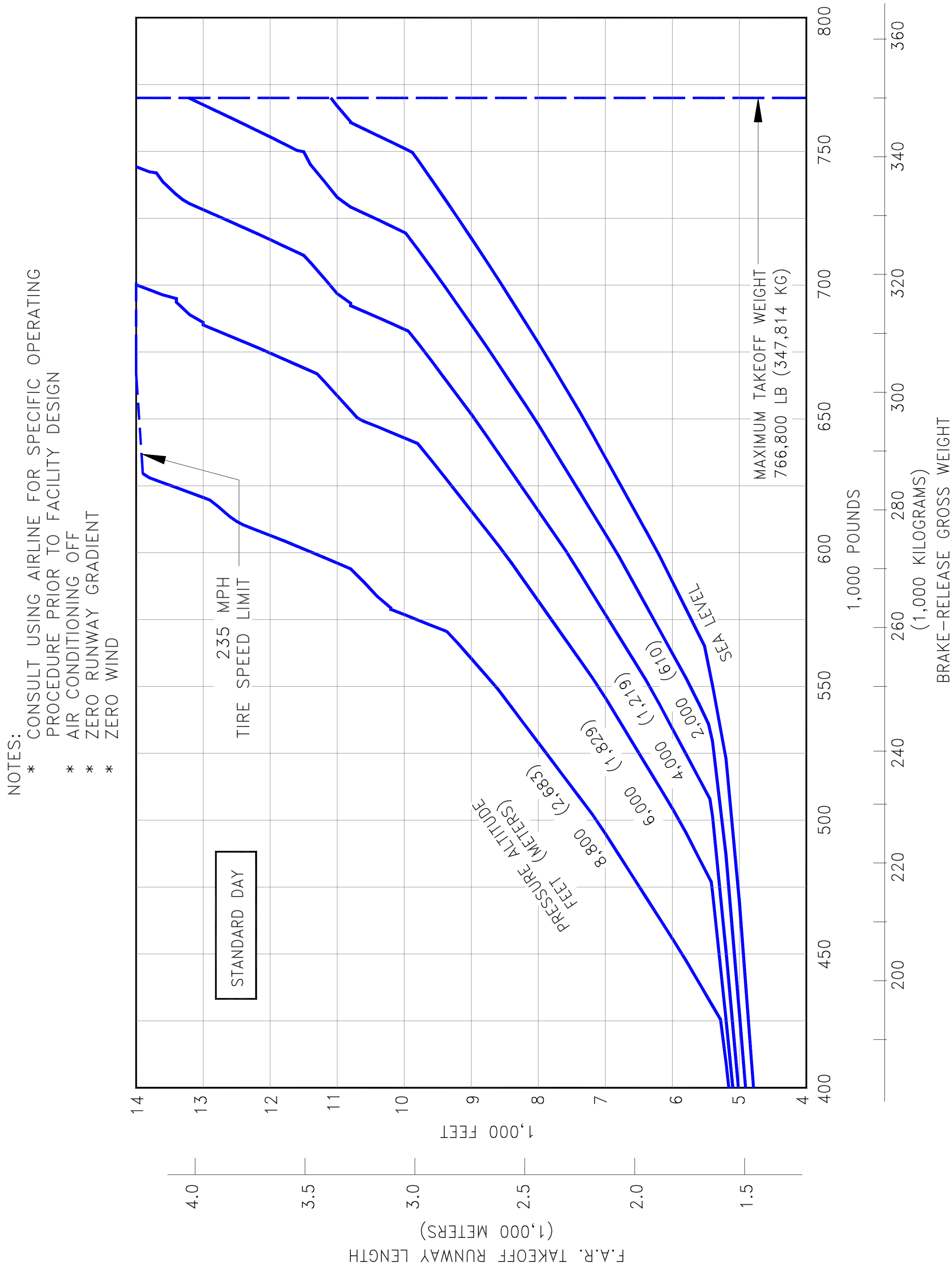


3.3.3 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY

MODEL 777-200LR (GE90-110B ENGINES)

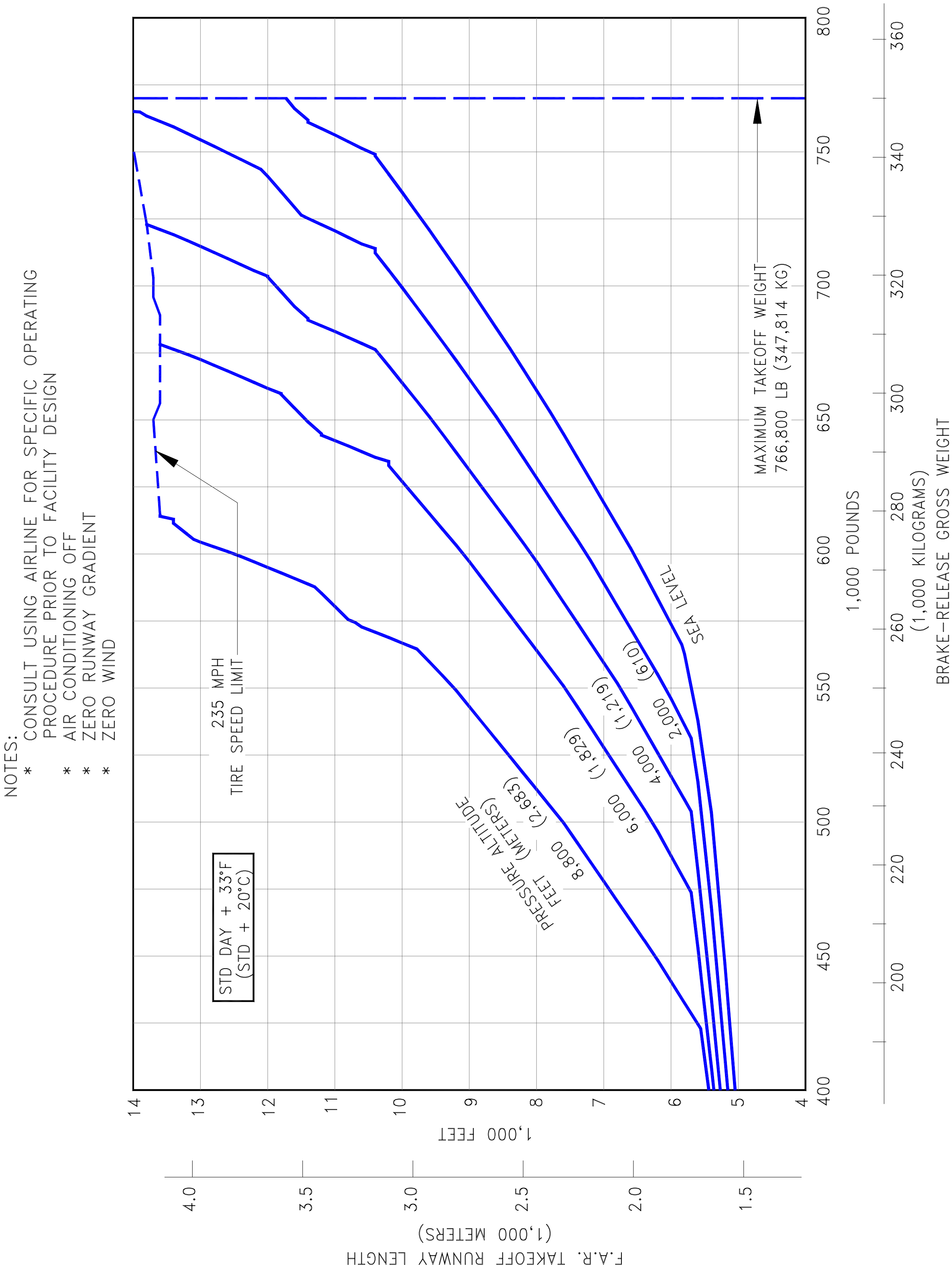


3.3.4 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +27^{O}F (STD + 15^{O}C)
MODEL 777-200LR (GE90-110B ENGINES)

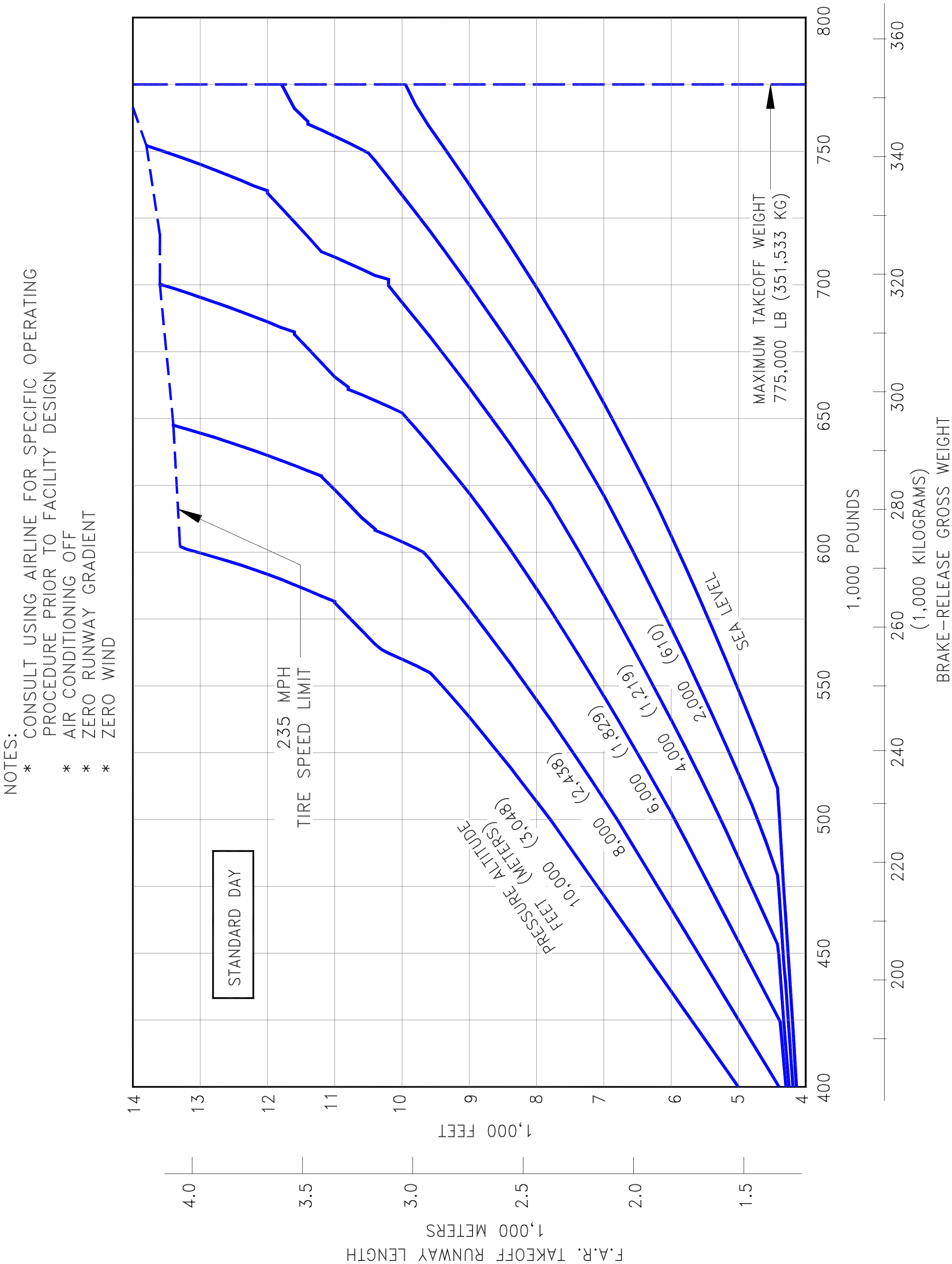


3.3.5 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY

MODEL 777-200LR (GE90-115B 1ENGINES)

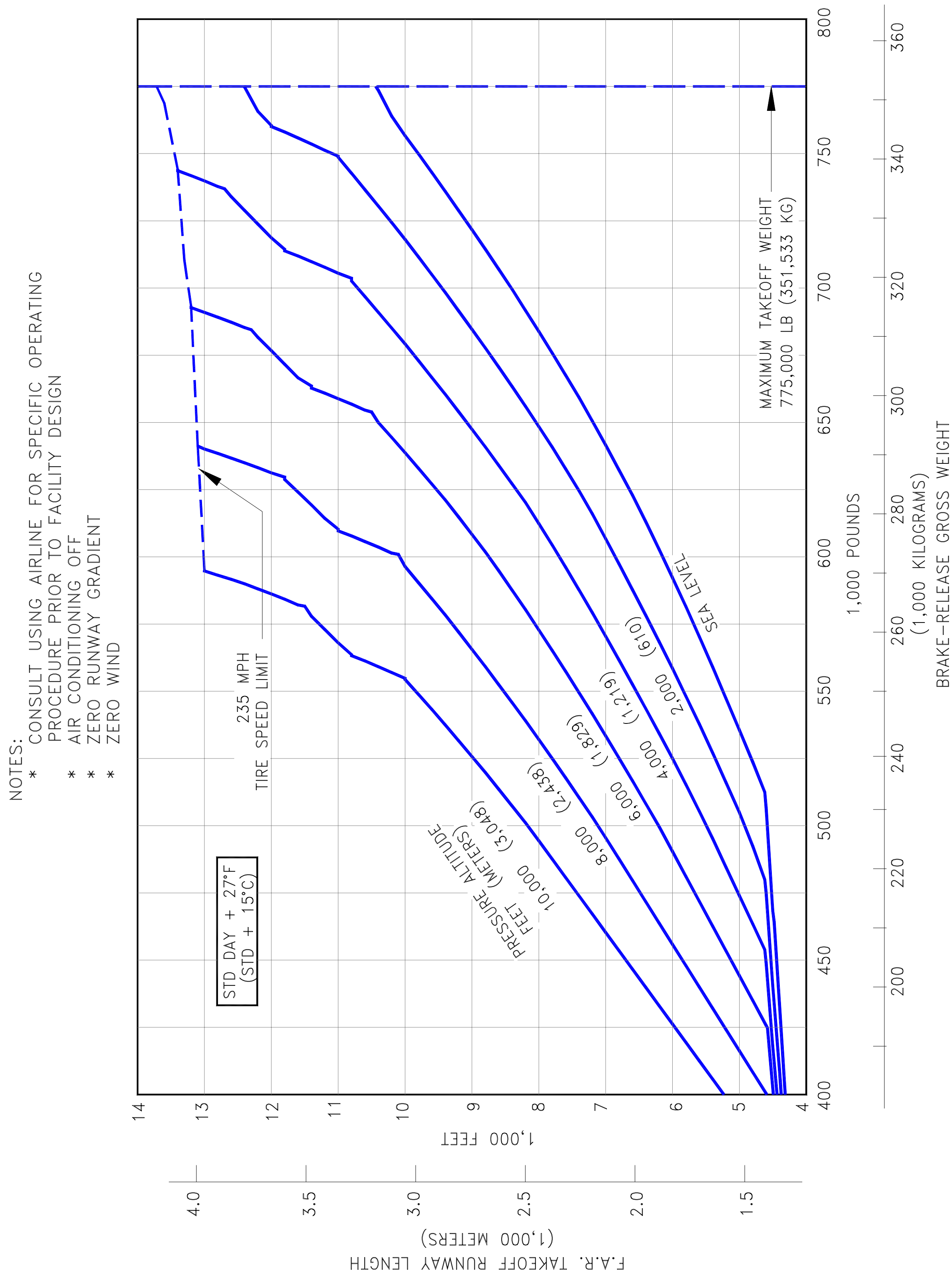


3.3.6 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +33^{O}F (STD + 20^{O}C)
MODEL 777-200LR (GE90-115B1 ENGINES)



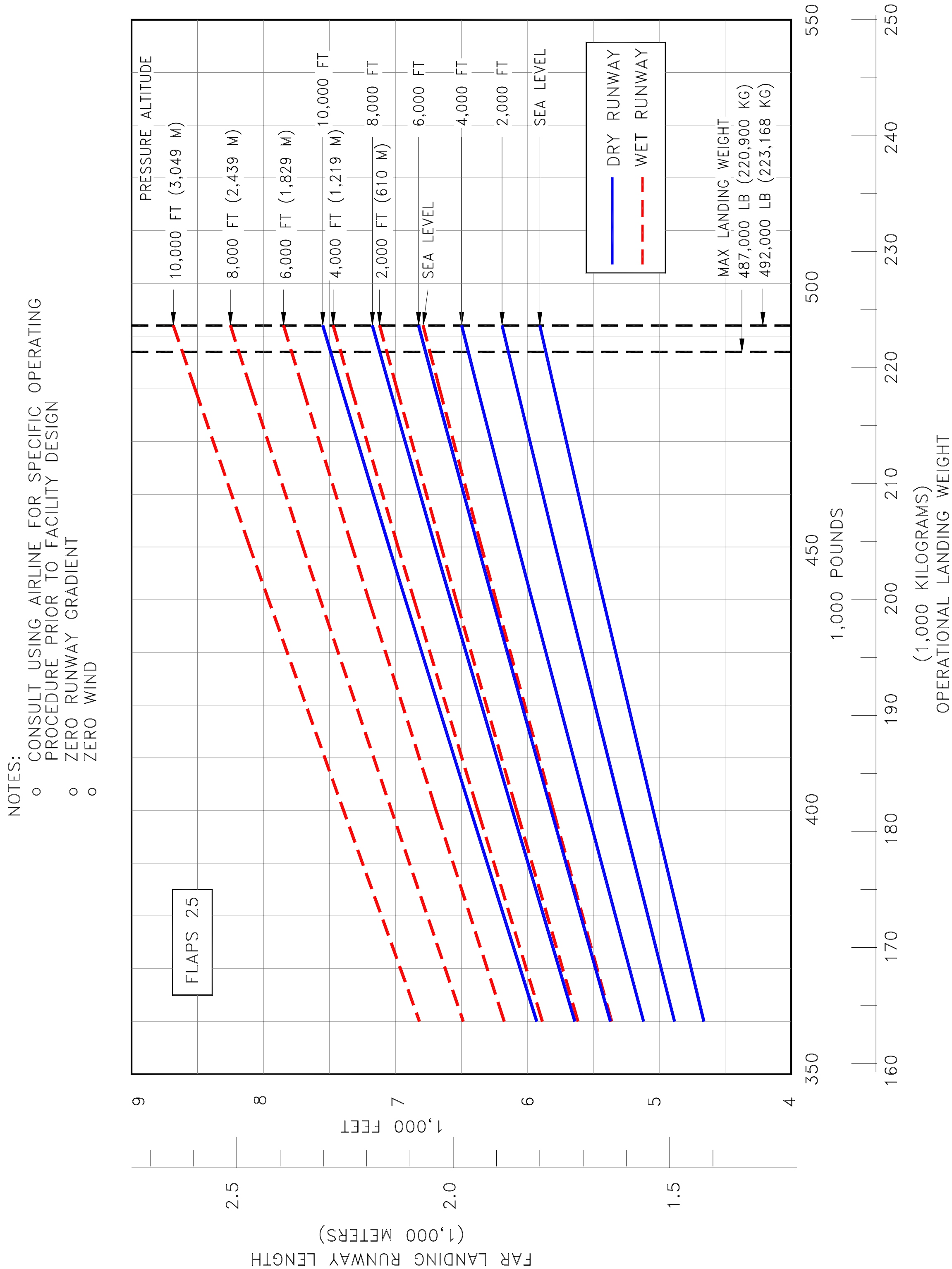
3.3.7 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY

MODEL 777-300ER (GE90-115B1 ENGINES)

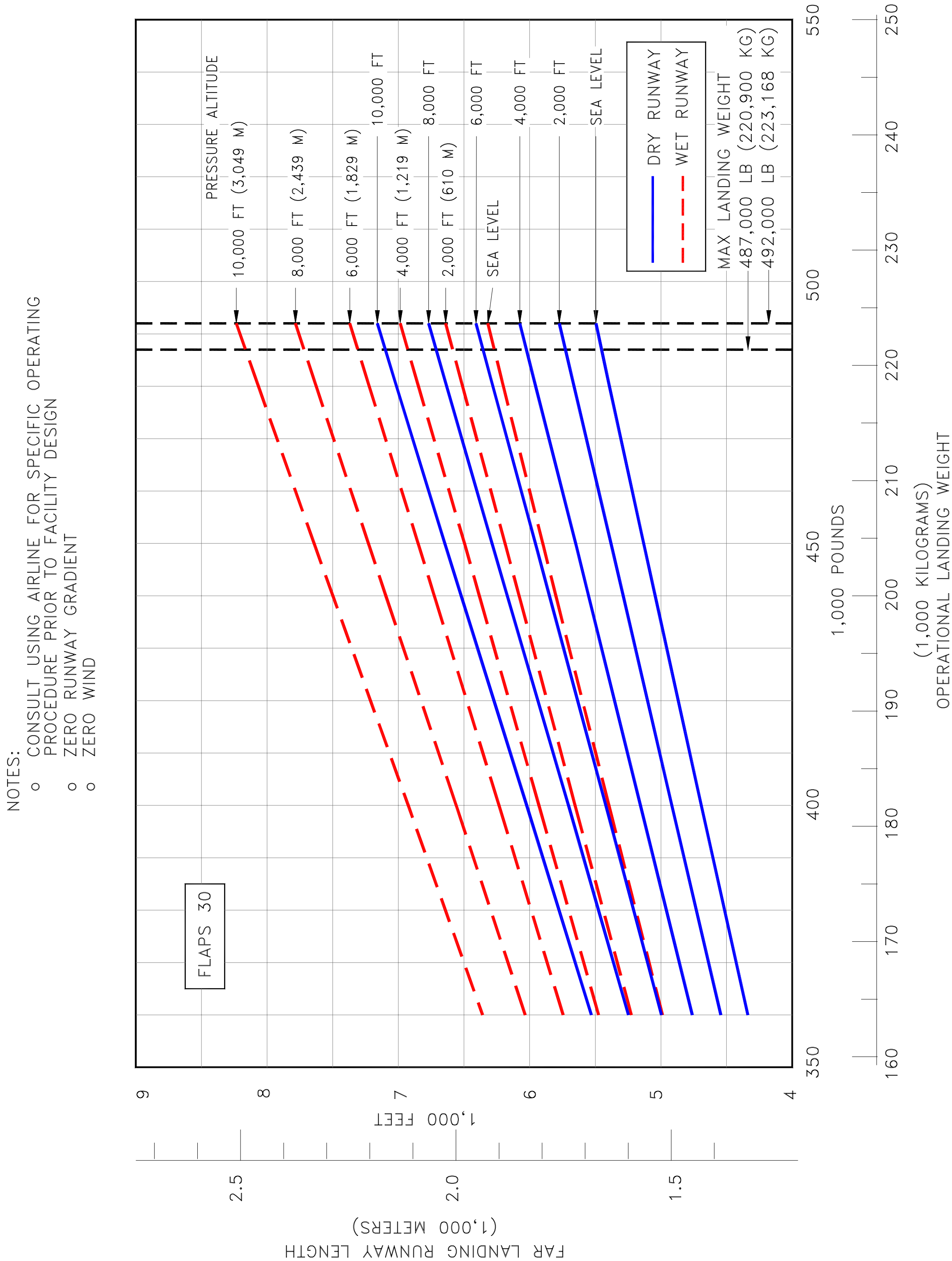


3.3.8 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS
STANDARD DAY +27°F (STD + 15°C)

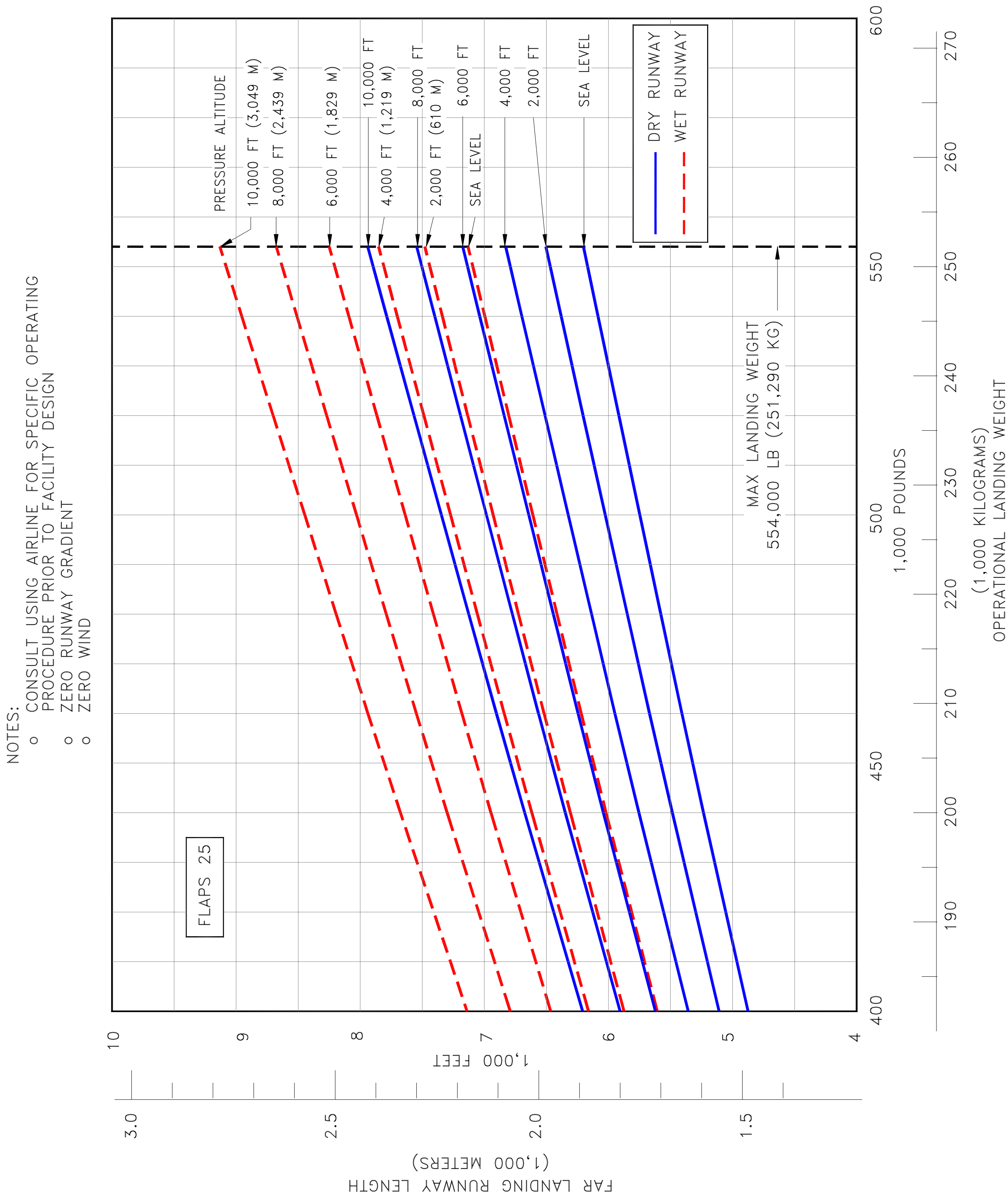
MODEL 777-300ER (GE90-115B1 ENGINES)



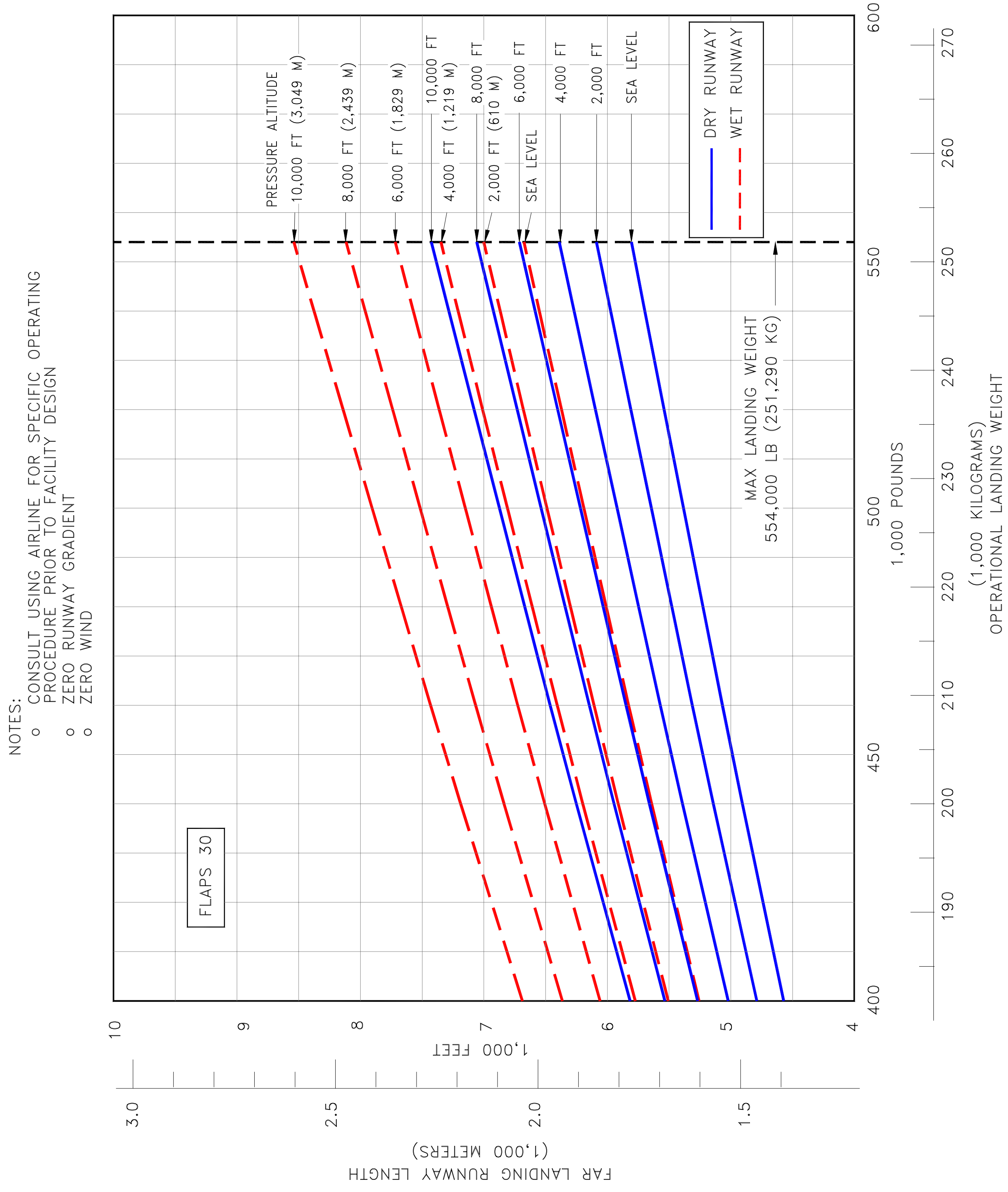
3.4.1 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS – FLAPS 25
MODEL 777-200LR



3.4.2 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS – FLAPS 30
MODEL 777-200LR



3.4.3 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS – FLAPS 25
MODEL 777-300ER



3.4.4 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS

MODEL 777-300ER

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4.0 GROUND MANEUVERING

4.0 GROUND MANEUVERING

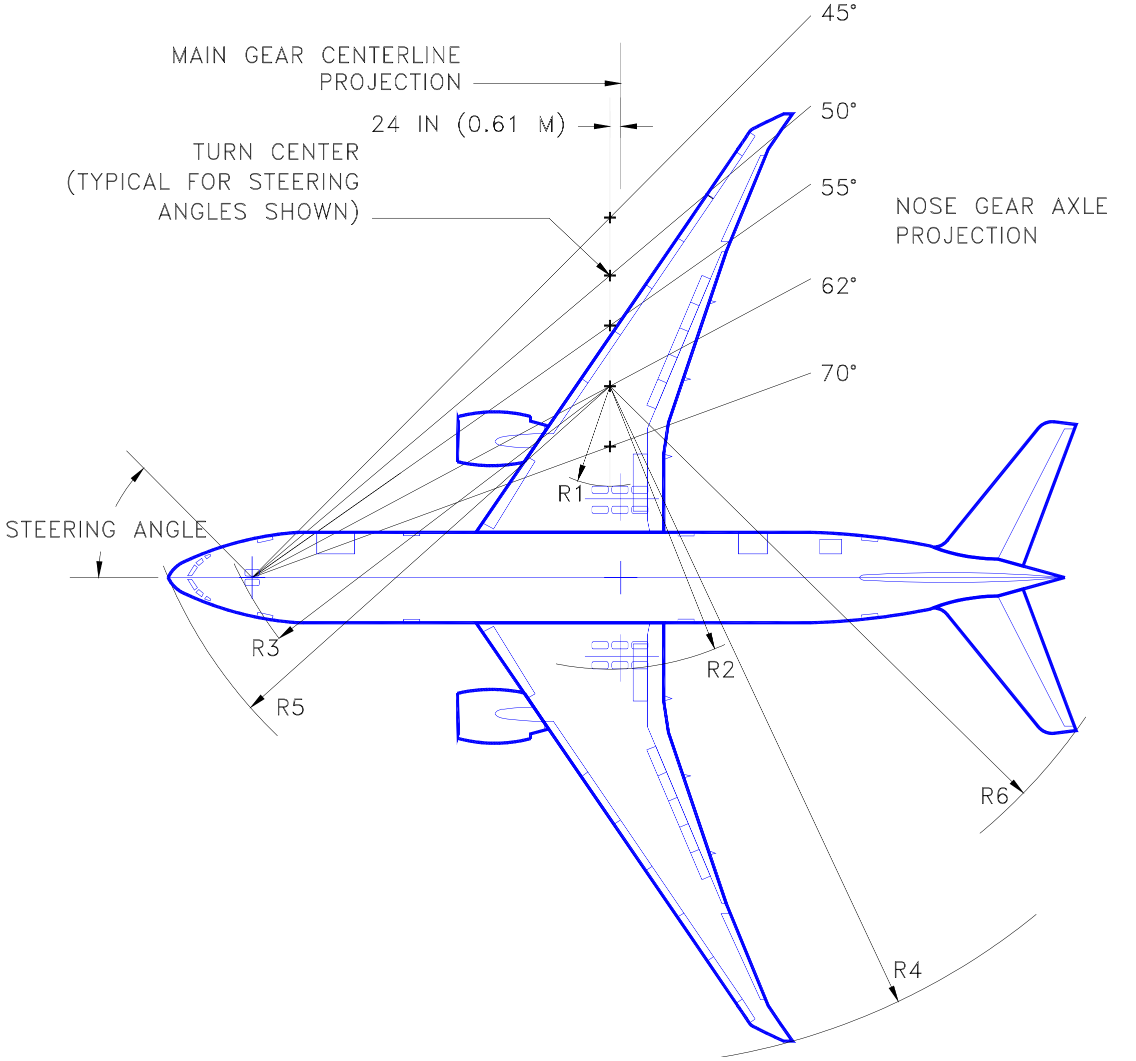
4.1 General Information

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

PRELIMINARY INFORMATION

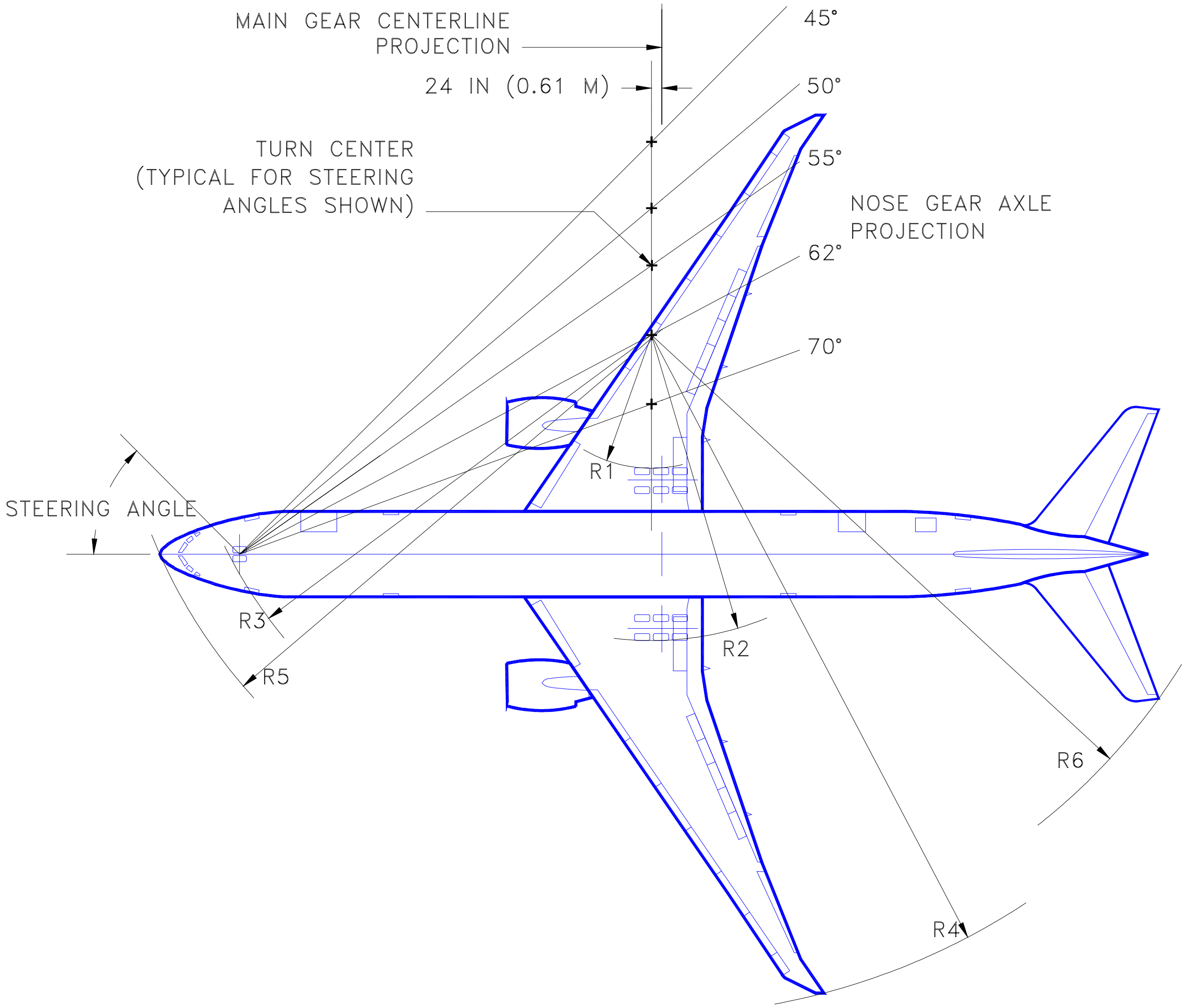


NOTES: DATA SHOWN FOR AIRPLANE WITH AFT AXLE STEERING
ACTUAL OPERATING TURNING RADII MAY BE GREATER THAN SHOWN
CONSULT WITH AIRLINE FOR SPECIFIC OPERATING PROCEDURE
DIMENSIONS ROUNDED TO NEAREST 0.1 FOOT AND 0.1 METER

STEERING ANGLE	R1 INNER GEAR		R2 OUTER GEAR		R3 NOSE GEAR		R4 WING TIP		R5 NOSE		R6 TAIL	
(DEG)	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
30	122.4	37.3	164.8	50.2	168.8	51.5	253.0	77.1	177.4	54.1	207.4	63.2
35	97.2	29.6	139.6	42.6	147.7	45.0	228.1	69.5	157.7	48.1	186.1	56.7
40	77.6	23.7	120.0	36.6	132.3	40.3	208.8	63.6	143.6	43.8	170.3	51.9
45	61.7	18.8	104.1	31.7	120.7	36.8	193.3	58.9	133.2	40.6	158.0	48.2
50	48.4	14.8	90.8	27.7	111.8	34.1	180.2	54.9	125.3	38.2	148.3	45.2
55	36.8	11.2	79.2	24.1	104.8	31.9	169.0	51.5	119.3	36.4	140.4	42.8
60	26.7	8.1	69.1	21.1	99.5	30.3	159.1	48.5	114.7	35.0	133.9	40.8
65	17.5	5.3	59.9	18.3	95.3	29.0	150.2	45.8	111.1	33.9	128.3	39.1
70 (MAX)	9.0	2.7	51.4	15.7	92.1	28.1	142.0	43.3	108.5	33.1	123.7	37.7

4.2.1 TURNING RADII - NO SLIP ANGLE

MODEL 777-200LR



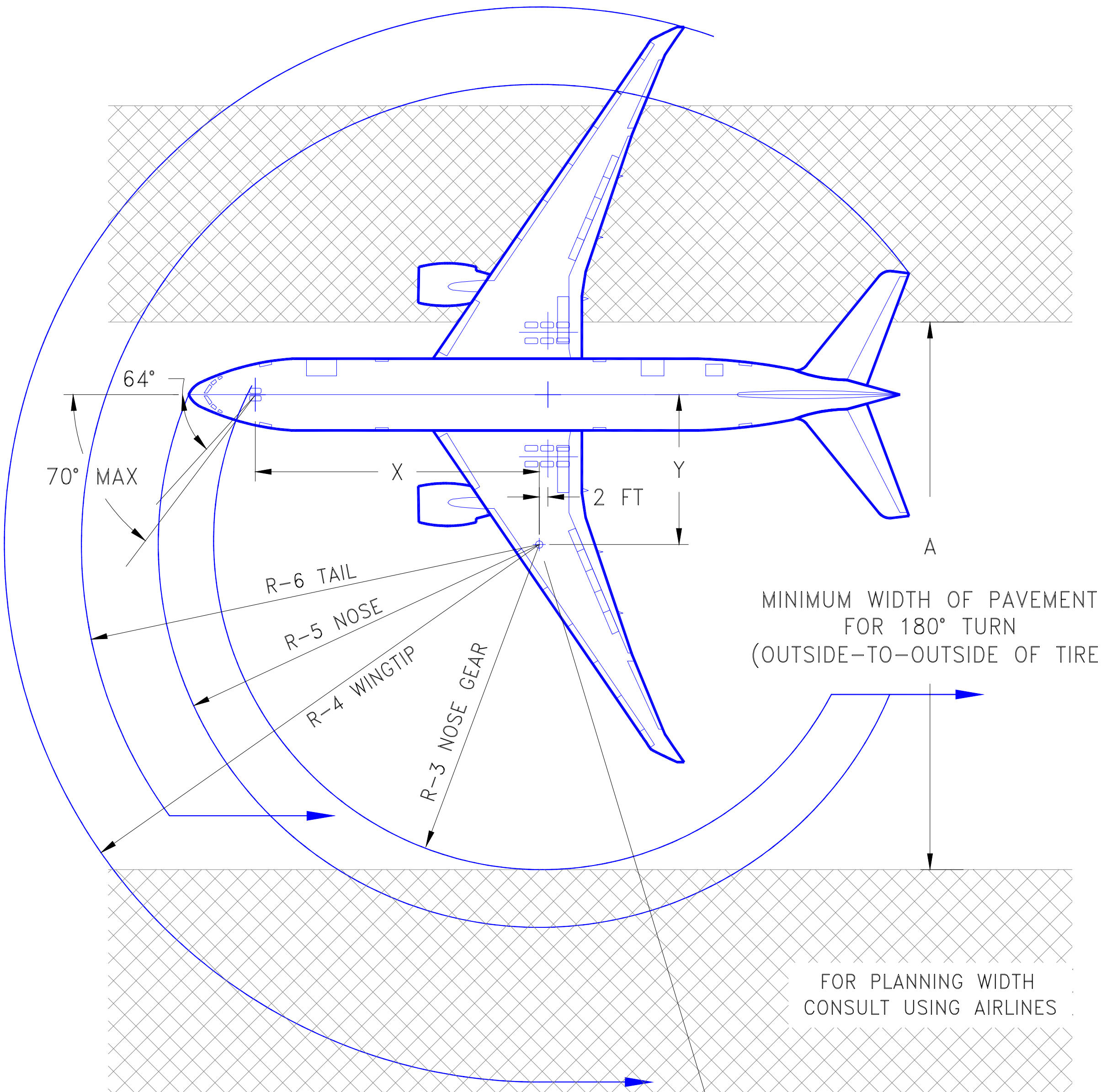
NOTES: DATA SHOWN FOR AIRPLANE WITH AFT AXLE STEERING
ACTUAL OPERATING TURNING RADII MAY BE GREATER THAN SHOWN
CONSULT WITH AIRLINE FOR SPECIFIC OPERATING PROCEDURE
DIMENSIONS ROUNDED TO NEAREST 0.1 FOOT AND 0.1 METER

STEERING ANGLE	R1 INNER GEAR		R2 OUTER GEAR		R3 NOSE GEAR		R4 WING TIP		R5 NOSE		R6 TAIL	
(DEG)	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
30	152.7	46.5	195.1	59.5	203.8	62.1	283.3	86.4	212.3	64.7	241.5	73.6
35	122.2	37.2	164.6	50.2	178.2	54.3	252.8	77.1	188.1	57.3	215.6	65.7
40	98.5	30.0	140.9	42.9	159.5	48.6	229.4	69.9	170.7	52.0	196.4	59.9
45	79.2	24.1	121.6	37.1	145.4	44.3	210.4	64.1	157.8	48.1	181.5	55.3
50	63.0	19.2	106.5	32.4	134.6	41.0	194.6	59.3	148.0	45.1	169.4	51.6
55	49.1	15.0	91.5	27.9	126.2	38.5	180.9	55.1	140.5	42.8	160.3	48.9
60	36.8	11.2	79.2	24.1	119.7	36.5	168.9	51.5	134.8	41.1	152.5	46.5
65	25.6	7.8	68.0	20.7	114.6	34.9	158.1	48.2	130.4	39.7	145.9	44.5
70 (MAX)	15.3	4.7	57.7	17.6	110.7	33.7	148.2	45.2	124.6	38.0	140.4	42.8

4.2.2 TURNING RADII - NO SLIP ANGLE

MODEL 777-300ER

PRELIMINARY FOR 777-200LR



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.

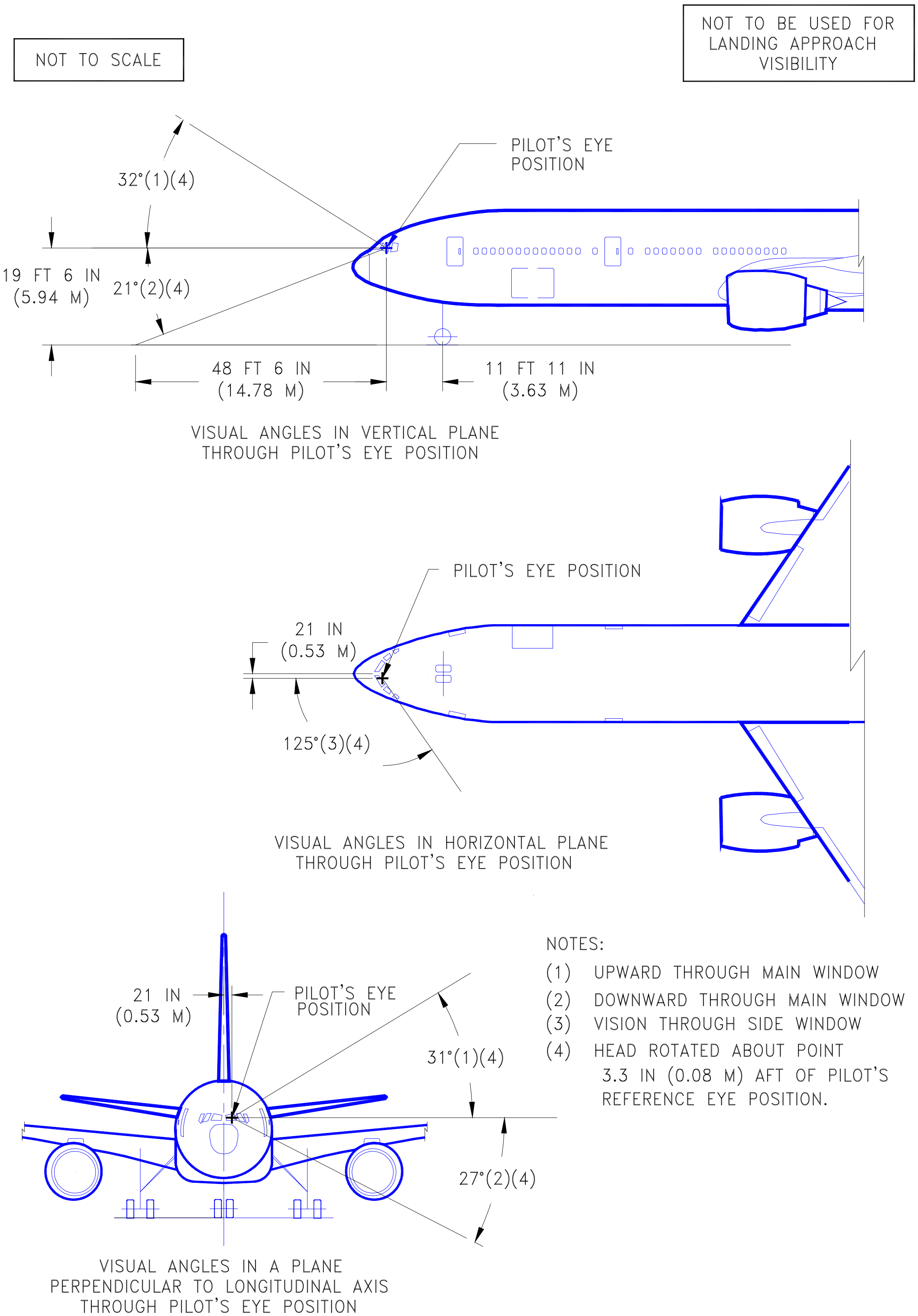
THEORETICAL CENTER OF TURN FOR MINIMUM TURNING RADIUS.
SLOW CONTINUOUS TURN
DIFERENTIAL THRUST
NO DIFFERENTIAL BRAKING

AIRPLANE MODEL	EFFECTIVE STEERING ANGLE (DEG)	X		Y		A		R3		R4		R5		R6	
		FT	M	FT	M	FT	M	FT	M	FT	M	FT	M	FT	M
777-200LR	64	82.9	25.3	40.4	12.3	155.8	47.5	94.3	28.7	152.5	46.5	110.0	33.5	131.0	39.9
777-300ER	64	100.4	30.6	49.0	14.9	183.9	56.1	113.7	34.7	160.7	49.0	129.4	39.4	148.8	45.3

4.3 CLEARANCE RADII

MODEL 777-200LR, -300ER

PRELIMINARY FOR 777-200LR

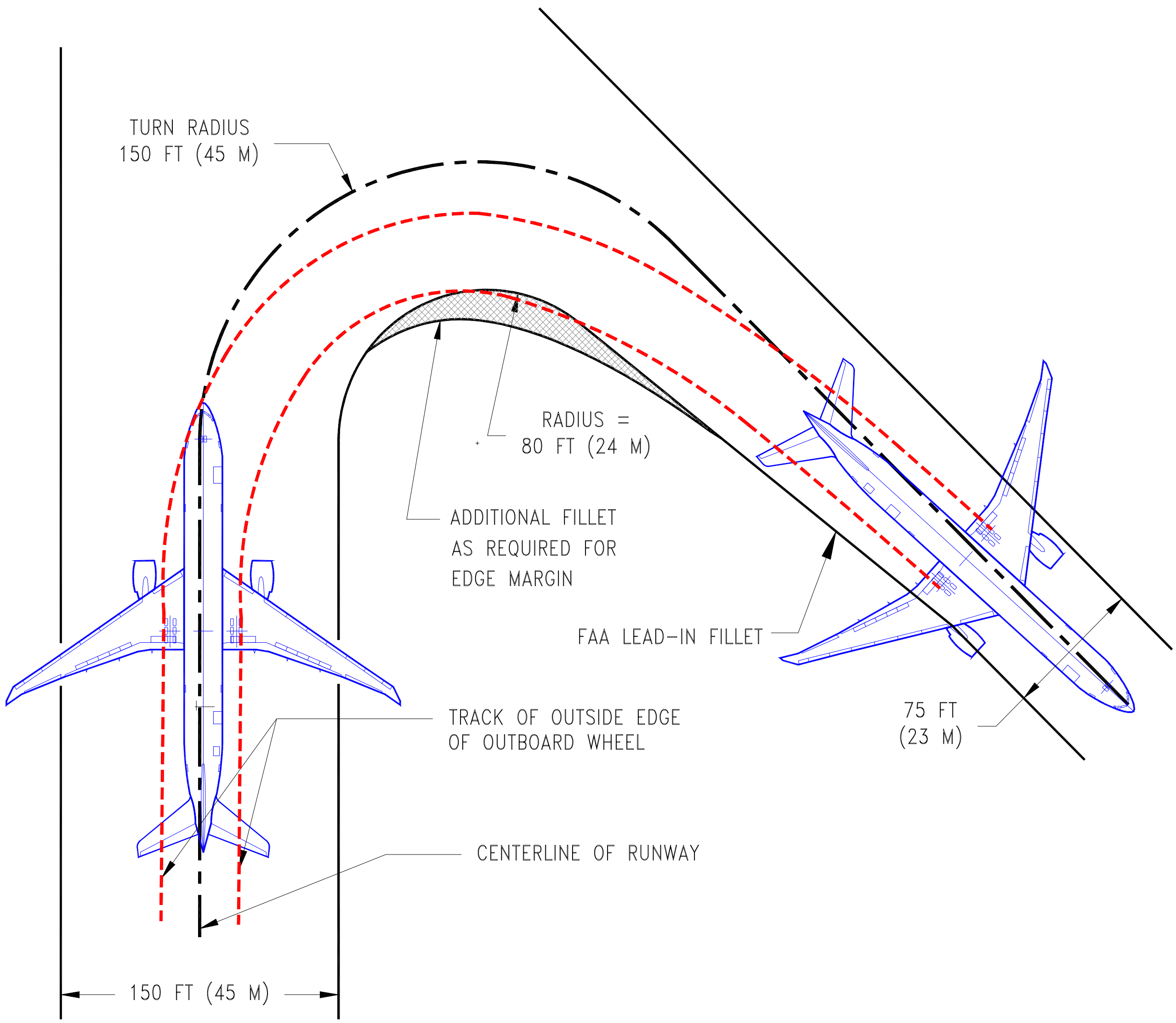


4.4 VISIBILITY FROM COCKPIT IN STATIC POSITION

MODEL 777-200LR, -300ER

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
- 777-300ER DATA SHOWN. 777-200LR DATA WOULD BE LESS STRINGENT.

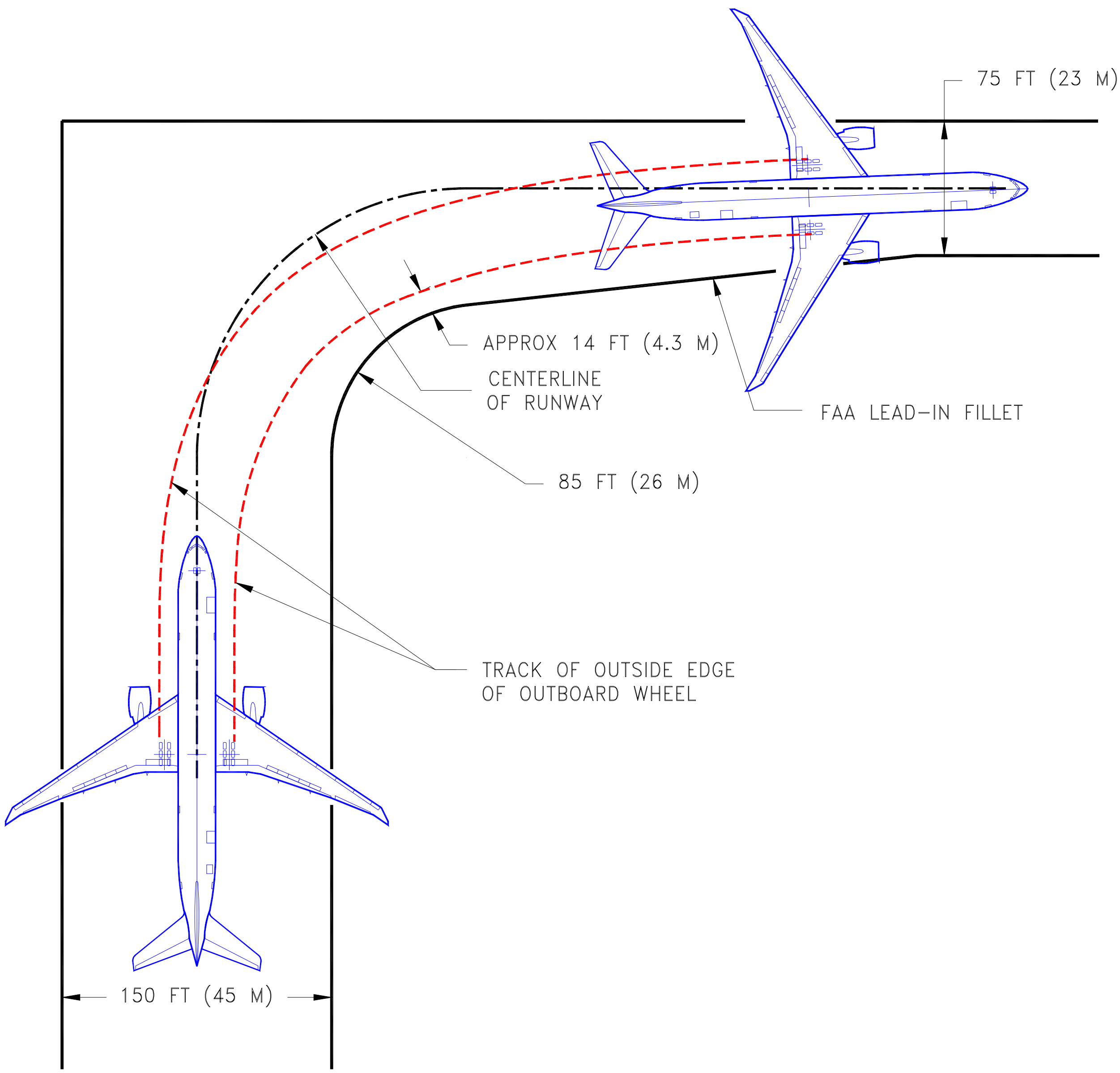


4.5.1 RUNWAY AND TAXIWAY TURNPATHS - RUNWAY-TO-TAXIWAY, MORE THAN 90 DEGREES

MODEL 777-200LR, -300ER

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
- 777-300ER DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200LR WOULD BE APPROXIMATELY 20 FT (6.1 M) INSTEAD OF 14 FT (4.3 M) AS SHOWN.

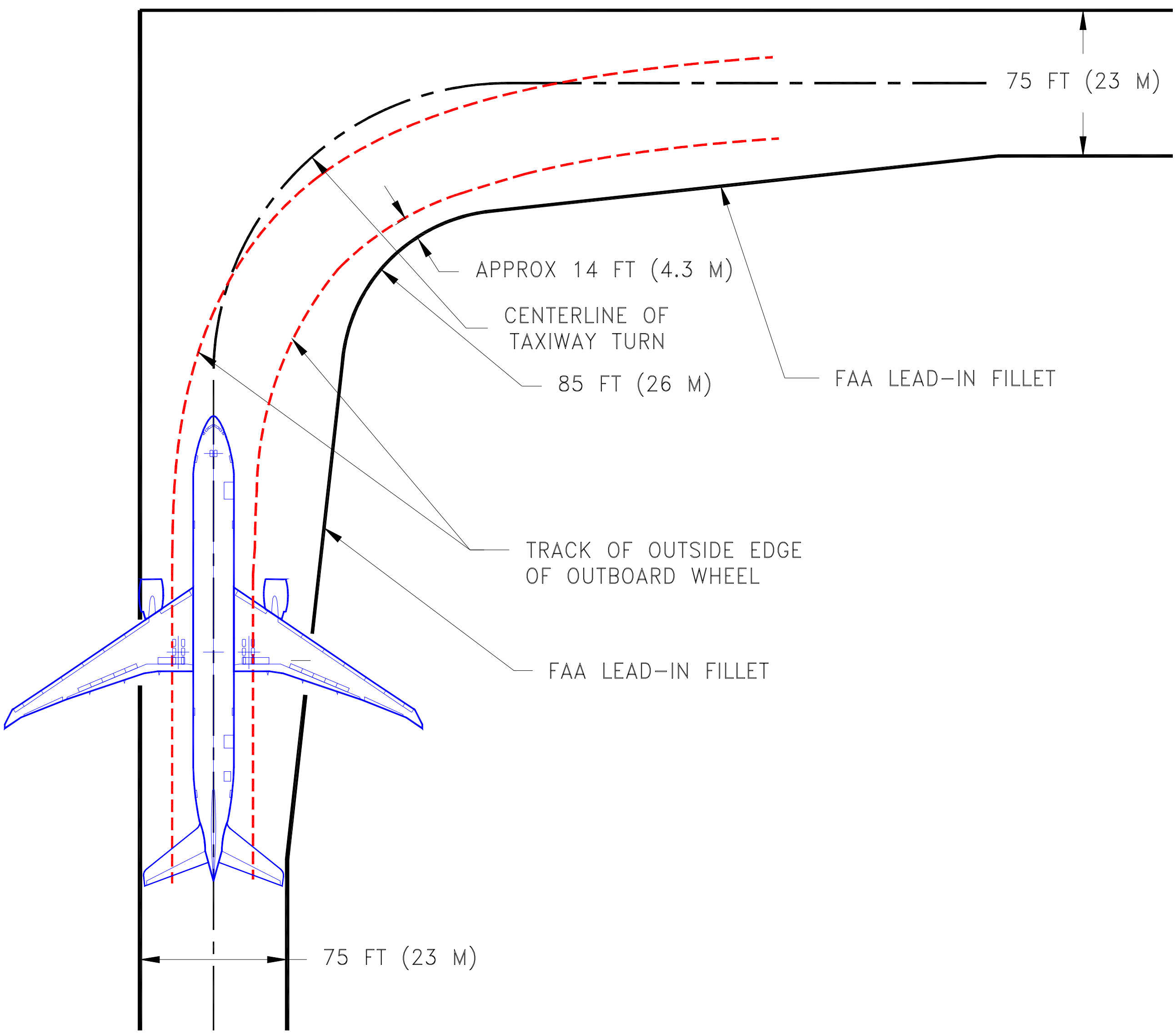


4.5.2 RUNWAY AND TAXIWAY TURNPATHS - RUNWAY-TO-TAXIWAY, 90 DEGREES

MODEL 777-200LR, -300ER

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
- 777-300ER DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200LR WOULD BE APPROXIMATELY 22 FT (6.7 M) INSTEAD OF 14 FT (4.3 M) AS SHOWN.

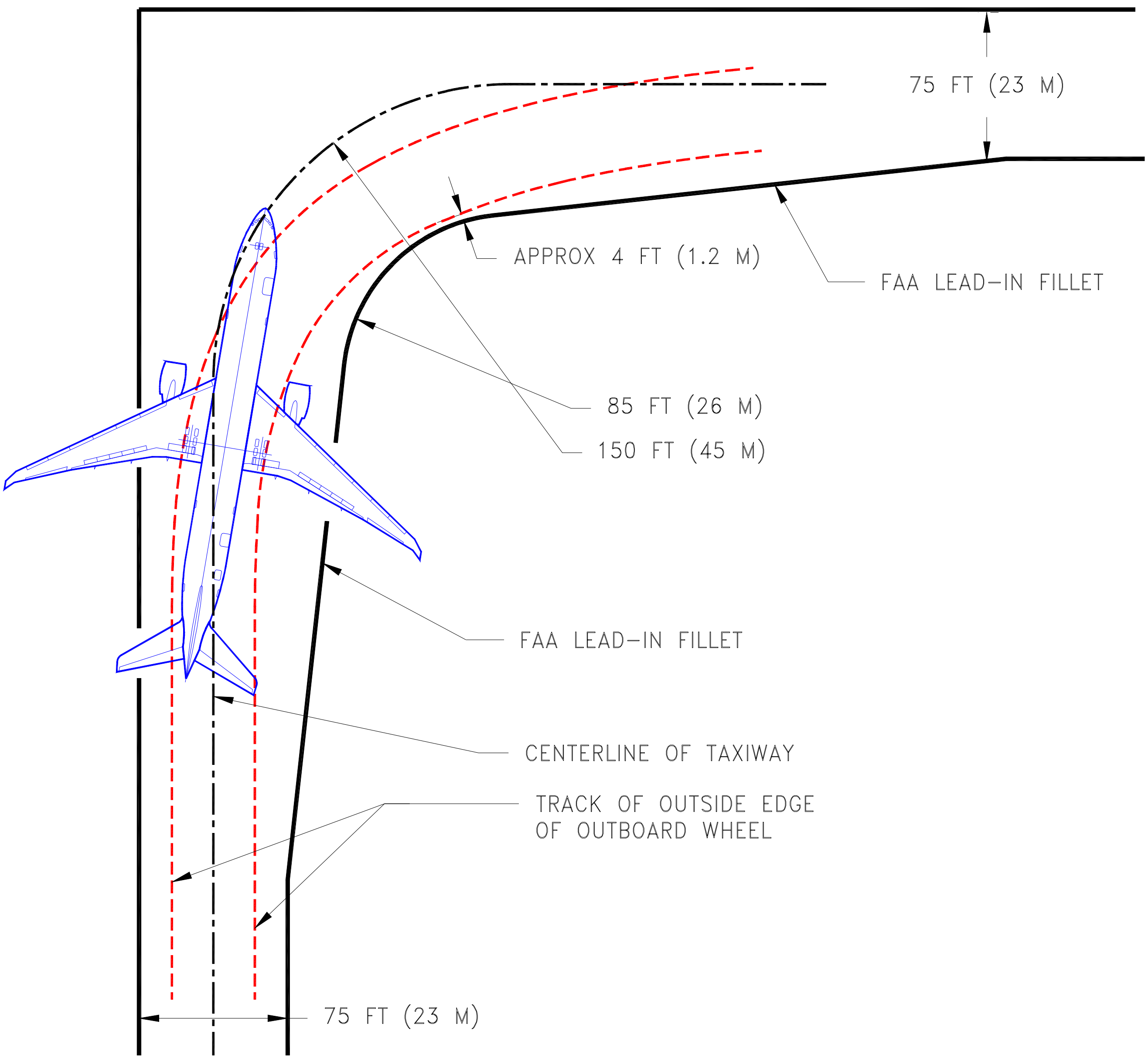


4.5.3 RUNWAY AND TAXIWAY TURNPATHS - TAXIWAY-TO-TAXIWAY, 90 DEGREES, NOSE GEAR TRACKS CENTERLINE

MODEL 777-200LR, -300ER

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
- 777-300ER DATA SHOWN. CALCULATED EDGE MARGIN FOR THE 777-200LR WOULD BE APPROXIMATELY 17 FT (5.2 M) INSTEAD OF 4 FT (1.2 M) AS SHOWN.

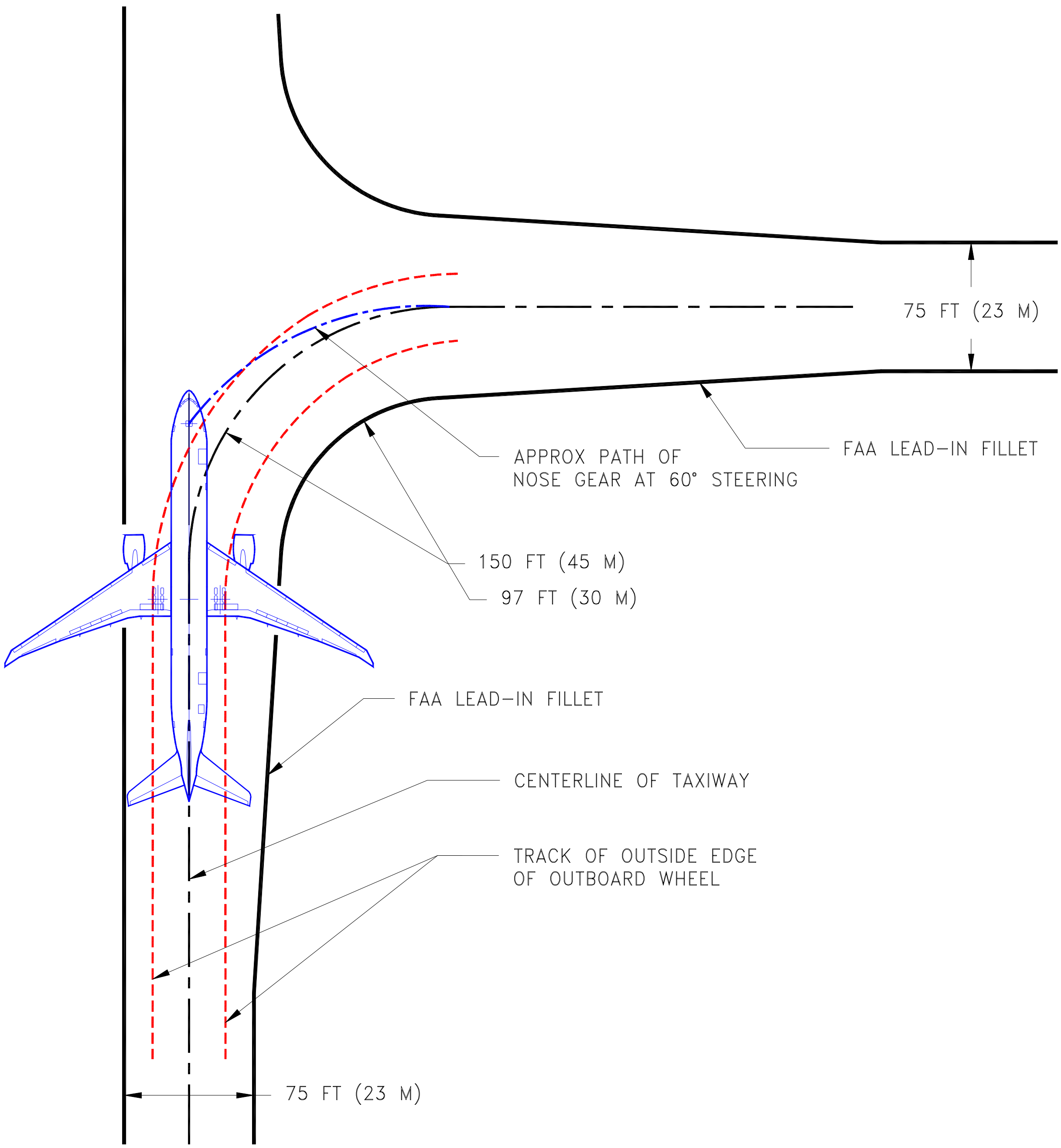


4.5.4 RUNWAY AND TAXIWAY TURNPATHS - TAXIWAY-TO-TAXIWAY, 90 DEGREES, COCKPIT TRACKS CENTERLINE

MODEL 777-200LR, -300ER

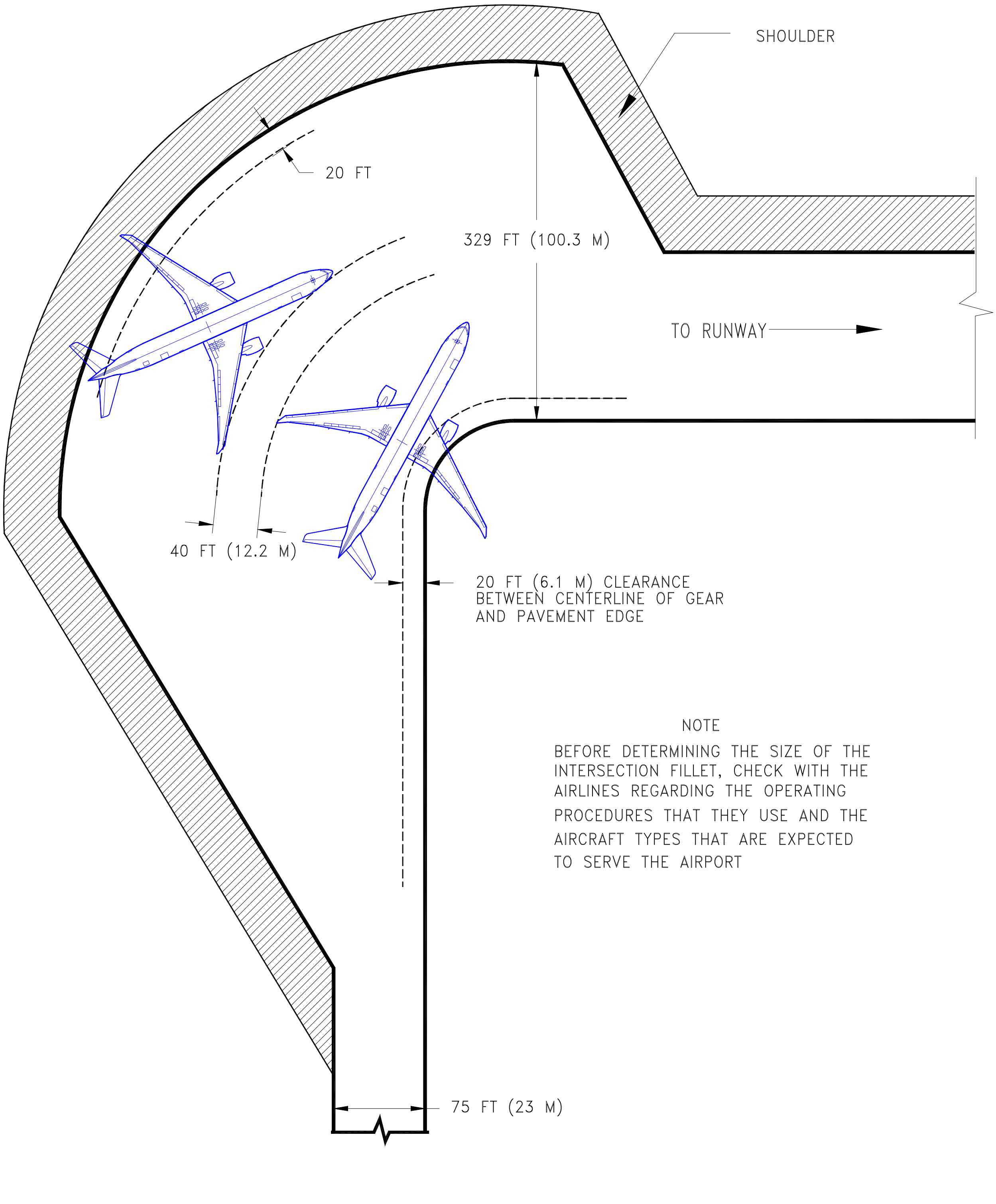
NOTES:

- 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
- 777-300ER DATA SHOWN. 777-200LR DATA WOULD BE LESS STRINGENT



4.5.5 RUNWAY AND TAXIWAY TURNPATHS - TAXIWAY-TO-TAXIWAY, 90 DEGREES, JUDGMENTAL OVERSTEERING

MODEL 777-200LR, -300ER



4.6 RUNWAY HOLDING BAY

MODEL 777-200LR, -300ER

5.0 TERMINAL SERVICING

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.

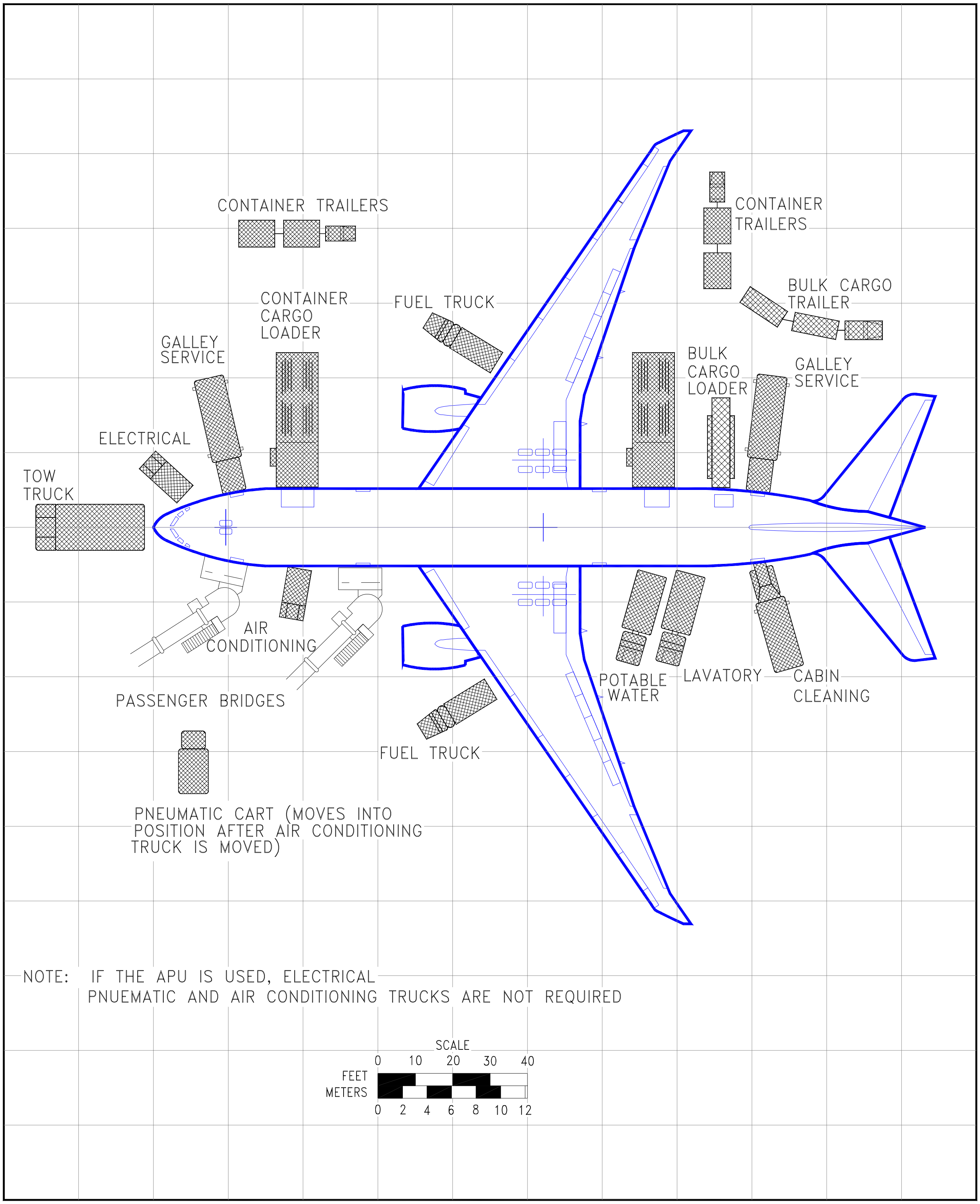
Section 5.4 shows the locations of ground service connections in graphic and in tabular forms. Typical capacities and service requirements are shown in the tables. Services with requirements that vary with conditions are described in subsequent sections.

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.

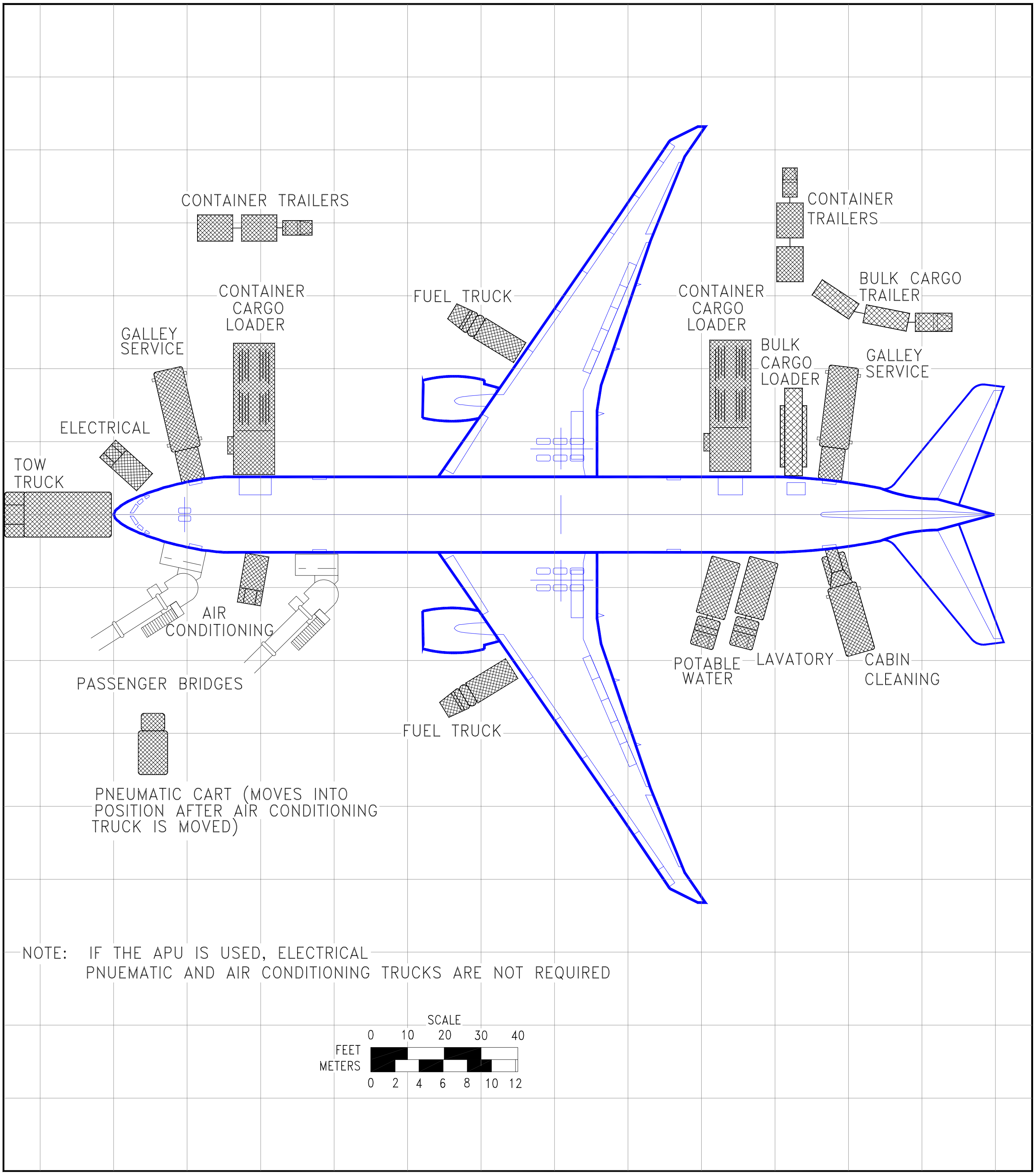
Section 5.7 shows air conditioning requirements for heating and cooling to maintain a constant cabin air temperature using low pressure conditioned air. This conditioned air is supplied through an 8-in ground air connection (GAC) directly to the passenger cabin, bypassing the air cycle machines.

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

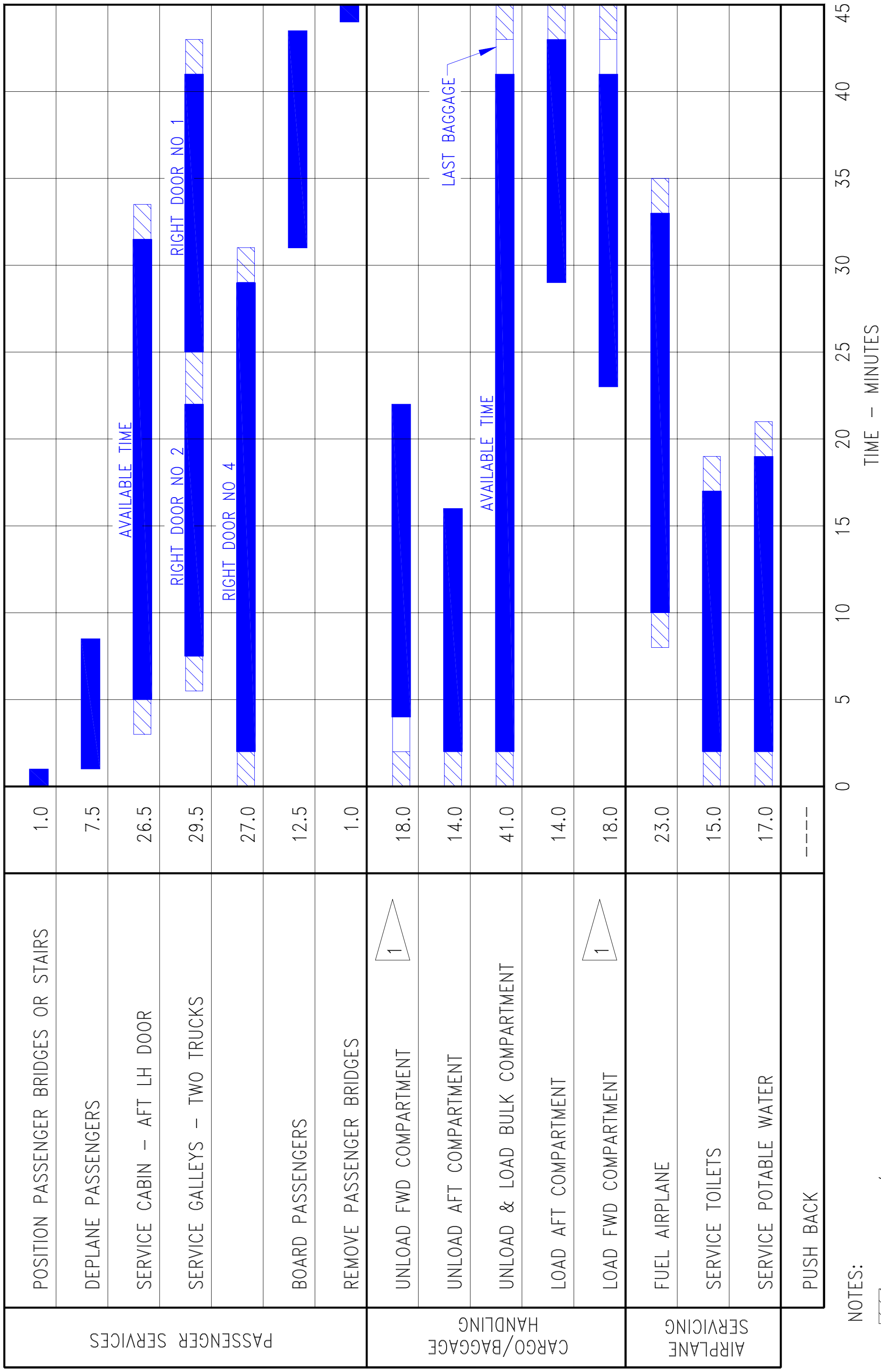


5.1.1 AIRPLANE SERVICING ARRANGEMENT - TYPICAL TURNAROUND

MODEL 777-200LR



5.1.2 AIRPLANE SERVICING ARRANGEMENT - TYPICAL TURNAROUND
MODEL 777-300ER



NOTES:

(hatched) POSITION/REMOVE EQUIPMENT

(1) WITH SIX PALLETS, LOAD OR UNLOAD TIME IS ESTIMATED TO BE 12 MINUTES LOWER LOBE 14 LD3 CONTAINERS AFT AND 18 FWD

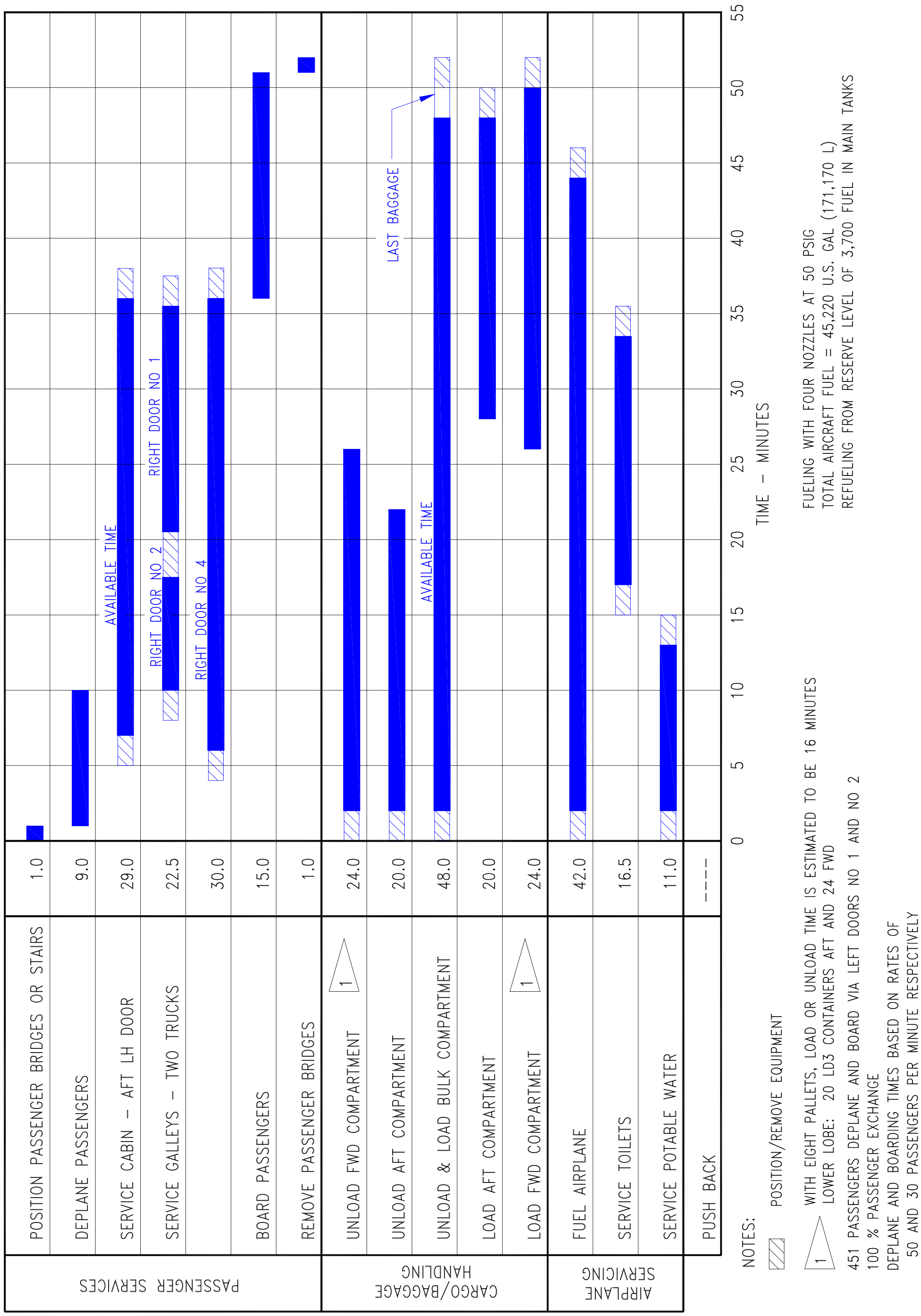
375 PASSENGERS DEPLANE AND BOARD VIA LEFT DOORS NO 1 AND NO 2
100 % PASSENGER EXCHANGE
DEPLANE AND BOARDING TIMES BASED ON RATES OF 50 AND 30 PASSENGERS PER MINUTE RESPECTIVELY

FUELING WITH FOUR NOZZLES AT 50 PSIG
TOTAL AIRCRAFT FUEL = 31,600 U.S. GAL (119,600 L)
REFUELING FROM RESERVE LEVEL OF 3,700 FUEL IN MAIN TANKS

FUELING AND CARGO OPERATIONS SEQUENCED TO MAINTAIN FAVORABLE WEIGHT AND BALANCE CONDITION

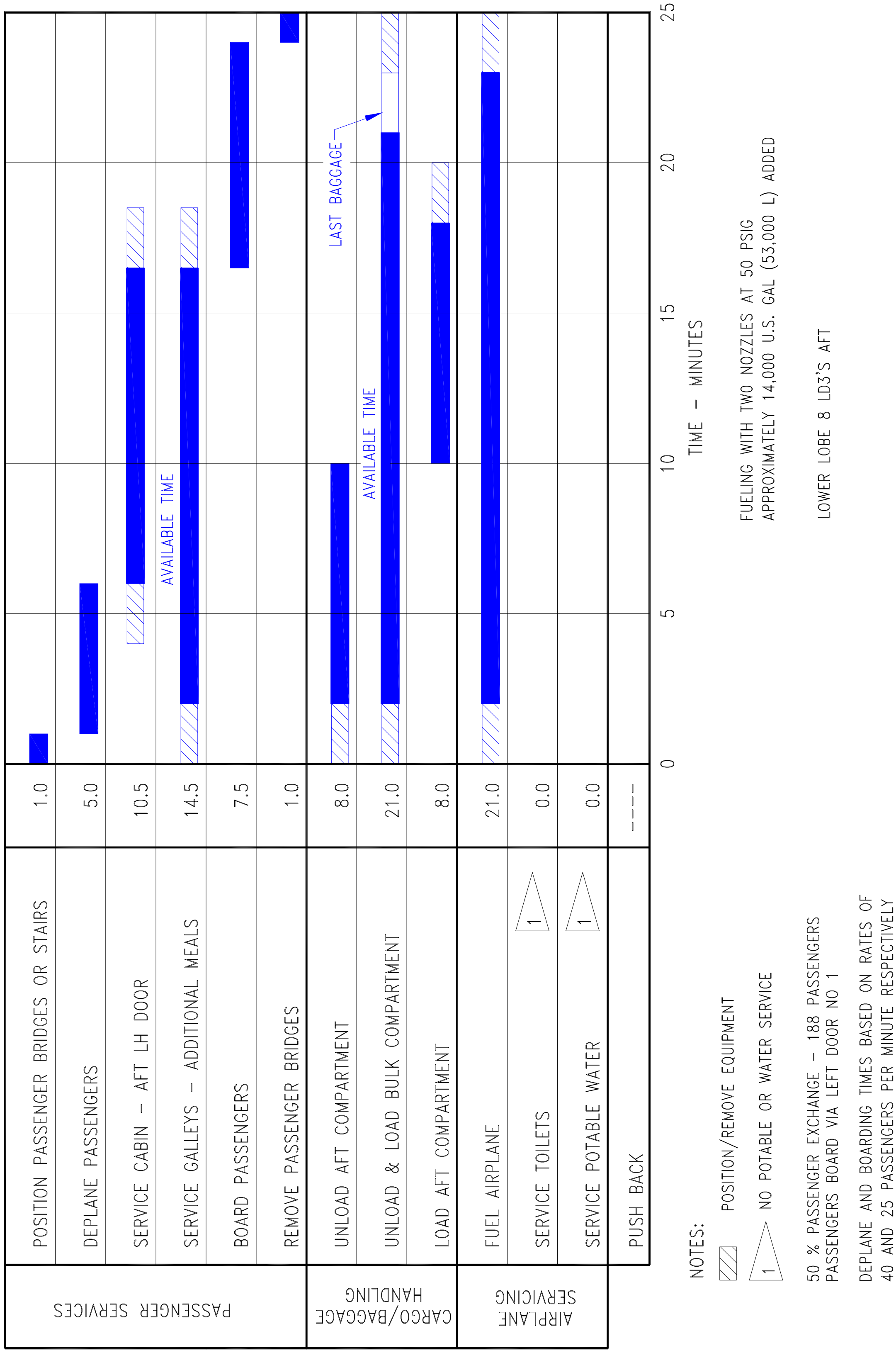
5.2.1 TERMINAL OPERATIONS - TURNAROUND STATION

MODEL 777-200LR

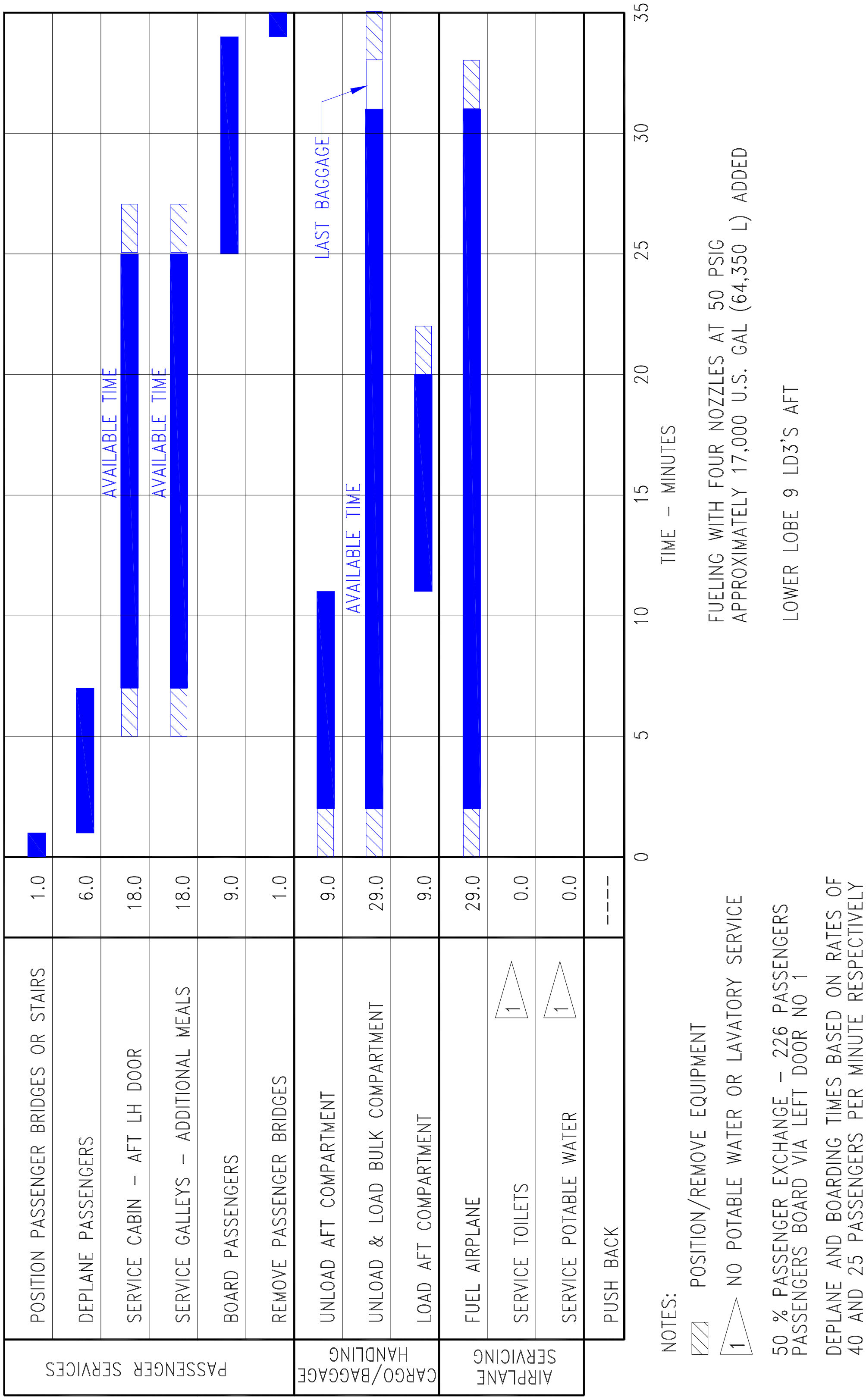


5.2.2. TERMINAL OPERATIONS - TURNAROUND STATION

MODEL 777-300ER

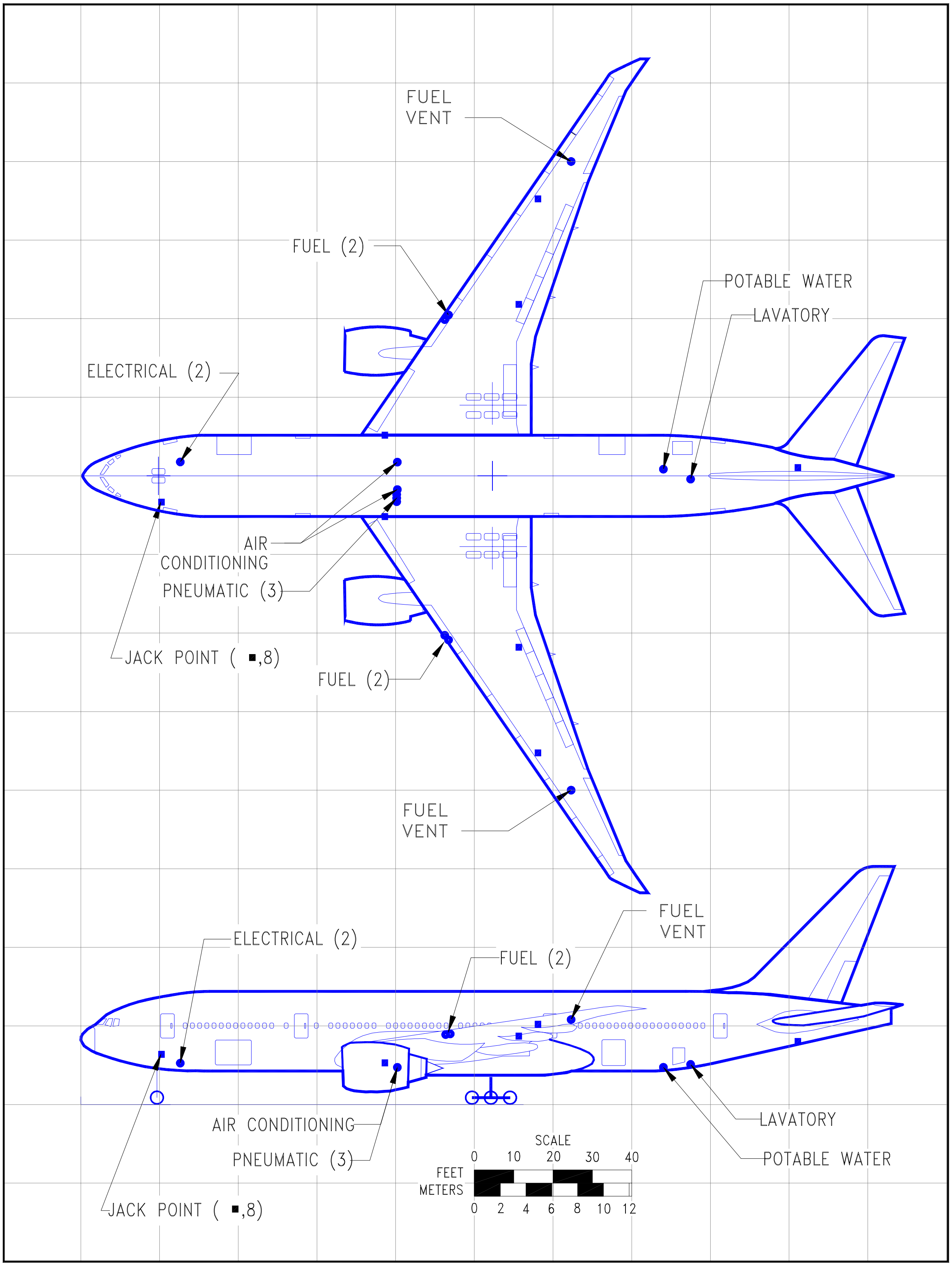


5.3.1 TERMINAL OPERATIONS - EN ROUTE STATION
MODEL 777-200LR



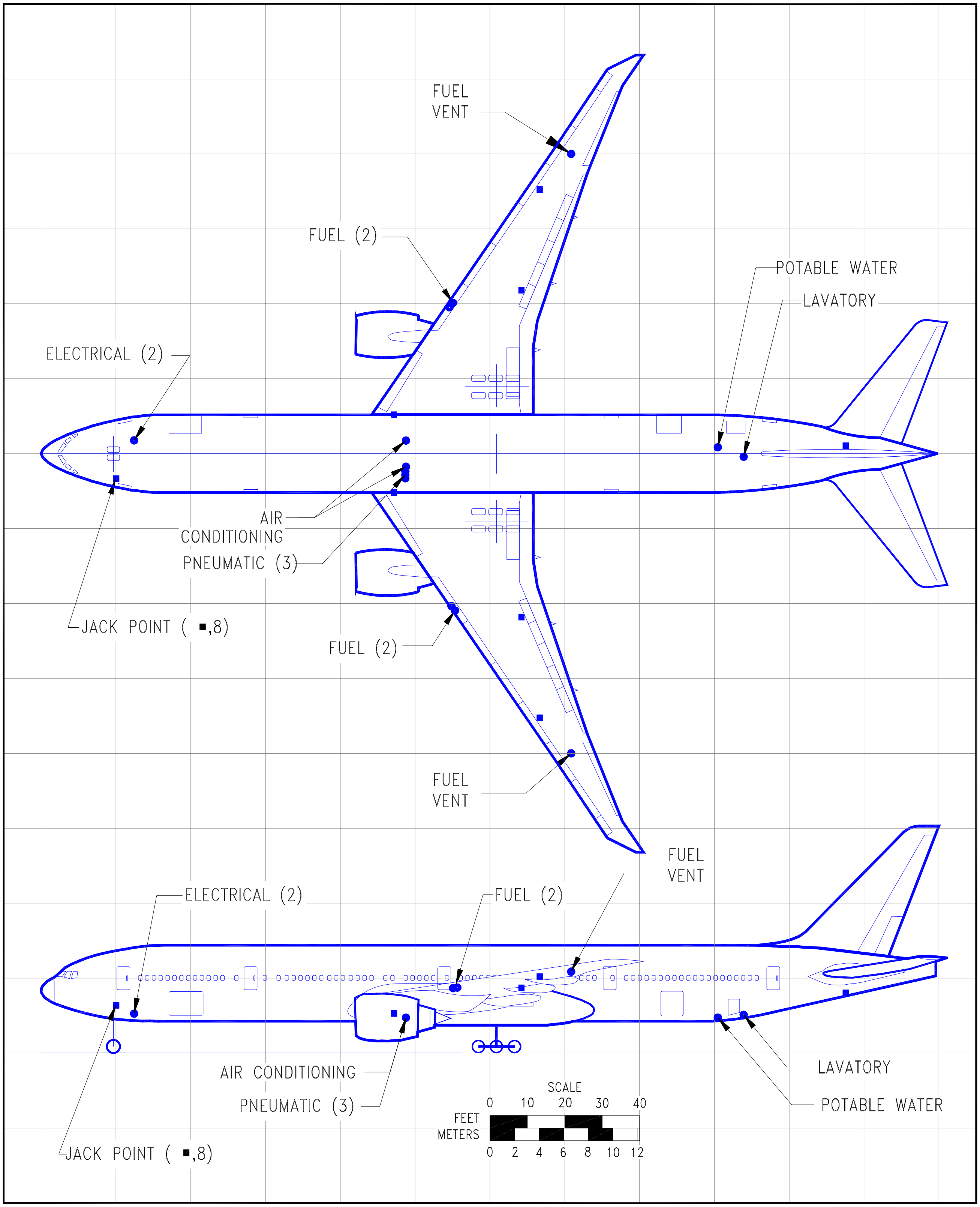
5.3.2 TERMINAL OPERATIONS - EN ROUTE STATION

MODEL 777-300ER



5.4 .1 GROUND SERVICING CONNECTIONS

MODEL 777-200LR



5.4.2 GROUND SERVICING CONNECTIONS

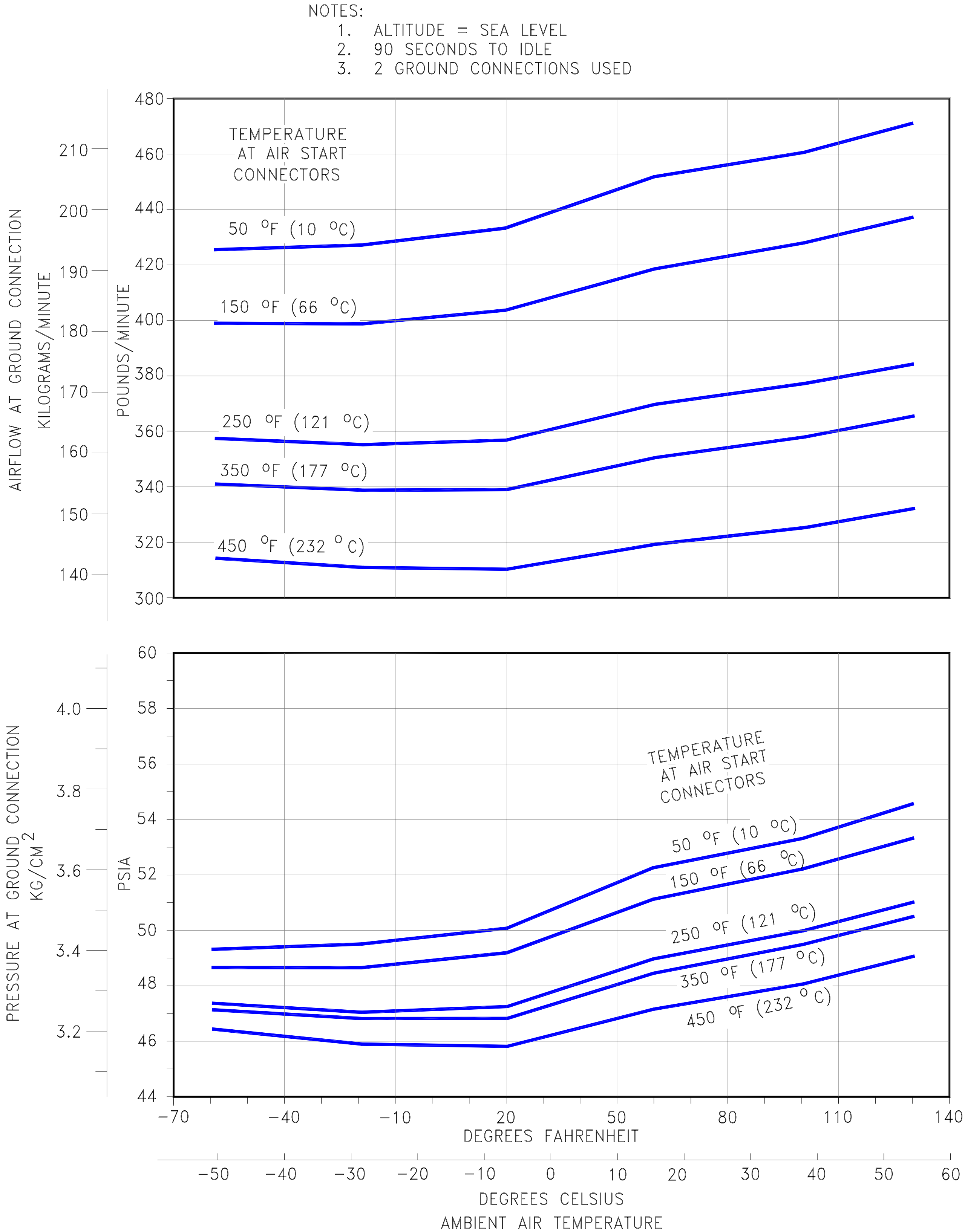
MODEL 777-300ER

SYSTEM	MODEL	DISTANCE AFT OF NOSE		DISTANCE FROM AIRPLANE CENTERLINE				MAX HEIGHT ABOVE GROUND	
				LH SIDE		RH SIDE			
		FT	M	FT	M	FT	M	FT	M
CONDITIONED AIR	777-200LR	80	24.4	3	1.1	3	1.1	8	2.4
TWO 8-IN (20.3 CM) PORTS	777-300ER	97	29.6	3	1.1	3-6	1.1	9	2.6
ELECTRICAL	777-200LR	23	7.1	-	-	4	1.2	9	2.8
TWO CONNECTIONS 90 KVA , 200/115 V AC 400 HZ, 3-PHASE EACH	777-300ER	23	7.1	-	-	3-9	1.1	10	3.0
FUEL									
TWO UNDERWING PRESSURE CONNECTORS ON EACH WING	777-200LR	92	28.1	39	11.9	39	11.9	19	5.6
		94	28.5	41	12.5	41	12.5	19	5.6
	777-300ER	110	33.5	39	11.9	39	11.9	18	5.4
		111	33.9	41	12.5	41	12.5	18	5.4
FUEL VENTS	777-200LR	125	38.1	80	24.4	80	24.4	22	6.7
	777-300ER	142	43.3	80	24.4	80	24.4	22	6.7
TANK CAPACITIES									
STANDARD = 47,890 GAL (181,260 L)									
THREE OPTIONAL BODY TANKS = 5,550 GAL (21,000 L)									
LAVATORY	777-200LR	155	47.1	1	0.3	-	-	11	3.3
ONE SERVICE CONNECTION	777-300ER	181	55.2	1	0.3	-	-	11	3.3
PNEUMATIC	777-200LR	80	24.4	5	1.5	-	-	8	2.4
		80	24.4	6	1.7	-	-	8	2.4
THREE 3-IN(7.6-CM) PORTS		80	24.4	7	2.0	-	-	8	2.4
	777-300ER	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	777-200LR	29	8.8	4	1.3	-	-	9	2.8
ONE SERVICE CONNECTION		147	44.9	-	-	3	1.0	10	3.0
AFT LOCATION (BASIC) FWD LOCATION (OPTIONAL)	777-300ER	29	8.8	4	1.3	-	-	9	2.8
		181	55.1	-	-	3	1.0	10	3.0

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

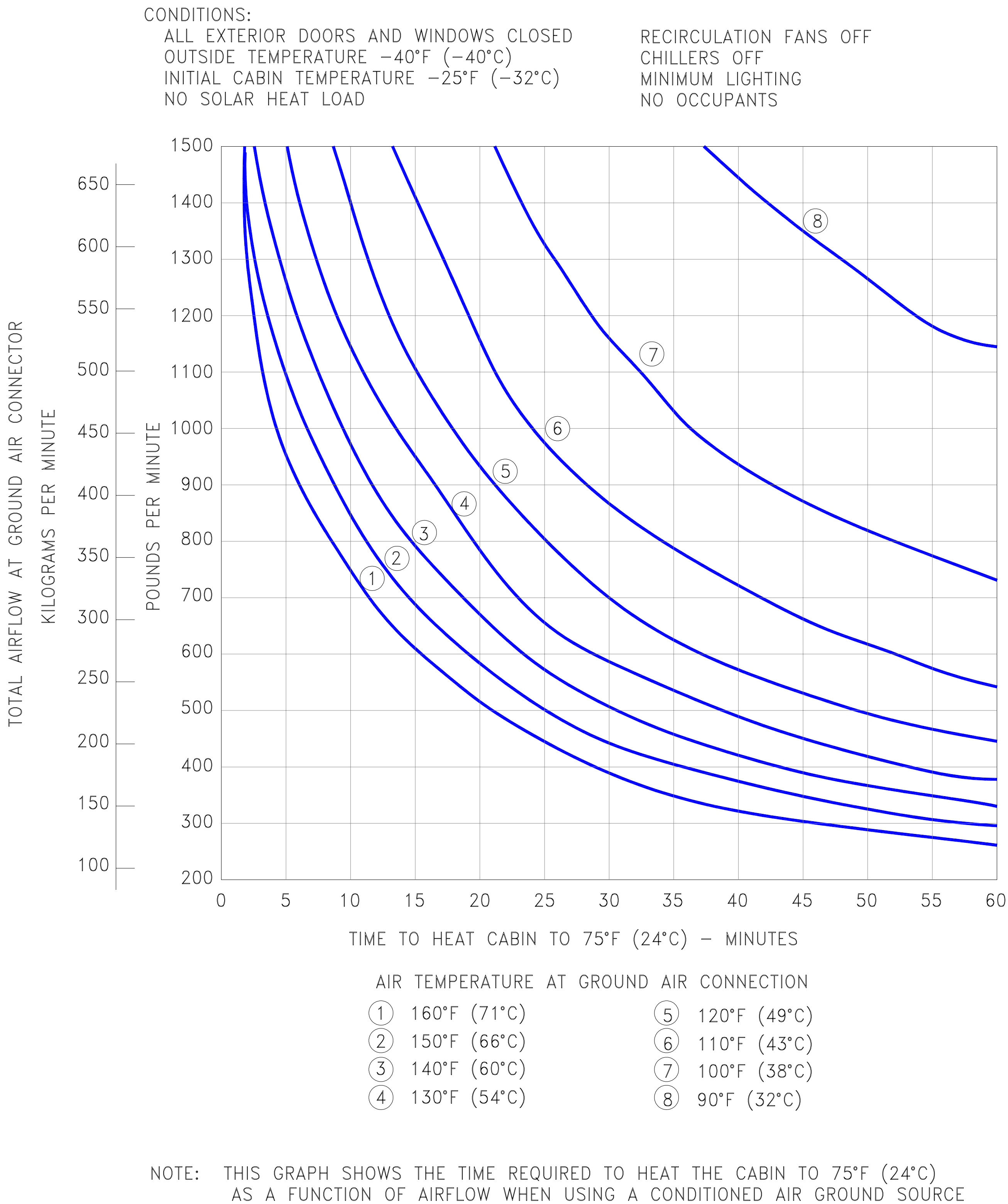
5.4.3 GROUND SERVICING CONNECTIONS AND CAPACITIES

MODEL 777-200LR, -300ER



5.5 ENGINE START PNEUMATIC REQUIREMENTS - SEA LEVEL

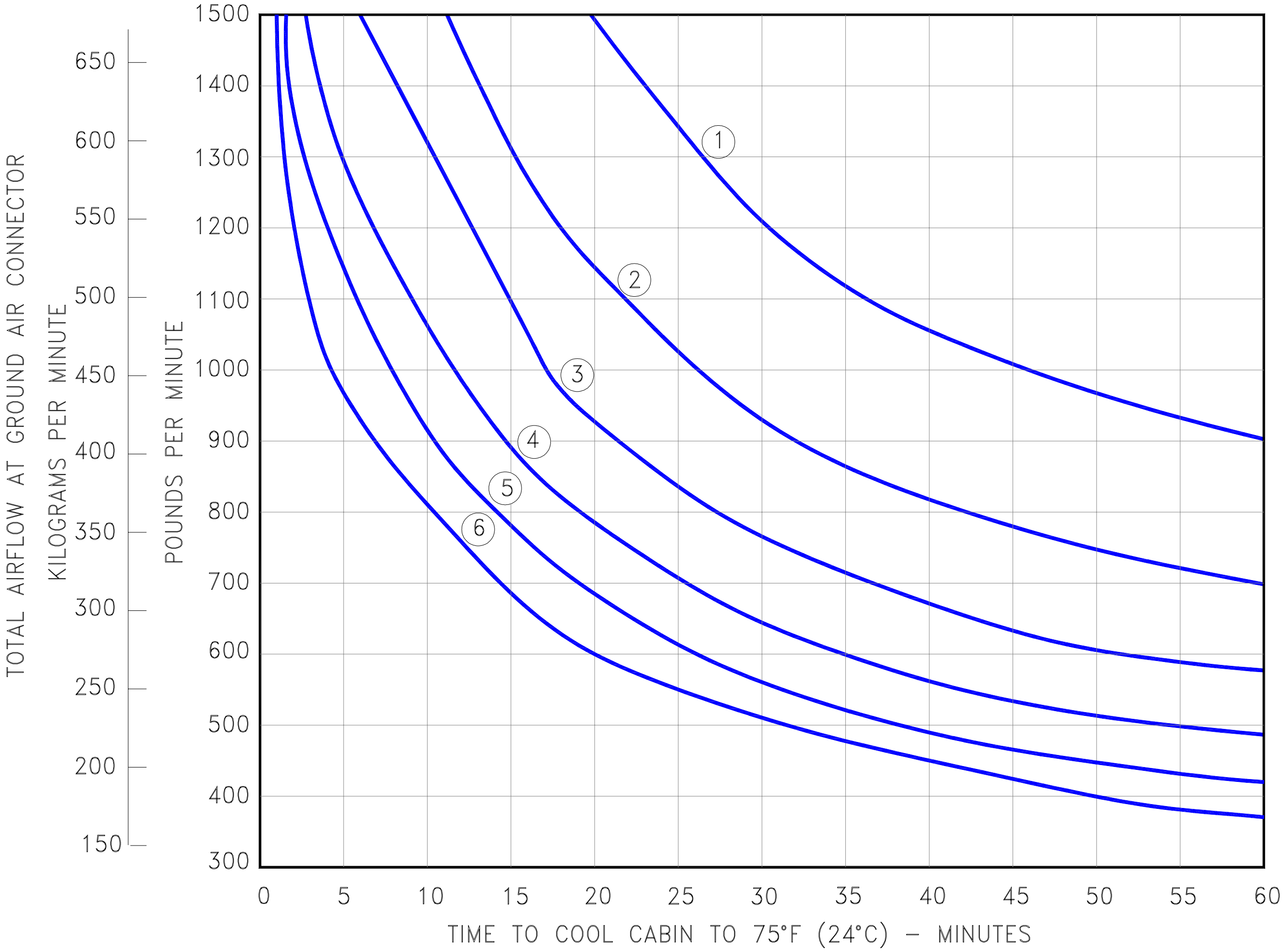
MODEL 777-200LR, -300ER



5.6.1 GROUND CONDITIONED AIR REQUIREMENTS - HEATING, PULL-UP
MODEL 777-200LR

CONDITIONS:

ALL EXTERIOR DOORS AND WINDOWS CLOSED
OUTSIDE TEMPERATURE 103°F (39°C)
INITIAL CABIN TEMPERATURE 115°F (46°C)
FULL SOLAR LOAD
RECIRCULATION FANS OFF
CHILLERS ON
MINIMUM LIGHTING
NO OCCUPANTS



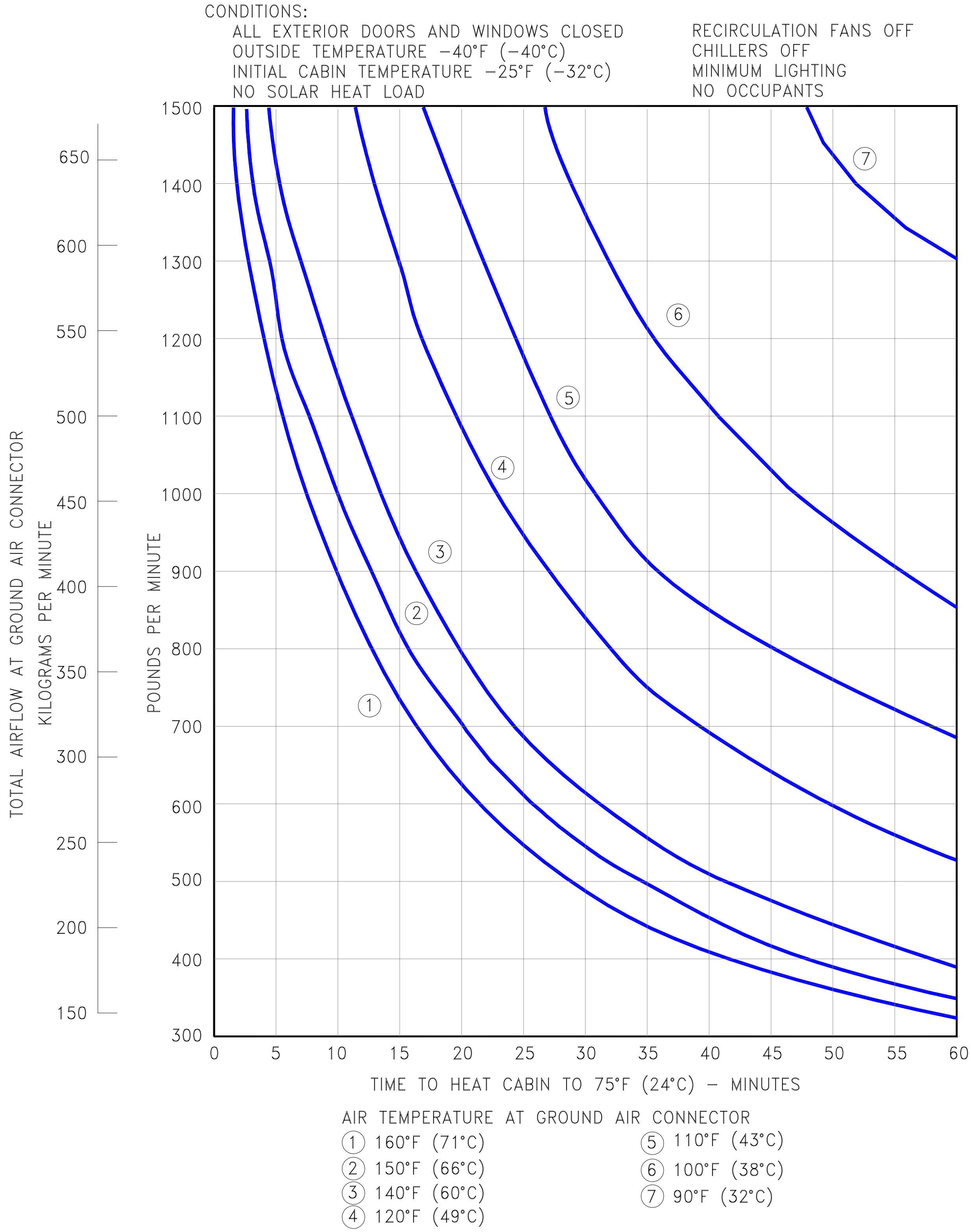
AIR TEMPERATURE AT GROUND CONNECTION

1. 60°F (16°C)
2. 55°F (13°C)
3. 50°F (10°C)
4. 45°F (7°C)
5. 40°F (4°C)
6. 35°F (2°C)

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.

5.6.2 GROUND CONDITIONED AIR REQUIREMENTS - COOLING, PULL-DOWN

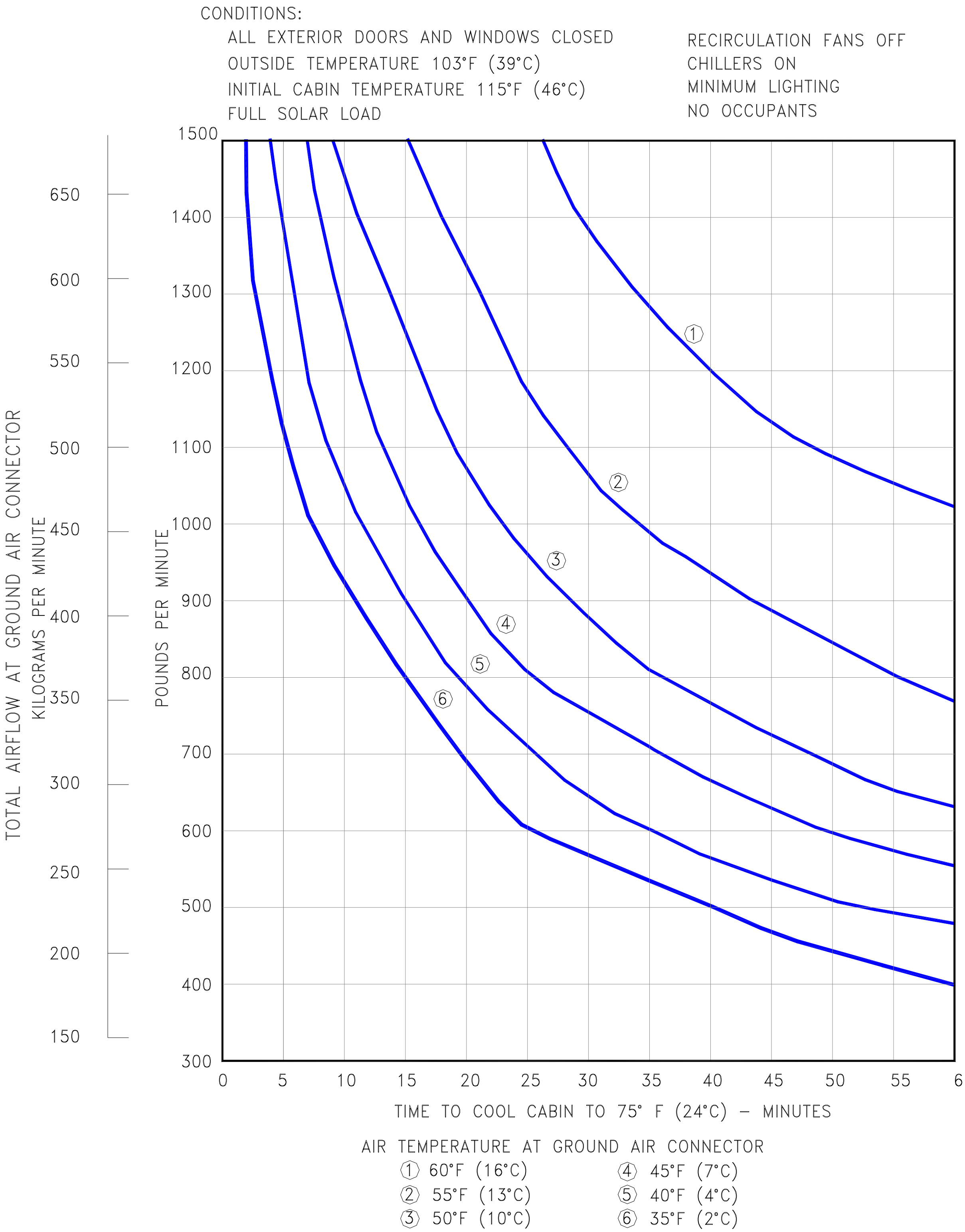
MODEL 777-200LR



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

5.6.3 GROUND CONDITIONED AIR REQUIREMENTS - HEATING, PULL-UP

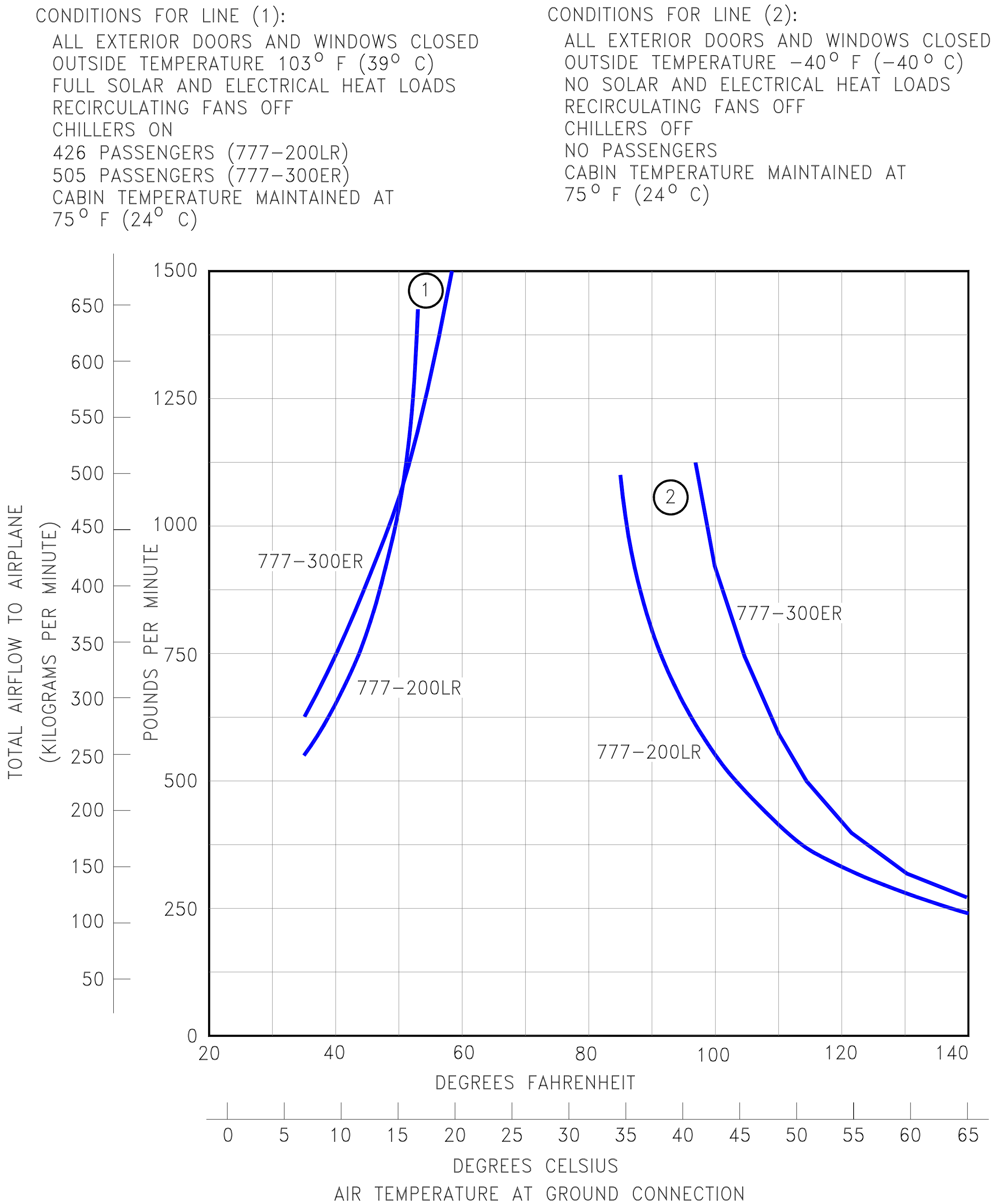
MODEL 777-300ER



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.

5.6.4 GROUND CONDITIONED AIR REQUIREMENTS - COOLING, PULL-DOWN

MODEL 777-300ER

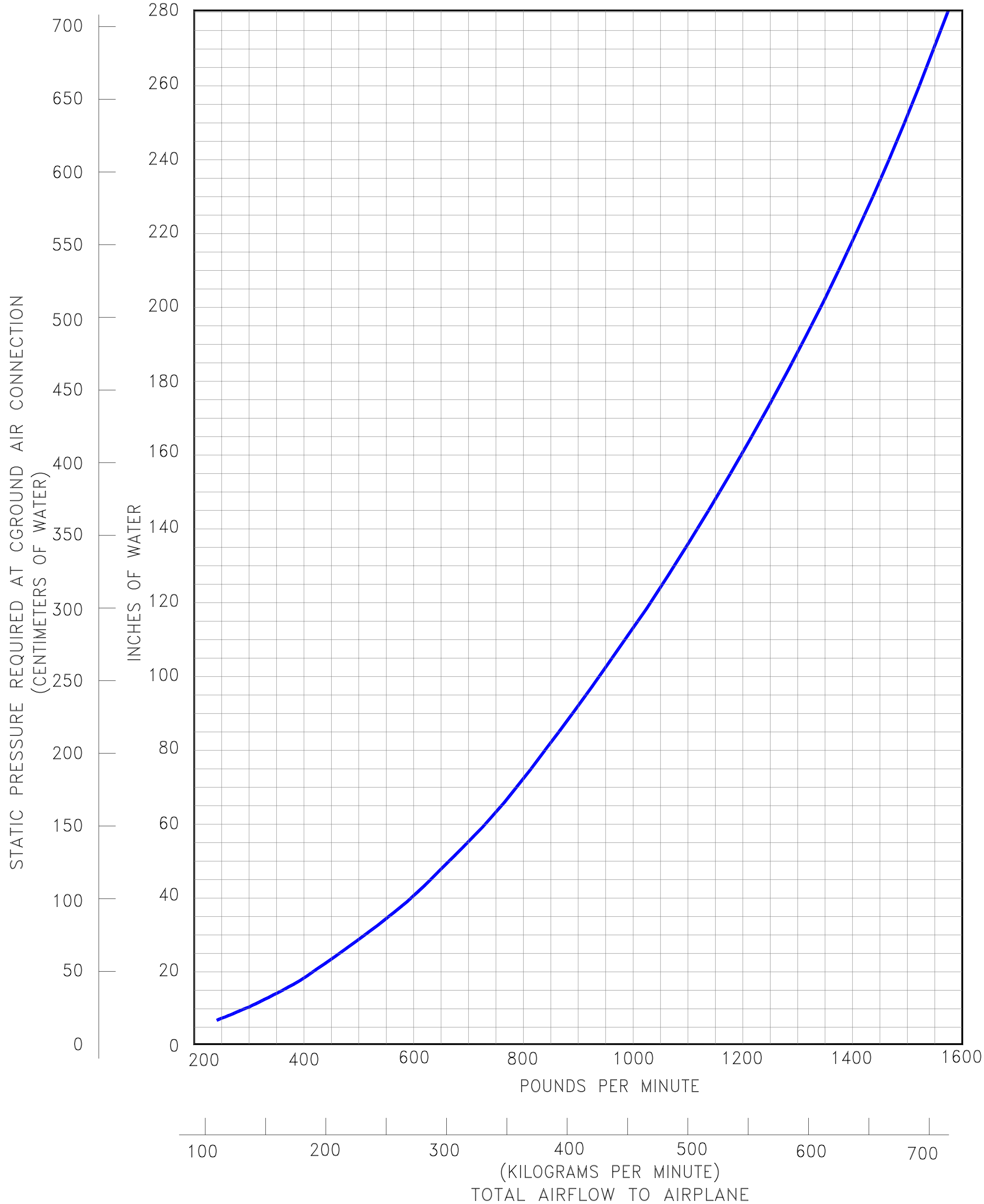


NOTE:
THIS GRAPH SHOWS REQUIRED AIR TEMPERATURES AT THE GROUND AIR CONNECTION IN ORDER TO MAINTAIN CABIN TEMPERATURE AT 75°F (24°C)

5.7.1 CONDITIONED AIR FLOW REQUIREMENTS - STEADY STATE AIRFLOW

MODEL 777-200LR, -300ER

PRELIMINARY FOR 777-200LR

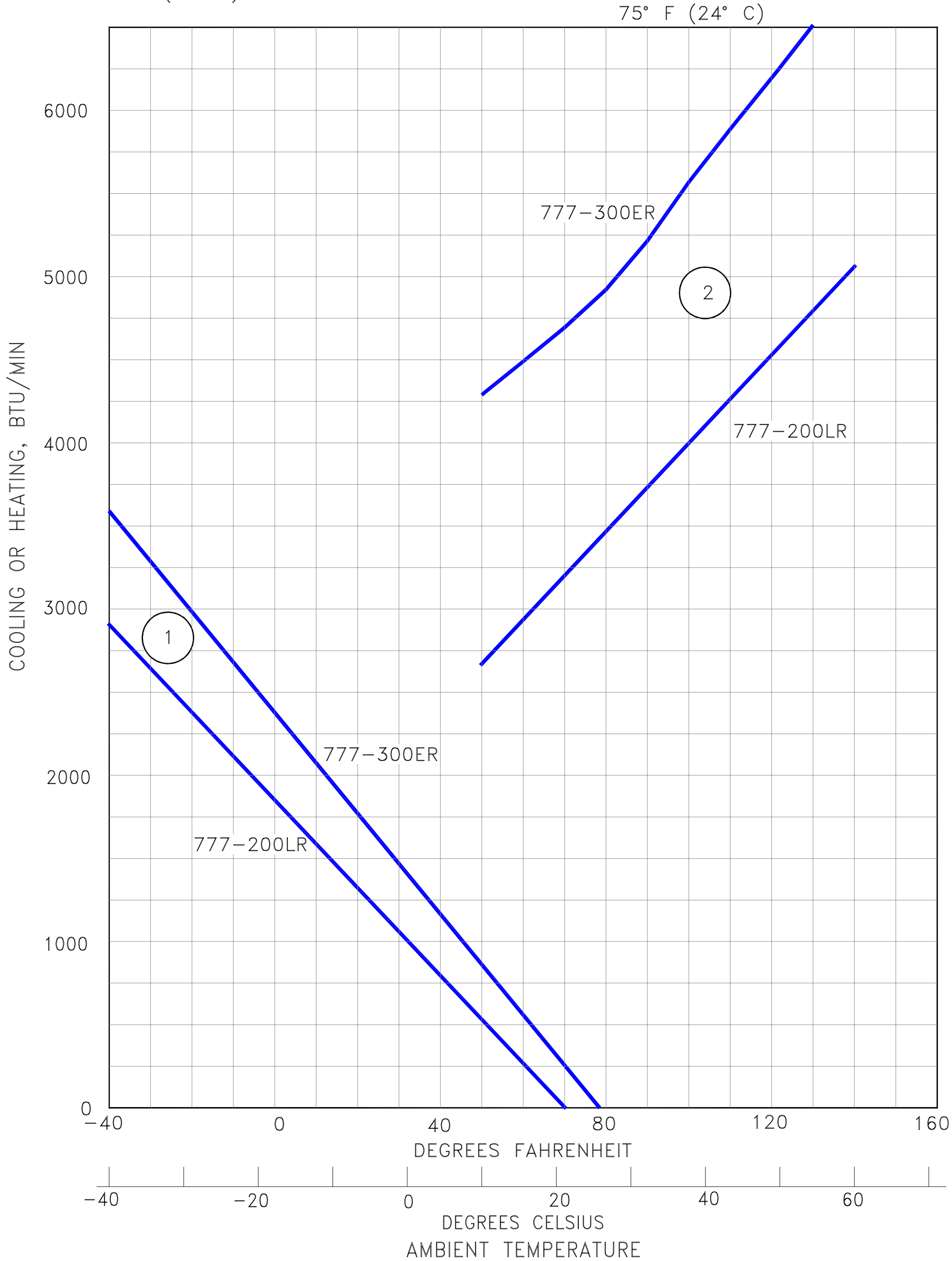


5.7.2 AIR CONDITIONING GAUGE PRESSURE REQUIREMENTS - STEADY STATE AIRFLOW

MODEL 777-200LR, -300ER

CONDITIONS FOR LINE (1) – HEATING
ALL EXTERIOR DOORS AND WINDOWS CLOSED
NO SOLAR AND ELECTRICAL HEAT LOADS
RECIRCULATING FANS OFF, CHILLERS OFF
NO OCCUPANTS
CABIN TEMPERATURE MAINTAINED AT
75° F (24° C)

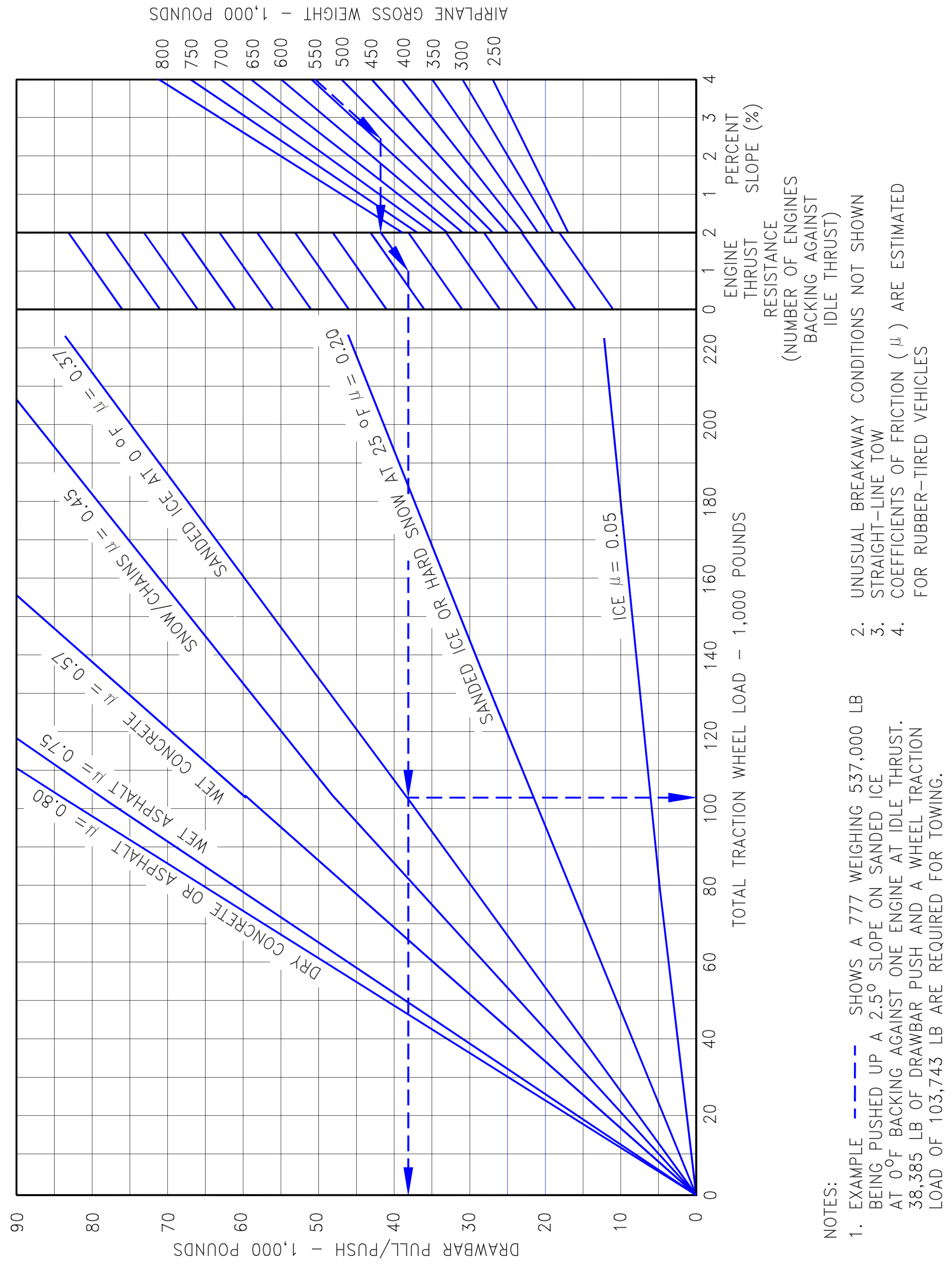
CONDITIONS FOR LINE (2) – COOLING
ALL EXTERIOR DOORS AND WINDOWS CLOSED
FULL SOLAR ELECTRICAL HEAT LOADS
RECIRCULATING FANS OFF, CHILLERS ON
426 OCCUPANTS (777–200LR)
505 OCCUPANTS (777–300ER)
CABIN TEMPERATURE MAINTAINED AT
75° F (24° C)



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)

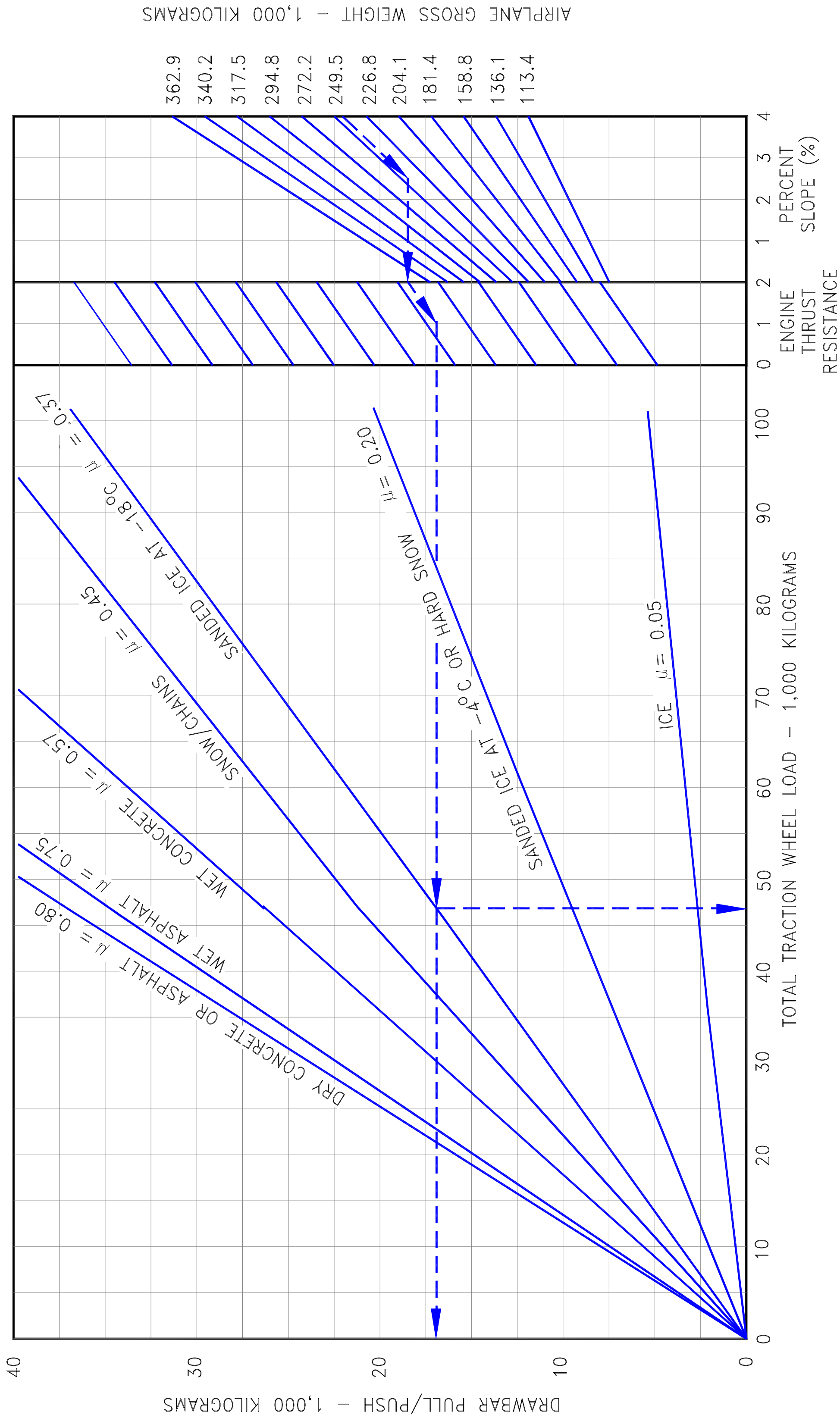
5.7.3 CONDITIONED AIR FLOW REQUIREMENTS - STEADY STATE BTU'S

MODEL 777-200LR, -300ER



5.8.1 GROUND TOWING REQUIREMENTS - ENGLISH UNITS

MODEL 777-200LR, -300ER



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

5.8.2 GROUND TOWING REQUIREMENTS - METRIC UNITS

MODEL 777-200LR, -300ER

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6.0 JET ENGINE WAKE AND NOISE DATA

6.1 Jet Engine Exhaust Velocities and Temperatures

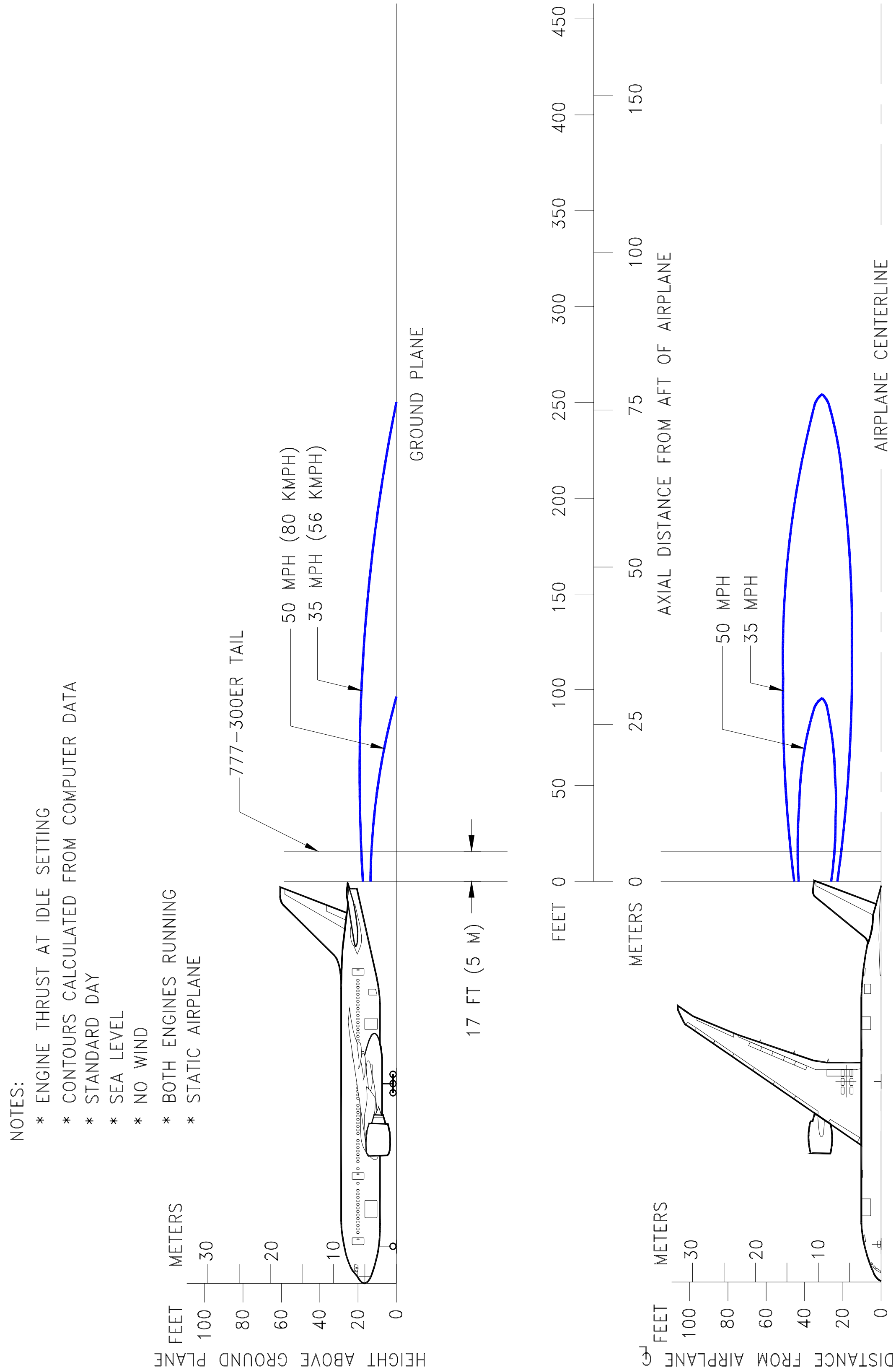
6.2 Airport and Community Noise

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 777-200LR and 777-300ER. 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 exhaust velocity and therefore are not included.

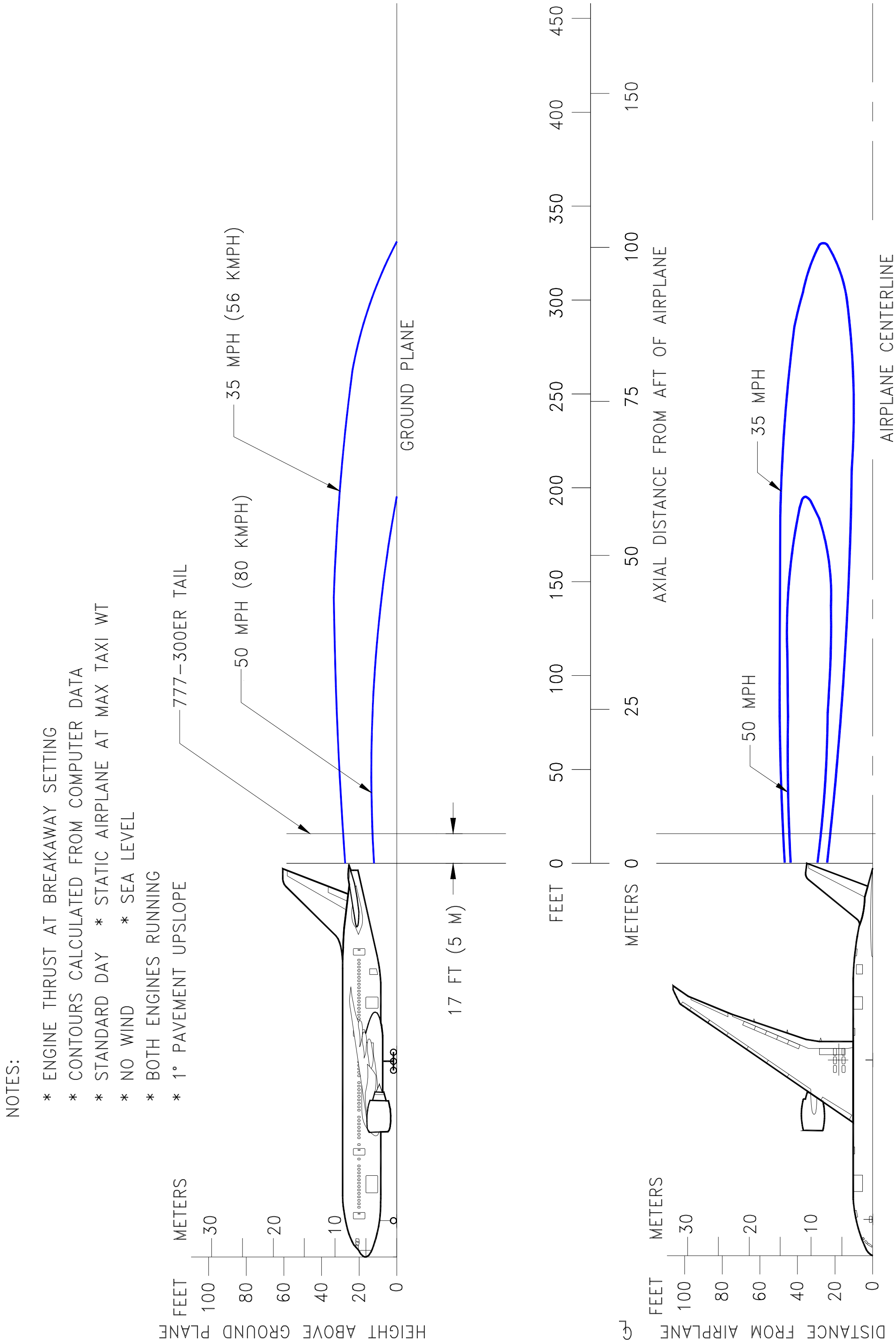
The graphs show jet wake velocity and temperature contours for a representative engine. The results are valid for sea level, static, standard day conditions. The effect of wind on jet wakes was not included. There is evidence to show that a downwind or an upwind component does not simply add or subtract 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 PREDICTED JET ENGINE EXHAUST VELOCITY CONTOURS - IDLE THRUST

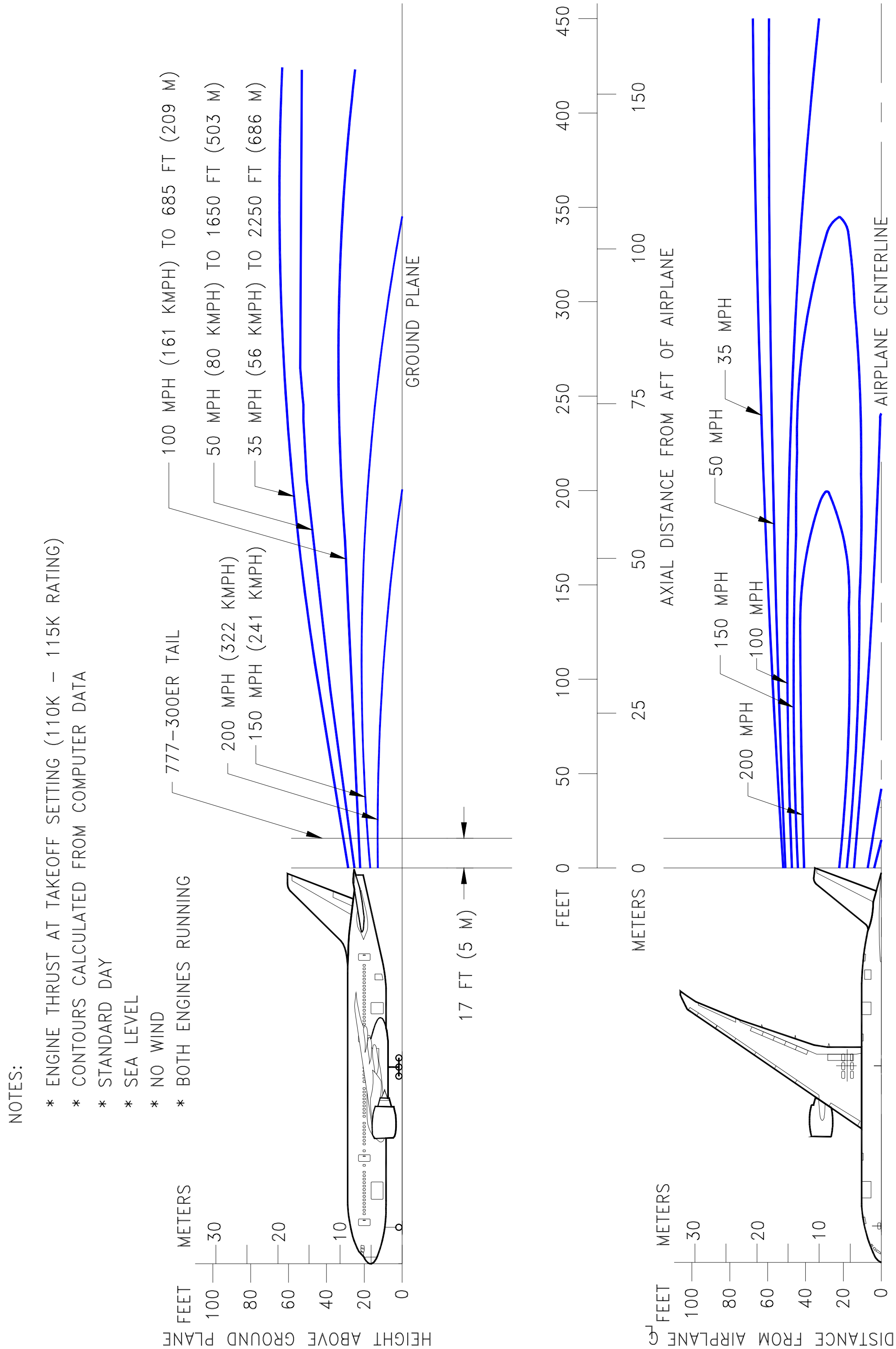
MODEL 777-200LR,-300ER

PRELIMINARY FOR 777-200LR



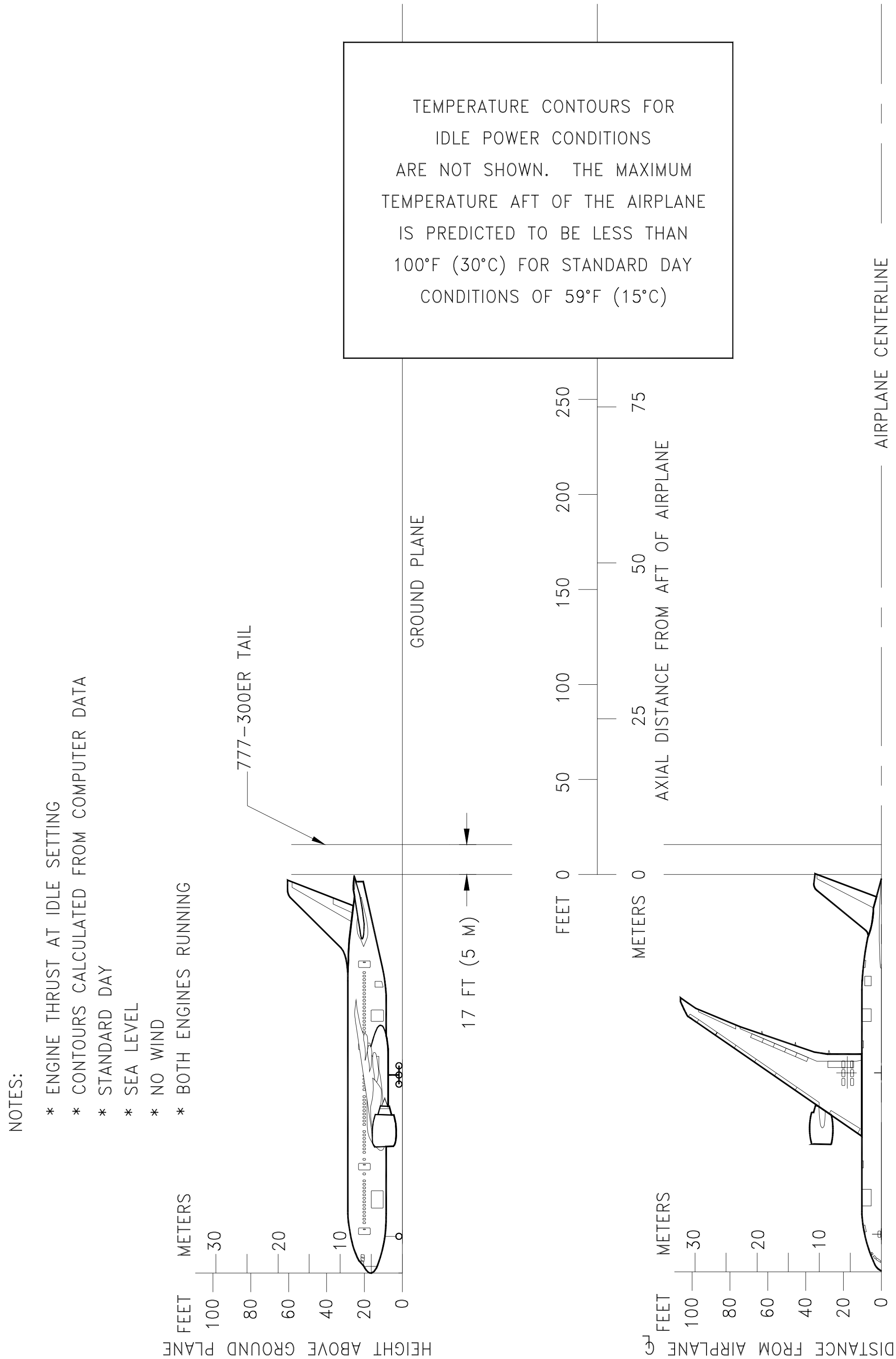
6.1.2 PREDICTED JET ENGINE EXHAUST VELOCITY CONTOURS - BREAKAWAY THRUST

MODEL 777-200LR, -300ER



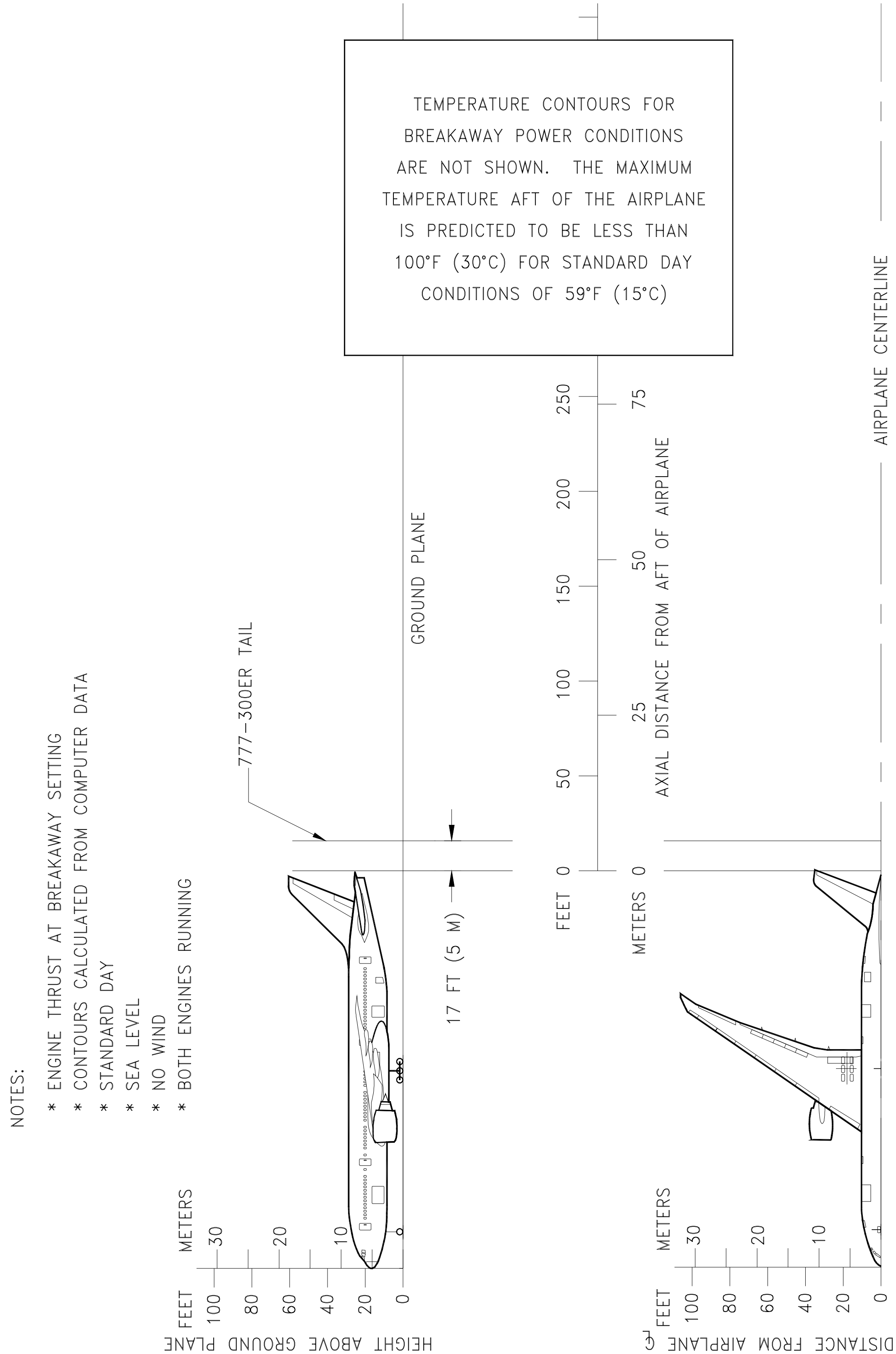
6.1.3 PREDICTED JET ENGINE EXHAUST VELOCITY CONTOURS - TAKEOFF THRUST

MODEL 777-200LR, -300ER



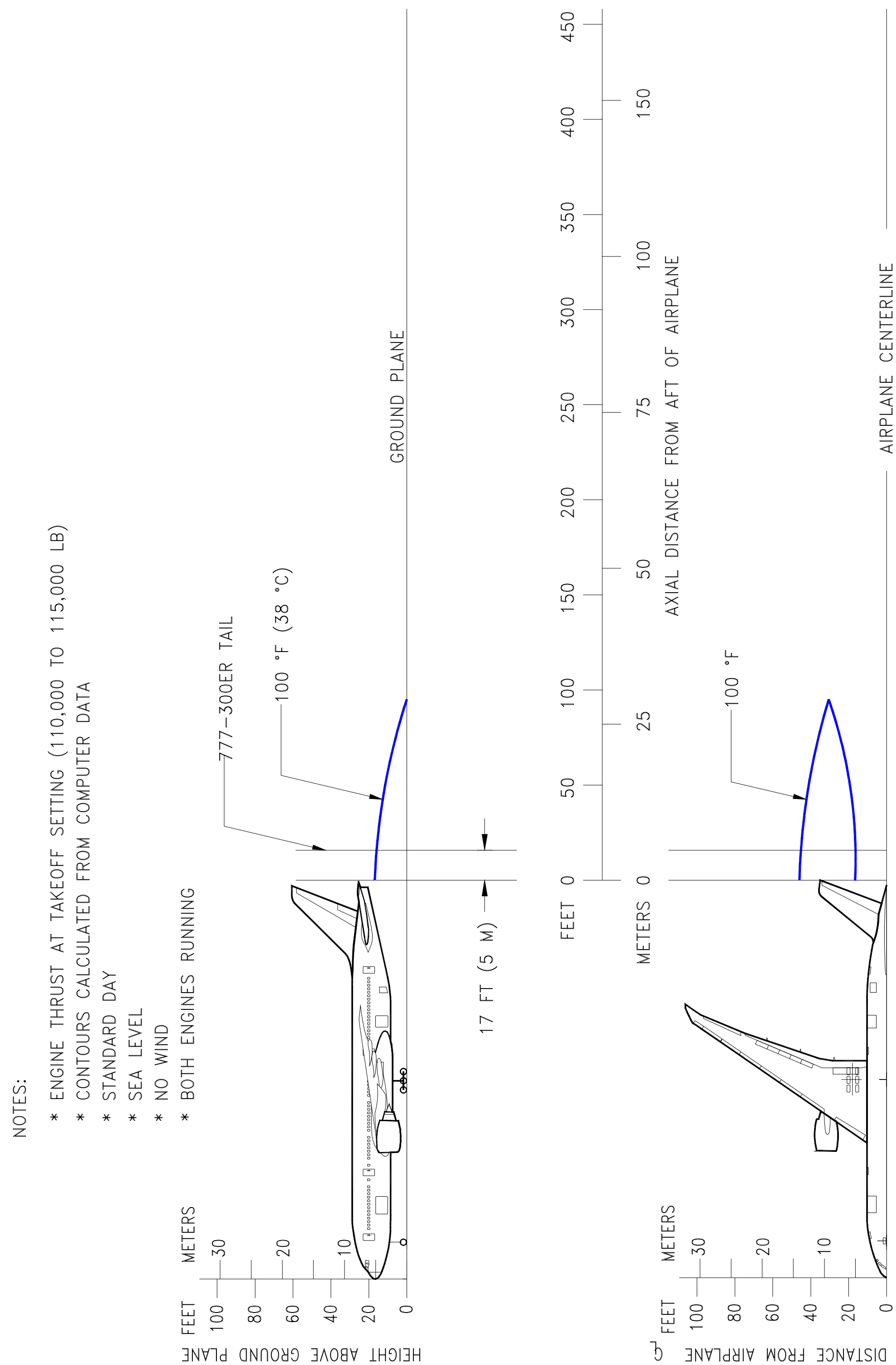
6.1.4 PREDICTED JET ENGINE EXHAUST TEMPERATURE CONTOURS - IDLE THRUST

MODEL 777-200LR, -300ER



6.1.5 PREDICTED JET ENGINE EXHAUST TEMPERATURE CONTOURS - BREAKAWAY THRUST

MODEL 777-200LR, -300ER



6.1.6 PREDICTED JET ENGINE EXHAUST TEMPERATURE CONTOURS - TAKEOFF THRUST

MODEL 777-200LR, -300ER

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.

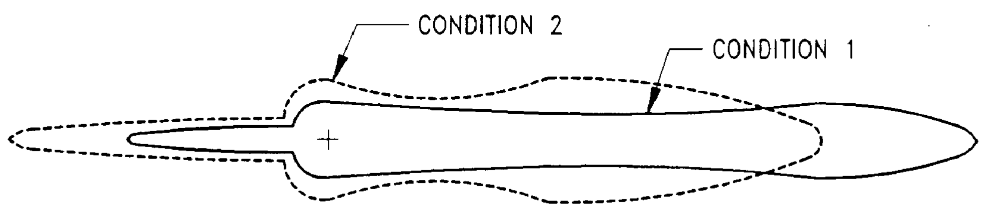
3. Surface Condition-Shielding, Extra Ground Attenuation (EGA)

(a) Terrain-If the ground slopes down after takeoff or 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.

All these factors can alter the shape and size of the contours appreciably. To demonstrate the effect of some of these factors, estimated noise level contours for two different operating conditions are shown below. These contours reflect a given noise level upon a ground level plane at runway elevation.

Condition 1

Landing	Takeoff
Maximum Structural Landing Weight	Maximum Gross Takeoff Weight
10-knot Headwind	Zero Wind
3^{o} Approach	84 ^{o}F
84 ^{o}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^{o} Approach	59 ^{o}F
59 ^{o}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

7.0 PAVEMENT DATA

7.1 General Information

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 six 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," dated June 1977. 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 the 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 6,000 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", First Edition, 1977. 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 American Concrete Pavement Association, 3800 North Wilke Road, Arlington Heights, Illinois 60004-1268. 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:

1. 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.

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

3. 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 ACN/PCN system (Section 7.9) as referenced in ICAO Annex 14, "Aerodromes," First Edition, July 1990, 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 method of pavement evaluation is left up to the airport with the results of their evaluation presented as follows:

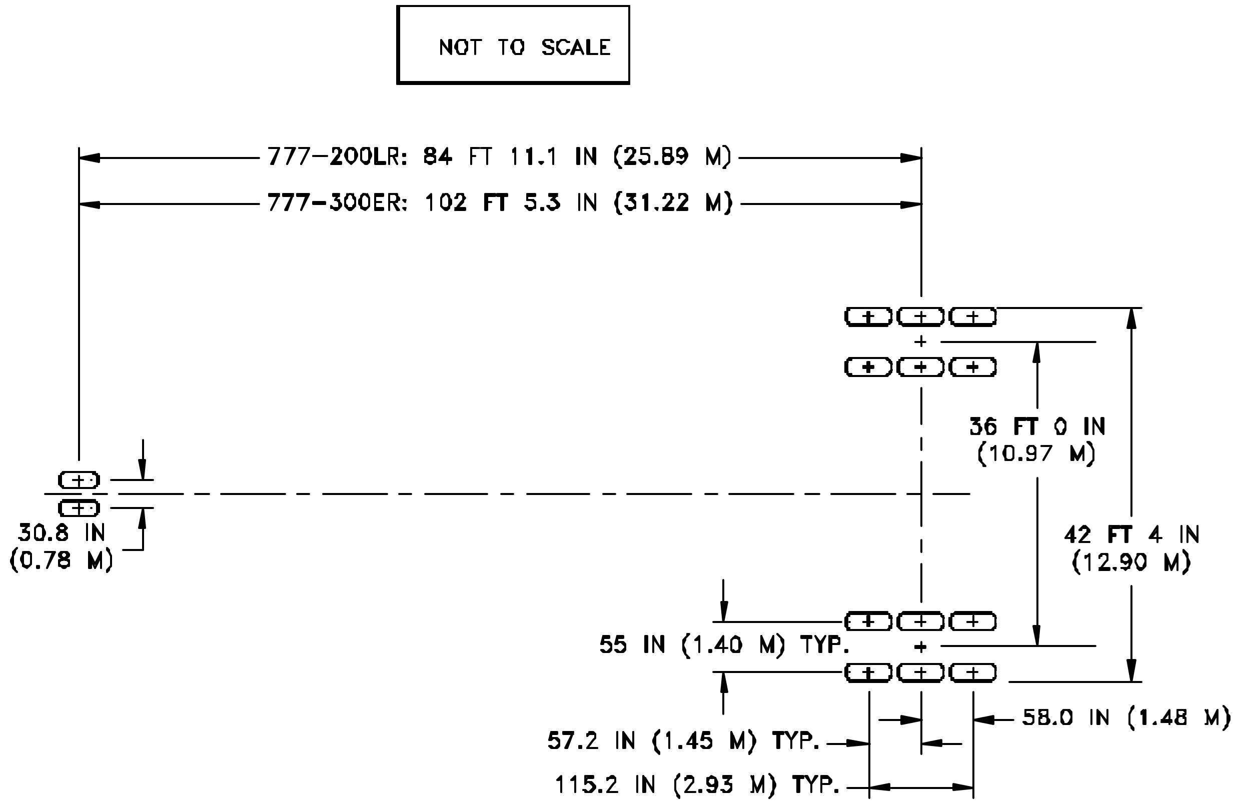
PCN	PAVEMENT TYPE	SUBGRADE CATEGORY	TIRE PRESSURE CATEGORY	EVALUATION METHOD
	R = Rigid	A = High	W = No Limit	T = Technical
	F = Flexible	B = Medium	X = To 217 psi (1.5 MPa)	U = Using Aircraft
		C = Low	Y = To 145 psi (1.0 MPa)	
		D = Ultra Low	Z = To 73 psi (0.5 MPa)	

Section 7.9.1 shows the aircraft ACN values for flexible pavements. The four subgrade categories are:

Code A - High Strength - CBR 15
Code B - Medium Strength - CBR 10
Code C - Low Strength - CBR 6
Code D - Ultra Low Strength - CBR 3

Section 7.9.2 shows the aircraft ACN values for rigid pavements. The four subgrade categories are:

Code A - High Strength, k = 550 pci (150 MN/m^3)
Code B - Medium Strength, k = 300 pci (80 MN/m^3)
Code C - Low Strength, k = 150 pci (40 MN/m^3)
Code D - Ultra Low Strength, k = 75 pci (20 MN/m^3)



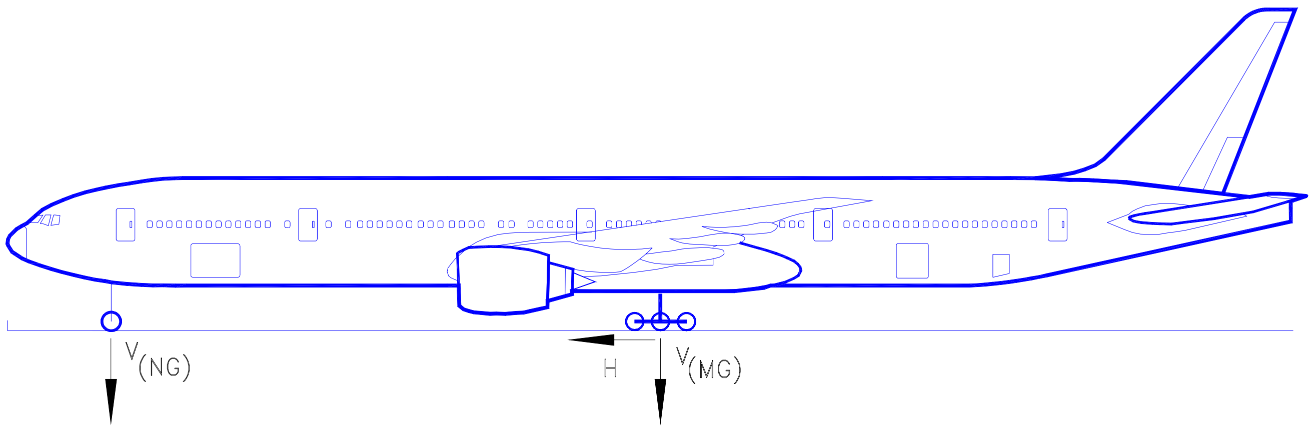
	UNITS	777-200LR	777-300ER	
MAXIMUM DESIGN TAXI WEIGHT	LB	768,800	762,700	777,000
	KG	348,721	345,954	352,441
PERCENT OF WT ON MAIN GEAR		SEE SECTION 7.4		
NOSE GEAR TIRE SIZE	IN.	43 X 17.5 R 17, 32 PR		
NOSE GEAR TIRE PRESSURE	PSI	218	218	
	KG/CM^2	15.3	15.3	
MAIN GEAR TIRE SIZE	IN.	52 X 21 R 22, 36 PR		
MAIN GEAR TIRE PRESSURE	PSI	218	218	221
	KG/CM^2	15.3	15.3	15.5

7.2 LANDING GEAR FOOTPRINT

MODEL 777-200LR/-300ER

PRELIMINARY FOR 777-200LR

$V_{(NG)}$ = 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

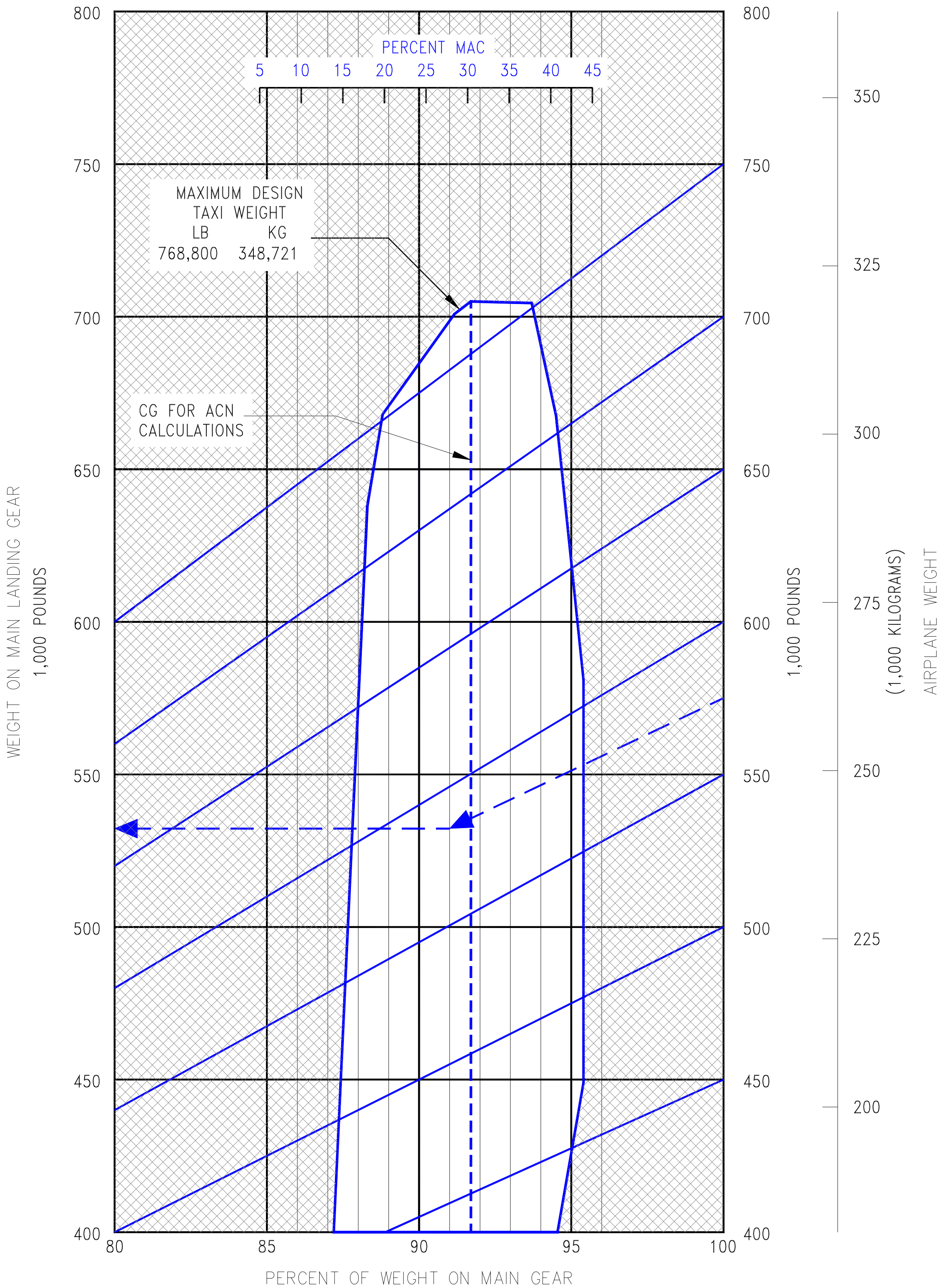


NOTE: ALL LOADS CALCULATED USING AIRPLANE MAXIMUM DESIGN TAXI WEIGHT

MODEL	UNITS	MAXIMUM DESIGN TAXI WEIGHT	$V_{(NG)}$		$V_{(MG)}$ PER STRUT	H PER STRUT	
			STATIC AT MOST FWD C.G.	STATIC + BRAKING 10 FT/SEC^2 DECEL	MAX LOAD AT STATIC AFT C.G.	STEADY BRAKING 10 FT/SEC^2 DECEL	AT INSTANTANEOUS BRAKING (μ= 0.8)
777-200LR	LB	768,800	67,500	114,597	352,436	119,395	281,949
	KG	348,721	30,617	51,980	159,862	54,157	127,890
777-300ER	LB	762,700	60,525	99,259	352,211	118,447	281,768
	KG	345,954	27,454	45,023	159,760	53,727	127,808
777-300ER	LB	777,000	59,019	98,480	359,166	120,668	287,333
	KG	352,441	26,771	44,670	162,915	54,734	130,332

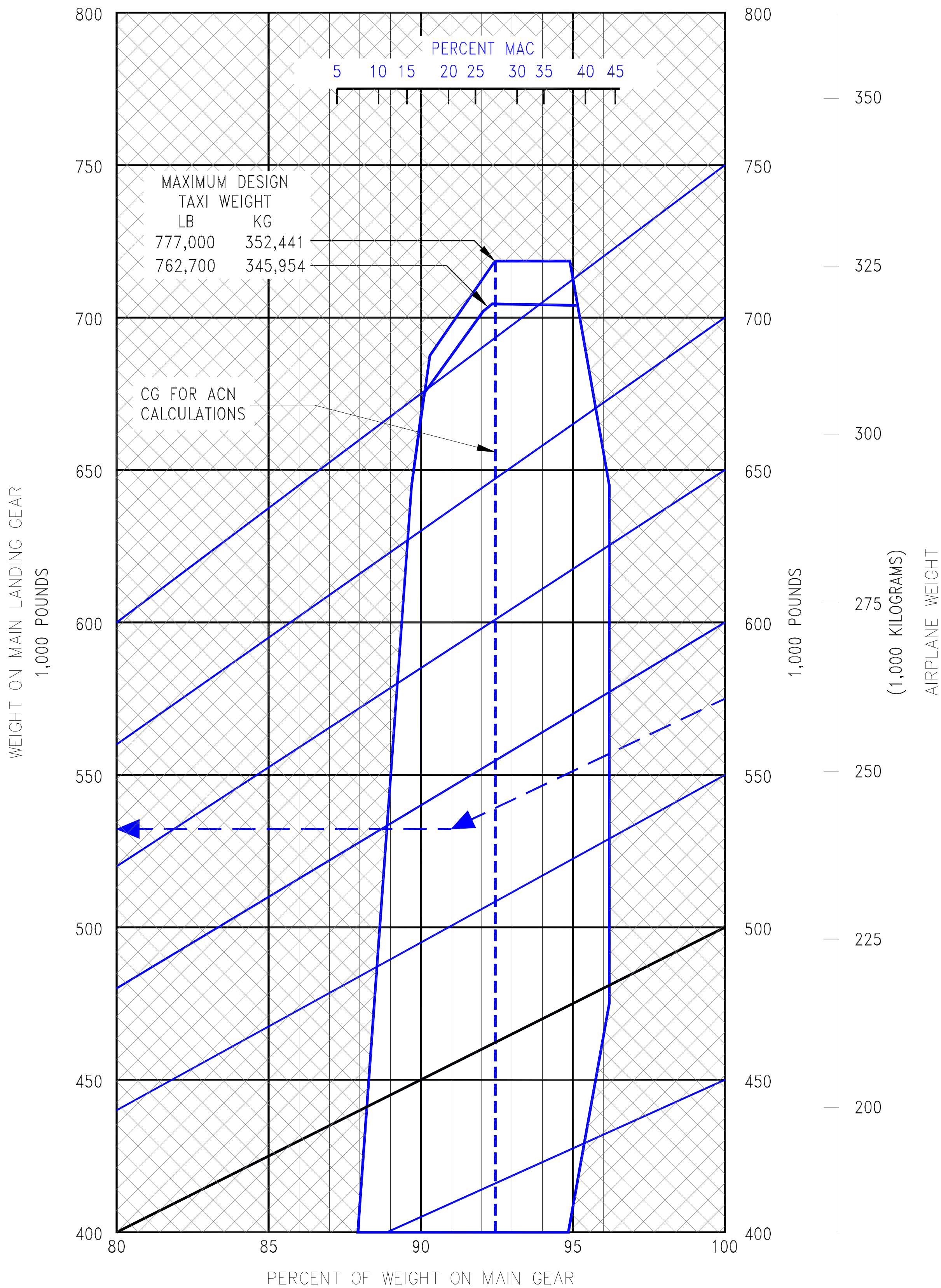
7.3 MAXIMUM PAVEMENT LOADS

MODEL 777-200LR,-300ER



7.4.1 LANDING GEAR LOADING ON PAVEMENT

MODEL 777-200LR



7.4.2 LANDING GEAR LOADING ON PAVEMENT

MODEL 777-300ER

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.

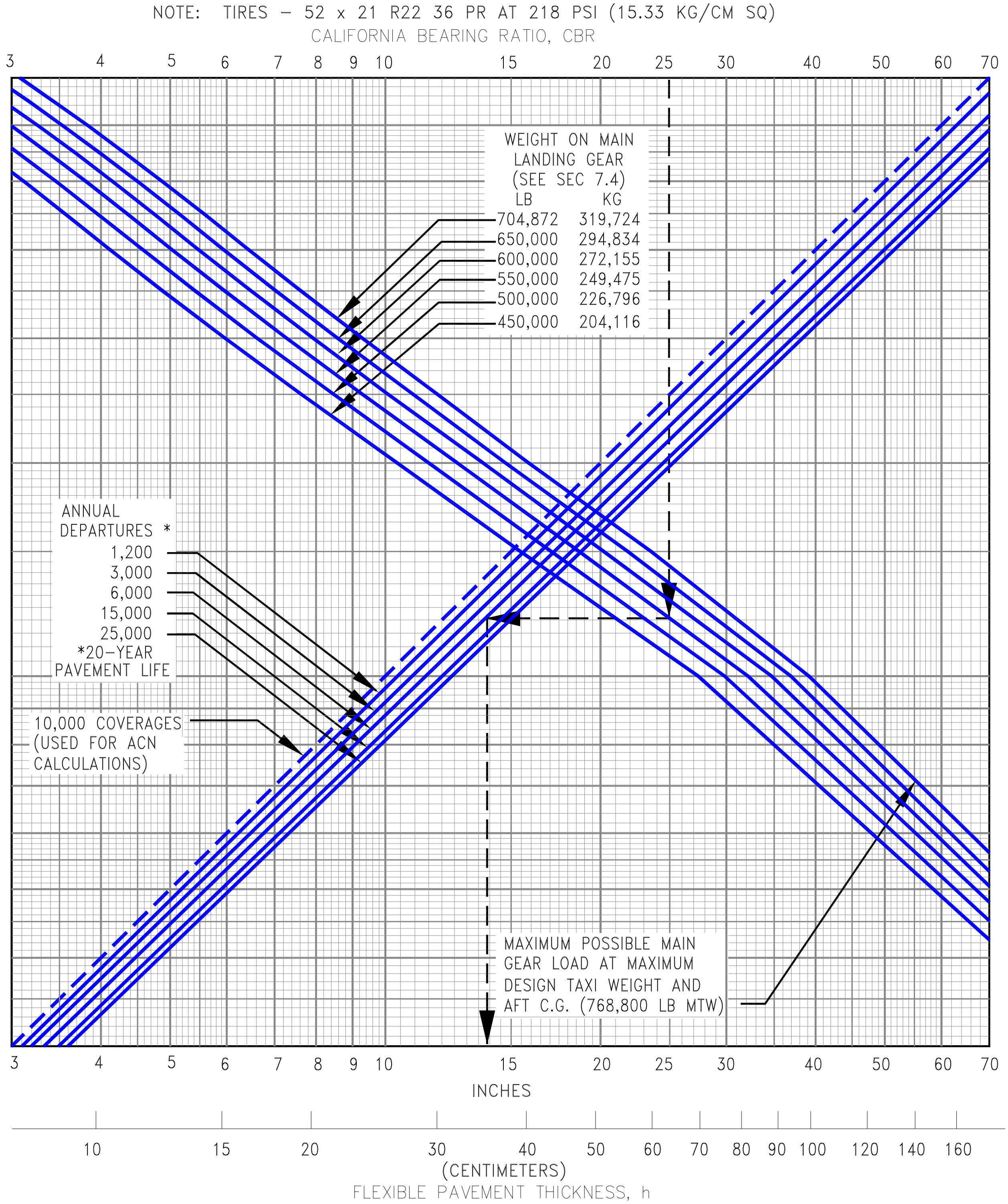
In the example shown in Section 7.5.1, for a CBR of 25 and an annual departure level of 6,000, the required flexible pavement thickness for a 777-200LR airplane with a main gear loading of 550,000 pounds is 13.8 inches. Likewise, the required flexible pavement thickness for the 777-300ER under the same conditions, is 13.9 inches as shown in Section 7.5.2.

The line showing 10,000 coverages is used for ACN calculations (see Section 7.9).

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 (D6-58329-2) was printed, the FAA was recommending a multi-layer elastic system 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.

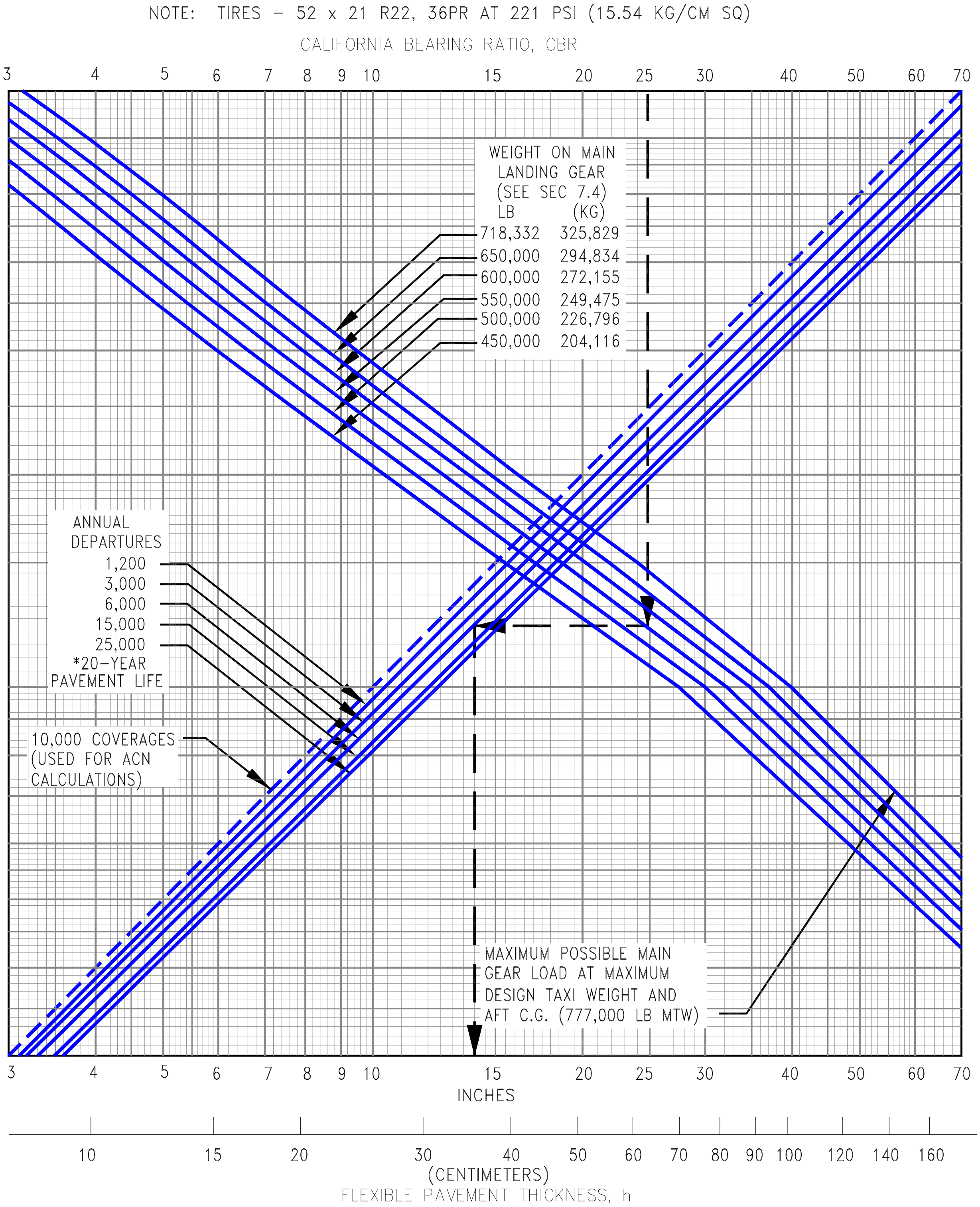
PRELIMINARY INFORMATION

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.



7.5.1 FLEXIBLE PAVEMENT REQUIREMENTS - U.S. ARMY CORPS OF ENGINEERS DESIGN METHOD (S-77-1)
MODEL 777-200LR

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)

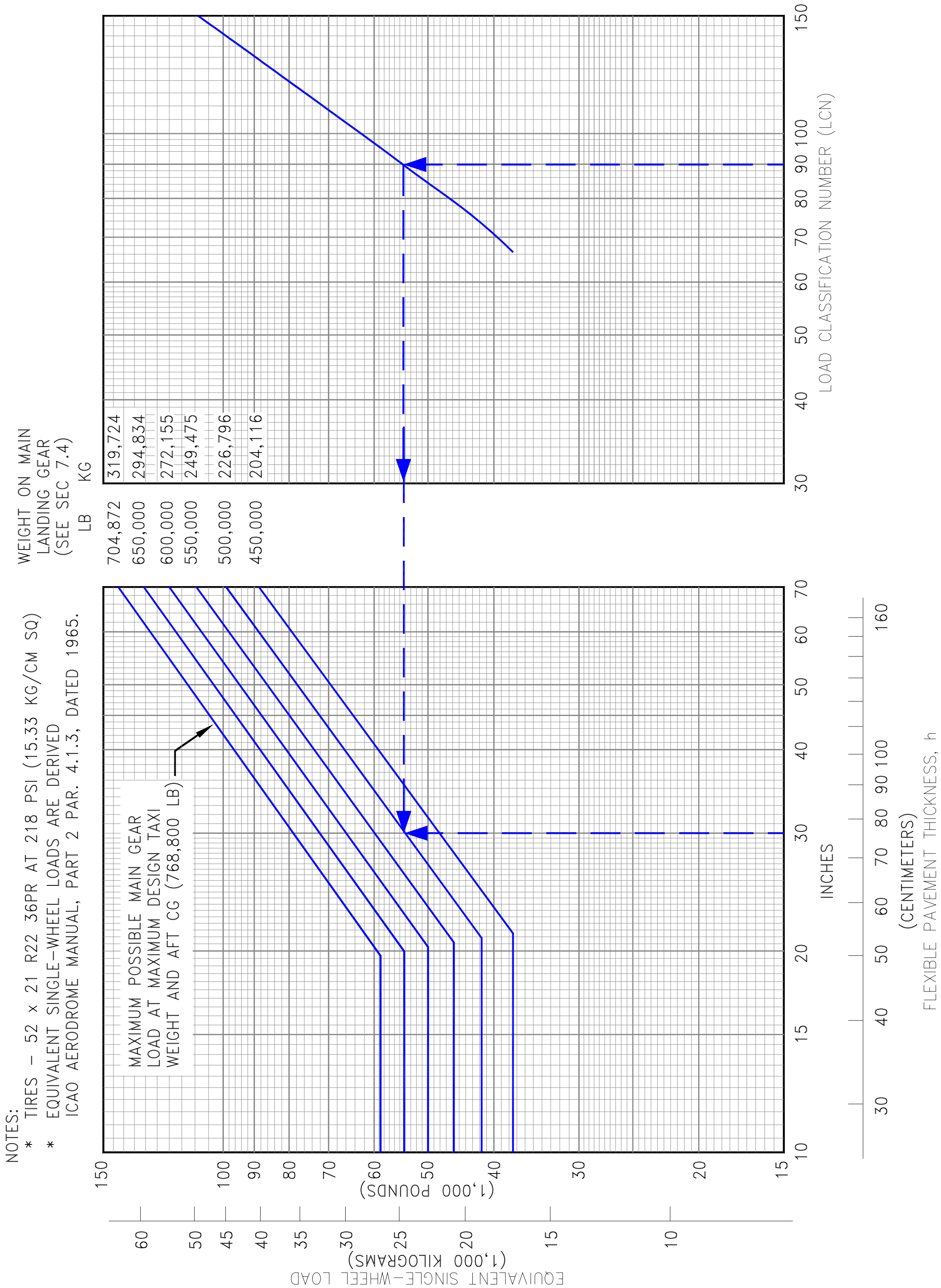
MODEL 777-300ER

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.

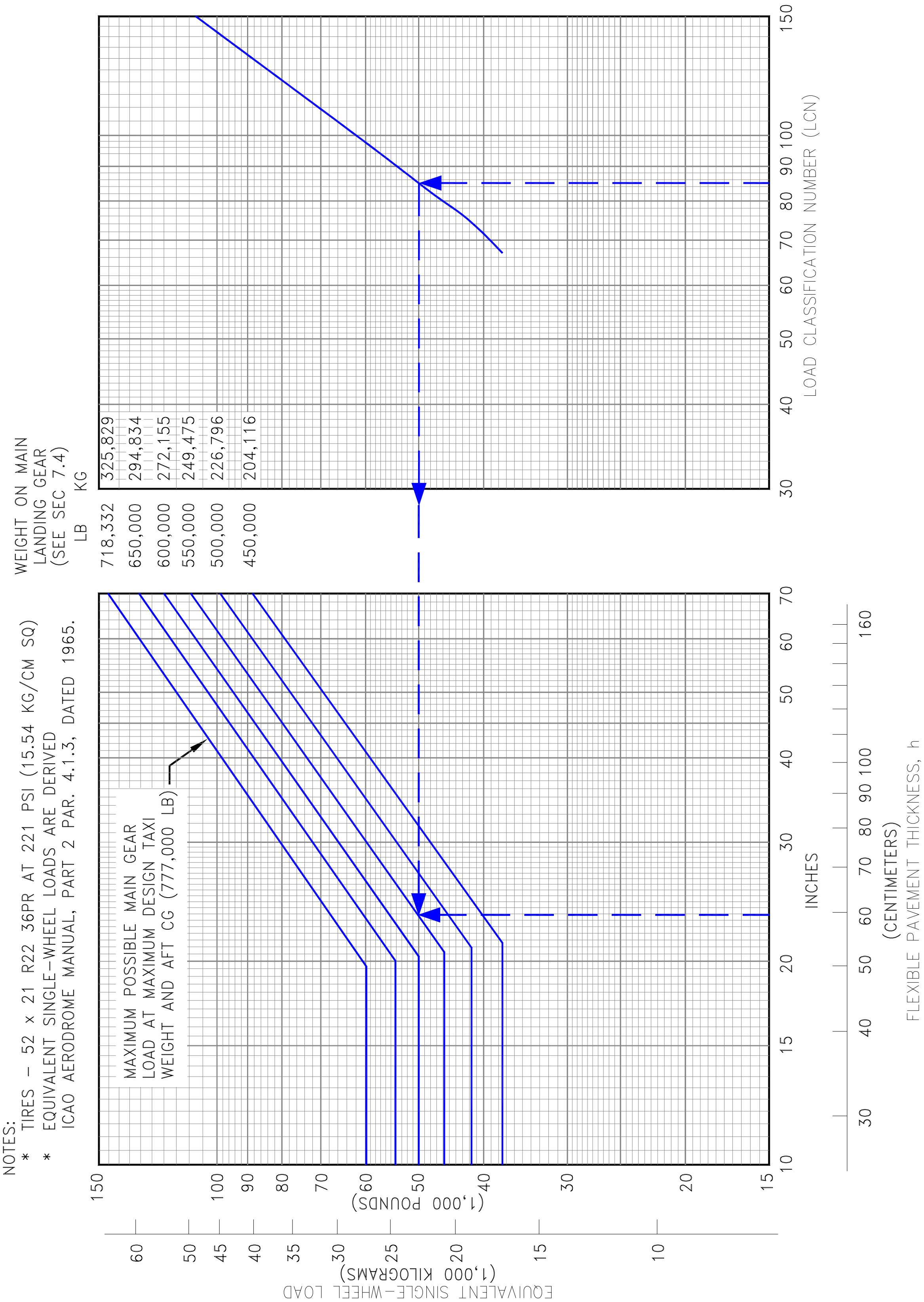
In the example shown in Section 7.6.1, flexible pavement thickness is shown at 30 inches with an LCN of 90. For these conditions, the maximum allowable weight on the main landing gear is 500,000 lb for a 777-200LR airplane with 218 psi main gear tires. Likewise, in the example shown in Section 7.6.2, the flexible pavement thickness is shown at 24 inches and the LCN is 85. For these conditions, the maximum allowable weight on the main landing gear is 550,000 lb for a 777-300ER airplane with 218 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 777-200LR



7.6.2 FLEXIBLE PAVEMENT REQUIREMENTS - LCN METHOD

MODEL 777-300ER

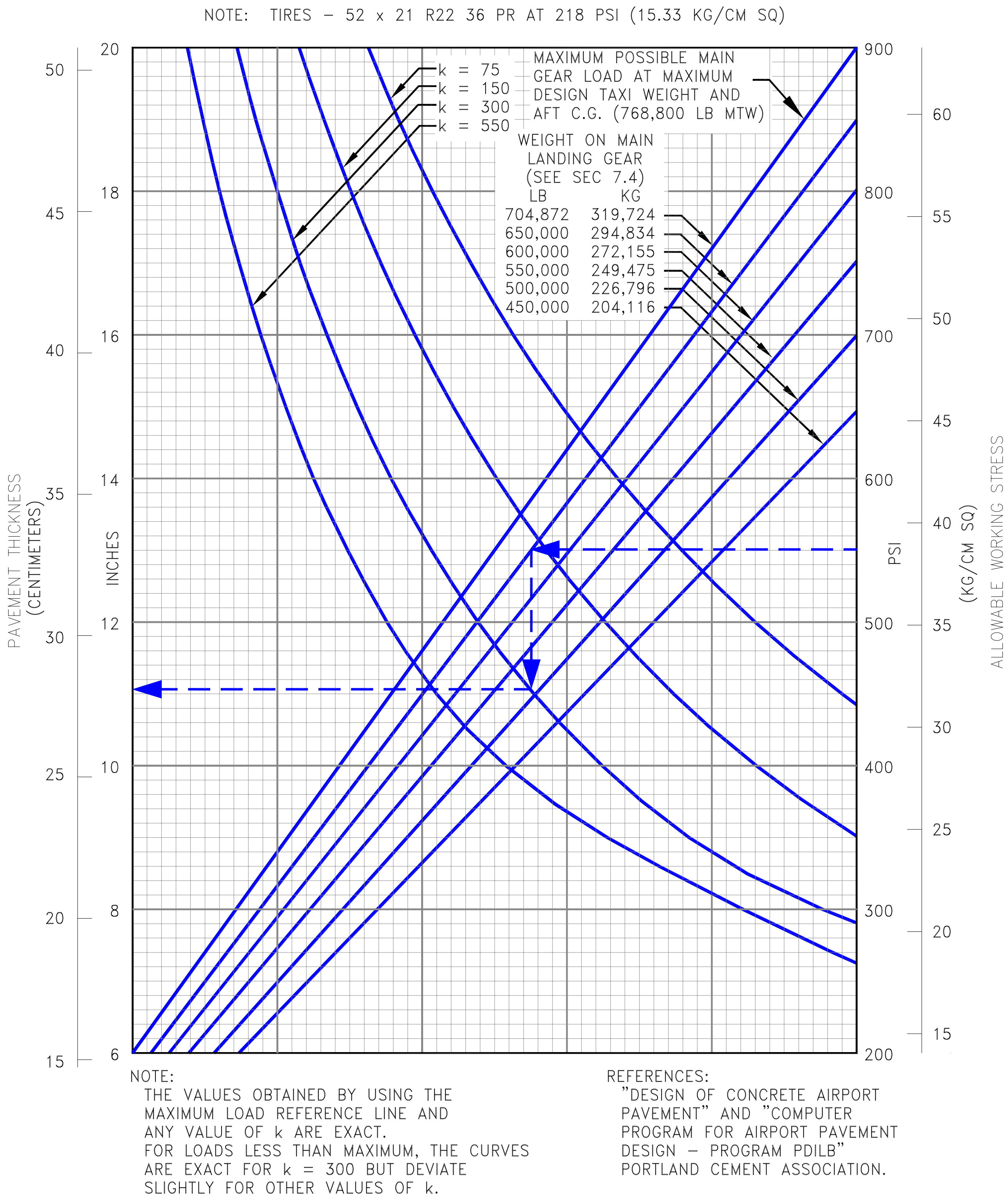
7.7 Rigid Pavement Requirements - Portland Cement Association Design Method

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.

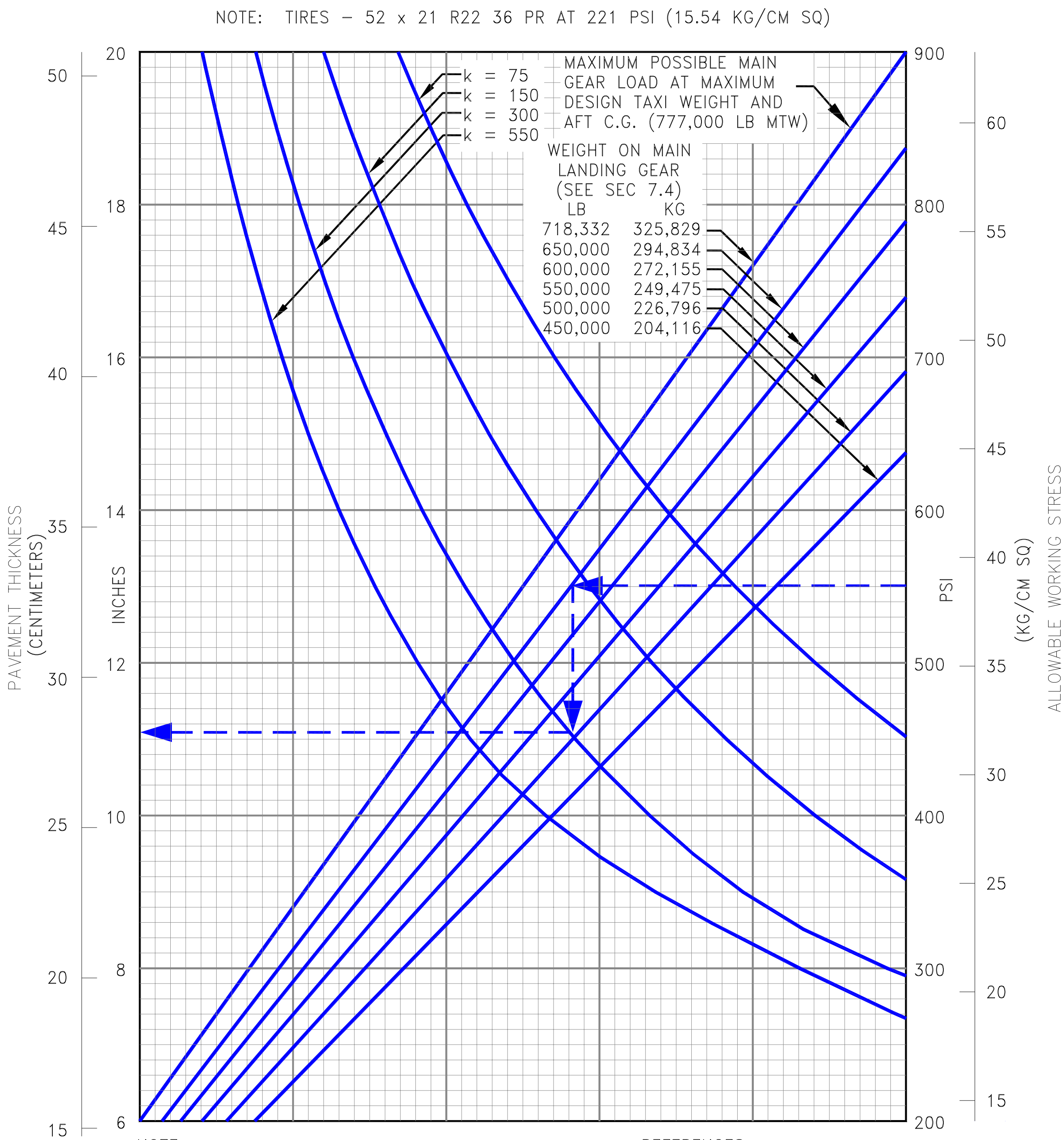
In the example shown in Section 7.7.1, for an allowable working stress of 550 psi, and a subgrade strength (k) of 300, the required rigid pavement thickness is 11.1 inches for a 777-200LR airplane with a main gear load of 650,000 lb. Likewise, for the same pavement conditions, the required pavement thickness for a 777-300ER airplane with a main gear load of 650,000 lb is 11.0 inches as shown in Section 7.7.2.

PRELIMINARY INFORMATION



7.7.1 RIGID PAVEMENT REQUIREMENTS - PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL 777-200LR



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 777-300ER

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 39 with an LCN of 87, the maximum allowable weight permissible on the main landing gear for a 777-200LR airplane is 550,000 lb for an airplane with 218 psi main tires. Similarly, in Section 7.8.3, for the same pavement characteristics, the maximum allowable weight permissible on the main landing gear for a 777-300ER airplane is 550,000 lb for an airplane with 218 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 Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v, 2nd Edition dated 1965).

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

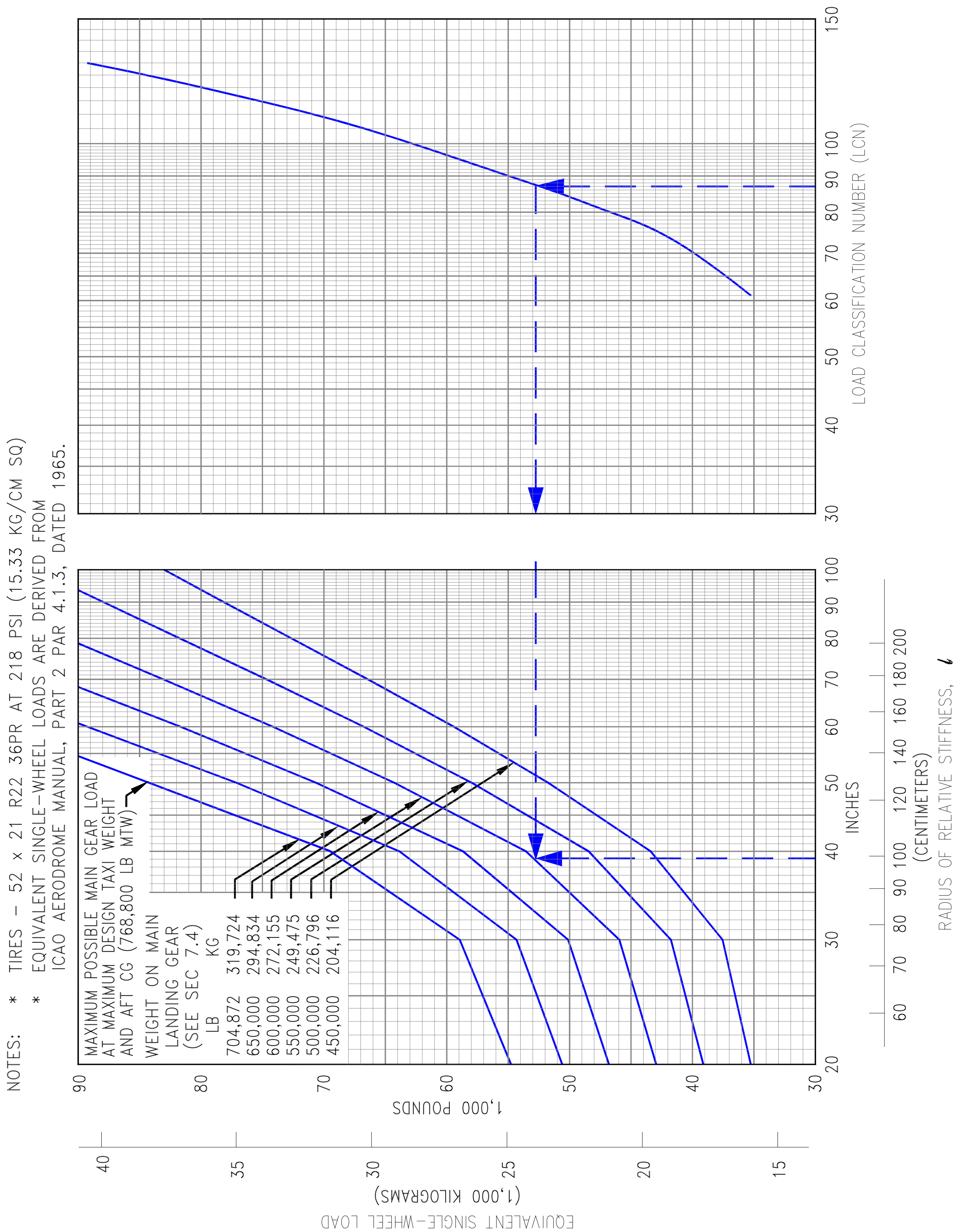
d = RIGID PAVEMENT THICKNESS, IN

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

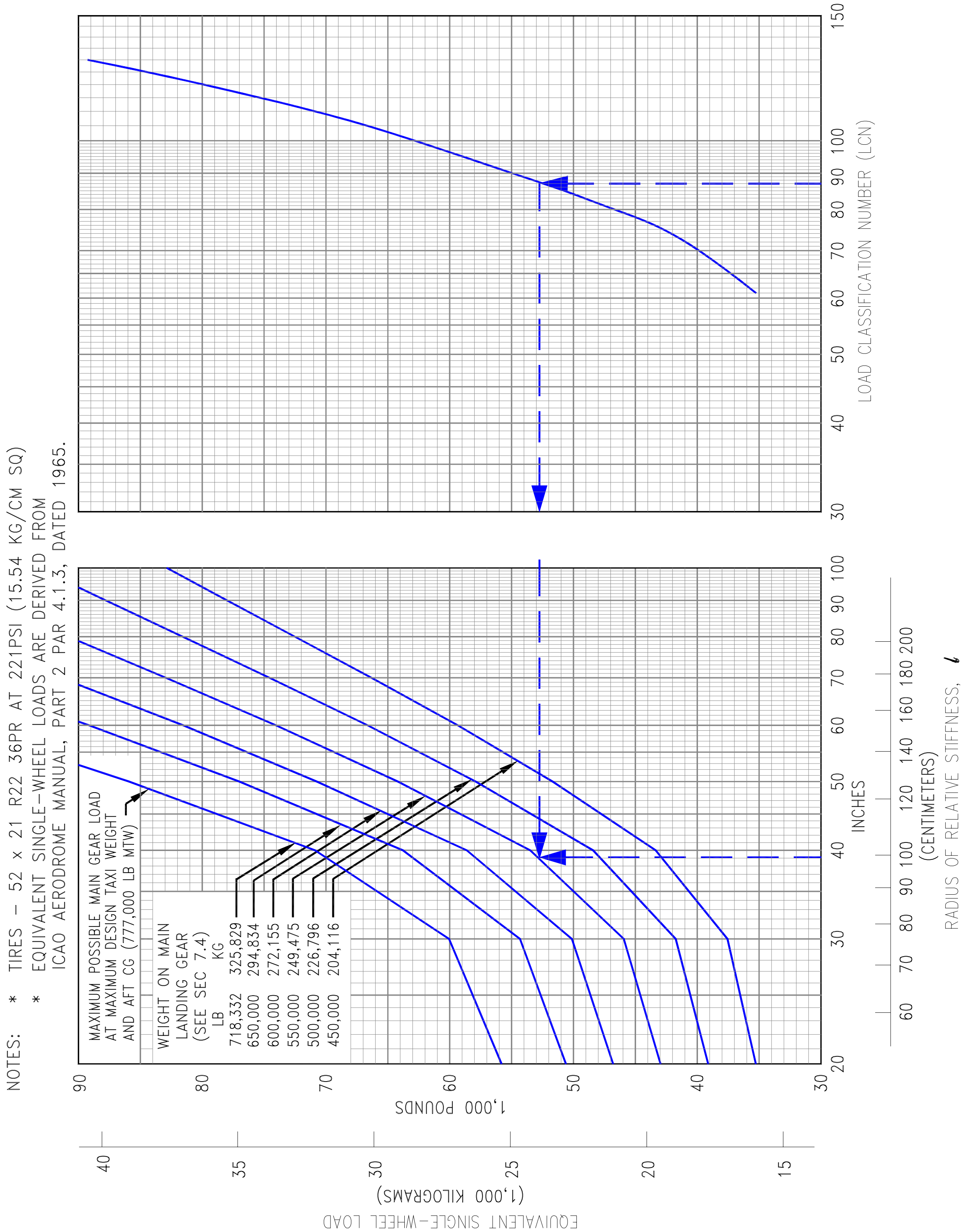
7.8.1 RADIUS OF RELATIVE STIFFNESS (REFERENCE: PORTLAND CEMENT ASSOCIATION)

PRELIMINARY INFORMATION



7.8.2 RIGID PAVEMENT REQUIREMENTS - LCN CONVERSION

MODEL 777-200LR

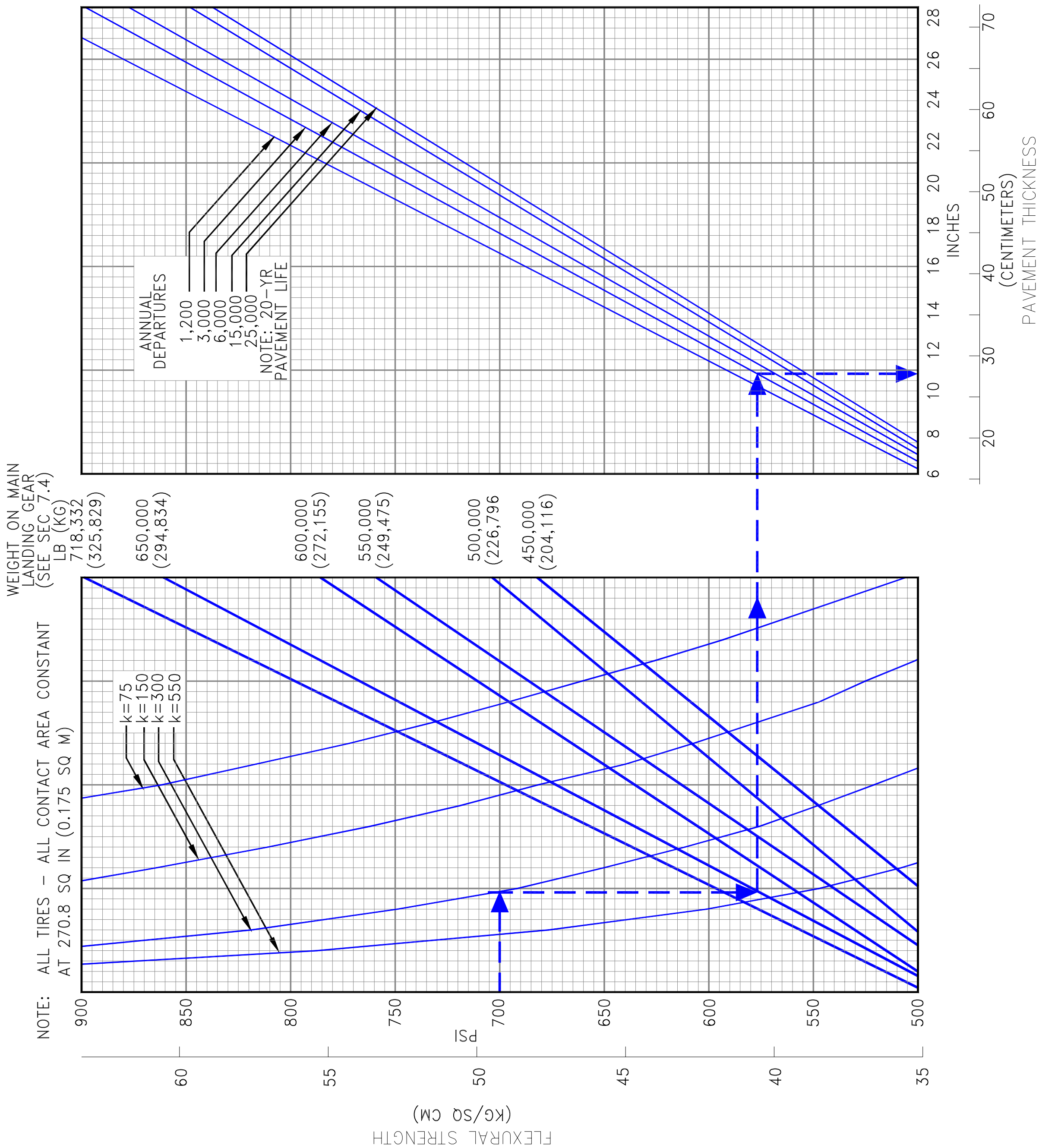


7.8.3 RIGID PAVEMENT REQUIREMENTS - LCN CONVERSION

MODEL 777-300ER

7.9 Rigid Pavement Requirements - FAA Design Method

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 (D6-58329-2) 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 shown in Section 7.9.1 is provided as an estimate of the design thickness for general guidance purposes only. In the example shown, for a pavement flexural strength of 700 psi, a subgrade strength of k = 300, and an annual departure level of 3,000, the required pavement thickness for a 777-200LR or 777-300ER airplane with a main gear load of 650,00 lb is 10.8 inches.



7.9.1 RIGID PAVEMENT REQUIREMENTS

MODEL 777-200LR, -300ER

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 777-200LR aircraft with gross weight of 700,000 lb on a medium strength subgrade (Code B), the flexible pavement ACN is 62. In Section 7.10.3, for the same aircraft weight and medium subgrade strength (Code B), the rigid pavement ACN is 73.

Similarly, for a 777-300ER aircraft with gross weight of 700,000 lb on a medium strength subgrade (Code B), the flexible pavement ACN is 62 (Section 7.10.2) and the rigid pavement ACN is 73 (Section 7.10.4).

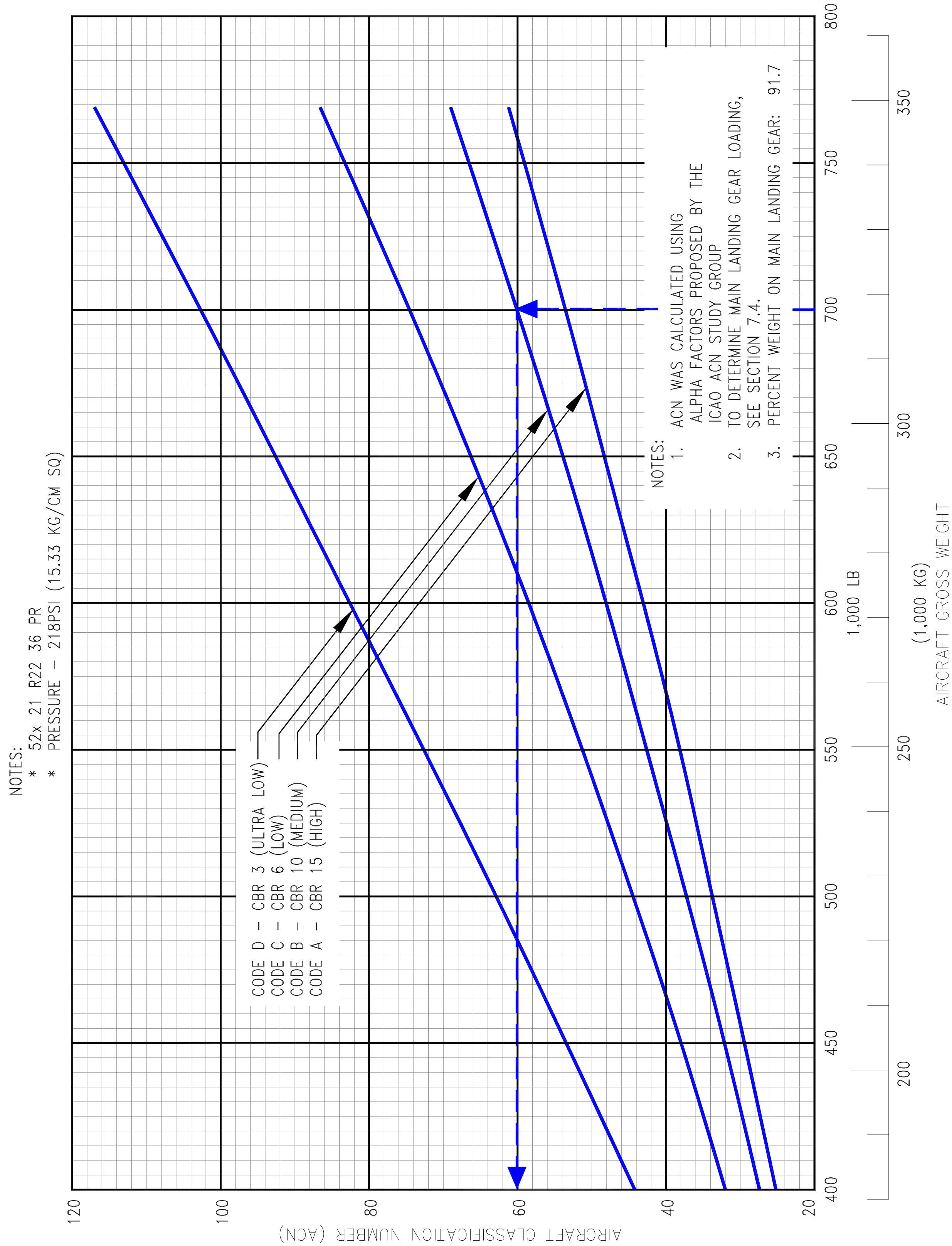
Notes: 1. An aircraft with an ACN equal to or less that the reported PCN can operate on that pavement subject to any limitations on the tire pressure. (Ref: ICAO Annex 14 Aerodromes, First Edition, July 1990.)

2. The ACN values on the Flexible Pavement charts were calculated using alpha factors proposed by the ICAO ACN Study Group.

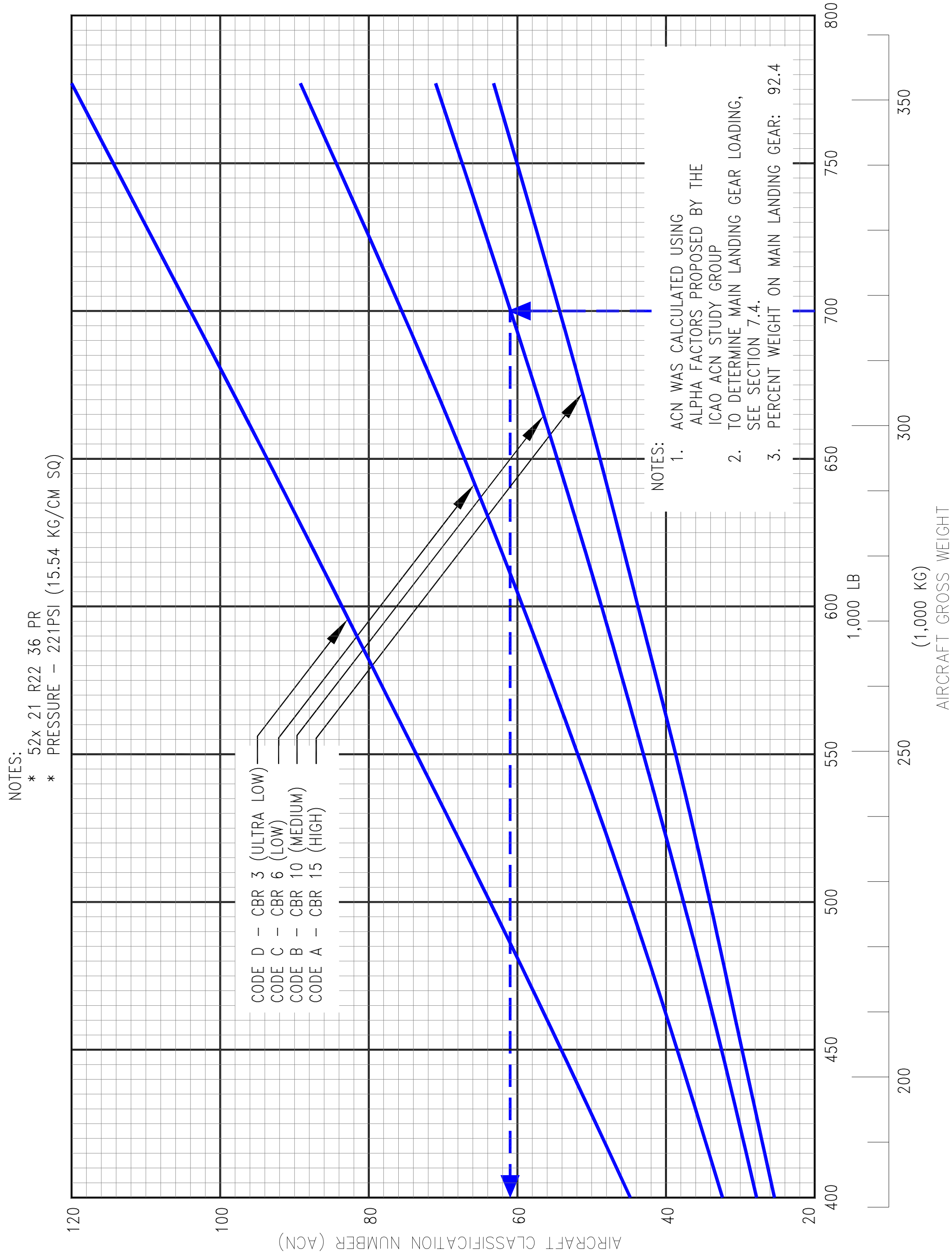
The following table provides ACN data in tabular format similar to the one used by ICAO in the "Aerodrome Design Manual Part 3, Pavements." If the ACN for an intermediate weight between taxi weight and empty fuel weight of the aircraft is required, Figures 7.10.1 through 7.10.4 should be consulted.

				ACN FOR RIGID PAVEMENT SUBGRADES – MN/m^3				ACN FOR FLEXIBLE PAVEMENT SUBGRADES – CBR			
AIRCRAFT TYPE	ALL-UP MASS/ OPERATING MASS EMPTY LB (KG)	LOAD ON ONE MAIN GEAR LEG (%)	TIRE PRESSURE PSI (MPa)	HIGH 150	MEDIUM 80	LOW 40	ULTRA LOW 20	HIGH 15	MEDIUM 10	LOW 6	ULTRA LOW 3
777-200LR	768,800(348,721)	45.84	218 (1.50)	64	82	105	127	61	69	87	117
	320,000(145,149)			23	23	27	34	19	20	23	31
777-300ER	762,700(345,954)	46.18	218 (1.50)	64	82	105	127	61	69	86	117
	370,000(167,829)			27	28	34	43	23	25	29	40
777-300ER	777,000(352,441)	46.22	221 (1.52)	66	85	109	131	63	71	89	120
	370,000(167,829)			27	28	34	43	23	25	29	40

PRELIMINARY INFORMATION

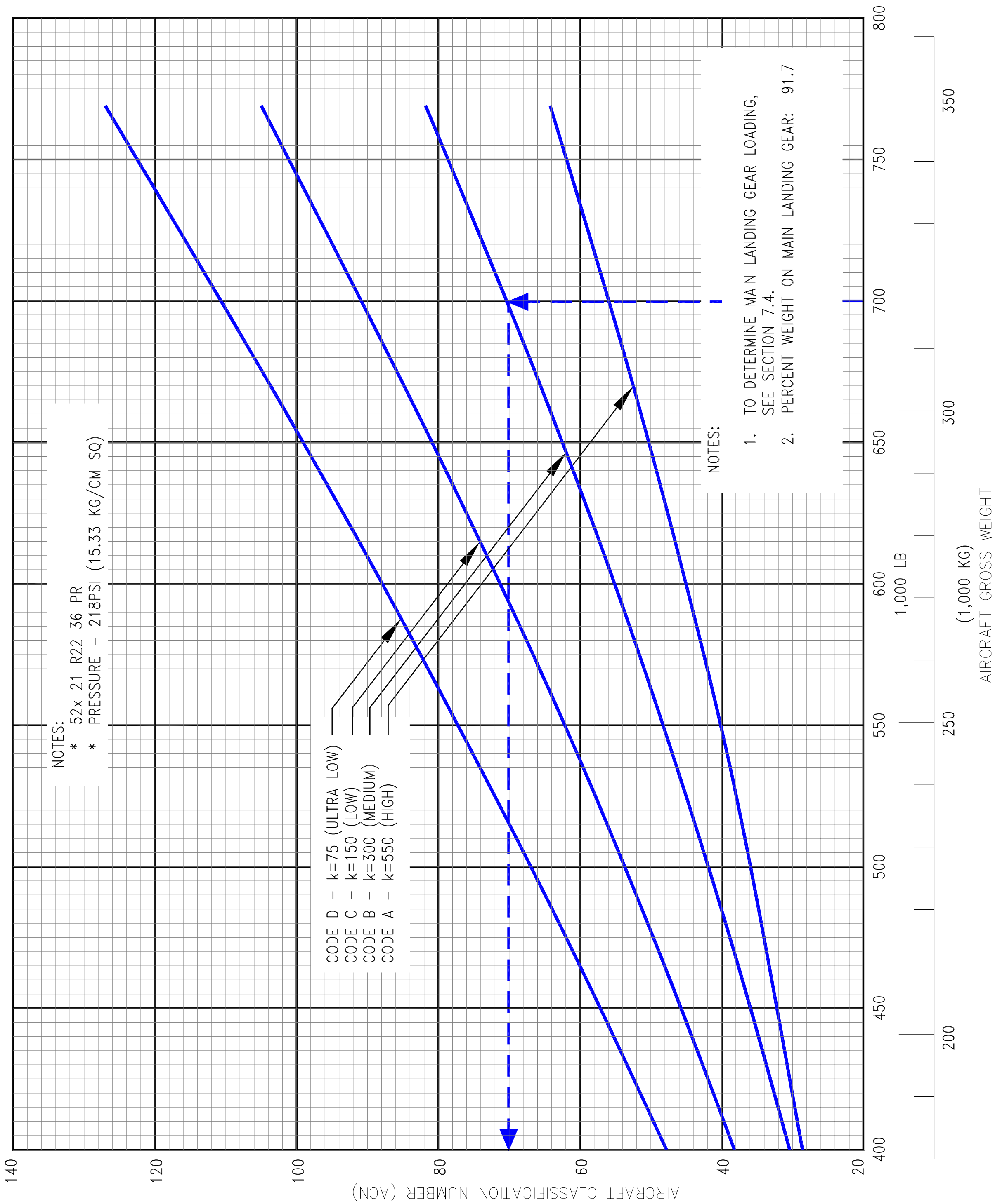


7.10.1 AIRCRAFT CLASSIFICATION NUMBER - FLEXIBLE PAVEMENT
MODEL 777-200LR



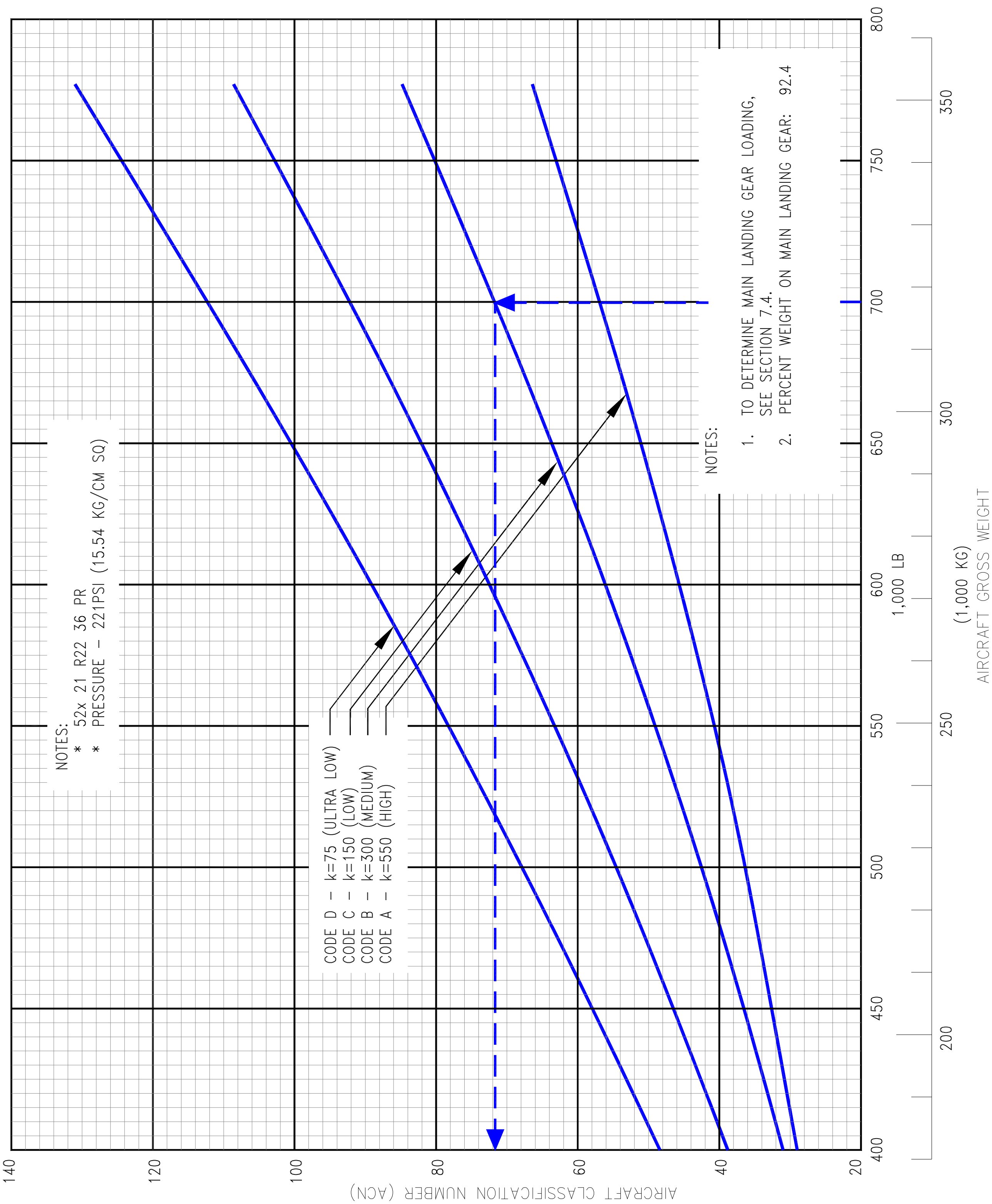
7.10.2 AIRCRAFT CLASSIFICATION NUMBER - FLEXIBLE PAVEMENT

MODEL 777-300ER



7.10.3 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT

MODEL 777-200LR



7.10.4 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT

MODEL 777-300ER

8.0 FUTURE 777 DERIVATIVE AIRPLANES

8.0 FUTURE 777 DERIVATIVE AIRPLANES

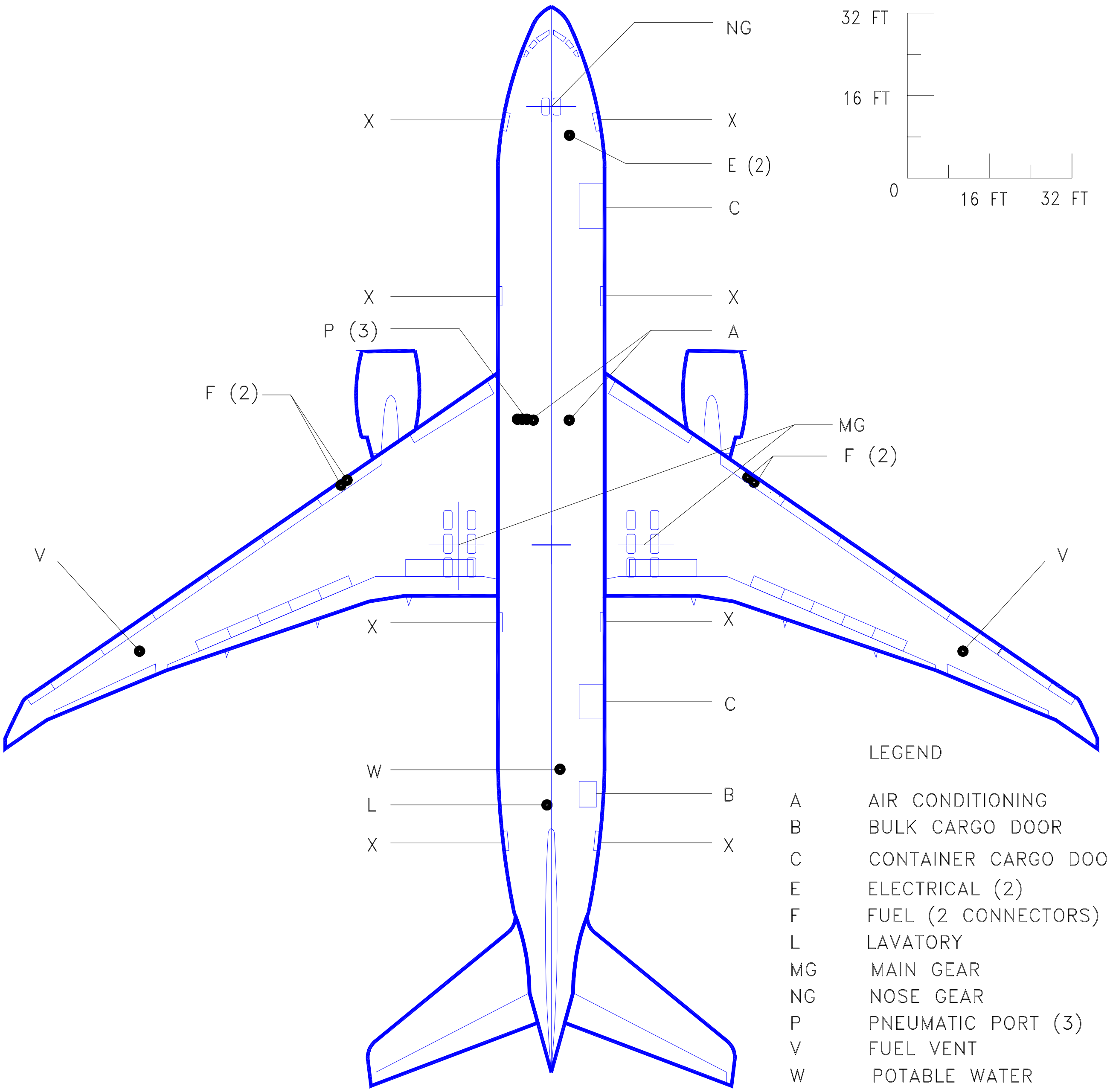
Several derivatives are being studied to provide additional capabilities of the 777 family of airplanes. Future growth versions could require additional passenger capacity or increased range or both. Whether these growth versions could be built would depend entirely on airline requirements. In any event,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

9.0 SCALED 777 DRAWINGS

9.0 SCALED 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 777-200LR and 777-300ER, along with other Boeing airplane models, can be downloaded from the following website:

http://www.boeing.com/airports

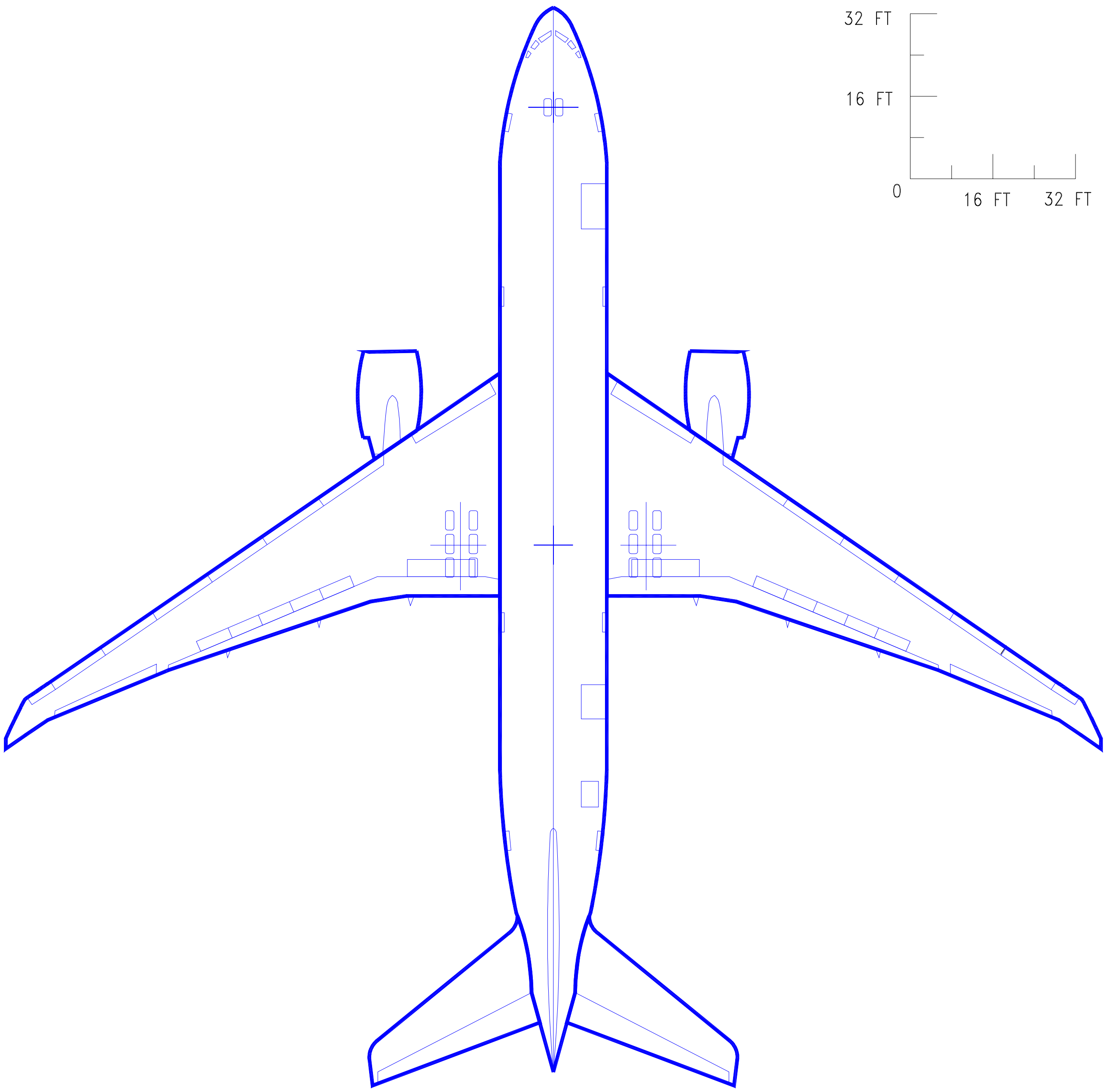


LEGEND

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

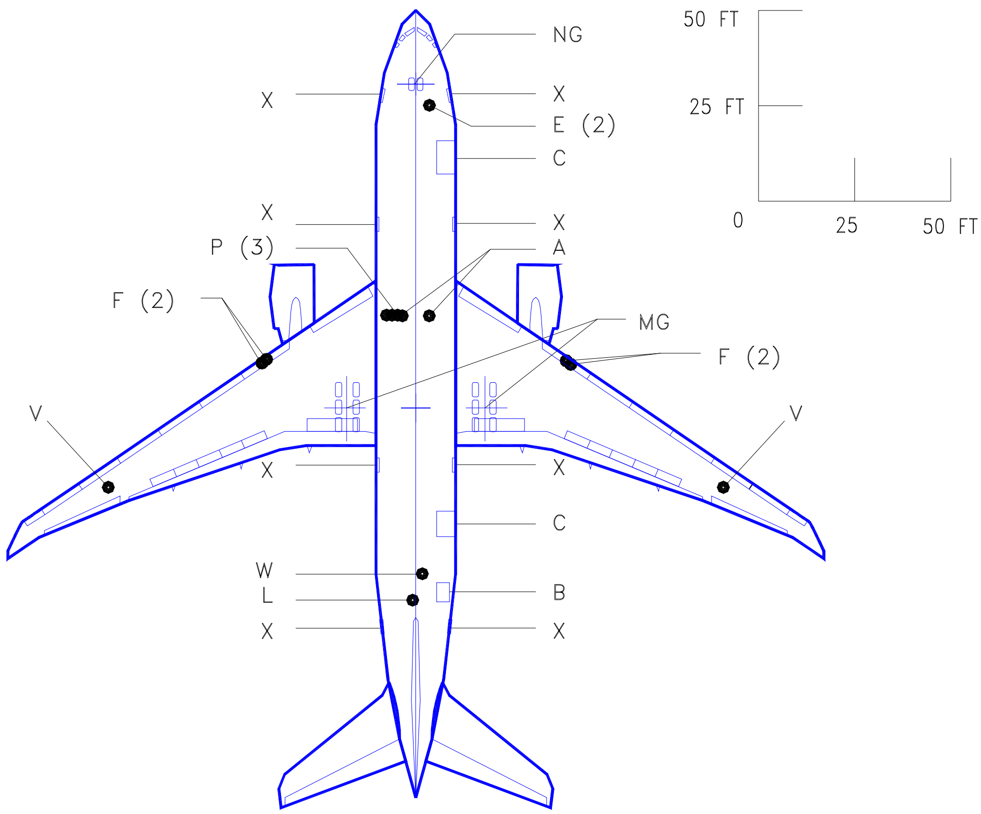
9.1.1 SCALED DRAWING - 1 IN. = 32 FT
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.1.2 SCALED DRAWING - 1 IN. = 32 FT

MODEL 777-200LR

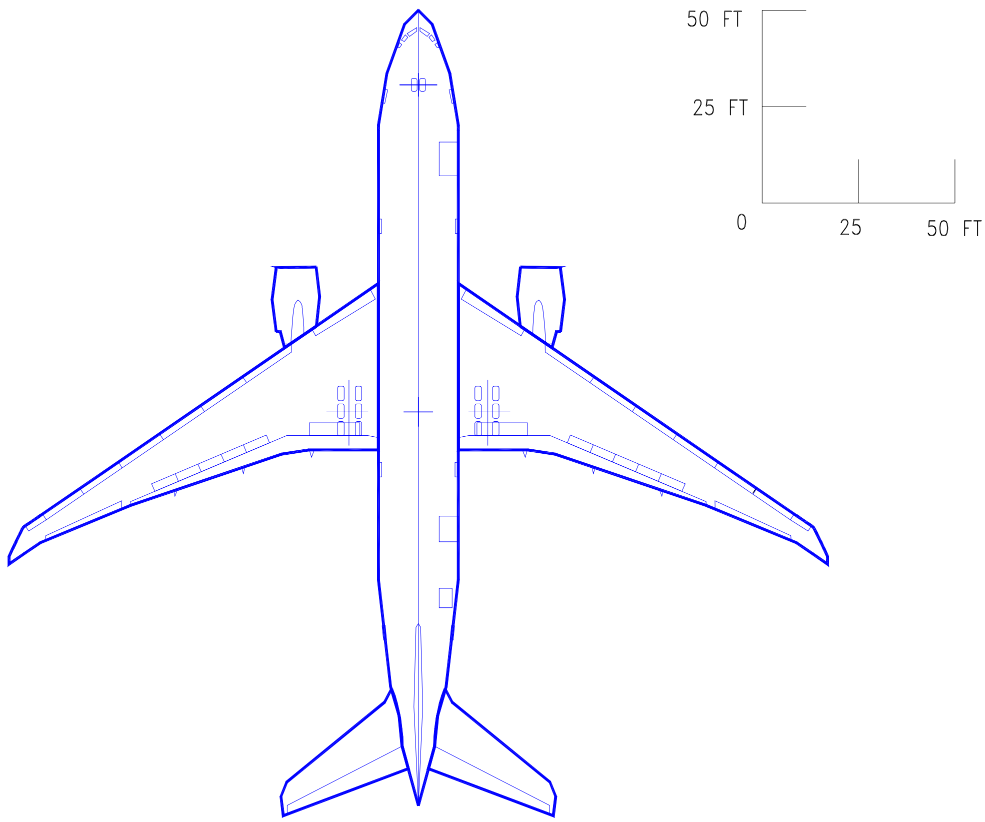


LEGEND

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

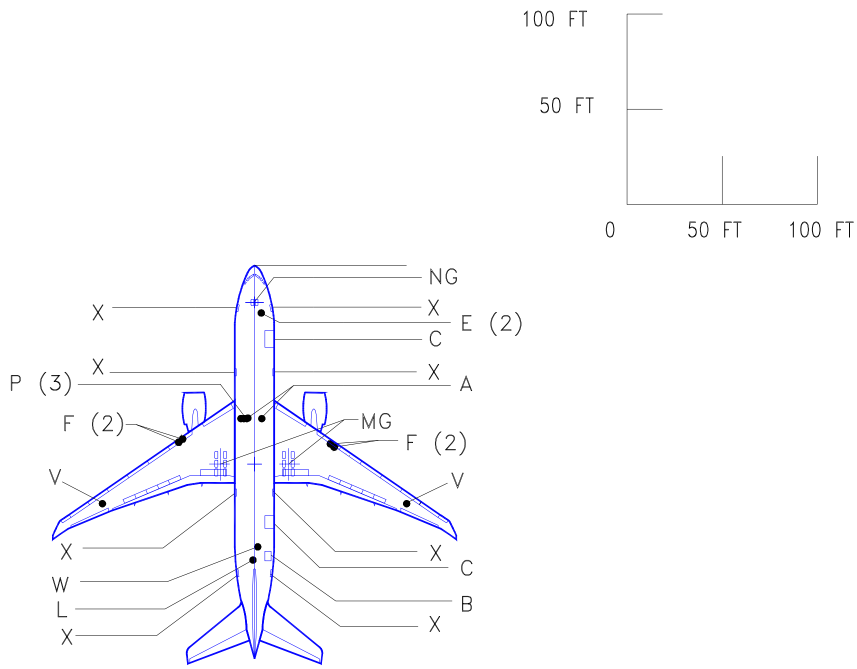
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.1 SCALED DRAWING - 1 IN. = 50 FT
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.2.2 SCALED DRAWING - 1 IN. = 50 FT
MODEL 777-200LR

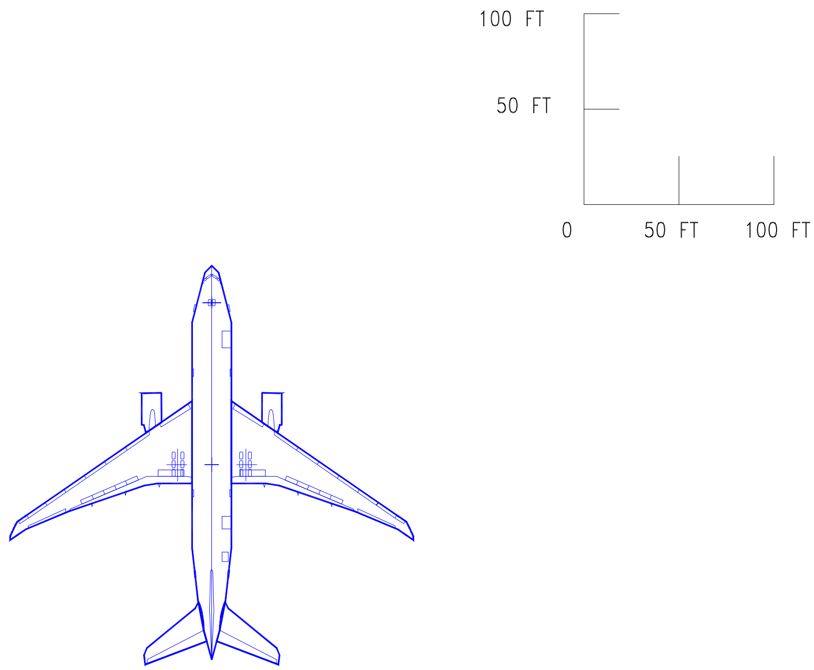


LEGEND

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

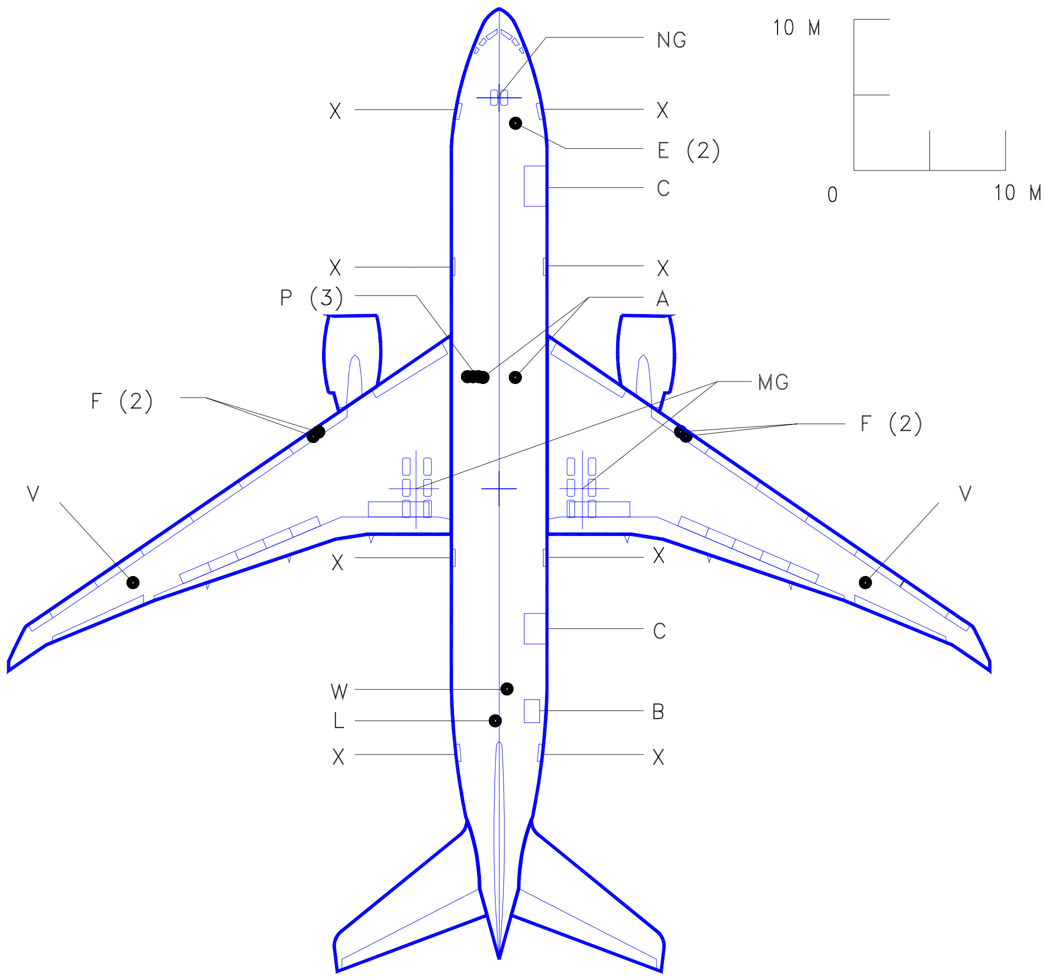
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.3.1 SCALED DRAWING - 1 IN = 100 FT
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.3.2 SCALED DRAWING - 1 IN = 100 FT
MODEL 777-200LR

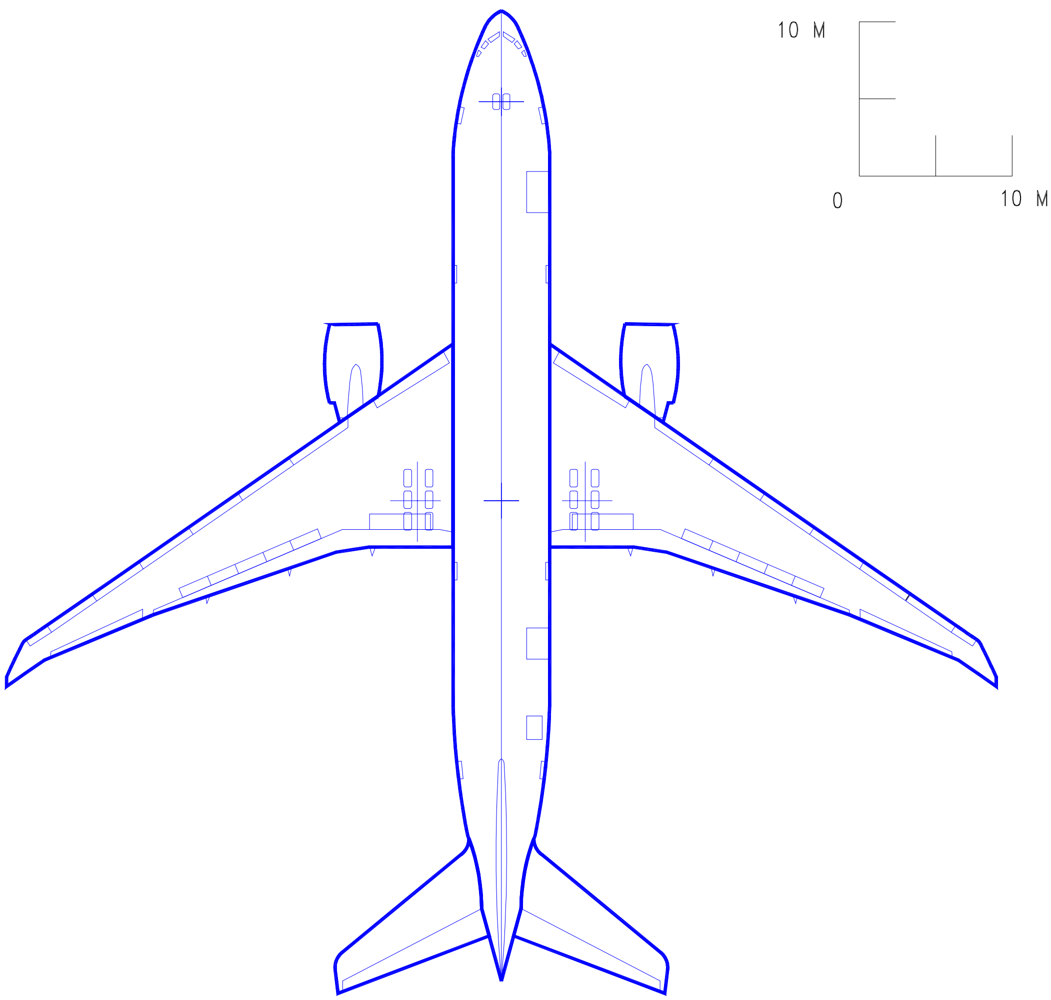


LEGEND

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

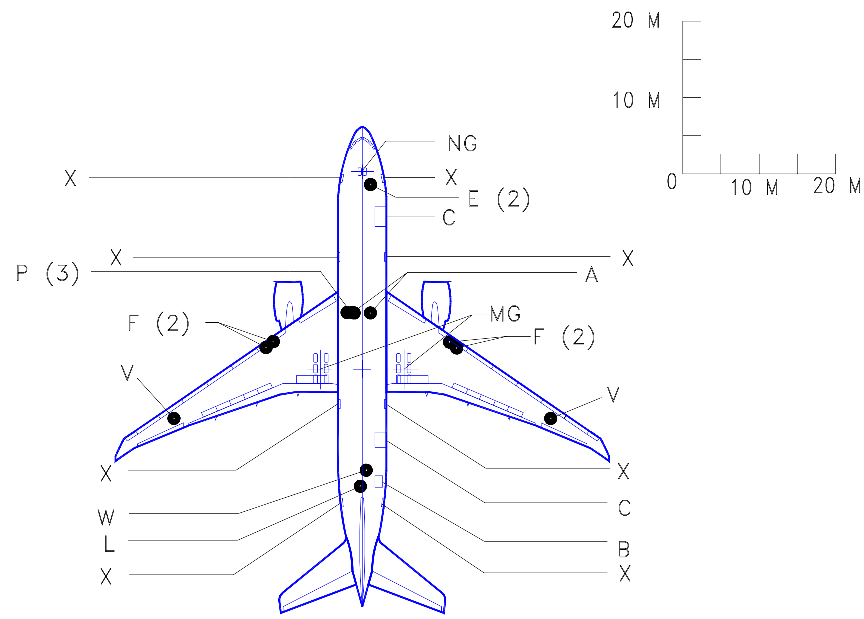
9.4.1 SCALED DRAWING - 1:500
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.4.2 SCALED DRAWING - 1:500

MODEL 777-200LR

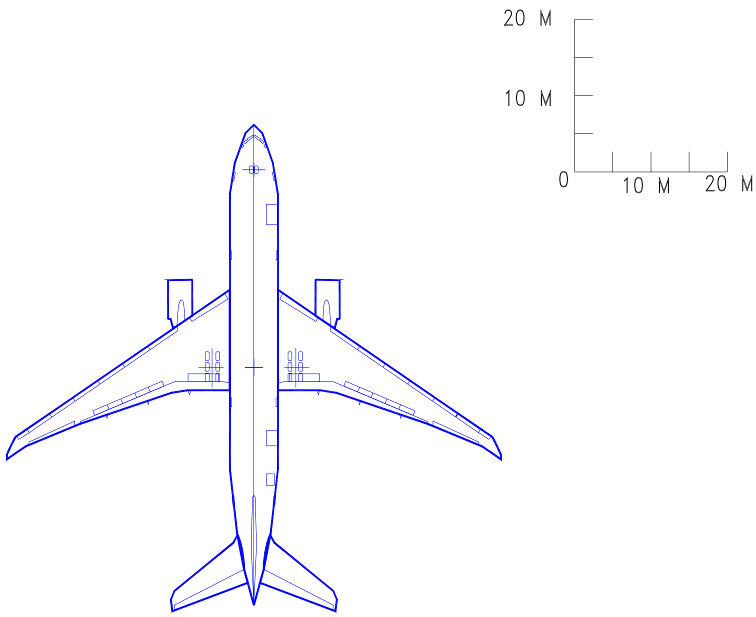


LEGEND

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

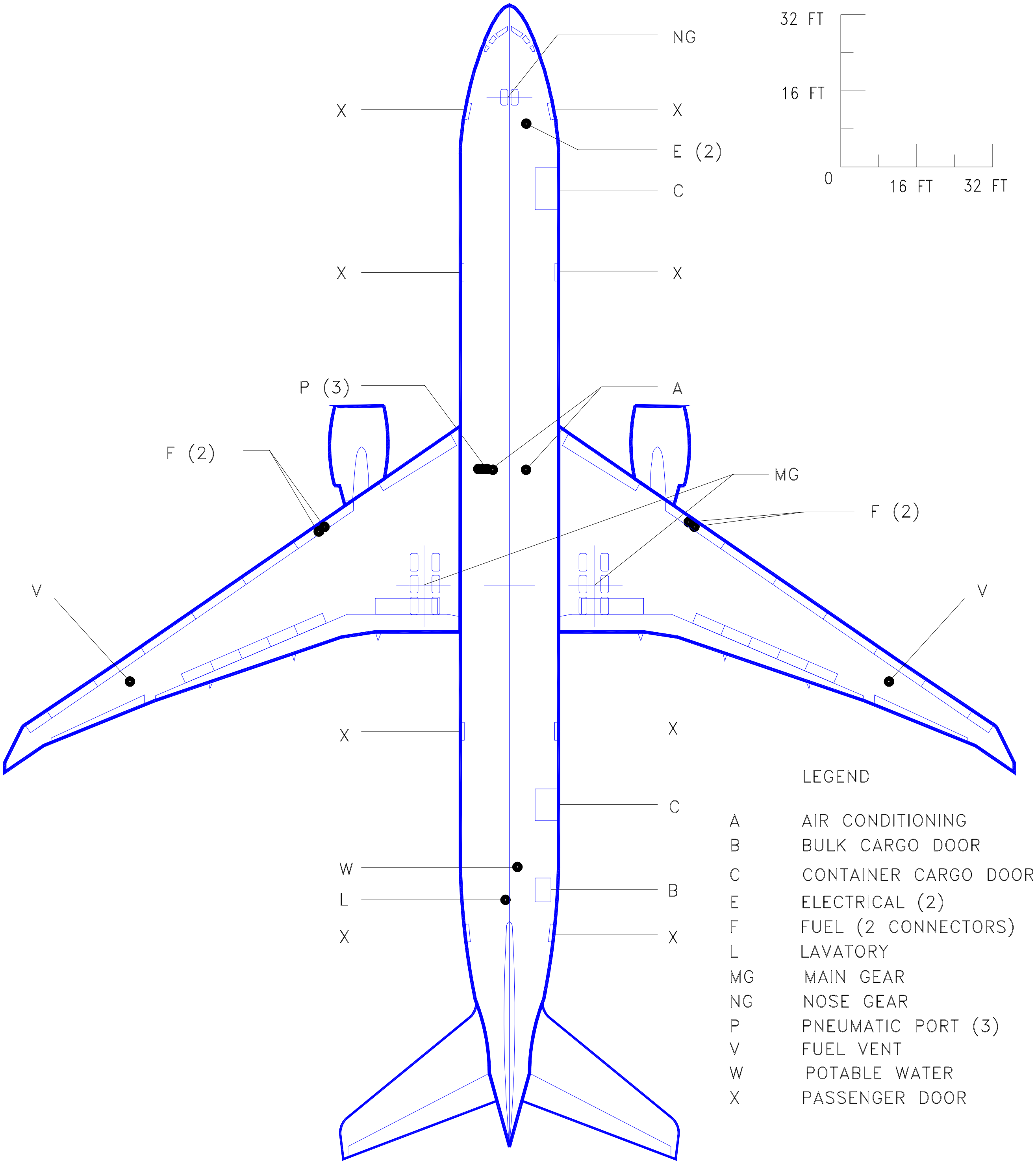
NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.5.1 SCALED DRAWING - 1:1000
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

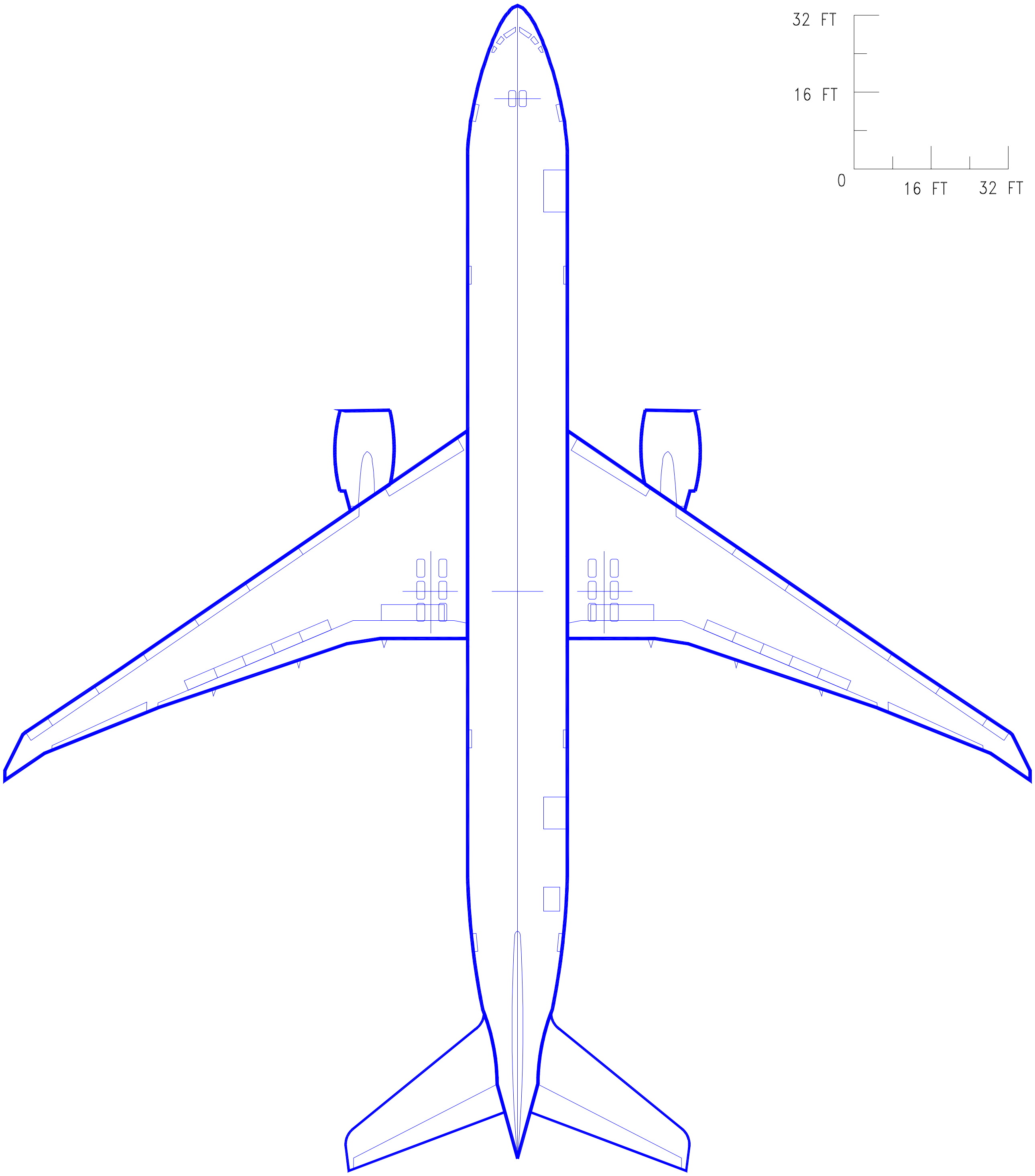
9.5.2 SCALED DRAWING - 1:1000
MODEL 777-200LR



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.6.1 SCALED DRAWING - 1 IN. = 32 FT

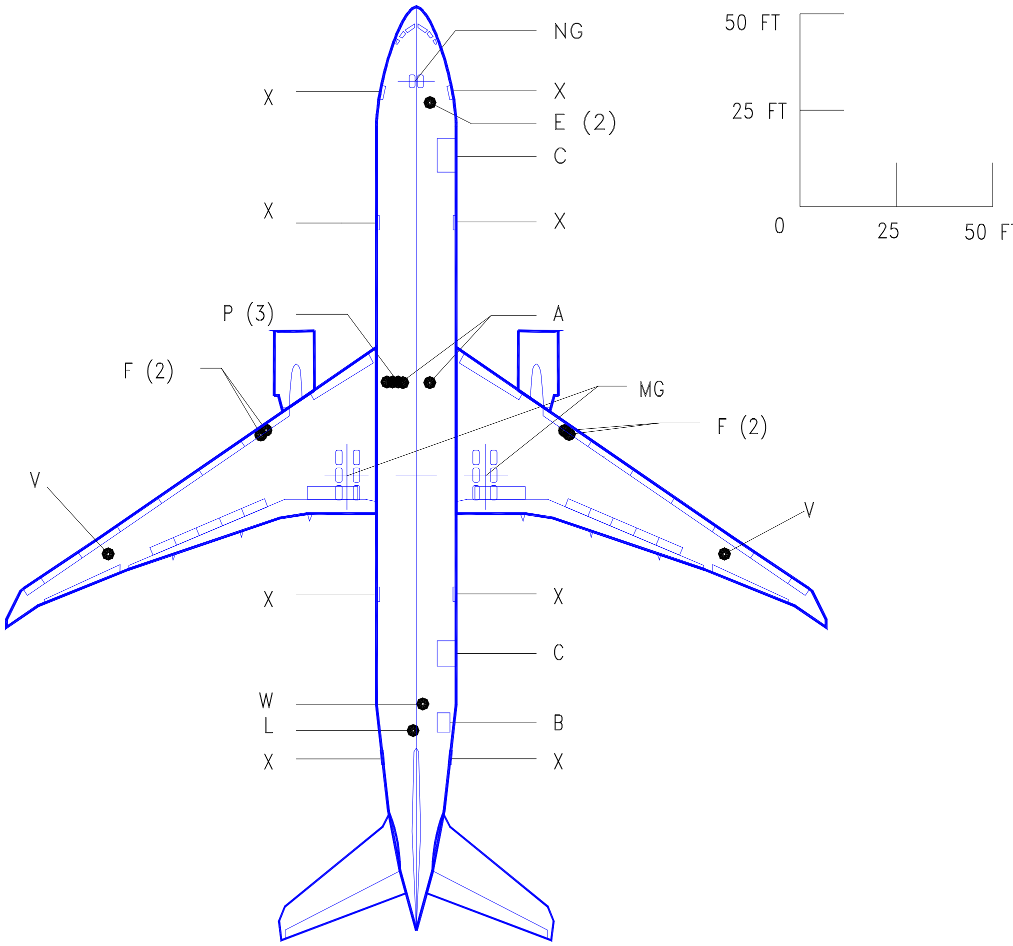
MODEL 777-300ER



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.6.2 SCALED DRAWING - 1 IN. = 32 FT

MODEL 777-300ER

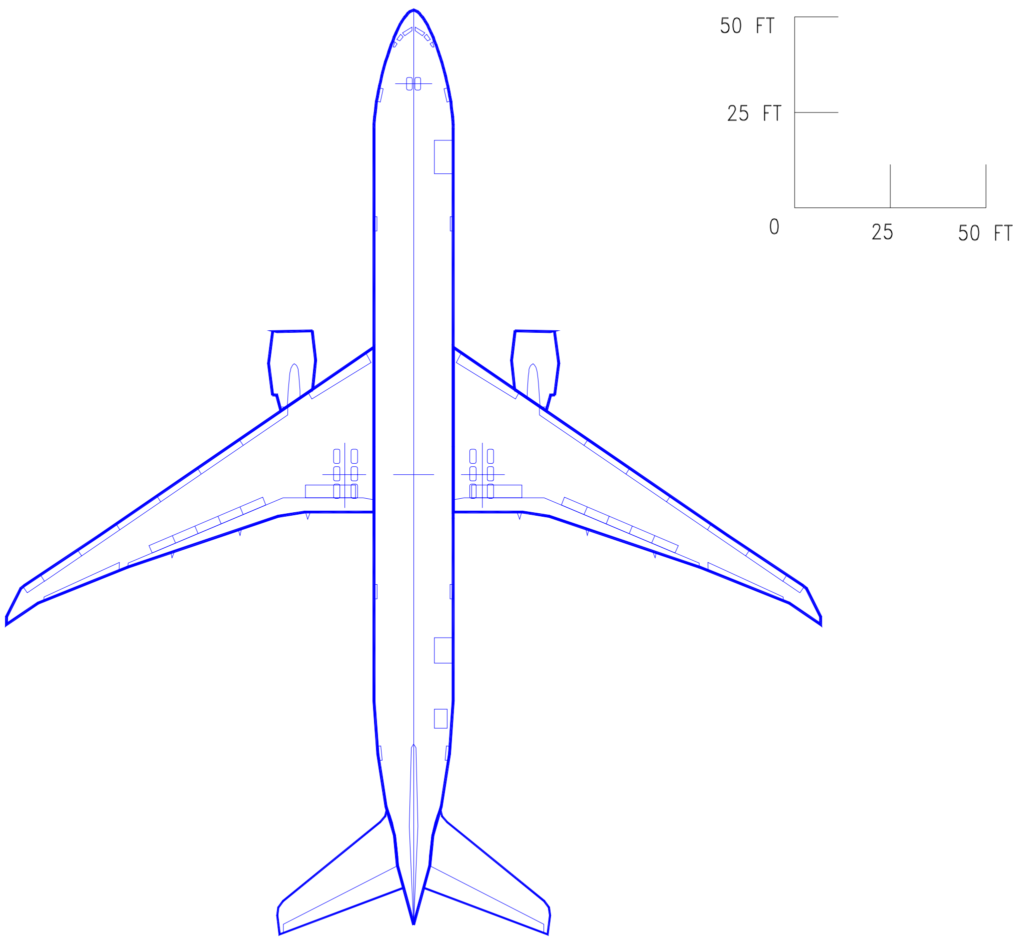


LEGEND

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

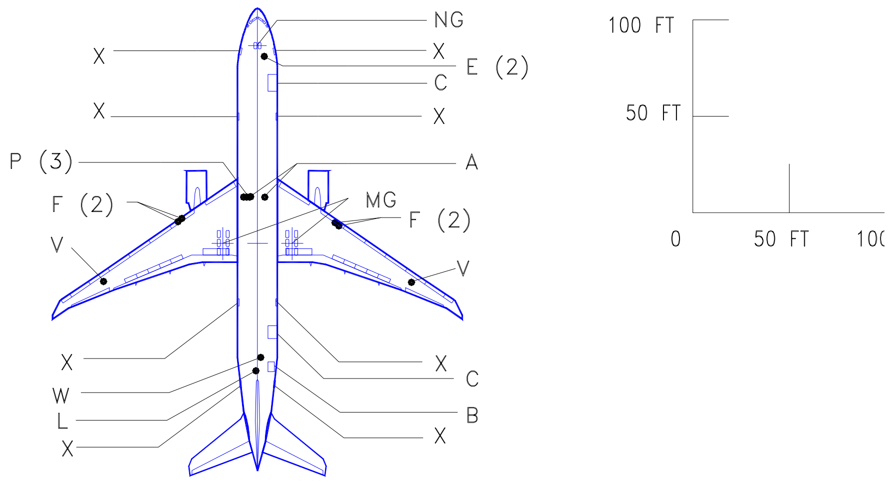
9.7.1 SCALED DRAWING - 1 IN. = 50 FT
MODEL 777-300ER



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.7.2 SCALED DRAWING - 1 IN. = 50 FT

MODEL 777-300ER



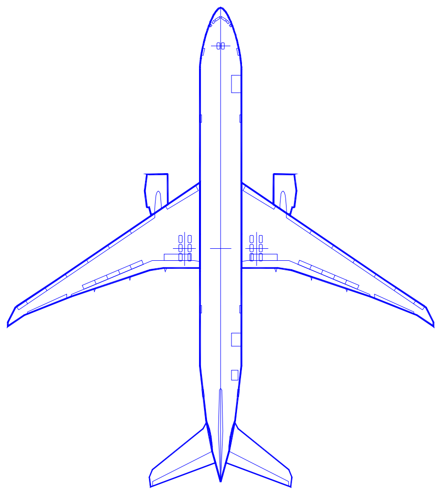
LEGEND

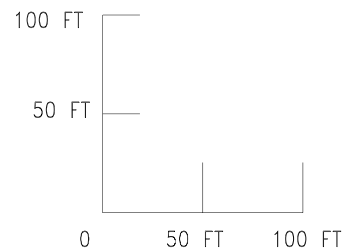
A	AIR CONDITIONING
B	BULK CARGO DOOR
C	CONTAINER CARGO DOOR
E	ELECTRICAL (2)
F	FUEL (2 CONNECTORS)
L	LAVATORY
MG	MAIN GEAR
NG	NOSE GEAR
P	PNEUMATIC PORT (3)
V	FUEL VENT
W	POTABLE WATER
X	PASSENGER DOOR

NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.8.1 SCALED DRAWING - 1 IN = 100 FT

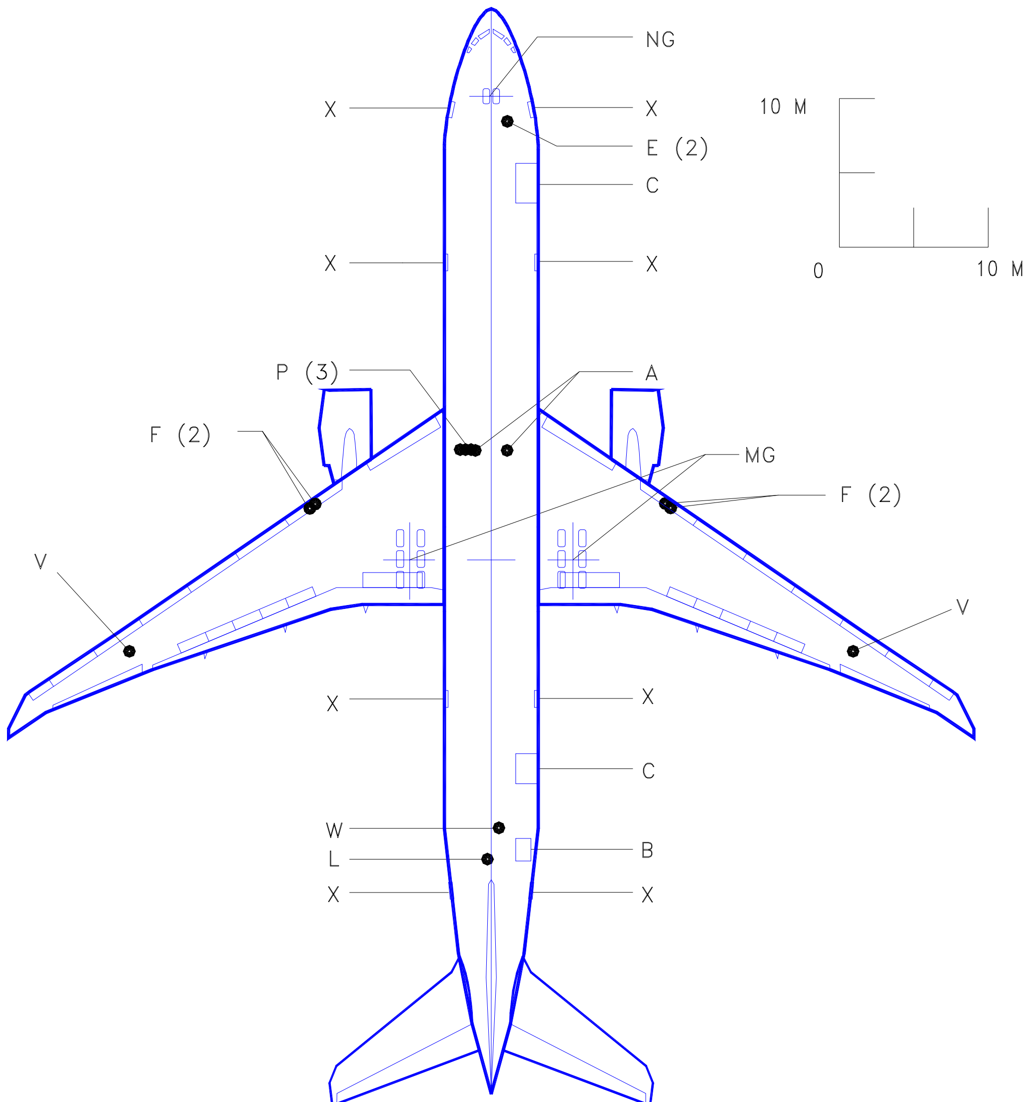
MODEL 777-300ER





NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.8.2 SCALED DRAWING - 1 IN = 100 FT
MODEL 777-300ER



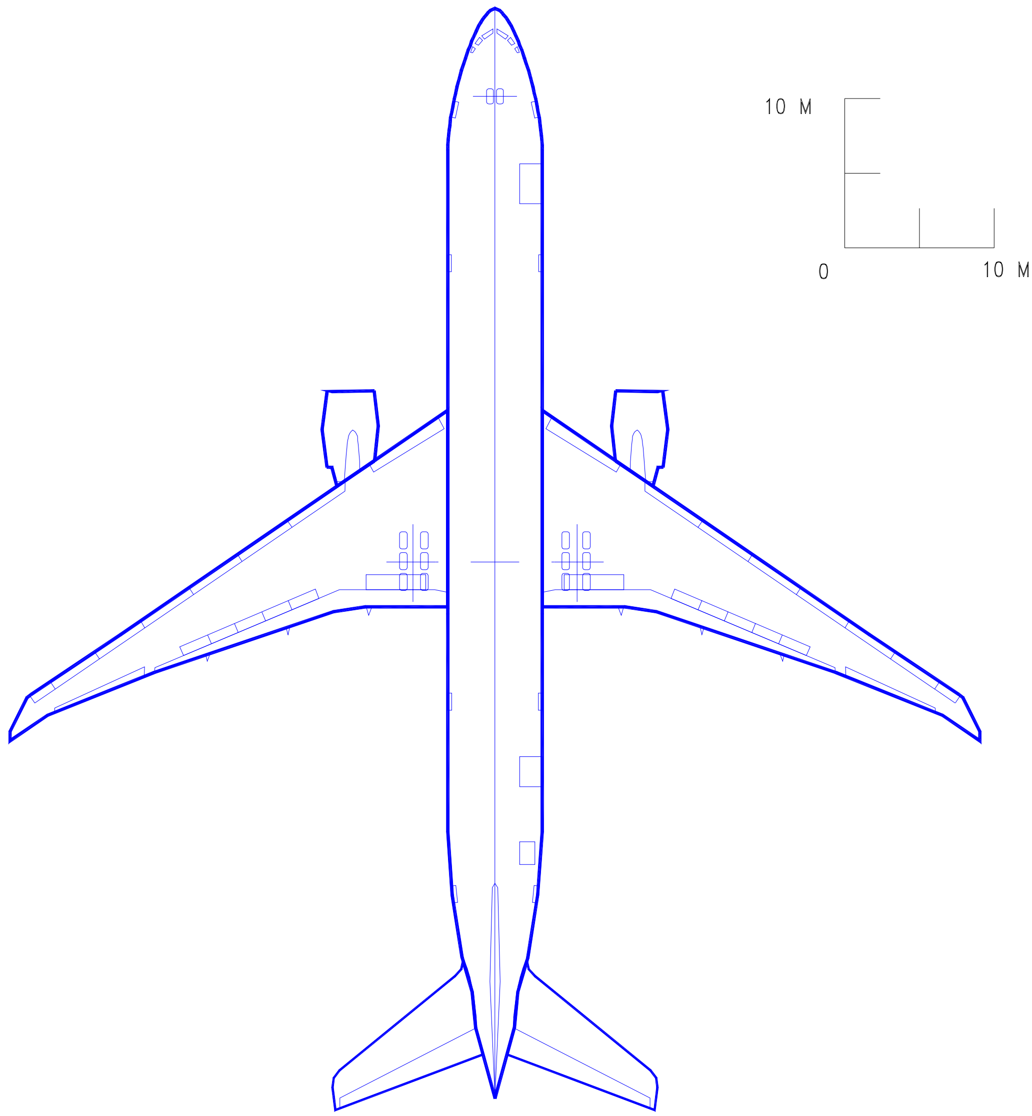
LEGEND

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

9.9.1 SCALED DRAWING - 1:500

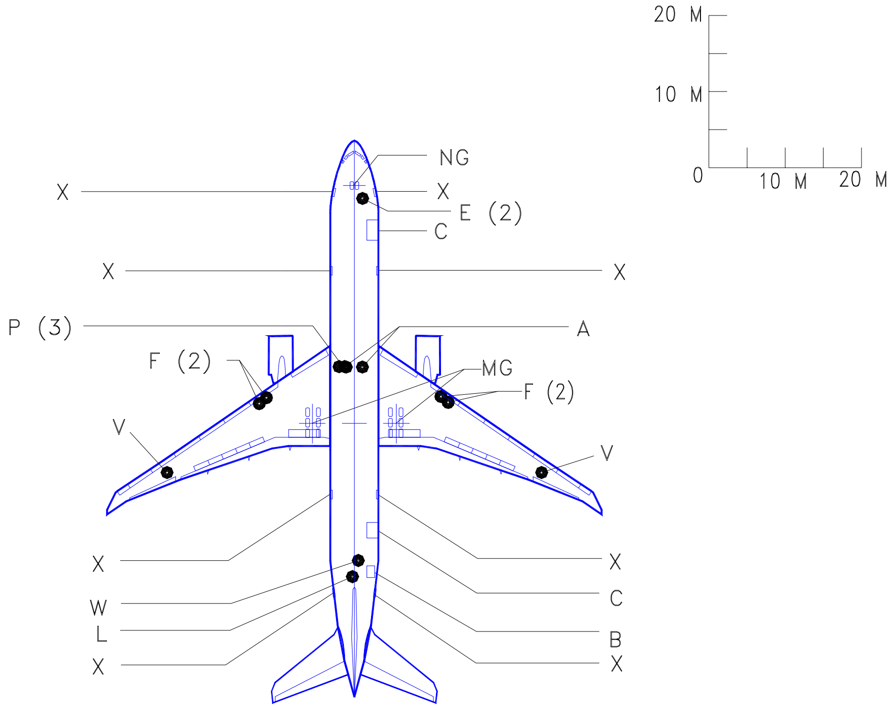
MODEL 777-300ER



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.9.2 SCALED DRAWING - 1:500

MODEL 777-300ER



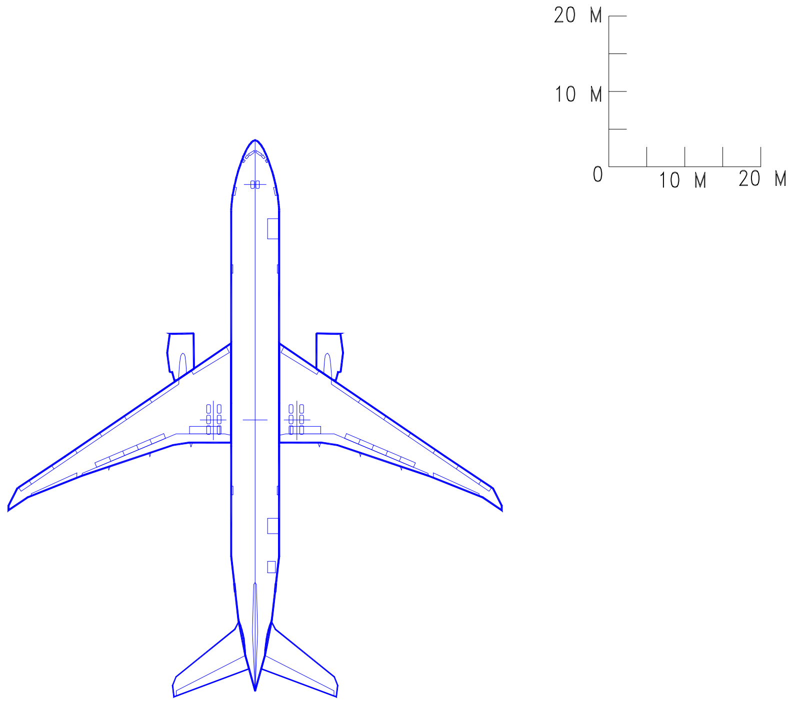
LEGEND

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

9.10.1 SCALED DRAWING - 1:1000

MODEL 777-300ER



NOTE: ADJUST SCALE WHEN PRINTING THIS PAGE

9.10.2 SCALED DRAWING - 1:1000

MODEL 777-300ER