ANNEX TO APPENDIX-F

ATC RECORDS

International Flight - Passenger and Cargo (Feb.1988 to Dec.1988 and Jan.1989)
Object of A/C Type: A300 EA30 B720 B727 B737 B747 B757 B767 BA11 DC10 DC8 DC6

Month	January		February		March		April		May		June		July		August		September		October		November		December		Total	Grand
Date	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total	Intnl	Total
1	43	168	33	169	41	258	28	104	37	152	30	224	38	200	26	180	41	215	47	248	40	252	48	244		
2	35	214	39	210	29	300	36	140	41	146	47	250	37	193	38	313	31	145	39	182	39	242	39	198		
3	44	203	30	211	40	262	39	176	41	167	36	224	41	160	35	235	43	118	39	204	46	309	48	189		
4	38	243	43	218	33	244	34	130	27	158	43	220	38	150	47	232	36	151	41	252	32	289	42	198		
5	42	(258)	32	246	38	210	43	212	49	236	38	128	34	192	39	311	40	143	34	251	42	264	39	209		
6	43	246	40	235	35	169	28	180	28	263	35	154	37	235	47	198	35	243	46	237	42	222	46	252		
7	53	288	32	148	31	181	45	282	45	182	42	195	42	242	40	140	36	188	37	239	41	220	38	257		
8	52	203	30	181	40	220	35	253	35	292	30	222	41	262	42	236	44	206	42	226	40	260	47	278		
9	43	201	42	249	24	221	38	222	38	143	48	243	43	262	40	260	38	182	41	180	41	219	41	258		
10	51	212	28	205	44	195	36	150	36	188	41	242	38	178	32	278	46	201	34	146	48	234	50	206		
11	40	257	(34)	(214)	34	191	35	144	35	148	43	241	41	190	41	200	38	174	37	174	43	246*	49	215		
12	49	280	(34)	(214)	39	215	38	177	38	183	35	117	41	160	34	256	35	192	32	214	32	235*	42	180		
13	39	274	36	193	35	183	28	168	28	168	34	168	33	239	42	202	36	240	45	253	37	192	47	226		
14	43	206	32	156	32	156	40	232	40	139	37	173	43	235	38	164	35	212	41	268	33	194	39	232		
15	51	199	29	193	38	206	31	199	39	116	27	185	39	267	42	193	46	166	45	239	38	216	59	286		
16	41	152	40	240	30	223	41	188	31	126	45	199	43	225	39	204	36	148	39	232	40	282	45	250		
17	39	231	30	255	47	234	37	148	41	166	40	204	40	161	30	270	42	224	34	223	44	320	55	220		
18	41	210	44	238	36	189	35	199	26	175	41	178	34	215	43	254	37	157	40	259	41	256	46	168		
19	50	253	31	260	41	189	39	227	45	235	34	165	39	256	37	245	34	171	32	200	46	285	49	201		
20	40	276	34	248	36	141	31	194	36	189	40	146	34	272	46	272	44	168	44	302	46	235	46	272		
21	48	226	32	170	32	165	38	194	38	168	45	150	47	278	41	218	31	216	38	252	33	183	47	281		
22	45	187	33	200	45	251	39	226	35	109	31	186	36	215	39	180	44	261	40	230	39	226	56	251		
23	44	223	37	241	31	274	40	216	32	171	44	251	44	244	43	250	41	245	35	152	41	235	44	234		
24	44	257	30	245	39	276	33	146	39	266	38	276	43	145	33	247	42	276	31	48	44	263	60	177		
25	41	216	40	236	32	251	33	165	29	210	45	227	41	193	51	231	42	198	36	172	41	254	43	100		
26	48	276	28	182	36	194	37	176	46	252	39	173	40	240	41	302	39	212	39	257	41	226	47	196		
27	37	217	38	260	38	184	32	196	38	239	34	180	34	234	48	138	41	215	39	223	38	167	48	243		
28	50	268	32	192	34	201	50	266	39	227	38	212	46	255	42	81	30	182	39	226	36	178	48	287		
29	47	251	30	203	37	212	43	204	33	127	31	254	37	292	40	136	38	258	44	278	38	229	41	229		
30	43	199	/	/	26	(211)	40	184	37	134	48	285	44	250	45	231	42	253	37	191	49	190	47	268		
31	40	291	/	/	44	152		/	29	160	/	/	42	213	34	195	/	/	36	220	/	/	52	213		
Total:	1,364	7,195	991	6,212	1,117	6,558	1,102	5,698	1,147	5,635	1,159	6,067	1,230	6,853	1,238	6,852	1,163	5,960	1,203	6,840	1,211	7,123	1,446	6,918	14,371	77,911
Order of peak month:	<2>		<12>		<10>		<11>		<9>		<8>		<4>		<3>		<7>		<6>		<5>		<1>			
% in total:	18.96		15.95		17.03		19.34		20.35		19.10		17.95		18.07		19.51		17.59		17.00		20.92		18.45	
Average by 30 days:	6,963		6,426		6,347		5,698		5,453		6,067		6,632		6,631		5,960		6,619		7,123		6,694			
Order of peak month:	<2>		<6>		<7>		<11>		<12>		<9>		<4>		<5>		<10>		<6>		<1>		<3>			

Note: ( ) Estimate due to lack of data - Average no. per day in the month.
* 11th & 12th of Nov. has 2 data - 11th 246 & 295, 12th 235 & 271.

10 Dec.1988, La Aurora

A/C Type / Time Local	L.Jet B-747 348-447		DC-10 339-380		A-300 251-267		EA300 270		M.Jet B-767 211		B-757 178-239		B-727 147-202		B-720 180		S.Jet B-737 115		DC-8 (196)		DC-6 (80)		Total		Grand Total
Seat No.	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																							0	0	0
0100																							0	0	0
0200													1										1	0	1
0300																							0	0	0
0400																							0	0	0
0500																							0	0	0
0600							1							2									1	2	3
0700									1				1					1	1				3	1	4
0800								1		1				4				1					0	7	7
0900							1						2	2			1						4	2	6
1000			1										1	1				1		1			2	3	5
1100								1						1									0	2	2
1200				1																			0	1	1
1300													1	1									1	1	2
1400													1										1	0	1
1500														1									0	1	1
1600													1					1					1	1	2
1700													2						1				3	0	3
1800									1				1	2			1						3	2	5
1900										1							1			1			1	2	3
2000							1						2										3	0	3
2100													1										1	0	1
2200																							0	0	0
2300																							0	0	0
Total:	0	0	1	1	0	0	3	2	2	2	0	0	14	14	0	0	3	4	2	2			25	25	50
Full Loaded passenger:			380 × 2 = 760				270 × 5 =1,350		211 × 4 = 844				202×28 =5,656				115 × 7 = 805								9,415*

* Average Seat No.: 188, almost equivalent to that of B727

15 Dec.1988, La Aurora

Aircraft Type / Time Local	L.Jet B-747 348-447		DC-10 339-380		A-300 251-267		EA300 270		M.Jet B-767 211		B-757 178-239		B-727 147-202		B-720 180		S.Jet B-737 115		Cargo DC-8 (196)		DC-6 (80)		Total		Grand Total
Seat No.	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																							0	0	0
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400													1										1	0	1
0500														1									0	1	1
0600					1									2									1	2	3
0700									1				2				1	1					4	1	5
0800								2		1			2	4				1					2	8	10
0900														3			1	1		1			1	5	6
1000							1						1										2	0	2
1100			1					1						1									0	2	2
1200				1									1										1	1	2
1300														1									0	1	1
1400													1	1									1	1	2
1500													1				1						2	0	2
1600			1															1	2				3	1	4
1700				1													1						1	1	2
1800									1				2	1				1		1			3	3	6
1900										1			1							1			1	2	8
2000					1								2	1			1			1			4	2	6
2100																							0	0	0
2200																							0	0	0
2300																							0	0	0
Total:	0	0	2	2	2	0	1	3	2	2	0	0	14	15	0	0	5	5	2	4	0	0	28	32	59
Full Loaded passenger:			380 × 4 =1,520		267 × 2 = 534		270 × 3 = 810		211 × 4 = 844				202×29 =5,858				115 10 =1,150								10,716*

* Average Seat No.: 188, almost equivalent to that of B727

24 Dec.1988, La Aurora

A/C Type / Time Local	L.Jet B-747 348-447		DC-10 339-380		A-300 251-267		EA300 270		M.Jet B-767 211		B-757 178-239		B-727 147-202		B-720 180		S.Jet B-737 115		Cargo DC-8 (196)		DC-8 (80)		Total		Grand Total
Seat No.	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000													1										1	0	0
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400																							0	0	0
0500																		1					0	1	1
0600							1		1					1			1	1					3	2	5
0700								2		1				2				1					0	6	6
0800														3									0	3	3
0900					1								1	1			1		1				4	1	5
1000			1										2	1				1					3	2	5
1100								1						1						1			0	3	3
1200													1										1	0	1
1300														1									0	1	1
1400													1	1			1						2	1	3
1500													1				1	1					2	1	3
1600													1	2			1						2	2	4
1700													2	1					1	1			3	2	5
1800									1				1	1			1	1					3	2	5
1900										1			2	1			1						3	2	5
2000							1						1	1						1			2	2	4
2100																							0	0	0
2200																							0	0	0
2300																							0	0	0
Total:	0	0	1	0	1	0	2	3	2	2	0	0	14	17	0	0	7	6	2	3			29	31	60
Full Loaded passenger:			380 × 1 = 380		267 × 1 = 276		270 × 5 =1,350		211 × 4 = 844				202×31 =6,262				115×13 =1,495								10,598*

* Average Seat No.: 177, almost equivalent to that of B727

31 Dec.1988, La Aurora

A/C Type / Time Local	L.Jet B-747 348-447		DC-10 339-380		A-300 251-267		EA300 270		M.Jet B-767 211		B-757 178-239		B-727 147-202		B-720 180		S.Jet B-737 115		DC-8 (196)		DC-6 (80)		Total		Grand Total
Seat No.	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																							0	0	0
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400																							0	0	0
0500																							0	0	0
0600							1		1									1					2	1	3
0700								1		1							1	1					2	2	4
0800								1					2	4				1	1				3	6	9
0900							1							2			1	1					2	3	5
1000			1										1										2	0	2
1100								1						1									0	2	2
1200													1										1	0	1
1300														1									0	1	1
1400													3										3	0	3
1500													2	2			1						3	2	5
1600														1				1					0	2	2
1700										1			1										1	1	2
1800									1				1	1			1	1					3	2	5
1900										1							1			1			1	2	3
2000							1						1										2	0	2
2100													1										1	0	1
2200													1										1	0	1
2300																							0	0	0
Total:	0	0	1	0	0	0	3	3	2	2	0	0	15	12	0	0	5	8	1	1	0	0	27	24	51
Full Loaded passenger:			380 × 1 = 380				270 × 6 =1,620		211 × 4 = 844				202×27 =5,454				115×11 =1,265								9,583*

* Average Seat No.: 188, almost equivalent to that of B727

07 Jan.1989, La Aurora

A/C	L.Jet								M.Jet																
Type	B-747		DC-10		A-300		EA300		B-767		B-757		B-727		B-720		B-737		DC-8		DC-6		Total		Grand Total
Time Seat No.	348-447		339-380		251-267		270		211		178-239		147-202		180		115		(196)		(80)				
Local	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																							0	0	0
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400																							0	0	0
0500																							0	0	0
0600									1					1									1	1	2
0730							1						1					1					2	1	3
0800								1		1				3			2	1	1				3	6	9
0900								1					1	2				1					1	4	5
1000			1				1						1	1									3	1	4
1100														1									0	1	1
1200								1					1										1	1	2
1300														1									0	1	1
1400																							0	0	0
1500													2				1						3	0	3
1600													2	2				1					2	3	5
1700													2	1				1					2	2	4
1800									1				2	1			1			1			4	2	6
1900										1				2									0	3	3
2000													2										2	0	2
2100																							0	0	0
2200													1										1	0	1
2300													1										1	0	1
Total:	0	0	1	0	0	0	2	3	2	2	0	0	16	15	0	0	4	5	1	1	0	0	26	26	52
Full Loaded			380	1			270	5	211	4			202	31			115	9							
passenger:			= 380				=1,350		= 844				=6,262				=1,035								9,871*

* Average Seat No.: 156, almost equivalent to that of B727

08 Jan.1989, La Aurora

A/C	L.Jet								M.Jet																
Type	B-747		DC-10		A-300		EA300		B-767		B-757		B-727		B-720		B-737		DC-8		DC-6		Total		Grand Total
Time Seat No.	348-447		339-380		251-267		270		211		178-239		147-202		180		115		(196)		(80)				
Local	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000													1										1	0	1
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400																							0	0	0
0500																							0	0	0
0600													1	1									1	1	2
0700			1		1			1		1								1					2	3	5
0800								1						3			2	1	1				3	5	8
0900													1	1				1					1	2	3
1000				1			1							1					1				1	3	4
1100								1															0	1	1
1200																							0	0	0
1300													2	1						1			2	2	4
1400													2	1									2	1	3
1500														1			1						1	1	2
1600													2					1					2	1	3
1700														1				1	1				1	2	3
1800																	1			1			1	1	2
1900							1		1				3	1			1						6	1	7
2000									1	1			1				1						3	1	4
2100																							0	0	0
2200																							0	0	0
2300																							0	0	0
Total:	0	0	1	1	1	0	2	3	2	2	0	0	13	11	0	0	6	5	3	2	0	0	28	24	52
Full Loaded			380	2	267	1	270	5	211	4			202	23			115	13							
passenger:			= 760		= 267		=1,350		= 633				=4,646				=1,495								9,151*

* Average Seat No.: 170, almost equivalent to that of B727

15 Jan.1989, La Aurora

A/C	L.Jet								M.Jet																
Type	B-747		DC-10		A-300		EA300		B-767		B-757		B-727		B-720		B-737		DC-8		DC-6		Total		Grand Total
Time Seat No.	348-447		339-380		251-267		270		211		178-239		147-202		180		115		(196)		(80)				
Local	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																							0	0	0
0100																							0	0	0
0200																							0	0	0
0300																							0	0	0
0400																							0	0	0
0500																							0	0	0
0600							1																1	1	2
0700			1						1									1					3	1	4
0800								1		1				2			2	1	1				0	4	4
0900													1	3				1					2	3	5
1000				1			1																1	2	3
1100								1															0	1	1
1200								1					2										2	1	3
1300													1	2									1	2	3
1400													1	1									1	1	2
1500													3	1			1						3	1	4
1600														1				1					1	1	2
1700													1					1					3	1	4
1800													1				1			1			2	2	4
1900									1														3	0	3
2000										1			3										4	1	5
2100													1										1	0	1
2200																							0	1	1
2300																							0	0	0
Total:	0	0	1	1	0	0	2	3	2	2	0	0	14	10	0	0	6	5	3	2	0	0	28	23	51
Full Loaded			380	2			270	5	211	4			202	24			115	11							
passenger:			= 760				=1,350		= 844				=4,848				=1,265								9,067*

* Average Seat No.: 178, almost equivalent to that of B727

19 Jan.1989, La Aurora

A/C	L.Jet								M.Jet										S.Jet		Cargo						
Type	B-747		DC-10		A-300		EA300		B-767		B-757		B-727		B-720		B-707		B-737		DC-8		DC-6		Total		Grand Total
Time Seat No.	348-447		339-380		251-267		270		211		178-239		147-202		180		147-202		115		(196)		(80)				
Local	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	Arv	Dep	
0000																									0	0	0
0100																									0	0	0
0200																									0	0	0
0300																									0	0	0
0400																									0	0	0
0500							1																		1	0	1
0600			1					1						1											1	2	3
0700													1	1	1				1	1					3	2	5
0800				1		1								3						1					0	6	6
0900							1						2		1	2	1	1							5	3	8
1000														1					1	1					1	2	3
1100								1																	0	1	1
1200													1			1							1		2	1	3
1300													1	1											1	1	2
1400													1	1											1	1	2
1500													1						1					1	2	1	3
1600																				1					0	1	1
1700																			1			1			1	1	2
1800													2						2	1					4	1	5
1900														1						1					0	2	2
2000							1						2						1						4	0	4
2100																									0	0	0
2200																									0	0	0
2300																									0	0	0
Total:	0	0	1	1	0	1	3	2	0	0	0	0	11	9	2	3	1	1	6	6	0	1	1	1	25	25	50
Full Loaded			380	2	267	1	270	5					202	20	180	5	202	2	115	12							
passenger:			= 760		= 267		=1,350						=4,040		= 900		= 404		=1,380								9,101*

* Average Seat No.: 182, almost equivalent to that of B727

10 DEC.1988

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	2	B727	2	4
		B737	2	B737	2	4
MMMX (Mexico City)	Mexico	B727	4	B727	2	6
MMUN (Cancun)		B727	1	B727	0	1
MROC (San Jose)	Costa Rica	B727	2	B727	1	3
MHLM (San Pedro Sula)	Honduras	B727	1	B727	2	3
MPTO (Panama City)	Panama	DC10	1	B727	0	1
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
MZUC ( )		B727	0	B727	1	1
KMIA (Miami)	USA	A300	1	A300	0	1
		B727	1	B727	3	4
		DC 8	1	DC 8	1	2
KLAX (Los Angeles)	USA	A300	1	A300	0	1
		EA30	0	EA30	1	1
		B767	1	B767	1	2
		B727	0	B727	1	1
		DC 8	1	DC 8	1	2
KIAH (Houston)	USA	B727	1	B727	1	2
		B737	1	B737	1	2
KMSY (New Orlean)	USA	B727	1	B727	0	1
?		DC10	0	DC10	1	1
?		B737	0	B737	1	1
TOTAL:			25		25	50

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	6	6	12
KMIA	3	4	7
KLAX	3	4	7
MMMX	4	2	6
MROC	2	1	3
KIAH	2	2	4
MHLM	1	2	3
MNMG	1	1	2
MPTO	1	0	1
MMUN	1	0	1
KMSY	1	0	1
MZUC	0	2	2
?	0	2	2
TOTAL:	25	25	50

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	1	2
A300	2	0	2
EA30	1	2	3
B767	2	2	4
B727	14	14	28
B737	3	4	7
DC 8	2	2	4
TOTAL:	25	25	50

15 DEC.1988

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	2	B727	3	5
		B737	3	B737	3	6
		DC 8	1	DC 8	0	1
MSSS (Ilopango)	El Salvador	B737	0	B737	1	1
MMMX (Mexico City)	Mexico	B727	3	B727	2	5
		B737	1	B737	0	1
MMUN (Cancun)	Mexico	B727	2	B727	0	2
MROC (San Jose)	Costa Rica	DC10	0	DC10	1	1
		B727	3	B727	2	5
MHLM (San Pedro Sula)	Honduras	B727	0	B727	2	2
MPTO (Panama City)	Panama	DC10	1	DC10	1	2
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
MZBZ (Belize City)	Belize	DC 8	0	DC 8	1	1
TNCC (Curacao I.)		DC10	1	DC10	0	1
KMIA (Miami)	USA	A300	1	A300	1	2
		EA30	0	EA30	1	1
		B727	1	B727	1	2
		DC 8	0	DC 8	2	2
KLAX (Los Angeles)	USA	A300	1	A300	0	1
		EA30	0	EA30	1	1
		B767	1	B767	1	2
		B727	1	B727	1	2
		DC 8	0	DC 8	1	1
KIAH (Houston)	USA	B727	1	B727	1	2
		B737	1	B737	1	2
MHPX ( )	Honduras	B727	0	B727	1	1
TOTAL:			28		31	59

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	8	8	16
KMIA	3	5	8
KLAX	3	4	7
MMMX	4	2	6
MROC	3	3	6
KIAH	2	2	4
MHLM	0	2	2
MNMG	1	1	2
MPTO	1	1	2
MMUN	2	0	2
MSSS	0	1	1
MHPX	0	1	1
MZBZ	0	1	1
TNCC	1	0	1
TOTAL:	28	31	59

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	2	2	4
A300	2	1	3
EA30	1	2	3
B767	2	2	4
B727	14	15	31
B737	5	5	10
DC 8	2	4	6
TOTAL:	28	31	59

24 DEC.1988

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	A300	1	A300	0	1
		EA30	0	EA30	1	1
		B767	1	B767	1	3
		B727	2	B727	1	3
		B737	3	B737	4	7
MMMX (Mexico City)	Mexico	B727	3	B727	3	6
		B737	2	B737	1	3
MMUN (Cancun)		B727	1	B727	0	1
MROC (San Jose)	Costa Rica	B727	3	B727	2	5
MHLM (San Pedro Sula)	Honduras	B727	1	B727	2	3
MPTO (Panama City)	Panama	DC10	1	DC10	0	1
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
KMIA (Miami)	USA	EA30	1	EA30	1	2
		B727	1	B727	3	4
		DC 8	1	DC 8	1	2
KLAX (Los Angeles)	USA	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	1	B727	1	2
		DC 8	1	DC 8	1	2
KIAH (Houston)	USA	B727	1	B727	1	2
		B737	1	B737	1	2
		DC 8	0	DC 8	1	1
KJFK (New York)	USA	B727	0	B727	1	1
?		B727	0	B727	1	1
?		B737	1	B737	0	1
TOTAL:			29		31	60

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	7	7	14
KMIA	3	5	8
KLAX	4	4	8
MMMX	5	4	9
MROC	3	2	5
KIAH	2	3	5
MHLM	1	2	3
MNMG	1	1	2
MPTO	1	0	1
MMUN	1	0	1
KJFK	0	1	1
?	1	2	3
TOTAL:	29	31	60

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	0	1
A300	1	0	1
EA30	2	1	3
B767	2	2	4
B727	14	17	31
B737	7	6	13
DC 8	2	3	5
TOTAL:	29	31	60

31 DEC.1988

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	2	B767	1	3
		B727	3	B727	2	5
		B737	4	B737	4	6
MMMX (Mexico City)	Mexico	B727	4	B727	3	7
		B737	0	B737	1	1
MMUN (Cancun)	Mexico	B727	1	B727	0	1
MMAA (Acapulco)	Mexico	DC 8		DC 8	1	1
MROC (San Jose)	Costa Rica	B727	2	B727	2	4
MHLM (San Pedro Sula)	Honduras	B727	0	B727	2	2
MPTO (Panama City)	Panama	DC10	1	DC10	0	1
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
KMIA (Miami)	USA	EA30	1	EA30	1	2
		B727	1	B727	2	3
KLAX (Los Angeles)	USA	EA30	1	EA30	1	2
		B767	1	B767	1	2
		DC 8	1	DC 8	0	1
KIAH (Houston)	USA	B727	0	B727	1	1
		B737	0	B737	1	1
?		B727	2	B727	0	2
?		B737	1	B737	0	1
TOTAL:			27		24	51

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	10	8	18
KMIA	2	3	5
KLAX	3	2	5
MMMX	4	4	8
MROC	2	2	4
KIAH	0	1	1
MHLM	0	1	1
MNMG	1	1	2
MPTO	1	0	1
MMUN	1	0	1
MMAA	0	1	1
?	3	0	3
TOTAL:	27	24	51

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	0	1
A300	0	0	0
EA30	3	3	6
B767	3	2	5
B727	14	12	26
B737	5	6	11
DC 8	1	1	2
TOTAL:	27	24	51

07 JAN.1989

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	3	B727	3	6
		B737	2	B737	3	5
MMMX (Mexico City)	Mexico	B727	4	B727	5	9
		B767	1	B767	0	1
MMUN (Acapulco)	Mexico	B727	0	B727	1	1
MMOX (Oaxaca)	Mexico	B727	1	B727	0	1
MMAA (Acapulco)	Mexico	EA30	0	EA30	1	1
		DC 8	0	DC 8	1	1
MMMD (Merida)	Mexico	B727	0	B727	1	1
MROC (San Jose)	Costa Rica	B727	2	B727	2	4
MHLM (San Pedro Sula)	Honduras	B727	2	B727	0	2
MPTO (Panama City)	Panama	DC10	1	DC10	1	2
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
MZBZ (Belize City)	Belize	B737	0	B737	1	1
KMIA (Miami)	USA	EA30	1	EA30	1	2
		B727	1	B727	1	2
		B737	1	B737	0	1
KLAX (Los Angeles)	USA	B767	0	B767	1	1
		DC 8	1	DC 8	0	1
KIAH (Houston)	USA	B737	0	B737	1	1
		B727	1	B727	0	1
		B737	1	B737	0	1
?		B727	2	B727	1	3
TOTAL:			26		27	53

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	7	8	15
KMIA	3	2	5
KLAX	1	1	2
MMMX	5	5	10
MROC	2	2	4
KIAH	1	1	2
MHLM	2	0	2
MNMG	1	1	2
MPTO	1	1	2
MMUN	0	1	1
MMAA	0	2	2
MMOX	1	0	1
MMMD	0	1	1
MZBZ	0	1	1
?	2	1	3
TOTAL:	26	27	53

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	1	2
A300	0	0	0
EA30	2	3	5
B767	2	2	4
B727	17	15	32
B737	3	5	8
DC 8	1	1	2
TOTAL:	26	27	53

08 JAN.1989

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	2	B727	1	3
		B737	4	B737	4	8
MMMX (Mexico City)	Mexico	B727	3	B727	3	6
		B737	1	B737	0	1
MMAA Acapulco)	Mexico	DC 8	0	DC 8	1	1
MROC (San Jose)	Costa Rica	B727	3	B727	2	5
MHLM (San Pedro Sula)	Honduras	B727	0	B727	1	1
MSSS (Ilopango)	El Salvador	B727	0	B727	1	1
MZBZ (Belize City)	Belize	B737	0	B737	1	1
KMIA (Miami)	USA	EA30	1	EA30	1	2
		B727	3	B727	2	5
		DC 8	2	DC 8	1	3
KLAX (Los Angeles)	USA	EA30	1	EA30	1	2
		B767	1	B767	0	1
		DC 8	1	DC 8	0	1
KIAH (Houston)	USA	B767	0	B767	1	1
		B737	1	B737	1	2
KJFK (New York)	USA	B727	1	B727	0	1
KIND (Indiana)	USA	B727	0	B727	1	1
TNCC (Curacao I.)		DC10	0	DC10	1	1
?		DC10	1	DC10	0	1
TOTAL:			28		24	52

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	8	7	15
KMIA	6	4	10
KLAX	3	1	4
MMMX	4	3	7
MROC	3	2	5
KIAH	1	1	2
MHLM	0	1	1
MNMG	1	1	2
MMAA	0	1	1
MZBZ	0	1	1
KJFK	1	0	1
MSSS	0	1	1
KIND	0	1	1
TNCC	0	1	1
?	1	0	1
TOTAL:	28	24	52

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	1	2
A300	1	0	1
EA30	2	3	5
B767	2	2	4
B727	13	11	24
B737	6	5	11
DC 8	3	2	5
TOTAL:	28	24	52

15 JAN.1989

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B767	1	B767	1	2
		B727	2	B727	1	3
		B737	2	B737	3	5
MMMX (Mexico City)	Mexico	B727	3	B727	2	5
		B737	1	B737	0	1
MMAA Acapulco)	Mexico	EA30	0	EA30	1	1
		DC 8	1	DC 8	1	2
MROC (San Jose)	Costa Rica	B727	3	B727	2	5
MHLM (San Pedro Sula)	*Honduras*	B727	1	B727	1	2
MMUN (Cancun)	Mexico	B727	1	B727	1	2
MPTO (Panama City)	Panama	B737	1	B737	1	2
KMIA (Miami)	USA	EA30	0	EA30	1	1
		B727	3	B727	2	5
		DC 8	1	DC 8	1	2
KLAX (Los Angeles)	USA	EA30	1	EA30	0	1
		B767	1	B767	1	2
		DC 8	1	DC 8	0	1
KIAH (Houston)	USA	B737	2	B737	0	2
MNMG (Managua)	Nicaragua	B727	1	B727	1	2
TNCC (Curacao I.)		DC10	1	DC10	1	2
?		B737	0	B737	1	1
TOTAL:			28		23	51

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	6	6	12
KMIA	4	4	8
KLAX	3	1	4
MMMX	4	2	6
MROC	3	2	5
KIAH	2	0	2
MHLM	0	1	1
MNMG	1	1	2
MMAA	1	2	3
MPTO	1	1	2
MMUN	1	1	2
TNCC	1	1	2
TOTAL:	28	23	51

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	1	1	2
A300	0	0	0
EA30	2	3	5
B767	2	2	4
B727	14	10	24
B737	6	5	11
DC 8	3	2	5
TOTAL:	28	23	51

19 JAN.1989

ICAO CODE (COUNTRY)	COUNTRY	ORIGINE		DESTINATION		TOTAL
MSLP (San Salvador)	El Salvador	EA30	1	EA30	1	2
		B727	2	B727	2	4
		B737	3	B737	3	6
		B707	1	B707	0	1
		DC 6	1	DC 8	0	2
MMMX (Mexico City)	Mexico	B727	2	B727	3	5
		B737	1	B737	1	2
MMAA (Acapulco)	Mexico	DC 8	0	DC 8	1	1
MROC (San Jose)	Costa Rica	B727	3	B727	2	5
		DC10	0	DC10	1	1
MHLM (San Pedro Sula)	Honduras	B727	0	B727	2	2
MNMG Managua)	Nicaragua	B720	1	B720	1	2
KMIA (Miami)	USA	EA30	1	EA30	1	2
		B727	2	B727	2	4
		B707	0	B707	1	1
		DC 6	0	DC 6	1	1
KLAX (Los Angeles)	USA	EA30	1	EA30	1	2
		B737	1	B737	1	2
KIAH (Houston)	USA	B737	2	B737	1	3
KJFK (New York)	USA	B727	2	B727	0	2
?		DC 8	1	DC 8	0	1
TOTAL:			25		25	50

NO. of ORIGINE & DESTINATION

A/P CODE	(O)	(D)	TOTAL
MSLP	8	6	14
KMIA	3	5	8
KLAX	2	2	4
MMMX	3	4	7
MROC	3	3	6
KIAH	2	1	3
MHLM	0	2	2
MNMG	1	1	2
MMAA	0	1	1
KJFK	2	0	2
?	1	0	1
TOTAL:	25	25	50

NO. of AIRCRAFT

A/C TYPE	(O)	(D)	TOTAL
DC10	0	1	1
A300	0	0	0
EA30	3	3	6
B767	0	0	0
B727	11	11	22
B737	7	6	13
B720	1	1	2
B707	1	1	2
DC 8	1	1	2
DC 6	1	1	2
	25	25	50

APPENDIX - G

ESTIMATE OF SPACE REQUIREMENTS

(LA AURORA)

G.1 SPACE REQUIREMENTS IN PASSENGER TERMINAL BUILDING

The Design Standards and Processing Times outlined in Table 5.1 in Volume-I and reproduced in Table G-01 attached hereto, constitute the basis of inputs to be used in the mathematical formulas which allow the computation of the area required for each space. The procedures for estimating the space requirements in the passenger terminal building are outlined below.

1) Check-in Hall:

- Distribution Factor (DF) = 57%
- Peak Hour = Departure PHP = 80% Design PHP (Without Transit)
- Visitor/Passenger Ratio = 1.75 VIS/PAX
- Unit Area/PHP (U.A.) = 1.75 m^2/PAX; 1.0 m^2/VIS

Required Area = (Dep. PHP x D.F x U.A) + (Dep. PHP x D.F x VIS/PAX x U.A)

1988	:	983 m^2
1995	:	1,481 m^2
2005	:	2,882 m^2

2) Ticketing Counters:

- Passenger Flow Rate : 1.75 min/PAX INT/1.5 min. for DOM
- Remembering the assumption that 50% of the peak hour load should be processed in (20) minutes, then:

$$\text{Required Number of Agents} = \frac{\text{PHP x 0.50 x Flow Rate}}{20}$$

1988	:	22 Agents
1995	:	32 Agents
2005	:	64 Agents

Notes:

1. The requirements for existing conditions seem relatively in line with the actual situation
2. Departure peaks will be used for all the "departure-related" activities which follow (80% Absolute Peak)
3. At the Master Plan target year, the requirements can become excessive and difficult to accommodate. When that happens, a reduction in the number of required agents can be made possible by improving some other functional aspects, such as the processing time.

3) Departure Hall:

- Distribution Factor (DF) = 40% (of PHP Without Transit)
- Unit Areas Required = 1.30/PAX - 1.0/VIS

Required Area = (PHP x D.F x U.A) + (PHP x D.F x VIS/PAX x U.A)

1988	:	601 m^2
1995	:	905 m^2
2005	:	1,762 m^2

Notes:

1. This function is not traditionally treated as a separate entity and is very often (as in La Aurora) mixed with general circulation space.
2. The recommended Distribution Factor is lower in this area because after checking in, many passengers wander around before starting the departure process.

4) Emigration Area

- Distribution Factor (D.F.) = 57%
- Passenger Flow = 0.75 minute/PAX (Dep PHP.W/out Transit)
- As in the case of check in, it is also assumed that the majority of the peak hour passengers can be processed during a peak (20) minute period.

- Required Number of Agents $= \dfrac{PHP \times D.F \times P.FLOW}{20}$

1988	:	10 Agents
1995	:	16 Agents
2005	:	31 Agents

If we assume 1.5 Square meters per passenger in line, and we recommend a limit of 15 people per line, the area per agent will be: 1.5 x 15 = 22.5 Sq.Meters. For the agents themselves, an area of 3.5 Sq. Meter per agent is assumed. Then,

- Required Area = (22.5 + 3.5) x No. Agents

1988	=	338 m^2
1995	=	520 m^2
2005	=	1,014 m^2

5) Departure (Holding) Lounges:

Departure Lounges are a function of the gates they serve and must be designed to accommodate the largest aircraft that will be using that particular gate. It would therefore be sufficient to size each gate based on its largest aircraft type, by incorporating seating capacity with a certain load factor. However, it is possible that a particular design solution might contemplate grouping some (or all) the departure lounges into a central holding room serving various (or all) gates. This practice is common in modern airport design (Miami Airport, for example). For that reason, it is preferable to compute a required total departure lounge area based on peak hour passengers with transit. In addition, some "Gate Types" will be devised to serve certain types of aircrafts (usually 3).

- Distribution Factor (D.F) = 85%
- Design PHP W/Transit = (867; 1,232; 2,218) 80%
- Unit Area Required = 1.75 m^2/PAX (W/seating)

Total Required Area : PHP x D.F. x U.A

1988 : 1,031 m^2
1995 : 1,466 m^2
2005 : 2,640 m^2

6) Immigration Area:

The method of computing this area is similar to the one for the Emigration; the following differences exist however in the figures: the arrival component of the design peak hour (50% PHP) will be used, and the distribution factor will be much higher, because the passengers are all congregated in one area at the arrival of the flights, at the same time. Given the fact that the arrival peak occurs in the evening, no transit activity will be assumed to take place and the Peak Hour with transit will be used.

- Distribution Factor (DF) = 85%
- Design Peak Hour = 50% PHR W/Transit
- Passenger Flow = 0.75 min/PAX at peak (20) minutes

$$\text{Number of Agents} = \frac{\text{PHP x D.F x PAX Flow}}{20}$$

1988 : 14 Agents
1995 : 20 Agents
2005 : 36 Agents

Note:
As previously mentioned this is one case where by the year 2005 it will not be feasible to provide 36 Agents. The processing time will have to be improved to better than 80 passengers per hour (0.75 min/PAX) and also a total processing time of more than 20 minutes will have to be tolerated during peak hours. A reasonable number of agents will be used, based on available space.

Required Area = (22.5 + 3.5) No. of Agents

1988	:	364 m^2
1995	:	520 m^2
2005	:	936 m^2

7) Baggage Claim:

- Distribution Factor (DF) = 75%
- Design Peak Hour (Arrival) = 50% Design PHP W/Transit
- Unit Area Required = 2.0 to 2.5 Sq.M./PAX Int.
  = 1.50 m^2/PAX. Dom.

a) Required Passenger Area = PHP x D.F x U.A

1988	:	650 m^2
1995	:	924 m^2
2005	:	1,664 m^2

Note:
Although it is customary, and logical, to exclude the transit passengers from the baggage claim area computations, it was judged to be more appropriate to include it for Guatemala, since the more significant arrival peaks occur at night when all passengers exit the terminal.

b) Required Number of Belts:

If the previously mentioned average of (3) bags for each passenger is assumed, the total number of bags at peak hour is: 0.50 x PHP x 0.75 x 3 = No. Bags

- The loading rate of an average conveyor = 25 Bags/min.
- The average time to unload belt = 20 minutes

$$\text{Number of Belts} = \frac{\text{No. Bags}}{20} \times 1/20$$

1988	:	3 Belts
1995	:	4 Belts
2005	:	7 Belts

c) Total Length of Belts:

These unloading figures are based on the average belt length. The total required length can be computed, if we assume that passengers line-up in two rows and take a width of 80 cm each:

$$\text{Total Length of Belt} = \frac{0.5 \times PHP \times 0.75}{2} \times 0.80$$

1988	:	130 Lin.M.
1995	:	177 Lin.M.
2005	:	333 Lin.M.

Considering that these dimensions appear unreasonable at the scale of this project, we can reduce them by assuming 3 rows of passengers instead of two. The new figures will then be:

1988	:	86 Lin.M.
1995	:	118 Lin.M.
2005	:	222 Lin.M.

8) Customs Inspection Area:

Observations had revealed that the rate of baggage inspection vary from a low of 30 seconds to a high of 4 minutes. The average rate of 2.5 minutes will be selected, which happens to be the inter-nationally recognized standard. It must also be noted that at La Aurora, passengers with bulky "problem" bags are inspected in a customs separate area.

a) Required Number of Agents

- Distribution Factor (DF) = 57% (less than Baggage Claim)
- Design Peak Hour (Arrival) = 0.50 PHP W/Transit (same as par. h)
- Total Processing Time = 30 minutes (standard)
- Unit Area Required = 3.0 m^2/PAX Int.
  2 m^2/PAX Domestic

$$\text{Required Number of Agents} = \frac{0.5 \text{ PHP x DF x } 2.5}{30}$$

A check at this formula will reveal a larger-than-possible amount of Agents (for example for 1995: 20 Agents). This is a typical case where the norms should be modified to achieve more realistic results. In this case, the total processing time for the peak hour load can be lengthened to 75 minutes, which is not unreasonable.

1988	=	8 Agents or (4) Stations
1995	=	12 Agents or (6) Stations
2005	=	21 Agents or (11) Stations

a) Required Inspection Area

Required Area = 0.5 PHP x DF x U.A.

1988	=	741 m^2
1995	=	1,053 m^2
2005	=	1,896 m^2

9) Arrival Greeting Area:

At La Aurora, this area is an open, but covered, porch which blends with the curbside pick-up area.

- Distribution Factor (DF) = 57%
- Design Peak Hour (Arrival) = 50% Design Peak Hour W/Transit
- Unit Area Required = 2.5 m^2/PAX., 1.0 m^2/VIS.

Required Area = (0.50 x PHP x DF x UA) +
(0.50 x PHP x DF x VIS/PAX x UA)

1988 = 1,050 m^2
1995 = 1,492 m^2
2005 = 2,686 m^2

This area is usually considered a "non-essential" part of the terminal building, and is not normally confined to one space. At La Aurora, for example, well wishers stay outside the arrival doors, as well as on the second floor mezzanine. This requirement will therefore not be strictly adhered to and will be provided on an "as available" basis, for the convenience of the user.

10) Passenger Terminal space Requirements

The results of the space requirement analysis made above can be summarized in Table G-02 attached hereto.

Table G-01 Design Standards and Processing Times

Facility		Standards
- Check-in Hall		
• International	=	1.75 m^2./PAX
• Domestic	=	1.30 m^2/PAX
• Well wishers	=	1.0 m^2/PAX
- Check-in Counters		
• Airline work area	=	Length x 2.3 m
• Passenger front area	=	1.30 m^2/PAX (or 0.80 m width)
• Processing time	=	1.5 to 2.0 min./PAX
• Passenger flow	=	50% of Peak PAX processed in 20 min.
• Max. individual queuing	=	4.5 to 5.0 m (when used)
- Departure Hall		
• Passengers	=	1.30 m^2/PAX
• Well wishers	=	1.0 m^2/visitors
- Emigration (Passport Control Departing)		
• Area	=	1.50 m^2/PAX in line
• Processing time	=	45 sec./1.5 min/PAX
(The existing procedure at La Aurora differentiates between foreigners and locals, whose names are verified in a book. We will discuss this point later).		
- Security (X-Ray) Processing Time	=	45 sec. to 1.0 min/PAX
- Security Area	=	Flexible according to design
- Departure Lounges		
• With seating	=	1.75 m^2/PAX
• Without seating	=	1.3 m^2/PAX
- Baggage Claim		
• Domestic	=	1.50 m^2/PAX
• International	=	2.0 to 2.5 m^2/PAX
• Average loading rate of belts	=	20 bags/min.
• Length of belt (average)	=	0.80 M/PAX
- Immigration (Arrival) (Arrival Passport control)	=	Same as Emigration

Facility		Standards
- Customs Inspection		
• Area	=	3.0 m^2/PAX, intern 2.0 m^2/PAX DOM (w/counter)
• Processing time	=	2.5 min./PAX
- Baggage Per Passenger		
• Domestic	=	2.0/PAX
• International	=	2.5 to 3.0/PAX
- Arrival Curbside Meeting Area		
• Area	=	2.50 to 3.0 m^2/PAX
• Curb length	=	0.1 to 0.2 m/Annual PAX (1,000)
- Visitor/Passenger Ratio		
• Domestic	=	1.75 to 2.0
• International	=	1.50 to 1.75

Note: Unlike some other criteria for which recommended standards were applied, even when they differ from observed occurrences, the visitor to passenger ratio is a local phenomenon which must be taken into consideration. Head counts were taken during the morning "departure surge" at the passenger entrance on the 3rd floor; at the same time, total number of departure passengers was compiled for that same day. It indicated a 2.11 VIS/PAX ratio for both international and domestic departures combined. However, that ratio had to be reduced slightly since some airline employees also used that entrance.

Table G-02 International Passenger Terminal Space Analysis

TERMINAL FUNCTION	EXISTING	1988 REQ'D	1995 REQ'D	2005 REQ'D
INTERNATIONAL				
- Check-in Area (S.M.)	1,089	983	1,481	2,882
- Ticketing Agents	24	22	32	64
- Departure Hall (S.M.)	564	601	905	1,762
- Emigration Agents	10	10	16	31
- Emigration Area (S.M.)	393	338	520	1,014
- Holding (Dep.) Lounges (S.M.)	886	1,031	1,466	2,640
- Intern. Transit Lounges	-	-	500	750
- No. of Gates Req'd	7	-	9	14
- Immigration Agents	8	14	20	36
- Immigration Area	244	364	520	936
- Baggage Claim Belts	2	3	4	7
- Total Length of Belt	64	(86) 130	(118) 177	(222) 333**
- Baggage Claim Area (SM)	1,503*	650	924	1,664
- Customs	-*	741	1,053	1,896
- Customs Agents		8	12	21
- Arrival Greeting Area	640	1,050	1,492	2,686
TOTAL FUNCTIONAL AREAS	5,319	5,758	8,361	15,480
ANCILLARY FUNCTIONS				
Airport Administration	1,052	-	1,052	1,452
Airline Offices	1,553	-	1,786	2,054
Apron Service Offices	1,980	-	1,980	2,277
Airline Cargo Offices	797	-	-	-
Cafeteria & Snacks	791	-	910	1,046
Shops and Concessions	1,694	-	1,694	1,945
Vertical/Horizontal Pure Circulation	2,854	-	3,000	5,160
Toilets	144	-	400	600
Functional Circulation & Others	5,885	-	7,500	12,000
Total Ancillary	16,750	-	18,322	26,534
Total International	22,069	-	26,683	42,014

* This function has been combined with customs for the existing conditions since those two spaces blend together and cannot be differentiated.

** See detailed analysis for alternative numbers in ( ) in Appendix-G.

G.2 SPACE REQUIREMENTS IN CARGO TERMINAL BUILDING

Many methods are used to compute air cargo area requirements, most of them are based on the concept of the Average Peak Day. Another method is the Gross Storage Area based on annual which has been developed and published by Flying Tigers. In this study, a combination of various criteria will be used depending on the space analyzed. Considering the relatively simple nature of operations, the gross-area-per-ton parameter will be used to compute the general cargo storage space based on annual volume. In addition, the unit criteria of square meters per total stored tonnage can be used for some more specialized area.

1) Cargo Storage Spaces

The total stored tonnage is obtained by multiplying the average peak day by the number of dwell days (14 days in this case). The average peak day is 120% of the average day in the peak month. Due to lack of cargo statistics, it is assumed that the average day is 1/365 of the annual volume. The criteria for space requirements are summarized as follows:

a) Outbound

- Heavy Cargo = 6.0 tons/m^2/year (assumed for future)
- Light Cargo = Prevalent cargo made-up mostly of perishables and palletized items, which are difficult to stack up, therefore requiring a lot of space, but are still light. A factor of 5.0 tons/m^2/year will be used.

b) Inbound

- Heavy Cargo = 7.0 tons/m^2/year
  Can be stacked in two shelves.
- Light Cargo = 5.5 t/m^2/year
  Also stackable at up-to 4 levels, but very light .

2) Support Spaces

a) Customs Revision and Cargo Conditioning Area

Cargo handling in this part of the building is transitory and does not require permanent storage. The normal procedure is to assume 0.5 hours revision time, or one half of peak hour volume. However, because of the characteristic of the cargo traffic in Guatemala, and because of possible necessary short time storage and delays, a one-day peak day storage capacity will be assumed. Inbound volume will be used for cargo revision and outbound for cargo conditioning. The parameters used will be 40 kg/m^2 for inbound and 30 kg/m^2 for outbound. There is always the possibility of treating the space architecturally as a single space, with the flexibility to subdivide it with removable partitions.

b) Cleared Cargo Area

It is customary to devise a separate area for the inbound cargo which has already been verified by customs, in order to differentiate it from the rest. However, considering the small scale of the operation, a method of differentiation more flexible (such as moving partitions) will be used instead.

c) Independent Cargo Agents

Modules of 60 m^2 (w/toilets) each will be made available for rental to individual private agents.

d) Customs Administration Area

It is recommended that an administrative nucleus, directly connected with the operation of the new cargo facility, have offices in the long-term improvement plan. The space requirement will be calculated on the basis of staff requirement estimated as follows:

Cargo Facility Personnel Requirements

Function	Day Shift	Night Shift
Director	1	-
Assistant Director	1	-
Supervisor (Customs Agent)	1	1
Secretarial (Clerks + Adm. Sec.)	6	2
Cashier	2	-
Agents (Customs)	4	2
Loaders	8	4
General Maintenance (Cleaning etc.)	2	2
Total	25	11

3) Cargo Terminal Space Requirements

Space requirements for cargo terminal at La Aurora will be listed as summarized in Table G-03.

Table G-03 Cargo Facility Space Requirements

(m²)

Space Description	1995	2005
Outbound:		
Heavy Cargo Storage	217	329
Light Cargo Storage	2,340	4,140
Subtotal Outbound Storage (1)	2,557	4,469
Inbound:		
Heavy Cargo Storage	286	514
Light Cargo Storage	1,454	2,618
Subtotal Inbound Storage (2)	4,297	3,132
Total storage Area (1+2)	4,297	7,601
Cargo Revision Area (Inbound)	821	1,479
Cargo conditioning (Outbound)	1,425	2,520
Independent Cargo Agents	250	400
Administrative Area	-	600
Circulation/Services	-	500
Total Area	6,793	13,100

G.3 SPACE REQUIREMENTS FOR PARKING LOT

1) Existing Parking Lots

Existing parking lots are located in front of the terminal building. They consist of several lots, each having a parking capacity as shown below.

(Location)	(Parking Capacity)	(Remarks)
Toll parking lot-1	128 cars	for public
Toll parking lot-2	242	for public
Free parking lot	90	for public
Road-side parking strip-1	49	for public
Road-side parking strip-2	58	for taxi
Controlled parking lot	94	exclusive to airport personnel
Total	661 cars	

2) Current Passenger Traffic

A field survey which was performed on one of the busy mornings of early March, 1989, revealed the following pattern of traffic to the airport, for departing passengers.

a)	Number of arriving vehicles	: Taxis	138	(27.7%)
		Personal cars	304	(61.0)
		Others/1	56	(11.2)
		Total	498	
b)	Average number of people per vehicle	: Taxi	1.8	
		Personal car	2.0	
c)	Number of departing passengers	:	529	
d)	Number of people arriving at terminal	:= 442/2 x 2 =	882	
e)	Vehicle vs. passenger	: 442/2/529 =	0.84	

/1 These are mainly micro-buses and used by airport and airline personnel.

/2 Vehicles used by incoming people: 138 + 304 = 442

3) Evaluation of the Existing Parking Lots

The existing parking lots can be evaluated for their capacity in the current peak hour by the following factors:

a) Peak hour passenger (P) : 725
b) Ratio of vehicle versus passenger (R) : 0.84
   (by observation)
c) Rate of vehicle which use parking lots (C) : 0.6

Required parking space (V) = P x R x C = 725 x 0.84 x 0.6
= 365 cars

The present capacity of the parking lots for passenger is 567 cars (=128 + 242 + 90 + 49 + 58), excluding areas exclusive for airport personnel. Obviously the existing parking lots is more than adequate at the moment.

4) Future Development Plan - Short Term (1995)

The peak hour passengers in 1995 is forecast at 1,092. The required number of parking spaces (V1) for passengers and well wishers will then be:

$$V_1 = P \times R \times C = 1{,}092 \times 0.84 \times 0.6 = 550 \text{ cars}$$

In view of the present parking capacity for passengers of 567 cars, no expansion of the parking lots for passengers would be necessary. Assuming that the number of airport personnel would increase in proportion to that of the terminal building as previously assumed, the required parking space (V_2) is,

$$V_2 = 94 \times 33{,}842 \text{ m}^2/28{,}142 \text{ m}^2 = 113 \text{ cars}$$

Then, the required land for the extra 19 cars (= 113 - 94) is

$$A = 19 \times 35 \; m^2 = 665 \; m^2$$

5) Space Requirement for Long-Term Improvement Plan

The peak hour passengers in 2005 is anticipated to be 2,125. The required number of parking spaces for passengers is calculated as follows:

$$V_1 = 2{,}125 \times 0.84 \times 0.6 = 1{,}071 \text{ cars}$$

For airport personnel, the required parking spaces are estimated in proportion to the floor area of the terminal building, as follows:

$$V_2 = 94 \times 48{,}442 \; m^2 / 28{,}142 \; m^2 = 162 \text{ cars}$$

Consequently, the total number of parking is estimated to be 1,233 cars (= 1,071 + 162). Since the present parking capacity is 661 cars, the expansion is required for 572 cars. At the rate of 35 m2 of land required for each parking space, the total space requirements are now calculated at:

$$A = 572 \times 35 \; m^2 = 20{,}020 \; m^2 = 2 \text{ ha}$$

G.4 SPACE REQUIREMENTS FOR CFR BUILDING

1) Airport Category

To determine the airport category for the CFR facilities, the aircraft movements in the busiest consecutive three months of the year has been analysed by reviewing the tower log in 1988. Table below indicates the results of analysis.

Airplane Movements

Airplane	Airport	Movements (Busiest 3 months of year) 1988
B-747	9	-
DC-10	8	96
A300	8	504
B-767	8	336
B-727	7	1,734
B-720	7	60
B-737	6	858

Consequently, the airport is classified as Category-8 under current operations. In the shot-term improvements, no large wide-body aircraft (B-747 type) is expected to be introduced in substantial number, the airport Category-8 would remain during such a period. In the long-term improvements, such large wide-body would be introduced to some extent. However, the number of such flights would be less than 360 in three consecutive months, which is not as frequent as to alter the airport category. Consequently, the airport Category-8 would remain during the long-term improvement period.

2) Existing CFR Building

The existing 2-story CFR building as functional spaces of 480 m^2 as shown below.

Functional Spaces of Existing CFR Building

Room	Fl. 1	Fl. 2	Fl. 3
Vehicle storage space	203 m^2		
Office	12		
Hall and corridor	29	34 m^2	
Dining & kitchen	11		
Storage	37		
Meditation room	12		
Toilet & shower	11		
Training room	48		
Dormitory/Resting		59	12 m^2
Observation room	12		
Sub-total	363 m^2	105 m^2	12 m^2
Total			480 m^2

3) Manpower requirements

The total number of personnel required should be determined primarily to ensure that the rescue and fire fighting vehicles are properly manned, and control and communication facilities are continually kept in service in case of an emergency. Table below indicates the minimum number of personnel required to maintain the airport Category-8 CFR facilities.

Table 5.19 Minimum Number of Personnel

Function of Personnel	Day Shift	Night Shift
1. Rapid intervention vehicle (x1)		
Fireman	1	1
Driver	1	1
2. Major vehicle (x2)		
Fireman	3 x 2	3 x 2
Driver	1 x 2	1 x 2
3. Chief of station	1	-
4. Assistant to chief cum instructor	1	1
5. Watchman	1	1
6. Service boy	1	-
Total	14	12
Stand-by (On leave)	2	-

4) CFR Building Space Requirements (Long-Term)

CFR building will have to be relocated under the long-term employment plan by the year 2005. The new CFR building will be designed on the basis of the number of vehicles, stored extinguishing agents and manpower requirements as discussed previously in this Study. The required service spaces in the new building is estimated as shown in Table below.

Table G-04 CFR Building Space Requirements

Room		Occupants	Required Floor Area (m^2)	
1)	Vehicle storage space	RIV x 1 MV x 2 Extra x 1	4^m x 14^m(for one vehicle) x 4 ea =	224
2)	Vehicle-related service room			
	- Extinguishing agent storage	Dry chemical 450 kg		20
	- Tool and parts storage			50
	- Battery room			20
3)	Office			
	- Station chief room	1		12
	- Asst. station chief room	1		12
	- Observation room	1		16
	- Toilet & shower			6
4)	Fireman's room			
	- Break room	13	13^p x 4^{m2} =	52
	- Dining and kitchen	14	14^p x 4^{m2} =	56
	- Toilet & shower		16^{m2} (toilet) + 12^{m2} (shower)	28
	- Locker room			20
5)	Others			
	- General storage			6
	- Machine room			6
	Sub-total			528 m^2
6)	Circulation		15% of above	79 m^2
	Total			607 m^2

APPENDIX - H

LA AURORA CONTROL TOWER PLANNING

CONTROL TOWER PLANNING

The existing control tower has deficiencies in functioning its proper control of aviations at La Aurora, as noted in Chapter 4.3.1 in Volume I. A new control tower is proposed to be constructed and equipped under the short-term improvement plan. For the preparation of preliminary design of the control tower, studies have been made as developed hereunder.

1. Control Tower Site

1) Siting Requirements:

The control tower is designed to meet the specific requirements for siting as listed up hereunder. (The first four requirements are considered as mandatory.)

a) Primary consideration must be given to the local control position. A clear, unobstructed and direct view of the approach to the end of the primary instrument runway and all other active runways and landing areas is required.

b) Complete visibility of all airport surface areas to be utilized in aircraft movement under the control of the air traffic control tower must be secured. Primary consideration must be given to the ground control position, though all operating positions should have the same capability. A clear, unobstructed and direct view of taxiway and runways is required.

c) Depth perception must be secured to permit control tower staff to differentiate the number and type of grouped aircraft and/or ground vehicles, and to observe their movement and position relative to the airport surface areas. Perception is enhanced where the controller's line of sight is perpendicular or oblique, not parallel, to the line established by aircraft and/or ground vehicle movement, and where the line of sight intersects the airport surface at a vertical angle greater than 35 minutes.

d) and future building area with its expanded dimensions; personnel and facility vehicle parking, if required, and fuel storage as dictated by local requirements.

e) The tower cab should be oriented towards north direction or alternatively east, south, or west, in the order of preference in the Northern hemisphere. Avoid orientations that will place a view of the runway approach in line with rising or setting sun.

f) Visibility is to be unimpaired by direct or indirect external light sources. Such sources are ramp lights, parking area light, and reflective surfaces.

g) Visibility is to be secured of all ground operations of aircraft and ground vehicles not previously specified, on ramps, parking areas and test areas.

h) Consideration of local weather phenomena to preclude restriction to visibility due to fog or ground haze.

i) Minimize exterior noise and signal interference to electronic equipment.

j) Provide an access to the site which avoids areas of aircraft operations.

2) Site Selection:

In view of the above noted siting requirements, three alternative sites for location of a new tower are found as follows: (Refer to Figure H-1 attached):

A: Western front of DGAC building at the north-eastern corner of the present apron, restricted area.

B: By the access road to the apron from the security gate for the restricted area.

C: North-eastern corner of the green near DGAC building which is located in landside.

All the above alternative sites are ideal to command airfield. However, some minor problems are found as follows:

A: The tower building blocks DGAC staff's view to the field.

B: The tower building stand at the entrance to the cargo truck parking area for 1995. However, there is enough space to provide the access.The cargo hanger is planned to be relocated for 2005.

C: Since the site is in the landside, a security fence should be provided in order to let the tower be in the airside.

The proposed site for replacing the existing radar antenna tower is at the corner on the green, west of the NDB tower. Microwave tower, NDB tower and DGAC building will be obstructions in east quadrant for radar wave of the new radar site to be proposed for relocation. All these likely obstructions are better to be located at a place close to each other. In this point of view, the alternative B will induce an independent obstruction for radar wave, then, the new tower is better built at the nearest place to the DGAC building. The Study Team recommends the alternative C as the best site .

In this new tower functional shaft, the Aerodrome Control Cab, the Radar Approach Control Room (RAPCON) and Meteorological Observation Office (MOO) will be relocated. Thus, the areas occupied presently by these facilities will be able to be used for the apron expansion.

2. Control Tower Height

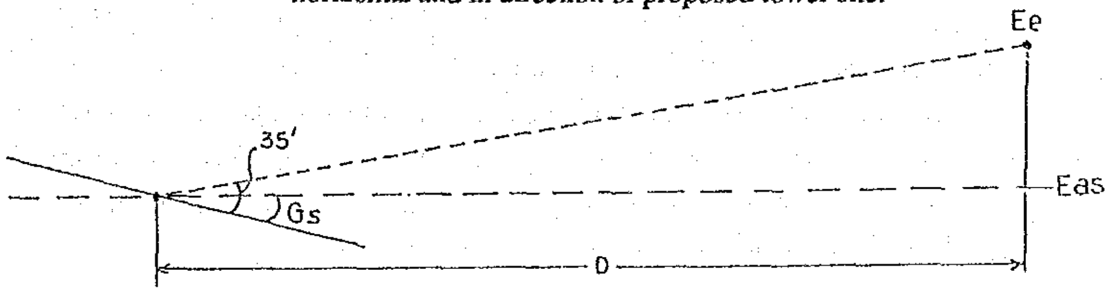
1) Tower Cab Eye Level Determination:

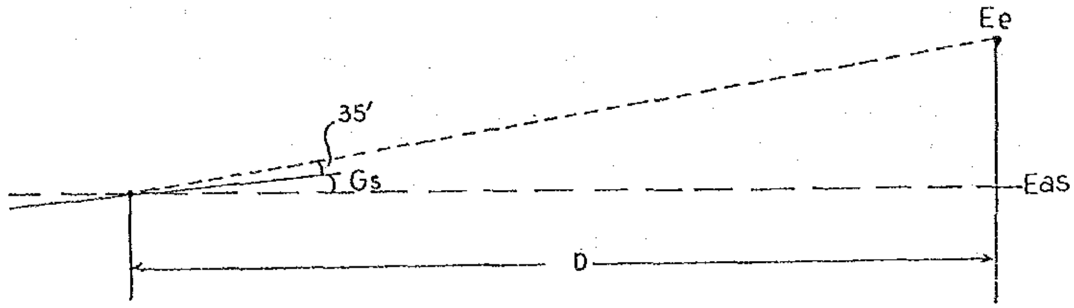
The grade of the airport traffic surface for each section must be considered. Where the section in question encompasses a rising taxiway grade leveling off at a runway end (the fartherest point) the grade of the runway end in the direction of the line of sight is the most important. The movement of aircraft and/or ground vehicles on the taxiway will be discernible if the 35 minute minimum angle is established relative to the runway grade, thus affording the ability to determine the position of aircraft and/or ground vehicles on the runway. However, if the taxiway grade slopes down to the runway end, the 35 minute minimum angle should be established relative to the taxiway. The minimum eye level elevation for a particular tower site can be determined by the following formula:

$$Ee = Eas + D \tan. (35 \text{ min.} + Gs)$$

Where:

- Ee = Eye level elevation
- Eas = Average elevation for section of airport traffic surface in question.
- D = Distance from proposed tower site to section of airport traffic surface in question.
- Gs = Angular slope of airport traffic surface measured from horizontal and in direction of proposed tower site.





2) Recommended Tower Height

The present tower height is 17.4 m, with the cab floor elevation at 12.8 m. The assumed controller's eye level is then approximately 14.3 m (12.8 m + 1.5 m). This is too low to obtain the minimum required eye level. It is lower than the height of the terminal building and even lower than the end of Runway 01 (tower elevation is about 1,484 m, while Runway 01 is 1,487.117 m and Runway 19 is 1,509.372 m).

If the new tower is to be relocated to a site near DGAC building, the tower cab level will be 26 m at minimum, applying the above mentioned formula. Normal eye level in the tower cab is about 1.5 m above the floor of the tower cab.

Hence, the floor elevation will be about 24.5 m. Then, the tower height should be about 29 m at minimum. On the other hand, the obstacle limitation surface derived from the transitional surface at the proposed tower site C is calculated as follows;

- The shortest distance from the runway centerline: 390 m
- The runway strip edge from the runway centerline: 150 m

Therefore,

$$(390 \text{ m} - 150 \text{ m}) / 7 = 34.285 \text{ m}$$

Consequently, the tower height can be raised up to approximately 34 m, with the floor elevation at about 30 m and the eye level at 31.5 m.

3. Tower Planning

1) Operational Considerations

a) The tower must be equipped so as to permit the controller reliable, clear and rapid communications with aircraft in his area of responsibility. This is accomplished through air-ground communications. It is also noted that frequent stress will be involved in the provision of ATC. The optimum tower site will normally be as close as possible to the center of the manoevering part of the aerodrome, provided that at the intended height, the tower structure itself does not become an obstruction or hazard to flight.

b) Reflections in the cab glass and sun or lamp glare through the windows should be kept to a minimum. Vertical supports for the cab roof should be kept to the smallest feasible diameter so as to minimize their obstruction of the controller's view. The supports should also be as few as possible commensurate with minimizing refections. The fewest window panes should be used. Since operations in and around a control tower generate a fair amount of noise, the provision of sound-deadening features in the control tower is important.

c) The layout of working positions will be determined by the locations of the tower in relation to the maneuvering area, and more especially , the approach direction which is most frequently used at the aerodrome. The tower consoles should be designed so as not to exceed the height of the window sill. It is also determined by the number of operating positions which are occupied simultaneously in the tower and the respective responsibilities of these positions. Thus, the layout is most likely to vary from aerodrome to aerodrome and also at an aerodrome as traffic changes.

d) Flexibility and far-sightedness are primary considerations in the initial installation in order to avoid major structural or installation modifications in the future due to changing operational requirements.

e) Sample space to ensure an optimum working environment for personnel (including expansion capabilities), be energy efficient, durable and aesthetically pleasing, all at moderate cost. In the case of control tower located atop the terminal building, it has often been found that such a location limits the expansion capability of the facility when air traffic rises and, consequently, tower staffing and equipment needs increase.

f) Therefore, at the important aerodromes or at those where significant future traffic developments are expected, it is better to have a separate control tower structure which is optimally sited, specifically designed to fulfil its operational purpose and whose height is sufficient to best meet ATC needs.

2) Structural Requirements

Free-standing control towers have 3 main components: Cab, Shaft and Base-Building. The space reserved for the tower cab should be ample but not excessive. The dimensions of polygonic cabs are suggested as follows:

Level of Activity		Approximate Number of Personnel Simultaneously Present in Cab	Cab Area (m^2)
Low	:	Not more than 6	21
Intermediate	:	Between 6 and 12	32
Major	:	More than 12	50

a) Minimum clear height from cab floor to ceiling should be 3 m.

b) There should be a walkway around the exterior of the tower cab. The walkway should be as narrow as possible and as low as possible, including railing, so as not to impair the controller's close-down view.

c) Due to its location, a control tower cab is normally exposed to changes in atmospheric conditions and a wide variance in temperature. Therefore, a good air circulation is required to retain reasonable working conditions.

d) as a single or multiple story structure.

e) A free-standing functional shaft, without an associated base building, requires a small area. It can be readily constructed in prefabricated sections and assembled on location in less time than a conventional building.

f) The combination of a base building with a non-functional tower shaft limits the use of the shaft to the point where it houses only a minimal amount of mechanical and electronic equipment but no support personnel.

g) A single or two-story base building lends itself to a more convenient and efficient circulation of people. The disadvantages are larger site required and higher construction costs.

3) Layout Plan of the Tower Shaft

The functional relations of the proposed control tower are shown in Figure H-2. On the basis of such relations, a layout plan in the tower shaft has ben worked out as summarized hereunder.

Story	Facilities (Room)	Floor
(10)	VFR Control Cab:	Atop the tower shaft
(9)	RAPCON:	Beneath the VFR Cab
(8)	Break & Briefing Room and Radar Simulator Training Room:	Beneath the RAPCON
(7)	Computer Room:	Beneath the RST
(6)	Radar Equipment Room:	Beneath the Computer Room
(5)	Communication Room:	Beneath the Radar Equipment Room
(4)	MOO and Training & Meeting Room:	Beneath the Communication Room
(3)	Extra Floor:	Beneath the MOO and Training & Meeting Rooms
(2)	ATS Office and Cafeteria:	Beneath the Extra Floor
(1)	Power Supply Room:	On the Ground Floor 272 m^2 (17m x 16m)

The proposed new tower will have 10 floors with VFR Control Cab atop the shaft. There will be an extra floor in the proposed tower shaft, which can be used for the future functional expendability. The tower is so designed that ATC functions are consolidated in (10) through (8), Telecommunication in (7) through (5) and others in (4) through (1). Clearances between each story can be adjusted, considering the functions of each facility, in order to accommodate 10 stories in the tower height of 34.0 m.

The provision of RAPCON right under VFR Control Cab with the additional provision of a Radar Simulator Training Room would enhance ATC's on-the-job training between VFR controllers and IFR controllers in the same tower shaft, which can be an ATC Training School. Thus, VFR controllers can easily have a chance to have IFR Control License and they can alternatively work in VFR Cab and IFR Room. This will make it available to utilize ATC man power to the efficient extent. It is very important to let them have a change of pace in working for their areas of responsibility, especially IFR controllers who are confined in a dark room. They should be able to come upto the light VFR Cab and see a configuration of aircraft movements at and around the airport which is directly conjunct with IFR Control.

The training and meeting room can be used for training other operational personnel and to hold meetings for setting up the course for aeronautical traffic services. Thus, with the provision of ATC Training School in conjunction with training and meeting room , an Aeronautical Training Center can be established, as DGAC desires, at minimum cost.

The space requirements of the control tower is preliminarily estimated as shown in Table H-01.

4. Accommodations and Equipment

The following are the requirements for accommodations and equipment in the control tower:

1) Aerodrome Control Cab:

- Consoles to house equipment and provide desk space of the same height are:
  a. Aerodrome Lighting Panels
  b. ILS Monitor Panels
  c. Telephone and Radio Selector Panels
  d. Brackets to hold Microphones and Telephone Handsets, etc.

  Aerodrome Lighting Control Panel should be incorporated in a separate desk. Consoles backed to the outer walls of the cab should open at the front for ease of maintenance.

- Wind Direction and Speed Indicators, Altimeter Readout Indicators, Light Guns and Clocks should be provided.

- An ATC Direct Speech system should be provided at the tower with major and intermediate activity.

- Windows require transparent, glare-proof shades which can be raised or lowered as needed.

- Convenient units, such as drinking water, hot-plate or small microwave oven and small refrigerator, should be provided to permit controllers to remain on the post while eating or drinking.

- Stairs leading up to the cab should be located farthest away from the cab operational areas in order to have the least impact on the cab's functional perimeter.

- Secured floor hatch (75 x 90 cm at minimum) should be provided in the cab floor with an electric mechanical hoist which permits hoisting heavy equipment between the cab and the top elevator landing. If the highest elevator level is not on the floor level immediately below the tower hatch, it should also be provided on an intermediate floor.

- In a tower with non-functional shafts, the levels between the base level and the next to last level normally serve only to add height to the tower shaft and to provide access to utility and elevator shafts at the various elevations. Space in these levels may be used for storage and other non-functional purposes.

2) Radar Approach Control:

- Approach Control units in the tower shaft or base building should be provided with a "drop tube" to send current Flight Progress Stripes on departures and arrivals to Approach Control position.

- The Approach Operation Room size is largely determined by the number of operating positions and radar consoles required or planned for the room.

- Wind Direction and Speed Indicators, Altimeter Readout Indicators and Clocks should be provided.

Where Approach Control is provided for one aerodrome only, the Approach Control Room is better accommodated within the control tower structure.

3) Other Required Rooms:

- The Radar Simulator Training Room should be located in the training area and close to or above the radar equipment room.

- A room for training and conference should be provided with the size adequate for number of operational personnel.

- In functional shaft facilities, the break room should be located under the cab. This room can be also used as the briefing room when controllers change their shifts. Allowance 2.5 m^2 should be provided per occupant but starting with a minimum size of 10 m^2.

- Recorder equipment is located in the communication room where access to cable ducts is facilitated. However, the equipment should be under direct control of a man in charge in order to keep the secrecy of recorded data.

- Space for technical equipment must be ample and as close as possible to its operational counterpart.

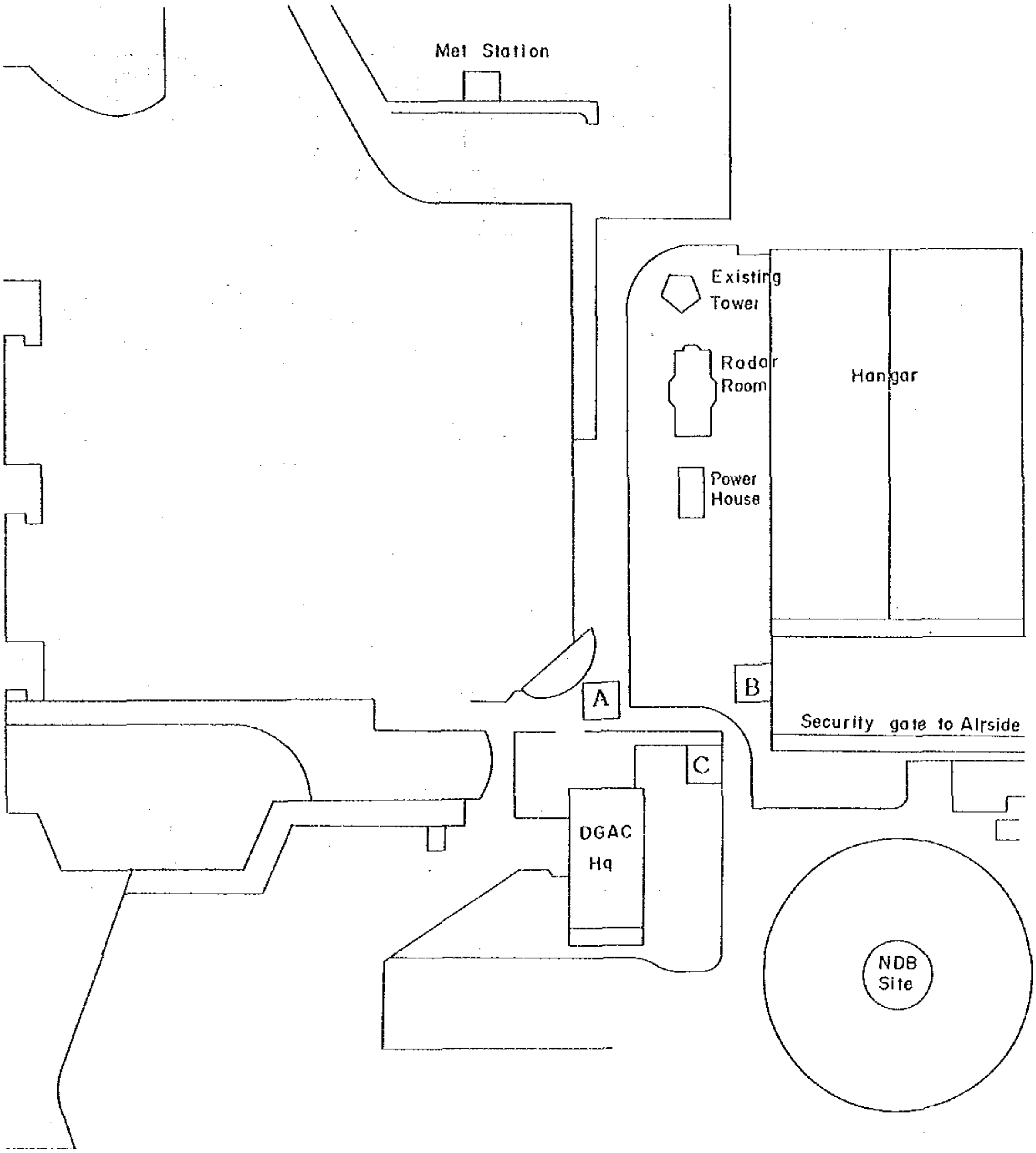
- Space for electronics equipment, including adequate cable length, is critical, as to temperature, in some cases, and the cleanliness of the room.

- Locker room should be so provided, adjacent to the rest or ready room.

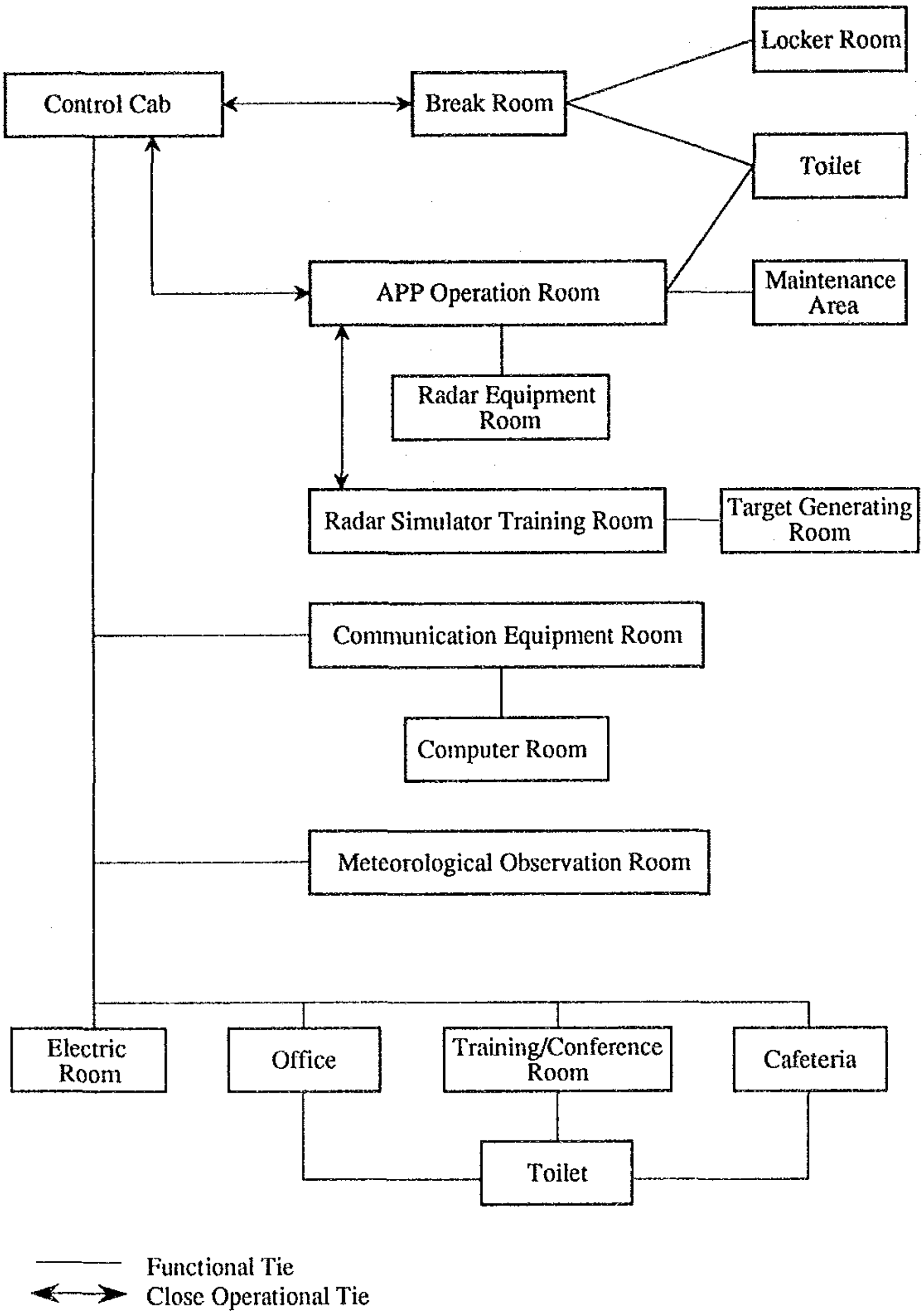
- Lavatories should be located near the approach operations room. However, they have to be located on the closest possible level below the cab.

Table H-01 Space Requirement - Control Tower

Room	Space Requirement
Control Cab	Octagonal in floor shape 7 x 7 m clear of control console
APP Operation Room	7 m x 7 m
Maintenance Area	3 m x 7 m
Radar Simulator Training Room	5 m x 3 m
Target Generating Room	5 m x 3 m
Radar Equipment Room	7 m x 7 m x 2
Communication Equip. Room	8 m x 10 m
Computer Room	7 m x 7 m
Meteorological Observ. Room	4 m x 4 m
Electric Room	
Break Room	20 m^2
Locker Room	8 m^2



DEVELOPMENT PROJECT OF LA AURORA AND SANTA ELENA AIRPORTS | Figure H – 1



FUNCTIONAL RELATIONS - CONTROL TOWER

DEVELOPMENT PROJECT OF LA AURORA AND SANTA ELENA AIRPORTS | Figure H-2

APPENDIX - I

LIST OF ELECTRIC FACILITIES

(LA AURORA and SANTA ELENA)

I.1 LIST OF EXISTING ELECTRIC FACILITIES: LA AURORA

Description	Q'ty	Manufacturer	Year of Installation	Location
1. Radio Navigationaids and Telecommunications				
Taperecorder	1	STANCIL-HOFFMAN	1976	Control Tower 2nd Floor
Electrical Power Supply	2	GENERAL ELECTRIC	1976	Control Tower 2nd Floor
PBX	1	GENERAL ELECTRIC	1976	Control Tower 2nd Floor
VHF TX 50 W	13	COMCO USA	1976	Control Tower 2nd Floor
UHF TX, RX Multi.	1			Control Tower 2nd Floor not using
Console	6		1976	VFR Room
Signal Lamp	2			VFR Room
VHF RX	16	COMCO USA	1978	Receiving Station
Engine Generator for emergency 7.5 kW, 9.4 kVA	1		1978	Receiving Station
RADAR ASR	1	ELECTRIC INDUSTRY Israel	1979	Antenna Site
RADAR SSR	1	CARDION ELECTRONICS Woodbury N.Y.	1979	Antenna Site
Scan Converter	1	RAYTHEON	1979	IFR Room
Remote Control Unit	1	ELTA	1979	IFR Room
Line Compensation Amplifier	1	CORDION ELECTRONICS Woodbury N.Y.	1979	IFR Room
Vidio Mapping Group	1	GENERAL TIME CORP. USA	1979	IFR Room
RADAR Console	1	LITEBEAM ISRAEL AIR-CRAFT INDUSTRY	1979	IFR Room
VHF TX, RX 50 W	6	TELERAD FRANCE	1987	Rabinal
DVOR/DME 100 W 1 kW	1	THOMSON CSF	1987	Rabinal

Description	Q'ty	Manufacturer	Year of Installation	Location
NDB 50 W	1	TELERAD FRANCE	1987	Rabinal
Engine Generator for emergency 30 kVA	1	DEUTZ	1987	Rabinal
Taperecorder	1	SYSTELEO RECORDER	1987	DGAC 3rd Floor
Re-producer	1	SYSTELEO RECORDER	1987	DGAC 3rd Floor
Control and Dispatching Unit	1	AE SIMPLEX France	1987	DGAC 3rd Floor
Telecommande Remote Control	1	THOMSON CSF	1987	DGAC 3rd Floor
Microwave Equipment	1		1987	DGAC 3rd Floor, Rabinal
VHF FM 100 W	2		1987	DGAC 3rd Floor
VHF AM TX, RX 50 W	3		1987	DGAC 3rd Floor
NDB	1	AEROCOM	1979	DGAC 3rd Floor
DVOR	1	RAYTHEON CANADA LTD.	1974	in Airport
DME	1	WILCOX	1979	in Airport
Localizer 2 Antennas	1	WILCOX	1979	in Airport
T-DME	1	WILCOX	1979	in Airport

2. Aeronautical Information Service (AIS)

Radioteletype	7	SIEMENS	1960	AIS Room in DGAC 1st flr.
Radioteletype	3	SAGEM France	1986	AIS Room in DGAC 1st flr.
Radioteletype	5	SIEMENS	1948	AIS Room in DGAC 1st flr.
Personnel Computer	1	LANE TELECOMMUNICA-TION INC.	1986	AIS Room in DGAC 1st flr.

Description	Q'ty	Manufacturer	Year of Installation	Location
3. Meteorological Equipment (INSIVUMEH)				
Teletype	4	OKI ELECTRONIC	1979	MET Room in DGAC 1st flr.
Facsimile via Satelite	1	AMCO ENGINEERING CO.	1979	MET Room in DGAC 1st flr.
Teletype	4		1979	MET field
HF TX, RX	1	SCIENTIFIC RADIO SYS. CO.	1979	MET field
VHF TX, RX 150 MHz FM	1		1979	MET field
Thermometer	1		1979	MET field
Barometer	1		1979	MET field
Hygrometer	1		1979	MET field
Anemometer	2		1979	MET field one of these is not used
4. Visual Navigation Aids				
VISI	2	CROUSE-HINDS	1979	in Airport
Simple Approach Lighting	38	REVERE ELECTRIC MFG. CO.	1979	in Airport
Obstacle Light	14	CROUSE-HINDS	1979	in Airport
Displaced Threshold Light runway 19	10	CROUSE-HINDS	1979	in Airport
Runway Threshold Light 01	14	CROUSE-HINDS	1979	in Airport
Runway End Light 01	5	CROUSE-HINDS	1979	in Airport
Runway Edge Light	149	CROUSE-HINDS	1979	in Airport
Taxiway Edge Light	209	CROUSE-HINDS	1979	in Airport
Rotating Obstacle Light	1	CROUSE-HINDS	1979	1.5 km approx. extension from airport
Aerodrome Beacon	1	CROUSE-HINDS	1979	in Airport

Description	Q'ty	Manufacturer	Year of Installation	Location
5. Regulator for Light				
30 kW CCR (Runway Edge Light)	2	HEAVY-DUTY ELECTRIC	1979	Regulator Room
7.5 kW CCR (VASI)	1		1979	Regulator Room
5 kW CCR (VASI)	1		1979	Regulator Room
7.5 kW CCR (Taxiway Edge Light)	1		1979	Regulator Room
6. Apron Flood Lighting				
1,500 W Halogen Lamp	15		1979	Terminal Bldg. Fingar
1,000 W Mercury Lamp	3		1979	Terminal Bldg. Fingar
175 W Mercury Lamp	29		1979	Terminal Bldg. Fingar
7. Apron Car Parking Area				
400 W Mercury Lamp	14		1979	Car Parking Area
175 W Mercury Lamp	3		1979	Car Parking Area
8. Electric Distribution (DGAC)				
Engine Generator for emergency 385 kVA	1	CATERPILLAR	1972	in the Substation
Secondary Terminal Board	1		1972	in the Substation
Secondary Magnet Switch	1		1972	in the Substation
Transformer 167 kVA	3		1972	in the Substation
Transformer 15 kVA	1		1972	in the Substation
9. Electric Distribution (Terminal Building Area)				
Transformer 1,000 kVA	1	SIEMENS	1972	Plant Room
High and Low Voltage Distribution Board	1 lot	SIEMENS	1972	Plant Room
125 kVA Engine Generator for	2	SIEMENS	1972	Plant Room

I.2 LIST OF PROPOSED ELECTRIC FACILITIES: LA AURORA

1) List of Radionavaids and Telecommunication Equipment
2) List of Airfield Lighting and Other Equipment

Remarks

DGAC has an alternative plan to install some of the electric equipment under separate arrangements. These equipments are marked in this list as follows:

1) * mark indicates the equipment similar, not necessarily the same, to the DGAC alternative.
2) Figures in parenthesis ( ) indicate the quantity of equipment contemplated by the DGAC alternative.
3) ° mark indicates the equipment required to be relocated if they are installed by the DGAC alternative.

1) Proposed Radionavaids and Telecommunication Equipment: La Aurora

Short-Term Improvement				Long-Term Improvement		
	Description		Q'ty	Description		Q'ty
1-1	Control Tower					
1-1-1	Equipment Room (Renew & New)					
*	a.	VHF TX AM dual	7 set (2)			
	b.	Antenna and coaxial cable for VHF TX	14 ea			
	c.	VHF Link and monitor	1 set			
*	d.	Taperecorder 24 H	1 set			
*	e.	Reproducer	1 set			
*	f.	Tape for Taperecorder	35 ea			
	g.	VHF AM Multichannel TX, RX	1 set			
	h.	PBX	1 set			
	i	NDB, VOR, DME Monitor	1 set			
	j.	Localizer Monitor	1 set			
				I.	MLS Monitor	1 set
1-1-2	VFR Room					
	a.	Local Control Console	1 set			
	b.	Ground control console	1 set			
	c.	En-route Control Console	1 set			
	d.	Flight Dat Console	1 set			
	e.	Supervisor Console	1 set			
	f.	Bright Display Panel	1 set			
	g.	NDB, VOR, DME Monitor	1 set			
	h.	Localizer Monitor	1 set			
				i.	MLS Monitor	1 set
*	j.	Meteorological Panel	1 set			
*	k.	Airfield Lighting Remote and Mimic Panel	1 set			
	l.	Signalling Lamp	2 ea			
	m.	Direct Phone and other equipment	1 lot			

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
1-2 VHF Receiving Station			
* a. VHF AM RX dual	7 set (2)		
b. Antenna and Coaxial Cable for VHF	14 ea		
c. Floating Power Supply Sys.	1 lot		
d. 7.5 kVA Engine Generator (re-location)	1 set		
1-3 ASR/SSR Emergency Plan			
1-3-1 ASR/SSR Site Equipment (Emergency			
a. Antenna Supporting Tower 15 m height	1 lot		
b. ASR/SSR Antenna	1 set		
c. Rotary Joint	1 lot		
d. ASR TX, RX dual	1 set		
e. SSR TX, RX dual	1 set		
f. Monitor display	1 set		
g. Electric Power Distribution Board	1 set		
h. Voltage Regulator	1 set		
i. CVCF and Battery	1 lot		
1-3-2 IFR Room (Emergency)			
Power Distribution Board	1 set		
Controller Console	2 set		
Assistant Console	1 set		
ASR Control Box	1 set		
1-3-3 Equipment and Computer Rooms (Emergency)			
DSP Rack CH-A	2 set		
DSP Rack CH-B	2 set		
MT Rack	1 set		
TTY	1 set		
System Console	1 set		
Power Supply Equipment	1 set		
TX/RX Control Rack A	1 set		

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
TX/RX Control Rack B	1 set		
Bright Display System	2 set		
		1-3-4 VOR/DME, NDB in airport (Renew)	
		* a. D-VOR/DME/ATIS	1 set
		b. 5 kVA Engine Generator	1 set
		* c. Shelter for above	1 set
		d. NDB	1 set
		1-3-5 Localizer/Terminal DME (Renew)	
		a. Localizer dual	1 set
		b. Terminal DME	1 set
		c. Antenna for LLZ, DME	2 set
1-3-6 Off Aerodrome Radio Facility (New)			
The site will be located at 7.96 km extension from runway 01 threshold.			
a. D/VOR/DME dual	1 set		
b. NDB 50 W	1 set		
c. NDB Antenna	1 set		
d. VHF Link	1 set		
e. Electric Power Distribution Facility	1 set		
f. 15 kVA Engine Generator	1 set		
g. Shelter for above	1 set		
		1-4 MLS (Microwave Landing System)	
		a. MLS Basic Type AZ, EL and P-DME	1 set

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
		*1-5 AIS (Aeronautical Information Service)	
		Automatic Teletype Message Switching System	
		a. Front End Processor Subsystem	1 lot
		b. Central Processor Subsystem	1 lot
		c. Network Subsystem	1 set
		d. Terminal Control Subsystem	1 set
		e. System Console	1 set
		f. Line Printer	1 lot
		g. CRT Terminal Printer	2 set

2) Proposed Airfield Lighting and Other Equipment: La Aurora

	Short-Term Improvement			Long-Term Improvement	
	Description	Q'ty		Description	Q'ty
	2. Airfield Lighting				
*	a. PAPI (Precision Approach Path Indicator)	2 set			
*	b. HIRL (High Intensity Runway Edge Light) 200 W Clear/Clear	60 ea			
*	c. Ditto 200 W Clear/Yellow	40 ea			
*	d. RWTL (Runway Threshold Light) 200 W Green	28 ea			
*	e. REL (Runway End Light) 100 W Red	12 ea			
*	f. OREL (Overrun End Light) 100 W Red	10 ea			
	g. RWCL (Runway Centerline Light)	99 ea			
	h. SALS (Simple Approach Lighting System) 200 W	51 ea			
	i. TWL (Taxiway Edge Light) 45 W Blue	200 ea		i. TWL (Taxiway Edge Light) 45 W Blue	200 ea
	j. TWCL (Taxiway Centerline Light)	60 ea		j. TWCL (Taxiway Centerline Light)	60 ea
	k. TGS (Taxing Guidance Sign)	5 ea		k. TGS (Taxing Guidance Sign)	5 ea
	l. DML (Distance Marker Light)	18 ea			
*	m. RTIL (Runway Threshold Identification Light) 500 W	2 ea			
*	n. WDIL (Wind Direction Indicating Light)	2 ea (1)			
	o. ABN (Aerodrome Beacon)	1 ea			
	p. Isolating Transformer	1 lot			
	q. FLD (Apron Flood Lighting)			q. FLD (Apron Flood Lighting)	
	20 M height	2 ea		20 M height	1 ea
	15 M height	4 ea		15 M height	11 ea
	10 M height	10 ea	*	10 M height	11 ea (2)
	r. Power Distribution Board	1 lot		r. Power Distribution Board	1 lot
	s. Single Core Cable	1 lot		s. Single Core Cable	1 lot

Short-Term Improvement			Long-Term Improvement		
	Description	Q'ty		Description	Q'ty
t.	CCR (Constant Current Regulator)		t.	CCR (Constant Current Regulator)	
*	30 kVA	4 ea (2)		15 kVA	1 ea
	20 kVA	3 ea			
*	5 kVA	2 ea			
	Switchover Panel	1 ea			
	Logical Console Panel	1 ea			
	Local Control Console	1 ea			
o*	Remote Control Console	1 ea			
u.	Conduit Tube 2"	1 lot			
			u.	Conduit Tube 2"	1 lot
v.	Electric Power Distribution Panel	1 lot			
w.	Temporary Lighting System	1 lot			
2.	Electric Power Distribution of Civil Aeronautical Portion (DGAC)				
a.	High Voltage Distribution Panel	1 set			
b.	Transformer 3 x 250 kVA, 13.2 kV, 120 V/240 V, 3 ø	3 ea			
c.	Transformer 240/2,400 V	2 ea			
d.	Low Voltage Distribution Panel	3 ea			
e.	450 kVA Engine Generator	1 set			
f.	Transfer Switch	1 ea			
g.	480 Liters Daily Tank	1 ea			
h.	18,000 Liters Main Tank	1 ea			

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
*3. Meteorological Equipment in Airport		*3. Meteorological Equipment in Airport	
a. Thermometer	1 ea		
b. Barometer	1 ea		
c. Hygrometer	1 ea		
d. Anemometer	1 set		
e. Data Collection Console in Observation Office	1 lot		
f. Re-location existing VHF and HF	1 lot		
		* g. Ceilometer	1 set
		* h. RVR (Runway Visual Range)	1 set

I.3 LIST OF EXISTING ELECTRIC FACILITIES: SANTA ELENA

Description	Q'ty	Manufacturer	Year of Installation	Location
1. Radio Navigationaids and Telecommunications				
Taperecorder 24 H	1	CALMAQUIP USA	1982	Control Tower
Control for DME	1	TELECOMANDE THOMSON CSF	1982	Control Tower
VHF TX 30 W	4	AEROCOM	1982	Control Tower
VHF TX 50 W	8	AEROCOM	1982	Control Tower
Microwave TX, RX MUX	1	ALCATEL THOMSON	1982	Control Tower
Rectifier	1	AE SIMPLEX France	1982	Control Tower
Teletype	2		1982	VFR Room
Righting Control	1		1982	VFR Room
NDB Monitor	1		1982	VFR Room
Local Control Console	1		1982	VFR Room
VOR Monitor	1		1982	VFR Room
Ground Control Console	1		1982	VFR Room
Position 3 Console	1		1982	VFR Room
Signal Lamp	1		1982	VFR Room
VHF RX	12	COLMAQUIP USA	1982	Receiving Station
NDB 50 W	1	WILCOX	1982	in Airport
VOR	1	WILCOX ELECTRIC INC.	1982	in Airport
DME	1	THOMSON CSF	1987	in Airport
7 kVA Engine Generator	1	LORAIN PRODUCTS CORP.	1987	in VOR/DME House
Control Unit	1	ASIMPLEX	1987	in VOR/DME House
Teletype (AIS)	1		1982	Terminal Area

Description	Q'ty	Manufacturer	Year of Installation	Location
Direct phone between Control Tower	1		1982	Terminal Area
2. Meteorological Equipment (INSIVUMEH)				
Field sensor	1 lot		1982	in Airport
3. Visual Navigationaids Description				
VASI	2	SEPCO	1982	in Airport
Runway Threshold Light	12	CROUSE-HINDS	1982	in Airport
Runway Edge Light	96	CROUSE-HINDS	1982	in Airport
Taxiway Edge Light	50	CROUSE-HINDS	1982	in Airport
Aerodrome Beacon	1	CROUSE-HINDS	1982	in Airport
Inset Type Light 200 W	2	CROUSE-HINDS	1982	in Airport
CCR 20 kW	2	CROUSE-HINDS	1982	Regulator Room
CCR 7.5 kW	2	CROUSE-HINDS	1982	Regulator Room
4. Electric Distribution Facilities				
Transformer 25 kVA	3		1982	on the electric pole of substation No. 1
188 kVA Engine Generator for emergency	1	CATERPILLAR ELECTRIC SET	(1967)	Sub-station No. 1
Transformer 37.5 kVA	3		1982	Sub-station No. 2
Distribution Board	3		1982	Sub-station No. 2
Transformer/regulator 30 kVA	3		1982	Sub-station No. 2
Transformer 15 kVA	1		1982	Sub-station No. 3
Transformer 25 kVA	1		1982	Sub-station No. 4
Transformer 15 kVA	1		1982	Sub-station No. 4
Transformer 15 kVA	1		1982	VOR Hut
7.5 kVA Engine Generator	1		1982	old NDB site

I.4 LIST OF PROPOSED ELECTRIC FACILITIES: SANTA ELENA

Remarks

DGAC has an alternative plan to install some of the electric equipment under separate arrangements. These equipments are marked in this list as follows:

1) * mark indicates the equipment similar, not necessarily the same, to the DGAC alternative.
2) Figures in parenthesis ( ) indicate the quantity of equipment contemplated by the DGAC alternative.

I-4 List of Proposed Electric Facilities: Santa Elena

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
		1. Radionavaids and Telecommunications	
		1-1 Control Tower	
		1-1-1 Equipment Room	
		a. VHF TX AM dual	6 ea
		b. Antenna and coaxial cable for VHF TX	12 ea
		c. VHF AM TX, RX Multichannel	1 ea
		d. Re-location of existing self stand steel tower with microwave antenna	1 ea
		f. Taperecorder 24H	1 ea
		g. Reproducer	1 set
		h. Tape for Taperecorder	1 lot
		i. VOR/DME remote control equipment	1 set
		j. Floating Power Supply System	1 set
		1-1-2 VFR Room	
		a. Local Control Console	1 set
		b. Ground Control Console	1 set
		c. Supervisor Console	1 set
		d. Airfield Lighting Remote Console	1 set
		e. Meteorological Panel	1 set
		f. NDB, VOR/DME, MLS Monitor	1 lot
		g. Signalling lamp	2 ea
		h. Teletype	2 ea
		i. Direct Phone and other equipment	1 lot

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
		1-2 VHF Receiving Station	
		a. VHF AM RX dual	6 ea
		b. Antenna and coaxial cable for VHF	12 ea
		c. Floating Power Supply System	1 set
1-2 VHF Receiving Station (EMERGENCY PLAN)			
d. 7.5 kVA Engine Generator with shelter	1 set		
		e. Self stand steel tower for VHF and ABN	1 lot
1-3 VOR/ATIS			
a. Taperecorder	1 set		
b. Reproducer	1 set		
		1-4 MLS (Microwave Landing System)	
		a. MLS basic type AX, EL and P-DME	1 lot
		2. Airfield Lighting	
		a. ABN (Aerodrome Beacon)	1 ea
		b. PALS (Precision Approach Lighting System) 200 W	120 ea
		* c. SALS (Simple approach Lighting System) 200 W	51 ea
d. PAPI (Precision Approach Path Indicator) 4 units/200 W x 3	2 set)		
		* e. HIRL (High Intensity Runway Edge Light) 200 W	96 ea
		* f. RWTL (Runway Threshold Light) 200 W Green	12 ea
		* g. REL (Runway End Light) 100 W Red	12 ea
		* h. OREL (Overrun End Light) 100 W Red	10 ea
		* i. RTIL (runway Threshold Identification Light)	2 ea
		j. DML (Distance Marker Light)	18 ea

Short-Term Improvement		Long-Term Improvement	
Description	Q'ty	Description	Q'ty
		* k. TWL (Taxiway Edge)	230 ea (118)
		l. TWCL (Taxiway Centerline Light)	20 ea
		m. TGS (Taxing Guidance Sign)	8 ea
		* n. WDIL (Wind Direction Indicating Light)	2 ea (1)
		o. AFL (Apron Flood Light)	
		15 M height	4 ea
		10 M height	6 ea
		p. CCR (Constant Current Regulator)	
		25 kVA	3 ea
		20 kVA	3 ea
		15 kVA	2 ea
		5 kVA	2 ea
		q. Switchover Panel	1 ea
		r. Logical Control Panel	1 ea
		s. Local Control Console	1 ea
		t. Remote Control Console	1 ea
		u. Conduit Tube 2"	1 lot
		v. Temporary Lighting	1 lot
		*3. Meteorological equipment	
		a. Thermometer	1 ea
		b. Barometer	1 ea
		c. Hygrometer	1 ea
		d. Anemometer	1 ea
		e. Ceilometer	1 set
		f. RVR (Runway Visual Range Indicator)	1 set
		g. Observation Office Facility	1 lot

Short-Term Improvement				Long-Term Improvement	
	Description		Q'ty	Description	Q'ty
4.	Secondary Power Supply (Emergency Plan)				
*	a.	250 kVA 60 Hz Engine Generator	1 set		
*	b.	480 Liters Daily Tank	1 ea		
*	c.	10 k Litters Main Tank	1 ea		
	d.	Automatic Switchover Board	1 set		

APPENDIX - J

EXTENT OF CRACKS ON RUNWAY PAVEMENT

(SANTA ELENA AIRPORT)

EXTENT OF CRACKS ON RUNWAY PAVEMENT
(SANTA ELENA AIRPORT)

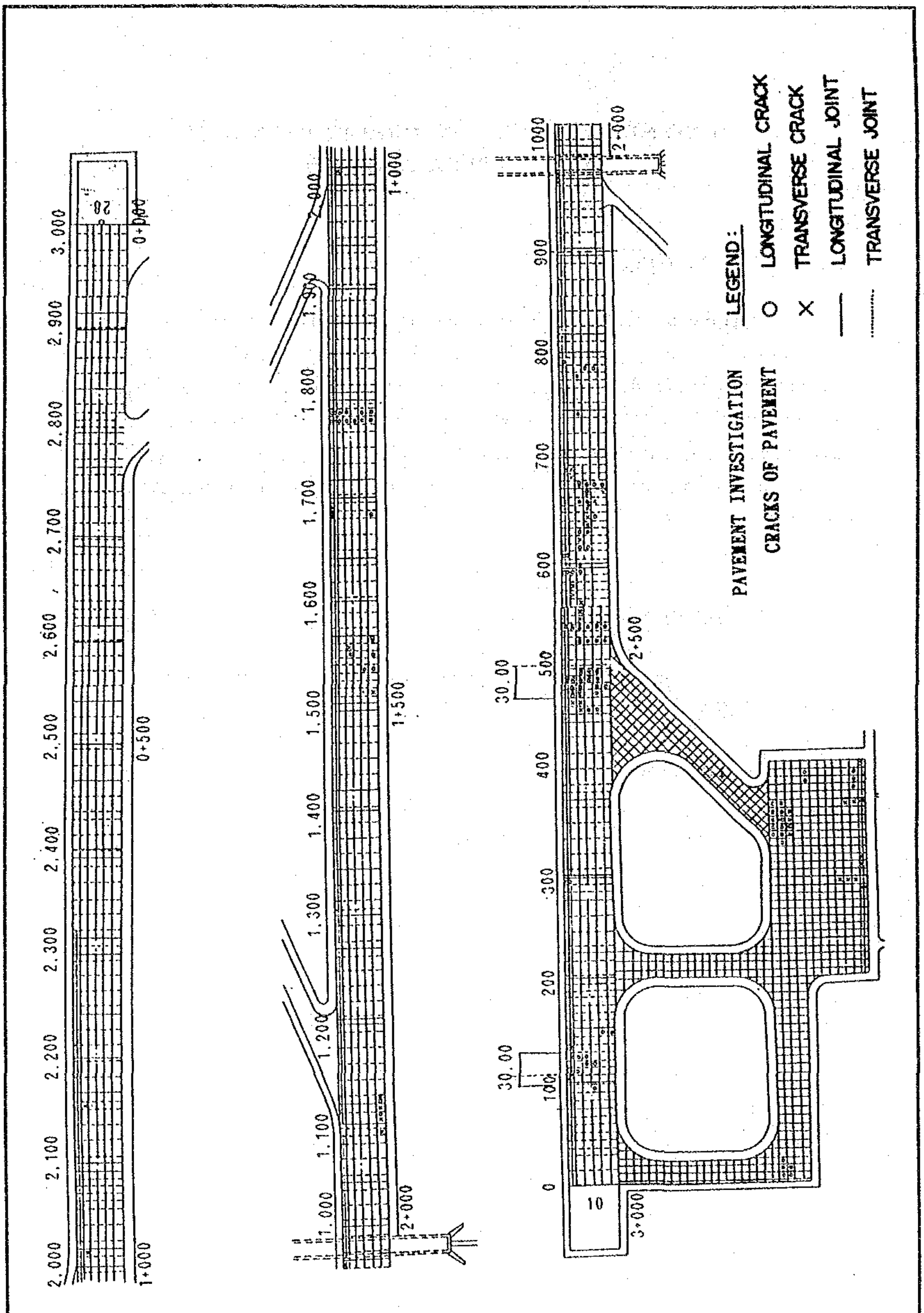
1. Field Investigation

Santa Elena airport is a relatively new airport completed in 1981. The runway, taxiways and apron are paved by concrete slabs of 30 cm in thickness, designed for operation of medium sized jet aircrafts. Cracks in the concrete have been observed in recent years. To work out a remedy measure, the Study Team carried out field investigations, including a general survey and detailed investigations of selected areas (30 m x 21 m) where cracks, deterioration of joint fill and settlement of concrete slabs are outstandings.

2. General Survey of Cracks

The Concrete slabs affected by cracks on the runway and taxiways and apron are shown in Figure F-1.

The cracks have not appeared uniformly but locally. On the runway, they are outstanding in the sections of 100 ~ 150 m and 450 m ~ 700 m from the Runway 01 threshold; on the taxiways, at the south-west corner; and on the apron, at the junction with the taxiway at the north-east corner.



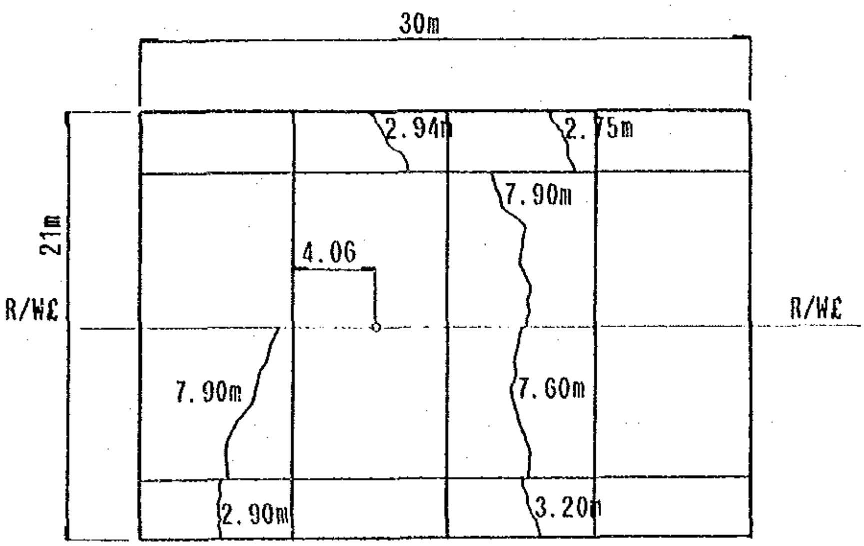
DEVELOPMENT PROJECT OF LA AURORA AND SANTA ELENA AIRPORTS | Figure J-1

3. Detailed Investigations

Two slabs, each having an area of 30 m x 21 m, have been selected for detailed investigation; one at STA. 0 + 88.4 ~ 118.44 and the other at STA. 0 + 470 ~ 500, where cracks, deterioration of joint fill and settlement of slabs have been recorded.

3.1 STA. 0 + 88.44 ~ STA. 0 + 118.44

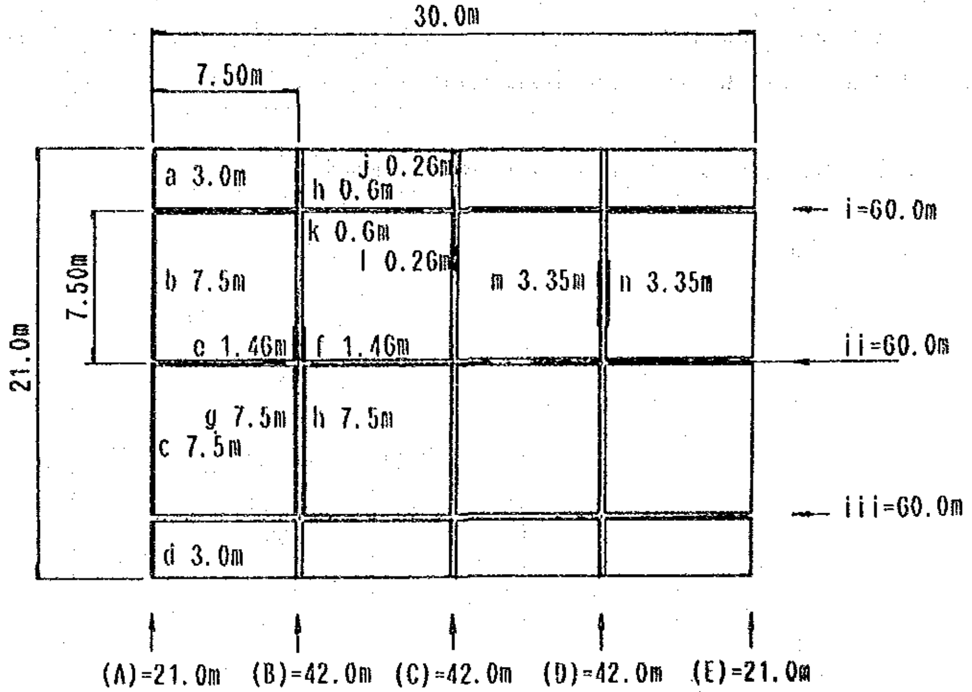
(1) Cracks



Crack ratio:

$$CR\ (cm/cm^2) = \frac{294 + 275 + 790 + 790 + 760 + 290 + 320}{21 \times 30} = 5.586$$

(2) Deterioration of joint fill



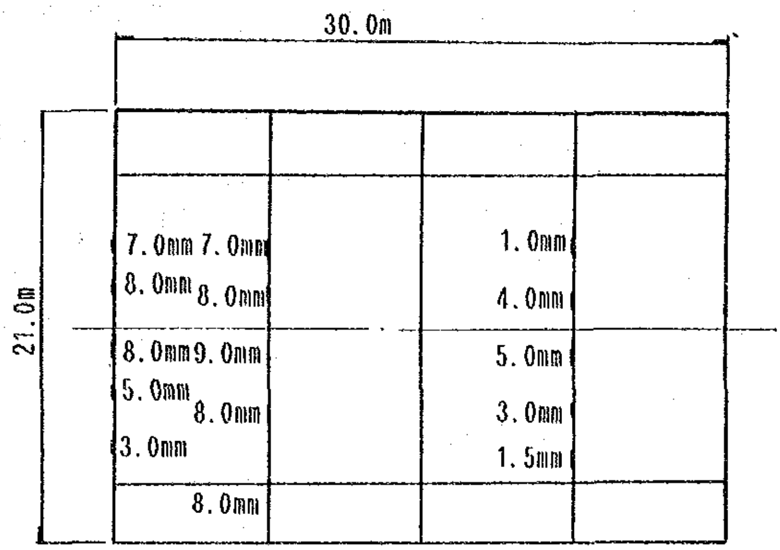
Total length of deteriorated joint fill (a ~ n) : 47.34 m

Total length of joint fill (A ~ F, i ~ iii) : 348.0 m

Joint deterioration rate:

JDR = 47.34/348.0 x 100 = 13.60%

(3) Settlement of slabs



Max. settlement:

SV = 9 mm

(4) Evaluation

The quality of pavement is evaluated by the "Pavement Rehabilitation Index" which is calculated by the following equation:

$$PRI = 10 - 0.290\ CR - 0.296\ JDR - 0.535\ SV$$

where,	PRI	:	Pavement rehabilitation index
	CR	:	Crack ratio (cm/m^2)
	JDR	:	Joint deterioration rate (%)
	SV	:	Settlement value (max.) (mm)

Applying the foregoing CR (5.586 cm/m^2), JDR (13.60%) and SV (9.0 mm), the PRI is obtained as follows:

$$PRI = 10 - 0.290 \times 5.586 - 0.296 \times 13.60 - 0.535 \times 9.0 = -0.461$$

The PRI indicates the urgency of repair work of a specific area according to its value as shown below:

	PRI Category		
	A	B	C
Runway	≥ 7.0	3.7 ~ 7.0	< 3.7

A : No repair work required
B : Early repair work required
C : Urgent repair work required

As the PRI in this area is classified under the Category C, urgent repair work is required.

(5) Repair works

Requirement for repair work on each defect (cracks, deterioration of joint fill and settlement of slabs), can also be indicated by the foregoing CR, JDR and SV values as shown below:

	Defect Index	Category		
		A	B	C
Runway	CR	≤ 0.2	0.2 ~ 5.6	> 5.6
	JDR	≤ 0.1	0.1 ~ 1.3	> 1.3
	SV	≤ 5	5 ~ 10	> 10

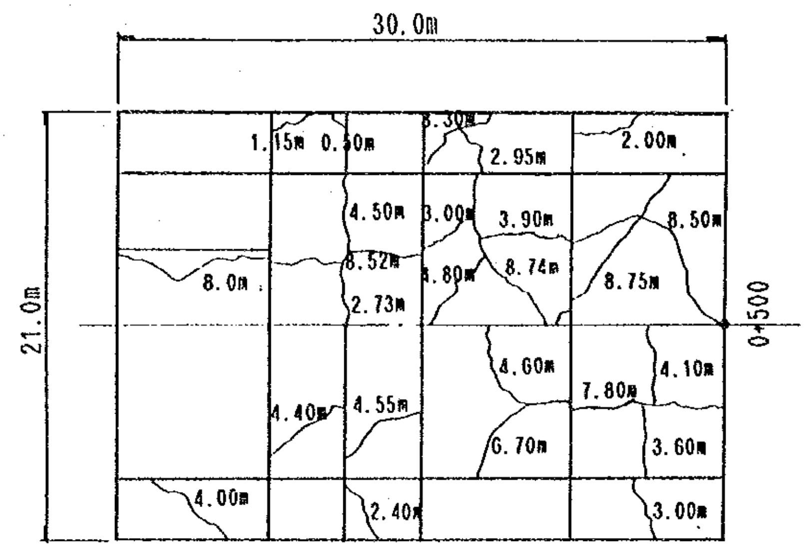
A : No repair work required
B : Early repair work required
C : Urgent repair work required

Referring to the above table, the urgency of repair work in this specific are is found to be as follows:

Defect	Category	Repair Work
Crack	B	Early repair work required
Joint	C	Urgent repair work required
Settlement	B	Early repair work required

3.2 STA. 0 + 470 ~ STA. 0 + 500

(1) Cracks



Crack ratio:

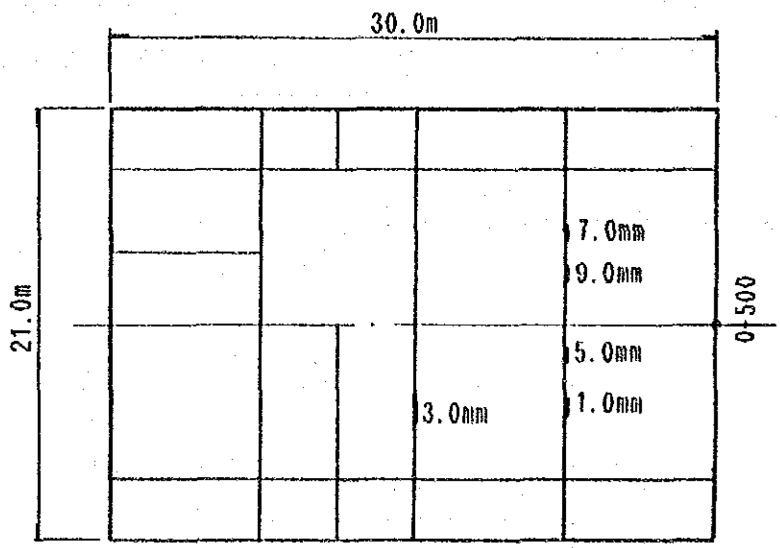
$$CR = (800 + 400 + 115 + 50 + 450 + 852 + 273 + 440 + 455 + 240 + 330 + 295 + 300 + 390 + 480 + 874 + 460 + 670 + 200 + 850 + 875 + 410 + 780 + 360 + 300) / 21.0 \times 30.0$$

$$= 11{,}649 / 21.0 \times 30.0 = 18.49 \text{ cm/m}^2$$

(2) Deterioration of joint fill

No deterioration was observed in the joint fill.

(3) Settlement of slabs



Max. settlement:

SV = 9.0 mm

(4) Evaluation

In the same way as the preceding section, the PRI in this area is assessed to be as follows:

PRI = -0.177

As this value is classified under Category C, an urgent repair work is required.

(5) Repair works

The CR, JDR and SV values in this area are calculated to be 18.49 cm/m^2, 0% and 9 mm, respectively. The requirement for repair work on specific defects is evaluated to be as summarized below:

	Category	Repair Work
Crack	C∠1	Urgent repair work required
Joint	A	No repair work required
Settlement	B∠2	Early repair work required

∠1 : Although makeshift repair works have been done on the cracks, demolition and re-casting concrete is recommended as most of the cracks are substantial cracks reaching the subgrade.

∠2 : As the settlements are supposed to have been caused by the cracks in the concrete, demolition and re-casting of concrete at an early time is recommended.

APPENDIX - K

AIR ROUTE

BETWEEN LA AURORA AND SANTA ELENA

AIR ROUTE BETWEEN LA AURORA AND SANTA ELENA

It is proposed to establish an ATS route, on protected airspace, between La Aurora and Santa Elena. The procedures applied in the proposed ATS are briefly explained herein.

1. Criteria on Establishment of ATS Routes

The criteria currently applied by Japan Civil Aviation Bureau (JCAB), "The Criteria on Establishment of ATS Route; February 26, 1978" has been basically adopted, with some modifications. (This JCAB criteria was derived from ICAO, Annex 10.) The JCAB criteria is reproduced and attached hereto.

For the application in establishing ATS route between La Aurora and Santa Elena, following route width and distance from VOR are applied:

a) Width of Route : 5 NM
b) Distance from VOR : 57 NM
c) Distance of more than 114 NM (Figures 8 through 11)

Further, out of the cases shown in the reproduced JCAB criteria, combination of Case 1.A (Figure 3), Case of 1.B.a. (Figure 5), Case of 1.B.b - portion 1 (Figure 7), Case of 2.A (Figure 9), and Case of 2.B - portion 2 (Figure 11) has been utilized.

2. Track Separation

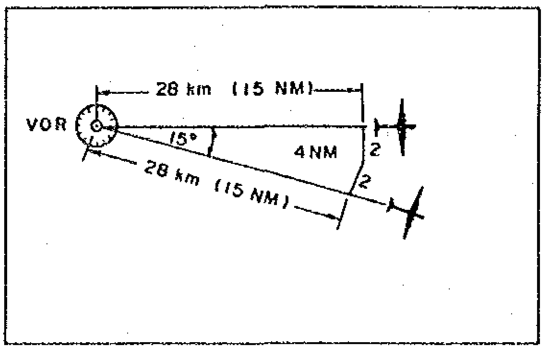
In the airspace beyond Coban Intersection which is under the jurisdiction of Central American ACC, aircrafts fly at VMC altitude separation of 500 ft inbetween low IFR altitude separation of 1,000 ft on the Route A-770. The separation between Route A-770 and Route R-630 which uses RAB VOR as the element Navaids, is 33 degree. Inbetween these routes, RAB radial 016 can be established as a route. Track separation between aircrafts will follow the ICAO rules. Tracks are separated by a minimum value appropriate to the navigation aid, or by the method employed as follows:

a) VOR : at least 15 degrees and at a distance of 28 km (15 NM) or more from the facility (See Figure below)

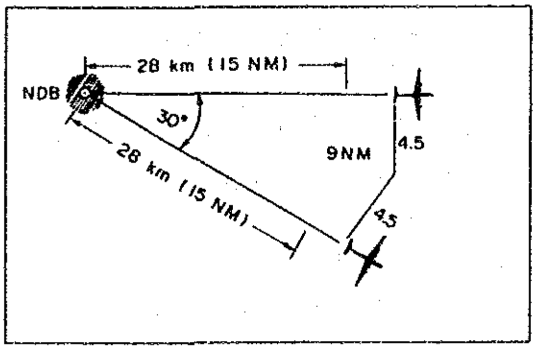
b) NDB : at least 30 degrees and at a distance of 28 km (15 NM) or more from the facility (See Figure below)

c) DR (Dead Reckoning) : tracks diverging by at least 45 degrees and at a distance of 28 km (15 NM) or more from the point of inversection of the tracks, this point being determined either visually or by reference to a navigational aid (See Figure below)

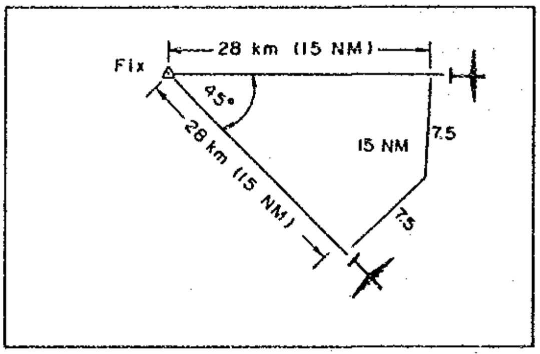
VOR



NDB



DR



These specifications are so set as to establish a lateral separation between 2 aircraft using the same navaids in the case of;

VOR: 4 NM NDB: 9 NM DR: 15 NM

Since the proposed route using RAB VOR is 10 NM in width (5 NM on both sides of the route centerline) and set at 16 degrees separation from Route A-770 and 17 degrees from Route R-630, track separation is established at a distance of 17 NM from RAB VOR.

On this track, RAB R-016, a compulsory fix will be established within La Aurora TMA at 35 NM distance from RAB in the same manner as COBAN and Minas, and the RAB R-016 will be extended straight beyond the TMA boundary so as to easily intersect the radial from FLO VOR, in view of the receptionability of FLO VOR. Over this intersection a compulsory reporting point will be provided.

In order to provide the protected airspace for a proposed air route separated from the existing routes, the route width of 5 NM is better provided on both sides of the route centerline. Thus, the radial route direction from FLO VOR is so recommended as to provide the separation from the Route A-770 and R-630. The prospected route distance is estimated to be 160 NM.

3. Recommended Route

The route direction from FLO VOR is thus recommended to be radial of FLO VOR as to provide the separation from the routes A-770 and R-630. The prospected route distance can be as shortest as possible and estimated to be 160 NM. The route structure is proposed as shown in Figure K-01.

Along this route, the following specifications should be defined and promulgated in AIP:

a. MEA (Minimum Enroute Altitude):

11,000 ft between RAB VOR (RNB NDB) and LA ISLA (Tentative name)
3,000 ft between FLO VOR (FRS NDB) and LA ISLA

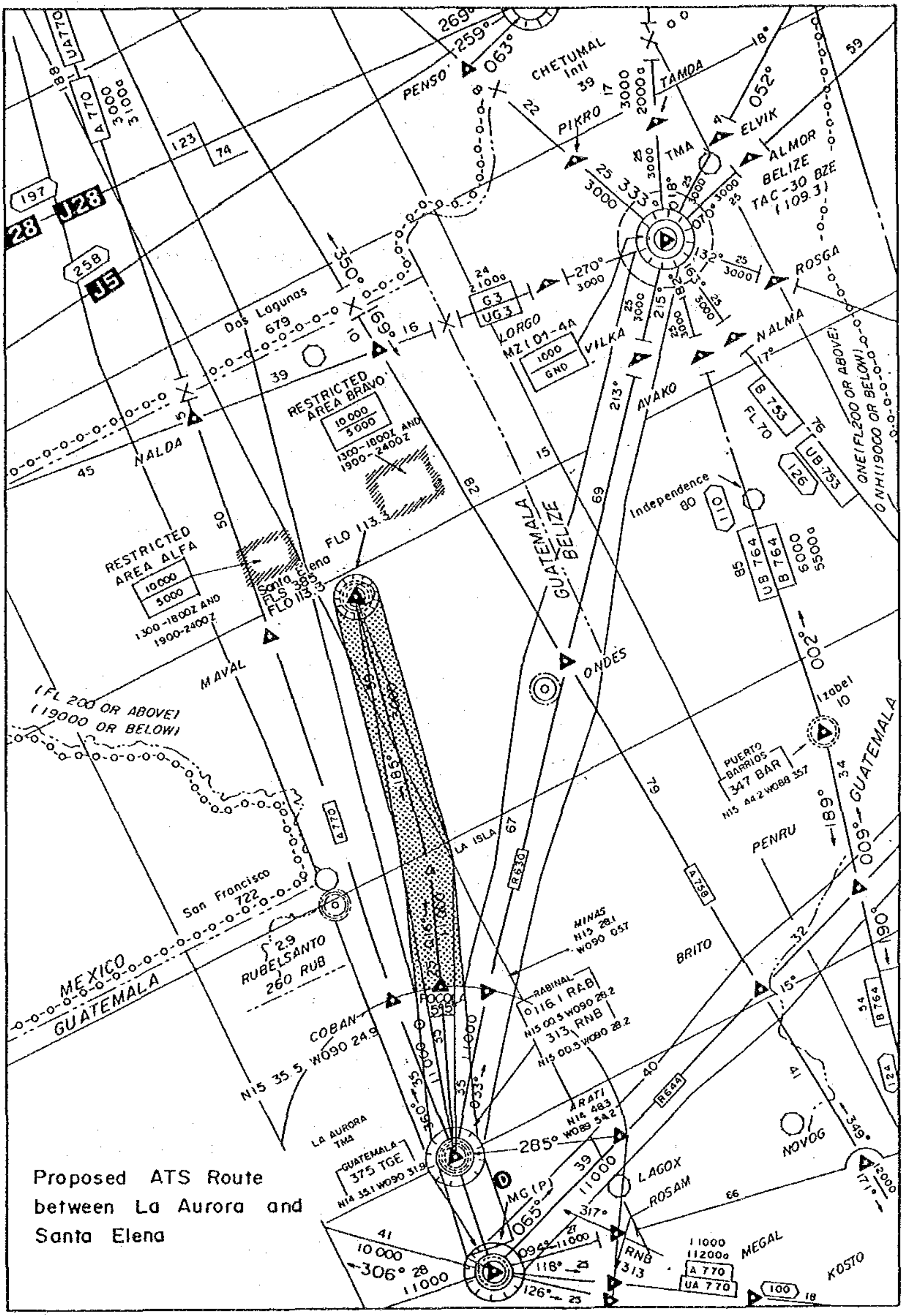
b. MCA (Minimum Crossing Altitude):

8,000 ft or above at the fix 40 NM from RAB VOR/DME
11,000 ft at the fix 26 NM from RAB VOR/DME

c. MRA (Minimum Reception Altitude):

On the portion between FLO (FRS) and LA ISLA at 3,000 ft, signals of FLO (FRS) are assumably receivable at LA ISLA, and the portion between RAB (RNB) and LA ISLA at 8,000 ft or above, signals of RAB (RNB) are assumably receivable. However, a flight check is needed.

d. COP (Change Over Point): LA ISLA



DEVELOPMENT PROJECT OF LA AURORA AND SANTA ELENA AIRPORTS	Figure K-01

ATS ROUTES DEFINED BY TWO VORS
(JCAB CRITERIA)

1. ATS Route with a distance of 92 NM or less between VORs

A. When COP is established at the midpoint between VOR. (Figure 1, 2 and 3)

The protected airspace encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline.

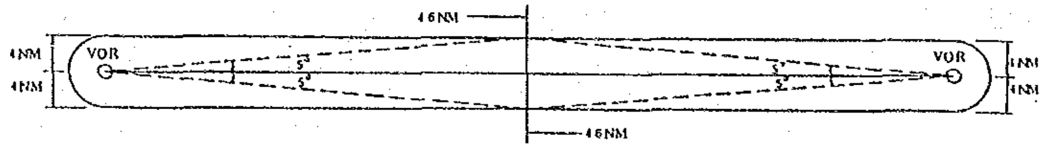


Figure-1

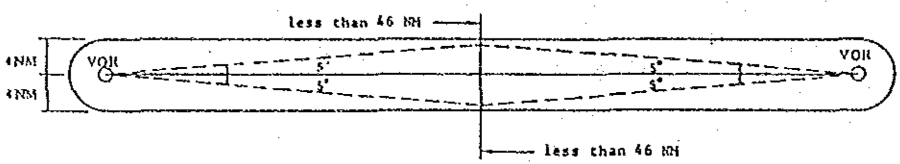


Figure-2

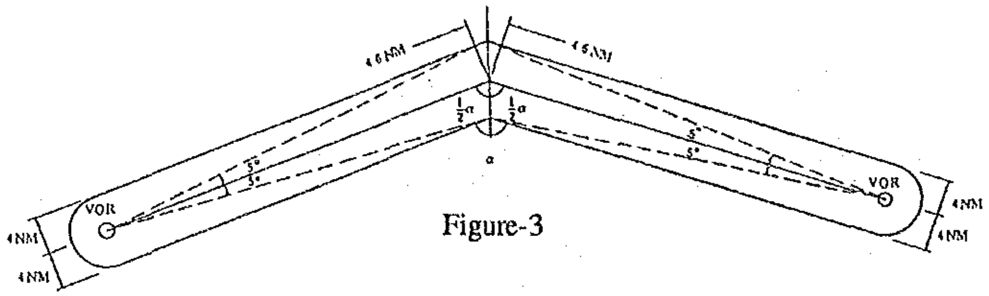


Figure-3

B. When COP is not established at the midpoint between VORs

a. When the distance on each side between COP and VORs is 46 NM or less (Figure 4 and 5)

The protected airspace encompassed by the lines of 4 miles, on both sides, from and parallel to the centerline.

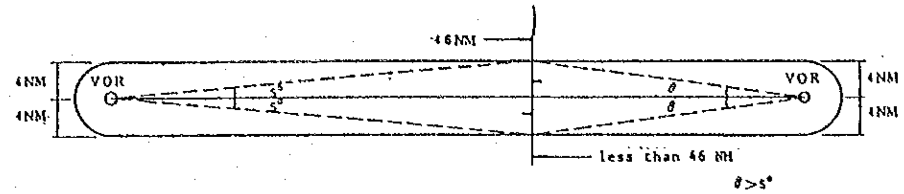


Figure-4

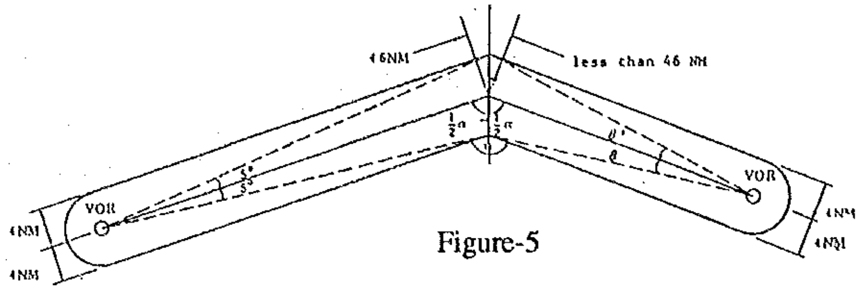


Figure-5

b. When a distance on either side between COP and VORs is more than 46 NM (Figures 6 and 7)

<u>Portion 1</u>

The protected airspace on the side of longer coverage in distance between VOR and COP;

Air space encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline to a distance of 46 NM from the VOR, and thereafter diverging at a 5 degree-angle to both points perpendicular to the route centerline where a COP is to be established.

<u>Portion 2</u>

The protected airspace on the side of shorter coverage in distance between VOR and COP;

Airspace encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline and airspace encompassed by the lines of both sides connecting the VOR of the shorter coverage and both points where the route-width at the COP is determined by the portion 1.

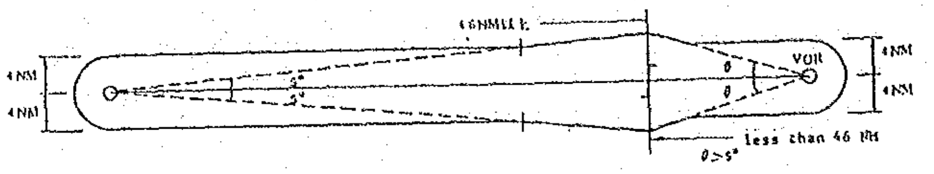


Figure-6

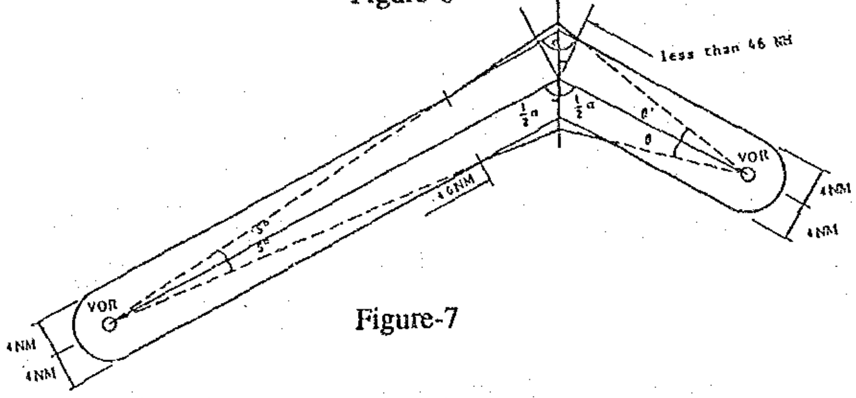


Figure-7

2. ATS Route with a distance of more than 92 NM between VORs

A. When COP is established at the midpoint between VORs (Figure 8 and 9)

The protected airspace encompassed by the line of 4 NM, on both sides, from and parallel to the route centerline to a distance of 46 NM from both VORs, and thereafter diverging at a 5 degree-angle to both points perpendicular to the route centerline where a COP is to be established.

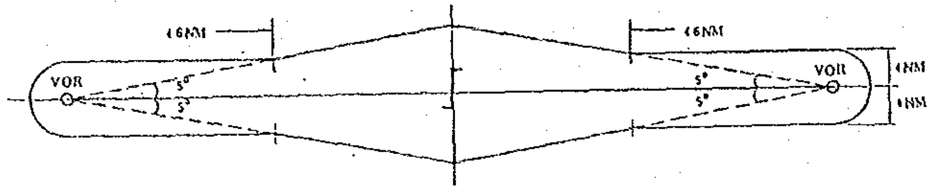


Figure-8

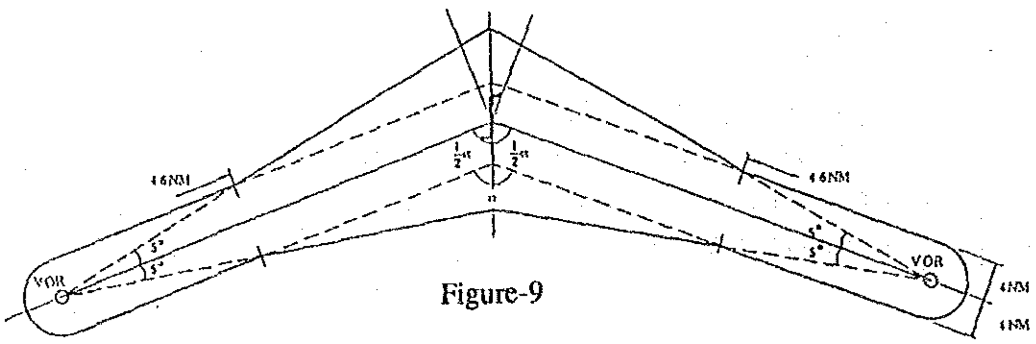


Figure-9

B. When COP is not established at the midpoint between VORs (Figure 10 and 11)

Portion 1

The protected airspace on the side of longer coverage in distance between VOR and COP;

Air space encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline to a distance of 46 NM from the VOR, and thereafter diverging at a 5 degree-angle to both points perpendicular to the route centerline where a COP is to be established.

Portion 2

The protected airspace on the side of shorter coverage in distance between VOR and COP;

Airspace encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline and airspace encompassed by the lines of both sides connecting the VOR of the shorter coverage and both points where the route-width at the COP is determined by the portion 1.

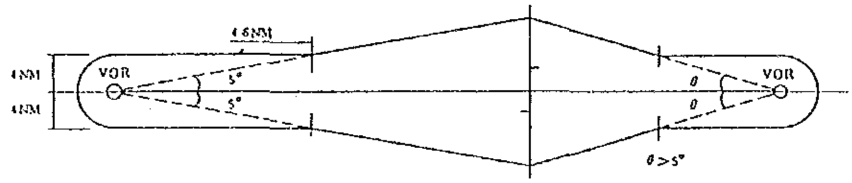


Figure-10

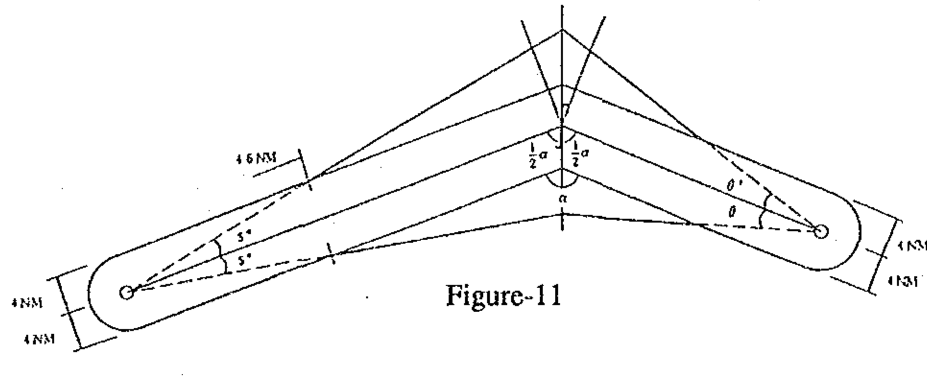


Figure-11

APPENDIX - L

CONSTRUCTION COST ESTIMATE

(LA AURORA AND SANTA ELENA)

List of Tables

Table L-01 Prices of Basic Construction Materials (As of August, 1989)

(Unit: Quetzales)

Item	Unit	Price
Reinforcing bars, plain	100 lb	67
Reinforcing bars, deformed	100 lb	77
Galvanized steel pipe, ø32 x 6 m	ea	62
Shaped steel, L-25 x 25 x 3 x 6 m	ea	20
Portland cement	40 kg	8
Coarse aggregate	cu.m	35
Sand	cu.m	16
Job-mixed concrete, 240 kg/sq.cm	cum.	137
Ready-,mixed concrete	cu.ft	4.1
Concrete masonry block 140 thick	1,000 pcs	900
Pavement block, 100 x 220 x 240	1,000 pcs	872
Brick, 65 x 110 x 230	1,000 pcs	151
Concrete pipe, ø300 x 2 m	ea	8
Concrete pipe, ø600 x 2 m	ea	29
Granite flooring block, 300 x 300	sq.m	15
Ceramic wall tile, 110 x 110	sq.m	24
Timber, pine	cu.ft	1
Plywood, 12 x 1,200 x 2,400	ea	56
Wood plank, 12 x 1,200 x 2,400	ea	27
Steel door, 900 x 2,100	ea	275
Aluminium window, 1,500 x 1,100	ea	247
Glass, 3 thick	sq.ft	2.2
Oil paint	Gallon	38
Corrugated metal roofing sheet, 90 x 180 cm	ea	27
Asbestos cement board, 60 x 60 cm	ea	3.9
Gasoline	Gallon	3.1
Diesel oil	Gallon	2.3
Lubricant	1	4.6
Cut-back asphalt, RC-250	Gallon	3.3
Asphalt cement, 120/150	Gallon	2.5
Asphalt emulsion, RS-1	Gallon	3.2

Table L-02 Labor Wages (As of August, 1989)

(Unit: Quetzales)

Description	Unit	Price
Mechanic	day	45
Electrician	day	28
Machine operator	day	35
Driver	day	18
Welder	day	40
Carpenter	day	35
Mason	day	35
Plasterer	day	35
Plumber	day	38
Concrete worker	day	15
Re-bar worker	day	38
Painter	day	30
Common labor	day	8

Note: Wages include tax and fringe benefit.

Table L-03 Estimated Financial Cost (La Aurora, Short-Term)

			Foreign Currency (US$ 10^3)	Local Currency (US$ 10^3 equiv.)	Total (US$ 10^3 equiv.)
A)	Civil Works:				
	1.	Runway, Taxiway and Apron	536	4,826	5,362
	2.	Airfield Drainage System	9	82	91
	3.	Access Road and Parking	24	220	244
		(Sub-total)	(569)	(5,128)	(5,697)
B)	Building Works:				
	4.	Buildings	540	4,863	5,403
	5.	Passenger Service Equip.	6,491	721	7,212
	6.	Sewage Disposal	43	100	143
		(Sub-total)	(7,074)	(5,684)	(12,758)
C)	Electrical Works:				
	7.	Navaids, Telecommunic.	10,278	318	10,596
	8.	Airfield Lighting	5,240	394	5,634
	9.	Power Supply	5,654	628	6,282
	10.	Meteo Observation	1,071	33	1,104
	11.	Special Equip.	2,439	278	2,717
		(Sub-total)	(24,682)	(1,651)	(26,333)
D)	Engineering and Administration		3,225	358	3,583
		(Total: A, B, C, D)	(35,550)	(12,821)	(48,371)
E)	Physical Contingencies		1,423	513	1,936
		(Total: A, B, C, D, E)	(36,973)	(13,334)	(50,307)
F)	Price Contingencies		3,831	5,058	8,889
G)	Interest during Construction		1,372	1,639	3,011
	TOTAL		42,176	20,031	62,207

Table L-04 Breakdown of Construction Cost
(La Aurora--Short-term Plan)

(Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
1. Runway, Taxiway and Parking Apron				
a. Earth work				
- Stripping	sq.m	55,000	0.96	52.8
- Excavation	cu.m	80,000	1.68	134.4
- Embankment (Excavated soil)	cu.m	72,000	1.07	77.0
- Embankment (Borrowed soil)	cu.m	77,500	6.18	478.9
b. Taxiway pavement				
- Asphaltic concrete surfacing	sq.m	36,600	27.14	993.3
- Upper subbase	sq.m	36,600	22.95	839.9
- Bottom subbase	sq.m	36,000	4.20	151.2
c. Taxiway shoulder pavement				
- Asphaltic concrete surfacing	sq.m	17,900	9.36	167.5
- Upper subbase	sq.m	17,900	5.31	95.0
- Bottom subbase	sq.m	17,900	3.82	68.4
d. Loading apron pavement				
- Concrete surfacing	sq.m	13,900	52.46	729.0
- Upper subbase	sq.m	13,900	3.15	43.8
- Bottom subbase	sq.m	13,900	4.20	58.4
e. Cargo apron pavement				
- Concrete surfacing	sq.m	9,310	42.25	393.3
- Upper subbase	sq.m	9,310	3.15	29.3
- Bottom subbase	sq.m	9,310	4.20	39.1
f. GSE staging area pavement				
- Concrete surfacing	sq.m	3,800	23.39	88.9
- Upper subbase	sq.m	3,800	3.15	12.0
- Bottom subbase	sq.m	3,800	4.20	16.0
g. Service road pavement				
- Asphaltic concrete surfacing	sq.m	2,740	9.32	34.9
- Upper subbase	sq.m	3,740	2.16	8.1
- Bottom subbase	sq.m	3,740	2.19	8.2
h. Grooving and marking				
- Runway grooving	sq.m	89,600	9.29	832.4
- Marking	sq.m	920	11.43	10.5
2. Airfield Drainage System				
a. Drainage ditch				
- Concrete surfacing	sq.m	2,100	23.21	48.7
- Subbase	sq.m	2,310	3.32	7.7
b. Culvert				
- Concrete pipe ø500	m	110	34.64	3.8
- Concrete pipe ø700	m	270	48.71	13.2
- Concrfete pipe ø800	m	290	55.21	16.0
c. Manhole	ea	4	364.46	1.5

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
3. Access Road and Parking Lot				
a. Parking lot				
- Concrete surfacing	sq.m	8,000	23.21	185.7
- Upper subbase	sq.m	8,000	3.15	25.2
- Bottom subbase	sq.m	8,000	4.20	33.6
4. Building				
a. Passenger terminal building				
- New construction	sq.m	11,700	357.1	4,181.4
- Modification of existing building	sq.m	10,600	35.7	378.6
b. Cargo terminal building				
- Repair of existing building	sq.m	8,000	17.9	142.9
- New consolidation building	sq.m	1,225	142.9	175.0
c. CFR building				
- Modification of existing building	sq.m	50	142.9	7.1
d. Control tower				
- VFR cab	sq.m	90	1,785.7	160.7
- Shaft	L.S.			210.0
- Base building	sq.m	340	285.7	97.1
e. Maintenance shop				
- Repair of existing building	sq.m	1,334	17.9	24.0
f. General aviation				
- Demolition of existing hangars	sq.m	2,900	8.9	25.9
5. Passenger Service Equipment				
a. New boarding bridge	unit	4	357,143	1,428.6
b. Baggage handling system				
- Departure baggabe belt	m	138	4,429	611.1
- Arrival bagagage belt	m	184	2,643	486.3
c. Elevator				
- Repair of existing elevators	unit	4	10,714	42.9
d. New escalator	unit	6	164,286	985.7
e. Flight information system	L.S.			1,078.6
f. Security system	L.S.			535.7
g. Public address system	L.S.			207.1
h. Telephone and intercomm system	L.S.			1,835.7
6. Sewage Disposal System				
a. Sewage treatment facilities	L.S.			142.9
7. NAVAIDS and Telecomm System				
a. Control tower				
- VHF, TX, AM	L.S.			1,584
b. VHF receiving station				
- VHF, RX, AM	L.S.			321
- Floating system	L.S.			67
c. ASR/SSR				
- ASR/SSR equipment, antenna, etc.	L.S.			2,954
- IFR controller console	L.S.			1,686
- System console	L.S.			1,770

(L-04 Cont'd) (Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
d. Off-aerodrome radio facilities				
- VOR/DME	L.S.			1,407
- NDB	L.S.			414
- VHF link	L.S.			107
- Electric power distribution	L.S.			286
8. Airfield Lighting System				
a. PAPI, CCR, etc.	L.S.			3,636
b. Apron flood lighting system	L.S.			427
c. Temporary lighting system	L.S.			1,571
9. Power Supply System				
a. Power center	L.S.			2,042.9
b. Emergency power supply system	L.S.			2,468.4
c. Power distribution system	L.S.			1,770.1
10. Meteorological Observation System				
a. Data collection console	L.S.			1,104
11. Special Equipment				
a. CFR vehicle				
- Rapid intervention vehicle	unit	1	290,929	290.9
- Major vehicle	unit	2	632,429	1,264.9
b. Maintenance shop equipment	L.S.			214.3
c. Airfield maintenance equipment				
- Backhoe	unit	1	109,286	109.3
- Dump truck	unit	1	56,428	56.4
- Tire roller	unit	1	52,857	52.9
- Macadam roller	unit	1	46,000	46.0
- Wheel loader	unit	1	50,000	50.0
- Portable concrete mixer	unit	1	21,714	21.7
- Trailer truck	unit	1	100,714	100.7
- Concrete joint repair equipment	L.S.		8,229	8.2
- Mower	unit	1	21,429	21.4
d. Cargo handling equipment				
- Forklift	unit	3	21,429	64.3
- Rack	sq.m	3,000	71.4	214.3
e. Measuring instrument	L.S.			202.0
TOTAL				44,788.2

Table L-05 Estimated Financial Cost (La Aurora - Long Term)

	Foreign Currency (US$ 10^3)	Local Currency (US$ 10^3 equiv.)	Total (US$ 10^3 equiv.)
A) Civil Works:			
1. Runway, Taxiway and Apron	1,641	14,766	16,407
2. Airfield Drainage System	19	168	187
3. Access Road and Parking	461	4,148	4,609
(Sub-total)	(2,121)	(19,082)	(21,203)
B) Building Works:			
4. Buildings	698	6,279	6,977
5. Passenger Service Equipment	4,179	464	4,643
6. Sewage Disposal	21	50	71
(Sub-total)	(4,898)	(6,793)	(11,691)
C) Electrical Works:			
7. NAVAIDS and Telecomm. System	9,569	296	9,865
8. Airfield Lighting	1,748	132	1,880
9. Power Supply	129	14	143
10. Meteo. Observation	403	12	415
11. Special Equipment	117	4	121
(Sub-total)	(11,966)	(458)	(12,424)
D) Engineering and Administration	3,262	363	3,625
(Total: A, B, C, D)	(22,247)	(26,696)	(48,943)
E) Land Acquisition	-	9,000	9,000
F) Physical Contingencies	890	1,428	2,318
Total	23,137	37,124	60,261

Table L-06 Breakdown of Construction Cost
(La Aurora--Long-term Plan)

(Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
1. Runway, Taxiway and Parking Apron				
a. Earth work				
- Stripping	sq.m	141,000	0.96	135.4
- Excavation	cu.m	392,000	1.68	658.6
- Embankment (Excavated soil)	cu.m	353,000	1.07	377.7
- Embankment (Borrowed soil)	cu.m	494,000	6.18	3,052.9
b. Taxiway pavement				
- Asphaltic concrete surfacing	sq.m	68,200	27.14	1,850.9
- Upper subbase	sq.m	68,200	22.95	1,565.2
- Bottom subbase	sq.m	68,200	4.20	286.4
c. Taxiway shoulder pavement				
- Asphaltic concrete surfacing	sq.m	37,700	9.36	352.9
- Upper subbase	sq.m	37,700	5.31	200.2
- Bottom subbase	sq.m	37,700	3.82	144.0
d. Loading apron pavement				
- Concrete surfacing	sq.m	40,910	52.46	2,146.1
- Upper subbase	sq.m	40,910	3.15	128.9
- Bottom subbase	sq.m	40,910	4.20	171.8
e. Cargo apron pavement				
- Concrete surfacing	sq.m	26,900	42.25	1,136.5
- Upper subbase	sq.m	26,900	3.15	84.7
- Bottom subbase	sq.m	26,900	4.20	113.0
f. GSE staging area pavement				
- Concrete surfacing	sq.m	13,900	23.39	325.1
- Upper subbase	sq.m	13,900	3.15	43.8
- Bottom subbase	sq.m	13,900	4.20	58.4
g. Service road pavement				
- Asphaltic concrete surfacing	sq.m	9,460	9.32	88.2
- Upper subbase	sq.m	9,460	2.16	20.4
- Bottom subbase	sq.m	9,460	2.19	20.7
h. Runway overlay				
- Asphaltic concrete overlay		141,000	18.05	2,545.1
i. Grooving and marking				
- Runway grooving	sq.m	89,500	9.29	831.5
- Marking	sq.m	6,000	11.43	68.6
2. Airfield Drainage System				
a. Drainage ditch				
- Concrete surfacing	sq.m	4,200	23.21	97.5
- Subbase	sq.m	4,600	3.32	15.3
b. Culvert				
- Concrete pipe ø800	m	1,250	55.21	69.0
c. Manhole	ea	15	364.46	5.5
3. Access Road and Parking Lot				
a. Terminal access road				
- Asphaltic concrete surfacing	sq.m	30,000	18.22	546.6
- Upper subbase	sq.m	30,000	15.30	459
- Bottom subbase	sq.m	30,000	4.20	126
- Others	L.S.			642.0

(L-06 Cont'd) (Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
b. Passenger drop-off overpass				
- Concrete structure	sq.m	2,300	1,071.43	2,464.3
c. Parking lot				
- Concrete surfacing	sq.m	8,000	39.00	312.0
- Upper subbase	sq.m	8,000	3.15	25.2
- Bottom subbase	sq.m	8,000	4.20	33.6
4. Building				
a. Passenger terminal building				
- New construction	sq.m	8,392	357.1	2,997.1
- Demolition of existing building	sq.m	138	8.9	1.2
b. Cargo terminal building				
- New construction	sq.m	12,900	250	3,225.0
c. CFR building				
- New construction	sq.m	635	250	158.8
d. Maintenance shop				
- New construction	sq.m	984	214.3	210.9
e. General aviation				
- General aviation building	sq.m	252	285.7	72.0
- Demolition of existing hangars	sq.m	35,000	8.9	312.5
5. Passenger Service Equipment				
a. Boarding bridge				
- New boarding bridge	unit	6	357,143	2,143
- Repair of existing bridge	unit	6	21,429	128.6
b. Baggage handling system				
- Departure baggage belt	m	238	4,429	1,054.0
- Arrival baggage belt	m	158	2,643	417.6
c. Flight information system	L.S.			221.4
d. Security system	L.S.			350.0
e. Public address system	L.S.			14.3
f. Telephone and intercomm system	L.S.			314.3
6. Sewage Disposal System				
- Sewage treatment facilities	L.S.			71.0
7. NAVAIDS and Telecomm System				
a. Control tower				
- MLS monitor	L.S.			59
b. DVOR/DME/ATIS and NDB	L.S.			1,481
c. Localizer/terminal DME	L.S.			3,543
d. MLS	L.S.			2,207
e. AIS	L.S.			2,575
8. Airfield Lighting System				
a. Taxiway lighting	L.S.			1,299
b. Apron flood lighting	L.S.			581
9. Power Supply System				
a. Power center	L.S.			135.7
b Power distribution system	L.S.			7.1

(L-06 Cont'd) (Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
10. Meteorological Observation System				
a. Ceilometer	L.S.			211
b. RVR	L.S.			204
11. Special Equipment				
a. Measuring instruments	L.S.			121
TOTAL				45,318.5

Table L-07 Estimated Financial Cost (Santa Elena, Short Term)

	Foreign Currency (US$ 10^3)	Local Currency (US$ 10^3 equiv.)	Total (US$ 10^3 equiv.)
A) Civil Works:			
1. Runway, Taxiway and Apron	64	574	638
(Sub-total)	(64)	(574)	(638)
B) Building Works:			
2. Buildings	39	349	388
(Sub-total)	(39)	(349)	(388)
C) Electrical Works:			
3. NAVAIDS and Telecomm System	188	6	194
4. Airfield Lighting	133	10	143
5. Power Supply	911	101	1,012
6. Special Equipment	804	25	829
(Sub-total)	(2,036)	(142)	(2,178)
D) Engineering and Administration	230	26	256
(Total: A, B, C, D)	(2,369)	(1,091)	(3,460)
E) Physical Contingencies	95	43	138
(Total: A, B, C, D, E)	(2,464)	(1,134)	(3,598)
F) Price Contingencies	301	523	824
G) Interest during Construction	48	68	116
Total	2,813	1,665	4,538

Table L-08 Breakdown of Construction Cost
(Santa Elena--Short-term Plan)

(Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
1. Runway, Taxiway and Parking Apron				
a. Loading apron pavement				
- Concrete surfacing	sq.m	1,800	42.25	76.1
- Subbase	sq.m	1,800	4.33	7.8
- Demolition of concrete pavement	sq.m	1,800	27.86	50.1
b. Service raod pavement				
- Asphaltic concrete surfacing	sq.m	5,400	9.32	50.3
- Upper subbase	sq.m	5,400	3.15	17.0
- Bottom subbase	sq.m	5,400	4.20	22.7
c. Runway overlay				
- Asphaltic concrete overly	sq.m	15,300	27.08	414.4
2. Building				
a. Passenger terminal building				
- New construction	sq.m	146	321.4	46.9
- Modificatoin of existing building	sq.m	2,465	89.3	220.0
b. CFR building				
- New construction	sq.m	484	250.0	121.0
3. NAVAIDS and Telecomm System				
a. VOR/ATIS				
- Tape recorder etc.	L.S.			194
4. Airfield lighting system				
- PAPI	L.S.			143
5. Power Supply System				
a. Emergency power supply system	L.S.			1,012
6. Special Equipment				
a. CFR vehicle				
- Rapid intervention vehicle	unit	1	290,929	290.9
- Major vehicle	unit	1	505,943	505.9
b. Measuring instruments				32
TOTAL				3,204.1

Table L-09 Estimated Financial Cost (Santa Elena, Long Term)

	Foreign Currency (US$ 10^3)	Local Currency (US$$10^3$ equiv.)	Total (US$ 10^3 equiv.)
A) Civil Works:			
1. Runway, Taxiway and Apron	553	4,976	5,529
2. Airfield Drainage System	30	267	297
(Sub-total)	(583)	(5,243)	(5,826)
B) Building Works:			
3. Buildings	48	431	479
4. Passenger Service Equipment	905	102	1,006
(Sub-total)	(953)	(532)	(1,485)
C) Electrical Works:			
5. NAVAIDS and Telecomm System	3,748	116	3,864
6. Airfield Lighting	3,632	273	3,905
7. Power Supply	1,061	118	1,179
8. Meteo Observation	394	12	406
9. Special Equipment	84	3	87
(Sub-total)	(8,919)	(522)	(9,441)
D) Engineering and Administration	1,206	134	1,340
(Total: A, B, C, D)	(11,661)	(6,431)	(18,092)
E) Physical Contingencies	466	257	723
Total	12,127	6,688	18,815

Table L-10 Breakdown of Consruction Cost
(Santa Elena--Long-term Plan)

(Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
1. Runway, Taxiway and Parking Apron				
a. Earth work				
- Stripping	sq.m	87,000	0.96	83.5
- Excavation	cu,n	230,000	1.68	386.4
- Embankment	cu.m	207,000	1.07	221.5
b. Taxiway pavement				
- Asphaltic concrete surfacing	sq.m	87,400	18.06	1,578.4
- Upper subbase	sq.m	87,400	6.30	550.6
- Bottom subbase	sq.m	87,400	14.47	1,264.7
c. Taxiway shoulder pavement				
- Asphaltic concrete surfacing	sq.m	48,200	9.36	451.2
- Upper subbase	sq.m	48,200	5.31	255.9
- Bottom subbase	sq.m	48,200	5.69	274.3
d. Loading apron pavement				
- Concrete surfacing	sq.m	4,400	42.25	185.9
- Upper subbase	sq.m	4,400	4.33	19.1
- Bottom subbasesq.m	sq.m	4,400	9.37	41.2
e. Service road pavement				
- Asphaltic concrete surfacing	sq.m	12,950	9.32	120.7
- Upper subbase	sq.m	12,950	3.15	40.8
- Bottom subbase	sq.m	12,950	4.20	54.4
2. Airfield Drainage System				
a. Drainage dtich				
- Concrete surfacing	sq.m	6,900	23.21	160.1
- Subbase	sq.m	7,600	3.32	25.2
b. Culvert				
- Concrete pipe ø700	m	2,300	48.71	112.0
3. Building				
a. Passenger terminal building				
- New construction	sq.m	361	321.4	116.0
b. Cargo terminal building				
- New construction	sq.m	300	214.3	64.3
c. Control tower				
- VFR cab	sq.m	60	1,786	107.1
- Shaft	L.S.			102.9
- Base building	sq.m	200	285.7	57.1
d. Maintenance shop				
- New construction	sq.m	150	214.3	32.1
4. Passenger Service Equipment				
a. Baggage handling system				
- Arrival baggage belt	m	43	2,643	113.6
b. Flight information system	L.S.			250
c. Security system	L.S.			400
d. Public address system	L.S.			64.3
e. Telephone and intercomm system	L.S.			178.6

(L-10 Cont'd) (Currency: US$)

Work Item	Unit	Q'ty	Unit Cost	Amount (x 1,000)
5. NAVAIDS and Telecomm system				
a. Control tower				
- VHF, TX, AM	L.S.			1246
b. VHF receiving station	L.S.			352
c. MLS	L.S.			2266
6. Airfield Lighting System				
a. Airfield lighting	L.S.			3699
b. Apron flood lighting	L.S.			206
7. Power Supply System				
a. Power center	L.S.			900
b. Emergency power supply system	L.S.			278.6
8. Meteorological ObservationSystem				
a. Meteorological observation equip.	L.S.			406
9. Special Equipment				
a. Maintenance shop equipment	L.S.			35.7
b. Measuring instruments	L.S.			51
TOTAL				16,752.2

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