9.3.2 Runway Strip

The length and width of the runway strip in the medium-term development will be 2,620m and 200m respectively. 90 m long and 90 m wide runway end safety areas are provided at both ends of the runway strip.

9.3.3 Taxiway

Two exit taxiways will be provided between the new runway and the new apron in the medium-term development. The minimum width of the taxiway is 23m according to ICAO Recommendation, however, 26.5m is adopted for the width in order to secure the required clearance between the wheels of maneuvering aircraft and the edge of the taxiway.

A connecting taxiway will be provided between the new runway and the existing apron for the general aviation aircraft since the general aviation facilities will remain on the present site after the completion of the medium-term development. The width of the connecting taxiway will be 23m because large jet aircraft, such as the A300, could taxi between the existing apron and the new runway during the construction period.

9.3.4 Apron

A new apron for accommodating two A300 class aircraft and one DC-10 class with nose-in parking configuration and one F-50 class with self-maneuvering will be provided. The width and depth of the apron will be 228.5m and 124.5m respectively.

B-747-400 can also park on the new apron with angled nose-in parking configuration as shown in Figure 7.2.6.

9.3.5 GSE Road

25m and 30m wide GSE (Ground Service Equipment) roads will be provided airside in front of the passenger terminal building and the cargo building respectively.

GSE park will be provided on the east of the apron.

9.3.6 Airfield Road

The runway strip will be surrounded by the perimeter road. The service road will be provided between the fire station and the new runway, between the perimeter road and the new runway, and along the ALS and SALS. The width of the airfield road will be 3m.

9.3.7 Terminal Road and Car Park

Terminal road will be constructed for vehicle circulation on the landside of the terminal area. The width of the terminal roads will be 6.5m and will have two lanes except at the terminal frontage road. The terminal frontage road will be 13.25m wide for four lanes of one-way traffic, i.e., a standing lane, a weaving lane, and two through lanes.

The car park that will accommodate 310 cars will have one entrance and exit and a booth for collecting the parking fee at the exit gate.

An independent taxi stand area with 64 spaces will be provided.

9.3.8 Grading Plan

Based on the runway profile described in section 7.6 and the layout plan of facilities in section 9.2, 9.3.1 to 9.3.7, the grading plan was prepared. The following items were considered in the plan:

a) To follow ICAO Recommendations.

b) To minimize earthwork volume.

c) To facilitate drainage.

As a result of the grading plan, a typical cross section is shown in Figures 9.3.1 and 9.3.2.

Typical slopes adopted in the grading plan are as follows:

Transverse slope of runway	:	1.3%	(ICAO Max. 1.5%)
Transverse slope of runway shoulder	:	2.5%	(ICAO Max. 2.5%)
Transverse slope of runway strip	:	1.0% ~ 2.5%	(ICAO Max. 2.5%)
Transverse slope of taxiway	:	1.5%	(ICAO Max. 1.5%)
Slope of apron	:	1.0%	(ICAO Max. 1.0%)

The slope of excavation is 1:1 and the embankment is 1:1.8. A 2m wide bench will be provided for every 5m of slope height.

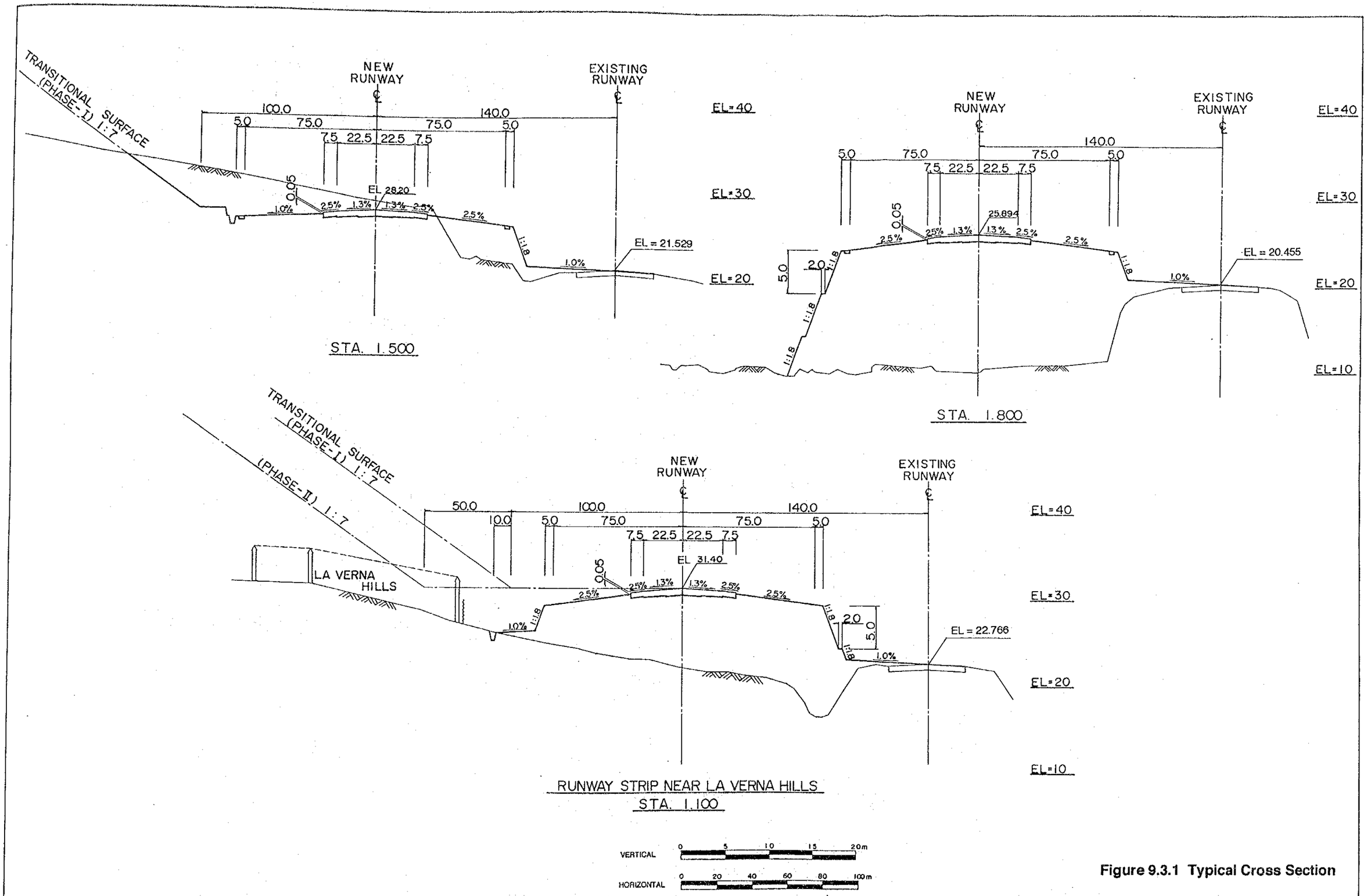
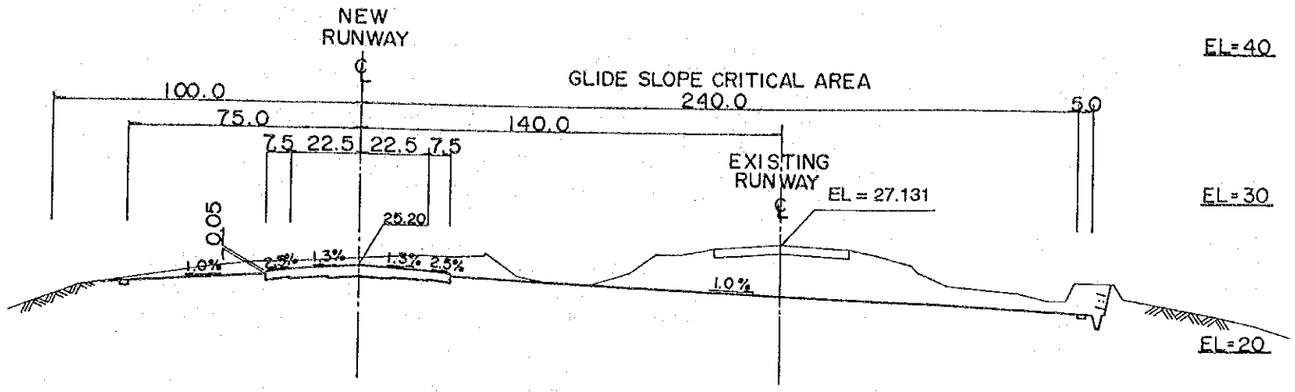
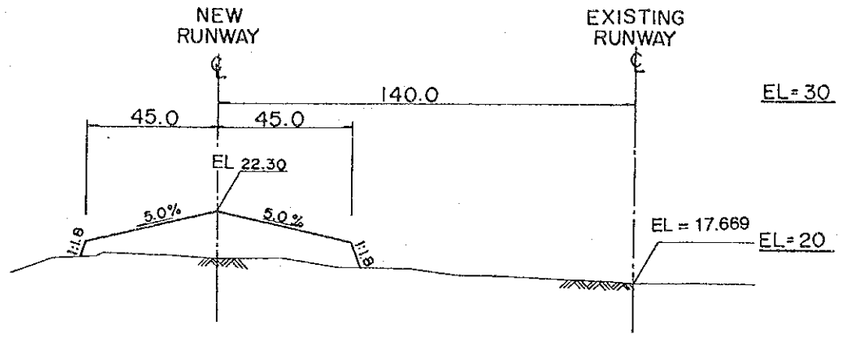


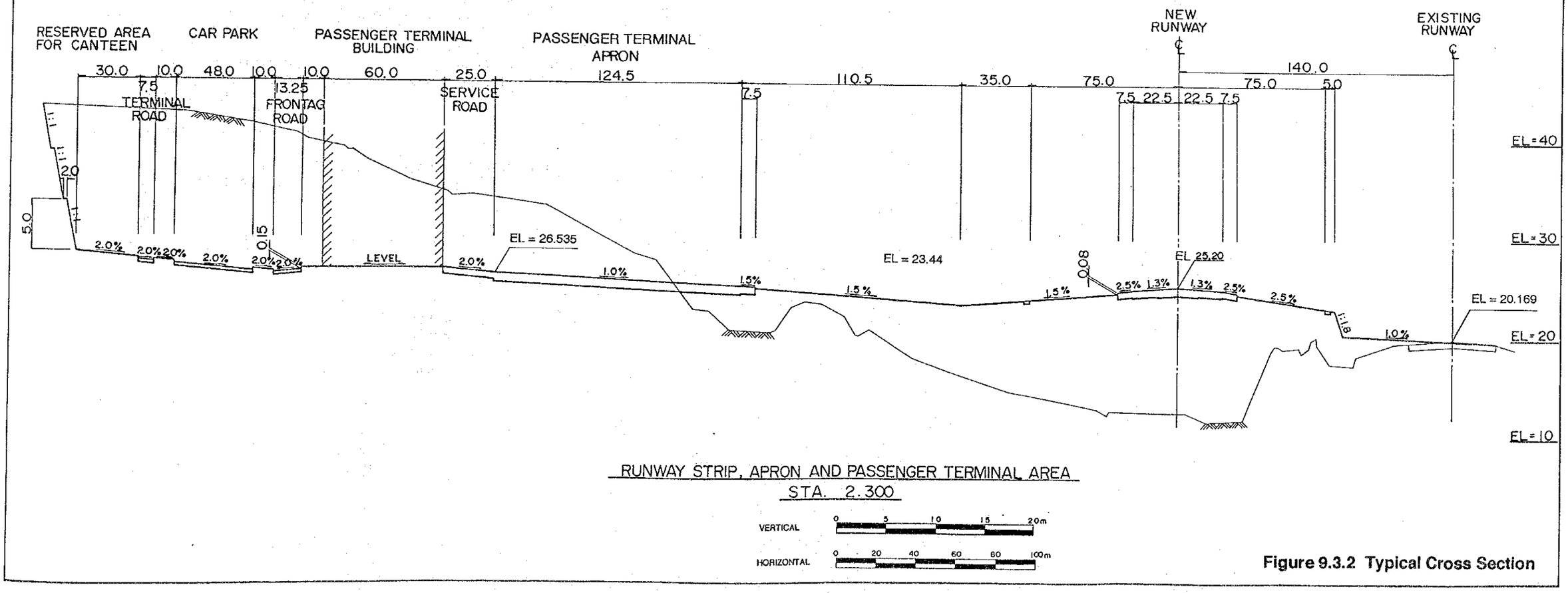
Figure 9.3.1 Typical Cross Section



RUNWAY STRIP AND GLIDE SLOPE CRITICAL AREA
STA. 3.500



RUNWAY END SAFETY AREA
STA. 3.700



RUNWAY STRIP, APRON AND PASSENGER TERMINAL AREA
STA. 2.300

Figure 9.3.2 Typical Cross Section

9.3.9 Storm Water Drainage Plan

(1) Basic Concept

At present, there are 2 drainage systems in the northern side of Davao International Airport. One is flowing from La Verna Hills subdivision to the south through the pipe culverts crossing the existing runway. The other flows to the east from the eastern side of the proposed new terminal area through the creek located north of the airport.

Storm water drainage is planned so as not to cause flooding and irrigation problems downstream due to the big change of the system. The storm water drainage system is planned to minimize the culvert crossing the runway, in consideration of ease of maintenance and economy.

As shown in Figure 9.3.3, storm water on the western portion of the runway strip and the new terminal area is discharged into the river located on the western side of the new terminal area. Storm water on the eastern portion of the runway strip is discharged into the river located north of the airport.

(2) Layout of Drainage facilities

Two 1,200mm diameter pipe culverts will be laid under the new runway as same as the existing pipe culverts under the existing runway. Basically, pipe culverts are adopted for the pavement area in the airside, trapezoidal channels for unpaved area, and U-shaped channels for the landside area.

Trapezoidal channels are newly adopted along the boundary of the airport property area at southern side of runway strip so as that storm water will not flow into the surrounding subdivisions.

(3) Size of Drainage facilities

The criteria employed for determining the size of storm water drainages are summarized as follows:

a) Runoff

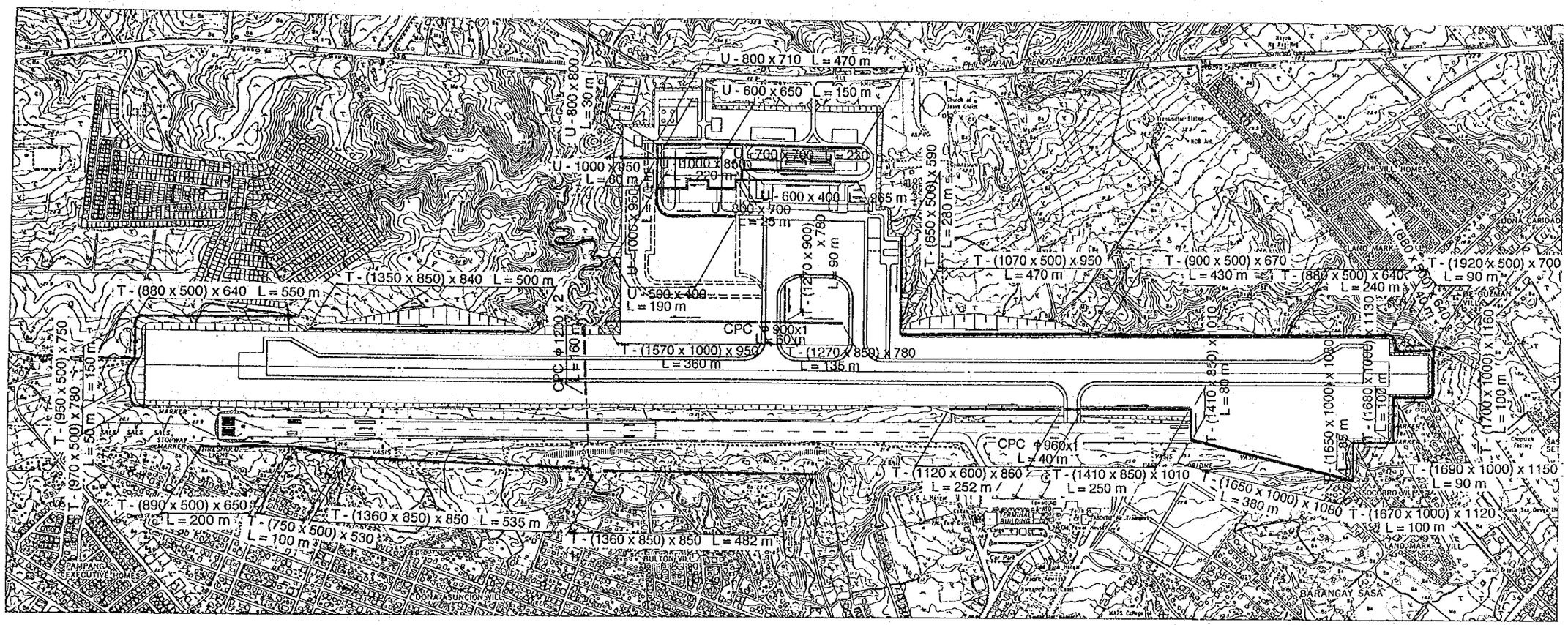
The rational formula is used to estimate run-off.

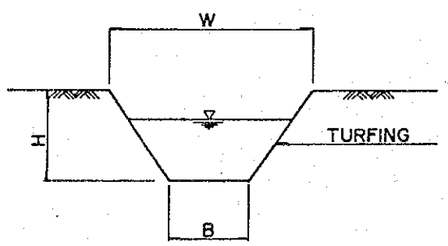
$$Q = \frac{1}{360} CIA$$

where,
- Q : Run-off (cum./sec)
- C : Run-off coefficient
- I : Rainfall intensity (mm/hr)
- A : Catchment area (ha)

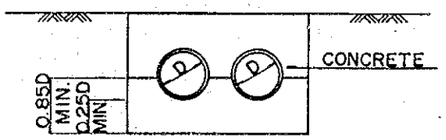
b) Runoff Coefficient

Pavement area	:	0.95
Building area	:	0.90
Turf area	:	0.40

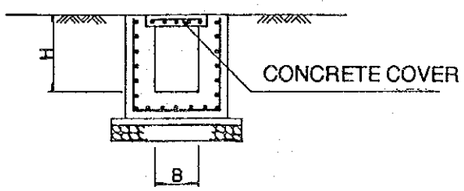




TRAPEZOIDAL CHANNEL
T - (W - B) H



REINFORCED CONCRETE PIPE
CPC ϕ (D) x n



U - SHAPED CHANNEL
U - B x H

Figure 9.3.3 Storm Water Drainage Plan

c) Rainfall Intensity

As described in Appendix - 3.5.1, the following equation was formulated to estimate rainfall intensity of 10 year recurrence.

$$It = 13{,}351/(t+69.37)$$

where, It : Rainfall intensity for "t" time period (mm/hr)
t : Duration of rainfall (minute)

9.3.10 Pavement Plan

The pavement plan for the medium-term development is shown in Figure 9.3.4.

The type of the pavement is cement concrete for the runway, taxiway, apron and GSE road, and asphalt concrete for the airfield road, terminal road and car park from the view point of load conditions, durability, construction cost and ease of work.

The required thickness of each pavement and the pavement structural component is based on JCAB standard.

The pavement structural component of the runway, the taxiways and the apron consist of the base course (38 cm thick) and concrete slab (37 cm thick). PCN of the pavement will be PCN 59/R/B/W/T. Although the design aircraft is DC-10 class, B747-400 can also be accommodated by the pavement as overload operation under the condition that it is operated a few times a day and for short periods of time.

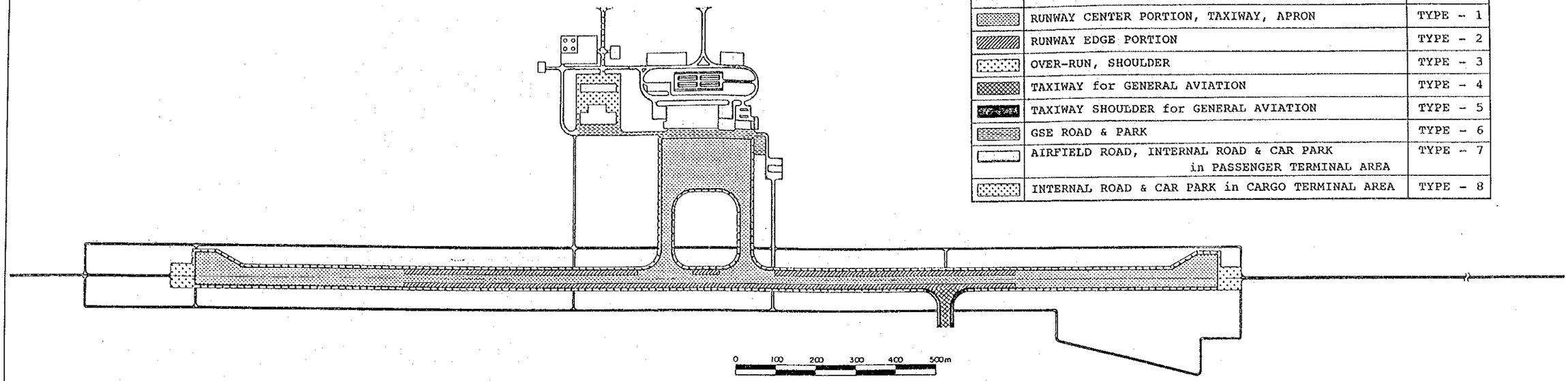
Table 9.3.1 ACN by Aircraft Type and ACN/PCN

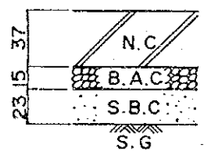
Aircraft Type	ACN	ACN/PCN	Remarks
B-747-400	66	1.12	1.1<ACN/PCN≤1.3

9.3.11 Fencing

A perimeter fence will be provided along the boundary of the airport property area except at the sections where the existing fencing are able to be utilized. A security fence will be provided on the boundary between the airside and the landside at the terminal area. In addition to the above fencing, another security fence will be installed close to, and along the edge of the runway strip to maintain a tight security, because the existing fence is broken in many places by the neighboring residents. It is noted that the cost for the additional security fence is not included in the cost estimates shown in Table 10.3.1 since this fencing will be required to meet with the conditions prevailing.

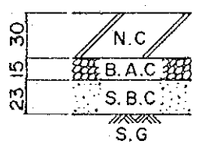
LEGEND		
SYMBOL	ITEMS	TYPE
	RUNWAY CENTER PORTION, TAXIWAY, APRON	TYPE - 1
	RUNWAY EDGE PORTION	TYPE - 2
	OVER-RUN, SHOULDER	TYPE - 3
	TAXIWAY for GENERAL AVIATION	TYPE - 4
	TAXIWAY SHOULDER for GENERAL AVIATION	TYPE - 5
	GSE ROAD & PARK	TYPE - 6
	AIRFIELD ROAD, INTERNAL ROAD & CAR PARK in PASSENGER TERMINAL AREA	TYPE - 7
	INTERNAL ROAD & CAR PARK in CARGO TERMINAL AREA	TYPE - 8





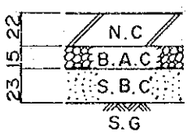
TYPE - 1

RUNWAY CENTER PORTION, TAXIWAY, APRON



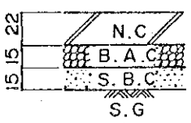
TYPE - 2

RUNWAY EDGE PORTION



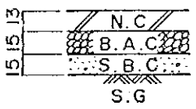
TYPE - 3

OVERRUN, SHOULDER



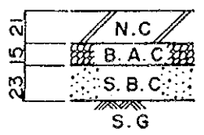
TYPE - 4

TAXIWAY FOR GENERAL AVIATION



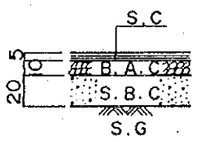
TYPE - 5

TAXIWAY SHOULDER FOR GENERAL AVIATION



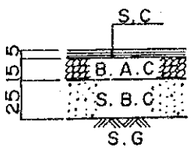
TYPE - 6

GSE ROAD & PARK



TYPE - 7

AIRFIELD ROAD, INTERNAL ROAD & CAR PARK PASSENGER TERMINAL AREA



TYPE - 8

INTERNAL ROAD & CAR PARK CARGO TERMINAL AREA

LEGEND		
SYMBOL		ITEMS
	N.C	PORTLAND CEMENT CONCRETE SLAB
	B.A.C	BASE COURSE (GRADED AGGREGATE)
	S.B.C	SUB BASE COURSE (CRUSHER-RUN)
	S.C	SURFACE COURSE (ASPHALT CONCRETE)
	S.G	SUBGRADE

Figure 9.3.4 Pavement Plan

9.4 Architectural Works

9.4.1 Passenger Terminal Building

(1) Concept

A new passenger terminal building will accommodate both international and domestic passengers including airline administrative offices (PAL) and will be about 16,160 sq.m in total floor area with a 2-story reinforced concrete structure to meet the requirements for medium-term development.

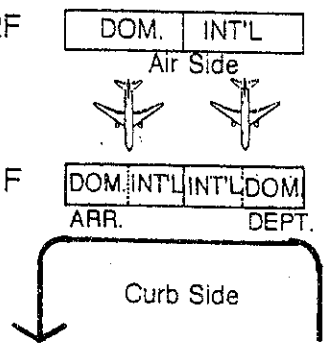
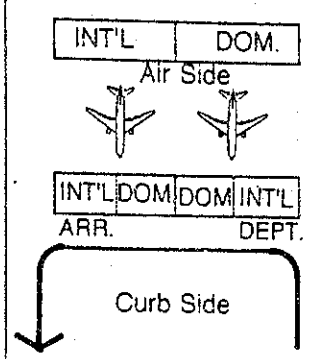
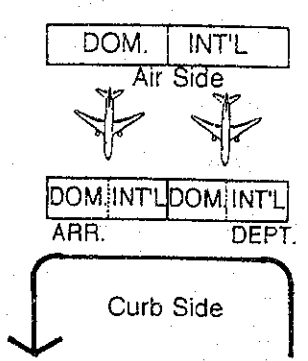
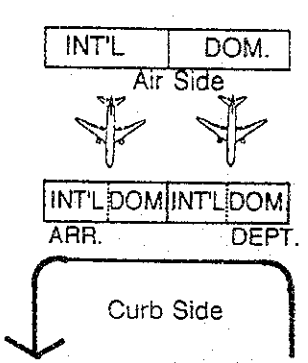
A linear frontal concept having a one and one-half processing level is adopted for the passenger terminal building taking into account the passenger demand and the provision of passenger boarding bridges.

(2) Zoning

As the passenger terminal building will be used for both international and domestic passengers it will be divided into four zones, namely the departure and arrival zones for international passengers, the departure and arrival zones for domestic passenger, and, based on four zone alternatives, can be made in 24 permutations mathematically. Four alternatives were selected as practical cases taking into account common use of the facilities and areas, such as public concourse, check-in lobby and counter, public departure hall, etc. and keep to right in the traffic way.

Four alternatives, namely ALT-1,2,3, and 4, have been examined and as the result of the study ALT-2 was selected based on the comparison table explained in Table 9.4.1.

Table 9.4.1 Comparison Table for Zoning of Passenger Terminal Buildings

Items / Alternatives	ALT -1		ALT -2		ALT -3		ALT -4		Remarks
Layout									LEGEND ARR. :Arrival DEPT.:Departure INT'L:International DOM. :Domestic PAX. :Passenger For Evaluation G :Good F :Fair P :Poor
1. Separation of INT'L and DOM. PAX. Flows	P	Crossing ARR. INT'L PAX flow with DOM. PAX. on 2F	G	ARR.INT'L and DOM.PAX. flow can be separated easily on 2F	P	It seems to have the same problem as indicated in ALT-1.	G	Same as ALT-2	
2. Utilization of Curb Side	F	DEPT.PAX. can be smoothly conducted to the terminal. ARR.INT'LPAX.may have Traffic consession infreqently caused by ARR.DOM.PAX.	G	DEPT.and ARR.PAX.can be smoothly conducted to and from the terminal	F	Same as ALT-1	G	Same as ALT-2	
3. Effective Use of Check-in Lobby	G	Common use of check-in lobby is possible.	G	Same as ALT-1	G	Same as ALT-1	G	Same as ALT-1	
4. Security Operation	P	Security Operation is ineffective due to crossing of ARR.INT'L and DOM.PAX.on 2F	G	Security Operation is effective.	P	Same as ALT-1	G	Same as ALT-2	
5. Operation of CIQ Facilities	G	Management and operation of CIQ are more efffective as INT'L area is located in the middle of terminal on 1F	F	Management and Operation of CIQ are effective.	F	Same as ALT-2	F	Same as ALT-2	
6. Expandability	F	Expansion is easy.	G	Expansion of ARR.INT'L is more complicated than ARR. DOM. Expansion is more easy because ARR.INT'l is located at the edge of the terminal.	F	Same as ALT-1	F	Same as ALT-1	
7. Evaluation	3		1		4		2		

(3) Functional Relationships and Required Areas, and Facilities in the Passenger Terminal Building

The functional relationships indicating departure and arrival passengers and baggage flows in conjunction with the components and facilities are essential for an international and a domestic passenger terminal building, and are shown in Figures 9.4.1 and 9.4.2.

The required areas and facilities in the passenger terminal building for the medium-term and the long-term development have been calculated based on the peak hour passenger volume and are shown in Appendix-9.4.1. The essential areas and facilities classified by categories, such as departure areas, arrival areas, CIQS facilities for international and domestic passenger terminal building, are listed in Table 9.4.2.

Table 9.4.2 List of Essential Areas and Facilities in Passenger Terminal Building

Categories	Areas and Facilities
International	
- Departure Areas	Public Departure Concourse, Check-in Lobby, Check-in Counters, Departure Hall, Departure Lounge, VIP Lounge
- Arrival Areas	Arrival Hall, Baggage Claim Area, Public Arrival Concourse
- Baggage Handling Areas	Baggage Make-up Area, Baggage Break-down Areas
- CIQS Facilities	Customs Inspections Passport Control Health Control Security Check
- Offices	Offices for CIQS, Airport Airline Office, Workers Room
- Concession and Other Services	Coffee stands, Restaurant, Duty Free Shop, Bank, Rent-A-Car Counters, Travel Information, First Aid Room, Observation Deck (on Roof Floor) Storage, Toilets
Domestic	
- Departure Areas	Public Departure Concourse Check-in Lobby, Check-in Counters, Departure Hall, Departure Lounge
- Arrival Areas	Baggage Claim Area
- Baggage Handling Areas	Baggage Make-up and Break-down Areas
- Office	Same as International
- Others	Ditto

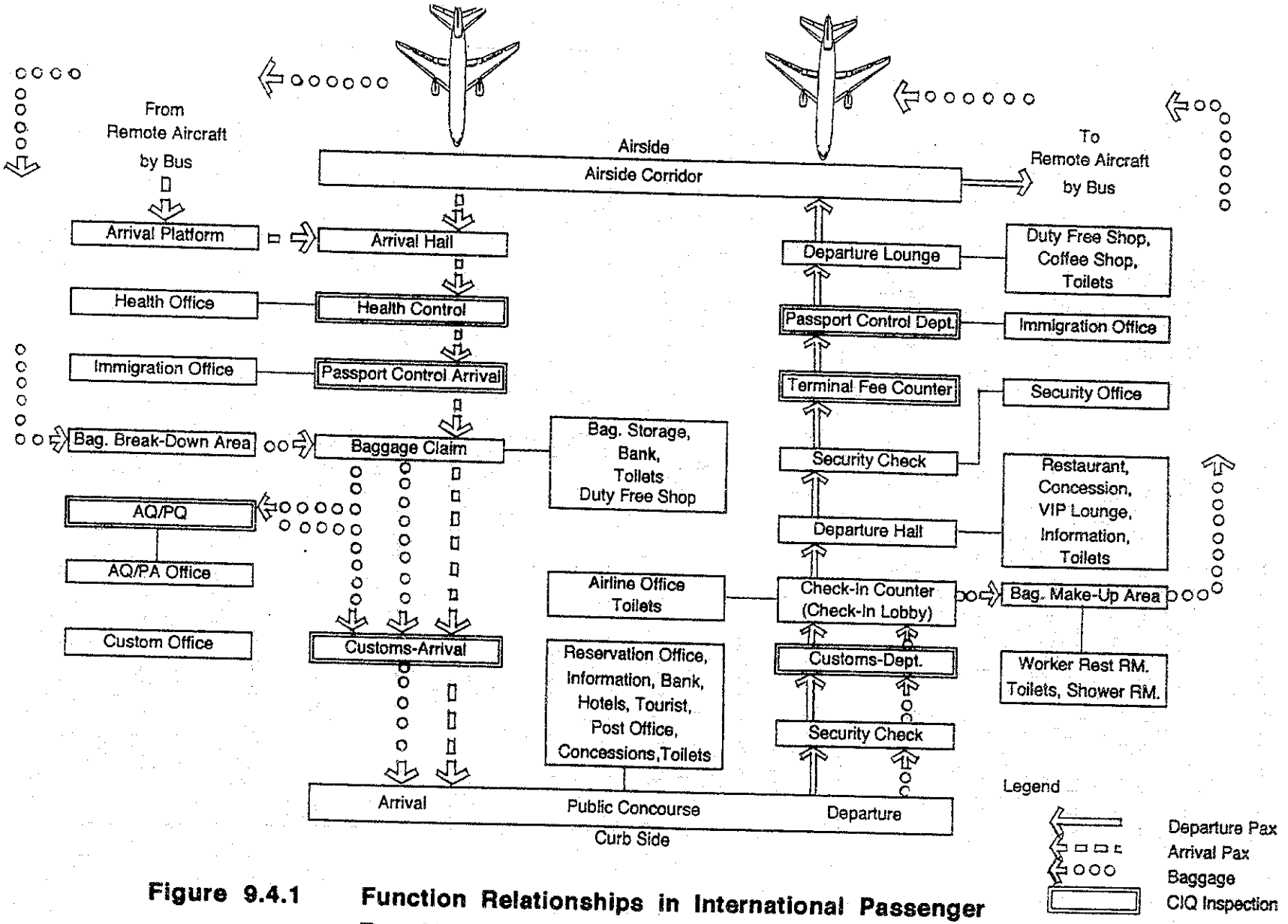


Figure 9.4.1 Function Relationships in International Passenger Terminal Building

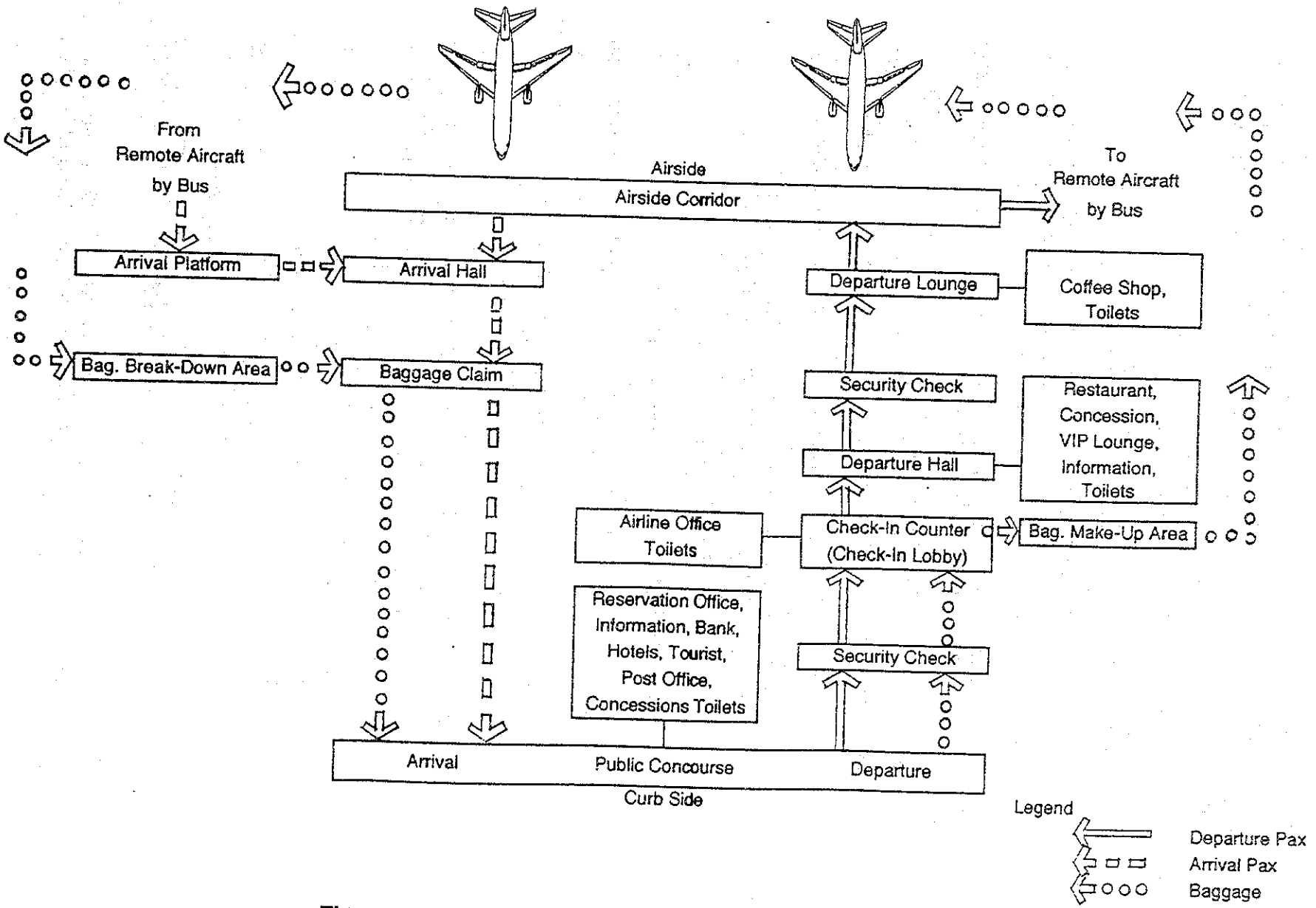


Figure 9.4.2 **Functional Relationships in Domestic Passenger Terminal Building**

The layouts of the passenger terminal building have been planned based on the functional relationships, the required areas and facilities and the list of essential areas and facilities so that the areas and facilities would be conveniently located in relation with the passengers and baggage movements.

(4) Architectural Design

a) Design Considerations

The passenger terminal buildings will have a modern design suitable for the third gateway of the Philippines taking into account the following considerations.

(i) Separation of the international and domestic passenger flows including their departure and arrival passenger flows.

(ii) Impressions of modern architecture

(iii) Impression of local identities to be attractive to tourists and visitors.

(iv) Tropical atmosphere, such as temperature, strong sunshine, rainfall, etc.

(v) Effective use of areas and facilities; share-use or joint-use methods, one that brings about economic and operational efficiency.

(vi) Easy expansion of the terminal buildings.

(vii) Provision of up-to date facilities and equipment.

(viii) Taking care of handicapped passengers by providing elevators for departures and arrivals.

(ix) Easy maintenance and economical construction cost.

b) Proposed Layout Plans

The proposed layout plans of the passenger terminal buildings, including sections and elevations, are planned based on the design considerations described in the previous pages and are shown in Figures 9.4.3 through 9.4.6. The floor areas of the terminal buildings are mentioned below:

Ground floor area	about	9,800	sq.m
Second floor area	about	6,200	sq.m
Roof Penthouse area	about	160	sq.m
Total floor area	about	16,160	sq.m

A list of the floor areas estimated based on the proposed layout plans, by the categories such as international and domestic terminal, etc. is shown in Table 9.4.3.

With regard to the terminal building foundations, as the result of soil investigation carried out in the proposed terminal site, it will most likely have pile foundations.

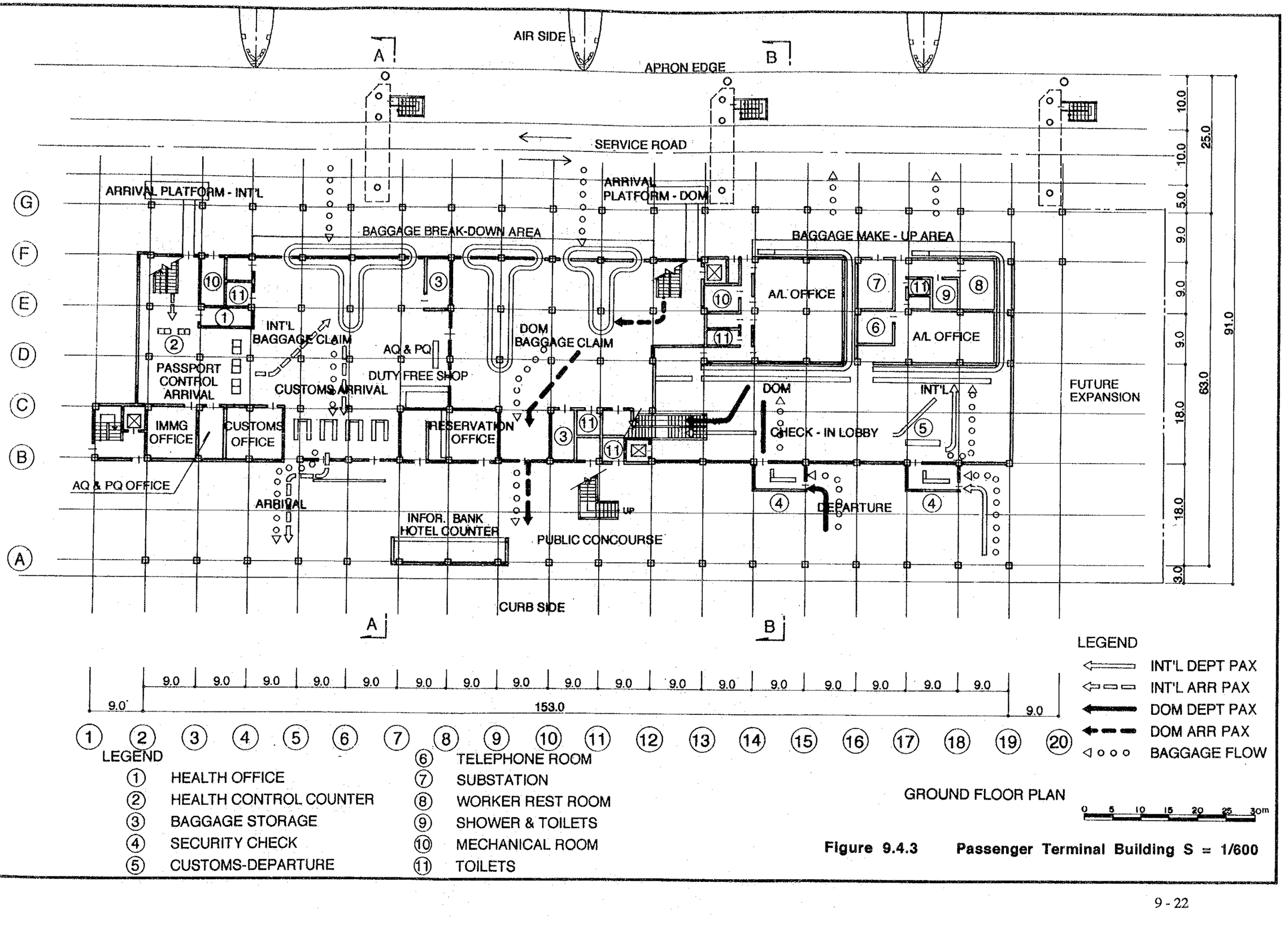
Table 9.4.3 List of Floor Areas of the Passenger Terminal Building

Area		Floor Area(sq.m)	Remarks
Common Area; Public	Public Concourse - Departure	1,422	1F
	Public Concourse - Arrival	1,512	1F
	Information, Hotel, Bank, etc.	105	1F
	Departure Hall	833	2F
	Concessions Area	276	2F
	Restaurant	356	2F
	Toilet	40	2F
	Kitchen	135	2F
	VIP Lounge	198	2F
	Toilets	73	1F,2F
	Total	4,950	
International Terminal Facilities	**Departure Area**		
	Security Check Area	45	1F
	Check-in Lobby	378	1F
	Check-in Counter	108	1F
	Security Check Area	81	2F
	Terminal Fee Counter	81	2F
	Passport Control Area	108	2F
	Immigration Office	54	2F
	Departure Lounge	492	2F
	Coffee Shop & Duty Free Shop	81	2F
	Toilets	50	2F
	Subtotal	1,478	
	Arrival Area		
	Arrival Hall	99	1F
	Health Control	44	1F
	Health Office	36	1F
	Passport Control Area	280	1F
	Immigration Office	81	1F
	Baggage Claim Area	635	1F
	Toilets	40	1F
	Baggage Storage	40	1F
	AQ & PQ Counter	63	1F
	AQ & PQ Office	45	1F
	Dufy Free Shop	40	1F
	Customs Inspection Area	420	1F
	Customs Office	90	1F
	Subtotal	1,913	
	Total	3,391	
Domestic Terminal Facilities	**Departure Area**		
	Security Check Area	45	1F
	Check-in Lobby	378	1F
	Check-in Counter	108	1F
	Security Check Area	162	2F
	Security Office	81	2F
	Departure Lounge	580	2F
	Coffee Shop	81	2F
	Toilets	81	2F
	First Class & Mabuhy Lounge	217	2F
	Toilets	40	2F
	Subtotal	1,773	

(to be continue)

Table 9.4.3 (Con't)

Area		Floor Area(sq.m)	Remarks
	Arrival Area		
	Arrival Hall	162	1F
	Baggage Claim Are	1,053	1F
	Toilets	40	1F
	Baggage Storage	40	1F
	Subtotal	1,295	
	Total	3,068	
Baggage Handling Area	Baggage Make-up Area	486	1F
	Baggage Break-down Area	729	1F
	Worker Rest Room	54	1F
	Shower & Toilet	30	1F
	Total	1,299	
Airline Office (PAL)	Check-in Office	135	1F
	General Office	270	1F
	Toilets	66	1F
	General Office	596	2F
	Reservation Office	162	1F
	Total	1,229	
Common Area; Airside Area	Airside Corridor	863	2F
	Gang Ways	240	2F
	Total	1,103	
Others	Penthouse for Observation Deck	162	RF
	Mechanical Room	170	1F,2F
	Substation	63	1F
	Telephone Room	42	1F
	Staircases, Escalators, Elevators, Open Areas & Others	1,982	1F,2F
	Total	2,419	
Ground Total		16,160	



LEGEND

①	HEALTH OFFICE	⑥	TELEPHONE ROOM
②	HEALTH CONTROL COUNTER	⑦	SUBSTATION
③	BAGGAGE STORAGE	⑧	WORKER REST ROOM
④	SECURITY CHECK	⑨	SHOWER & TOILETS
⑤	CUSTOMS-DEPARTURE	⑩	MECHANICAL ROOM
		⑪	TOILETS

GROUND FLOOR PLAN

0 5 10 15 20 25 30m

Figure 9.4.3 Passenger Terminal Building S = 1/600

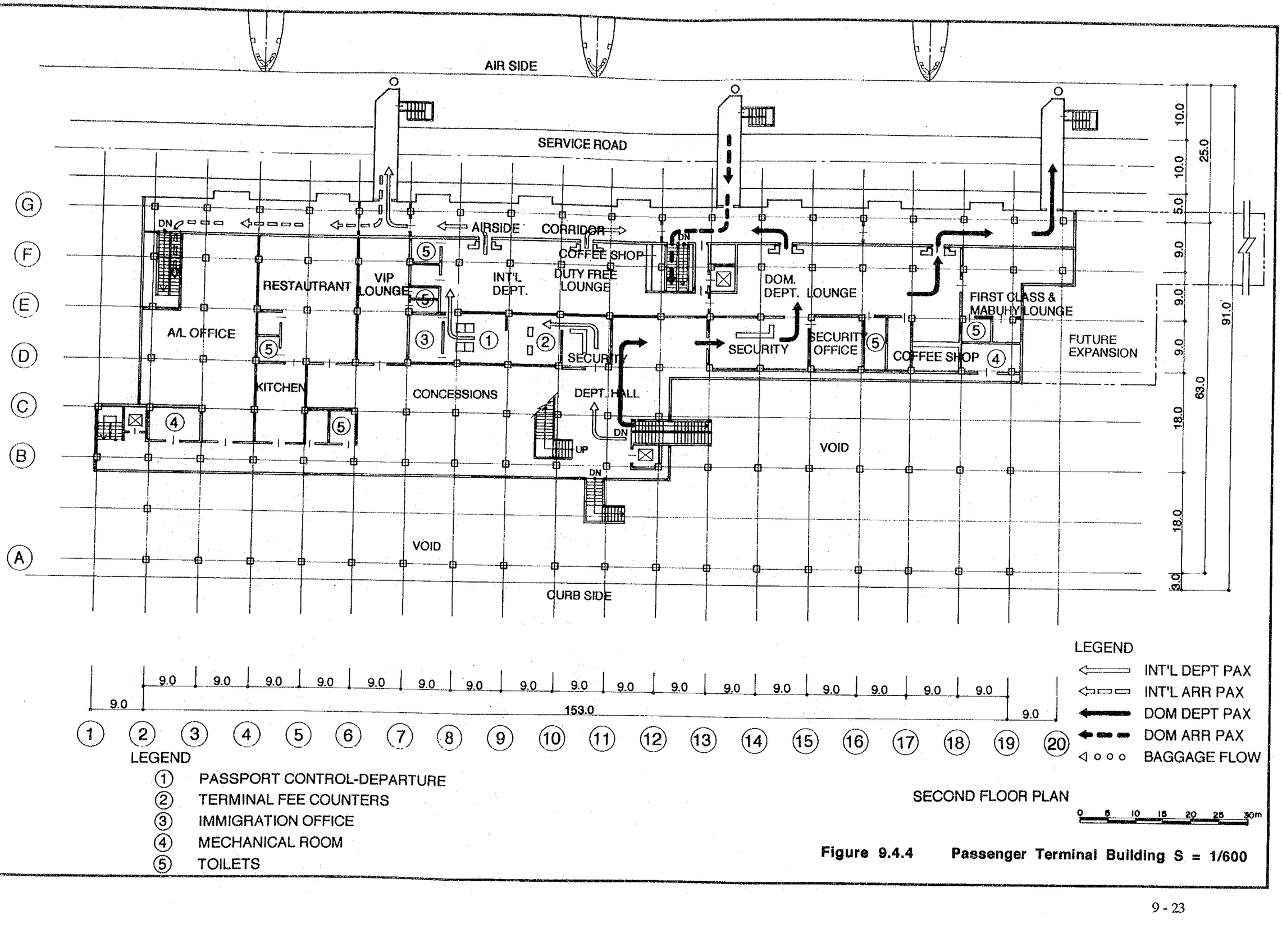
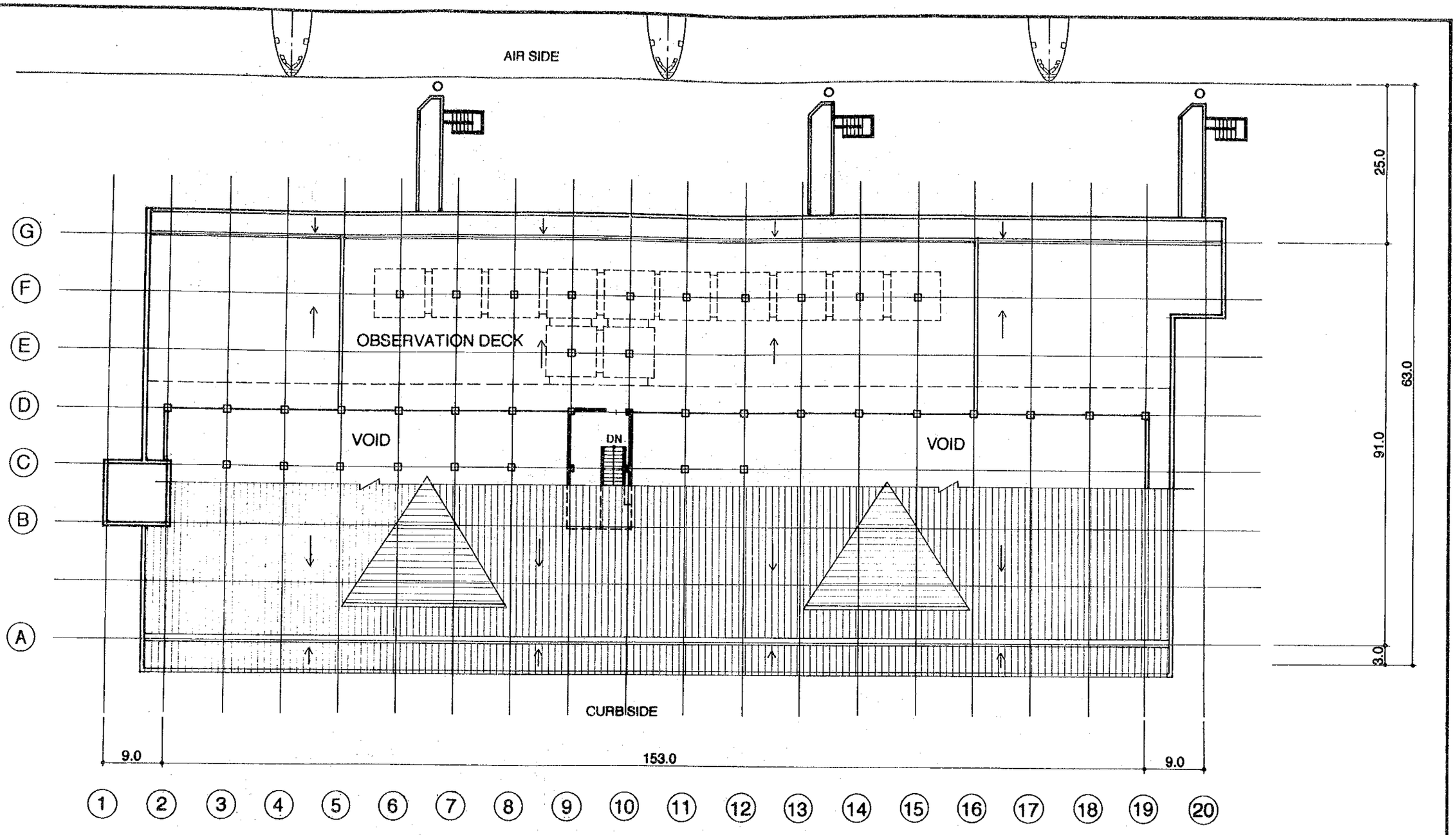
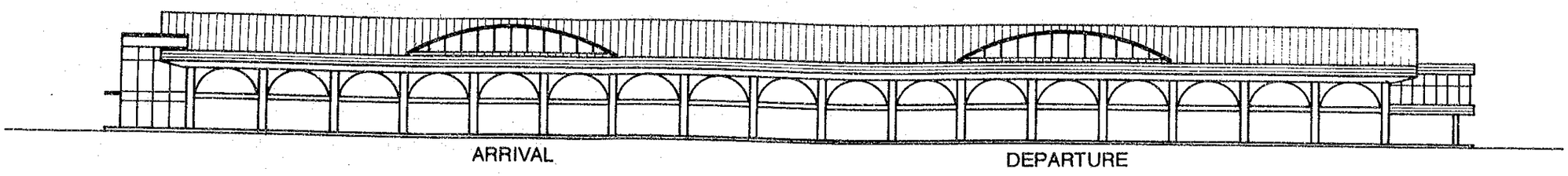


Figure 9.4.4 Passenger Terminal Building S = 1/600

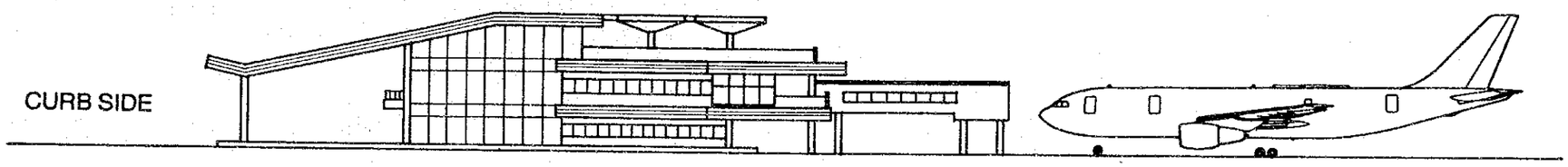


ROOF PLAN

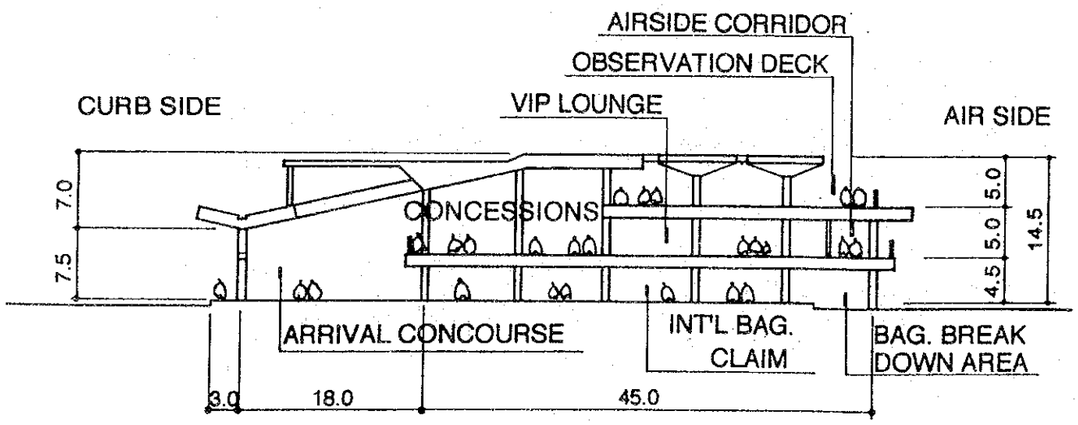
Figure 9.4.5 Passenger Terminal Building S = 1/600



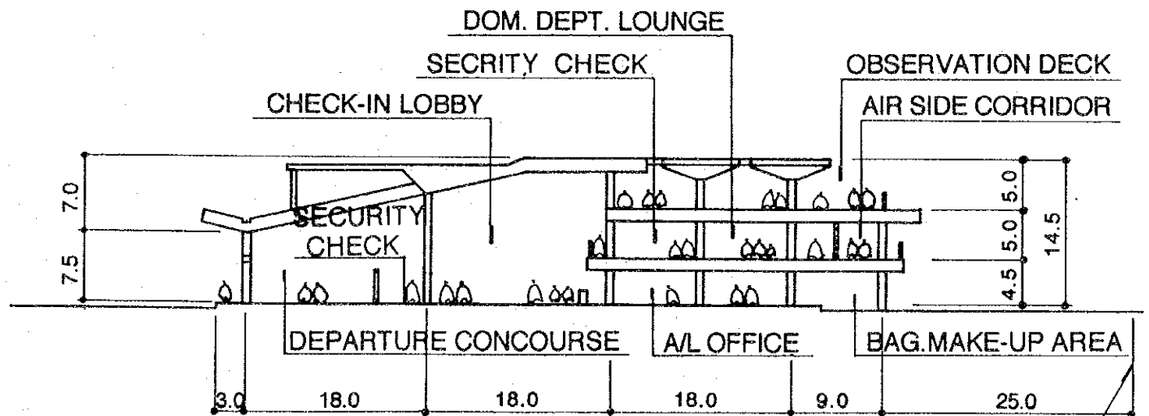
CURB SIDE ELEVATION



SOUTH ELEVATION



A - A SECTION



B - B SECTION

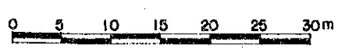


Figure 9.4.6 Elevation and Section of Passenger Terminal Building

c) Incidental Facilities to be installed in the Passenger Terminal Buildings

The following facilities will be installed in the terminal buildings:

(i) Two elevators for physically handicapped passengers, and one elevator for restaurant and concession usage.

(ii) Three escalators for departure and arrival passengers.

(iii) Air conditioning and ventilating systems; window type or split type air conditioners will be installed in closed rooms, such as offices, VIP lounge, departure lounges, first class lounge, baggage claim areas, restaurant, etc. Ceiling fans and extractor fans will be installed in the check-in lobby, concession area, and departure hall, in order to support natural ventilation.

(iv) Fire protection systems should be installed in the terminals in accordance with the Philippine fire protection code.

d) Special Equipment

(i) Baggage conveyor

Two conveyors for the check-in counters, and three conveyors for the baggage claim area, will be installed as shown.

(ii) Check-in weighing scale

24 check weighing scales (11 scales for international and 13 scales for domestic) will be installed at the check-in counters.

(iii) Security equipment

X-ray screening units with walk-through metal detectors and handy metal detectors, will be installed ahead of the check-in lobby and the departure lounges as shown.

(iv) Clock system

A master quartz clock with battery back-up will be installed in the administration room, and secondary clocks at necessary places in the terminal building.

(v) Public address system

An amplifier will be installed in the airport office. Speakers will be installed at appropriate places in the terminal buildings. A public address system will be designed to be able to announce departures and arrivals separately.

(vi) Flight information system

Considering the relatively small number of daily flights, the flight information system to be installed will be an automatic TV type.

(vii) Passenger boarding bridge

Two boarding bridges which can be utilized by passengers of aircraft (B 737s up to wide body B 747s) will be installed at the edge of gangways. The number of boarding bridges has been planned based on the peak hour aircraft movements and economical considerations.

9.4.2 Cargo Terminal Building

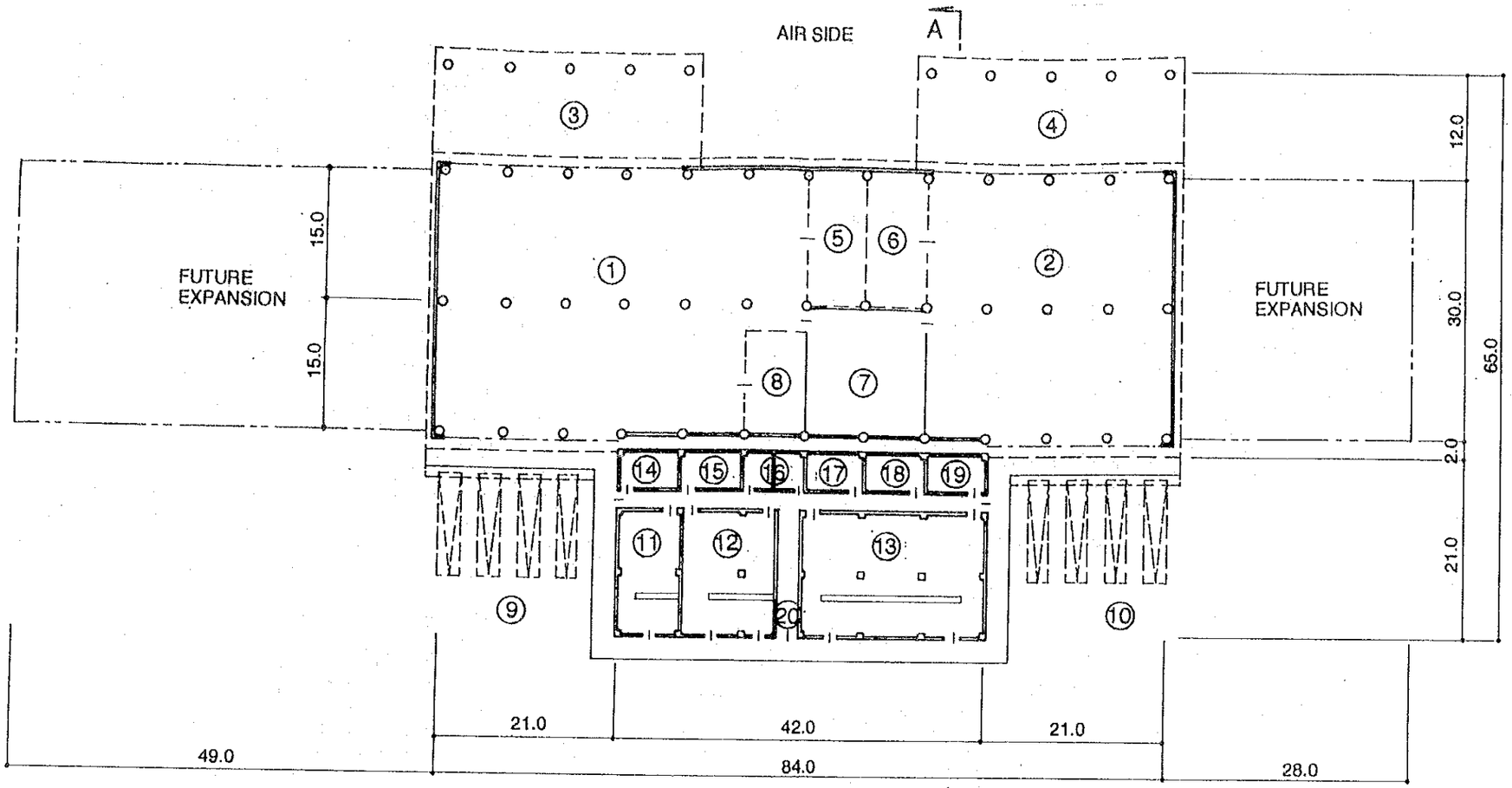
A new cargo terminal building is to be located to the southwest of the new passenger terminal building. The building is planned to meet the requirements for the medium-term development as shown in Figure 9.4.7 and will have a total floor area of about 3,500 sq.m. The cargo storage area will be a single story building with a steel frame structure; the office area will also be single story with a reinforced concrete structure.

The floor area of the cargo storage area of the building will be about 2,500 sq.m, and will accommodate international and domestic services. However, the building will accommodate mainly domestic services for the annual cargo volume in the year 2000 between international and domestic services. The domestic and international annual cargo volume in 2000 are expected to be 43,800 tons and 1,600 tons respectively. The outbound storage is planned in the southeast of the building. The inbound storage is located on the other side of the building (in the northwest side).

International cargo storage, including both the outbound and inbound storage, are located almost in the center of the cargo storage area as shown in Figure 9.4.7. A domestic transit storage area is considered to be located in the center of the cargo storage area.

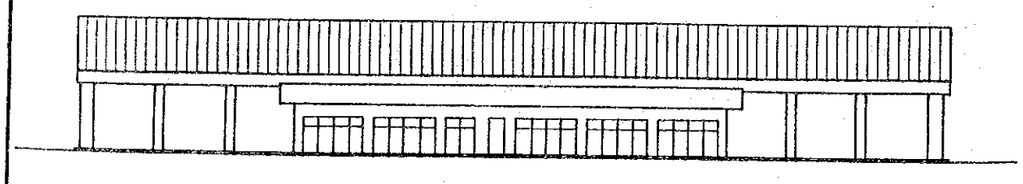
The cargo storage area is equipped with a 5 ton weighing scale to be installed in the outbound and inbound storage areas. A cold-freezer storage consisting of a cold storage with a floor area of about 150 sq.m and a freezer storage having a floor area of about 50 sq.m.

The office area will have about a 1,000 sq.m floor area and will accommodate an airline office (PAL office), a customs office, AQ and PQ office, a worker's rest room, a strong room with a vault door, a shower room, toilets, etc.

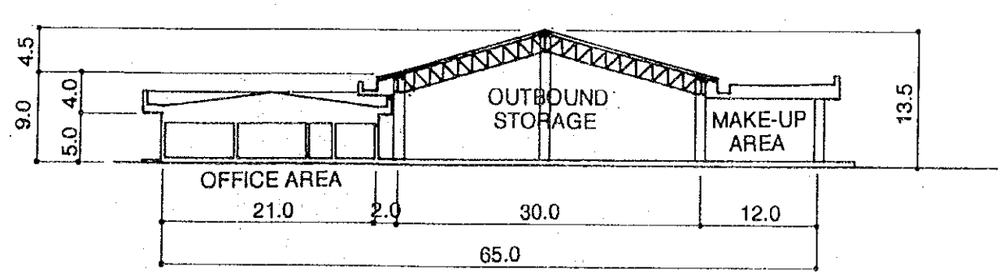


LEGEND

① INBOUND STORAGE
② OUTBOUND STORAGE
③ BREAK-DOWN AREA
④ MAKE-UP AREA
⑤ INTERNATIONAL INBOUND STORAGE
⑥ INTERNATIONAL OUTBOUND STORAGE
⑦ COLD-FREEZER STORAGE
⑧ DOMESTIC TRANSIT STORAGE
⑨ INBOUND TRUCK DOCKS
⑩ OUTBOUND TRUCK DOCKS
⑪ AQ/PQ OFFICE
⑫ CUSTOMS OFFICE
⑬ PAL OFFICE
⑭ WORKER REST ROOM
⑮ SHOWER ROOM
⑯ TOILETS
⑰ STRONG ROOM
⑱ SUBSTATION
⑲ MECHANICAL ROOM
⑳ CORRIDOR



CURB SIDE ELEVATION



A - A SECTION

0 5 10 15 20 25 30m

Figure 9.4.7 Cargo Terminal Building S=1/600

9.4.3 Administration and Control Tower Building

A new administration and control tower building are planned to meet the requirements for the medium-term development as shown in Figure 9.4.8 and is to be located to the northeast of the new passenger terminal building. The building will have a total floor area of about 1,630 sq.m and will be a reinforced concrete structure. The administration area will have two stories and the control tower will have 5 stories and an elevator.

The building will accommodate the following airport administration and operation activities.

a) Airport Administration : Airport manager room, administration office, accounting office, cashier room, auditor room, canteen, etc.

b) Airport Operation : Briefing room, air traffic controller room, nav. engineering room, equipment room, workshop room, VFR room, etc.

Regarding the required height of the control tower, it is planned to be 17m above the proposed ground level in accordance with FAA standards. Both runway thresholds will be visible from the VFR room.

9.4.4 Fire Station Building

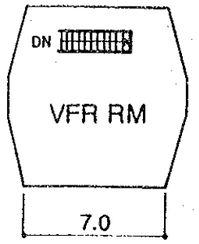
A new fire station building is planned to meet ICAO standards category 8. The floor plan of the building is shown in Figure 9.4.9. The building has a total floor area of about 490 sq.m with a reinforced concrete superstructure covered with asbestos cement board roofing. It will accommodate the following facilities and rooms.

a) Vehicle Room : One rapid intervention vehicle, two major vehicles, one command car and one ambulance.

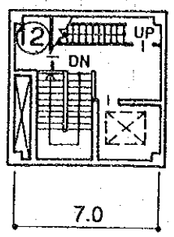
b) Office Area : Office for fire fighting staff, rest room for fire fighting crew including dormitory, canteen, storages, toilets and shower room.

9.4.5 Other Buildings

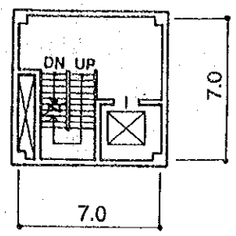
Other buildings will include a single story sub-station building having about 400 sq.m of floor area and a single story pump house having a floor area of about 50 sq.m.



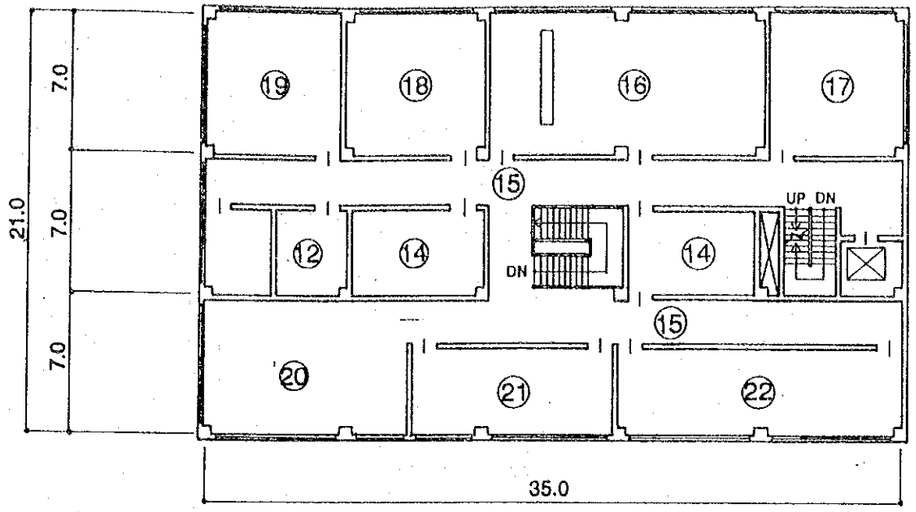
5TH FLOOR



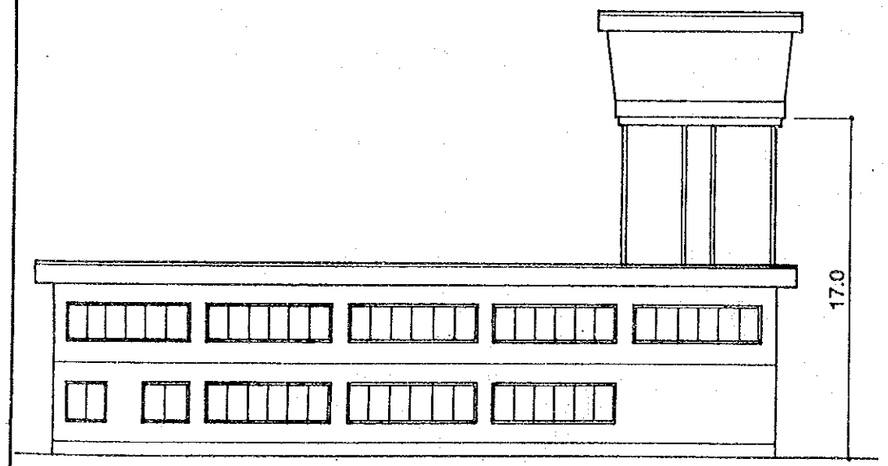
4TH FLOOR



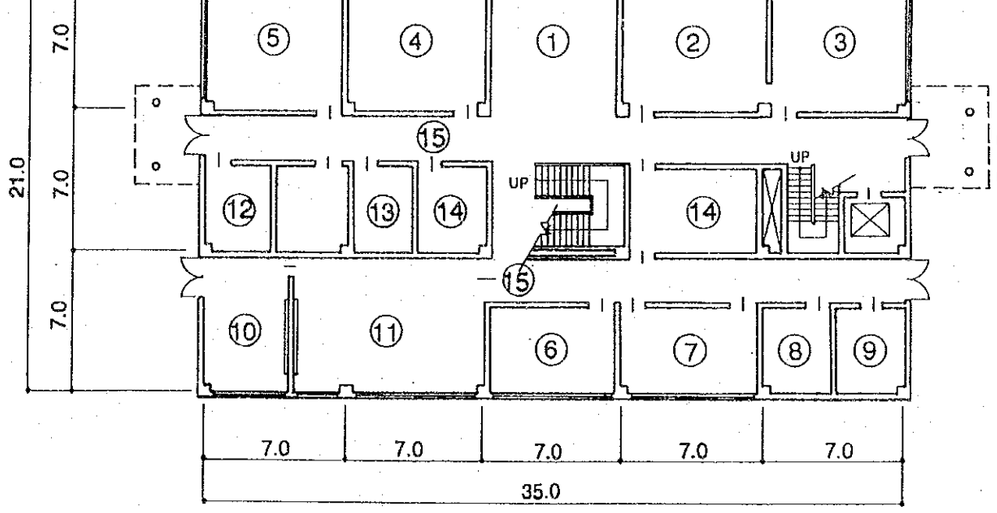
3RD FLOOR



SECOND FLOOR PLAN



AIR SIDE ELEVATION



GROUND FLOOR PLAN

LEGEND

① ENTRANCE HALL
② ADMINISTRATION OFFICE
③ AIRPORT MANAGER'S ROOM
④ ACCOUNTING OFFICE
⑤ CASHIER'S ROOM
⑥ AUDITOR'S ROOM
⑦ CONFERENCE ROOM
⑧ MECHANICAL ROOM
⑨ SUBSTATION
⑩ KITCHEN
⑪ CANTEEN
⑫ TOILETS
⑬ SHOWER ROOM
⑭ STORAGE
⑮ CORRIDOR
⑯ BRIEFING ROOM
⑰ AIR CONTROLLER ROOM
⑱ ENGINEER STAFF ROOM-1
⑲ ENGINEER STAFF ROOM-2
⑳ NAVIGATION ENGINEER ROOM
㉑ WORK SHOP ROOM.
㉒ EQUIPMENT ROOM

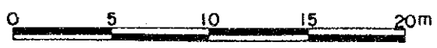
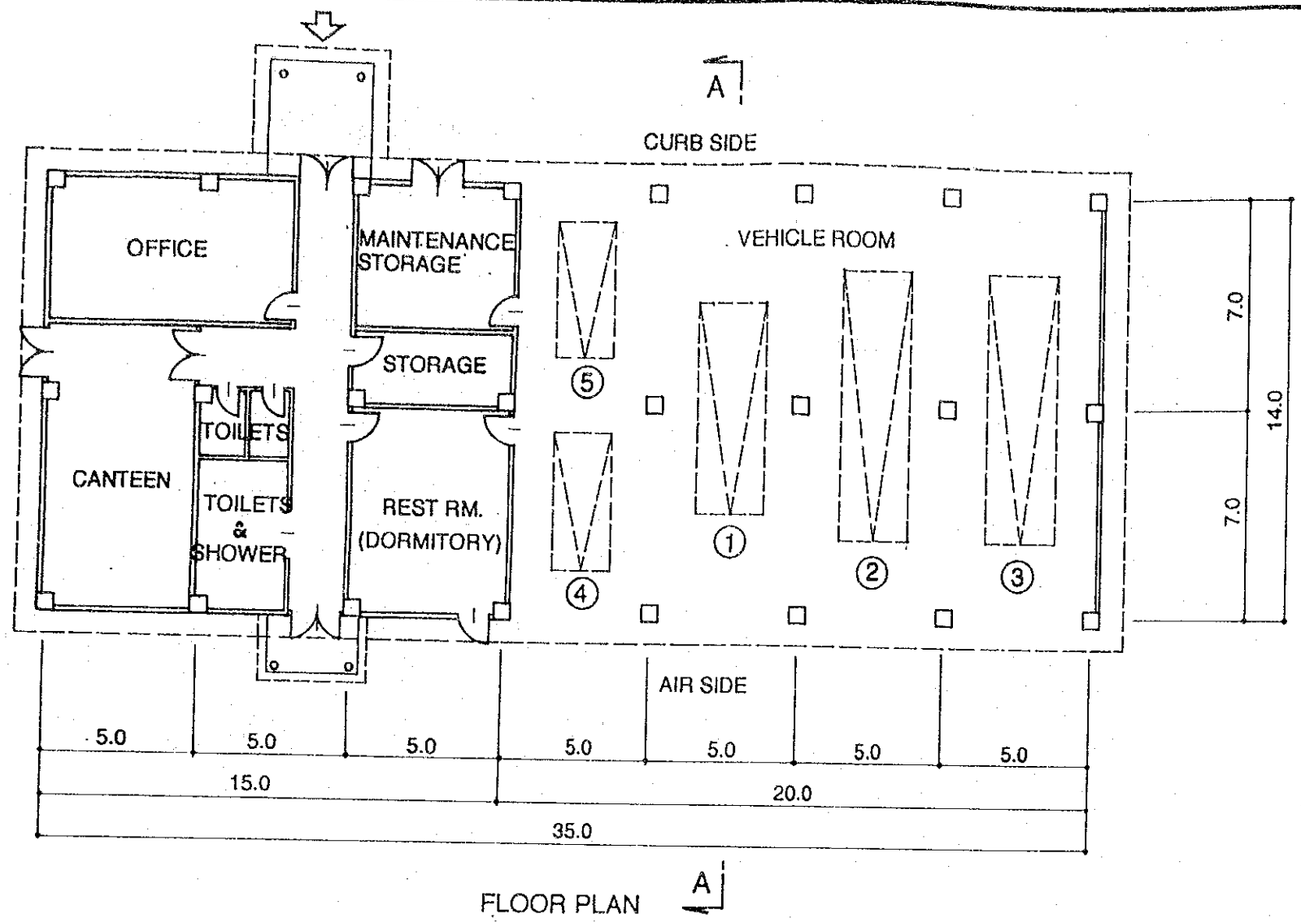
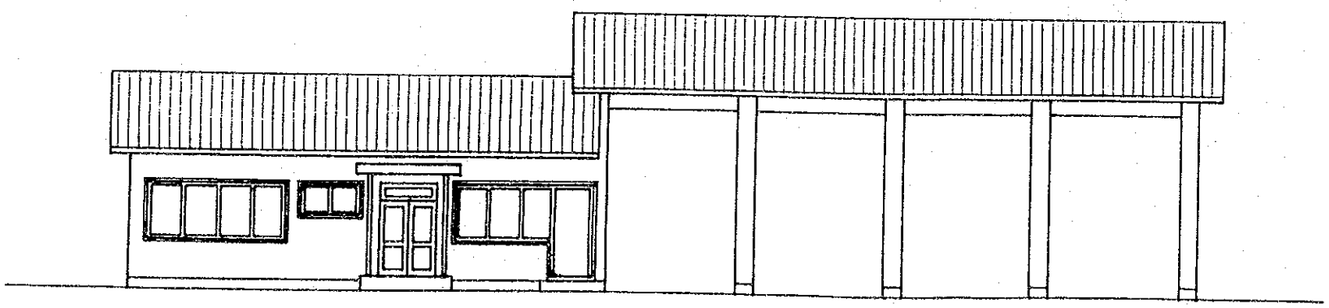


Figure 9.4.8 Administration and Control Tower Building

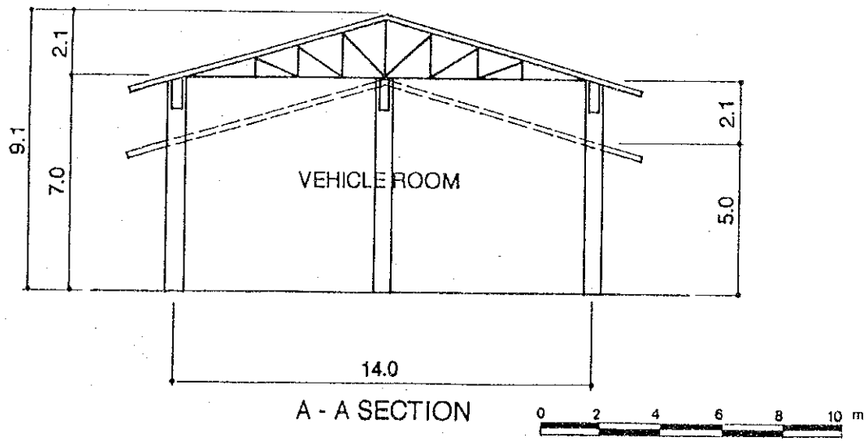


FLOOR PLAN

LEGEND
① RAPID INTERVENTION VEHICLE
② MAJOR VEHICLE
③ MAJOR VEHICLE
④ COMMAND CAR
⑤ AMBULANCE



AIR SIDE ELEVATION



A - A SECTION

Figure 9.4.9 Fire Station Building S=1/200

9.5 Air Navigation System

The Air Navigation System consists of the following subsystems:

- Radio Navigation Aids
- Air Traffic Control System
- Aeronautical Telecommunication System
- Aeronautical Ground Lights System
- Meteorological Observation System

Most of the equipment consisting of the subsystems mentioned above should be replaced or relocated for the following reasons:

- Service life of the equipment will be exceeded in the construction stage of the project.
- The existing air navigation system shall be required for the transition of airport functions without any interruption to aircraft operations during the construction period.

Some of the equipment is being planed to be replaced through US and OECF funded projects for Davao airport. This plan, therefore, should be revised at the time of implementation to incorporated each relevant plan.

Conceptual diagram and layout plan of air navigation systems is shown in Figures 9.5.1. and 9.5.2 respectively.

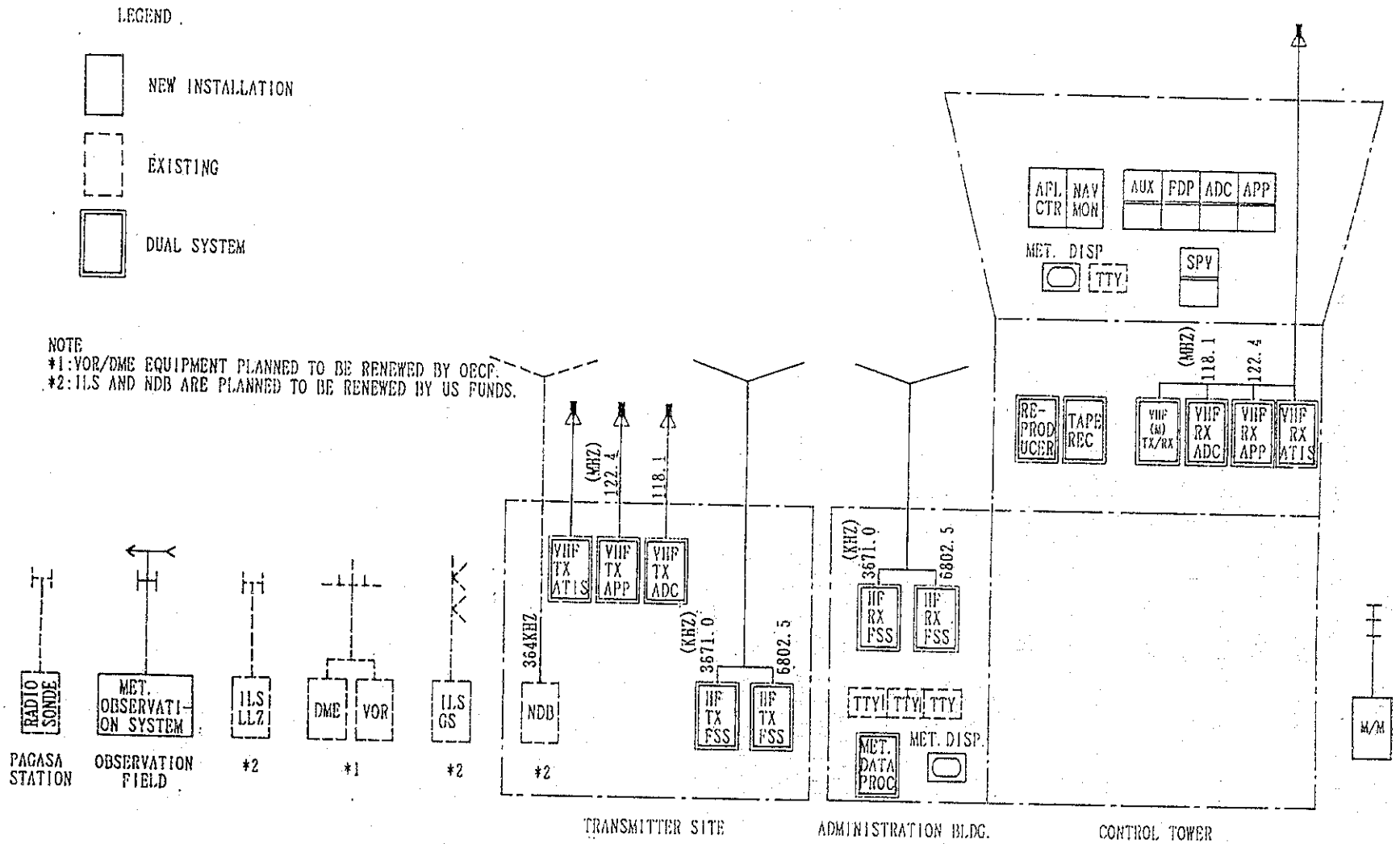


Figure 9.5.1 Conceptual Diagram of Air Navigation Systems

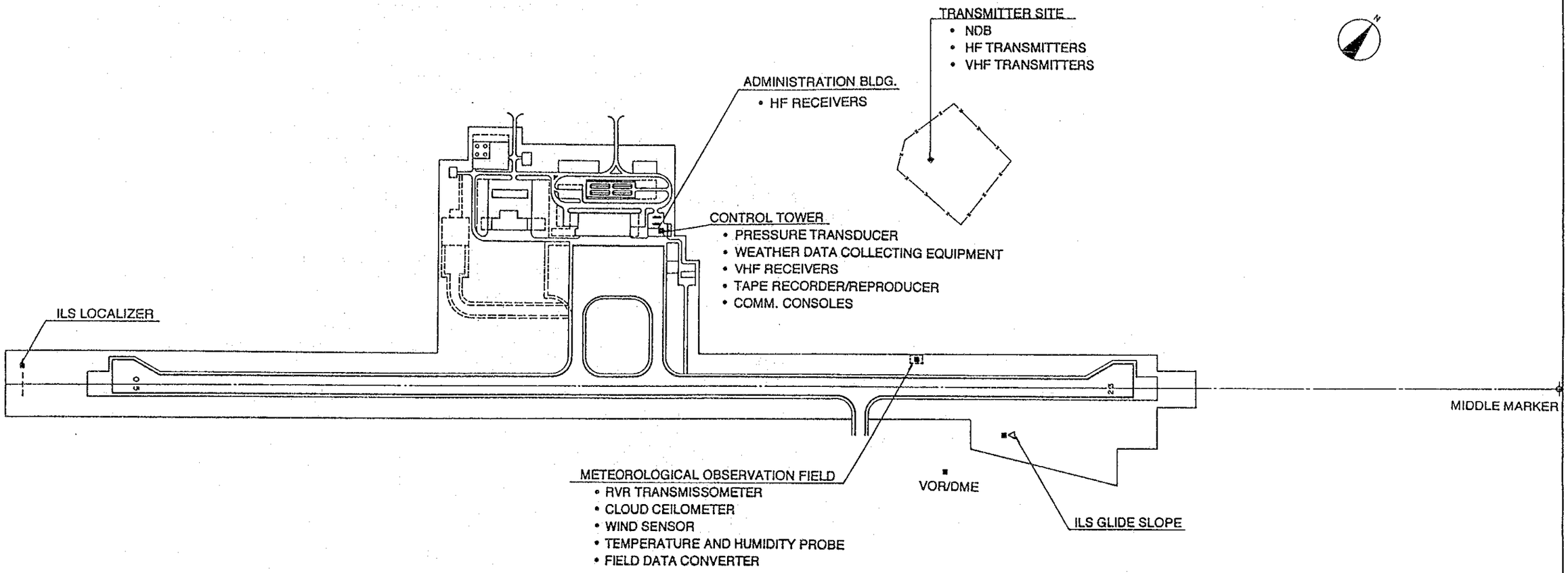


Figure 9.5.2 Layout Plan of Air Navigation Systems

9.5.1 Radio Navigation Aids

The ILS, consisting of ILS/LLZ and GP, which is scheduled to be renewed by US AID will be relocated to the new runway by this project so as to continue service for precision approach category I.

Relocatable ILS shall be operated as a complete precision approach Category I complying with ICAO Annex 10 ILS basic requirements. The new facility should therefore have a Middle Marker added to the system for the following reasons:

- As Middle Marker beacon indicates on airbone instruments that an aircraft is passing the decision height and terminating the instrument approach guidance segment. The pilot should decide whether or not to continue descending at this point.

  When the provision of a marker beacon is impracticable, an alternative DME, which has a system accuracy of 0.2NM or better and the same airbone indicator resolution, will be required.

- Installation of the new Middle Marker will be allowed without any geographical obstructions on the extended center line of new runway 23 from the effect of runway relocation.

According to the report of ICAO Communications/Operations Divisional Meeting on September 1985 in Montreal, the following transition plan (ILS to MLS) was agreed upon.

a) ILS will cease to be an ICAO standard system on January 1, 1998 and from then MLS will be the ICAO standard system.

b) However, on the basis of Regional Agreement, the ILS can remain in service at international airports until 1999, after which it ceases to be the ICAO standard system.

However, it seems that the above-mentioned transition plan will be reviewed by the 29th session of the ICAO Assembly and most probably the plan be postponed due to a delay of MLS development program as well as huge costs involved.

Therefore, the installation of MLS instead of ILS should be reviewed in relation to the transition status from ILS to MLS by ICAO and the world trend before executing this project.

The following radio navigation aids should be maintained at the new airport:

a) VOR/DME

   The existing CVOR/DME will be replaced by OECF in the near future as a result of the Air Navigation Modernization Program. Replaced VOR/DME will be provided to serve continuously at the new airport.

b) NDB

   The existing NDB will be replaced by US Funds. This equipment will also be used continuously.

The status of all radio navigational aids should be monitored and controlled at the ATC Tower by the provision of an additional function.

9.5.2 Air Traffic Control System

ATC consoles will be provided at the following control positions in the Control Tower cabin:

- Supervisor
- Approach control
- Aerodrome control
- Auxiliary controller
- Flight data officer

Each console should be equipped with circuits for ATS direct speech, intercom, PABX, VHF/HF radio. Flight strip boards, weather data indicator and navigation aids status indicator should also be provided on the console when required.

9.5.3 Aeronautical Telecommunication System

Aeronautical telecommunication equipment to be replaced or relocated are as follows:

a) Replacement

- VHF radio (air to ground)
- HF radio (flight service stations)
- Voice logging recorder and reproducer
- Automatic terminal information system (ATIS)

The equipment mentioned above should be replaced because they have exceeded their service life, and be installed in the new administration building, the ATC tower and the transmitter station.

b) Relocation

- Teletypewriter terminals

Although the service life of equipment, such as teletype terminals, differ from other types of equipment, the existing terminals will not be replaced but relocated in this plan.

9.5.4 Aeronautical Ground Light System

The following aeronautical ground lights should be installed to the new runway, taxiway and apron:

- Precision approach lighting system (ALS) for runway 23
- Simple approach lighting system (SALS) for runway 05
- PAPI for runway 05 and 23
- Runway edge lights
- Runway threshold and end lights
- Taxiway edge lights

- Turning pad lights
- Apron floodlights
- Aerodrome beacon
- Illuminated wind direction Indicator
- Taxi guidance sign
- AGL control system

Performance and installation of lighting fittings should conform to standards and recommendations of ICAO Annex 14.

Lighting controls, such as switching facilities and illuminance controls, should be executed at the ATC tower control cabin.

The electric power supply should be controlled by the current control regulator (CCR) installed in the power station.

The facilities of the system should be supported by a secondary power supply system which conform to ICAO Annex 14.

The aeronautical ground lights layout plan is shown in Figure 9.5.3.

9.5.5 Meteorological Observation System

The automatic meteorological observation system consists of observation sensors and a data processor. The observation sensors described hereinafter will be installed at the side of runway 23's touch down point so as to observe the weather conditions at the representative place on the runway.

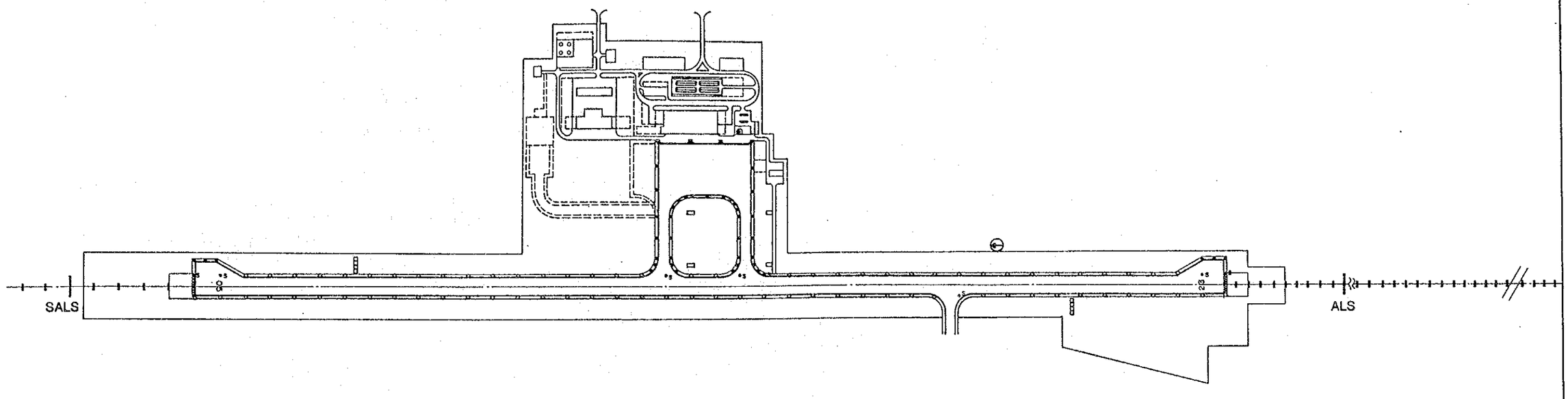
a) Observation sensors

- Runway visual range (RVR) transmissometer / back ground illuminance meter with 75m base line length
- Cloud ceilometer
- Wind sensor
- Temperature/humidity probe
- Precipitation gauge
- Field data converter

Pressure transducer and mercury barometer which measure values of pressure QFE and QNH will be installed at the equipment room in administration building.

b) Data processor and display

Reporting data in cyclic routine from sensors should be processed at the data processor and be indicated on weather data displays on real time. A main processor will be installed in the equipment room. Data display will be provided to the ATC tower, PAGASA, briefing room and equipment room.



LEGEND

- ● TAXIWAY EDGE LIGHT (TURNING PAD LIGHT)
- ●s RUNWAY EDGE LIGHT SURFACE TYPE
- ○ RUNWAY EDGE LIGHT ELEVATED TYPE
- ✲ APRON FLOODLIGHT
- ● AERODROME BEACON
- ⊕ ILLUMINATED WIND DIRECTION INDICATOR
- □□□□ PAPI
- ▬ APPROACH LIGHTS BARRETTE
- ○○○○ RUNWAY END/THRESHOLD LIGHTS
- ▭ TAXIWAY GUIDANCE SIGN

Figure 9.5.3 Aeronautical Ground Lights Layout Plan

9.6 Airport Utilities

9.6.1 Power Supply System

The airport's power supply system is based on the concept of controlling and monitoring the electricity intensively at the main power station. The main high tension voltage from outside to the airport is divided into two lines at the power supply station. An operational line provides power to the air navigation system and a utilities line provides power to the passenger terminal building and cargo terminal.

The primary power source should be supported by a secondary generator supply system having a capacity of about 1,000 KVA.

Three(3) engine generators, each having a 500 KVA capacity, including one(1) set of spares, should be installed to the power supply station.

The system diagram of the power supply system and layout plan are shown in Figures 9.6.1 and 9.6.2.

9.6.2 Telephone System

An electric telephone exchange system having about a 200 channel capacity should be installed in the new passenger terminal building.

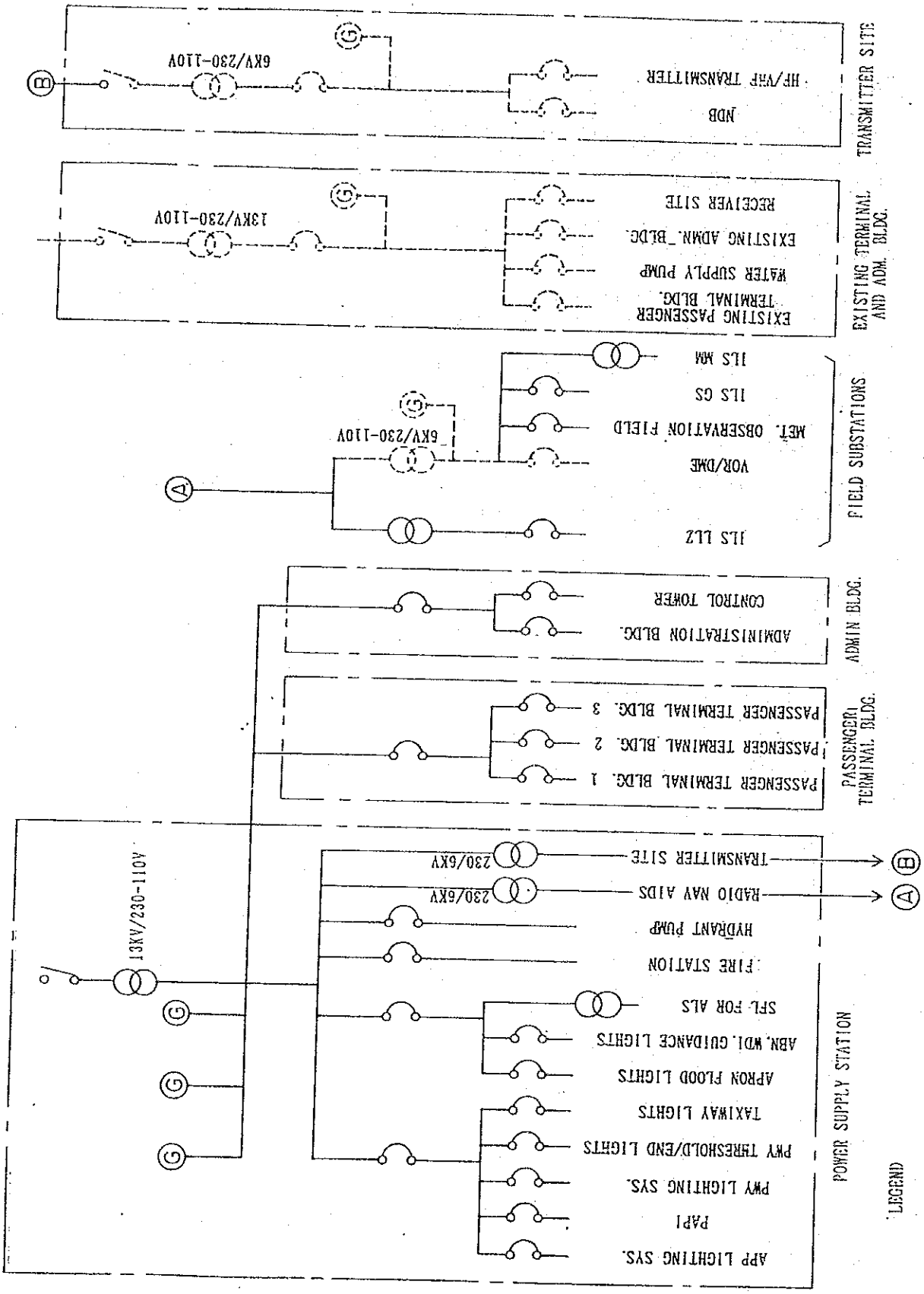
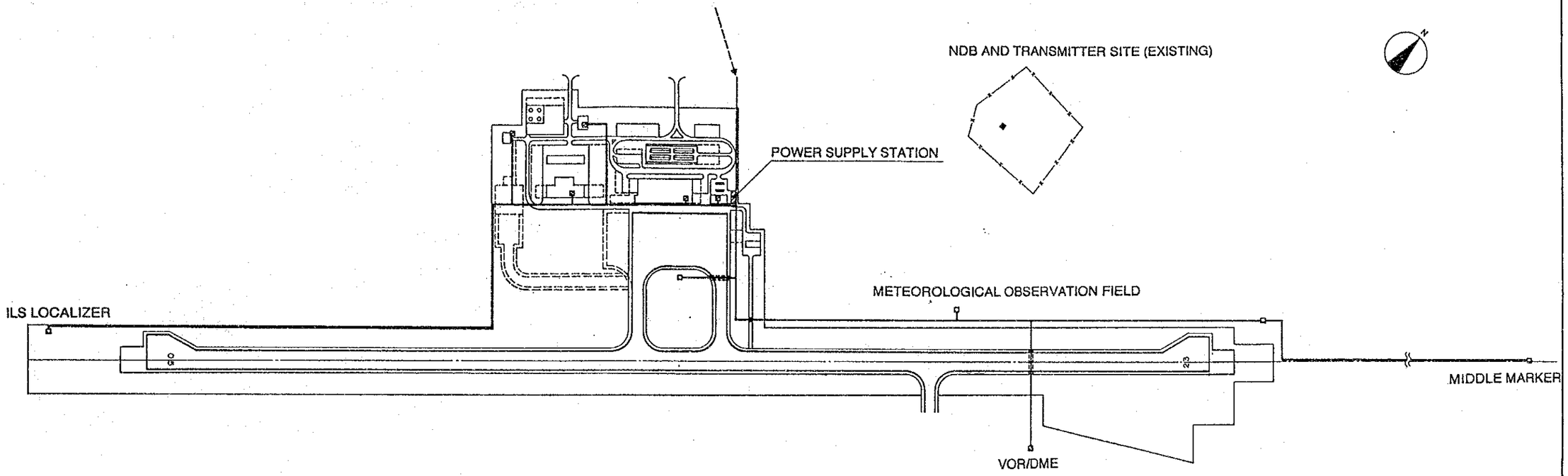


Figure 9.6.1 System Diagram of Power Supply System



LEGEND

=======	CABLE CONDUIT
———	HIGH TENSION VOLTAGE UNDERGROUND CABLE
□	TRANSFORMER
⊠	POWER CUBICLE

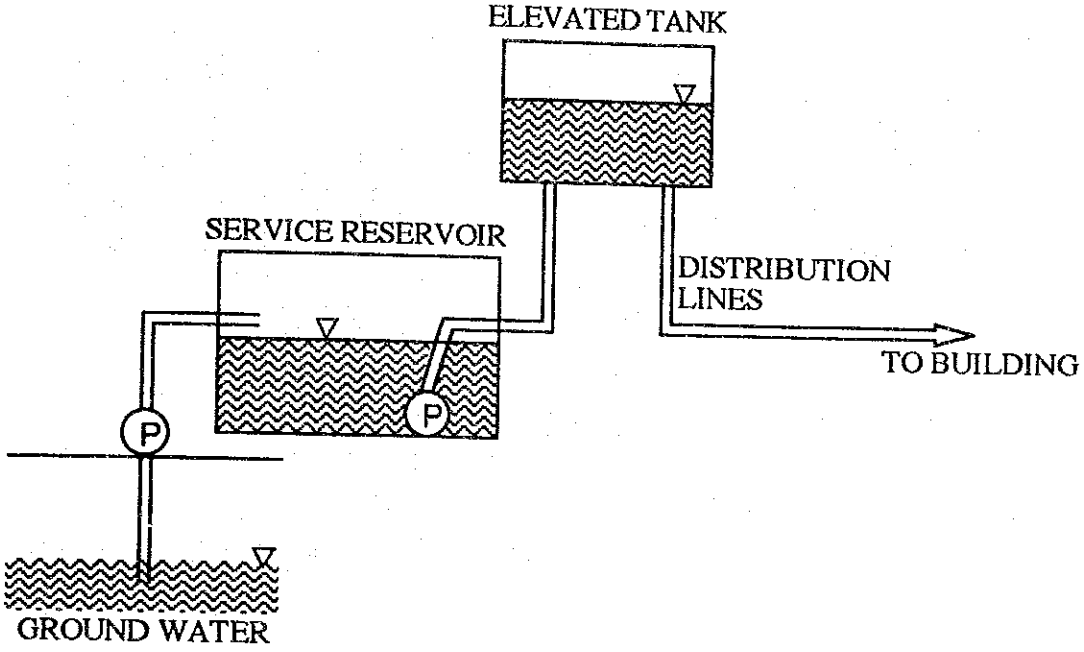
Figure 9.6.2 Layout Plan of Power Supply System

9.6.3 Water Supply System

Potable water will be supplied from a deep well. Maximum daily demand is estimated at 260 cu.m /day.

A reservoir and an elevated tank will be provided to ensure a stable water supply.

Concept of the water supply system is shown in Figure 9.6.3.



Fugure 9.6.3 Concept of Water Supply System

9.6.4 Sewerage System

There are various systems to be considered for wastewater collection and treatment, such as the conventional activated sludge process, the extended aeration process, the oxidation ditch process, the sequencing batch reactor process, etc. The appropriate system should be selected by taking into account the design conditions shown in Table 9.6.1, the ease of maintenance and the cost.

Table 9.6.1 Design Condition

Number of Person		2,000
Design Volume of Sanitary Sewage		230 cu.m/day
Water Quality	:Influent Quality BOD	250 ppm
	:Effluent Quality BOD	20 ppm

Based on the comparative evaluation shown in Table 9.6.2, the oxidation ditch process has been selected as the optimum system because it is advantageous in terms of construction cost and required area. The concept of the process is shown in Figure 9.6.4.

Table 9.6.2 Comparative Study of the Sewage Treatment Method

Note: A: Advanced
D: Disadvanced

	Change of Inflow Volume	Occurring Sludge Volume	Required Area	Mainte-nance	Construc-tion Cost	Driving Cost
Conventional Activated Sludge Process	D	D	A	D	D	D
Extended Aeration Process	A	A	A	A	D	D
Oxygen Aeration Activated Sludge Process	A	D	A	D	D	D
Oxidation Ditch Process	A	A	A	A	A	D
Sequencing Batch Reactor Process	A	D	A	D	D	A
Rotating Biological Contactor Process	D	A	A	A	D	A
Oxidation Pond Process	A	A	D	A	A	A

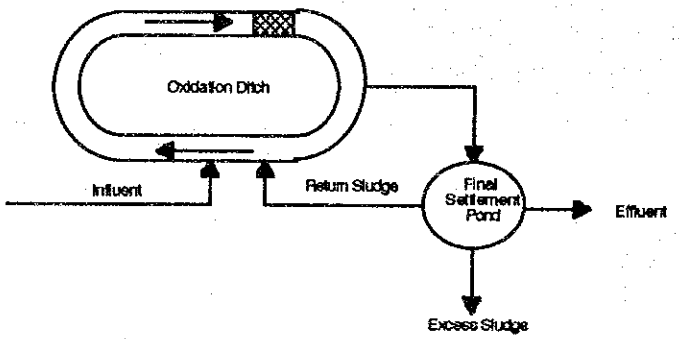


Figure 9.6.4 Concept of Sewerage Treatment System

9.6.5 Solid Waste Disposal System

The solid waste collected from the entire airport will be disposed of by the incinerator to be located in the sewerage treatment plant.

9.7 Fuel Supply System

At the existing Davao International Airport, the fuel supply services for civil aviation aircraft are carried out by the Philippine Airlines. Petron services general aviation and military aircraft. Each relevant facilities are owned by them.

The existing facilities for general aviation are planned to be maintained at the existing position after the completion of the development project. Therefore, the new fuel supply system to be developed in line with the project will serve civil aviation and the operation and maintenance is contemplated to be carried out by the Philippine Airlines.

Accordingly, the construction of the new fuel supply system by the development is considered to be the responsibility of the Philippine Airlines.

The pipeline installation work at the apron area is included in the scope of the project so as to avoid interruption with airport operations during the construction stage. The size of main pipe to be installed at the apron will be 12 inches because the design condition was assumed to serve two A-300 class aircraft simultaneously.

The site preparation of the fuel farm of 7,700 square meters is also considered in the terminal area plan to satisfy space requirements up to the year 2010.

The site plan of the fuel farm and the expected pipeline route to the apron area are shown in Figure 9.7.1.

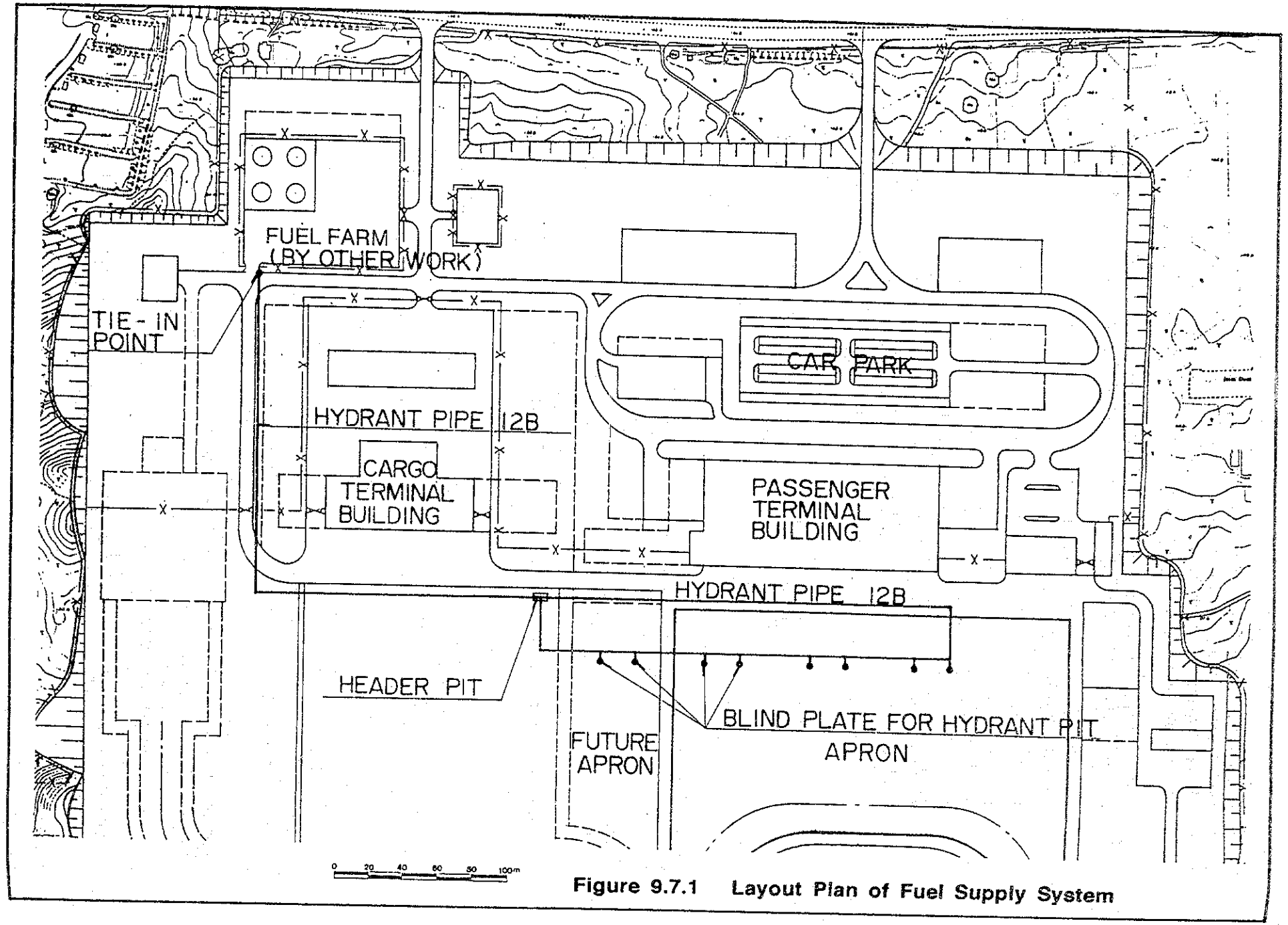


Figure 9.7.1 Layout Plan of Fuel Supply System

9.8 Airspace Use

(1) Instrument Approach Procedures

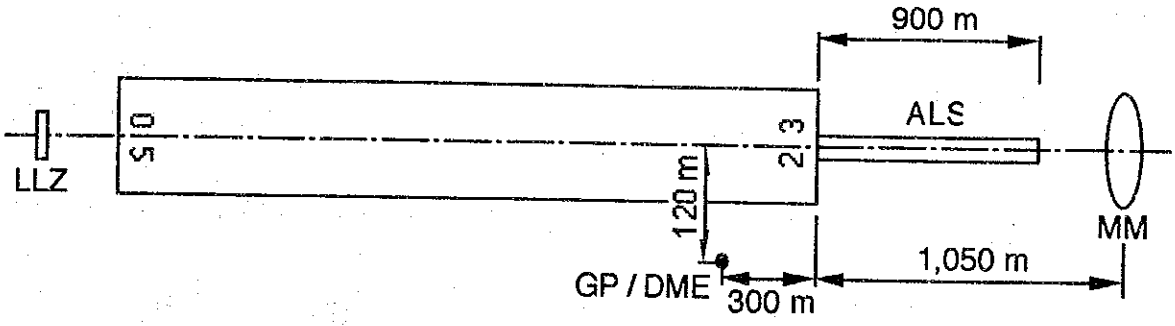
The following instrument approach procedures were studied for the new runway 05 / 23.

- VOR/ILS/DME	RWY 23
- NDB/ILS/DME	RWY 23
- VOR/DME	RWY 23
- VOR/DME	RWY 05
- NDB	RWY 23
- NDB	RWY 05

The assumption for the construction of instrument approach procedures is as follows:

a) Configuration of ILS for Runway 23.

Configuration of ILS for Runway 23 is illustrated in Figure 9.8.1.



Glide path is 3.0 degrees.
ILS reference datum is 18 m.

Figure 9.8.1 Configuration of ILS for Runway 23

b) Location of nav. aids

The location of VOR/DME and NDB are shown in Figure 9.8.2.

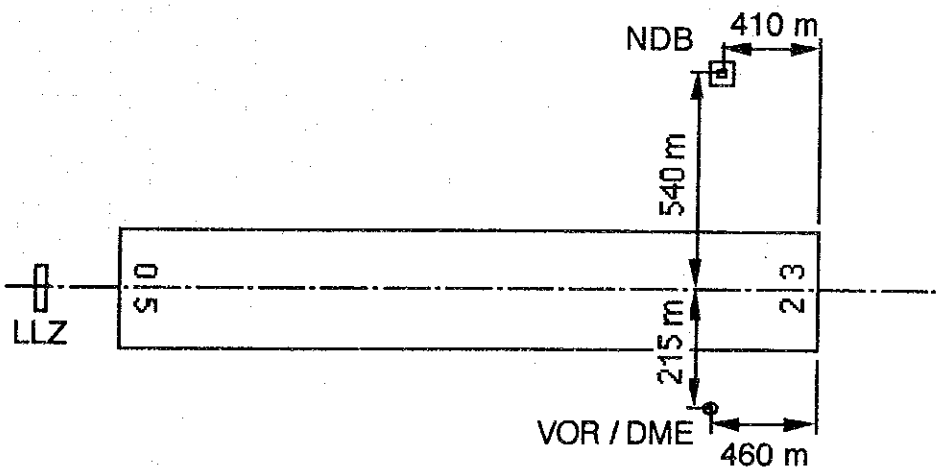


Figure 9.8.2 The Location of VOR/DME and NDB

c) Approach lighting system

Runway 23 : 900 m length of standard approach lighting system will be installed.

Runway 05 : 420 m length of simple approach lighting system will be installed.

d) Runway threshold elevation

Runway threshold elevation of new runways 05 and 23 will be 31.4 m and 25.2m respectively.

e) Airport elevation

The highest elevation of the new runway 05 / 23 will be 31.4 m AMSL.

f) Decision altitude for ILS approach

Decision altitude for VOR / ILS /DME RWY 23 and NDB / ILS / DME RWY 23 will be 383 feet (Runway 23 threshold elevation plus 300') until the 300 m width of the runway strip is ensured.

g) The Construction of procedures

The construction of procedures is based on ICAO DOC 8168 - OPS / 611 PANS OPS (Procedures for Air Navigation Services, Aircraft Operations) except study of flight visibilities.

The study of flight visibilities is based on Japanese criteria as shown in Tables 9.8.1 and 9.8.2.

Table 9.8.1 Criteria for Establishment of Flight Visibilities for CAT-I Approach

	Categories of Aircraft	ILS PAR		Off set LLZ				MM not AVBL	
				Less than 1 degree		More than 1 degree			
		FLT VIS (m)	RVR (m)	FLT VIS (m)	RVR (m)	FLT VIS (m)	RVR (m)	FLT VIS (m)	RVR (m)
ALS and TDZ/RWY	A, B, C	800	600	800	800	1000	1000	1000	1000
C/L lights ABVL	D	800	600	1000	1000	1200	1200	1200	1200
ALS only	A, B, C	800	800	800	800	1000	1000	1000	1000
AVBL	D	800	800	1000	1000	1200	1200	1200	1200
ALS or SALS	A, B, C	1000	1000	1000	1000	1200	1200	1000	1000
AVBL	D	1000	1000	1200	1200	1200	1200	1200	1200
RWYTIL lights AVBL	A, B, C, D	1200	1200	1200	1200	1200	1200	1200	1200

Note ;
ALS : Approach lighting system
SALS : Simple approach lighting system
TDZ : Touchdown zone
RWYTIL : Runway threshold identification lights

Table 9.8.2 Criteria for Establishment of Flight Visibilities for Non-precision Approach

	Categories of Aircraft	LLZ		VOR, ASR		NDB	
		FLT VIS (m)	RVR (m)	FLT VIS (m)	RVR (m)	FLT VIS (m)	RVR (m)
ALS ABVL	A, B, C	1200	1200	1200	1200	1400	1400
	D	1200	1200	1400	1400	1600	1600
SALS or APCH Guidance LGT AVBL	A, B, C	1200	1200	1400	1400	1600	1600
	D	1400	1400	1600	1600	1600	1600
RWYTIL AVBL	A, B, C	1400	1400	1600	1600	1600	1600
	D	1600	1600	1600	1600	1600	1600

h) Standard instrument departures

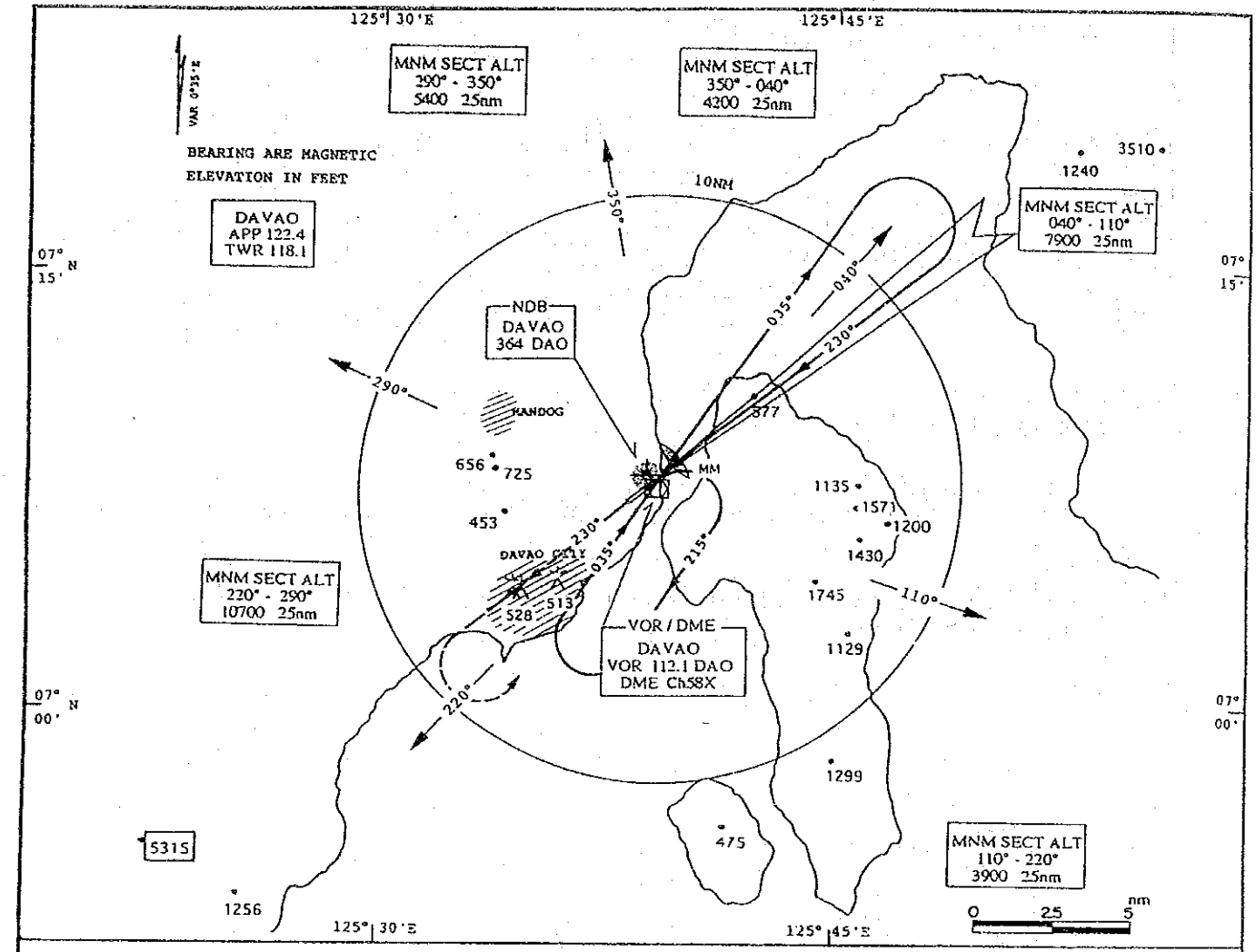
The new standard instrument departure procedures for the new runway were not studied because it will entail only minor changes in the flight course oriented to the new runway.

As a result of the study, the proposed instrument approach procedures are shown in Figures 9.8.3 to 9.8.8.

Instrument Approach Chart - ICAO

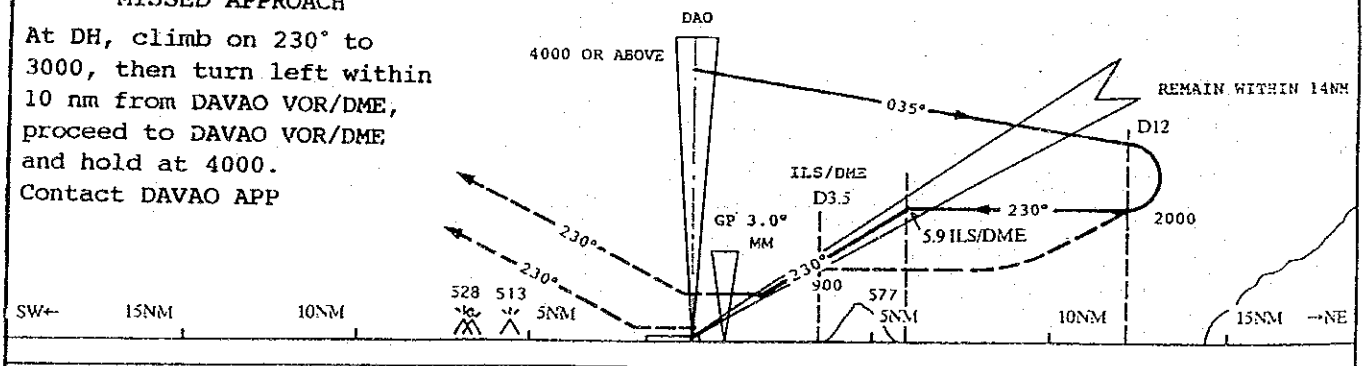
AIRPORT ELEV. 103 ft
RWY 23 THR ELEV. 83 ft

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



MISSED APPROACH

At DH, climb on 230° to 3000, then turn left within 10 nm from DAVAO VOR/DME, proceed to DAVAO VOR/DME and hold at 4000. Contact DAVAO APP



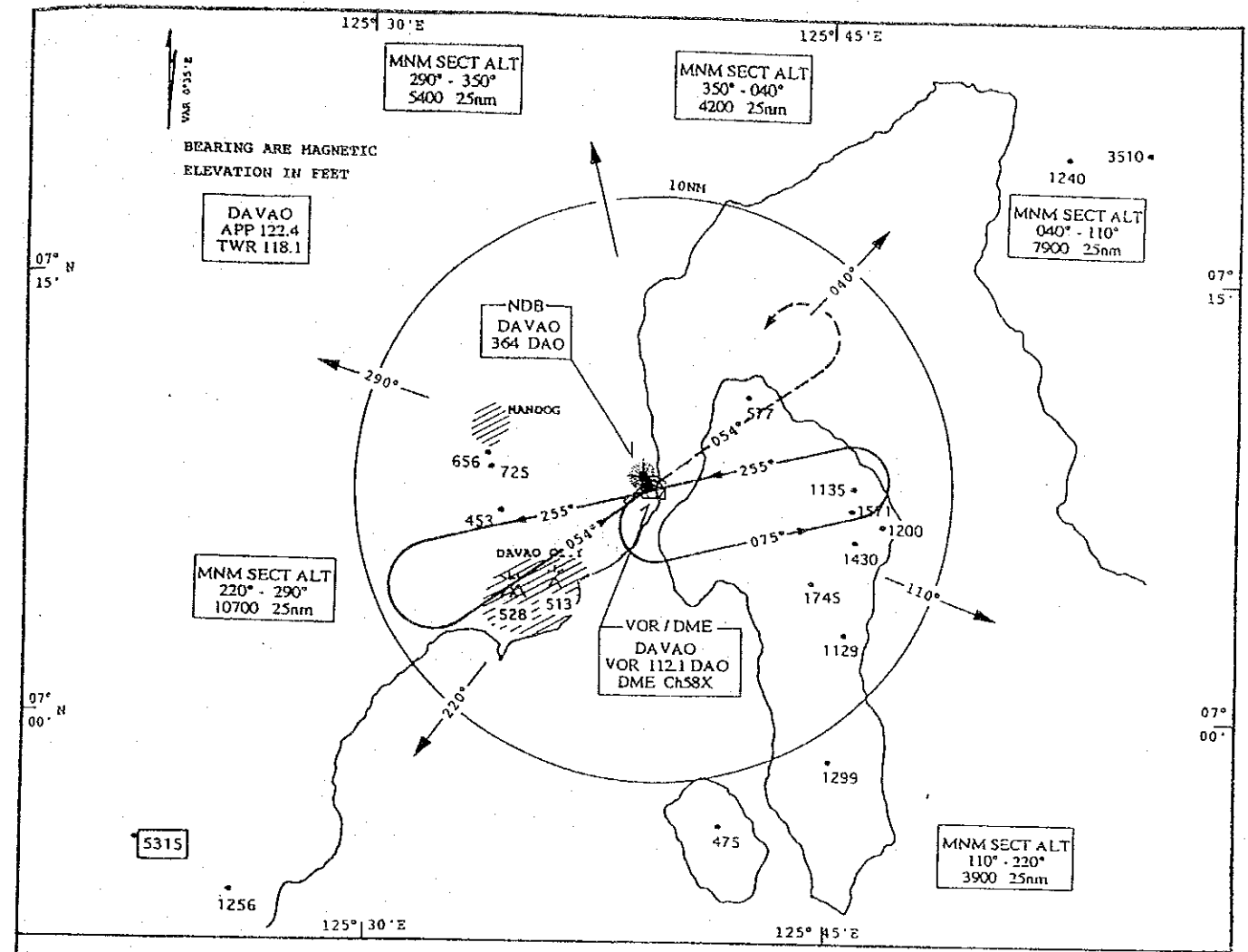
MINIMA						
	STA RWY 23				CIRCLING	
	FULL ILS DA 383'		GP OUT MDA 500'			
	ALS AVBL	ALS OUT	ALS AVBL	ALS OUT	MDA	VIS
A					500'	1900m
B	RVR 1000m	RVR 1400m	RVR 1200m	RVR 1400m	640'	2800m
C	VIS 1000m	VIS 1400m	VIS 1200m	VIS 1400m	920'	3700m
D				RVR 1600m VIS 1600m	1260'	4600m

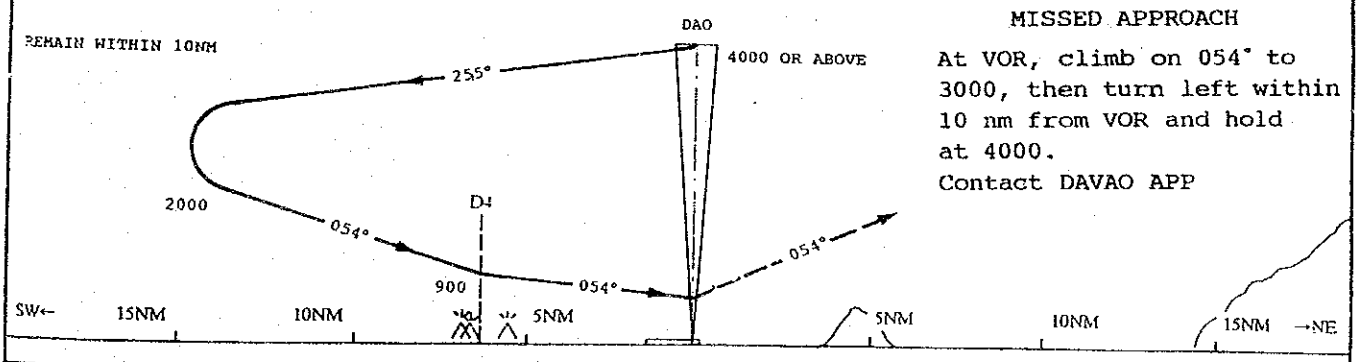
Figure 9.8.3 Draft of VOR/ILS/DME Approach to New Runway 23 at Davao/F.Bangoy International Airport

Instrument Approach Chart - ICAO

AIRPORT ELEV. 103 ft
RWY 05 THR ELEV. 103 ft

DAVAO/F.BANGOY INTL
VOR/DME RWY 05





MISSED APPROACH

At VOR, climb on 054° to 3000, then turn left within 10 nm from VOR and hold at 4000.
Contact DAVAO APP

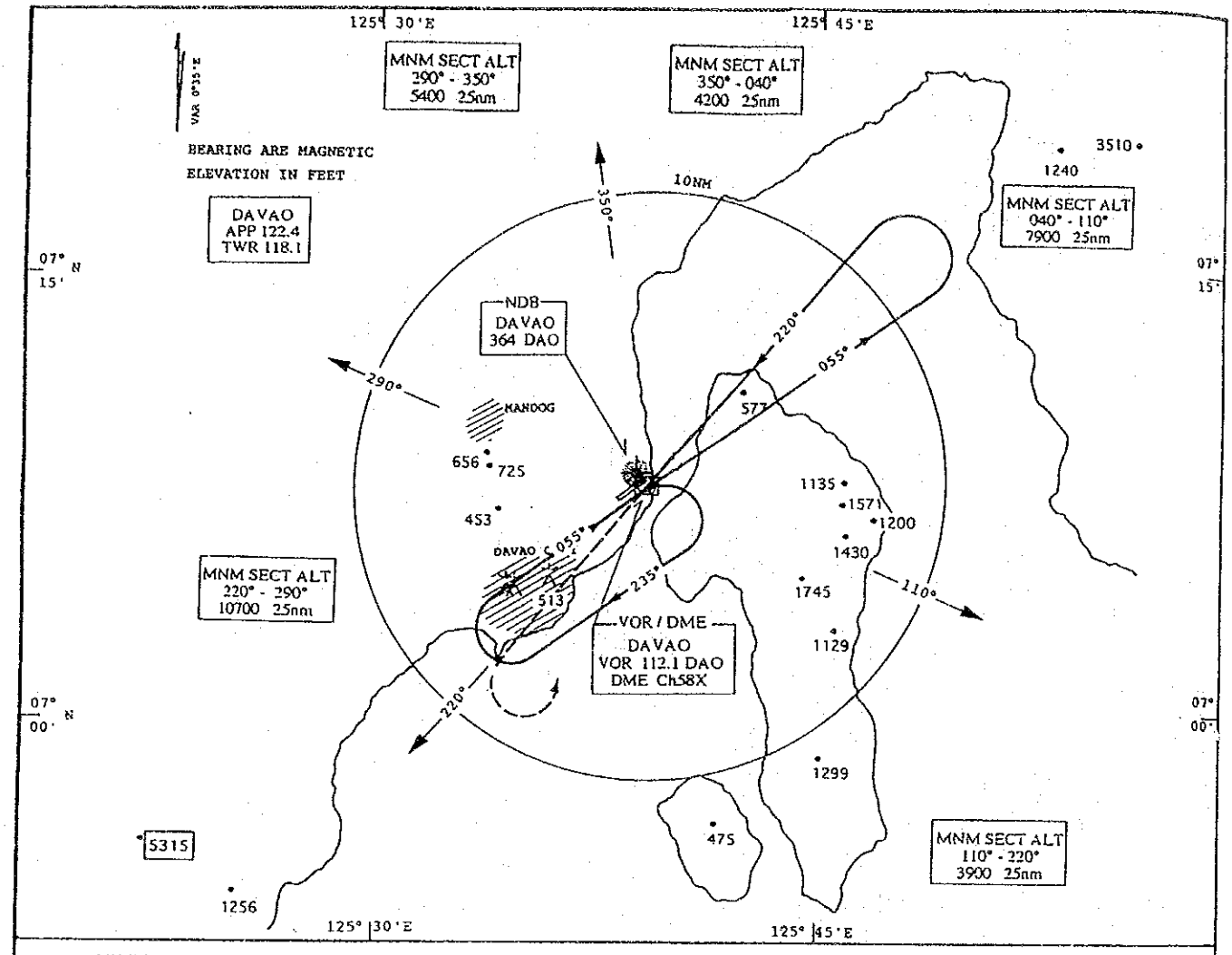
MINIMA				
	STA RWY MDA 500'		CIRCLING	
	SALS AVBL	SALS OUT	MDA	VIS
A			880'	1900m
B	RVR 1400m	RVR 1600m	880'	2800m
C	VIS 1400m	VIS 1600m	920'	3700m
D	RVR 1600m VIS 1600m		1260'	4600m

Figure 9.8.4 Draft of NDB/ILS/DME Approach to New Runway 23 at Davao/F.Bangoy International Airport

Instrument Approach Chart - ICAO

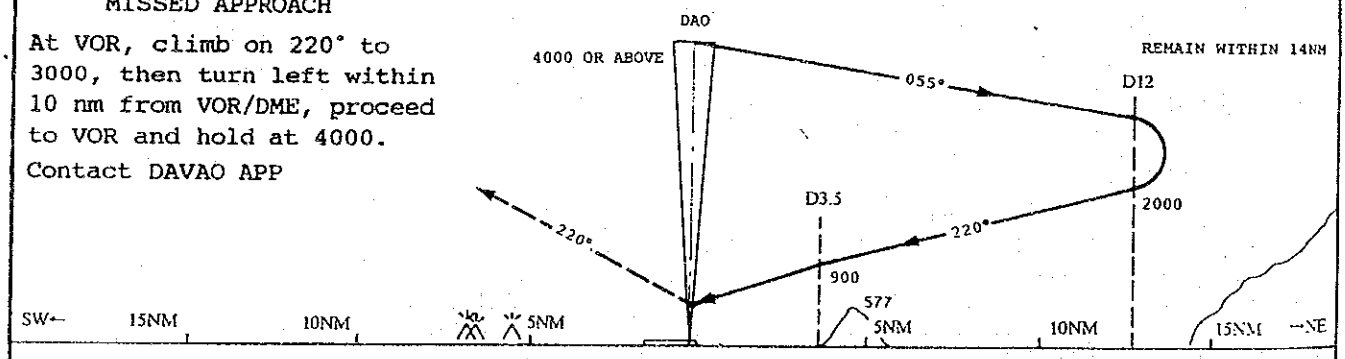
AIRPORT ELEV. 103 ft
RWY 23 THR ELEV. 83 ft

DAVAO/F.BANGOY INTL
VOR/DME RWY 23



MISSED APPROACH

At VOR, climb on 220° to 3000, then turn left within 10 nm from VOR/DME, proceed to VOR and hold at 4000.
Contact DAVAO APP



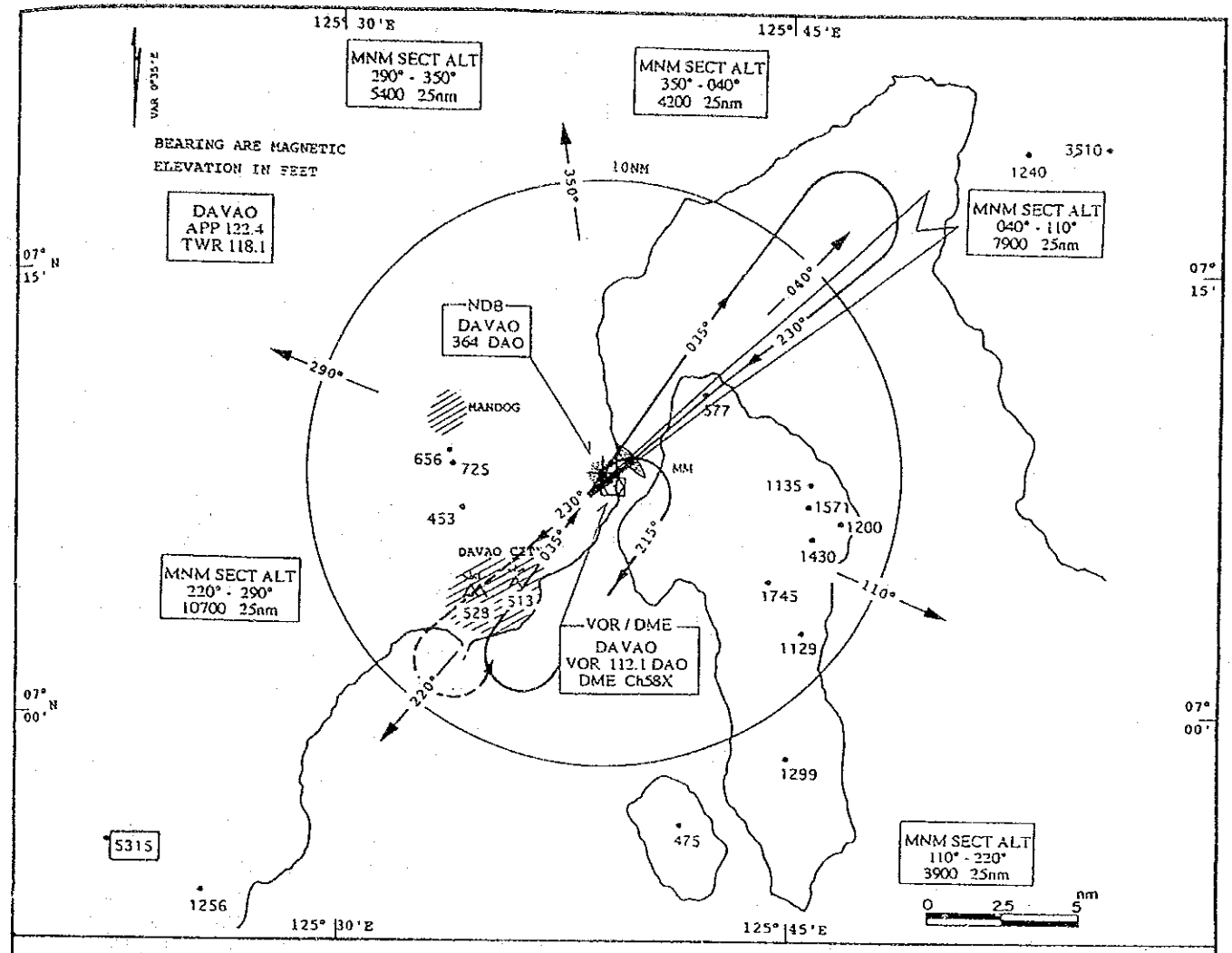
MINIMA				
	STA RWY MDA 500'		CIRCLING	
	ALS AVBL	ALS OUT	MDA	VIS
A			500'	1900m
B	RVR 1200m	RVR 1600m	640'	2800m
C	VIS 1200m	VIS 1600m	920'	3700m
D	RVR 1400m VIS 1400m		1260'	4600m

Figure 9.8.5 Draft of VOR/DME Approach to New Runway 23 at Davao/F.Bangoy International Airport

Instrument Approach Chart - ICAO

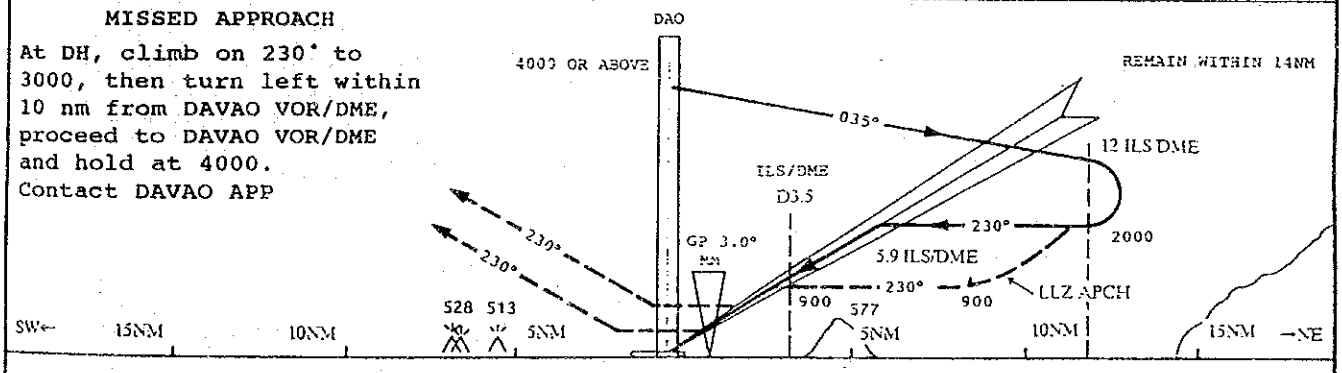
AIRPORT ELEV. 103 ft
RWY 23 THR ELEV. 83 ft

DAVAO/F.BANGOY INTL
NDB/ILS/DME RWY 23



MISSED APPROACH

At DH, climb on 230° to 3000, then turn left within 10 nm from DAVAO VOR/DME, proceed to DAVAO VOR/DME and hold at 4000. Contact DAVAO APP



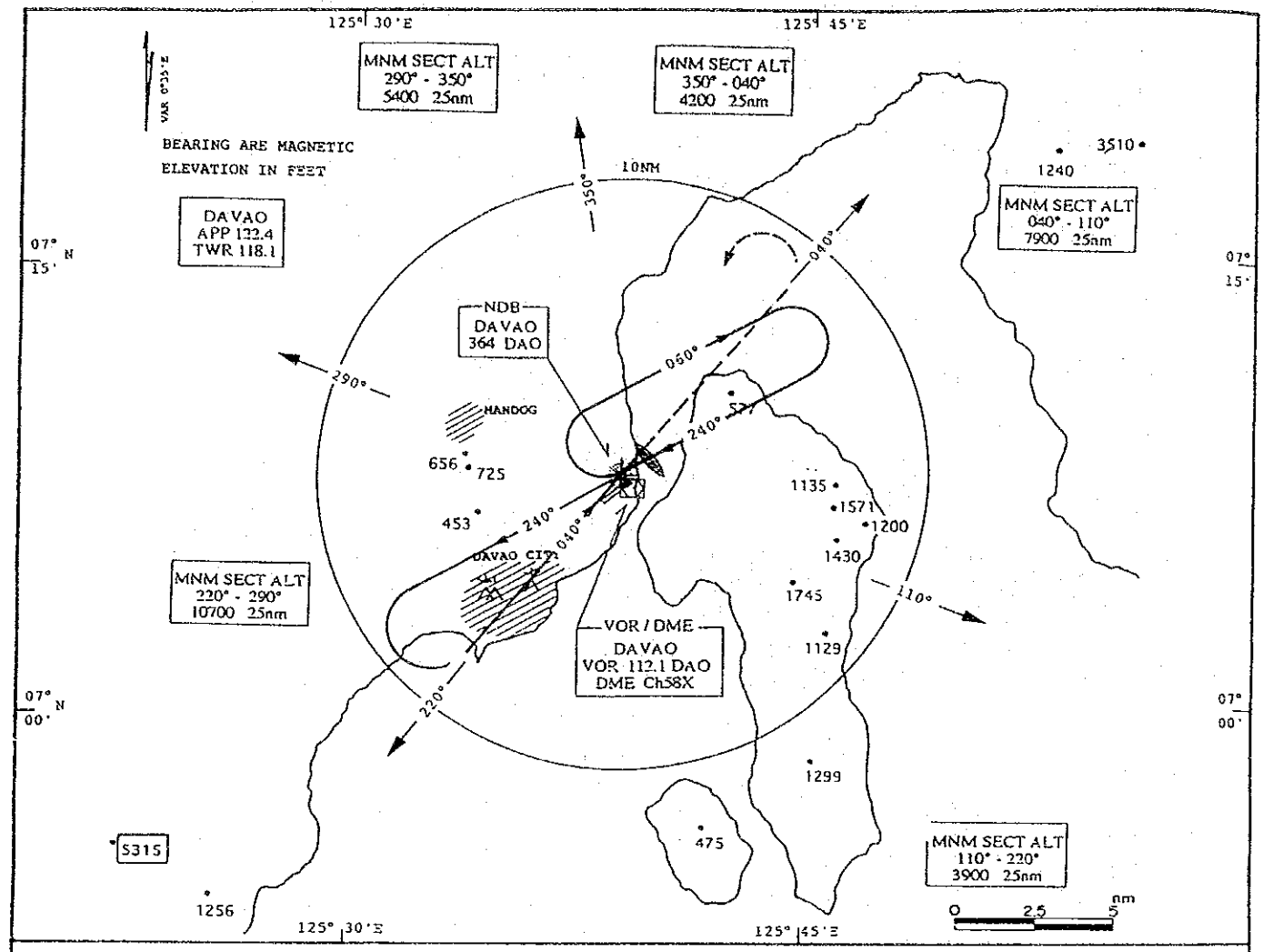
MINIMA						
	STA RWY 23				CIRCLING	
	FULL ILS DA 383'		GP OUT MDA 500'			
	ALS AVBL	ALS OUT	ALS AVBL	ALS OUT	MDA	VIS
A					500'	1900m
B	RVR 1000m	RVR 1400m	RVR 1200m	RVR 1400m	640'	2800m
C	VIS 1000m	VIS 1400m	VIS 1200m	VIS 1400m	920'	3700m
D				RVR 1600m VIS 1600m	1260'	4600m

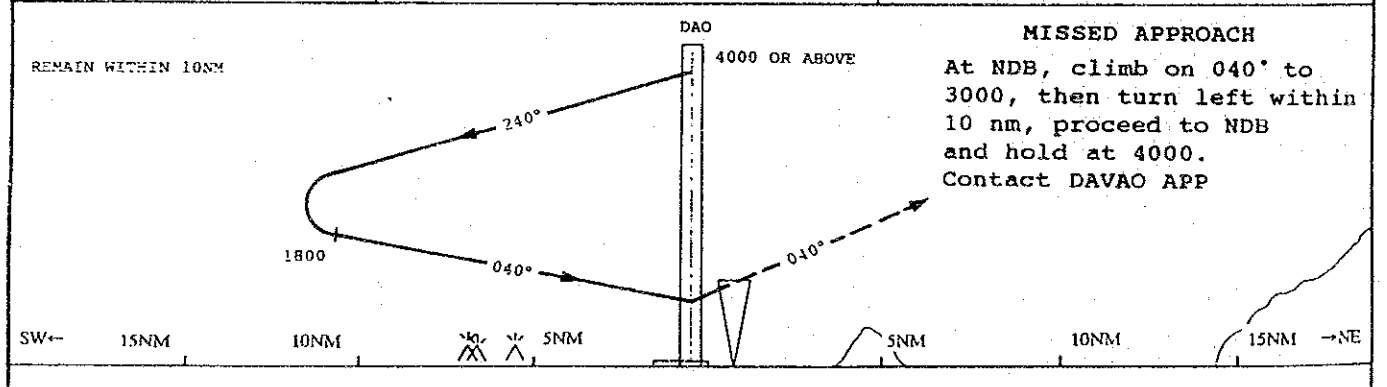
Figure 9.8.6 Draft of VOR/DME Approach to New Runway 05 at Davao/F.Bangoy International Airport

Instrument Approach Chart - ICAO

AIRPORT ELEV. 103 ft
RWY 05 THR ELEV. 103 ft

DAVAO/F.BANGOY INTL
NDB RWY 05





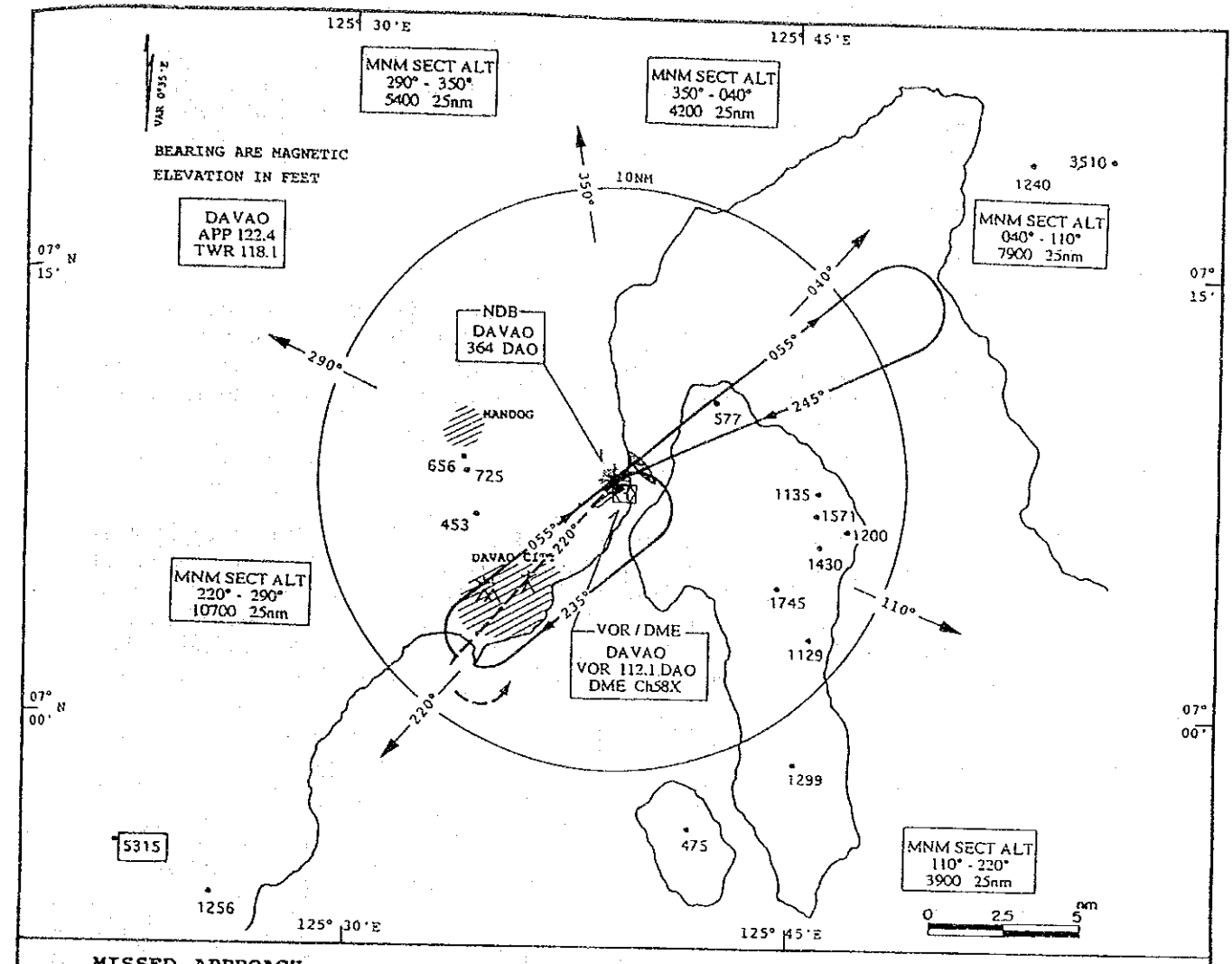
MINIMA				
	STA RWY MDA 900'		CIRCLING	
	SALS AVBL	SALS OUT	MDA	VIS
A			900'	1900m
B	RVR 1600m	RVR 1600m	900'	2800m
C	VIS 1600m	VIS 1600m	920'	3700m
D			1260'	4600m

Figure 9.8.7 Draft of NDB Approach to New Runway 23 at Davao/F.Bangoy International Airport

Instrument Approach Chart - ICAO

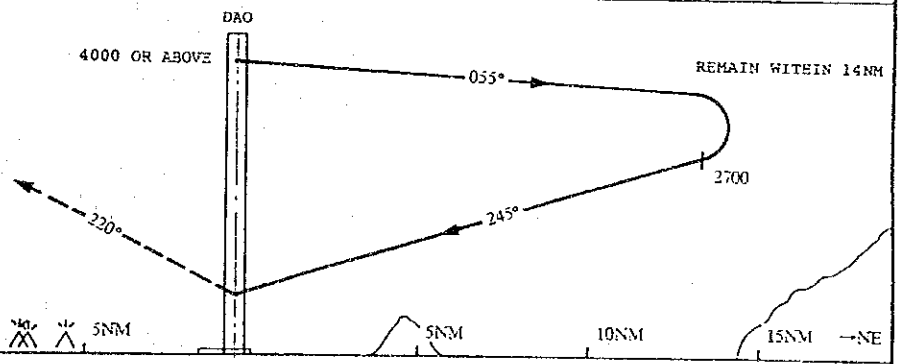
AIRPORT ELEV. 103 ft
RWY 23 THR ELEV. 83 ft

DAVAO/F.BANGOY INTL
NDB RWY 23



MISSED APPROACH

At NDB, climb on 220° to 3000, then turn left within 10 nm, proceed to NDB and hold at DAVAO NDB at 4000.
Contact DAVAO APP



	MINIMA			
	STA RWY MDA 880'		CIRCLING	
	ALS AVBL	ALS OUT	MDA	VIS
A			880'	1900m
B	RVR 1400m	RVR 1600m	880'	2800m
C	VIS 1400m	VIS 1600m	920'	3700m
D	RVR 1600m VIS 1600m		1260'	4600m

Figure 9.8.8 Draft of NDB Approach to New Runway 05 at Davao/F.Bangoy International Airport

(2) Obstacle Limitation Surface

The obstacle limitation surface for the new runway 05 / 23, non-precision approach runway, code number 4E, which is planned in the medium-term development project at Davao International Airport are shown in Figure 9.8.9 in accordance with Table 5.3.1 described in ICAO Annex 14 Aerodromes.

a) Approach Surfaces

i) Runway 23

A small hill, 191 m (176m MSL plus 15 m trees) AMSL, on the northern part of Samal Island, is located at a distance of 8,000m from Runway 23 threshold in the extended approach area. This hill will be projected above the surface of horizontal section. However, this surface will be free from obstacles provided that the length of the second section is extended to 4,500m.

ii) Runway 05

The radio broadcasting antenna masts and the 188m AMSL TV tower are located on the hill at a distance of 8,500m from Runway 05 threshold in the extended approach area. The TV tower (188m AMSL) will be projected above the surface of the horizontal section. However, this surface will be free from these obstacles provided that the length of the second section is extended to 4,500m. The remaining portion of the approach area will be free from obstacles.

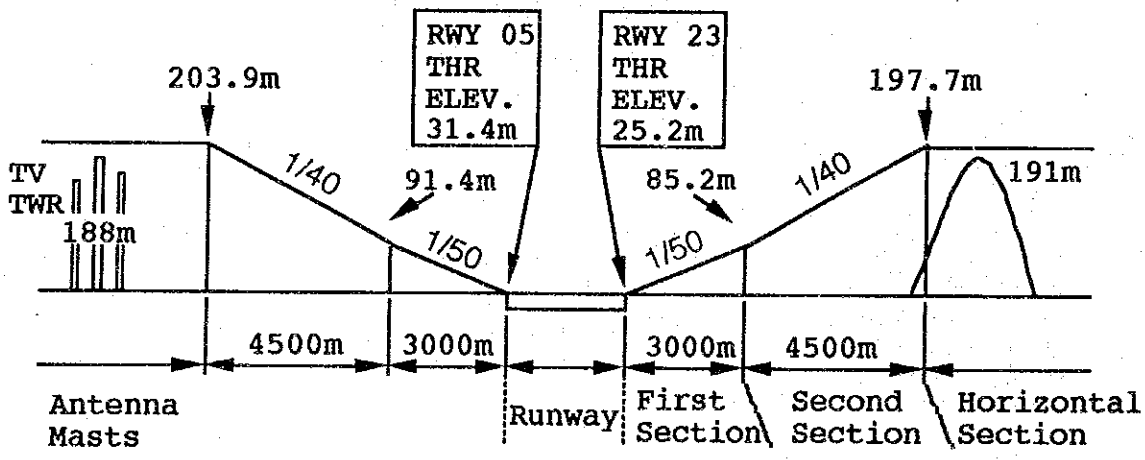


Figure 9.8.9 Profile of Approach Surfaces

b) Inner Horizontal Surface

The elevation of the inner horizontal surface will be 76.4 m AMSL. Some 80 m AMSL hills are projected on the north and south edge of this surface as shown in Figure 9.8.10.

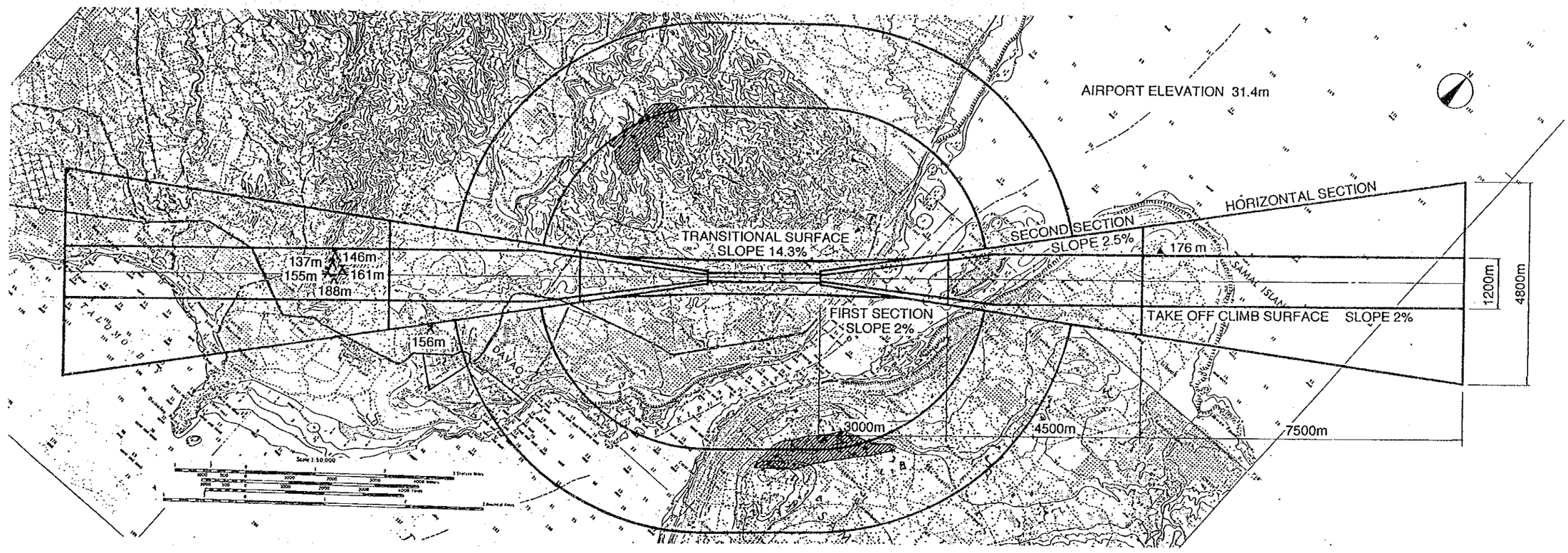


Figure 9.8.10 Obstacle Limitation Surface for Medium-Term Development Project

c) Conical Surface

Some 90 ~ 100 m AMSL hills are projected on the north and south edge of this surface as shown in Figure 9.8.10.

d) Transitional Surfaces

Figure 9.3.1 show the projection of obstacles above the surface. These obstacles, swollen ground level, are planned to be cut off during the construction of the new runway.

e) Take-off Climb Surface

No obstacle is projected above the surfaces of the 1/40 slope for Runways 05 and 23.

CHAPTER 10 PROJECT IMPLEMENTATION SCHEDULE AND COST ESTIMATES

CHAPTER 10 PROJECT IMPLEMENTATION SCHEDULE AND COST ESTIMATES

10.1 General

This chapter explains the project implementation schedule and cost estimates of the medium-term development project based on the preliminary design in Chapter 9.

10.2 Project Implementation Schedule

The project implementation schedule is shown in Table 10.2.1.

Table 10.2.1 Preliminary Implementation Schedule for the Medium-Term Development

Work Item \ Year	1992	1993	1994	1995	1996	1997	1998
Feasibility Study	■	■					
Financial Arrangement		■					
Selection of Consultant			■ ■ ■ ■				
Land Acquisition				■	■		
Detailed Engineering Services*				■			
Tendering					■		
Construction Works					■	■	■
Test Operation, Flight Check, etc.							■ ■
Inauguration							▼

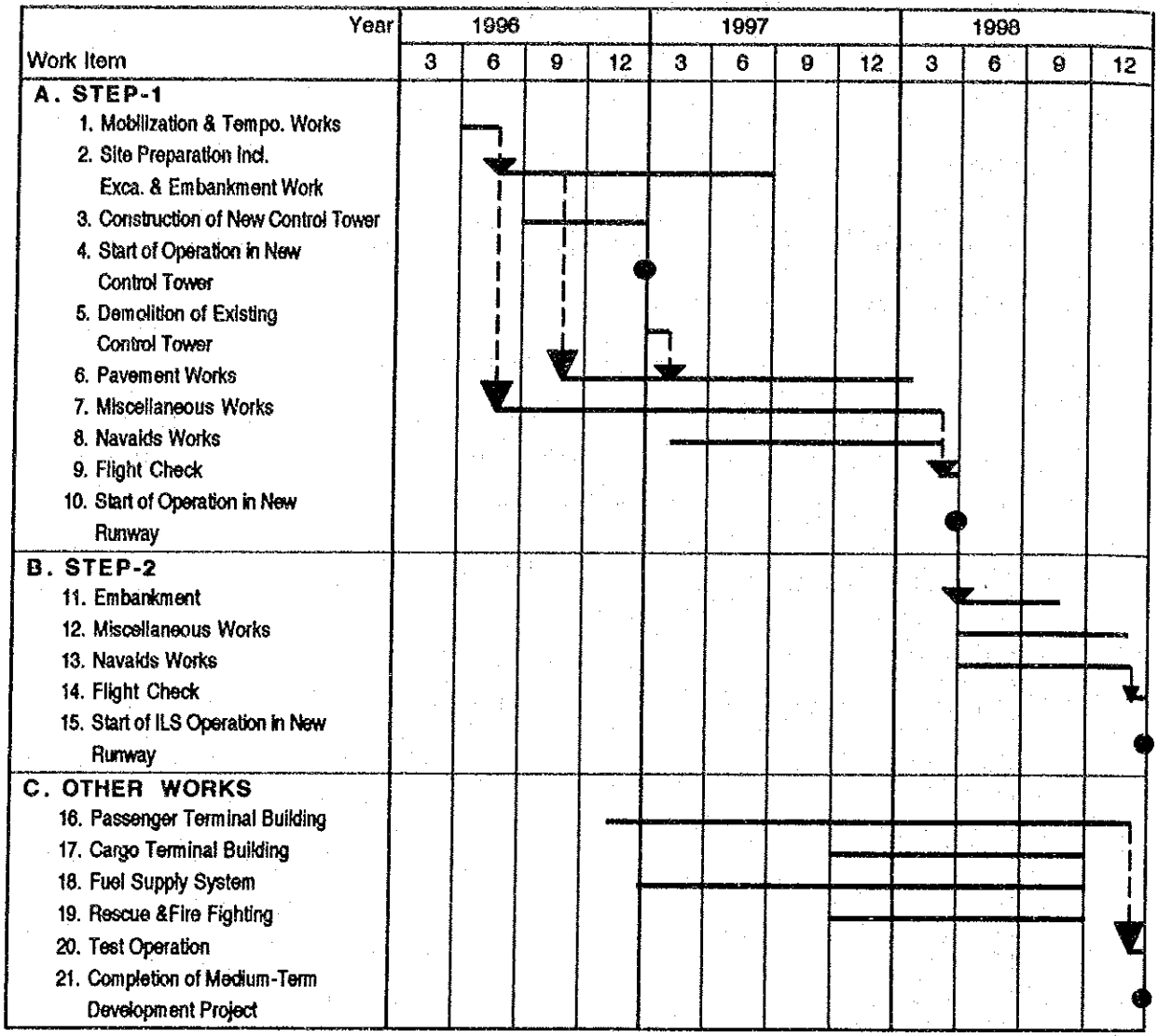
Note*: Including basic design, detailed engineering design and preparation of tender documents.

It should be noted here that the duration of selection of consultant shown by the dotted line in the table indicates uncertainty of time required to process necessary formalities until the final selection of the consultant is made. In general it will take almost one year due to the time loss during the selection process, however, it may be shortened some six months if processing formalities are accelerated.

The next stage of the project implementation to this Study is the financial arrangement for the project. The selection of a consultant, land acquisition, the detailed engineering services, and tendering will follow the financial arrangement prior to the commencement of the construction work.

The construction schedule of the medium-term development project is estimated as shown in Figure 10.2.2 based on the expected work volume, procedures of incremental embankment mentioned in Section 9.2 and the procedures of switching the runway operations from the existing runway to the new one.

Table 10.2.2 Construction Schedule



The construction work will take approximately 33 months to complete including test operations and flight check.

As shown in Tables 10.2.1 and 10.2.2, the construction works are expected to commence in the second quarter of 1996 and to be completed at the end of 1998. While Table 10.2.1 indicates the practical schedule, the schedule could be reduced by one-half year in the optimistic case as mentioned above.

While the design target year of the medium-term development plan is 2000, the proposed facilities are able to accommodate the air traffic demand up to 2005 if the level of service in the new passenger terminal building can be lowered from C level (good) to D level (adequate) categorized by IATA. Capacity of the new passenger terminal building is shown in Appendix-10.2.1.

10.3 Project Cost Estimates

10.3.1 Assumption to the Cost Estimates

The costs are estimated based on the following assumptions:

a) The costs are based on the September 1992 price index.

b) The exchange rates were 25 Philippine Pesos per US Dollar, Japanese 125 Yen per US Dollar, and Japanese 5 Yen per Philippine Pesos.

c) The costs are estimated in Philippine Pesos (PHP).

d) No price escalation is included in the cost estimates because this cost estimate has been made primarily for the economic analysis which is made in current prices.

e) The facilities to be provided by organizations other than DOTC are not included in the project cost.

f) The cost of the engineering services consisting of soil investigation, topographical survey, basic design, detailed design and construction supervision is estimated at 15% of the total construction cost.

g) The contingency is estimated at about 10% each for land acquisition and compensation, construction and engineering services.

10.3.2 Project Cost

The cost of the medium-term development project is shown in Table 10.3.1. A breakdown of the cost estimates in shown in Appendix-10.3.1.

The cost is estimated to be 136 million PHP for land acquisition and compensation, 2,246 million PHP for the construction, 330 million PHP for engineering services and 2,712 million PHP in total.

Annual disbursement schedule is shown in Table 10.3.2 based on the project implementation schedule.

Table 10.3.1 Project Cost for Medium-Term Development Project

Based on 1992 price

Unit : PHP 1,000

ITEM	LOCAL PORTION	FOREIGN PORTION	TOTAL
I. LAND ACQUISITION AND COMPENSATION COST			
1. LAND ACQUISITION	69,186	0	69,186
2. RELOCATION OF HOUSES	54,660	0	54,660
Subtotal	123,846	0	123,846
Contingency (Approx. 10%)	12,154	0	12,154
TOTAL OF I.	136,000	0	136,000
II. CONSTRUCTION COST			
1. Mobilization/Demobilization & Tempo. Works	66,000	125,000	191,000
2. CIVIL WORKS			
Demolition Work	15,860	18,990	34,850
Earthwork	115,798	184,198	299,996
Pavement Work	156,278	126,896	283,174
Drainage Work	10,068	5,701	15,769
Miscellaneous Works	28,560	8,330	36,890
Total of 2.	326,564	344,115	670,679
3. ARCHITECTURAL WORKS			
Pax. Bldg.	165,240	306,180	471,420
Cargo Bldg.	21,700	32,900	54,600
Admin. Bldg. & Control Tower	13,040	19,560	32,600
Fire Station	4,753	2,597	7,350
Other Bldgs.	2,920	1,580	4,500
Boarding Bridge	1,600	30,400	32,000
Other Special Equipment	20,440	81,760	102,200
Total of 3.	229,693	474,977	704,670
4. AIRPORT UTILITIES			
Power Supply System	10,780	44,100	54,880
Telephone System	1,340	6,720	8,060
Water Supply System	1,000	9,000	10,000
Sewer Pipe	1,800	10,200	12,000
Sewerage Treatment Plant	1,800	7,300	9,100
Incinerator	5,000	5,000	10,000
Total of 4.	21,720	82,320	104,040
5. AIR NAVIGATION SYSTEMS			
5.1. Radio Navigation System	1,406	7,030	8,436
5.2. Aero. Telecom. System	3,930	26,500	30,430
5.3. Air Traffic Control System	7,780	41,700	49,480
5.4. Met. Observation System	5,010	16,700	21,710
5.5. Airfield Lighting System	41,679	153,353	195,032
Total of 5.	59,805	245,283	305,088
6. RESCUE AND FIRE FIGHTING	300	5,700	6,000
7. FUEL SUPPLY SYSTEM	15,000	45,000	60,000
Subtotal	719,082	1,322,395	2,041,477
Contingency (Approx. 10%)	71,918	132,605	204,523
TOTAL OF II.	791,000	1,455,000	2,246,000
III. ENGINEERING SERVICES COST			
Engineering Services	30,000	270,000	300,000
Contingency (Approx. 10%)	3,000	27,000	30,000
TOTAL OF III.	33,000	297,000	330,000
TOTAL PROJECT COST (I.+II.+III.)	960,000	1,752,000	2,712,000

Note: Exchange rates US$1.00 = PHP25 = Yen 125 (PHP 1.0 = Yen 5)

Table 10.3.2 Annual Disbursement Schedule

Based on 1992 price

Unit : PHP 1,000

YEAR	19 95		19 96		19 97		19 98		TOTAL	
ITEM	LOCAL PORTION	FOREIGN PORTION	LOCAL PORTION	FOREIGN PORTION	LOCAL PORTION	FOREIGN PORTION	LOCAL PORTION	FOREIGN PORTION	LOCAL PORTION	FOREIGN PORTION
A. LAND ACQUISITION	100%								100%	
& COMPENSATION	123,846	0	0	0	0	0	0	0	123,846	0
Contingency (Approx. 10%)	12,154	0	0	0	0	0	0	0	12,154	0
Total of A.	136,000	0	0	0	0	0	0	0	136,000	0
B. CONSTRUCTION										
1. Mobilization & Tempo. Works			100%						100%	
	0	0	66,000	125,000	0	0	0	0	66,000	125,000
2. Civil Works			30%		40%		30%		100%	
	0	0	97,969	103,235	130,626	137,646	97,969	103,235	326,564	344,115
3. Architectural Works			10%		50%		40%		100%	
	0	0	22,969	47,498	114,847	237,489	91,877	189,991	229,693	474,977
4. Airport Utilities			10%		50%		40%		100%	
	0	0	2,172	8,232	10,860	41,160	8,688	32,928	21,720	82,320
5. Air Navigation Systems			5%		55%		40%		100%	
	0	0	2,990	12,264	32,893	134,906	23,922	98,113	59,805	245,283
6. Rescue and Fire Fighting					25%		75%		100%	
	0	0	0	0	75	1,425	225	4,275	300	5,700
7. Fuel Supply System			10%		50%		40%		100%	
	0	0	1,500	4,500	7,500	22,500	6,000	18,000	15,000	45,000
Subtotal	0	0	193,601	300,728	296,800	575,125	228,681	446,542	719,082	1,322,395
Contingency (Approx.10%)			19,399	30,272	29,200	57,875	23,319	44,458	71,918	132,605
Total of B.	0	0	213,000	331,000	326,000	633,000	252,000	491,000	791,000	1,455,000
	40%		20%		20%		20%			
C. ENGINEERING SERVICES	12,000	108,000	6,000	54,000	6,000	54,000	6,000	54,000	30,000	270,000
Contingency	1,000	12,000	0	5,000	1,000	5,000	1,000	5,000	3,000	27,000
Total of C.	13,000	120,000	6,000	59,000	7,000	59,000	7,000	59,000	33,000	297,000
TOTAL PROJECT COST	149,000	120,000	219,000	390,000	333,000	692,000	259,000	550,000	960,000	1,752,000

CHAPTER 11 AIRPORT MANAGEMENT STUDY

CHAPTER 11 AIRPORT MANAGEMENT STUDY

11.1 General

This chapter describes the organization and number of airport staff required for the medium-term development. In addition, evaluation of the existing airport management is described.

11.2 Organization and Number of Airport Staff

The airport offices in the Republic of the Philippines are administrated by the Air Transportation Office (ATO) which belongs to the Department of Transportation and Communications (DOTC).

The organization of ATO is shown in Figure 3.10.1.

The existing organization of Davao International Airport Office is shown in Figure 3.10.2.

This airport office consists of three divisions, such as airport maintenance services, air traffic services and airways navigation services.

The division of airport maintenance services is composed of 10 sections which mainly handle routine airport maintenance and administrative services.

The division of air traffic services is composed of 2 sections which mainly handle air traffic control and ground-air communications by HF.

The division of airways navigation services is composed of 4 sections which mainly handle the maintenance of radio navigation facilities, such as VOR/DME, NDB, LLZ, monitor facilities of communications for the air traffic services and airfield lighting.

At present, this airport is operated by a staff of 147 people.

The airport manager of this airport has the additional responsibility for the management services of the local airports, such as Allah Valley, Bislig, General Santos, Mati, Tandag and Cotabato as shown in Figure 3.10.2. Thus, the daily work of the airport manager has increased to an overburdening level due to the additional work of the administration at the 6 airports. To release the airport manager from the serious conditions a full-time airport manager should be assigned to assist the airport manager.

The organization structure for the medium-term development is assumed to be almost the same as the existing structure except for the requirement of a full-time airport manager.

The number of airport staff needs to be increased in proportion to the growth of the air traffic volume and upgrading of the fire fighting and rescue category of this airport.

The number of airport staff required for the medium-term development is shown in Table 11.2.1.

Table 11.2.1 Number of Airport Staff for Medium-Term Development at Davao International Airport

Division	Section or Position	Present 1992	Medium-Term Development 2000
	Airport Manager	1	1
	Full-time Airport Manager	0	1
Airport Maintenance Services	Administrative Services	1	1
	Personnel Administration Unit	2	2
	Financial Management Unit	7	7
	Cashier Unit	3	3
	General Services Unit	1	1
	Terminal Building Janitorial Services	12	12
	Special Services Staff	2	2
	Concessions and Statistic Unit	3	3
	Fire Rescue Unit	33 (+14)	47
	Civil Security Unit	9	9
	Building and Ground Unit	10	10
Air Traffic Services	Air Traffic Services	3	3
	Aerodrome/Approach Station	11 (+4)	15
	Flight Service Station	12 (+4)	16
Airways Navigation Services	Airways Navigation Services	4 (+4)	8
	Control Station	11	11
	VOR/DME/ILS/LLZ Receiver Station	11 (+4)	15
	Transmitter Station	8	8
	Electrical/Airfield Lighting	3	3
	Total	147	178

11.3 Evaluation of Existing Airoprt Management

(1) Airport Maintenance Services

a) Security Services

Security services are carried out by two agents: ATO and the Philippine National Police.

ATO has the responsibility of observing the administration building, the arrival area of the passenger terminal building and gates, and observing the pedestrians at the airside.

The Philippine National Police has the responsibility of observing and screening the passengers at the passenger terminal building and for guarding the control tower.

b) Fire Rescue Services

At present, the airport category for rescue and fire fighting is category 6 in consideration of aircraft operations at this airport.

The facilities for rescue and fire fighting are adequately provided and maintained with total number of 33 persons. However, in the near future the category for rescue and fire fighting will be raised up to category 8.

Thus, more fire fighting facilities are required based on the international standard.

Two major vehicles for fire fighting and one rapid intervention vehicle are expected to be donated by other counties.

An increase in the total number of staff personnel will be needed when the airport category is changed to 8 and more fire fighting facilities are provided.

(2) Air Traffic Services

At present, air traffic services consisting of the aerodrome/approach station and the flight services station (FSS) are adequately provided at this office.

It is considered that there are no operational problems.

(3) Airways Navigation Services

a) Radio Navigation

At present, C-VOR/DME, NDB and LLZ are installed at this airport for use during instrument approaches and departures.

The ground inspection of existing conditions for these facilities are carried out by the staff of the airways navigation services.

At present, most of facilities are maintained in good condition.

However, flight checks at these facilities are not conducted on a regular basis. Periodic flight checks should be carried out to confirm the reliability of the radio navigation facilities.

b) Airfield Lighting

At present, SALS, PAPI, runway threshold end lights, runway edge lights, taxiway edge lights, apron floodlights, aerodrome beacon, obstruction lights and illuminated wind direction indicator are installed at this airport.

These airfield lighting facilities are normally maintained by the staff of the electrical/airfield lighting section. Most of the facilities are in good condition.