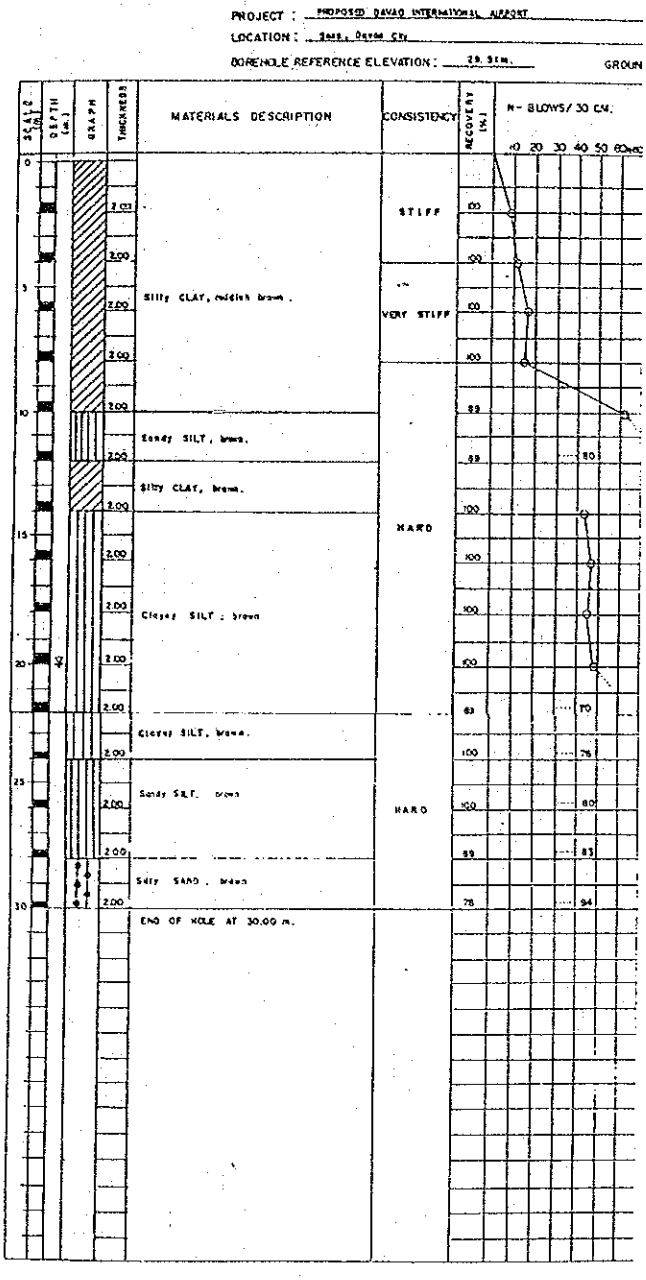
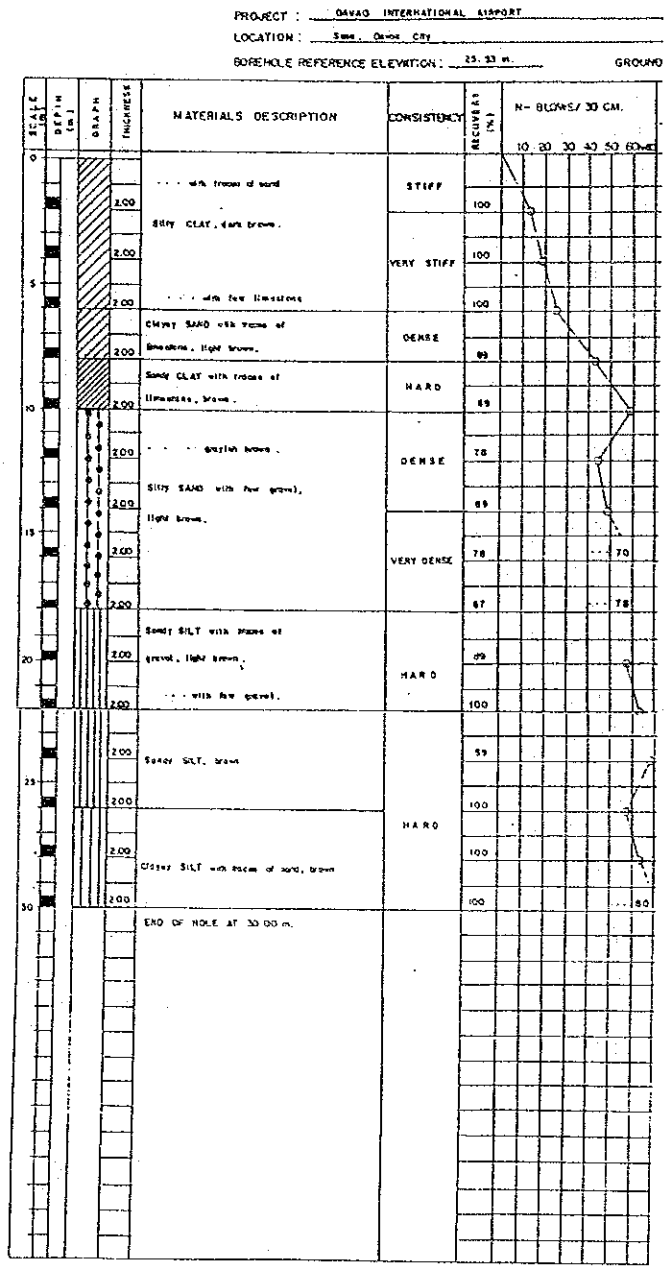
Mechanical Boring Logs (2)

B - 3

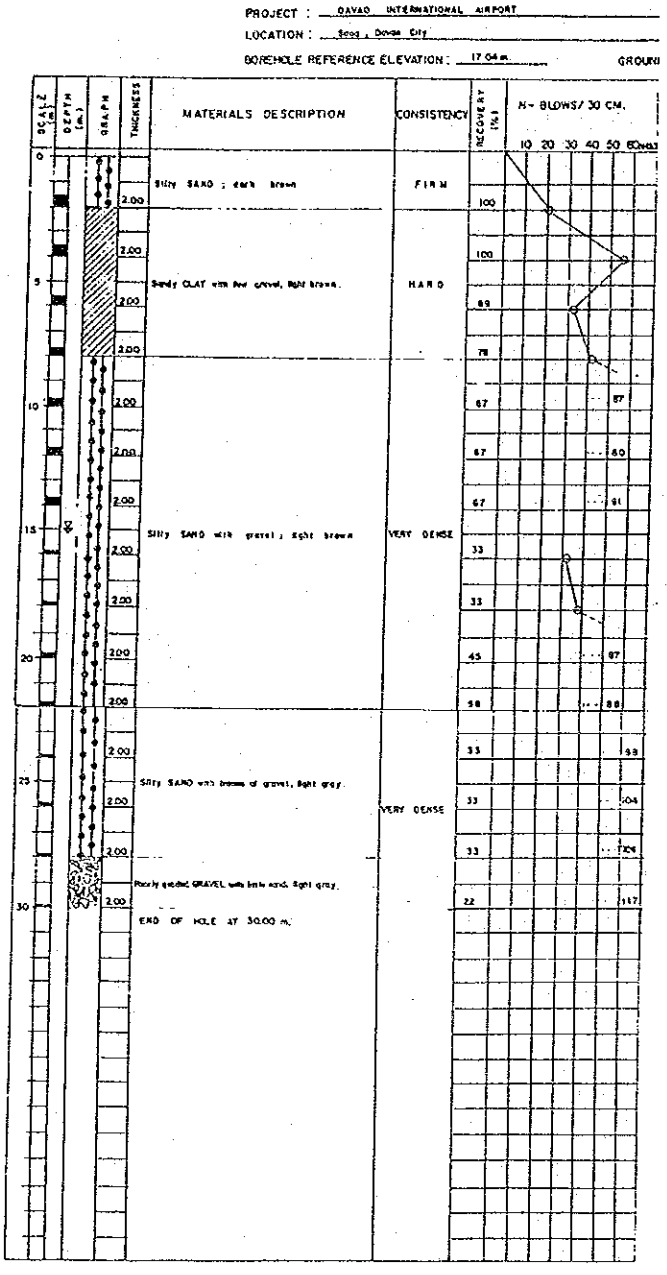


B - 4

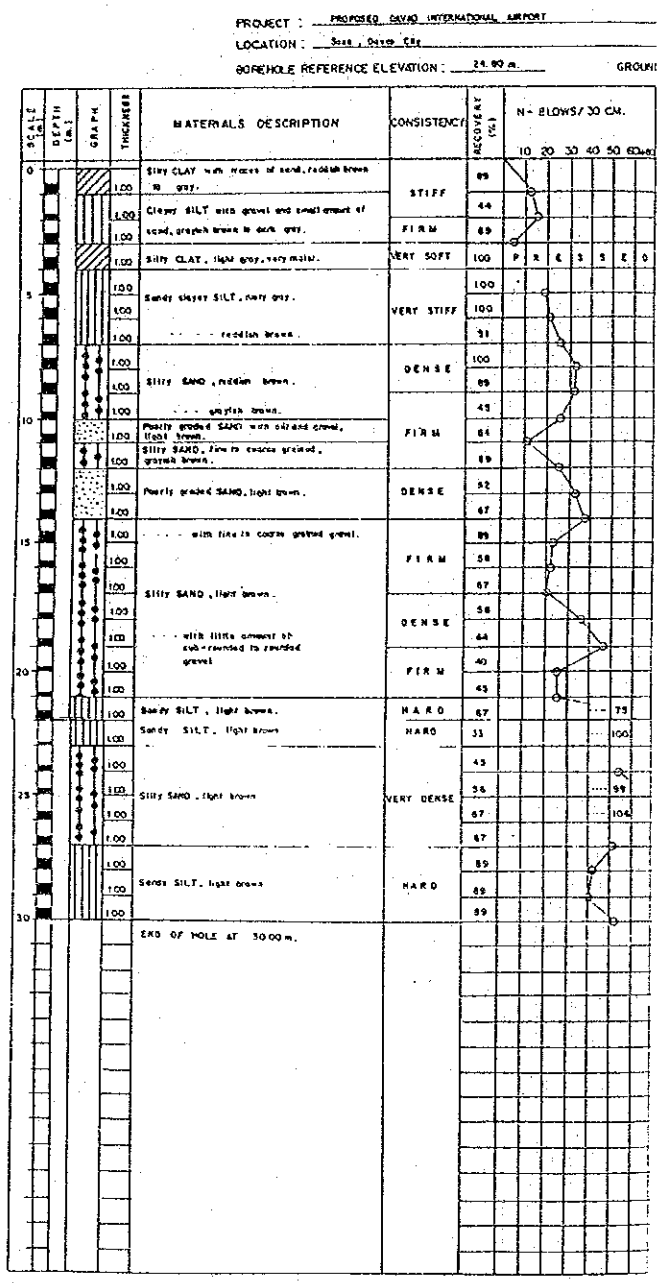


Mechanical Boring Logs (3)

B - 5



C - 1



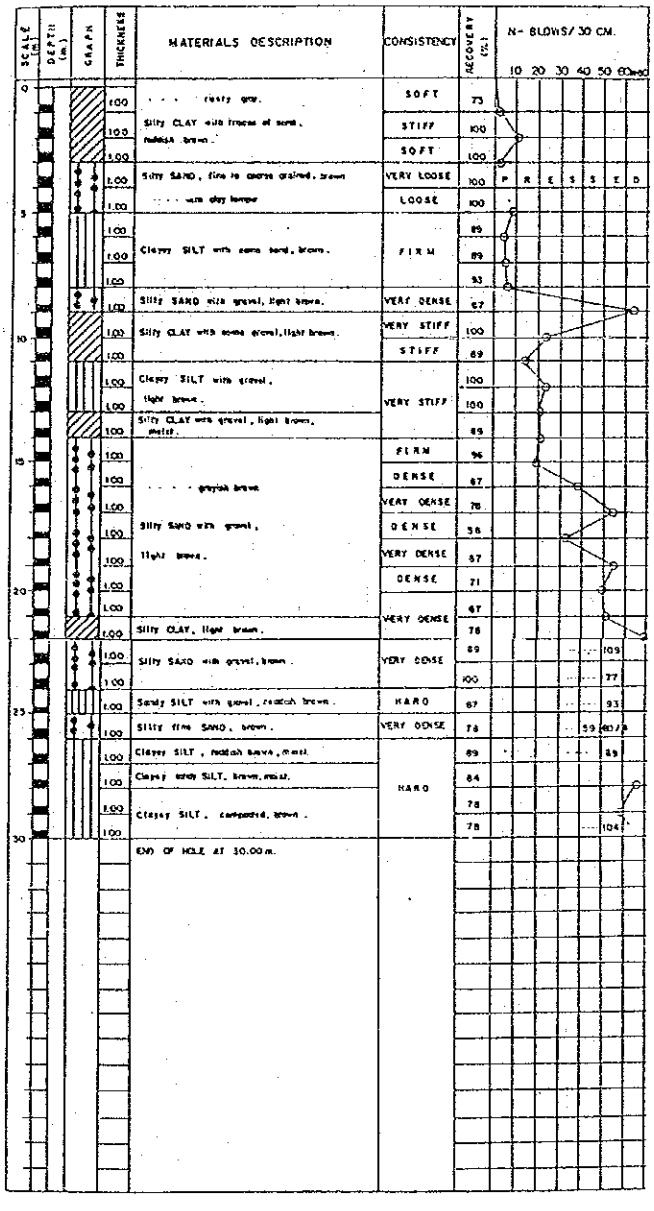
Mechanical Boring Logs (4)

C - 2

PROJECT : PROPOSED DAVAO INTERNATIONAL

LOCATION : Sasa, Davao City

BOREHOLE REFERENCE ELEVATION : 22.13m. GROUND

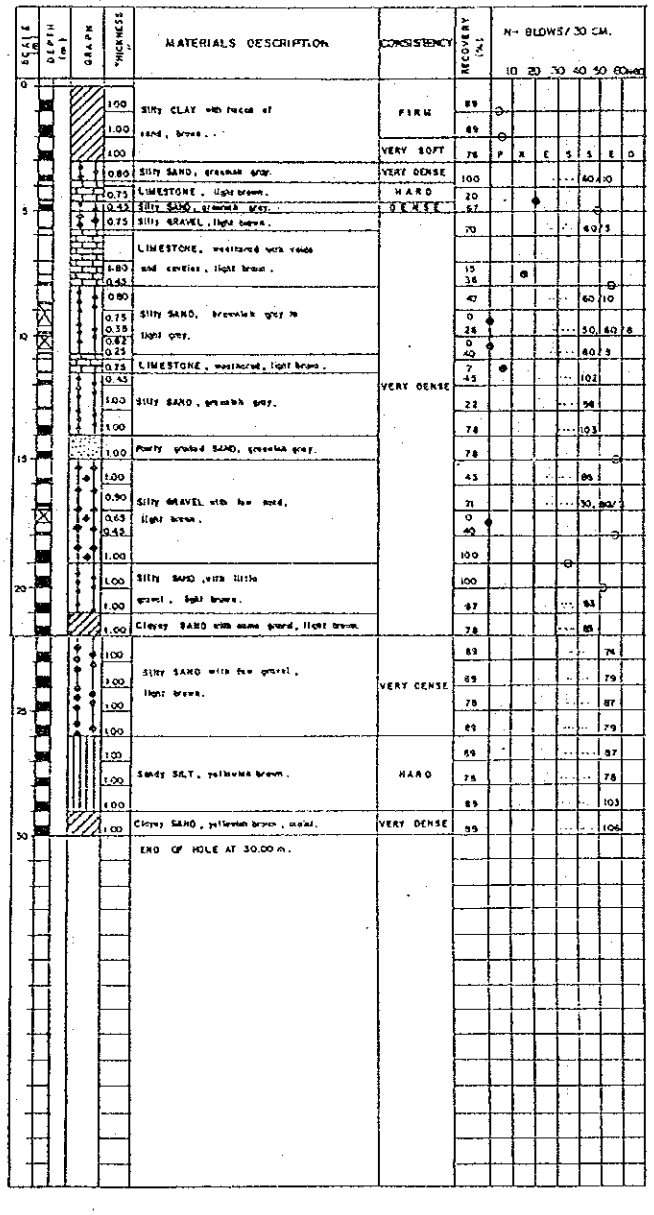


C - 3

PROJECT : PROPOSED DAVAO INTERNATIONAL AIRPORT

LOCATION : Sasa, Davao City

BOREHOLE REFERENCE ELEVATION : 21.80m. GROUND



Mechanical Boring Logs (5)

C - 4

PROJECT : DAVAO INTERNATIONAL AIRPORT
LOCATION : Sasa, Davao City
BOREHOLE REFERENCE ELEVATION : 29.59 m. GROUN

SCALE (m)	DEPTH (m)	GRAPH	THICKNESS	MATERIALS DESCRIPTION	CONSISTENCY	RECOVERY (%)	N - BLOWS / 30 CM. 10 20 30 40 50 60+
0			1.00	Silty CLAY, brown.	STIFF	100	
			1.00		VERY SOFT	100	P A E S S E D
			1.00		STIFF	100	
			1.00	Clayey SILT, yellowish brown.	HARD	100	
			1.00	Sandy SILT, light brown.		83	70
5			1.00	with traces of limestone		67	
			1.00			67	
			1.00	Silty SAND, greenish grey to light brown.		78	73
			1.00			78	72
10			1.00		VERY DENSE	78	
			1.00	Clayey silty SAND, brown.		89	
			1.00			100	77
			1.00	Silty fine SAND, light brown.		89	81
			1.00	Clayey silty SAND, light brown.		78	82
15			1.00	Poorly graded SAND with silt, grey.		56	85
			1.00	Silty fine SAND, grey.		67	87
			1.00			78	100
			1.00			89	87
			1.00	Clayey SILT with fine sand, light brown.	HARD	71	101
			1.00			89	94
20			1.00			78	88
			1.00			78	89
			1.00	Sandy SILT, brown.	HARD	89	93
			1.00			89	75
			1.00	Clayey SILT with fine sand, brown.		100	82
25			1.00	Silty fine SAND, grey.	VERY DENSE	89	87
			1.00			100	98
			1.00	Clayey fine SAND, greyish brown.		89	100
			1.00			100	101
30			1.00			100	109
				END OF HOLE AT 30.00 m			

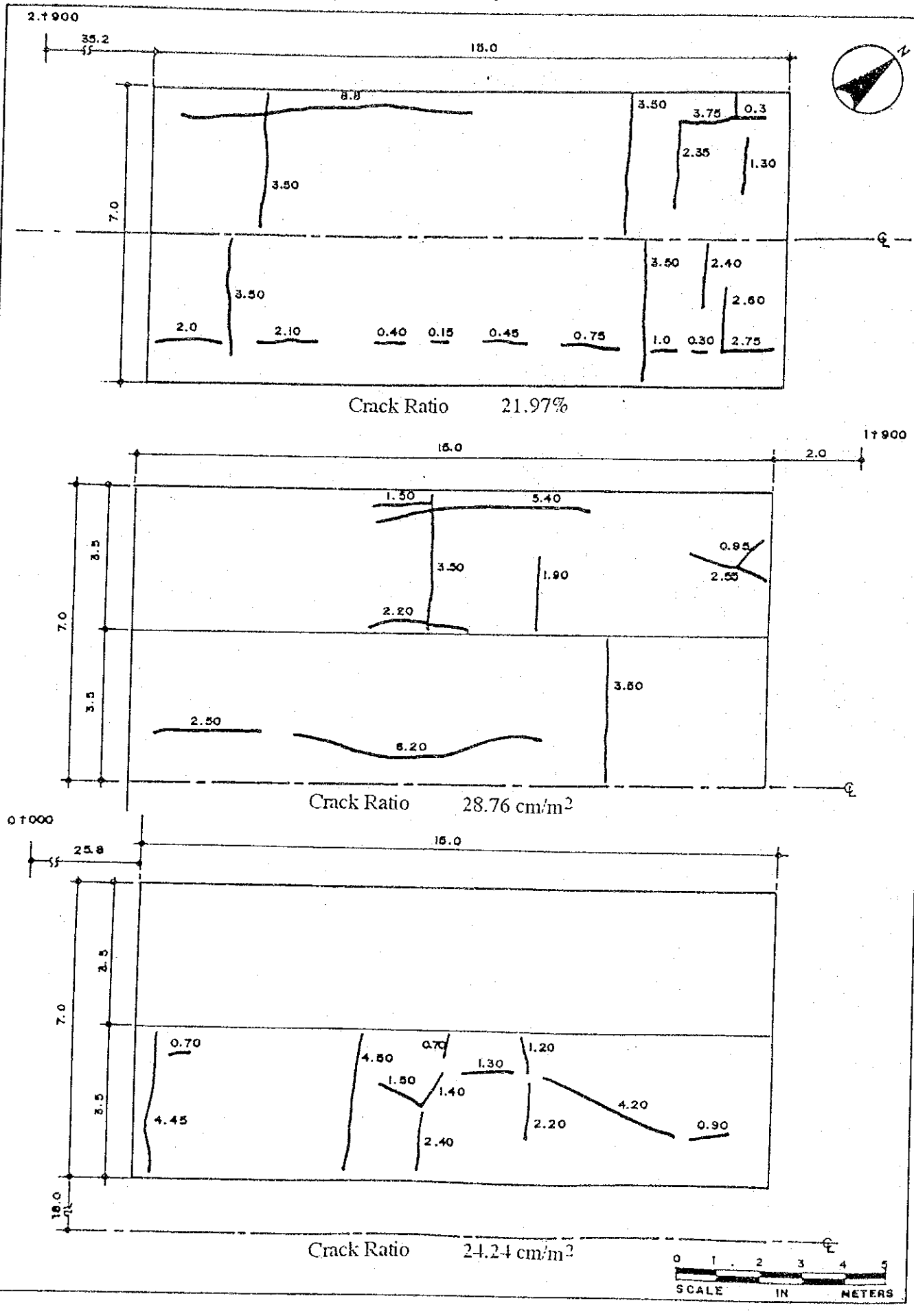
C - 5

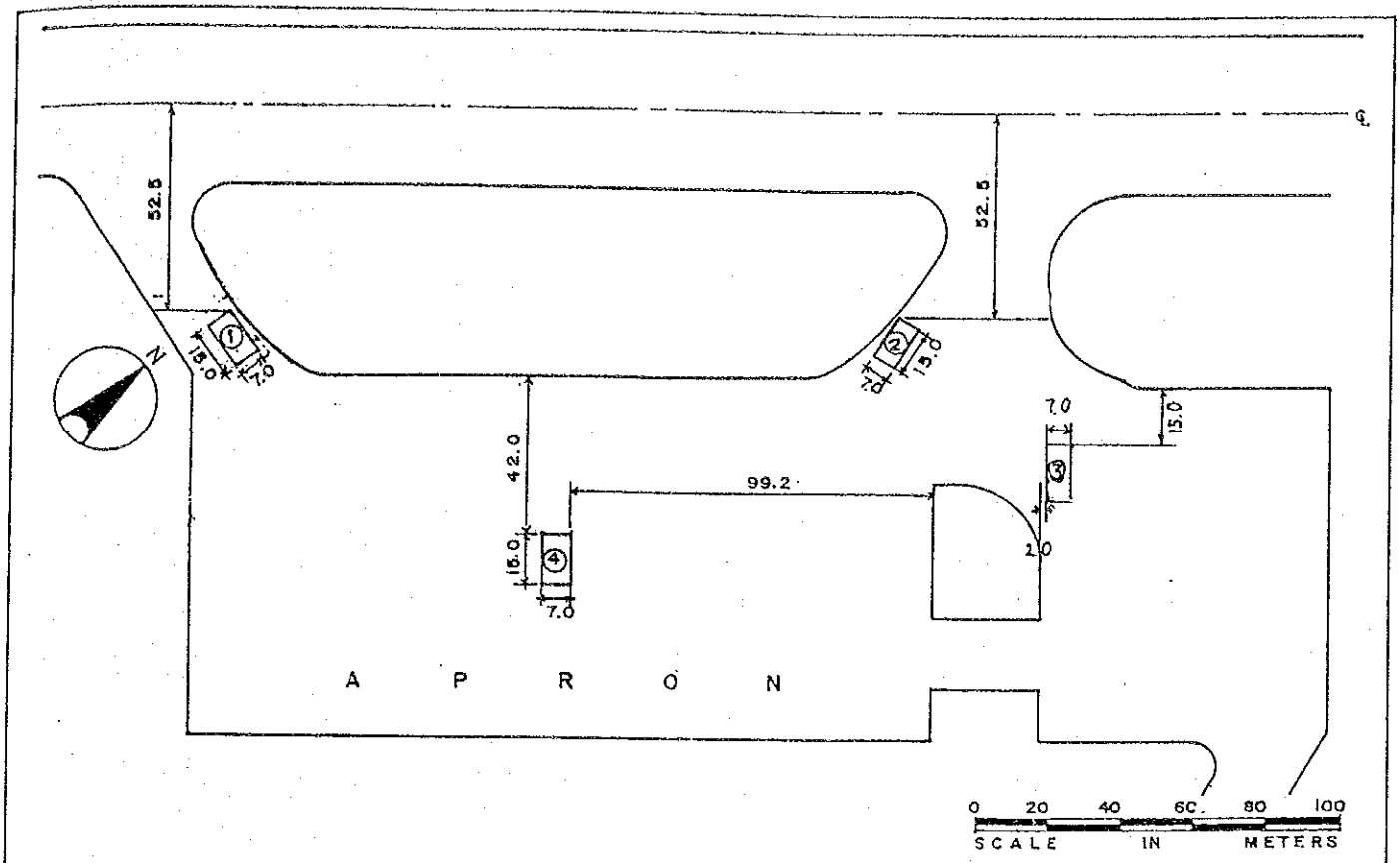
PROJECT : DAVAO INTERNATIONAL AIRPORT
LOCATION : Sasa, Davao City
BOREHOLE REFERENCE ELEVATION : 36.55 GROUN

SCALE (m)	DEPTH (m)	GRAPH	THICKNESS	MATERIALS DESCRIPTION	CONSISTENCY	RECOVERY (%)	N - BLOWS / 30 CM. 10 20 30 40 50 60+
0			1.00	Silty CLAY, dark grey, very moist.	FIRM	100	
			1.00		VERY SOFT	67	P R E S S E D
			1.00	Clayey SILT, brown.	HARD	100	
			1.00	Clayey SAND with little gravel, brown.	FIRM	100	
5			1.00	Clayey SILT with traces of fine sand, brown.	VERY STIFF	89	
			1.00			89	
			1.00	Silty fine SAND with traces of gravel & reddish grey.	FIRM	89	
			1.00	Clayey silty fine SAND, greyish brown.		93	
			1.00			89	
10			1.00	Silty fine SAND, brownish grey.	DENSE	67	
			1.00			78	
			1.00			89	
			1.00	Sandy SILT, greyish brown.	STIFF	89	
			1.00	Clayey SILT, yellowish brown.		89	
			1.00	Silty CLAY, yellowish brown.	VERY SOFT	73	P A E S S E D
15			1.00	Silty fine SAND, brownish grey.	DENSE	91	
			1.00		VERY DENSE	89	
			1.00	Sandy SILT, greyish brown.	HARD	89	
			1.00			87	
			1.00	Clayey sandy SILT, greyish brown.		89	
20			1.00	yellowish brown	VERY STIFF	78	
			1.00		HARD	89	
			1.00	Clayey sandy SILT, yellowish brown.		89	
			1.00	Clayey SILT, light brown		89	
			1.00			89	
25			1.00			100	72
			1.00	with little sand, greenish grey.		80	71
			1.00			87	71
			1.00			84	90
30			1.00			89	75
				END OF HOLE AT 30.00 m.			

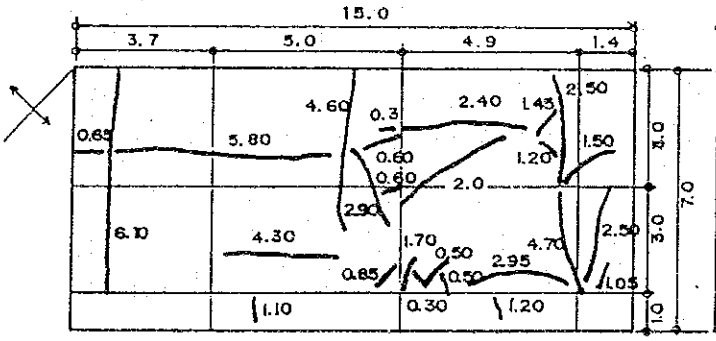
Result of Unconfined Compression Test

Borehole	Type of Soil	Compressive Strength (kg/sq.cm)	Depth (m)
A-1	Silty clay	3.02	2.00 - 2.30
A-5	Silty clay	3.48	1.50 - 1.75
A-7	Silty sand	1.14	1.50 - 1.65
A-10	Silty sand	0.23	1.30 - 1.46
A-13	Silty silt	3.11	1.74 - 2.15
A-16	Silty sand	2.14	1.32 - 1.80
A-19	Silty clay	4.80	0.85 - 1.15
A-25	Silty clay	0.83	1.55 - 1.75
C-1	Silty clay	2.61	3.55 - 4.00
C-2	Silty sand	1.23	3.55 - 4.00
C-3	Silty clay	0.61	2.55 - 3.00
C-4	Silty clay	1.39	1.55 - 2.00
C-5	Silty clay	4.56	1.55 - 2.00
C-5	Silty clay	2.59	14.55 - 15.00


2+900
35.2
18.0
N
8.8
3.50
3.50
3.75
0.3
2.35
1.30
7.0
3.50
2.40
3.50
2.60
2.0
2.10
0.40
0.15
0.45
0.75
1.0
0.30
2.75
Crack Ratio 21.97%
1+900
18.0
2.0
1.30
5.40
0.95
3.50
1.90
2.55
2.20
7.0
3.5
3.50
3.5
2.50
6.20
Crack Ratio 28.76 cm/m2
0+000
25.8
18.0
3.5
7.0
0.70
4.50
0.70
1.20
1.30
1.50
1.40
4.20
3.5
4.45
2.40
2.20
0.90
18.0
Crack Ratio 24.24 cm/m2
0 1 2 3 4 5
SCALE IN METERS

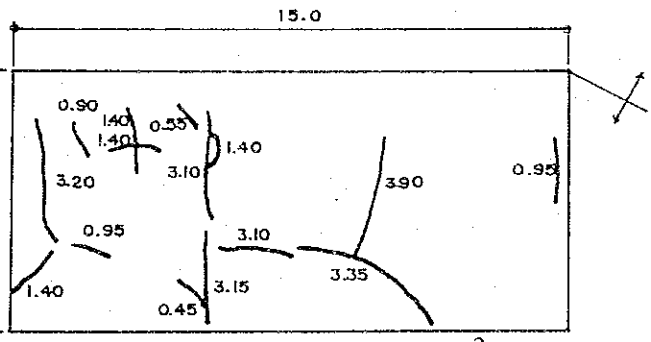


①



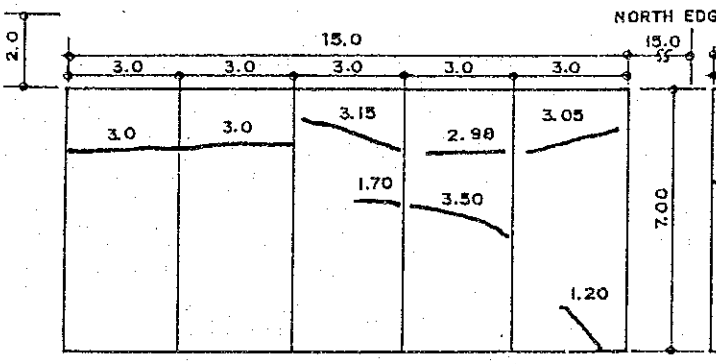
Crack Ratio 51.76 cm/m²

②



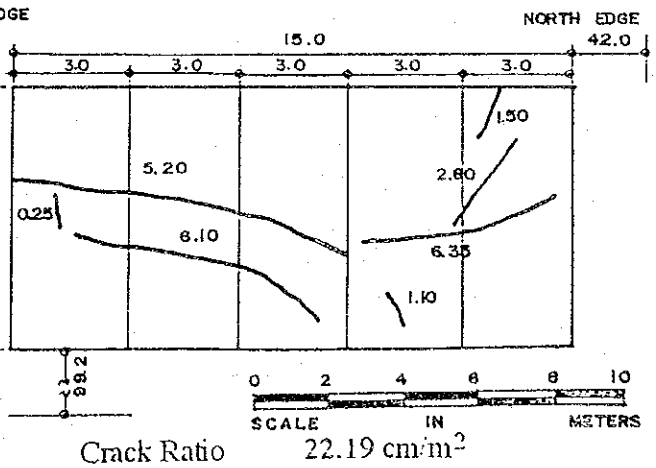
Crack Ratio 27.81 cm/m²

③



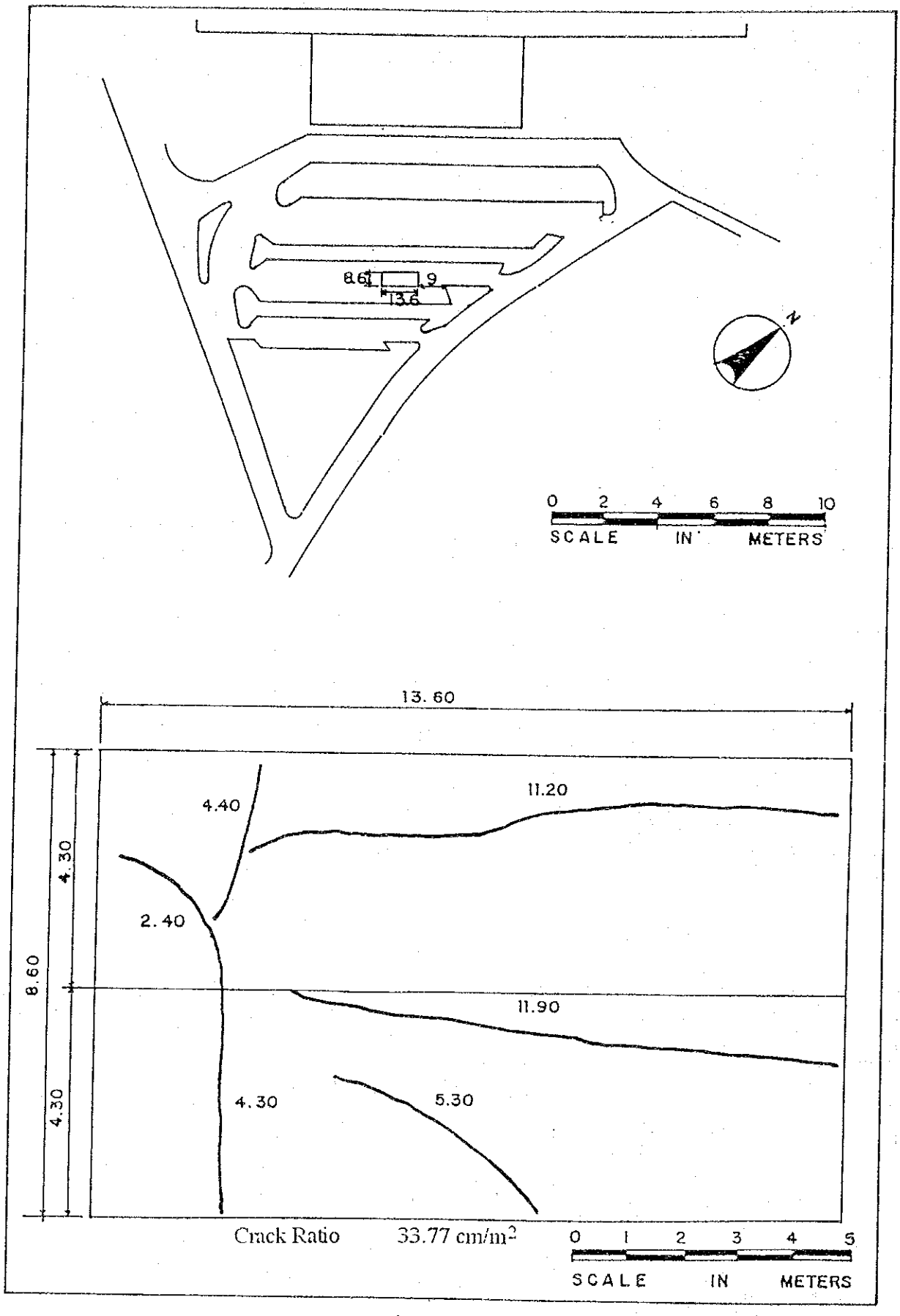
Crack Ratio 20.53 cm/m²

④



Crack Ratio 22.19 cm/m²

Condition of Existing Car Parking Pavement Surface



APPENDIX TO CHAPTER 4

Estimation of GRDP in Future by Region and Main City

	1985	1990	1995	2000	2005	2010	1990	1995	2000	2005	2010
NCR(Metro Manila)	26,670	34,321	43,696	55,377	67,919	83,019	5.2	4.9	4.9	4.2	4.1
REGION 1	4,006	4,810	5,723	6,778	7,832	9,019	3.7	3.5	3.4	2.9	2.9
REGION 2	2,372	2,466	2,550	2,624	2,680	2,729	0.8	0.7	0.6	0.4	0.4
REGION 3	7,665	8,963	10,391	11,992	13,546	15,250	3.2	3.0	2.9	2.5	2.4
REGION 4	12,916	14,603	16,383	18,295	20,078	21,960	2.5	2.3	2.2	1.9	1.8
REGION 5	3,117	3,484	3,866	4,270	4,640	5,026	2.3	2.1	2.0	1.7	1.6
REGION 6	6,581	7,238	7,903	8,591	9,208	9,835	1.9	1.8	1.7	1.4	1.3
REGION 7	6,280	8,384	11,065	14,537	18,402	23,217	5.9	5.7	5.6	4.8	4.8
REGION 8	2,271	3,267	4,639	6,557	8,854	11,915	7.5	7.3	7.2	6.2	6.1
REGION 9	3,259	4,091	5,085	6,290	7,552	9,037	4.7	4.4	4.3	3.7	3.7
REGION 10	4,819	6,116	7,683	9,606	11,642	14,062	4.9	4.7	4.6	3.9	3.8
REGION 11	6,418	7,849	9,508	11,465	13,459	15,746	4.1	3.9	3.8	3.3	3.2
REGION 12	3,511	4,297	5,208	6,283	7,380	8,639	4.1	3.9	3.8	3.3	3.2
Total	89,885	109,889	133,700	162,665	193,192	229,454	4.1	4.0	4.0	3.5	3.5
DAVAO	1,197	1,497	1,845	2,256	2,680	3,173	4.6	4.3	4.1	3.5	3.4
CEBU	823	1,114	1,484	1,965	2,505	3,181	6.2	5.9	5.8	5.0	4.9
CAGAYAN de ORO	430	592	793	1,041	1,317	1,659	6.6	6.0	5.6	4.8	4.7
ZAMBOANGA	450	572	719	897	1,085	1,308	4.9	4.7	4.5	3.9	3.8
BUTUAN	307	397	509	650	804	992	5.3	5.1	5.0	4.3	4.3
COTABATO	135	172	217	272	333	406	5.0	4.8	4.7	4.1	4.0
SURIGAO	149	176	207	241	275	311	3.5	3.3	3.2	2.6	2.5
GENERAL SANTOS	321	440	599	810	1,068	1,402	6.5	6.3	6.2	5.7	5.6

Note: Davao is included in Region 11.

Applied formula for the estimate of future values : $Gi(t) = (G(t)/G(t-1))*Gi(t-1)$ Gi(t): Growth Rate for the period (t), G(t): Growth Rate of the total in Philippine for the period (t). Estimatations are made for the years 1995 , 2000 , 2005 and 2010 with 1990 as the base year.

Formulation of Total Demand Model by Regression Analysis

from/to Davao	Distance	GDP (i)	(j)	Total Demand
Zamboanga	740	1497	572	58840
Cagayan	483	1497	592	435426
Cebu	743	1497	1114	411163
Manila	1450	1497	34321	604100
Butuan	286	1497	397	715000
Cotabato	226	1497	172	703000
Surigao	419	1497	176	230000
G.Santos	142	1497	440	639000

	Logarithm		
	Distance	(i)*(j)	Demand
Zamboanga	6.6066501	13.660357	10.982577
Cagayan	6.1800166	13.694725	12.984080
Cebu	6.6106960	14.326930	12.926745
Manila	7.2793188	17.754731	13.311495
Butuan	5.6559918	13.295154	13.480037
Cotabato	5.4205349	12.458712	13.463112
Surigao	6.0378709	12.481702	12.345834
G.Santos	4.9558270	13.397993	13.367659

Results of Regression Analysis

Constant value:		14.752050
Standard deviation for estimated Y:		0.0863612
Determination coefficient(R^2):		0.9459338
Number of samples:		5
Degree of freedom:		2
Coefficiet of correlation(R):		0.9725912
Coefficient of X:	-0.983938	0.3222623
Standard deviation for X:	0.1676239	0.0612936

Estimate Model for Total Passenger Traffic

TR = Exp(14.752050)*(GDPi*GDPj)^0.3222623*DIST^-0.983938

R = 0.9725912

Estimation of Passenger Traffic Volume based on Capacities

1. Sea Transportation

(1) Number of Services by route

a) Davao - Cebu - Manila : 2/week
b) Davao - Zamboanga - Manila : 1/week

(2) Accommodation Capacity / ship : 1,200 persons/ship

(3) 52 weeks/year

(4) Estimated Number of Passengers

a) Davao - Zamboanga :	1 x 2 x 52 x 1200 x 0.3 =	37,440
b) Davao - Cebu :	2 x 2 x 52 x 1200 x 0.2 =	49,920
c) Davao - Manila :		249,600
(1)	1 x 2 x 52 x 1200 x 0.6 =	74,880
(2)	2 x 2 x 52 x 1200 x 0.7 =	174,720

2. Bus Transportation

(1) Number of Services by route

a) Davao - Cagayan de Oro : 43(21.5x2)/day
+ Cebu
b) Davao - Manila : 5(2.5 x 2)/day
c) Davao - Butuan : 56/day
d) Davao - Cotabato : 55/day
e) Davao - Surigao : 18/day
f) Davao - G. Santos : 50/day

(2) Accommodation of Bus : 50 persons/vehicle

(3) Estimation of Number of Passengers

a) Davao - Cagayan de Oro :	43 x 50 x 0.7 x 365 =	549,000
b) Davao - Manila :	5 x 50 x 0.8 x 365 =	73,000
c) Davao - Butuan :	56 x 50 x 0.7 x 365 =	715,000
d) Davao - Cotabato :	55 x 50 x 0.7 x 365 =	703,000
e) Davao - Surigao :	18 x 50 x 0.7 x 365 =	230,000
f) Davao - G. Santos :	50 x 50 x 0.7 x 365 =	639,000

Concept of MD Model

This model explains the modal shares using two different distributions concerning time value and total time cost (time and fare cost calculated in time (hours)) of passengers. They are expressed as follows:

g (x) : Distribution function of time value of passengers
(x = l/v, v:time value, 10 pesos/hour)

f (u) : Distribution function of total cost of passengers
(u : total time cost, hours)

It is generally assumed that these distribution functions follow normal logarithmic type of distribution.

In this model, a passenger chooses a mode of which sacrificial value is smaller than that of other mode of transportation. The sacrificial value is expressed in terms of time in logarithm as follows:

$$S = \ln (t + c/v)$$

where, S : Sacrificial value
t : Trip time (hour)
v : Time value (10 pesos)
c : Fare of a transportation mode

Considering three modes of transportation, air, sea and road, a passenger chooses air transportation if S1 is smaller than S2 and S3. here, "1" denotes air, "2" denotes road and "3" denotes ship.

Substitutional time value for S1 and S2 which gives S1 equals to S2 is calculated as follows:

$$v'1\text{-}2 = \frac{C1 - C2}{t2 - t1} \text{ or } x'1\text{-}2 = \frac{t2 - t1}{C1 - C2}$$

Substitutional time value for S2 and S3 which gives S2 equals to S3 is calculated as follows:

$$v'2\text{-}3 = \frac{C2 - C3}{t3 - t2} \text{ or } x'2\text{-}3 = \frac{t3 - t2}{C2 - C3}$$

Illustrating the two distribution functions in a figure, air passengers account for D1 of the all potential passengers, road passenger account for D2 of the all potential passengers and ship passengers account for D3 of the all potential passengers. D1, D2 and D3 are expressed as follows:

$$D1 = \int_{-\infty}^{x'1\text{-}2} g(x) \cdot \int_{S1}^{\infty} f(u)\, dx \cdot du$$

$$D2 = \int_{x'1\text{-}2}^{x'2\text{-}3} g(x) \cdot \int_{S2}^{\infty} dx \cdot du$$

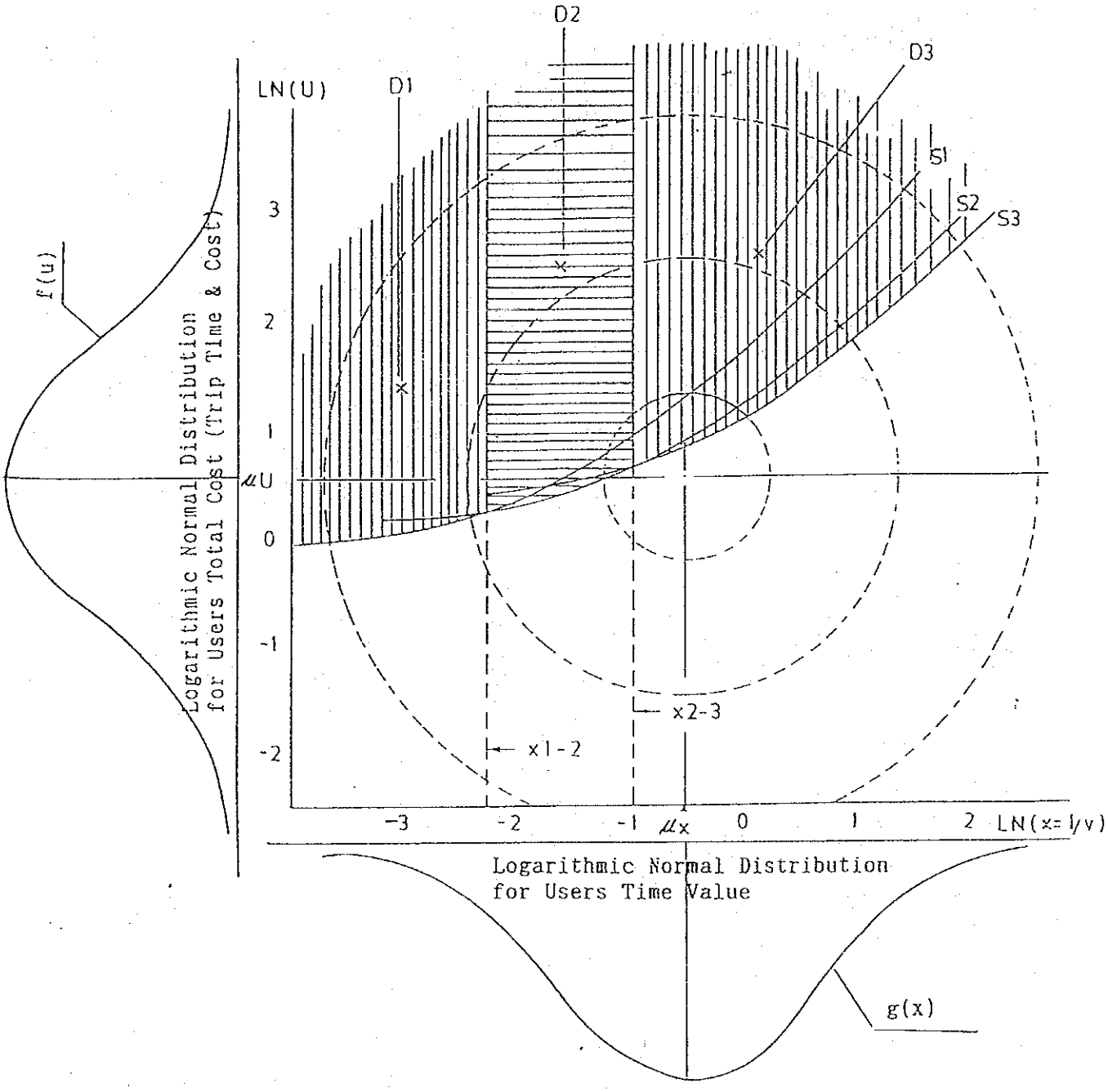
$$D3 = \int_{x_{2-3}}^{\infty} g(x) \cdot \int_{S_3}^{\infty} f(u)\, dx \cdot du$$

The share of air transportation (H1), road transportation (H2) and sea transportation (H3) are obtained as follows:

$$H1 = D1/(D1 + D2 + D3)$$

$$H2 = D2/(D1 + D2 + D3)$$

$$H3 = D3/(D1 + D2 + D3)$$


D2
D3
D1
LN(U)
S1
S2
S3
3
2
1
μU
0
-1
-2
f(u)
Logarithmic Normal Distribution
for Users Total Cost (Trip Time & Cost)
x2-3
x1-2
-3
-2
-1
μx
0
1
2
LN(x=1/v)
Logarithmic Normal Distribution
for Users Time Value
g(x)

Parameters of MD Model

	1990	1995	2000	2005	2010
mean value of ln (1/v)	- 0.700	- 0.896	- 1.092	- 1.264	- 1.436
for Low Projection	- 0.700	- 0.848	- 0.996	- 1.119	- 1.243
for High Projection	- 0.700	- 0.944	- 1.188	- 1.384	- 1.580
deviation of Ln (l/v)	1.421	1.421	1.421	1.421	1.421
mean value of Ln (U)	2.35	2.35	2.35	2.35	2.35
deviation of ln (U)	2.09	2.09	2.09	2.09	2.09

In the above mentioned parameters, v means average time value (10 pesos per hour) which is assumed to increase according to the growth of GDP in this Study. The value of v is obtained by the following formula.

$$v = GS^{k} \cdot v90$$

where, v : Average time value in the future (10 pesos)

v90 : Average time value in 1990 (20.14 pesos)

GS : The growth factor of GDP of the total Philippines (1990 = 1.0)

k : Parameter, k = 1.0

Economic Data for Model Formulation

		1983	1984	1985	1986	1987	1988	1989	1990
		Achieved							
1 USA	US$(billion)	3,355.9	3,724.8	3,974.2	4,205.4	4,497.2	4,840.2	5,163.2	5,423.4
	Rate	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	US$(billion)	3,355.9	3,724.8	3,974.2	4,205.4	4,497.2	4,840.2	5,163.2	5,423.4
	Deflater(1985=100)	93.6	97.2	100.0	102.5	105.8	109.4	113.8	118.5
2 Saudi Arabia	Riyals(billion)	373.88	351.40	313.94	271.09	275.45	285.15	310.82	
	Riyals/US$	3.4548	3.5238	3.6221	3.7033	3.7450	3.7450	3.7450	3.7450
	US$(billion)	108.2	99.7	86.7	73.2	73.6	76.1	83.0	
	Deflater(1985=100)	56.5	84.1	100	101	109.2	115.7	125.5	141.9
3 West Germany	D.Mark(billion)	1,668.5	1,750.9	1,823.2	1,925.3	1,990.5	2,094.9	2,219.4	2,403.4
	D.Mark/US$	2.5533	2.8459	2.9440	2.1715	1.7974	1.7562	1.8800	1.6157
	US$(billion)	653.5	615.2	619.3	886.6	1,107.4	1,192.9	1,180.5	1,487.5
	Deflater(1985=100)	95.6	97.7	100	103.2	105.4	107.1	109.9	113.7
4 India	Rupees(billion)	2,068.6	2,306.8	2,626.0	2,933.6	3,325.5	3,949.9	4,427.7	
	Rupees/US$	10.0990	11.3630	12.3690	12.6110	12.9620	13.9170	16.2260	17.5040
	US$(billion)	204.8	203.0	212.3	232.6	256.6	283.8	272.9	
	Deflater(1985=100)	86.8	93.3	100	106.6	115.6	125.5	134	
5 Singapore	S.$(million)	36,733.0	40,048.0	38,924.0	38,654.0	42,609.0	49,365.0	55,310.0	
	S.$/US$	2.1131	2.1331	2.2002	2.1774	2.106	2.0124	1.9503	1.8125
	US$(million)	17,383.5	18,774.6	17,691.1	17,752.4	20,232.2	24,530.4	28,359.7	
	Deflater(1985=100)	56.5	84.1	100	101	109.2	115.7	125.5	141.9
6 Japan	Yen(billion)	281,709.0	300,348.0	320,169.0	334,540.0	348,085.0	371,260.0	395,359.0	
	Yen/US$	237.51	237.52	238.54	168.52	144.64	128.15	137.96	144.79
	US$(billion)	1,186.1	1,264.5	1,342.2	1,985.2	2,406.6	2,897.1	2,865.8	
	Deflater(1985=100)	96.2	98.4	100.0	101.8	101.8	102.1	104.0	106.0
7 Australia	A.$(billion)	180.35	205.98	229.22	251.65	282.34	318.69	359.17	378.48
	A.$/US$	0.9024	0.8796	0.7008	0.6709	0.7009	0.7842	0.7925	0.7813
	US$(billion)	199.9	234.2	327.1	375.1	402.8	406.4	453.2	484.4
	Deflater(1985=100)	89	94	100	107	115	126	136	141
8 Philippine	Pesos(billion)	384.7	539.4	612.7	627.1	708.4	803.0	922.6	1,066.3
	Pesos /US$	11.1127	16.6987	18.6073	20.3857	20.5677	21.0947	21.7367	24.3105
	US$(billion)	34.6	32.3	32.9	30.8	34.4	38.1	42.4	43.9
	Deflater(1985=100)	56.5	84.1	100	101	109.2	115.7	125.5	141.8

Passenger Traffic Data for Model Formulation

Intenational Air Passenger Traffic from/to Philippine (in thousands)

No.	Regions	1983	1984	1985	1986	1987	1988	1989	1990
		Achieved							
1	North America	405.7	505.4	412.2	578.8	626.4	672.2	738.7	646.0
2	Middle East	364.6	403.2	459.1	442.5	480.8	489.1	453.7	485.7
3	Europe	144.1	118.9	117.0	129.0	150.8	203.3	173.2	186.0
4	Indian Sub-Continent	65.0	28.2	26.5	31.3	36.0	40.9	16.7	34.8
5	South East Asia	335.4	525.4	512.4	513.6	579.2	591.2	670.3	641.3
6	North East Asia	1,276.7	1,227.0	1,245.4	1,222.5	1,557.5	1,785.5	2,317.0	2,048.1
7	South West Pacific	134.2	114.7	134.7	118.4	137.0	127.6	137.8	387.6
8	North Africa *								14.8
	Total	2,725.7	2,922.8	2,907.3	3,036.1	3,567.7	3,909.8	4,507.4	4,444.3

Input Data for Formulation of Domestic Cargo Demand Model

Domestic Cargo volume from/to Davao International Airport

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total Cargo	4,339	5,084	6,641	7,524	9,437	10,656	12,228	11,263	12,804

Gross Domestic Product

(In million pesos; at 1972 constant Prices)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Region XI	5,987	6,169	6,424	6,300	6,418	6,700	7,121	7,330	7,655

Input Data for Formulation of International Cargo Demand Model

(1) Gross Domestic Product of Total Philippine
(in million pesos at 1972 constant prices)

1981	1982	1983	1984	1985	1086	1987	1988	1989	1990
96,208	98,999	99,920	93,927	89,885	91,181	95,373	101,449	107,144	109,889

(2) International Air Cargo from/to Philippines

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Manila - Tokyo	1,764	3,149	5,912	8,459	8,240	10,200	11,010		13,745	
Tokyo - Manila	1,600	7,433	6,493	17,315	7,809	7,369	8,793		10,257	
Subtotal	3,364	10,582	12,405	25,774	16,049	17,569	19,803		24,002	
Manila - Hongkong	872	5,742	4,524	6,360	5,285	3,525	4,306		9,116	
Hongkong - Manila	2,588	15,540	6,583	7,673	8,990	8,734	9,970		10,013	
Subtotal	3,460	21,282	11,107	14,033	14,275	12,259	14,276		19,129	
Manila - Honolulu	142	54	245	114			284		814	622
Honolulu - Manila	39	32	101	171	101	171			157	158
Manila - Los Angels	470		1,340	998	1,116	1,187	1,311		2,470	2,509
Los Angels - Manila	387		730		680	389	416		522	568
Manila - S. Francisco	1,504		3,138	3,333	2,320	1,910	2,423		3,411	3,788
S. Francisco - Manila	1,111		1,503	1,293	724	519	586		1,833	1,058
Subtotal	3,653	86	7,057	5,909	4,941	4,176	5,020		9,207	8,703
Manila - Singapore	1,012	1,534	2,966	3,313	3,451	3,412	3,736		4,165	4,022
Singapore - Manila	916	2,040	2,820	3,155	3,505	2,594	4,385		4,673	5,440
Subtotal	1,928	3,574	5,786	6,468	6,956	6,006	8,121		8,838	9,462

Data source : ICAO

APPENDIX TO CHAPTER 5

Runway Length Requirement of A300 to Tokyo

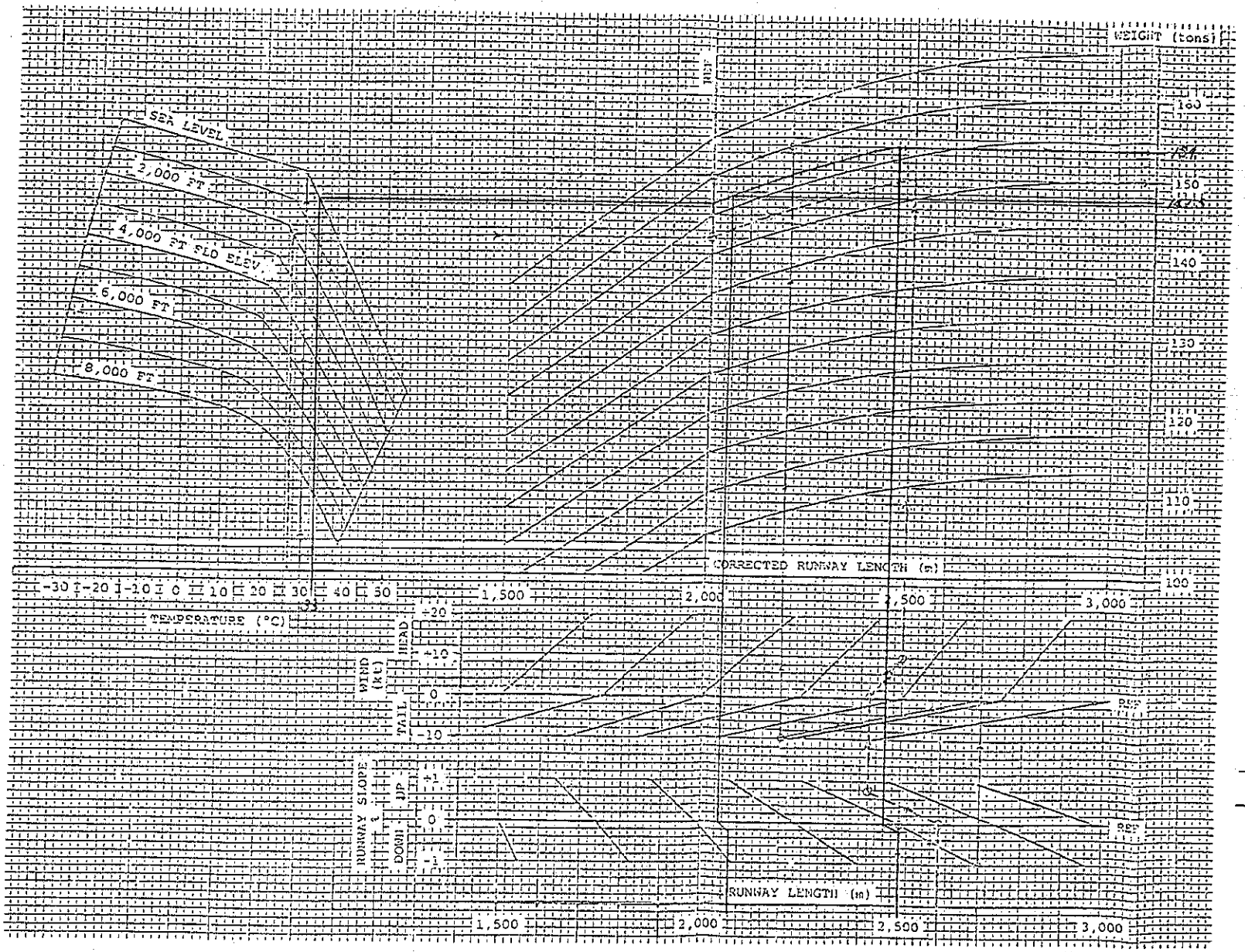
Runway Length Requirement

A300-B4			
Tokyo	1,974 NM		
Manual	PAL Aircraft Operations Manual A300		
Aircraft Data	PAL		
Operating Weight Empty	93.225 ton		
Maximum Payload	32.775 ton		
Fuel Comsumption	6.579 ton/hr		
Ave. Speed	477 Kts		
Passenger Load	0.091 ton/pax	200 LB	
Number of PAX	244		
Maximum Takeoff Weight	165.000 ton		
Runway Condition			
Elevation	27 m		
Temperature	32.7 C		
Runway Slope	0.2 %		
Wind	0.0 kt		
Maximum Takeoff Weight	165.000 ton		
Runway Length Requirement	2,930 m	PAL	
	4,000 m	PAL Aircraft Operations Manual A300	
Maximum Payload	32.775 ton		
Cruising Time	4.138 hr		
Distance to Alt. Airport	233.600 NM	269 sm	Osaka
Cruising Time to Alt. Airport	0.490 hr		
Total Cruising Time	4.628 hr		
Fuel Comsumption	30.448 ton		
Takeoff Weight	156.448 ton	344,968 LB	
Runway Length Requirement	2,920 m	FL0	
Full Pax Load	22.136 ton		
Takeoff Weight	145.809 ton	321,509 LB	
Runway Length Requirement	1,940 m	FL8	
	1,920 m	FL15	
Allowable Payload under 2,500m			
Allowable Takeoff Weight	154.000 ton	FL8	
Maximum Cargo Volume	10.639 ton		
Allowable Cargo Volume	8.191 ton	77.0%	

Runway Length Requirement of A300 to Hong Kong

Runway Length Requirement

A300-B4			
Hong Kong	1,128 NM		
Manual	PAL Aircraft Operations Manual A300		
Aircraft Data	PAL		
Operating Weight Empty	93.225 ton		
Maximum Payload	32.775 ton		
Fuel Comsumption	6.579 ton/hr		
Ave. Speed	477 Kts		
Passenger Load	0.091 ton/pax	200 LB	
Number of PAX	244		
Maximum Takeoff Weight	165.000 ton		
Runway Condition			
Elevation	27 m		
Temperature	32.7 C		
Runway Slope	0.2 %		
Wind	0.0 kt		
Maximum Takeoff Weight	165.000 ton		
Runway Length Requirement	2,930 m	PAL	
	4,000 m	PAL Aircraft Operations Manual A300	
Maximum Payload	32.775 ton		
Cruising Time	2.365 hr		
Distance to Alt. Airport	427.253 NM	492 sm	Taipei
Cruising Time to Alt. Airport	0.896 hr		
Total Cruising Time	3.260 hr		
Fuel Comsumption	21.451 ton		
Takeoff Weight	147.451 ton	325,129 LB	
Runway Length Requirement	2,080 m	FL8	



8° FLAPS

CHART BASED ON:
. No engine bleed.

CORRECTIONS:
. QNH:
Above 1013 mb ADD 80 kg/
Below 1013 mb SUB 160 kg
. Nacelle Anti-Ice:
SUBTRACT 1,500 kg.
. Total Anti-Ice:
SUBTRACT 4,000 kg.
. Bleeds to PACKS ON:
SUBTRACT 2,000 kg.

See:

——— Example No. 6

— — — — Example No. 7

Runway Length Requirement of DC10 to Sydney

Runway Length Requirement

DC-10 30C
Sydney — 2,861 NM
Manual — Characteristics

Aircraft Data	Characteristics	PAL
Operating Weight Empty	120.742 ton	123.500
Maximum Payload	46.180 ton	43.700
Fuel Comsumption	8.821 ton/hr	
Ave. Speed	485.000 Kts	
Passenger Load	0.091 ton/pax	
Maximum Takeoff Weight	251.744 ton	259.455
Number of PAX	274	

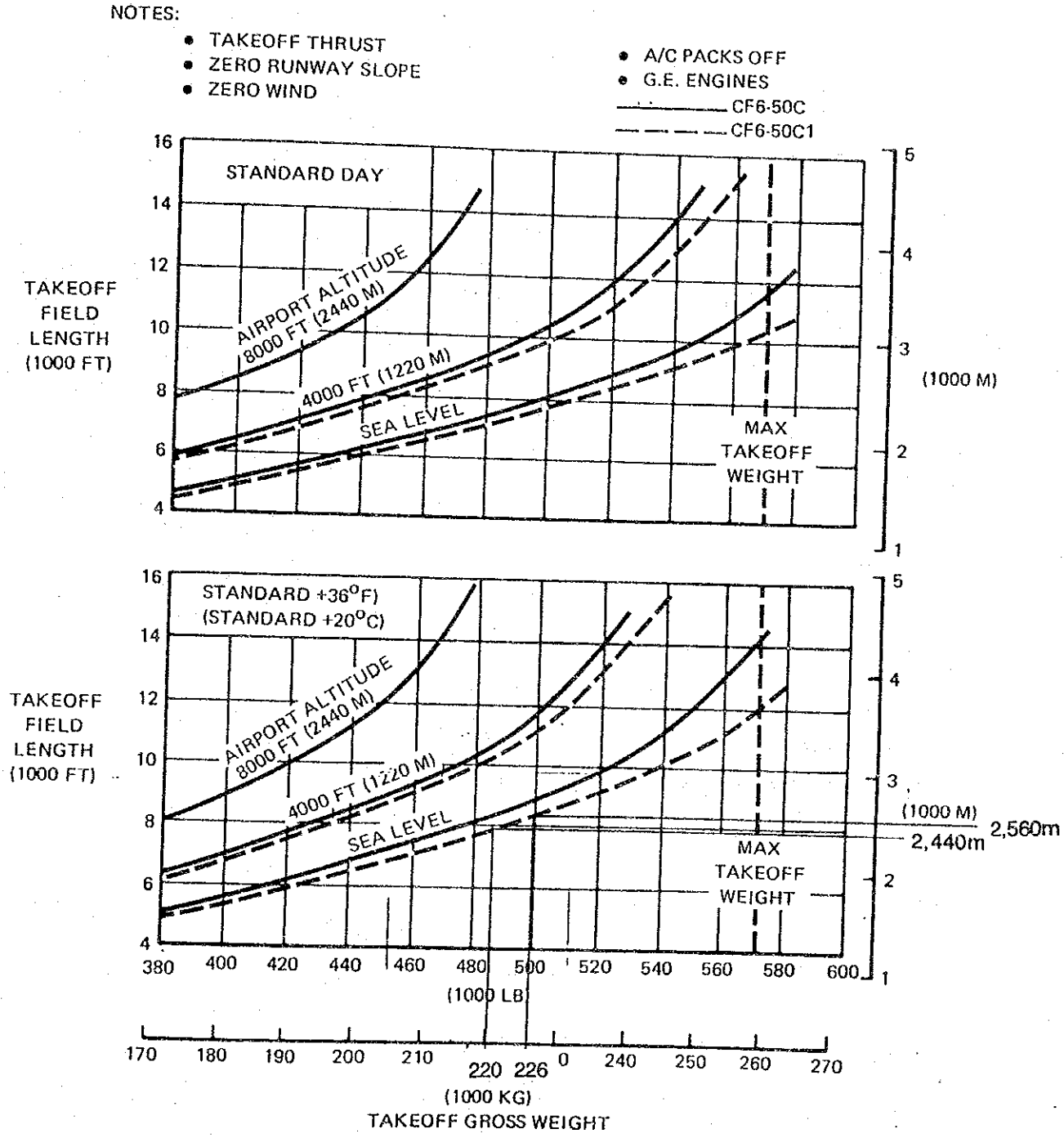
Runway Condition	
Elevation	27 m
Temperature	32.7 C
Runway Slope	0.2 %
Wind	0.0 kt

Maximum Takeoff Weight	259.455 ton	
Runway Length Requirement	3,520 m	PAL
	3,660 m	Characteristics

Maximum Payload	43.700 ton	
Cruising Time	5.899 hr	
Distance to Alt. Airport	381.228 NM	439 sm Melbourne
Cruising Time to Alt. Airport	0.786 hr	
Total Cruising Time	6.685 hr	
Fuel Comsumption	58.968 ton	
Operating Weight Empty	123.500 ton	
Takeoff Weight	226.168 ton	498,701 LB
Runway Length Requirement	2,630 m	8,150 FT

Full Pax Load	24.934 ton	
Takeoff Weight	207.402 ton	457,322 LB
Runway Length Requirement	2,103 m	6,900 FT

Allowable Cargo Volume		
Allowable Takeoff Weight	220.000	
Maximum Cargo Volume	18.766	
Allowable Cargo Volume	12.598	67.1%



Corrections for elevation and runway slope 2,560m × 1.0063 × 1.02 = 2,628m

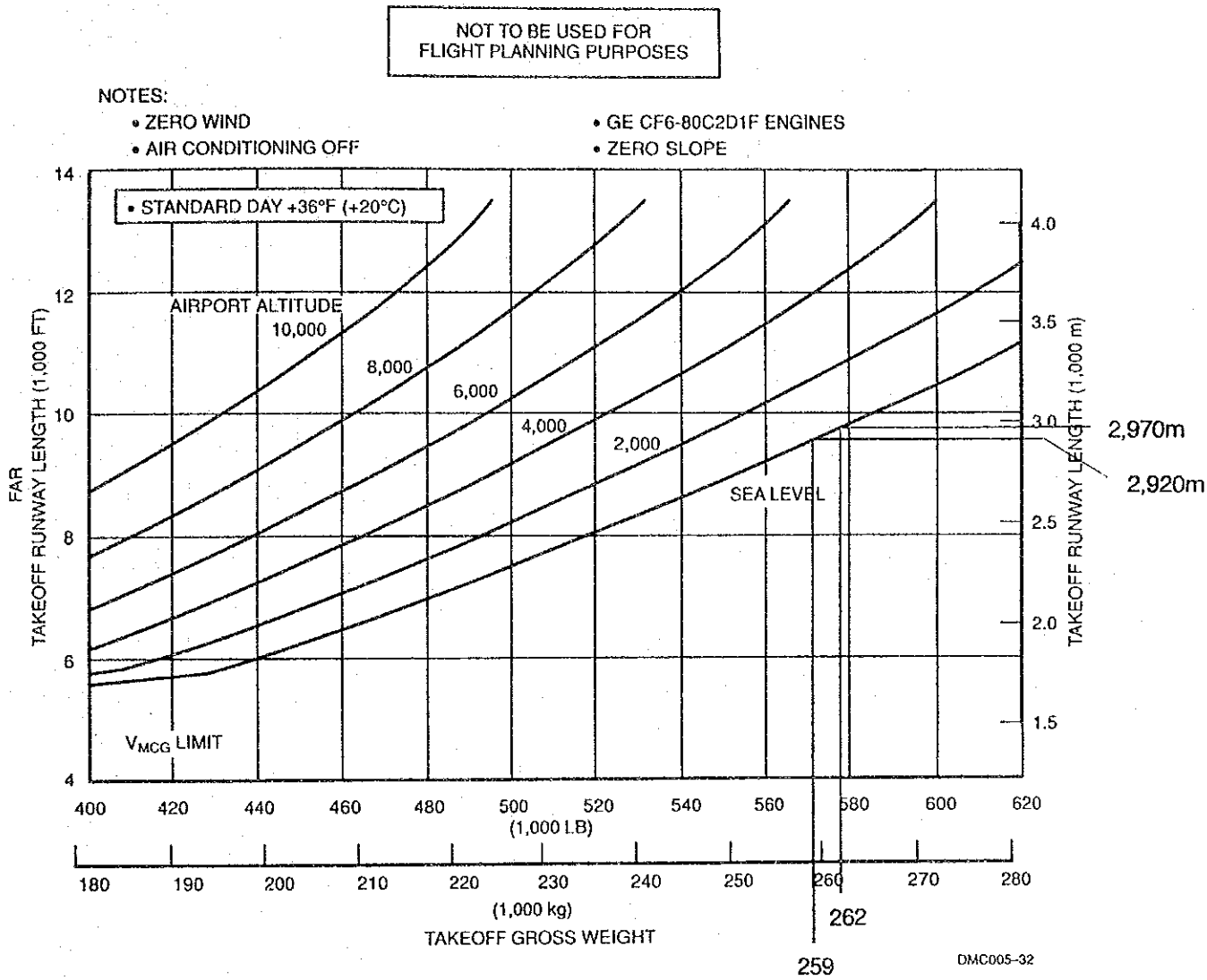
Basic length of 2,500m 2,500 ÷ 1.0063 ÷ 1.02 = 2,436m

3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS MODEL DC-10 SERIES 30 AND 30CF

Runway Length Requirement of MD11 to Honolulu

Runway Length Requirement

MD11		
Honolulu	4,599 NM	
Manual	Characteristics	
Aircraft Data	Characteristics	
Operating Weight Empty	129.657 ton	
Maximum Payload	51.780 ton	
Fuel Comsumption	8.821 ton/hr	
Ave. Speed	485.000 Kts	
Passenger Load	0.091 ton/pax	
Maximum Takeoff Weight	273.288 ton	
Runway Condition		
Elevation	27 m	
Temperature	32.7 C	
Runway Slope	0.2 %	
Wind	0.0 kt	
Maximum Takeoff Weight	273.3 ton	
Runway Length Requirement	3,231 m	10,600 FT
Maximum Payload		
Cruising Time	9.482 hr	
Distance to Alt. Airport	187.574 NM	216 sm
Cruising Time to Alt. Airport	0.387 hr	
Total Cruising Time	9.869 hr	
Fuel Comsumption	87.056 ton	
Operating Weight Empty	123.500 ton	
Takeoff Weight	262.336 ton	578,452
Runway Length Requirement	3,048 m	
Allowable Payload under 3,000m		
Allowable Takeoff Weight	259.0 ton	
Full Pax Load	37.310	
Maximum Cargo Volume	14.470	
Allowable Cargo Volume	11.134	76.9%



3.3.3 STANDARD DAY +36°F (+20°C)
MODEL MD-11 GE ENGINE

Corrections for elevation and runway slope

2,970m × (1 + 0.07 × 27/300) × (1 + 0.10 × 0.2)

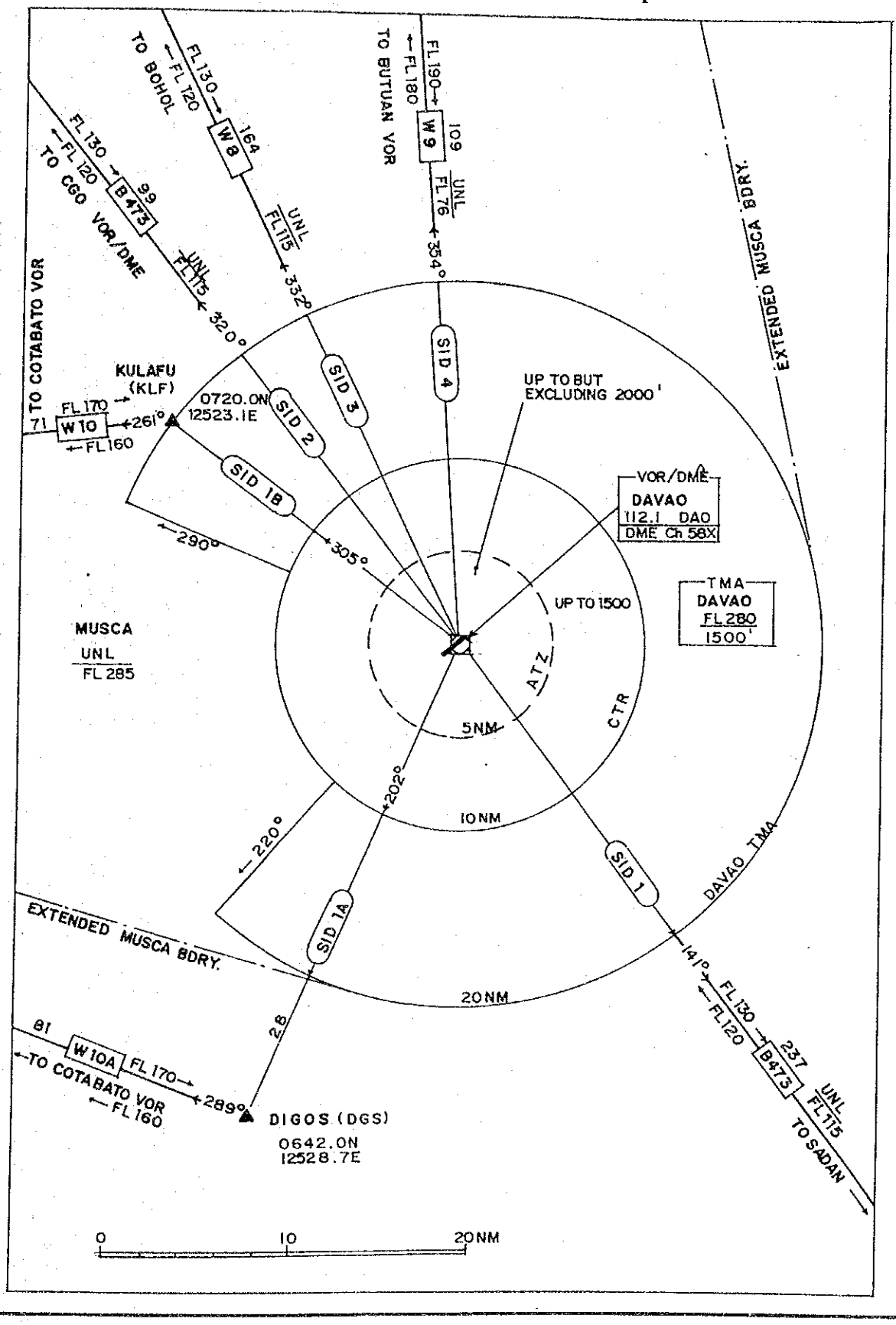
= 2,970m × 1.0063 × 1.02 = 3,048m

Basic Length of 3,000m

3,000m ÷ 1.0063 ÷ 1.02 = 2,923m

APPENDIX TO CHAPTER 6

Terminal Control Area, Control Zone and Aerodrome Traffic Zone at Davao International Airport



Dimension of Davao Terminal Control Area, Control Zone and Aerodrome Traffic Zone

Davao Terminal Control Area

NAME AND LATERAL LIMIT	UPPER LIMIT LOWER LIMIT	UNIT PROVIDING SERVICE	RADIO CALL SIGN	REMARKS
DAVAO TERMINAL CONTROL AREA (TMA) Sectors bounded by arc of 20 NM radius centered on Davao VOR/DME 07°08'12"N 125°39'35"E between R-290 clockwise to R-220, and by arc of 10 NM radius centered on Davao VOR between R-220 clockwise to R-290	FL 280 1,500 ft	APP DAVAO* ACC MACTAN**	RTF: Davao Approach (En)	TMA/Visual Exempted * From 1,500 ft to FL 115 ** From FL 128 to FL280 (See charts pages RAC 3-1 and RAC 3-1.11)

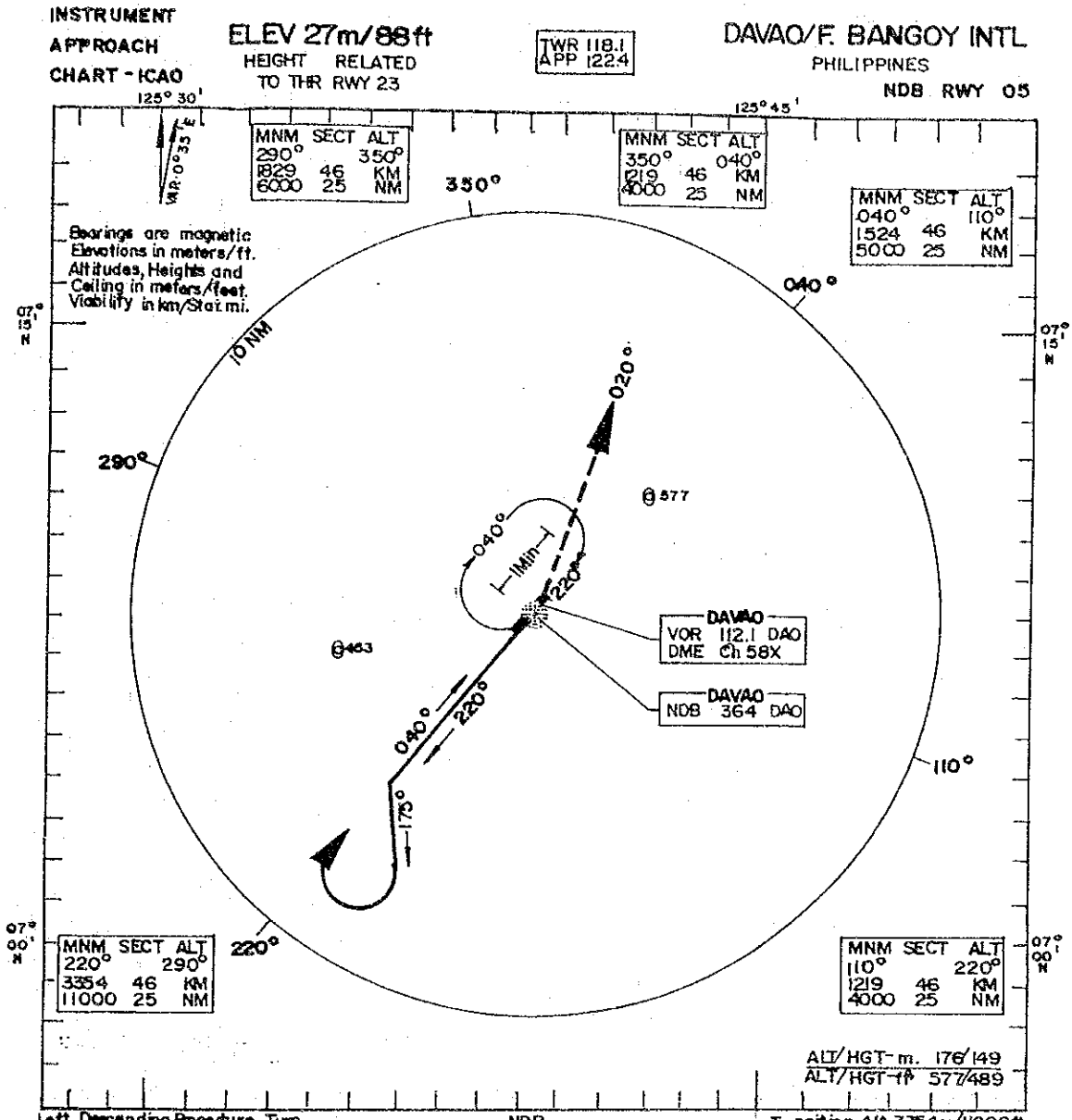
Source: AIP Philippines

Davao Control Zone (CTR) and Aerodrome Traffic Zone (ATZ)

TOWER	HOURS (GMT)	LATERAL LIMIT	UPPER LIMIT (FT)	LANGUAGE	REMARKS
DAVAO TOWER	H24	CTR: Circle, 10 NM radius centered on the Davao VOR/DME (07°08'12"N 125°39'24"E)	1,500 feet	En	Instrument/Visual flights are controlled. CTR controlled by DAVAO APP.
		ATZ: Circle, 5 NM radius centered on aerodrome reference point (07°07'48"N 125°38'48"E)	up to but excluding 2,000 feet		VFR, aerodrome traffic are controlled.

Source: AIP Philippines

INSTRUMENT APPROACH PROCEDURE NDB RWY 05



APP CAT	A	B	C	D	E	
STR - IN	250/228 - 274 - 1.61 / 820/748 - 900 - 1	250/228 - 274 - 2.01 / 820/748 - 900 - 1.25	250/228 - 274 - 3.6 / 820/748 - 900 - 225	250/228 - 274 - 4.4 / 820/748 - 900 - 2.75		FACILITY ON AERODROME
CIRCLING	250/223 - 274 - 3.6 / 820/732 - 900 - 2.25		267/240 - 274 - 3.6 / 880/792 - 900 - 225	267/240 - 274 - 6.5 / 880/792 - 900 - 4		

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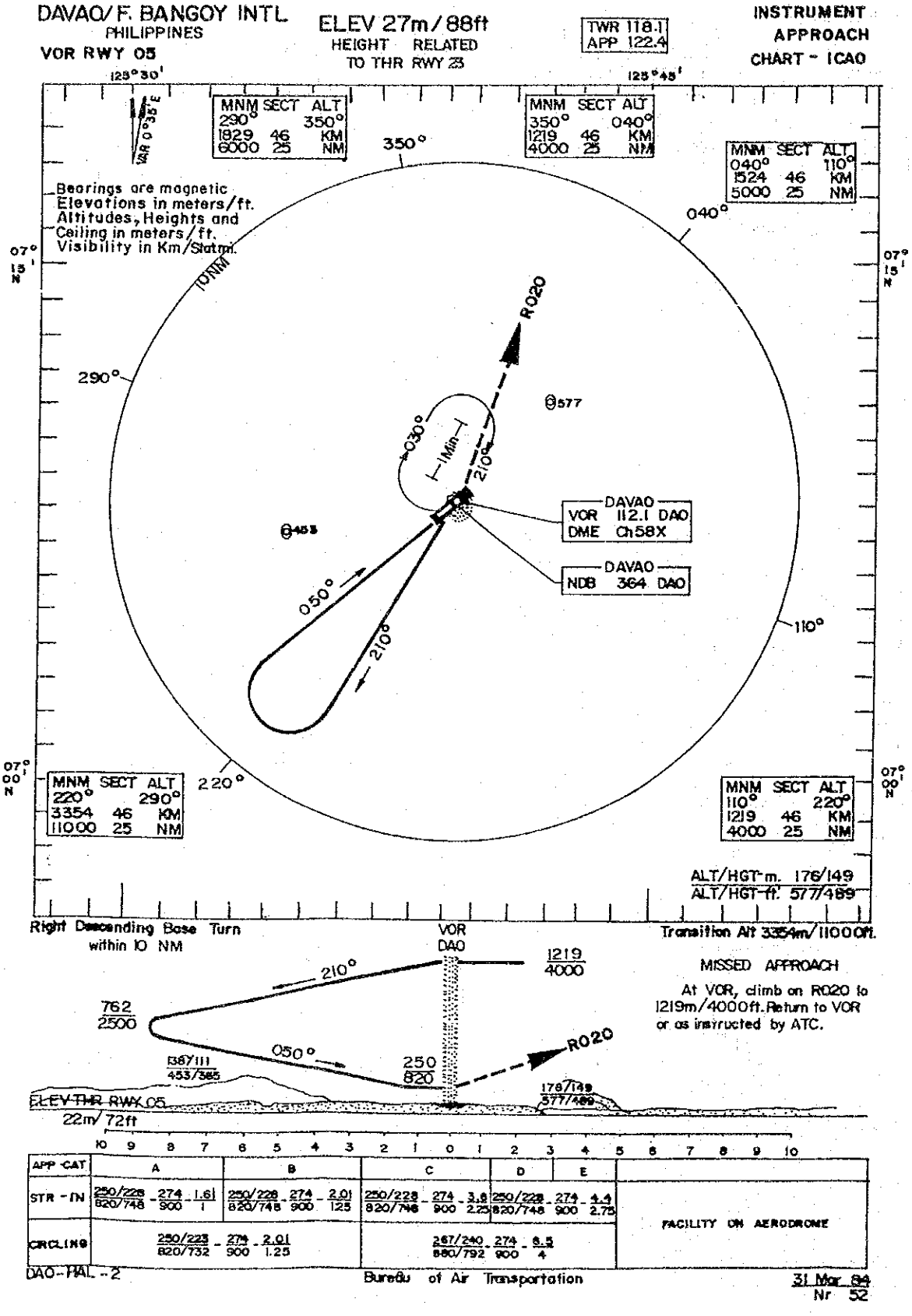
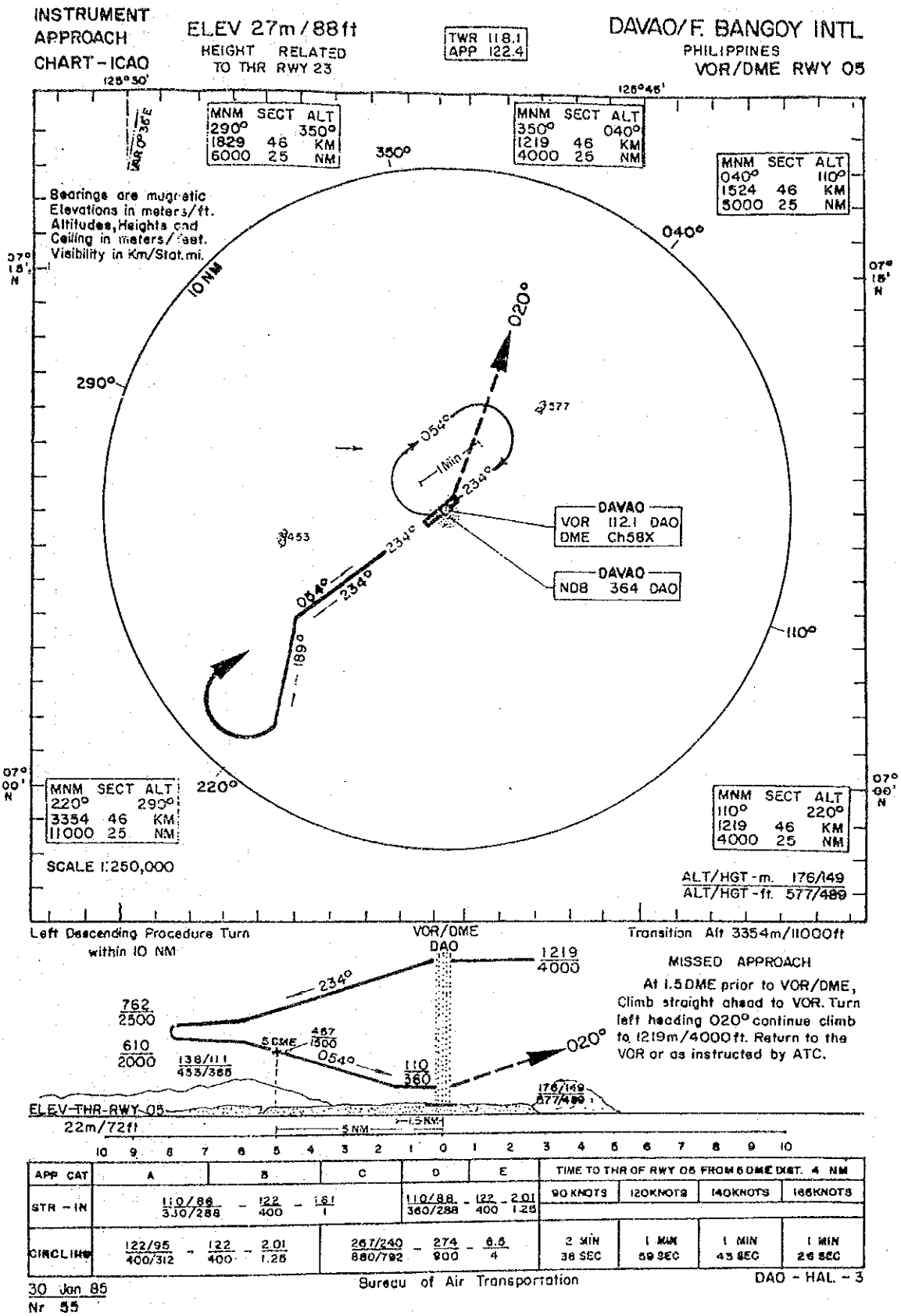
INSTRUMENT APPROACH PROCEDURE VOR RWY 05



INSTRUMENT APPROACH PROCEDURE VOR/DME RWY 05



APP CAT	A	B	C	D	E	TIME TO THR OF RWY 05 FROM 6 DME DIST. 4 NM			
						90 KNOTS	120KNOTS	140KNOTS	165KNOTS
STR - IN	110/86 / 330/288 - 122/400 - 1.61/1			110/88 / 360/288 - 122/400 - 2.01/1.25					
CIRCLING	122/95 / 400/312 - 122/400 - 2.01/1.25			267/240 / 880/792 - 274/900 - 6.6/4		2 MIN 38 SEC	1 MIN 59 SEC	1 MIN 45 SEC	1 MIN 26 SEC

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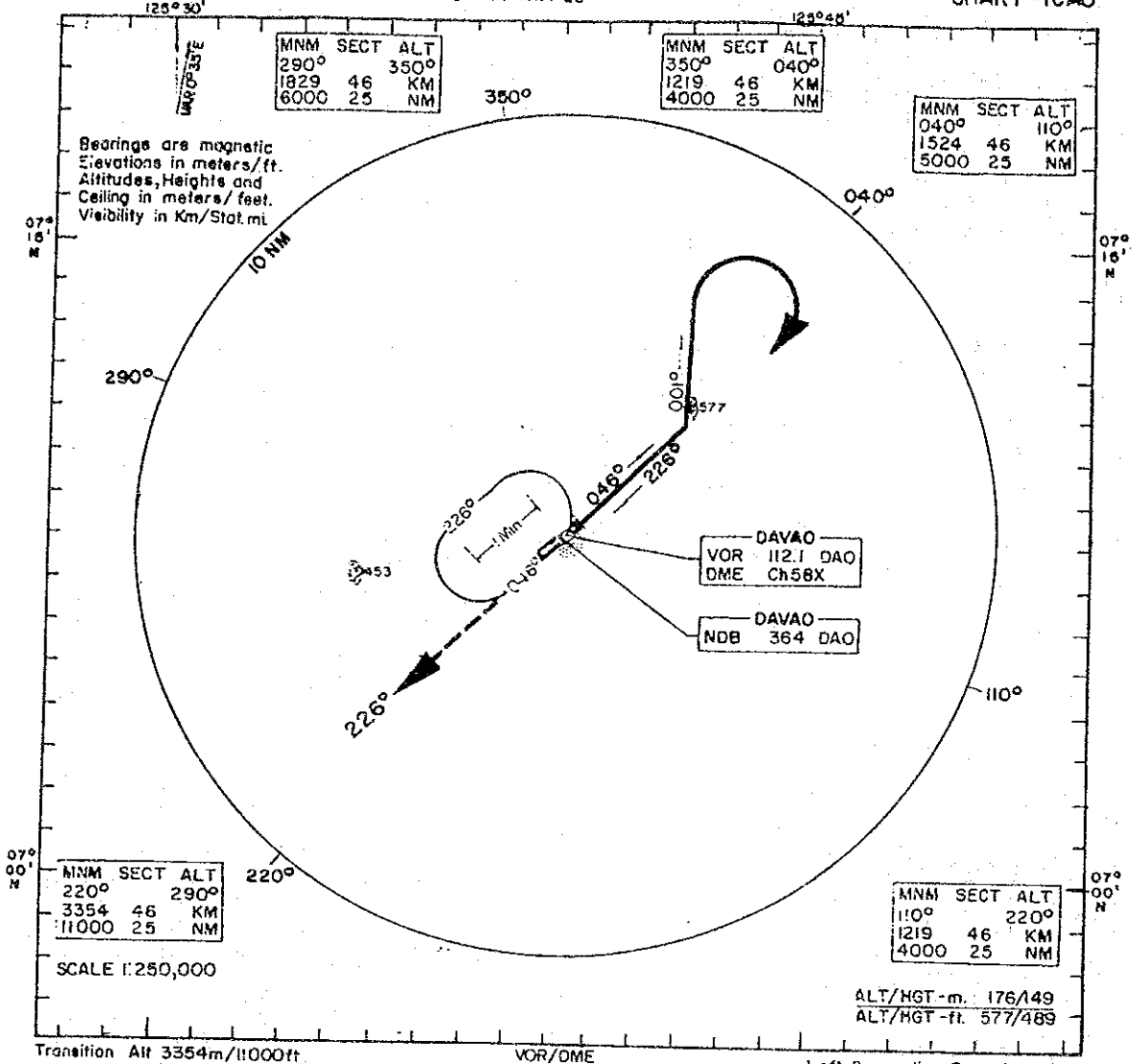
INSTRUMENT APPROACH PROCEDURE VOR/DME RWY 23

DAVAO/F. BANGOY INTL
PHILIPPINES
VOR/DME RWY 23

ELEV 27m/88ft
HEIGHT RELATED TO THR RWY 23

TWR 118.1
APP 122.4

INSTRUMENT APPROACH CHART - ICAO

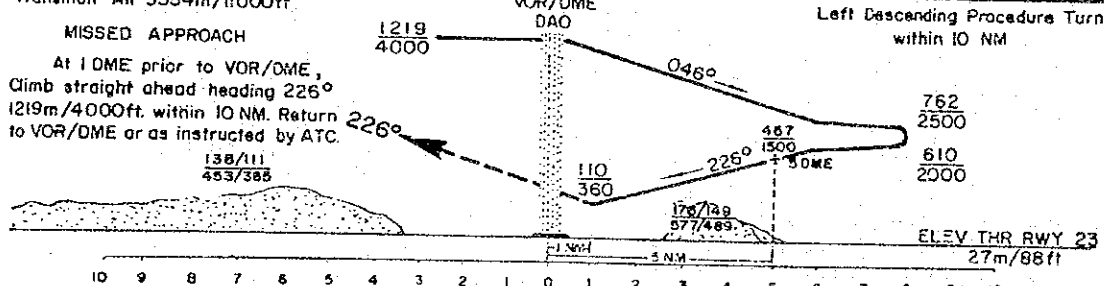


Transition Alt 3354m/11000ft

Left Descending Procedure Turn within 10 NM

MISSED APPROACH

At 1 DME prior to VOR/DME, climb straight ahead heading 226° 1219m/4000ft. within 10 NM. Return to VOR/DME or as instructed by ATC.



APP CAT	A	B	C	D	E	TIME TO THR OF RWY 23 FROM 5DME DIST. 4 NM			
STR-IN	110/83 / 360/272 - 122/400 - 1.61/1			110/83 / 360/272 - 122/400 - 2.01/1.26		90 KNOTS	120 KNOTS	140 KNOTS	165 KNOTS
CIRCLING	122/95 / 400/312 - 122/400 - 2.01/1.26			267/240 / 880/792 - 274/900 - 6.6/4		2 MIN 38 SEC	1 MIN 59 SEC	1 MIN 43 SEC	1 MIN 26 SEC

DAO-HAL-4

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Nr 55

INSTRUMENT DEPARTURE CHART

INSTRUMENT DEPARTURE CHART

DAVAO/F.BANGOY INTL.
PHILIPPINES

ELEV 27m/88ft

3.I.D:s

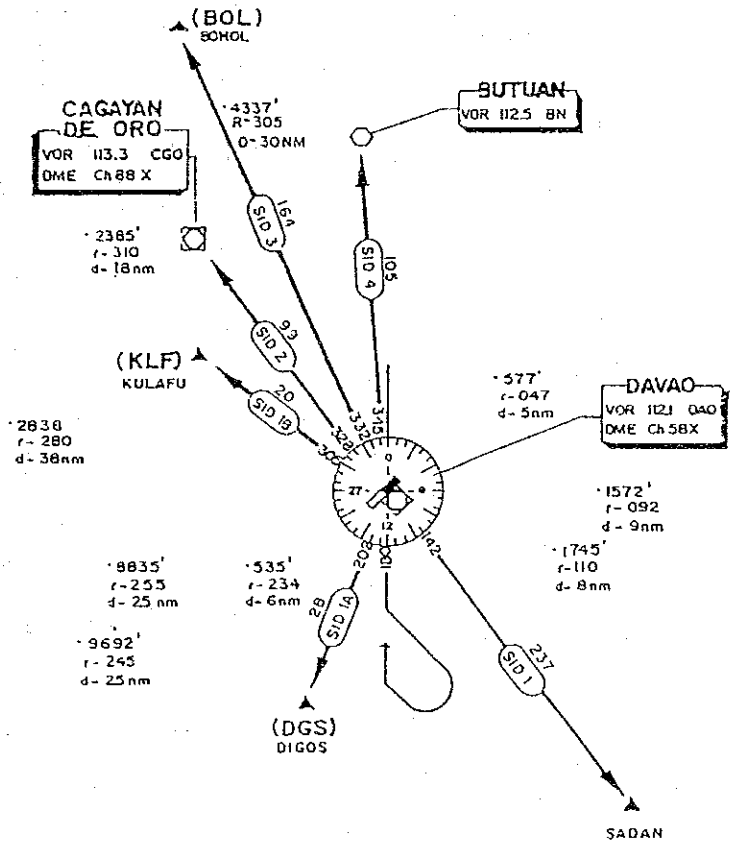
DAVAO APP - 122.4 MHz DAVAO TWR - 118.1 MHz ATIS 126.6 MHz
MACTAN SECT CTL - 127.5 MHz (N sect) 132.2 MHz (S sect)
MANILA ACC - 119.3 MHz (N sect) 118.9 MHz (W sect)
126.1 MHz (E sect primary)
125.7 MHz (E sect secondary) 255.4 UHF (Military)

CHART NOT TO SCALE

Bearings are magnetic
Distances in nautical miles
Change altimeter to 29.92 Hg.
Immediately upon passing 11,000ft.

LEGEND:

R - Radical
D - Distance from VOR
* - Spot Elevation



INSTRUMENT DEPARTURE ROUTE DESCRIPTION

DEPARTURE ROUTE DESCRIPTION			
	TAKE - OFF	PROCEDURE	REMARKS
	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Intercept and track out on R-142 to assigned level.	VMC climb during day time may be authorized by ATC depending on traffic conditions.
1-A	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Cross DAO VOR/DME at 5000 ft. above. Track out on R-202 to cross DIGOS at FL 160 or above.	
1-B	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Climb on R-180 to 4000 ft. Make a left climbing procedure turn within 10 NM to cross DAO VOR/ DME at 8000 ft. or above. Track out on R-305 to cross KULAFU at FL 160 or above.	
2	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Climb on R-180 to 4000 ft. Make a left climbing procedure turn within 10 NM to cross DAO VOR DME at 8000 ft. or above. Track out on R-320 to cross 20 DME at FL 120 or above.	
3	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Climb on R-180 to 4000 ft. Make a left climbing procedure turn within 10 NM to cross DAO VOR/ DME at 8000 ft. or above. Track out on R-332 to cross 20 DME at FL 120 or above.	
4	Rwy 05 - Left turn within 5 NM Rwy 23 - Left turn within 5 NM	Climb on R-180 to 4000 ft. Make a left climbing procedure turn within 10 NM to cross DAO VOR/ DME at 8000 ft. or above. Track out on R-354 to assigned level	

Source: AIP Philippines

Capacity Analysis of Existing Passenger Terminal Building

The capacities of the major components of the existing passenger terminal building are evaluated by using the criteria of IATA (International Air Transportation Association) and the data obtained from the passenger processing time survey. The capacities are calculated for the following two cases:

Domestic case : No. of present peak hour passengers: 310 pax in one way.
International case : No. of present peak hour passengers : 30 pax in one way.

The capacities of the major components between existing and requirements are summarized as follows.

1. Domestic

		Requirements	Existing
1.1	Departure Curb Length	23 m	16 m
1.2	Departure Concourse	1,165 sq.m	180 sq.m
1.3	Security Check before Check-in Lobby	1 unit	None
1.4	Check-in Counters	9 Counters	7 counters
1.5	Queuing Area - Check-in	85 sq.m	80 sq.m
1.6	Security Check before Pre-Departure Hall	1 unit	1 unit
1.7	Pre-Departure Hall	455 sq.m	705 sq.m
1.8	Baggage Claim Area	310 sq.m	240 sq.m
1.9	No. of Baggage Claim Devices	1 Device	None
1.10	Arrival Concourse	1,150 sq.m	None
1.11	Arrival Curb Length	23 m	10 m

2. International

		Requirements	Existing
2.1	Departure Curb Length	2.0 m	None
2.2	Departure Concourse	153 sq.m	None
2.3	Security Check before Check-in	1 unit	None
2.4	Customs Inspection-Departure	1 Position	1 Position
2.5	Check-in Counters	2 Counters	1 Counter
2.6	Queuing Area-check-in	9 sq.m	4 sq.m
2.7	Terminal Fee Counter	1 counter	1 counter
2.8	Passport Control-Departure	1 Position	1 Position
2.9	Security Check-before Pre-Departure Hall	1 unit	None
2.10	Pre-Departure Hall	55 sq.m	None
2.11	Passport Control-Arrival	1 Position	1 Position
2.12	Queuing Area-Passport Control-Arrival	9 sq.m	4 sq.m
2.13	Baggage Claim Area	30 sq.m	None
2.14	No. of Baggage Claim Devices	1 Device	None
2.15	Customs Inspection-Arrival	1 Position	1 Position
2.16	Queuing Area-Arrival Customs	7 sq.m	None
2.17	Arrival Concourse	110 sq.m	None
2.18	Arrival Curb Length	2 m	None

1. Domestic case

1.1 Departure Curb

L=0.095 ap meters + (10%)

Where, L = Curb length required (m)
a = No. of peak hour passengers: 310 pax
p = Proportion of passenger using car/taxi: 0.7

L= 0.095 x 310 x 0.7 = 20.6 + 2.1 = 22.7 = 23m
L= 23 m existing curb length= 16m

1.2 Departure Concourse

A= 0.75 a (1+0) sq.m

Where, A = Area required (sq.m)
a = No. of peak hour passengers : 310 pax
0 = No. of visitors per passenger : 4 assumed

Note : 1. 20-minute average occupancy time assumed
2. Space required per person : 1.5 sq.m assumed

A = 0.75 x 310 (1+4) = 1,165 sq.m
A = 1,165 sq.m Existing departure concourse = 180 sq.m

1.3 Security check before Check-in Lobby

N= a/300 Unit

Where, N = X-Ray unit required (unit)
a = No. of peak hour passengers: 310 pax

Note : 1. Capacity of X-Ray unit: 600 pcs./hour assumed
2. No. of baggage items per passenger: 2 pcs.assumed

N= 310/300 = 1 unit
N= 1 unit existing unit= none

1.4 Check-in Counter

N= at/60 counters + (10%)

Where, N = Check-in counters required (counters)
a = No. of peak hour passengers: 310 pax
t = Average processing time per passenger : 1.5 minutes

N= 310 x 15/60 = 7.75 + (0.78) = 8.5 = 9
N= 9 counters Existing counter = 7 counters

1.5 Queueing Area- Check-in

A= 0.25 a sq.m + (10%)

Where, A = Area required (sq.m)
a = No. of peak hour passengers: 310 pax

Note : 1. Space required per passenger: 1.5 sq.m assumed

A= 0.25 x 310 = 77.5 + 7.8 = 85.3 = 85
A= 85 sq.m Existing queueing area= 80 sq.m

1.6 Security Check before Pre-Departure Hall

The result is the same as No. 1.3

N= 1 unit Existing unit = 1 unit

1.7 Pre- Departure Hall

A= C (ui + vk/30) sq.m + (10%)

Where, A = Area required (sq.m)
C = No. of peak hour passengers: 310 pax
U = Average occupancy time per long-haul passenger: 50 minutes assumed
V = Average occupany time per short-haul passenger: 30 minutes assumed
i = Proportion of long-haul passenger: 0.5 assumed

Note : Space required per passenger : 2.0 sq.m assumed

A= 310 (50 x 0.5 + 30 x 0.5/30) = 413 + 4 = 455
A= 455 sq.m Existing pre-departure hall = 705 sq.m

1.8 Baggage claim Area (excluding claim devices)

A= ews/60 sq.m + (10%)

Where, A = Area required (sq.m)
e = No. of peak hour passengers : 310 pax
w = Average occupancy time per passenger: 30 minutes assumed
s = Space required per passenger : 1.8 sq.m assumed

A= 310 x 30 x 1.8/60 = 279 + 28 = 307 = 310
A= 310 sq.m Existing baggage claim area= 240 sq.m

1.9 Number of Baggage Claim Devices

Wide-body aircraft (Required claim length: 50-60m)

N= eq/425

Narrow- body aircraft (Required claim length: 30-40m)

N= er/300

Where, N = Claim devices required
e = No. of peak hour passengers: 310 pax
q = Proportion of passengers arriving by wide-body aircraft: 0.65
r = Proportion of passengers arriving by narrow-body aircraft: 0.35

Note : 1. Average claim device occupancy time per wide and narrow-body aircraft: 45 minutes and 20 minutes assumed respectively.

Wide-body aircraft

N= 310 x 0.65/425 = 0.47 = 1

N= 1 device Existing baggage device = none

Narrow- body aircraft

N= 310 x 0.35/300 = 0.36

N= 0 device Existing baggage device = none

1.10 Arrivals Concourse

A= 0.375 (d+2do) sq.m + (10%)

Where, A = Area required (sq.m)
d = No. of peak hour passengers= 310 pax
o = No. of visitors per passengers : 4 assumed

Note : 1 Average occupancy time per passenger:15 minutes assumed
2. Average occupancy time per visitor : 30 minutes assumed
3. Space required per person: 1:5 sq.m assumed

A= 0.375 x (310 + 2 x 310 x 4) = 1,046 + 104 = 1,150
A= 1,150 sq.m Existing arrival concourse= None

1.11 Arrivals Curb

The result is the same as No.1.1
L= 23m Existing curb length= 10m

2. International Case

Although there are temporary components installed or arranged in the arrival hall of the existing passenger terminal building the major components required for the present demands (peak hour passenger= 30 pax) are estimates for the evaluation.

2.1 Departure Curb

L= 0.095 ap meters + (10%)

Where, L = Curb length required (m)
a = No. of peak hour passengers: 30 pax
p = Proportion of passenger using car/taxi: 0.7

L= 0.095 x 30 x 0.7 = 1.9m + 0.2 = 2.1 = 2
L= 2 m Existing curb length= None

2.2 Departure Concourse

A= 0.75 a(1 + 0) sq.m

Where, A = Area required (sq.m)
a = No. of peak hour pax: 30 pax
0 = No. of visitors per passenger: 4 assumed

Note: 1. 20-minute average occupancy time assumed
2. Space required per person: 1.5 sq.m assumed

A= 0.75 x 30 (1 + 4) = 112
A= 112 sq.m Existing departure concourse= none

2.3 Security check before Check-in Lobby

N= a/300 unit

Where, N = X-Ray unit required (unit)
a = No. of peak hour passenger= 30 pax

Note : 1. Capacity of X-Ray unit: 600 pcs/hour assumed
2. No. of baggage items per passenger: 2 pcs.assumed

N= 30/300 = 0.1 = 1 unit
N= 1 unit Existing unit = None

2.4 Customs Inspection - Departure

N= at/60 position

Where, N = No. of customs positions required
a = No. of peak hour pax: 30 pax
t = Average processing time per passenger : 0.75 minutes (45 seconds)

N = 30 x 0.75/60 = 0.37 = 1

N = 1 position Existing Customs = 1 position

2.5 Check-in Counter

N= at/60 counter: + (10%)

Where, N = Check-in counters required (counter)
a = No. of peak hour passenger: 30 pax
t = Average processing time per passenger : 2.50 minutes (2 minutes 30 seconds)

N = 30 X 2.5/60 = 1.25 + 0.125 = 1.37 = 2
N = 2 counters Existing counter = 1 counter

2.6 Queueing Area- Check-in

A= 0.25 a sq.m + (10%)

Where, A = Area required (sq.m)
a = No. of peak hour passengers: 30 pax

Note : 1. Space required per passenger: 1.5 sq.m assumed

A= 0.25 x 30 = 7.5 + 0.75 = 8.25 = 9
A= 9 sq.m Existing queueing area= 4 sq.m

2.7 Terminal Fee Counter

N= at/60 counters + (10%)

Where, N = Terminal fee counter required
a = No. of peak hour passengers: 30 pax
t = Average processing time per passenger: 0.42 minutes (25 seconds)

N= 30 x 0.42/60 = 0.21 + 0.021 = 0.23 = 1
N= 1 counter Existing counter = 1 counter

2.8 Passport Control - Departure

N= a ts/60 positions + (10%)

Where, N = Control position required (positions)
a = No. of peak hour passengers: 30 pax
t = Average processing time per passenger : 1 minute

N= 30 x 1/60 = 0.6 + 0.06 = 0.66 = 1.0
N= 1 position Existing control position = 1 position

2.9 Security check before Pre-Departure Hall

The result is the same as No. 2.3

N= 1 unit Existing queueing area = none

2.10 Pre-Departure Hall

A= C t/30 sq.m + (10%)

Where, A = Area required (sq.m)
C = No. of peak hour passengers: 30 pax
t = Average occupancy time per passenger : 50 minutes assumed

Note : 1. Space required per passenger: 2.0 sq.m assumed

A= 30 x 50/30 = 50 + 5 = 55
A= 55 sq.m Existing pre-departure hall= none

2.11 Passport Control-Arrival

N= dt/60 positions + (10%)

Where, N = Control positions required
d = No. of peak hour passengers: 30 pax
t = Average processing time per passenger: 0.75 minutes (45 seconds)

N= 30 x 0.75/60 = 0.375 + 0.04 = 0.41 =1
N= 1 position Existing control position= 1 position

2.12 Queueing Area = Passport Control - Arrival

The result is the same as No. 2.6

A= 9 sq.m Existing queueing area= 4 sq.m

2.13 Baggage Claim Area (Excluding claim devices)

A= ews/60 sq.m + (10%)

Where, A = Area required (sq.m)
e = No. of peak hour passengers: 30 pax
w = Average occupancy time per passenger : 30 minutes assumed
s = Space required per passenger: 1.8 sq. m assumed

A= 30 x 30 x 1.8/60 = 27 + 2.7 = 29.7 = 30
A= 30 sq. m Existing baggage claim area= none

2.14 Number of Baggage Claim Devices

Narrow-body aircraft (Required claim length:30-40m)
N= er/300

Where, N = claim devices required
e = No. of peak hour passengers: 30 pax
r = Proportion of passengers arriving by narrow-body aircraft: 1.0

Note : 1. Average claim device occupancy time per narrow-body aircraft: 20minutes assumed

N= 30 x 1/300 = 0.1 = 1.0
N= 1 unit Existing baggage device = None

2.15 Customs Inspection-Arrival

N= eft/60 position + (10%)

Where, N = No. of customs positions required
e = No. of peak hour passengers: 30 pax
f = Proportion of passengers to be customs inspected : 0.80
t = Average processing time per passenger: 2.0 minutes

N= 30 x 0.8 x 2.0/60 = 0.80 + 0.08 = 0.88 =1.0
N= 1 position Existing customs= 1 position

2.16 Queveing Area- Arrival Customs

A= 0.25 ef (sq.m) + (10%)

Where, A = Area required (sq.m)
e = No. of peak hour passengers: 30 pax
f = Proportion of passengers to be inspected: 0.80

Note : 1. Space required per passengers:1.5 sq.m assumed

A= 0.25 x 30 x 0.8 = 6 + 0.6 = 6.6 = 7.0
A= 7 sq.m Existing queveing area= none

2.17 Arrivals Concourse

A= 0.375 (d + 2 d0) sq.m + (10%)

Where, A = Area required (sq.m)
d = No. of peak hour passengers: 30 pax
0 = No. of visitors per passenger: 4 assumed

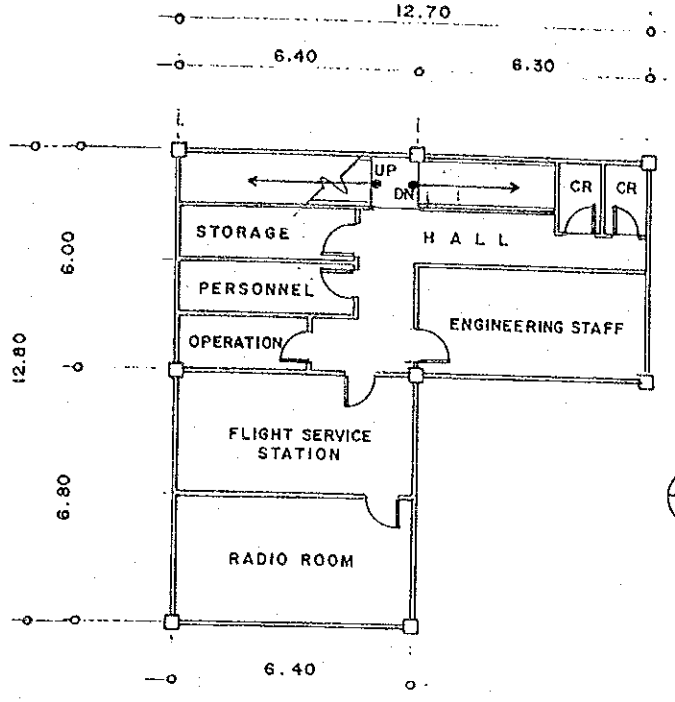
Note : 1. Average occupancy time per passenger : 15 minutes assumed
2. Average occupancy time per visitor: 30 minutes assumed

A= 0.375 x (30 + 2 x 30 x 4) = 101 + 10 = 111
A= 111 sq.m Existing arrival concourse= none

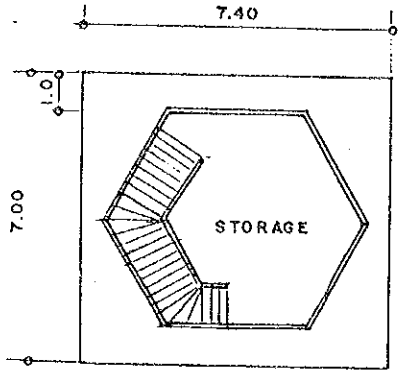
2.18 Arrivals Curb

The result is the same as No. 2.1

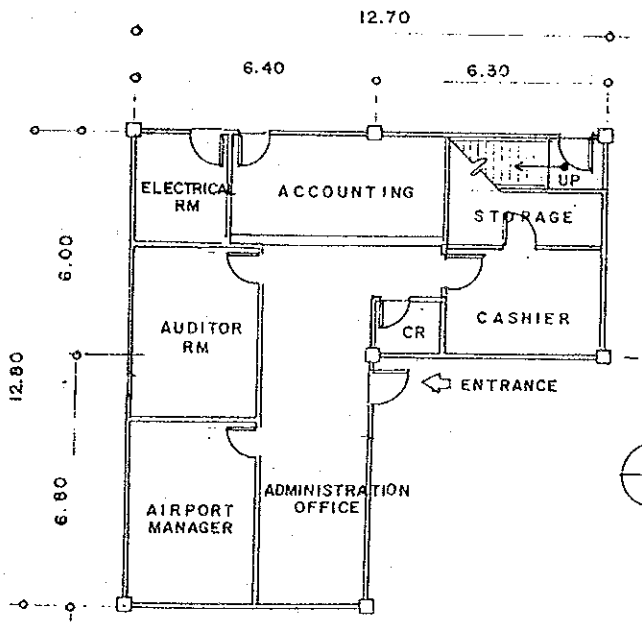
L= 2m Existing curb length= none



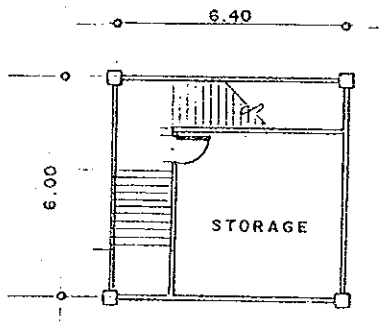
SECOND FLOOR PLAN
SCALE 1:200



FOURTH FLOOR PLAN
SCALE 1:200

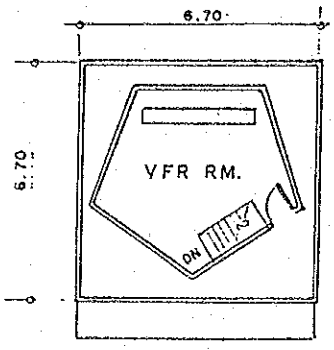


GROUND FLOOR PLAN
SCALE 1:200

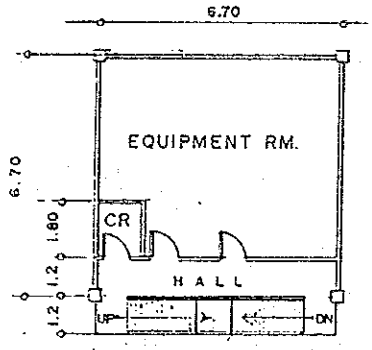


THIRD FLOOR PLAN
SCALE 1: 200

Floor Plan of Existing Administration Building

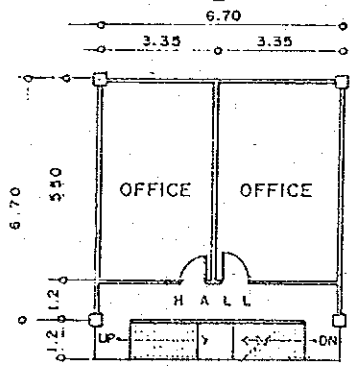


5th FLOOR

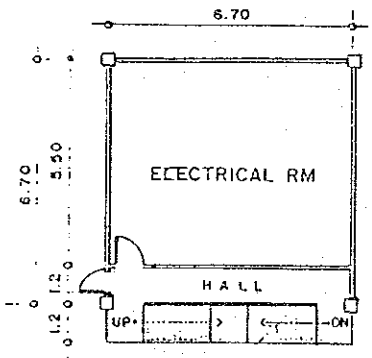


4th FLOOR

CONTROL TOWER BLDG
SCALE 1:200

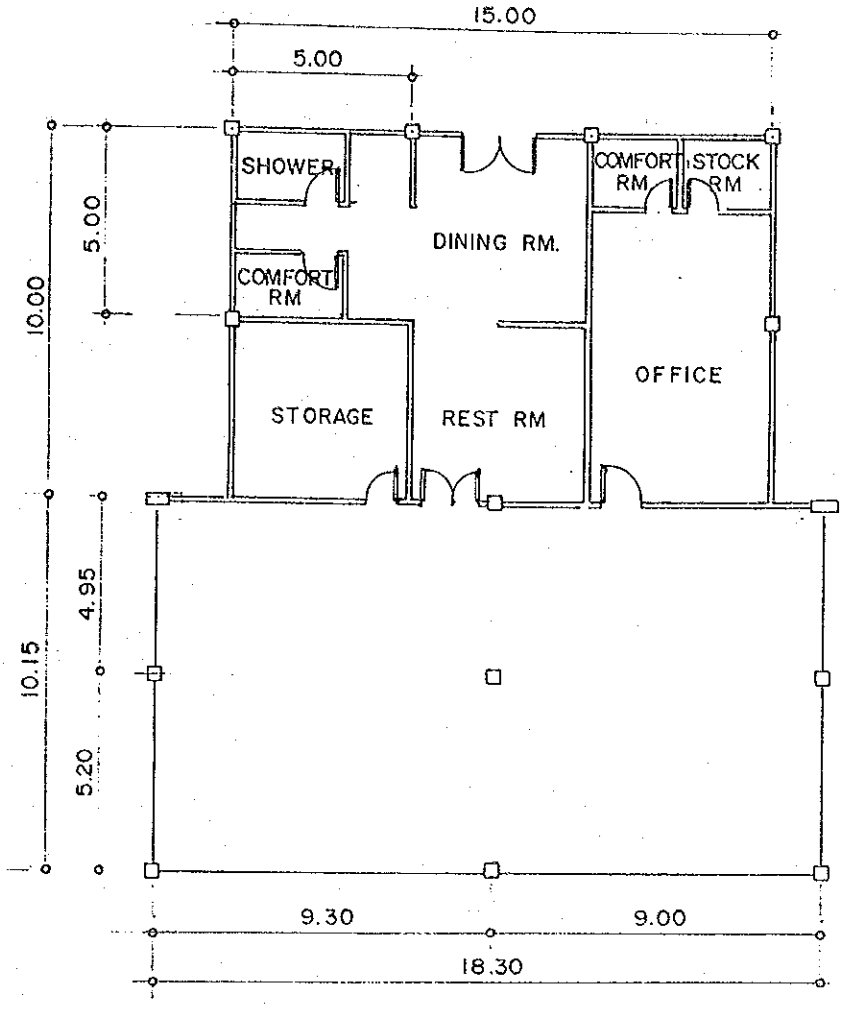


TYPICAL 2nd & 3rd FLOOR



GROUND FLOOR

Floor Plan of Existing Control Tower Building



FIRE STATION
SCALE 1:200

Floor Plan of Existing Fire Station

Definition of WECPNL

WECPNL (Weighted Equivalent Continuous Perceived Noise Level) is an index to evaluate an aircraft noise and has been used as an environmental criteria.

The WECPNL is total energy of perceived noise in a day being indicated in logarithm and is corrected in terms of difference in sense of perceiving noise depending on the time zone.

The WECPNL is calculated by the following formula.

$$WECPNL = \overline{dB(A)} + 10 \log N - 27$$
$$N = N_1 + 3N_2 + 10N_3$$

$\overline{dB(A)}$: Average of peak levels of total noise perceived in a day

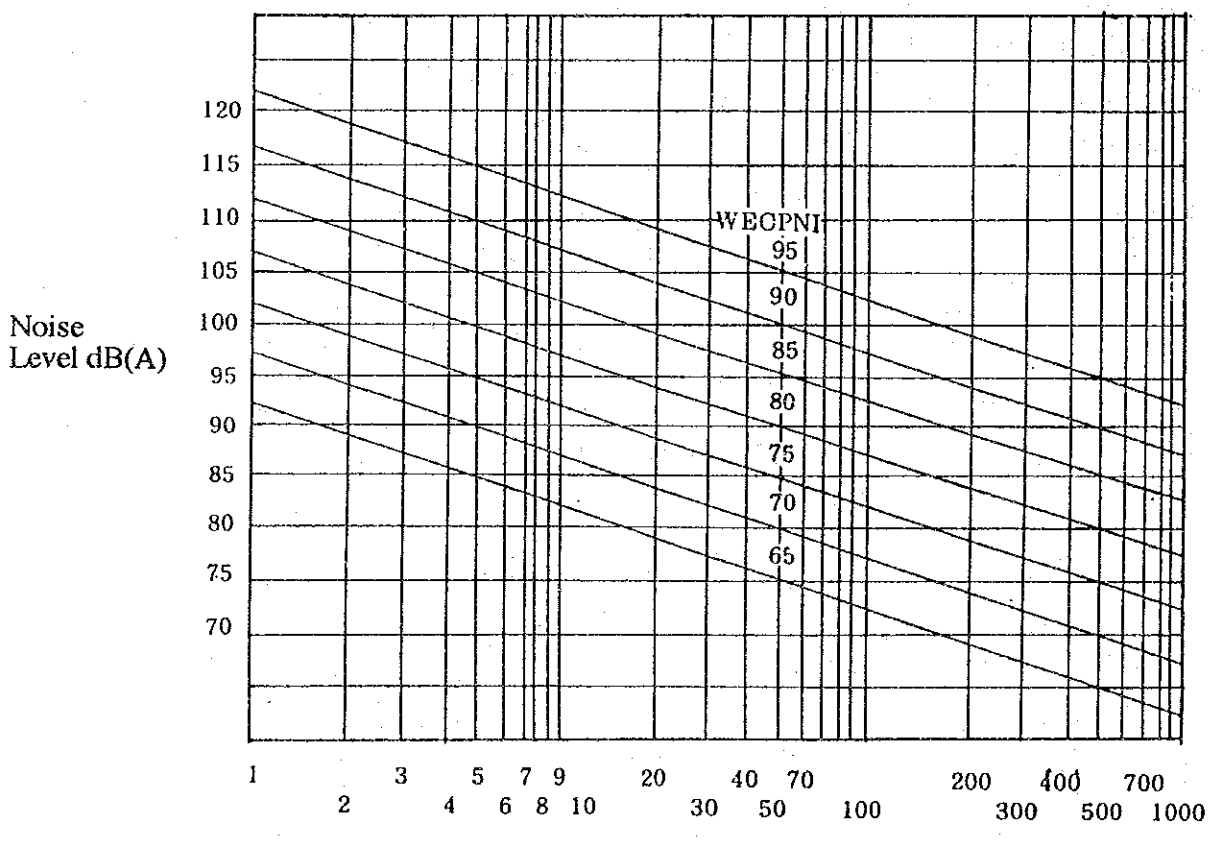
N_1 : Daily aircraft movements in the daytime (7:00~19:00)

N_2 : Daily aircraft movements in the evening (19:00~22:00)

N_3 : Daily aircraft movements in the night (22:00~ 7:00)

The graph to estimate WECPNL based on the noise level and aircraft movement is shown below:

Note : N is only N_1



Conditions for Preparation of Aircraft Noise Contours

(1) Number of Cases

The aircraft noise contours will be calculated for the following three cases.

Case1 Target Year 1992 (Present condition)
Case2 Target Year 2000 (Medium-term)
Case3 Target Year 2010 (Long-term)

(2) Dimension of the Runway

Case1 and Case2 :2,500m x 45m
Case3 :3,000m x 45m

(3) Daily Aircraft Movements

See Table A6.18.1

(4) Procedure of Approach and Departure

Straight in approach and straight climb procedures for both runways.

(5) Ratio of Departure to Arrival

Arrival : Departure = 1 : 1

(6) Approach Angle

Runway 05 : 3°
Runway 23 : 3°

(7) Ratio of runway Use

Runway 05 : 60%
Runway 23 : 40%

Table A6.18.1 Daily Aircraft Movements in Each Case

Case1 (1992)

Aircraft Type	DC10	A300	B737	F50,HS748 (YS11)	Total
Annual Aircraft Movements	0	1,460	1,460	834	3,754
Daily Aircraft Movements	0.00	4.00	4.00	2.28	10.28
7:00-19:00	0.00	3.00	2.00	2.28	
19:00-22:00	0.00	0.00	0.00	0.00	
22:00-7:00	0.00	1.00	2.00	0.00	

Case2 (2000)

Aircraft Type	DC10	A300	B737	F50,HS748 (YS11)	Total
Annual Aircraft Movements	12	2,936	3,043	1,092	7,083
Daily Aircraft Movements	0.03	8.04	8.34	2.99	19.41
7:00-19:00	0.03	6.44	6.67	2.39	
19:00-22:00	0.00	0.80	0.83	0.30	
22:00-7:00	0.00	0.80	0.83	0.30	

Case3 (2010)

Aircraft Type	DC10	A300	B737	F50,HS748 (YS11)	Total
Annual Aircraft Movements	210	6,634	1,432	1,664	9,940
Daily Aircraft Movements	0.58	18.18	3.92	4.56	27.23
7:00-19:00	0.46	14.54	3.14	3.65	
19:00-22:00	0.06	1.82	0.39	0.46	
22:00-7:00	0.06	1.82	0.39	0.46	

Impact of Aircraft Noise

In 1992

WECPNL	Hospital	School	Church	House	Total
More than 95	0	0	0	0	0
95 - 90	0	0	2	23	25
90 - 85	0	1	1	267	269
85 - 80	0	0	5	763	768
80 - 75	0	2	6	2,116	2,124
75 - 70	0	4	14	4,032	4,050

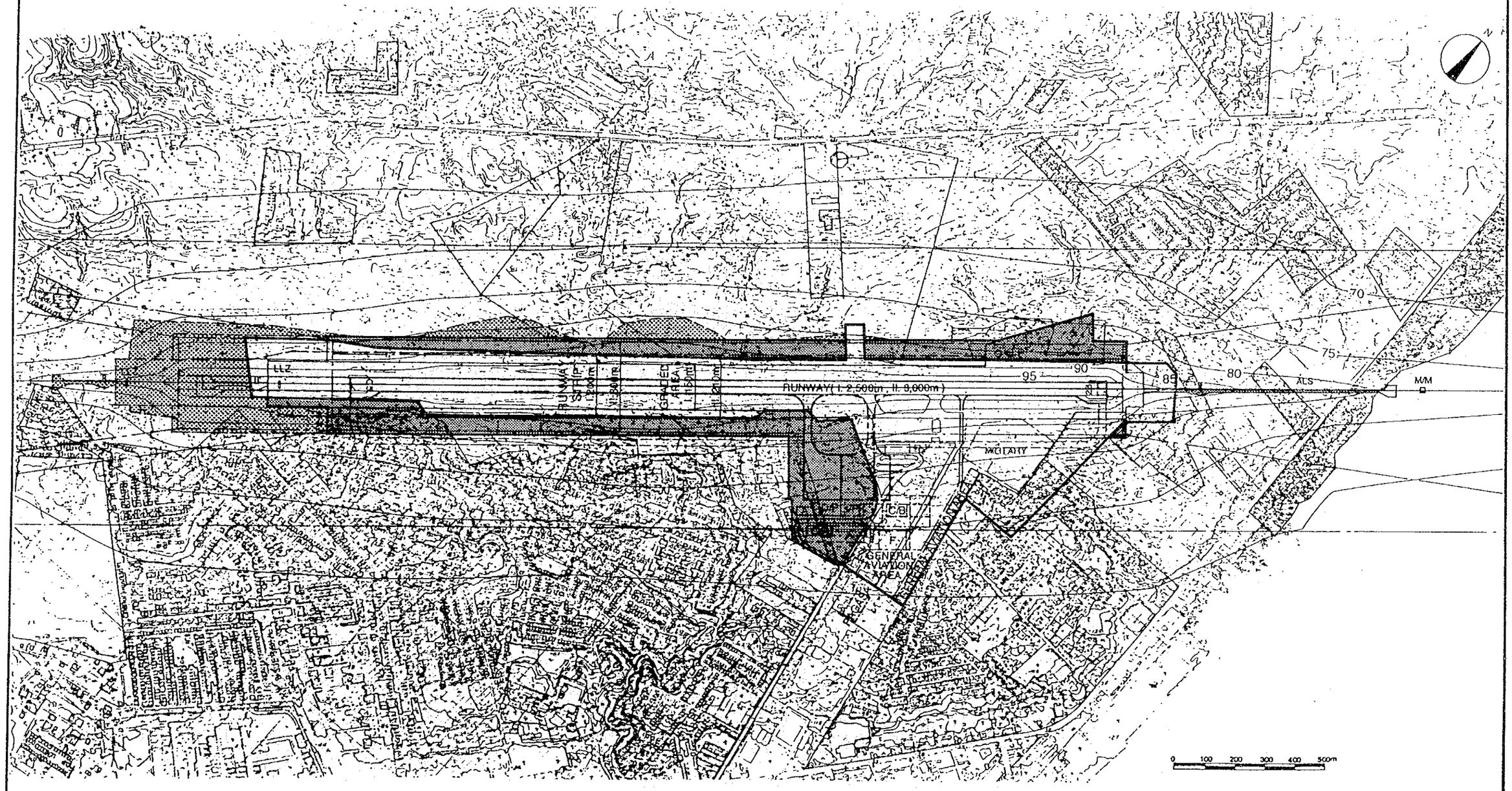
In 2000

WECPNL	Hospital	School	Church	House	Total
More than 95	0	0	0	0	0
95 - 90	0	0	1	14	15
90 - 85	0	0	2	211	213
85 - 80	0	0	3	667	670
80 - 75	0	2	7	1,938	1,947
75 - 70	0	4	6	3,937	3,947

In 2010

WECPNL	Hospital	School	Church	House	Total
More than 95	0	0	0	0	0
95 - 90	0	0	0	34	34
90 - 85	0	1	3	232	236
85 - 80	0	2	3	632	637
80 - 75	0	0	5	1,685	1,690
75 - 70	1	5	11	4,066	4,083

APPENDIX TO CHAPTER 7



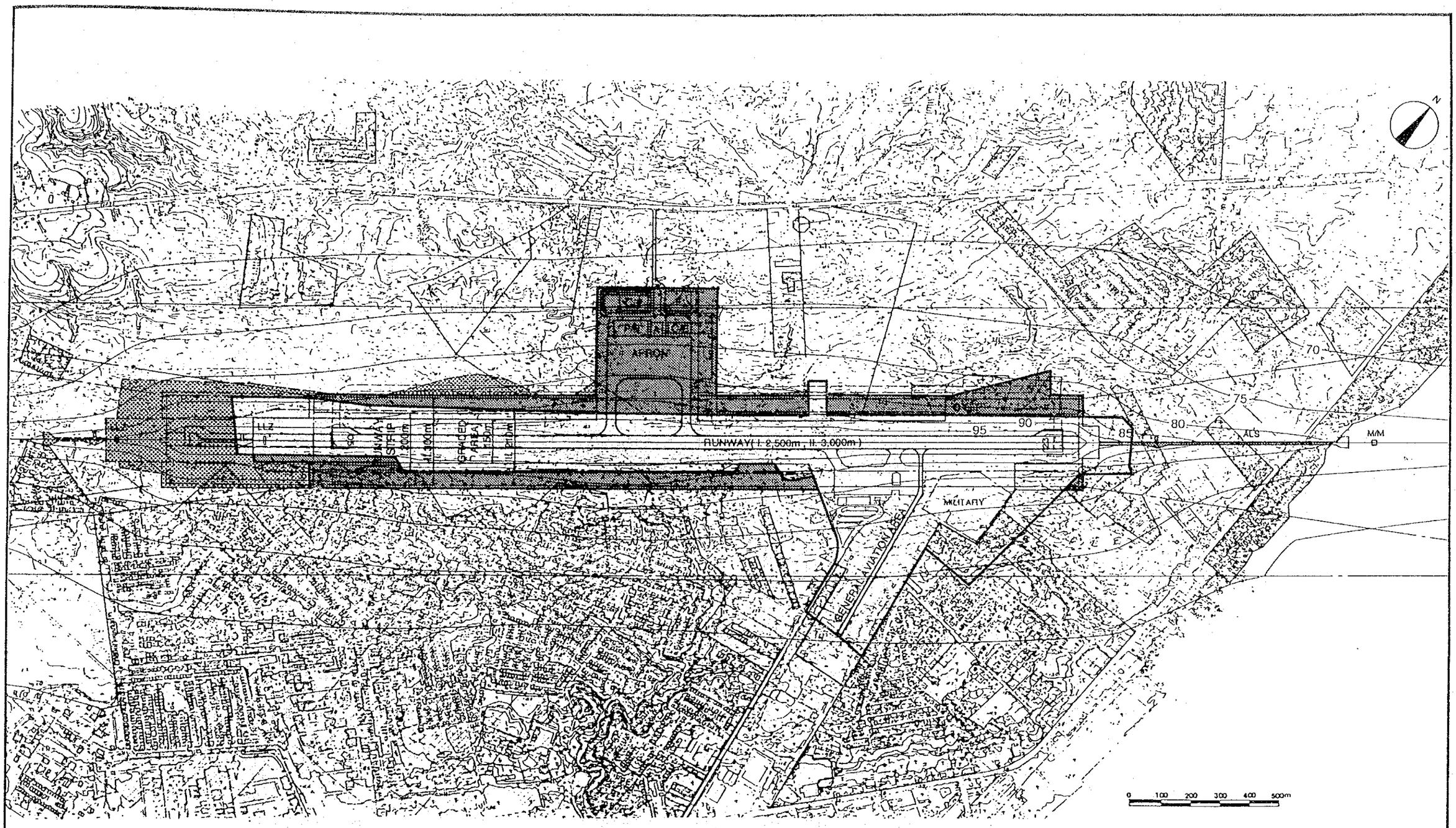
Legend,

: Boundary of Existing Airport Property Area

: Land Acquisition Area for Phase I Development

: Land Acquisition Area for Phase II Development

Land Acquisition Area in Alternative - AS



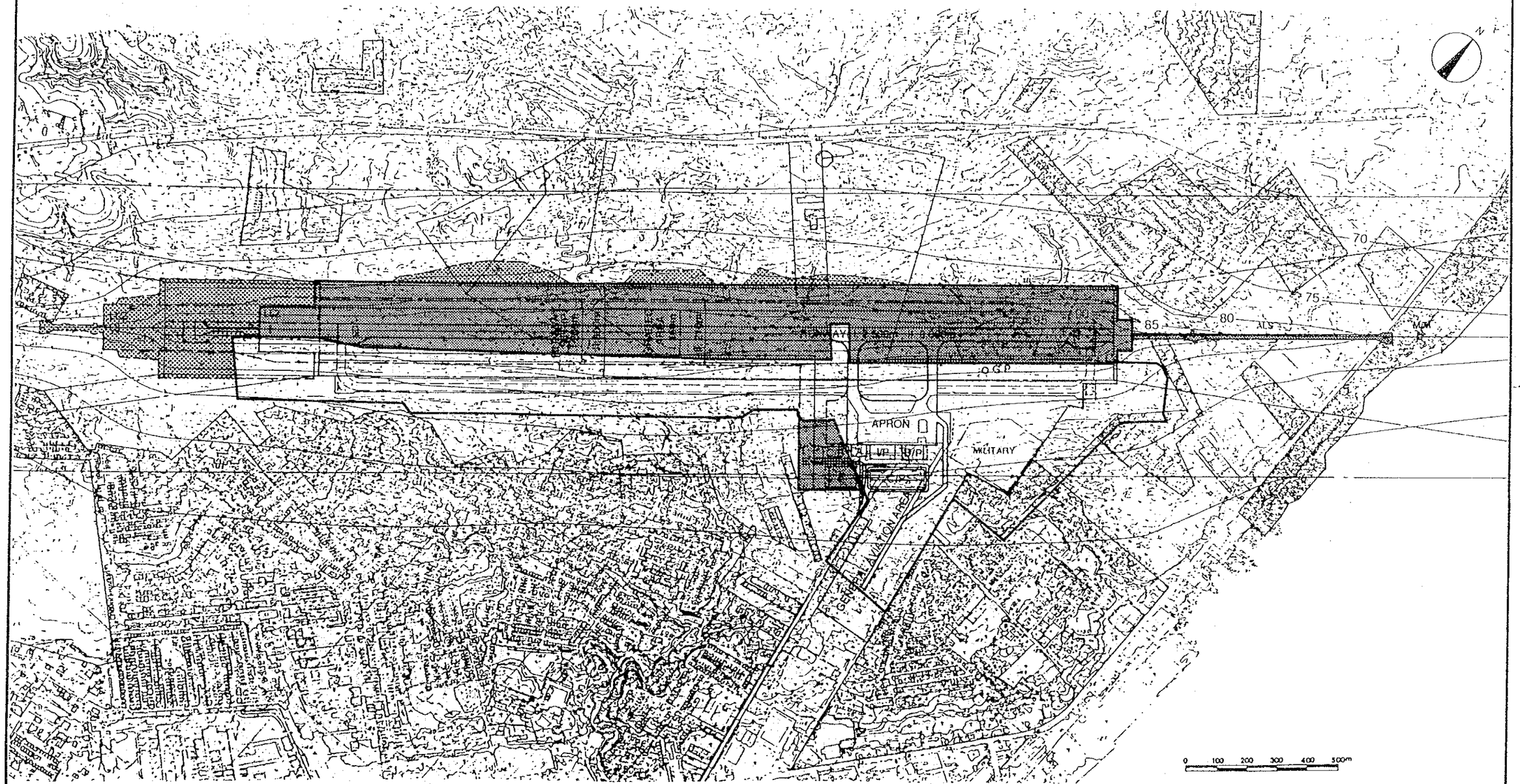
Legend,

: Boundary of Existing Airport Property Area

: Land Acquisition Area for Phase I Development

: Land Acquisition Area for Phase II Development

Land Acquisition Area in Alternative - AN



Legend,

——— : Boundary of Existing Airport Property Area

: Land Acquisition Area for Phase I Development

: Land Acquisition Area for Phase II Development

Land Acquisition Area in Alternative - BS