Table 8.2.4 (Continued)

	Alt.T-A	Alt.T-B	Alt.T-C
5. Apron-General Aviation	**Short-term** Parking space for general aviation aircraft together with their hangars will be grouped at the west end of the expanded terminal area in the short-term development. This is because all aircraft hangars in the north side of the COOPESA hangar and security hangar will need to be demolished in the short-term development. **Long-term** No additional requirement is expected.	**Short-term** General aviation aircraft of hangars on the north side of the COOPESA hangar will not be influenced by the short-term development. Only the apron for aircraft using security hangar will be constructed. **Long-term** Apron and hangars for all general aviation aircraft will be grouped in an area at the west end of the terminal area.	**Short-term** General aviation aircraft of hangars on the north side of the COOPESA hangar will not be influenced by the short-term development. Only the apron and taxiway for aircraft using security hangar will be constructed. **Long-term** The stands between the cargo apron and the maintenance apron will be used for all general aviation aircraft. The hangars for general aviation aircraft will be constructed behind new COOPESA hangar and the cargo terminal area.
6. Int'l Passenger Terminal Building	**Short-term** The existing passenger terminal will be expanded to secure larger space. The first floor of the building will be expanded by 12m (2spans) toward the landside to increase the depth of the check-in lobby. The width of the check-in lobby will also be expanded by 18m (3 spans) to the west to widen check-in area for the LACSA. An additional gate lounge with a boarding bridge will be constructed on the east side of the existing terminal building. The bus lounge for the new loading stands will be added on the basement floor. **Long-term** The second terminal building of approximately 9,000sq.m floor area will be constructed. This building will be of one and a half level concept with five boarding bridges. The depth of the terminal building of 50 to 60m is recommended. The two terminal buildings will be connected by a corridor. All aircraft will be served with boarding bridges.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
7. Dom. Passenger Terminal Building	**Short-term** A new domestic passenger terminal building of approximately 700 sq.m will be constructed at the location of the existing cargo terminal building after its relocation. The domestic cargo will also be handled in this building. **Long-term** No additional requirement is expected.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
8. Cargo Terminal Building	**Short-term** A cargo terminal building with a total floor area of 16,100sq.m will be constructed in the landside front of the cargo apron. It will be located on the west side of the cargo area to allow future expansion to the east. The COOPESA automobile workshop and security hangar should be relocated. **Long-term** The cargo terminal building will be expanded forward to the east side of the cargo area to cope with traffic increase. The additional floor area will be 10,000sq. m.	**Short-term** The same concept as Alt.T-A will be applied. The location is approximately 100m westward of Alt.T-A. Major difference is that this alternative will not require the relocation of the COOPESA automobile workshop in the short-term development. **Long-term** The cargo terminal building will be expanded upon completion of the relocation of the COOPESA automobile workshop.	**Short-Term** The same concept as Alt.T-A will be applied. The location is also same as Alt.T-A, however, security hangar should not be relocated in this alternative. **Long-Term** Although the additional stands for cargo aircraft will be prepared on the east side of the cargo apron constructed in the short-term development, the cargo terminal building will be expanded forward to both sides of the cargo area because the operations and administration building and control tower will be constructed between the cargo area and the int'l passenger terminal buildings.

Table 8.2.4 (Continued)

	Alt.T-A	Alt.T-B	Alt.T-C
9 Operations and Administration Building	**Short-term** The operational and administrative function of the DGAC will remain in the existing passenger terminal building. **Long-term** The new operations and administration building will be constructed with a total floor area of 1,300sq.m between the international passenger terminal building and the cargo terminal area. The administrative function will be divided between this new building and in the existing passenger terminal building.	**Short-term** The same concept as Alt. T-A will be applied. **Long-term** The new operations and administration building will be constructed between the COOPESA hangar and the cargo terminal area. The total floor area will be same as that of Alt. T-A(1,300sq.m).	The same concept as Alt. T-A will be applied.
10. Control Tower	**Short-term** The existing control tower will be utilized continuously in the short-term development. **Long-term** A new control tower of 35m height will be constructed on the west side of the operations and administration building to secure unobstructed view of movement areas.	The same concept at Alt.T-A will be applied. (The location is approximately 100m westward of Alt.T-A.)	The same concept as Alt. T-A will be applied.
11. Meteorological Office	**Short-Term** The existing meteorological office in the existing passenger terminal building will be utilized. **Long-Term** The meteorological office will be accommodated in the new operations and administration building taking into account its merit of close location to the DGAC's operational function and meteorological service.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
12. Car Park	**Short-term** The arrangement of terminal circular road in front of the existing passenger terminal building will be changed to increase carpark capacity and to cope with the expansion of the terminal building toward the landside. The capacity of the carpark will be increased to 550 cars. **Long-term** The second carpark for the second international passenger terminal building will be constructed. The capacity of the carpark will be 420 cars.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
13. Fire Station	**Short-term** A new fire station of 450sq. m large will be constructed on the west side of the general aviation apron. **Long-term** Three new fire vehicles to confirm to ICAO Category-8 will be introduced to replace the existing old vehicles.	**Short-term** The existing fire station will be used continuously. **Long-term** A new fire station of 450sq. m will be constructed on the west side of the general aviation apron. Three new fire vehicles to confirm to ICAO Category-8 will be introduced to replace the existing old vehicles.	The same concept as Alt.T-B will be applied.
14. Airport Maintenance Workshop	**Short-term** A new airport maintenance workshop will be constructed on the northwest corner of the expanded terminal area. **Long-term** No additional requirement is expected.	**Short-term** The existing airport maintenance workshop will be used continuously. **Long-term** The airport maintenance workshop will be relocated to the northwest corner of the expanded terminal area.	The same concept as Alt.T-B will be applied.

Table 8.2.4 (Continued)

	Alt.T-A	Alt.T-B	Alt.T-C
15. Power House	**Short-term** A new power house will be constructed on the north side of the new operations building. **Long-term** No additional requirement is expected except capacity of the transformer and generator.	Short-term The existing power house will be used with the expansion of transformer and generator capacity. Long-term The airport maintenance workshop will be constructed on the north side of the operations building.	The same concept as Alt.T-B will be applied.
16. Sewage Treatment Plant and Incinerator	**Short-term** A sewage treatment plant will be constructed under the slope to the west of the expanded terminal area. An incinerator will also be installed. The facility should cope with average efficient volume of 360ton per day. **Long-term** The capacity of the sewage treatment will be increased to average 610ton per day.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
17. Security Hangar	**Short-term** Security hangar will be relocated to the general aviation area on the west side of the expanded terminal area. **Long-term** No additional requirement is expected.	**Short-term** The same concept as Alt.T-A will be applied. The apron in front of security hangar will be utilized for the parking space for security aircraft. **Long-term** The 100m wide apron completed for general aviation will be jointly utilized with security aircraft parking.	**Short-Term** The existing security hangar will be utilized continuously. The taxiway will be constructed to connect the existing security hangar and the west side edge of the new apron. **Long-Term** Security hangar will be relocated to the general aviation area on the north side of the COOPESA hangar and the cargo terminal area.
18. Storage-DGAC	**Short-term** The existing DGAC storage will be relocated to a storage area on the west side of the area reserved for fuel depot. **Long-term** No additional requirement is expected.	**Short-term** The same concept as Alt.T-A will be applied. **Long-term** No additional requirement is expected.	The same concept as Alt.T-A will be applied.
19. Storage-Meteorological	**Short-term** A new storage to accommodate the equipment for radiosonde, etc. will be constructed on the north side of the new operations and administration building to replace the existing meteorological observation building (storage). **Long-term** No additional requirement is expected.	**Short-term** The existing meteorological observation building is operable in this alternative. **Long-term** A new storage to accommodate the equipment for radiosonde etc. will be constructed on the north side of the new operations and administration building to replace the existing facility.	The same concept as Alt.T-B will be applied.
20. Fuel Depot	**Short-term** A new fuel depot will be constructed on the north side of the cargo terminal area. The planned storage capacity of the fuel depot is 1,300kl of Jet-A1 and an appropriate amount of Avgas. **Long-term** The capacity of the fuel depot will be increased to 2,000kl.	**Short-term** The existing fuel depot will be used continuously. **Long-term** The fuel depot will be relocated to the north side of the new cargo area. The fuel depot will have a storage capacity of 2,000kl of Jet-A1 and an appropriate amount of Avgas.	The same concept as Alt.T-B will be applied.
21. COOPESA Hangar	**Short-term** The COOPESA hangar will be relocated to the west side of the new cargo terminal building. The new hangar is planned to be able to expand its capacity for up to three narrow-body jet aircraft. **Long-term** No additional requirement is expected.	**Short-term** The existing COOPESA hangar is a operable in this alternative. **Long-term** A new hangar will be constructed between the second international passenger terminal building and operations building.	**Short-term** The same concept as At.T-B will be applied. **Long-term** A new hangar will be constructed at the west end of the expanded terminal area.

Table 8.2.4 (Continued)

	Alt.T-A	Alt.T-B	Alt.T-C
22. General Aviation Hangars	**Short-term** The general aviation hangars presently located on the north side of the COOPESA hangar should be relocated. The new location will be in the new general aviation area at the west end of the expanded terminal area. **Long-term** Additional hangars, if so required, will be constructed in the new general aviation area.	**Short-term** The existing general aviation hangar on the north side of the COOPESA hangar is operable in this alternative. **Long-term** A new general aviation area will be constructed at the west end of the expanded terminal area, and all the hangars will be relocated in this area.	**Short-Term** The same concept as Alt.T-B will be applied. **Long-Term** A new general aviation area will be prepared on the north side of the COOPSA hangar, and two hangars will be constructed on the both side of the security hangar.
23. COOPESA Automobile Workshop	The COOPESA automobile workshop will need to be relocated to outside of the airport in the short-term development.	**Short-term** The existing COOPESA automobile workshop is operable in this alternative. **Long-term** It will need to be relocated to outside of the airport for the construction of the new COOPESA hangar and expansion of the cargo terminal building.	The same concept as Alt.T-A will be applied.
24. Leather Factory	The leather factory is operable in this alternative.	The existing leather factory is operable in this alternative.	**Short-Term** The existing leather factory is operable in the short-term development. **Long-Term** It will need to be relocated to the outside of the airport for the construction of the security hangar and the general aviation area.
25. Storage-American Embassy	**Short-term** Storage of American Embassy will be relocated next to the DGAC Storage on the west side of the reserved area for fuel depot. **Long-term** No additional requirement is expected.	The same concept as Alt.T-A will be applied.	The same concept as Alt.T-A will be applied.
26. Storage-LACSA	**Short-term** Storage of LACSA will be relocated next to the airport maintenance workshop on the northwest corner of the expanded terminal area. **Long-term** No additional requirement is expected.	**Short-term** The existing LACSA storage is operable in this alternative. **Long-term** The LACSA storage will be relocated next to the airport maintenance workshop on the northwest corner of the expanded terminal area.	The same concept as Alt.T-B will be applied.

Table 8.2.5 Comparative Evaluation of Alternative Terminal Area Development Plan

Legend, ○ : Good
△ : Fair
× : Poor

Items	Alt. T-A		Alt. T-B		Alt. T-C	
Aircraft Operational Aspects						
Infringement of Trqansitional Surface						
-Short-term	×	- Tail fin of DC-10: 10.0m - Tail fin of B-727: 2.3m - Passenger terminal building: 7.1m.	×	- Tail fin of DC-10: 10.0m - Tail fin of B-727: 2.3m - Passenger terminal building: 7.1m - COOPESA hangar: 12.8m	×	- Tail fin of DC-10: 10.0m - Tail of B-727: 2.3m - Passenger terminal building: 7.1m - COOPESA hangar: 12.8m
-Long-term	○	- No obstacles	○	- No obstacles	○	- No obstacles
Aircraft Ground Movements						
-Short-term	○	- New apron to be constructed in the western part of the terminal area will be connected with the existing terminal by the new apron taxiway which satisfies the runway-taxiway separation standard.	△	- New apron will be cul-de-sac configuration. - Separation distance between the runway and taxiway will remain substandard.	△	- New apron will be cul-de-sac configuration - Separation distance between the runway and taxiway will remain substandard.
-Long-term	○	- Dual taxiway for the entire terminal area	○	- Dual taxiway for the entire terminal area	○	- Dual taxiway for the entire terminal area
Passenger and Cargo Handling Aspects						
Passenger Handling (Distance between the terminal building to the farthest aircraft stand)						
-Short-term	△	- 300m(bus transport)	×	- 800m(bus transport)	×	- 1,100m(bus transport)
-Long-term	○	- All aircraft stands except an extra stand will be served with boarding bridges.	○	- All aircraft stands except an extra stand will be served with boarding bridges.	○	- All aircraft stands except an extra stand will be served with boarding bridges.
Cargo Handling (Distance between the terminal building to the farthest aircraft stand)						
-Short-term	△	- 1,100m	△	- 1,350m	△	- 1,100m
-Long-term	△	- 1,000m	△	- 1,250m	△	- 900m
(Running of cargo trolleys)						
-Short-term	○	- No problem	△	- Cargo trolleys should go across the airside edge of the COOPESA maintenance apron	△	- Cargo trolleys should go across the airside edge of the COOPESA maintenance apron
-Long-term	○	- Noproblem	○	- No problem	○	- No problem
Airport Operational and Administrative Aspects						
Distance from Operations to Fire Station						
-Long-term	△	- 900m(air side), 1,100m(land side)	△	- 800m(air side), 1,000m(land side)	△	- 800m(air side), 1,000m(land side)
Response Time of Fire Vehicle to Farther End of Runway						
-Short-term	△	- 140 sec.	△	- 180 sec.	△	- 180 sec.
-Long-term	△	- 160 sec.	△	- 160 sec.	△	- 160 sec.

Table 8.2.5 (Continued)

Legend, ○ : Good
△ : Fair
× : Poor

Items	Alt. T-A		Alt. T-B		Alt. T-C	
Visibility from Control Tower						
-Short-term	○	- No problem	△	- The existing COOPESA hangar obstructs the visibility from the control tower.	△	- The existing COOPESA hangar obstructs the visibility from the control tower.
-Long-term	○	- No problem	○	- No problem	○	- No problem
Expandability and Flexibility of Facility						
Expandability of Terminal Area byond 2010	○	- Sufficient	○	- Sufficient	○	- Sufficient
Flexibility of Facility Development against Changes of Future Traffic Demands	△	- Concentration of investement in the short-term development is a demerit when the growth of traffic demands is lower than expected.	○	- Minimum investment requirement in the short-term development is a merit to cope with the changes in future traffic demands.	○	- The maximum vacant space can be secured in the area facing the loading apron even in the long-term development.
Utilization of Existing Facilities						
Continuous Utilization of Existing Facilities in Short-term Development (Public facilities)	×	- Int'l loading apron(with expansion) - Cargo apron(for domestic aircraft) - Int'l passenger terminal bldg. (with expansion) - Administration office - Control tower - Meteorological office - Carpark(with expansion)	○	- Int'l loading apron(with expansion) - Overnight stay apron - Cargo apron(for domestic aircraft) - Int'l passenger terminal bldg. (with expansion) - Administration office - Control tower - Meteorological office - Carpark(with expansion) - Fire Station - Airport Maintenance Workshop - Power House - Meteorological Storage	○	- Int'l loading apron(with expansion) - Overnight stay apron - Cargo apron(for domestic aircraft) - Int'l passenger terminal bldg. (with expansion) - Administration office - Control tower - Meteorological office - Carpark(with expansion) - Fire Station - Airport Maintenance Workshop - Power House - Meteorological Storage
Ease of Project Implementation						
Land Acquisition						
-Short-term	△	- 3ha	○	- Nill	○	- Nill
-Long-term	○	- Nill	△	- 3ha	△	- 3ha
Compensation (Private facilities)						
-Short-term	×	- Fuel depot - COOPESA hangar - General aviation hangars - COOPESA automobile work-shop - Storages(American Embassy, LACSA)	○	- Storage(American Embassy)	△	- COOPESA automobile work-shop - Storage(American Embassy)
-Long Term	○	Nil	×	- Fuel Depot - COOPESA hangar - General aviation hangars - COOPESA automobile workshop - Storage(LACSA)	×	- Fuel Depot - COOPESA hangar - General avation hangars - Leather factory - Storage(LACSA)

Table 8.2.5 (Continued)

Legend, ○ : Good
△ : Fair
× : Poor

Items		Alt. T-A		Alt. T-B		Alt. T-C
Construction Cost						
Terminal Area Development (Million US$)						
-Short-term		44.1		37.0		36.4
	×	53.0 (incl. compensation)	○	41.3 (incl. compensation)	○	40.7 (incl. compensation)
-Long-term		62.7		41.2		42.3
	×	70.7 (incl. compensation)	○	53.8 (incl. compensation)	○	56.0 (incl. compensation)
-Total(Discounted at 10% for 3 years for Short-term and 10 years for Long-term)		57.3		43.7		43.7
	×	67.1 (incl. compensation)	○	51.8 (incl. compensation)	○	52.2 (incl. compensation)
Overall Project Cost (Million US$)						
-Short-term		48.7		41.6		41.1
	×	57.6(incl.compensation)	○	45.9 (incl. compensation)	○	45.4 (incl. compensation)
-Long-term		198.7		177.2		178.4
	×	228.8(incl.compensation)	○	211.9 (incl. compensation)	○	214.1 (incl. compensation)
-Total(Discounted at 10% for 3 years for Short-term and 10 years for Long-term)		113.2		99.6		99.7
	×	131.5 (incl. compensation)	○	116.2 (incl. compensation)	○	116.7 (incl. compensation)
Overall Evaluation		- The investment requirements of the short-term development will be very high because of less utilization of existing airport facilities and extensive compensation required,while the functional advantage over Alt. T-A is minimum.		- Practical solution to increase the capacity of the terminal facilities in the short-term development. However, the construction cost is more expensive than Alt. T-C because the Security office will need to be relocated to outside of the airport in the short-term development.		- This alternative is more practical than Alt. T-B because the construction cost for the short-term development is minimum although the COOPESA automobile workshop will need to be relocated to outside of the airport in the short-term development. 0

8.2.5 Airport Utilities

1) Power Supply System

A main power supply system will be developed to cope with the required load capacity of the project. The existing emergency power supply system will be also developed through the short-term development so as to feed the essential load for the normal airport operation.

2) Telephone System

The telephone system is inadequate both in quality and in capacity, and its replacement in early stages of the project is desirable. The new telephone system should be installed in the new operations building in consideration of convenience of maintenance and performance monitoring. Therefore, the telephone system will be replaced during the construction stage of the operations building in the long term development. The new telephone system should be considered for the installation of a digital based telephone exchange with an approximate capacity of 600 channels so as to serve not only public services but also airport operations.

(3) Sewerage Treatment Plant

A new sewerage treatment plant is planned in the west side of the expanded terminal area from the viewpoint of the sanitary conditions. An incinerator is also located in the same site.

(4) Water Supply System

Potable water at the airport is supplied by a pipe from the town. The capacity of the source is enough to supply the water to the airport even after completion of expansion of the terminal area. The water supplied to the present passenger terminal and new cargo terminal area will be connected to the city main pipe along the existing airport road.

8.2.6 Work Items of Airport Master Plan

The master plan of Juan Santamaria Airport is shown in Figure 8.2.12 and the work items of the master plan of Juan Santamaria Airport are as follows:

Table 8.2.6 Work Items of Master Plan of Juan Santamaria Airport

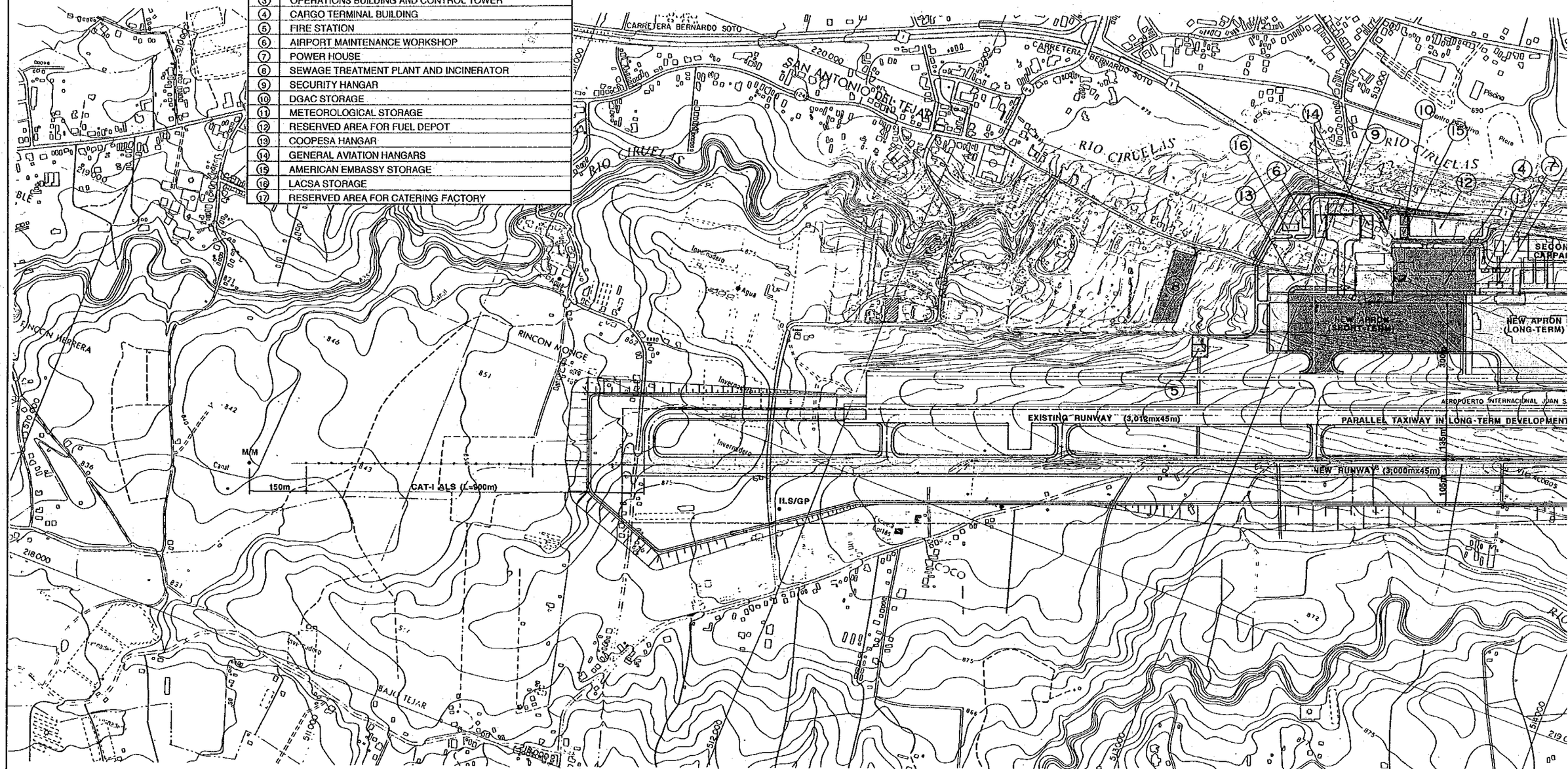
A. Short-term Development Plan

1) Overlay of Existing Runway
2) Connecting Taxiway for New Apron (50m x 57m)
3) Expansion of Apron for Passenger and Cargo Loading Stands (130.5m x 415m)
4) Security Apron (130.5m x 50m)
5) Expansion of International Passenger Terminal Building (2,600m²)
6) Domestic Passenger Terminal Building (700m², including Cargo Handling Area)
7) Cargo Terminal Building (16,000m²)
8) GSE Road and Other Airside Road
9) Terminal Circulation Road
10) Carpark (550 cars)
11) ATC System (*VHF radio, ATIS and tape recorder*)
12) Meteorological Observation System
13) Taxiway and Apron Lighting
14) *Expansion of Airport Utility (Power Supply System, Telephone System, Water Supply* System and Sewage Treatment System)
15) Compensation (American Embassy Storage COOPESA Automobile and DGAC Storage)
16) Land Acquisition (2,000 m²)

B. Long-term Development Plan

1) New Runway (3,000m x 45m)
2) Parallel Taxiway (23m x 600m)
3) Exit Taxiways (23m x 101m x 6)
4) Expansion of Apron for Passenger and Cargo Loading Stands (130.5m x 440m)
5) Expansion of Apron for Overnight Stay Stands (92.5m x 270m)
6) Expansion of Maintenance Apron (130.5m x 50m)
7) Second International Passenger Terminal Building (9,000m²)
8) Second Cargo Internal Building (11,000m²)
9) Operations Building with Control Tower (1,800m²)
10) Security Hangar
11) Fire Station (including Category-8 Equipment, 450m²)
12) Airport Maintenance Workshop (1,000m²)
13) General Aviation Hangars
14) LACSA Storage
15) Power House (200m²)
16) Meteological Storage (200m²)
17) GSE Road and Other Airside Road
18) Terminal Circular Road
19) Second Car Park (420 cars)
20) *Radio Air Navigation Aids (ILS, VOR/DME, NDB)*
21) Renewal of Aeronautical Telecommunications System
22) Aeronautical Ground Lights (ALS, SALS, PAPI, RWYL, RWTL, WBAR, TWYL, AFL, ABN, WDIL, etc.)
23) Expansion of Airport Utilities
24) Compensation (Fuel Depot, COOPESA hangar, General Aviation Hangars, Leather Factory, LACSA Storage, 80 private residence, 3.0km road diversion)
25) Land Acquisition (79ha)

LEGEND	
	SHORT-TERM DEVELOPMENT PLAN (2000)
	LONG-TERM DEVELOPMENT PLAN (2010)
(1a)	EXISTING INTERNATIONAL PASSENGER TERMINAL BUILDING
(1b)	SECOND INTERNATIONAL PASSENGER TERMINAL BUILDING
(2)	DOMESTIC PASSENGER TERMINAL BUILDING
(3)	OPERATIONS BUILDING AND CONTROL TOWER
(4)	CARGO TERMINAL BUILDING
(5)	FIRE STATION
(6)	AIRPORT MAINTENANCE WORKSHOP
(7)	POWER HOUSE
(8)	SEWAGE TREATMENT PLANT AND INCINERATOR
(9)	SECURITY HANGAR
(10)	DGAC STORAGE
(11)	METEOROLOGICAL STORAGE
(12)	RESERVED AREA FOR FUEL DEPOT
(13)	COOPESA HANGAR
(14)	GENERAL AVIATION HANGARS
(15)	AMERICAN EMBASSY STORAGE
(16)	LACSA STORAGE
(17)	RESERVED AREA FOR CATERING FACTORY



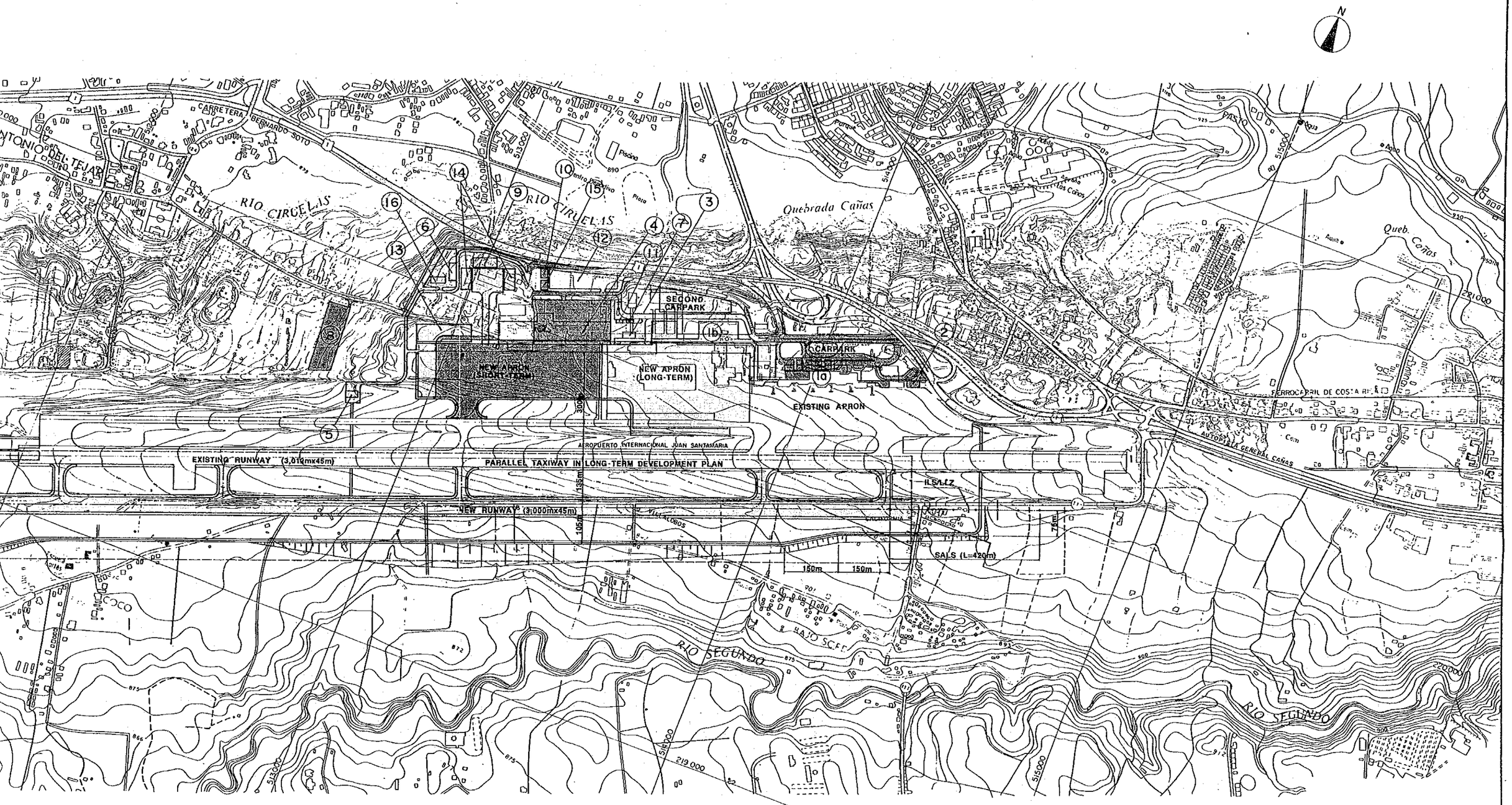


Figure 8.2.12 Masterplan of Juan Santamaria Airport

8.2.7 Rough Cost Estimate

The rough cost estimate for the developemnt of Juan Santamaria Airport is given in Table 8.2.7.

Table 8.2.7 Rough Cost Estimate for Juan Santamaria Airport (not including engineering services)

Items		Cost (Million US$)
Short-term Development Plan		
a)	Civil Work	10.6
b)	Building Work	22.1
c)	Air Navigation Systems	2.5
d)	Airport Utilities	3.9
e)	Compensation	4.1
f)	Total *3	43.2
Long-term Development Plan		
a)	Civil Work	142.2
b)	Building Work	26.1
c)	Air Navigation Systems	5.0
d)	Airport Utilities *1	5.0
e)	Compensation *2	35.7
f)	Total	214.1

Note 1: Including rescue and fire fighting equipment
2: Including land acquisition
3: The short-term cost will be saved by US$ 14.3 million in selection of cost saving options 1 through 4.

8.3 Liberia International Airport

8.3.1 Basic Development Policy

The ongoing development work at Liberia Airport has been evaluated to be adequately planned by the DGAC as expressed in Chapter 6. Therefore, the future development of Liberia Airport will be focused on the expansion of the facilities to be completed by the ongoing development work. The future development is planned to be implemented along with the growth of air traffic demand and of the urgency of the facility construction by year 2010, taking into account the minimum and efficient investment for an uncertain increase of air traffic at a newly opened airport. Based on the above development policy, the master plan of Liberia Airport is produced as shown in Figure 8.3.1.

8.3.2 Airside Development

1) Runway and Taxiways

The runway and taxiways to be completed by the ongoing development work will be used continuously until completion of the long-term development periods. The aircraft pavement can be used up to around 2010 without further strengthening, but it will require an adequate pavement overlay to maintain its performance. A taxiway connection between the runway 25 threshold and the apron is planned to enable smooth circulation of aircraft ground movements in the long-term development.

2) Perimeter Road

A perimeter road of 5.5m width which will encompass the airport property is planned for maintenance and security purposes in the long-term development.

8.3.3 Terminal Area Development

1) Concept of Terminal Area Expansion

The land use of the terminal area under construction is planned to be utilized as passenger area on the east side and administration area (airport operations and utilities) on the west side with an appropriate separation distance in-between. Based on this land use, it is planned that the passenger area will be expanded towards the east in accordance with the future increase of air traffic. This direction of the expansion is compatible with the airport property acquired by the DGAC. The administration area will not require the expasion proportional to the traffic demand. Therefore, it is planned to locate the cargo area to the west of the administration area with westward future expansion. With this concept of capacity expansion, large expandability will be guaranteed for the terminal area.

2) Apron

The apron will be widened to the east by 185m. The number of aircraft stands available in the development project will be two for wide-body aircraft, two for narrow-body aircraft and two for small props. All the aircraft will be parked in 45° angled configuration with self-maneuvering. Nose-in parking of aircraft will be possible, however, the provision of towing tractors may not be practical for this level of airport traffic.

LEGEND	
	PROPOSED IMPROVEMENT PLAN
①	PASSEGER TERMINAL BUILDING EXPANSION
②	EXISTING CONTROL TOWER
③	EXISTING FIRE STATION
④	CARGO TERMINAL BUILDING
⑤	UTILITY COMPLEX (POWER HOUSE, MECHANICAL ROOM, WATER TANK)
⑥	FUEL DEPOT
—•—	BOUNDARY OR SECURITY FENCE
—·—	AIRPORT PROPERTY LINE
—·—	LINES OF OBSTACLE LIMITATION SURFACE AND RUNWAY CENTER

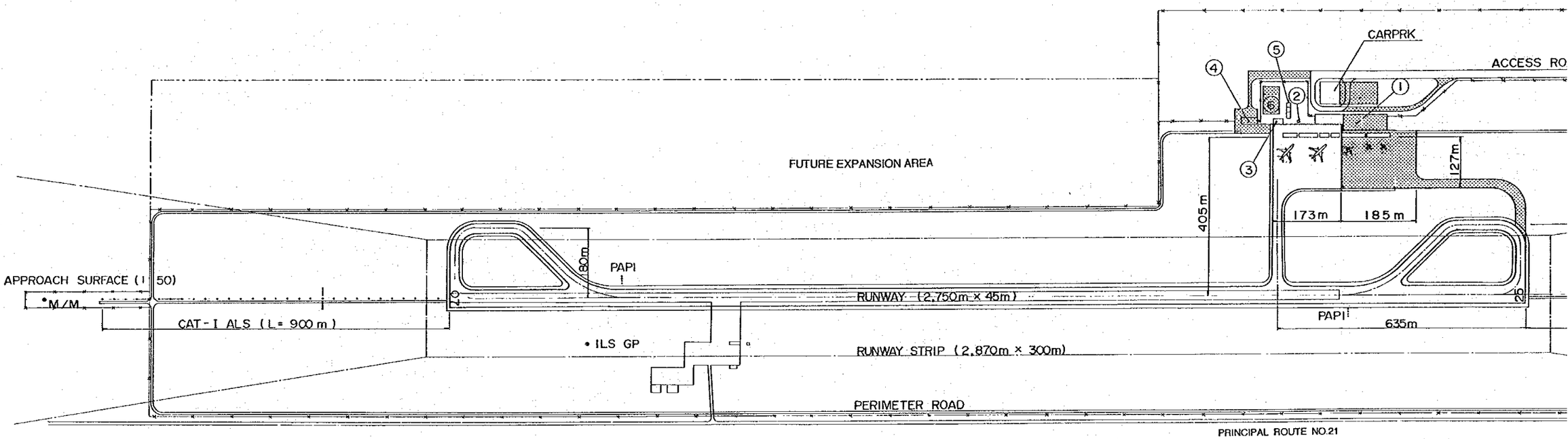


Figure 8.3.1

OM, WATER TANK)

AY CENTER

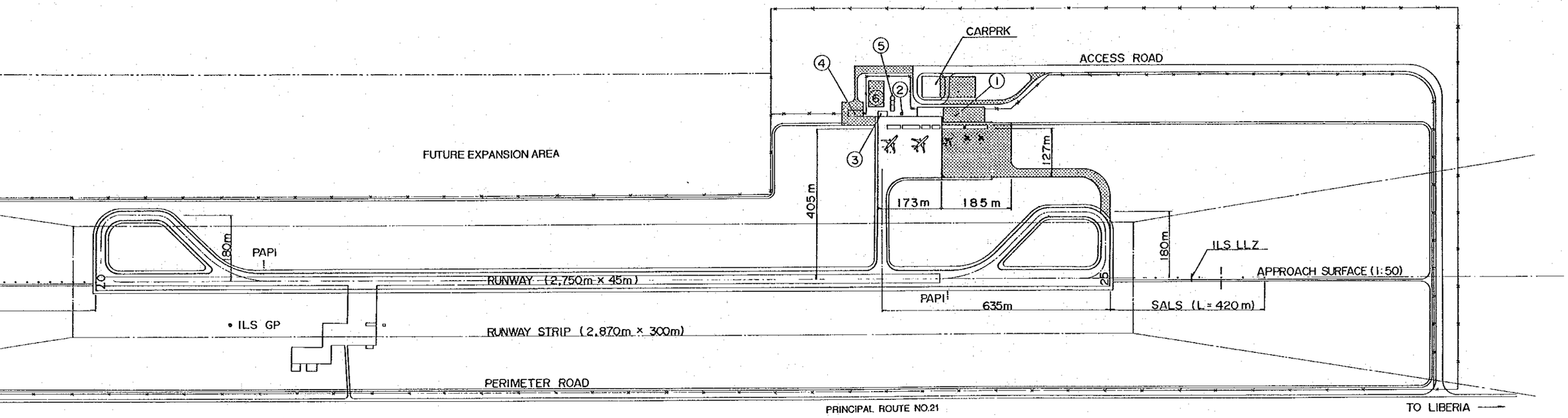


Figure 8.3.1 Improvement Plan of Liberia International Airport

3) Passenger Terminal Building

The passenger terminal building will need to be expanded during the ongoing development work to appropriately handle peak hour passengers of DC-10 class aircraft. The expansion will be made by constructing a 3,900m^2 large single story structure to connect to the east side of the existing building. It is recommended that the depth of the expanded building be increased to 36m by adding two spans. This is because the 24m depth of the original building will become inadequate to accommodate various functional areas required for an international terminal building in the future. Upon completion of the above expansion work, the original and extended parts of the terminal building will be used respectively for international arrival and international departure plus domestic terminals.

4) Terminal Circular Road and Carpark

The capacity of the carpark will be increased by expanding the area to the east in accordance with the terminal building expansion. The planned capacity of 100 cars in the ongoing development work will be 210 cars in the development plans. Along with the above development, it will be necessary to relocate the terminal circulation road.

5) Cargo Terminal Building

A new cargo terminal building of 1,050m^2 will be constructed on the west end of the terminal area. The depth of the building will be 15 to 20m. The GSE (ground service equipment) area and truck yard will be provided on the airside and landside of the cargo terminal building respectively. The access road will be extended to the west to connect the cargo area.

6) Other Terminal Facilities

The control tower and fire station will be used continuously for the future. It is assumed that the DGAC will provide the ICAO category-7 rescue and fire fighting equipment in the planned fire station. The utility complex consisting of a power house, mechanical room and water tank will basically be used continuously, however, the capacity expansion will be required along with the development of terminal facilities. A fuel depot is assumed to be located between the utility complex and cargo terminal building by the ongoing development work. Fuel trucks will be used for refuelling aircraft.

8.3.4 Air Navigation Systems Development

1) Radio Navigation Aids

In consideration of the operations of large jet aircraft at Liberia Airport, the radio navigation aids and lighting system are planned to enable precision instrument approach procedures. The instrument landing system (ILS) consisting of a localizer (LLZ) and a glide path (GP) will be installed for the main approach direction of the runway 07 in compliance with prevailing wind directions. The middle marker (M/M) will be installed on the extended centerline of the runway at a distance of 1,050m to the runway 07 threshold.

2) Aeronautical Telecommunications System

No equipment in addition to the ongoing DGAC's development work is planned.

3) Aeronautical Ground Lights

The 900m long standard approach lighting system (ALS) will be installed for the precision instrument operations of Runway 07. For Runway 25, the simple approach lighting system (SALS) is recommended.

4) Meteorological System

No equipment in addition to the ongoing DGAC's development work is planned.

8.3.5 Work Items of Airport Master Plan

The work items of the improvement plan of Liberia Airport are as follows:

The 8.3.1 Work Items of Improvement Plan of Liberia Airport

1) Overlay of Runway Pavement (5cm)
2) Taxiway for Runway 25 Threshold (23m x 360m)
3) Expansion of Apron (127m x 185m)
4) Expansion of Passenger Terminal Building (3,800m²)
5) New Cargo Terminal Building (1,050m²)
6) Perimeter Road (5.5m x 11km)
7) Extension of Access Road (20m x 160m)
8) Terminal Circulation Road (12m x 260m)
9) Expansion of Carpark (190 cars)
10) ILS (Runway 07)
11) ALS (Runway 07)
12) SALS (Runway 25)
13) Expansion of Airport Utility
14) Additional Taxiway Edge Lights

8.3.6 Rough Cost Estimate

The rough cost estimate for the development of Liberia Airport is shown in Table 8.3.2.

Table 8.3.2 Rough Cost Estimate for Liberia Airport

Items	Cost (Million US$)
a) Civil Work	5.0
b) Building Work	3.0
c) Air Navigation Systems	3.9
d) Airport Utilities	0.8
e) Total	12.7

8.4 Limon International Airport

8.4.1 Basic Development Policy

The basic development policy for Limon Airport is to improve the air safety at the airport in a practical way. It is not very important to increase the airport capacity because of the continuing role of the airport for general aviation. However, the provision for the future development as a regular transport airport is also considered as much as practical. The improvement plan of Limon Airport is shown in Figure 8.4.1.

8.4.2 Clearance of Obstacles

The most serious problem at Limon Airport is the existence of many obstacles to the obstacle limitation surfaces. In order to alleviate this situation, the diversion of Principal Route No. 36 and set-back of the terminal area are planned in compliance with the ICAO code number 2 requirement. A 300m section of Principal Rout No.36 nearby the Runway 32 threshold will be diverted in order that it may be free from the 1:25 approach surface of the runway 32. The set-back of the terminal area will be required to make the terminal facilities free from the 1:5 transitional surface. Strictly speaking, vehicles on Principal Route No. 36 taller than 2.0m are obstacles to the transitional surface. However, this defect is relatively minor, and its correction will require 1,500m long diversion of the road on the swampy land. Therefore, the diversion of Principal Route No. 36 is planned to be limited for the runway 32 approach surface.

8.4.3 Airside Development

The existing runway will be used continuously for the future with necessary maintenance and repair work. A 15m wide connecting taxiway for the new terminal area will be constructed.

8.4.4 Terminal Area Development

A new terminal area will be constructed to relocate the existing terminal facilities so as not to infringe the transitional surface. A new apron of 150m by 55m will be constructed for parking of one C-212 class aircraft and four general aviation aircraft to compensate the existing apron. The landside edge of the apron will be 200m from the runway centerline. This separation distance was decided in order that A-320 may be parked on the apron with adequate clearance for the 1:7 transitional surface from 150m* wide runway strip. This provision allows introduction of A-320 to Limon Airport with pavement strengthening and diversion of Principal Route No. 36 in the future.

The terminal building, customs storage and carpark will be constructed in the landside. The size of these facilities will be more or less the same as the existing ones.

Note*:
Although the ICAO stipulates a 300m wide strip for a non-precision instrument runway, 150m wide strips are practiced at many airports in Japan and the United States. For the future provision at Limon Airport, the width of 150m is the maximum value justifiable as an immediate development from a practical point of view.

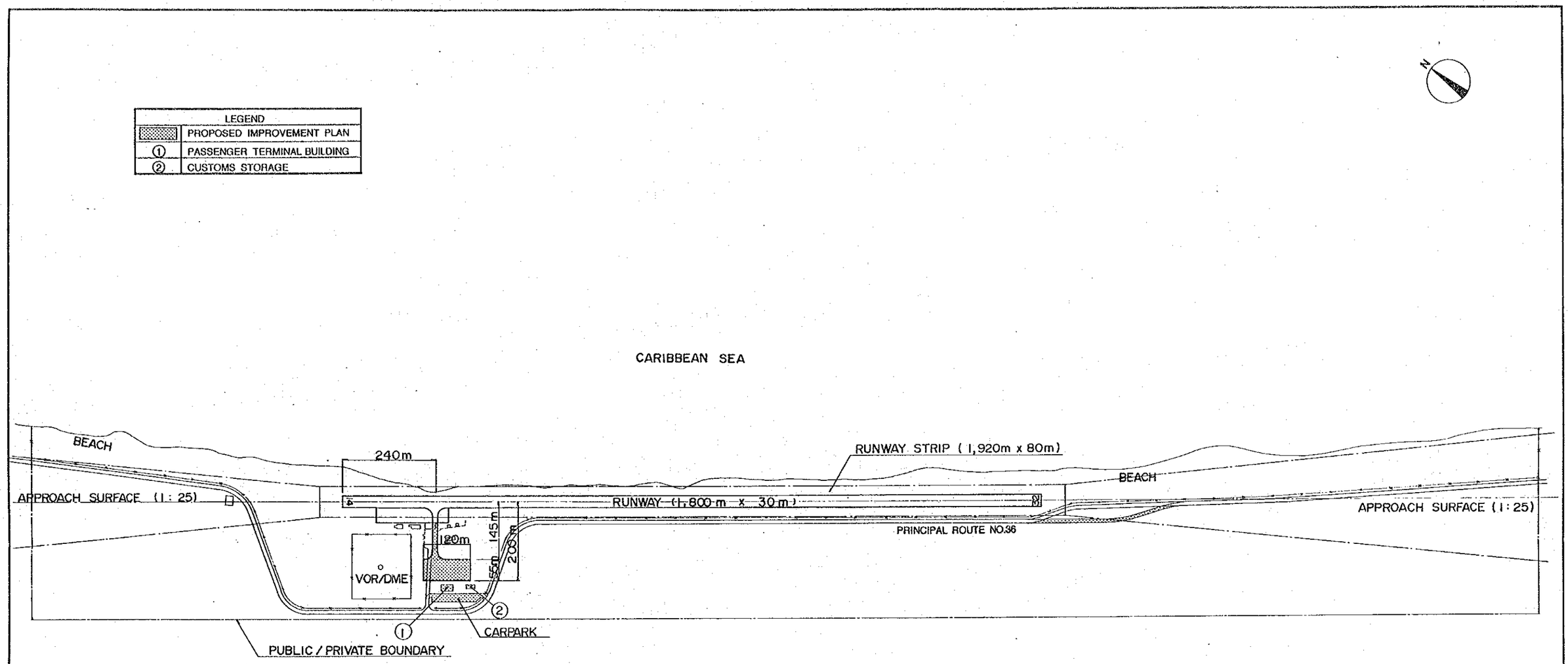
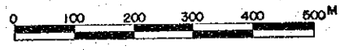


Figure 8.4.1 Improvement Plan of Limon International Airport



The above development work will be carried out with the suspension of airport operations.

8.4.5 Air Navigation Systems Development

The level of the services of the air navigations systems at Limon Airport will be maintained at the present conditions, therefore, only the replacement of old equipment will be necessary.

8.4.6 Work Items of Airport Improvement Plan

The work items of the improvement plan of Limon Airport are as follows:

The 8.4.1 Work Items of Improvement of Limon Airport

1) Taxiway (15m x 92m)
2) Apron (120m x 55m)
3) Passenger Terminal Building (500m^2)
4) Custom Storage (300m^2)
5) Terminal Road (7.5m x 150m)
6) Carpark (40 cars)
7) Diversion of Principal Route No. 36 (7.5 m x 300 m)
8) Replacement of VOR/DME
9) Replacement of VHF Communications for ATIS
10) Replacement of Aeronautical Ground Lights
11) Replacement of Meteorological System
12) Airport Utility

8.4.7 Rough Cost Estimate

The rough cost estimate for the development of Limon Airport is shown in Table 8.4.2.

Table 8.4.2 Rough Cost Estimate for Limon Airport

Items	Cost (Million US$)
a) Civil Work	1.4
b) Building Work	0.5
c) Air Navigation Systems	2.7
d) Airport Utilities	0.2
e) Compansation (Road Diversion)	0.1
f) Total	4.9

CHAPTER 9 SELECTION OF PRIORITY PROJECT AND ITS SCOPE OF WORK

CHAPTER 9 SELECTION OF PRIORITY PROJECT AND ITS SCOPE OF WORK

9.1 General

This chapter identifies the priority project from the airport master plans of the three airports. The construction items of the priority project are also listed.

9.2 Priority Project

The short-term development of Juan Santamaria Airport is selected as the highest priority project from the viewpoints of importance and urgency of development in international airport system in Costa Rica. The reasons for selecting Juan Santamaria Airport are as follows:

a) Juan Santamaria Airport will continue to handle most of international passenger and cargo traffic demands in Costa Rica. From the size of the traffic demands and the degree of insufficiency of the airport capacity, it is obvious that the short-term development should be implemented immediately and its economic return is largest among the three airports.

b) As for Liberia Airport, the ongoing development work at the airport satisfies the minimum requirements to inaugurate international services by wide-body jet aircraft. The basic concept of the development work has been evaluated to be adequate to allow future expansion without any difficulty. Therefore, it is wise to re-evaluate the development needs after the actual inauguration of the airport rather than to decide its expansion now.

c) The improvement plan of Limon Airport is necessary, but its urgency is low due to very limited activity.

9.3 Scope of the Project

The work items of the priority project, i.e., the short-term development plan of Juan Santamaria Airport is listed in Table 9.3.1. The feasibility study in the next stage of the Study will be carried out for these work items.

Table 9.3.1 Work Items of the Priority Project
(Short-term Development of Juan Santamaria Airport)

1)	Overlay of Existing Runway
2)	Connecting Taxiway for New Apron (50m x 57m)
3)	Expansion of Apron for Passenger and Cargo Loading Stands (130.5m x 415m)
4)	Security Apron (130.5m x 50m)
5)	Expansion of International Passenger Terminal Building (2,600m^2)
6)	Domestic Passenger Terminal Building (700m^2, including Cargo Handling Area)
7)	Cargo Terminal Building (16,000m^2)
8)	GSE Road and Other Airside Roads
9)	Terminal Circulation Road
10)	Carpark (550 cars)
11)	ATC System
12)	Meteorological Observation System
13)	Taxiway and Apron Lighting
14)	Expansion of Airport Utility (Power Supply System, Telephone System, Water Supply System and Sewage Treatment System)
15)	Compensation (American Embassy Storage, COOPESA Automobile Workshop and DGAC Storage)
16)	Land Acquisition

CHAPTER 10 PRELIMINARY DESIGN

CHAPTER 10 PRELIMINARY DESIGN

10.1 General

This chapter describes the preliminary design for the facilities to be constructed in the short-term development. The preliminary design is carried out based on the airport master plan of the priority project planned and selected in Chapter 8 and 9. The objective of the preliminary design is to clarify basic concept, design criteria, outline specifications and dimensions of the facilities for the cost estimates.

10.2 Civil Works

10.2.1 Runway

The length and width of the runway in the short-term development will remain as the existing condition, i.e., 3,012m in length and 45m in width. The pavement strength will be increased by bituminous overlay works so as to accommodate DC-10.

The runway profile is designed based on the existing runway profile and required overlay thickness. Although the existing longitudinal slope of 1.3% exceeds the maximum gradient of 1.0% recommended by ICAO, it is impossible to improve to meet ICAO recommendations, as the thickness of bituminous overlay would reach an impractical 5.4 meters at station No. 2 of the runway (if the existing 1.3% slope was changed to 1.0%). The profile shown in Figure 10.2.1 was determined to minimize the quantity of bituminous materials. The required overlay thickness is estimated in Section 10.2.8.

10.2.2 Taxiway

A 61.5m long and about 50m wide stub taxiway connecting the existing parallel taxiway and the new apron will be constructed in the short-term development. Although 23m is the minimum width of taxiway according to ICAO recommendations, the wider 50m was adopted for the new taxiway in order to secure the minimum wheel clearance for B-747 taxiing in the short separation (61.5m) between the new apron and the existing parallel taxiway.

Taxiway shoulders of 7.5m will be provided on each side of the taxiway in accordance with ICAO recommendations.

10.2.3 Apron

A new apron accommodating four B747s and three A320s with nose-in parking configuration will be constructed in the short-term development. The west end of the new apron will be used as taxiing space for security aircraft.

10.2.4 GSE Road

A 20m wide GSE (ground service equipment) road will be provided in the airside front of the new cargo terminal building.

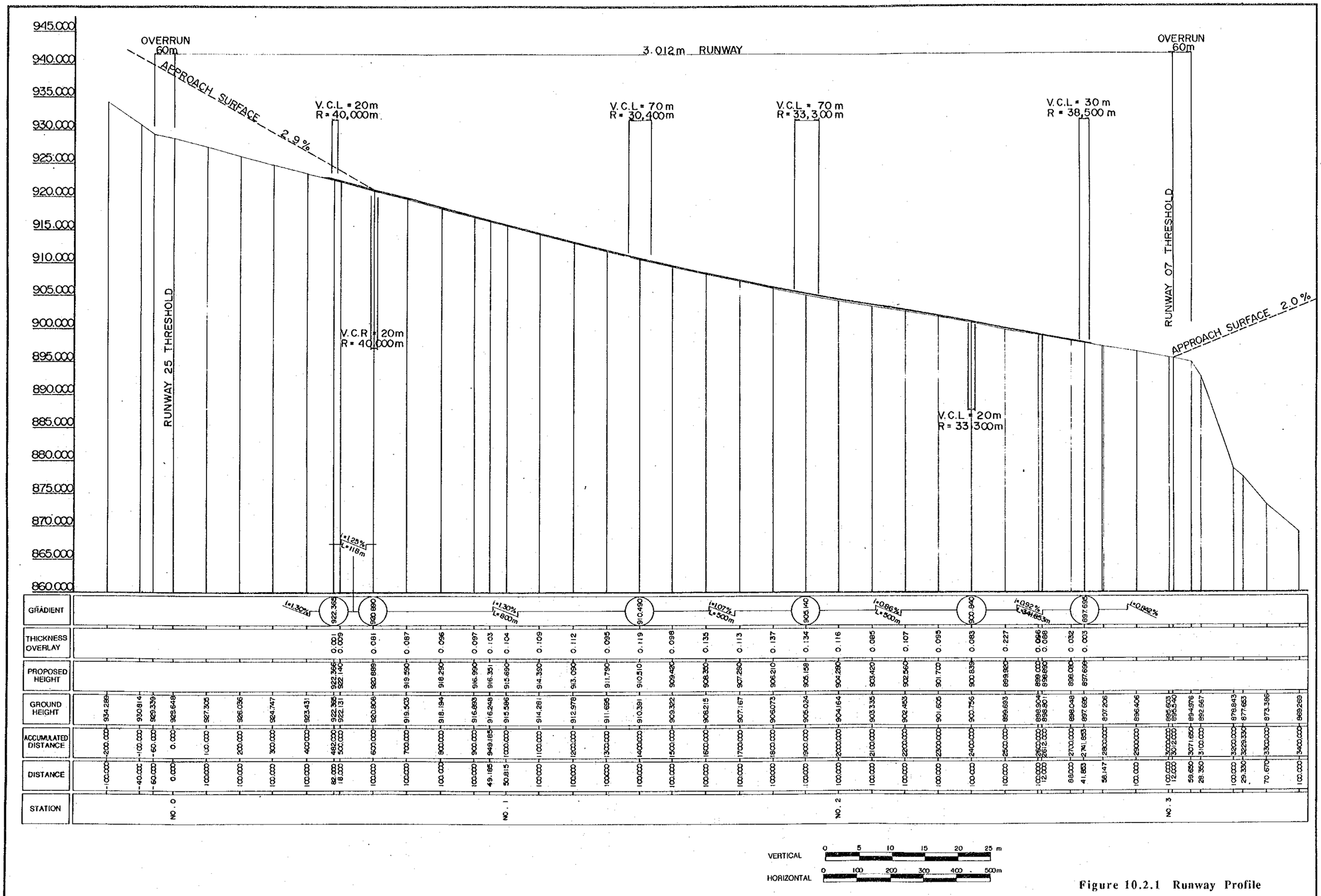


Figure 10.2.1 Runway Profile

10.2.5 Terminal Road and Car Park

The terminal road and car park are planned for two separate areas viz. the existing passenger terminal area and the new cargo area.

(1) Existing Passenger Terminal Area

The layout plan of the terminal road and car park in front of the existing terminal building is shown in Figure 10.2.2.

The existing terminal road will be realigned for vehicle circulation to match the new configuration of the passenger terminal building. Based on the selected concept of the terminal building development, arrival and departure curbs are laid out on the basement and first floor levels respectively in front of the expanded terminal building. The rectangular area in land side on the building is to be excavated up to the basement floor level in order to construct arrival curb.

The width of the arrival curb is planned to be 17m. This provides an open feeling to arrival passengers and more flexibility in managing concessions. Departure curb is located parallel to it, and connected with the first floor of the building with some bridges above the arrival curb. Each curb has enough length. The road to the domestic terminal will branch from the terminal frontage road on the arrival curb because of the simple traffic circulation in the terminal area.

The car park will be divided into four sections by the terminal road. Since the depth of the terminal area is tightly limited, the capacity of car park prepared in the terminal area is not enough to accommodate the facility requirement. Thus, peak hour vehicles will overflow into the car park beyond the access road. The capacity of each car park is shown in Table 10.2.1.

Table 10.2.1 Terminal Area Car Parks

	Area	Applied Unit Space	Capacity	Dimension
	(sq.m)	(sq.m/slot)	(slot)	(m)
West Car Park	3,000	35	85	40 x 75
Main Car Park	5,400	35	155	30 x 180
East Car Park	4,600	35	130	60 x 65
North Car Park	3,600	(*) 20	180	30 x 145
Total	16,600	-	550	-

Note : (*) For only small cars with right angle configuration

(2) New Cargo Area

A new circular road will be constructed to connect the new cargo terminal area and the road on the north side of the existing general aviation storage.

An on-ramp will be provided for cargo trucks traveling to the highway from the existing gate on the north of the leather factory. The length of this ramp should be at least 200m to secure safe wearing distance in accordance with the Japanese standard for road construction.

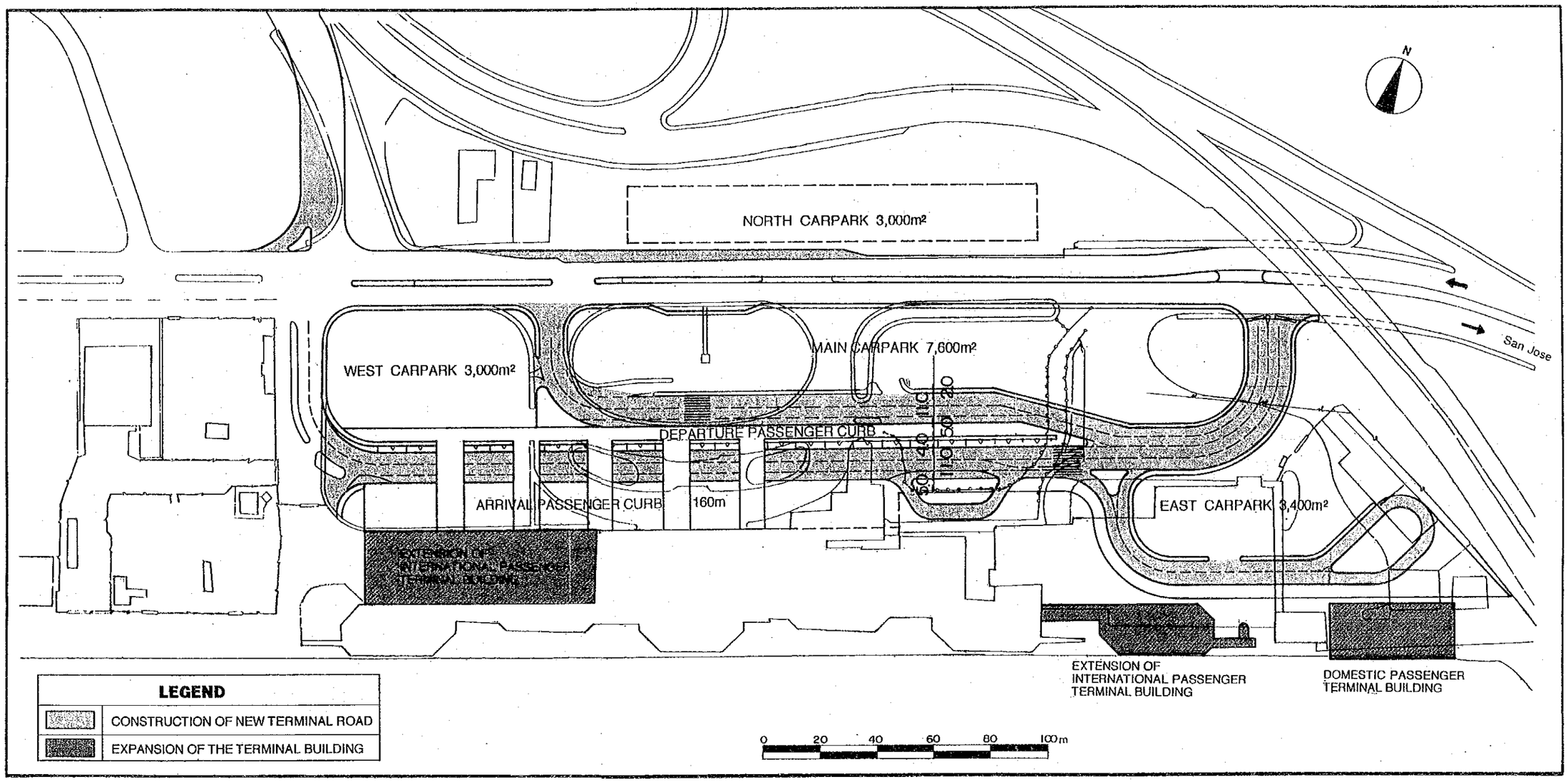


Figure 10.2.2 Layout Plan of Road and Carpark in the Existing Terminal Area

10.2.6 Grading Plan

Typical cross sections for the runway overlay and terminal area are planned in compliance with ICAO recommendations as shown in Figure 10.2.3.

The runway will be overlaid so as to secure the minimum overlay thickness as described in Section 10.2.8.

The elevation of the new apron is fixed at about 907m above sea level at the intersection of the new apron and new taxiway in order to connect to the existing parallel taxiway with a smooth slope.

10.2.7 Storm Water Drainage Plan

(1) Basic Concept

The storm water drainage system will be prepared on the new cargo area and the existing passenger terminal area. The storm water is presently discharged into the canal located on the north side of the parallel taxiway from the new cargo area. The storm water on the existing terminal area is presently discharged into the canal located along the highway on the north side of the airport.

Therefore, a new drainage system is planned so as to discharge the storm water into these existing canals even after the completion of the short-term development.

(2) Layout of Drainage Plan

The layout of the storm water drainage system is shown in Figure 10.2.4. Trapezoidal channels are basically adopted for unpaved areas, and U-shaped channels for paved areas. The reinforced concrete pipe culverts are laid out at the crossing points of the taxiway and the roads.

a) Runoff

The rational formula is used to estimate runoff.

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

where,
- Q : Runoff (cu.m/sec)
- C : Runoff coefficient
- I : Rainfall intensity (mm/hr)
- A : Catchment area (ha)

b) Runoff Coefficient

Pavement area	:	0.95
Building area	:	0.90
Turf area	:	0.30

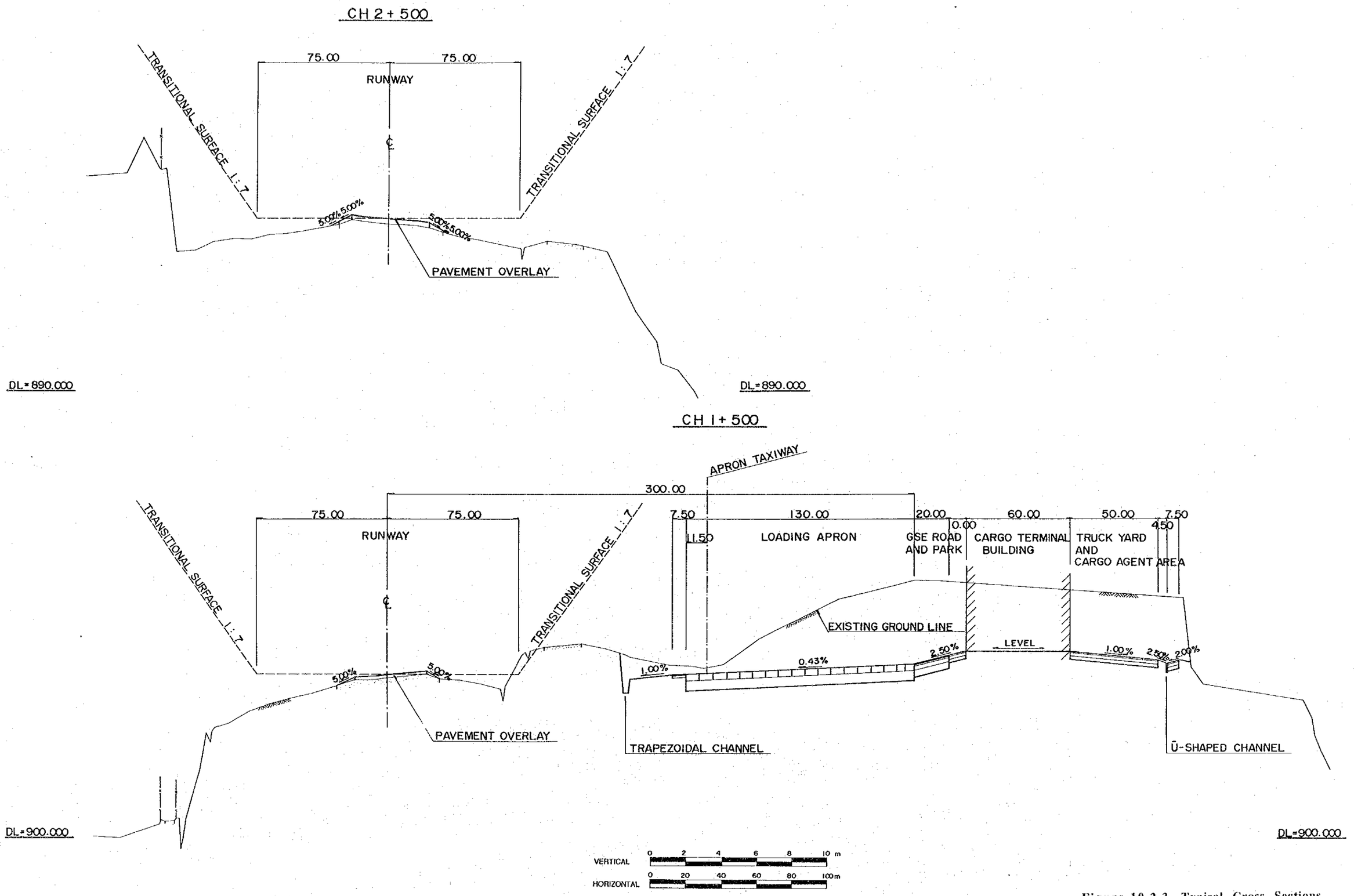
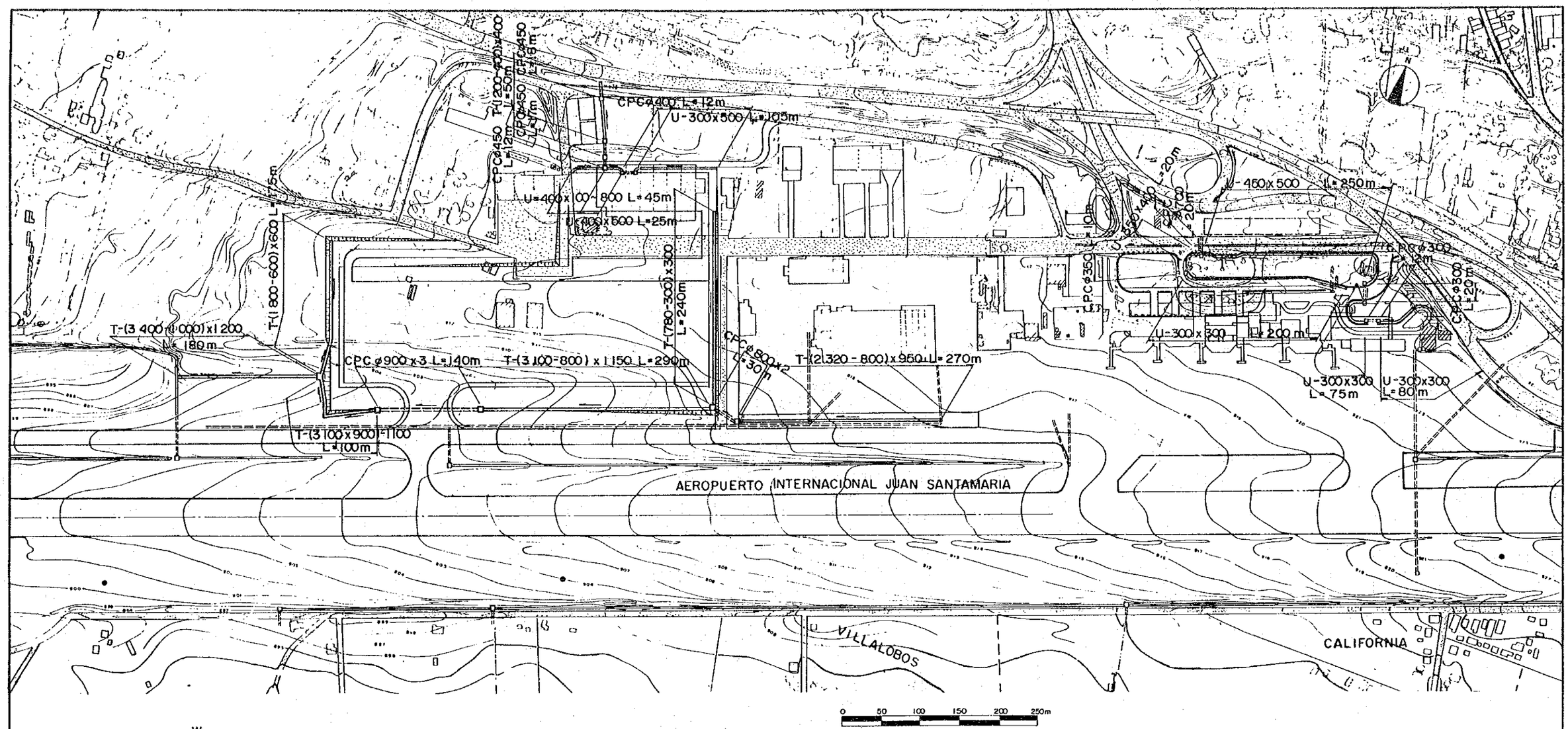
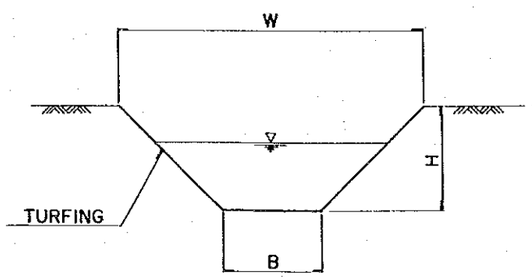
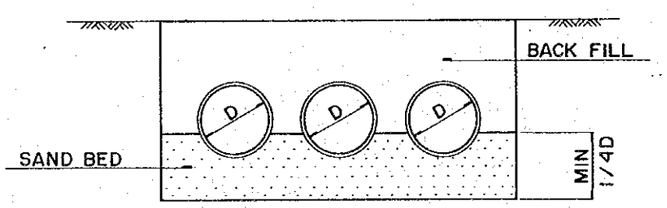


Figure 10.2.3 Typical Cross Sections

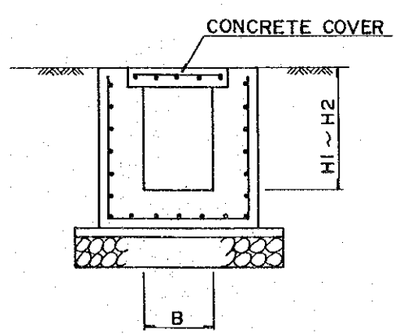




TRAPEZOIDAL CHANNEL
T-(W-B)xH



REINFORCED CONCRETE PIPE
CPC ϕ(D) x n



U-SHAPED CHANNEL
U-BxH1~H2

Figure 10.2.4 Storm Water Drainage Plan

c) Rainfall Intensity

Based on the nomogram of rainfall intensity provided by the National University of Costa Rica, the following formula is used to estimate rainfall intensity. The nomogram is shown in Appendix 10.2.1.

$$It = 5527/(t+26.36)$$

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

10.2.8 Pavement Plan

The required overlay thickness of each portion of runway pavement is estimated based on the result of visual investigation of existing pavement and soil investigation, and is summarized as follows:

Station Number	Minimum Thickness
No. 0 - No. 6	No need
No. 6 - No.26+12	8cm
No.26+12	No need

The existing apron and taxiways will not be overlaid because large aircraft such as DC-10 will not use these facilities in the short-term development.

The detailed processes of calculation for bituminous overlay is shown in Appendix 10.2.2.

Cement concrete pavement was adopted for new loading aprons in order to avoid rutting by the maneuvering and standing loads of large jet aircraft and also to take advantage of its oil-proof character. Asphalt concrete was adopted for the other new pavement such as the taxiway, GSE road and park because of its lower cost and more adjustable and flexible character than that of cement concrete.

The required thickness of each pavement is estimated in Appendix 10.2.2. The applied design criteria for the aircraft pavement are as follows:

Design aircraft : DC-10 (Present design aircraft : B727)
Repetition of design load : 3,000 times

The landside pavement is designed based on the Japanese standard and the soft subgrade of the existing passenger terminal area are planned to be replaced with qualified sand as described in Appendix 10.2.2.

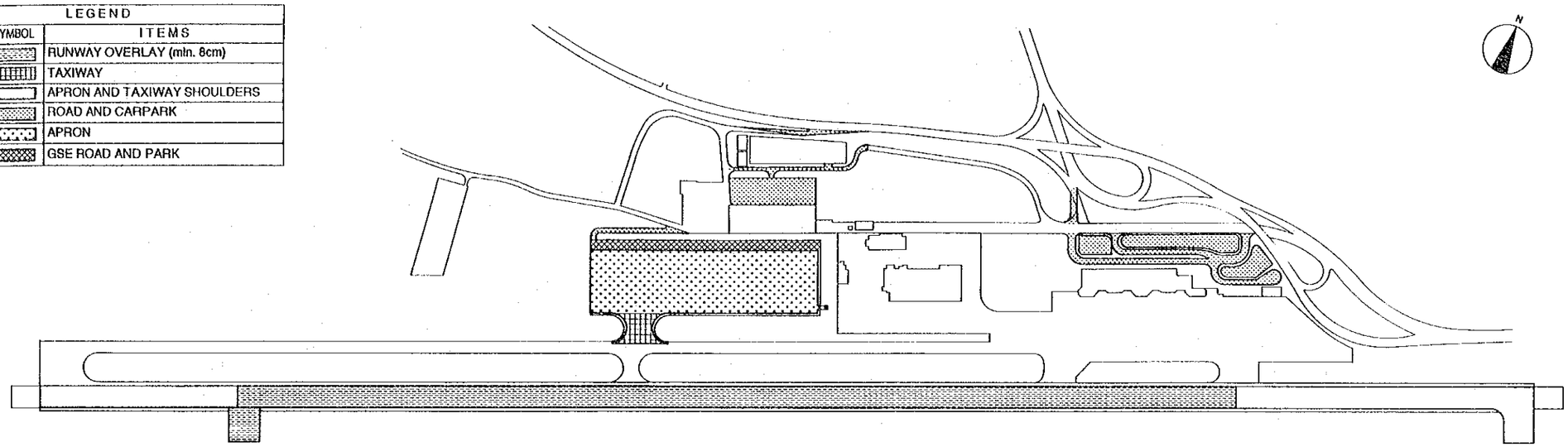
The pavement plan for the short-term development is shown in Figure 10.2.5.

10.2.9 Fencing

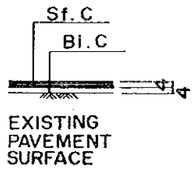
Security fences are planned in the new cargo area and surrounding the area for sewerage treatment plant in order to keep out unauthorized persons from entering the restricted area. The 2.4m high fences made of concrete poles and chain-link fabric, the same type as existing ones, will be used.

The layout of fencing with gates in the new cargo area is shown in Figure 10.2.6.

LEGEND		
TYPE	SYMBOL	ITEMS
PT-1		RUNWAY OVERLAY (min. 8cm)
PT-2		TAXIWAY
PT-3		APRON AND TAXIWAY SHOULDERS
PT-4		ROAD AND CARPARK
PT-5		APRON
PT-6		GSE ROAD AND PARK

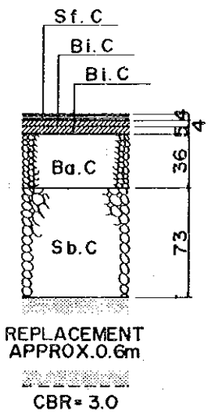


PT-1



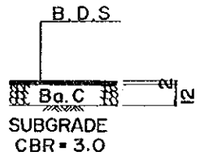
RUNWAY OVERLAY

PT-2



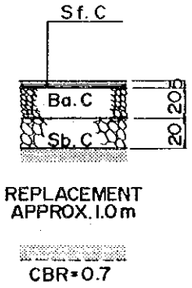
TAXIWAY

PT-3



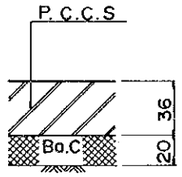
SHOULDER

PT-4



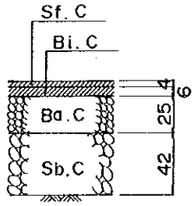
ROAD AND CARPRK

PT-5



APRON

PT-6



GSE SERVICE ROAD

LEGEND		
SYMBOL		ITEMS
	St.C	SURFACE COURSE(ASPHALT CONCRETE)
	C.S	PORTLAND CEMENT CONCRETE SLAB
	Bi.C	BINDER COURSE(ASPHALT CONCRETE)
	Ba.C	BASE COURSE(ASPHALT STABILIZATION)
	Ba.C	BASE COURSE(GRADED AGGREGATE)
	Sb.C	SUBBASE COURSE(CRUSHER RUN)
	B.D.S	BITUMINOUS DOUBLE SEAL
	S.G	SUBGRADE

Figure 10.2.5 Pavement Plan

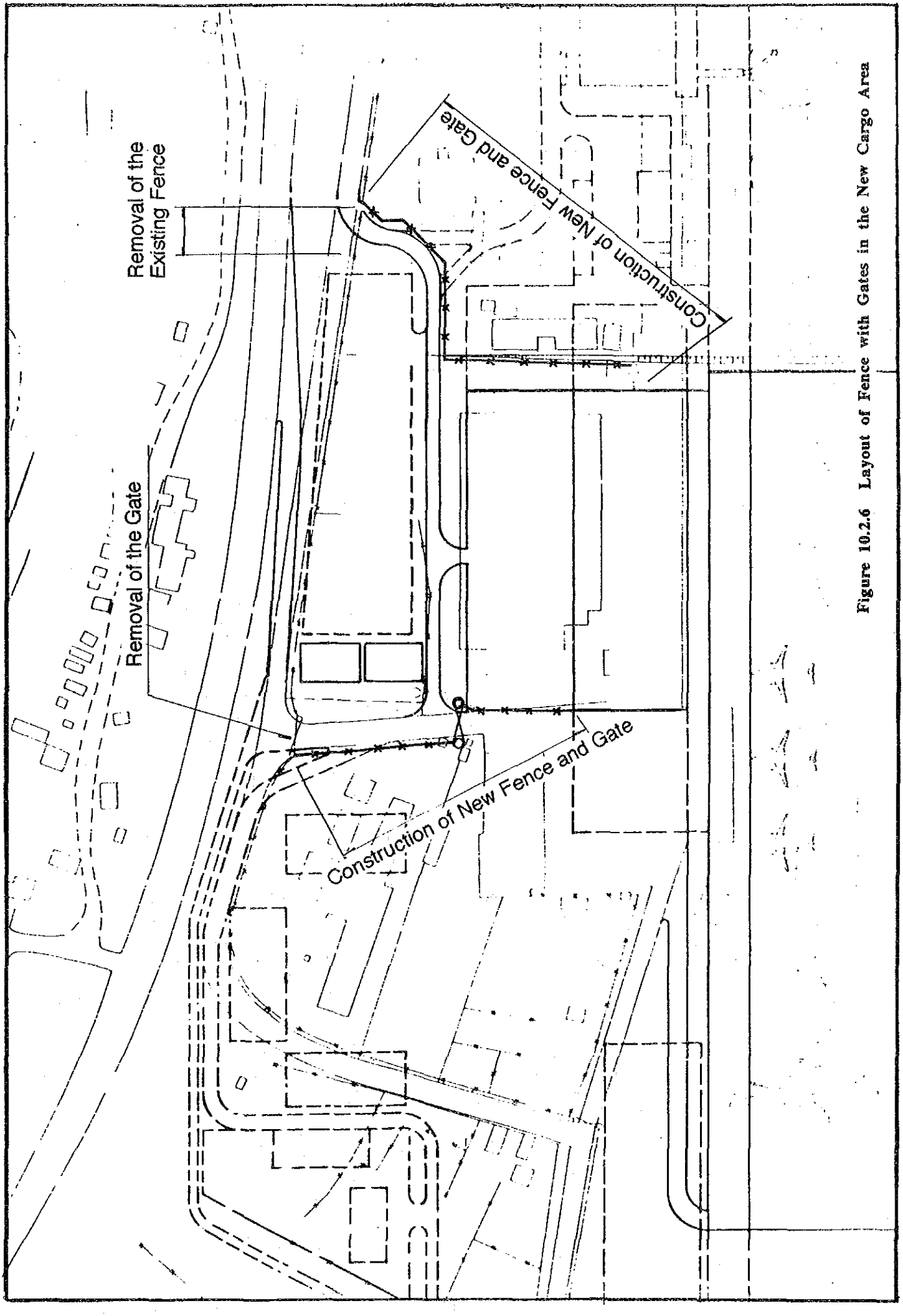


Figure 10.2.6 Layout of Fence with Gates in the New Cargo Area

10.3 Architectural Works

10.3.1 International Passenger Terminal Building

(1) Background

During the course of this study, to put the time more precisely, it was soon after the presentation of the Interim Report including a draft Master Plan in Juan Santamaria Airport by the study team in February, 1992, the Government of Costa Rica decided to take an immediate action for remodeling and extension of the existing International Passenger Terminal Building. Through close discussions with the JICA study team by face to face communication in Costa Rica and Japan and by facsimile communication, the DGAC worked out comparative studies on block plan configurations of the terminal area and formulated an optimum scheme. At this moment, July, 1992, the DGAC is still developing the scheme into a preliminary design and is proceeding into the detailed design soon so that the tendering procedure can possibly be made within the year 1992. In the mean time, the study team also developed a tentative preliminary design along the same lines as the scheme of the DGAC in order to use it as one of the basis for the feasibility study. This section presents the outline of the preliminary design study.

(2) Objectives

The objectives of the preliminary design of the international passenger terminal building are summarized as followings:

a) To develop the existing international passenger terminal building for the passenger demand of the year 2000.

b) To achieve a well balanced distribution of spaces for sections concerned, also providing adequate numbers and volumes of passenger processing facilities.

c) To improve the flows of passengers, baggage and other services as much as possible, and

d) To improve the finishings as well as the M & E services of the building to a reasonable extent.

(3) Design Principles

The design principles are as followings:

a) To achieve appropriate cost input allowing compromises as far as the design objectives are reasonably satisfied,

b) To utilize the existing building frames as much as possible,

c) To keep the existing building operable with limited nuisance during the renovation work,

d) To keep the linear concept of the existing terminal as it is.

(4) Required Facilities

The required floor areas for the main terminal components and the number of counters and the effective length of conveyer belts are calculated based on the peak hour passenger traffic, also taking into account the actual usages in the existing passenger terminal. These are included in Appendix - 10.3.1.

(5) Block Plan Configuration Alternatives

The DGAC studied the block plan configurations comparing the following 4 alternatives:

a) Single Level Development with "L" shape
   - Both Departure Check-in and Arrival on the first floor.

b) Single Level Linear Development
   - Both Departure Check-in and Arrival on the first floor.

c) 2 Level Linear Development; Parallel Double Curb Sides
   - Basement: Customs and International Arrival
   - First Floor: Departure Check-in

d) 2 Level Linear Development; Remote Double Curb Sides
   - Basement: Customs and International Arrival
   - First Floor: Departure Check-in

The DGAC concluded that the alternative c) would be the optimum scheme. (For details of the comparative study, see Appendix - 10.3.2.)

(6) Plan

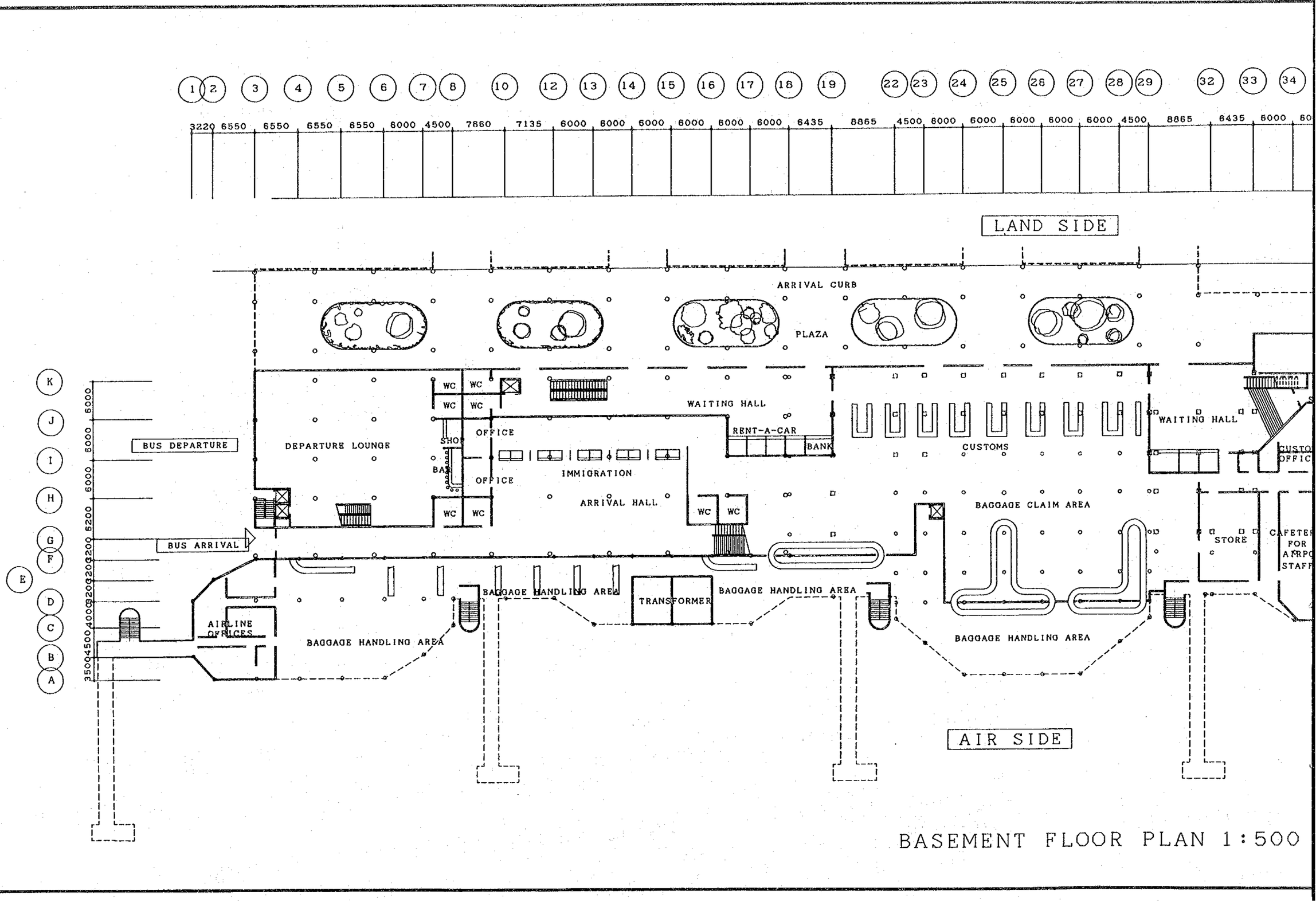
The features of the determined plan are summarized as stated below:

a) To construct a new 3-story block at the west side of the central block accommodating the following facilities:

- At the Basement	:	- Departure Lounge for Passengers to be transported by Bus System
		- Airline Offices and Stores
		- New Arrival Immigration area etc.
- On the First Floor	:	- Departure Check-in Lobby
- On the Second Floor	:	- Airline Offices
		- Staff Utilities, etc.

b) To reorganize the land side area by dynamically moving the earth in front of the central block, thus creating a new car access for arrivals at the basement level. The departure curb will be relocated parallel to the arrival curb at the first floor level. Pedestrian bridges will be constructed for the access from the departure curb to the first floor of the terminal.

c) To provide an additional boarding bridge with the necessary concourse and lounge at the east end of the existing concourse.



BASEMENT FLOOR PLAN 1:500

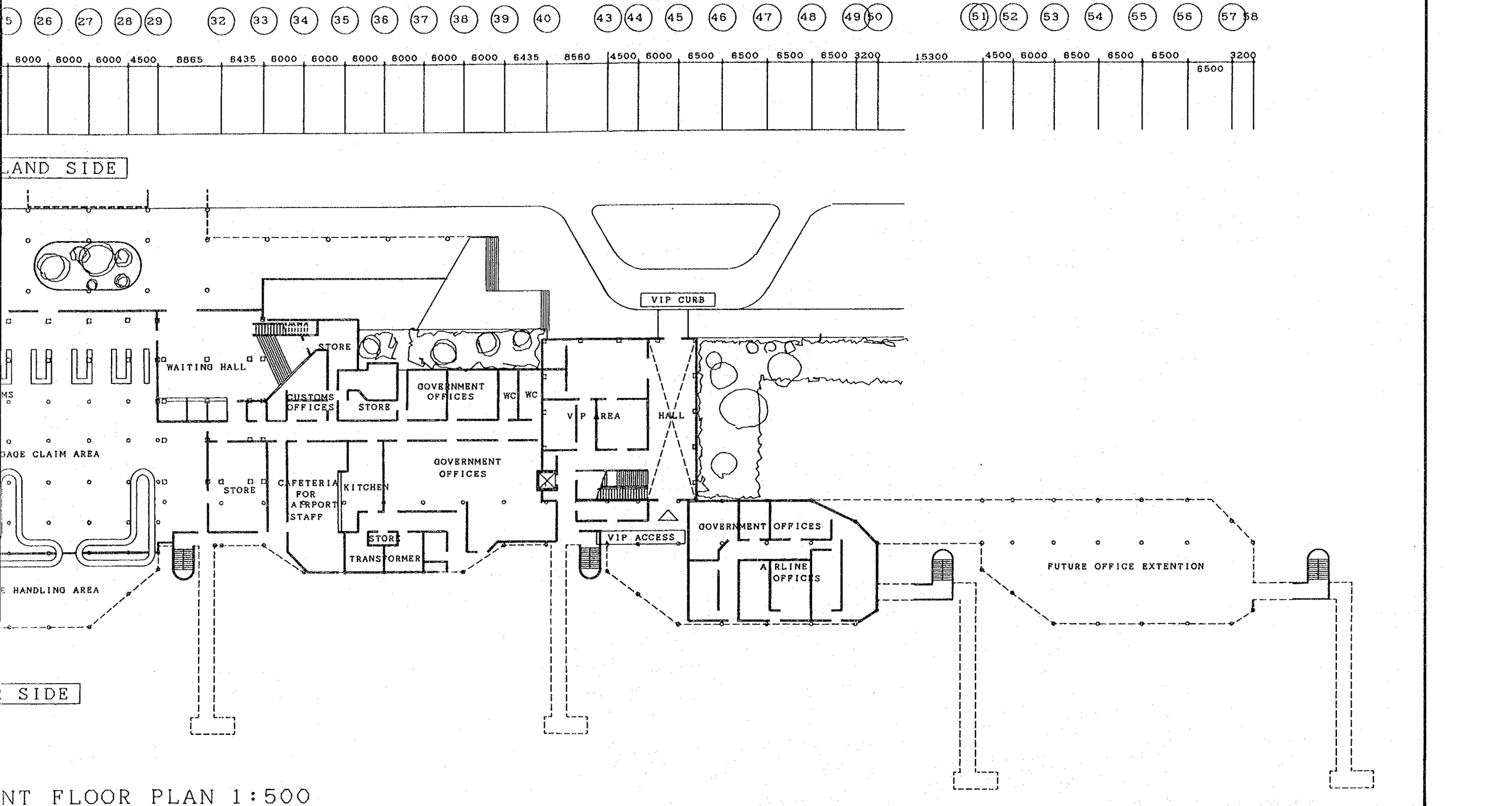
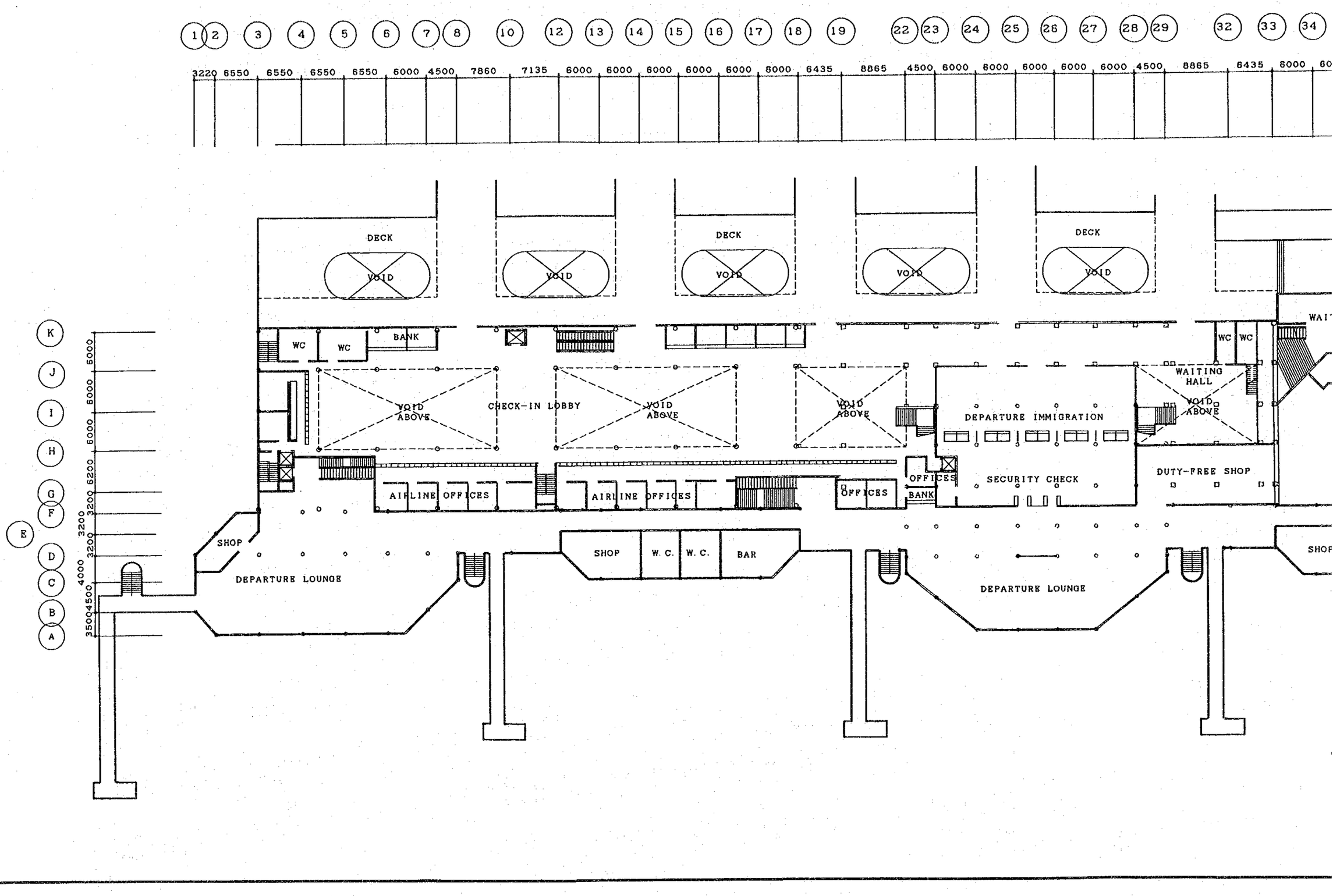


Figure 10.3.1 Layout Plan of International Passenger Terminal Building (Basement Floor)


1 2 3 4 5 6 7 8 10 12 13 14 15 16 17 18 19 22 23 24 25 26 27 28 29 32 33 34
3220 6550 6550 6550 6550 6000 4500 7860 7135 6000 6000 6000 6000 6000 6000 6435 8865 4500 6000 6000 6000 6000 6000 4500 8865 6435 6000
K J I H G F E D C B A
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DECK
VOID
WC
WC
BANK
VOID ABOVE
CHECK-IN LOBBY
AIRLINE OFFICES
SHOP
DEPARTURE LOUNGE
SHOP
W. C.
W. C.
BAR
OFFICES
BANK
DEPARTURE IMMIGRATION
SECURITY CHECK
WAITING HALL
DUTY-FREE SHOP

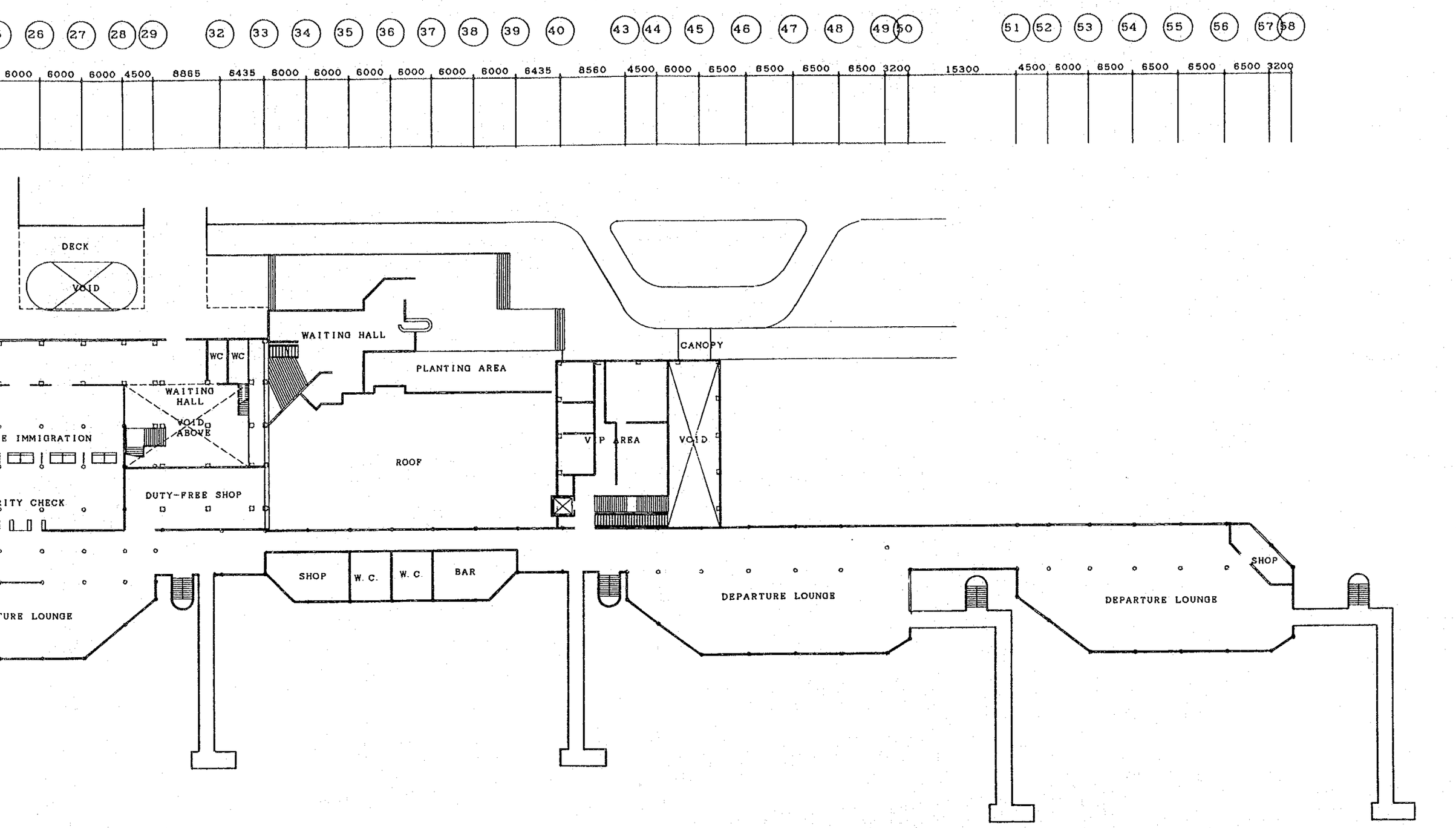
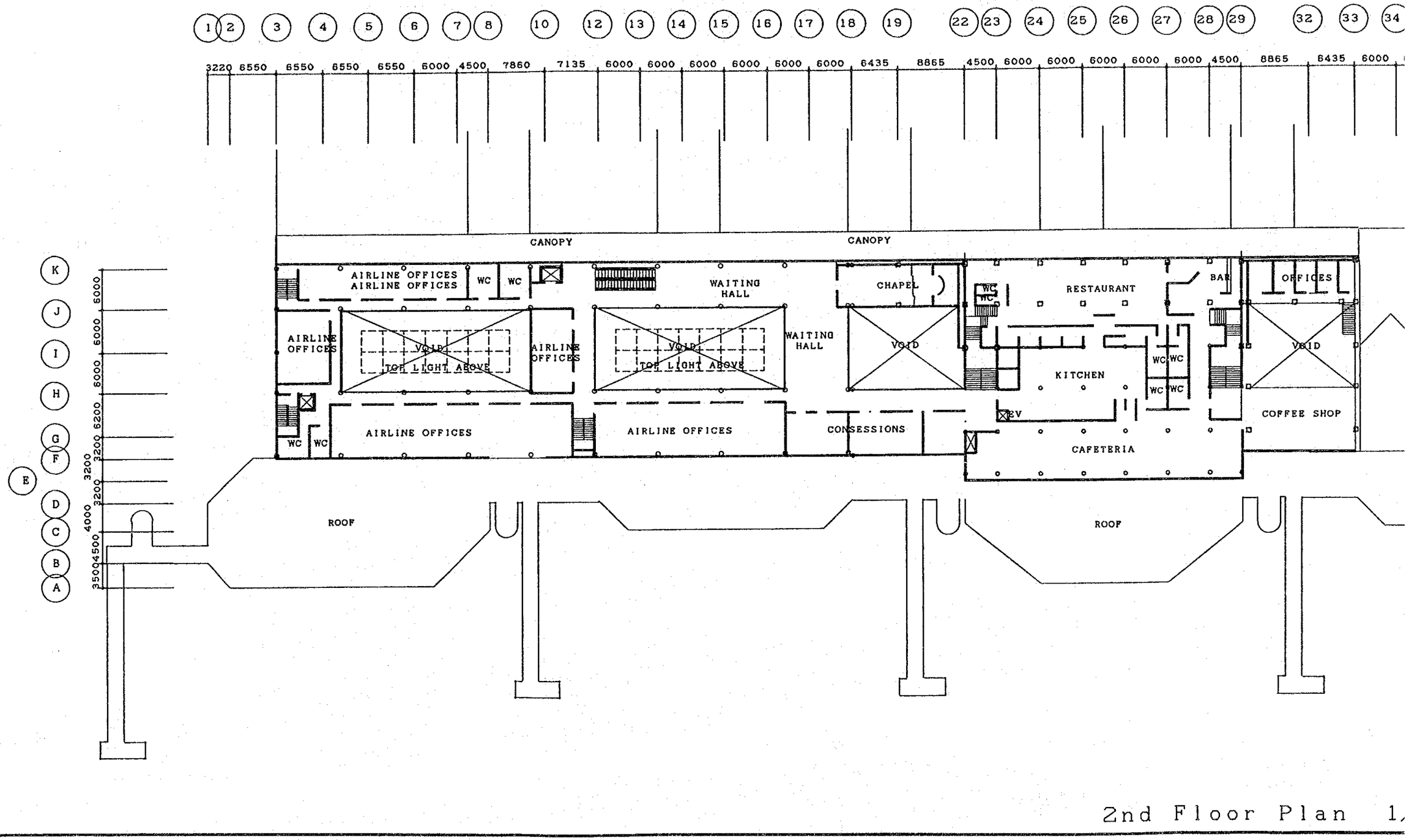
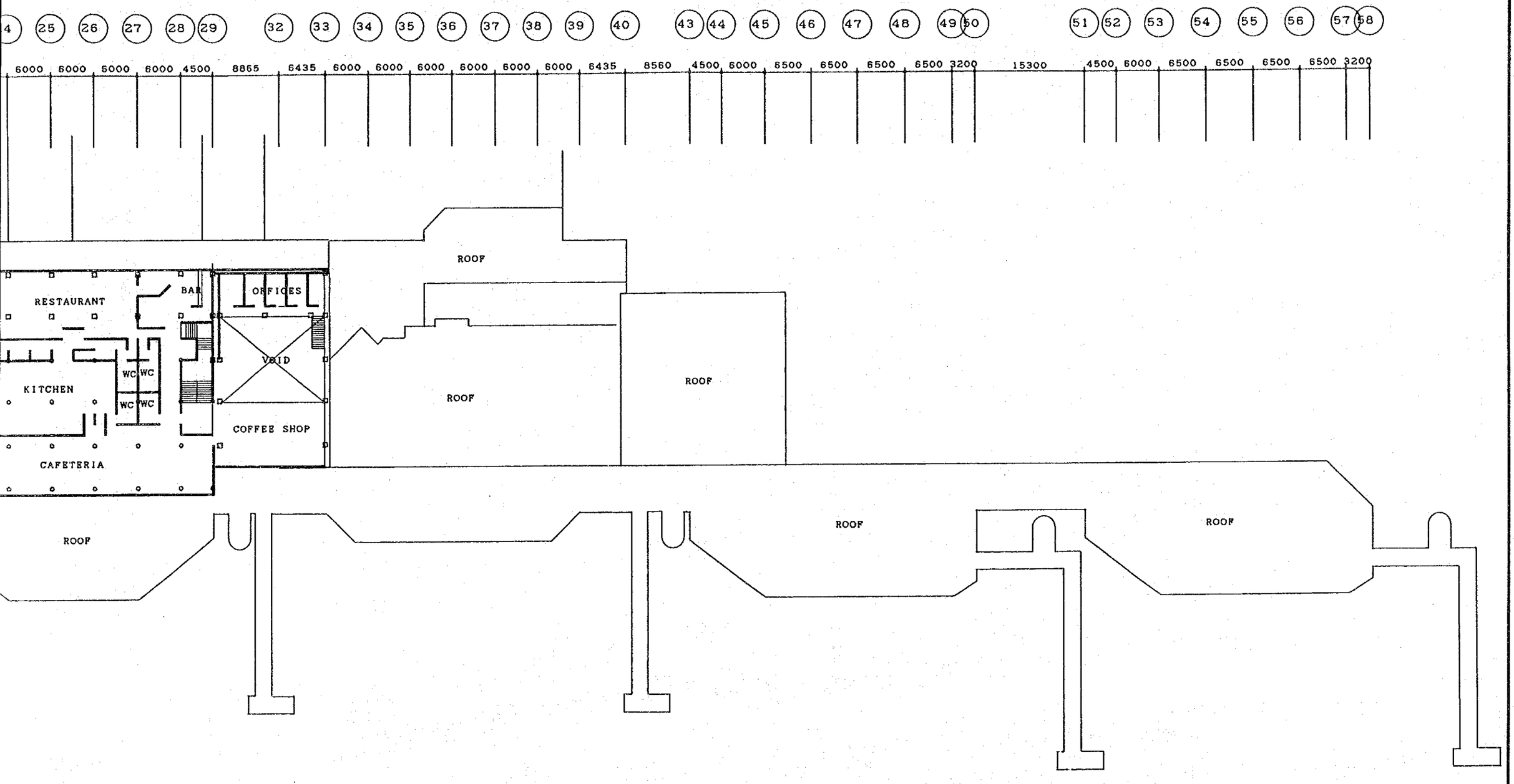


Figure 10.3.2 Layout Plan of International Passenger Terminal Building (1st Floor)

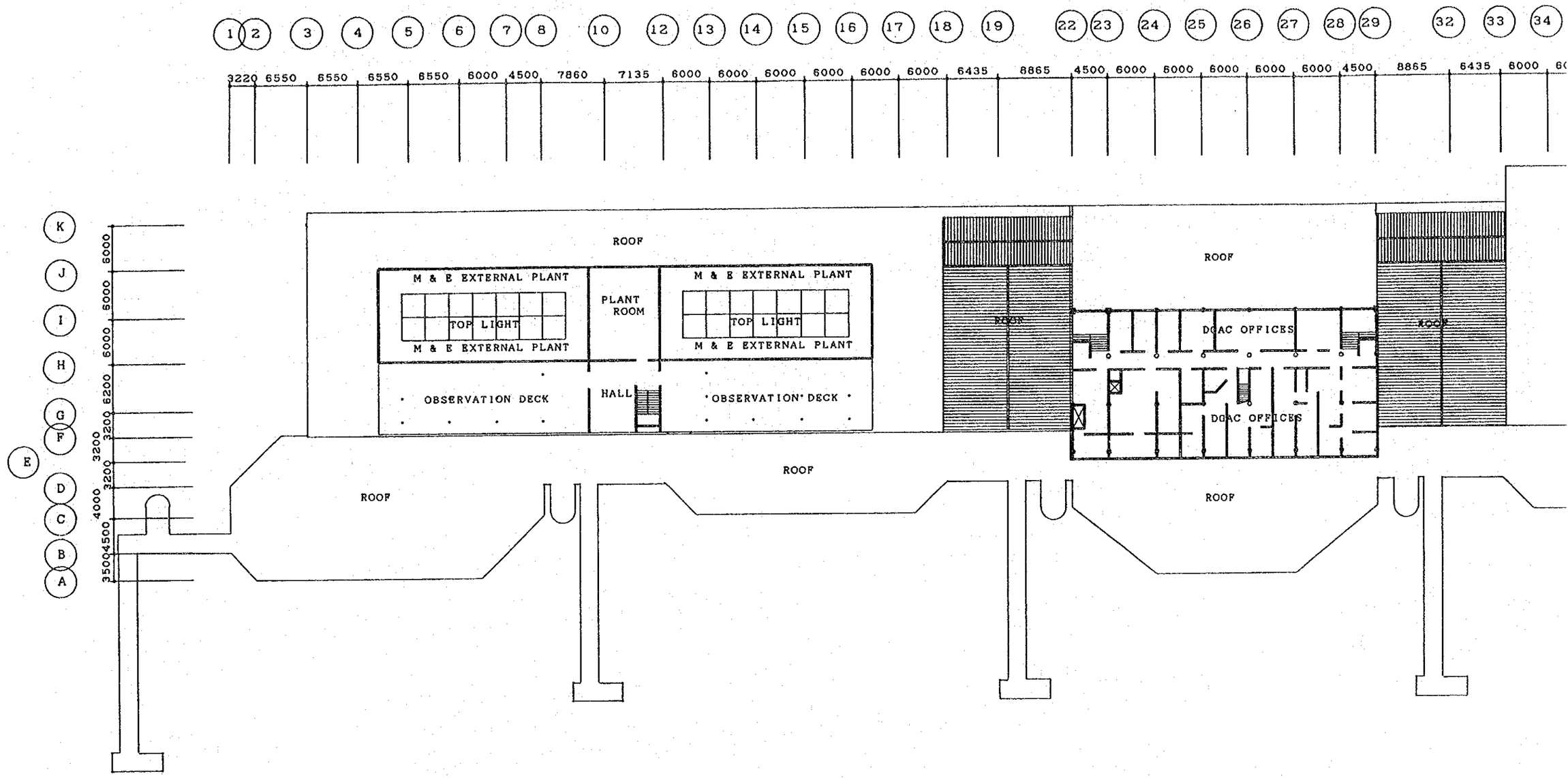


2nd Floor Plan 1,

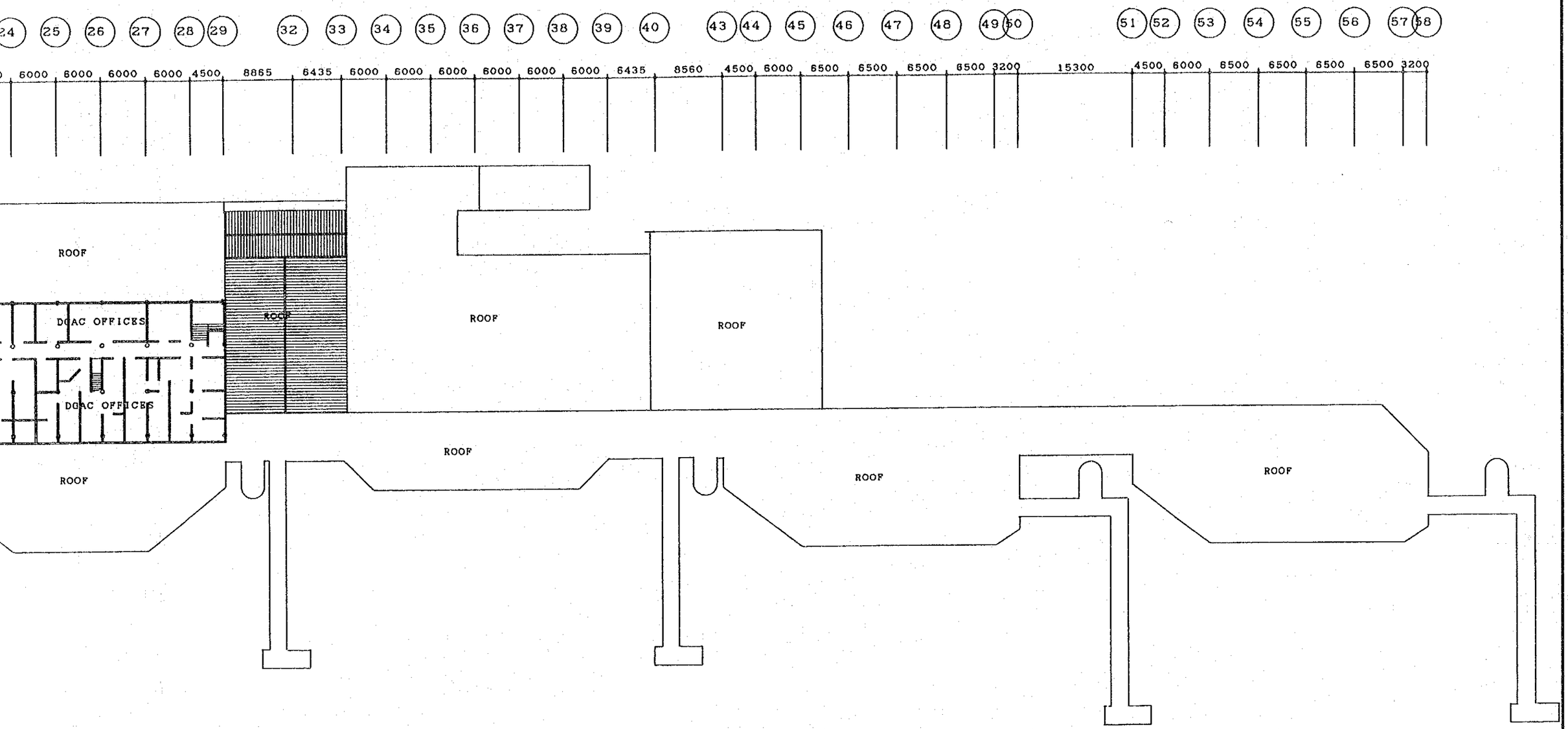


2nd Floor Plan 1/500

Figure 10.3.3 Layout Plan of International Passenger Terminal Building (2nd Floor)

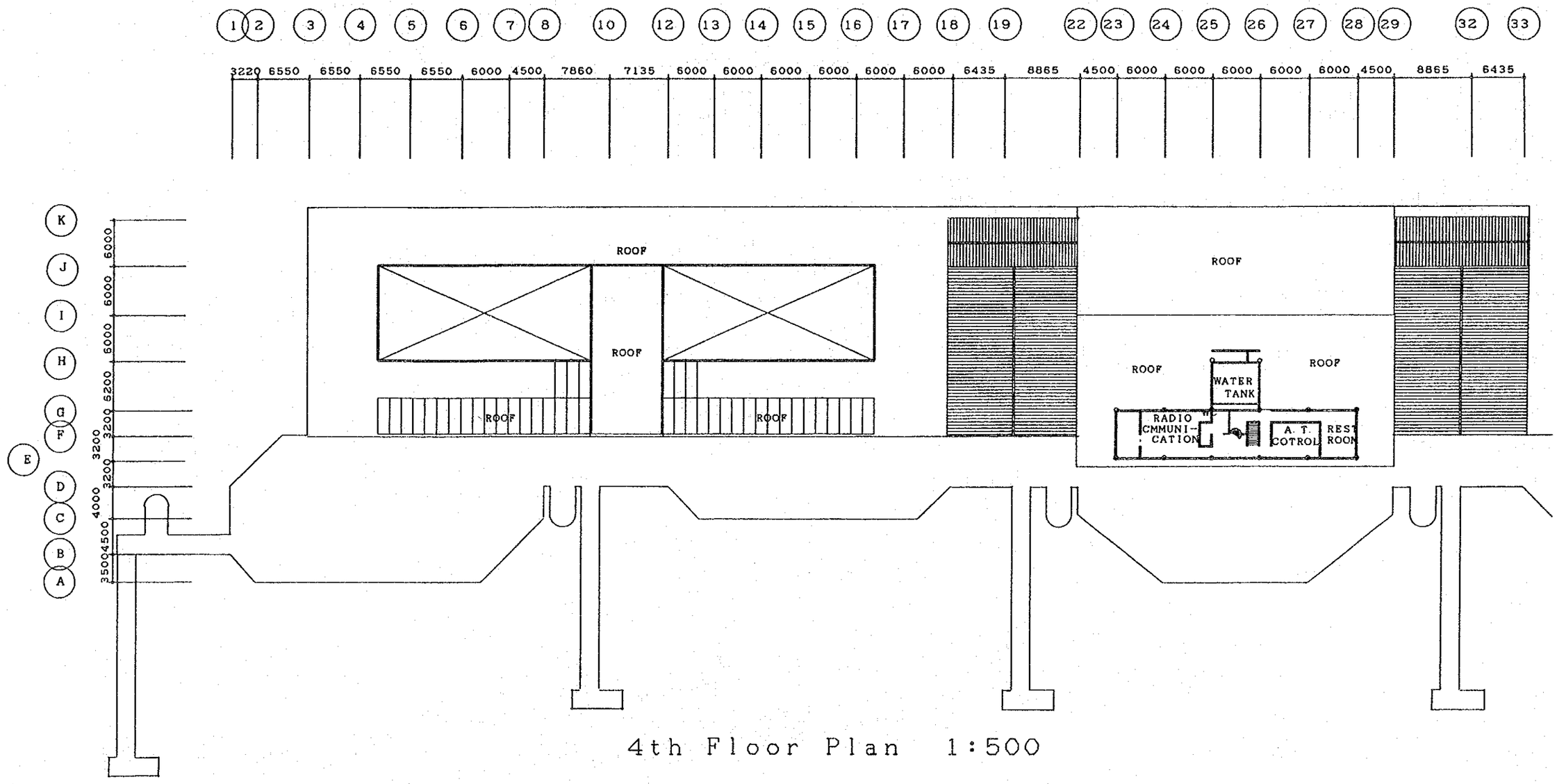


3rd Floor Plan 1/

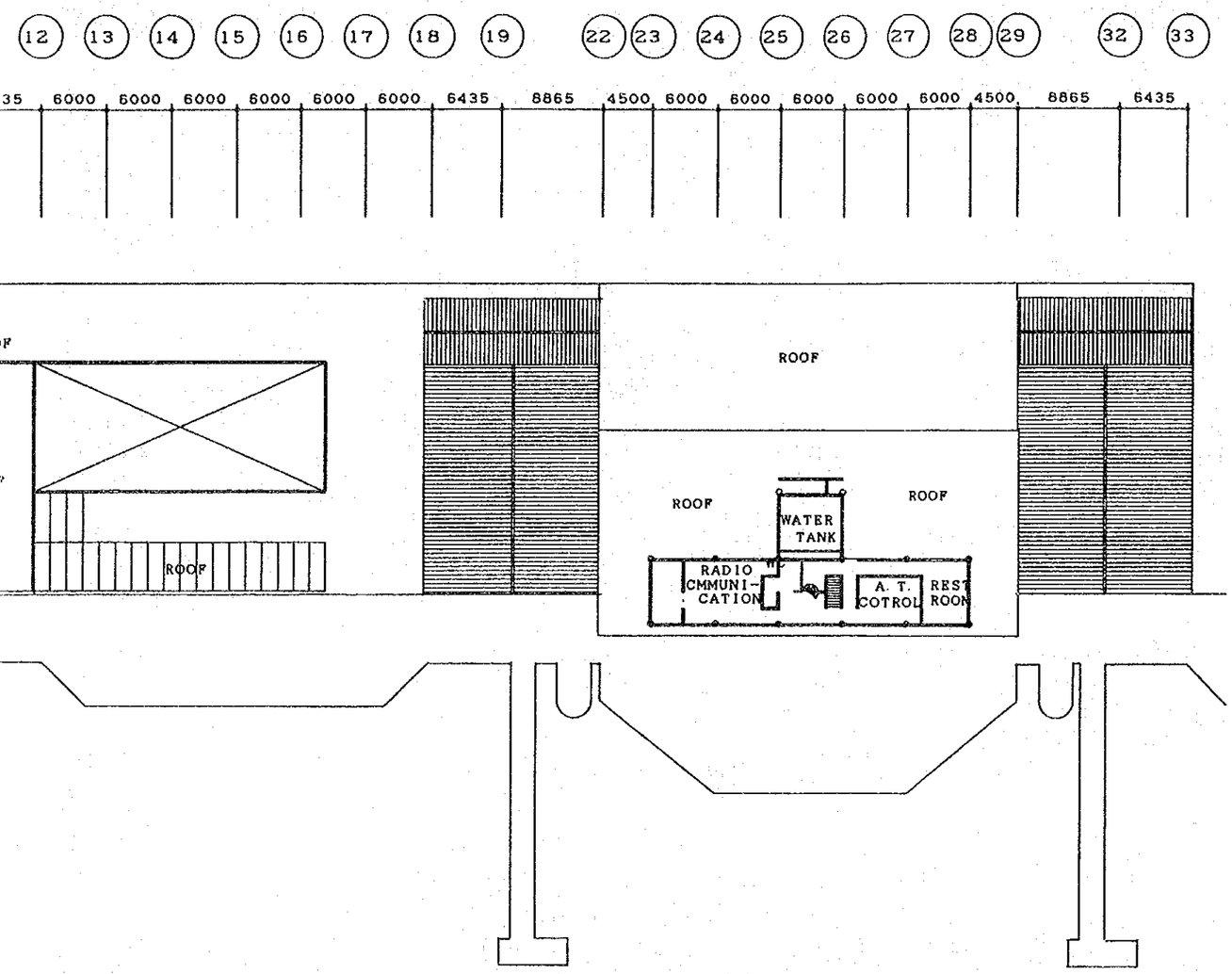


3rd Floor Plan 1/500

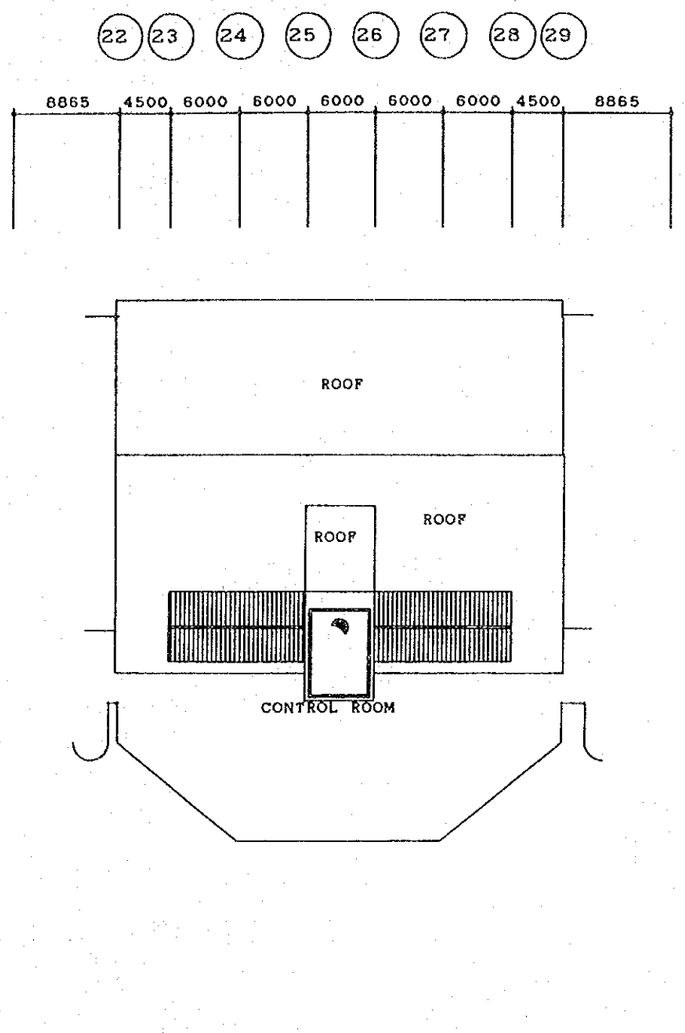
Figure 10.3.4 Layout Plan of International Passenger Terminal Building (3rd Floor)



4th Floor Plan 1:500

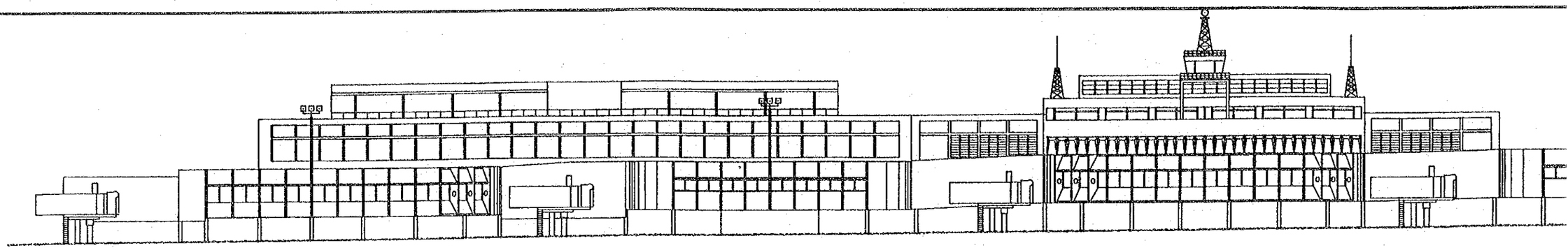


th Floor Plan 1:500

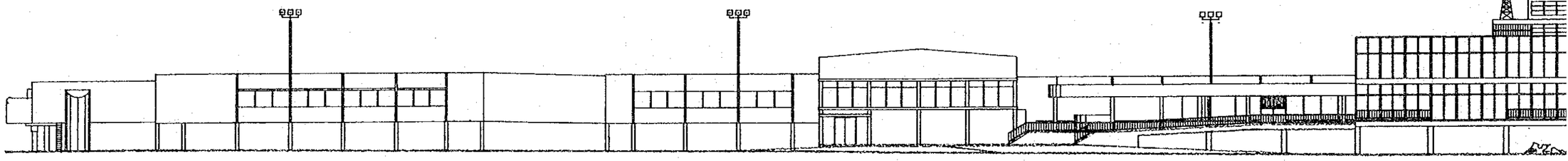


5th Floor Plan 1:500

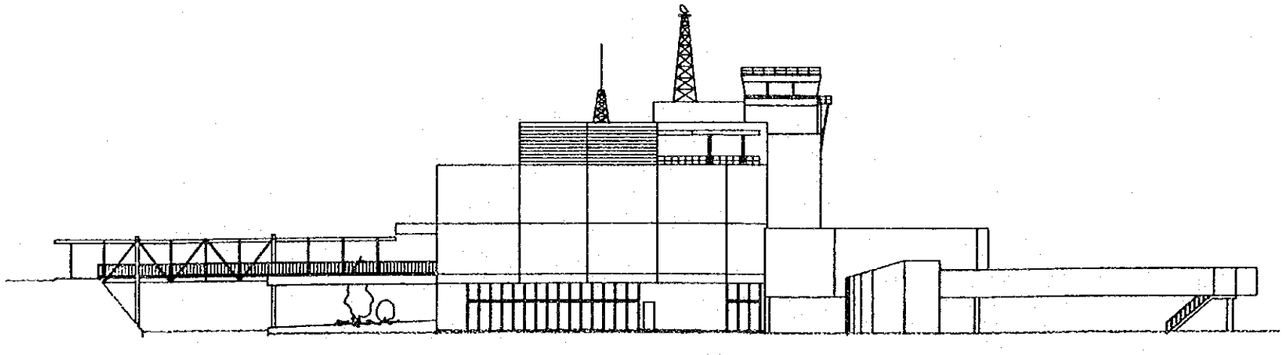
Figure 10.3.5 Layout Plan of International Passenger Terminal Building (4th and 5th Floor)



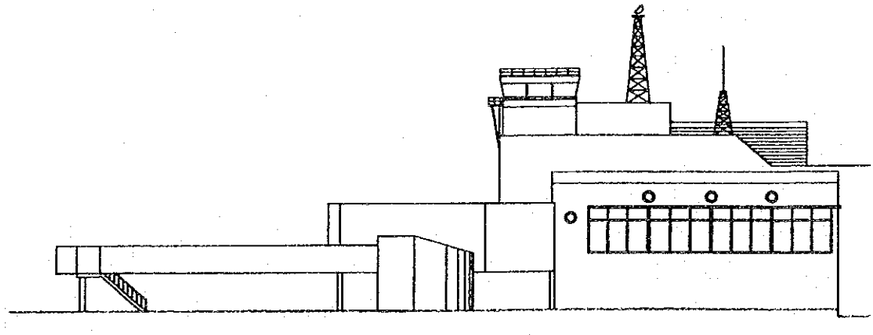
SOUTH ELEVATION 1



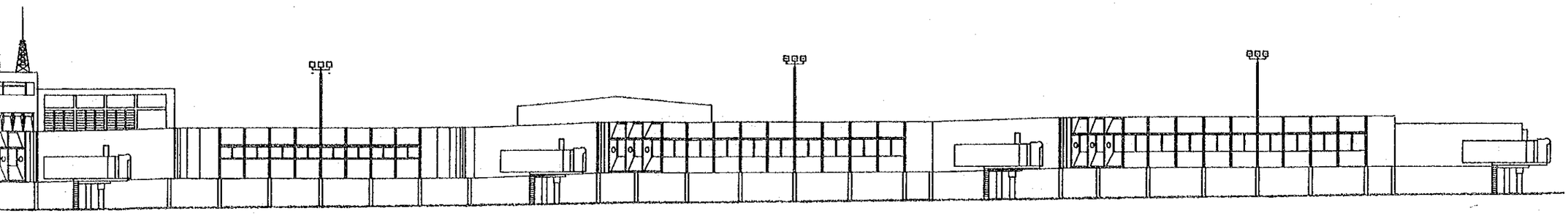
NORTH ELEVATION 1



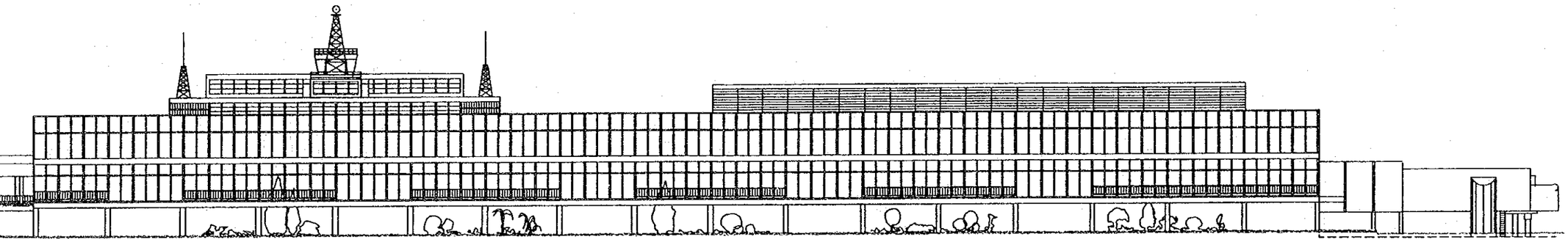
WEST ELEVATION 1:500



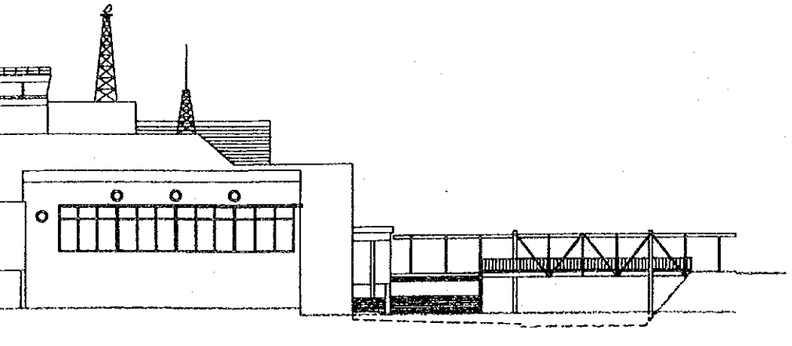
EAST ELEVATION 1:5



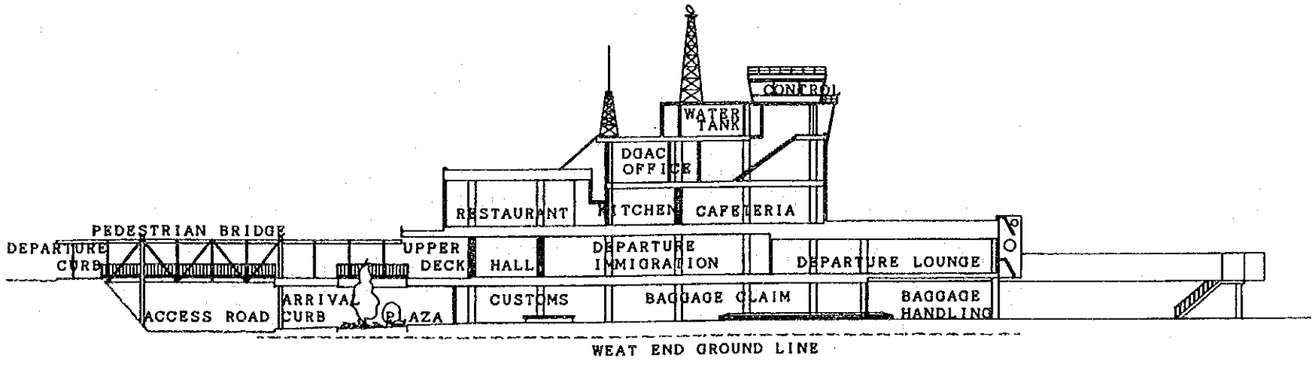
ELEVATION 1:500



ELEVATION 1:500



EVATION 1:500



SECTION

Figure 10.3.6 Elevations and Section of International Passenger Terminal Building

d) To move the existing facilities in the basement such as airline offices, stores, etc. to the extended block, thus, obtaining the necessary space for the expansion of the new arrival passenger processing area. The flow of passengers at the basement is reversed in direction as shown on the plan of the basement.

e) To alter the existing check-in lobby area into departure immigration and security check areas, as well as into additional concessions within the restricted area.

f) To modify the plan of the 3rd and 4th floors, allocating more spaces for the exclusive use by DGAC. The control tower at the top of the terminal will remain in the short-term development.

g) To construct an open canopy system along the curb sides, which may be broad enough to accommodate the overflow of people from the lobby areas during peak seasons. The canopy may be designed to be an eye-catcher, thus improving the elevation of the whole terminal building, which would otherwise be seen as a disorganized complex of blocks of different types extended one by one.

h) To modify the existing arrival immigration hall into a new VIP area, constructing a new floor at the first floor level.

i) To modify the basement of the existing central block to accommodate a new baggage claim area. Broader areas for baggage handling and make-up are reorganized in a better concentration of spaces which allows for ease of movement and greater mobility for personnel, baggage and equipment.

(7) Floor Areas

The floor areas of the proposed International Passenger Terminal Building are as shown in Tables 10.3.1 and 10.3.2 below. The total floor area is considerably larger than the figure presented in Chapter 5 as an average requirement by IATA's standard. The difference is considered to be the outcome of the following features of this project:

a) Unavoidable inefficiency of space utilization caused by the nature of renovation works,

b) Exclusive use of departure check-in counters and baggage handling devices by airlines,

c) Higher demand for concessions, airline offices, etc.

d) Inefficient distribution of departure lounges, and

e) High concentration of passenger load.

Table 10.3.1 Floor Areas of the International Passenger Terminal Building

(Unit: sq.m)

	New Blocks	Existing Areas Remodeled	Existing Areas Not Remodeled	Total
Basement	2,309	4,925	1,636	8,870
1st Floor	2,972	2,433	3,922	9,327
2nd Floor	1,539	314	1,427	3,280
3rd Floor	186 (*)	-	741	927
4th Floor	-	-	236	236
5th Floor		-	29	29
	7,006	7,672	7,991	22,669

Note (*) : Excluding observation deck (485 sq.m)

Table 10.3.2 Floor Areas for Functional Areas

(Unit: sq.m)

		Present	*Proposed*
1.	Public Offices and Related Areas in Total	1,300	1,773
2.	VIP Areas	398	782
3.	Passenger Processing and Related Area in Total	9,060	16,066
3-1.	Chick-in Lobby	901	1,456
3-2.	Departure Immigration and Security Check Cueing Areas	288	525
3-3.	Departure Lounges	1,051	1,955
3-4.	Arrival Immigration Cueing Area	293	410
3-5.	Customs Check Cueing Area	149	396
3-6.	Baggage Claim Area	354	856
3-7.	Arrival Waiting Halls	-	630
3-8.	Other Public Lobbies	-	545
3-9.	Concessions in the Restricted Area	323	452
3-10.	Bar & Coffee Shop in the Restricted Area	75	170
3-11.	Concessions out of the Restricted Area	32	153
3-12.	Restaurant & Cafeteria	622	789
4.	Airline Offices and Related Areas	1,397	1,712

10.3.2 Domestic Terminal (Passenger and Cargo)

(1) Objectives

The objectives of the preliminary design of the domestic terminal building are summarized as followings:

a) To design a new terminal building to accommodate spaces for both domestic passenger processing and domestic cargo processing at the east of the international passenger terminal,

b) The building is to have enough capacity for the demand at the year 2000,

c) Though being separated from the international terminal, the building is to have an appropriate connection for the passengers to and from the international terminal, and

d) To present a typical design of a domestic terminal of this size, which is to be used as a basis of the feasibility study, but not to present the final plan to be followed by detailed design.

(2) Design Principles

The design principles are as followings:

a) Considering that the size of the building is relatively small, and that the function of the building is relatively simple, the terminal is to a single story building,

b) To achieve an appropriate separation of passenger flows between departure and arrival,

c) To establish a restricted area separated from the public.

(3) Required Facilities

The required floor areas for the terminal components are calculated based on peak hour passenger traffic, the results of which are included in Appendix - 10.3.1.

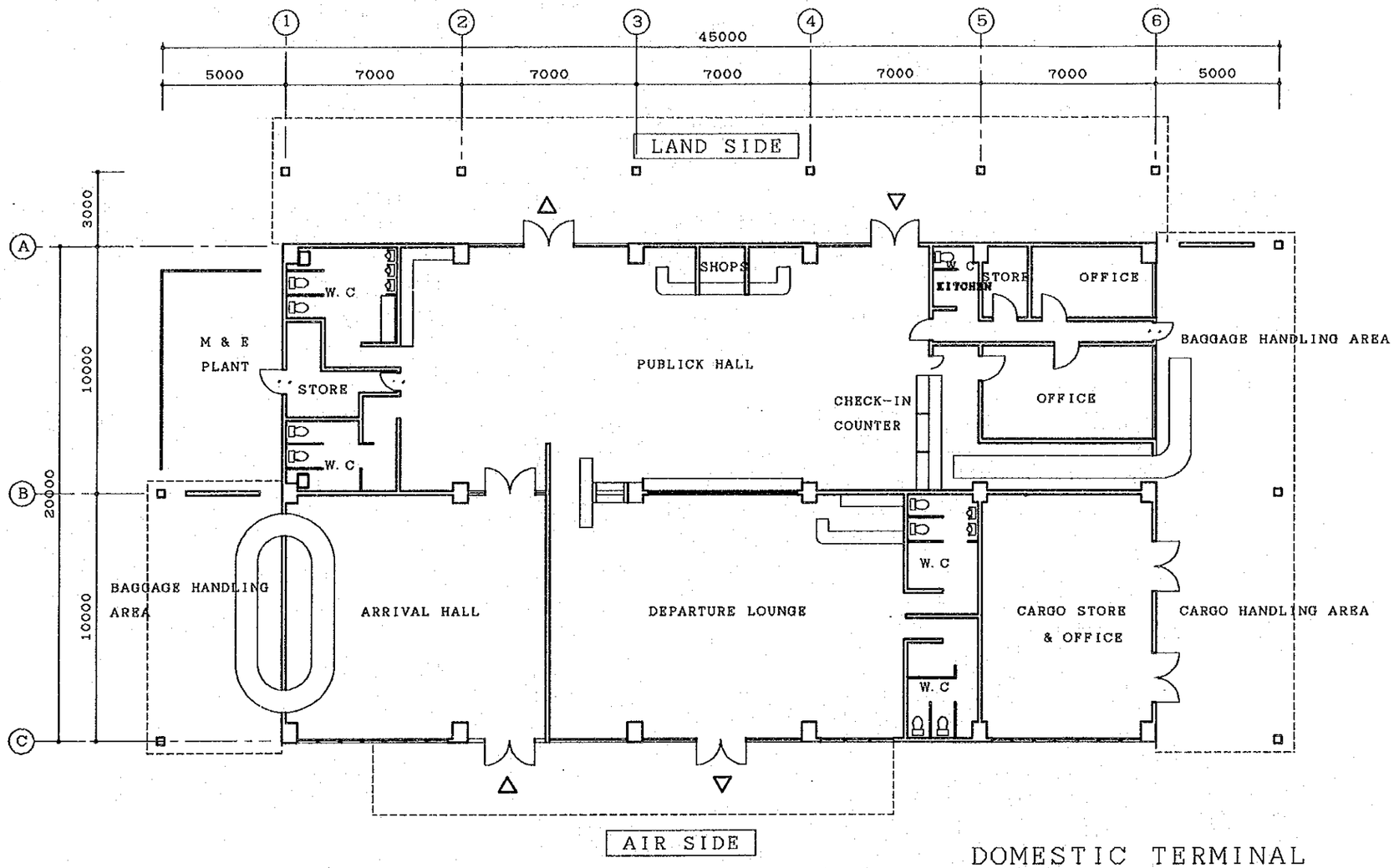
(4) Plan

The features of the plan are as followings:

a) The building is to be 20m by 35m in size, the long side being parallel to the front curb as well as to the apron, the total floor area being approximately 700 sq.m.

b) Along the central axis which is parallel to the long side, the floor is roughly divided into two functional areas; namely the restricted area at the air side and the public area at the land side.

c) The land side area is to accommodate 2 functional areas; the Public Hall and Offices.



DOMESTIC TERMINAL
PLAN 1:200

Figure 10.3.7 Layout Plan of Domestic Passenger Terminal Building

d) The air side area accommodates 3 functional areas - Arrival Hall, Departure Lounge and Cargo Store & Office.

e) At the east side of the building, there are to be external areas with a canopy for handling departure baggage and cargo, and

f) At the west side of the building, there is to be an external area with a canopy for handling arrival baggages.

10.3.3 International Cargo Terminal

(1) Background

The preliminary design of the new international cargo terminal building of Juan Santamaria Airport has been proposed in the report authorized in 1988 by MOPT. Having reviewed the report of the preliminary design, the study team revised the facility requirements following the same methodology stated in the report, but applying the figures obtained from the latest demand forecast (for the year 2000), as well as altering some assumptions, taking into account some of the latest and actual conditions of cargo operations. The altered items are:

a) Annual Cargo Volumes to be handled

Import:	59,781 tons instead of	44,600 tons
Export:	170,507 tons instead of	66,100 tons
Total	230,288 tons instead of	110,700 tons

b) Working days per week: 6 days instead of 5 days.

c) Peak hour ratio: 20% instead of 30%

d) Duration of storage for imported unit cargo:

1/10 of Imported Cargo: 5 days instead of 10 days
9/10 of Imported Cargo: 0.5 days instead of 10 days (*)

Note : (*) Transported to other customs branches without clearance.

e) Type of storage for imported unit cargo:

One level instead of 3 levels

The floor areas obtained from the re-calculation are as listed below:

		1st floor	2nd Floor	3rd Floor	Total
1.	Terminal	4,470	-	-	4,470
2.	Store	4,630	-	-	4,630
3.	Offices	1,060	4,590		5,650
	Total	10,160	4,590		14,750

(2) Plan

To meet the requirements stated in the above, the study team reviewed and revised the proposed plan of the cargo terminal in the previous design with the following assumptions:

a) The same cargo handling systems as proposed in the previous design will be applied.

b) The office block may be located at the end of the main terminal block instead of at the center, thus obtaining flexibility in allocating spaces for import and export areas.

c) The refrigeration room may be located at the end of the export area for the same reason as stated in b) above.

d) The projection of the office block to the land side should not exceed the dimension of the necessary depth of the truck yard.

10.4 Air Navigation System

The block diagram of the air navigation system in the short-term development is shown in Figure 10.4.1.

10.4.1 ATC System

VHF air to ground radio, ground to ground radio, Automatic Terminal Information Service (ATIS) and tape recorder/reproducer for ATIS voice logging will be replaced at the existing operation building.

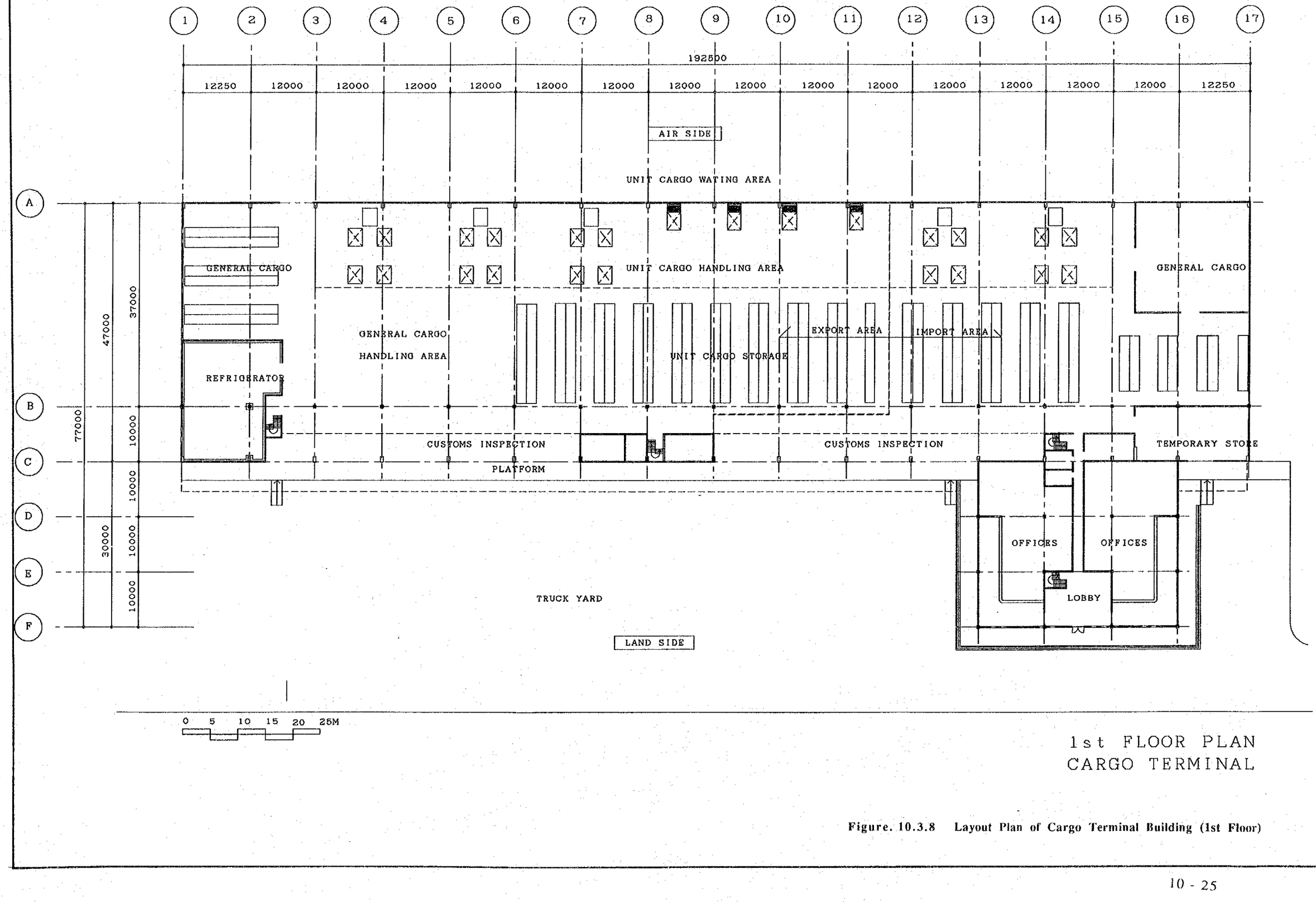
10.4.2 Meteorological Observation System

The existing meteorological observation facility will be replaced by an automatic observation system. The sensor will be installed at the meteorological observation field located near the runway. A cloud ceilometer will be provided at the area around the runway. Processing data collected from sensor in cyclic will be provided to each ATS operation position respectively.
Weather satellite receiver and radio sonde are replaced at the existing location.

10.4.3 Ground Lighting System

Apron Floodlight will be installed to the new apron area to provide adequate illuminance which complying ICAO Design Manual.

Taxiway edge lights will also be provided to new taxiway and apron edges.



1st FLOOR PLAN
CARGO TERMINAL

Figure. 10.3.8 Layout Plan of Cargo Terminal Building (1st Floor)

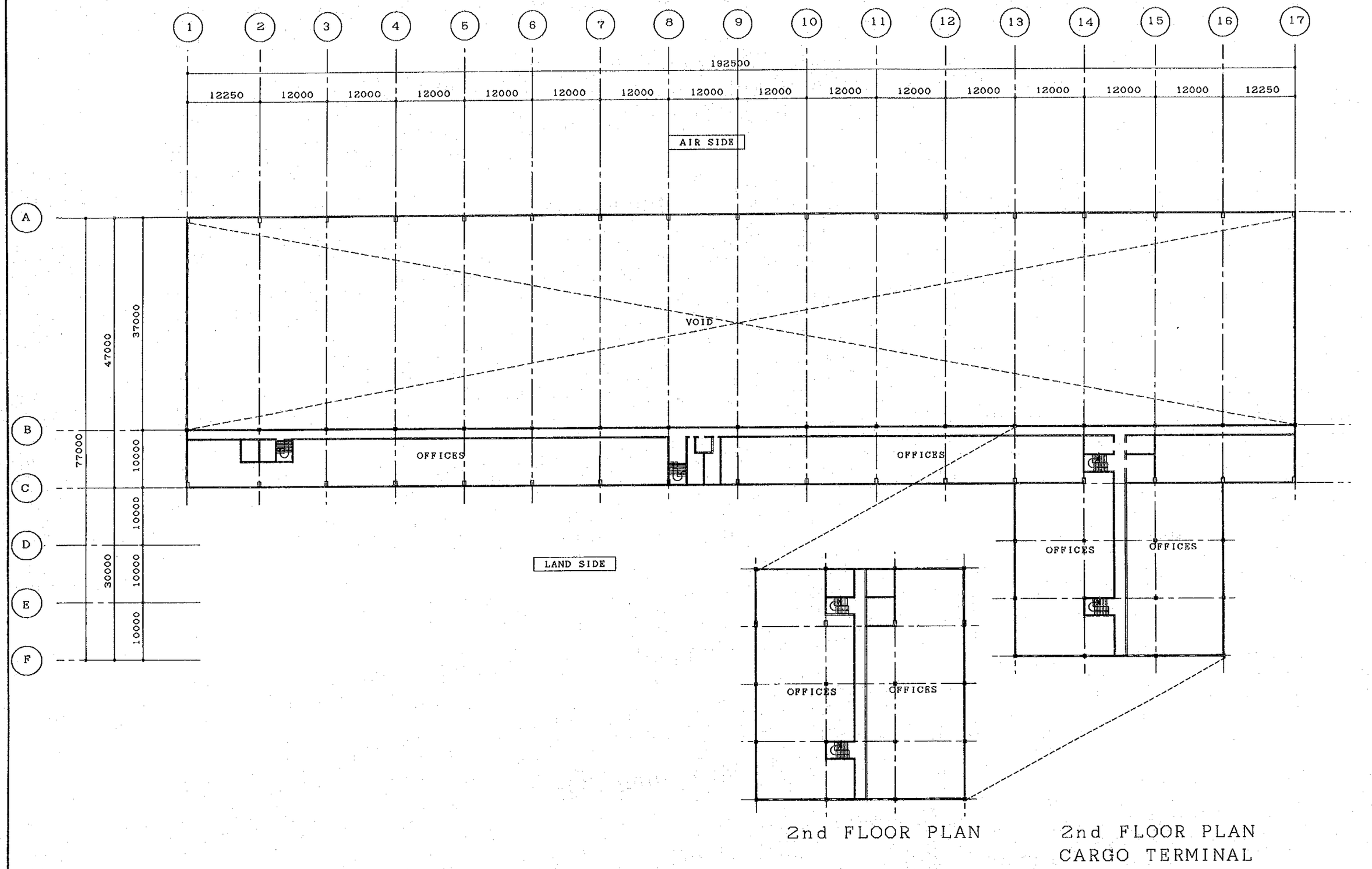
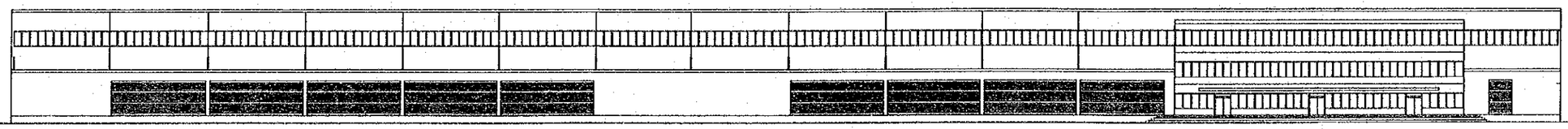
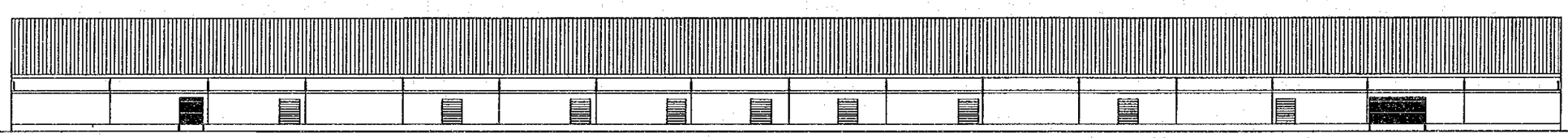


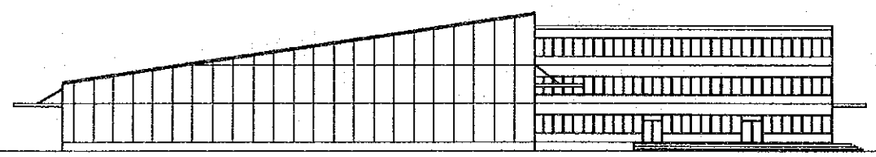
Figure. 10.3.9 Layout Plan of Cargo Terminal Building (2nd Floor)



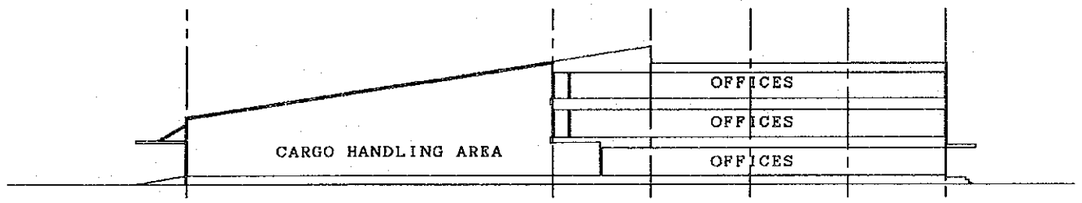
NORTH ELEVATION



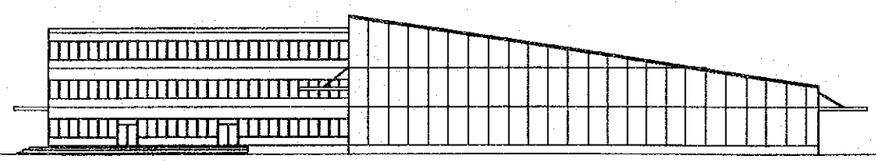
SOUTH ELEVATION



EAST ELEVATION



SECTION



WEST ELEVATION

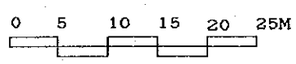


Figure. 10.3.10 Elevations and Section of Cargo Terminal Building

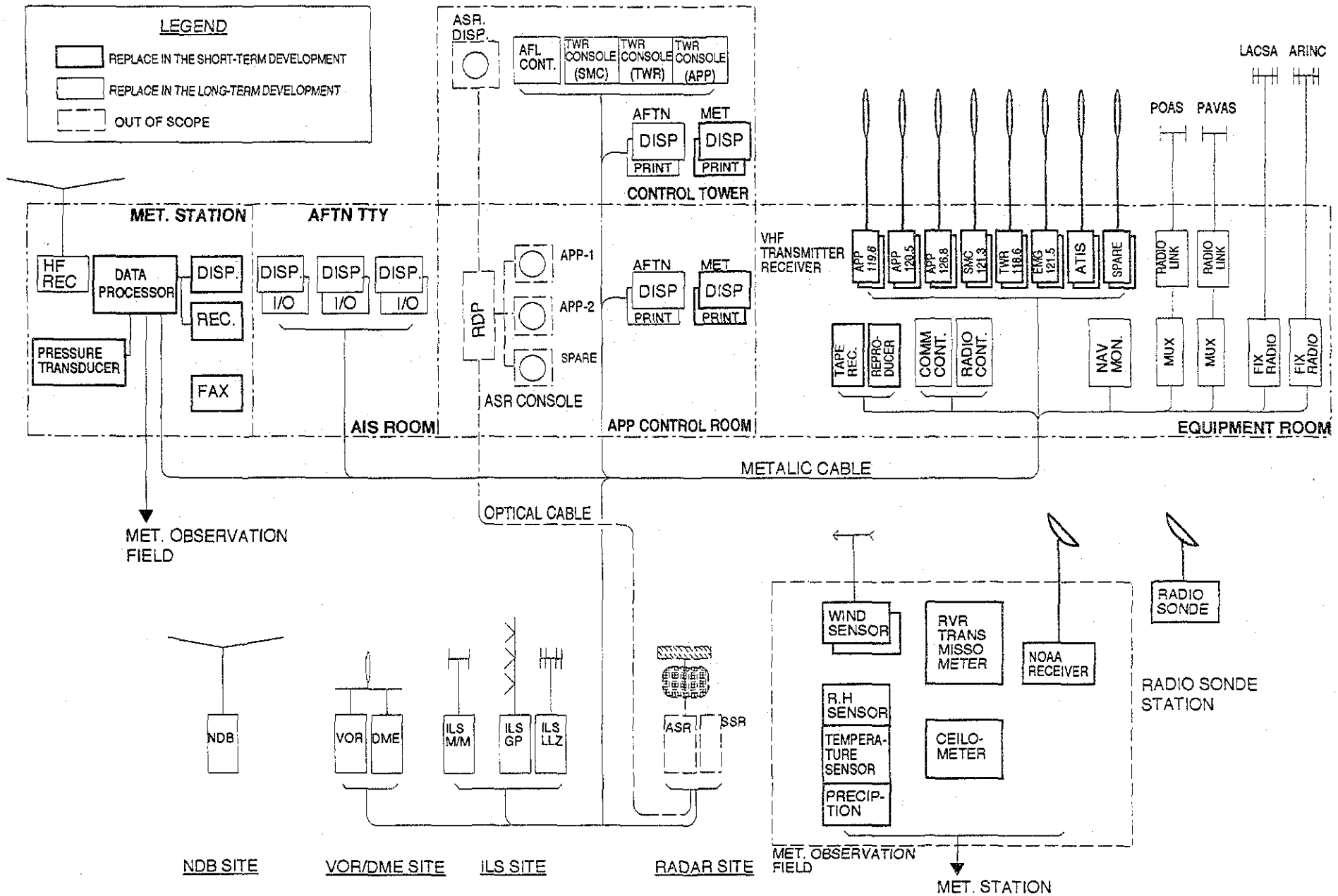


Figure 10.4.1 Air Navigation System Block Diagram