Chapter 9 Selection of an Airport for Feasibility Study

CHAPTER 9 SELECTION OF AN AIRPORT FOR F/S

9.1 SELECTION CRITERIA

It was required to select one medium term development project for the feasibility study to be conducted in the Study. A project should be selected mainly from the viewpoints of national development strategy and foreign aid status once technical, environmental, economical and financial viability of the master plan (in long term) is confirmed.

The following were agreed, in principle, between DOTC and the JICA Study Team as the major determining factors of selecting a project for the feasibility study.

a) Optimal economic internal rate of returns in long term
b) Large number of beneficiaries (high traffic volume) in long term
c) Least problems in project implementation in medium term
d) Project cost

9.2 COMPARISON OF THE FOUR AIRPORT DEVELOPMENT PLANS

Evaluation results of the four airport development master plans are summarized in Table 9.2.1 and the following paragraphs.

Bacolod Airport : Anticipated traffic volume at Bacolod Airport is the second highest among the four airports and about 85% of Iloilo Airport, the highest. Total project cost is in the middle range and similar to but about 14% higher than Iloilo. Economic Internal Rate of Returns (EIRR) is in the similar range to Iloilo (over 20%). The EIRR is high enough to justify the development of Bacolod Airport. It is considered that the project will have the least technical and environmental problems. It should be noted that the development of the new airport will reduce aircraft noise problem of the province.

Iloilo Airport : Anticipated traffic volume at Iloilo Airport is the highest among the four airports. Total project cost is in the middle range and 14% lower than Bacolod. EIRR of the Iloilo Airport development is the highest among the four, and high enough to justify the project. There will be substantial impacts by resettlement and on aircraft noise pollution. It may be required from the environmental protection viewpoint to conduct a study on new airport development as an alternative.

Tacloban Airport : Anticipated traffic volume at Tacloban Airport is the second lowest; about 50% of Iloilo. Total project cost is the lowest and about 70% of Iloilo. As a result, EIRR is lower than Iloilo, but

it is high enough to justify the development of Tacloban Airport. There will be some impact on aircraft noise pollution at Runway 36.

Legaspi Airport : Anticipated traffic volume at Legaspi Airport is the lowest; about 32% of Iloilo. Total project cost is the highest due to the hill obstacle removal. As a result, EIRR is the lowest. The EIRR suggest that the project is unfeasible from the economical viewpoint. There will be impacts by resettlement and on aircraft noise pollution. Furthermore, hill obstacle removal will have impacts on flora, fauna and landscape.

From the view point of EIRR and number of beneficiaries the developments of Bacolod and Iloilo Airports should have higher priority than the development of Tacloban and Legaspi Airports. Comparing the developments of Bacolod and Iloilo Airports, it is considered that the development of Bacolod Airport has less technical and environmental problems, which is one of the major concerns of the international lending agencies.

Developments of the trunkline airports are an urgent requirement of the development of civil aviation sector of the Philippines. Therefore, it is recommended to seek an international financial assistance for the development of Bacolod and Iloilo Airports first, then the others. Iloilo Airport, however, needs a study on new airport development as mentioned previously. Therefore, it was decided to conduct a feasibility study on Medium Term Development of Bacolod Airport in the Study.

Table 9.2.1 Comparison of Four Airport Developments

Item	Bacolod Airport	Iloilo Airport	Tacloban Airport	Legaspi Airport
1. Annual Passengers				
Year 2005	1,003,000	1,179,000	655,000	375,000
Year 2015	1,436,000	1,688,000	938,000	537,000
2. Project Costs (PHP million)				
Medium Term	2,144	1,770	1,377	3,049
Long Term	277	320	166	264
Total	2,421	2,090	1,543	3,313
3. Technical / Environmental Issues	– Minimal adverse impacts by resettlement of inhabitants. – Reduce aircraft noise problems of the province. – Little adverse impacts on flora and fauna.	– Considerable adverse impacts by resettlement of inhabitants. – Substantial increase of aircraft noise pollution. – Little impacts on flora and fauna.	– Some adverse impacts by resettlement of inhabitants. – Some increase of aircraft noise pollution on Runway 36 side. – Need special attentions to avoid adverse impacts on the mangrove area near the Runway 18 end.	– Some adverse impacts by resettlement of inhabitants. – Substantial increase of aircraft noise pollution. – Adverse impacts on flora and fauna by cutting the hill tops. – Impacts on landscape by removal of hill tops. – Potential environmental problems by transportation and dumping of the removed soils and rocks
4. EIRR	21.4 %	22.8 %	17.4 %	2.7 %

Note: Due to the environmental problems, it is recommended to conduct a study on new airport development for Iloilo and Legaspi Airports.

Chapter 10 Airport Operations Management and Training

CHAPTER 10 AIRPORT OPERATIONS MANAGEMENT AND TRAINING

10.1 GENERAL

10.1.1 Introduction

An airport is an integrated system providing linkages with surface modes of transportation and with the Air Navigation System (ANS). The airport system primarily and basically consists of the subsystems landside, airside, terminals and terminal airspace capacity.

The main objective of the Airport operations management is to control and develop these subsystems in an efficient and competitive way to the benefit of the passengers, airline companies and cargo holders.

The terminal building and its close vicinity provides a market place for secondary products or a wide range of commercial services which represent an important source of revenues. To develop these commercial services in order to maximize total revenue is also an important task for the airport operational management.

This chapter describes the present operations and training situation on the four studied airports, including organization and staffing, operating system, management system, human recourses system, maintenance system, airport facilitation and financial conditions.

10.1.2 Special Notes

It should be noted that all airports studied except for Bacolod are area centers and ATO at these airports are responsible for managing all airports in their respective areas. Meteorological services and passenger/baggage screening are the responsibilities of PAGASA and AVSECOM respectively. The passenger terminal building of Bacolod Airport is owned and maintained by PAL.

Organizations and responsibilities of DOTC and ATO headquarters are described in Section 2.3.1.

10.2 ORGANIZATION AND STAFFING

10.2.1 General

Organization is necessary to make the most efficient and effective use of all available resources to achieve the desired outputs. An organization is not an end in itself but a means to an end and should therefore always be considered in this context.

10.2.2 Present Situation

1) Organization Structure

Figures 10.2.1 through 10.2.4 show the existing organization charts of ATO at the four studied airports. It is to be noted that persons in charge of air traffic control and airways communications/navigation systems are employed by the ATO headquarters but administrated by the airport managers.

2) Number of Staff by Class

The numbers of ATO staff (total of permanent and casual staff) at Bacolod, Iloilo, Tacloban and Legaspi are 96, 98, 85 and 95 respectively. The number of airport staff by class is described in Table 10.2.1 below.

Table 10.2.1 Number of Staff by Class

Staffing by class	Bacolod	Iloilo	Tacloban	Legaspi
Airport Management	1	1	1	1
Administration	6	9	6	8
Air traffic section	1	1	1	1
- airways communication	5	2	2	8
- air traffic control	11	10	5	6
Airport section	1	1	1	1
- maintenance	8 (5)	16 (11)	28 (25)	23 (16)
- terminal operations	8 (6)	-	-	-
- crash fire and rescue	26 (12)	29 (12)	15 (4)	11
- airport security	15 (4)	7	7 (5)	14 (5)
Air navigation section	1	1	1	1
- airways systems maintenance	7	10	11	8
- electro-mechanical maintenance	6	11	7	13
Total	96 (27)	98 (23)	85 (34)	95 (21)

Note: The above numbers of staff indicate the total of permanent and casual staff. Numbers in ( ) indicate numbers of casual staff only.

The casual staff are employed for a six month period at a time, and their employment may be extended depending on the needs and available budget. Based on the size of facilities and frequencies of aircraft movements and the number of passengers, the numbers of staff (in administration and airport sections) at Bacolod and Legaspi are considered excessive even if the working period of casual staff is 50% of the permanent staff.

There might be many reasons for the large number of staff as:

a) Additional responsibilities as an area center (except Bacolod)
b) Insufficient equipment and vehicles for airport operations and maintenance

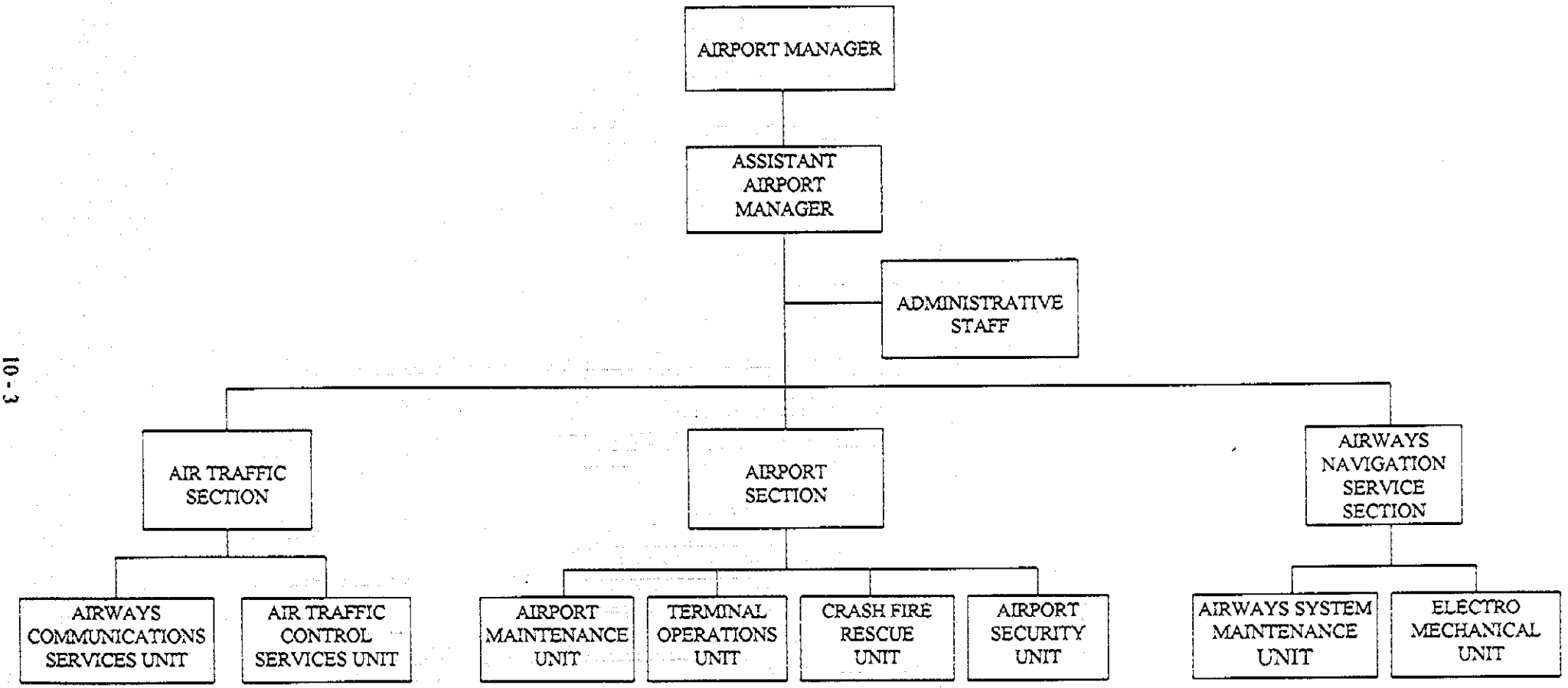


Figure 10.2.1 Organization Chart of Bacolod Airport

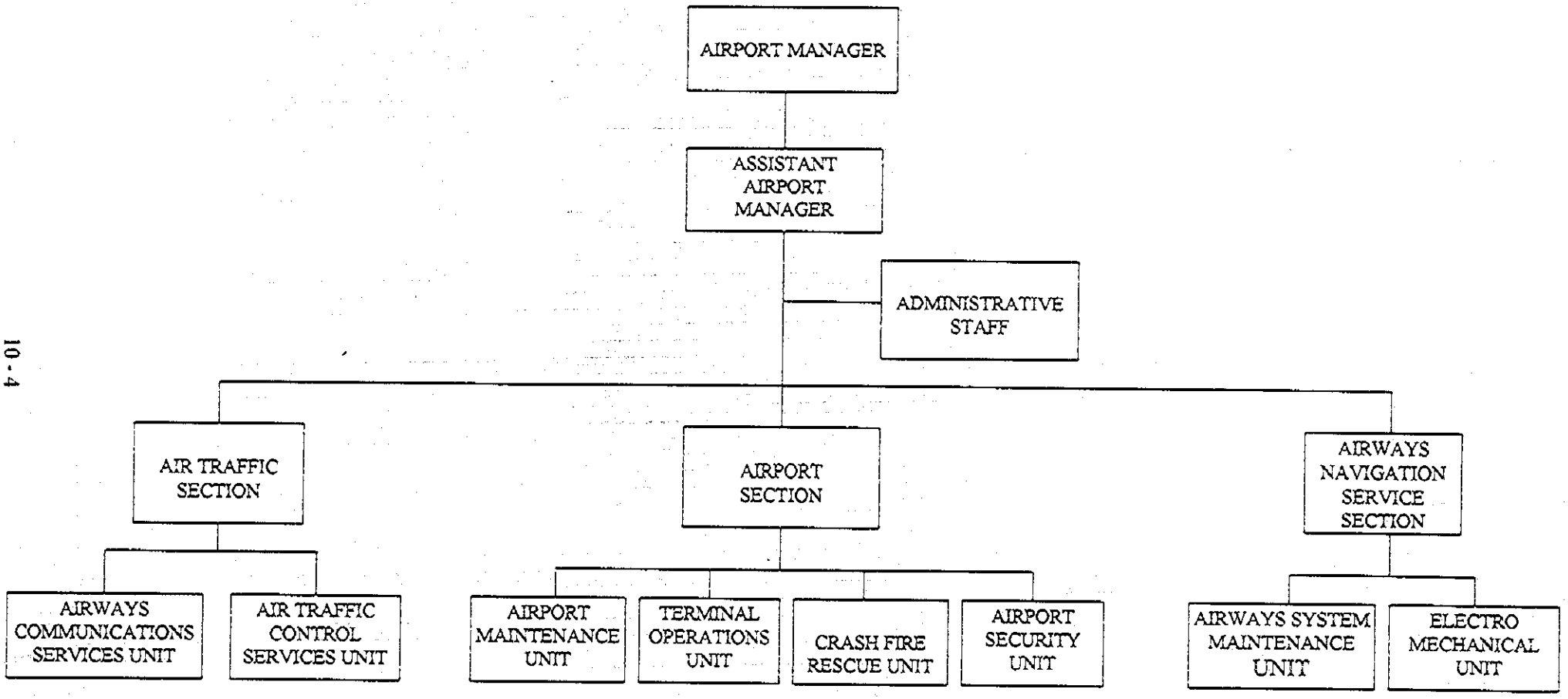


Figure 10.2.2 Organization Chart of Iloilo Airport

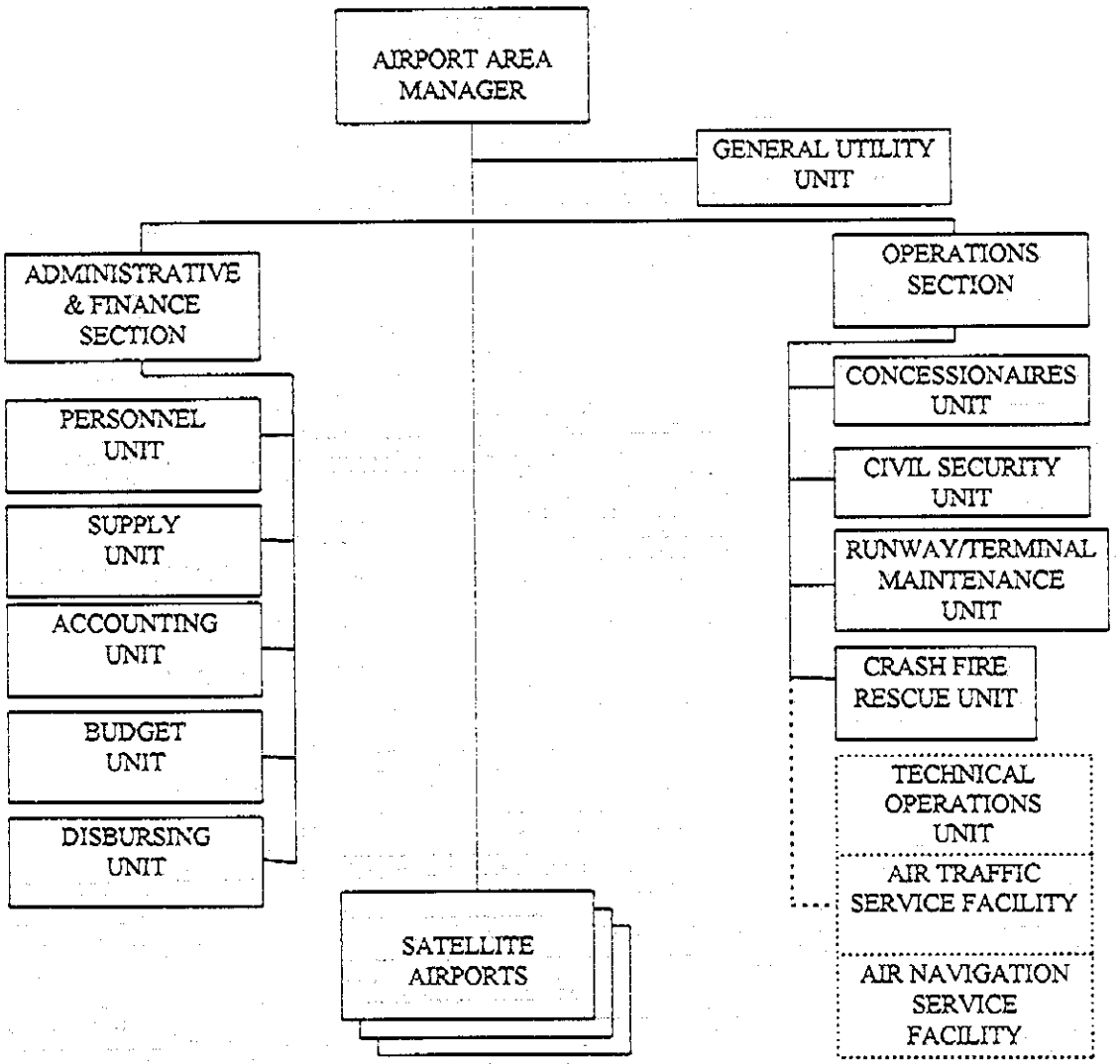


Figure 10.2.3 Organization Chart of Tacloban Airport

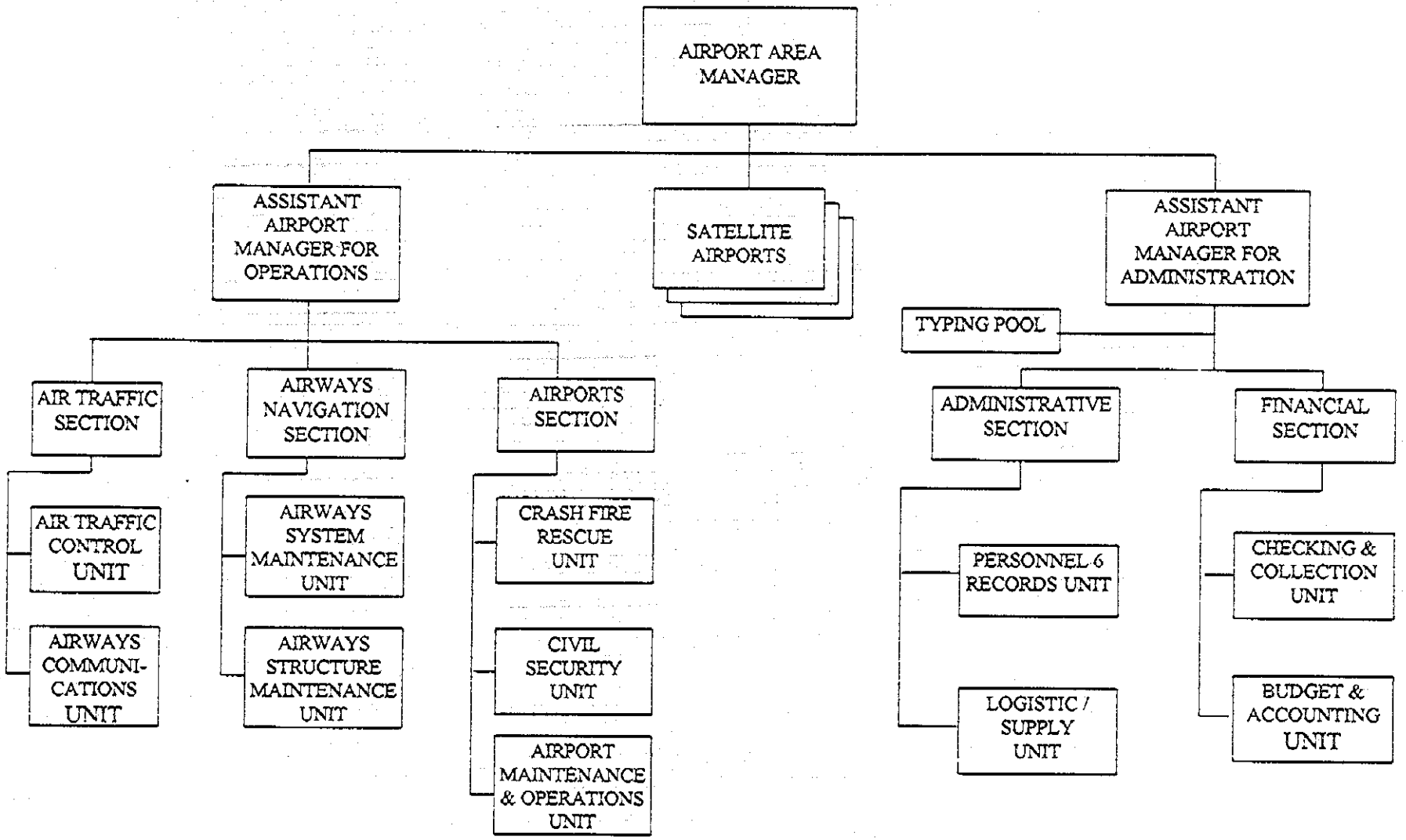


Figure 10.2.4 Organization Chart of Legaspi Airport

c) Low level of automation/computerization both in administration and passenger handling
d) All opening hours are not always in complete coordination with air traffic
e) Insufficient incentives and goals for the employees and insufficient control systems
f) Insufficient management training
g) Low labor costs and high unemployment rate in the Philippines
h) Low level of professional training

3) Framework of Responsibility on Airport Management Level

The airport managers of the area center airports are directly reporting to the ATO headquarters in Manila.

The main objectives given to the airport managers from ATO are:

a) Provide with safe air traffic
b) Provide with an airport/terminal service meeting the requirements of the passengers and airline companies
c) Provide with security and safety for the airport
d) Cost-budget goals

The airport managers of the area centers airports have the responsibility of all airports in their respective areas.

10.2.3 Findings

The main findings made during the field study as to organization and staffing are as follows:

a) The present organizational structures are generally well working.
b) The total number of staff at Bacolod and Legaspi Airports are considered relatively high regarding the traffic volumes and traffic distribution.
c) The staff shifts setting and opening hours are not in all cases optimal adjusted to the traffic volumes and traffic distribution.
d) Low level of automation and computerization in the field of administration.
e) Insufficient equipment and vehicles for airport operations and maintenance.

10.2.4 Recommendations

Regarding the findings it is recommended to:

a) Employment stop for the next five years to allow reduction of the total number of staff[1].
b) By training and education try to increase the degree of integration between the various staff classes.
c) Review the staff planning procedures.
d) Achieve a closer adjustment between opening hours with shift settings and the air traffic distribution over the 24 hours.
e) Increase automation and computerization in the administrative work.
f) Provide sufficient number of equipment and vehicles.

10.3 AIRPORT OPERATING SYSTEM

10.3.1 General

An airport is a highly regulated and technologically sophisticated system which operates within an extensive political framework. An airport plays an important role in air safety but at the same time it should be a service oriented system providing different services, important to passengers and airline companies. In addition an airport is a market place with opportunities to making business on secondary services. Construction of an airport demands extensive fundings constituting high fixed cost during the life of the investments. Therefore it is of great importance to operate the airport with efficient and effective systems regarding the interaction of the major components of the air transport system namely the airport, ANS, the airline and the user.

10.3.2 Present Situation

The airport operating system at all four airports comprises the subsystems of various maintenance and terminal operations systems, security, crash fire and rescue and ATS. From the organizational and staffing point of view these subsystems are distinct and well regarded.

[1] The optimal number of staff is estimated for the four airport for present (1996), the medium term development plan and the long term development plan as follows. These figures may be used as target numbers for establishing staff reduction schemes. Breakdown of staff numbers is shown in Appendix 10.2.1.

	Present Staff Level in 1996	Target Staff Level for Present (1996)	Target Staff Level in Medium Term	Target Staff Level in Long Term
Bacolod	96	68	82	95
Iloilo	98	85	90	103
Tacloban	85	68	76	82
Legaspi	95	70	78	84

Some instructions regarding airport operations and administration have been issued by the airport managers, but no comprehensive airport operations manual has been issued at any of the four airports. An airport operations manual is the means by which airport staff are fully informed of their duties and responsibilities, the airport services and facilities, all operations procedures and any restrictions on airport availability. An Air Rescue Organization has been established at Legaspi Airport to prepare and organize emergency procedures dealing with serious accidents and controlling crisis. This organization consists of representatives from the airport, airline, hospital and police from the local community.

At all four airports the airside safety and security are insufficient due to incomplete fencing and lack of adequate alternative transportation means in the airport surrounding communities to completely prohibit public from trespassing the airport property.

10.3.3 Findings

The main findings made during the field study as to airport operating system are as follows:

a) Lack of a comprehensive airport operations manual at all four airports
b) Lack of complete fencing around the airport property
c) Airport security is well performed but there is a lack of a security plans, procedures, training and equipment.

10.3.4 Recommendations

Regarding the findings it is recommended to:

a) Issue an airport operations manual at all four airports (contents suggested in Table 10.3.1)
b) Prepare an emergency plan at all four airports
c) Prepare a security plan at all four airports and introduce a badge-system for personnel allowed to enter airside
d) Complete fencing surrounding the airport property at all four airports
e) Establish an Air Rescue Organization at Bacolod, Iloilo and Tacloban similar to the one established at Legaspi Airport.

Table 10.3.1 Suggested Contents of an Airport Operational Manual

- Introduction: purposes and distribution of the manual, etc.
- Technical Administration: identifications, operating hours, runway length etc.
- Aerodrome Characteristics: airport layout, lighting etc.
- Ground procedures
- Rescue and Fire Fighting Plan
- Airport Security Plan
- Meteorological Services
- Air Traffic Control Services
- Communications and Navaids
- Signals and Markings
- Passenger Terminal
- Cargo Handling Terminal
- General Aviation
- Aerodrome Emergency Plan including crisis control
- Facility/Equipment operation/maintenance procedure

10.4 AIRPORT MANAGEMENT SYSTEM

10.4.1 General

To manage and control a sophisticated system as an airport there is a need of various management systems such as:

a) Airport operations and technical system
b) Financial and accounting system
c) Statistical system
d) Airport personnel system
e) Secretarial system

The purpose of these systems is to support the management to reach the goals set up for the operations.

10.4.2 Present Situation

The management group, consisting of airport manager and heads of sections, at some of the studied airports have monthly meetings and sectional meetings.

Inspections of the movement area and airfield lighting systems are conducted every morning at all four airports. Some airports use "airport safety inspection check list" but remarks are not always noted by or passed on to the management or the maintenance unit.

All administrative works including invoicing, financing, salaries and statistics are performed manually. Although a few computers are available at some airports, it seems that the utilization of the computers still is on a primitive level.

10.4.3 Findings

The main findings made during the field study as to airport management system are as follows:

a) Sufficient management systems supporting the management work are not completely established or available.
b) Management group meetings are not performed to the full extent.
c) Procedures of inspections and reporting are not sufficiently established.
d) Computers are not used to the possible extent in the administrative work.

10.4.4 Recommendations

Regarding the findings it is recommended to:

a) Introduce and establish a common management system available to control operations, accounting, statistics and personnel completed with systems and methods to create various key ratios indicating the performance efficiency
b) Provide check lists at all airports and establish standard procedures of inspections and reporting[2]
c) Increase the frequency of inspections[3]
d) Increase the frequency of management group meetings focusing on performance measures[4]
e) Increase the computer utilization in the administrative work and in the performance reporting

10.5 HUMAN RESOURCE DEVELOPMENT SYSTEM

10.5.1 General

As an airport is a highly regulated and technologically sophisticated system it is necessary that personnel at all levels are skilled and well trained for their tasks. It is important that the airport has the

---

[2] The existing checklist shown in Appendix 10.4.1 seems to be sufficient as to the items in the list. When a finding is marked "Not OK", the nature of the finding should be explained in the column "Remarks" and there should be a column where the manager in charge could sign to acknowledge. In addition, the checklist should cover the buildings, building facilities and landside facilities.

[3] Inspection of the runway, taxiways and apron should be made twice a day -- the first inspection before first aircraft movement in the morning and the second before dark in the evening. Inspection of the building, building facilities and landside facilities should be once a day. In addition, inspection of instructions, the qualification of the personnel and certificate system as to adequacy and validity should be made three to four times a year.

[4] The performance measures should employ various key ratios indicating performance efficiency, such as total revenue/employee, total cost/employee, aircraft movements/employee, number of passengers/employee, number of failures/selected time period (day, week, month, year), punctually rate, etc. They should be related to performance goals set up by the management.

opportunities and systems to develop the personnel sufficiently in order to reach the performance standards and quality required.

10.5.2 Present Situation

The obtained information indicates that all training programs for airport personnel is performed by ATO headquarters. It seemed that the existing training programs are sufficient and comprise all classes of personnel. The necessity in this field is recognized for the development of local training, in addition to those performed by ATO headquarters, which aims to adjust the training closely to the local conditions and to create the opportunity to continuously or periodically keep the personnel well trained for their tasks.

10.5.3 Findings

The main findings made during the field study as to human resource development system are as follows:

a) Local personnel training plan is not developed at the four airports.
b) Local training is not performed.

10.5.4 Recommendations

Regarding the findings it is recommended to:

a) Develop a training program as to:
   - Education and training of management staff.
   - Education and training of administrative staff.
   - Education and training of various groups of airport professional staff.
b) Develop special training programs for
   - Operational staff.
   - Crash fire and rescue staff.
   - Security staff.
   - Technical staff.
c) Introduce a certification system for staff working at airside or handling complex equipment and vehicles.
d) Introduce a periodical control of the qualification, i.e., continuous and periodical check of the skill, of staff working at airside or handling complex equipment and vehicles to maintain and increase safety and efficiency.

10.6 AIRPORT MAINTENANCE SYSTEM

10.6.1 General

An airport comprises many various and expensive establishments and technical systems. Functions of many of these systems are vital for air safety and for an efficient operational performance. For these reasons well developed maintenance systems are of great importance at all airports as the continuos reliability and availability of all operational systems are a primary concern for air transportation.

10.6.2 Present Situation

At all four airports it seems to be no systematic approach to the maintenance and no preventive maintenance program or log was found during the field study.

Facilities for major maintenance and repair of vehicles, electrical systems, painting or storage of equipment and spare parts are not available at the airports. Hence major maintenance and repairs have to be contracted out, provided that sufficient fundings are available in the annual budget.

10.6.3 Findings

The main findings made during the field study as to the airport maintenance system are as follows:

a) A comprehensive and systematic maintenance system is not sufficiently developed at the airports.
b) A systematic, preventive maintenance system is not sufficiently developed at the airports.
c) Facilities for major maintenance and repair of vehicles and equipment is not sufficiently available.

10.6.4 Recommendations

Regarding the findings it is recommended to:

a) Introduce a maintenance control program based on the basic components of maintenance:
   - Inspections according to checklists.
   - Periodical servicing and overhaul.
   - Repair.
b) Introduce a program of periodical inspections according to checklists of the various groups of facilities requiring maintenance:
   - Buildings.
   - Pavement sections and unpaved areas.
   - Navaids.
   - Equipment.
   - Vehicles.

c) Introduce an economic control program of maintenance costs per group of facilities and per item in order to keep the cost low and to give opportunity to make correct decisions as to reinvestment

10.7 AIRPORT FACILITATION

10.7.1 General

On an airport many various bodies are involved in common facilitation activities. To ensure an effective utilization of the facilities an efficient coordination between various bodies is of great importance. It is of special importance to coordinate signing system, traffic information system, car parking and ground transportation and caring systems for special categories of passenger (elderly, disabled, small children).

10.7.2 Present Situation

At the four airports it has not been considered required to coordinate the facilitation activities between the various bodies. The probable reasons for this are that the airports are open only for domestic traffic with a few operators.

10.7.3 Findings

The main findings made during the field study as to airport facilitation are as follows:

a) An airport facilitation committee has not been established at any of the four airports.
b) An airport facilitation committee will become necessary as the number of airlines will increase.

10.7.4 Recommendations

Regarding the findings it is recommended to:

- Establish an airport facilitation committee at each of the four airports.

10.8 FINANCIAL CONDITIONS

10.8.1 General

Since an airport consists of very large and expensive establishments and there is a great need of continuos maintenance and a personnel-intensive performance the financial conditions are of great importance for efficient planning and control.

10.8.2 Present Situation

The financial approach is concentrated on accounting and controlling of funding and appropriations which is a fundamental task in a financial system.

The airport manager has to submit a budget estimate to the Financial Department at the ATO Headquarters for examination and approval in due time before the beginning of the fiscal year. This budget estimate comprises all expenses allocated to personnel, services, maintenance and other operating expenses, specified by cost item.

There is no budget concerning revenues made up or processed.

Upon the end of the fiscal year a Statement of Income, Statement of Operating Expenditures and Balance Sheet are compiled for the airport by the accounting staff at the airport.

Tables 10.8.1 through 10.8.4 summarize financial data of the four airports.

Table 10.8.1 Financial Conditions of Bacolod Airport (PHP '000)

Year	1993	1994	1995
Personnel costs	3,737	3,052	3,172
Maintenance and other expenditures	1,351	560	602
Total costs	5,088	3,612	3,774
Revenues collected at the airport	n.a.	80	125

Source: Costs from ATO Headquarters and revenues from the airport office.

Table 10.8.2 Financial Conditions of Iloilo Airport (PHP '000)

Year	1993	1994	1995
Personnel costs	4,026	5,226	5,927
Maintenance and other expenditures	2,746	2,002	2,349
Total costs	6,772	7,228	8,276
Revenues collected at the airport	n.a.	n.a.	6,574

Source: Costs from ATO Headquarters and revenues from the airport office.

Table 10.8.3 Financial Conditions of Tacloban Airport (PHP '000)

Year	1993	1994	1995
Personnel costs	4,026	5,226	5,927
Maintenance and other expenditures	2,746	2,002	2,349
Total costs	6,772	7,228	8,276
Revenues collected at the airport	626	295	695

Source: Costs from ATO Headquarters and revenues from the airport office.

Table 10.8.4 Financial Conditions of Legaspi Airport (PHP '000)

Year	1993	1994	1995
Personnel costs	3,963	5,099	5,949
Maintenance and other expenditures	1,409	780	898
Total costs	5,372	5,879	6.847
Revenues collected at the airport	301	1,065	1,911

Source: Costs from ATO Headquarters and revenues from the airport office.

The various items of revenues from the airport operations are:

a) Aircraft landing and take off charges
b) Aircraft terminal parking fees
c) Operational charges
d) Passenger service charge
e) Rentals of building, areas and land
f) Concession privilege fees
g) Utilities services
h) Miscellaneous

Passenger service charges revenues are not included in the total revenue of the airport because they are collected by ATO Headquarters and not allocated to the airport. Therefore the difference between total revenues and total costs at the airports does not represent the true profit or loss of the airports.

The charges have been increased in 1995 and 1996 but can still be regarded relatively low.

Many airports world-wide have traditionally been owned by the governments. Over the last period of years these airports have experienced increasingly degree of severe funding constraints but still under pressure to improve both quality and scale of services. This has required the airports to be managed in a more commercial manner. The ATO airports need to follow the similar path and secure increased revenues through efficiency and improvements.

10.8.3 Recommendations

Regarding the findings and in order to improve the financial condition of the four airports, the following are recommended:

a) Set up profit/loss goals
b) Keep record of costs and revenues on airport basis in order to calculate the true profit or loss.

c) Introduce cost-based pricing according to ICAO recommendations[5].

d) Increase the number of possible and profitable commercial services.

e) Set up various cost reduction goals.

f) Increase productivity by a higher degree of training and integration between the various classes of staff.

[5] Refer to ICAO, Airport Economics Manual (Doc 9562).

Chapter 11 Recommendations for Unselected Airports

CHAPTER 11 RECOMMENDATIONS FOR UNSELECTED AIRPORTS

11.1 ILOILO AIRPORT

As a result of the master planning study of the existing Iloilo Airport development, it can be concluded that the development of the existing airport is economically feasible, but have some problems in environmental protection. It is, therefore, recommended to take the following actions as soon as possible.

a) Review the ongoing and planned projects and suspend (or decrease the scale of) the major projects which aim to increase the airport capacity.

b) Conduct a site selection study for a new airport and decide the optimum airport site (including the existing site).

c) Prepare and authorize a long term master development plan of Iloilo Airport at the selected site.

d) Conduct a detailed feasibility study on the Medium Term Development of the airport including environmental impact assessment.

e) Approve the Medium Term Development, and initiate financial arrangements.

f) Implement the Medium Term Development.

11.2 TACLOBAN AIRPORT

As a result of the master planning study of Tacloban Airport development, it can be concluded that the development of the existing airport is economically feasible in long term. Development of the airport facilities is an urgent requirement to cope with the increasing demand. It is, therefore, recommended to take the following actions as soon as possible.

a) Authorize the proposed master development plan.

b) Review the ongoing and planned projects and adjust them (if necessary) to suit to the master plan.

c) Conduct a detailed feasibility study on the Medium Term Development including environmental impact assessment.

d) Approve the Medium Term Development, and initiate financial arrangements.

e) Implement the Medium Term Development.

11.3 LEGASPI AIRPORT

As a result of the master planning study of the existing Legaspi Airport development, it can be concluded that the development of the existing airport is economically and environmentally infeasible due to the hill

obstacle removal required for the operational safety. It is, therefore, recommended to take the following actions as soon as possible.

a) Review the ongoing and planned projects and suspend the major projects which aim to increase the airport capacity such as runway extension to 2,400m.

b) Establish Standard Instrument Approach procedures using the existing air navigation facilities so as to improve usability of the airport.

c) Conduct a site selection study for a new airport.

d) Prepare and authorize a long term master development plan of the new airport.

e) Conduct a detailed feasibility study on the Medium Term Development of the new airport including environmental impact assessment.

f) Approve the Medium Term Development, and initiate financial arrangements.

g) Implement the Medium Term Development.

11.4 AIRPORT OPERATIONS MANAGEMENT AND TRAINING

As a result of the study on airport operations management and training for the four airports it is recommended to take the following actions as soon as possible.

a)	Organization and Staffing:	Reduce the number of airport staff by stopping new employment, increase degree of integration between staff by training, review the staffing with adequate planning procedures, adjustment in relation to operating hours and more use of computers
b)	Airport Operating System:	Prepare airport operations manual, emergency plan and security plan, and establish Air Rescue Organization
c)	Airport Management System:	Introduce common management systems, increase management group meetings and increase the frequency of inspections
d)	Human Resource Development:	Develop local training programs, introduce certification system and introduce periodical control of staff's qualification
e)	Airport Maintenance System:	Introduce maintenance control program, introduce a program of periodical inspections, and introduce an economic control program of maintenance
f)	Airport Facilitation:	Establish an airport facilitation committee
g)	Airport Finance:	Set up profit/loss goals, keep record of costs and revenues on airport basis, introduce cost-base pricing and exploit profitable commercial services

PART III

FEASIBILITY STUDY ON THE SELECTED PROJECT

PART III

FEASIBILITY STUDY ON THE SELECTED PROJECT

Chapter 12 Planning and Preliminary Design of the Selected Project

CHAPTER 12 PLANNING AND PRELIMINARY DESIGN OF THE SELECTED PROJECT

12.1 GENERAL

Facility planning and preliminary design for the Medium Term Development Project of the new airport at about 5km east of Silay City have been conducted based on the Long Term Development Plan established in Chapter 5. The main purpose of the planning and design of the facilities is to describe the facilities sufficiently for cost estimation and environmental impact assessment in a feasibility study.

This chapter consists of the following sections.

a) Development of Master Plan
b) Civil Works
c) Building Works
d) Air Navigation Systems
e) Airport Utilities
f) Construction Plan

12.2 DEVELOPMENT OF MASTER PLAN

12.2.1 Review of Overall Airport Layout

The airport layout plan in Chapter 5 was prepared on the basis of the minimum facility requirements anticipated in the year 2015 so that it can be compared with the development of the existing airport which has limited expandability in the future. The new airport should, however, be able to cope with the ever growing demand as long as possible after the year 2015. Therefore, overall airport layout is reviewed to make the following provisions for the future:

a) construction of parallel taxiway
b) accommodation of B747 class aircraft
c) extension of runway up to 3,200m
d) expansion of terminal area

Provisions for items a) and b) are possible at the proposed Site 3 without any difficulties. In accordance with ICAO Annex 14, the minimum separation distance between the centerlines of the runway and the future parallel taxiway should be 182.5m for Code 4E, and that between the parallel taxiway centerline to object should be 47.5 m. Allowing 10m wide area for perimeter road and fence, the land area up to 240m from the runway centerline should be acquired for the future parallel taxiway provision.

Runway extension up to 3,200m is also possible by extending 600m each end of the runway. The runway extension at the Runway 03 will require a diversion of a creek of about 3m wide. If the runway is relocated to avoid diversion of this creek, other creek(s) will be affected and/or noise pollution at the residential area of La Purisima (including an elementary school) will increase significantly as shown in Figure 12.1.1. Therefore, no relocation of the runway is recommended.

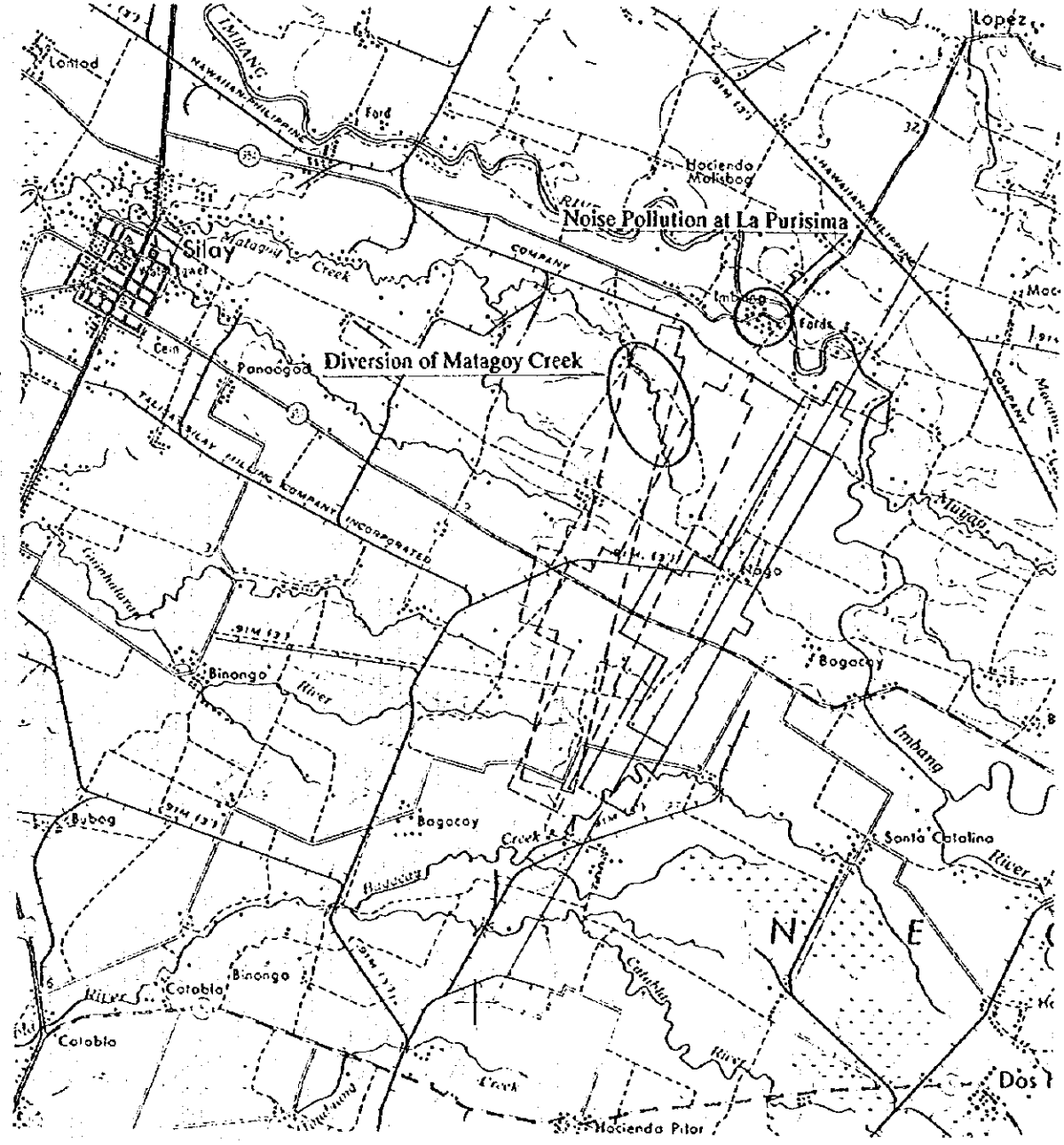


Figure 12.1.1 Alternative Locations of New Airport

Planning of the terminal area is described in the following section. Figure 12.2.2 shows the revised airport master plan for the New Bacolod Airport.

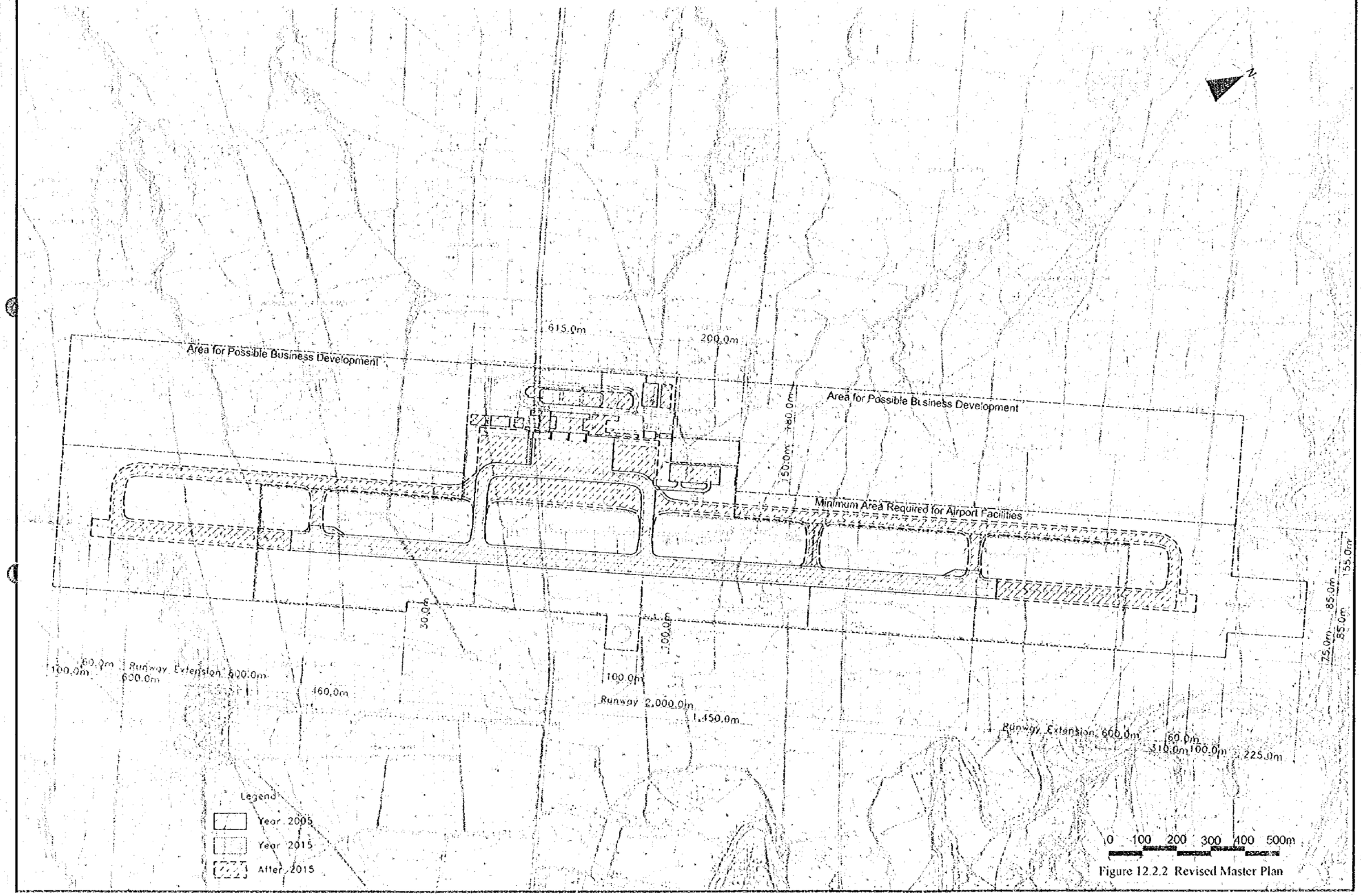


Figure 12.2.2 Revised Master Plan

The master plan indicates both the minimum land area required for the airport facilities and the areas to be reserved for possible business developments in the direct vicinity of the airport. The business developments in the direct vicinity of the airport may be used as a system to return a part of the profits from investment for the new airport to the GOP. However, the land acquisition for these areas is not included in the project cost, and the profits from such business developments are also not included in the Study.

Figure 12.2.3 shows the airport facility layout plan in the initial phase only.

12.2.2 Layout Planning of Terminal Area

The following facilities should be located in the terminal area:

a) passenger loading apron;
b) passenger terminal building;
c) public car park and taxi pool;
d) cargo terminal building;
e) control tower and administration building;
f) fire station;
g) fuel farm;
h) main power house;
i) water reservoir and elevated tank;
j) general aviation buildings/hangars; and
k) canteens/concessionaires.

In order to provide maximum flexibility in the future developments and smooth traffic flow in the terminal area, the terminal area land use zoning and road network are studied. The following are the major considerations made during the layout planning.

a) The passenger loading apron should be located in the central part of the terminal area to provide the maximum expandability on both sides. The landside edge of the apron should be located at 357.5m from the runway centerline so that B747-400 can be accommodated in the future without infringing the transitional surface.
b) The passenger terminal building and associated car park should be located in the central part of the terminal area to provide the maximum expandability on both sides. A 25m wide space, for utilities, GSE parking and apron service traffic, should be provided between the apron and terminal building. Width of the passenger terminal building will be about 60m including curb. The roads and car park will require about 90m wide space in front of the passenger terminal building.

c) The control tower should be located near to the northeastern boundary of the terminal area so as to provide the best visibility of the both runway ends. It should be located at the boundary of airside and landside so as to provide access to the both sides.

d) The fire station should also be located near to the northeastern boundary of the terminal area so as to provide the best accessibility to the both ends of the runway. Its location should not obstruct the future expansion of the airside facilities.

e) The cargo terminal building will, then, be located in the area to the southwest of the passenger terminal building maintaining a space for future expansions of passenger and cargo terminal buildings.

f) The fuel farm will be located to the northwest of the control tower and fire station so that all the area to the southwest of the cargo terminal can be used for long term future development without any difficulties. A road outside of the terminal area will provide an access for tanker trucks transporting the fuel to the airport without passing in front of the passenger terminal building.

g) The general aviation area will be located on the northeast of the control tower and fire station. A 148m x 54m general aviation apron is planned to accommodate nine twin-engine aircraft which is about a half of the number of general aviation aircraft stationed at Bacolod at present.

h) An area to the northwest of the car park (about 35m wide space between the road and fence) will be reserved for canteens and other concessionaires.

Figure 12.2.4 shows the proposed facility layout in the terminal area. The land area reserved in the master plan can accommodate more than 100% increase of the passenger and cargo terminal area without any problems. If further expansion is required, the terminal will be expanded toward the south by relocating the cargo terminal further to the south.

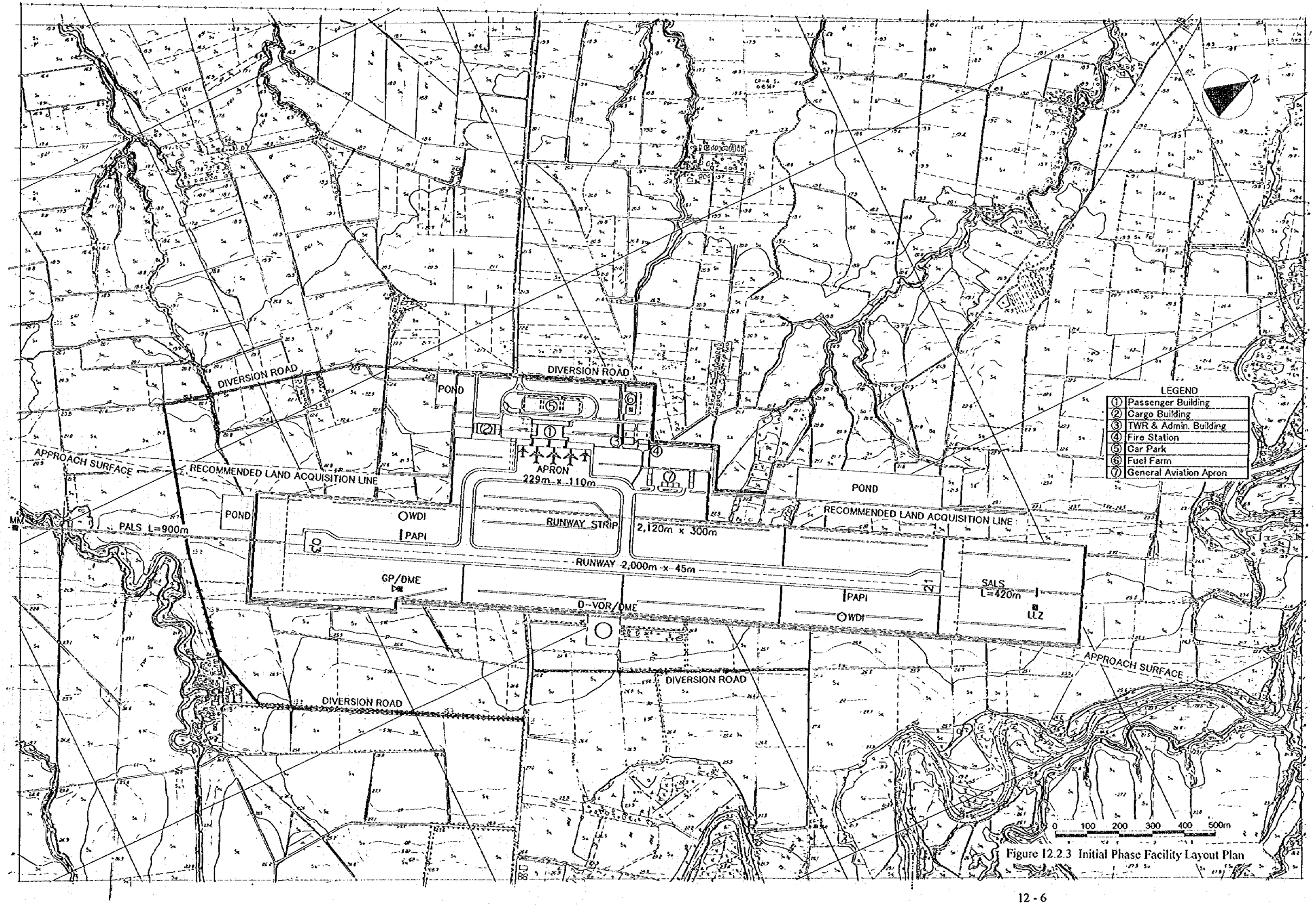


Figure 12.2.3 Initial Phase Facility Layout Plan

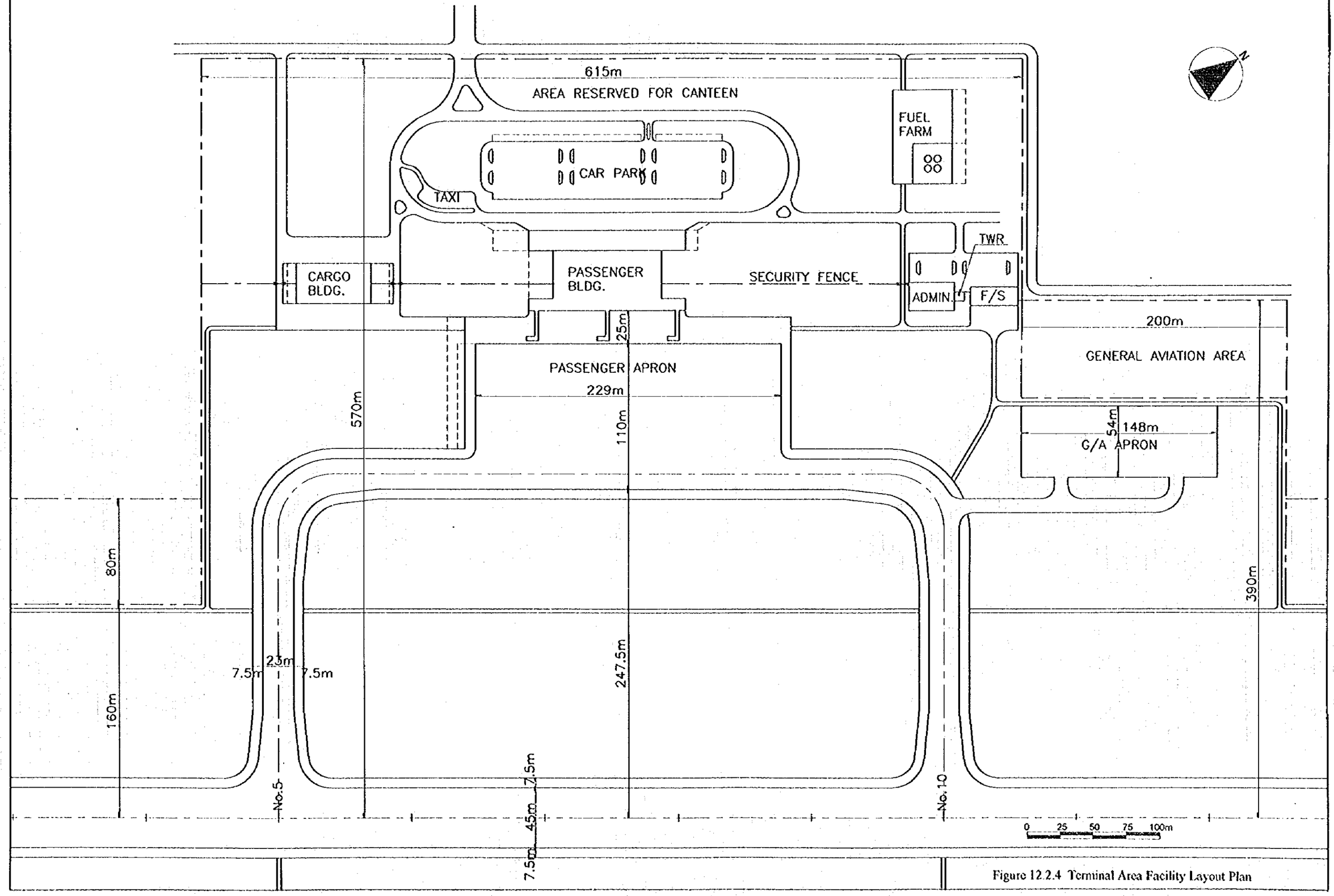


Figure 12.2.4 Terminal Area Facility Layout Plan

12.2.3 Land Use Zoning for Airport Surroundings

Some public control of land in the vicinity of the airport is necessary for:

a) controlling obstacles or hazards; and

b) ensuring the minimum interference to the environment and the public.

With regard to the control of obstacles or hazards, construction works under the obstacle limitation surfaces described in Section 4.2.4 should be controlled. Special attention should be given to the works under the inner approach surfaces and transitional surfaces. Construction of any structures which penetrate the obstacle limitation surfaces should not be permitted unless it would be shielded by an existing immovable object.

In addition to the height limitation, some control is necessary for the following:

a) uses which would cause electrical interference with radio communications and navigational aids;

b) lights which might confuse pilots in the clear interpretation of aeronautical lights; and

c) smoke which reduces visibility.

At present Caneland Sugar Central, a sugar mill factory to the north of the new airport, emits sometimes very dark smoke. In order to minimize the influence to the visibility, smoke emission should be controlled in accordance with the standards and regulations of the DENR.

With regard to interference to the environment and the public, zoning based on the noise sensitivity of various land use and activities is essential. From the estimated aircraft noise contours in the future (refer to Chapter 13) it is recommended to use the area of about 600m x 6km around the runway be used for agricultural, industrial and/or outdoor recreational purposes. New development of residential areas should not be permitted within this area.

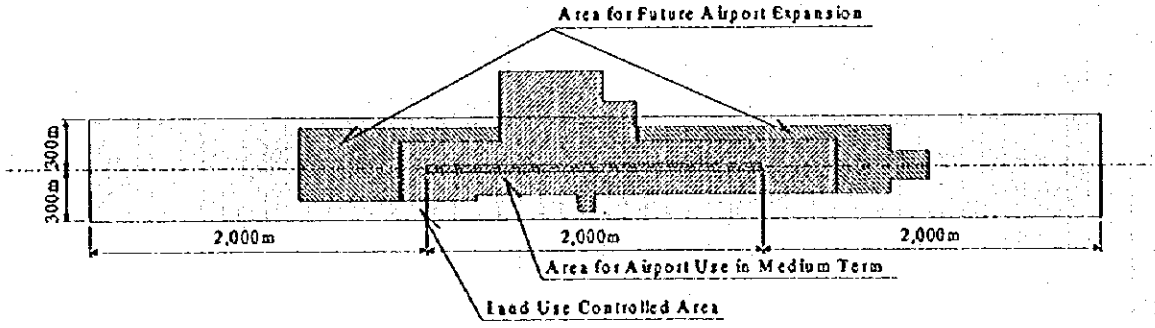


Figure 12.2.4 Proposed Area to Be Controlled Land Use

Figure 12.2.5 shows a suggested land use zoning around the airport and access road. It also indicate the major existing roads, roads planned by the Province and the City, and proposed additional roads.

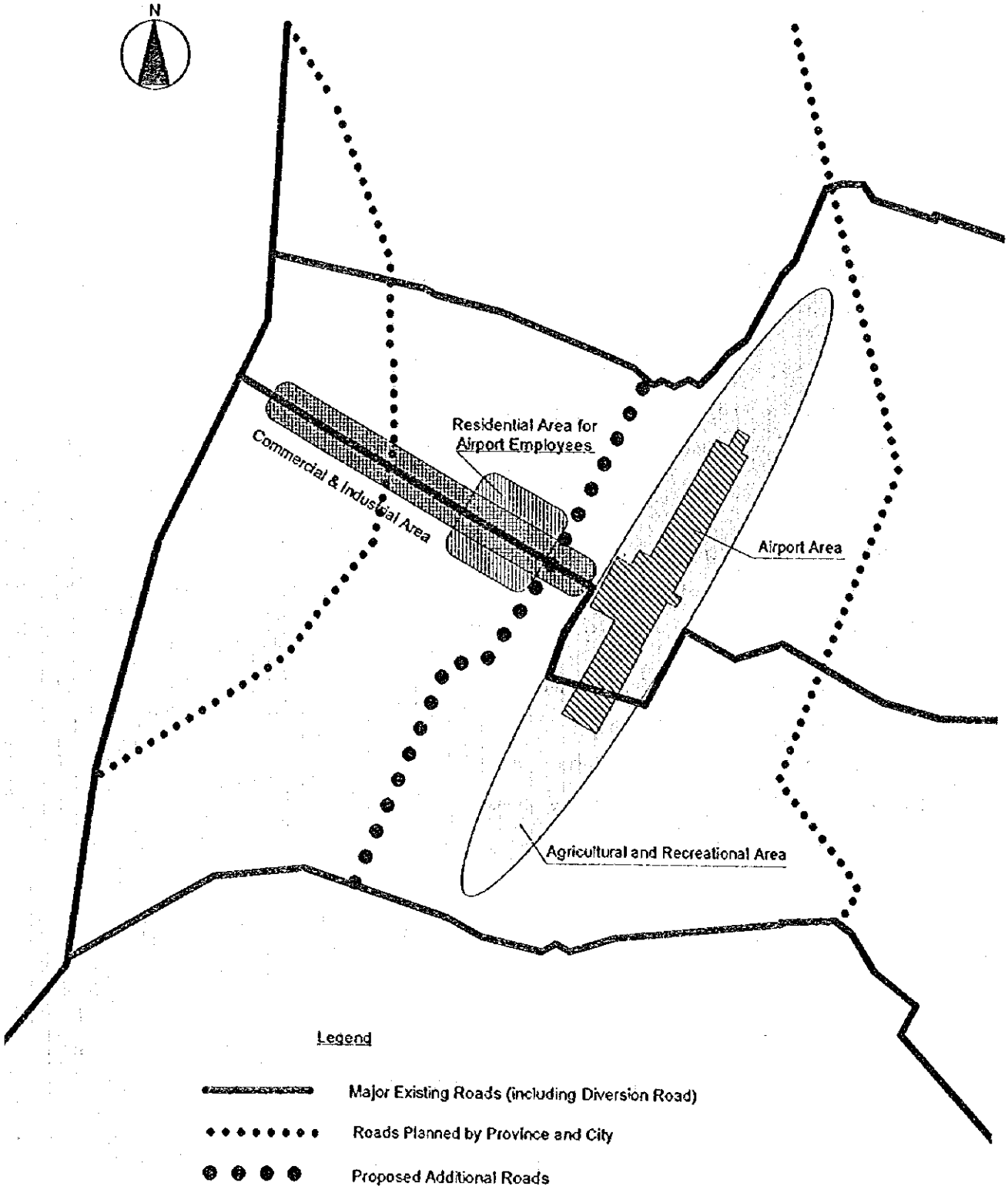


Figure 12.2.5 Suggested Land Use Zoning around the Airport and Access Road

12.3 CIVIL WORKS

12.3.1 Runway, Taxiway and Apron

1) Runway

The dimensions of the runway should be 2,000 m x 45 m with a 7.5 m shoulder on each side, in accordance with ICAO Annex 14. The slopes of the runway and its shoulders should conform to the recommendations of Annex 14, and the maximum transverse slopes used in the preliminary design are as follows:

a) Transverse Slope of Runway: 1.3%

b) Transverse Slope of Runway Shoulder: 2.0%

Figures 12.3.1 through 12.3.3 show the longitudinal profile and typical cross sections of the runway.

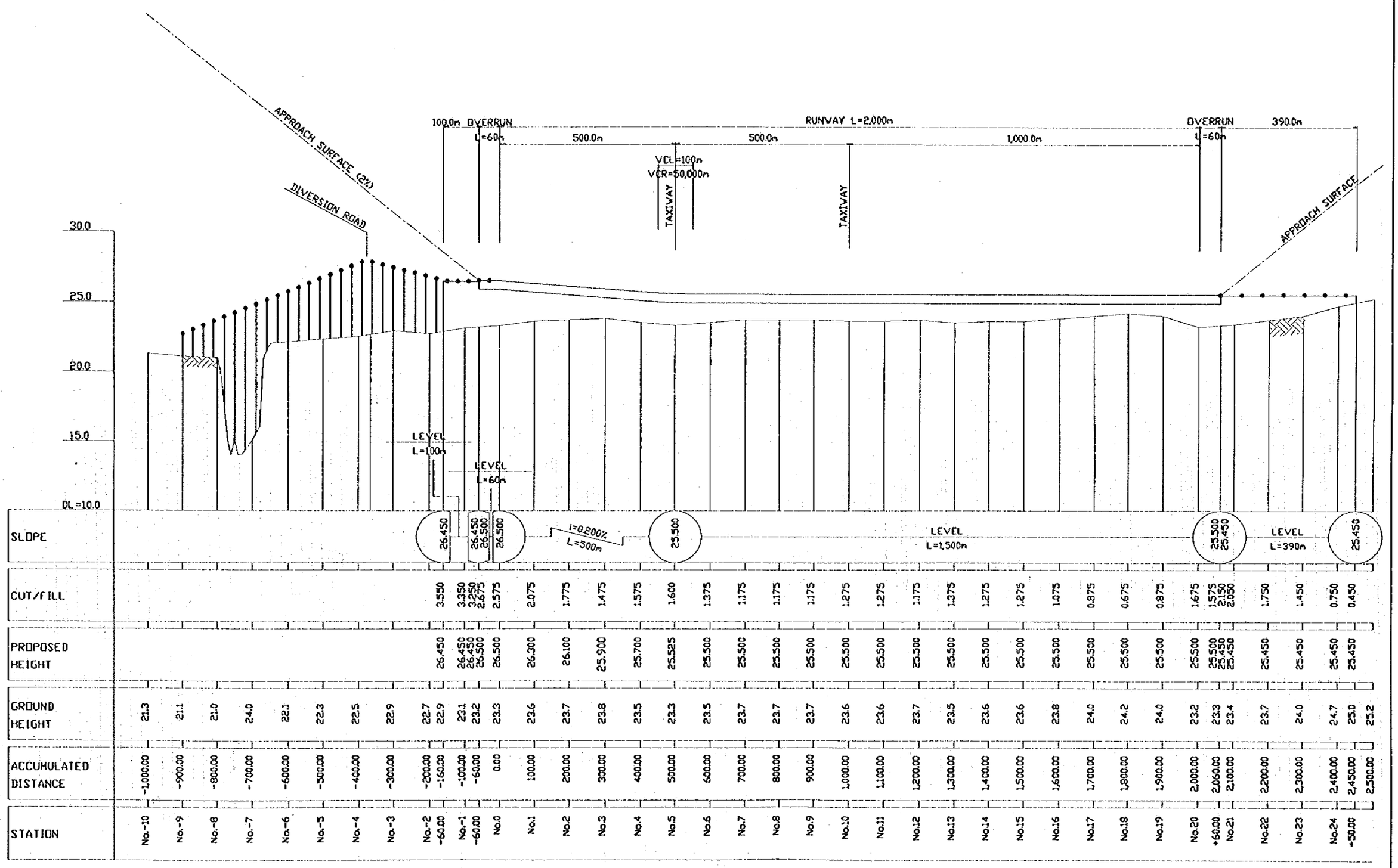
2) Taxiway

Two exit taxiways are planned at 500m and 1,000m from the Runway 03 threshold considering the future taxiway system, which consists of a full parallel taxiway and five exit taxiways at 500m intervals. The width of taxiways should be at least 23 m with a 7.5 m shoulder on each side in accordance with Annex 14. The slopes of the taxiways should conform to the recommendations of Annex 14, and the maximum transverse slopes used in the preliminary design are the same as those for the runway. Figures 12.3.2 through 12.3.4 show the typical cross sections and longitudinal profile of the taxiway.

3) Apron

The dimensions of the passenger loading apron should be 229m x 110m so as to accommodate three A300 and two A320 class aircraft. The slopes of the apron should not exceed 1%, which is the recommended practice of Annex 14. In order to minimize the volume of fill, a very gentle slope of 0.6% is used for the apron in the preliminary design. Figure 12.3.2 shows the typical cross sections of the aprons.

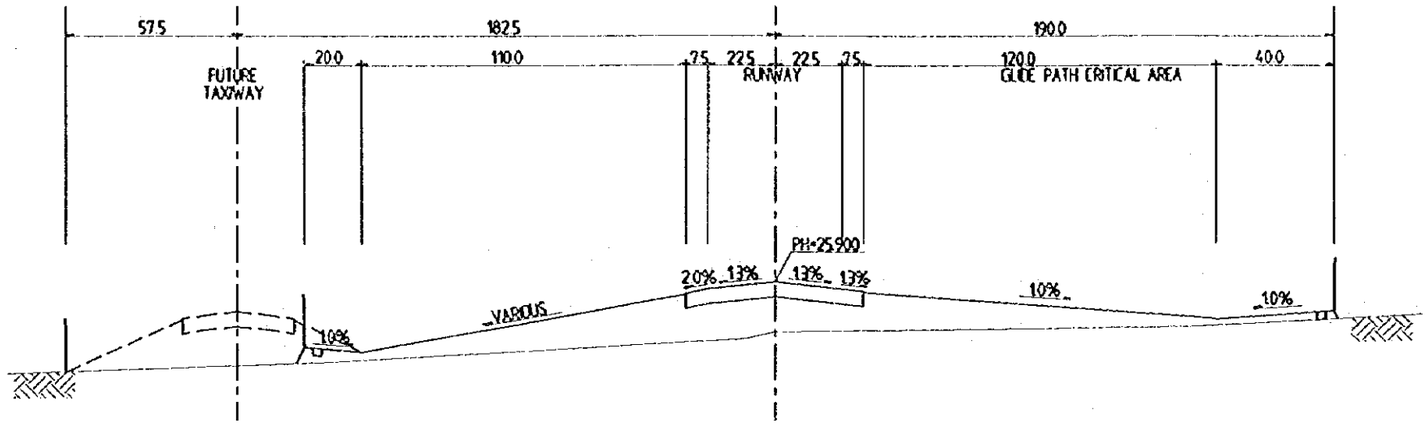
The general aviation apron should be 148m x 54m to accommodate nine twin engine general aviation aircraft.



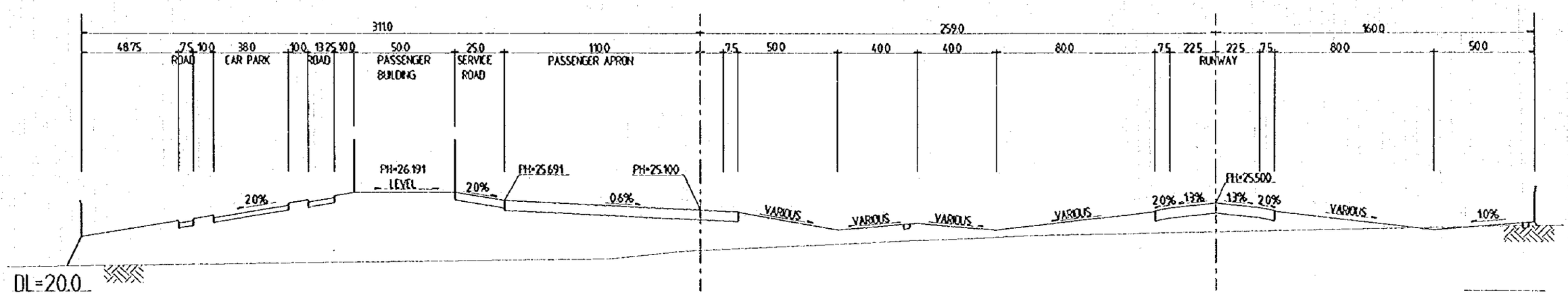
Scale V = 1/250, H = 1/10,000

Figure 12.3.1 Runway Profile

No. 3



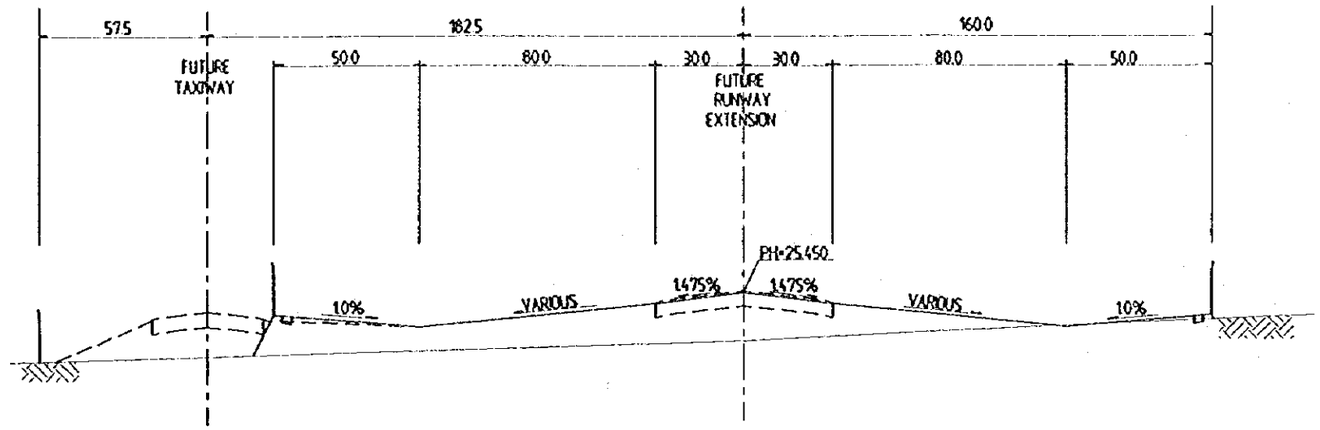
No. 7



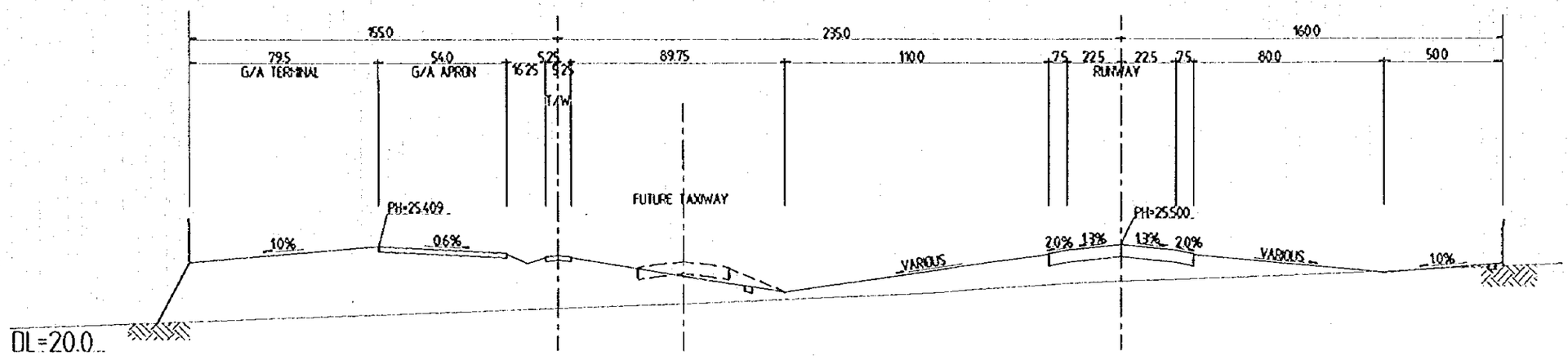
Scale V = 1/250, H = 1/2,000

Figure 12.3.2 Typical Cross Sections (1)

No. 21

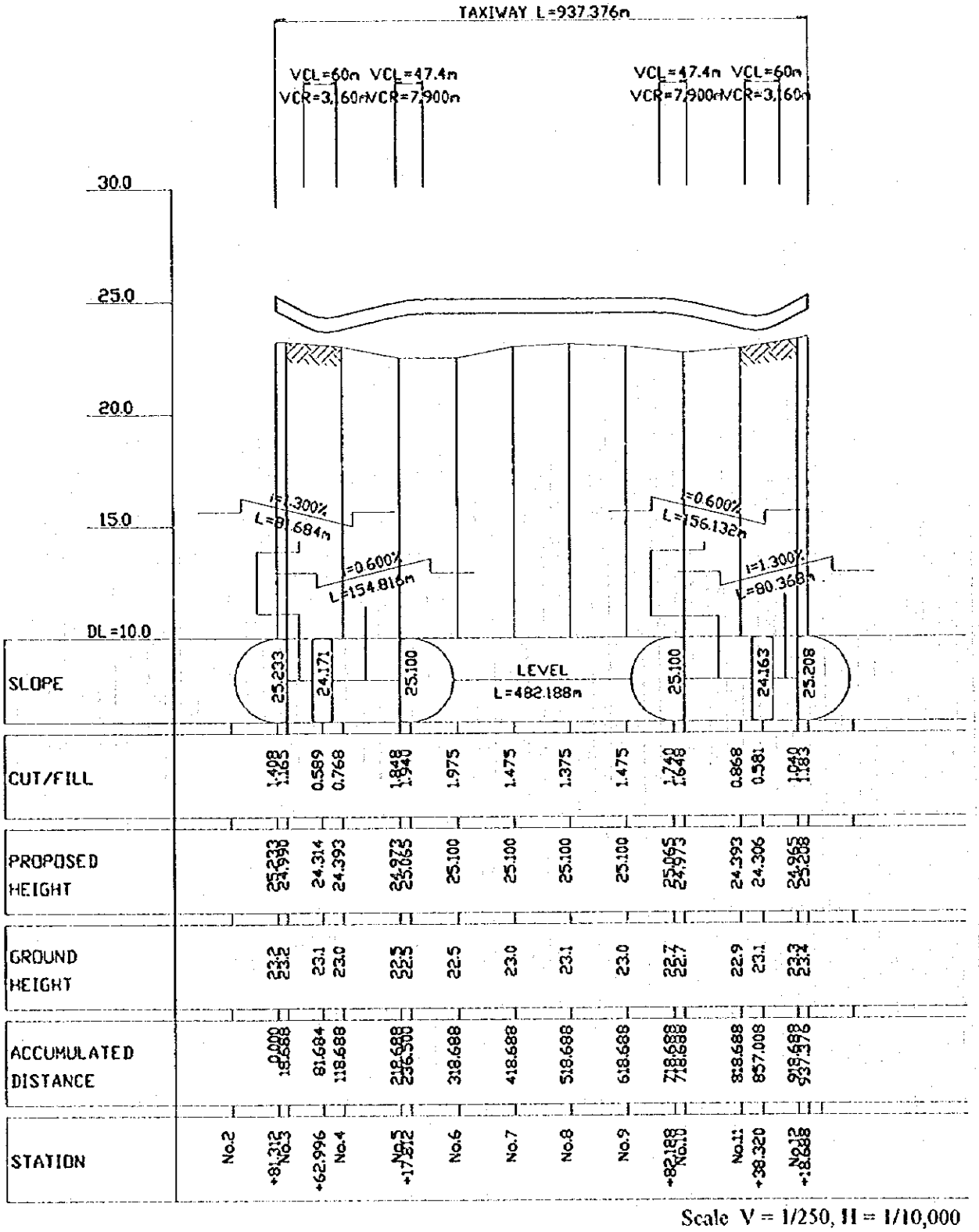


No. 11



Scale V = 1/250, H = 1/2,000

Figure 12.3.3 Typical Cross Sections (2)



Scale V = 1/250, H = 1/10,000

Figure 12.3.4 Taxiway Profile

3) Pavement Design

The pavement of the runway, taxiways and passenger loading apron should be designed for the aircraft movements anticipated in the 20-year period. Taking an A320 as the design aircraft, equivalent annual departures are estimated as shown in Table 12.3.1 from the forecast aircraft movements in the year 2010.

Table 12.3.1 Calculation of Equivalent Annual Departures

Aircraft	Average Annual Departure	Conversion Factor	Dual Gear Departures	Wheel Load (kg)	Equivalent Annual Departures
A300-B4	2,405	1.7	4,089	16,162	4,414
A320-200	1,750	1.0	1,750	15,868	1,750
Total					6,164

The proposed elevations of the runway, taxiways and aprons are generally higher than the existing ground level in order to provide good surface water drainage. The subgrade of the pavements will, therefore, be constructed on the fill material. The soil investigations of the new airport site indicate that the soils around the site are mainly silty clays and silty/clayey sands (classified as CL, SC or SM). Assuming that the fill material will be similar to the soils at the new airport site, the following subgrade conditions are assumed:

a) Design CBR of Subgrade: 6.0%

b) Design K-value of Subgrade: 40 MN/m^3 (= 4kg/cm^3)

In this preliminary design, rigid pavements are used for the aircraft pavement because the thickness of rigid pavement is generally less than that of flexible pavements and suitable where the ground water level is high. Typical design of the pavement for runway, taxiway and passenger loading apron based on the FAA's practices is estimated as follows (refer Appendix 12.3.2 for more details):

a) Concrete Flexural Strength: 700psi (= 49kg/cm^2)

b) K on Top of Subgrade: 250pci (= 6.9kg/cm^3)

c) Typical Pavement Structure: 35cm Poltland Cement Concrete Slab
27.5cm Subbase Course (Mod. CBR ≥ 45%)

Typical pavement structures for runway edge portion, shoulder, apron service road and general aviation apron are also prepared and shown in Figure 12.3.5.

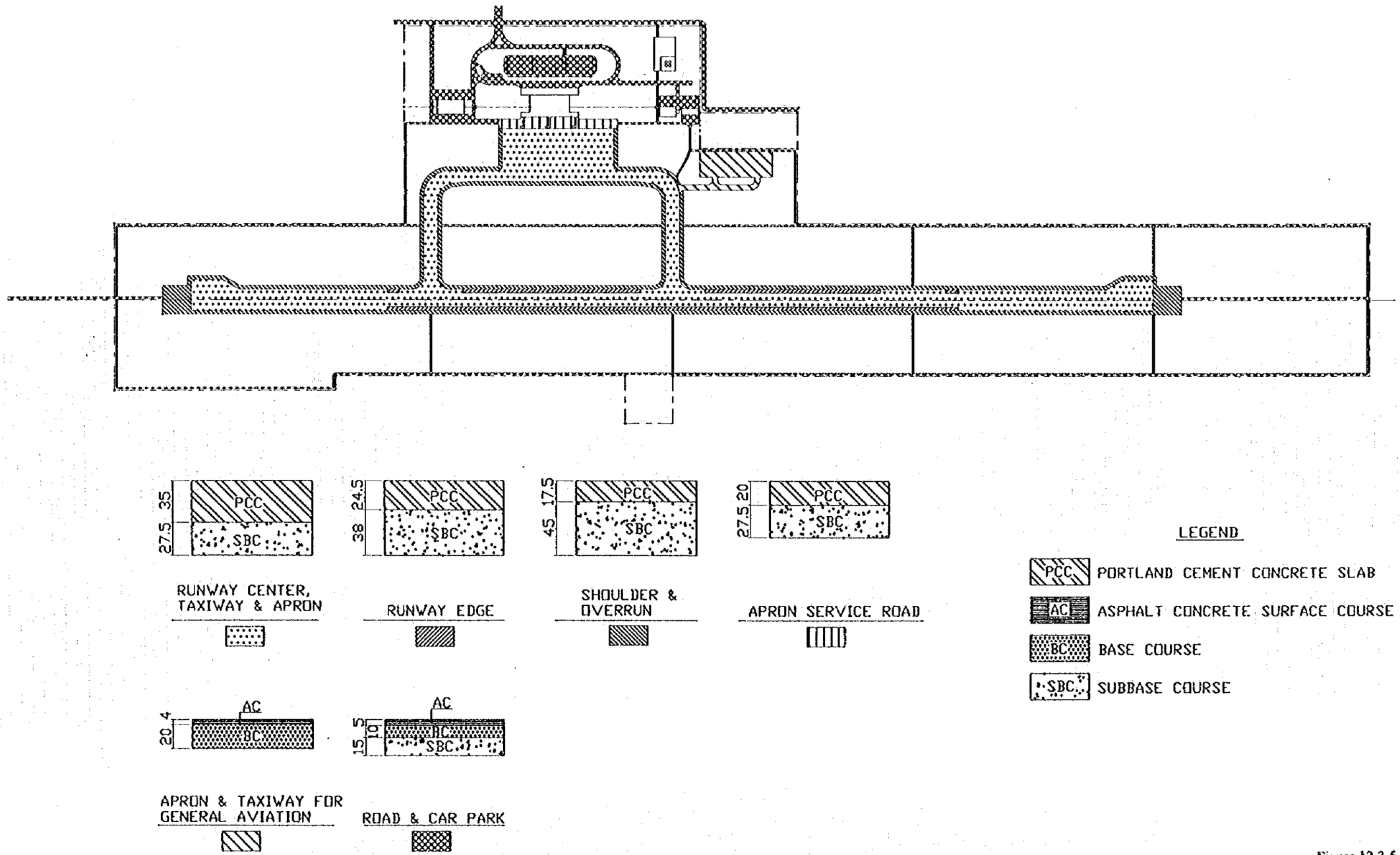


Figure 12.3.5 Pavement Plan

The pavement for runway, taxiway and passenger loading apron should have a strength rating of PCN 53 R/C/W/T (equal to ACN of A300-B4 at gross weight 140tons).

12.3.2 Roads and Car Parks

1) Terminal Road

The terminal road will be a 6.5m wide two lane road except at the terminal frontage. The terminal frontage road will require a 3.5m standing lane and a 3.25m weaving lane in addition to the two through lanes. Therefore, its width will be 13.25m.

2) Car Park

The car park will be separated into two areas, one as a public car park and another as a taxi pool. The public car park will have 300 parking lots. Size of a parking lot will be 2.5m x 5.0m, and width of the driveways in the car park will be 6.0m. The taxi pool will be able to accommodate 20 taxis.

3) Airside Service Road

Airside service roads will be provided along the airport perimeter (except for the landside of the terminal area), between the perimeter road and the runway, between the perimeter road and the GP, along the PALS and SALS, and between the fire station and the taxiway. The service road will be 3 m wide and paved for all-weather service.

4) Diversion Roads

In order to compensate the closure of the existing roads, the diversion roads are planned as shown in Figure 12.3.6. The diversion roads will be constructed to the similar or better standards than the existing ones.

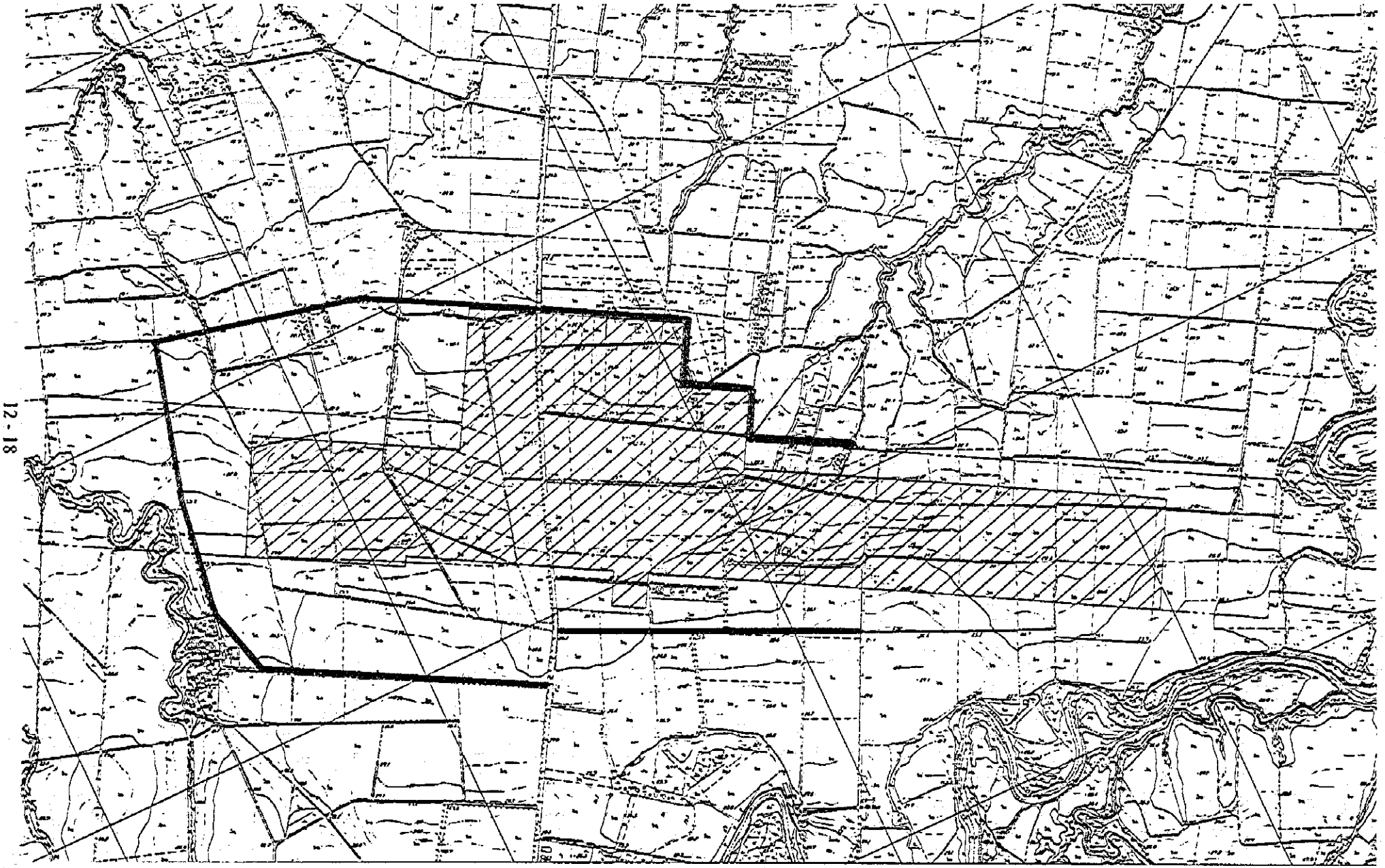


Figure 12.3.6 Layout of Diversion Roads

6) Pavement Design

The pavements of the roads and car parks should be capable of withstanding anticipated traffic for 10 years from the inauguration date. The average daily traffic of large vehicles (buses and trucks) in the terminal was estimated from the traffic survey results and the air traffic demand forecast for the year 2005 as follows:

a) Design day passengers in 2005: 3,340 passengers
b) Unit demand of vehicle traffic 1.5 vehicles per passenger
c) Proportion of large vehicles: 1.5%
d) Daily traffic of large vehicles: 3,340 x 1.5 x 0.015 = 75

Typical design of the pavement based on the Asphalt Pavement Manual of the Japan Road Association is as follows:

a) Design CBR of Subgrade: 6%
b) Traffic Volume: L class
c) Typical Pavement Structure: 5cm Asphalt Concrete Surface Course
(refer to Figure 12.3.4) 10cm Base Course (Mod. CBR ≥ 80%)
15cm Subbase Course (Mod. CBR ≥ 30%)

12.3.3 Site Preparation and Storm Water Drainage

1) Grading Plan

(1) Runway Strip

A runway strip of 2,120 m x 300 m should be provided for the new runway. The runway strip should be graded so as to create a storm water drainage system. The maximum slopes of the runway strip should be in accordance with the recommendations in ICAO Annex 14. The minimum slope of 1.0% for surface drainage of the runway strip was used in the preliminary design.

(2) Taxiway Strip

An area within 40.5 m from the taxiway centreline should be graded in accordance with the recommendations for taxiway strips in Annex 14.

(3) ILS Glide Path and Localizer Areas

The grading of the ILS Glide Path and Localizer critical areas has been designed within the following ranges of slope:

a) Glide Path Critical Area :

Longitudinal Slope: +1.5% to -1.5%

Transverse Slope: 0% to -1.5%

b) Localizer Critical Area :

Longitudinal Slope: 0% to -1.5%

Transverse Slope: +1% to -3%

(4) Terminal Area

The slope of terminal area has been designed to have down slope in a general easterly direction. The slope of the car park will not exceed 2%.

2) Storm Water Drainage

(1) Basic Concept

Surface water of the new airport site generally flows from the east to the west, and collected by four major creeks at present. Two creeks to the north of the access road are branches of Matagoy Creek, and two creeks in the south are branches of Binonga Creek. The catchment areas of these four creek are illustrated in Figure 12.3.7. Parts of Northern and southern future expansion areas are in the catchment areas of Imbang River and Bagacay Creek respectively.

Catchment areas of the storm water drainage system of the new airport are planned so as to maintain almost the same catchment area for each creek as shown in Figure 12.3.8. However, the runoff will be increased due to the development of the airport (new buildings and pavements will increase the runoff coefficient, and the new drainage system will concentrate the discharge in the shorter period of time). In order to minimize the change of flow volume and to avoid flooding and irrigation problems downstream, regulation ponds will be constructed.

(3) Layout of Drainage Facilities

The storm water drainage system is laid out to minimize the culvert crossing the runway and taxiways considering the construction cost and ease of maintenance.

Figure 12.3.7 Catchment Areas of Existing Creeks

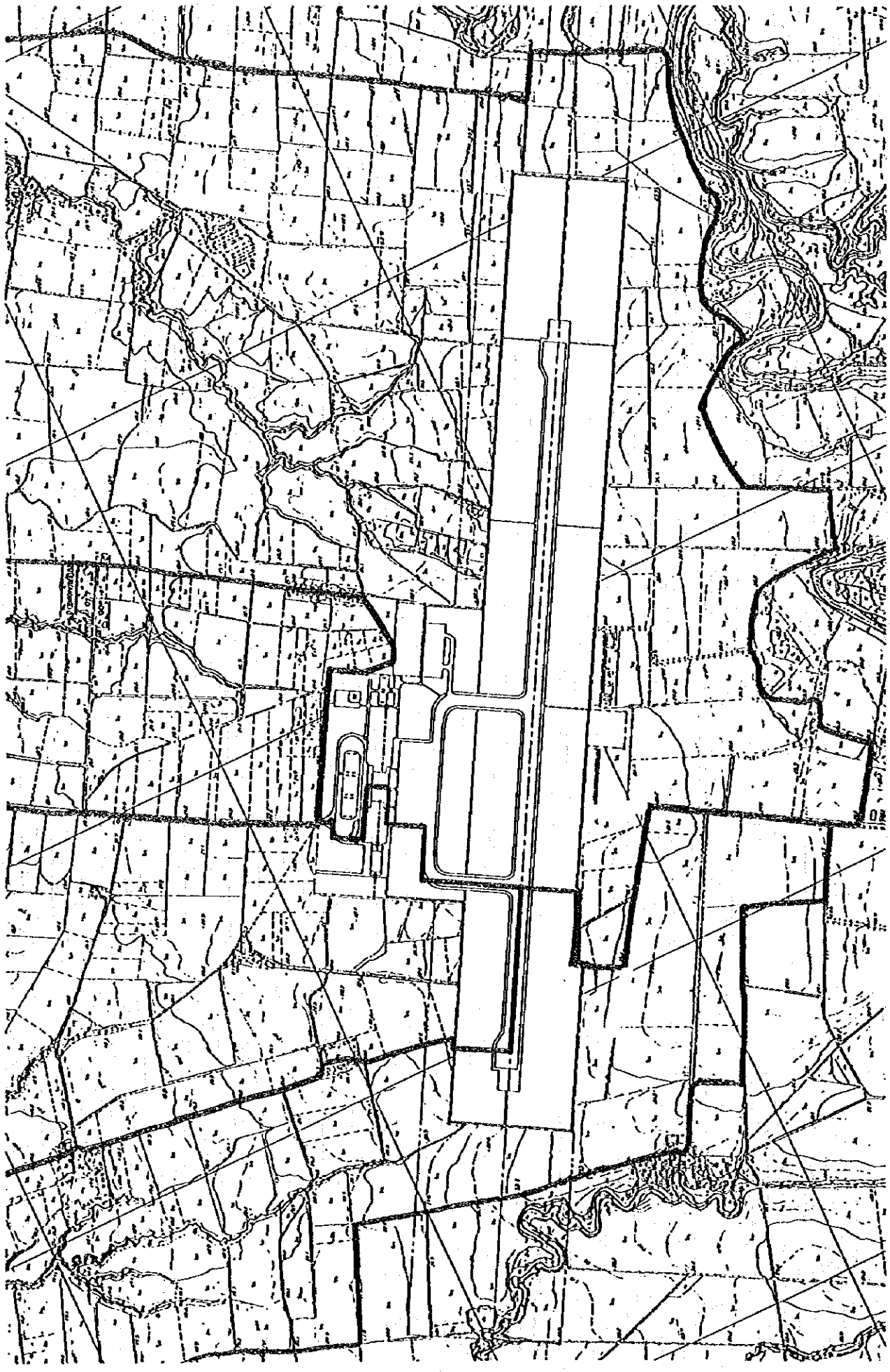


Figure 12.3.8 Catchment Area for Storm Water Drainage

Trapezoidal channels are planned along the western perimeter of the airport so as to collect the surface water from the west before the water flows into the airport. For the drainage of the runway strip, trapezoidal channels are also laid out at more than 105m from and generally in parallel with the runway centerline. An additional trapezoidal channel is planned in the area surrounded by the runway and taxiways so as to lower the pavement elevations (reduce the fill volume). A box culvert is planned for crossing the runway and taxiway. Pipe culverts will be used where the drainage systems crossing the roads. Trapezoidal channels and pipe culverts are laid out at strategic locations within the terminal area.

A stabilization pond is planed at the outfall of each airport drainage system. Since the site is quite flat, the stabilization ponds will be constructed by excavating the existing ground.

Figure 12.3.9 shows an outline of the storm water drainage facility layout.

(3) Sizing of Drainage Facilities

The sizes of drainage facilities are planned from hydraulic calculations based on the following parameters (further details are shown in Appendix 12.3.1.).:

a) Return Period of Design Rainfall: 5 Years

b) Rainfall Intensity Duration Curve: As shown in Figure 12.3.10.

c) Runoff: $Q = 1/360 \times C \times I \times A$

where, Q: Runoff (m^3/sec.)
C: Runoff Coefficient
I: Rainfall Intensity (mm/hr)
A: Catchment Area (ha)

d) Runoff Coefficient:
Pavement Area : 0.95
Building Area : 0.90
Turf Area : 0.50 (clayey soil)

The sizes of regulation ponds are planned based on the following parameters (further details are shown in Appendix 12.3.2.).:

a) Return Period of Design Rainfall: 5 Years

b) Long Term Runoff Coefficient: 0.8

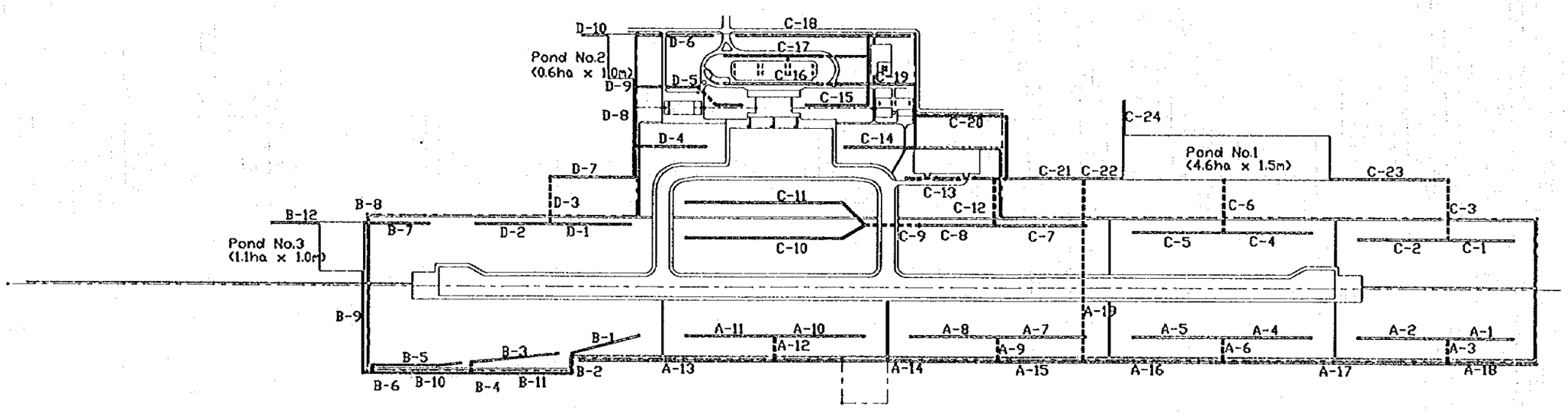
c) Allowable Volume of Discharge: Equivalent to runoff of 50.6 mm/hr rainfall
(It is assumed that the existing creeks can discharge the runoff of 2-year return period 1hr rainfall.)

No.	Size (W x H)	Length (m)
A-1	T - 1.3 x 0.8	150
A-2	T - 1.3 x 0.8	200
A-3	P - 0.8 x 5	50
A-4	T - 1.3 x 0.8	200
A-5	T - 1.3 x 0.8	200
A-6	P - 0.8 x 5	50
A-7	T - 1.3 x 0.8	200
A-8	T - 1.3 x 0.8	200
A-9	P - 0.8 x 5	50
A-10	T - 1.3 x 0.8	200
A-11	T - 1.3 x 0.8	200
A-12	P - 0.8 x 5	50
A-13	T - 2.0 x 1.0	430
A-14	T - 4.7 x 1.5	500
A-15	T - 5.8 x 1.5	190
A-16	T - 4.8 x 1.5	310
A-17	T - 2.8 x 1.5	500
A-18	T - 1.0 x 0.9	200
A-19	B - 2.0 x 1.5 x 4	400

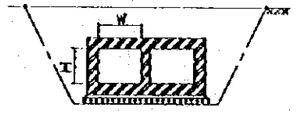
No.	Size (W x H)	Length (m)
B-1	T - 0.8 x 0.9	160
B-2	P - 0.9 x 1	40
B-3	T - 0.8 x 1.0	200
B-4	P - 1.0 x 1	10
B-5	T - 0.8 x 1.0	200
B-6	P - 1.0 x 1	10
B-7	T - 0.8 x 0.9	125
B-8	P - 0.9 x 1	10
B-9	T - 3.3 x 1.2	220
B-10	T - 2.0 x 1.1	220
B-11	T - 0.9 x 1.0	225
B-12	T - 2.4 x 1.0	200

No.	Size (W x H)	Length (m)
C-1	T - 1.3 x 0.9	150
C-2	T - 1.3 x 0.9	200
C-3	P - 0.8 x 6	131
C-4	T - 1.3 x 0.9	200
C-5	T - 1.3 x 0.9	200
C-6	P - 0.8 x 6	121
C-7	T - 1.3 x 0.9	210
C-8	T - 3.1 x 1.3	200
C-9	B - 1.5 x 1.2 x 2	120
C-10	T - 1.0 x 1.2	400
C-11	T - 1.5 x 1.2	400
C-12	P - 1.2 x 4	100
C-13	T - 0.7 x 0.8	200
C-14	T - 0.6 x 0.7	230
C-15	T - 0.7 x 0.8	170
C-16	U - 0.8 x 0.7	320
C-17	U - 1.4 x 1.0	320
C-18	T - 0.6 x 0.7	320
C-19	T - 1.7 x 1.2	280
C-20	T - 2.4 x 1.2	340
C-21	T - 4.5 x 1.5	290
C-22	T - 4.3 x 1.0	
C-23	T - 2.4 x 1.0	
C-24	T - 8.5 x 1.5	400

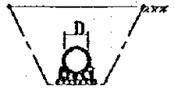
No.	Size (W x H)	Length (m)
D-1	T - 1.3 x 0.9	145
D-2	T - 1.3 x 0.9	165
D-3	P - 0.8 x 6	100
D-4	T - 0.8 x 0.7	145
D-5	T - 0.8 x 0.9	250
D-6	T - 0.8 x 0.7	165
D-7	T - 2.4 x 1.0	250
D-8	T - 2.7 x 1.0	130
D-9	T - 3.2 x 1.0	20
D-10	T - 1.2 x 1.0	950



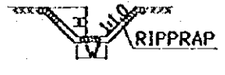
BOX CULVERT
B - W x H x n



PIPE CULVERT
P - D x n



TRAPEZOIDAL CHANNEL
T - W x H



U-SHAPED CHANNEL
U - W x H

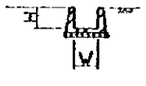
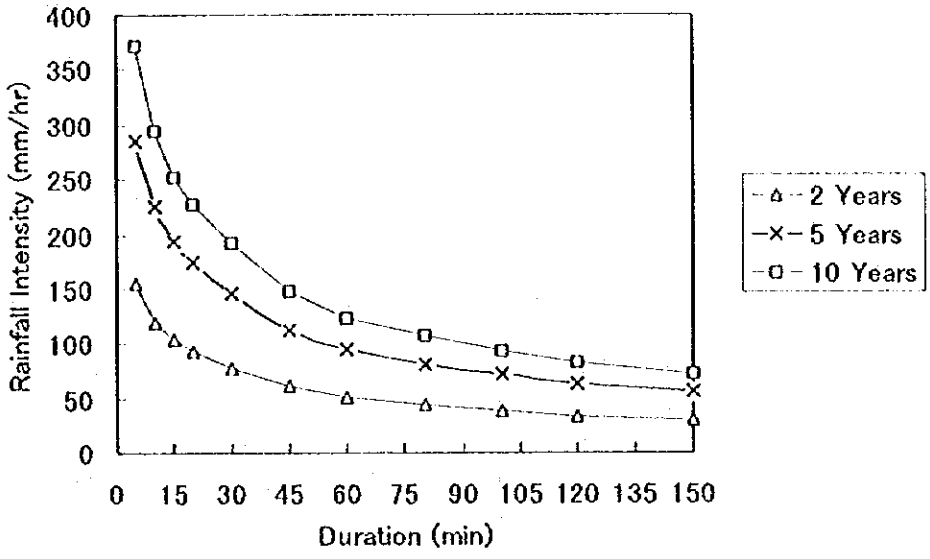


Figure 12.3.9 Storm Water Drainage Plan



Source: Estimated by the Study Team based on the maximum 24hr rainfall in Silay City and rainfall intensity duration curve for Iloilo City.

Figure 12.3.10 Rainfall Intensity - Duration Curve

12.3.4 Other Civil Works

Other civil works will include the following.

1) Fence and Gates

A security fence should be installed along the airport perimeter and at the boundary of landside and airside in the terminal area. Gates including crash gates should be provided where access between the landside and airside is required.

2) Landscaping

Landscaping will be required in the terminal area to create pleasing impression for users. In addition, sodding and seeding will be required for surface protection of the grading areas.

3) Marking and Signs

Marking will be required on the runway, taxiways, aprons, roads and car parks. Signs should also be provided along the roads and at the car parks.

12.4 BUILDING WORKS

12.4.1 Passenger Terminal Building

1) Terminal Concept

The concept for the domestic passenger terminal building is a combination with a linear frontal concept and one and a half processing level concept considering the passenger demands and the provision of passenger loading bridges. The passenger terminal building will be about 7,000 sq.m in total floor area with a two-story reinforced concrete structure to meet the requirements of the Medium Term Development.

2) Design Considerations

The passenger terminal building shall be designed with modern terminal suitable for passengers and visitors taking into account the following considerations.

a) Easy expansion of the terminal building for future development.
b) Easy operation and maintenance to be suitable for passengers' and airlines' convenience.
c) Separation of departing and arriving passenger flows in the airside corridors and the departure lounges in terms of airport security.
d) Impression of modern architecture which will not spoil local identities.
e) To be suitable for tropical atmosphere, such as warm temperature, strong sun shine, heavy rain, etc.
f) Provision of modern facilities and equipment.
g) Reasonable construction cost.

3) Facility Requirements and Terminal Layout Plan

The major areas and facilities required in the terminal building for the medium and long term development were estimated by using IATA's standards based on the peak hour passenger volumes. The requirements for the Medium Term Development are shown in Table 12.4.1. Details of the calculation are shown in Appendix 12.4.1.

Table12.4.1 Major Areas and Facilities (Medium Term Development)

Area and Facility	Requirement	Key Assumption
Departure Curb	40 m	
Departure Concourse	950 sq.m	2.0 visitor per pax
For Check-in Baggage	2 sets	1.5 bags per pax
Check-in Queuing Area	120 sq.m	
Check-in Counter	16 nos.	2.0 min. per pax
Security Check(Gate Lounge)	2 sets	2 bags per pax.
Departure Lounge (Gate lounge)	540 sq.m	420 pax
Baggage Claim Area	420 sq.m	
Baggage Claim Devices	2 sets	Narrow Body
Arrival Concourse	870 sq.m	2.0 visitor per pax
Arrival Curb	40 m	

Passenger and baggage flows in conjunction with the areas and facilities shown in Figure 12.4.1 are essential for terminal planning. The proposed terminal plans, such as floor plans, elevations and sections are planned based on the design considerations, the facility requirements as well as the passengers and baggage flows and are shown in Figure 12.4.2 and 12.4.3. The floor areas of the terminal building are as follows and a list of the floor areas by the areas in the terminal building is shown in Table 12.4.2.

First floor area	about 3,627 sq.m
Second floor area	about 2,835 sq.m
Third floor area	about 540 sq.m
Total floor area	about 7,002 sq.m

Departure passengers will usually arrive at departure curb on the first floor and enter the terminal building. There is a departure concourse where passengers and their friends can stay together for a while before the passengers proceed to check-in security check. After the baggage security check the passengers proceed to the check-in counter and then go up to the departure lobby on the second floor. There are a restaurant and concessions in the departure lobby on the second floor. The passengers proceed to the security check at the entrance of the departure lounge where the passengers will stay and enter the aircraft through the passenger loading bridges until their boarding time.

Arriving passengers will enter the terminal building on the second floor through the passenger loading bridges. The passengers will walk along airside corridor and will go down to the baggage claim area on the first floor. After claiming their bags, the passengers will proceed to the arrival concourse where welcomers may wait. From the arrival concourse, the passengers and welcomers will exit to the arrival curb.

Table 12.4.2 List of Floor Area of the Passenger Terminal Building

Name of Area		Floor Area (sq.m)	Remarks
1st Floor	Check-in Lobby	738	
	Check-in Baggage Screening	72	
	Baggage Claim Area	546	excluding two baggage conveyors
	Arrival Lobby	324	
	Information	40	
	Concession Area	214	
	Office Area	324	
	Baggage Make-up Area	405	
	Baggage Break-down Area	324	
	Toilets	120	
	Others	520	
Sub Total		3,627	
2nd Floor	Departure Hall	396	
	Departure Lounge	546	
	CIP Lounge	252	including pantry and toilets (42 sq.m)
	Airside Corridor	520	
	Restaurant	252	
	Kitchen	81	
	Concession Area	331	
	Office Area	41	
	Toilets	102	
	Others	314	
Sub Total		2,835	
3rd Floor	Observation Hall	198	
	Concession Area	117	
	Office Area	153	
	Toilets	54	
	Others	18	
Sub Total		540	
Grand Total		7,002	

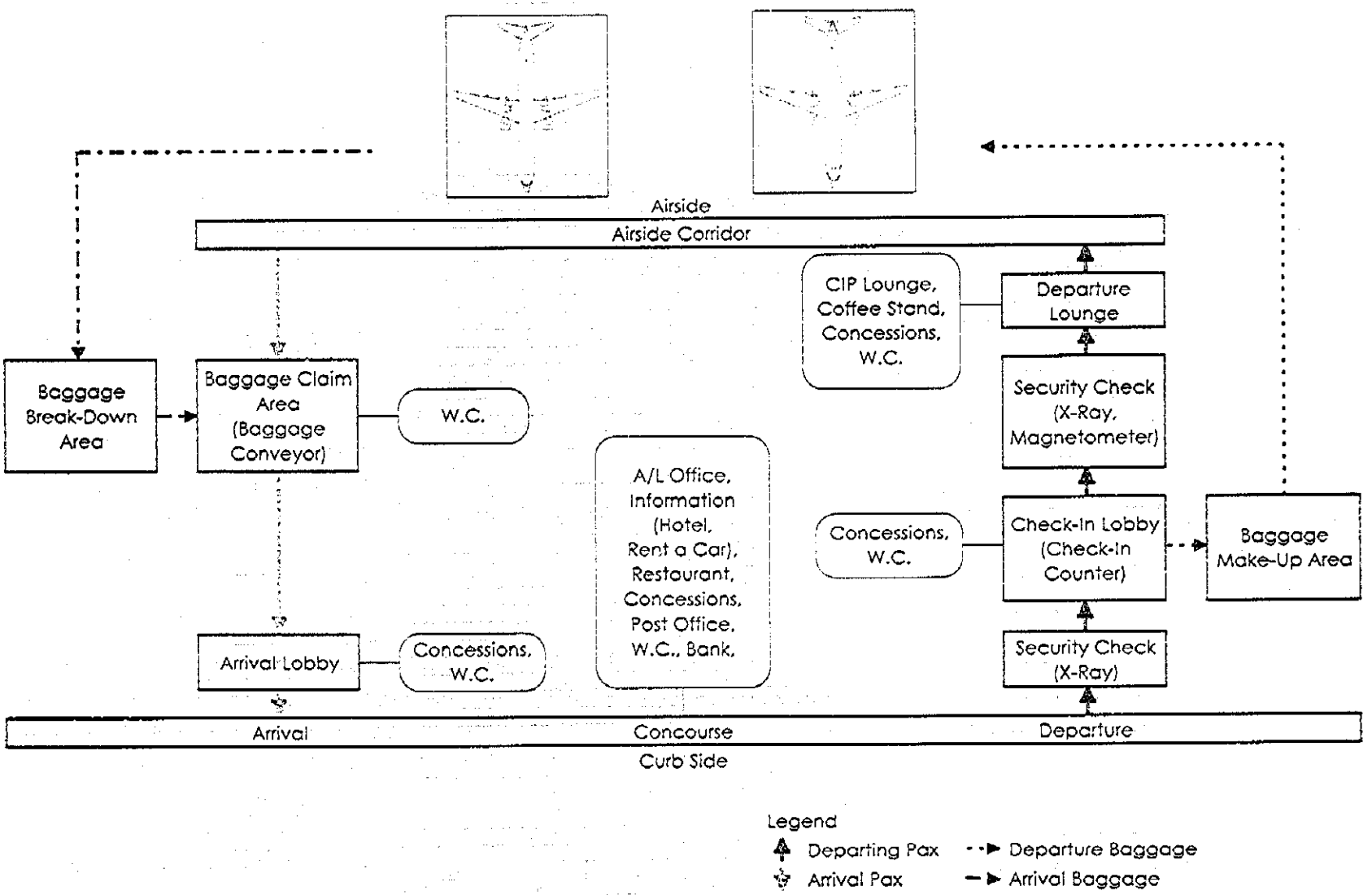
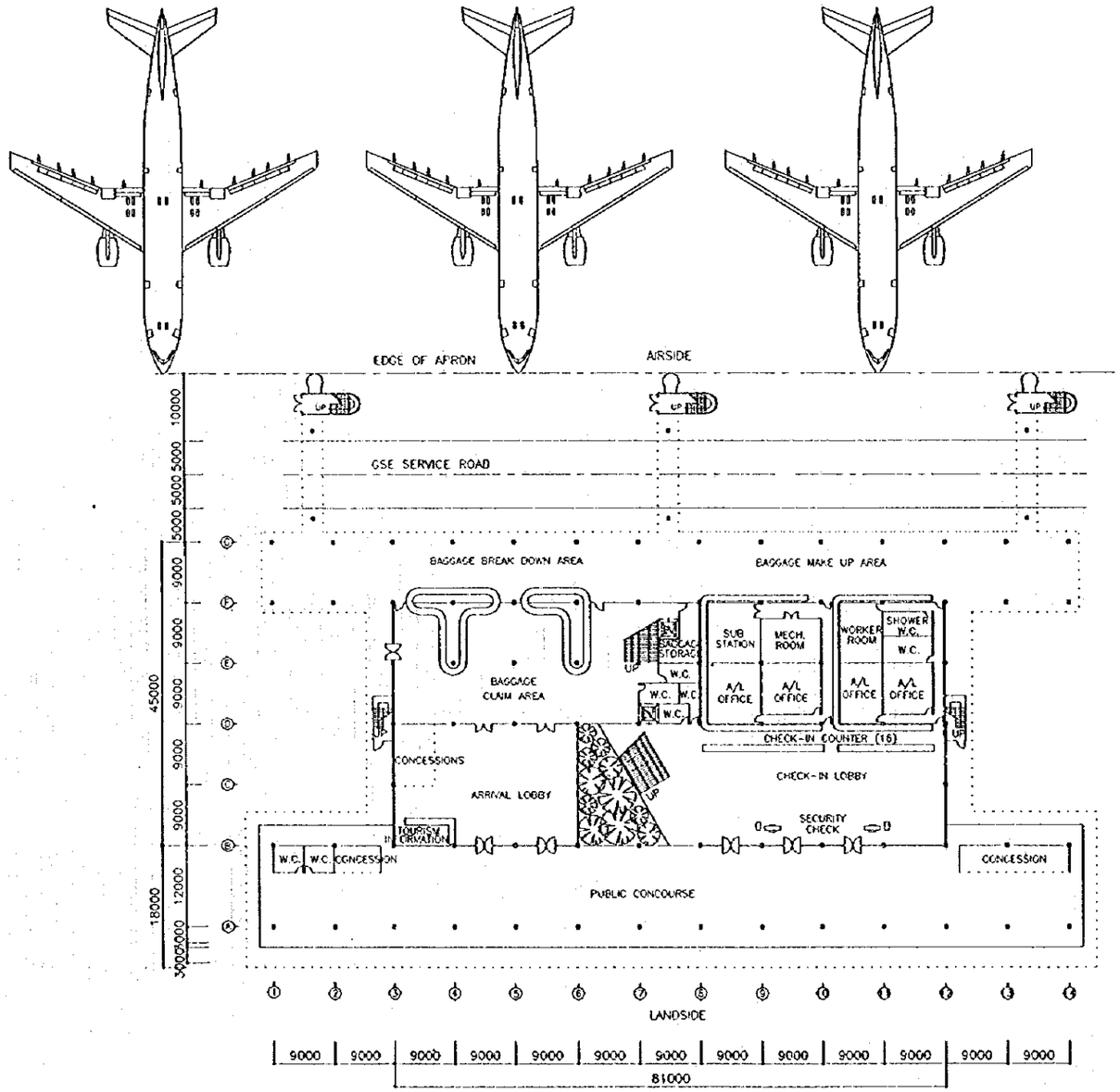
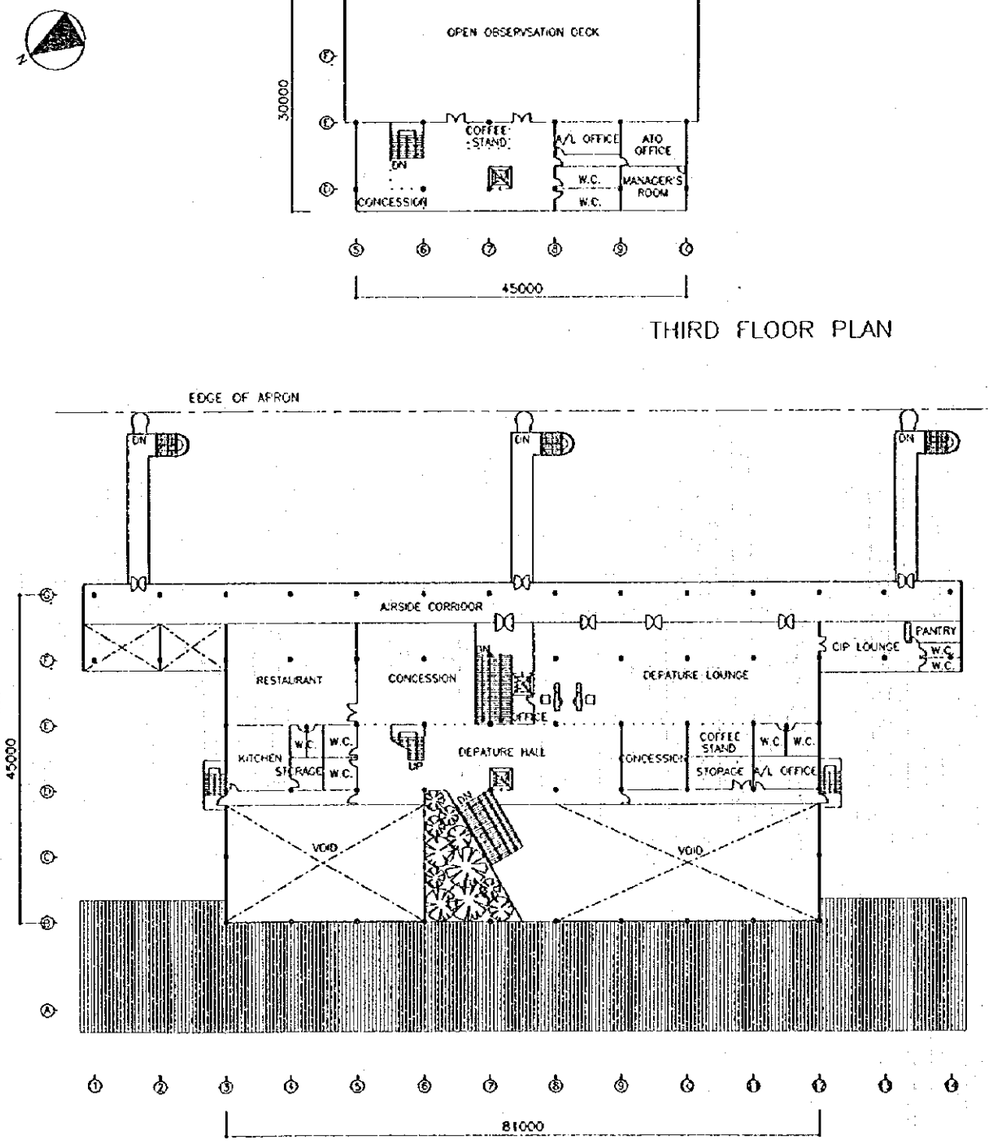


Figure 12.4.1 Flow of Passengers and Baggage



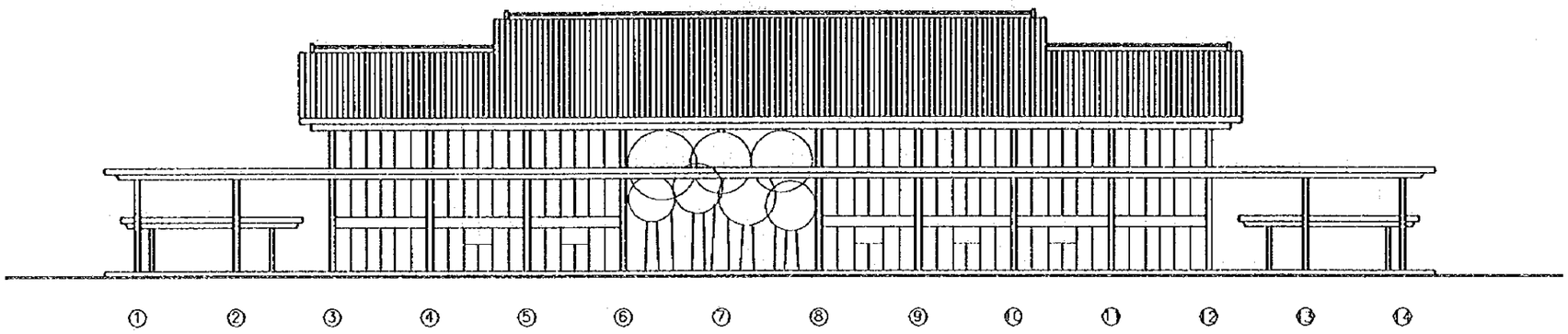
FIRST FLOOR PLAN



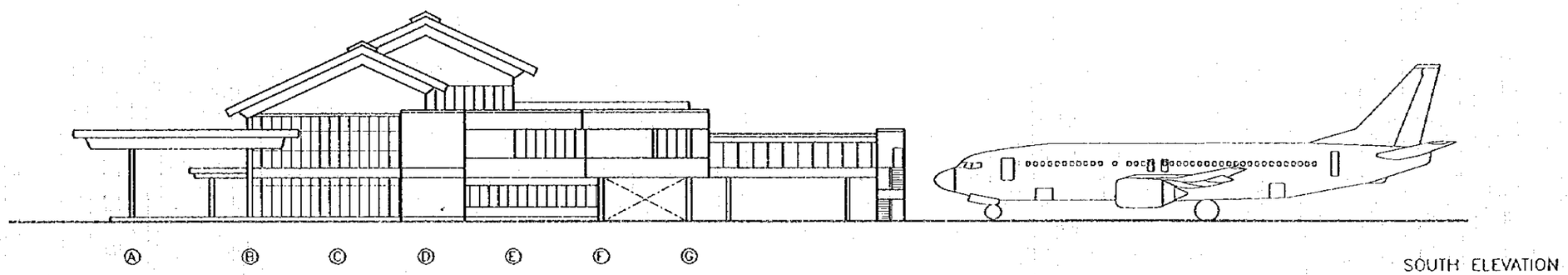
SECOND FLOOR PLAN

THIRD FLOOR PLAN

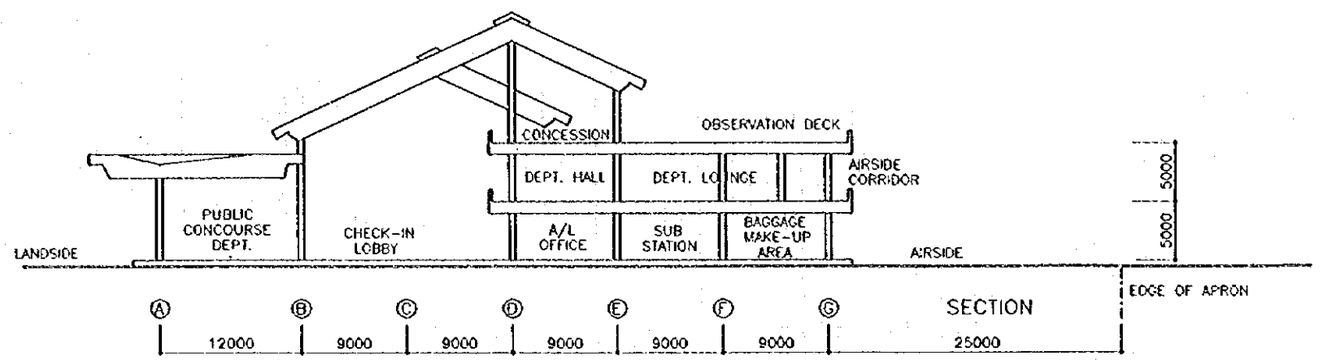
Figure 12.4.2 Passenger Terminal Building - Floor Plans



LANDSIDE ELEVATION



SOUTH ELEVATION



SECTION

Figure 12.4.3 Passenger Terminal Building - Elevations and Section

0 2.5 5 10 20 m

4) Outline of Finishing

Exterior and interior finish schedule of the passenger terminal building have been planned as shown in Table 12.4.3

Table 12.4.3 Outline of Finish Schedules of Passenger Terminal Building

Location	Part	Finishing Material
Exterior	Curb Walkway	Granite Flames Finish
	Columns and Beams	Painted on Fair Faced Concrete
	Windows and Doors	Anodized Aluminum Windows and Doors
	Wall	Molded and Painted Pre-cast Concrete
	Roof	Concrete Finish on Built-up Roofing & Roof Tile Finish
Interior		
Departure Concourse, Check-in, Baggage Claim, Bus Lounge, etc.	Floor	Porcelain Ceramic Floor File
	Wall	Emulsion Paint Finish and Local Marble stone
	Ceiling	Acoustical Ceiling Tile
Airside Corridor and Departure Lounge	Floor	Porcelain Ceramic Floor Tile
	Wall	Emulsion Paint Finish and Finished Faced Plywood
	Ceiling	Acoustical Ceiling Panels
Office Area	Floor	Vinyl Floor Sheet
	Wall	Emulsion Paint Finish
	Ceiling	Acoustical Ceiling Panels

5) Incidental Facilities and special Equipment

(1) Incidental facilities to be installed in the terminal building are as follows.

a) Two elevators for disabled passengers. - departure and arrival.

b) Two escalator for departing and arriving passengers

c) Air conditioning and ventilating systems will be installed at offices, departure lounges, check-in lobby, baggage claim area, concession areas, etc.

d) Fire protection systems will be provided in the terminal building.

e) Other incidental facilities such as electrical, water supply, telephone, etc. will be installed in the terminal building.

(2) Special Equipment to be installed in the terminal building is as follows.

i) Passenger Loading Bridge (PLB)

Two PLB to be utilized by aircraft (B 737s, up to wide body B 747s) will be installed at the edge of the fixed bridge.

ii) Baggage Handling System (BHS)

Two conveyors for check-in and two conveyors for baggage claim will be installed.

iii) Flight Information Display System (FIDS)

FIDS-TV type flight information system will be installed .

iv) Security Equipment

Two x-ray screening units for check-in baggage ahead of check-in lobby will be installed and two x-ray screening units with walk-through metal detectors and handy metal detectors at the departure lounges will also be installed.

12.4.2 Cargo Terminal Building

1) General Concept and Layout Plan

The cargo terminal building is planned to meet the requirements of the Medium Term Development and will be about 1,850 sq.m total floor area with a one-story steel frame structure. The cargo terminal mainly consists of inbound and outbound area and office areas as follows, and Figure 12.4.4 shows the floor plan, elevations and section.

Inbound area	:	672 sq.m
Outbound area	:	504 sq.m
Office area	:	672 sq.m
Total floor area	:	1,848 sq.m

The internal layout of the cargo terminal is planned such that the cargo flow in the building can be as straight as possible from landside to airside and vice versa. In order to allow the free access of forklifts, the floor of the cargo terminal is also planned to be flat with airside and landside roads.

2) Outline of Finishing

Exterior and interior finish schedule of the cargo terminal have been planned as shown in Table 12.4.4 .

Table 12.4.4 Outline Finish Schedule of Cargo Terminal Building

Location	Part	Finishing Material
Exterior	Wall	Extruded Cement Painted and Corrugated Fiber Glass Cement Boards
	Roof	Corrugated Fiber Glass Cement Boards Roof
	Windows and Doors	Aluminum Windows, Painted Steel Doors, and Steel Roll-Up Doors
Interior		
Cargo Handling Area	Floor	Colored Concrete Hardener
	Wall	Extruded Cement Painted and Corrugated Fiber Glass Cement Boards
	Ceiling	Exposed Steel Frame Painted and Painted Insulation Board
Office Area	Floor	Vinyl Floor Sheet
	Wall	Emulsion Paint Finish
	Ceiling	Acoustical Ceiling Panels

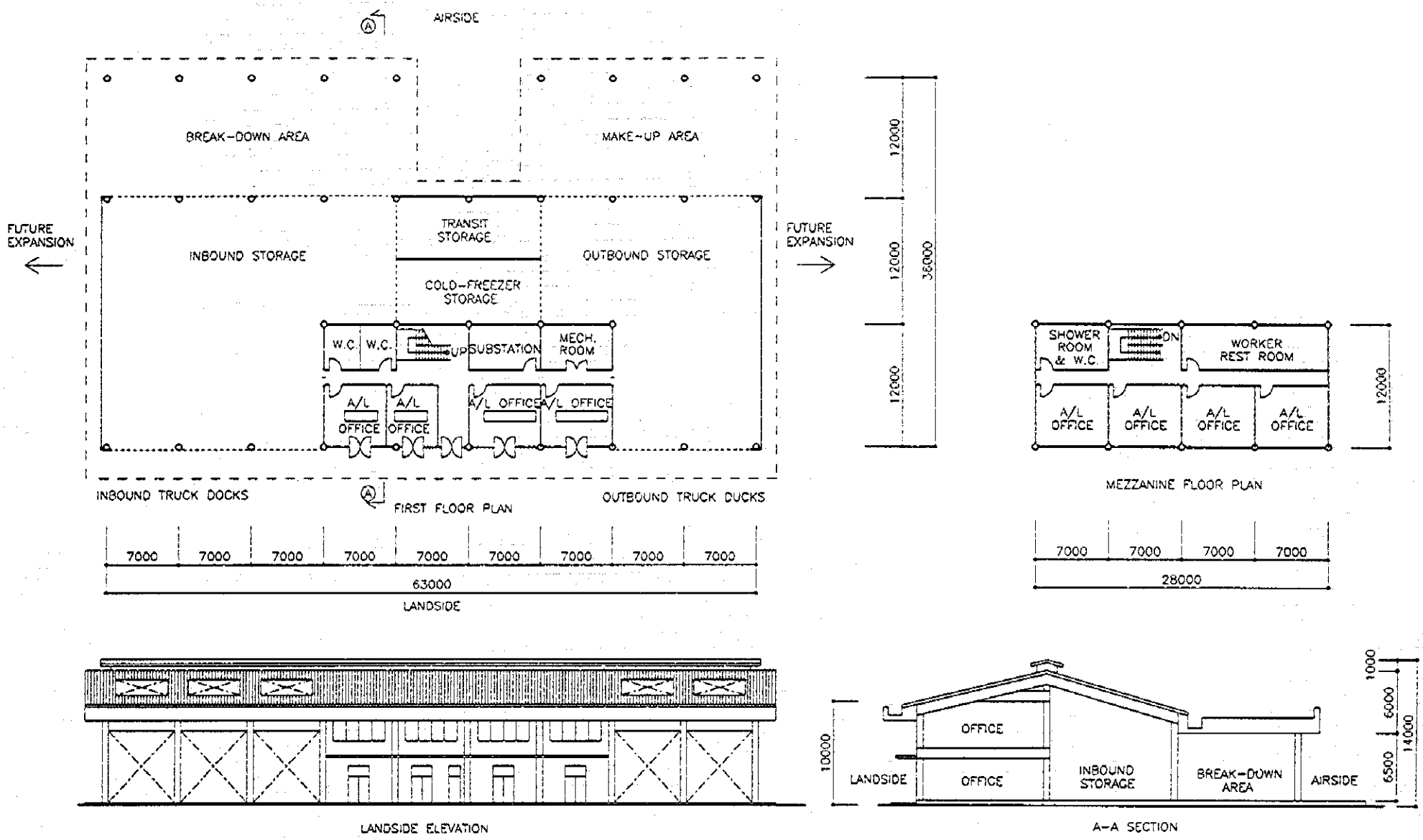


Figure 12.4.4 Cargo Terminal Building

12.4.4 Control Tower and Administration Building

1) Concept and Layout Plan

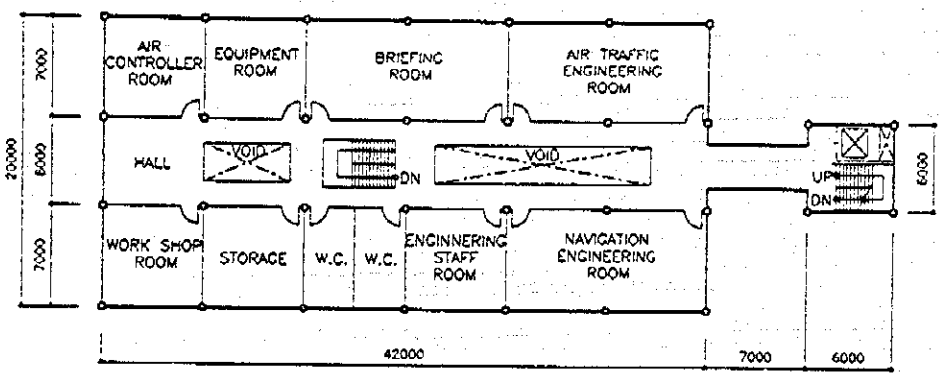
An Administration building with a control tower is planned to meet the requirements for the Medium Term Development in terms of airport administration and operation. Figure 12.4.5 shows floor plans and elevation of the administration building. The building will be about 1,910 sq.m in total area and will be a reinforced concrete structure which have two stories for the administration area and six stories with an elevator for the control tower. The minimum eye level to provide good visibility of the both runway thresholds from the VFR room in accordance with FAA standards is estimated to be 23m above the ground level.

2) Outline of Finishing

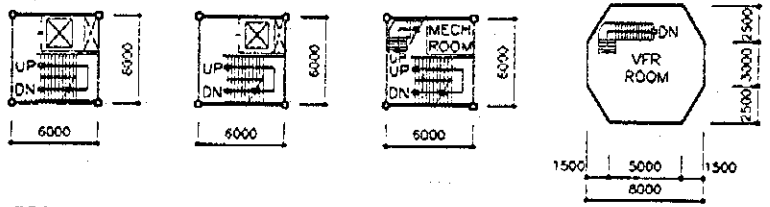
Exterior and interior finish schedule of the administration building have been planned as shown in Table 12.4.3.

Table 12.4.3 Outline of Finish Schedule of Administration Building

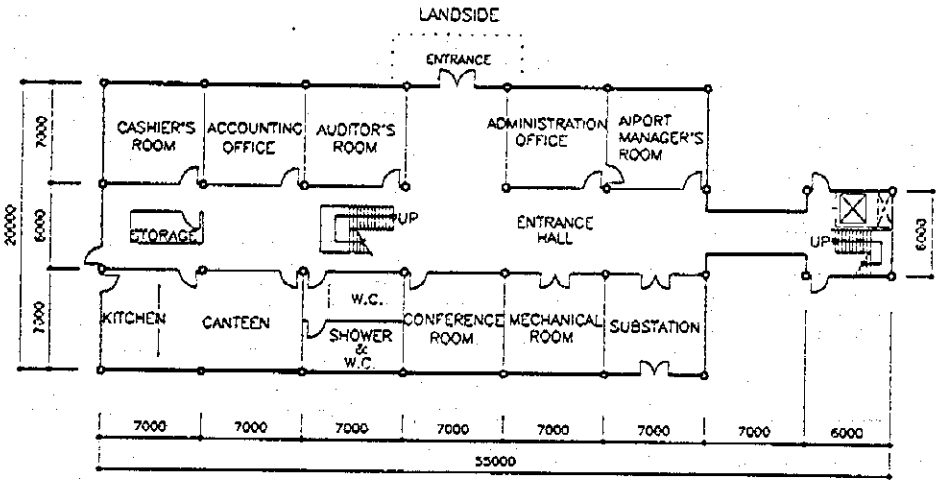
Location	Part	Finishing
Exterior	Columns and Beams	Painted on Fair Faced Concrete
	Windows and Doors	Anodized Aluminum Windows and Doors
	Glass	Reflective Pair Glass at Control Tower
	Wall	Molded Anodized Aluminum Panels and Painted Pre-cast Concrete
	Roof	Concrete finish on Built-Up Roofing
Interior		
Office Area	Floor	Vinyl Floor Sheet
	Wall	Emulation Paint Finish
	Ceiling	Acoustical Ceiling Panels
VFR Room	Floor	Carpet
	Wall	Emulation Paint Finish
	Ceiling	Acoustical Ceiling Panels



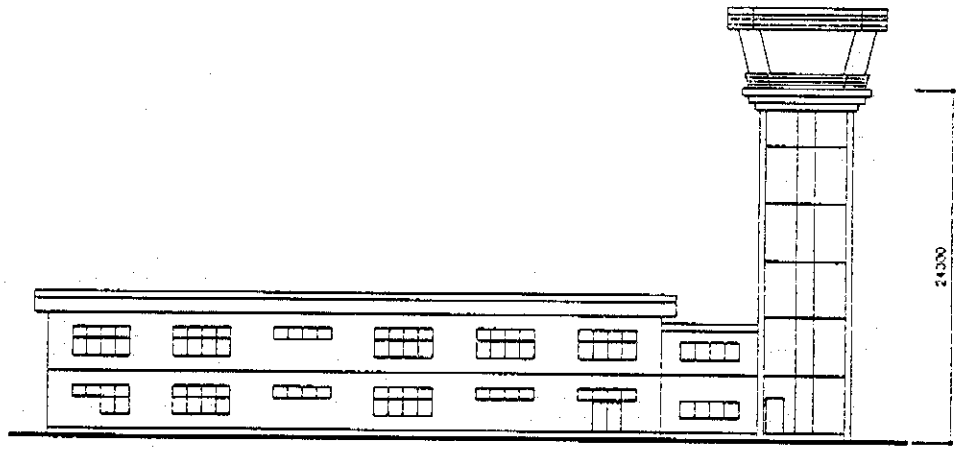
SECOND FLOOR PLAN



FLOOR PLAN



FIRST FLOOR PLAN



AIRSIDE ELEVATION

Figure 12.4.5 Control Tower & Administration Building

0 2.5 5 10 20 m

12.4.4 Fire Station

1) Concept and Layout Plan

The fire station is planned to meet ICAO standards category 8. The building has a total floor area of about 560 sq.m with a one-story reinforced concrete structure and will accommodate a self-contained fire fighting unit, garage, storage for extinguishing agents, bed room, locker room, canteen, etc. The garage should face the airside, and the garage can accommodate three fire fighting vehicles and one command car. Figure 12.4.6 shows the floor plan, elevation and section of the building.

2) Outline of Finishing

Exterior and interior finish schedule of the fire station have been planned as shown in Table 12.4.4

Table 12.4.4 Outline of Finish Schedule of Finish Station

Location	Part	Finishing Material
Exterior	Wall	Extruded Cement Painted
	Roof	Corrugated Fiber Glass Cement Board
	Windows and Doors	Aluminum Windows, and Painted Steel Doors
Interior		
Garage, Storage, Work Space	Floor	Colored Concrete Hardener
	Wall	Extruded Cement Painted
	Ceiling	Exposed Steel Frame Painted and Painted Insulation Board
Bed Room, Office Area	Floor	Vinyl Floor Sheet
	Wall	Wall Paper, Emulsion Paint Finish
	Ceiling	Acoustical Ceiling Panels

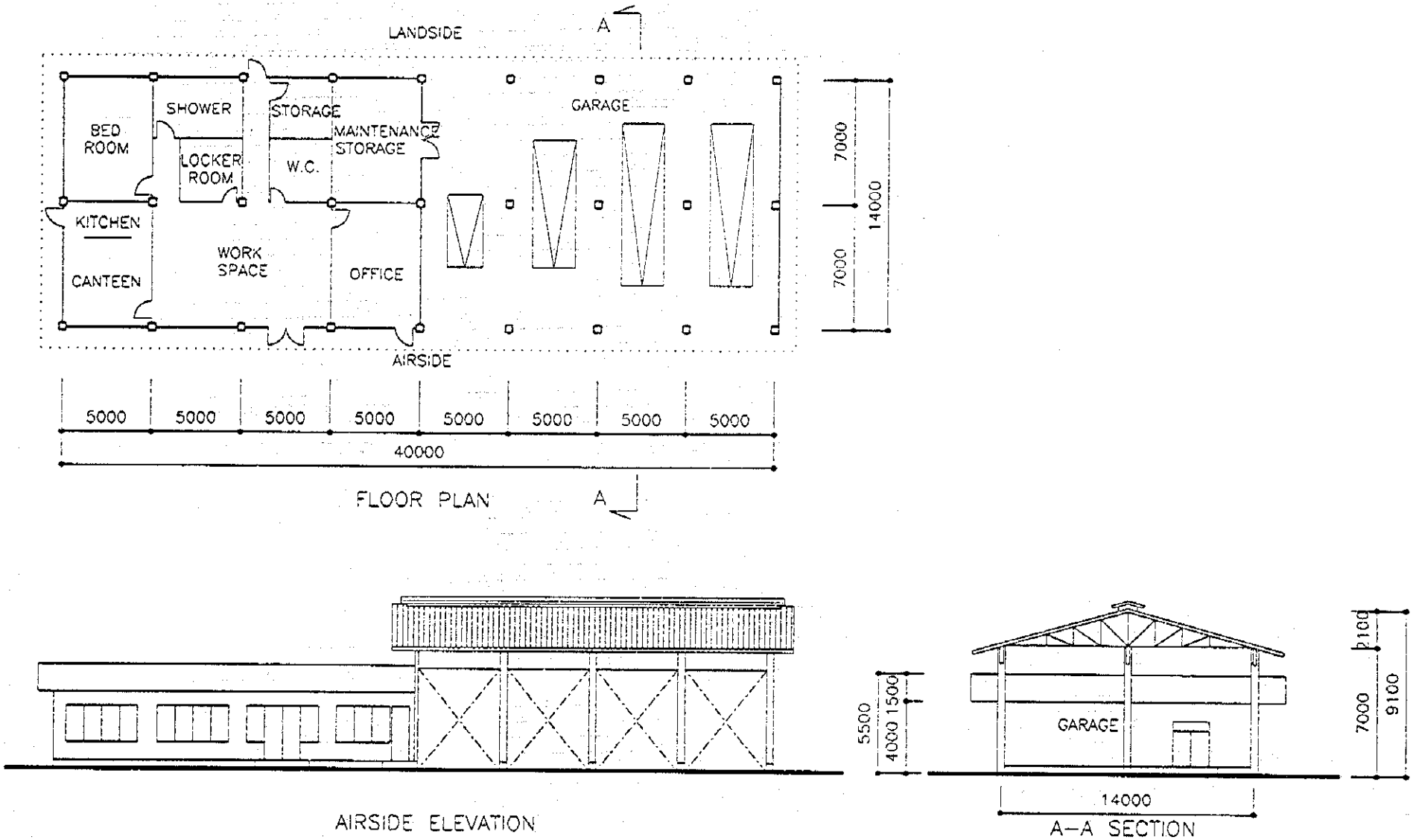


Figure 12.4.6 Fire Station