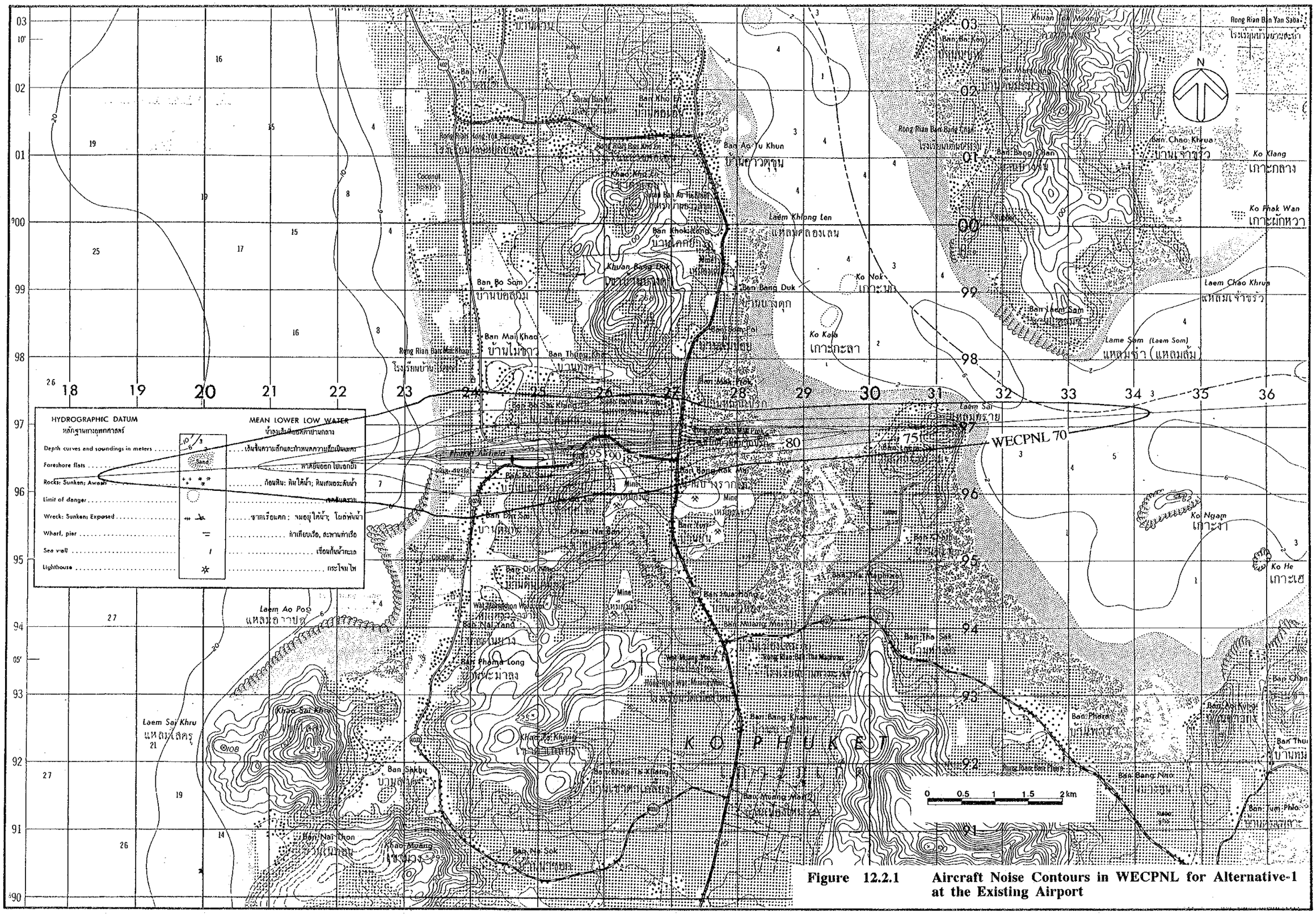

Figure 12.2.1 Aircraft Noise Contours in WECPNL for Alternative-1 at the Existing Airport

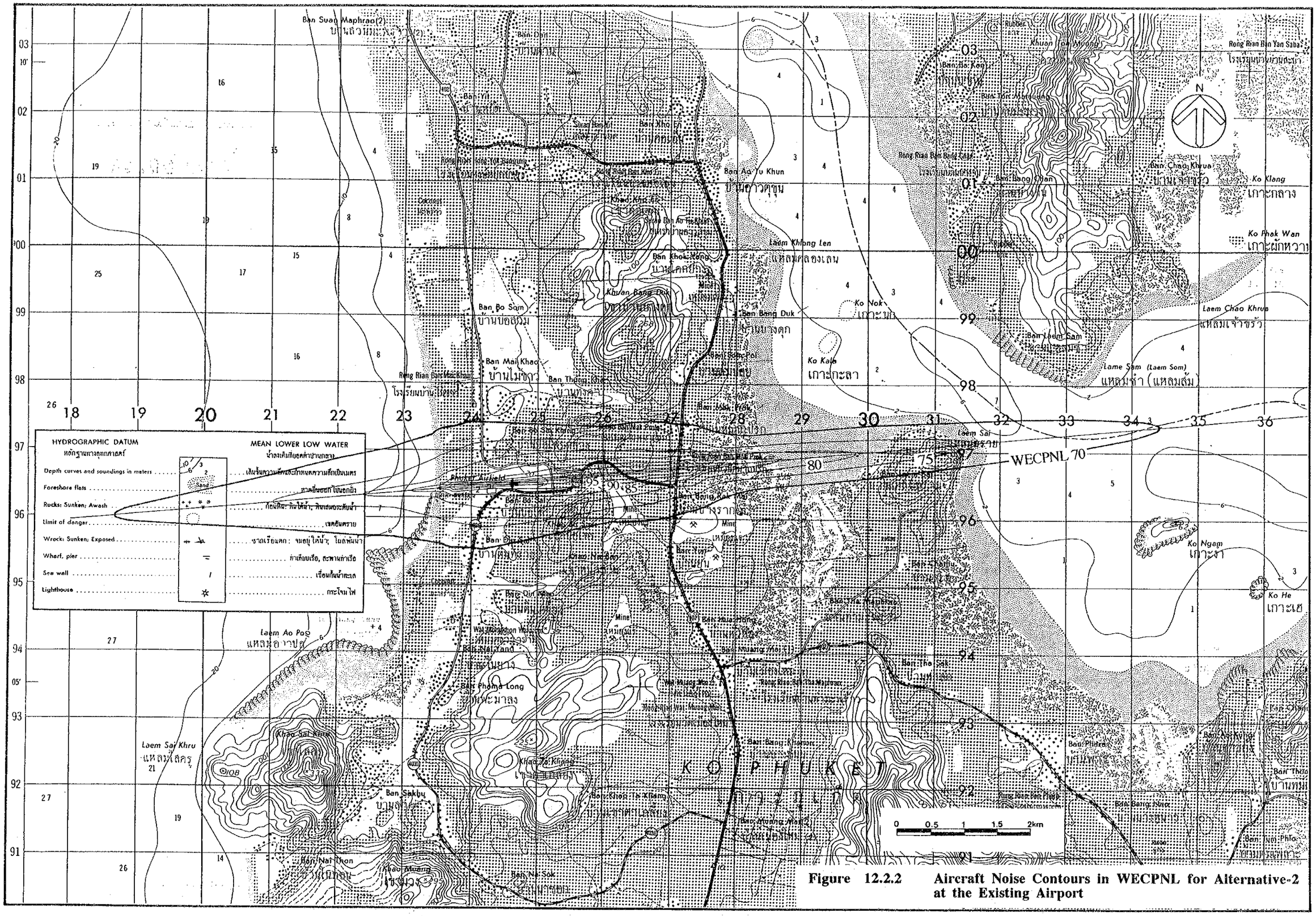

Figure 12.2.2 Aircraft Noise Contours in WECPNL for Alternative-2 at the Existing Airport

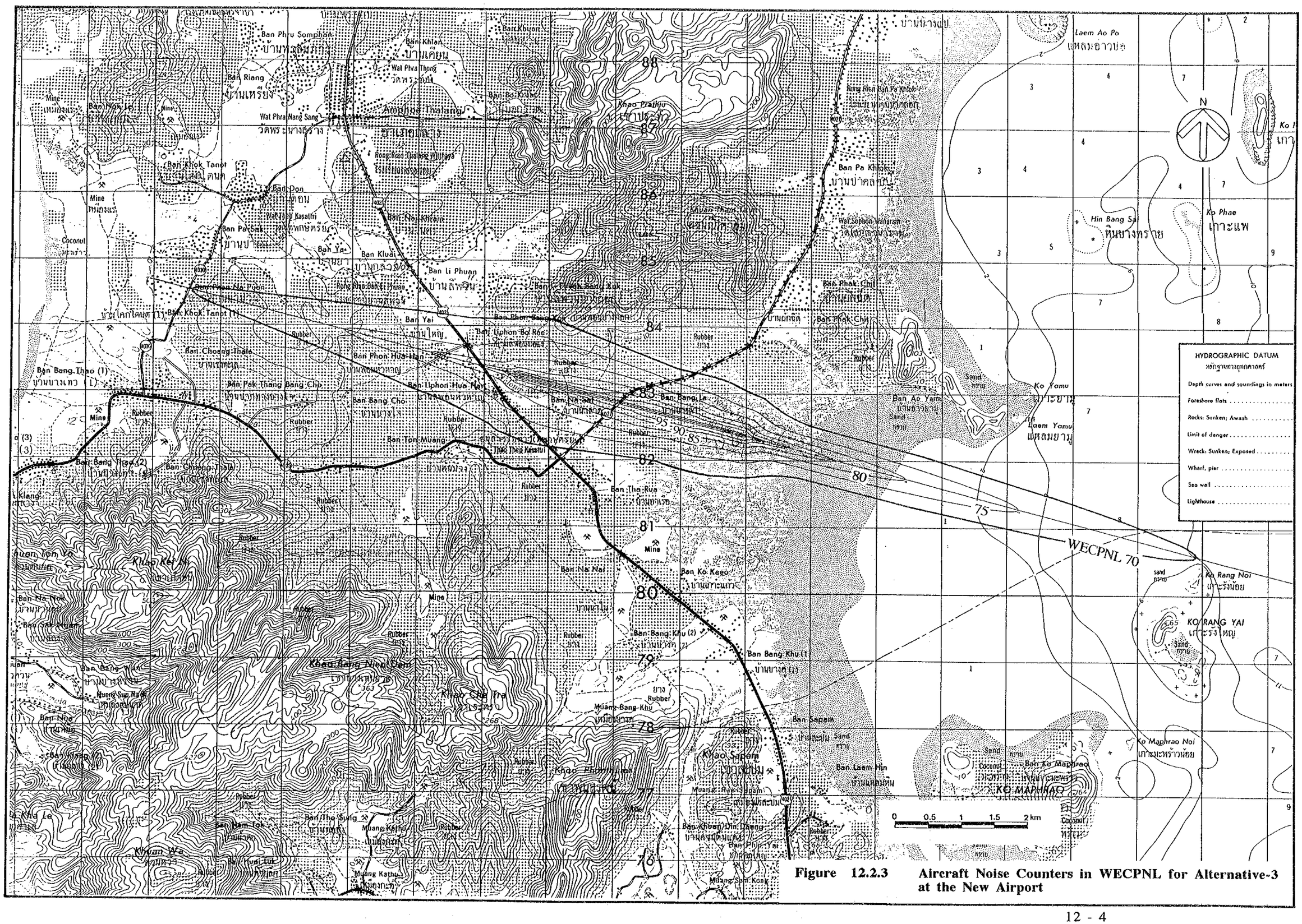

Figure 12.2.3 Aircraft Noise Counters in WECPNL for Alternative-3 at the New Airport

12.3 EVALUATION OF NOISE INFLUENCE

12.3.1 General

It is determined in Japan that appropriate countermeasures are required for aircraft noise if WECPNL in residential areas is more than 75. The countermeasures basically consist of the following:

a) Airport Surroundings Protection Measures

- Indemnity for relocation of local residents (WECPNL > 90), sound-proofing work for dwellings (WECPNL > 75), etc.
- Land use planning of airport surroundings for industrial use, buffer green belt (WECPNL > 95), etc.

b) Airport Structural Improvements

- Relocation of runways, construction of buffer green belts, and noise-break forests within airport property.

c) Noise Source Control Measures

- Improvement in operating methods such as adoption of rapid climb out, delayed flap approach procedure, and preferential runway use.
- Restrictions on night flights, establishment of arrival/departure quotas and introduction of larger aircraft with reduced frequencies.
- Aircraft improvements including modification of existing engines to lower noise types and introduction of low noise aircraft.

12.3.2 Areas Affected by Aircraft Noise

The total area with WECPNL more than 70 and 75 of each airport development alternative are shown in **Table 12.3.1**. The number of house units within these areas which were counted on the topographic map are also given in this table.

Table 12.3.1 Noise Affected Areas and House Units around Phuket International Airport

WECPNL	Airport Development Alternatives		
	Alternative - 1	Alternative - 2	Alternative - 3
more than 70			
Area (ha) *	780	810	1,110
Number of House Units	310	340	430
more than 75			
Area (ha) *	500	520	560
Number of House Units	530	550	700

* Area excluding the surface of the water

12.3.3 Land Use Surrounding the Airport

The noise affected areas of both the existing and the new airport sites are relatively small, because a large portion of the contour comes on the surface of the water. On the other hand, the number of house units are considerably large at the new airport site.

(1) Existing Airport

In case the that expansion or upgrading of the existing airport will be executed, in the year 2010 the contour of WECPNL 70 will be extended approximately 7 km long 2 km wide, and contour of WECPNL 75 will cover a part of Ban Laem Sai village, east of the Runway 27 threshold. Furthermore, condominiums in the golf resort in the south of the airport will be exposed to noise WECPNL 70.

(2) New Airport Site

The land use in the vicinity of the new airport consists of agricultural fields and residential areas. Agricultural use except poultry will not be serious affected by aircraft noise, however, the residential areas will be exposed to influence of aircraft noise.

Judging from the present land use, and taking into account the level of aircraft noise, countermeasures are required from the viewpoint of land use. A criteria for land controls for aircraft noise is proposed based on experience in Japan as follows.

- WECPNL ≥ 70 : Not suitable for public facilities such as schools, hospitals, churches, etc.
  ≥ 75 : No new residences are recommended
  ≥ 90 : Not suitable for residence

Some of countermeasures which are described in 12.3.2 should be considered in order to harmonize the new airport with the surrounding area. Major points at issue are shown in **Table 12.3.2.**

Table 12.3.2 Major Items in the Noise Affected Area

Item	WECPNL (more than)	Recommendation
Village along Route 402	75 ~ 90	Restriction of Residence
Village along Route 4027	75 ~ 90	Restriction of Residence
Saisunton School	70	Relocation or Noise Proofing Work

CHAPTER 13

AIRPORT MASTER PLAN

CHAPTER 13 AIRPORT MASTER PLAN

13.1 SELECTION OF OPTIMUM ALTERNATIVES

13.1.1 Comparison of the Three Alternatives

Outline of each alternative has been mentioned in Chapter 9. Comparative evaluation of these alternatives are indicated in the following tables.

Table 13.1.1 shows the evaluation on the function provided in each Alternative. **Table 13.1.2** shows the evaluation from the operational, construction and environmental aspects. **Tables 13.1.3** and **13.1.4** summarize the detail of the characteristics of each Alternative for evaluation. The rough cost estimate for selection of the Airport Development Alternative is summarized in **Table 13.1.5.**

Evaluation for each alternative is summarized as follows.

Alternative-1 is the concept where the airport will be improved in accordance with increase of traffic demand. Current problems such as runway strip width, separation distance between the runway and parallel taxiway, and obstructions penetrating upon the transitional and horizontal surfaces will not be resolved. ILS localizer will still be offset. However, construction cost is the lowest among the three alternatives and impact to the environment is minimum.

Alternative-2 is the concept where the airport will be upgraded to the international standard level as much as possible in addition to the improvements included in Alternative-1. Some constraints to the operation such as obstructions for the transitional surface will be relieved by much more civil works than Alternative-1. However, some constraints such as the obstructions for the horizontal surface are still remaining. Project cost is larger than Alternative-1 but smaller than Alternative-3 for new airport construction.

Alternative-3 is a new airport concept. In Alternative-2, existing airport will be improved to the international standard level. In Alternative-3, the same level of the facilities will be developed at the new airport site selected in Chapter 8. In comparison with the existing airport site, there are no obstructions penetrating on the approach and transitional surfaces. There are still mountains penetrating on the horizontal surface. Major facilities such as the runway, taxiway, apron and terminal facilities will be located in accordance with international standards with sufficient future expansion space. On the other hand, land acquisition of about 280 ha will be necessary and the existing road and transmission line are to be diverted.

Table 13.1.1 Evaluation of the Basic Function for Airport Operation

Main Purpose	Subject	Contents	Measures	Evaluation result on			Remark
				Alt-1	Alt-2	Alt-3	
Maintaining of Safety operation of Airport	Aircraft	• Development of airport infrastructure	• Provision of adequate capacity of facilities being cope with the demand	Fitted	Fitted	Fitted	
			• Compatibility or satisfaction with international standards / recommendations	Not met	Mostly met	Mostly met	OLS RWY/TWY clearance
		• Development of supporting system facility for landing and taking off at the airport	• Establishment of various procedure	Not met *	Not met *	Not met *	* Straight-in/out procedure only
			• Provision of ILS, VOR/DME . NDB	Provided	Provided	Provided	
			• Provision of air field lighting	Provided	Provided	Provided	
			• Provision of airport and meteorological information	Provided	Provided	Provided	
		• Development or completion of supporting system to aircraft at en-route so as to guide to the airport	• Elimination or limitation of obstacle or marking	Not enough	Not enough	Not enough	Existence of obstacle
			• Provision of Radar System including RDP.FDP	Provided	Provided	Provided	
			• Provision of VOR/DME . NDB	Provided	Provided	Provided	
			• Development of aeronautical communication system of air to ground	Provided	Provided	Provided	
			• Provision of the equipment of airport terminal information	Provided	Provided	Provided	
	Passenger	• Smooth handling of passenger	• Compliance with International standards or recommendations on building space. Number of CIQ booth, check-in space etc.	Meet	Meet	Meet	
		• Provision of good service level	• Development of supporting facility such as information system, boarding bridge, and baggage handling system etc.	Considered	Considered	Considered	
			• Maintaining of the stability of public utility such as power, telephone, water supply	Considered	Considered	Considered	
		• Maintaining of security	• Provision of security system	Considered	Considered	Considered	

Table 13.1.2 Evaluation of Airport Development Alternatives

Aspect	Items to be evaluated	Evaluation Result			Points to be Evaluated
		Alt-1	Alt-2	Alt-3	
Compatibility with International Standard	1. Airfield infrastructure by Annex 14	Poor	Good	Good	Width of runway strip Clearance between RWY and TWY Obstacles
	2. Obstacles by airport service manual	Fair	Poor	Poor	Operational consideration in Article 5.5.3 - 5.5.7 of Airport Planning Manual
	3. Obstacles by PANS OPS	Poor	Fair	Fair	Checked by OAS
	Total Evaluation	**Poor**	**Good**	**Good**	
Operational Aspects	1. Establishment of APCH/DEP procedure	Fair	Fair	Fair	Only straight in and out procedure
	2. Existence of obstacle				
	Approach surface	Poor	Fair	Good	Obstacle restriction in Annex 14
	Transitional surface	Poor	Fair	Good	Obstacle restriction in Annex 14
	Inner horizontal surface	Poor	Poor	Poor	Obstacle restriction in Annex 14
	Conical surface	Fair	Fair	Fair	Obstacle restriction in Annex 14
	Take off climb surface	Poor	Fair	Good	Obstacle restriction in Annex 14
	3. OCS	Poor	Fair	Good	PANS - OPS
	4. Location of ILS	Poor	Good	Good	Location on course
	5. Taxiing distance	Fair	Fair	Good	Consideration of landing on both runway
	6. Accessibility from Town	Fair	Fair	Good	
	7. Maneuverability of aircraft operation on the ground	Fair	Fair	Good	Simplicity of operation
	8. Apron control by controller at control tower	Poor	Good	Good	Existence of blind area
	Total Evaluation	**Poor**	**Fair**	**Good**	
Construction Aspects	1. Civil work				
	Land acquisition	Good	Fair	Poor	Volume
	Existing road diversion	Good	Fair	Poor	Distance
	Land reclamation	Good	Good	Poor	Volume of area
	Embankment	Good	Poor	Good	Requirement
	Improvement of land	Good	Poor	Poor	Requirement
	Pavement area	Good	Fair	Poor	Volume
	2. Building work				
	Floor area	Good	Good	Poor	Volume
	Designability	Fair	Fair	Good	No limitation on design
	Passenger handling procedure	Fair	Fair	Good	Simplification for mixed handling of Dom. and Int'l.
	Passenger accessibility at curbside	Fair	Fair	Good	Simplisity
	3. Effective utilization of existing facility	Good	Fair	Poor	
	4. Construction period	Good	Fair	Poor	From 2 years to 3 years
	5. Construction cost	Good	Fair	Poor	
	Total Evaluation	**Good**	**Fair**	**Fair**	
Environmental Aspects	1. Resettlement	Good	Fair	Poor	Number of houses
	2. Effection to surrounding	Poor	Poor	Fair	
	3. Topography	Good	Poor	Poor	Scale of civil work
	4. Flora and Fauna	Good	Fair	Poor	Impact to mangrove
	5. Water Pollution	Good	Good	Poor	
	6. Noise Problem	Fair	Fair	Fair	
	Total Evaluation	**Good**	**Fair**	**Poor**	

Table 13.1.3 Comparison of Airport Development Alternatives (1)

Comparison Item		Existing Airport	Alternative - 1 (Expansion)	Alternative - 2 (Upgrading)	Alternative - 3 (New Airport)
A. Traffic Demand		Present (1991)	2010		
Annual Passengers	Int'l	626,000	3,110,000		
	Dom.	1,228,000	3,700,000		
Annual Cargo (ton)	Int'l	1,000	4,600		
	Dom.	2,700	14,600		
Peak Hour Aircraft Movement	Int'l		7		
	Dom.	7	7		
Peak Hour Passengers	Int'l	330	1,500		
	Dom.	680	1,700		
B. Facility / Capacity		4D	4E		
Runway Capacity (movement/hr)					
Maximum Aircraft and Destination		A300, Middle East	B747, London		
Parallel Taxiway		Partial	Full		
Terminal Building (sq. m)	Int'l	12,200	30,000		
	Dom.	11,500	17,000		
Terminal Building	Int'l	37 sq.m	20 sq.m		
(Floor Area per peak hour pax)	Dom.	17 sq.m	10 sq.m		
Apron (Number of Spots)	B747	–	4		
	B777	–	3		
	A300	4	2		
	Small	6	2		
Nav. Aid		ILS (Cat - I)	ILS (Cat - I)		
C. Operation		RWY 27	RWY 27	RWY 27	
OCA for Cat I		A: 520' B: 530' C: 540' D: 550'	A: 406' B: 418' C: 426' D: 437'	A: 308' B: 310' C: 318' D: 329'	No obstacles exist in both final approach and missed approach areas
		RWY 09	RWY 09	RWY 09	
		A: – B: – C: – D: –	A: – B: – C: – D: –	A: 342' B: 354' C: 362' D: 373'	
(OCA : Obstacle Clearance Altitude)		(Note 1)		(Note 2)	
D. Construction					
Area to be acquired (ha) :			90	150	280
Rough Construction Cost (Baht) :					
Civil Works (Baht) :			800 Mil	1,760 Mil	1,650 Mil
Architectural Works (Baht) :			530 Mil	590 Mil	1,380 Mil
Air Navigation System (Baht) :			120 Mil	210 Mil	530 Mil
Fuel Supply System (Baht) :			210 Mil	210 Mil	260 Mil
Airport Utilities (Baht) :			240 Mil	240 Mil	360 Mil
Land Aquisition (Baht)			220 Mil	320 Mil	590 Mil
Total (Baht) :			2,100 Mil	3,300 Mil	4,800 Mil
Immediate Improvement of Existing Airport			–	–	400 Mil
E. Environment					
Social Environment	: Resettlement		No impact	No impact	No impact
	: Land Use		Impact to golf course	Impact to golf course	No impact
Natural Environment	: Topography		No impact	Hill cutting	Alternating of wetland
	: Flora & Fauna		No impact	No impact	Impact to mangroves
Quality of Life	: Water Pollution		No impact	No impact	Impact to mangroves
	: Noise Problem		Impact to golf course	Impact to golf course	Impact to the village

Note 1. Mountains and hills proximity to Runway are influenced to decide the OCA

Note 2. Mountain, 116.2 m AMSL located south of runway is still influenced to decide the OCA

Exchange Rate : Baht 1.00 = ¥ 5.00

Table 13.1.4 Comparison of Airport Development Alternatives (2)

Alternative	Alt-1	Alt-2	Alt-3
Outline of Concept	Expansion to cope with the traffic demand of target year	Upgrading for future demand mostly in compliance with Int'l standard	New airport concept for the full development mostly in compliance with future demand and Int'l standard
1. Construction aspect			
- Land acquisition	Required Small site 90 ha	Bigger than Alt-1 148 ha	Required all airport sites 276 ha
- Detour of Main Road	3.5 km	4.2 km	2.7 km
- Civil Work			
- Cut work	1.1mil cu.m	4.5mil cu.m	2.8mil cu.m
- Filling work	1.5mil cu.m	4.5mil cu.m	3.2mil cu.m
- Land reclamation(Swamp area)	Not required	Required	Required
- Pavement area	220,000 sq.m	360,000 sq.m	670,000 sq.m
- Drainage system			
- Special work	Small embankment will be required	High embankment and land improven will be required	Land improvement will be required
- Building work			
- Designability	Required coordination with existing bldg.	Same as Alt-1	Required bldg. design freely
- Usability	L shape due to addition new bldg.	Same as Alt-1	Linear frontal apron
- Cooperatebility with existing building	Cooperation required		
- Passenger's accessibility	Complicated than Alt-3	Same as Alt-1	Easy because Curbside is linear frontage
- Navigation aids (ILS, position, etc.)	Offset localizer	Localizer will be set on the extended runway center line	Localizer can be installed on course
- Effective utilization of existing facilities	Maximum utilization	Less than Alt-1	Newly construction
- Construction period	Less period(around 2 years)	More than Alt-1	Most long period (around 3 years)
- Easiness of connection with public utility	Depend on the back capacity of existing facility		No difficulty because adjacent to main road
2. Operational aspect			
- Existence of obstacles in the obstacle limitation surface	Obstacles exist in the approach, transitional and inner horizontal surfaces	Obstacles projected above approach and transitional surfaces are to be cut by Alt-2 plan	No obstacle exists in the approach areas for both runways. High mountains located on the southern and northern parts of inner horizontal surfaces are projected.
- ILS procedure	ILS approach procedure will be established for Runway 27.	ILS approach Category I procedures for both runways will be established	ILS approach Category I procedures for both runways will be established successfully.
- OCS	OCS will not be improved due to existence of obstacles around the airport	OCS for ILS approach procedures for both runways will be improved provided that the completion of cut works around the airport.	Lower OCS of ILS approach procedures for both runways will be secured in comparison with those of Alt-1 and 2.
- Take off climb Surface	No obstacle exists on the Take off climb surface for Runway 27 provided that the portion of 142.2m hill which is projected above the 1/50 slope is to be cut	No obstacle exists on the Take off climb surface for Runway 27 provided that the portion of 142.2m hill which is projected above the 1/50 slope is to be cut	No obstacles exist in Take off climb area for both runways.
- Approach Surface	Same as the above	Clear (both R/W)	- Clear (both R/W)
- Taxiing distance	- Long distance of taxiing from RWY09 landing - Less distance landing from RWY 27 and take off from RWY09		
- Maneuverability of aircraft operation	- Control is complicated for arriving and departure aircraft around terminal area. - Apron control will require complicated procedures at apron area		- Simple control because of linear parking apron around the center of RWY with Parallel TWY.
- Maneuverability of GSE	- Complicated procedure will be required due to L-shaped apron configuration.		- Simple due to linear apron configuration.
- Safe apron control	- Existence of blind area of apron from the existing control tower	- Inferior than Alt-3	- Very safe due to the full observation from control tower.
- Expansibity for future demand	- Less expansibility than Alt-3	- Same as Alt-1	- High expansibility
- Comparability with ICAO recommendation	- Not complied fully	- Mostly satisfied with ICAO fully	- Same as Alt- 2
3.Environmental Aspect			
- Social Environment			
Á Resettlement	- No impact due to very little resettlement	- Same as Alt-1	- Same as Alt-1
Á Land use	- Impact to the golf club and National Park	- Same as Alt-1	- Conversion of land use at the existing airport
- Natural Environment			
Á Topography	- A little impact due to hill cutting	- Impact by hill cutting	- Impact by alteration of wetland
Á Flora & Fauna	- A little impact due to felling of trees	- Impact to mangrove that will be felled	- Significant impact to mangrove that is in good condition.
- Quality of Life			
Á Water Pollution	- No impact due to very few earth work	- Same as Alt-1	- Impact to mangrove that will be polluted
Á Noise Problem	- Impact to the condominium in the golf club	- Same as Alt-1	- Impact to the villages near the airport
4. Cost (Preliminary)	2.1 bil Baht	3.3 bil Baht	4.8 bil Baht

Table 13.1.5 Cost Comparison of Airport Development Alternatives

Unit : 1,000 Baht

Item	Alt-1	Alt-2	Alt-3
1. CONSTRUCTION COST	**1,895,000**	**3,012,000**	**4,190,000**
1.1 CIVIL WORKS	796,000	1,755,700	1,652,100
Excavation under Approach Surfac	67,700	141,700	
Runway Extension	279,300	546,000	
Runway Strip	130,500	612,000	1,353,900
Parallel Taxiway	42,700	158,500	
Apron Expansion	40,300	40,300	
Road and Car Park	16,900	16,900	18,200
Drainage	10,600	13,400	33,200
Miscellaneous Work	108,000	176,900	126,800
ALS Bridge	100,000	50,000	0
Revetment	0	0	120,000
1.2 ARCHITECTURAL WORKS	525,000	592,500	1,381,300
Passenger Terminal Building	525,000	525,000	1,295,000
Cargo Terminal Building	0	0	10,960
Administrative Building	0	67,500	67,500
Fire Station	0	0	7,840
1.3 AIR NAVIGATION SYSTEM	119,600	210,000	534,000
Radio Navigation System	3,900	37,200	74,000
ATC & Communication System	38,300	91,900	220,500
Met. Observation System	13,200	13,200	38,400
Airfield Lighting System	64,200	67,700	201,100
1.4 FUEL SUPPLY SYSTEM	210,000	210,000	260,000
1.5 AIRPORT UTILITIES	244,000	244,000	362,800
Power Supply System	129,000	129,000	187,200
Telephone	3,000	3,000	15,600
Water Supply System	21,000	21,000	30,000
Sewer Piping	7,000	7,000	10,000
Sewerage Treatment Plant	70,000	70,000	100,000
Incinerator	14,000	14,000	20,000
2. LAND ACQUISITION AND COMPENSATION COST	**218,000**	**321,000**	**591,000**
Land Acquisition	154,800	249,000	329,600
Compensation for Relocation	63,600	71,700	261,400
3. TOTAL OF 1.+2.	**2,100,000**	**3,300,000**	**4,800,000**
Immediate Improvement of Existing Airport	–	–	400,000

13.1.2 Selection of the Best Alternative

It is considered that Phuket International Airport will not only be expanded in accordance with future increase of traffic demand but also be upgraded so as to meet international standards so as to ensure safe aircraft operations by the release from current constraints.

As already described in Chapter 9, there are some difficulties to upgrade the existing airport or to construct a new airport in Phuket Island completely in compliance with international standards since there are some difficulties in establishment of inner horizontal surfaces of Obstruction Limitation Surfaces stipulated in Annex 14 of ICAO due to the mountainous terrain of the Island. Therefore, Alternatives-2 and 3 are selected as adequate alternatives in compliance with international standards as much as possible.

In the comparative study between the above two alternatives, the construction cost of Alternative-2 is lower than Alternative-3, and the existing facilities can be utilized effectively in Alternative-2.

Although these advantages are expected in Alternative-2, Alternative-3 is selected as the best alternative for Airport Master Plan in this Study for the following reasons:

(1) In comparison between Alternatives-2 and 3, there are no significant differences in the difficulties in land acquisition* and environmental conditions, however, Alternative-3 is slightly better in the constraints of the surrounding terrain.

    Accordingly it is considered that the ability of the better layout of the airport shall be regarded as the more important factor for the long-term development of the airport in order to secure efficient and safe operation for the increasing air traffic and to keep future expansibility for further development.

(2) An ideal airport is expected to be developed at the new site for the satisfaction with international standards as much as possible by the airport authority and persons concerned.

(3) There are some difficulties expected for further development of the existing airport. For example, land acquisition and cutting of mountainous areas around the existing airport is very difficult since there are many laws and governmental organizations concerned as listed in **Table 13.1.6**.

Consequently, Alternative-3 is selected as the most preferable alternative for Airport Master Plan in this Study, judging from the future expansibility and pursuit of an ideal airport.

The new airport site for the Study is not fully in compliance with international standards. Therefore, the further detailed survey for the site selection will be required for the implementation of a new airport construction in the Island including in the sea or on the adjacent mainland.

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* : Although land acquisition area for a new airport is larger than that in the existing airport, there are not so much difference in the acquisition procedures between both cases since, for a new airport, procedures can be made for a whole area at one time.

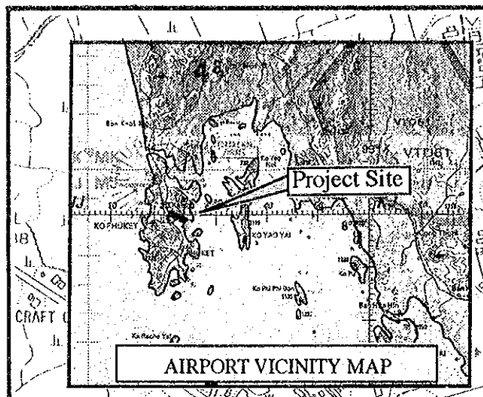
Table 13.1.6 Organizations Concerned for Cutting of Hills and Mountains

1. Ministry of Transport and Communications	
2. Governor of Province, Ministry of Interior	General matters of the province
3. The Royal Forestry Department, Ministry of Agriculture and Cooperatives	Control of forests
4. Office of Environmental Policy and Planning, Ministry of Technology, Science and Environment	Environmental matters
5. Fine Arts Department, Ministry of Education	Fossils and ancient ruins
6. Department of Mineral Resources, Ministry of Industry	Minerals
7. Department of Town and Country Planning, Ministry of Interior	Land use
8. The Royal Thai Police Department, Ministry of Interior	Security and safety of local people
9. The Treasury Department Ministry of Finance	Land utilization

13.2 AIRPORT MASTER PLAN

13.2.1 General

Figure 13.2.1 shows the selected master plan for Phuket International Airport for the target year 2010. Descriptions of each facility are given in the following section.



BUILDINGS			
(1)	Passenger Terminal Building	(6)	Equipment Maintenance Workshop
(2)	Cargo Terminal Building	(7)	Power House
(3)	Administration Operation Building	(8)	Sewage Treatment Plant and Incinerator
(4)	Control Tower	(9)	GSE Parking
(5)	Fire Station	(10)	Fuel Storage

RUNWAY STRIP	3,620.0 X 300.0
RUNWAY	3,500.0 X 45.0

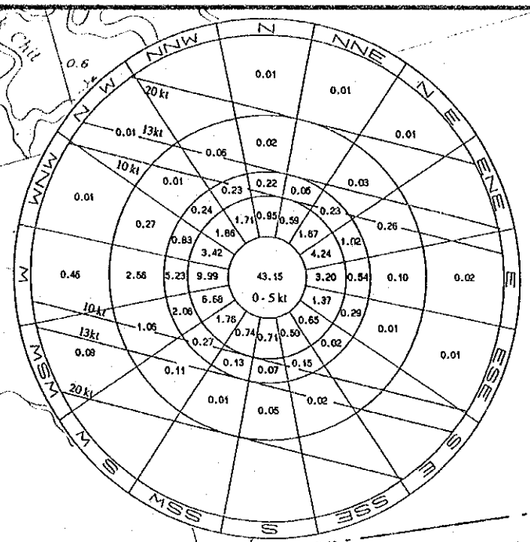
RUNWAY DATA		
Runway Orientation		104/284 (True North)
Effective Gradient		
Wind Coverage		99.58%(13 KT)
		99.97%(20 KT)
Instrument Runway		Yes (RWY 10, RWY 28)
Pavement Strength		PCN 55 /F/C/X/U
Approach Surface	RWY 10	1:50
	RWY 28	1:50
Runway Lighting		HIRL
Navigational Aids	RWY 10	ILS CAT-I
	RWY 28	ILS CAT-I
Visual Aids	RWY 10	ALS, PAPI
	RWY 28	ALS, PAPI

AIRPORT DATA	
Elevation	8.8 m (29 ft)
Reference Point (ARP)	07°59'10"N
	98°22'32"E
Reference Temperature	33.2°C
Magnetic Variation	1°18'W
Airport and Terminal Navigational Aids	ILS Cat-I, VOR/DME, NDB, ASR, SSR
Fire Protection	Category-8

BUILDINGS			
(1)	Passenger Terminal Building	(6)	Equipment Maintenance Workshop
(2)	Cargo Terminal Building	(7)	Power House
(3)	Administration Operation Building	(8)	Sewage Treatment Plant and Incinerator
(4)	Control Tower	(9)	GSE Parking
(5)	Fire Station	(10)	Fuel Storage

LEGEND	
----------	Property Line

ALL - WEATER WIND COVERGE		
Source	:	Meteorological Department
Location	:	Phuket International Airport
Period	:	August 1989 - July 1992
Runway Orientation	:	N 104° E



RUNWAY STRIP 3,620.0 X 300.0

RUNWAY 3,500.0 X 45.0

60.0 OVERRUN

ROUTE 4027

A6 Po

AMPHOE THALANG

VOR/DME

ILS/GP

ILS/LLZ

1:50 APPROACH SURFACE

ALS (L=900M)

M/M

300.0

160.0

240.0

350.0

PARALLEL TAXIWAY

APRON

RUBBER GLOVE FACTORY

CAR PARK

1,000.0

NATIONAL MUSEUM

Phuket Town

THA RUA SCHOOL

Ban Tha Rua

Khlong Tha Rua

Khlong Bang Sai

S = 1 : 10,000

Figure 13.2.1 Master Plan of Phuket International Airport (Year 2010)

13.2.2 Layout Planning

(1) Civil Works

a) Runway

A 3,500 m long runway is planned based on the requirement of runway length calculated in Chapter 5. Runway width is 45 m for Aerodrome Reference Code 4E, in accordance with Annex-14 of ICAO.

b) Runway Strip

A 300 m wide runway strip will be provided for the precision approach runway of Category-I operations based on Annex-14 of ICAO.

c) Taxiway

According to Airport Planning Manual of ICAO, a parallel taxiway is justified when there are four instrument approaches during the peak hour. For exit taxiways, right angle exit taxiways are sufficient instead of rapid exit taxiways when the peak hour traffic is less than around 25 operations according to Aerodrome Design Manual of ICAO.

Considering the forecasted traffic demand of 14 operations in Year 2010 at Phuket International Airport, a parallel taxiway and right angle exit taxiways are justified. Separation distance between the runway and the parallel taxiway is planned to be 182.5 m in accordance with Annex 14 of ICAO.

d) Apron

A terminal area is planned in the south side of the runway taking into consideration the terrain and easy connection with the trunk road. A linear concept is adopted for the passenger apron and the passenger terminal building.

An apron with 720 m width and 190m depth will be constructed for aircraft parking in the middle of the runway. This apron will accommodate 11 aircraft which consists of four B-747 class, three B-777 class, two A-300 class aircraft and two small aircraft. Nose-in parking configuration is adopted except for small aircraft which can park with self-maneuvering. Apron depth is determined so that the vertical wing of B-747 aircraft may not infringe upon the transitional surface.

Parking space of GSE for ground handling of passengers and cargo, aircraft maintenance, and other services are provided at the both sides of the apron.

e) Road and Car park

The airport access road is planned to utilize the existing road (Route 4027) from the junction with the trunk road (Route 402) to the new terminal area.

A circulation road is planned around the car park to be one way traffic for vehicular flow. Terminal roads accessing to the cargo terminal and fuel storage area are separated from the circular road in order to permit the direct access to those areas without passing in front of the passenger terminal building.

A car park for 960 vehicles will be constructed in front of the passenger terminal building so as to minimize walking distance of users. Parking space for taxis will be reserved west of the car park.

(2) Architectural Works

a) Passenger Terminal Building

A passenger terminal building for international and domestic passengers with a total floor area of 47,000 sq.m will be constructed in front of the passenger apron. Two-level passenger processing floors with double deck access road at curb side is adopted. The ground floor is used for arrival passengers of domestic and international routes. The second floor is used for departing passengers of the both routes.

A sufficient space for future expansion is kept at the both ends of the building in order to cope with increase of domestic and international passengers in future.

b) Cargo Terminal Building

A cargo terminal building with a total floor area of about 1,400 sq.m is planned in the east end of the terminal area facing the passenger terminal apron with an access road from the outside of the airport. GSE maneuvering space in the airside and cargo truck maneuvering space in the curb side are planned for smooth handling of the cargo.

c) Administration Operation Office

Administration operation office with a control tower is planned in the west of the passenger terminal building so as to have good visibility to the runway and other aircraft movement area, and good access to both airside and curbside.

d) Fire Station

A fire station which has a floor area of 450 sq.m will be constructed on the airside almost in the middle of the runway adjacent to the passenger terminal apron so as to ensure quick access to the runway. A direct service road is planned to connect with the runway and taxiway.

(3) Air Navigation System

Air navigation system are planned to cope with the requirements for the precision approach runway category-I in order to secure aircraft operational safety.

(a) Radio Navigation System

Category-I ILS or MLS co-located with DME will be installed for both directions of the Runway.

Terminal VOR/DME and NDB are also installed.

(b) Airfield Lighting System

Category-I approach lighting system (ALS) will be installed for Runways 11 and 29. Some approach lights for Runway 29 will be located in the mangrove area and installed on poles.

PAPIs will be installed for Runways 29 and 11.

Other following airfield lights will be installed.

Runway edge light, Runway threshold/end light, Taxiway light, Apron flood light, Illuminated wind direction indicator, Obstacle light, Information sign, Aerodrome beacon light, and Power supply system

(4) Fuel Supply System

The fuel storage area is planned in the west of the terminal area which is connected by the access road directly to the aircraft parking apron and from the airport access road. A hydrant system will be employed for supply of aviation fuel to aircraft.

CHAPTER 14

SCOPE OF THE SHORT-TERM DEVELOPMENT PLAN

CHAPTER 14 SCOPE OF THE SHORT-TERM DEVELOPMENT PLAN

14.1 GENERAL

The scope of the short-term development plan is described in this chapter which was determined within the framework of the airport master plan. Feasibility of the short-term development is examined in the following chapters.

Although the new airport alternative was selected for the long-term development plan, the short-term development plan is established on the existing Phuket International Airport with the target year of 2000 as described in the Scope of Work.

In the airport master plan for long-term development, a new airport will be constructed. The existing Phuket International Airport will be operated for about ten years until a new airport will be completed, and will be closed after an inauguration of the new airport.

Therefore, development of the existing airport shall be minimized only to cope with the increase of traffic demand until the year 2000.

14.2 CONSTRUCTION WORK ITEMS FOR SHORT-TERM DEVELOPMENT PLAN

Work items of the short-term development are listed in **Table 14.2.1**.

Work items for the short-term development are selected through the comparison between the existing capacity and the requirement in the year 2000, and the facilities which will not have sufficient capacity in the year 2000 will be expanded in the short-term development plan.

Outline of major work items are summarized as follows:

- Flexible pavement of the runway will be strengthened by bituminous overlay for introduction of B747 class aircraft. For the rigid pavement of the runway, the taxiways and apron, existing pavement will be sufficient for the above mentioned aircraft.

- Expansion of the passenger terminal building, mainly international passengers facilities, will be expanded in accordance with increase of the passengers.

- Car park will be expanded so as to increase capacity.

- Airport utilities such as electricity and water supply will be expanded in accordance with demand increase.

Other facilities except the above will be able to cope with the future traffic demand without any expansion until year 2000.

Table 14.2.1 Construction Work Items

A. Civil Works

1) Runway Overlay

Construction section : STA 1110 to STA 3390 m (L = 2280 m)
Minimum overlay thickness : 7.5 cm
Average overlay thickness : 12.7 cm

2) Expansion of the Car Park

Number of parking slots : 420 cars

3) Miscellaneous Work

Construction of the additional security fence : L = 800 m

B. Architectural Works

1) Expansion of Passenger Terminal Building

Floor area = 6,980 sq.m

C. Utilities

1) Installation of Power Generator
2) Construction of New Deep Water Well
3) Installation of Incinerator
4) Installation of Telephone Exchange

In the above listed items, following works are already planned to be implemented by AAT. These items are included in the short-term development works of this Study, and evaluated together with other items.

- Expansion of the Car Park

Number of parking slots : 200 lots

- Expansion of Passenger Terminal Building

Floor Area : 5,400 sq.m

CHAPTER 15

PRELIMINARY DESIGN

CHAPTER 15 PRELIMINARY DESIGN

15.1 GENERAL

The preliminary design of the facilities for the short-term development plan is carried out on the selected work items in Chapter 14.

Airport Master Plan is shown based on the selection in Chapter 13.

The airport layout plan and terminal area layout plan in the short-term development plan are shown in **Figures 15.1.1** and **15.1.2** respectively.

The objective of the preliminary design is to clarify the basic concept and design criteria, and to outline specifications and dimensions of the facilities for the purpose of cost estimats.

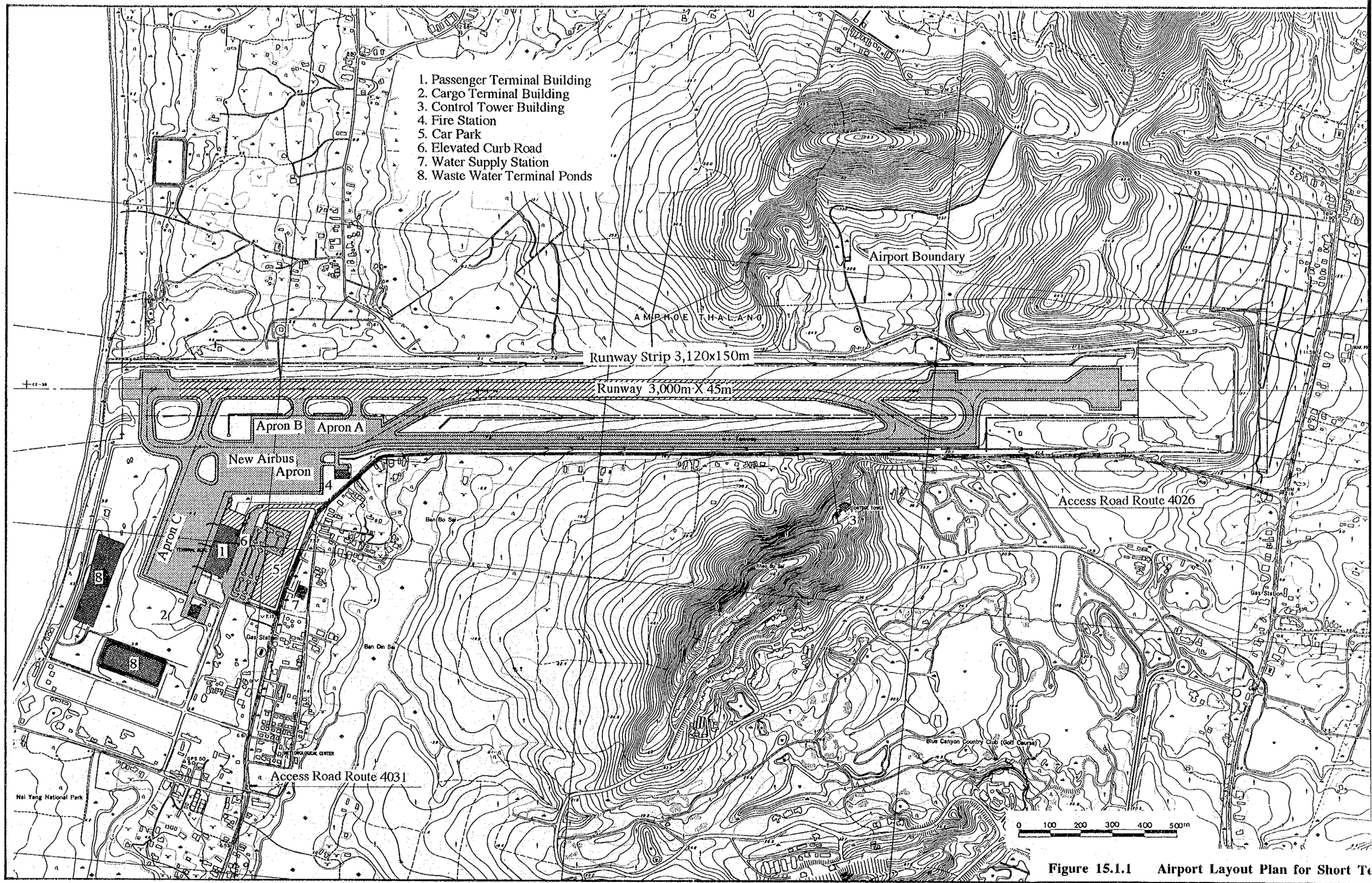


Figure 15.1.1 Airport Layout Plan for Short Te

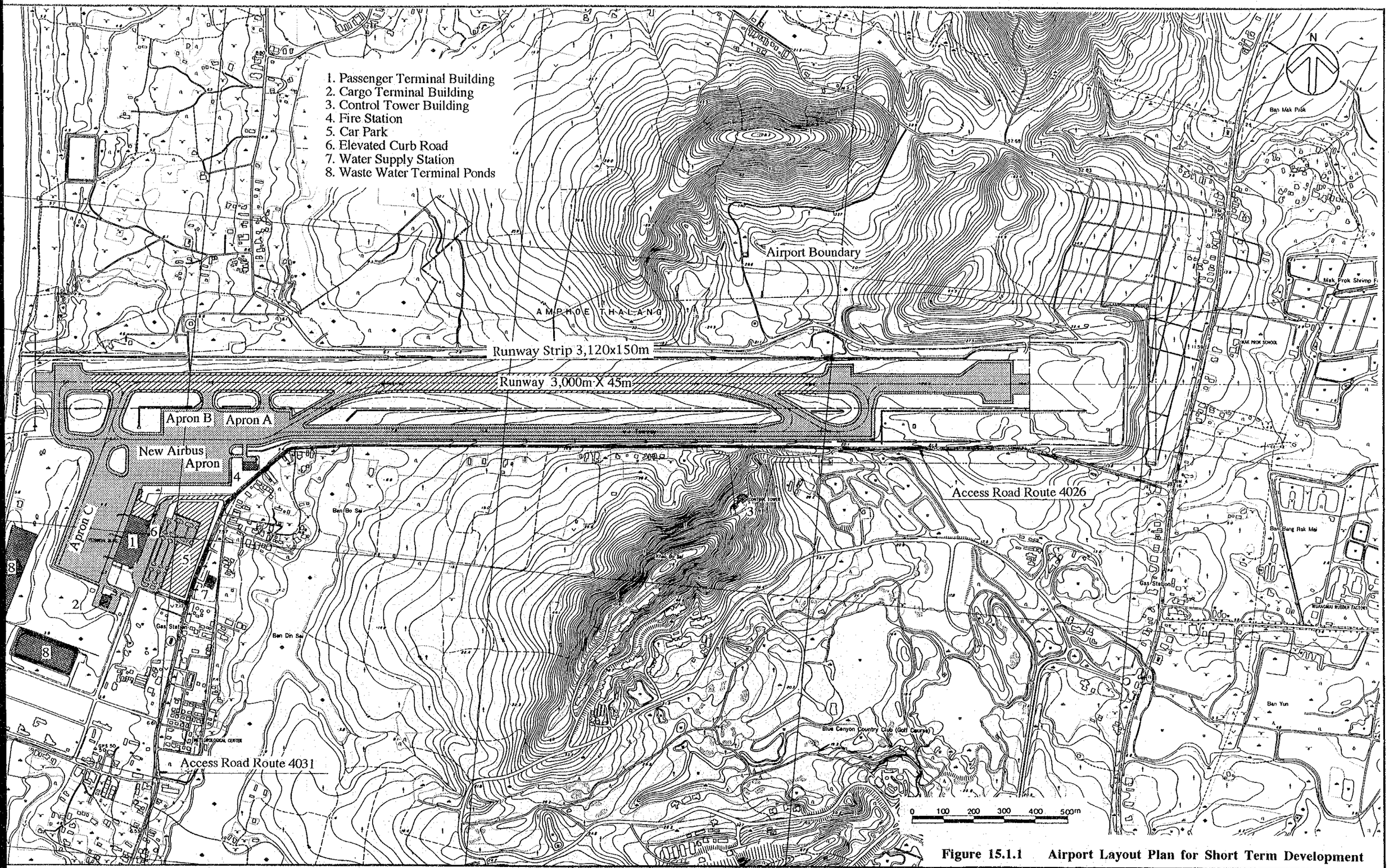


Figure 15.1.1 Airport Layout Plan for Short Term Development

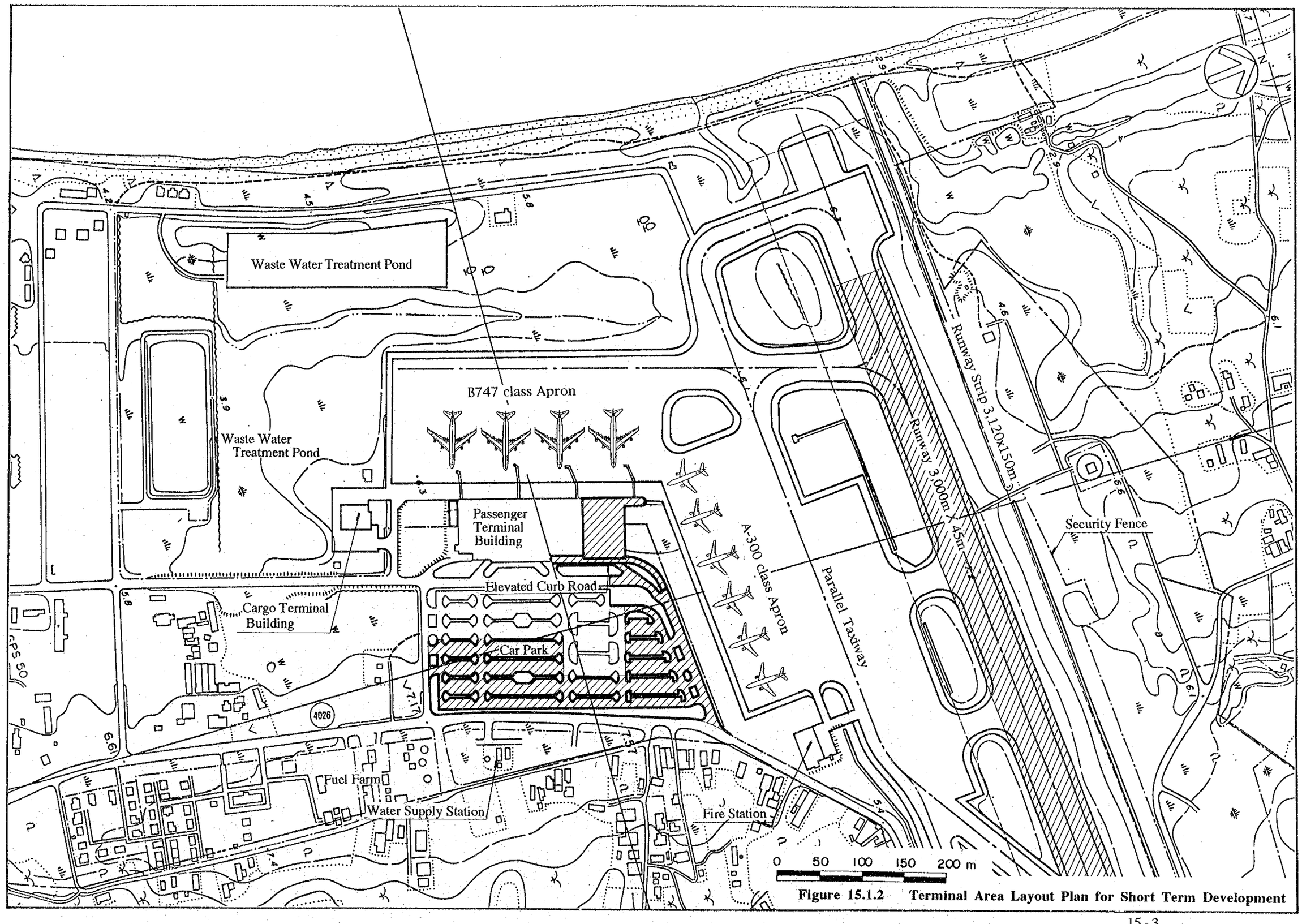


Figure 15.1.2 Terminal Area Layout Plan for Short Term Development

15.2 CIVIL WORKS

15.2.1 Runway

The length and width of the runway in the short-term development plan will remain the same as the existing condition, i.e., 3,000 m long and 45 m wide. The pavement strength will be increased by bituminous overlay works so as to accommodate B747 class aircraft as detailed in Section 15.2.4.

The runway profile was designed to secure the required thickness of pavement overlay mentioned in Section 15.2.4 "Pavement Plan", and to satisfy the recommendations on physical characteristics stipulated in Annex 14, Aerodromes, ICAO. Therefore, the runway profile was determined as shown in **Figure 15.2.1** so as to minimize the volume of bituminous materials for overlay works.

The average overlay thickness is 12.7 cm. This is relatively thick in comparison with the minimum required thickness of 7.5 cm, since existing runway profile is not so smooth and additional volume of materials is necessary to finish the runway surface so as to satisfy the ICAO recommendations on runway slopes.

Typical cross section of the runway is shown in **Figure 15.2.2**.

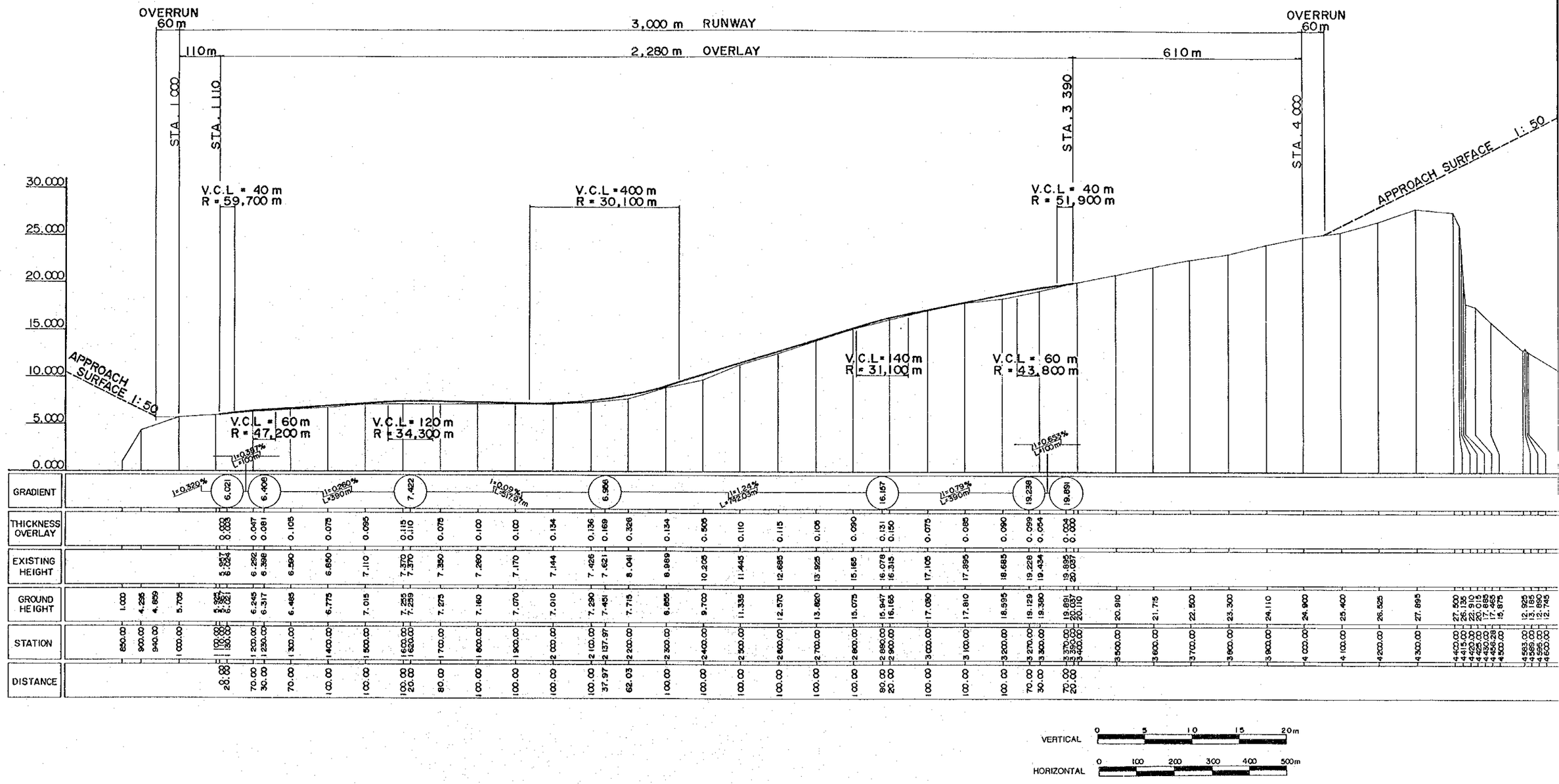


Figure 15.2.1 R

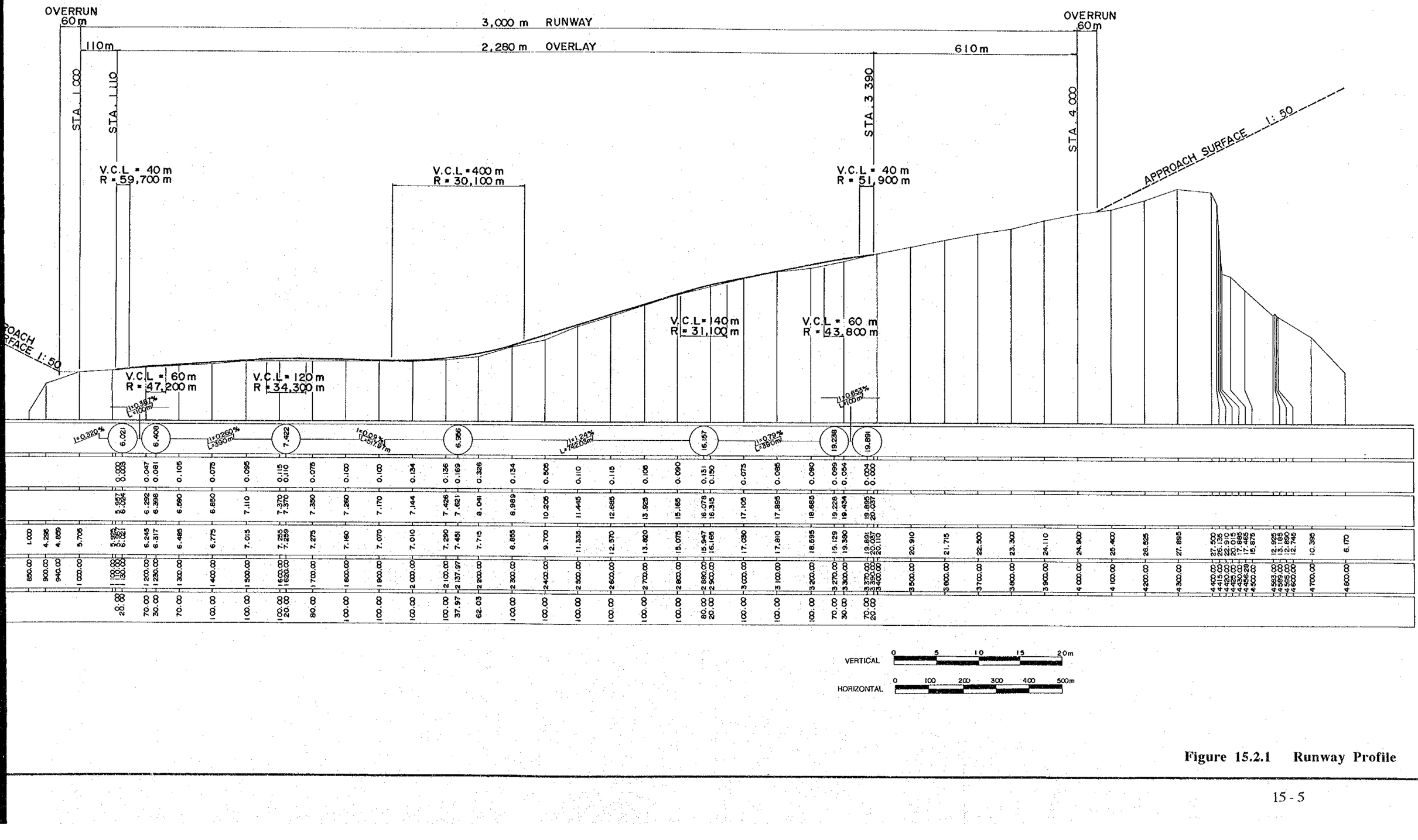
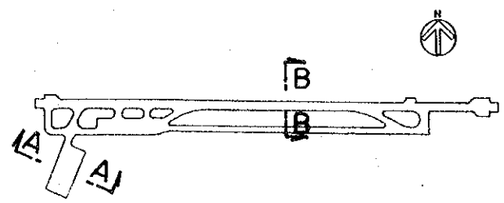
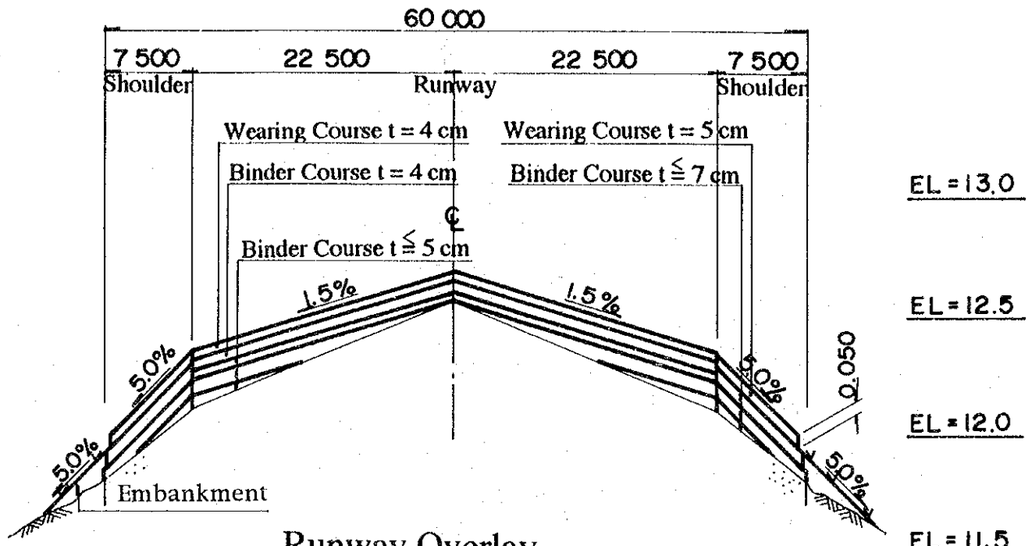


Figure 15.2.1 Runway Profile

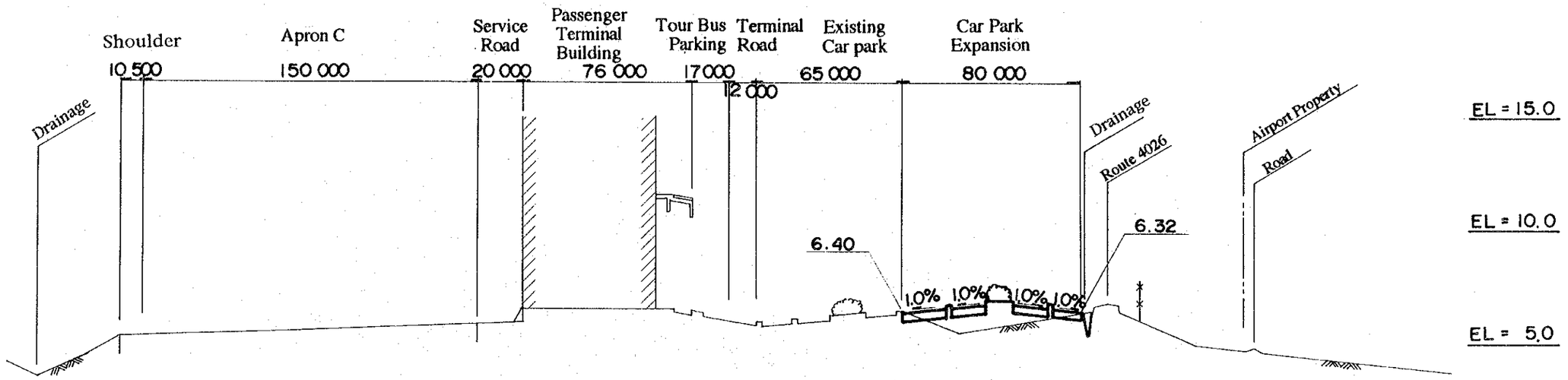
KEY PLAN





Runway Overlay

Scale Vertical 1 : 25
Section B-B Horizontal 1 : 500



Passenger Terminal Area

Scale Vertical 1 : 200
Section A-A Horizontal 1 : 2,000

Figure 15.2.2 Typical Cross Sections

15.2.2 Car Park and Terminal Road

Car park will be expanded to accommodate a total of 600 cars inside the terminal road. Most of parking spaces of the existing car park (including group tour bus parking in front of the building) will remain as they are now.

New terminal roads will be constructed for vehicle circulation in accordance with the expansion of car park. The width of the terminal roads will be 8 to 12 m same as existing. They are located among passenger terminal building, new apron expansion under construction and the access road Route 4031. Basically current vehicular flow system will not be changed. This is because that change in parking fee collection would be inconvenient for users and airport administration.

Passenger building curb will be extended by approximately two times in front of the expanded passenger terminal building. Departure level elevated road is extended 80 m toward the extended terminal building. Arrival level curb road will also be extended below the elevated road. The exit of airport terminal road will be shifted northward so as to allow the elevated road have enough length to descend to the ground level.

Layout plan of terminal road and car park is shown in **Figure 15.1.2.**

15.2.3 Storm Water Drainage Plan

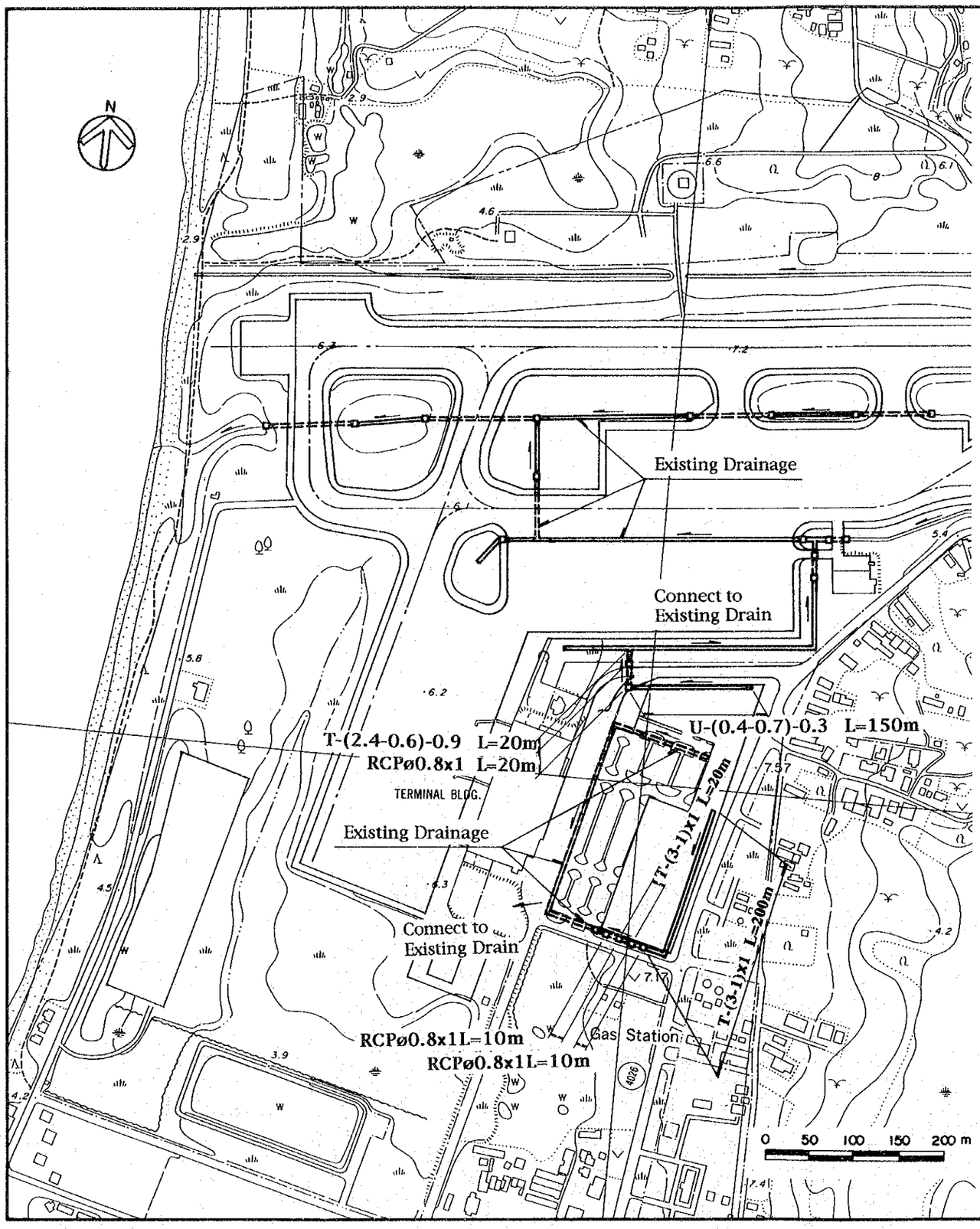
Drainage facilities will be extended so as to handle the rain water from the expanded car park area. Since the civil work in the terminal area is relatively small, the same concept as the existing drainage system is adopted.

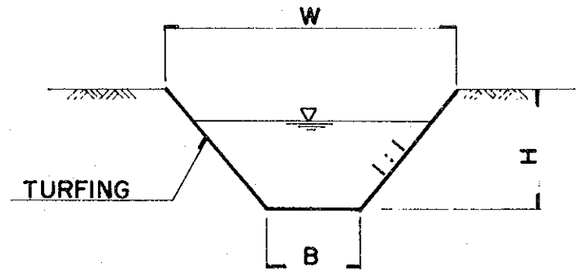
At present, there are separated drainage systems in the runway strip and in the terminal area.

Rainfall onto the existing car park runs off into the terminal area drainage system. Trapezoidal channel along southern edge of the car park will be extended so as to collect rain water in south-eastern part of the expanded car park. Pipe culvert is adopted where the drainage crosses under the entrance / exit of the car park.

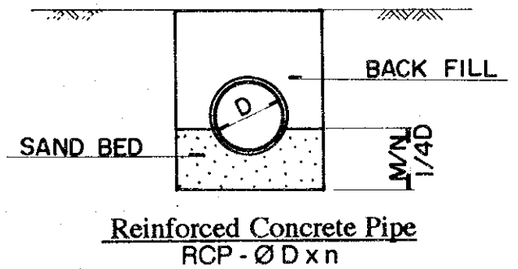
For the northern part of the car park, drainage is planned to be connected with the drainage system in the runway strip. An open channel is under construction beside the new apron expansion. It connects with the existing drain. A U-shaped channel is planned so as to collect rain water in the north part of the car park. A pipe culvert will connect it to the open channel beside the new apron.

Layout plan of storm water drainage is shown in **Figure 15.2.3.**

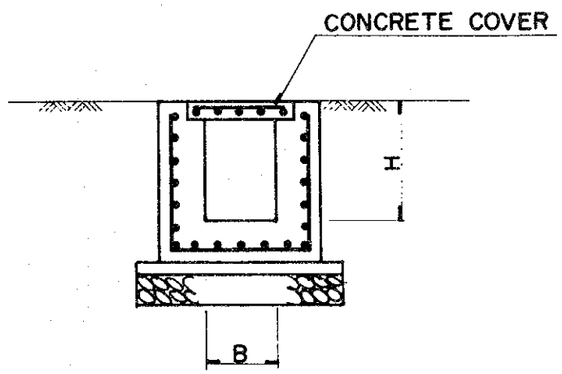




Trapezoidal Channel
T - (W - B) x H



Reinforced Concrete Pipe
RCP - Ø D x n



U - Shaped Channel
U - B x H1 ~ H2

Figure 15.2.3 Storm Water Drainage Layout Plan