CHAPTER 3

EXISTING FACILITY CONDITIONS

CHAPTER 3 EXISTING FACILITY CONDITIONS

3-1 General

Surveys were made on the existing conditions of the airfield, terminal area and air navigation facilities at Lusaka International Airport in the field survey, and the findings are shown hereinafter, with the supplemental materials compiled in Appendices C - E.

3-2 Airfield Facilities

The existing airfield facilities were constructed in 1967. The runway and taxiway are paved with bituminous concrete except at one end of the runway which is paved with cement concrete. The entire apron is paved with cement concrete.

The problems with the existing airfield facilities are that the pavement, after nearly twenty years of use since its construction in 1967, is worn out, and that some of the facilities are already incapable of accommodating today's aviation requirements that include service by larger jet aircraft.

With regard to the surface deterioration, weathering of bitumen is observed on the runway and taxiway. Other problems hampering accommodation of larger jets include cracking and

sinking of concrete slabs at the runway end and in apron, peeling of slurry seals off the runway shoulders and lack of adequate clearance for aircraft parking in apron.

As countermeasures to these problems, the pavement has been repaired partially, and insufficient apron parking clearance is barely being covered by careful manoeuvering in actual operation.

The present conditions of the existing airfield facilities of Lusaka International Airport are summarized in Table 3-1.

Table 3-1 Existing Facility Conditions - Airfield Facilities

FACILITY		DESCRIPTION	CONDITION
Runway Strips	Dimensions:	10/28 4419m x 305m 15/33 943m x 250m	
Runway	Dimensions:	10/28 3962m x 46m 15/33 823m x 30m	10/28 can accommodate direct flight to London by DC-10 class aircraft.
	Surface:	10/28 Bituminous concrete, except for the west side which is cement concrete-paved.	Weathering of bitumen is observed. No cracking of bitumen observed except along the boundaries with rigid pavement. The Marshall stability of asphalt concrete surface layer is about 1,200kg which is adequate.
		15/33 Grass	Cracking exists in about 10% of concrete slabs and is mostly left unrepaired.
	Strength:	10/28 LCN 100	
Taxiway	Width:	23m	4 exit taxiways are provided at the western edge of the runway and at points 1,150m, 1,850m and 2,700m therefrom. A parallel taxiway connects these.
	Surface:	Bituminous concrete	There is no cracking but weathering is observed.
	Strength:	LCN 100	The Marshall stability of bituminous concrete surface layer is about 1,200kg which is adequate. Unsatisfactory drainage causes pooling of rain water where Taxiways A and C intersect the parallel taxiway.
Shoulder	Width:	7.6m	Runway shoulder is susceptible to occasional peeling off of slurry seals due to B747 jet blast, which is temporarily repaired as it occurs.
	Surface:	Seal of bituminous slurry	
Overrun	Dimensions:	10 305m x 46m 28 305m x 46m	
	Surface:	Bituminous concrete	Weathering of bitumen is observed.

Table 3-1 Cont'd Existing Facility Conditions - Airfield Facilities

FACILITY		DESCRIPTION	CONDITION
Apron	Dimensions:	Int'l 259m x 144.5m Domes. 44m x 103.6m	Apron parking clearance is inadequate for B747/DC-10 class aircraft.
	Aircraft Stand:	Int'l 6 stands Domes. 6 stands	6 international spots together can accommodate only 4 medium/large aircraft.
	Surface:	Cement concrete	Cracking is observed in about 10% of slabs. Large cracks are seen in the area connecting to Taxiway A, but hardly any repair is made. No cracking is seen in domestic apron. Cracking is seen in about 15% of holding apron but hardly any repair is made. Rain water pooling is observed where slabs are sunk.
	Strength:	Int'l LCN 100 Domes. LCN 75	Compressive strength of concrete is 250 kgf/ cm^2.
Drainage			RC grating on the north edge of Apron is damaged. Receiving capacity of the brook as airport drainage outlet is sufficient.
Perimeter Road	Surface:	Unpaved	Many water pools prohibit vehicle passage in rainy season.
Security Fence		Barbed wire fencing	Insufficient guarding against trespassing into the restricted area.
Subgrade	Strength:	Runway and taxiway Apron	CBR 7% CBR 4%

3-3 Terminal Area Facilities

Terminal area is generally well laid out, and the facilities, with a few exceptions, have ample capacity. Sufficient space is also reserved for future expansion of the Airport to cope with the growth of demand.

Some minor defects exist in the building structure such as roof leakage due to deterioration of bituminous waterproofing, but they do not constitute any major problems.

However, many of the utility facilities such as water supply and disposal, sanitary and air-conditioning facilities, as well as the transporting and conveying facilities such as escalators and elevators, have been left out of operation over a long period of time due to poor maintenance and lack of necessary spare parts, so much so that some of the facilities are entirely incapable of being reinstated.

In passenger and cargo processing areas, operational inefficiency is conspicuous apparently due to the inadequate passenger and cargo flow plan. Imbalance in capacity among the internal facilities of the passenger terminal building is causing congestion within the building.

The passenger terminal building has too many passages accessible to airside and not enough security personnel to control them, and this is causing both security problems and functional inefficiency.

The existing terminal are facilities and their present conditions are summarized in Table 3-2.

Table 3-2 Existing Facility Conditions - Terminal Area Facilities

FACILITY	DESCRIPTION		CONDITION
Passenger Terminal Building	Structure	RC 3F	Aging and failure are observed in waterproofing and terminal equipment.
	Floor Area	Main Building 12,600sq.m	Capacity imbalance among facilities is causing functional inefficiency.
		Finger 2,100sq.m	Passenger flow is not smooth.
			Inadequate security provisions for access to airside.
			Some facilities incapable of accommodating large size aircraft.
Cargo Terminal Building	Structure	B/S 1F	Floor area of office space is insufficient.
	Floor Area	Main Building 3,200sq.m	Inadequate security provisions for airside access.
		Airside 2,900sq.m	Poor working environment with no ventilation facility.
			Conspicuous damage to the floor and rack.
Customs Office & Bonded Warehouse	Structure	B 1F	Waterproofing has deteriorated.
	Floor Area	490sq.m	Entire ceiling of one room has come down due to insect damage.
Cargo Agents Site	Site Area	27,200 sq.m	Only 4 out of 9 available lots are in use.
			All sheds are new.
Control Building	Structure	RC 3F (Partly 7F)	Aging and failure are observed in waterproofing and installed equipment.
	Floor Area	4,000sq.m	

Table 3-2 Cont'd Existing Facility Conditions - Terminal Area Facilities

FACILITY		DESCRIPTION	CONDITION
Fire Station	Structure	Main Station RC/B 1F (Partly 2F, 5F) Crush Aid Wing B 1F Fire Substation B 1F	The watch tower and hose drying yard are not in use. Aging is seen in installed equipment. Fire-fighting vehicles were enforced a few years ago but some of them are out of order. The Fire Substation is decayed and unusable.
	Floor Area	Main Station 950sq.m Crush Aid Wing 120sq.m Substation 70sq.m	
Aircraft Maintenance Hangar	Structure	S 1F (Partly 2F)	Can accommodate HS-748 aircraft, but height is not enough for B707.
	Floor Area	3,050sq.m	
Fuel Supply Facility	Tank Capacity	Jet A-1 100klx2 Av-gas 75klx8	Only a small part of the large site is used, leaving ample room for expansion. Facilities are maintained and operated by BP.
	Site Area	27,500sq.m	
	Supplying Method	Refueler	
General Aviation Facility		Government	Several governmental aircraft are left unusable due to shortage of maintenance equipment and parts. Bituminous concrete surface of apron is damaged.
		MAS Joint Air Express Charter	Well maintained.

Table 3-2 Cont'd Existing Facility Conditions - Terminal Area Facilities

FACILITY	DESCRIPTION		CONDITION
Catering Facility (Uplift Meals Kitchen)	Structure	RC 1F	Floor area is not large enough. Expansion plan currently under study.
	Floor Area	680sq.m	
Water Supply Facility	Water Main	8" Asbestos Concrete Pipe from Lusaka City	Fire-fighting water tank is old and is leaking. City water supply pressure from Lusaka is instable and supply is interrupted at times.
	Capacity of Water Reservoir for Fire Fighting	$2,300m^3$	
Sewage Disposal Facility	Sewage Main	12" Concrete Pipe	In good condition.
	Cesspool		
Electric Power Supply Facility	Sub-station	Main x 1, Sub x 15	Substation monitor panel installed in Main Substation is out-of-order.
	Back-up Engine Generator	1.25MW	
Refuse Disposal Facility	Dump Pit	2,500sq.m	Refuse collection is often delayed due to vehicle trouble.
Roads and Car Park	Access Rd.	One lane in both directions	Parking lot is mostly unused. (partly because of security problems) Weathering and cracking of flexible pavement are seen.
	Main Circuit Rd.	Two lanes in one direction	
	Car Parking Lots	Public 450 lots Secured 160 lots Taxi 10 lots	
	Car Parking Area	Public 30,200sq.m Secured 10,800sq.m	

3-4 Air Navigation Facilities

The existing air navigation facilities are provided with most of the necessary equipment items, which, however, are superannuated and functionaly degraded to such an extent that some no longer meet the performance requirements of the ICAO standards and recommended practices.

Most radio navaids have not been replaced or renewed for nearly twenty years and DCA is having difficulty in operating and maintaining the equipment due to non-availability of spare parts. As instrument flight procedures published for Lusaka International Airport are established on the basis of these navaids, the equipment should be able to provide the level of performance consistent with the requirements for safety and efficiency as set forth by ICAO. For example, inadequate secondary power supply system for navaids needed for instrument approach procedures is apparently against the ICAO requirements described in Annex 10, Attachment C to Part I, 8.1. Except for those equipment that have been replaced lately such as NDB (LW) and VDF, performance level of the navaids equipment will be so degraded in late 80's that it would seriously affect the reliability and efficiency of air transport system of Zambia.

As for the visual aids, part of the airfield lighting system such as PAPI has been renewed lately as the essential aids to instrument flights and night operations. However the secondary power supply system for visual aids has been out of order for the

last decade, not conforming to ICAO requirements described in Annex 14, 8.1.3.

The existing ATS/Telecommunications facilities (FIC, APP, TWR and Communication Centre) will permit efficient use of the airspace of Zambia as it is satisfactorily organized today, only if the equipment replacement programme is implemented on the teletypewriter system, VHF air-ground communications system and terminal approach radar, etc. to secure adequate radio and radar coverage.

Aged communications equipment are maintained at present, but most of them have been in use beyond their design life and are adversely affecting the daily operational performance. Accuracy or reliability of the AFTN system of Lusaka Communication Centre seems to be far below the standards of ICAO requirements because of many impaired equipment with no spare parts being manufactured any longer. Their performance level will go down year after year, and in the very near future it might seriously affect the AFTN system in southern Africa if no improvement is made.

So many impaired weather observation instruments and teletypewriters are hindering the adequate and timely availability of weather information and their exchange between the forecast centres. Aged weather radar suffers from significant supply problems of its parts and is feared to cease operating in the near future. The conditions of the existing facilities are summarized in Table 3-3.

Table 3-3 Existing Facility Conditions - Air Navigation Facilities

FACILITY	EQUIPMENT	DESCRIPTION	CONDITION
Radio Navaids	VOR (1967)	Wilcox 485A/200W conventional	One of the dual transmitters is out of order. No secondary power provided.
	DME (1982)	Wilcox 596B/1kw	Out of order due to lack of spare parts.
	ILS (1967)	CAT-1 LLZ STAN7/25w(15w) GS STAN8/25w(15w) MM STAN9/60w(15w) OM STAN9/60w(15w)	Trouble in rainy season. One of the dual transmitters is out of order.
	NDB (LW) (1980)	Decca 80002A/200w Compass Locator	In operation.
	NDB (LE) (1967)	Aerocom 3000L/3kw	In operation.
	VDF (1980)	Servo 7010/6 channels	In operation.
Visual Aids	ALS (RWY10) (1967)	Philips PS-28/300w Insulated transformers replaced in 1980	Some 20 lamps out of service.
	SALS (RWY28) (1967)	Philips PS-28/300w	Some 7 lamps out of service.
	RWY THR/End Light (1983)	ADB REE-2-150/200w	2 lamps out of service. Cables are not renewed.
	RWY Edge Light (1983)	ADB REE-2-150/200w	Some one tenths of total lamps out of service. Cables and CCRs are not renewed.
	RWY Centre Line Light (1979)	ADB SQ 2200E-W/200w	Not in service due to lack of spare lamps. Cables and CCRs are not renewed.

Table 3-3 Cont'd Existing Facility Conditions - Air Navigation Facilities

FACILITY	EQUIPMENT	DESCRIPTION	CONDITION
Visual Aids (Cont'd)	RWY Touch-Down Zone Light (1967)	Atlas CH/a/1/200w	Out of order.
	PAPI (1984)	ADB PPL400/200w	In operation. Cables and CCRs are not renewed.
	TWY Centre Line Light (1979)	ADB SQ 265E/65w	Not in service due to lack of spare lamps. Cables and CCRs are not renewed.
	TWY Edge Light (1967)	Atlas LIR 4/3/40w at Apron edge	Some one tenths of lamps out of service.
	Apron Flood Light (1983)	Idman Osakeyhtiol P3-40/1000w P3-30/400w	In operation. Cables are not renewed.
	Power Supply for AFL (1967)	For precision approach	Secondary power supply systems at #3, #5A, and #12 substations are out of order for 10 years.
ATC Facility	ATC Consoles (1967)	TOWER Approach FIC	In operation. Lack of CCU is inconveniencing inter-console communication.
	Radar (1967)	Plessey AR-1	Out of order for 5 years. Difficult to restore operation.
Communi-cations Facility	AFTN Message Switching System (1967)	Siemens C7 Semiautomatic Message Switching System	In operation, but some element circuits are out of order and not meeting dependability requirements of ICAO.
	TTY (1967)	Siemens	In operation. Difficult to maintain due to lack of spare parts.

Table 3-3 Cont'd Existing Facility Conditions - Air Navigation Facilities

FACILITY	EQUIPMENT	DESCRIPTION	CONDITION
Communi-cations Facility (Cont'd)	TX Station	Transmitters 31 sets (1967) 4 sets (1980) 2 sets (1981) Driver 2 sets (1967) PYE, AEROCOM. RACAL, REDIFON	11 sets out of order. Communication cables get in trouble in rainy season.
		Secondary power supply	Not available.
	RX Station	Receivers 19 sets (1967) 4 sets (1977) 3 sets (1979) 16 sets (1981) PYE, AEROCOM, RACAL, RADIFON	1 set out of order. 3 sets out of service. Communication cable get in trouble in rainy season.
		Secondary power supply	Not available.
	RCAG (Kaloko Hill)	Transmitters 4 sets (1967) Aerocom, PYE Receivers 4 sets (1967) Aerocom	Omnidirection out of order. ER VHF, in operation, but frequently fail in rainy season.
		Secondary power supply	In operation.
Meteoro-logical Facilities	Observation Instruments	RVR Impulsphysics (1982)	Out of order.
		Ceirometer Impulshysics (1967)	Out of order.
		Anemometer R.W.Munro (1967)	In operation.
		Thermometer (1967)	In operation.
		Hydrometer (1967)	Out of order.
		Barometer F. DARTON (1967)	In operation.
	Commu-nications	TTY 8 sets RACAL, IAL (1967)	One TTY out of order.
		Facsimile 1 set MUIRHEAD D-649-L/El (1968)	In operation, but difficult to maintaion.
	WX Radar (1976)	Enterprize Electronics Corporation WRS-74S	Out dated, but in service.
	Satellite Receiver (1979)	ALDEN U.S. 9273 RV	In operation.

CHAPTER 4

FACILITY REQUIREMENTS

CHAPTER 4 FACILITY REQUIREMENTS

4-1 General

Facility requirements are determined based on the type of critical aircraft, longest flight stage length, estimated peak hour traffic, simulated flight schedule, etc. which are developed from the air transport demand forecast for the years 1990, 2000 and 2010. The supplemental materials on this chapter are compiled in Appendix F.

4-2 Facility Requirement Analysis

The following sections of this subchapter describe the requirements of each facility group in a general term, and the quantitative requirements are found in the Tables 4-1 to 4-3.

4-2-1 Airfield Facilities

(1) Runway

Dimensional requirements of runway are such that they should be sufficient to accommodate the critical aircraft of B747 to serve the longest expected stage length of Lusaka-London. Pavement structure and thickness requirements are those to produce the design coverage that can accommodate the forecast load.

(2) Taxiway

The configurational requirements of taxiway are to accommodate the critical aircraft of B747 and to enable the runway to function fully and efficiently so as to cope with the forecast aircraft movements. Pavement structure and thickness should be adequate to produce the satisfactory design coverage to meet the forecast load as in the case of the runway.

(3) Shoulder

Both runway and taxiway shoulders should satisfy the safety requirements of B747 operation both structurally and widthwise.

(4) Apron

Sufficient number of aircraft stands are to be accommodated for common use of international and domestic services based on the simulated flight schedule developed from the traffic forecast.

In the event the VIP facilities are transferred out of the passenger terminal building into a separate new building to be constructed, an exclusive VIP apron will need to be provided.

Pavement structure and thickness should be such as to produce the satisfactory design coverage as in the case of the runway and taxiway.

(5) Overrun

Overrun should satisfy the safety requirements of B747 operation both structurally and lengthwise.

(6) Drainage

Expansion of the existing apron and creation of new VIP apron will require corresponding new and extended drainage system of a similar structure to that of the existing drainage and in adequate capacity to accommodate the new apron needs. The added apron drainage system should form an integral part of a new total drainage system so as to satisfy the entire drainage requirements of the Airport.

(7) Perimeter Road

One-way perimeter road system needs to be improved so as to be usable even in the rainy seasons.

(8) Security Fence

Security fencing needs to be improved so as to ensure adequate security protection of the Airport.

Table 4-1 Facility Requirements (Airfield Facilities)

FACILITY	ITEM	EXISTING	1990	2000	2010	REMARKS
Runway	· Length	3,962m		Approx. 4,000m		
	· Width	46m	46m	46m	46m	
	· Pavement (Flexible)	Premix 10cm Base/Subbase 79~89cm	Premix 10cm Base/Subbase 79~89cm	Premix 14~20cm Base/Subbase 79~89cm	Premix 14~25cm Base/Subbase 79~89cm	Overlay
	· Pavement (Rigid)	Slab 36cm Base/Subbase 25cm	Slab 36m Base/Subbase 25cm	Slab 36cm Base/Subbase 25cm	Slab 36cm Base/Subbase 25cm	Replace
Taxiway	· System	Partial Parallel	Partial Parallel	Partial Parallel	Full Parallel Rapid Exit	
	· Width	23m	23m	23m	23m	
	· Pavement (Flexible)	Premix 10cm Base/Subbase 79~89cm	Premix 10cm Base/Subbase 79~89cm	Premix 14~20cm Base/Subbase 79~89cm Premix 14cm Base/Subbase 80cm	Premix 14~26cm Base/Subbase 79~89cm Premix 14cm Base/Subbase 91cm	Overlay Construct
Shoulder	· Width	7.6m	7.6m	7.6m	7.6m	
	· Pavement	Base/Subbase 27cm	Surface Slurry Seal Base/Subbase 27cm	Premix 3cm Base/Subbase 27cm	Premix 3cm Base/Subbase 27cm	Overlay, R/W only
Apron	· Aircraft Stand					
	350 Seater	1	2	3	5	
	250/200 Seater	3	3	3	3	
	100 Seater	8	2	4	4	
	50 Seater		1	2	1	
	20 Seater		1	3	6	
	Total	12	9	15	19	
	for VIP			1	1	250 Seater
	· Pavement (Rigid)	Slab 36cm Base/Subbase 25cm	Slab 36cm Base/Subbase 25cm	Slab 36cm Base/Subbase 25cm Slab 34cm Base/Subbase 45cm	Slab 36cm Base/Subbase 25cm Slab 38cm Base/Subbase 45cm	Replace Construct
Drainage				New Apron Drainage		
Perimeter Road	· Surface	Unpaved	Unpaved	Gravel Paved	Bitumen Paved	
	· Width	4m	4m	4m	4m	
	· System	One Way	One Way	One Way	One Way	
Security Fence	· Length	19,080m	19,080m	19,080m	19,080m	
	· System	Timber and barbed wire	Timber and barbed wire	With Wire Net	With Wire Net	

4-2-2 Terminal Area Facilities

(1) Passenger Terminal Building

Capacity requirements of the passenger and baggage handling areas are determined on the basis of peak-hour international and domestic passenger traffic derived from the simulated flight schedule, to allow smooth flow of peak-hour passengers and efficient handling of baggage without causing undue congestion. In areas shared by international and domestic services the capacity requirements are based on the overall peak-hour traffic, rather than on the arithmetic sum of the international and domestic peak-hour traffic.

Functional requirements include provision of adequate signs and terminal information system for effective guidance of air passengers within the building. As regards the VIP accommodations, security measures need to be improved, and this calls for consolidation or simplification of the flow lines of different VIP categories as well as transfer of the VIP facility out of the passenger terminal building into a separate new building.

Provision of air-conditioning is desirable for the entire building and definitely required at least for the areas where passengers remain for certain period of time.

(2) Cargo Terminal Building

Cargo terminal building needs to have sufficient floor area to accommodate the forecast cargo volume by the same cargo handling system as that of the existing facility. Offices should continue to accommodate the present occupants including the cargo headquarters of Zambia Airways. Cargo handling area needs to be provided with adequate ventilation, and for office area air-conditioning is desirable. Overall security measures should be stepped up to ensure safe and efficient processing of cargo.

(3) Customs Office and Bonded Warehouse

Sufficient floor area needs to be secured for the bonded warehouse to accommodate the forecast international cargo, and office space should be enough to house sufficient number of staff to perform the Customs procedures for the forecast cargo traffic. The convenient present location, in relation to such related facilities as cargo sheds, etc., of the Customs office and bonded warehouse should be kept as is.

(4) Control Building

Control Building should be large enough to house airport administration, air traffic control, meteorological and communications facilities in an optimum layout to maximize functional efficiency. Air-conditioning is imperative for the areas where refrigerating equipment is installed, and it is desirable for the entire areas of the Control Building from the view point of labour productivity.

(5) Fire Station

Fire Station is to be of adequate size to house the fire-fighting vehicles that meet the relevant ICAO recommendation determined by the class of critical aircraft and its operational frequency.

(6) Aircraft Maintenance Hangar

Maintenance hangar should enable Zambia Airways to meet all its future maintenance requirements at the Airport.

(7) Fuel Supply Facility

Fuel storage capacity is determined from the requirements per day calculated from the peak-day number of flights, and by multiplying it by the number of days for which reserve fuel is to be

maintained to satisfy the operational requirements of the Airport. The present tank-lorry supply system is adequate and should be maintained.

(8) General Aviation Facility

The existing general aviation facility should satisfy the future needs and hence should be maintained.

(9) Catering Facility (Uplift Meals Kitchen)

Inflight meal requirements of forecast peak-day scheduled international departing passengers are to be adequately accommodated. The facility should include laundry and linen supply provisions and should be located to permit convenient access to and from International Catering Service in the passenger terminal building.

(10) Electric Power Supply Facility

A dual system by disintegrated routes is required to ensure a reliable power supply, which should be of sufficient capacity to meet the needs of the entire airport facilities. In addition, provision of emergency backup power supply system is indispensable for the facilities so designated by the ICAO recommendation.

(11) Water Supply Facility

Water supply facility capacity requirements are determined based on the forecast number of air passengers and airport employees. The facility should also be capable of supplying water at a constant level notwithstanding the possible supply disruption and pressure fluctuations of the city water supply from Lusaka.

(12) Sewage Disposal Facility

Sewage disposal capacity should be sufficient to accommodate the forecast sewage volume to match the forecast water consumption of the entire Airport.

(13) Refuse Disposal Facility

The volume of refuse that needs to be disposed of is determined from the floor area requirements of all airport buildings and forecast aircraft movements. The disposal facility should be of the system that is environmentally acceptable.

(14) Roads and Car Park

Peak-hour igress and egress of access car traffic derived from the simulated flight schedule are to be adequately accommodated by the access feeder and the

passenger terminal circuit roads. Effective security provisions are a must for the parking area to function as it should.

Table 4-2 Facility Requirements (Terminal Area Facilities)

FACILITY	ITEM	EXISTITING	1990	2000	2010	REMARKS
Passenger Terminal Building	· Common Use Area	1,760m²	1,200m²	1,500m²	2,000m²	
	· Int'l Use Area	2,340m²	2,900m²	3,500m²	5,100m²	
	· Doms. Use Area	340m²	600m²	700m²	700m²	
	· Other Area	8,160m²	5,800m²	7,300m²	11,700m²	
	· Total	12,600m²	10,500m²	13,000m²	19,500m²	
Cargo Terminal Area	· Cargo Terminal Building	3,200m²	5,000m²	6,400m²	8,800m²	
	· Airside	2,900m²	5,000m²	6,400m²	8,800m²	
	· Landside	2,900m²	5,000m²	6,400m²	8,800m²	
	· Cargo Agents' Site	27,200m²	15,000m²	19,200m²	26,400m²	
	· Customs Office and Warehouse	470m²	600m²	1,100m²	2,000m²	
Control Building	· Floor Area	4,000m²	2,300m²	2,300m²	2,300m²	
Fire Station	· ICAO Category	CAT 8	CAT 8	CAT 8	CAT 8	
	· Fire Engine	Water 28,000l CO_2 450Kg Dry Powder 140Kg	Water 27,300l CO_2 900Kg or Halons 450Kg or Dry Chemical 450Kg Discharge Rate 10,800 l			Protein foam Current discharge rate is not available
Aircraft Maintenance Hangar	· Nos	1 Hangar for HS 748	1 Line Maintenance Hangar and 1 Overhaul Hangar for Wide Body Jet			
Fuel Supply	· Tank Capacity	500Kl×2 (Jet A-1)	1,400Kl	2,100Kl	3,300Kl	
General Aviation	· Site	4 Units	Less than 12 Units			
Catering Facility	· Floor Area	680m²	1,100m²	1,800m²	2,700m²	
VIP Facility	· Floor Area	400m²	—	1,400m²	1,400m²	with suitable Road. Car Parking, Playground and Plaza
Elec. Supply Facility	· Elec. Demand	1 MVA	1 MVA	1.3 MVA	1.5 MVA	
Watwr Supply Facility	· Water Demand	N.A.	140m³/day	220m³/day	340m³/day	
Sewage Disposal Facility	· Sewage Volume	N.A.	26m³/hour	41m³/hour	64m³/hour	
Refuse Disposal Facility	· Refuse Volume	N.A.	2.3t/day	3t/day	4.3t/day	
Roads	· Composition	One-way two lanes	One-way one lane	One-way one lane	One-way one lane	
Car Park	· Parking Lot (Private Car)	610	100	200	300	
	· Parking Lot (Taxi)	10	20	30	50	

4-2-3 Air Navigation Facility

The air navigation facility requirements are determined from the following planning factors.

1) Operational requirements

The Airport is:

- the gateway serving the capital of the Republic of Zambia;
- categorized by ICAO as the international regional scheduled (RS) airport;
- served by wide-body aircraft;
- utilized after dark;
- utilized by the international/domestic general aviation aircraft; and
- adversely affected by low ceiling and visibility in rainy seasons.

2) ICAO standards and recommended practices.

3) Intention of the Zambian Government.

(1) Navigational Aids

Lusaka VOR/DME and its alternative NDBs are required to provide pilots with continuously available information to determine their position and maintain the flight-plan track while flying to or from Lusaka International Airport on air routes provided by these navaids.

ILS, ALS and HIRL, etc. are required to operate and be maintained adequately as essential navaids for pilots to conduct precision approach and landing to the main Runway 10 of Lusaka International Airport.

(2) ATS/Telecommunications/Meteorological Facilities

These facilities and their services and operational procedures are required to form an integrated system designed to meet the requirements of all civil aircraft operations in Lusaka Terminal Area. Also, every equipment in these facilities is required to operate and be maintained at an adequate performance level to meet the ICAO standards.

Table 4-3 Facility Requirements (Air Navigation Facilities)

FACILITY	ITEM	EXISTING	1990	2000	2010	REMARKS
Radio NAV-AIDS	VOR	200 W	200 W			
	DME	1 kW	1 kW			
	ILS/MLS	CAT-I	CAT-I (Signal Quality CAT-II)		MLS	
	NDB	West & East	West(200W) & East(3 KW)			
	VDF	6 Channels	6 Channels			
Visual AIDS	ALS・SALS	RWY10 ALS RWY28 SALS	RWY 10 ALS RWY 28 SALS			
	RWY THR/END Light	Precision CAT-I	Precision CAT-I			
	RWY EDGE Light	At 60m Intervals	at 60m Intervals			
	RWY Center Line Light	At 30m Intervals	at 30m Intervals			
	PAPI	RWY10, RWY28	RWY 10, RWY 28			
	TWY Center Line Light	Low Intensity Green	Low Intensity Green			
	TWY EDGE Light	Low Intensity Blue	Low Intensity Green			
	Illuminated WDI	NIL	RWY 10, RWY 28			
	Apron Flood Light	North Side of Apron	North Side of Apron			
	Remote Control System for AFL	Controled at Tower	Controled at Tower			
	Power Supply System for AFL	Precision	Precision CAT-I			
ATC Facilities	ATC Consoles	TWR,APP/Radar,FIC	Tower, APP/Radar, FIC			
	CCU	NIL	Radio and Intercom Channels			
	RADAR	Primary	Primary/Secondary		With DPS	
Communication Facilities	MSS	Semiautomatic	Automatic Teletype Massage Switching System			
	AFTN TTY	Int'l.Domes.Local	International, Domestic, Local			
	AMS Console	8 Frequencies	8 Frequencies			
	MAS System	DUAL	Dual			
	Transmitter STN	A/G COM (Tower,APP/Radar,FIC) AFTN RTT ATC Direct Speech Circuits RTF	A/G COM.(Tower, APP/Radar, FIC) AFTN RTT, ATC Direct Speech Circuits RTF with Secondary Power Supply			
	Receiver STN	Same as Above	Same as Above			
	RCAG (Kaloko Hill)	Omni Directional VHF, ER VHF With E/G Generater	Omni Directional VHF, ER VHF With Secondary Power Supply			

Table 4-3 Facility Requirements (Air Navigation Facilities)

FACILITY	ITEM	EXISTING	1990	2000	2010	REMARKS
Meteological Facility	R V R	One Indicator	3 Indicators			
	Observation Instruments	Ceilometer	Ceilometer			
		Anemometer	Anemometer		With	
		Barometer	Barometer		Data Collecting	
		Thermo/Hygrometer	Thermo/Hygrometer		System	
	WX Radar	PPI Indicator	With Data Analyzing Processor			
	WX TTY	INT'L. DOMES.	International, Domestic			
	Facsimile	Receiving System	Receiving System			
	Satellite Receiver	Geostational, Polar Orbital	Geostational, Polar Orbital			

CHAPTER 5

FACILITY IMPROVEMENT PLAN

CHAPTER 5 FACILITY IMPROVEMENT PLAN

5-1 General

5-1-1 Design Years of Improvement

For the purpose of the present feasibility study, the design years of improvement of the Lusaka International Airport are set at 2000 and 2010 for the proposed improvement stages of Phase I and Phase II respectively.

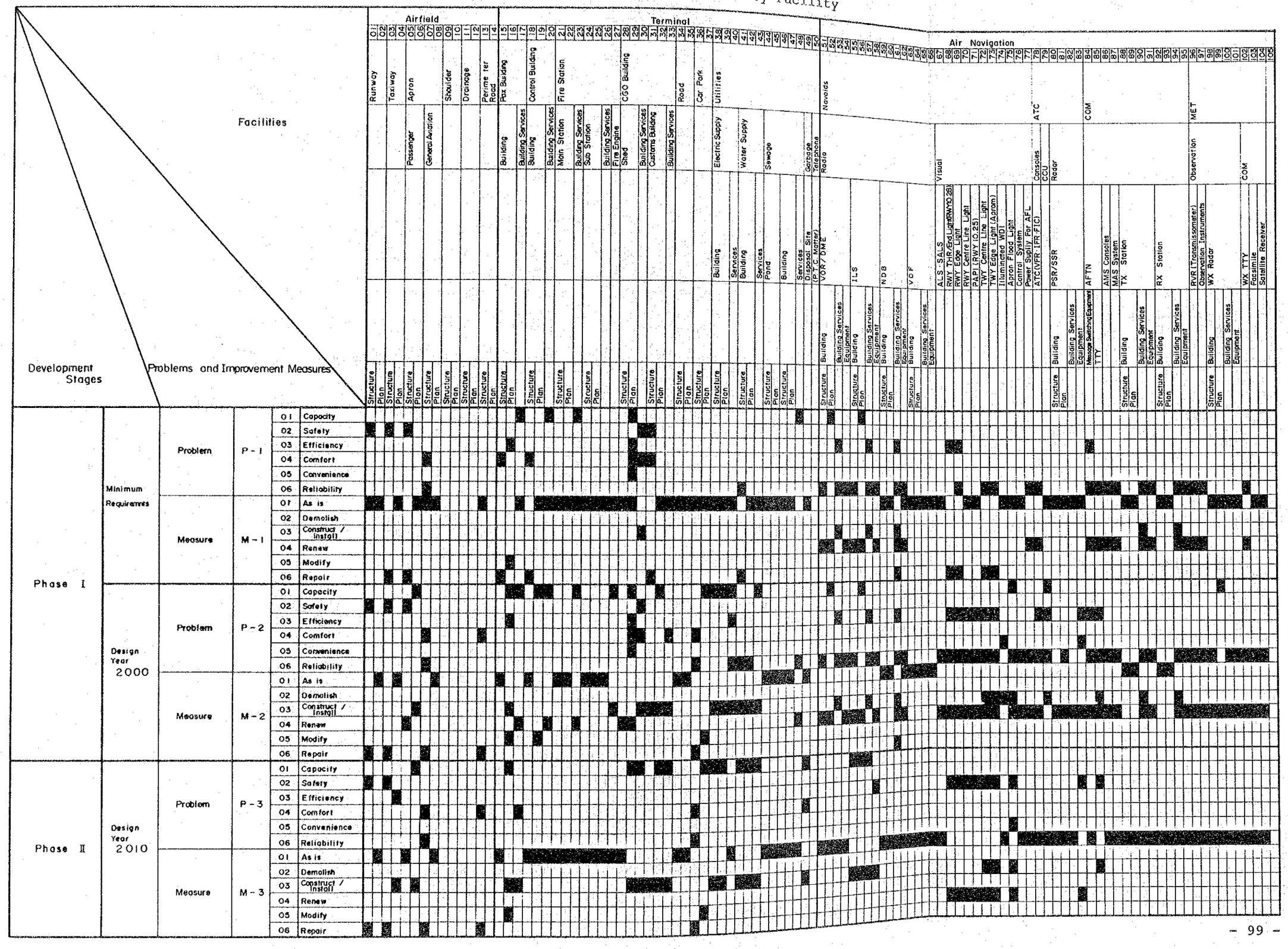
For the sake of optimizing investment effects, the facilities planned for the design years are recommended for completion 10 years ahead of the respective design years, as is generally practiced in airport development projects, namely by 1990 and 2000 for Phases I and II respectively.

Apart from the proposed two-phase development of medium- and long-range perspective as mentioned above, the Study Team sees a need for urgent improvement of a few, limited facilities at the Lusaka International Airport for soonest possible execution in order to permit the Airport to maintain the present functional level. This need is termed "minimum requirements" for the purpose of this study, and if this is not met for any reason, then such improvement should be implemented as an integral part of Phase I work.

5-1-2 Problems and Countermeasures

The facility improvement plan is developed by closely examining the existing facility conditions described in Chapter 3 hereinabove in the light of the facility requirements presented in Chapter 4 hereinabove. Presented in Table 5-1 is a comparative tabulation, in graphic form, of the existing problem areas by nature and the corresponding countermeasures by method of implementation, i.e., whether to repair, modify, renew, newly construct/install, or demolish. The supplemental materials on this chapter are compiled in Appendix F.

Table 5-1 Problems and Important Measures by Facility



5-2 Airfield Facilities

5-2-1 Runway, Taxiway and Runway Shoulder

Runway and taxiway pavement is classified as shown in Fig. 5-1 according to the working load of aircraft. Table 5-2 shows the respective thicknesses for the planned pavement improvements by area so classified and by phase of development. The pavement structures of the planned overlay and of the new pavement for the planned construction are shown in Fig. 5-2. As for the rigid pavement of the runway, cracked concrete slabs are to be replaced in Phase I, and also in Phase II, if any.

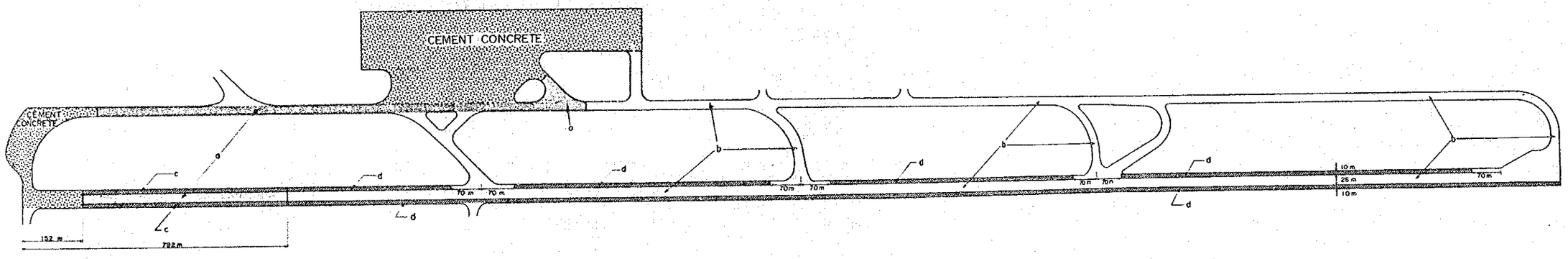


Fig. 5-1 Pavement Classification of Runway and Taxiway

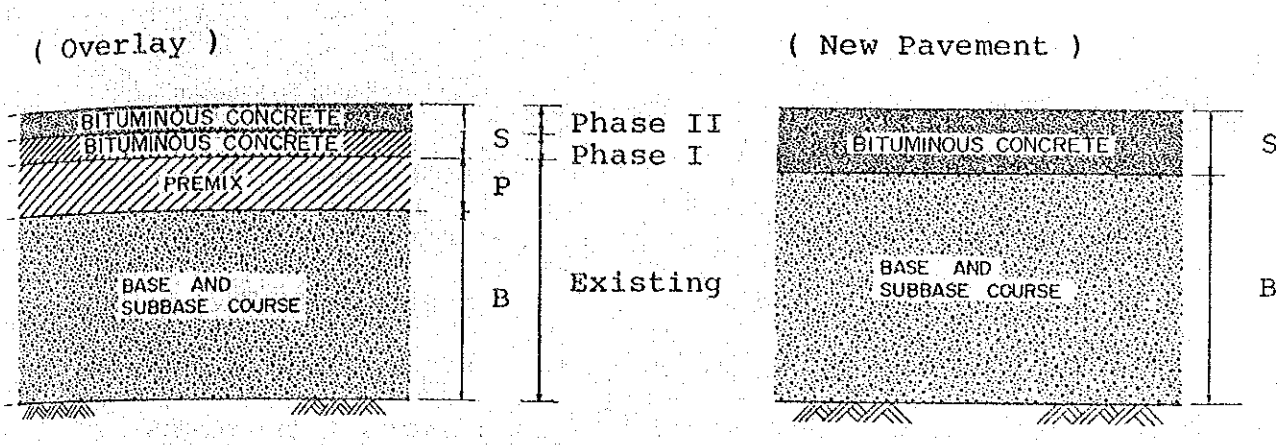


Fig. 5-2 Planned Pavement Structure

Table 5-2 Planned Pavement Thickness

(Unit : cm)

Improvement	Area		B	P	S		Remarks
					Phase I	Phase II	Pavement Types*
Overlay	Runway	a	79	10	10	5	R2,R12
			89	10	5	5	R1,R1AB,R1A
		b	79	10	5	5	R2,R2AB,R2BC,R2C,R12
			89	10	4	-	R1
		c	79-89	10	4	-	All types
		d	79-89	10	4	-	All types
	Runway Shoulder		27	-	3	-	
	Taxiway	a	79-89	10	10	6	All types
		b	79	10	5	-	T2
			89	10	4	-	T1
New	Taxiway		81	-	-	14	Parallel
		b	81	-	-	14	Rapid exit
			81	-	14	-	For new VIP apron

* See"C-3 Types of Pavement"in Appendix C.

5-2-2 Apron

For the sake of effective utilization of the apron space to accommodate the required number of aircraft stands, push-out system is adopted under Phase I for 350-seaters while maintaining the present taxi-out system for smaller aircraft, whereas under Phase II the 350-seater stands to be added and the 100-seater stands constructed under Phase I are both planned for push-out manoeuvering. Considering the fact that the western side of the passenger terminal is used for international services and the eastern side for domestic, large aircraft stands are planned on the western side and the ones for smaller aircraft on the eastern side.

Under Phase I, to minimize the distance between the terminal building and the aircraft stands, the turfed area between the parallel taxiway and the existing apron is converted into an additional apron space, and the Phase II apron expansion is planned on the western side of the existing apron directly adjacent thereto.

Along with the creation of a new, separate VIP building under Phase I as planned in Section 5-3-7 hereinafter, a new VIP apron is to be created, and it is placed between the control building and the fire station next to the existing apron so that small domestic service aircraft may use the VIP apron when not in use.

As for the apron pavement, the cracks on the surface are to be repaired as part of the "minimum requirements" under Phase I which also include replacement in Phase I of concrete slabs by 1990. In Phase II, cracked concrete slabs, if any, are to be replaced.

Cross sections of the new apron pavements are shown in Fig. 5-3. Apron configurations in Phase I and Phase II are shown in Figs. 5-4 and 5-5 respectively.

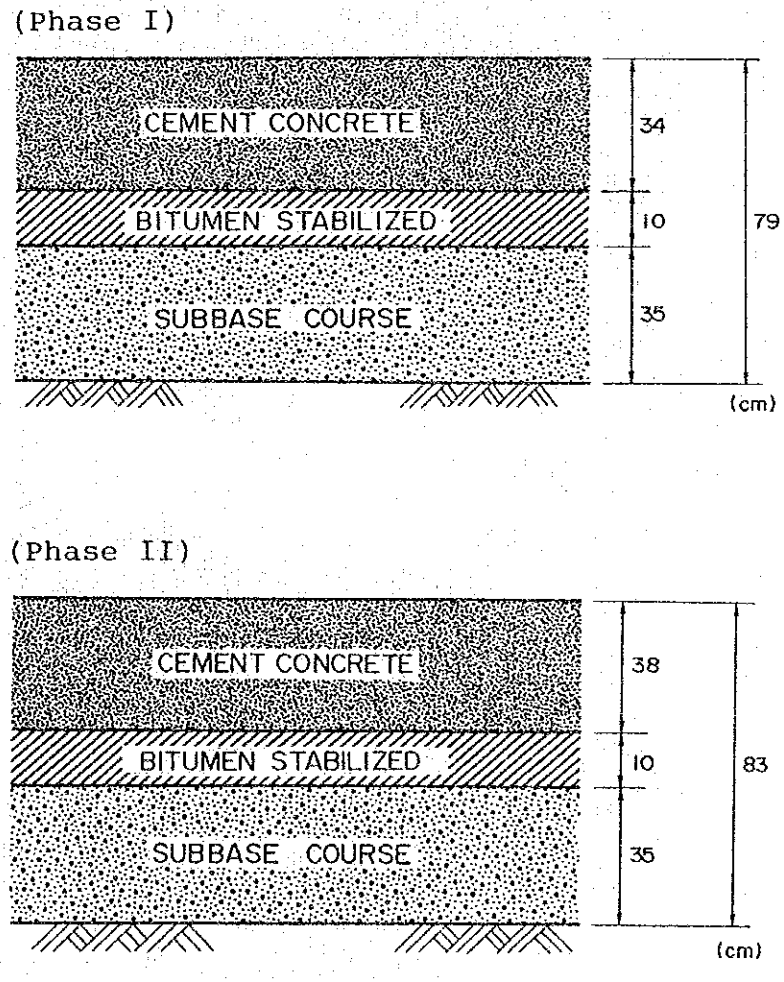


Fig. 5-3 Cross Section of New Apron Pavement

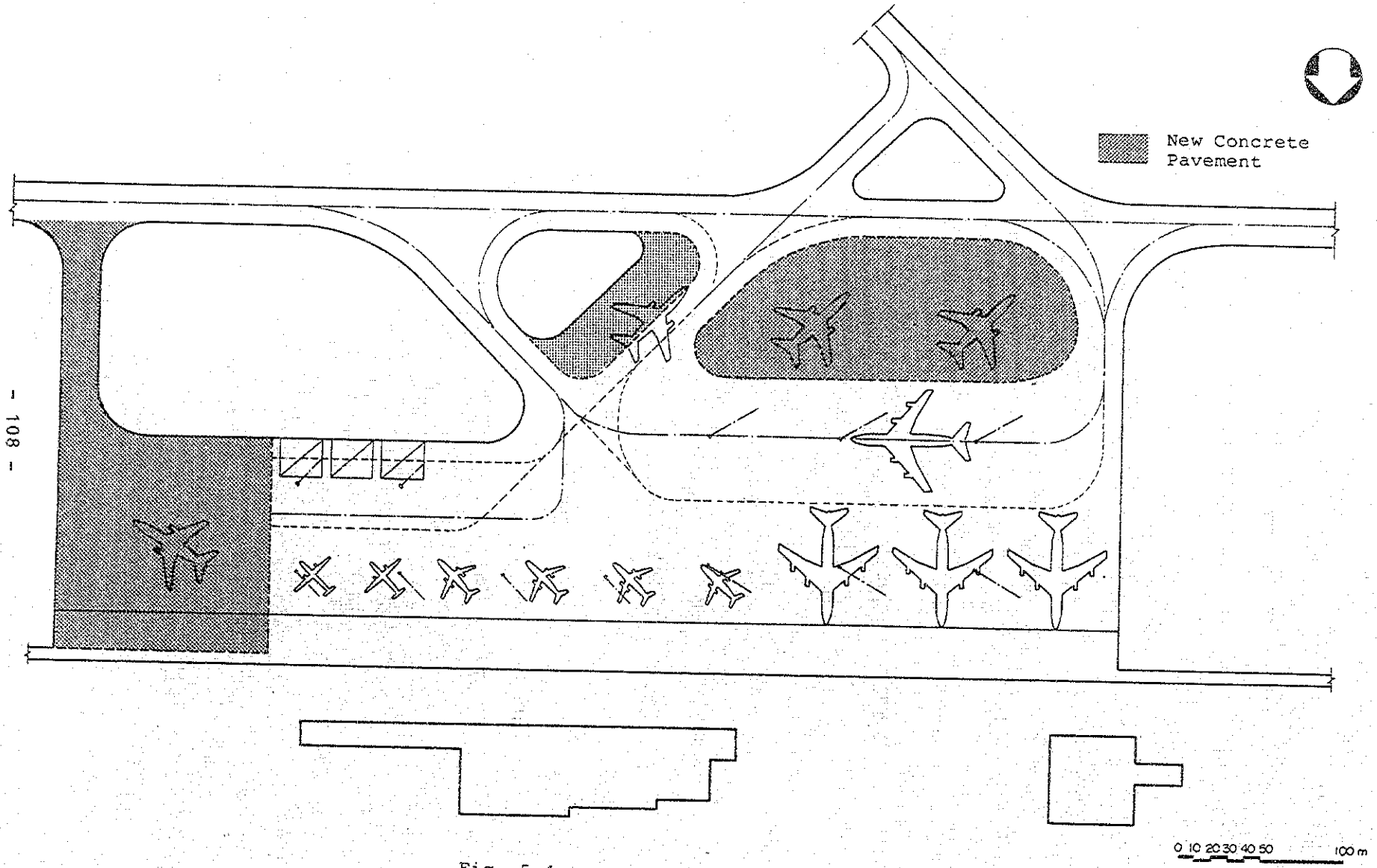


Fig. 5-4 Apron Configration (Phase I)

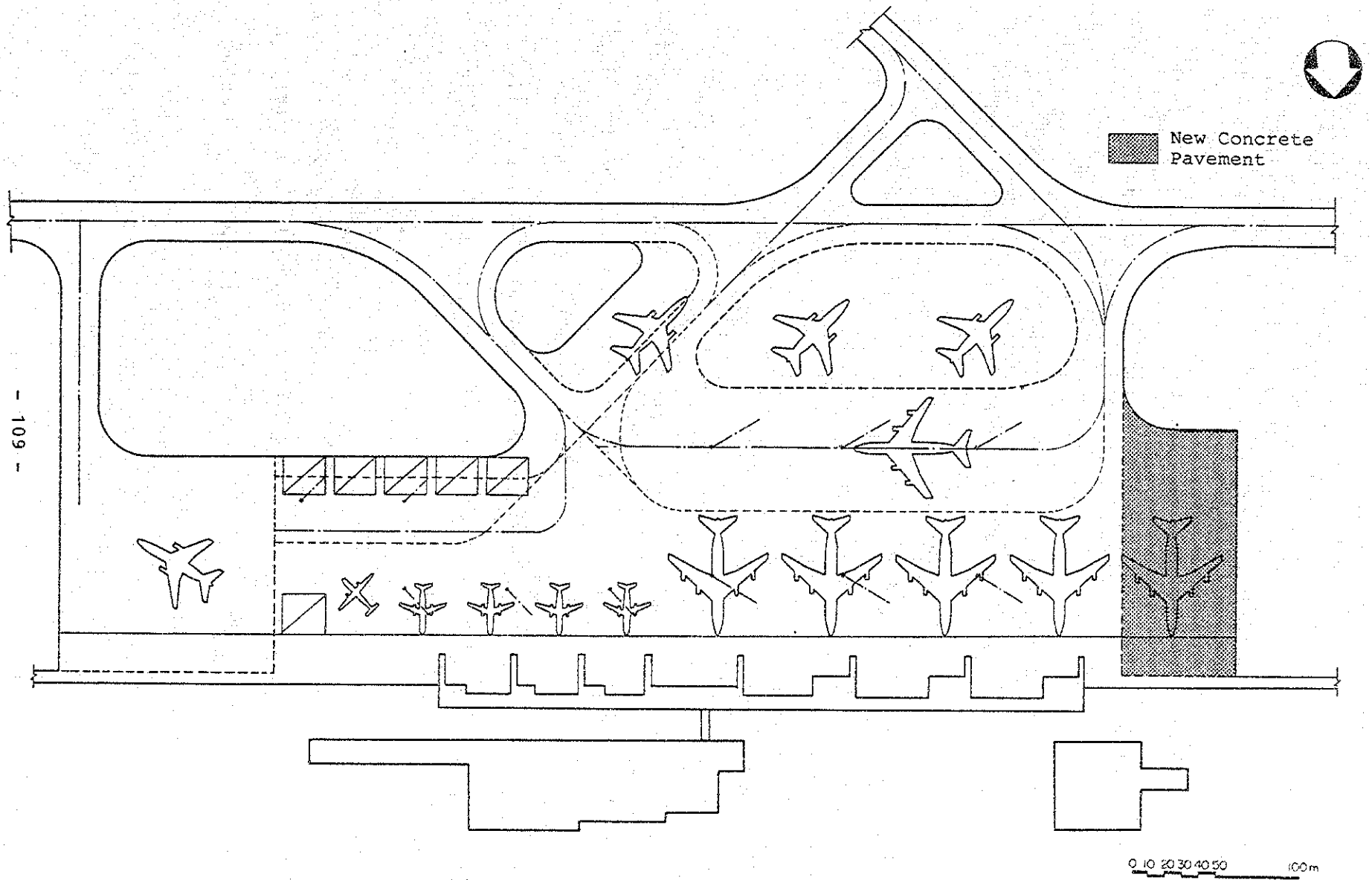


Fig. 5-5 Apron Configration (Phase II)