

## 5.6 Master Planning of Priority Project(s) of Airports

### 5.6.1 Identification of Priorities for Airport Development

All nine airports classified as Primary and Secondary were evaluated to determine development priorities until the year 2020.

### 5.6.2 Development Guideline

Airport facilities will be planned and constructed in accordance with the Standards and Recommended Practices of the International Civil Aviation Organization. Where ICAO SARP's are not sufficient or relevant, those of the Japan Civil Aviation Bureau (JCAB), United States Federal Aviation Administration (FAA) and International Air Transport Association (IATA) will be selectively applied.

The process for determining facility requirements during master planning appears in the chart below.

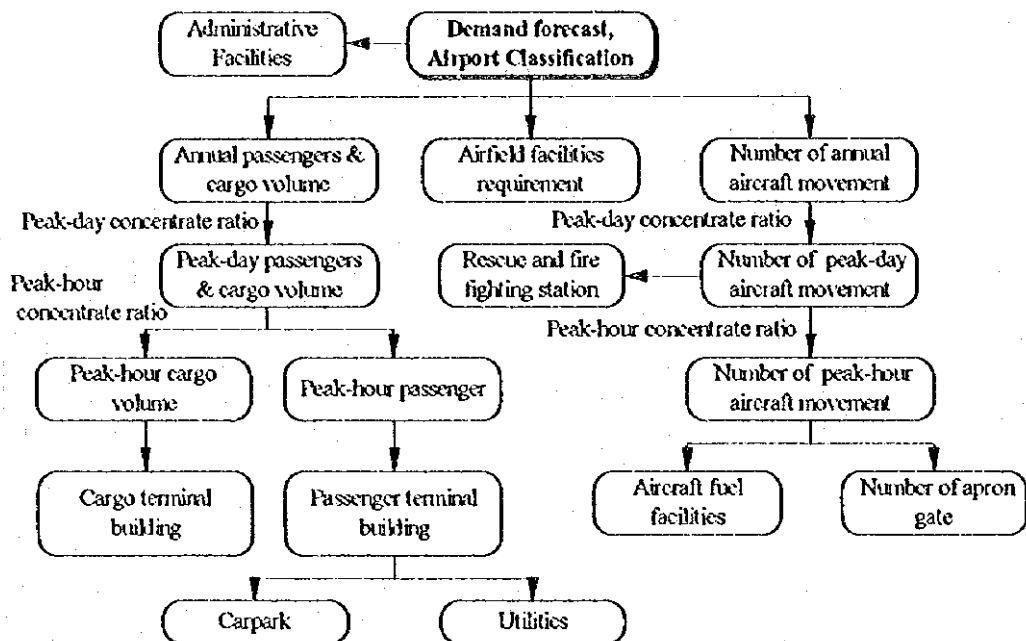


Figure 5.1 Work Flow of Facility Requirements Calculation

Table 5.3 shows the characteristics and specifications for existing and required facilities.

### 5.6.3 Master Planning

For the selected nine airports, master plans for airport development over the long term to the year 2020 have been prepared and layout plans drawn. Particular considerations are described below for some of these airports.

#### (1) Akmola International Airport

This airport will serve the new capital as well as serving as a primary airport along with Almaty. Figure 5.5 shows overall airport layout. The following facilities are required in addition to the usual airport facilities.

- Runway for flights to western Europe by Boeing 747 class aircraft
- VVIP building separated from the public area

#### a) Runway Extension

It is planned to extend the runway by 1,000 meters in the 04 direction.

- The ground water level in the runway 22 extension area appears high. Geological conditions can be considered poor for airfield pavement laying. The construction costs will therefore be less for the 04 extension than that for 22 regarding earthwork, pavement and drainage works.
- The impact of aircraft noise will be less because 04 is further from the City.

#### b) Selection of Terminal Location

A new terminal area is planned because most of the existing facilities are more than 20 years old, and because airport operation must continue during any construction work. Three cases have been studied (Table 5.4) i.e. 1) international and domestic terminals on the existing terminal side; 2) ditto, on the lake side; 3) international and domestic terminals separated on both sides. (Figure 5.2)

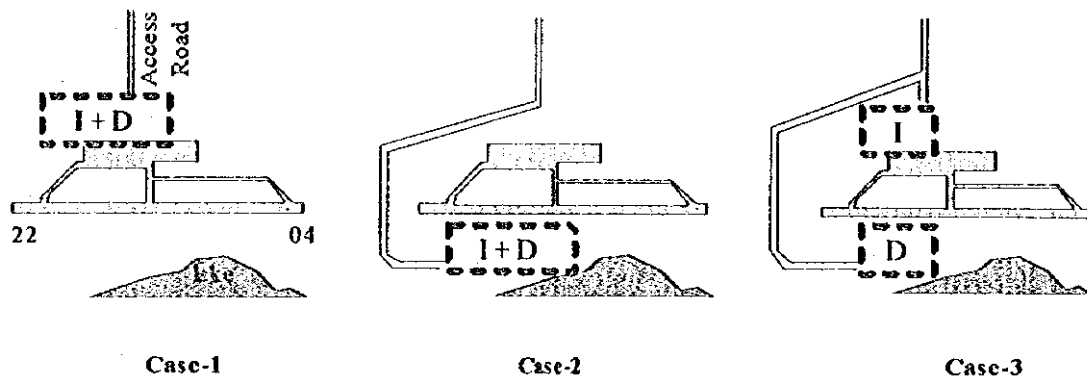
Table 5.3 Existing Facilities and Future Requirement

Airport (Region) Year	Akola (Akola)			Akteu (Margistau)			Aktjubinsk (Aktjubinsk)			Almaty (Almaty)		
	1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020
1. Annual Passengers (000)												
-Domestic	-	1,001	2,315	-	430	845	-	117	269	-	2,568	3,374
-International	-	237	1,294	-	56	225	-	61	61	-	2,163	3,057
-Total	154	1,237	3,609	281	486	1,070	69	117	330	1,615	4,731	6,431
2. Annual Cargo Volume (tons)												
-Domestic	-	12,560	29,936	-	5,265	9,871	-	1,213	2,541	-	23,731	25,143
-International	-	8,866	31,305	-	377	6,371	-	385	385	-	46,096	69,784
-Total	2,385	21,426	61,241	2,882	5,642	16,242	593	1,213	2,930	20,355	69,827	94,926
3. Annual Aircraft Movements	NA	17,820	49,500		6,600	15,180		1,320	5,280		67,320	74,580
4. Peak Hour Passengers (both way)												
-Domestic	-	500	1,000	-	280	440	-	190	220	-	1,040	1,330
-International	-	160	580	-	120	180	-	80	80	-	910	1,260
5. Peak Hour Aircraft Movements (one way)												
-Domestic	-	3.8	7.6	-	2.1	3.5	-	1.2	1.7	-	8.3	8.6
-International	-	1.5	4.2	-	0.8	1.2	-	0.9	0.9	-	6.8	7.7
6. ICAO Aerodrome Reference Code	4D	4D	4D	4D	4D	4D	4D	4D	4D	4E	4E	4E
7. Runway												
-length (m)	2,511	2,800	2,800	2,650	2,650	2,650	3,100	3,100	3,100	4,400	4,400	4,400
-width (m)	49	45	45	42	45	45	60	45	45	60	45	45
8. Runway Strip												
-length (m)	3,311	2,920	2,920	3,450	2,770	2,770	3,900	3,220	3,220	5,200	4,520	4,520
-width (m)	200	300	300	265	300	300	150	150	300	300	300	300
9. Taxiway												
-System	Partial Parallel Taxiway	Parallel Taxiway	Parallel Taxiway	2 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	Partial Parallel Taxiway	Partial Parallel Taxiway	Partial Parallel Taxiway	4 Exit Taxiway	Parallel & 8 Exit Taxiway	Parallel & 8 Exit Taxiway
-max width (m)	18	30	30	NA	30	30	22.5	30	30	22.5	30	30
10. Apron												
-LJ (B747)							2			12	3	5
-MJ (B767,A300)	3	2	5	6		2	4		1	16	5	5
-SJ (B737,A320)	2	6	12		5	6	4	2	3	15	16	16
-JP (E50, ATR72)	13		1	13			16			17	1	
11. Passenger Terminal Building												
-Domestic (m <sup>2</sup> )	-	8,800	16,500	-	5,240	7,740	-	3,550	4,110	-	17,160	21,950
-International (m <sup>2</sup> )	-	2,990	10,210	-	2,240	3,370	-		1,580	-	15,020	20,790
-Total (m <sup>2</sup> )	1,650	11,790	26,710	215	7,480	11,110	3,600	3,550	5,690	11,500	32,180	42,740
12. Cargo Terminal Building												
-Domestic (m <sup>2</sup> )	-	1,050	2,150	-	750	870	-	530	640	-	1,770	1,860
-International (m <sup>2</sup> )	-	840	2,240	-		780	-			-	3,050	3,200
-Total (m <sup>2</sup> )	-	1,890	4,390	-	750	1,650	-	530	640	-	4,820	5,060
13. Administrative Area (m <sup>2</sup> )	1,963	4,000	5,000	226	2,400	4,000	886	2,400	4,000	1,769	4,000	5,000
14. Carpark												
-Parking Slots	NA	528	1,264	NA	320	496	NA	152	240	NA	1,560	2,072
-Area (m <sup>2</sup> )	NA	18,480	44,240	NA	11,200	17,360	NA	5,320	8,400	NA	54,600	72,520
15. Air Navigation System	ILS, 4NDZ, RSN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, PALS, RWYTL, RTZL, ABN	CAT-II ILS/MLS, VOR/DME, NDB, RSN, REDL, RWCL, PALS, RWYTL, RTZL, ABN	ILS, VOR/DME, 4NDZ, RSN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, VOR/DME, 4NDZ, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, VOR/DME, 4NDZ, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSN, REDL, RWCL, PALS, RWYTL, RTZL, ABN	CAT-II ILS/MLS, VOR/DME, NDB, RSN, REDL, RWCL, PALS, RWYTL, RTZL, ABN
16. Rescue and Fire Fighting												
-Level of Protection	6	7	8	6	5	7	7	4	7	8	9	9
-Fire Station Area (m <sup>2</sup> )	*438	1,500	2,700	*94	1,050	1,500	*115	1,050	1,500	*69	2,700	2,700
17. Utilities												
-Power Supply (KVA)	2,000	2,010	4,070	NA	1,230	1,910	NA	750	1,200	NA	4,630	6,030
-Water Supply (t/day)	NA	320	680	NA	200	300	NA	110	170	600	790	1,050
-Sewage Disposal (t/day)	NA	320	680	NA	200	300	NA	110	170	NA	790	1,050
-Solid Waste Disposal (tq/day)	NA	1,650	3,180	NA	960	1,570	NA	660	1,050	NA	3,490	4,400
18. Fuel Supply Facilities												
-Tank Capacity (t)	8,000	1,930	5,350	3,000	610	1,580	9,000	140	440	22,000	10,120	13,160
-Fuel Farm Area (m <sup>2</sup> )	NA	14,300	35,300	NA	8,500	14,300	NA	4,800	6,300	NA	63,000	63,000

Note: Data of 1995 is assumed by historical data.

\*: Building Floor Area

Atyrau (Atyrau)			Karaganda (Karaganda)			Pavlodar (Pavlodar)			Shimkent (South Kazakhstan)			Ust-Kamenogorsk (East Kazakhstan)		
1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020
	242	319		343	774		292	675		322	712		255	496
	41	83		91	208		44	89		37	77			31
167	283	602	242	434	982	157	336	764	203	359	789	174	255	527
	2,249	4,815		4,002	6,512		1,554	3,339		2,324	4,939		3,084	6,079
	86	173		308	2,601		102	205		179	373			148
1,439	2,334	4,989	2,604	4,311	9,113	1,034	1,656	3,544	1,431	2,503	5,312	1,878	3,084	6,227
	3,960	9,240		5,940	12,540		4,620	10,560		4,620	7,260		3,300	7,260
	720	310		250	420		230	380		260	470		230	320
	90	110		110	200		100	110		80	100			60
	1.6	2.6		1.9	3.1		1.7	2.8		1.7	2.1		1.6	2.3
	0.8	0.9		0.9	1.0		0.8	0.9		0.8	0.9			0.8
4D	4D	4D	4E	4E	4E	4D	4D	4D	4D	4D	4E	4D	4D	4D
2,350	2,350	2,350	3,300	3,300	3,300	2,500	2,700	2,700	2,800	2,800	2,800	2,500	2,500	2,500
44	44	44	60	45	45	45	45	45	44	44	44	42	42	42
NA	2,470	2,470	4,100	3,420	3,420	3,300	2,820	2,820	3,080	2,920	2,920	NA	2,620	2,620
NA	150	300	200	300	300	130	300	300	NA	300	300	150	150	150
2 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	1 Stub Taxiway	2 Stub Taxiway	2 Stub Taxiway	Parallel Taxiway	Parallel Taxiway	Parallel Taxiway	Parallel Taxiway	Parallel Taxiway	Parallel Taxiway
18	18	30	22.5	22.5	23	18	30	30	NA	30	30	NA	23	23
NA			2						2		1			
	4	4	9	1	3	2		2	2	1	1	NA		
			9	3	4	3	4	4	16	4	2		2	5
						13					1			
	4,110	5,460		4,680	7,390		4,300	6,690		4,860	8,270		4,300	5,630
	1,780	2,060		2,060	3,740		1,870	2,060		1,580	1,870			1,190
2,880	5,890	7,520	13,500	6,740	11,130	3,600	6,170	8,750	1,177	6,440	10,140	394	4,300	6,820
	610	730		700	780		560	670		610	740		660	770
					630									
	610	730		700	1,410		560	670		610	740		660	770
2,674	4,000	4,000	437	2,400	4,000	689	2,400	4,000	990	2,400	4,000	2,310	2,400	4,000
NA	248	336	NA	288	496	NA	264	392	NA	272	455	NA	184	304
NA	8,680	11,760	NA	10,080	17,360	NA	9,240	13,720	NA	9,520	13,960	NA	6,440	10,640
ILS, VOR/DME, ANDB, RSBN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, VOR/DME, ANDB, RSBN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, ANDB, RSBN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, ANDB, RSBN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	ILS, ANDB, RSBN, REDL, ALS, RWYTL	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN	CAT-I ILS, VOR/DME, NDB, RSBN, REDL, RWCL, SALS, RWYTL, RTZL, ABN
6	5	7	7	7	8	7	5	7	6	7	8	6	5	5
53	1,030	1,500	339	1,500	1,750	84	1,050	1,500	170	1,500	2,700	820	1,050	1,050
NA	1,220	1,430	NA	1,140	1,900	NA	1,060	1,570	NA	1,100	1,740	NA	840	1,340
NA	180	220	1,200	180	300	12,000	170	240	NA	170	280	NA	120	200
NA	180	220	NA	180	300	NA	170	240	NA	170	280	NA	120	200
NA	1,060	1,190	NA	910	1,540	NA	850	1,270	NA	870	1,370	NA	730	1,150
9,000	330	700	10,000	480	970	10,000	360	1,020	7,000	310	780	NA	180	740
NA	6,300	8,500	NA	6,300	8,500	NA	6,300	8,500	NA	6,300	8,500	NA	4,800	8,500



**Figure 5.2 Alternative Locations of New Terminal Area**

- It is common practice to locate most terminal functions in one area and, where possible, adjacent to the center of the runway(s). Some examples appear in **Figure 5.3**. Besides Tokyo's Narita Airport, integrated terminal areas have been built for many new airports in Asian countries. In the case of Moscow Sheremetyevo International Airport, terminal II was inaugurated for the 1990 Olympic Games being located opposite terminal I adjacent to the runway. This was because there is no room for development on the terminal I side, and construction period was so limited that phased construction, which involves demolition or relocation of the existing facilities, was not practical. Now terminal II is used for international flights while terminal I is used for domestic flights.
- Expandability will not be a problem in all cases.
- There are no major differences in terms of scenic impact.
- Development in and around the existing area would allow more utilization of the existing facilities, such as aprons, taxiways, access road and utilities. This would reduce construction costs compare to developing a new airport terminal.

Case-1 was considered the preferred option after considering all of these factors.

**Table 5.4 Comparison of Terminal Area Development**

Alternative Evaluation Item	Case 1	Case 2	Case 3
	Development in the existing area with combination of Domestic PTB and International	Development in the lake side area with combination of Domestic PTB and International	Development in two area with separation between Domestic PTB and International
<b>1. Convenience for Airport Users</b>			
<b>1.1 Passenger and Cargo</b>			
1.1.1 Transfer between Int'l and Dom.	- Good: Easy and time-saving	- Good: Easy and time-saving	X Poor: Complicated and time-consuming
1.1.2 Accessibility from the city	- Good: Easy and time-saving	X Poor: Longer	X Poor: Longer
<b>1.2 Airport Operation</b>			
1.2.1 Vehicle circulation on airside	- Good: Short	- Good: Short	X Poor: Long
1.2.2 Apron spot assignment	- Good: Easy and flexible	- Good: Easy and flexible	X Poor: Complicated and not easy
1.2.3 Cargo handling & conveying between Int'l and domestic PTB	- Good: Easy and time-saving	- Good: Easy and time-saving	X Poor: Complicated and time-consuming
1.2.4 Airport administration & security	- Good: Easy and efficient	- Good: Easy and efficient	X Poor: Not easy and inefficient
<b>2. Expandability of PTB for future</b>	- Easy	- Easy	- Easy
<b>3. Scenery consideration</b>	- Good	- Good	- Good
<b>4. Cost Consideration</b>			
3.1 Land acquisition	- US\$ 17,601,000 10.5 ha	X US\$ 38,231,000 91 ha	X US\$ 34,521,000 103.8 ha
3.2 Utilization of existing facilities	Apron, taxiway	None	Apron, taxiway
3.3 Additional facilities for terminal	None	Extension of access road and utilities	Extension of access road and utilities
<b>Total Evaluation</b>	0 1	2 2	7 3

Note:

1. The above costs exclude the costs of common facilities for any of the three alternatives, such as runway extensions, overlay of runway, parallel taxiways, etc.
2. Width of access road is 40 m calculated for the land acquisition area.

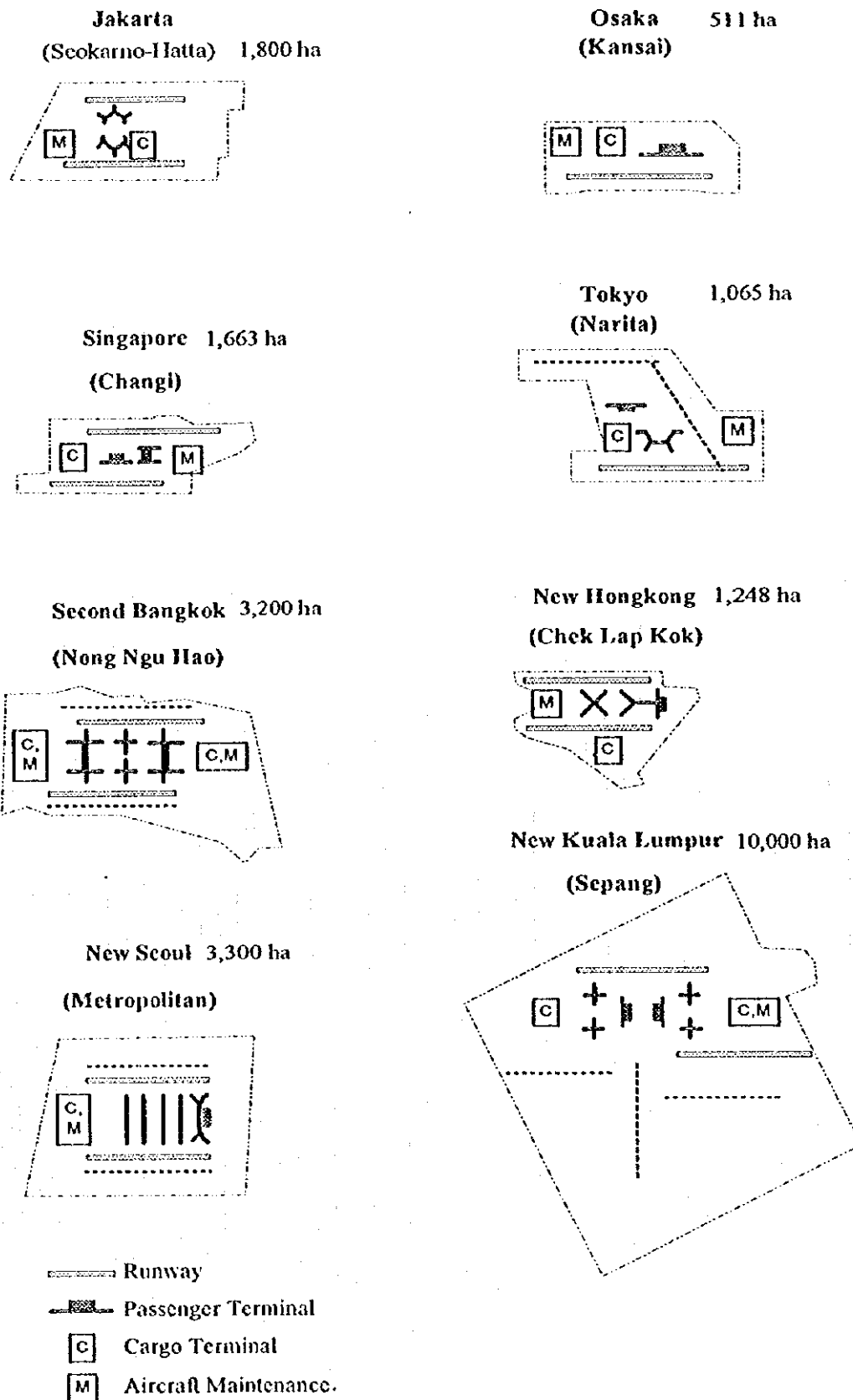
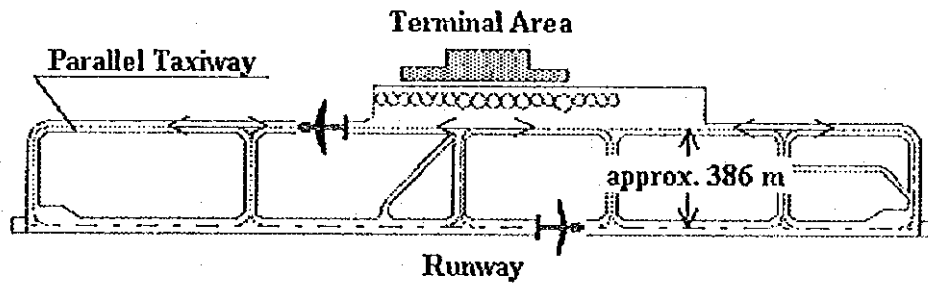


Figure 5.3 Examples of Terminal Siting

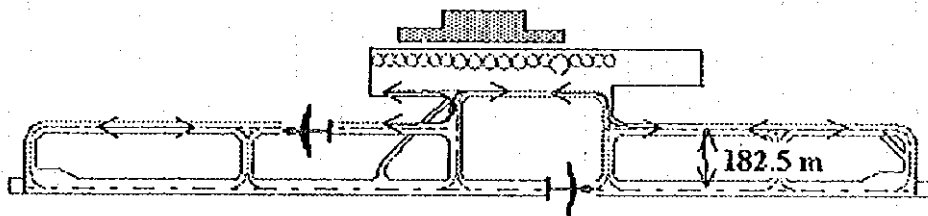
c) Taxiway Alignment

If an airport facilitates large aircraft, a separation between parallel taxiway centerline and runway centerline shall be more than 182.5m, due to the ICAO standard.

Because of apron's being far apart from the runway and the enough airport area at the Akmola airport, an alignment of the parallel taxiway was planned to achieve simple aircraft taxiing. So that the separation became bigger than the minimum separation distance.



Simple Aircraft Taxiing, Parallel Taxiway Planned to Meet the Existing Apron Edge



Parallel Taxiway at minimum separation distance from Runway

Figure 5.4 Parallel Taxiway Alignment



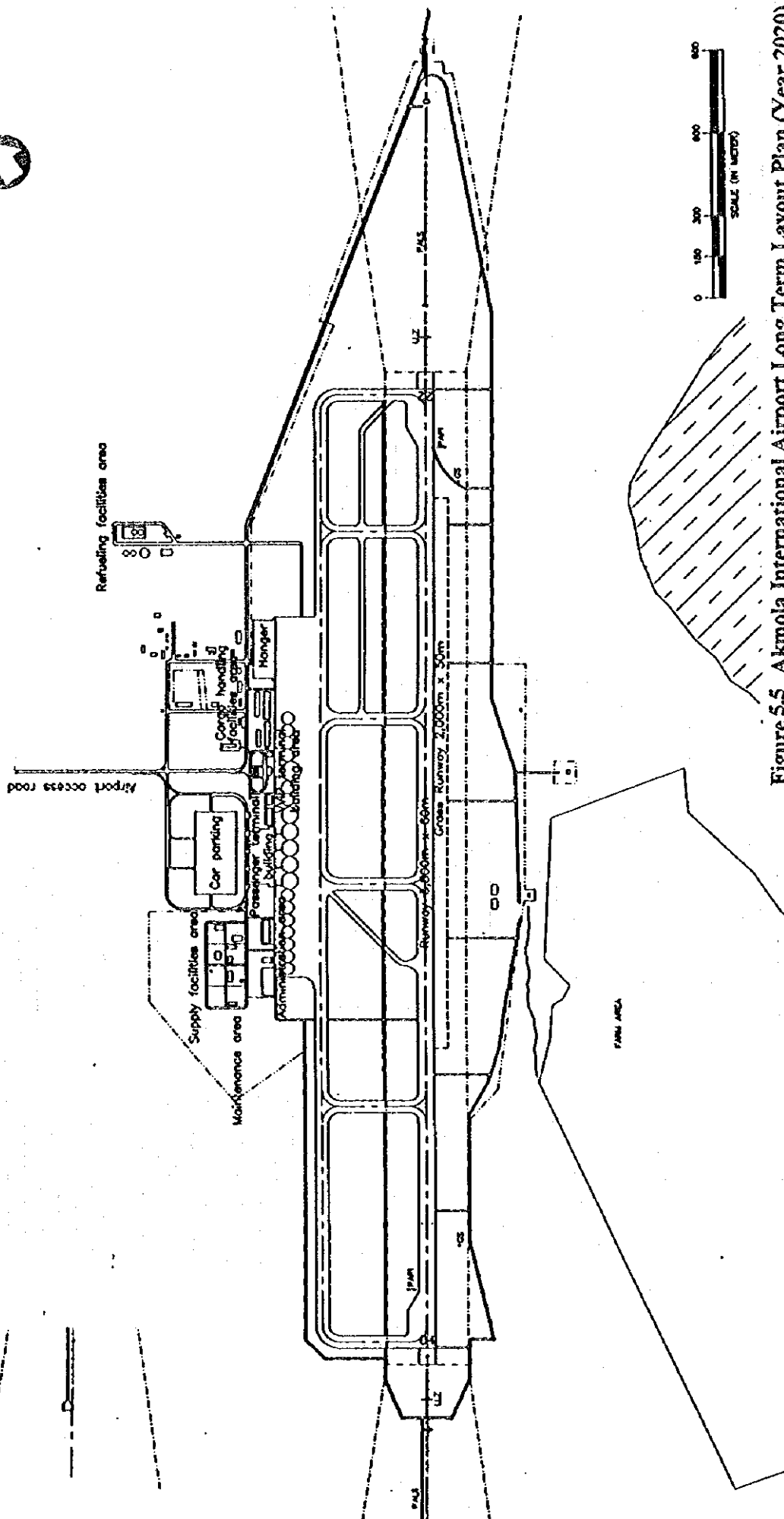


Figure S.5 Akmol International Airport Long Term Layout Plan (Year 2020)

LEGEND	
	ROAD
	AIRPORT BOUNDARY
	RUNWAY STRIP
	GRASSED MOVEMENT AREA
	PERIMETER ROAD
	BUILDINGS

BASIC DATA TABLE	
AIRPORT CLASS	PRIMARY
AIRPORT STATUS	04, Z2
AIRPORT REF. ELEVATION	303 m
AIRPORT REF. POINT (APP) COORDINATES	N 51°11' E 71°25'
AIRPORT REF. TEMP	20.7 °C
RUNWAY DIRECTION	04 / Z2
RESTRAINED RUNWAY	04, Z2
PAVEMENT STRENGTH	63/R/B/X/T
NAV. AIS CATEGORY	CAT-I
DISTANCE FROM CITY	18.0 km

APPROVED BY:	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY:	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY:	AKMOLA AIRPORT
DRAWING NO.:	AIRPORT LAYOUT PLAN (Year 2020)
SCALE:	1 / 20,000
DATE:	JAN. 1997
THE STUDY ON AIR TRANSPORT DEVELOPMENT IN THE REPUBLIC OF KAZAKHSTAN JAPAN INTERNATIONAL COOPERATION AGENCY	

(2) Almaty International Airport

Figure 5.7 shows overall airport layout.

a) The following considerations will apply for runway capacity.

- Influence of aircraft noise should be evaluated using internationally adopted and more practical indices based on: noise levels, frequency of aircraft operation and time. The runway is considered as having its full capacity in this Study with no anticipated preferential runway operation.
- The basic required runway length is 3,500 meters to accommodate large aircraft flying to Western Europe. The current length is 4,400 meters and this will be retained to deal with possible future requirements.
- Major improvement work will commence in 1997. It is assumed that no further major work will be required until 2020.

b) New Terminal Area

The existing terminal area is operating at close to capacity and there is no room for expansion to meet increased traffic demands to 2020. Also airport operation must continue during any construction work. A new terminal area has, therefore, been included in the master plan. The two alternative locations appear in Figure 5.6.

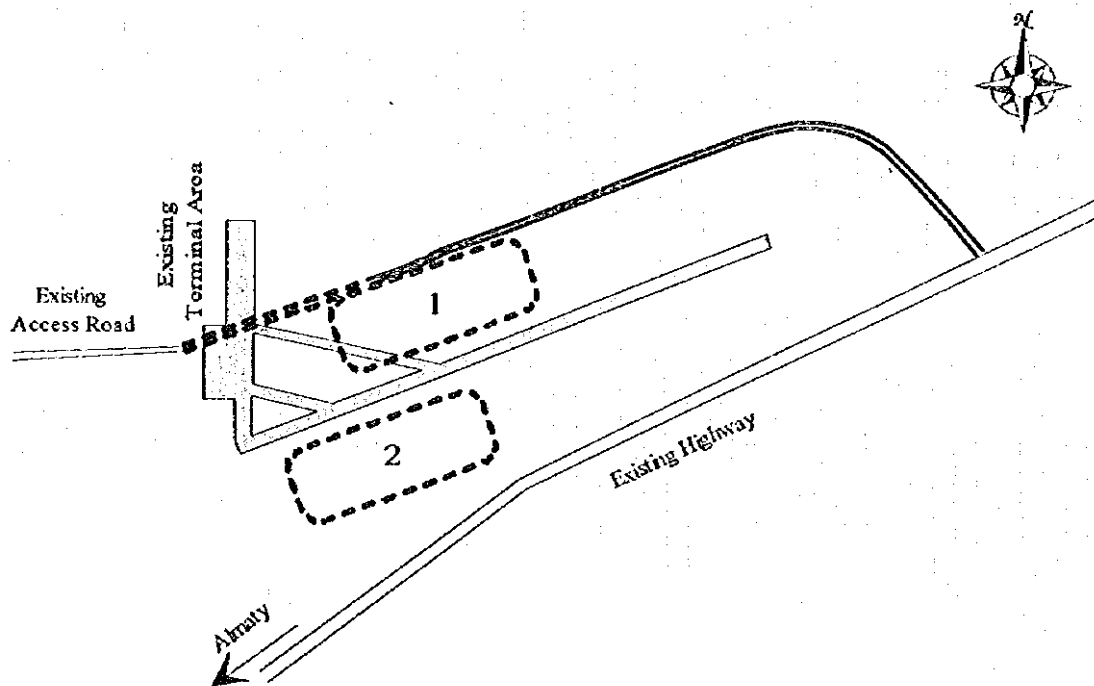


Figure 5.6 Alternatives of New Terminal Location

**Alternative-1 is the preferred option since the site is closer to the existing terminal area and will allow a better layout of facilities and land acquisition is not necessary due to the airport area.**



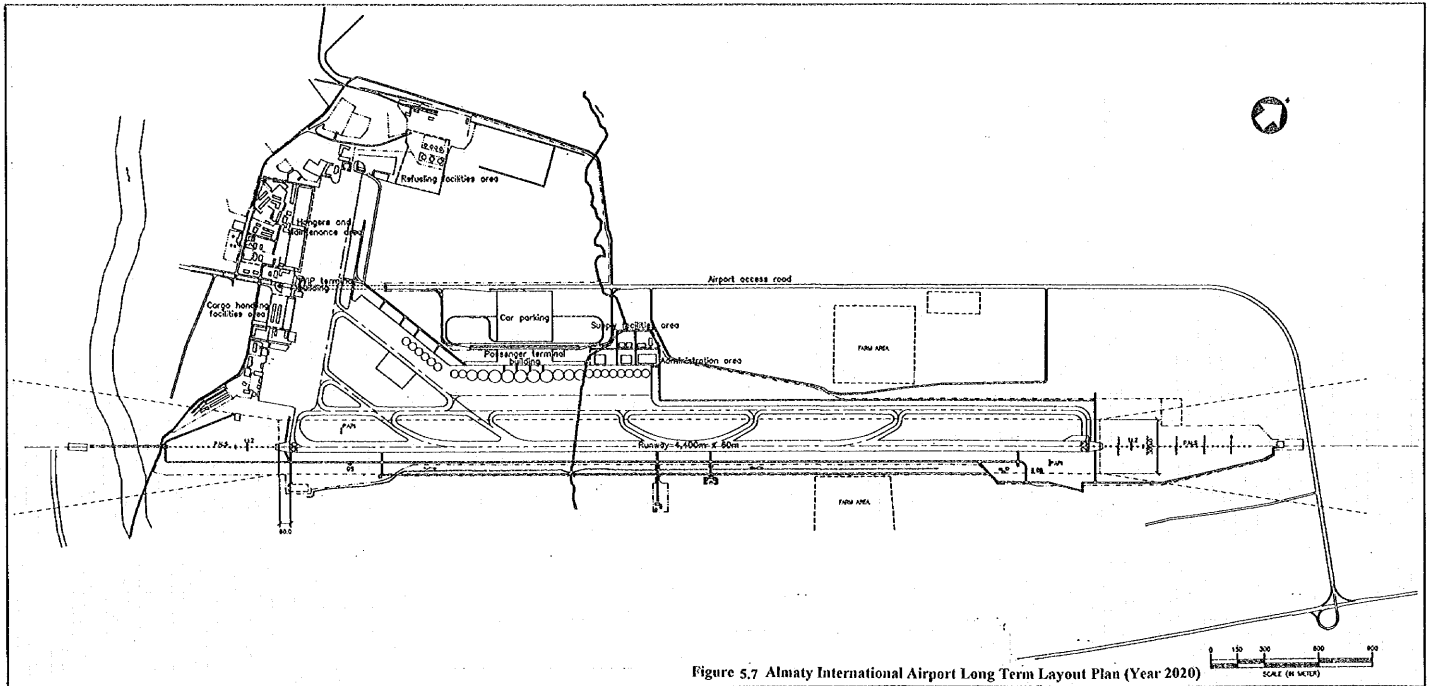


Figure 5.7 Almaty International Airport Long Term Layout Plan (Year 2020)

BASIC DATA TABLE				LEGEND	
APPROVE CLASS	PRIVATE	ACTIVATION NUMBER	05_23	---	AIRPORT FENCE
APPROVE STATUS	5% Bcm	PLANNING STRENGTH		---	BUILDINGS
APPROVE REF. ELEVATION	581 m	WAY. NOES CATEGORY	043-8	---	PERIMETER ROAD
APPROVE REF. NORTH	N 42211°	DISTANCE FROM EDGE	10 km	---	RAILWAY
APPROVE COORDINATES	E 7202 Y			---	ROAD
APPROVE REF. TEMP	30 F C			---	PERIMETER STRIP
APPROVE INJECTION	08 / 23				

THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS	APPROVED BY: _____
<b>ALMATY AIRPORT</b>	CHECKED BY: _____
DRAWING TITLE <b>AIRPORT LAYOUT PLAN (Year 2020)</b>	DRAWN BY: _____
THE EFFECT OF AIR TRANSPORT DEVELOPMENT IN THE REPUBLIC OF KAZAKHSTAN	DESIGNED BY: _____
JAPAN INTERNATIONAL COOPERATION AGENCY	SCALE: 1 / 20,000
	DATE: JUN 1997









**(3) Secondary Airports**

Layout plans appear in **Figures 5.8 through 5.14.**

**a) Runway**

It is planned to extend the runways at Pavlodar Airport by 200 meters to handle medium size aircraft flying directly to Western Europe.

**b) Terminal area**

Terminal areas are generally planned to remain in the existing locations. New terminal facilities will be laid out within these areas.

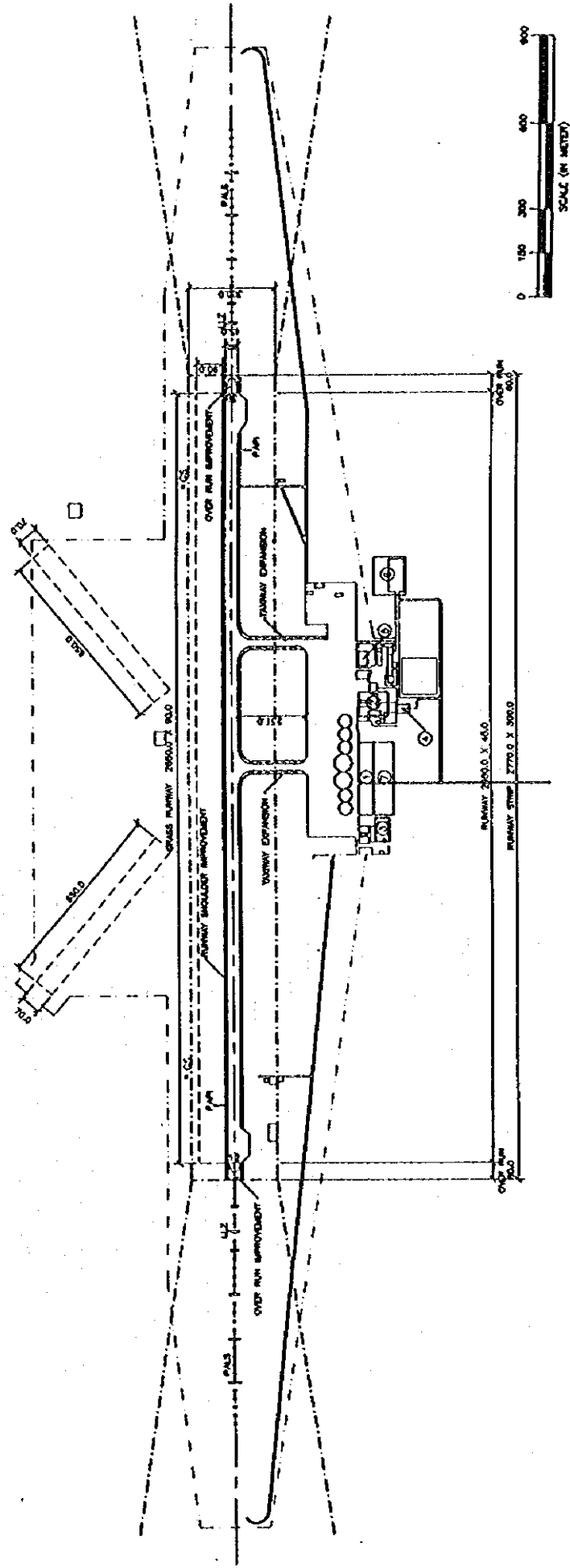


Figure 5.8 Aktau Airport Long Term Layout Plan (Year 2020)

APPROVED BY:	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY:	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY:	AKTAU AIRPORT
DRAWING NO.:	AKTAU AIRPORT LAYOUT PLAN (Year 2020)
SCALE:	1 / 20,000
DATE:	JAN. 1997

LEGEND	
	ROAD
	AIRPORT BOUNDARY
	RUNWAY STRIP
	GRASSED MOVEMENT AREA
	BUILDINGS

BUILDING AREA			
No.	NAME OF BUILDING	No.	NAME OF BUILDING
①	PASSENGER TERMINAL	⑦	CAR PARK
②	CARGO TERMINAL		
③	ADMINISTRATOR BUILDING		
④	POWER HOUSE		
⑤	FIRE STATION		
⑥	FUEL TANK		

BASIC DATA TABLE			
AIRPORT CLASS	SECONDARY	INSTRUMENT RUNWAY	12, 30
AIRPORT STATUS	Int / Dom	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	22 m	NAV. AIDS CATEGORY	CAT-1
AIRPORT REF. POINT (AIP) COORDINATES	N 43°14' E 51°45'	DISTANCE FROM CITY	10 km
AIRPORT REF. TOWNSHIP	12/30, 19/34, 05/28		
RUNWAY DIRECTION			

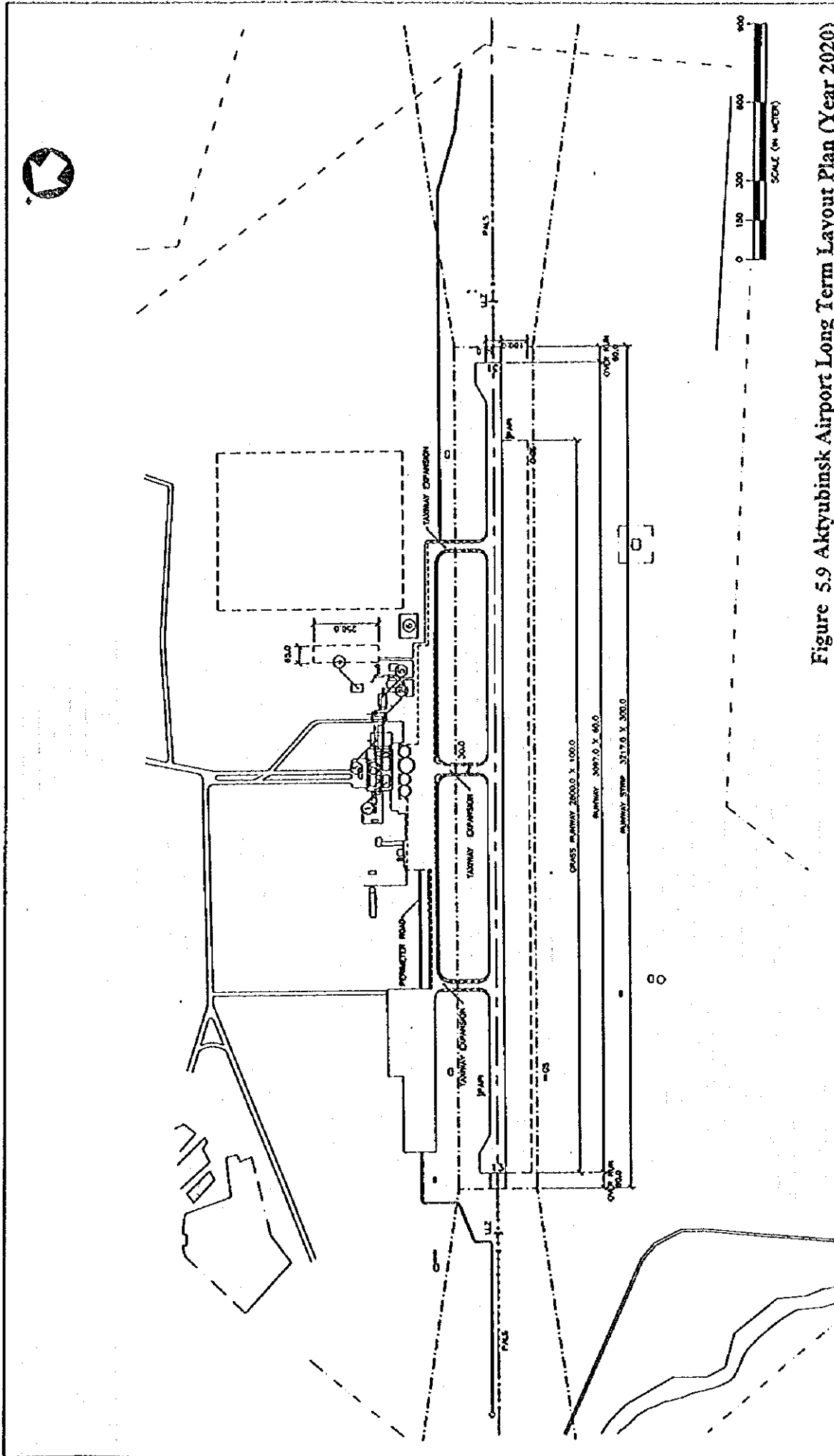


Figure 5.9 Aktymbinsk Airport Long Term Layout Plan (Year 2020)

BASIC DATA TABLE		BUILDING AREA		LEGEND		APPROVED BY :	
APPORT CLASS	SECONDARY	No.	NAME OF BUILDING	ROAD	THE REPUBLIC OF KAZAKHSTAN	MINISTRY OF TRANSPORT AND COMMUNICATIONS	APPROVED BY :
APPORT STATUS	INT. Dev.	①	PASSENGER TERMINAL	APPORT BOUNDARY	AKTYUBINSK AIRPORT		CHECKED BY :
APPORT REF. ELEVATION	220 m	②	CARGO TERMINAL	RUNWAY STRIP	DRAWING #:		DRAWING No.
APPORT REF. POINT (AMP) COORDINATES	N 50°14'27" E 87°12'27"	③	ADMINISTRATION BUILDING	CROSSED MOVEMENT AREA	THE STUDY OF AIR TRANSPORT DEVELOPMENT		SCALE: 1 / 20,000
APPORT REF. TEMP	26.07C	④	POWER HOUSE	RIVER	JAPAN INTERNATIONAL COOPERATION AGENCY		DATE: JAN. 1997
RUNWAY DIRECTION	13 / 31	⑤	FUEL FARM	BUILDINGS			

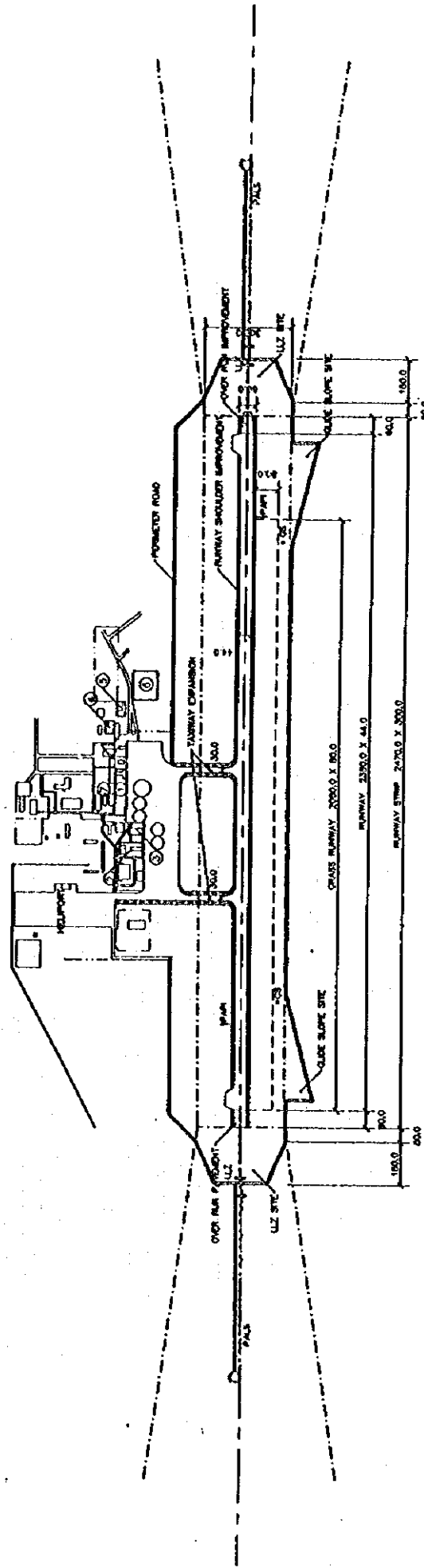


Figure 5.10 Atyrau Airport Long Term Layout Plan (Year 2020)

BASIC DATA TABLE		BUILDING AREA		LEGEND	
APPROVAL CLASS	SECONDARY	NAME OF BUILDING	No.	NAME OF BUILDING	No.
APPROVAL STATUS	IN CONSTRUCTION	(1) PASSENGER TERMINAL	(1)	(1) PASSENGER TERMINAL	(1)
APPROVAL REF. ELEVATION	20.00	(2) CARGO TERMINAL	(2)	(2) CARGO TERMINAL	(2)
APPROVAL REF. POINT (AMP) COORDINATES	N 47°07'2" E 17°48'5"	(3) ADMINISTRATION BUILDING	(3)	(3) ADMINISTRATION BUILDING	(3)
APPROVAL REF. TEMP	14. / 32.	(4) POWER HOUSE	(4)	(4) POWER HOUSE	(4)
APPROVAL REF. TYP	14. / 32.	(5) FUEL TANK	(5)	(5) FUEL TANK	(5)
APPROVAL REF. DIRECTION	14. / 32.	(6) CAR PARK	(6)	(6) CAR PARK	(6)
APPROVAL REF. INSTRUMENT RUNWAY	14. / 32.	(7) AIRPORT BOUNDARY FENCE	(7)	(7) AIRPORT BOUNDARY FENCE	(7)
APPROVAL REF. INSTRUMENT STRENGTH	17/M/10/T	(8) RUNWAY STRIP	(8)	(8) RUNWAY STRIP	(8)
APPROVAL REF. MAX. ADS CATEGORY	CAT-I	(9) GRASSED MOVEMENT AREA	(9)	(9) GRASSED MOVEMENT AREA	(9)
APPROVAL REF. DISTANCE FROM CITY	3 km	(10) PERIMETER ROAD	(10)	(10) PERIMETER ROAD	(10)
APPROVAL REF. RUNWAY DIRECTION	14. / 32.	(11) BUILDINGS	(11)	(11) BUILDINGS	(11)

APPROVED BY :	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY :	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY :	ATYRAU AIRPORT
DRAWING NO. :	ATYRAU AIRPORT LAYOUT PLAN (Year 2020)
SCALE :	1 / 20,000
DATE :	SEP. 1998

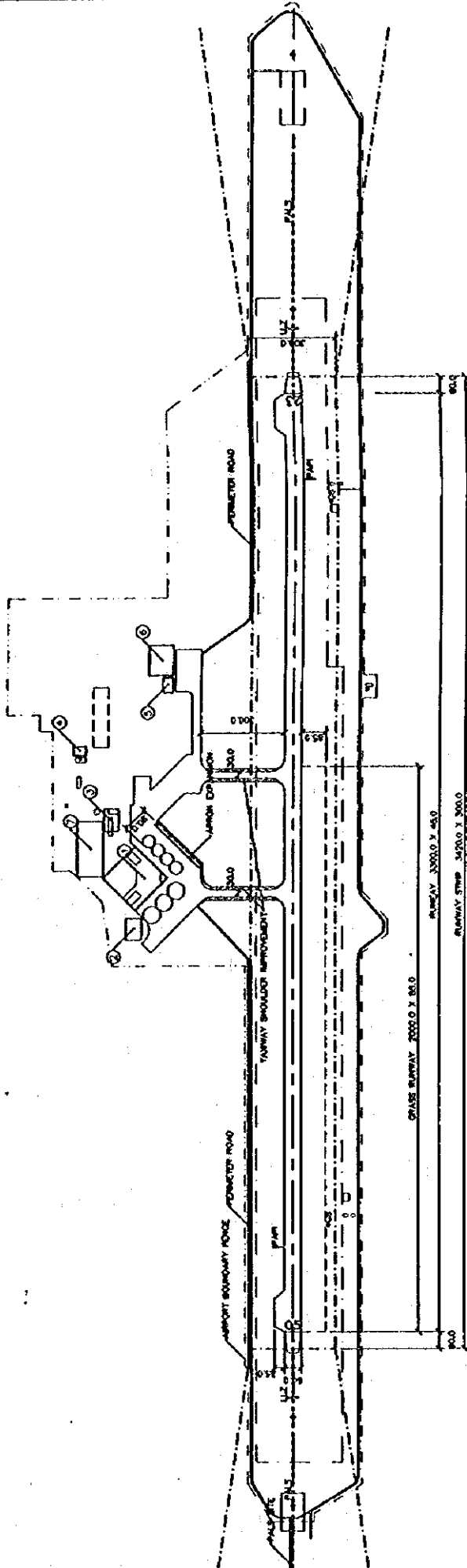


Figure 5.11 Karaganda Airport Long Term Layout Plan (Year 2020)

APPROVED BY :	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY :	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY :	KARAGANDA AIRPORT
DRAWING No.	APPROVAL LAYOUT PLAN (Year 2020)
SCALE :	1 / 20,000
DATE :	5 APR. 1998

LEGEND	
—	ROAD
- - - -	AIRPORT BOUNDARY
- · - · -	RUNWAY STRIP
- - - -	GRAZED MOVEMENT AREA
- - - -	PERIMETER ROAD
⊙	BUILDINGS

BUILDING AREA	
No.	NAME OF BUILDING
1	PASSENGER TERMINAL
2	CARGO TERMINAL
3	ADMINISTRATION BUILDING
4	POWER HOUSE
5	FIRE STATION
6	FUEL TANK

BASIC DATA TABLE	
APPROVAL CLASS	SECONDARY RUNWAY
APPROVAL STATUS	INSTRUMENT RUNWAY
APPROVAL REF. ELEVATION	40.71 M / 133.7 FT
APPROVAL REF. POINT (APR) COORDINATES	N 49°40.1' E 73°20.3'
APPROVAL REF. TEMP	20 M
APPROVAL REF. WIND	06 / 23
APPROVAL REF. CITY	40.71 M / 133.7 FT
APPROVAL REF. CATEGORY	CAT-1
APPROVAL REF. CITY	20 M
APPROVAL REF. WIND	06 / 23
APPROVAL REF. DIRECTION	06 / 23

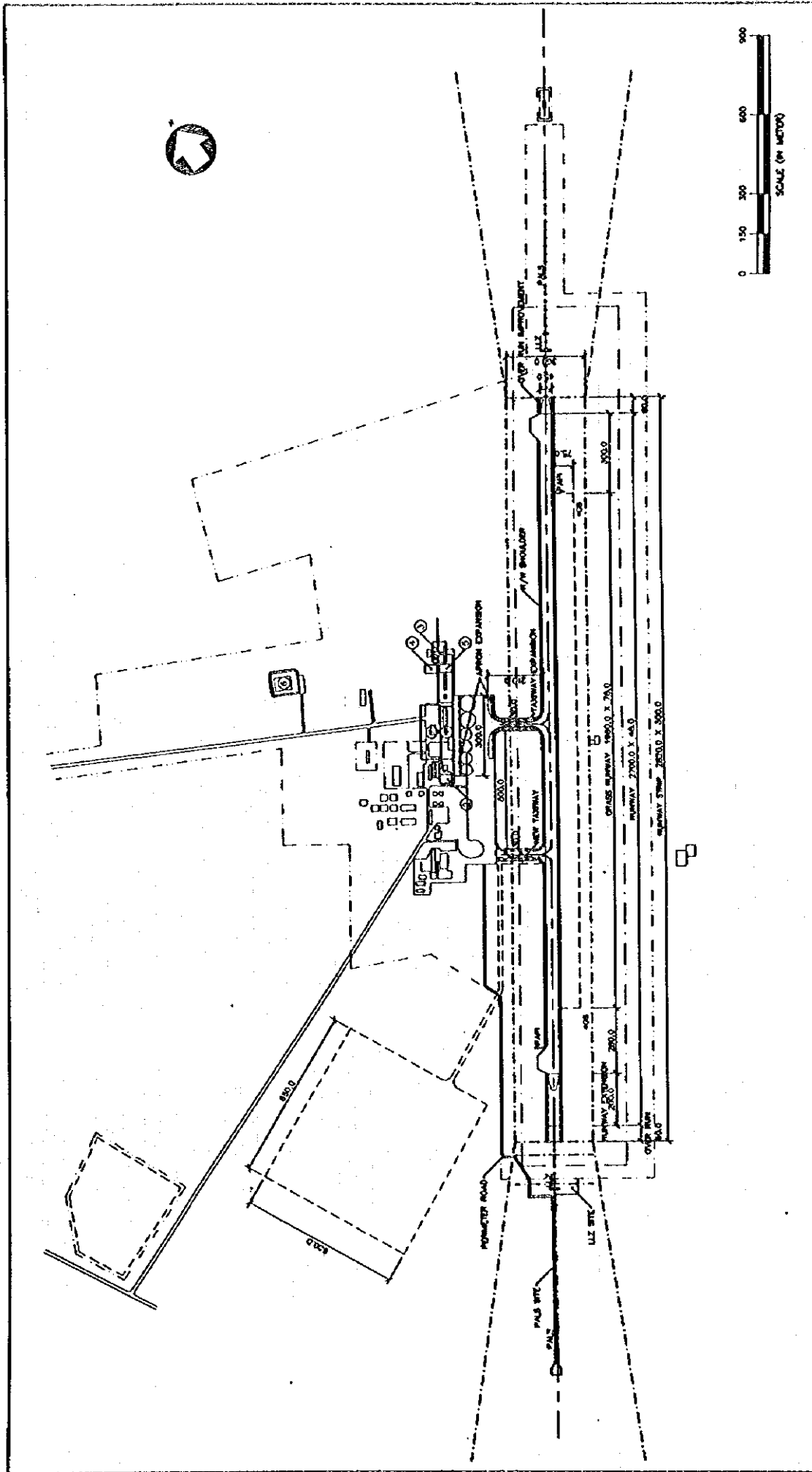


Figure 5.12 Pavlodar Airport Long Term Layout Plan (Year 2020)

APPROVED BY:	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY:	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY:	PAVLODAR AIRPORT
DRAWING NO.:	DRAWING TITLE: AIRPORT LAYOUT PLAN (Year 2020)
SCALE:	1 / 20,000
DATE:	14 SEP. 1998

LEGEND	
(Symbol)	ROAD
(Symbol)	AIRPORT BOUNDARY
(Symbol)	AIRPORT BOUNDARY FENCE
(Symbol)	RUNWAY STRIP
(Symbol)	PERIMETER ROAD
(Symbol)	GRASSED MOVEMENT AREA
(Symbol)	BUILDINGS

BUILDING AREA	
NO.	NAME OF BUILDING
1	PASSENGER TERMINAL
2	CARGO TERMINAL
3	ADMINISTRATION BUILDING
4	POWER HOUSE
5	FIRE STATION
6	FUEL TANK

BASIC DATA TABLE	
APPROVED CLASS	SECONDARY
APPROVED STATUS	14/9/2007
APPROVED REF. ELEVATION	120 m
APPROVED REF. POINT (APP) COORDINATES	N 5211'4" E 7704'4"
APPROVED REF. TEMP	12.0 mm
APPROVED RUNWAY DIRECTION	04 / 22
APPROVED RUNWAY INSTRUMENT	14/9/2007
APPROVED RUNWAY PAYMENT STRENGTH	04-1
APPROVED RUNWAY NAV. AID CATEGORY	12.0 mm
APPROVED RUNWAY DISTANCE FROM CITY	

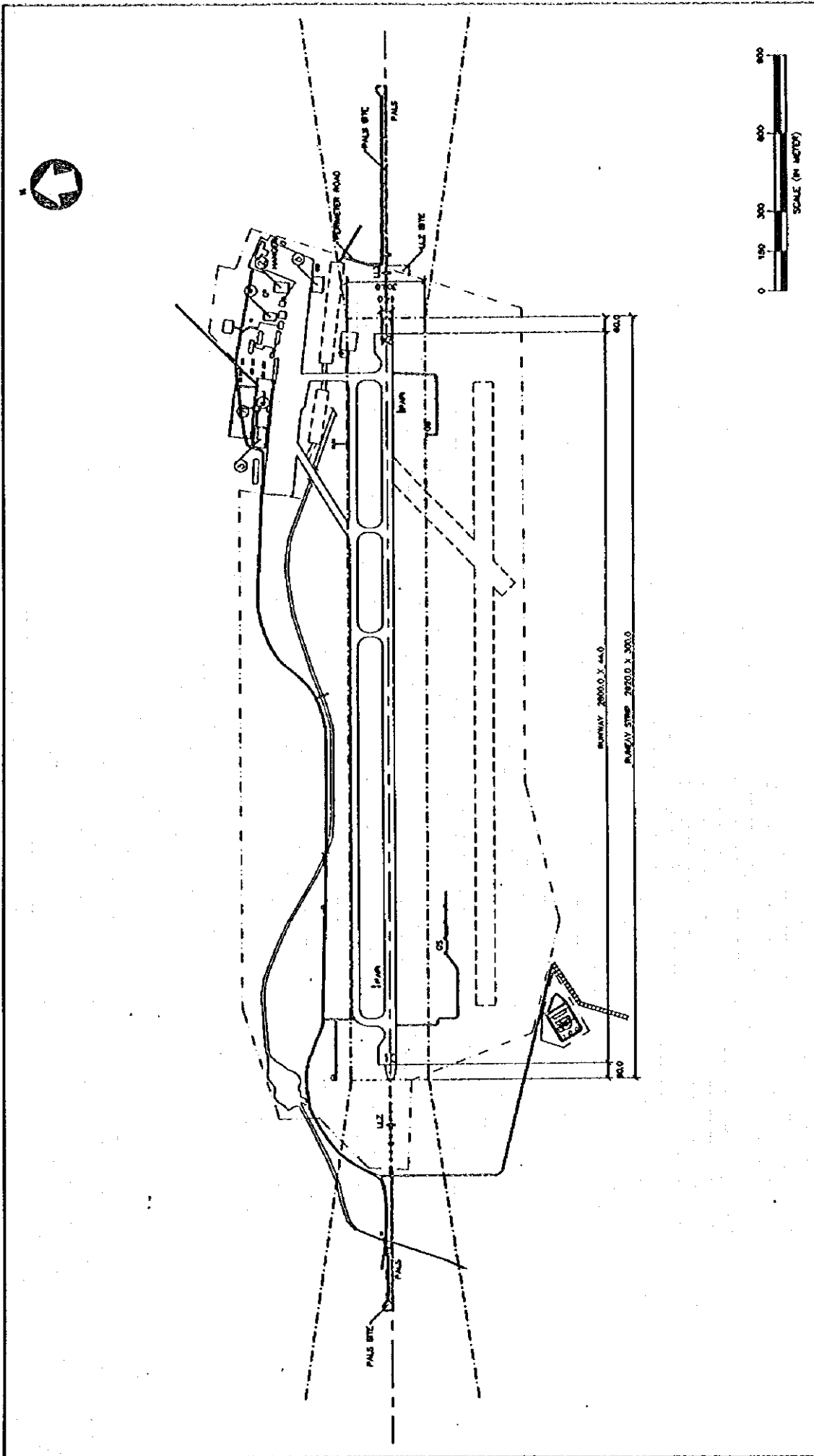


Figure 5.13 Shymkent Airport Long Term Layout Plan (Year 2020)

APPROVED BY:	THE REPUBLIC OF KAZAKHSTAN
CHECKED BY:	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY:	SHYMKENT AIRPORT
DESIGNING NO.	SHYMKENT AIRPORT LAYOUT PLAN (Year 2020)
SCALE	1 / 20,000
DATE	Sept. 1998

LEGEND	
[Symbol]	ROAD
[Symbol]	AIRPORT BOUNDARY
[Symbol]	RUNWAY STRIP
[Symbol]	CROSSED MOVEMENT AREA
[Symbol]	RAIL WAY
[Symbol]	POWER

BUILDING AREA	
No.	NAME OF BUILDING
1	PASSENGER TERMINAL
2	CARGO TERMINAL
3	ADMINISTRATION BUILDING
4	POWER HOUSE
5	FIRE STATION
6	PUBL. PARK

BASIC DATA TABLE			
APPROVED CLASS	SECONDARY	INSTRUMENT RUNWAY	10, 24
APPROVED STATUS	INT. DEM.	PAVEMENT STRENGTH	
APPROVED REF. ELEVATION	413 m	NAV. AOS CATEGORY	CAT-I
APPROVED REF. POINT (AMP) COORDINATES	N 4271.8 E 8478.7	DISTANCE FROM CITY	12 km
APPROVED REF. TEMP	10 / 24		
APPROVED RUNWAY DIRECTION			

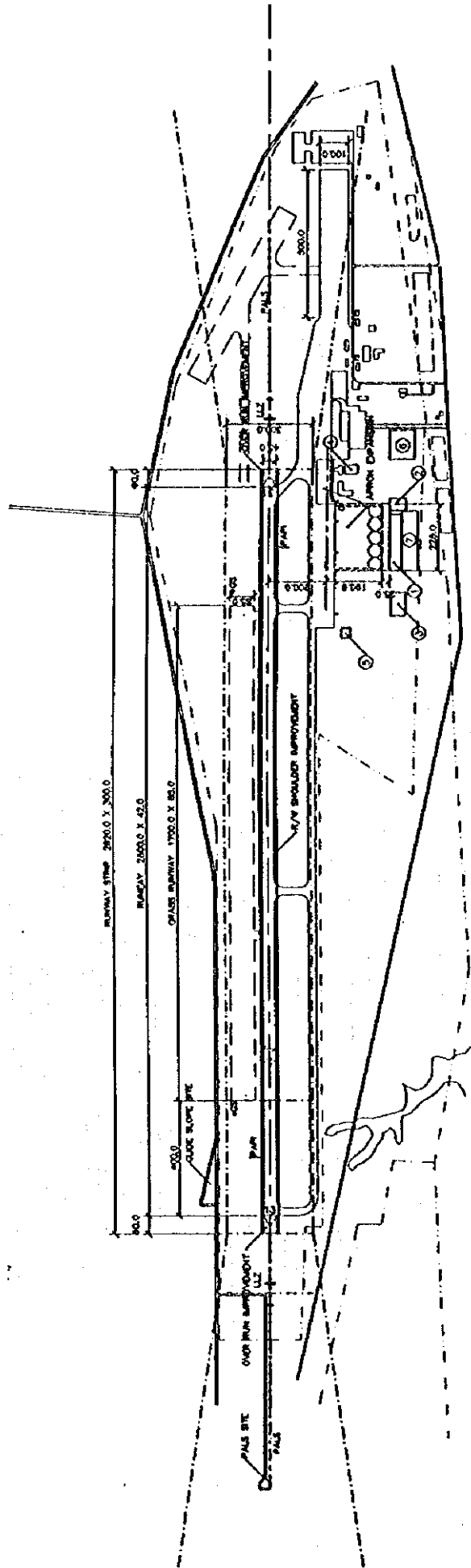


Figure S.14 U'st Kamenogorsk Airport Long Term Layout Plan (Year 2020)

BASIC DATA TABLE	
AIRPORT CLASS	SECONDARY
AIRPORT STATUS	INSTRUMENT RUNWAY
AIRPORT REF. ELEVATION	14.0m
AIRPORT REF. POINT (AMP) COORDINATES	N 50702.1' E 82700.0'
AIRPORT REF. TOWP	13 S 31
RUNWAY DIRECTION	13, 31
RUNWAY STRENGTH	
MAX. AOS CATEGORY	CAT-I
DISTANCE FROM CITY	13 km

BUILDING AREA	
No.	NAME OF BUILDING
1	PASSENGER TERMINAL
2	CARGO TERMINAL
3	ADMINISTRATION BUILDING
4	POWER HOUSE
5	FIRE STATION
6	FUEL FARM

LEGEND	
ROAD	ROAD
AIRPORT BOUNDARY	AIRPORT BOUNDARY
AIRPORT BOUNDARY FENCE	AIRPORT BOUNDARY FENCE
RUNWAY STRIP	RUNWAY STRIP
GRASED INTERGRATE AREA	GRASED INTERGRATE AREA
RESIDENTIAL AREA	RESIDENTIAL AREA
RWDY	RWDY

APPROVED BY:	THE REPUBLIC OF KAZAKHSTAN
ORDERED BY:	MINISTRY OF TRANSPORT AND COMMUNICATIONS
DRAWN BY:	UST-KAMENOGORSK AIRPORT
DRAWING No.:	AIRPORT LAYOUT PLAN (Year 2020)
SCALE:	1 / 20,000
DATE:	Sept. 1998



### 5.6.4 Rough Cost Estimate

The rough estimates of the project cost for each airport for development up to the year 2020 appear in Table 5.5.

**Table 5.5 Cost Estimates for Nine Airports**

Work Items		Akmola (US\$)	Aktau (US\$)	Aktyubinsk (US\$)	Almaty (US\$)	Atyrau (US\$)
A	Compensation	87,482	0	0	400,000	0
B	Preliminary and General	31,284,412	14,300,345	11,423,122	26,652,616	15,980,911
C	Construction / Installation	166,868,085	94,151,490	103,259,737	291,026,164	97,242,834
	1 Civil Works	26,905,586	13,825,111	19,265,043	38,394,996	13,016,328
	i Airside	23,154,761	11,685,701	16,933,031	30,099,782	11,108,859
	ii Landside	3,750,825	2,139,410	2,332,012	8,295,214	1,907,469
	2 Architectural Works	68,953,500	32,860,350	44,401,500	131,714,100	42,663,500
	3 Air Navigation Systems	18,101,207	20,998,230	22,230,088	32,658,000	20,715,041
	4 Supporting Facilities	42,652,445	18,725,076	10,182,389	61,748,000	13,423,070
	i Power Supply	4,400,000	2,850,000	4,672,566	3,115,000	2,522,124
	ii Outdoor Lighting	500,000	420,000	800,000	133,000	371,681
	iii Sanitary Works	1,350,000	2,020,740	1,010,000	3,300,000	1,061,947
	iv Communication system	1,004,215	160,000	160,000	200,000	160,000
	v Heating and air-conditioning system	19,469,027	13,274,336	3,539,823	35,000,000	9,307,318
	vi Fuel Supply System	15,929,204	0	0	20,000,000	0
	5 Special Equipment	10,255,346	7,742,723	7,180,717	26,511,067	7,424,892
D	Total of B + C	198,152,497	108,451,835	114,682,859	317,678,780	113,223,744
E	Contingencies	16,686,808	9,415,149	10,325,974	29,102,616	9,724,283
F	Total of B + E	214,839,306	117,866,984	125,008,833	346,781,397	122,948,028
G	Consulting Cost	18,355,489	10,356,664	11,358,571	32,012,878	10,696,712
H	Grand Total	233,282,277	128,223,648	136,367,404	379,194,275	133,644,739

Work Items		Karakanda (US\$)	Pavlodar (US\$)	Shimkent (US\$)	Ust-Kamenogorsk (US\$)
A	Compensation	0	0	0	0
B	Preliminary and General	3,205,190	9,031,747	20,344,356	18,688,781
C	Construction / Installation	17,551,902	93,217,501	108,790,330	109,027,683
	1 Civil Works	6,803,962	11,777,098	24,654,832	22,132,884
	i Airside	5,852,045	10,529,867	22,510,439	20,180,255
	ii Landside	951,917	1,247,231	2,144,393	1,952,628
	2 Architectural Works	0	43,435,050	60,882,800	54,979,350
	3 Air Navigation Systems	1,490,217	20,998,230	12,135,467	11,944,847
	4 Supporting Facilities	1,515,000	9,165,221	3,430,000	12,279,558
	i Power Supply	855,000	2,850,000	2,850,000	2,850,000
	ii Outdoor Lighting	400,000	420,000	420,000	420,000
	iii Sanitary Works	100,000	160,000	0	0
	iv Communication system	160,000	160,000	160,000	160,000
	v Heating and air-conditioning system	0	5,575,221	0	8,849,558
	vi Fuel Supply System	0	0	0	0
	5 Special Equipment	7,742,723	7,841,902	7,687,231	7,691,045
D	Total of B + C	20,757,092	102,249,248	129,134,686	127,716,465
E	Contingencies	1,755,190	9,321,750	10,879,033	10,902,768
F	Total of B + E	22,512,283	111,570,998	140,013,719	138,619,233
G	Consulting Cost	1,930,709	10,253,925	11,966,936	11,993,045
H	Grand Total	24,442,992	121,824,924	151,980,656	150,612,278

### **5.6.5 Implementation Plan**

The general schedule for airport projects implementation appears in Table 5.6.

### **5.7 Selection of Airport Projects for Feasibility Studies**

The results of the evaluation of the nine primary and secondary airports in order of priority are:

1. Almaty
2. Akmola
3. Aktau and Atyrau
5. Aktyubinsk and Pavlodar
7. Karaganda
8. Ust-Kamenogorsk
9. Shimkent

Measures for dealing with rising levels of the Caspian Sea should be determined before proceeding with any project for Atyrau.

Karaganda's relatively low priority was due to its modern facilities which already provide excess capacity.

Ust-Kamenogorsk and Shimkent were excluded from consideration because of the Japanese Government's policies concerning official development assistance to joint use civil/military airports.

Table 5.6 Implementation Schedule of an Airport Project

Work Items	Year					
	1	2	3	4	5	6
1	=====					
2	=====					
3	=====					
4		(==)				
5		=====				
6						
6.1						
6.2						
6.3						
6.4						
6.5						
8					=====	
9						=====

Table 5.7 Comparison of Priority Projects of Airports

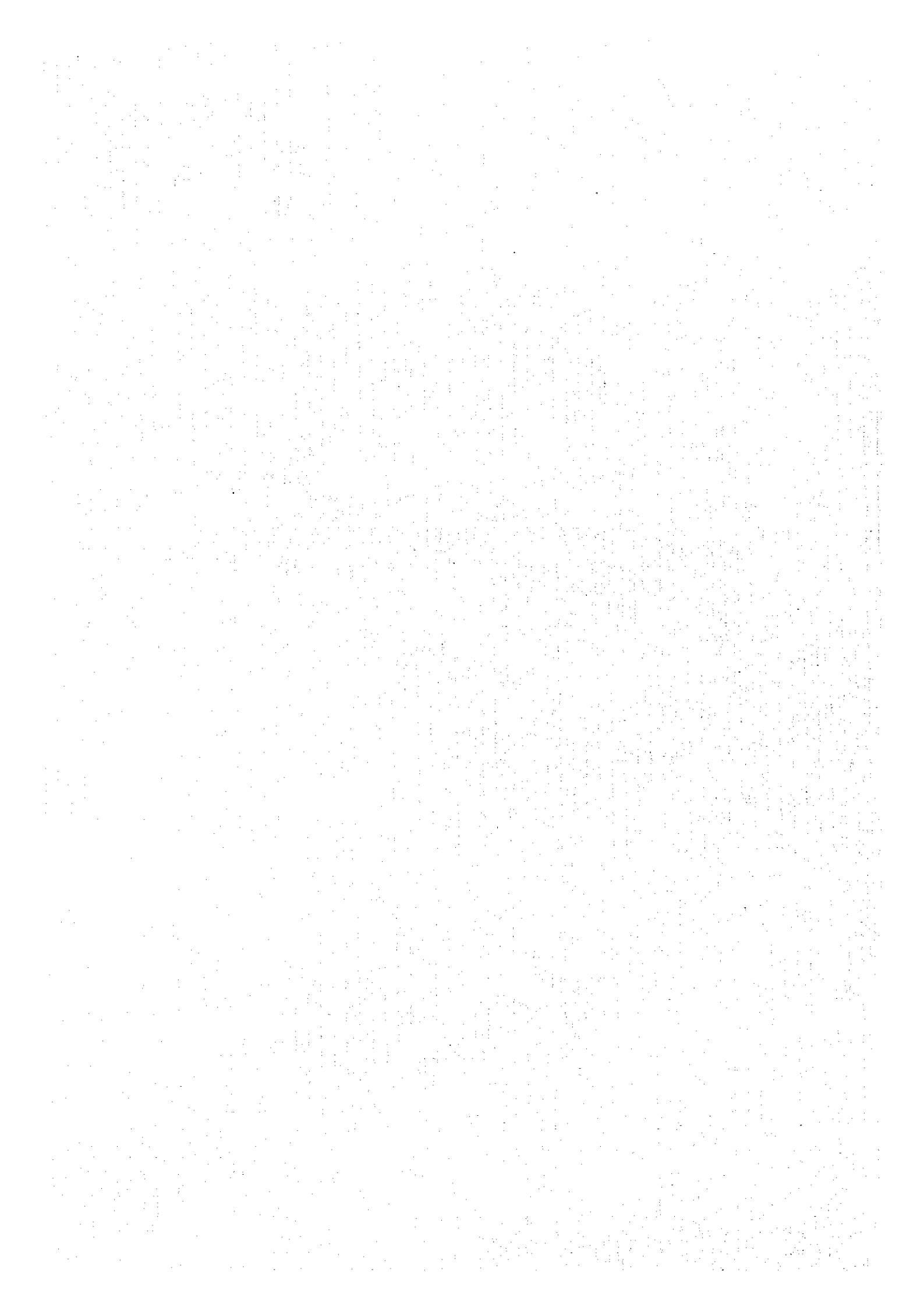
airport classification evaluation item	primary airport		secondary airport							remarks	
	Almaty	Akmola	Pavlov	Aktyu- binsk	Kara- ganda	Anyrau	Aktau	Ust- Kame	Shimkent		
urgency of airport development (safety and service)	1	2	2	2	3	2	2	2	2	2	
priority in the national development	1	1	3	3	3	2	2	3	3	3	
impact of airport development on promoting other industries	2	2	2	2	2	2	2	2	2	2	
importance of air transport in modal competition	1	1	1	1	1	1	1	1	1	1	
maturity of airport development project	1	1	2	2	2	2	2	2	2	2	
project cost per forecast passengers at 2020 (dollars/PAX)	2(\$29)	3(\$65)	5(\$159)	9(\$413)	1(\$25)	7(\$222)	4(\$119)	8(\$256)	6(\$193)		
environmental impact of airport development	1	1	1	1	1	1	1	(-)*	(-)*		*not examined at the sites
airport use for civil or military	civil.	civil.	civil.	civil.	civil.	civil.	civil.	Joint use	joint use		
Total evaluation points	7	8	11	11	13	10	10	(10+a)	(10+a)		
order of priority	1	2	5	5	7	3	3	(-)	(-)		Joint use airports are excluded.

note 1: evaluation point (1: high, 2: medium, 3: low)

note 2: Akmola in a case of the capital relocation.

**CHAPTER 6**

**FEASIBILITY STUDIES FOR SELECTED AIRPORTS**



## CHAPTER 6 FEASIBILITY STUDIES FOR SELECTED AIRPORTS

### 6.1 Preliminary Design

Facility planning and preliminary design for the selected six priority airports have been conducted. Table 6.1 summarizes development items of each airport.

#### (1) Akmolá International Airport

##### a) Terminal Area Layout Planning

- The new area for terminal development has been chosen in a vacant lot to the southwest of the existing terminal.
- A linear type terminal concept has been applied.
- All necessary facilities have been laid out in the new terminal area. The VVIP building should be located at the site of existing terminal building after the latter has been demolished. The cargo building should be located at the existing abandoned mail shed site to divide landside vehicle flows

Figure 6.1 shows the overall airport layout.

##### b) Civil Works

A runway extension of 1,000 m is planned so to increase the total length to 3,500 m. Other necessary airside facilities are planned in accordance with Annex 14. The terminal road network is planned so traffic flow will be smooth and efficient. A car park for 630 vehicles should be provided in front of passenger terminal building.

##### c) Architectural Facilities

Passenger terminal building is planned with the following concept.

- Applying internationally adopted passenger flow processing.
- Use of passenger boarding bridges.
- One and half level concept to meet size and boarding bridges requirements.
- Distinct separation of departure from arrival flows, and international from domestic flows.
- A common airside corridor, with manual door operation to economically ensure flow separations.
- Providing bus gate lounges for remote aircraft stands.
- Office rooms for ground support functions have been located so as to protect the baggage loading area from strong winds, especially in winter.

**Table 6.1 Scope of Development Plan to Target Year 2005 (1)**

Construction Item	Akmola	Almaty
<b>1. Civil Works</b>		
<b>1.1 Runway</b>		
1) Extension of length	1,000 x 45 m, 7.5 m s/d	
2) Expansion of width		
3) Pavement overlay	125,500 sq.m, min.t = 11 cm	217,200 sq.m, ave. t = 30 cm
4) Provision of overrun	60 x 60 m	
5) Improvement of shoulder	Widening: 2 >> 7.5 m	
<b>1.2 Taxiway</b>		
1) Extension / new taxiway(s)		5,500 x 23 m
2) Expansion of width	L = 2,190 m, 18 >> 23 m	L = 1,800 m, 20 >> 23 m
3) Pavement overlay	39,500 sq.m	41,400 sq.m
4) Improvement of shoulder	w = 7.5 m both sides	w = 7.5 m both sides
<b>1.3 Apron</b>		
1) Expansion	2,000 sq.m	
2) Pavement overlay	72,900 sq.m	177,500 sq.m
3) Apron service road	13,300 sq.m	
<b>1.4 Drainage System</b>		
1) Replacement of existing storm water pumps	L.S.	
2) System expansion in development area	L.S.	L.S.
<b>1.5 Road and Car Park</b>		
1) Access road, terminal road and car parking	58,900 sq.m	54,600 sq.m
2) Expansion /repair of perimeter road and security road at airside	l = 10,600 m	7,400 m
<b>1.6 Demolition of START cabin</b>	2 nos.	2 nos.
<b>1.7 Earthworks in expansion area</b>	L.S.	L.S.
<b>1.8 Landscaping at terminal area</b>	L.S.	L.S.
<b>1.9 Miscellaneous civil works</b>	Fencing, cable duct, traffic sign, marking, etc.	Cable duct, traffic sign, marking, etc.
<b>2. Building Works</b>		
<b>2.1 New passenger terminal building</b>	22,600 sq.m	32,800 sq.m
Passenger boarding bridges	4 nos.	8 nos.
Special equipment	Baggage handling system, elevator, escalator, etc.	Baggage handling system, elevator, escalator, etc.
<b>2.2 New cargo building</b>	1,890 sq.m	
<b>2.3 V.V.I.P terminal building</b>	450 sq.m	
<b>2.4 Administration building</b>	4,000 sq.m	4,000 sq.m
<b>2.5 Fire station</b>	L.S.	600 sq.m
<b>2.6 Control tower and navigation office</b>	L.S.	600 sq.m
<b>2.7 Building for heating and cooling facilities</b>	L.S.	
<b>2.8 Main power station for buildings</b>	L.S.	
<b>2.9 Main power station for the air navigation systems</b>	L.S.	600 sq.m
<b>2.10 Sub-station(s) for airfield lighting</b>	L.S.	L.S.
<b>2.11 Sub-station(s) for air navigation</b>	L.S.	L.S.
<b>2.12 Sub-station(s) for air communication</b>	L.S.	L.S.



Aktau	Aktyubinsk	Atyrau	Pavlodar
<p>L = 2,650 m, 43&gt;&gt;45 m 119,200 sq.m, min.t = 5 cm</p>	<p>139,400 sq.m, min.t = 5 cm 60 x 60 m, both ends</p>	<p>L = 2,500 m, 44&gt;&gt;45 m 103,400 sq.m, min.t = 5 cm 60 x 60 m, both ends w = 7.5 m both sides</p>	<p>200 x 45 m, 7.5 m s/d  110,800 sq.m, min.t = 5 cm 60 x 60 m</p>
<p>L = 460 m, 18 &gt;&gt; 23 m 15,500 sq.m w = 7.5 m both sides</p>	<p>L = 800 m, 20 &gt;&gt; 23 m 19,400 sq.m w = 7.5 m both sides</p>	<p>L = 400 m, 18 &gt;&gt; 30 m 7,200 sq.m w = 7.5 m both sides</p>	<p>420 x 30 m L = 200 m, 18 &gt;&gt; 30 m 7,200 sq.m w = 7.5 m both sides</p>
<p>40,500 sq.m</p>	<p>90,000 sq.m 10,000 sq.m</p>	<p>32,400 sq.m, 15,000 sq.m</p>	<p>27,900 sq.m 2,200 sq.m 8,000 sq.m</p>
<p>L.S.</p>	<p>L.S.</p>	<p>L.S.</p>	<p>L.S.</p>
<p>18,200 sq.m 400 m</p>	<p>12,400 sq.m</p>	<p>19,500 sq.m</p>	<p>23,300 sq.m</p>
<p>2 nos. L.S. L.S.</p>	<p>1 no. L.S. L.S.</p>	<p>1 no. L.S. L.S.</p>	<p>2 nos. L.S. L.S.</p>
<p>Cable duct, traffic sign, marking, etc.</p>	<p>Cable duct, traffic sign, marking, etc.</p>	<p>Cable duct, traffic sign, marking, etc.</p>	<p>Fencing, cable duct, traffic sign, marking, etc.</p>
<p>7,500 sq.m 2 nos. Baggage handling system, elevator, escalator, etc.</p>	<p>7,500 sq.m 2 nos. Baggage handling system, elevator, escalator, etc. 530 sq.m</p>	<p>7,500 sq.m 2 nos. Baggage handling system, elevator, escalator, etc. 610 sq.m</p>	<p>L.S.  Baggage handling system, elevator, escalator, etc. 560 sq.m</p>
<p>L.S. L.S.</p>	<p>2,000 sq.m L.S. L.S.</p>	<p>3,000 sq.m L.S. L.S. L.S.</p>	<p>1,400 sq.m L.S. L.S.</p>
<p>L.S. L.S. L.S. L.S. L.S.</p>	<p>L.S. L.S. L.S. L.S. L.S.</p>	<p>L.S. L.S. L.S. L.S. L.S.</p>	<p>L.S. L.S. L.S. L.S. L.S.</p>

**Table 6.1 Scope of Development Plan to Target Year 2005 (2)**

Construction Item	Akmola	Almaty
2.13 Miscellaneous buildings	Airport maintenance office, airline office, pilot training center, storage, equipment workshop and garage, guard house, GSE maintenance station, radar station	Storage, equipment garage, guard house, radar station
<b>3. Air navigation Systems</b>		
<b>3.1 Radio navigation Aids</b>		
3.1. 1) Replacement of the existing ILS	L.S. CAT I or II	L.S. CAT II
2) Replacement of the existing VOR/DME	L.S.	
3) Replacement of the existing NDBs	L.S.	L.S.
<b>3.2 ATC and communication systems</b>		
1) Installation of ATC consoles and equipment for the new control tower	L.S.	L.S.
2) Installation of ARTS	L.S.	L.S.
3) Installation of ASDE	L.S.	L.S.
<b>3.3 Aeronautical Ground Lighting System</b>		
1) Installation of PALS for the runway	L.S. CAT II	L.S. CAT II
2) Installation of SALS for the runway	L.S.	
3) Installation of PAPI for the runway	L.S. both direction	L.S. both direction
4) Installation of Aerodrome Beacon	L.S.	L.S.
5) Renewal of airfield lighting system	REDL, RTHL, TWTL, RECL, TDZL	REDL, RTHL, TWTL, RECL, TDZL
<b>3.4 Meteorological Observation System</b>		
1) Installation of RVR and ceilometer	L.S.	L.S.
2) Installation of thermometer, illuminated wind direction indicator, barometer, etc.	L.S.	L.S.
<b>4. Airport Utilities</b>		
1) Construction of new utility station	Elec. and heating supply	
2) Expansion of existing facilities	Elec., water, sewage, etc.	Elec., water, sewage, etc.
3) Installation of communication system	Expansion of telephone	Expansion of telephone
4) Replacement of sewage scooping pumps	Terminal area / lake side	
5) Installation of incinerator	for prohibited garbage	
6) Installation of an aircraft refueling pipe line	L = 1.6 km	
7) Relocation of existing fuel pipeline / pump		
<b>5. Procurement of Equipment</b>		
1) Rescue and Fire Fighting vehicles	total 6 nos.	total 9 nos.
2) Maintenance vehicles	total 10 nos.	total 10 nos.

Aktau	Aktyubinsk	Atyrau	Pavlodar
Airport maintenance office, storage, equipment workshop and garage, guard house	Airport maintenance office, storage, equipment workshop and garage, guard house, radar station	Airport maintenance office, storage, equipment workshop and garage, guard house	Airport maintenance office, storage, equipment workshop and garage, guard house
<p>L.S. CATI</p> <p>L.S.</p> <p>L.S.</p> <p>L.S. CATI L.S. L.S. both direction L.S. REDL, RTHL, TWIL, RECL, TDZL</p> <p>L.S. L.S.</p>	<p>L.S. CATI or II</p> <p>L.S.</p> <p>L.S.</p> <p>L.S.</p> <p>L.S. CATI L.S. L.S. both direction L.S. REDL, RTHL, TWIL, RECL, TDZL</p> <p>L.S. L.S.</p>	<p>L.S. CATI</p> <p>L.S.</p> <p>L.S.</p> <p>L.S. CATI L.S. L.S. both direction L.S. REDL, RTHL, TWIL, RECL, TDZL</p> <p>L.S. L.S.</p>	<p>L.S. CATI</p> <p>L.S. L.S.</p> <p>L.S.</p> <p>L.S. CATI L.S. L.S. both direction L.S. REDL, RTHL, TWIL, RECL, TDZL</p> <p>L.S. L.S.</p>
<p>Elec., water, sewage, etc.</p> <p>Expansion of telephone Terminal area</p>	<p>Elec., water, sewage, etc.</p> <p>Expansion of telephone Terminal area</p>	<p>Elec., water, sewage, etc.</p> <p>Expansion of telephone Terminal area</p>	<p>Elec., water, sewage, etc.</p> <p>Expansion of telephone Terminal area</p> <p>L = 0.9 km</p>
<p>total 7 nos.</p> <p>total 5 nos.</p>	<p>total 7 nos.</p> <p>total 10 nos.</p>	<p>total 7 nos.</p> <p>total 7 nos.</p>	<p>total 7 nos.</p> <p>total 16 nos.</p>

**Figure 6.2** shows floor plans and **Figure 6.3** for elevations. These drawings were prepared for reference only. The actual design for implementation will be discussed between the executing agency and concerned users.

**d) VVIP Building**

A VVIP terminal building for national guests is planned separately from public facilities. **Figure 6.4** shows floor plans and elevation.

**e) Air Navigation System**

These facilities required for short term development are described in Chapter 4.

**f) Airport Utilities**

Public utilities necessary for new facilities should be provided such as an electrical power supply, and water, heating and sewerage disposal systems. A fuel hydrant system should be installed in the apron.



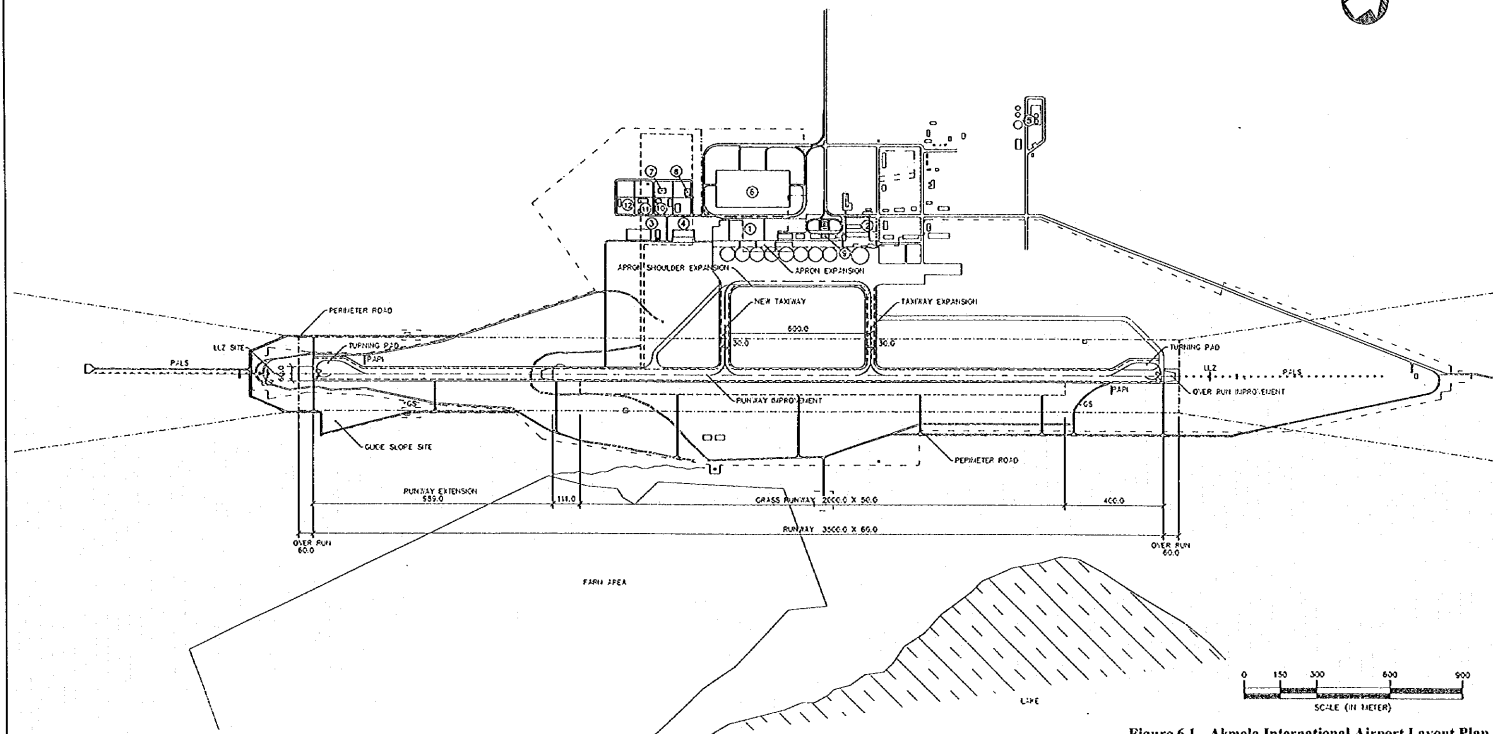


Figure 6.1 Akmol International Airport Layout Plan

BASIC DATA TABLE				BUILDING AREA				LEGEND		THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		APPROVED BY :	
AIROPT CLASS	PRIMARY	INSTRUMENT RUNWAY	CA, 22	No.	NAME OF BUILDING	No.	NAME OF BUILDING	---	ROAD	THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		CHECKED BY:	
AIROPT STATUS	1st. 6cm	PAVEMENT STRENGTH	63/R/B/M/T	①	PASSENGER TERMINAL	⑦	POWER HOUSE	---	AIROPT BULWARK	AKMOLA AIRPORT		DRAWN BY:	
AIROPT REF. ELEVATION	355 m	NAV. AIDS CATEGORY	CAT-I	②	CRUISE TERMINAL	⑧	BOILER & COOLING ST-TCH	---	RUNWAY SIGN	AKMOLA AIRPORT		DATE: 2011.10.27	
AIROPT REF. POINT (EGP) COORDINATES	N 51°01.8'	NAV. AIDS CATEGORY		③	ADMINISTRATION BUILDING	⑨	VAP TERMINAL BUILDING	---	GRASSED MOVEMENT AREA	THE STUDY ON AIR TRANSPORT DEVELOPMENT AT THE REPUBLIC OF KAZAKHSTAN		SCALE: 1 / 15,000	
AIROPT REF. TEMP.	20.7 °C	DISANCE FROM CITY	18.5 km	④	FOIE SERVICE	⑩	OSE INTERFERENCE BLDG.	---	PERIMETER ROAD	AIROPT INTERNATIONAL COOPERATION AGENCY		DATE: 2011.10.27	
RUNWAY DIRECTION	04 / 22			⑤	FUEL STATION	⑪	HELICO STATION	---	BULWARKS				
				⑥	CAR PARK	⑫	WORK SHOP	---					







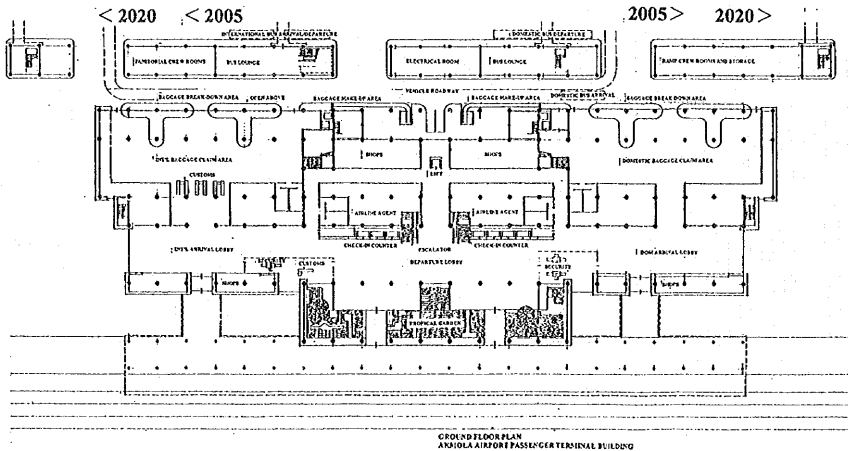
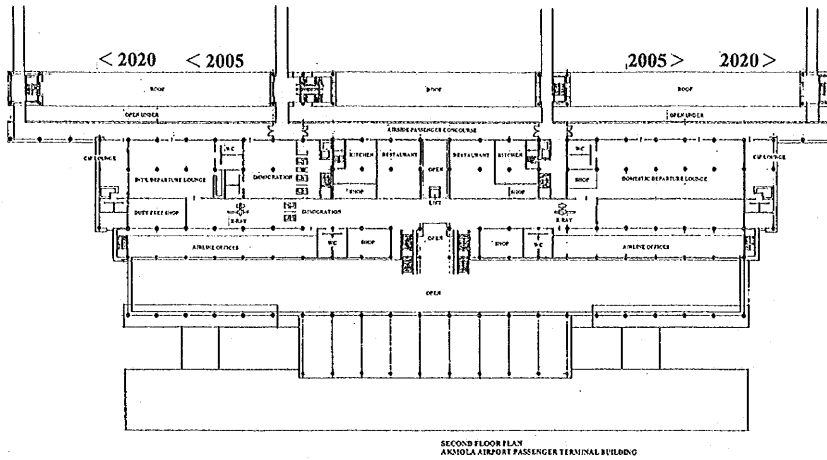
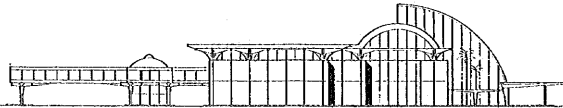
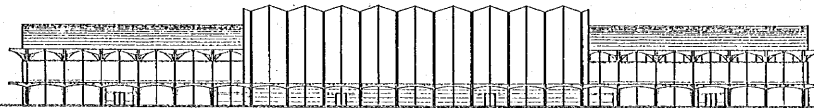


Figure 6.2 Passenger Terminal Building - Floor Plans



SIDE ELEVATION  
ANGOLA AIRPORT PASSENGER TERMINAL BUILDING

0 5m 10m 20m 30m  
SCALE



LANDSIDE ELEVATION  
ANGOLA AIRPORT PASSENGER TERMINAL BUILDING

0 5m 10m 20m 30m  
SCALE

Figure 6.3 Passenger Terminal Building - Elevations

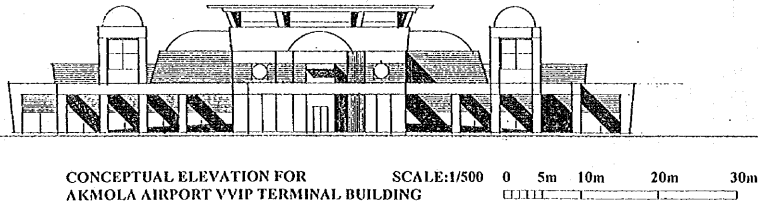
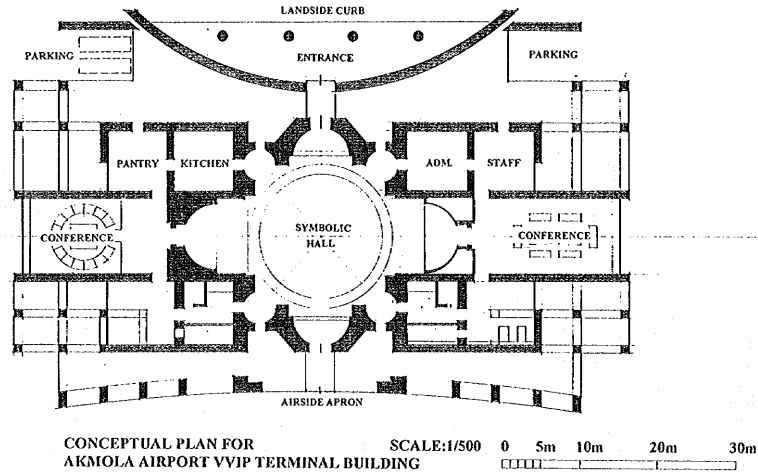


Figure 6.4 VVIP Terminal Building - Plans and Elevation



(2) Almaty International Airport

Figure 6.5 shows overall airport layout.

a) Layout Planning for Feasibility Study

The National Airport System Development Plan in Chapter 5 states that new terminal area should be developed over the long term because the existing terminal area has no room for further expansion. The Lufthansa-led airport management company already has facility development plans which appear below.

- Runway improvement involving pavement overlays
- Construction of a partial parallel taxiway and holding bays, and apron improvement
- Expansion and renewal of the passenger terminal building

Implementation of these development plans will depend on airport's revenues. While this is a sound commercial management in terms of acceptable airport standards, many of these facilities and equipment are already in need of replacement or improvement. Hence in the feasibility study with a target year of 2005, the following has been incorporated.

- 1 Development in the existing terminal area reflects Lufthansa's plan, i.e. a new passenger terminal building is to be located at the site of the existing passenger terminal building.
- 2 Aircraft stands, car parks and related facilities are laid out in the existing terminal area.
- 3 The runway will meet for traffic demands to 2020 after the completion of improvement work in 1997. Construction of the remaining portion of the parallel taxiway and rapid exit taxiways are included in the feasibility study.
- 4 An administration building with control tower, navigational facilities, and any other functions not included in the current development plan have been included.

b) Architectural Facilities

The general considerations are the same as those in Akmoła, except for dual level airside corridors and gate lounges, because large number of gates will be required. This plan enables more strict vertical separation of departure and arrival passengers. See Figure 6.6 for floor plans.

These drawings were prepared for reference only. The actual design for implementation will be discussed between the executing agency and users





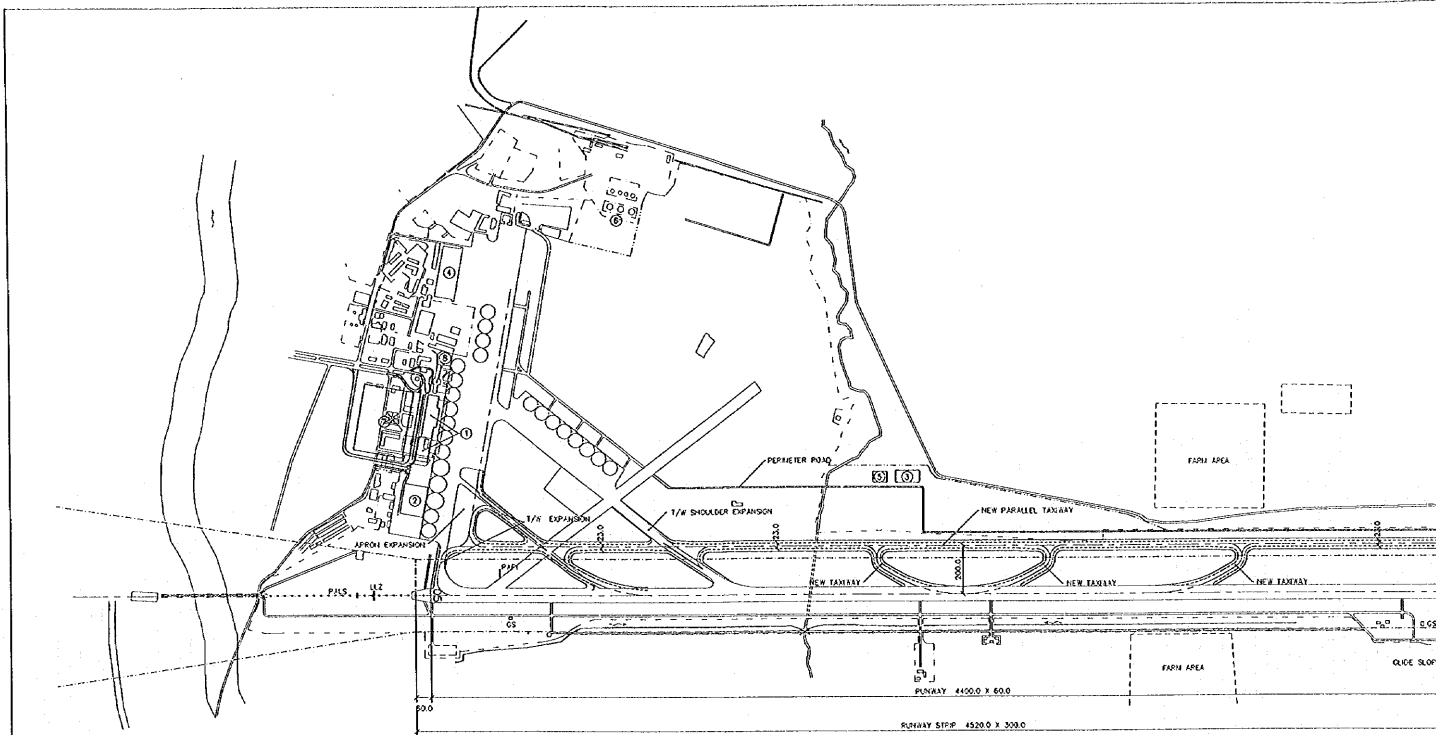


Figure 6.5 Almaty International Airport Layout Plan

BASIC DATA TABLE				BUILDING AREA			
AIRPORT CLASS	PRIMARY	INSTRUMENT RUNWAY	05, 23	No. 1	NAME OF BUILDING	No. 1	NAME OF BUILDING
AIRPORT STATUS	Int. Opn	PAVEMENT STRENGTH		2	PASSENGER TERMINAL	2	CAR PARK
AIRPORT REF. ELEVATION	681 m			3	CARGO TERMINAL	3	SHIP TERMINAL BUILDING
AIRPORT REF. POINT (APP) COORDINATES	N 43°21.1' E 77°02.3'	NAV. AIDS CATECCY	CIT-II	4	ADMINISTRATIVE BUILDING		
AIRPORT REF. TEMP	30.8°C	DISTANCE FROM CITY	10 km	5	INSULAT./RESISTANCE		
RUNWAY DIRECTION	02 / 23			6	PIPE STATION		
				7	FUEL FARM		



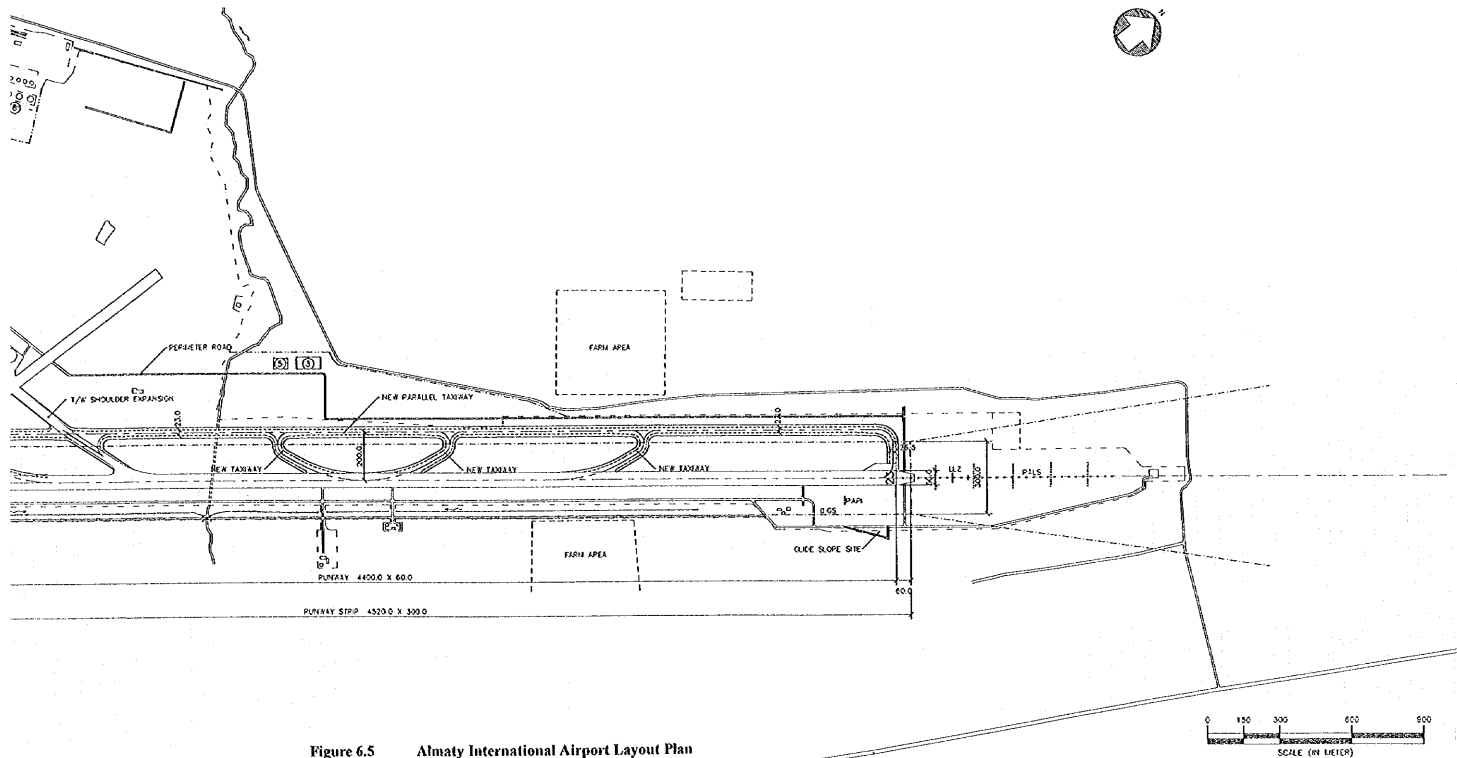


Figure 6.5 Almaty International Airport Layout Plan

BASIC DATA TABLE			
AIRPORT CLASS	PRIMARY	INSURMENT RUNWAY	CS, 23
AIRPORT STATUS	Intl. Dom	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	581 m	NAV. AIDS CATEGORY	CAT-B
AIRPORT REF. POINT (ARP) COORDINATES	N 43°21.1' E 77°02.3'	DISTANCE FROM CITY	10 km
AIRPORT REF. TEMP	30.0°C		
RUNWAY DIRECTION	CS / 23		

BUILDING AREA			
NO.	NAME OF BUILDING	NO.	NAME OF BUILDING
①	PASSENGER TERMINAL	①	CAR PARK
②	CARGO TERMINAL	②	VNP TERMINAL BUILDING
③	ADMINISTRATION BUILDING		
④	MAINTENANCE BUILDING		
⑤	FIRE STATION		
⑥	FUEL AREA		

LEGEND	
CS	AIRPORT FENCE
CS	BUILDINGS
CS	PERIMETER ROAD
CS	RIVER
CS	ROAD
CS	RUNWAY STRIP

THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS	APPROVED BY:
<b>ALMATY AIRPORT</b>	CHECKED BY:
DRAWING TITLE PRELIMINARY LAYOUT PLAN (Year 2005)	DRAWN BY:
THE STUDY ON AIR TRANSPORT DEVELOPMENT BY THE REPUBLIC OF KAZAKHSTAN JAPAN INTERNATIONAL COOPERATION AGENCY	DRAWING NO.:
	SCALE: 1 / 15,000
	DATE: JUL 1997





**(3) Aktau Airport**

**Figure 6.7** shows overall airport layout.

A new passenger terminal building facing the apron, car park, terminal road and others is planned for location in a vacant lot near the existing passenger terminal. Other civil facilities, architectural facilities, navigation aids and airport utilities are included based on the master plan.

The passenger terminal building is planned in the similar way as Akmola. There are international and domestic baggage claims on both sides, while check-in counters are located in the common central area for international and domestic passengers.

See **Figure 6.8** for floor plans.

**(4) Aktyubinsk Airport**

**Figure 6.9** shows the overall airport layout.

A new passenger terminal building, car park, terminal road and other facilities are planned for location in the terminal area, adjacent to the existing passenger building. The apron will be expanded in front of the new passenger terminal building to allow aircraft park in a nose-in configuration. The edge of the apron is set at the location where LJ class aircraft can use the apron in future. Other required civil facilities, architectural facilities, navigation aids and airport utilities are included based on the master plan.

Regarding the passenger terminal building, the required facilities and functional areas will be similar for the secondary airports of Aktau, Aktyubinsk, Atyrau and Pavlodar with adjustments for different traffic forecasts. For Aktyubinsk, the forecast traffic will be less than for Aktau, facilities should be planned which can be used for either domestic or international passengers. Check-in counters are located to one side to allow adjacent international and domestic baggage claim areas. See **Figure 6.12** for floor plans.

**(5) Atyrau Airport**

**Figure 6.10** shows the overall airport layout.

Expansion of the apron, construction of a new passenger terminal building, car park, terminal road and other facilities are planned for location in the terminal area. A few existing buildings need to be demolished or relocated. The edge of the apron is set at the location where LJ class aircraft can use the apron in future. Other required civil facilities, architectural facilities, navigation aids and airport utilities are included based on the master plan.

The plan of the passenger terminal building is same as that of Aktyubinsk.

**(6) Pavlodar Airport**

**Figure 6.11** shows the overall airport layout.

Expansion of the apron, construction of new passenger terminal building, car park, terminal road and other facilities are planned for location in the terminal area. Aviation fuel pipeline and pumps need to be relocated to allow for relocation of new passenger terminal. The edge of the apron is set at the location where LJ class aircraft can use the apron in future. Other required civil facilities, architectural facilities, navigation aids and airport utilities are incorporated based on the master plan.

The plan of the passenger terminal building is same as those of Aktyubinsk and Atyrau.



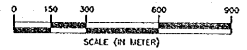
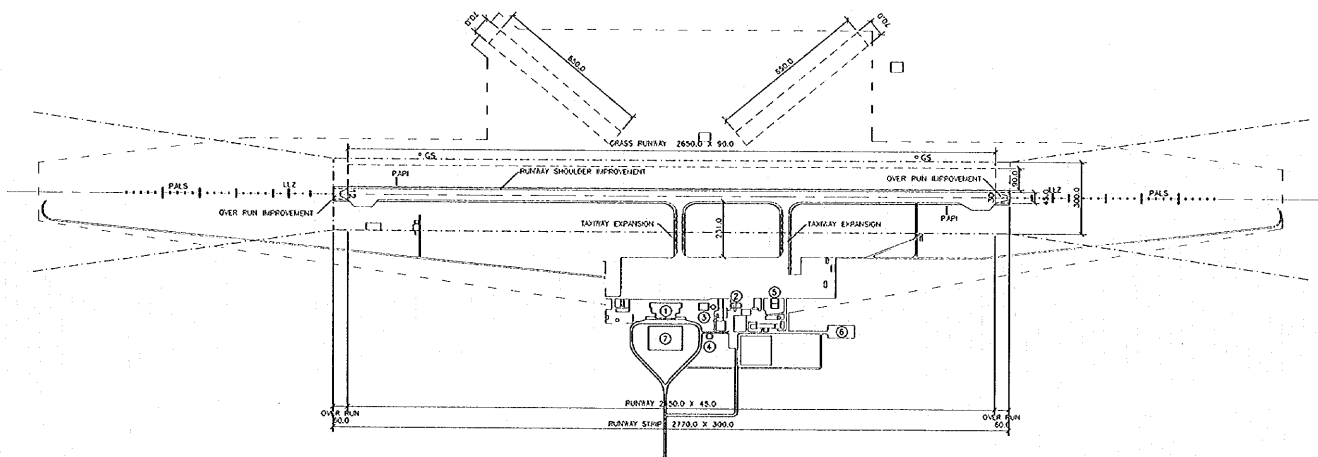


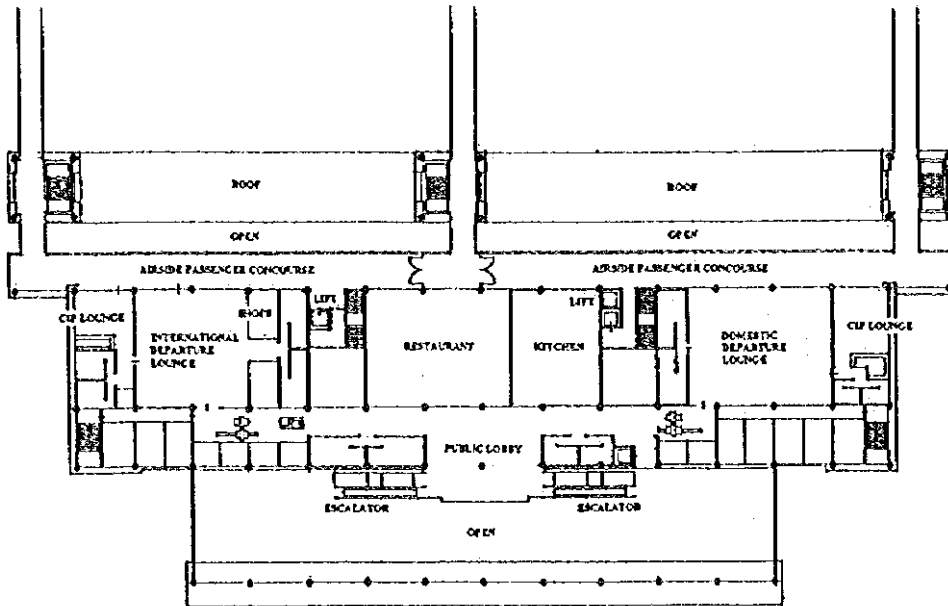
Figure 6.7 Aktau Airport Layout Plan

BASIC DATA TABLE			
AIRPORT CLASS	SECONDARY	INSTRUMENT RUNWAY	12, 30
AIRPORT STATUS	Int / 0cm	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	22 m	NAV. AID CATEGORY	CAT-I
AIRPORT REF. POINT (APP) COORDINATES	N 43°31.6' E 51°05.8'	DISTANCE FROM CITY	10 km
AIRPORT REF. TEMP			
RUNWAY DIRECTION	12/30, 16/34, 08/26		

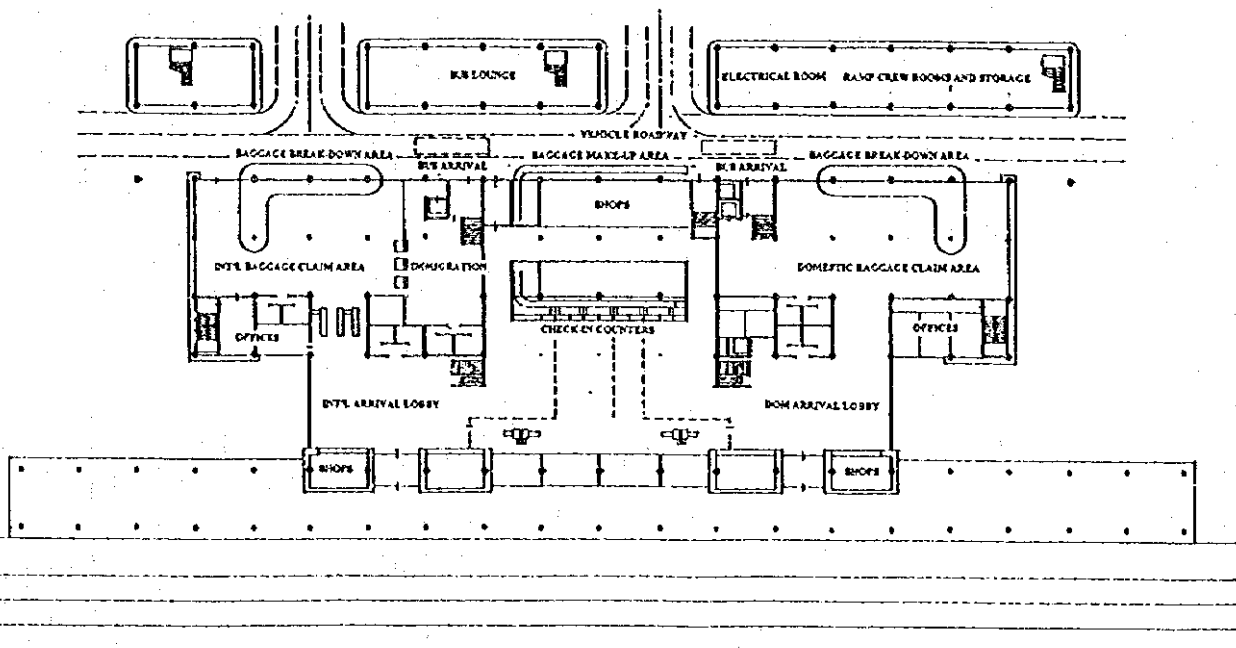
BUILDING AREA			
No.	NAME OF BUILDING	No.	NAME OF BUILDING
①	PASSENGER TERMINAL	⑦	CAR PARK
②	CARGO TERMINAL		
③	ADMINISTRATION BUILDING		
④	POKER HOUSE		
⑤	FIRE STATION		
⑥	FUEL FARM		

LEGEND	
	ROAD
	AIRPORT BOUNDARY
	RUNWAY STRIP
	GRASSED MOVEMENT AREA
	BUILDINGS

THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		APPROVED BY :
<b>AKTAU AIRPORT</b>		CHECKED BY:
DRAWING TITLE PRELIMINARY LAYOUT PLAN (Year 2005)		DRAWING No.
THE STUDY ON AIR TRANSPORT DEVELOPMENT IN THE REPUBLIC OF KAZAKHSTAN JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: 1 / 15,000 DATE: JUN 1997



SECOND FLOOR PLAN  
REGIONAL AIRPORT PASSENGER TERMINAL BUILDING



GROUND FLOOR PLAN  
REGIONAL AIRPORT PASSENGER TERMINAL BUILDING

Figure 6.8 Passenger Terminal Building - Floor Plans





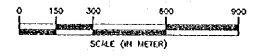
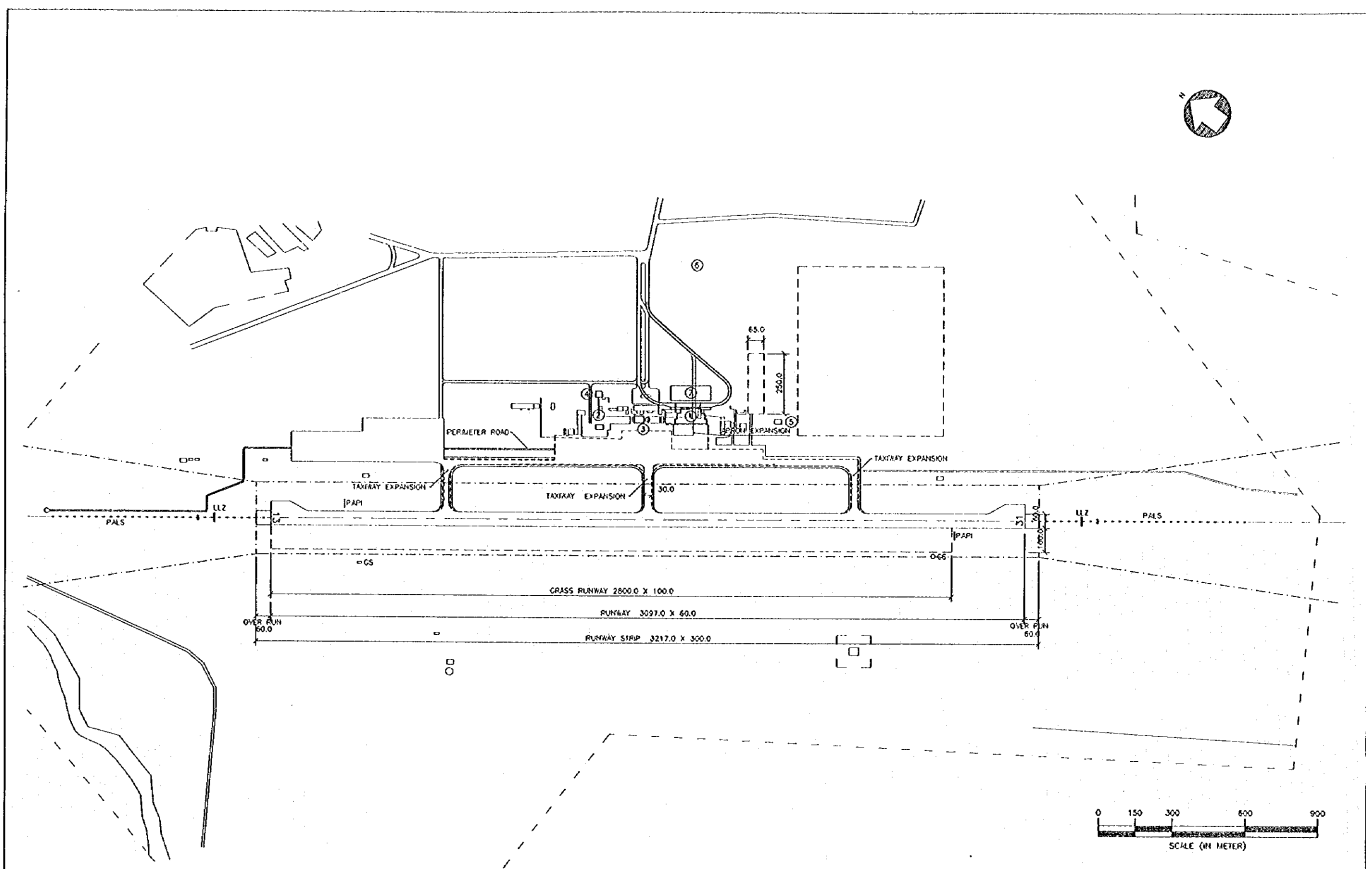


Figure 6.9 Aktjubinsk Airport Layout Plan

BASIC DATA TABLE			
AIRPORT CLASS	SECONDARY	INSTRUMENT RUNWAY	13, 31
AIRPORT STATUS	Int, Dom	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	220 m	NAV. AOS CATEGORY	CAT-1
AIRPORT REF. POINT (GPS) COORDINATES	N 50°14'7" E 57°12'2"	DISTANCE FROM CITY	3 km
AIRPORT REF. TEMP.	26.0°C		
RUNWAY DIRECTION	13 / 31		

BUILDING AREA			
No.	NAME OF BUILDING	No.	NAME OF BUILDING
①	PASSENGER TERMINAL	⑥	CAR PARK
②	CARGO TERMINAL		
③	ADMINISTRATION BUILDING		
④	POWER HOUSE		
⑤	FIRE STATION		
⑦	FUEL FARM		

LEGEND	
	POND
	AIRPORT BOUNDARY
	RUNWAY STRIP
	GRASSED MOVEMENT AREA
	FWYER
	BUILDINGS

THE REPUBLIC OF KAZAKHSTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		APPROVED BY:
<b>AKTYUBINSK AIRPORT</b>		CHECKED BY:
DRAWING TITLE PRELIMINARY LAYOUT PLAN (Year 2005)		DRAWING No.
THE STUDY ON AIR TRANSPORT DEVELOPMENT OF THE REPUBLIC OF KAZAKHSTAN JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: 1 / 15,000
		DATE: JUL 1997

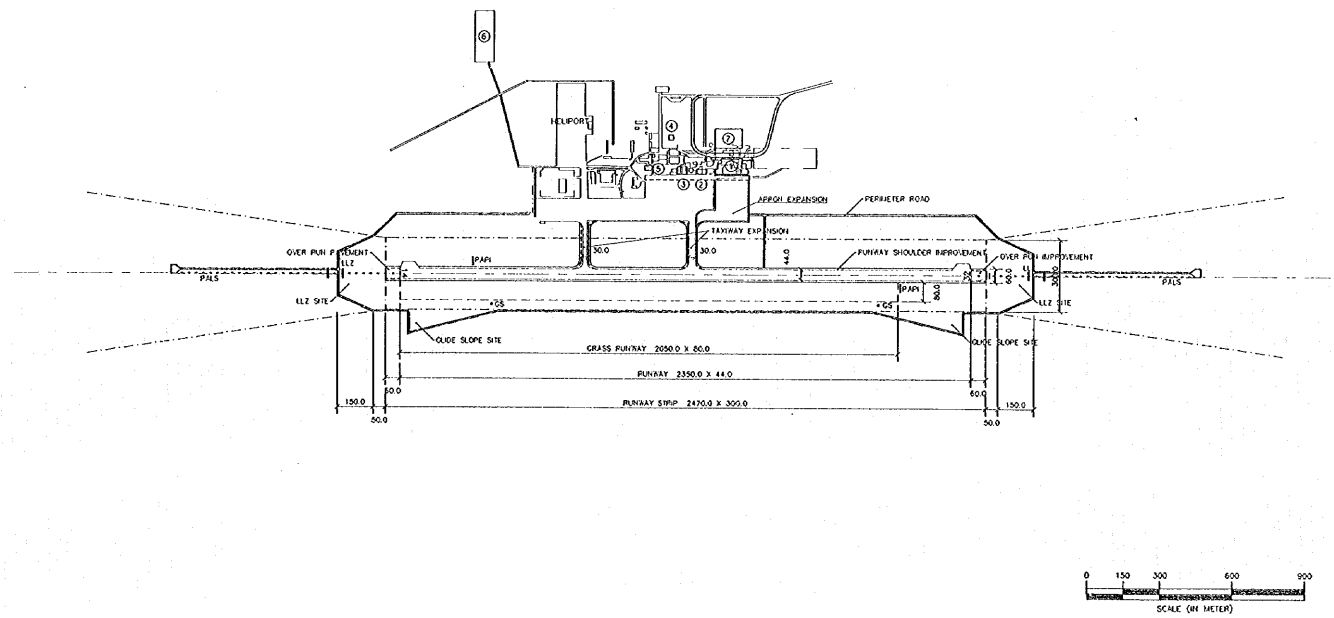


Figure 6.10 Atyrau Airport Layout Plan

BASIC DATA TABLE			
AIRPORT CLASS	SECONDARY	INSTRUMENT RUNWAY	14, 32
AIRPORT STATUS	Int. Dom	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	23 m	NAV. AID CATEGORY	CAT-I
AIRPORT REF. POINT (ARP) COORDINATES	N 47°02.2' E 91°49.5'	DISTANCE FROM CITY	5 km
AIRPORT REF. TEMP			
RUNWAY DIRECTION	14 / 32		

BUILDING AREA			
No.	NAME OF BUILDING	No.	NAME OF BUILDING
①	PASSENGER TERMINAL	⑦	CAR PARK
②	CARGO TERMINAL		
③	ADMINISTRATION BUILDINGS		
④	POWER HOUSE		
⑤	FIRE STATION		
⑥	FUEL FARM		

LEGEND	
—————	ROAD
-----	AIRPORT BOUNDARY FENCE
-----	RUNWAY STRIP
-----	GRASSED MOVEMENT AREA
-----	PERIMETER ROAD
-----	BUILDINGS

THE REPUBLIC OF KAZAKHISTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		APPROVED BY :
<b>ATYRAU AIRPORT</b>		CHECKED BY:
DRAWING TITLE PRELIMINARY LAYOUT PLAN (Year 2005)		DRAWING No.
THE STUDY ON AIR TRANSPORT DEVELOPMENT IN THE REPUBLIC OF KAZAKHISTAN JAPAN INTERNATIONAL COOPERATION AGENCY		SCALE: 1 / 15,000
		DATE: JUN. 1997

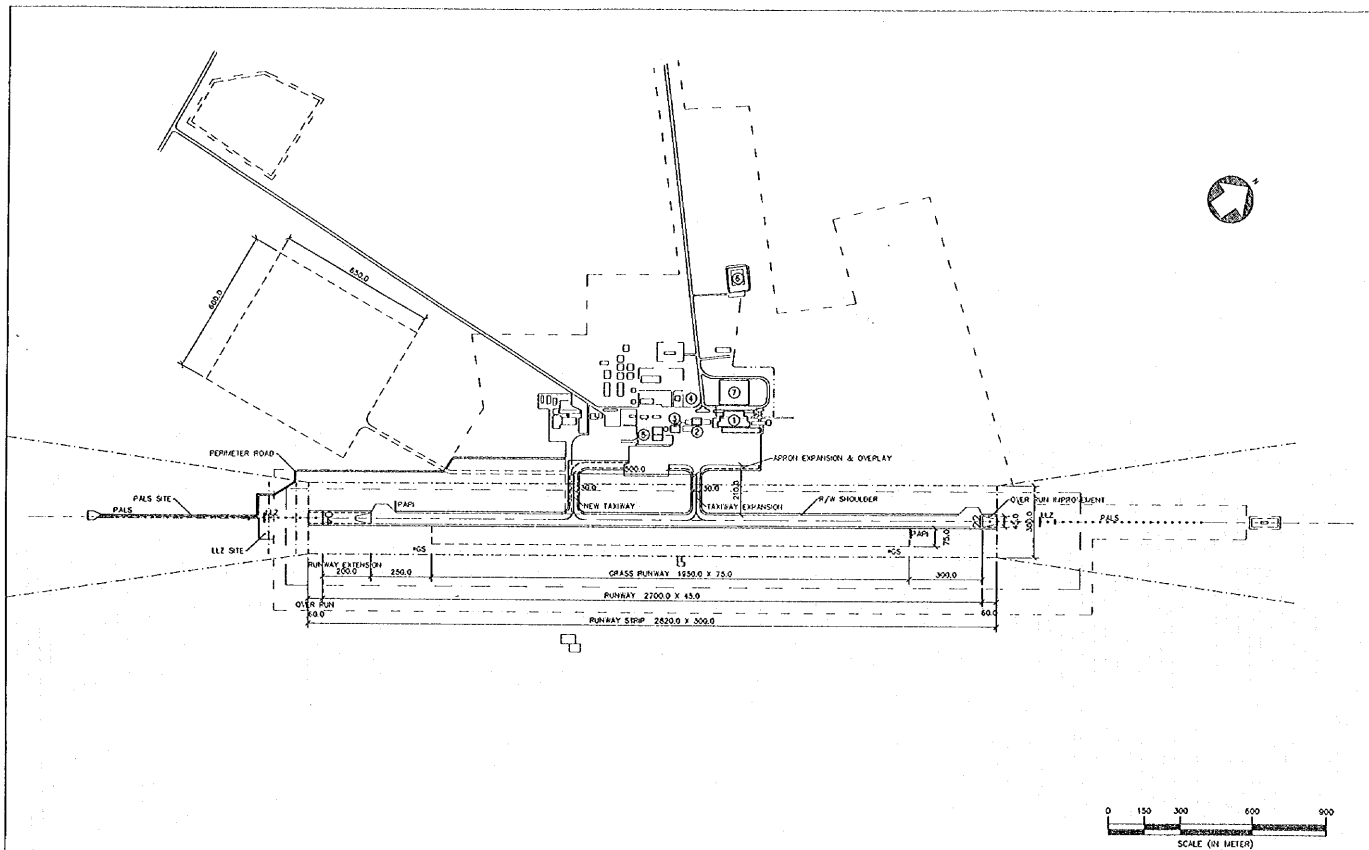


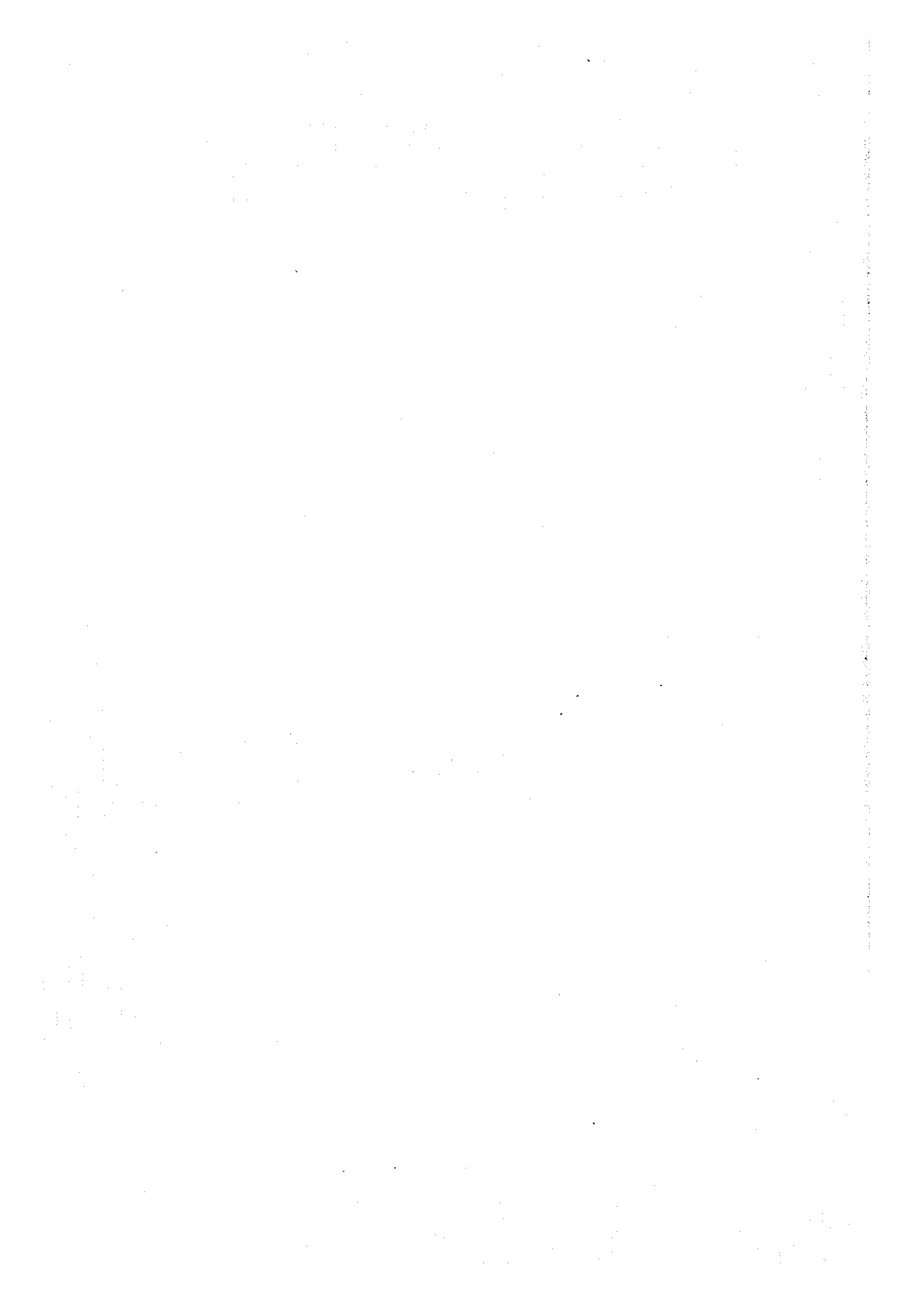
Figure 6.11 Pavlodar Airport Layout Plan

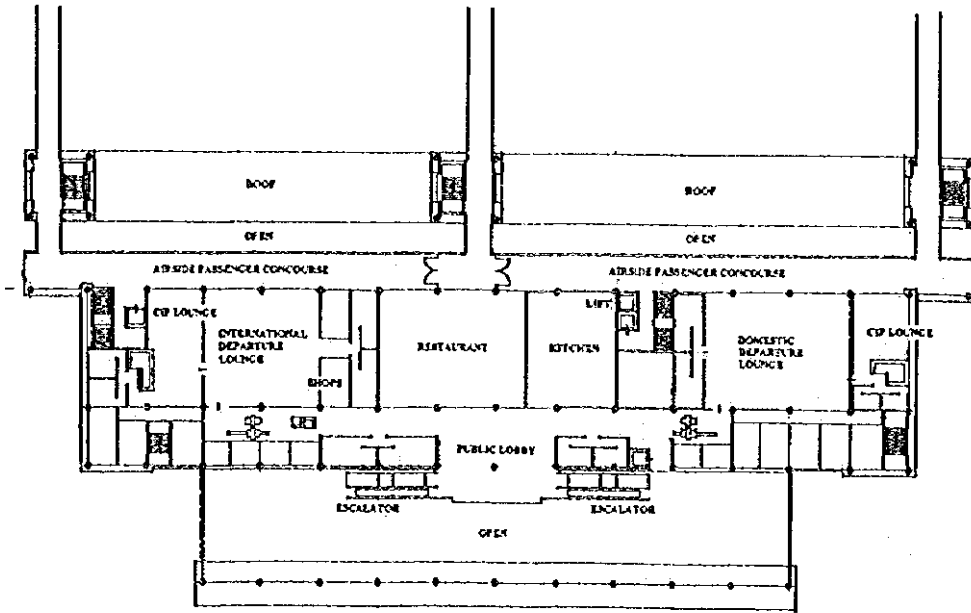
BASIC DATA TABLE			
AIRPORT CLASS	SECONDARY	INSTRUMENT RUNWAY	04, 22
AIRPORT STATUS	Int. Dom.	PAVEMENT STRENGTH	
AIRPORT REF. ELEVATION	125 m		
AIRPORT REF. POINT (40°) COORDINATES	N 52°11.6'	NAV. AOS CATEGORY	CAT-1
	E 77°04.4'		
AIRPORT REF. TEMP		DISTANCE FROM CITY	12.8 km
RUNWAY DIRECTION	04 / 22		

BUILDING AREA			
No.	NAME OF BUILDING	No.	NAME OF BUILDING
①	PASSENGER TERMINAL	②	CAR PARK
③	CARGO TERMINAL		
④	ADMINISTRATION BUILDING		
⑤	POWER HOUSE		
⑥	FIRE STATION		
⑦	FUEL FARM		

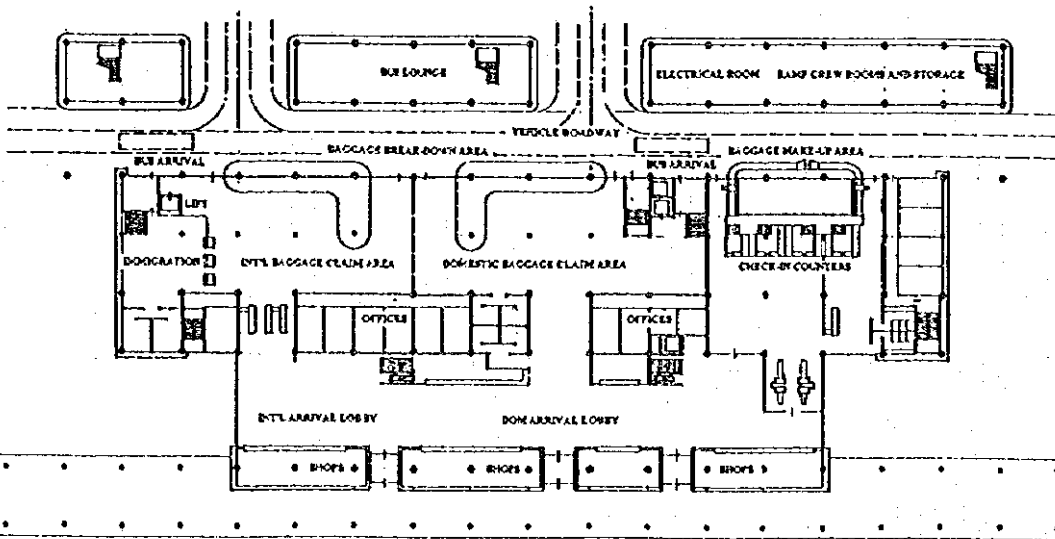
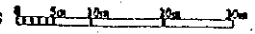
LEGEND	
	ROAD
	AIRPORT BOUNDARY
	AIRPORT BOUNDARY FENCE
	RUNWAY STRIP
	PERIMETER ROAD
	GRASSED MOVEMENT AREA
	BUILDINGS

THE REPUBLIC OF KAZAKHISTAN MINISTRY OF TRANSPORT AND COMMUNICATIONS		APPROVED BY:
<b>PAVLODAR AIRPORT</b>		CHECKED BY:
DRAWING TITLE PRELIMINARY LAYOUT PLAN (Year 2005)		DRAWN BY:
THE STUDY ON AIR TRANSPORT DEVELOPMENT IN THE REPUBLIC OF KAZAKHISTAN IAP21 INTERNATIONAL COOPERATION AGENCY		DATING NO.
SCALE: 1 / 15,000		DATE: JAN. 1997





SECOND FLOOR PLAN  
REGIONAL AIRPORT PASSENGER TERMINAL BUILDING



GROUND FLOOR PLAN  
REGIONAL AIRPORT PASSENGER TERMINAL BUILDING

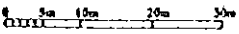


Figure 6.12 Passenger Terminal Building  
Aktyubinsk, Atyrau and Pavlodar - Floor Plans

## **6.2 Land Use Plan**

### **6.2.1 General**

Land use plan for surrounding area of an airport is important to secure safe and efficient operation of an airport and to keep better harmony with communities around an airport by solving and or easing environmental problems caused by the airport operation and or functions.

### **6.2.2 Current Land Use**

The current land use in Akmola and Almaty Airports and their surroundings are shown in Figures 6.13 and 14 respectively. Urbanization has been fairly expanding to the vicinity area of the Almaty airport, while the other airports are mainly surrounded by pastures and or fields.

The Kazakhstan government and provincial governments have been considering the land use control and utilization of surrounding areas of airports, but not yet established them as plans. However, referring to the current situation around the airports, Almaty in particular, it is immediately necessary to establish land use plans to secure the environment for keeping harmony between airports and neighbouring communities.

### **6.2.3 Land Use Plan**

(1) Regarding the requirement for airport operation, there is an international standard of obstacle limitation surfaces of obstacle restriction and removal for aircraft operation established by ICAO. This gives height restriction of structures and buildings in land use around airports.

(2) On the other hand, there is bad environmental influences specifically caused by airport operation, aircraft noise in particular. For aircraft noise countermeasure, it is primarily necessary to introduce low-noise aircraft and engines to replace the existing ones as a noise source measure, because the aircraft noise is now caused mainly by outdated high-noise aircraft in Kazakhstan. In addition to this, it is effective to control land use in accordance with permissible aircraft noise levels in life. Land use criteria was designed as follows, referring to the environment standard and countermeasure of Japan.

**Table 6.2 Land Use Compatibility**

aircraft noise level (WECPNL)	compatible land use
less than 70	residential area (housing, schools, hospitals)
less than 75	commercial (offices, shops)
more than 75	agriculture (farms, orchards), industrial (factories, warehouses), recreation (parks, sports facilities)
more than 95	green belt (buffer zone)

(3) Land use was planned taking aircraft noise contours for 2020, land use compatibility, expandability for the future airport development, etc. into account.

At the airports except Almaty, as the future influence of aircraft noise is estimated to remain within fields and pastures, there is no necessity to change the current land use except to set up the plans based on the contours.

At Almaty, the aircraft noise gives influence on the current land use, particularly noise invasion to the residential area. It is advisable to change the current land use into more ideal one. The Figure 6.15 was planned considering harmonized and transitional land use with neighbouring usage.

(4) As the vicinity area of the Almaty airport has been urbanized almost coming to one end of the airport, it is urgent to prevent further expansion of the aircraft noise to the area, by restricting and controlling the land use. Furthermore, it is also necessary to abate the noise level from the existing residences suffering the aircraft noise by countermeasure for aircraft noise.

Countermeasure was planned considering the Japanese ones, as follows.



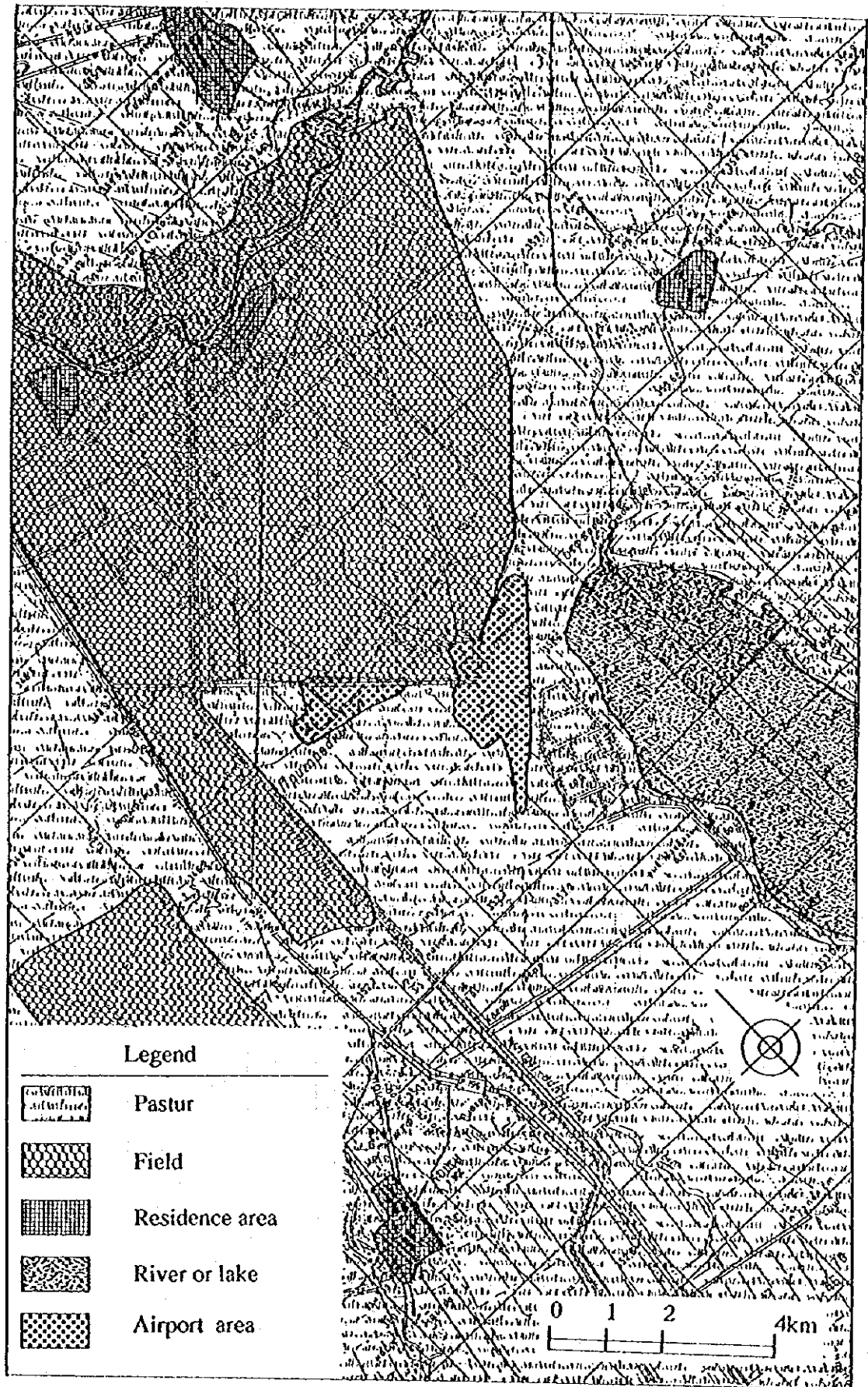
**Table 6.3 Aircraft noise measures**

aircraft noise level (WECPNL)	measure
area more than 70	sound proof work for schools and hospitals
area more than 75	sound proof work for housing
area more than 90	relocation of housing

The cost for the countermeasures was estimated as follows.

**Table 6.4 Cost estimation of aircraft noise measures**

measures	cost
sound proof works	US \$ 400 thousand



**Figure 6.13** Current Land Use at Akmola Airport and its Surrounding



**Figure 6.14** Current Land Use in Almaty Airport and its Surrounding



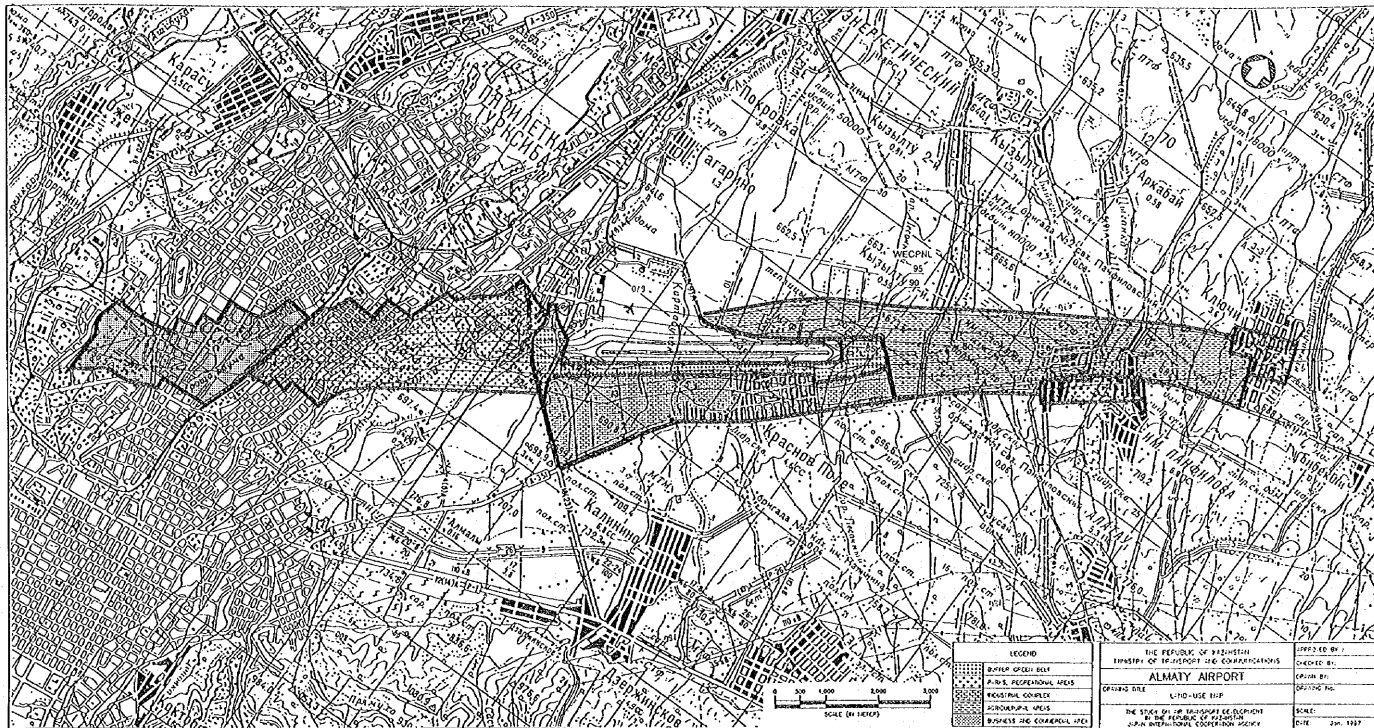


Figure 6.15 Land Use Plan (Almaty)



### 6.3 Construction Plan

The followings major considerations have been taken when planning airport development.

- (1) Safety considerations are paramount. Work shall be scheduled to minimize the risk of accidents and not to impair the movement of aircraft.
- (2) The time available for outdoor work will be limited by long winter seasons. Work and resource scheduling should take this into account.
- (3) Certain items of equipment, some materials and some skilled labor will need to be imported. This requirements should be well planned in advance.
- (4) A suitable quarry site capable of providing 200,000 cu.m of good quality aggregate should be secured.
- (5) Asphalt concrete will be used for pavements because it can be used by aircraft soon after it has been laid.
- (6) Mobilization will start during the winter season so that earthwork can be started as soon as the season ends.
- (7) Prefabrication of major facilities components will be used wherever possible.

**Table 6.5 Construction Program**

Work Items		Year	1	2	3
1	Civil Works				
1.1	Airside Facilities (Runway, Taxiway, Apron and Other Civil Works)				
1.2	Landside Facilities (Access Road, Terminal Road, Car Park and Other Civil Works)				
2	Architectural Works				
2.1	Passenger Terminal Building				
2.2	Administration Building				
2.3	Control Tower and Navigation Building				
2.4	Other Buildings				
3	Airport Utilities				
3.1	Air Navigation Systems				
3.2	Power Supply				
3.3	Air Conditioning and Heating Facility				
3.4	Sanitary Works				
4	Test Operation and Flight Check, etc.				

## 6.4 Cost Estimates

### 6.4.1 Premise

It was difficult to accurately estimate construction costs because very little infrastructure work has taken place in recent years and there is no developed market for construction materials.

Costs were estimated based on available information from the following sources.

- (1) Airport staff and construction companies working in Kazakhstan.
- (2) The JICA Road Study for Kazakhstan
- (3) Computing reasonable equipment rental fees based on equipment prices and comparing these with actual rental fees being charged.
- (4) Current salaries and wages of construction labor.
- (5) Transportation costs of the various construction resources from point of origin.

### 6.4.2 Cost Estimation of Each Airport

**Table 6.6 Cost Estimation for Objective Airport (2005)**

US\$ / KZT = 70.3

Airport	Akmola (US\$ 1,000)	Almaty (US\$ 1,000)	Aktau (US\$ 1,000)	Aktyubinsk (US\$ 1,000)	Atyrau (US\$ 1,000)	Pavlodar (US\$ 1,000)
I Compensation	8,748	400	0	0	0	0
II Preliminary general Cost	25,779	32,144	13,198	13,488	18,473	18,591
III Construction / Installation	151,577	155,408	74,146	64,464	77,440	75,265
1 Civil Works	26,453	34,031	3,713	10,869	9,666	11,148
2 Architectural Works	48,760	56,870	19,120	14,623	19,627	16,272
3 Air Navigation Systems	26,103	32,658	20,998	22,230	20,715	20,998
4 Supporting Facilities	28,982	3,363	16,772	3,957	13,498	12,516
5 Special Equipment	7,499	14,358	6,802	6,926	6,895	7,489
6 Contingencies	13,780	14,128	6,741	5,860	7,040	6,842
IV Construction Cost	186,104	187,953	87,344	77,952	95,913	93,856
V Consulting Cost	15,158	15,541	7,415	6,446	7,744	7,526
<b>Project Cost</b>	<b>201,262</b>	<b>203,493</b>	<b>94,759</b>	<b>84,398</b>	<b>103,657</b>	<b>101,383</b>



## 6.5 Environmental Impact Analysis

- (1) Environmental Impact Analyses was conducted for the items indicated in the Initial Environmental Evaluation at the six airports which make up the Selected Priority Projects. The results are shown below.

**Table 6.7 Summary of Environmental Impact Analysis**

Environmental Item	Akmola	Aktyubinsk	Almaty	Atyrau	Aktau	Pavlodar
Motor vehicle noise levels	-	-	G	-	-	-
Probability of Residential Area Damage due to Aircraft Accident	C	C	C	-	-	C
Hazard (Bird strike)	B	-	-	-	C*	-
Hazard (Rising of the Caspian Sea)	-	-	-	G	A	-
Fauna and Flora (Migratory birds)	C	-	-	-	C	-
Ground water	-	A	-	-	-	-
Air pollution	D	D	D	D	-	D
Water pollution (Surface water)	G	-	G	A	-	-
Noise (Aircraft noise levels)	E, F	E, F	E, F	E, F	-	E, F
Land subsidence	A	-	-	-	-	-
Environmental Impact during Construction Phase (Muddy water discharge)	E	E	E	E	E	E

(remarks)

- A: No problems
- B: Being improved
- C: Recommended for monitoring
- D: Further study requested
- E: Recommend airport authorities to take appropriate action
- F: Recommend city planning authorities to take appropriate action
- G: Further study and countermeasures requested
- C\*: Described in the Fauna and Flora (Migratory birds) section

- (2) Aircraft noise is the major item for these airport projects. The aircraft noise levels at the Almaty Airport already exceed the environmental standards of Kazakhstan. Much quieter aircraft will be acquired due to fleet expansion or replacement.

Further protection can be achieved by means of land use control around airports.

- (3) Since major development work for each airport involves refurbishment and/or improvement of existing facilities, the possibility of significant changes in environmental impact seems low. Negative impacts caused by airport activities and drained water during construction can be eliminated by installation of water treatment facilities, etc. Aircraft accidents and noise can be avoided by means of sound aircraft maintenance, conversion to new type aircraft, and land use control in the vicinity of the airport. As to the rising levels of the Caspian Sea, the necessary countermeasures should be implemented. Traffic noise from the access road for Almaty airport already exceeds the maximum permissible level. It is necessary to deal with the matter through regulations on vehicle maintenance and city planning.

#### 6.6 Geological Considerations

To determine the geological conditions, soil investigations, involving static penetration tests and physical laboratory tests using undisturbed samples, were done in each terminal area of the six airports selected for feasibility study.

- (1) There are sand or sandy clay layers 2 to 4 m below the surface at five airports, i.e. Akmola, Aktau, Aktyubinsk, Atyrau and Pavlodar. These layers have satisfactory characteristics for spread foundations of buildings. In Almaty, however, pile foundations are preferable since it is within an earthquake zone.
- (2) The strength of subgrades is estimated at CBR 10 equivalent at Akmola, Aktau, Aktyubinsk, Atyrau and Pavlodar, and CBR 2 to 3 equivalent at Almaty. These subgrade strengths are sufficient.
- (3) The ground water levels at Akmola and Atyrau rise to 0.8 to 0.5 m below of the surface in rain and snow thawing seasons. This should be taken into account when planning construction work. Frost heave should be paid careful attention for further design.

## 6.7 Economic and Financial Analyses

The objective of the economic analysis is to determine the feasibility of the project view of national economy. The financial analysis on the other hand, shows how the project investment affects the financial status of the executing agency.

In the economic analysis, incremental costs and benefits are estimated by comparing between "with project case" and "without project case". The evaluation has been carried out over 25 years, from inauguration in 2002 to 2022. This includes the construction period from 1997 to 2001.

### (1) Economic Analysis

First, the benefits and costs of the Project have been identified and quantified in the context of the "with" and "without" assumption. Secondly, benefits and costs of the Project have been converted from market prices to economic prices. Thirdly the feasibility of the Project has been estimated using economic analysis indices. Finally, the sensitivity of the Project has been examined.

Economic cost has been calculated from the project cost estimated in section 6.4 by applying the conversion factor of 82 % for the local portion. Personnel expenses, operation and maintenance costs have also been estimated. For the benefits from the project, the following four items have been quantified.

- Airport's revenues (landing fees, air navigation fees, terminal facility fees and revenues from concessionaires)
- Benefits in views of passengers' convenience from air transport (compared to other transport modes)
- Benefits from foreign tourist expenditures (a portion of incremental foreign currency earnings)
- Revenue from aviation fuel tax (20% VAT included in the selling price)  
Note:  $(\text{Fuel sales}) \times (1 - 1/1.20)$

The Economic Internal Rate of Return (EIRR) has been estimated based on the foregoing factors.

Economic sensitivity has been compared for the following four conditions.

- 10 % of cost increase

- 10 % of cost increase
- 10 % of cost decrease
- 10 % of air traffic demand increase
- 10 % of air traffic demand decrease

(2) Financial Analysis

The following revenues sources will increase due to implementation of the project.

- Airport's revenues (landing fees, air navigation fees, terminal facility fees and revenues from concessionaires)
- Revenue by aviation fuel tax (VAT20 %)

The FIRR (Financial Internal Rate of Return) is estimated using these incremental revenues and costs (project cost, personnel expenses, operation and maintenance costs).

Table 6.8 shows summary of economic and financial analyses.

**Table 6.8 Summary of Economic and Financial Analyses**

airport	Akmola	Almaty	Aktau	Atyrau	Aktyubinsk	Pavlodar
economic analysis						
EIRR (%) (base case)	11.86	30.97	12.20	5.06	0.97	7.99
at the cost +10%	10.81	29.03	11.20	4.28	0.22	7.02
at the cost -10%	13.06	33.23	13.51	6.04	1.81	9.10
at the traffic +10%	12.95	33.01	13.39	5.95	1.73	9.0
at the traffic -10%	10.70	28.84	11.09	4.11	0.15	6.92
Benefit / Cost ratio at 5% discount rate	1.89	6.05	1.92	0.95	0.58	1.29
EPNV (million Tenge)						
at 5% discount rate	13,854	79,899	7,701	53	-2,493	2,743
at 10% discount rate	2,107	34,854	1,343	-2,457	-3,268	-1,016
at 15% discount rate	-2,163	15,646	-969	-3,076	-3,206	-2,249
financial analysis						
FIRR (%)	7.78	19.48	0.00	-4.68	-5.82	-3.23

## 6.8 Implementation Planning

Contracts for each stage should be signed in a timely manner so as to start the field work before the arrival of severe frost. Otherwise the project shall be delayed.

The implementation plan is divided into 2 stages: design stage and construction stage.

A commitment to the project from both countries is needed before design. Normally 6 months of contract negotiation are required prior to signing. Then a consultant would be selected by the Kazakhstan government.

Topographic surveys and soil surveys for detailed design shall start after construction. A review of traffic demand forecasts shall start simultaneously. Detailed design for contracting construction will take 10 to 12 months.

The Japanese government will check the plan and design including project cost. All of the foregoing activities will take a total of 2 years prior to the commencement of construction.

Table 6.9 shows the main items of project implementation.

**Table 6.9 Airport Project Implementation Program**

Work Items		Year	1	2	3	4	5
1	Financial Arrangement, Loan Agreement of Project and Contract of Consultant	=====					
2	Topographic Survey and Soil Investigation	====					
3	Basic Design and Detailed Design	====	=====				
4	Land Acquisition		(====)				
5	Pre-Qualification, Tendering and Contract for Construction			==			
6	Construction Works				=====	=====	=====
7	Test Operation and Flight Check etc.						=

Note: Land acquisition must be done by Kazakhstan, if required.

## **6.9 Conclusions and Recommendations**

### **6.9.1 Conclusions**

The conclusions of the feasibility study on the selected six airports can be summarized as follows:

#### **(1) Operational and other issues**

The purpose of the project is to modernize the existing airports to meet international standards and levels of services.

Akmola Airport is planned to serve the new national capital. Specific facilities will be required to service large jet aircraft and greet distinguished visitors, in addition to meeting technical standards and levels of service.

#### **(2) Environmental Issues**

The environmental impact analyses indicate that there are unlikely to be any specific adverse impacts resulting from the projects. This is because the projects primarily involve refurbishing existing facilities. Any adverse impacts can be dealt with by installing treatment facilities.

Aircraft noise, however, is a problem specific to airports and the surrounding areas. Noise levels at Almaty airport already exceed national standards. The outdated aircraft currently used in Kazakhstan are the primary causes of these high noise levels and their replacement with modern aircraft will ease the problem. It is also necessary to introduce effective land use control in the surroundings areas to protect the well-being of residents.

#### **(3) Economic Issues**

- 1) The results of the economic and financial analyses appear in **Table 6.8**. The analyses indicate high levels of economic and financial viability for both Almaty and Akmola. The less favorable situation at the other airports is attributable to lower air traffic demands and lower revenues.

The financial viability of all projects will be enhanced by soft loan funding at low interest rates.

At Aktau, Atyrau, Aktyubinsk and Pavlodar, it will be necessary to increase

revenues and reduce costs. Any increases in airport charges, however, need to be carefully formulated to avoid adverse impacts on traffic levels. Some form of governmental financial assistance may be necessary.

- 2) The airport projects would bring indirect benefits as well as direct economic and financial benefits. The upgraded airports would be clear symbols at Kazakhstan's commitment to market reforms, infrastructure modernization, and a safe and reliable air transportation system. This will encourage foreigners to travel more often by air and promote tourism.

Domestically, upgraded airports will strengthen air transportation links and promote a sense of national unity and identity. This will be particularly important given the inadequate surface transportation systems.

#### (4) Priorities

The analyses confirm the overall feasibility of all the airport projects. Since Almaty airport is already being modernized by the Lufthansa consortium, the highest development priority should be accorded to Ak-mola to serve the new national capital.

### 6.9.2 Recommendations

It is recommended that the followings measures should be taken to complement an airport modernization programme.

#### (1) General modernization of the air transport system

Airports are components of the overall air transport system so there should be complementary modernization and enhancement programs for the Air Navigation System, Air Carriers and the Regulatory Regime.

#### (2) Enhanced airport management

More efficient management is required to fully benefit from facility modernization programs. Services need to be more user orientated and delivered more efficiently. Costs reductions will be required. The government is advised to design any cost reduction programs involving personnel with great care and sensitivity. Appropriate measures include providing alternative employment, retraining and

financial remuneration packages.

(3) Financial assistance from governments

Although the processing of soft loans will improve the financial viability of the airport projects, supplementary financial assistance from various levels of government may be required for these airports with low economic and financial viability. These can include subsidies and tax relief.

(4) Understanding Investment Requirements

Considerable foreign investment will be required to implement the projects in the form of equity purchases or loan funding. The owners and managers of Kazakhstan's airports should, therefore, understand the parameters which govern investment decision making. These entail a thorough assessment of the records and risks involved. To foreign investors, the current managerial and financial systems in Kazakhstan often appear unclear and subject to sudden change.

Investors will, therefore, usually require certain conditions to be met prior to making any funding available. For debt financing, the airport owners would have to provide loan guarantees and also part of the actual loan requirements. Investors would also require that adequate management, financial and safety systems be in place.

Soft loans are usually only available from bilateral or multilateral governmental lending institutions. Private investors are likely to apply more stringent loan conditions.

The expected roles of the government would be to provide sovereign guarantees as appropriate for foreign loans, provide tax relief as appropriate, establish viable economic and safety regulatory regimes, and to fund any public service obligations imposed on the airports.

(5) Requirements for individual projects

a) Akmola airport

This airport will serve the new national capital after it has been relocated from Almaty to Akmola. There are, however, few details on the scope and schedule of



the actual relocation activities. As these become known, the airport development plan should be reviewed and amended as necessary.

b) Almaty airport

The management of this airport has been transferred to a private company whose development program will be primarily determined by financial considerations. To ensure that the development of this airport is balanced and timely, it is advisable to monitor the development activities of the private company in relation to the plan proposed in this study.

c) Atyrau airport

The rising water levels of the Caspian Sea may require a relocation of the city and airport. Such measures and any other counter measures need to be monitored, and the airport development plan modified accordingly.

(6) Implementation Framework

It is recommended that all of the activities involved in the design stage of project implementation be conducted in accordance with the laws and standards of Kazakhstan, taking local conditions into account, and in full collaboration with Kazakhstan side.

## **CHAPTER 7**

# **MODERNIZATION OF NATIONAL AIRLINE**

## **CHAPTER 7 MODERNIZATION OF THE NATIONAL AIR CARRIER**

### **7.1 Introduction**

#### **7.1.1 Trends Affecting the National Air Carrier and Demand for Air Travel**

Following independence in 1991, the economy of Kazakhstan experienced a decline in output, high levels of inflation and reduced consumer demand for all but the basic necessities. During this period there was a dramatic reduction in the demand for air travel. Contributing factors are much lower discretionary incomes, higher rates of unemployment, wage levels which did not keep pace with inflation, and substantial increases in air fares. Because of this situation, the condition of the national air carrier, Kazakhstan Auje Zholy, (hereafter referred to as Kaz Air) progressively deteriorated.

While a large part of the airline's decline is linked to general economic conditions, there is also evidence which suggests that the airline's performance has also been seriously impacted by a substantial increase in the number of domestic and international air carriers serving Kazakhstan since 1991 and the airlines' lack of skill and experience in operating in a more open, demand driven marketplace.

#### **7.1.2 Recent Developments Affecting the National Air Carrier**

The role of and need for air transportation is significant in Kazakhstan, given the country's large land mass, rugged terrain, dispersed population centers, and limited intermodal links. Transportation and air transportation, in particular, are considered vital to the national interests of the Republic.

Because of these considerations and the progressively deteriorating position of the national air carrier, the government of the republic undertook a number of measures in the last year intended to strengthen the air transportation infrastructure and improve the financial condition of the national air carrier. These include separating the navigational services, establishing air law, expanding the role of civil aviation, separating some of the major airport and airline operations, placing Kaz Air under the management of a trustee, and establishing "Air Kazakhstan" as a new national air carrier.

### **7.2 Review of Air Transportation Market in Kazakhstan**

During the former Soviet Union, demand for air travel was excessively high. Air travel was widely subsidized and many CIS citizens took annual vacations which were fully, or partially, paid by employers. Soviet air fares were known as amongst the lowest in the world, in part due to fuel supplied by the State at a fraction of world market prices.

When air travel market peaked in Kazakhstan in the 1990 to 1991, the national air carrier operated regularly with load factors in the range of 90%, or higher. An influx

of new competition started in 1992 with new international services. Independent air carriers started to emerge in 1993. As a result of these new airline carriers, along with the establishment of social and economic links between Kazakhstan and other outside areas, new segments of air travel began to develop. In addition to the traditional business and leisure travel, the citizens of the republic also began to travel for purposes of migration and purchasing of goods outside the country. These developments have significantly influenced the level of competitive services and the evolution of Kaz Air's international route structure in recent years.

### 7.2.1 Competition

Prior to separation there was no domestic or international competition in Kazakhstan. In the latter case, all services were provided by Aeroflot from either Moscow or Tashkent. Since that time, the level of competition and capacity in Kazakhstan has risen dramatically in relation to the market size. New services have been introduced by international scheduled carriers, as well as a sizable number of "independent carriers". This influx of competition has had a significant impact on the national air carrier, even more so because of the coincident decline in demand for air travel. As of September, 1996 more than 65 air companies have been identified as providing services within or to/from points outside Kazakhstan. Another 20 carriers are designated, but are not currently operating. Table 7.2.1.1 provides a general overview of this competition.

**Table 7.2.1.1 Carriers Licensed or Designated to Operate**

Type of Carrier	Type of Service	Region of Service	Number of Airlines
International	Scheduled & Cargo	Central, Eastern Europe, Middle East & Asia	8
Independents	Charter & Cargo	Central Europe, CIS Middle East, & Asia	20
AUTK & Regional Avias	Scheduled, Cargo & Charter	Within Republic & CIS	20
CIS Regional and National Carriers	Scheduled & Cargo	To/From CIS	18
Total			66

Source: Compiled from information provided by Kaz Air lines and the CAD

As of September 1996, some new domestic operations are developing. AsiaService is operating flights from Akmola, Aktau, and Atyrau to Almaty, and Skyservice has flights from Akmola to Almaty. Other services are being provided to Atyrau and Aktau to transport workers and cargo to the oil fields. It is expected that more domestic competitive services will evolve in the future from the smaller private airlines in various regional locations.

As of May 1996, there were some 18 carriers operating from points in the CIS to

Almaty. The national air carrier operates from Almaty to six points and there is also service to fifteen points in the CIS from other locations in Kazakhstan. CIS carriers also operate to five points other than Almaty. From Almaty, Kaz Air has a 31% of the overall seats operated to CIS points, but the airline's position is weak in the case of Tashkent and Moscow, where it either operates less frequently or competes against larger western manufactured aircraft.

The only growth market in Kazakhstan since Independence is the international air travel market. From 1993 to 1995 international departures at Almaty airport grew by 267%.

**Table 7.2.1.2 Annual Departing Passengers (000) - Almaty Airport**

Year	Total	Initial	Transit	International
1993	1279.5	1173.4	29.1	75.6
1994	907.1	672.2	16.5	215.8
Change 94/93	-29.2%	-42.7%	-43.3%	185.4%
1995	858.8	541.2	39.7	277.4
Change 95/93	-52.1%	-53.9%	36.4%	267.0%

As of summer 1996, there were eight international air carriers operating to a total of eight destinations from Almaty. Lufthansa, KLM, and Austrian Airlines also have code share agreements with major partners on the Almaty route. The national air carrier share of the scheduled seat capacity was 52%.

In addition to the scheduled carriers, several new airlines recently established international services to Almaty from London, Frankfurt and Hanover. As of October 1996, many of the scheduled carriers have increased frequency, while Kaz Air has suspended operations to Frankfurt, Hanover, Sharjah, Delhi and Vienna. The national air carrier's share of scheduled seats had dropped to 21%.

Much of the international traffic in Kazakhstan does not travel on scheduled services, but rather the "shop tourism" charters regularly operated by the independent air carriers using either their own aircraft or planes wet-leased from other air carriers, including the national air carrier. Charters are also operated by air carriers registered in other countries. The CAD does not record outbound charter movements and there is no central industry source of distribution.

Shop tourism charters are operated on a number of routes which have designated carriers providing scheduled operations, including many of those of the national air carrier. Kaz Air has tried to arrest the charter competition, increasingly diverting capacity from scheduled to charter capacity in recent years. Some scheduled markets, such as Almaty-Istanbul, now have far more charters than scheduled services. In summer 1996, 80% of the operations in this market were charters.

Turkish Airlines, on the other hand, does not participate in the charter market. The airline's strategy has been to focus on the high yield scheduled business traveler. The airline uses A-310 aircraft with a business class product and as of October, 1996 offered four weekly flights. The national air carrier's share of scheduled capacity in this market has decreased from 35% in July 1996 to 16% in October.

In addition to the issue of capacity, the national air carrier's price structure is not competitive with either the scheduled or charter operators. Because the national air carrier does not want to undermine its scheduled price structure, it applies the same fares for both scheduled and charter services, resulting in higher fares than the charters and lower fares than the scheduled competition. The airline offers lower scheduled fares because it does not have a premium product and its service level are lower.

**Table 7.2.13 Schedule and Charter Comparison - Summer 1996**

Airline	Aircraft Type	Weekly Seats	Weekly Flights	Weekly Capacity	Percent of Total	Charter Price			
						CIS OW	CIS RT	Foreign OW	Foreign RT
<b>Charter Flights</b>									
Kaz Air	IL-86	350	4	1400	39.5%	\$250	\$450	\$400	\$600
Kaz Air	TU-154	160	1	160	4.5%	\$250	\$450	\$400	\$600
Jana Arka	TU-154	160	6	960	27.1%	\$165	\$240	\$250	\$350
Turkestan "Kvadratur"	IL-86	350	2	700	19.8%	\$180	\$260	\$250	\$350
Azamat	TU-154	160	2	320	9.0%	\$165	\$225	\$220	\$320
<b>Total Charter</b>			15	3540	100.0%				
<b>Scheduled Flights</b>									
Turkish Airlines	A-310	200	4	800	71.4%	NA	NA	\$870	\$1,625
Kaz Air	TU-154	160	2	320	28.6%	\$250	\$450	\$400	\$600
<b>Total Scheduled</b>			6	1120	31.6%				
<b>All Carriers</b>			21	4660					
<b>% Charter Capacity</b>				76.0%					
<p>Note: Turkish offers Business Class Fares of \$1000 each way and Excursion of \$900 round trip</p> <p>Source: Kazakstan Airlines</p>									

## 7.2.2 Government Policy Overview

### (1) Bilateral Air Services Agreements

The framework for two countries to establish direct air services under the multilaterally based Chicago Convention is through the negotiation of a bilateral Air Services Agreement (ASA). Bilaterals are predicated on the exchange of a "balance of benefits". The government of Kazakhstan position has taken a liberal in establishing air services agreements. Since 1991, the government has authorized, approved, or ratified some 35 bilateral Air Services Agreements. Twelve are with CIS countries, with the balance outside the CIS. As of September 1996, services were being offered by one of the designated carrier in 23 countries.

## (2) Carrier Certification

In addition to Kaz Air and Sayahat, there were twenty or more independent licensed air carriers. However, it appears that there is no procedure or legislation in place which specifies the criteria that an air carrier must meet to be granted an operating license.

## (3) Charters

There also appears to be no ongoing regulation or monitoring of charter operations after the license has been issued and operators are not subject to any filing requirements. A number of issues have surfaced with respect to the safety and financial solvency of the "shop tourist" charter operations.

## (4) Safety

The subject of safety is discussed in detail in Chapter 8.

## (5) Air Transportation Reform

Since the national air carrier was established in October 1993, the government of Kazakhstan has issued a number of measures intended to restructure Kaz Air and strengthen the overall air transportation sector.

### 7.2.3 Conclusions

The air transportation market in Kazakhstan is highly saturated competitively relative to the Republic's population base, current economic climate and level of demand for air travel. This is particularly true in the case of international and CIS markets. While more stable domestically, new carriers are starting to emerge.

As indicated in the interim audit, the Kaz Air's market share in CIS and international routes has declined in recent years. There are number of factors contributing to this decline. On scheduled services, the number of new international air carriers and destinations have increased and more established carriers are increasing frequency and capacity. Lufthansa, Austrian Airlines and KLM all operate into large gateway hubs in central Europe, have code share agreements with global airline partners, offer business class products with an overall superior cabin service. They also operate western aircraft with greater passenger appeal. The latter not only relates to comfort and noise, but a growing perception by passengers that western aircraft are more safe. This concern is likely to increase, given the high number of air safety incidents and catastrophes involving fleet manufactured in the former USSR in recent years. The product offered by the national air carrier is not competitive in any of these areas.

Another significant factor affecting Kaz Air's position is the emergence of

independent air carriers who operate shop tourism charters. Many of the charters operate on routes with scheduled services, including those of the national air carrier. The entry of these carriers has created a high degree of market fragmentation which has been compounded by the national air carrier's response to this market segment. The net effect on the airline is an exceedingly low share of the overall scheduled and charter traffic, as well as a low share of higher yielding business traffic.

The government of Kazakhstan has taken a rather liberal posture in providing open bilateral access to all carriers expressing interest. However, there has been limited use of widely accepted commercial levers to ensure a "balance of benefits" or a "level playing field" for the national air carrier.

There appears to be no formal licensing process in place to ensure that the independent air carriers meet various tests of management fitness, financial solvency and safety. These operators are not subject to any regulation, which is reason for concern, particularly in the area of safety. Despite several serious safety incidents in the past year, no comprehensive state sponsored safety program has yet been implemented to ensure compliance.

The recent establishment of "Air Kazakhstan" as a new national air carrier is viewed as a rather positive development. The manner the new airline has been structured, along with other recent reform, eliminates a number of serious impediments. "Air Kazakhstan" is organized to operate as a separate, integrated airline entity and starts from a debt-free base.

#### **7.2.4 Review of Air Kazakhstan**

The size of national air carrier far exceeds its requirements, particularly given the depressed state of the air travel market in Kazakhstan. Although the airline has responded by reducing its level of operation, there has been no commensurate reduction in the staff levels or number of aircraft. The airline's productivity levels by industry standards are exceedingly low.

The organizational structure of the national air carrier creates a duplication of functions and includes a number of non core airline activities. Because of this structure, there is no centralized accountability or financial controls. The organization contributes to a situation where management lacks an adequate understanding of costs, revenues, productivity, or allocation of expenses by function or activity. Route profitability is not properly measured and it appears that the pricing practices of the airline are not compensatory. Another serious implication of the entity's organizational structure is a lack of control by airline management of the sale and distribution of the airline product.

The cash flow situation at the airline is extremely serious and has begun to affect the airline's ability to pay international airport fees, aircraft insurance and fuel. Day-to-day operations are being adversely impacted, as well as potentially, maintenance and safety. Because of public perception of financial insolvency and safety, traffic levels in the first six months of 1996 deteriorated further.



**Table 7.2.4 Kaz Air - Productivity and Size Comparison**

	<b>Kaz Air 1995</b>	<b>Top 100-125 "1995</b>
Sales (Million USD)	\$180.2	\$299.7
Passenger Fleet	200	23
Total Employees	21,000	2,589
Revenue Passenger - Km (million)	4,041.0	3,212.3
Average Seat - Km (Millions Passengers (millions))	7,099.3	4,545.2
Passenger Load Factor	56.9%	70.7%
Revenue per Passenger	\$98.47	\$133.20
Revenue per Employee	\$8,581	\$115,752
RPK per Employee	192,429	1,240,822
ASK per Employee	338,062	1,755,679
Passenger per Employee	87.0	1,199.5

(source: Airline Business, Top 100 Annual Survey)

The business and management skills at the national air carrier are weak and there is limited experience in operating in international markets. The latter fact may partially explain the airline's deteriorating share in international markets. A major factor, however, is that the airline has not developed a business product or its business markets. Since 1995, Kaz Air has put increasing amounts of capacity into charter services, in many cases, in markets where it also operates on a scheduled basis. This strategy along with its pricing policies, has been ineffective and caused the airline to reduce the number of its international destinations from 15 in 1995 to nine in 1996. The airlines services levels and fleet are also not competitive.

In addition to adversely affecting its marketing and financial position, the airline's response to shop tourism has created a high degree of market fragmentation. The independent and inefficient scheduling of the Almaty based airline and the subsidiary airlines also contributes to this market fragmentation, as the services on many routes are duplicated. Kaz Air's fleet is old and in need of repair. Fleet utilization, crew deployment and overall productivity are well below industry standards.

### **7.3 Recommendations for a Modernization of the National Air Carrier**

#### **7.3.1 General**

Decree 1030 took an important step in establishing what is considered an appropriate framework for a new national air carrier in Kazakhstan. Along with prior government directives, it divested a number of non core subsidiaries and separated the airports from the airline companies. Most importantly, it has created a single airline entity, which is assumed as free of debt. Now, it will be incumbent

upon the management of the airline to create an effective internal organization and strong management team with the prerequisite skills. One of the greatest challenges will be overcoming the legacy of its predecessor which was perceived as being financially insolvent and having poor safety and service.

### **7.3.2 Airline Simulation**

One of the major factors effecting Kaz Air's performance was an operation, organization, and staff levels which far exceeded the airline's requirements. An airline simulation was undertaken to establish an appropriate sizing for the new national air carrier based on prevailing economic and market conditions, and project what the airline could expect to achieve over time with suitable marketing, product and pricing strategies. A summary of the simulation results is provided in Appendix 7.3.2.

#### **(1) Proposed Route Network and Fleet Plan**

The proposed route network was developed based on an evaluation of Kaz Air's load factor by route and aircraft for during the first six months of 1996. The simulation assumed the minimum criteria for scheduled service as market demand great enough to support one weekly flight, using a 50 seat aircraft, and operating at a 65% load factor. The objective was to increase frequency an improve the overall efficiency of the schedule.

It was further assumed that smaller markets would be served by the independent regional air companies, the IL86 fleet would be disposed of as the aircraft is too large and uneconomic for market sizes in Kazakhstan, and that two B-757 aircraft should be wet-leased for operations on international scheduled routes where the competition offers business class services.

The above simulation results in a requirement of 32 passenger aircraft, including three operational spares, operating at a utilization of 8.8 hours per day at an overall load factor of 69.5%.

#### **(2) Passenger and Cargo Traffic and Revenue**

Utilizing the traffic demands derived in the simulation, revenues were developed using the yields derived in the overall air travel market forecast. Internationally, it was assumed that the airline would have a competitive business class product on international scheduled services and generate overall revenues of \$187 million USD.

#### **(3) Staff Levels**

Based on the flying hours in the simulation, it was determined that the new airline would require approximately 605 flight operations crew and 667 flight attendants to operate the schedule. Crews were assumed to fly more in line with industry

standards at 48 hours per month and deployed in flight two-thirds of the time. Using the assumption that operational crews are generally account for 26% of an airline's overall employee base, a staff of 4,900 employees is considered appropriate for the new national air carrier. (Source: Air Transport Association, 1996 Annual Report).

### **7.3.3 Management**

A major factor in the success of the new national carrier will be the strength, skills and experience of its management. A key objective of the new airline should be streamlining of management, and establishing accountability and initiative. Managers should also understand the key processes and interrelationships between departments. The new airline should also focus on hiring, training, and creating incentives for management and non management staff. Productivity levels should be brought more in line with industry standards.

### **7.3.4 Organization**

"Air Kazakhstan" should develop and implement an organization with centralized and internal control of all core airline related activities, including sales, distribution, planning and flight activities. Key functional activities should be organized in a market oriented manner more in line with industry standards.

### **7.3.5 Training**

The new national air carrier should strongly consider formal airline training for all senior managers. Recommended areas of training include basic business management and airline management, with the latter covering areas such as strategic business planning, airline economics, marketing, marketing strategy, pricing, product and route strategy, financial strategies, route profitability, aircraft scheduling, and fleet strategy.

### **7.3.6 Financial**

As a business entity, "Air Kazakhstan" must develop integrated financial management and exercise strong management control of its financial situation. Specific emphasis should be placed on cash management and budgeting controls. The airline must also develop or acquire both an expense and revenue accounting system.

### **7.3.7 Customer Service**

Customer service is a major component of an airline's product and service offer. "Air Kazakhstan" should undertake an extensive training program with all staff engaged in providing service to the customer. The training should emphasize a customer service ethic, accountability and initiative, and English language skills.

The new national air carrier should also hire and train English speaking cabin crews for its international scheduled services. The airline must also evaluate its product and in-flight service standards in relation to the competition and make comparable assessments of the suitability of services provided at the airport and city sales offices. The airline should develop a business class product for competitive international routes.

### **7.3.8 Sales and Distribution**

#### **(1) Sales**

“Air Kazakhstan” should internally control its sales function. Seats should be allocated in accordance with a yield management system. The airline should regularly distribute schedule and fare information to the travel trade. A dedicated and appropriately trained sales staff should be assigned to selling the airline product.

#### **(2) Distribution**

The new airline should establish an internal reservations center and ensure there are properly maintained reservations sets at city sales offices, airport check-in and gate locations. Reservations sets should be installed at the airline headquarters and available to appropriate management. The airline should also provide more listings of services beyond its international gateways.

#### **(3) Computer Reservations Systems**

“Air Kazakhstan” should fully understand the functionality, costs, and effectiveness of the Sirena/Gabriel system in distributing its product and evaluate participation in a global distribution system.

### **7.3.9 Marketing and Sales**

#### **(1) Market Segmentation**

The new national air carrier must define its various market segments and develop specific products designed to meet the needs of these market groups. The airline must also understand the overall “quality” of its traffic and the content of high and low yield traffic in each market. In charter markets with little business traffic, the airline should determine whether it can profitably operate at charter competitive rates, but presumably at considerably higher load factors targeted in the range of 80% to 90 %, or higher. In those markets with a business traffic content, the new national air carrier should focus on developing a higher frequency schedule, with a business class product and elevated levels of service. The airline should also offer a portion of its seats priced to meet charter competition, enabling it to fill seats on scheduled services which would otherwise be empty.

#### **(2) Route Profitability**

"Air Kazakhstan" must understand profitability of its potential route structure on a fully allocated basis. The airline should develop a plan to restore losing routes back to profitability. To support this understanding, the airline should adopt a system of reporting and measuring route profitability on a regular basis.

### (3) Scheduling

"Air Kazakhstan" should rationalize its route network, and schedule operations in a more efficient and cost effective manner. Flight schedules should be centrally developed, eliminating much of the duplicate, "point-to-point" flying prevalent at Kaz Air. A key goal should be a higher frequency, higher load factor product

### (4) Pricing

As indicated above, Air Kazakhstan should have a true understanding of the costs and profitability of all routes operated and develop fare levels which reflect these costs realities. The airline should utilize more conventional market segmentation to develop the air travel market and price levels. The airline should include price offers at both the high and low end of the market. The airline should also develop Business Class fares for competitive CIS and international markets, experiment with discount pricing as a means of stimulating air travel demand, offer a limited allocation of charter competitive fares on scheduled flights in markets with both scheduled and charter competition, and overtime eliminate the differentiation of fares between CIS nationals and foreigners. These recommendations are based on the assumption that "Air Kazakhstan" will acquire a yield management system to manage the seat inventories of various fare classes.

### (5) Cargo

Cargo represents an incremental and untapped source of revenue for the new national air carrier. The management for the new airline should analyze the potential for this market segment.

#### 7.3.10 Fleet

At the outset, "Air Kazakhstan" must fully understand the economics associated with bringing unserviceable aircraft back into service and determine the implications for the balance of the fleet in the current flying cycle. Given public concerns related to safety, as well as the worn condition of the fleet, the airline should refurbish aircraft exteriors and interiors. A priority should be placed on acquiring western manufactured fleet of suitable gauge for higher yielding international routes, where its competitors operate western aircraft and offer business class services. Wet leasing is recommended because it would permit "Air Kazakhstan" to commence competitive international operations in a relatively short time frame, without time consuming and expensive training of flight operations and maintenance crews.

### **7.3.11 Maintenance**

The new national air carrier should carry out a review of its overall maintenance needs, including heavy maintenance requirements and engine overhauls. In addition, the airline should determine those locations where its maintenance needs can be best met. Given the fleet size, an ideal situation would be the consolidation of all maintenance work at one center. This may be impractical, however, given the large market distances and less than daily frequency between most points. A potential scenario is two or three maintenance centers where the operation is largest such as Almaty, Atyrau and Karaganda, for example.

### **7.3.12 Others**

#### **(1) Commercial Relationships**

After its has completed an upgrade to its fleet, service and image, the new national air carrier should consider entering into strategic commercial agreements to expand its market base.

#### **(2) Systems**

The new national air carrier must invest in management systems which will provide it with the capability of understanding and controlling key airline and business management processes. At a minimum, the airline should acquire and implement a management accounting, revenue accounting, route profitability and yield management system. Other considerations include evaluative tools to assist management and investing in computer and office equipment.

#### **(3) Labor Relations**

If the new national air carrier is to survive as a viable entity, it must exist as a much smaller version of its predecessor airline. The proposed simulation established a target employee base of 4,900. This means the new airline's staff may be 50% or less than those working in airline related activities at Kaz Air. "Air Kazakhstan" and the government will have to proactively address this sensitive issue, including what financial and policy measures may be required to accommodate displaced staff.

#### **(4) Public Image**

The new national air carrier will carry for some time the poor public image and perceptions of its predecessor. Organizational and structural changes will have little affect with the public, particularly outside of Kazakhstan and the CIS. The senior executives of the new national air carrier should launch a new corporate identity and publicity campaign designed to restore the image of the "national carrier". The corporate identity program should include new livery, logo and employee uniforms, which will distinguish the new national air carrier as a different entity.

## **(5) Outsourcing**

Airlines with low critical mass and flight activity often outsource to third parties as a means of reducing costs and improving productivity levels. Areas where airlines typically outsource include airport passenger handling at the check-in and gate areas, airport security, aircraft handling, baggage and cargo loading, fueling, cabin grooming, and commissary. "Air Kazakhstan" should review such options.

## **7.4 Some Potential Areas of Government Policy Development**

Even within the framework of an open market regime, there are areas where policy and regulation play a key role. Intervention can be beneficial in correcting structural imbalances, stimulating competition and economic development, stabilizing industry or sector conditions, protecting national interests and protecting public interests. Policy development in the following areas could strengthen both the air transportation market and the national air carrier:

### **(1) Bilateral Air Services Agreements**

In future bilaterals, the government should develop and pursue a range of mechanisms that would permit the national air carrier to develop international services over time as it makes a transition to a market based economy. The "Open Skies" agreement ratified between Canada and the United States in February of 1995 placed a three year moratorium on US carriers services at the three largest airports in Toronto, Montreal and Vancouver. This addressed Canadian concerns that there was a traffic imbalance in favor of US airlines. Canada believed its carriers needed some time to adjust to more open market conditions before competing head on with larger, dominant US carriers at major hubs feeding into vast route networks.

While the best time to gain concessions is during actual bilateral negotiation, bilaterals are reopened, and even abrogated, when one party is dissatisfied. Because of the deteriorating financial position of its air carrier, the Philippine's recently reopened discussions with the US and achieved a seven year deferral on the introduction of Open Skies, access to five more gateway and 24 more interior points in the US for its carriers, and a specification of number of frequencies which can be phased in during the next seven years.

Other balancing mechanisms could include limiting capacity and traffic, single track designation for a specified period of time, limiting third country rights, mandatory commercial arrangements and implementing royalty and block seat arrangements, in instances where the national air carrier is not currently operating.

(2) Debt Repayment of the National Air Carrier

As of mid 1996, Kaz Air had various international debts of \$11.3 M USD owed to international airports, insurers and various foreign countries. The government must develop a plan to repay these obligations to external agencies. If these obligations are not fully resolved, it is unlikely that authorities will permit "Air Kazakhstan" to operate or that insurers will insure the new air carrier's fleet.

(3) Carrier Certification

To ensure the future viability of the air transportation industry and to protect both public and national interests, the government of Kazakhstan should develop and regulate the financial and management fitness, and safety compliance of its air carriers. Considerations include demonstration of prior airline management experience, sufficient working capital on hand during the start up period, adequate liability insurance, safety compliance and a feasible operating plan.

(4) Charter Policy

Charter air carriers should be subjected to the above carrier certification process. Further stabilizing measures could include requiring charter operators to file charter programs with authorities, limiting the overall level of charter operations and including clauses in bilaterals which specify the terms and conditions under which charters can be operated. Some countries have required charter operators to file and economically justify the wholesale charter tariff as a means of restraining predatory pricing and charter organizers have also been required to place funds in an escrow or trust account as a means of ensuring payment.

(5) Essential Services and Regional Air Policy

When the US airline industry was deregulated in 1978 underwent, this process was carried out over a period of five years. To address concerns about the potential loss of air services to small communities, the Department of Transportation established the Essential Air Service program as a means of ensuring the continuation of air services on lightly traveled routes which otherwise could not be profitably served. The program provided subsidies to air carriers willing to provide air services. Bid were solicited from the air carriers and the DOT determined the level of subsidy based on a case by case review.

(6) Safety

While the subject of safety is covered in detail in Chapter 8, regulation and compliance of safety matter in accordance with industry accepted practices is considered of vital importance, given the high number of serious safety incidents.



**(7) Social Services**

Kaz Air currently has some 1800 individuals engaged in providing various social services which are not core to the airline operation. While the implications of providing these services are unnecessary staff levels and expense, it may be necessary to retain these benefits due to social, policy and economic reasons. Should this be the case, the new national air carrier and the government should mutually discuss who and how these services should be carried out, including the possibility of state takeover or subsidy of costs.

**(8) Goods and Services at Just and Reasonable Prices**

There are a wide variety of goods and services which air carriers must purchase to operate the airline. These may be supplied by third parties or designated authorities and include handling services, landing fees, navigation fees, fuel, airport security, customs and immigration services. The appropriate government agency should monitor the price and availability of these services, particularly in monopoly cases, to ensure the prices charged to all air carriers are just and reasonable.

**(9) Privatization**

Privatization should be viewed as a long term goal because it would not only permit the national air carrier to access equity, but would also give management a higher degree of control and management of its assets and resources. The timing of this initiative, however, is highly important and should only be considered if, and when, the national air carrier becomes a self sustaining entity.

## **CHAPTER 8**

# **NATIONAL AIR TRANSPORT REGULATORY REGIME DEVELOPMENT**

## **CHAPTER 8      NATIONAL AIR TRANSPORTATION REGULATORY REGIME DEVELOPMENT**

### **8.1    Current Situation**

The National Air Transport Regulatory Regime of Kazakhstan is virtually ineffective in terms of both safety and economic regulation. A viable air transport sub-sector cannot be developed for Kazakhstan until an effective regime is in place. Its establishment, therefore, is a matter of some urgency.

### **8.2    Institutional Background**

The 12 newly created CIS republics concluded the "Agreement on Civil Aviation and Airspace Utilization" on 30 December, 1991. It covers a wide range of activities, including regulation. A "Council on Aviation and Airspace Utilization" (CAAU) was established. The Interstate Aviation Committee (known as the MAK committee) was established to implement the Agreement but its functioning with respect to Kazakhstan has been limited to certain safety regulatory activities.

The Civil Aviation Department (CAD) of the Ministry of Transport and Communications (MOTC) was formed in January, 1994 with its primary responsibilities being Regulation and Policy Advice to the government. As a new organization with few staff, it experienced considerable difficulties in fulfilling its mandate. Its authorized staff strength has been increased to 40 persons but, as of mid-October 1996, the actual staff strength was only 28 persons. The staffing program has been hampered by the low salaries levels.

Presidential Decree 2687 of 20 December, 1995 provided Kazakhstan with its National Civil Aviation Law (NCAL).

### **8.3    Condition of the Regulatory Regime as of October 1996**

#### **(1) General**

A modest start has been made on developing a body of regulations and standards pursuant to the NCAL.

There is no civil aircraft register for Kazakhstan and no register of licensed aviation personnel.

## **(2) Safety Regulation**

Any certification of air carriers, airports and airworthiness is done by the MAK Committee, with most of the expertise coming from Russia.

A Personnel Licensing Commission was formed in mid-1996. It directly licenses newly trained flight crew; special flight crew such as those on VIP flights; and air traffic controllers. It has delegated all flight crew type conversion licensing and maintenance engineer licensing to Kazakhstan Airlines.

There is very large aviation medicine organization comprising a main center at Almaty with an estimated staff strength of 300 to 500 persons and a unit at each airport with about 15 persons. The scope and frequency of medical examinations is high compared with most other countries.

There is no program of regular compliance inspections and monitoring. This situation has contributed to a number of serious incidents of non-compliance.

## **(3) Economic Regulation**

There has been no regulation of domestic air transportation operations in terms of market entry, market exit, routes or frequencies.

There were 20 carriers licensed for commercial operations in Kazakhstan but there appears to be no clear policy or procedural framework for issuing such licenses, or for ensuring compliance with the provisions of the licenses.

Thirty three international air service agreements had been concluded or are being negotiated between Kazakhstan and other states.

There are no specific provisions in the NCAL which limit the foreign ownership of airports or of air carriers licensed in Kazakhstan.

## **(4) Main problem areas**

The CAD lacks the necessary resources in terms of: qualified staff; working procedures and other guidance material; suitably equipped office space; and a comprehensive data base of personnel, equipment, facilities, institutions and enterprises.

The situation has been made worse by the limited effectiveness of the MAK

Committee which has also been hampered by resource problems.

#### **8.4 Strategy for Developing the Air Transportation Regulatory Regime**

The strategy should incorporate a number of key elements based on the regulatory policies and practices of states which are the most advanced in this field.

##### **(1) Key Elements of a General Regulatory Strategy**

- Compatibility with other transportation modes.
- Consultation with other sub-sector interest groups.
- Application of cost benefit criteria when developing new regulations.
- Adoption of non-legal approaches for achieving regulatory objectives.
- Funding regulatory activities from licensing and certification fees.
- Surveying and selectively adopting regulatory methods from other states.

##### **(2) Key Elements of a Safety Regulatory Strategy**

- Harmonization and workload sharing with other CIS members.
- The use of risk analysis to focus monitoring and enforcement activities.
- Delegation of regulatory functions to industry and other interest groups.
- A review of ICAO's SARP's and filing any differences with ICAO.
- Establishment of an independent entity for aircraft accident investigation.
- Use of available technology to manage information on air safety incidents.

##### **(3) Key Elements of an Economic Regulatory Strategy**

- Regulation of domestic air carrier operations based only on tests of commercial viability.
- Non-discriminatory pricing of all aeronautical charges.
- Setting all aeronautical charges to cover relevant costs only.
- Any cross subsidization of public policy obligations to be phased out and replaced by direct governmental subsidies.
- Any airport regulation limited to Air Side activities only.

One of the best examples of a cost-effective air transportation regulatory regime is that operated by the Civil Aviation Authority for the United Kingdom. It is also the only one in Europe which is fully financed from fees received for regulatory services rather than from general taxation revenues.

## **8.5 Recommendations**

The Government of the Republic of Kazakhstan should give the highest priority to establishing a viable Air Transportation Regulatory Regime. A proposal has been prepared by the JICA Study Team to establish such a regime within a 2 year period. It has been prepared in the form of a technical cooperation project funded through an international official development assistance program.









