4.3.2 Terminal Buildings and Car Parking

(1) Concept of Terminal Buildings

a. The Existing Site Conditions

The existing terminal buildings are surrounded by apron in the north, administration buildings and V.I.P. fale in the west, car park in the south, and HF antenna in the south-west. Judging from the above conditions, the expansion of the existing terminal buildings will be made toward the east, south and/or the south-east.

b. Basic Concept of Passenger Terminal

The concept of a passenger terminal building varies according to the size of passenger traffic to be processed.

In this case, the existing terminal building will be expanded keeping the existing frontal system with a single floor concept, because the demand is relatively small in size (the number of aircraft and passengers to be processed during the design peak hour are 3 and approx. 300 respectively.).

The extension of the existing building will be made in such a way that the expanded building will permit further expansion to cope with the increasing demand and will appear as a single building.

Public departure and arrival lobby for well-wishers and greeters will be accommodated in the covered open area in between the departure and arrival building units as at present.

c. Alternative expansion scheme of terminal building

Two principal methods of extension are conceivable.

A : the extension is made by structurally enlarging parts of the existing building.

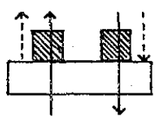
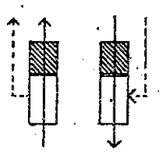
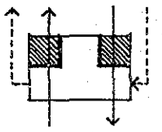
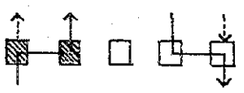
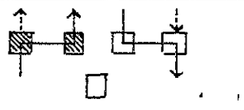
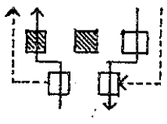
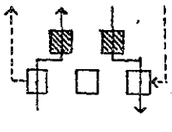
B : the extension is made by adding new building units

Three and four alternatives are conceivable for each method respectively. The characteristics of those alternatives are studied and the results are shown in Table 4.3.1.

As a result of the above-mentioned comparative study, it is judged that alternatives A-1 and B-3 are to be further studied to choose the best alternative.

Interior layouts are planned for the above two alternatives and further comparative study is carried out as shown in Tables 4.3.2 and 4.3.3.

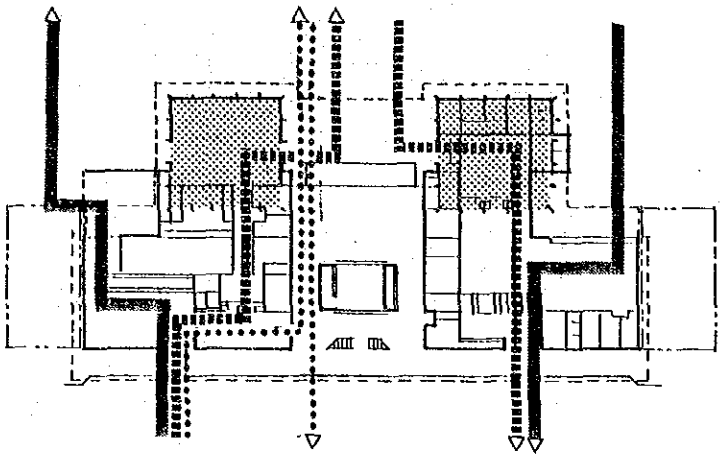
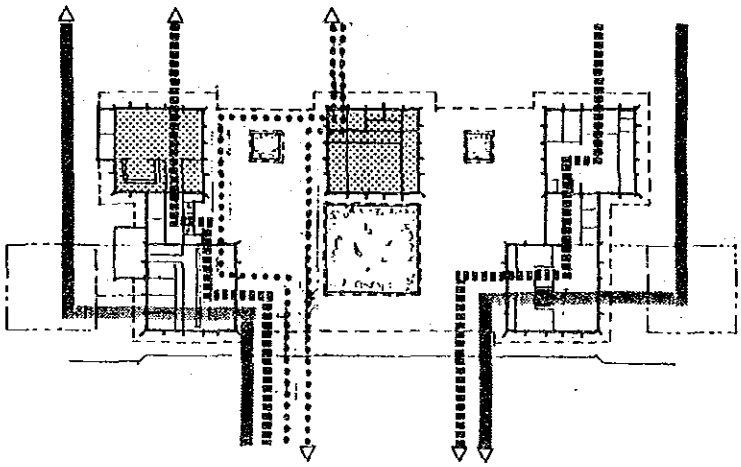
Table 4.3.1 Comparative Table of Alternatives

		Alternative	Characteristics	Characteristics in future extension
A	1		. Directions of extension are to existing car park and parallel to apron. . Flow lines of passengers and checked-in baggage are simple and short. . As the part extended forms a single body, it provides maximum free interior space and is adjacent to the existing part, the interior layout can be flexible. . Existing public space for well-wishers and greeters is reserved. . Baggage handling area can be easily obtained. . Appearance from car park side can be as a single building. . Appearance from apron side can remain as the present.	. Extension parallel to apron will be natural. . Size of extension can be chosen freely. . Modification of layout can be done with good flexibility. . Less remodeling because baggage handling area, check-in counters and customs check counters are parallel to direction of extension, and they do not interfere with the expansion of building.
	2		. Direction of extension is to existing car park. . Flow lines of passengers and checked-in baggage are simple and short. . As the departure building is separated from the arrival building by public space, flexibility of interior layout is relatively small. . Public space is extended in direction of existing car park. . Appearance from car park side may be relatively difficult to be as a single building. . Appearance from apron side can remain as at present.	. Extension toward car park will be natural. . In that case, car park must be rearranged and the direction of the extension is not in accordance with that of apron in future. . Size of extension can be chosen freely. . As the building is separated into two parts, flexibility by modification of interior layout will be restricted compared with A-1. . More remodeling in the case of extension parallel to apron, because baggage handling area, check-in counters and customs check counters are vertical to direction of extension, and they may interfere with the expansion of the building.
	3		. Direction of extension is to existing car park. . Public space must be removed to the place between the building and car park. . Appearance from car park can be as a single building. . Appearance from apron is difficult to remain as the present.	. Extension will be made parallel to apron and/or to car park. . More remodeling in the case of extension parallel to apron, because baggage handling area, check-in counters and customs check counters must be vertical to the direction of extension and they may interfere with the expansion of the building.
B	1		. Direction of extension is parallel both to apron and car park and in accordance with that of apron. . Flow line of passengers must be long and complicated. . As the size and form of units are copied from that of the existing building, the flexibility by designing interior layout is restricted. . Public space can be spacious. . Appearance is developed from that of the existing building.	. Extension parallel to apron will be natural. . Direction of extension will be in accordance with that of apron. . As extension will be made by adding separated Unit(s), modification of interior layout must be made on relatively large scale.
	2		. Location of newly added building in center is not functionally appropriate. . Otherwise similar to B-1.	. Direction of extension will be parallel to apron and/or to car park. . Otherwise, similar to B-1.
	3		. Directions of extension are parallel to apron and to car park. . Characteristics of passenger flow line are similar to that of A-2, and those of checked-in baggage to those of A-3. . As added units are separated from each other, flexibility of interior layout is restricted. . Public space can be spacious. . Center located existing building can be used for Airport Authority office. . Appearance follows that of the existing building.	. Characteristics similar to B-2.
	4		. Directions of extension are parallel to apron and car park. . Characteristics of passenger flow line are similar to that of A-1, and these of checked-in baggage to those of A-3. . As added units are separated from each other, flexibility of interior layout is restricted. . Public space can be spacious, but center located newly added building can be used only for facilities like restaurant or shop. . Appearance is developed following that of the existing building.	. Extension parallel to apron will be natural. . Otherwise, similar to B-1.

▨ building existing ⟶ flow line of passengers

□ building to be added ⇢ flow line of checked-in baggage

Table 4.3.2 Characteristics of Two Alternative Layouts

	Alternative Layouts	Characteristics
A - 1		* Existing departure and arrival terminal buildings are utilized respectively as departure and arrival as at present. * Further expansion will be made in direction of east and/or west * The whole can be seen as a large single building from car park side. * Flexible design is possible without being affected by methods and style adopted presently.
B - 3		* Existing departure terminal will be used as departure. * Existing arrival terminal will be converted to administration and concession. * Arrival terminal will be accommodated in newly added units. * Further expansion will be made by adding units on the east and/or west sides. * The construction method and style of the existing building are adopted to the new building units.

LEGEND

- INTERNATIONAL PASSENGERS
- INTERNATIONAL BAGGAGE
- DOMESTIC PASSENGERS & BAGGAGE
- EXISTING BUILDINGS
- SUGGESTED FUTURE EXPANSION

Table 4.3.3 Comparison between Characteristics of Two Alternatives

No.	Alternatives / Comparison Items	A-1 Description	Comparison with B-3	B-3 Description	Comparison with A-1
1	Floor Areas of Indoor and public space	. Indoor Approx. 3,000 m^2 . Public space Approx. 1,000 m^2 Total 4,000 m^2		. Indoor Approx. 3,000 m^2 . Public space Approx. 1,000 m^2 Total 4,000 m^2	
2	Walking Distance (with Baggage)	. Approx. 60 m from center of car parking area to check-in counter . Approx. 60 m from baggage claim area to center of car parking area		. Same as A-1	
3	Walking Distance (without Baggage)	. Approx. 120 m from check-in counter to aircraft . Approx. 120 m from aircraft to baggage claim area	Better	. Approx. 120 m from check-in counter to aircraft . Approx. 140 m from aircraft to baggage claim area	
4	Passenger Flow Line	. Length: Approx. 120 m from apron to car parking . Direction change: 2 or 4 times*	Better	. Length: Approx. 120 m from apron to car parking area . Direction change: 4 times*	
5	Checked-in baggage flow	. Baggage flow is planned without interference by passenger flow. . Ample space is allocated for baggage make-up and break-down.		. Same as A-1	
6	Future Expansibility	. Expansion to be made toward the east and/or the west . Less remodeling is necessary.	Better	. Expansion to be made by increase of number of units . More remodeling of the existing units is necessary whenever new unit is added.	
7	Capability of staged construction	. Staged construction can be made as the expansion in the above.	Better	. Remodeling of the existing units is necessary whenever new unit is added.	
8	Transfer passenger	. Transfer passengers can be guided directly to the departure lounge by providing the counter at airside in between arrival and departure buildings when necessary.		. Same as A-1	
9	Transit passenger Flow Line (without Baggage)	. Transit passengers to be separated from arrival passengers at the arrival gate area so as to proceed to the departure lounge . Shorter walking distance.	Better	. Same as A-1, but longer walking distance	
10	Duplication of Facilities	. None		. None	
11	Balanced planning of Facility from Air side to Land side	. Orderly layout of facilities is possible		. Same as A-1	
12	Utilization of Existing terminal Buildings	. Maximum use for the passenger processing . The existing departure and arrival buildings to be converted to departure lounge, and Quarantine and Immigration control area respectively.		. The existing departure and arrival buildings to be converted to departure lounge, and office and restaurant respectively.	
13	Aesthetic aspect as the National gateway	. Two buildings can appear to be unified as one building as required.	Better	. Same as A-1, but less unified due to the wider covered open area.	
14	Overall evaluation	. A-1 is better than B-3 in terms of future expansibility. . This centralized layout provides more unified appearance and easier operations.	Better	. This scheme provides the shorter walking distance to arriving passengers, when the apron is expanded toward the east after 1993. The difference between two schemes is about 40 meters.	

* Number of direction changes may vary with detailed interior layout.

Having studied the aforementioned points, Alternative A-1 which is considered as the best one in general is decided as a basic concept of the proposed terminal building.

(2) Floor Plan

a. Required Facilities inside the Terminal Building

Facilities in the terminal building are generally divided into the functional categories as shown in the following table.

Table 4.3.4 Functional Classification of Facilities in Passenger Terminal Building

Categories	Facilities
Passenger Departure	Check-in Lobby, Check-in Counters, Departure Lobby, Boarding Gates and Lounge
Passenger Arrival	Arrival Lounge, Baggage Claim area
Baggage Handling	Baggage make-up area, Baggage break-down area
CIQS Check	C: Customs check counter I: Immigration check counter Q: Quarantine check counter S: Security check counter
Offices	Offices for Authorities (CIQS), A part of Airport authority Office, Airline Offices, Police, Tax Office
Concession	Restaurants, Coffee Lounge, Souvenir Shops, Duty-Free Shops, Banks
Other Services	Observation, Information and Others Counters, Washrooms, Service Yards

The flows of both passenger and baggage are planned in relation to the above facilities as indicated in Fig. 4.3.2.

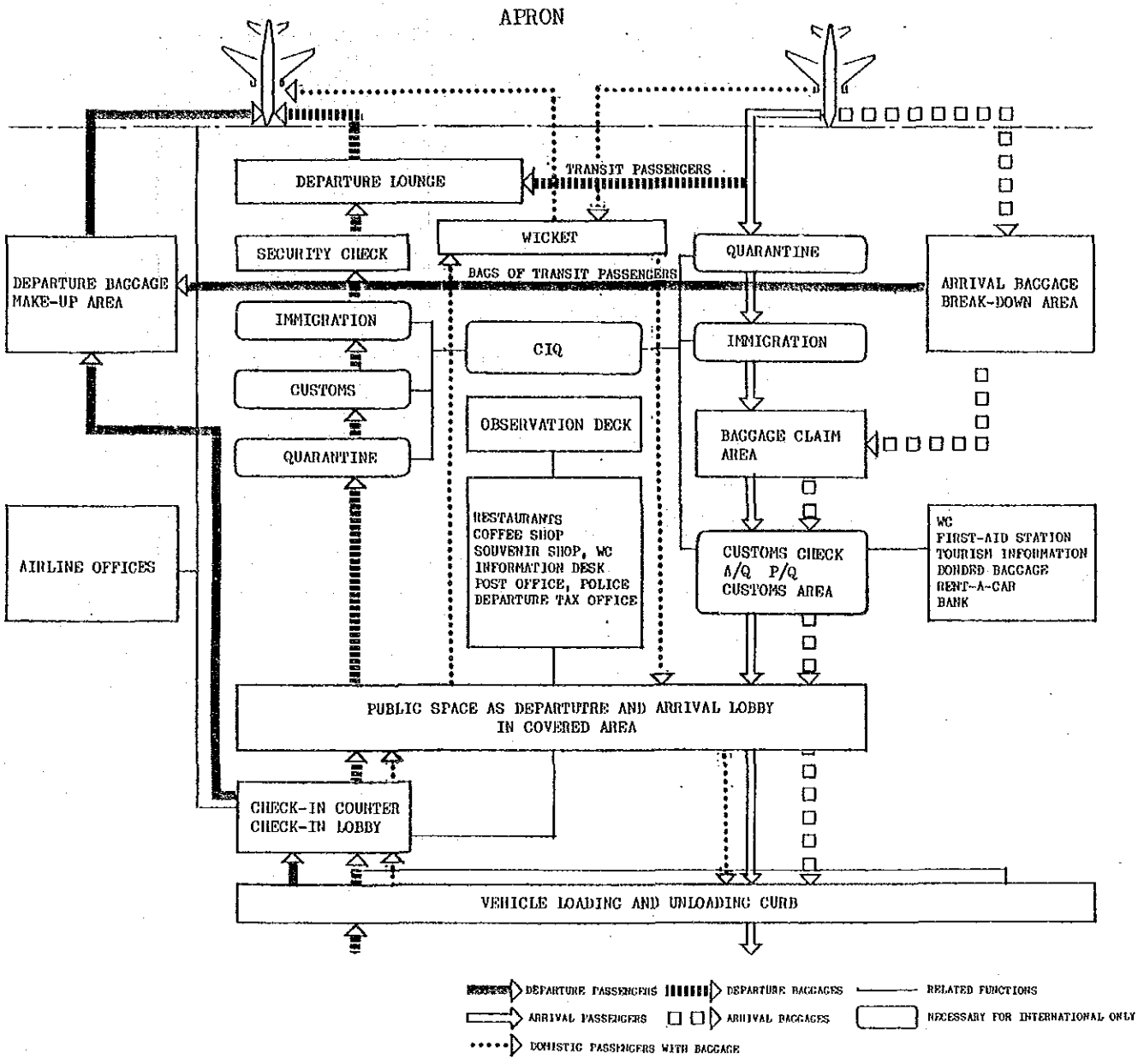


Fig. 4.3.2 General Flow Diagram of Passengers and Baggage

b. Required Floor area by Facility

Number of counters required for the various facilities is estimated as indicated in Appendix G and summarized in Table 4.3.5.

Table 4.3.5 Floor Area and Facilities Requirements

Counter	No.
1. Departure Building	
1) Check-in Counter	9
2) Immigration Counter	4
3) Security Check Counter	2
2. Arrival	
1) Quarantine Counter	2
2) Immigration Counter	4
3) Customs Counter	4
4) Baggage Claim Counter	17m

c. Layout Plan of Facilities

Internal layout of the terminal building is planned as indicated in Fig. 4.3.4. based on the following considerations made to the various facilities to be housed in the building.
The following considerations were made from the viewpoints of relations between facilities, flow lines of passengers and baggage, and accommodation of the requirements from the Government of Western Samoa.

i) Check-in lobby — Airline offices and baggage make-up area are located behind the check-in counters. Ceilings of the Lobby shall be high enough to allow natural ventilation. Air conditioning equipment will not be installed.

ii) Immigration and Security Check (Departure) — Immigration counters and security check will be located in such a way that minimum walking distance and straight flow from Immigration Counter to departure lounge can be achieved.
Police station will be located nearby.

iii) Departure Lounge — The departure lounge will be planned as large as possible in the existing departure building.
Walk-in style duty-free shop will be located after the security check.
Covered outdoor waiting area will be

		attached to the departure lounge in order to absorb the possible excessive congestion due to delays of departing flights, excess overlapping of departures and a non-scheduled flight of B747.
iv)	Quarantine and Immigration for Arrival	Separate facilities will be provided for Quarantine and Immigration. Counters will be located with Sufficient provision of queueing space and future additions. Offices for Quarantine and Immigration will be provided close to the respective counters. Duty-free shop for arrival passengers will be located after Immigration Counter.
v)	Baggage Claim Area	Baggage claim area accommodating the anticipated queue will be located so as not to impede the passenger flow from immigration to customs and queue for customs inspection. A bank, toilets, bounded baggage, etc. will be located in the baggage claim area.
vi)	Offices for Government Controls (CIQS)	The offices will be located at the appropriate places close to their respective checking facilities.
vii)	Airport Authority Office	The office for the executive staffs of Airport Authority will be accommodated in the arrival building and facing the apron area.

viii)	Customs Inspection Area	Costoms inspection counters will be located without any interference by the crowd at the baggage claim area. Animal and plant quarantine facilities are also provided in this area. Information, travel agent, rent-a-car desks etc. will be placed after customs clearance section for the passengers' convenience.
ix)	Domestic Passenger Facilities	The public space between the departure and arrival buildings will be utilized by domestic passengers. A wicket is provided facing the apron area for boarding aircraft and leaving airport.
x)	Public Space	Public space for well-wishers and greeters will be provided between the departure and arrival terminals. This area will also be utilized by the departing passengers before proceeding to immigration control. Open-air restaurant with seating facilities and kiosk will be located in this area An observation deck will be provided above this area so as to be free from any adverse jet blast and will provide a panoramic view of the airport.

d. Floor area

The existing terminal building will be expanded as indicated in the following table 4.3.6 in order to accommodate the above-mentioned requirements and requirements of the Government Western Samoa described in APPENDIX-H.

Table 4.3.6 List of Floor Area

		Facilities	Existing Terminal		Proposed Terminal	
			Area(m2)	Remarks	Area(m2)	Remarks
Arrival terminal	1	Quarantine Lobby		Table x 2 Use same lobby for Dep. & Arr.	57.1	Table x 2
	2	Inbound Immigration Lobby	72.8	Use desks	151.2	Counter x 4
	3	Toilets	23.2		51.8	
	4	Customs Office	11.6		34.3	
	5	Health/First Aid and Quarantine	23.2		62.8	Including wash room
	6	Immigration Office	7.6		33.0	
	7	Night duty Room/CIQS	----		22.4	
	8	Night duty Room/AIRLINE	----		22.4	
	9	Baggage Claim Area	98.8	Counter: 8.5m	259.2	Counter: 16m
	10	Bonded/Mislaid Baggage Area	18.2		15.1	
	11	Duty-Free Shop	----		23.4	Incl. store
	12	Customs Check	46.8	Table x 3 Incl. Arrival Lounge	273.2	Table x 4 Incl. Arrival Lounge
	13	Restaurant	76.7	Incl. Kitchen & Store	----	Incl. Kitchen & Store (outside kitchen)
	14	Toilets for Public	72.8		51.8	
	15	Bank	----		10.8	
	16	Information Office	----		15.3	
	17	Airport Authority	----		142.8	Incl. WC, Shower room, kitchen
	18	common conference room	----		25.9	
	19	Others	----		52.5	
		Subtotal	451.7		1,321.6	

Cont'd

	Facilities	Existing Terminal		Proposed Terminal	
		Area(m2)	Remarks	Area(m2)	Remarks
Departure terminal	1 International Departure Lounge	124.8		357.0	
	2 Outbound Immigration & Security Check	30.0		211.5	Immigration counter x 4 Security x 2
	3 Duty-Free Shop	55.9		117.6	Incl. Store
	4 Store	9.1			
	5 Toilets	27.0		51.8	
	6 Check-in Lobby	124.8	Incl. Bank, Tax Office	220.3	
	7 Check-in Counter	46.8	Counter x 3	86.4	Counter x 9
	8 Airline Offices	63.7	4 rooms	140.6	4 rooms
	9 Baggage Make-up/Transfer Area	33.8		51.8	
	10 Post Office	12.4		10.8	
	11 Police Office	----		10.8	
	12 Tax Paid Office	----		10.8	
	13 Security Office	----		36.0	
	14 Immigration Office	----		32.4	
	15 Others			139.8	
	Subtotal	528.3		1,477.6	
Covered Open Area	1 Public Space	600.0		1,128.9	
	2 Restaurant	----		155.0	Incl.Kitchen and Store
	3 Kiosk	----		14	
	Subtotal	600.0		1,297.9	
Total		1.580.0		4,097.1	
Covered Area for Baggage dolly	1 Baggage Make-Up Area	84.0		94.5	
	2 Baggage Break-Down Area	58.8		180.7	
Grand Total		1,722.8		4,372.3	

(3) Finishing schedule

a. To minimize kinds of finishing materials by grouping according to the function of the area.

b. To use local materials (aggregates, sand, concrete blocks, and wood) as much as possible.

c. To procure materials not available in Western Samoa, from the neighboring countries including Japan.

Table 4.3.7 Finishing Schedule

Location	Part	Finishing Materials		Principal reason for selection
		Materials to be used	Materials as alternatives	
Outside :	roof	Asphalt shingle	Corrugated G.I sheet	Durability
	walls	Concrete Block wood painted partials wooden covering	Concrete Block painted	Durability and flexibility for future modification
	Doors & windows	glazed Aluminum Sash	glazed Wooden Sach	To obtain effective ventilation and Durability
	Floor	Inter-locking paving block	Cement Mortar	Durability

Location	Part	Finishing Materials		Principal reason for selection
		Materials to be used	Materials as Alternatives	
Large-scale Rooms:	Floor	Rubber Tiles	Plastic tiles	Durability
	Plinth	Plastic Plinth	Wooden Plinth painted	Easy maintenance
Check-in Lobby, Departure Lounge, Baggage Claim Area	Wall	Paint	Plastic Cloth	Easy maintenance
Arrival Passenger Processing Area	Suspended Ceiling	nil		To match local climate
Offices: CIQ, Air-line, & Administration	Floor	Rubber tiles	Plastic tiles	Durability
	Plinth	Plastic Plinth	Wooden Plinth painted:	Easy maintenance
	Wall	Paint	Plastic Cloth	Local method & easy maintenance
	Suspended Ceiling	Paint	Plastic Cloth	Ditto
Wet Rooms: Toilets,	Floor	Ceramic Tiles	Cement mortar	Easy to maintain
	Wall	Ceramic Tiles	Ditto	Ditto
Kitchens	Suspended Ceiling	Paint	Paint	
Other Rooms for Rent	Floors, walls, and ceilings are preliminarily finished.			

(4) Outline of Structural design

a. Outline of the Building

The terminal building structurally consists of the existing buildings and new expansion.

i) Existing terminal buildings

Those buildings consist of two similar buildings, each of which has a square floor plan of 70ft x 70ft. The roof is supported by four main columns located on each corner of building and secondary columns around the periphery. As the structural system is not designed taking into account the future extension, the building will be structurally independent of the new expansion and piloti.

ii) New building to be expanded

① The expansion will be made by steel framed structure in order to provide large free interior spaces with minimizing number of columns.

② The following two types of framings are conceivable.

a. Columns and beams frame
b. Columns and trusses frame

Frame a. is adopted from the viewpoints of ease of construction works, structural durability and construction economy.

③ Foundations of the building are to be simple footing foundations, as was adopted for the existing buildings.

④ Foundation will be constructed with reinforced concrete. Sand for concrete includes salt 0.2% according to test data on sand sample utilized for cement concrete blocks. Therefore, the specification No. 759 issued by the ministry of construction of Japan titled "Concerning the treatment of concrete in case of using sand containing salt" is to be stipulated in the specification for this Project.

(5) Mechanical and Electrical Systems

a. Design Policy

Plumbing systems which include local air conditioning and ventilating, and electrical system are to be installed.

Mechanical and electrical systems are to be designed in accordance with New Zealand Drainage and Plumbing Regulations (1978) and New Zealand Wiring Regulations (1976) respectively.

Considering local circumstances, simple systems which require less maintenance will be adopted.

b. Plumbing Systems

i) Water Supply System

Total floor area of proposed terminal building including covered open space is approximately 4,350m^2. Water consumption of daily average, daily maximum, hourly average and hourly maximum are estimated as follows.

Daily Average : 4,350m^2 x 10ℓ/m^2.day =
43,500ℓ/day (43.5m^3/day)

Daily Maximum : 4,350m^2 x 20ℓ/m^2.day =
87,000ℓ/day (87m^3/day)

Hourly Average : 87,000ℓ/day ÷ 24hours/day =
3,625ℓ/hour

Hourly Maximum : 3,625ℓ/hour x 2 =
7,250ℓ/hour (121ℓ/min.)

Water to terminal buildings will be supplied by existing 75mm loop piping which comes from existing elevated water tanks (capacity 43m^3 x 2sets), as shown in Fig. 4.3.8. Although an existing

water service pipe to water tanks is 32mm, 50mm pipe is required only to treat hourly maximum flow rate of terminal buildings. Considering water consumption in other buildings and facilities, it is necessary to repalce the water service pipe with 75mm by Western Samoa Side.

ii) Drainage, Waste and Vent System

Foul drains will be gathered with New Zealand system and treated at a septic tank. The effluent from the septic tank is treated by soak field.

iii) Septic Tanks and Soak Field

Although existing septic tanks are located near each toilet, a single septic tank will be installed for this project considering easier maintenance. The capacity of septic tank is determined by the retention time of two average days, and resulting time of two average days, and resulting capacity becomes $87m^3$. Soak field will be $217.5m^2$, based on the treating capacity of $0.2m^3/m^2 \cdot day$.

Location of septic tank and soak field is shown in Fig. 4.3.8.

iv) Air Conditioning and Ventilating Systems

Although natural draft will be mainly installed for ventilation, ceiling fans will be installed considering no wind period. Split type air conditioners will be installed in such closed rooms as administration offices, airline offices, and duty free shops. Ventilating fans will be installed in toilets.

Fig. 4.3.9 shows the arrangement of ceiling fans and air conditioners.

c. Electrical Systems

i) Estimation of Transformer Capacity

Transformer capacity will be estimated as follows.

Loads	Installed Capacity	Demand Factor	Transformer Capacity
Lighting, Receptacles ($20VA/m^2$)	87 KVA	80%	70KVA
Air-conditioners, Fans	40KVA	100%	40KVA
Kitchen Applicances	30 KVA	30%	9.KVA
Outdoor Lighting	3KVA	100%	3KVA
Total			123KVA

Loads for existing termianl area (excluding terminal buildings) and runway lighting under construction are approximately 70KVA. Considering the above 123KVA to existing loads, 200KVA transformer capacity is necessary upon the terminal building extension. The existing capacity of the transformer near the Power Center No. 1 is 100KVA. It is necessary to change this transformer capacity to 200KVA by Western Samoan Side.

ii) Power Supply

As shown in Fig. 4.3.8, power will be supplied from the Power Center NO. 1 by PVC/SWA/PVC cables. Existing cables to the terminal have insufficient capacity for the extension and will be removed. Cables to accommodate new loads will be installed.

Cables will be buried under the ground and protected with pipes where installed under roads, as is existing.

iii) Distribution Boards

Departure and arrival terminals will have their own distribution boards from which PVC insulated cables will be installed, being protected by PVC pipes.

iv) Lighting and Receptacles

Intensity of illumination will be designed as follows.

Rooms	Illumination Intensity
Offices, Shops, Banks	300 lx
Other Rooms	150 lx

Switching of lighting fixtures under the higher ceiling and in the public space is so designed as to be controlled by airport personnel from an administration room.

Self-contained, battery operated emergency lighting fixtures will be installed mainly in the public space.

Besides receptacles for general use, receptables for air-conditioners, and ventilating fans will be installed.

v) Telephone System

A switchboard and a terminal board will be installed in the Post Office. Cables with piping and additional extension telephones will be installed.

As for airline offices, concessions, banks, etc., piping and terminal boxes for direct lines will be installed.

vi) Interphone System

Between security check and exit affer customs check area, one set of interphone will be installed as is existing.

vii) Clock System

A master quartz clock with battery back-up will be installed in an administration room and secondary clocks in necessary spaces.

viii) Public Address System

A table top amplifier will be installed in an administration room, and speakers will be installed in public space in departure and arrival areas. Public address system will be so installed as to be able to announce departures and arrivals separately.

ix) Alarm System

Alarm buttons and alarm bells will be installed in public spaces in buildings. An alarm indicator panel with battery back-up will be installed in an administration room.

x) Arrangement of Electircal Equipment

The proposed arrangement of distribution boards, telephones, interphones, clocks speakers, alarm buttons and bells is shown in Fig. 4.3.10 and 11.

(6) Car Park

a. Layout Plan

The principal design criteria for the internal road of car park are as follows :

Design speed	:	20km/hr
Lane width	:	3m
Shoulder width	:	0.5m
Standing lane width	:	1.5m

As for the parking configuration, 90° reverse parking is adopted and the dimensions for unit parking lot are 5m x 2.5m.

b. Grading Plan

Existing terrain of proposed site for the car park has down slope to the terminal building and has elevation difference of approximately 6m.
Therefore, the difference in proposed level and steep slope between car park and the terminal frontage road are planned in order to minimize the earthwork volume for cut.
The cross-sections of terminal frontage road are planned to have a down slope outward from terminal building, taking into account the influence of storm water drainage to the pedestrians.

c. Storm Water Drainage Plan

Storm water collected on the car parking area is basically discharged into existing open ditch located on the east of passenger terminal building.
The planning criteria employed for the drainage facilities requirement are summarized as follows :

i) Rational formula is utilized to estimate the Run-off

$$Q = \frac{1}{360} \; C.I.A$$

Where Q : Run off (m^3/sec)
C : Run off coefficient
I : Rainfall intensity (mm/hr)
A : Catchment area (ha)

ii) Run off coefficients

Pavement area : C = 0.95
Building area : C = 0.90
Sodded area : C = 0.10 Note*

Note * from the geological conditions of high water permeability

iii) Rainfall intensity

Five year frequency storm is adopted for this design. The rainfall intensity is estimated by the following formula, which is based on the past record of rainfall in Apia City.

$$i = \frac{5,070}{t + 18}$$

Where t : Inlet time (minute)

For the storm water drainage system of car park, U shaped gutter is basically adopted taking the following items into account.

- Local condition of heavy storm in short period
- Relatively gentle slope of car park
- Easy maintenance

d. Pavement

Geological feature of proposed car park is same effusive rocks as runway extension area under construction and its bearing strength is extremely high. Therefore, subgrade CBR value is estimated to be more than 20%. The pavement thickness is planned as shown in Fig. 4.3.13 based on the relatively small traffic volume anticipated in the future.

4.3.3 Instrument Landing System (ILS)

The prevailing wind at Faleolo Airport is east wind, and thus installation of an ILS is planned for runway 08 approach.

An outer marker and a middle marker are eliminated from the ILS and a terminal distance measuring equipment (T-DME) is planned instead of these markers for the following reasons :

i) The location of outer marker is on the sea, thus the construction and maintenance are very difficult. The function of outer marker can normally be substituded by a T-DME.

ii) There is a world-wide tendency to use T-DME instead of middle marker.

iii) Installation of middle marker requires felling and uprooting of many coconut trees, which is contrary to the environment protection policy.

The necessary equipment and the location of installation are as follows :

i) Localizer facility
The localizer facility is planned at 600m east of runway 26 threshold and on the extended centerline of the runway. This is intended to ensure clearways and stopways.

ii) Glide Slope Facility
The glide slope is planned at runway 08 touchdown area and at the north of the runway.

iii) T-DME
The T-DME is planned to be co-located with the glide slope facility. Although the standard location of T-DME for ILS is localizer area, the T-DME is planned to be separated from the existing VOR/DME in order to prevent mutual interferance.

iv) Control and monitor equipment

Control and monitor equipment is planned at the equipment room below the control tower cab.

v) Display Panel

Display panel is planned to be intergrated with the control tower console.

The performance of ILS and T-DME should comply with the requirements specified in Annex-10, Aeronautical Telecommunications, ICAO. The equipment itself meets the specification required for precision approach Category-I. As a result of the site reconnaissance, localizer and glide path critical area are considered to be in good condition. The system will accordingly be made simple (one frequency type) for easy maintenance. The passenger terminal building and wide-bodied jet aircraft parked on the apron are not considered to cause localizer course bend.

The supply of minimum but necessary measuring equipment and spare parts is necessary for maintenance work.

Flight check of ILS will be performed by the Government of New Zealand. Close coordination on the schedule of the flight check is indispensable.

4.3.4 Fire Fighting Vehicles

Four fire fighting vehicles are provided at present as shown in Table 2.4.2 in Chapter 2. The total of existing amounts of extinguishing agents are as follows :

Principal Agents
- aqueous film forming foam : 1,360 ℓ
- Water : 15,800 ℓ

Complementary agents
- Dry chemical : 910kg

Others
- Ready mixed foam : 1,000 ℓ
- CO_2 : 50kg

The required amounts of extinguishing agents for target year of 1993 are shown in Section 3.3.2 (6).
Based on these conditions, the replacement programme of fire fighting vehicles is planned as shown in Table 4.3.8, for the following reasons.

(1) Dry Chemical Unit

As for the amounts of dry chemical, 910kg of existing dry chemical is sufficient for the required amounts (225kg) in year 1993 and 2005. However, the vehicle is required to be replaced as explained in previous Section 3.2.3. In this case, minimum amounts of dry chemical required for new vehicle is 200kg, taking into account the existing amounts of CO_2 (50kg) for the rapid intervention vehicle.
During the study team's site survey, the Government of Western Samoa requested to introduce aqueous film forming foam unit instead of the existing dry chemical unit. Since the complementary agents will be insufficient in this case, the existing dry chemical vehicle is planned to be replaced by same complementary agents.

(2) 4,500ℓ Major Vehicles

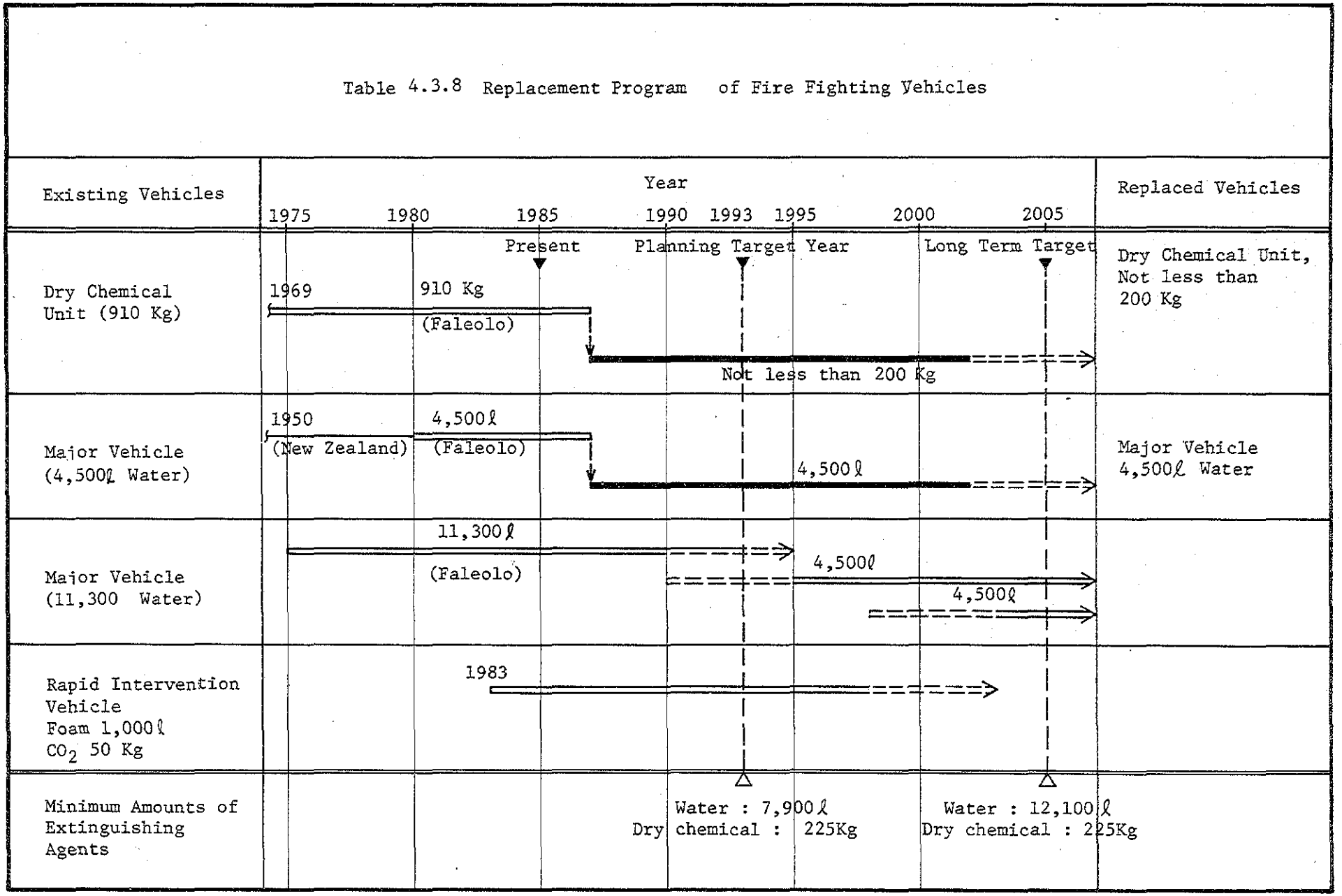
Required amount of water for aqueous film forming in 1993 is 7,900ℓ. Therefore, only existing major vehicle of 11,300ℓ water is sufficient for this requirement. However, airport Category 6 requires more than two major vehicles as specified in Airport Service Manual, Part I.

Since the minimum amounts of extinguishing agents in year 2005 are estimated to be 11,200ℓ water, three vehicles with capacity of 4,500ℓ water each will be a balanced combination to meet the requirements in 2005.

Accordingly, new 4,500ℓ major vehicle with equivalent capacity to the existing major vehicle, which has been requested to be replaced by the Government of Western Samoa, is planned to be introduced.

Table 4.3.8 shows that replacement of these two vehicles is sufficient to cope with the demand anticipated in 1993.

Table 4.3.8 Replacement Program of Fire Fighting Vehicles



4.3.5 Basic Design Drawings

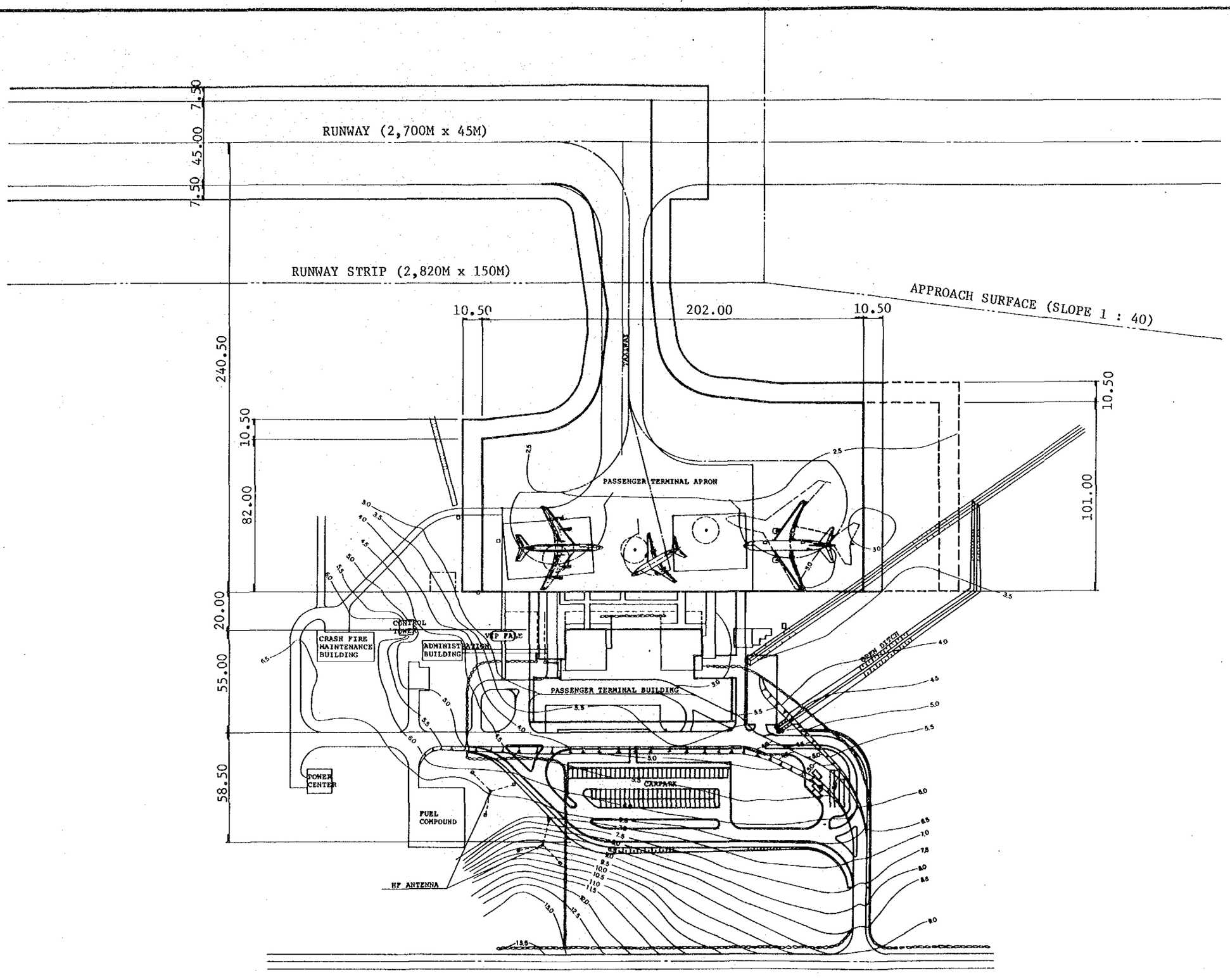


Fig. 4.3.3 Terminal Area Layout Plan

SCALE 1 : 2,000

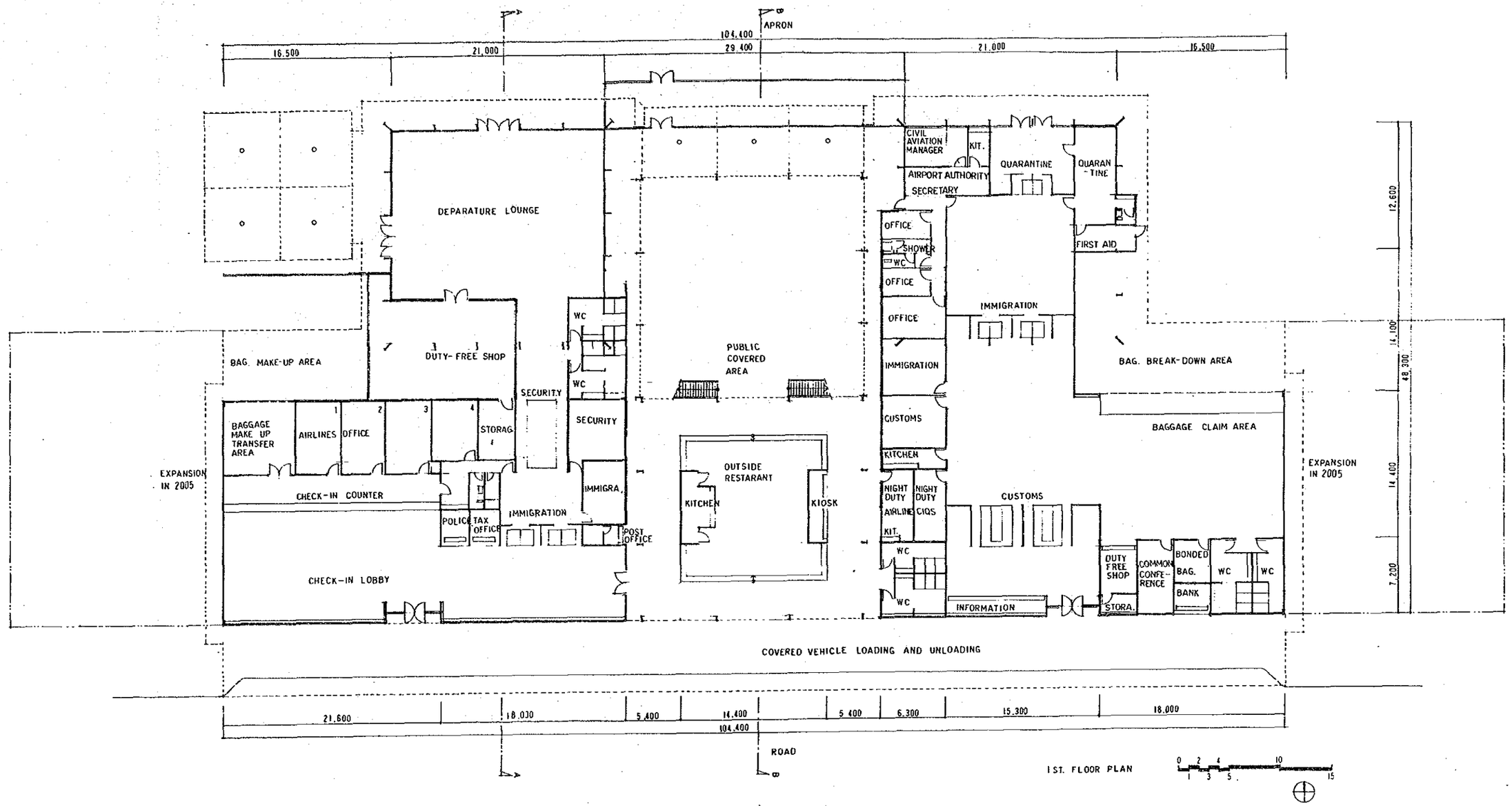


Fig. 4.3.4 Passenger Terminal Building (First Floor Plan)

Scale 1:400

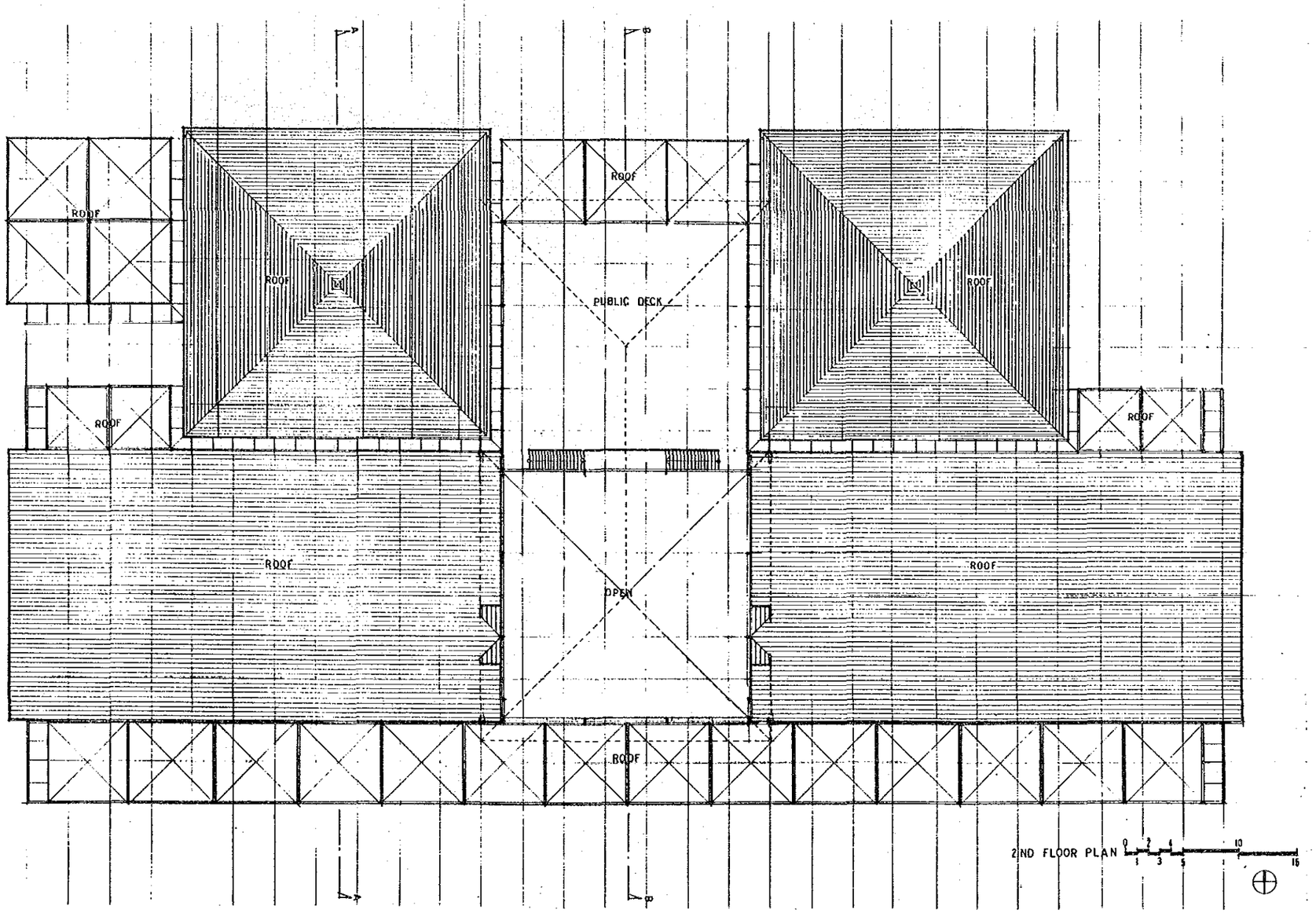
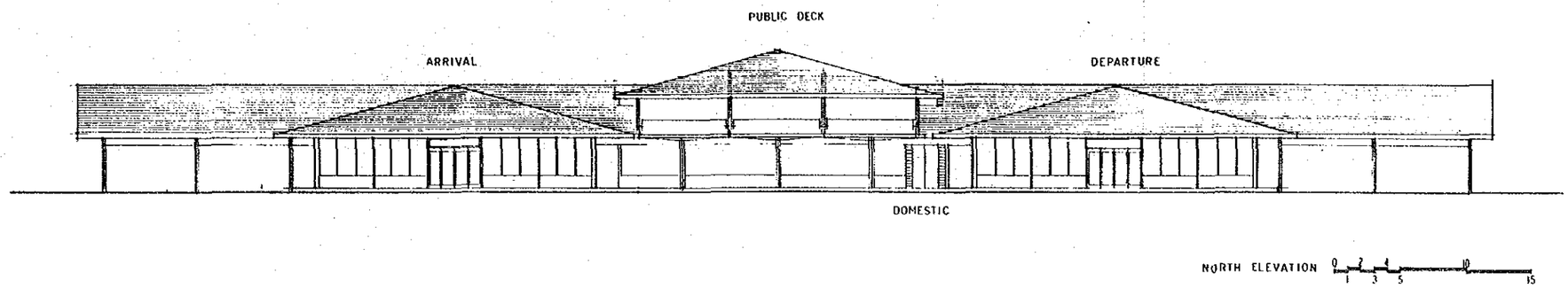


Fig. 4.3.5 Passenger Terminal Building (Second Floor Plan)

Scale 1:400



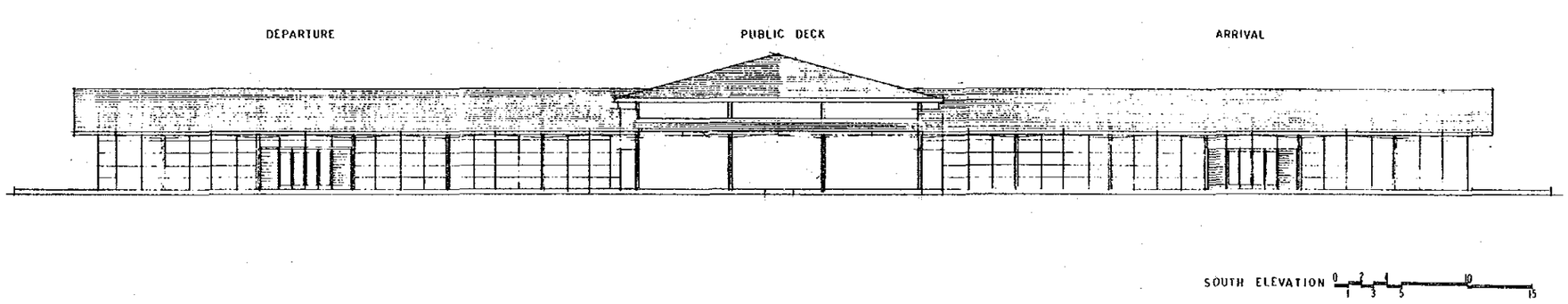
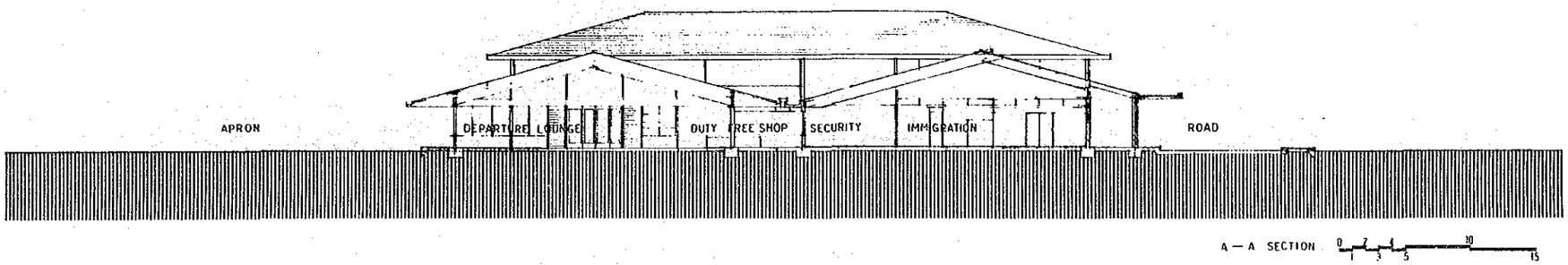


Fig. 4.3.6 Passenger Terminal Building (Elevations)

Scale 1:400



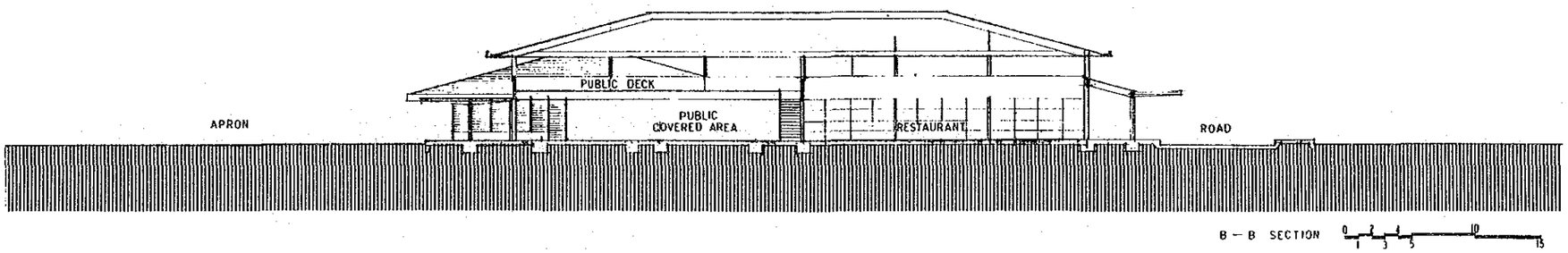


Fig. 4.3.7 Passenger Terminal Building (Sections)

Scale 1:400

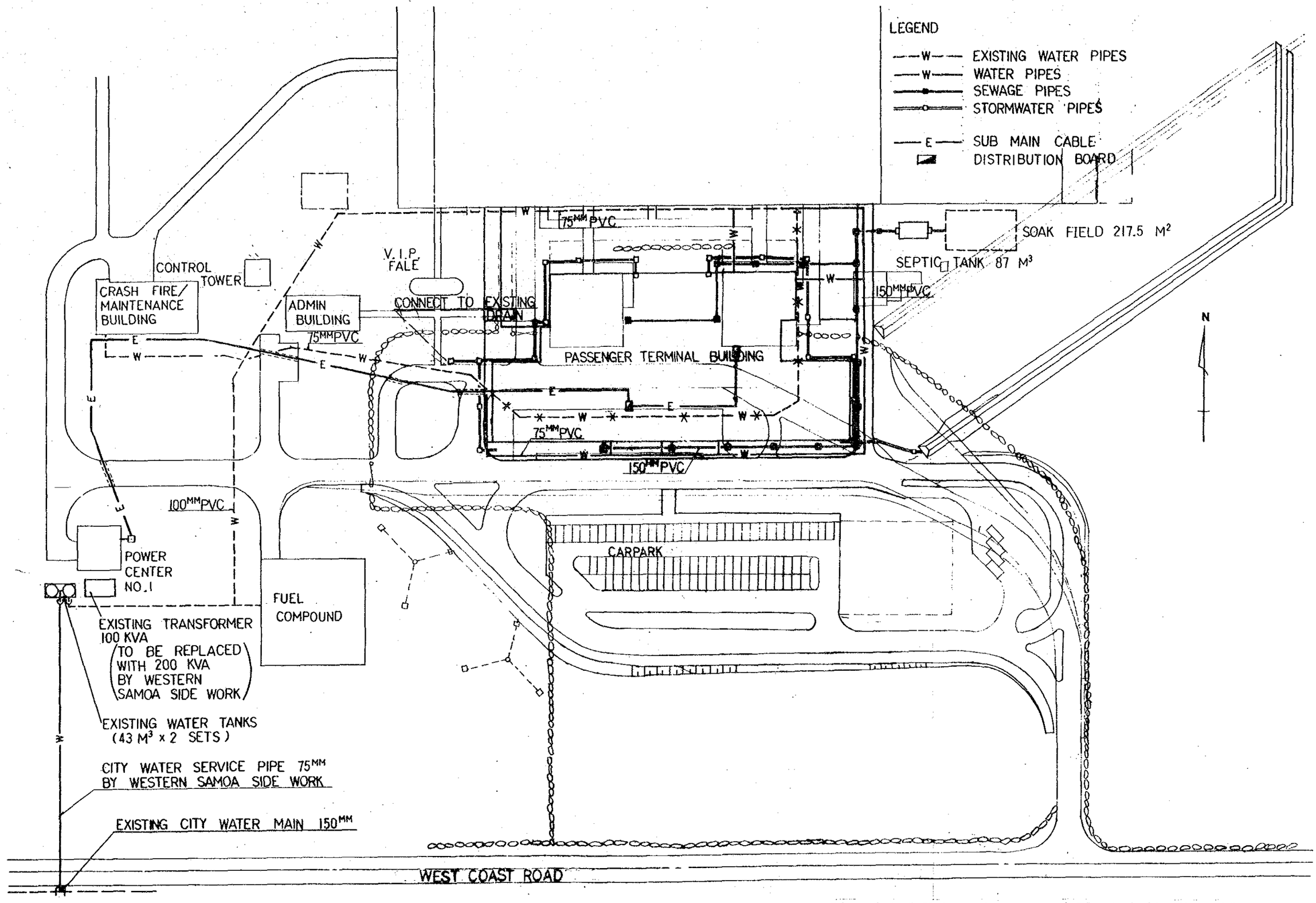


Fig. 4.3.8 Water, Sewage and Electricity Main Plan

Scale 1 : 1,000

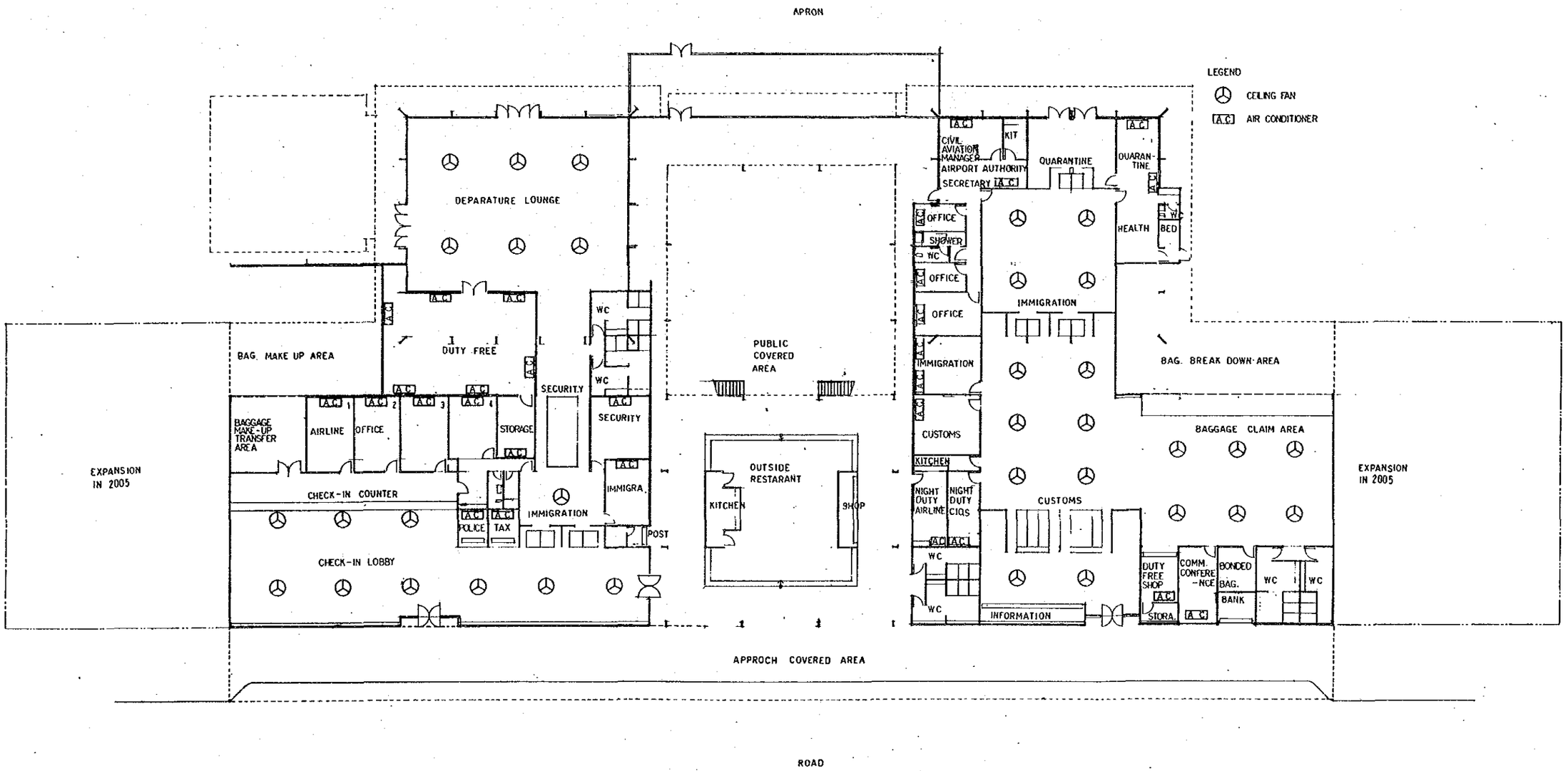


Fig. 4.3.9 Arrangement of Air Conditioners and Ceiling Fans

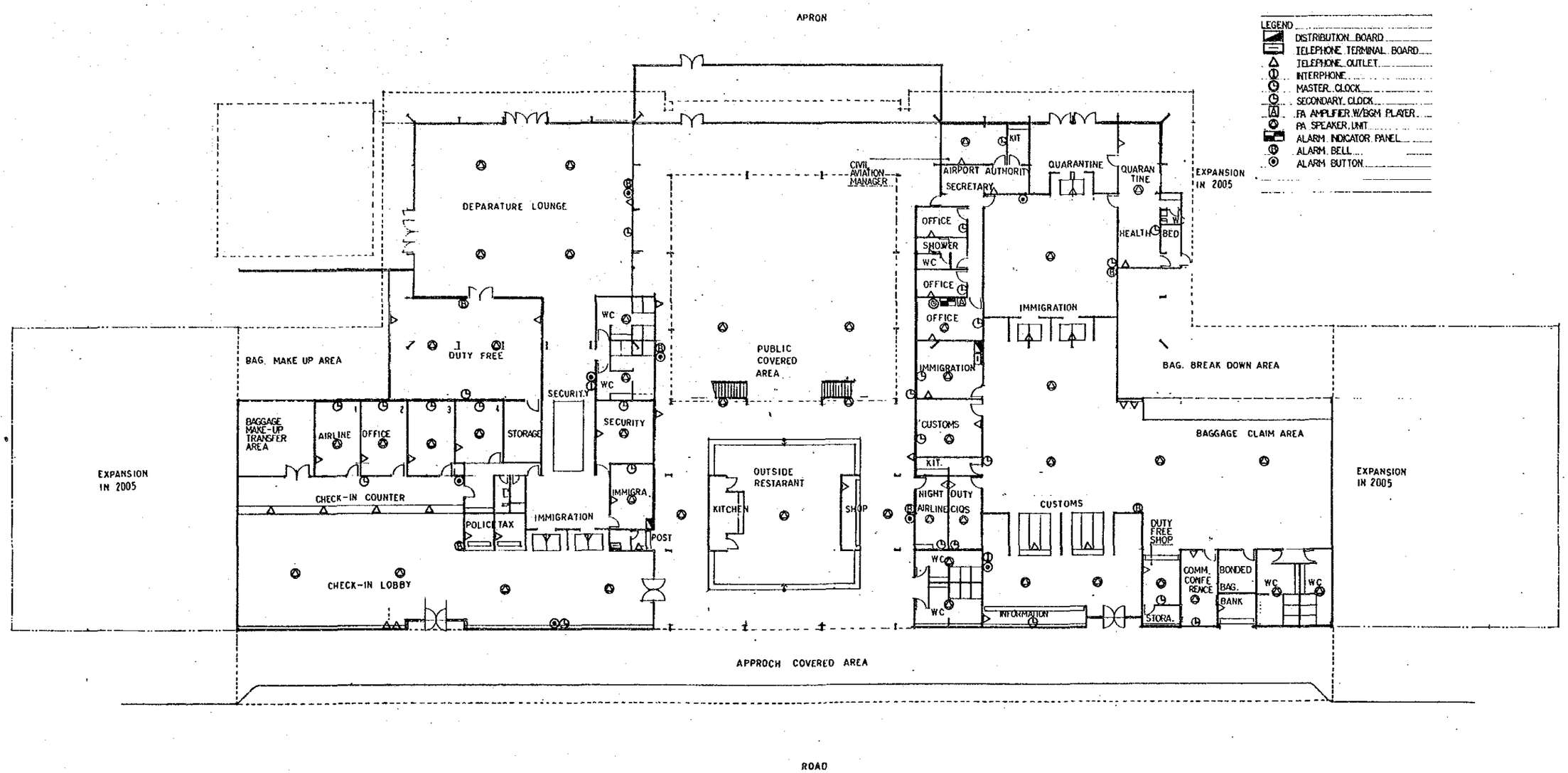


Fig. 4.3.10 Arrangement of Electrical Equipment (First Floor)

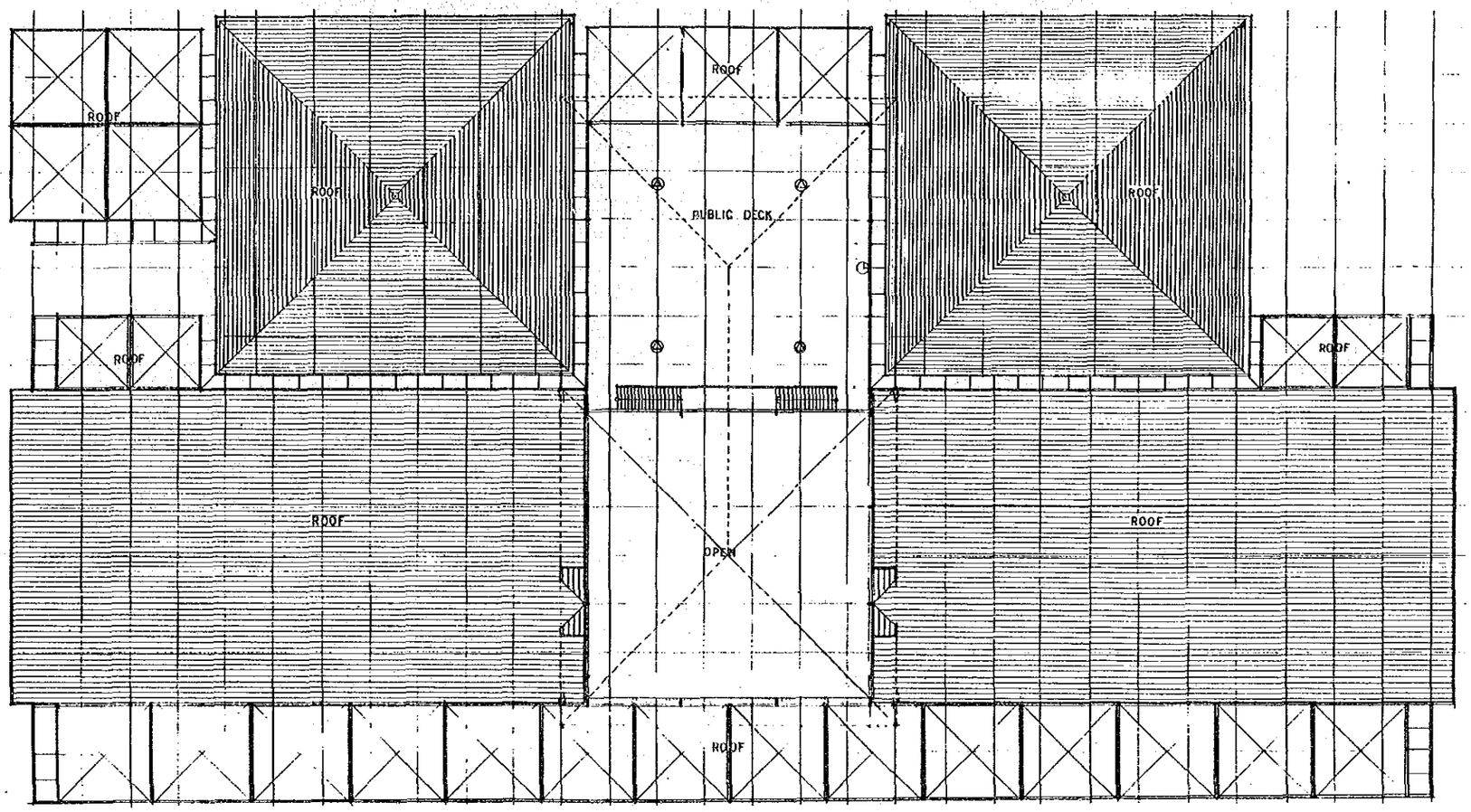


Fig. 4.3.11 Arrangement of Electrical Equipment (Second Floor)

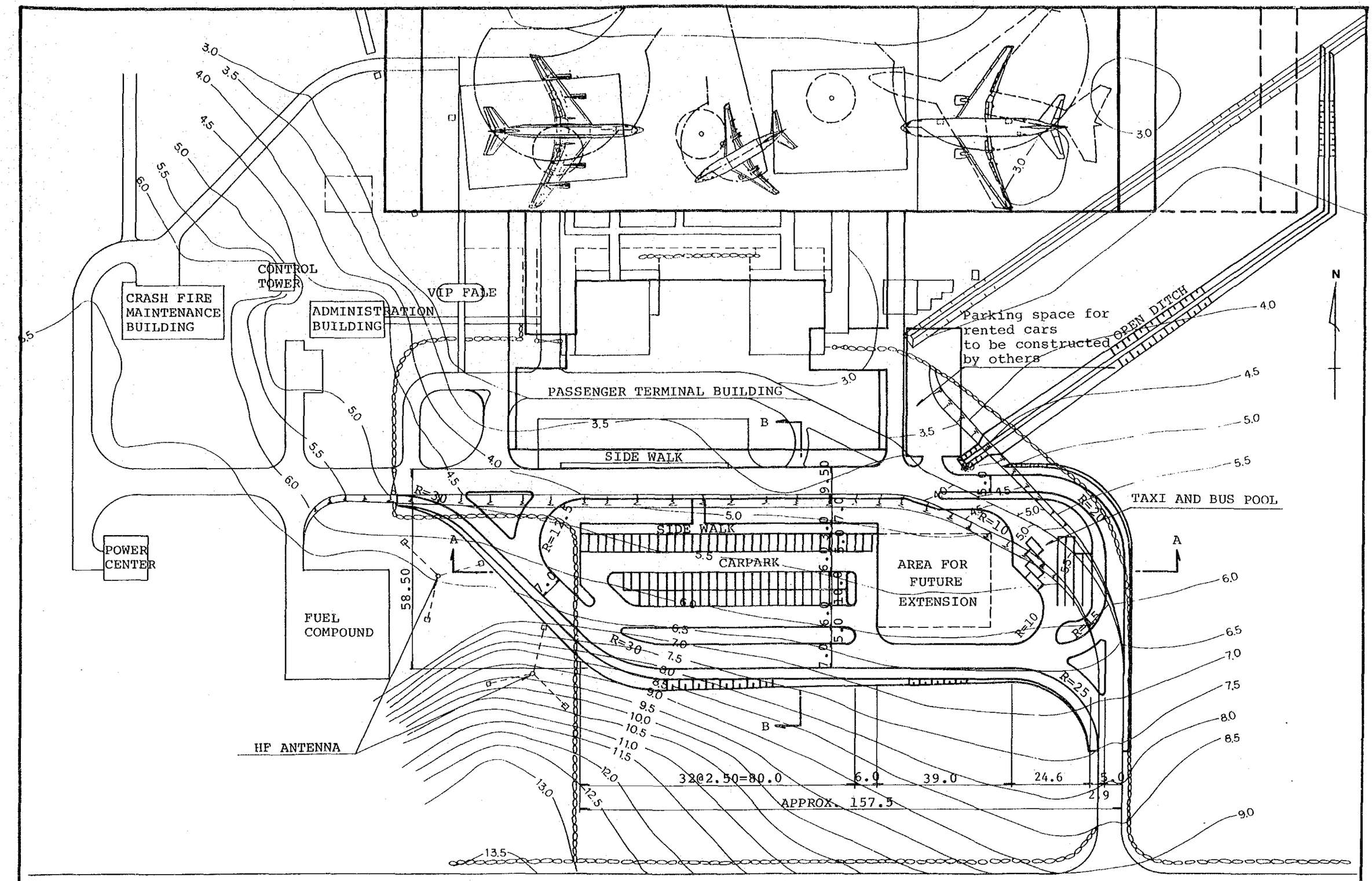
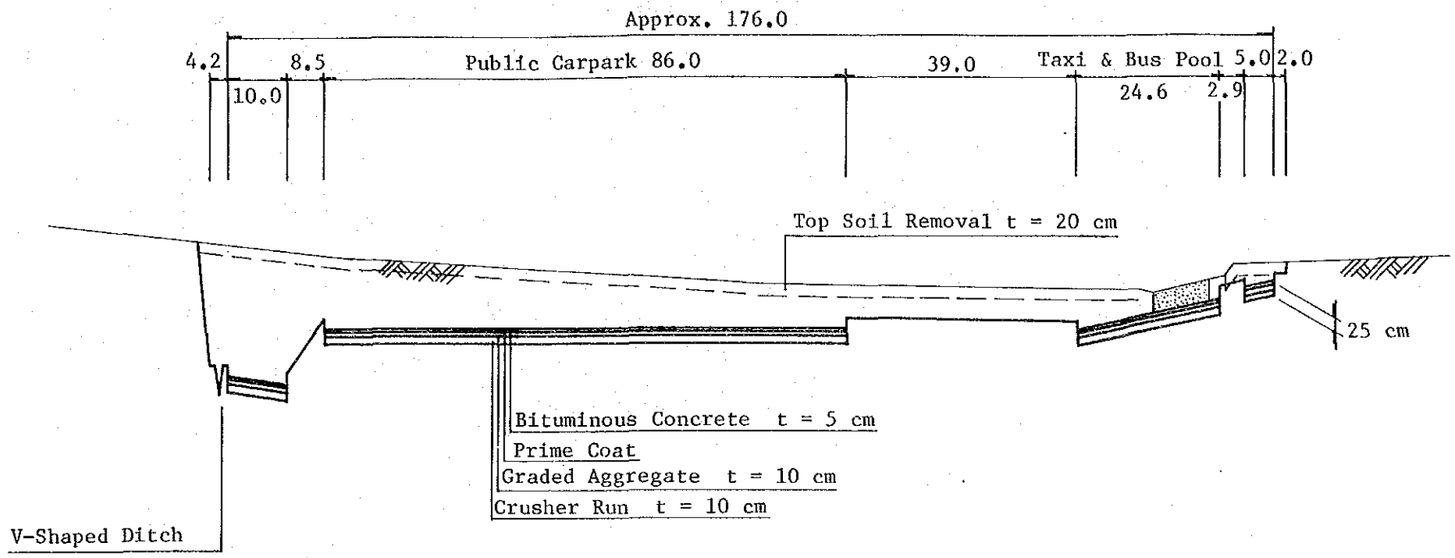


Fig. 4.3.12 Car Parking Area Layout Plan

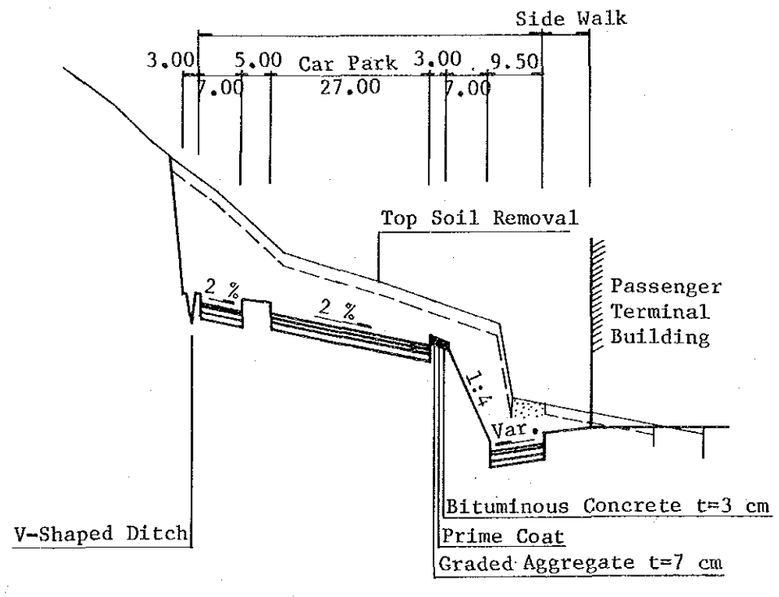
SCALE 1 : 1,000

V = 1:100
SECTION A-A H = 1:1000



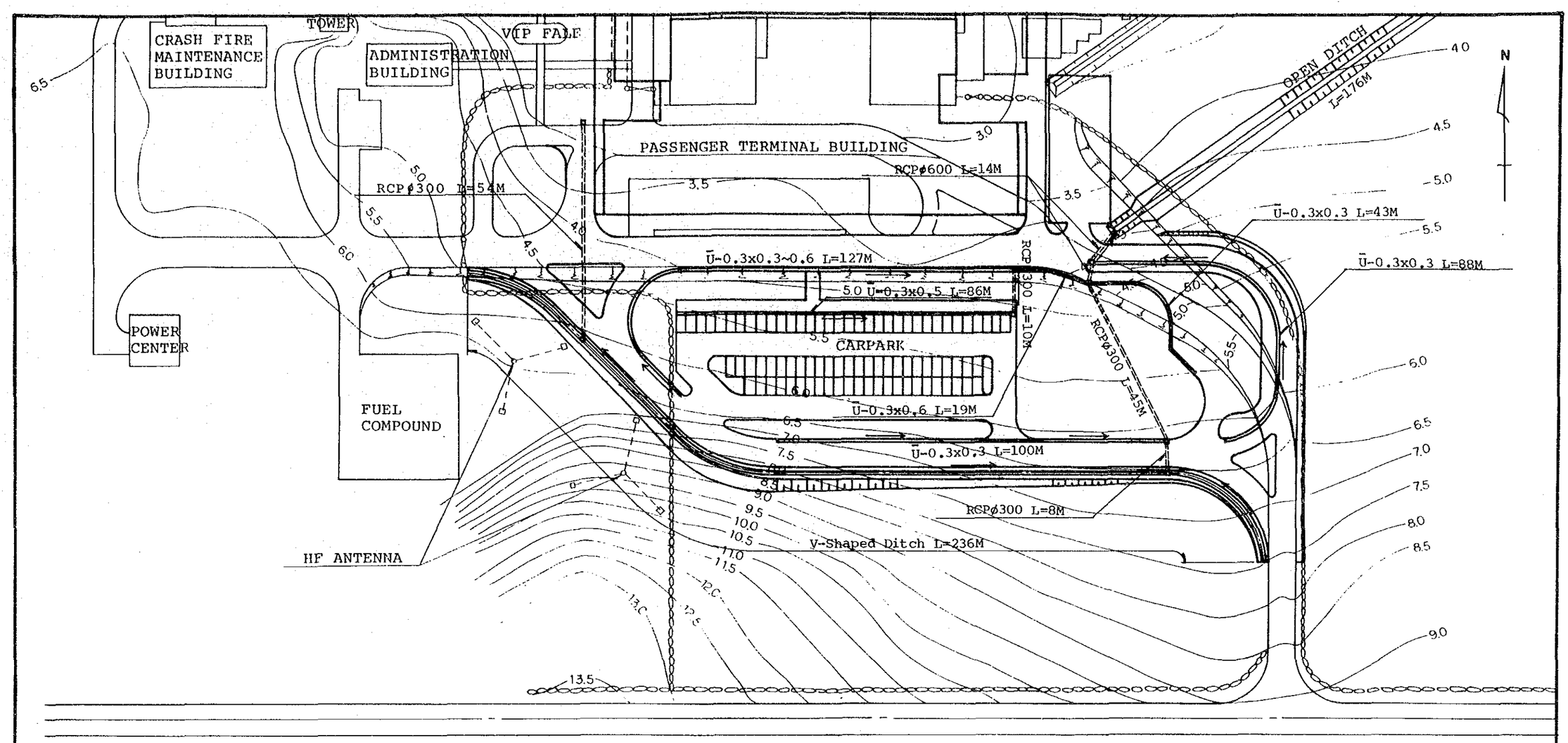
DL = 5.00

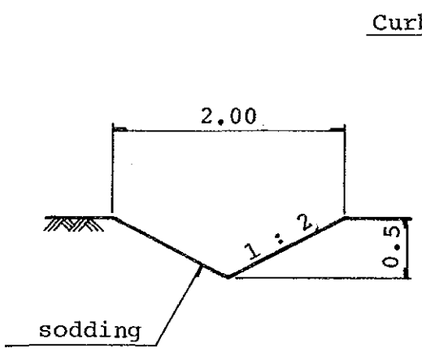
V = 1:100
SECTION B - B H = 1:1000



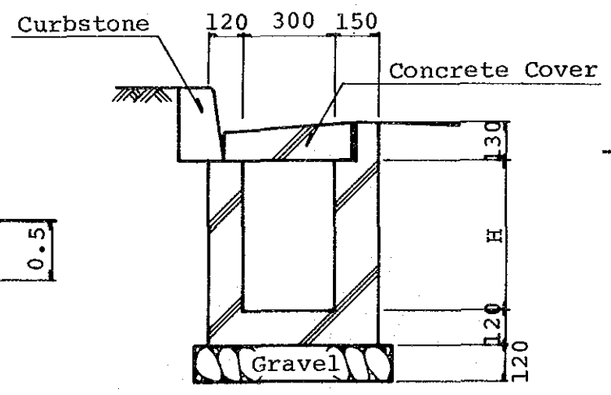
DL = 5.00

Fig. 4.3.13 Typical Cross Section of Carparking Area

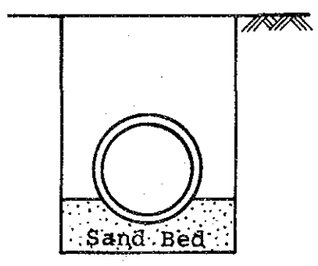




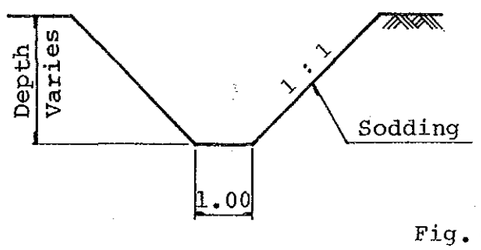
V-Shaped Ditch



Ū-Shaped Gütter



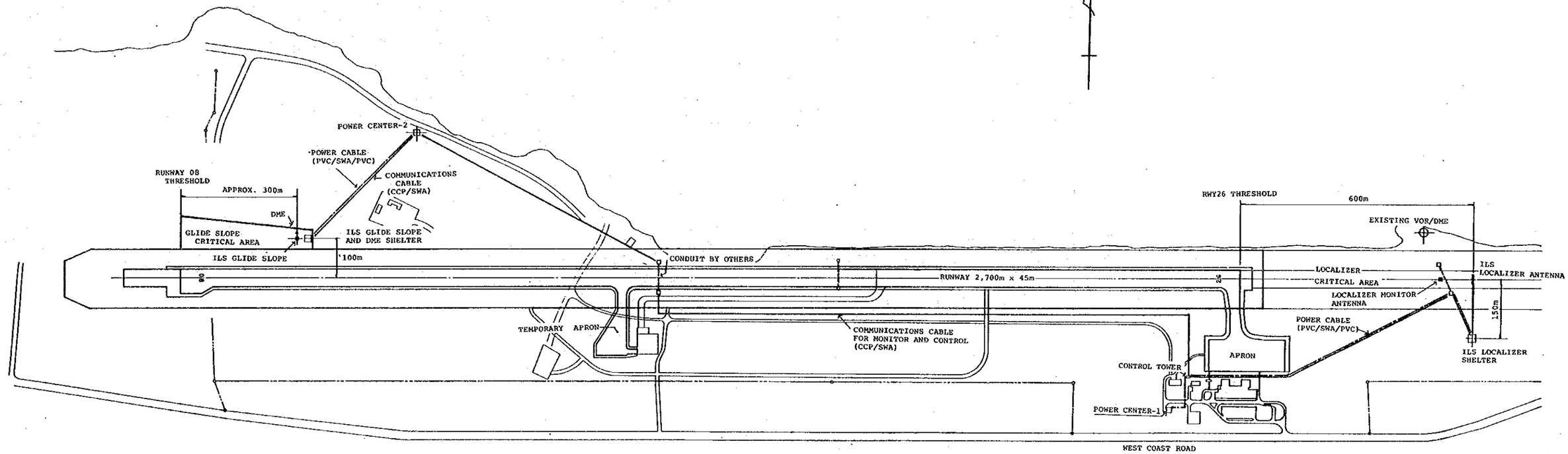
Reinforced Concrete Pipe

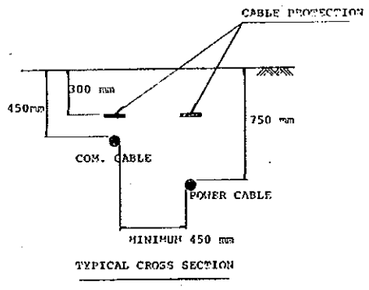


Open Ditch

Fig. 4.3.14 Storm Water Drainage System Plan

SCALE 1 : 1,000





TYPICAL CROSS SECTION

Note

(1) CONTROL AND MONITOR EQUIPMENT TO BE INSTALLED AT EQUIPMENT ROOM BELOW THE TOWER CAB.

(2) MONITOR DISPLAY TO BE INTEGRATED TO THE CONTROL CONSOLE

Fig. 4.3.15 ILS LAYOUT PLAN

S = 1 : 10,000

4.4 Project Implementation Plan

4.4.1 Basis of Project Implementation

Before commencing the construction project of the terminal building under the grant aid of the Government of Japan, present functions of the existing buildings shall be transferred to the temporary terminal building (by the Government of Western Samoa). The rainy season in Western Samoa lasts from November to April, when precipitation is great. As the civil works and construction works of the parking lots will be slowed down due to the rain, implementation schedule during the rainy season shall be carefully studied.

As the project site is close to the airport administration facilities and the airport is kept operating during the construction period, safety and security controls of the construction works must be perfectly carried out and damages and disasters to third parties shall be completely avoided.

During the installation works of ILS, access is required into limited areas. Safety and security controls are to be strictly carried out in order not to disturb safe operations of aircraft.

4.4.2 Scope of Work

Scope of work under the grant aid of Japan and scope of work of Western Samoa are as follows :

Table 4.4.1 Scope of Work

Item	Scope of Japanese Side	Scope of Western Samoan Side
Passenger terminal building	- Construction of Building - Air-conditioning, electricity, water supply, sewage - Finishing works (excl. interior finishes for airline offices, restaurants, and kitchen. - Other facilities (check-in counters, baggage claim counters, etc.) - Demolishing of partition walls of the existing buildings and their replacement.	- Temporary terminal building - Site preparation - Demolishing and transfer of buildings for catering and storage - Expansion of water and electricity facilities - Ordinary furniture - Replacement of transformers
Access road and car park	- Civil works - Pavement works storm water drainage works - Vegetation works - Lighting of access road and car park - Installation of traffic signs	- Felling of coconut trees - Temporary car park - Security fencing work - Parking space for rented cars
ILS	- ILS installation, adjustment and ground assistance of flight check - Cabling works	
Fire Fighting Vehicles	- Equipment procurement (Delivery at site)	
Others		- Expansion of the existing apron

4.4.3 Procurement Plan

It is basic policy that construction equipment and materials required for the implementation of this project shall be procured as much as possible in Western Samoa.

(1) Equipment and Materials Available in Western Samoa

Construction Equipment	Materials
Equipment for civil works	Aggregates for concrete works
Equipment for pavement works	Wood

(2) Equipment and Materials Procured in Japan

Construction Equipment	Materials
Nil	Structural Steels
	Steel Bars
	Cement
	Aluminum Sashes
	Rubber Tiles for Flooring
	Shingles for Roofs
	Materials for Water Supply Facilities
	Materials for Electricity Supply Facilities
	Materials for Sanitary Facilities
	Fire Extinguishing Facilities

Construction Equipment	Materials
Nil	ILS
	Fire Fighting Vehicle

(3) Equipment and Materials Procured from Neighboring Countries

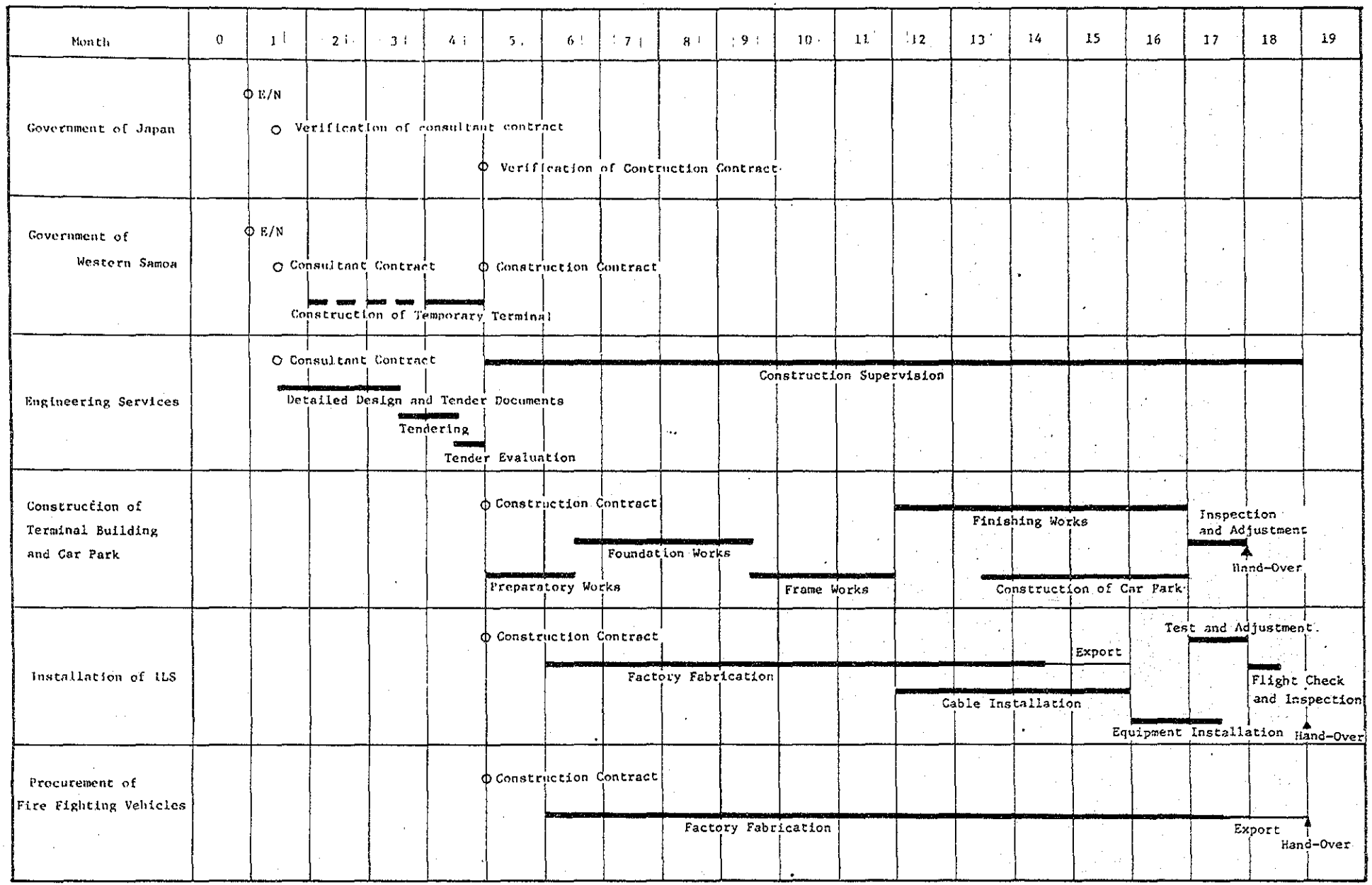
Construction Equipment	Materials
Nil	Glass
	Paint
	Hardware
	Insulators

4.5 Implementation Schedule

Approx. thirteen (13) months are required for the construction work after concluding the construction contract, judging from the size, structure, facilities of the terminal building.

As for the ILS, approx. fourteen (14) months are estimated for manufacturing, installation, and cabling works from the time of concluding contracts until the completion of works. As the flight check are scheduled to be performed by New Zealand, it is necessary for the Government of Western Samoa to arrange the flight check schedule with New Zealand, in order to ensure prompt turn over upon completion of the works.

Table 4.5.1 Implementation Schedule after Exchange of Notes (E/N)



4.6 Operation and Maintenance of Airport

At present, operation and maintenance of Faleolo International Airport are executed by Civil Aviation Division, Ministry of Transport. Present number of full-time staff and temporary employee for operation and maintenance of the airport is 54 and 55 respectively. Revenue and expenditure of airport in the last four years (1981-1984) shows sound financial condition, because revenue greatly exceeds expenditure.

In June, 1985, the Western Samoa Airport Authority is scheduled to be established for airport operation and maintenance. Its staffs are planned to comprise 67 full-time staffs and 61 temporary employees.

After expansion of terminal building and car park, installation of ILS, and replacement of fire-fighting vehicles, cost required for operation and maintenance is estimated as follows, based on the Revenue Statement in 1985.

Maintenance cost	122,000 Tala
Charge for electric power	50,000 Tala
Cost for furniture etc.	25,000 Tala
Operation cost	30,000 Tala
Total	227,000 Tala

4.7 Project Cost by the Government of Western Samoa

Cost of the works to be executed by the Government of Western Samoa is estimated as follows :

		(In Thousand Tala)
(1) Temporary passenger terminal building	:	146
(2) Site preparation for expansion of the passenger terminal building	:	11
(3) Transfer of the catering shed and storage	:	1
(4) Transfer of lead-in pipe for water supply	:	7
(5) Furniture	:	46
(6) Replacement of the main transformer	:	5
(7) Felling of coconut trees in car park area	:	5
(8) Temporary car park	:	14
(9) Security fence for car park	:	28
(10) Parking space for rented cars	:	16
Total		279

CHAPTER 5. PROJECT APPRAISAL

CHAPTER 5 PROJECT APPRAISAL

The increased capacity and upgraded service level of the terminal facilities, which will be expected after the implementation of the construction project, will completely be coordinate with the extended runway and other improved airport facilities. Together with the installation of instrument landing system and replacement of fire fighting vehicles, safe, efficient and unrestricted operation for both wide-bodied jet aircraft (B767, etc.) and increasing passengers will be ensured at Faleolo International Airport. The construction project will provide the following national benefits.

(1) To alleviate the severe congestion of the existing airport and to provide more comfortable services for passengers

(2) To ensure safety and regularity of air transport

(3) To exert impact on increase of air cargo volume by realization of rapid and mass cargo transportation

(4) To activate foreign trade, other business activities through opening the way for closer connections with foreign countries

(5) To contribute to Polynesian Airlines' profitability (national flag carrier of Western Samoa and Government managed company) by means of introduction of more profitable wide-bodied jet aircraft

(6) To effect impact on the development of tourism

(7) To contribute to the increase of employment opportunities

The project will contribute to the development of the national economy of Western Samoa through the above-mentioned benefits. Hence, the implementation of the project is considered to be highly significant for Western Samoa.

CHAPTER 6. CONCLUSION AND RECOMMENDATIONS

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The construction project for terminal facilities of Faleolo International Airport, which includes expansion of the passenger terminal buildings and car park, installation of instrument landing system and replacement of fire fighting vehicles, is considered to contribute greatly to the development of the national economy of Western Samoa.

It is accordingly recommended that the construction project be implemented with Japan's Grant Aid.

6.2 Recommendations

(1) The existing apron is scheduled to be expanded by the Government of Western Samoa.
The expansion work of the apron is required to be completed at the same time with the completion of the expansion of the passenger terminal building.

(2) The terminal building was designed to reduce the maintenance work or to make it as easy as possible when necessary. Regular maintenance work after its completion will, however, be required for some electrical and mechanical facilities, etc., in order to maintain the original performance.

(3) The flight check of the instrument landing system (ILS) is scheduled to be performed by the Government of New Zealand. Close coordination on the flight check schedule should be made in advance in order to operate the ILS soon after its installation and adjustment works.

APPENDIX

LIST OF APPENDIX

APPENDIX-A MEMBERS OF THE SURVEY TEAM

Basic Design Study Team

Mr. Masaki KASHIMURA (Team leader/Project Supervisor)	Director, Regional Airport Administration Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Hiroshi MANABE (Project Supervisor/Grant Aid)	Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Mr. Tatsuo SUZUKI (Project Coordinator)	Basic Design Division, Grant Aid Department, Japan International Cooperation Agency
Mr. Shota MORITA (Airport Engineer)	Pacific Consultants International
Mr. Isao FUKUWATARI (Architect)	Pacific Consultants International
Mr. Ken MAEJIMA (Building Services Engineer)	Pacific Consultants Internaitonal
Mr. Keiichi TAKEDA (Airport Engineer/Air Navigation)	Pacific Consultants International
Mr. Kimihiro MAETA (Airport Engineer/Civil Work)	Pacific Consultants International

Basic Design Study Team (Explanation of Draft Final Report)

Mr. Masuzo KIKUTA (Team leader)	Director, Tokyo International Airport Development Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport
Mr. Tadashi SATOH (Project Coordinator)	Planning Division, Grant Aid Planning and Survey Department, Japan International Cooperation Agency
Mr. Shota MORITA (Airport Engineer)	Pacific Consultants International
Mr. Isao FUKUWATARI (Architect)	Pacific Consultants International

APPENDIX-B SCHEDULE OF SITE SURVEY

March 23 Saturday	Team leader Mr. Kashimura, Mr. Manabe, Mr. Suzuki and Mr. Morita departed from Narita to Sydney.
March 24 Sunday	Mr. Kashimura and other three members arrived at Sydney. They departed from Sydney and arrived at Wellington via Auckland. Mr. Fukuwatari, Mr. Maejima, Mr. Takeda and Mr. Maeta departed from Narita to Auckland.
March 25 Monday	Mr. Kashimura and other three members visited Japanese Embassy in Wellington. Meeting with the concerned officials of Government of New Zealand. Mr. Fukuwatari and other three members arrived at Auckland and collected data.
March 26 Tuesday	Mr. Kashimura and other three members departed from Wellington and arrived at Auckland and joined with other members. The mission departed from Auckland to Apia. (Crossed the international date line)
March 25 Monday	Arrived at Apia.
March 26 Tuesday	Mission paid a courtesy visit upon the Prime Minister.
March 27 Wednesday	Meeting with members of Public Works Department, Ministry of Finance, Ministry of Foreign Affairs, Economic Development Dept. and Airport, presenting inception report and discussing the schedule of the study.
March 28 Thursday	Hearing on the existing facilities and problems from Airport Manager at Faleolo Airport. Preliminary site investigation.

March 29 Friday	Discussion with the concerned members of the Government of Western Samoa. Meeting with New Zealand consultant Mr. Alex Robinson.
March 30 Saturday	Preliminary demand forecast and study of facilities requirements。
March 31 Sunday	Study of collected data
April 1 Monday	Study of facilities requirements. Preliminary topographical survey of new terminal site.
April 2 Tuesday	Site investigation at Faleolo Airport. Inspection of quarry, Mt. Olo. Preparation of the draft of the Minutes of Discussions (M/D).
April 3 Wednesday	Discussion on the draft of M/D with concerned members of Government of Western Samoa.
April 4 Thursday	Signing of M/D between JICA mission and Government of Western Samoa. Study of preliminary master plan of terminal area.
April 5 Friday	Investigation on passenger flow and site investigation. Team leader Mr. Kashimura and Mr. Manabe departed from Apia to Nadi. (Crossed the international date line)。
April 6 Saturday	Team leader Mr. Kashimura and Mr. Manabe arrived at Nadi。 Mr. Morita and other five members studied preliminary master plan of terminal area and plan of terminal building。

April 7 Sunday	Team leader Mr. Kashimura and Mr. Manabe departed from Nadi to Narita. Mr. Morita and other five members did supplemental investigation of passenger flow.
April 8 Monday	Study of preliminary master plan.
April 9 Tuesday	Study of preliminary master plan. Topographical survey of terminal area (Base line survey).
April 10 Wednesday	Discussion on the preliminary master plan with the concerned members. Leveling survey of terminal area.
April 11 Thursday	Study of the answers to questionnaire. Investigation of construction cost.
April 12 Friday	Mr. Fukuwatari, Mr. Maejima, Mr. Takeda and Mr. Maeta departed from Apia to Nadi. (Crossed the international date line). Mr. Morita collected data.
April 13 Saturday	Mr. Fukuwatari and other three members arrived at Nadi.
April 14 Sunday	Mr. Fukuwatari and other three members departed from Nadi and arrived at Narita. Mr. Morita departed from Apia to Wellington. (Crossed international data line).
April 15 Monday	Mr. Morita arrived at Wellington via Auckland.
April 16 Tuesday	Mr. Morita reported the results of site investigation to Japanese Embassy in Wellington, and departed from Wellington to Narita via Auckland.
April 17 Wednesday	Mr. Morita arrived at Narita.

June 12	Wednesday	Team leader Mr. Kikuta and other three members departed from Narita to Sydney.
June 13	Thursday	Arrived at Sydney. Departed from Sydney and arrived at Wellington via Auckland.
June 14	Friday	Visited Japanease Embassy in Wellington and explained Draft Final Report.
June 15	Saturday	Departed from Wellington and arrived at Apia (crossed the international date line).
June 15	Saturday	Meeting with Civil aviation manager and Project co-ordinator, presenting Draft Final Report and discussing the implementation schdule.
June 16	Sunday	Preparation for explanation of Draft Final Report.
June 17	Monday	Explanation of Draft Final Report to the members of Civil Aviation Department, Public Works Department, Ministry of Finance, Ministry of Foreign Affairs and Airport.
June 18	Tuesday	Detailed discussion on the Draft Final Report.
June 19	Wednesday	Discussion on the interior layout of passenger terminal building with concerned members of Civil Aviation Dept., Customs, Immigrations, Airlines and other users. Preparation of Minutes of Discussions (M/D).
June 20	Thursday	Signing of M/D between JICA team and Government of Western Samoa.
June 21	Friday	Departed from Apia to Nadi (crossed the international date line).
June 23	Sunday	Departed from Nadi and arrived at Narita.

MINUTES OF DISCUSSIONS

ON

BASIC DESIGN STUDY
ON
THE CONSTRUCTION PROJECT
FOR
TERMINAL FACILITIES
OF
FALEOLO INTERNATIONAL AIRPORT
IN
WESTERN SAMOA

In response to the request by the Government of Western Samoa, the Government of Japan, through Japan International Co-operation Agency (hereinafter referred to as "JICA"), has sent Basic Design Study Team (hereinafter referred to as "the Team") to Western Samoa for the purpose of conducting the basic design study on the construction project for terminal facilities of Faleolo international airport (hereinafter referred to as "the Project") from March 25 through April 14, 1985.

The Team headed by Mr. Masaki Kashimura, Director of Regional Airport Administration Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport, has carried out a field survey, held a series of discussions, and exchanged views with the officials of the Government of Western Samoa concerned with the Project (hereinafter referred to as "the Officials").

As a result of the field survey and discussions of the Team with the Officials, both parties have agreed to recommend to their respective Governments that the result of discussions attached herewith should be examined toward the realization of the Project, especially the extension and alterations to the terminal building and ancillary to be implemented in the fiscal year of 1985/86.

As regards the scope of work to be covered by the grant aid of Japan, both parties have agreed on finalizing based on the Draft Final Report.

Mr. Peseta L. Tone
Director of Works

Mr. Masaki Kashimura
Team Leader, Japanese Basic
Design Study Team, JICA

Date: April 4, 1985

Mr. Kolone Va'ai
Financial Secretary
Government of Western
Samoa
Date: April 4, 1985

ATTACHMENT-1

OUTLINE OF DISCUSSIONS

1. The facility requirements for the grant aid of Japan are to be based on the traffic demands anticipated in 1993.This is to utilize the facility without major expansion or alteration during at least 5 year period after the completion of the Project.

2. Although a review of the existing traffic forecast will be carried out by the Team based on the latest statistic data of air traffic to be obtained from the Government of Western Samoa, it is estimated as the planning target demand that the total annual passengers will be in the range between 250 and 300 thousand and there will be overlapping arrivals or departures of B-727-200 (or B-707) and B-767 class aircraft with about 300 peak hour passengers.

3. The constituent facilities of the existing terminal including departure holding lounge, baggage claim area, car parking area, etc. are saturated by daily service of B-737 flight with a high load factor at present. It is quite insufficient in size for an accommodation of a present peak hour demand of the peak season when overlaping arrivals or departures of two B-737s are handled. Therefore, it is recognized with the utmost importance and urgency from the view point of unrestraint continuation of civil air transport that the existing terminal building and car parking area should be expanded in order to overcome the present capacity problem and to meet the future increasing demands as expected in the above. Although the scope of work for the extension and alterations to terminal building and ancilliary will be determined based on review of the entire master plan of the terminal area including apron, car parking area, etc., the terminal building will be expanded to an integration of building units by adding new unit. Apron is scheduled to be expanded under the own finance of the Government of Western Samoa.

4. Instrument Landing System (ILS) is a standard requirement for the operation of the new generation aircraft including B-767, DC-10, L-1011, etc. which are anticipated in the future. Therefore, the Government of Western Samoa requests its installation within a few year for Runway 08 approach with the second priority next to the terminal building.

5. The existing capacity of the fire fighting facility is classified in Category-7 of ICAO which is estimated to suffice the requirement in size anticipated in 5 to 10 years from now. However, the Government of Western Samoa requests with the third priority the replacement of two worn-out fire engines with new vehicles.

6. The freight handling building is deleted from the list of facilities to be covered by Japan's grant aid taking into account the air cargo traffic volume anticipated in the near future, and availability of existing building to be converted to cargo terminal.

7. The scope of work to be covered by the grant aid of Japan will be determined taking into account the above priorities and the present budgetary condition of Japan's grant aid programme.

8. The Western Samoa Officials were informed by the Team of the grant aid system of Japan and the priciple of using Japanese consulting engineering firm which is to carry out Basic Design Study, and Japanese contractor for the project implementation.

9. The Officials have confirmed that the Government of Western Samoa will endevour to take the necessary measures as listed in ATTACHMENT-2 on which condition the grant aid of Japan is extended to the Project.

ATTACHMENT-2

MEASURES TO BE TAKEN BY THE GOVERNMENT OF WESTERN SAMOA

1. To secure necessary land for the construction.

2. To clear (including demolishing the existing facilities) the site of the Project when needed before the construction starts.

3. To provide data and information necessary for the Project.

4. To provide power supply, water supply, and other necessary utilities to the Project site.

5. To ensure prompt unloading and customs clearance, customs duty exemption of the products for the Project at the port of disembarkation in Western Samoa.

6. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Western Samoa with respect to the supply of materials for the construction, equipment, and services under the contracts.

7. To bear all the reasonable expenses other than those to be borne by the Grant aid, necessary for the execution of the Project. this requires the prior approval of the Government of Western Samoa.

MINUTES OF DISCUSSIONS

ON

THE DRAFT FINAL REPORT OF THE BASIC DESIGN STUDY ON THE CONSTRUCTION PROJECT FOR TERMINAL FACILITIES OF FALEOLO INTERNATIONAL AIRPORT IN WESTERN SAMOA

The Government of Japan has sent, through Japan International Cooperation Agency (hereinafter referred to as "JICA"), Basic Design Study Team to Western Samoa for the purpose of presenting and explaning the Draft Final Report of the Basic Design Study (hereinafter referred to as "the Report") on the captioned project (hereinafter referred to as "the Project") from June 14 through 21, 1985.

The Team headed by Mr. Masuzo Kikuta, Director of Tokyo International Airport Development Division, Aerodrome Department, Civil Aviation Bureau, Ministry of Transport, held a series of meetings with the Government officials of Western Samoa to explain and discuss about the Report.

As a result of the discussions, both parties have confirmed the following items:

1. The Government of Western Samoa has agreed in principle on the Basic Design of the Project proposed in the Report with some modifications as described in ATTACHMENT-2.

2. The Final Report (10 copies in English) on the Project will be submitted to the Government of Western Samoa by the end of July 1985.

3. The Government of Western Samoa will carry out the measures as listed in ATTACHMENT-1 for the realization of the Project.

L. Tone.

Mr. Peseta L. Tone
Director of Works

Masuzo Kikuta

Mr. Masuzo Kikuta
Team Leader, Japanese Basic
Design Study Team, JICA

Mr. Kolone Va'ai
Financial Secretary
Government of Western
Samoa

Date: June 20, 1985

Date: June 20, 1985

ATTACHMENT-1

THE MEASURES TO BE TAKEN BY THE GOVERNMENT OF WESTERN SAMOA

1. To complete temporary terminal facilities prior to the commencement of the construction of the passenger terminal building in order to serve the passenger and cargo traffic during the construction by Japanese aid.

2. To ~~complete the~~ increase~~ment~~ ~~of~~ the existing transformer capacity of 100 KVA to 200 KVA in order to cope with the expansion of the passenger terminal.

3. To provide 6 KVA from PC-1 for Localizer and 7 KVA from PC-2 for Glide slope/DME.

4. To provide one vacant conduit with a diameter of 100 mm. crossing under the runway in order for Japanese side to lay down the communications cable to the Glide slope/DME.

5. To provide the flight check by New Zealand so as to execute the same without delay upon the installation of ILS including ground tests and necessary adjustment which is expected to be completed in 14th month from the contract. The definitive schedule is to be discussed and fixed between the Government of Western Samoa and the contractor during the construction period.

6. To fulfill all the work items listed in Table 4.4.1 and Appendix-C-4 of the Draft Final Report.

ATTACHMENT-2

MODIFICATIONS TO THE PLAN OF THE PASSENGER TERMINAL BUILDING

1. The observation deck on the second floor is to be shifted toward the airside in order to give spectator the better view of the airport.

2. Airport Authority executive office facing the apron is to be transferred to the location where a direct access from the public area can be provided.

APPENDIX-D LIST OF PERSONNEL INTERVIEWED

Embassy of Japan in New Zealand

Mr. Akiyama	Ambassador, Embassy of Japan in New Zealand
Mr. Wanibuchi	Minister, Embassy of Japan in New Zealand
Mr. Minoru Yamashita	First Secretary, Embassy of Japan in New Zealand

Government of Western Samoa

Mr. Tofilau Eti Alesana	Prime Minister, Western Samoa
Mr. Peter Smith	Acting Secretary, Ministry of Transport
Mr. D.R. Buchan	Director, Civil Aviation Department
Mr. Noel Lomas	Civil Aviation Manager
Mr. Pesana L. Tone	Director, Public Works Department
Mr. Misiolo Sofe	Department of Economic Development
Mr. Alen Wendt	Ministry of Foreign Affairs
Mr. Kolone Va'ai	Financial Secretary
Ms. Hinauri Petana	Treasury Department
Ms. Pisaina Lelua	Treasury Department
Mr. John R. Block	Chief Water Engineer, PWD
Mr. Keith Foulkes	Chief Engineer Operation EPC
Mr. Eric T. Smith	Project Co-ordinator

Faleolo Airport

Mr. Alefosio Matulino	Senior Air Traffic Controller, Faleolo Airport
Mr. Talavou To'o	Manager, Station Rescue Fire Officer, Faleolo Airport
Mr. John Hudson	Station Telecom, Technical Officer, Faleolo Airport
Mr. Steve Michel	Station Electrical Officer, Faleolo Airport

Government of New Zealand

Mr. Miller	Director, EAD
Ms. McDonald	Assistant Section, Head, Pacific Projects, EAD
Ms. Slade	Western Samoa Desk Officer, EAD
Mr. McBryde	Western Samoa Desk Officer, SPA
Ms. Mackwell	Japan Desk Officer

Other Officials

Mr. Hasegawa	Resident Representative, UNDP
Mr. Kusano	Resident Representative, JOCV

Private Company

Mr. Alex Robinson	Consulting Engineer, Electrical and Communications, ALEX ROBINSON & ASSOCIATES
Mr. Aloe Vaai	Civil Engineer, INTERNATIONAL CONSTRUCTION LTD.
Mr. Brian Maltby	Quantity Surveyors, Building Economists, and Cost Engineers MALTBY & PARTNERS
Mr. Robert H. Coutanche	Ditto

APPENDIX-E LIST OF DATA COLLECTED

1. General

- Annual Statistical Abstract 1983	Department of Statistics
- Quarterly Statistical Bulletin Lst and 2nd Quarters JAN - JUN 1984	Department of Statistics
- Report of the Census of Population and Housing 1981	Department of Statistics

2. Meteorology

- Wind Coverage of the Existing Airport

3. Geography and Geology

- Western Samoa Topographical Map 1/20,000 2 sheets	Department of Land and Survey
- Island of Samoa	University Press of Hawaii
- A guide to Western Samoa	Visitors Bureau

4. National Development Plan

- The 1984 Budget Statement	Ministry of Finance

5. Previous Reports

- Faleolo Airport Development Study Vol. 1 - 5	Sir Alexander Gibb and Partners Australia, Consulting Engineers.
- Supplementary Report on Urgent Upgrading	Ditto

- Faleolo Airport Extension 1984 Material Report	Cameron McNamara Consultants
- Faleolo Airport Extension 1984 Vol. 2 Drawing	Cameron McNamara Consultants
- Faleolo Airport Extension 1984 Vol. 1, 2	Alex Robinson & Associates
- Faleolo Airport Appraisal Study Dec. 1982	Department of Transport and Construction

6. Airline Companies

- Worldwide Time Table 28/OCT/1984 - 31/MAR/1985 31/MAR/1985 - 26/OCT/1985	Air New Zealand
- Time Table 4/MAR/1984 - Fares 3/SEP/1984 -	Ansett
- Time Table 3/MAR/1985 -	Polynesian Airlines
- Time Table 1/SEP/1983 - 3/MAR/1985 -	Air Pacific
- Time Table	SPIA

7. Existing Airport

- Faleolo Airport Communications Control System

- Design drawing of Existing Airport Total 52 Sheets

8. Airport Administration

- Ministry of Transport (Civil Aviation) Current Expenditure and Revenue Estimates 1981 - 1984	Civil Aviation Division, MOT.
- Proposed Salary Scale - Western Samoa Airport Authority	Ditto
- Expenditure Estimates 1985 Ministry of Transport	Ditto
- Proposed Establishment Table - Western Samoa Airport Authority	Ditto
- Western Samoa Airport Authority Review of Landing Charges	Ditto
- Western Samoa Airport Authority Financial Organization	Ditto
- Airport Authority - Explanatory Memorandum	Ditto

9. Engineering

- Samoa Islands - Times and Heights of High and Low Waters 1985
- Soil Test Result/Apron

10. AIP

- PPG/NAN Terminal Area Chart
- Radio Navigational Chart

11. Constructions

- Cost Estimates Data (Runway)

- Cost Estimates Data (Australia, NZ)

- Faleolo Airport Extension — Alex Robinson & Associates
  Preliminary Estimate of Cost for
  ELECTRICAL AND TELECOMMUNICATION
  AIDS AND SERVICES

APPENDIX-F RESULT OF PASSENGER TRAFFIC SURVEY

1. Outline of the Survey

1) Date of Survey: April 5 and 6, 1985

2) Surveyed by: Messrs. Takeda, Maeda, Fukuwatari, and Maejima

3) Surveyed Flights:

FJ 250	(B-737)	(One small PH flight arrived at the same time)
PH687	(B-737)	(One small SPIA flight of DHC-6 arrived at the same time)
TE192	(B-737)	

4) Number of Arrival Passengers, excluding transit passengers (data from passenger lists):

FJ250	22 pax.	PH arrived at same time ---	Total 28 pax. (survey record)
PH687	20 pax.	SPIA arrived at same time 13 pax.	Total 30 pax. (survey record)
TE192	40 pax.		

5) Length of Baggage Claim Table:

3.8m + 3.65m = 7.45m

2. Result of the Survey

Departure

- Check-in time per passenger (FJ250 + PH687):
  3.5 min./passenger
- Passport control time (immigration) per pax. (FJ250 + PH687):
  45 sec./passenger

Arrival

- Time required for the first passenger to arrive at the entrance of the terminal from the time of door open:

FJ250	1.5 min.
PH687	50 sec.

- Time required for all passengers to pass through the entrance gate:

FJ250 (17 pax.)	4 min. and 50 sec.
PH687 (20 pax.)	1 min. and 40 sec.

- Passport control time (immigration):

FJ250	19 min.	(one counter)
PH687	9 min.	(three counters)
TE192	11 min.	(three counters)

- Baggage pick-up time:

FJ250 + PH233	12 min.
PH687 + SPA	9 min.
TE192	12 min.

- Customs Check time:

FJ250 (17 pax. only)	18 min.	(one counter)
PH687 + SPA	14 min.	(two counters)
TE192	10 min.	(two counters)

3. Consideration

1. Based on the latest survey, the following two items are mainly considered for planning of terminal building:

   1) Check-in time required per one passenger is 3.5min
   2) Too much time is required for inbound immigration.

Item 1) is due to the congestion in the check-in lobby. The congestion is caused by a large number of well-wishers who are able to enter into the check-in lobby. It is a national custom for a large number of well-wishers accompany each passenger.

Item 2) is caused by quarantine check carried out at the same time as immigration check. They should be conducted separately in accordance with the request from the Goverment of Western Samoa.

The result and conclusion of passenger traffic survey are summarized in Table F.1.

Table F.1. Result of Passenger Traffic Survey

unit: sec./passenger

Item	Time	Time Counted at the Faleolo International Airport	Required Time Planned
Outbound (Dept.)	Check-in (Int'l)	210	120
	Check-in (Domestic)	---	30
	Customs Check	---	60
	Security Check	---	15
	Outbound Immigration	45	45
	Quarantine		17
Inbound (Arr.)	Inbound Immigration	62	45
	Customs Check	55	55

APPENDIX-G CALCULATION OF FLOOR AREA REQUIREMENTS

1. Average Waiting Time and Space per Passenger and/or Greeters and Well-wishers

Average waiting time and space per apssenger and/or greeters and well-wishers are listed in Table G.1. Those figures are calculated in consideration of the custom of WEstern Samoa, which is described hereunder;

1) Well-wishers are off-limit from the check-in lobby in accordance with the request of the Government of Western Samoa.
2) It is planned that a passenger shall spend 10 minutes for check-in and 20 minutes in the waiting lounge. (# 1)
3) Number of greeters and well-wishers per passenger is estimated to be 2.0 persons.

Table G.1 Floor Area Requirements

Facility	Item	Average Waiting Time (# 1)	Space Available per person
Public Lobby (Dept.)	Passenger	30 min.	2.0m^2
	Well-wishers	60 min.	2.0m^2
Gate Lounge	Passenger	30 min.	1.5m^2
Public Lobby (Arr.)	Passenger	10 min.	1.5m^2
	Greeters	30 min.	1.5m^2

2. Performance Standard

Maximum waiting times at each location are listed hereunder :

* Check-in Lobby:	20 min.
* Check-in Counter:	20 min.
* Outbound Immigration:	4 min.
* Security Check:	4 min.
* Departure Gate Lounge:	20 min.
* Quarantine:	4 min.
* Inbound Immigration:	4 min.
* Customs Check:	10 min.
* Arrival Lobby:	20 min.

3. Required Check-in

$$\text{Desks Required} = \frac{a \times b}{60} = \frac{261 \text{ pax.} \times 2 \text{ min.}}{60} = 8.7 \quad \text{---9 desks}$$

where:

a = Equivalent peak hour passengers

$$\text{Mean} = 210 \text{ pax.} \times \frac{20 \text{ min.}}{60 \text{ min.}} = 70 \text{ pax.}$$

Mean + 2 x Standard deviation

= 70 pax. + 2 70 pax. = 87 pax.

$$a = \frac{87 \times 60}{20} = 261$$

b = Check in time per passenger (min.)

4. Required Immigration Desks

$$\text{Desks Required } \frac{a \times b}{60} = \frac{300 \times 0.75}{60} = 3.75$$

where:

a = Equivalent peak hour passengers

$$\text{Mean} = 190 \text{ pax.} \times \frac{4 \text{ min.}}{60 \text{ min..}} = 12.7 \text{ pax.}$$

Mean + 2 x Standard deviation

= 12.7 pax. x 2 12.7 = 19.8--20 pax.

$$a = 20 \text{ pax.} \times \frac{60 \text{ min.}}{4 \text{ min.}} = 300 \text{ pax.}$$

5. Required Security Desk

$$\text{Desks Required} = \frac{a \times b}{60} = \frac{300 \text{ pax.} \times 0.25}{60 \text{ min.}} = 1.25 \quad \text{---2 desks}$$

where:

a = Equivalent peak hour passengers

300 pax. (Same as immigration desks)

b = Time required for check per passenger (min.)

6. Departure Gate Lounge

$$\text{Area Required} = \frac{a \times b \times c}{60} = \frac{327 \text{ pax.} \times 1.5\text{m}^2 \times 30 \text{ min.}}{60} = 245\text{m}^2$$

where:

a = Equivalent peak hour passengers

$$\text{Mean} = \frac{(190 + 80) \text{ pax.} \times 20 \text{ min.}}{60 \text{ min.}} = 90 \text{ pax.}$$

Mean + 2 x Standard deviation

= 90 pax. + 2 90 = 108.9 pax.

$$a = \frac{108.9 \times 60}{20} = 327 \text{ pax.}$$

b = Space per passenger 1.5m^2

c = Average waiting time 30 min.

7. Departure Public Lobby

Area Required for Passengers, and Well-wishers

Area Required for Passengers

$$S_1 = \frac{a \times b \times c}{60} = \frac{261 \text{ pax.} \times 2m^2 \times 60 \text{ min.}}{60} = 174m^2$$

Area Required for Well-wishers:

$$S_2 = \frac{a' \times b' \times c'}{60} = \frac{(261 \times 2 \text{ pax.}) \times 2m^2 \times 60 \text{ min.}}{60} = 1,044m^2$$

Total : $S_1 + S_2 = 174 + 1044 = 1218$ ---$1,220m^2$

where:

a = Equivalent peak hour passengers
b = Area per passenger
c = Average waiting time

a' = Equivalent peak hour well-wishers
b' = Area per well-wishers
c' = Average waiting time

8. Inbound Quarantine

$$\text{Desks Required} = \frac{a \times b}{60} = \frac{300 \times 0.28}{60} = 1.4 \qquad \text{----2 desks}$$

where:

a = Equivalent peak hour passengers

$$\text{Mean} = 190 \text{ pax.} \times \frac{4 \text{ min.}}{60 \text{ min.}} = 12.7 \text{ pax.}$$

Mean + 2 Standard deviation

$$= 12.7 \times 2 \quad 12.7 = 19.8 \text{ pax.} \qquad \text{---20 pax.}$$

$$20 \times \frac{60}{4} = 300 \text{ pax.}$$

b = Time required for check per passenger (min.)

9. Inbound Immigration

$$\text{Desks Required} = \frac{a \times b}{60} = \frac{300 \times 0.75}{60} = 3.75$$

where:

a = Equivalent peak hour passengers
b = Time required for check per passenger 45 sec. = 0.75 min.

10. Customs Desks Required

$$\text{Desks Required} = \frac{a \times b}{60} = \frac{257 \text{ pax.} \times 0.92}{60} = 3.94$$

where:

a = Equivalent peak hour passengers

$$\text{Mean} = 190 \text{ pax.} \times \frac{10 \text{ min.}}{60} = 31.6$$

Mean + 2 Standard deviation

$$= 31.6 + 2 \quad 31.6 = 42.8$$

$$42.8 \times \frac{60}{10} = 256.8 \qquad \text{---257 pax.}$$

b = Time required for check per passenger 55 sec.

11. Arrival Lobby

Area Required for Passengers and Greeters.

Area Required for Passengers

$$S_1 = \frac{a \times b \times c}{60} = \frac{257 \text{ pax.} \times 1.5m^2 \times 10 \text{ min.}}{60} = 64.3m^2$$

Greeters/Well-wishers area

$$S_2 = \frac{a' \times b' \times c'}{60} = \frac{(257 \text{ pax.} \times 2) \times 1.5m^2 \times 30 \text{ min.}}{60} = 385.5m^2$$

Total: $S_1 + S_2 = 64.3 + 385.5 = 449.8$

where:

a = Equivalent peak hour passengers
b = Space per passenger
c = Average waiting time

a' = Equivalent peak hour greeters
b' = Space for greeter.
c' = Average waiting time

APPENDIX-H REQUEST ON THE PASSENGER TERMINAL BUILDING FROM THE GOVERNMENT OF WESTERN SAMOA

Problems of existing passenger terminal building

1. Bus, Taxi and Private vehicle

Loading and Unloading Zones

These zones are not protected from the weather.
NOTE: Peak traffic periods occur in the "wet" season.

2. Ticketing and Baggage Check-in Areas

Overcrowding and congestion occur in this area due to friends and relatives who use floor as seating accommodation. Presence of Bank, Post Office and Passenger Services tax collector in this area adds to confusion and congestion.

3. Passenger Waiting and Public Areas

These areas are not adequately protected from the weather. During periods of rain, 50% of this area becomes unuseable. This adds to overall congestion. Busiest traffic periods (December/January) are in the "wet" season.

4. Departure Terminal

(i) Entrance to Departure Terminal is through a poorly lighted, poorly ventilated "add on" structure. In this area are located the Immigration and Security check points.

(ii) The Security check point has no private personal search or holding area.

(iii) Departure lounge is not adequate for one B737 load. It is poorly lighted and ventilated.

(iv) Washroom (toilet) facilities are inadequate. Access is through a narrow passage to outside of building.

(v) Duty Free Shop presentation is poor.

5. Arrival Terminal

(i) Total area available is inadequate and congestion occurs.

(ii) Baggage reception area is inadequate. There is insufficient space for operation of baggage trollies. Baggage clutters up the floor space.

(iii) Passenger flow control through area is poor.

(iv) Washroom (toilets) are available at pre check points only.

(v) Bank in area adds to congestion.

6. General

All areas are lacking in staff amenities:

(i) There are no staff wash or changing rooms, no lockers or recreation areas.

(ii) Office accommodation is inadequate in all areas of space, lighting and ventilation.

(iii) Cafeteria facilities are inadequate (for public and staff) food and drink are available at a standup counter only.

(iv) Terminal janitors have no changing or locker facilities. They have no space to store cleaning equipment or materials.

7. Desirable Requirements

(other than those indicated above)

(i) More adequate baggage and cargo handling areas

(ii) Office accommodation for rental car, tour and travel agencies and for a tourist information bureau.

(iii) Accommodation for a shop to sell handicrafts, souvenirs and general goods.

(iv) Provision for a Police post (Office)

(v) Office accommodation for the Airport Aviation Service Chief Security Officer.

(vi) Office accommodation for the Airport Authority executive staff

(vii) A cafeteria or restaurant with sit down facilities.

Note: It would be desirable that the cafeteria/restaurant should serve the public, departing international passengers, and staff, from the one location (due to staffing and economic reasons)

(viii) A Bank facility that also can serve both arriving international passengers and the public from one location (again this is for staff and economic considerations)

(ix) It is also desirable that the public has access to Government officials such as Customs, Immigration and Agriculture. These officers would normally be located in the Arrival Terminal (this is also a staffing and economic consideration).

(x) In the new terminal bldg., space to accommodate 8 staffs of airport administration, janitors, storage, locker room, etc. is required in addition to the present office accommodations.

(xi) Duty-free Shop is desirable to be provided before customs area.

Table I.1 Future Aircraft Movement (Year : 2005)

Route	Annual Pax. *1	Weekly Pax.	SUN	MON	TUE	WED	THU	FRI	SAT	Total	Load Factor
APW-NAN	60,000	1,900	I : 1 III : 1	III : 2	II : 1	III : 1		II : 1 III : 1		I : 1 II : 2 III : 5	76%
-AKL	150,000	4,700	II : 1 III : 3	II : 1 III : 3	II : 2	II : 1 III : 2	II : 1 III : 2	I : 2 II : 2		I : 2 II : 8 III : 10	74%
-PPG	360,000	11,300	I : 1 II : 1 III : 2 IV : 2 VI : 12	II : 1 III : 2 IV : 2 VI : 12	II : 1 III : 4 IV : 2 VI : 12	II : 1 III : 3 IV : 2 VI : 12	I : 1 II : 1 III : 4 IV : 2 VI : 12	II : 1 III : 2 IV : 2 VI : 12	II : 2 III : 5 IV : 2 VI : 12	I : 2 II : 8 III : 22 IV : 14 VI : 84	72%
Others	30,000	900			III : 1	III : 1		III : 2	III : 1	III : 5	64%
Total	600,000	18,800	I : 2 II : 2 III : 6 IV : 2 VI : 12	II : 2 III : 7 IV : 2 VI : 12	II : 4 III : 5 IV : 2 VI : 12	II : 2 III : 7 IV : 2 VI : 12	I : 1 II : 2 III : 6 IV : 2 VI : 12	I : 2 II : 4 III : 5 IV : 2 VI : 12	II : 2 III : 6 IV : 2 VI : 12	I : 5 II : 18 III : 42 IV : 14 VI : 84	72%
			24	23	23	23	23	25	22	163	

Remarks *1 : Including Transit Passenger

LEGEND

III : 2	
Aircraft Category	Daily Movement

APPENDIX-J ESTIMATED FLIGHT SCHEDULE IN THE YEAR 2005

Table J.1 Estimated Flight Schedule (Year : 2005)

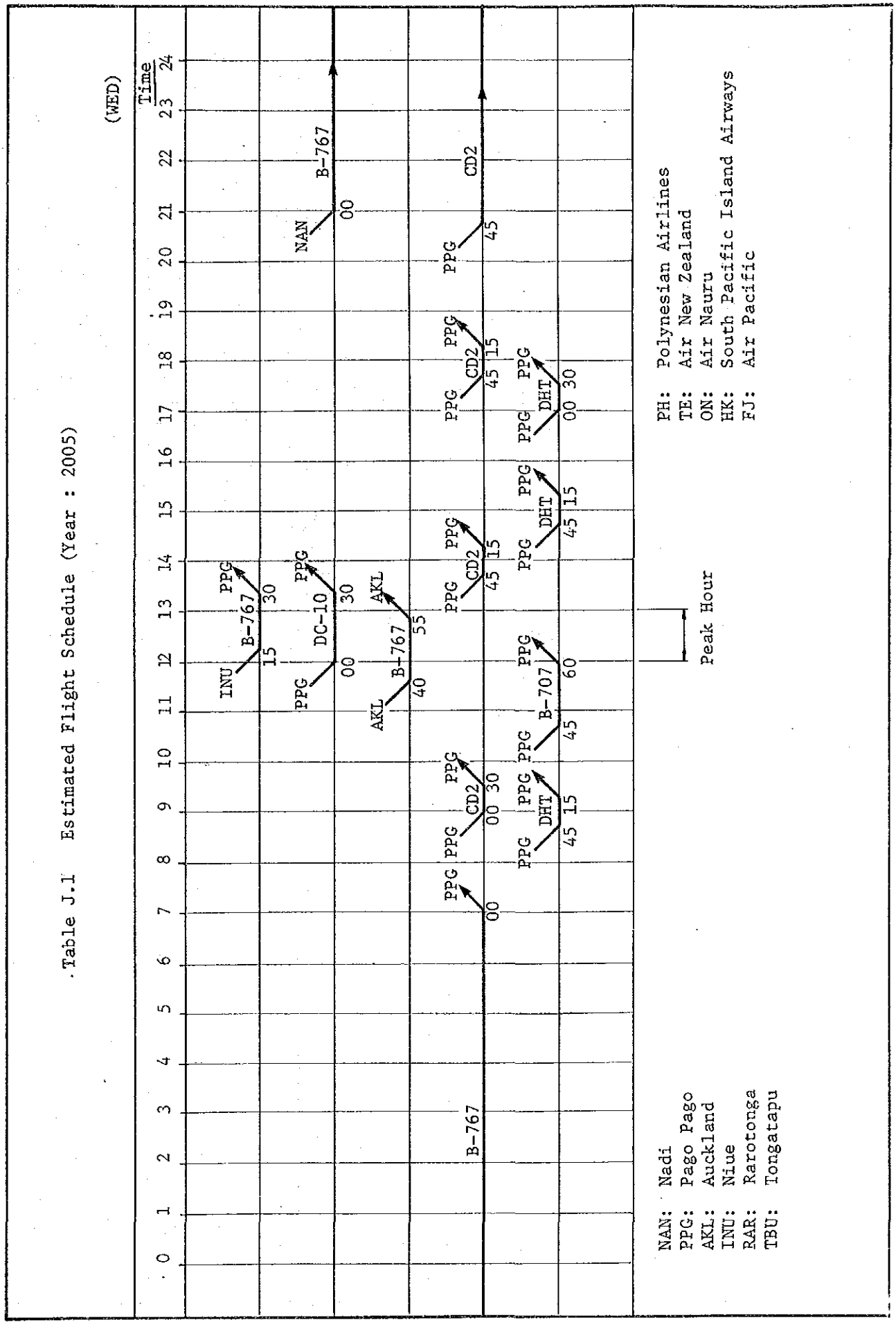
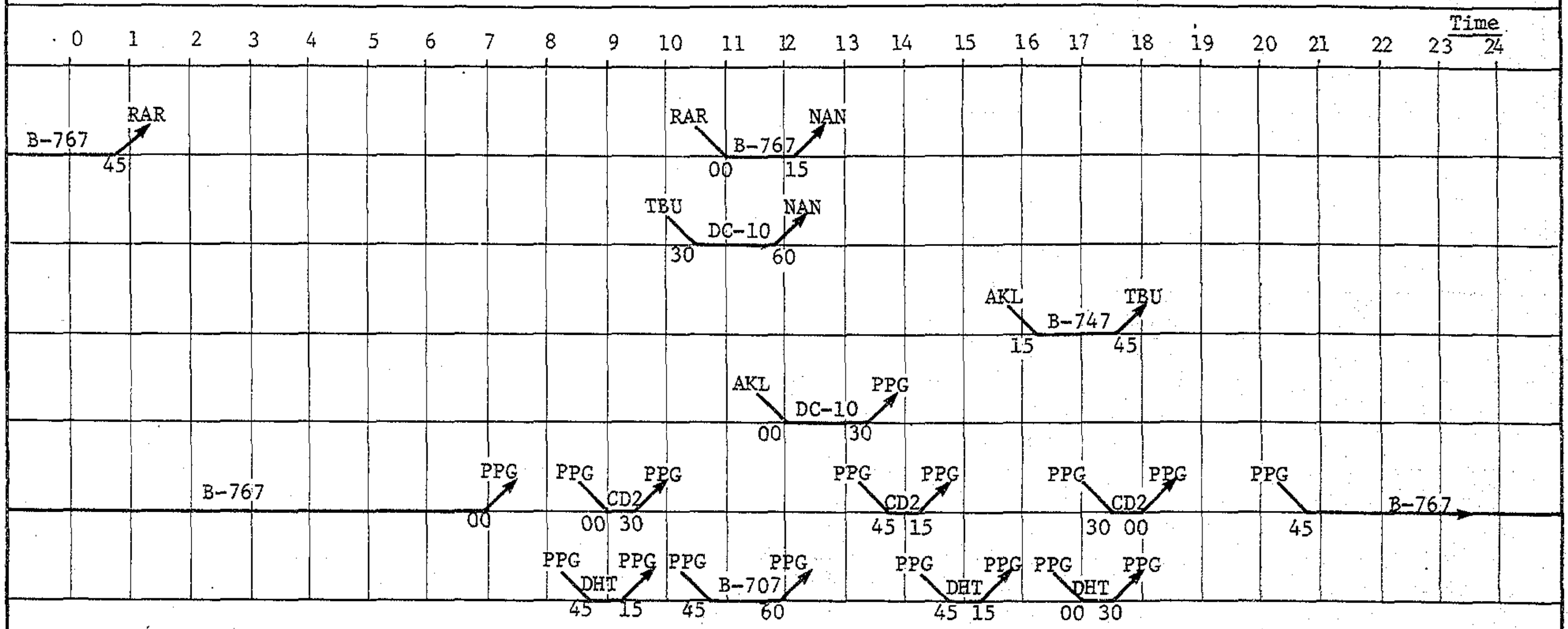


Table J.2 ESTIMATED FLICHT SCHEDULE (Year : 2005)

(FRI)



NAN: Nadi
PPG: Pago Pago
AKL: Auckland
INU: Niue
RAR: Rarotonga
TBU: Tongatapu

Peak Hour

PH: Polynesian Airlines
TE: Air New Zealand
ON: Air Nauru
HK: South Pacific Island Airways
FJ: Air Pacific


JICA