4.4 Facility Requirement Establishment

Based on the air traffic demand forecasted in the Chapter 4.2, the planning requirements of each airport facility are determined in accordance with the procedure shown in **Fig. 4.4 1**. Summary of the facility requirements by airport and phase of development is given in **Tables 4.4.18**.

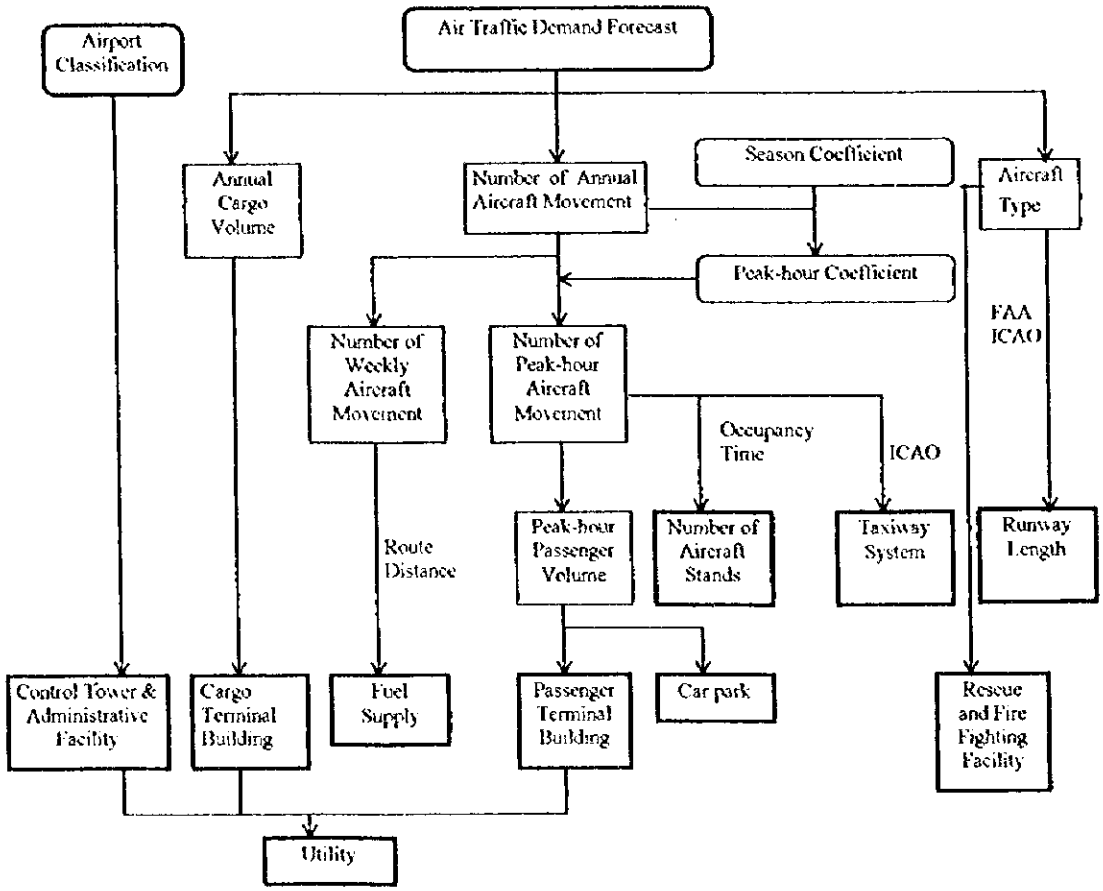


Fig. 4.4.1 Procedures of Facility Requirement Establishment

Table 4.4.18 Summary of Facility Requirements

Item			Tashkent			Namangan			Andizhan			Fergana			Kokand			Samarkand		
			1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020	1995	2005	2020
Demand	Annual Passenger ('000) one way	International	-	734	1,416	0	16	33	-	17	35	-	73	192	-	0	0	-	102	233
		CIS&Baltic	-	809	1,654	35.8	85	182	-	100	214	-	117	241	-	0	0	-	119	258
		Domestic	-	927	1,411	44.8	288	489	-	508	837	-	458	783	-	17	54	-	267	460
		Total	1,749	2,470	4,475	80.6	389	704	117.4	635	1,086	101.6	648	1,216	47.4	17	51	91.2	388	951
	Annual Cargo (ton)	International	-	20,771	37,210	-	1,189	2,569	-	528	1,142	-	4,512	12,039	-	-	-	-	3,777	9,641
		CIS&Baltic	-	7,830	17,807	-	587	1,344	-	1,166	2,675	-	1,880	4,299	-	-	-	-	819	1,911
		Domestic	-	1,753	4,669	-	544	1,617	-	961	2,771	-	867	2,590	-	32	180	-	505	1,521
		Total	14,470	30,354	59,686	866	2,320	5,530	92	2,655	6,588	3,715	7,259	18,928	15	32	180	287	5,101	13,073
	Annual	International Pax	-	4.9	9.5	-	0.1	0.2	-	0.1	0.2	-	0.5	1.3	-	-	-	-	0.7	1.6
		CIS&Baltic Pax	-	7.3	13.4	-	0.7	1.6	-	0.8	2.0	-	1.2	2.2	-	-	-	-	1.0	2.4
		Domestic Pax	-	17.4	19.2	-	8.2	10.8	-	11.4	12.0	-	10.4	11.2	-	0.5	1.6		6.6	8.6
		Pax Total	-	29.5	42.1	-	9.1	12.6	-	12.4	14.2	-	12.1	14.7	-	0.5	1.6	-	8.3	12.6
		Cargo Freighter	-	1.2	2.3	-	0.07	0.17	-	0.07	0.15	-	0.34	0.88	-	-	-	-	0.21	0.55
		Total	34.8	30.7	44.4	2.6	9.1	12.8	3.2	12.4	14.3		12.4	15.6	-	0.5	1.6	2.4	8.5	13.1
	Peak Hour Aircraft Movement		-	15	18	-	6	8		8	9		8	9	-	2	2	-	7	8
	Peak Hour Passenger	Int'l	-	280	770	-	280	280	-	280	280	-	280	280	-				280	280
		CIS	-	420	1050	-	280	280	-	280	280	-	280	280	-			-	280	280
		Domestic	-	630	700	-	140	280	-	280	560	-	280	560	-	70	70	-	210	210
Facility	Runway	length	4000	4000	4400	3270	3300	3300	2900	3000	3000	2860	3300	3300	1600	1600	2200	3100	3100	3100
							(New Runway)		(Extension or new runway)											
		width	60	60	60	50	50	50	45	45	45	50	50	50	40	40	40	49	49	49
		Aircraft	IL86	IL86	B747-400	-	B767	B767	-	B767	B767	-	B767	B767	1720.0	AN24	IL114	TU154	B767	B767
	Runway Strip	length	4120	4120	4520	3390	3420	3420	3020	3120	3120	2980	3420	3420	1720	1720	2320	3220	3220	3220
		width	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	Taxiway	System	Partial Parallel	Full Parallel	Full Parallel	partial Parallel	partial Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Full Parallel	Partial Parallel	Partial Parallel	Partial Parallel	Full Parallel
		Max width	21-22.5	23	23	20	23	23	20-26	23	23	18-24	23	23	14-16	18	18	18-21	23	23
	Apron	Large-Jet	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Medium-Jet	35	14	20	5	3	3	2	3	4	6	3	4	0	0	0	4	3	3
		Small-Jet	26	4	4	2	0	1	3	1	2	3	1	2	0	0	0	18	1	2
		Mini-Plane	0	6	5	0	3	3	0	4	2	0	3	2	3	2	2	0	3	2
		Total	62	24	35	7	6	7	5	8	8	9	7	8	3	2	2	22	7	7
		Freighter	-	2	4	-		1	-		1	-	1	2	-			-	1	1
	Passenger Terminal Bldg. ('000sqm)	Int'l	39.5	4.2	11.6	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2	-	0.0	0.0	-	4.2	4.2
		CIS		6.3	15.8	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2	-	0.0	0.0	-	4.2	4.2
		Domestic	2.9	7.6	8.4	-	1.7	3.4	-	3.4	6.7	-	3.4	6.7	-	0.8	0.8	-	2.5	2.5
		Total	42.4	18.1	35.8	4.2	10.1	11.8	-	11.8	15.1	-	11.8	15.1	0.32	0.8	0.8	5.3	10.9	10.9
	Cargo Terminal Bldg. ('000sqm)	Int'l	-	4.0	6.4	-	1.3	1.6	-	1.1	1.3	-	1.8	2.5	-			-	1.8	2.1
		CIS	-	2.1	3.5	-	1.2	1.4	-	1.3	1.6	-	1.5	1.8	-			-	1.2	1.5
		Dom.	-	0.6	0.7	-	0.5	0.6	-	0.5	0.6	-	0.5	0.6	-	0.03	0.2	-	0.4	0.6
		Total	4.3	6.6	10.6	0.1	2.9	3.5	-	2.9	3.5	-	3.7	4.9	0.06	0.03	0.2	0.5	3.4	4.2
	Control Tower/Operations(sqm)		-	---	---	-	2800	2800	-	1400	1400	-	2800	2800	941	1400	1400	1.6	---	---
	Aircraft Fu. Tank Capacity(kl)		-	4050	8270	-	280	540	-	340	780	-	610	1410	-	5	14	-	660	1340
	Supply	Area ('000sqm)	-	14.3	19.5	-	3.15	3.85	-	4	4.8	-	4.8	6	0.24	1.4	1.4	-	4.8	6
	Rescue and	Category	-	8	8	-	6	6	-	6	6	-	6	6	-	5	5	-	6	6
	Fire Fightin Facility (sqm)		630	700	900	-	600	600	-	600	600	-	600	600	324	500	500	610	---	---
	Car parking Lots		-	1060	2020	80	550	660	-	660	890	-	660	890	50	60	60	50	610	610
		Area('000sqm)	-	37.1	70.7	1.1	19.3	23.1	-	23.1	31.2	-	23.1	31.2	0.524	2.1	2.1	-	21.4	21.4
	Utilities	Power (KVA)	-	4550	7210	-	1410	1610	-	1570	1940	-	1770	2189	400	310	310	640	1660	1710
		Water (ton/day)	-	730	1230	-	270	310	-	310	390	-	330	410	198	60	60	1600	310	310
		Sewage (ton/day)	-	730	1230	-	270	310	-	310	390	-	330	410	-	60	60	-	310	310
		Waste (ton/day)	-	2060	3560	-	810	940	-	930	1180	-	900	1230	-	140	140	-	930	930
	Airfield Lighting		[illegible]	[illegible]	[illegible]	ALS,RWL,T WL,ALI	PALS, PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	-	SALS, PAPI, RWL,TWL, ALI	SALS,PAPI, RWL,TWL, ALI	-	PALS,PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	None	None	SALS,PAPI, RWL,TWL, ALI	ALS,SALS,R WL,TWL, ALI	PALS,PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI
	Radio Navaids and Telecommunications		CAT II ILS,VOR/DME,PAR,SSR [illegible]	CAT II ILS,VOR/DME,PAR,NDB [illegible]	CAT II ILS,VOR/DME,NDB [illegible] FANS	ILS,PAR,NDB x2	CAT I ILS,PAR,NDB,VOR/DME	CAT I ILS,PAR,NDB,VOR/DME,FANS	-	NDB, VOR/DME	NDB, VOR/DME, FANS	-	CAT I ILS,NDB, VOR/DME	CAT I ILS,NDB, VOR/DME, FANS	[illegible]	NDB	NDB, VOR/DME, FANS	ILS,NDBx2	CAT I ILS,NDB	CAT I ILS,NDB, FANS

Item			Termez			Narshi			Bukhara			Navoi			Urgench			Nukus		
			1995	2005	2020	1995	2005	2020	1995	2005	2020	1996	2005	2020	1995	2005	2020	1995	2005	2020
Demand	Annual Passenger ('000) one way	International	-	0	22	-	14	30	-	69	140	-	0	19	-	21	56	-	0	24
		CIS&Baltic	-	55	115	-	81	174	-	91	205	-	72	149	-	50	107	-	83	178
		Domestic	-	268	491	-	179	304	-	238	383	-	55	121	-	387	703	-	212	370
		Total	171.8	323	628	67.4	274	508	88.2	398	728	22.2	127	289	137.0	458	866	100.0	295	572
	Annual Cargo (ton)	International	-	-	499	-	583	1,260	-	3,925	7,678	-	-	1,374	-	488	3,430	-	-	457
		CIS&Baltic	-	510	1,166	-	1,286	2,952	-	945	2,216	-	1,404	3,212	-	609	1,398	-	467	1,071
		Domestic	-	506	1,625	-	339	1,005	-	450	1,266	-	103	399	-	731	2,326	-	401	1,224
		Total	146	1,016	3,290	37.8	2,208	5,217	224	5,320	11,160	-	1,507	4,985	133.6*2	1,828	7,154	70	868	2,752
	Annual	International Pax	-	-	0.1	-	0.1	0.2	-	0.4	0.9	-	-	0.1	-	0.1	0.3	-	-	0.2
		CIS&Baltic Pax	-	0.5	1.0	-	0.7	1.6	-	0.8	2.0	-	0.6	1.4	-	0.5	0.9	-	0.7	1.6
		Domestic Pax	-	5.8	7.2	-	5.2	6.2	-	6.0	5.6	-	1.6	3.5	-	6.6	9.5	-	5.2	6.7
		Pax Total	-	6.3	8.3	-	6.0	8.0	0.7	7.3	8.5	-	2.2	5.0	-	7.2	10.7	-	5.9	8.4
		Cargo Freighter	-	0.01	0.06	-	0.08	0.20	-	0.25	0.53	-	0.07	0.24	-	0.01	0.25	-	0.00	0.02
		Total	2.5	6.3	8.4	2.5	6.1	8.2	1.4	7.5	9.1	-	2.3	5.2	4.0	7.2	11.0	5.4	5.9	8.5
	Peak Hour Aircraft Movement		-	5	6	-	5	6	-	7	7	-	3	5	-	5	8	-	5	6
	Peak Hour Passenger	Int'l	-		280	-		280	-	280	280	-		280	-	280	280	-		280
		CIS	-	280	280	-	280	280	-	280	280	-	280	280	-	280	280	-	280	280
		Domestic	-	210	420	-	140	210	-	210	420	-	70	70	-	420	490	-	210	420
Facility	Runway	length	3000	3000	3000	2900	2900	3000	3000	3100	3100	1410	2600	3100	3000	3000	3000	3000	3000	3000
		width	42	45	45	42	45	45	45	45	45	45	45	45	44	45	45	48	48	48
		Aircraft		TU154	B767		TU154	B767		B757	B767		A310	B767		B767	B767		B767	B767
	Runway Strip	length	3120	3120	3120	3020	3020	3120	3120	3220	3220	1530	2720	3220	3120	3120	3120	3120	3120	3120
		width	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
	Taxiway	System	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel	None	Partial Parallel	Partial Parallel	None	Partial Parallel	Partial Parallel	Partial Parallel	Partial Parallel	Full Parallel	Partial Parallel	Partial Parallel	Partial Parallel
		Max width	20	23	23	21-22	23	23	18-30	23	23	14	23	23	21	23	23	22-36	23	23
	Apron	Large-Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Medium-Jet	2	2	4	3	2	3	4	3	4	0	2	3	3	4	5	3	2	4
		Small-Jet	5	1	1	8	0	1	5	1	1	4	0	0	2	1	1	5	1	1
		Mini-Plane	0	1	2	0	2	3	0	2	2	0	1	3	0	1	2	0	1	2
		Total	7	4	7	11	4	7	9	6	7	4	3	6	5	6	8	8	4	7
		Freighter	-			-	1	1	-		1	-		1	-		1	-		
	Passenger Terminal Bldg. ('000sqm)	Int'l	-	0.0	4.2	-	0.0	4.2	-	4.2	4.2	-	0.0	4.2	-	4.2	4.2	-	0.0	4.2
		CIS	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2	-	4.2	4.2
		Domestic	-	2.5	5.0	-	1.7	2.5	-	2.5	5.0	-	0.8	0.8	-	5.0	5.9	-	2.5	5.0
		Total	2.2	6.7	13.4	2.4	5.9	10.9	1.1	10.9	13.4	-	5	9.2	3.4	13.4	11.3	2.2	6.7	13.4
	Cargo Terminal Bldg. ('000sqm)	Int'l	-		1.0	-		1.4	-	1.8	2.0	-		1.4	-	1.0	1.7	-		0.9
		CIS	-	1.0	1.3	-	1.3	1.6	-	1.2	1.6	-	1.4	1.7	-	1.2	1.4	-	0.9	1.3
		Dom.	-	0.4	0.6	-	0.3	0.5	-	0.4	0.5	-	0.1	0.3	-	0.5	0.6	-	0.3	0.5
		Total	-	1.4	2.9	-	1.6	3.5	0.25	3.3	4.1	-	1.5	3.4	0.3	2.7	3.2	0.6	1.3	2.8
	Control Tower/Operations(sqm)		-	2800	2800	-	1400	1400	-	---	---	-	1400	1400	570	---	---		2800	2800
	Aircraft Fu. Tank Capacity(kl)		-	200	450	-	210	520	-	170	1040	-	160	410	-	320	780	-	220	520
	Supply	Area ('000sqm)	1.5	3.15	3.85	-	3.15	3.85	-	4	4.8	-	2.8	3.85	-	4	4.8	-	3.15	3.85
	Rescue and	Category		6	6	-	6	6	-	6	6	-	6	6	-	6	6	-	6	6
	Fire Fightin Facility (sqm)		576	600	600	-	600	600	1070	600	600	-	600	600	410	---	---	445	---	---
	Car parking Lots		80	390	780	-	330	610	20	610	780	-	280	500	80	780	830	-	390	780
		Area('000sqm)	1.2	13.7	27.3	-	11.6	21.4	-	21.4	27.3	-	9.8	17.5	-	27.3	29.1	2	13.7	27.3
	Utilities	Power (KVA)	-	1130	1880	-	900	1520	1260	1660	1960	-	810	1340	800	1870	2020	-	970	1730
		Water (ton/day)	29	210	370	-	180	290	-	310	370	-	160	250	-	370	390	-	190	350
		Sewage (ton/day)	-	210	370	-	180	290	-	310	370	-	160	250	-	370	390	-	190	350
		Waste (ton/day)	-	610	1100	-	500	880	-	930	1110	-	440	760	-	1100	1170	-	560	1050
	Airfield Lighting		ALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	ALS,RWL,T WL,ALI	ALS,RWL,T WL,ALI	SALS, PAPI,RWL,T WL,ALI	ALS,SALS,R WL,TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	None	SALS, PAPI,RWL,T WL,ALI	SALS, PAPI,RWL,T WL,ALI	ALS,SALS,R WL,TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI	ALS,SALS,R WL,TWL	PALS, PAPI, SALS,RWL, TWL,ALI	PALS,PAPI, SALS,RWL, TWL,ALI
	Radio Navaids and Telecommunications		ILS,NDBx2, VOR/DME	CAT I ILS,NDBx2, VOR/DME	CAT I ILS,NDBx2, VOR/DME, FANS	ILS,NDBx2	ILS,NDB	NDB, VOR/DME, FANS	ILS,NDBx2	CAT I ILS,NDB, VOR/DME	CAT I ILS,NDB, VOR/DME, FANS	NDBx2	NDB, VOR/DME	NDB, VOR/DME, FANS	ILS,VOR/D ME,NDBx2	CAT I ILS,NDB, VOR/DME	CAT I ILS,NDB, VOR/DME, FANS	ILS,NDBx2	CAT I ILS,NDB, VOR/DME	CAT I ILS,NDB, VOR/DME, FANS

4.5 Master Plan for Long-Term Development of Priority Airports

4.5.1 General

Master planning of the priority airports will be made in the following sequence:

(1) Phasing of Development Plan

The target year of the master plan for each airport is 2020, and its development is planned to be implemented by the following 4 stages:

- **First Stage** **Present - 2005**
- **Second Stage** **2006 - 2010**
- **Third Stage** **2011 - 2015**
- **Fourth Stage** **2016 - 2020**

(2) Priority Airports

The purpose of the Study is to prepare master plans of Class I and II airports for long-term development, and to select high priority projects for the subsequent Pre-Feasibility Study for short-term development.

Furthermore, recommendations on the modernization plan for long-term development of air transport system in Uzbekistan is another object of the Study. This is why master plan for Class III airports is also prepared in the Study.

(3) Coordination with Suspended Projects

There are several projects that were planned before and after the independence of Uzbekistan, and suspended thereafter.

These previous projects shall be incorporated into the master plan taking into account the facility requirements of the respective airports.

As to the modernization project for the three local airports, namely, Samarkand, Bukhara and Urgench, now progressing up to the development target year of 2005, the plans for these airports are to be included in the master plans, but their costs shall not be included in the cost estimate.

4.5.2 Development of Metropolitan Airport

(1) Facility Requirements of Metropolitan Airport

Runway extensions and domestic passenger terminal building will be required, in order to serve the large western-made aircraft such as the B-747, and to meet the air traffic demand of 2010, providing that the existing Tashkent airport will continue to operate after 2010.

However, continuous operation up to the year 2020 of the existing airport is expected to lead the following problems:

a) Impact of Aircraft Noise

The present approach and departure courses are crossing over the southern part of Tashkent city, therefore, the impact of aircraft noise will expand to a larger area of the

city in the future.

b) Interference of Development of Tashkent City

According to the long-term Tashkent city development plan up to 2015, the urban area is planned to expand largely to the east and south of the city. Consequently, the existing Tashkent airport will be surrounded by an urbanized area so that the existence of the airport is expected to hamper the regular development of the city.

c) Geographical Difficulty in Expansion of Tashkent Airport

On the east side of the runway, there is a river and the residential area extends to the banks of this river. The west side of the runway is also surrounded by a river and a residential area. Consequently, it is extremely difficult to extend the runway in both directions to meet the requirements for the operation of large aircraft such as B-747, from the economical and social aspects.

(2) Development Plan of Metropolitan Airport

Judging from the above circumstances, in the long-term development plan of airports for the Capital, construction of a new metropolitan airport is considered as an alternative solution.

Therefore, a long-term development plan for the metropolitan airport is studied in the following two cases:

Case 1: Development Plan of the Existing Airport

Case 2: Construction of New Airport

- **Existing Tashkent Airport Development Plan (Case-1)**

At a maximum degree, the existing airport facilities will be used with necessary rehabilitation and improvements, except runway extension. Maximum design aircraft is to be B767. Development of the existing airport is planned as shown in **Table 4.5.8**, and the general plan for 2020 is shown in **Fig. 4.5.3**.

Table 4.5.8 Development Plan of Existing Tashkent Airport

Item			Existing	1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Demand	Passenger ('000)		1,750	2,500	3,100	3,800	4,700
	Max. Aircraft		IL86(medium-Jet)	IL86/B767(Medium Jet)			
Development	Airfield	Runway Taxiway	4000m Partial	○ Full Parallel			
		Pavement		○ TWY Improvement ○ Apron Improvement		○ RWY/TWY/APR overlay	
	Terminal	Pax. Bldg.		○ Rehabilitation (International passenger building)		○ Rehabilitation (Dom. Int.)	
				○ Expansion (Domestic passenger building)			
	Air-Nav			○ VOR/DME, ASDE		○ Renewal	
				○ Weather Radar			FANS ○
Remark							

- **New Tashkent Airport Development Plan (Case-2)**

As shown in **Fig. 4.5.4**, the location of the possible site, selected by NAC, for construction of the new airport is an area situated 40 km southwest of Tashkent city, near Almazar village in Chinaz, and between the state road M-39 and railway lines.

Development of the new airport is planned to be implemented in 2 phases. The First Phase will be to develop an airport serving international and CIS flights, and the Second Phase will include the facilities for domestic flights, as shown in **Table 4.5.10**. The general development plan for the year 2020 is shown in **Fig. 4.5.5**.

Fig.4.5.4 Location of New Tashkent Airport Site

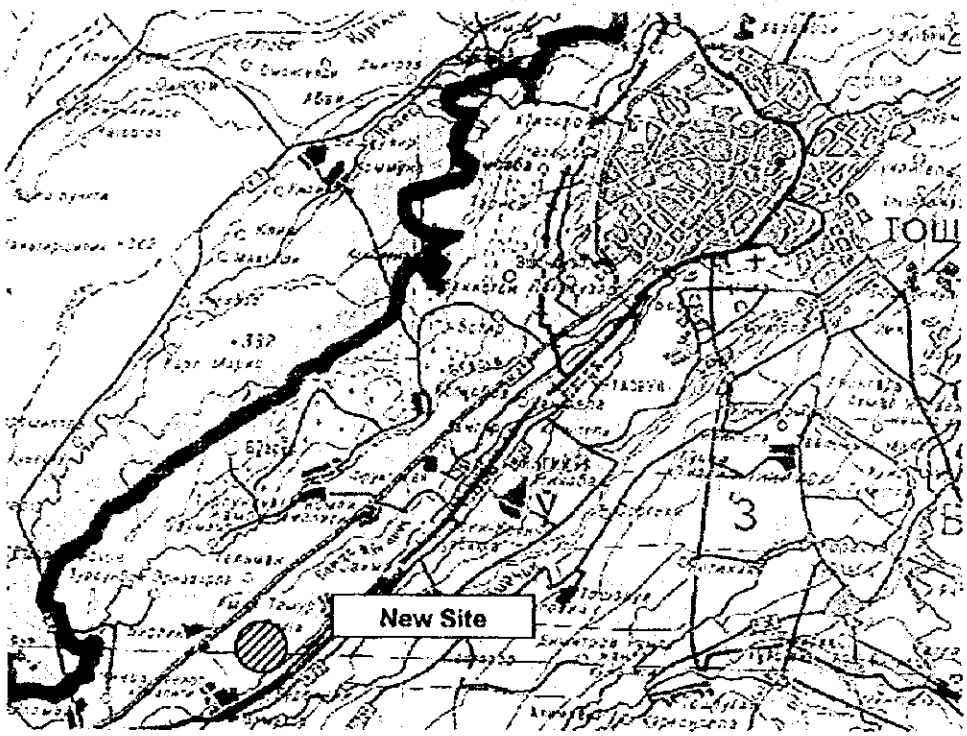
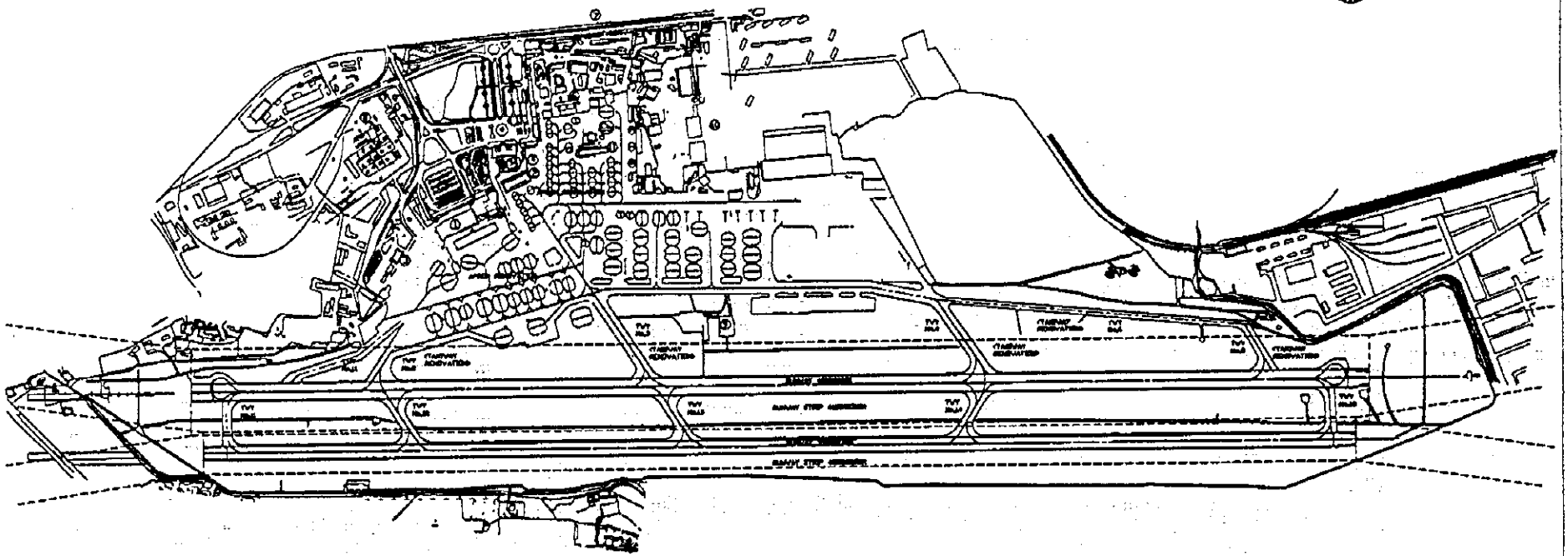


Table 4.5.10 Development of New Tashkent Airport (Class I)

Item			1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Demand	Passenger ('000)		2,000	3,800	4,700	
			=> (Int'l/CIS)		=>(Int'l/CIS/Dom.)	
	Max. Aircraft		O B747(Large-Jet)			
Development	Airfield	Runway	Phase I O 4,300m			
		Taxiway	Phase I O Full Parallel			
		Apron	Phase I O International & CIS Apron		O Domestic Apron	
	Terminal	Pax. Bldg.	Phase I O Int. bldg.		O Phase II Dom. Bldg	
	Air-Nav		O Cat-II ILS, VOR/DME, ASR/SSR O ATC, Met, Airfield Lighting		FANS O	



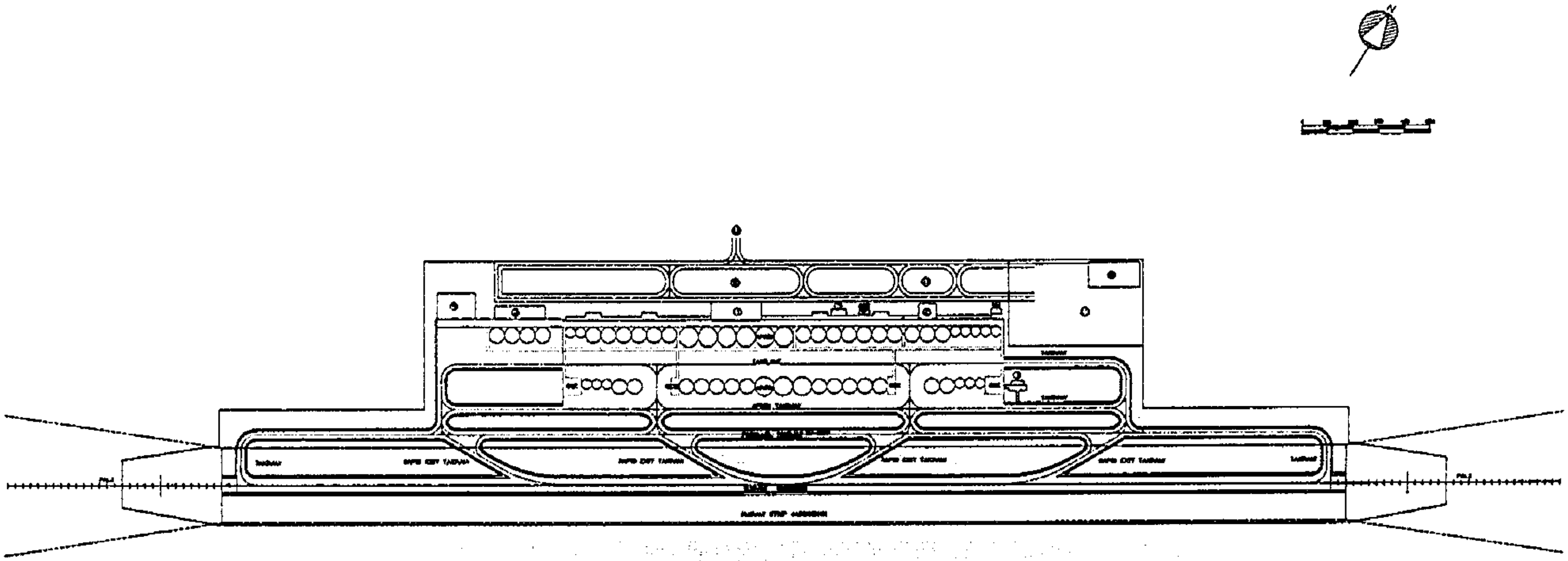
Facilities		Existing Facilities	1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Airfield	Runway Taxiway	4000m Partial	○ Full Parallel			
	Pavement		○ TWY Improvement ○ RWY/TWY/APR overlay ○ Apron Improvement			
Terminal	Pax. Bldg.		○ Rehabilitation (International passenger building) ○ Extension (Domestic passenger building)			
Air Navigation			○ VOR/DME, ASDE ○ Weather Radar			FANS ○

Fig. 4.5.3 Tashkent Airport Development Plan (2020)

TERMINAL AREA			
1	Int'l Passenger Terminal Building	8	Fuel Tank Farm
2	Dom. Passenger Terminal Building	9	Fire Station
3	VIP Building	10	Aircraft Maintenance Area
4	Control Tower and Operation	11	Aircraft Maintenance Office
5	Car Park		
6	Cargo Handing Area		
7	Administration Area		

AIRPORT DATA			
Airport Name	Tashkent	Elevation	431m
Class	I	Reference Temperature	29℃
Province	Tashkent	Runway	4000mx60m
Main City	Tashkent		3900mx45m
Distance from city	6km south	Direction (True north)	N 82° E
Reference Point	N 41° 15' 24"	Instrument Runway	08L/08R/26R
Coordinates	E069° 16' 24"	ILS Category	CAT-II

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Tashkent Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale



Item			1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Demand	Passenger ('000)			2,000 [illegible]	3,000	4,200 [illegible]
	Max. Aircraft		[illegible] (Large Jet)			
Development	Airfield	Runway	Phase I [illegible]			
		Taxiway	Phase I [illegible] Full Parallel			
		Apron	Phase I [illegible] International & CIS Apron		[illegible] Domestic Apron	
	Terminal	Pax. Bldg.	Phase I [illegible] Bldg		[illegible] Phase II Dom. Bldg	
	Air-Nav		[illegible] ILS, VOR/DME, ASR/SSR [illegible] ATC, MLS, Airfield Lighting			FANS [illegible]

Fig. 4.5.5 New Tashkent Airport Development Plan (2020)

TERMINAL AREA			
1	International Passenger Terminal Bldg.	8	Fuel Tank Farm
2	Domestic Passenger Terminal Bldg.	9	Hanger
3	International Cargo Terminal Bldg.	10	International Car Park
4	Domestic Cargo Terminal Building	11	Domestic Car Park
5	Operation and Control Tower	12	Acsess Road
6	Power Station	13	Dormitory,Operation Center etc.
7	Fire and Rescue Station		

AIRPORT DATA			
Airport Name	New Tashkent	Elevation	(350m)
Class	1	Reference Temperature	-
Province	Tashkent	Runway	4300mx60m
Main City	Tashkent		
Distance from city	40km southwest	Direction (True north)	-
Reference Point	-	Instrument Runway	-
Coordinates	-	ILS Category	CAT-II

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	New Tashkent Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale

4.5.3 Local Airports Development Plan

The existing facilities of the other eleven (11) local airports need to be upgraded as follows.

(1) Extension or Relocation of Runway

Following airports require runway extension and bituminous overlay of the runway pavement in order to cater for larger aircraft:

- class II airports;
  Namangan and Fergana,
- class III airports;
  Andizhan, Kokand, Karshi and Navoi.

Runway should be widened at Termez and Karshi to meet international standard of ICAO.

(2) Taxiway Improvement

Taxiway should be widened and shoulder should be provided at the ten (10) airports in accordance with ICAO standards.

(3) Apron Extension and Improvement

Apron of the eleven (11) airports should be extended and pavement be strengthened to accommodate larger and more frequent aircraft operation.

(4) Passenger Terminal Building

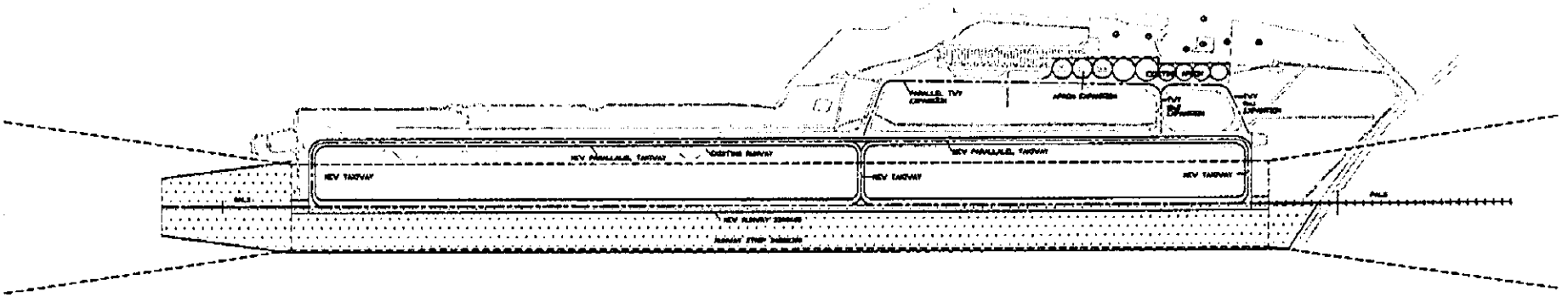
Passenger terminal buildings of the eleven (11) airports should be expanded as necessary to accommodate future passenger demand.

(5) Other Facilities

Administration buildings and control tower, etc. should be expanded or constructed as necessary to cater for future demand.

(6) Air Navigation Aids

Air navigation aids should be installed or renewed in accordance with development criteria based on the classification of the airports.



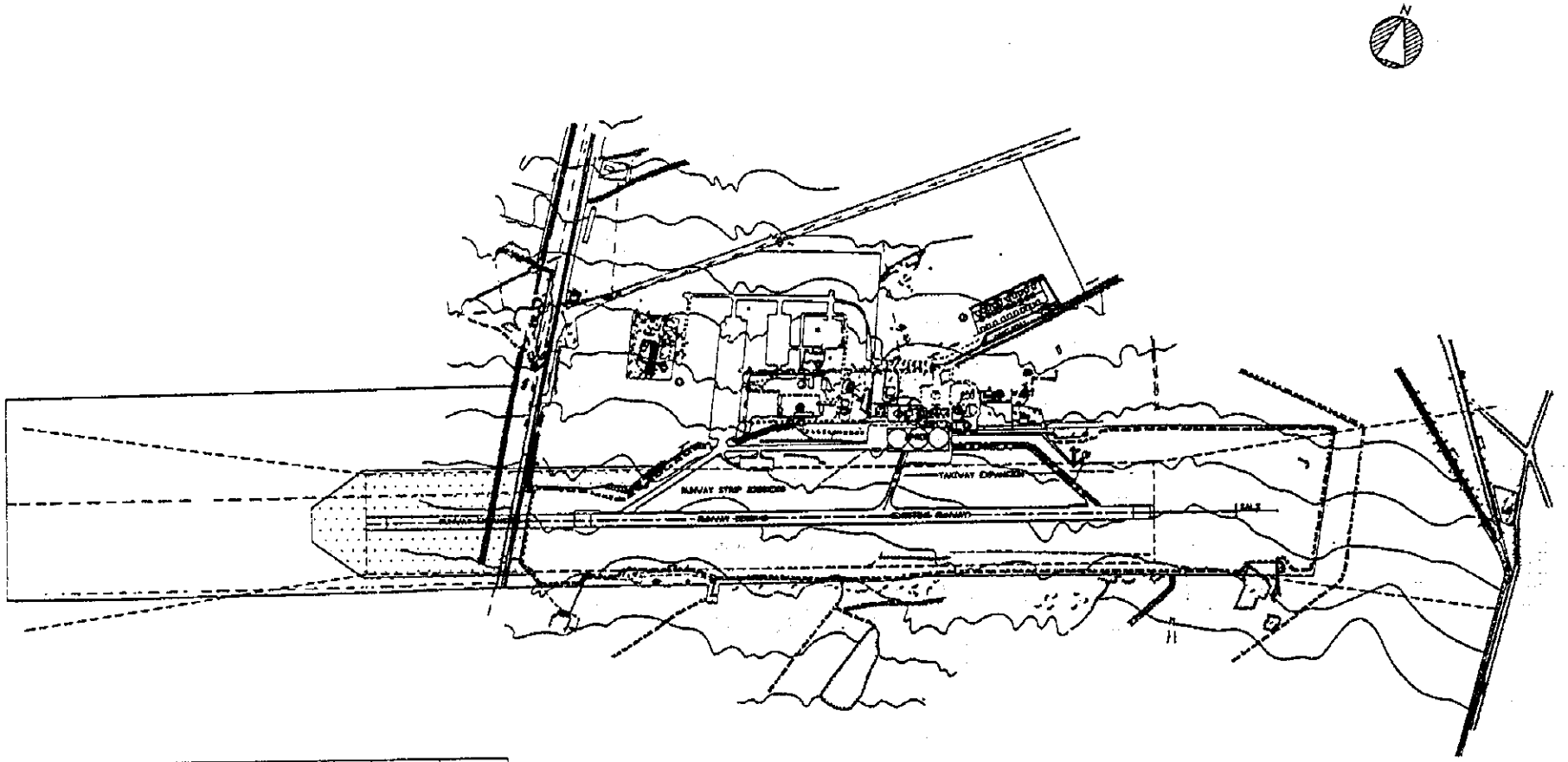
Facilities		Existing Facilities	1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Airfield	Runway Taxiway Apron	3,270m Partial Parallel	○ New Runway 3300m		○ Full Parallel	
				○ Expansion		
	Pavement		○ Overlay (TW & Apron)			
Terminal	Pax. Bldg.		○ Int. (New)		○Expansion (Dom)	
Air-Navigation			○ Cat-II/I, ASR/SSR, VOR/DME			
			○ ATC, Met., Airfield Lighting			
						PASS ○

Fig. 4.5.6 Namnangan Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	8	Car Park
2	VIP building		
3	Cargo Storage(under construction)		
4	Control Tower		
5	Administration Building		
6	Storage and Garage Area		
7	Fuel Farm		

AIRPORT DATA			
Airport Name	Namangan	Elevation	515m
Class	II	Reference Temperature	-
Province	Namangan	New Runway (Existing)	3300m (3000m)
Main City	Namangan		
Distance from city	8km south-west	Direction (True north)	N 112° 33' E
Reference Point Coordinates	N 40° 59' 05" E071° 33' 27"	Instrument Runway	28
		ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Namangan Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale



Facilities		Existing Facilities	1st Stage (~2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	1,600m	~ 2,200 m			
	Taxiway	Parallel				
	Pavement		~ Overlay of Runway and Taxiway			
Terminal	Pax. Bldg.		~ Expansion			
Air Navigation			~ VOR/DME, ATC Mk. Airfield Lighting			

Fig. 4.5.9 Kokand Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	8	Boiler Building
2	VIP Building	9	Club House
3	Cargo Storage	10	Hanger
4	Administration Building	11	Fuel Farm
5	Fire Station	12	Dormitory
6	Garage		
7	Storage		

AIRPORT DATA			
Airport Name	Kokand	Elevation	500m
Class	III	Reference Temperature	34°C
Province	Fergana	Runway (Existing)	2200m (1600m)
Main City	Kokand		
Distance from city	4km south	Direction (True north)	N 73° E
Reference Point Coordinates	N 40° 26' E070° 50'	Main Runway	25
		ILS Category	-

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Kokand Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale

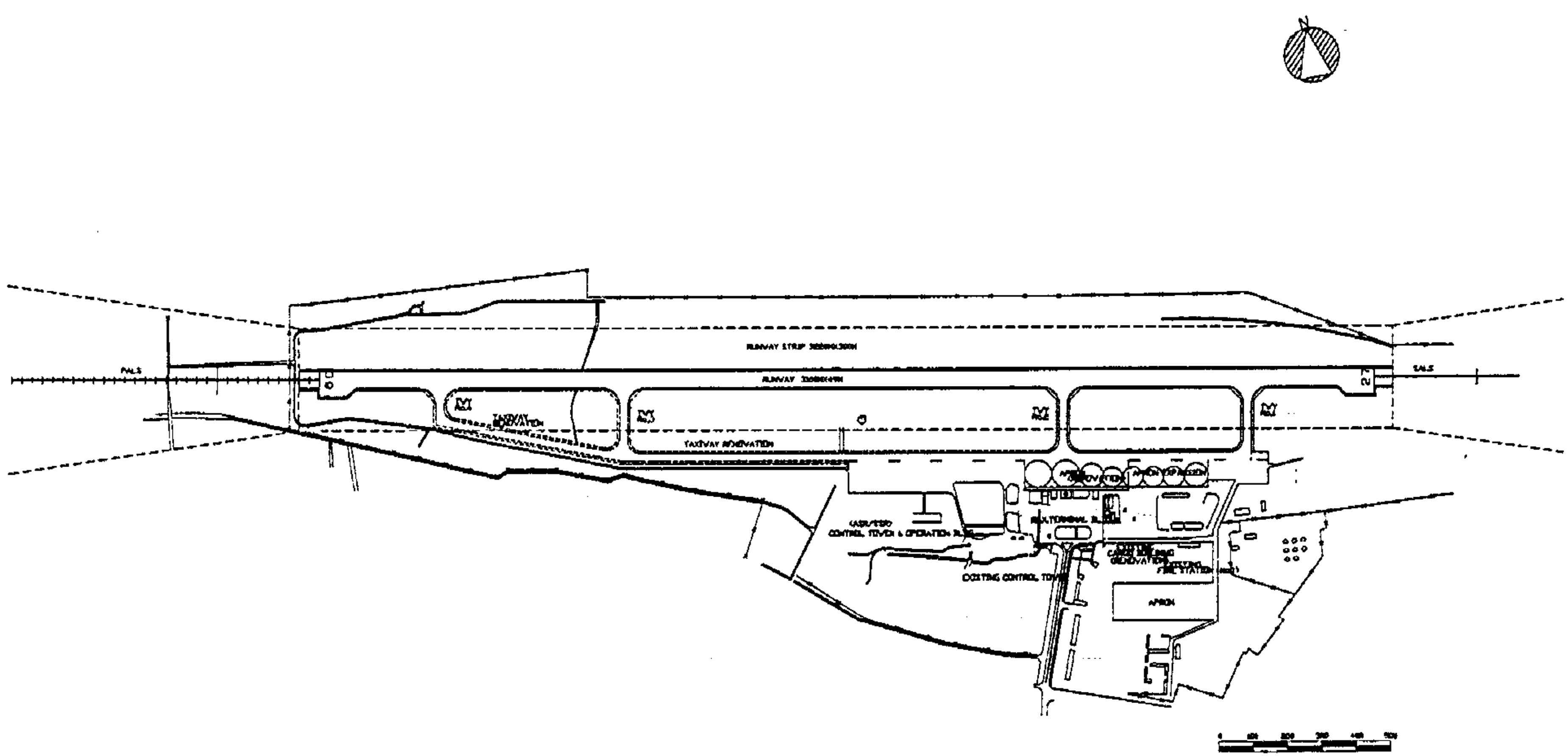
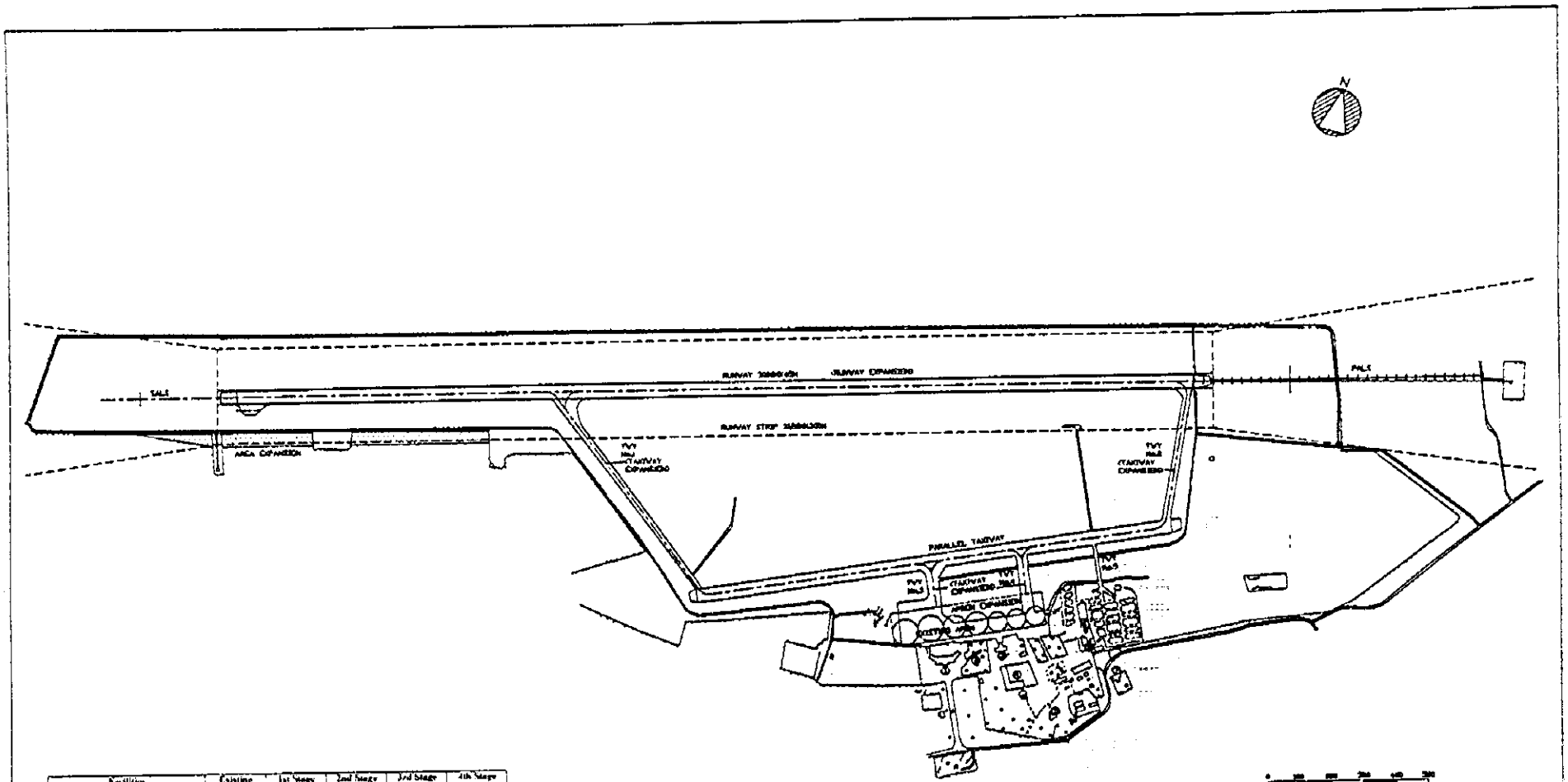


Fig. 4.5.10 Samarkand Airport Development Plan (2020)

Facilities		Existing Facilities	1st Stage (-2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,100m				
	Taxiway	Partial Parallel		Widening & Shoulders(TWY 3, 4 & Parallel)		Full Parallel
	Apron			Expansion		
	Pavement			Overlay (TWY 3, 4 & parallel)	Overlay (R/W)	Overlay (TWY 1, 2)
Terminal	Pass. Bldg.				Expansion	
Air Navigation				VOR/DME		Renewal FANS

AIRPORT DATA			
Airport Name	Samarkand	Elevation	678m
Class	II	Reference Temperature	36°C
Province	Samarkand	Runway	31000m
Main City	Samarkand	(Existing)	(3100m)
Distance from city	8km north	Direction (True north)	N 99° 44' E
Reference Point	N 39° 42' 06"	Instrument Runway	09
Coordinates	E066° 59' 06"	ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Samarkand Airport		
Drawing Tittle	Airport Layout Plan (Year 2020)		
Date		Scale	



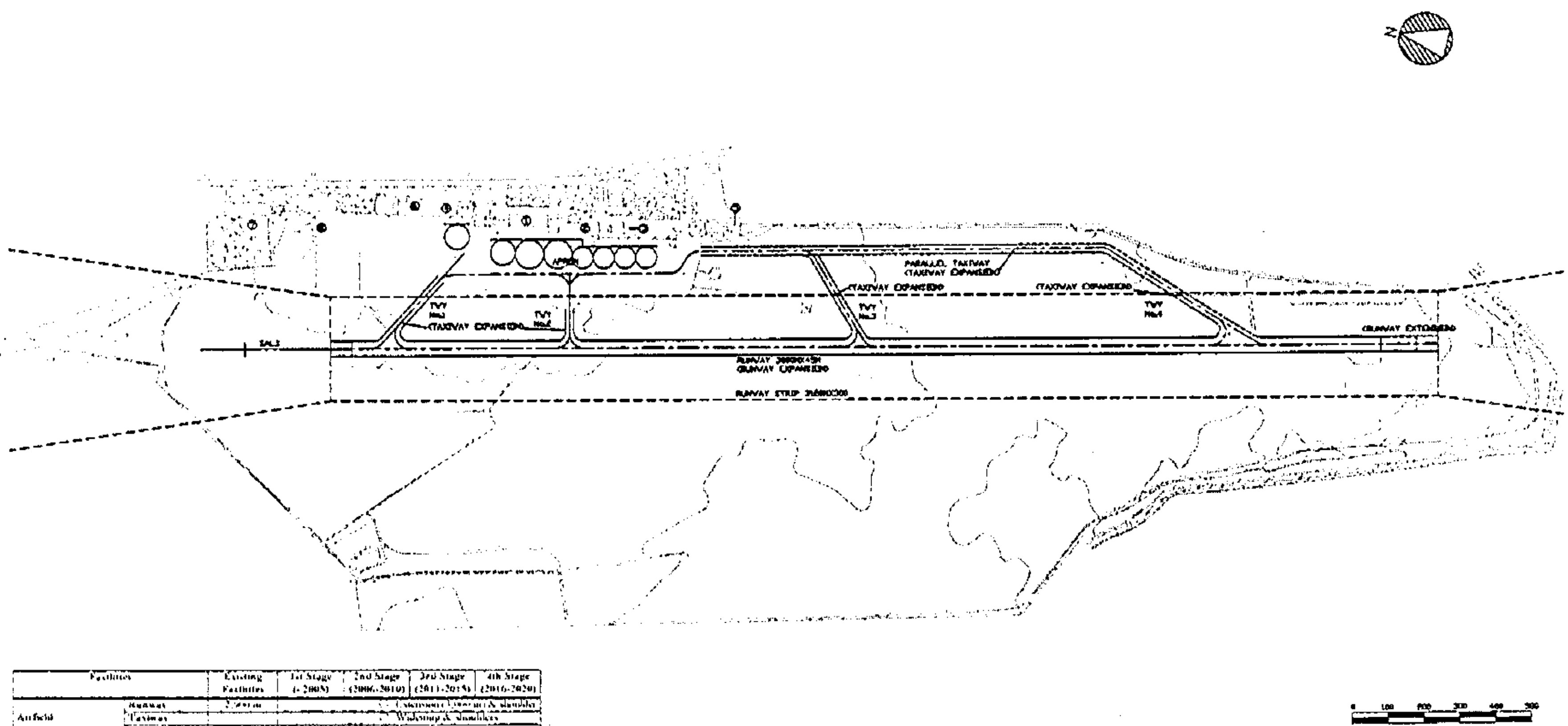
Facilities		Existing Facilities	1st Stage (~2005)	2nd Stage (2006~2010)	3rd Stage (2011~2015)	4th Stage (2016~2020)
Airfield	Runway	Asphalt				・Shoulders
	Taxiway					・widening & Shoulders
	Apron		・Expansion			
	Pavement					・Overlay (RW, TXW)
Terminal	Pax. Bldg.	2,200m²	・Expansion			・Expansion (to)
Air Navigation			・Cat-I ILS, VOR/DME, ATC, Met, Airfield Lighting			・Renewal ・FANS

Fig. 4.5.11 Termez Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	7	Canteen
	Controll Tower		
2	VIP Building		
3	Fire Station		
4	Garage		
5	Sotrage		
6	Hanger		

AIRPORT DATA			
Airport Name	Termez	Elevation	313m
Class	II	Reference Temperature	-
Province	Surkhandarya	Runway (Existing)	3000 (3000)
Main City	Termez		
Distance from city	9km	Direction (True north)	N 74° 09' E
Reference Point Coordinates	N 37° 17' 11" E067° 18' 33"	Instrument Runway	25
		ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"		
The Study for The Air Transportation Development in The Republic of Uzbekistan		
Airport	Termez Airport	
Drawing Title	Airport Layout Plan (Year 2020)	
Date		Scale



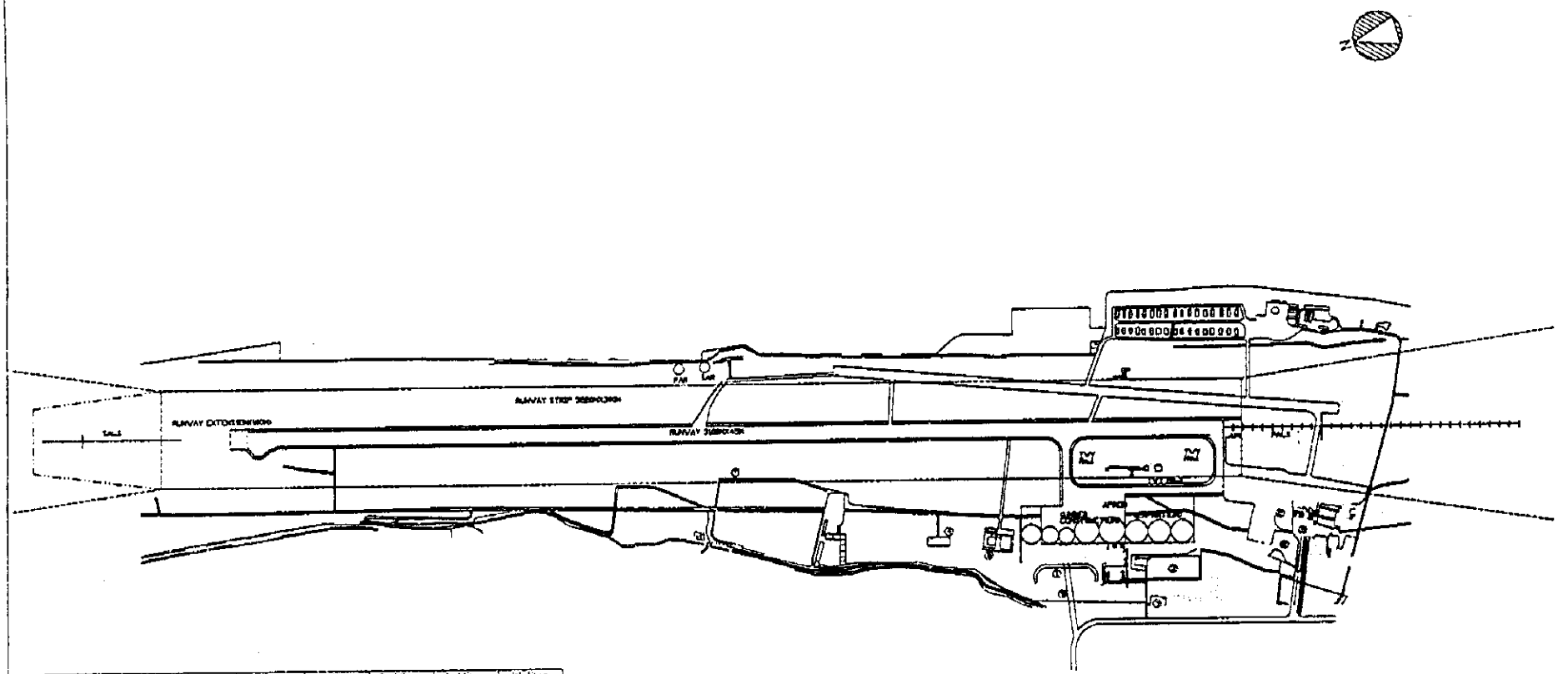
Facilities		Existing Facilities	1st Stage (-2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	2,900m		○ Extension, Overlay & shoulder		
	Taxiway			○ Widening & shoulders		
	Apron			○ Expansion		
	Pavement		Overlay (R/W, T/W)			
Terminal	Pax. Bldg.			○ International & CIS		
Air Navigation				○ VOR/DME, ASR/SSR ATC, Met, Airfield Facilities		

Fig. 4.5.13 Karshi Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	7	Fuel Farm
2	VIP Building	8	Hanger
3	Operation Administration Building		
	and Control Tower		
4	Sotrage		
5	Fire Station		
6	Garage		

AIRPORT DATA			
Airport Name	Karshi	Elevation	374m
Class	III	Reference Temperature	-
Province	Kashkadarya	Runway	3000mx45m
Main City	Karshi	(Existing)	(2900mx42m)
Distance from city	5km north	Direction (True north)	N 167° 47' E
Reference Point	N 38° 48'	Main Runway	16
Coordinates	E065° 46'	ILS Category	-

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Karshi Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale



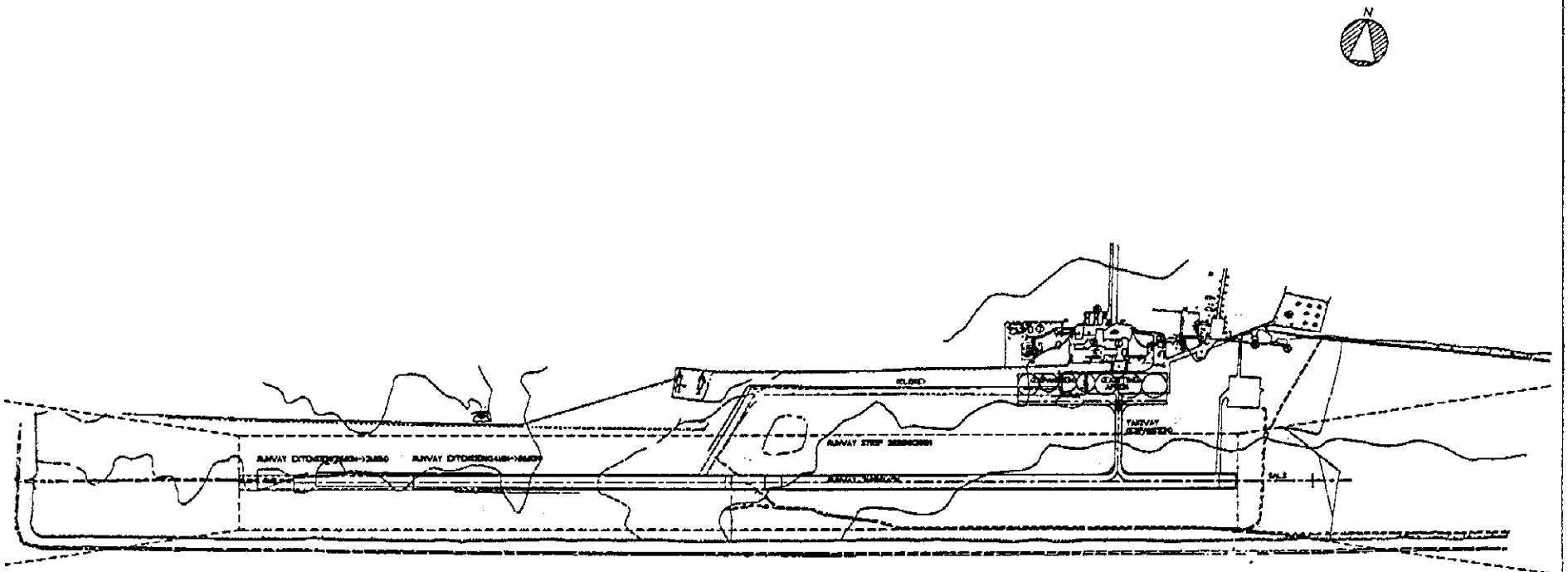
Facilities		Existing Facilities	1st Stage (~2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,000 m	○ 3,700 m			
	Taxiway	No Parallel	○ Partial Parallel			
	Apron		○ Extension			
	Pavement			○ Overlay (RW, TW)		
Terminal	Pass. Bldg.			○ Extension		
						Expansion ○
Air Navigation			○ VOR/DME			○ Renewal FANS ○

Fig. 4.5.15 Bukhara Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Bldg.	8	Administration Building
2	Existing Passenger Terminal Bldg.	9	Car Park
3	Cargo Bldg.		
4	Control Tower and Operation		
5	Existing Control Tower and Operation		
6	Fire Station		
7	Boiling Station		

AIRPORT DATA			
Airport Name	Bukhara	Elevation	229m
Class	II	Reference Temperature	35°C
Province	Bukhara	Runway (Existing)	3000mx45m (3000mx45m)
Main City	Bukhara		
Distance from city	7km	Direction (True north)	N 15° E
Reference Point Coordinates	N 39° 46' 30" E064° 28' 48"	Instrument Runway	01
		ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Bukhara Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,410 m		○ 3,600 m		○ 3,800 m
	Taxiway	No Parallel		○ Widening & Partial Parallel		
	Apron			○ Expansion		○ Expansion
	Pavement			○ Overlay (RAV)		
Terminal	Pax. Bldg.					○ Expansion
Air Navigation				○ VOR/DME, ASR/SSR ATC, Met, Airfield Lighting		
						○ Renewal CANS ○

Fig. 4.5.16 Navoi Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	8	Car Park
2	Operation and Control Tower		
3	Administration Building		
4	Fire Station		
5	Storage		
6	Fuel Farm		
7	Utilities Farm		

AIRPORT DATA			
Airport Name	Navoi	Elevation	347m
Class	III	Reference Temperature	-
Province	Navoi	Runway (Existing)	3100mx45m (3410mx45m)
Main City	Navoi		
Distance from city	25km south-west	Direction (True north)	N 82° 25' E
Reference Point Coordinates	N 40° 07' E065° 12'	Main Runway	25
		ILS Category	-

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Navoi Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale

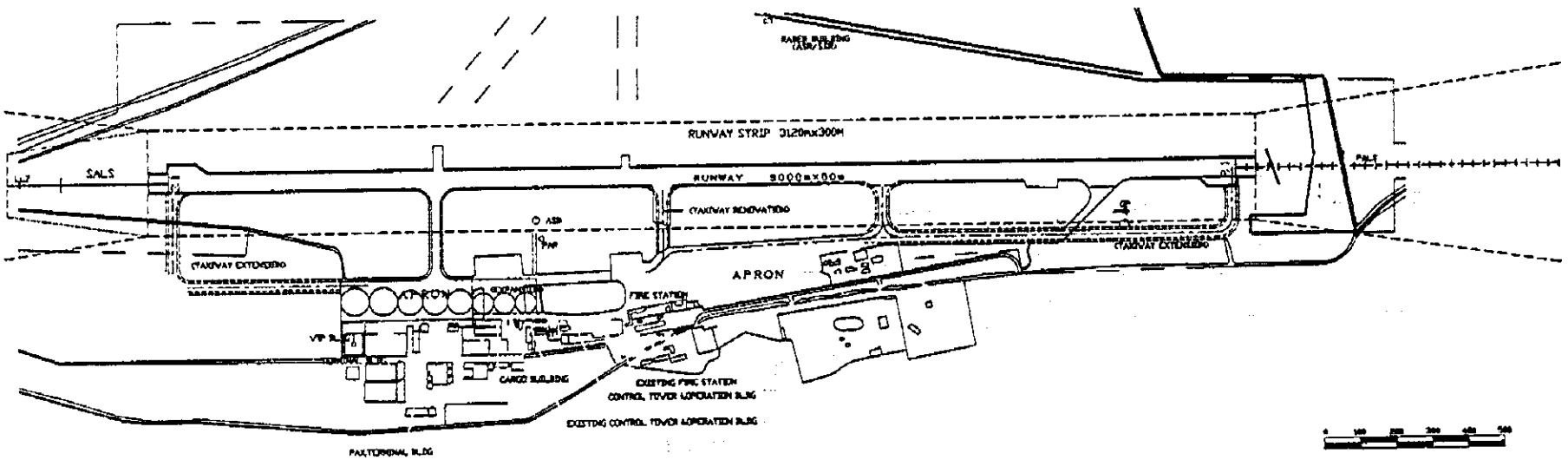
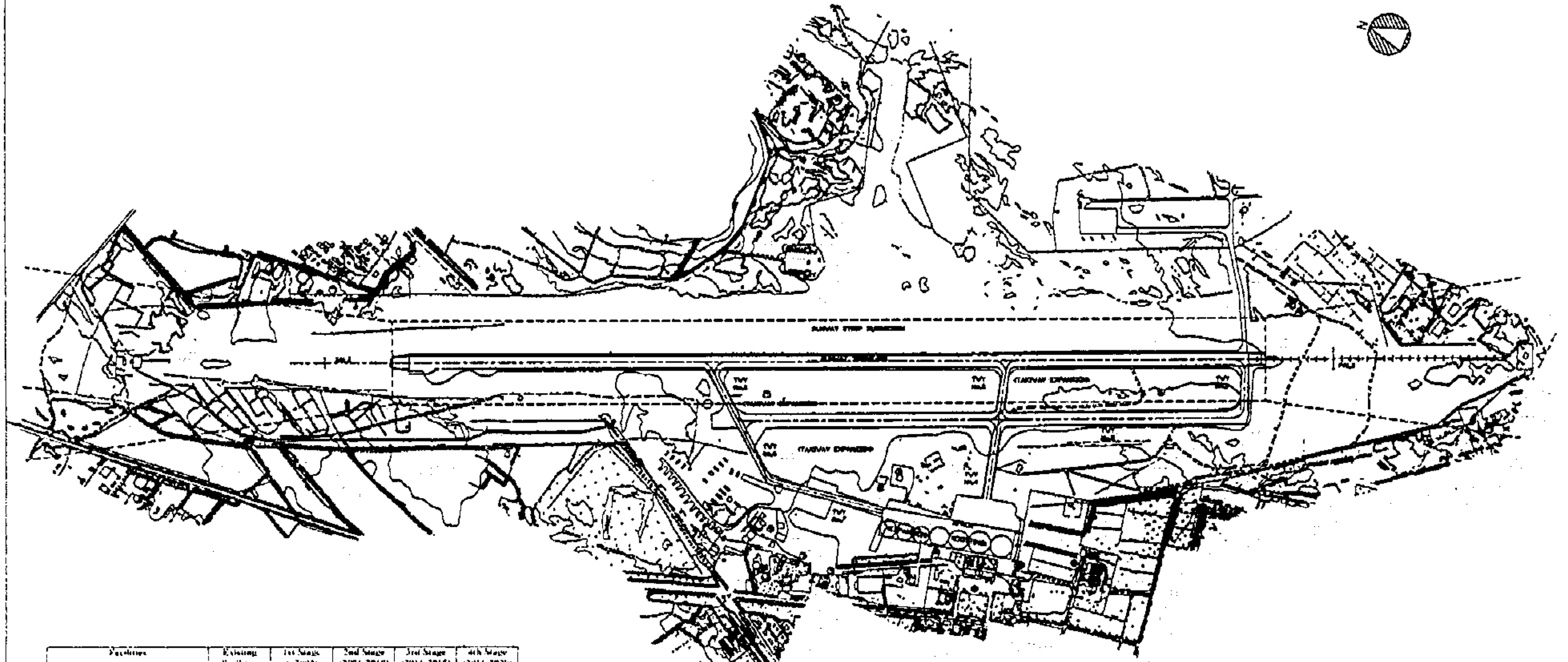


Fig. 4.5.17 Urgench Airport Development Plan (2020)

Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3000 m				○ Partial Parallel
	Taxiway	Partial Parallel				
	Apron			○ Expansion		
	Pavement			○ Overlay (R/W, T/W)		
Terminal	Pax. Bldg.			○ Expansion	Expansion ○	
Air Navigation				○ VOR/DME		
					○ Renewal	
					IANS ○	

AIRPORT DATA			
Airport Name	Urgench	Elevation	97m
Class	II	Reference Temperature	-
Province	Khorezm	Runway (Existing)	3000mx45m (3000mx44m)
Main City	Urgench		
Distance from city	5km east	Direction (True north)	N 143° 29' E
Reference Point Coordinates	N 41° 34' 30" E060° 38' 30"	Instrument Runway	31
		ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"	
The Study for The Air Transportation Development in The Republic of Uzbekistan	
Airport	Urgench Airport
Drawing Title	Airport Layout Plan (Year 2020)
Date	Scale



Facilities		Existing Facilities	1st Stage (-2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	[illegible]	Shoulders (6m)			
	Taxiway	Partial (Seal)	Widening & Shoulders			
	Apron		Expansion			
	Pavement		Overlay (R/W, T/W)			
Terminal	Pax. Bldg	2,200m²	Expansion (Dom & CIS) / Expansion (Int.) / Expansion			
Air Navigation			Cat-I ILS, VOR/DME, ASR/SSR, ATC, Met, Airfield Lighting / Renewal / FANS			

Fig. 4.5.18 Nukus Airport Development Plan (2020)

TERMINAL AREA			
1	Passenger Terminal Building	8	Fuel Tank Farm
2	VIP Building	9	Aircraft Maintenance
3	Cargo Storage	10	Car Park
4	Administration Building		
5	Control Tower		
6	Fire Station		
7	Garage Storage		

AIRPORT DATA			
Airport Name	Nukus	Elevation	76m
Class	II	Reference Temperature	-
Province	Karakalpakstan	Runway	3000mx48m
Main City	Nukus	(Existing)	(3000mx48m)
Distance from city	7km northwest	Direction (True north)	N 159° 31' E
Reference Point	N 42° 29' 18"	Instrument Runway	18
Coordinates	E059° 37' 24"	ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"		
The Study for The Air Transportation Development in The Republic of Uzbekistan		
Airport	Nukus Airport	
Drawing Tittle	Airport Layout Plan (Year 2020)	
Date		Scale

4.6 Development Plan for Air Navigation System

4.6.1 General

Air route structure in Uzbekistan mainly comprises four (4) VOR/DMEs and twenty (20) NDBs. ASR/SSRs are also installed at ten (10) local airports as well as Tashkent airport, for approach and en-route control.

A major part of these facilities were installed in the 1980s, and if their life is assumed to be about 15 years, they will reach the end of their useful life within the 1st Stage. Therefore, replacement of these facilities shall be taken into account for the development planning of the air navigation facilities.

On the other hand, Future Air Navigation System (FANS) discussed by ICAO and other countries, is expected to be realized in the future air navigation system, in place of the present system. During the long-term development of the air navigation systems, introduction of FANS shall be incorporated into the development plan.

4.6.2 Development Criteria

(1) Air Navigation Facilities by Category of Airports

Development of air navigation facilities is planned based on the criteria shown in **Table 4.6.2**.

Table 4.6.2 Air Navigation Facilities by Category of Airports

Airport	ILS	VOR/DME	ASR/SSR	NDB	AFTN	Control Tower	Airfield Lighting	Met. Facilities
Class I	Cat-II	Yes	Yes	Yes	Yes	Yes	Cat-II	Cat-II
Class II	Cat-I	Yes	Yes	Yes	Yes	Yes	Cat-I	Cat-I
Class III	No	Yes	No	Yes	Yes	Yes	Non-Precision (for night use)	Minimum

(2) Priority of Development

Priority for improvement and modernization of the air navigation system shall be based on the following factors:

- Replacement of existing facilities that are more than 15 years old
- Renewal and improvement by airport class from Class I and II
- Introduction of Medium and Large Jets

4.6.3 Facility Planning at Airports

Based on the above criteria, facility planning of air navigation systems at each airport is summarized as shown in **Table 4.6.3**.

Table 4.6.3 Development of Each Airport (1)

ITEM	Tashkent				New Tashkent				Namangan				Andizhan				Fergana				Kokand			
	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020
(1) Radio Navaids																								
a) ILS		○				●			○		○						●		○					
b) Locator		○				●			○		○		●		○		●		○			○		
c) VOR/DME	○			○		●			●		○		●		○		●		○			●		
(2) ATC System and Telecommunication																								
a) Control Tower Facilities		○				●			●		○		●		○		●		○			○		
b) ASR/SSR		○				●			○		○				○		●		○					
c) TRDPS		○				●			●		○				○		●		○					
d) AFTN		○				●			○		○		○		○		○		○			○		
e) ASDE	●			○																				
(3) Airfield Lighting System																								
a) PALS		○				●			●		○						●		○					
b) SALS		○				●			●		○		●		○		●		○			●		
c) PAPI		○				●			●		○		●		○		●		○			●		
d) REDL		○				●			○		○		●		○		●		○			●		
e) RTHL		○				●			○		○		●		○		●		○			●		
f) TWEL		○				●			○		○		●		○		●		○			●		
g) AFL		○				●			○		○		●		○		●		○			●		
h) Aerodrome Beacon		○				●			●		○		●		○		●		○			●		
i) Power supply system for Navaids		○				●			●		○		●		○		●		○			●		
(4) Meteorological Observation System																								
a) Wind direction and speed sensor		○				●			○		○		○		○		○		○			○		
b) Air temperature and humidity sensor		○				●			○		○		○		○		○		○			○		
c) Barometer		○				●			○		○		○		○		○		○			○		
d) RVR and Ceilometer		○				●			●		○		●		○		●		○			●		
e) Data Collection and Processing System		○				●			●		○		●		○		●		○			●		
f) Weather Data Monitor		○				●			●		○		●		○		●		○			●		
g) Forecast equipment		○				●			●		○						●		○					
h) Weather Radar	●			○		●																		
(5) FANS				●				●				●				●				●				●

○ Renewal of existing facilities (equipment)

● Installation of new facilities (equipment)

Table 4.6.3 Development of Each Airport (2)

ITEM	Samarkand/Bukhara				Urgench				Termez				Karshi				Navoi				Nukus			
	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020	-2005	-2010	-2015	-2020
(1) Radio Navaids																								
a) ILS		○				○			○		○										○			○
b) Locator		○				○			○		○		○				○		○		○			○
c) VOR/DME	●		○		○				○		○		●				●		○		●			○
(2) ATC System and Telecommunication																								
a) Control Tower Facilities		○				○			●		○		●				○		○		●			○
b) ASR/SSR		○				○			○		○										○			○
c) TRDPS		○				○			●		○										●			○
d) AFTN		○				○			○		○		○				○		○		○			○
e) ASDE																								
(3) Airfield Lighting System																								
a) PALS		○				○			●		○										●			○
b) SALS		○				○			●		○		●				●		○		●			○
c) PAPI		○				○			●		○		●				●		○		●			○
d) REDL		○				○			○		○		○				●		○		○			○
e) RTHL		○				○			○		○		○				●		○		○			○
f) TWEL		○				○			○		○		○				●		○		○			○
g) AFL		○				○			○		○		○				●		○		○			○
h) Aerodrome Beacon		○				○			●		○		●				●		○		●			○
i) Power supply system for Navaids		○				○			●		○		●				●		○		●			○
(4) Meteorological Observation System																								
a) Wind direction and speed sensor		○				○			○		○		○				○		○		○			○
b) Air temperature and humidity sensor		○				○			○		○		○				○		○		○			○
c) Barometer		○				○			○		○		○				○		○		○			○
d) RVR and Ceilometer		○				○			●		○		●				●		○		●			○
e) Data Collection and Processing System		○				○			●		○		●				●		○		●			○
f) Weather Data Monitor		○				○			●		○		●				●		○		●			○
g) Forecast equipment		○				○			●		○										●			○
(5) FANS				●				●				●				●				●				●

○ Renewal of existing facilities (equipment)

● Installation of new facilities (equipment)

4.6.4 Development Plan of Nationwide Air Navigation System

(1) Present Situation of Air Route System

Air routes in Uzbekistan mainly comprises of four (4) VOR/DMEs and twenty (20) NDBs, which are installed at the airports and other than airports, as shown in **Fig. 4.6.1**. Present air routes are concentrated at the areas of Tashkent, Samarkand and on the borders. Installation year of those equipment is shown in **Table 4.6.4**.

Functions of the en-route navigational aids importantly are summarized as follows:

Tamdybulak (VOR/DME), Karakhtay (NDB), Makhtaly (NDB), Toytepa (NDB), Dzhizak (NDB), Dalverzin (NDB), Syrdarya (NDB), Nurata (NDB), Bulungur (NDB), Nagornaya (NDB), Urgut (NDB), Guzar (NDB)

Table 4.6.4 Installation Year of En-route Navaids

Point	Year	Point	Year
VOR/DME		**NDB**	
Tamdybulak	1997	Syrdarya	1990
NDB		Nurata	1979
Karakhtay	1989	Bulungur	1988
Makhtaly	1993	Nagornaya	1982
Toytepa	1994	Urgut	1989
Dzhizak	1986	Guzar	1993
Dalverzin	1986		

(2) Development Plan

As abovementioned, en-route navaids in Uzbekistan mainly consist of NDBs. However, since NDB has disadvantages of radio wave interference, VOR/DME is commonly used as the en-route navaids precisely, and enable Region Navigation System(R-NAV).

Considering above situation, en-route navaids should be replaced by VOR/DME from the present NBD facilities. Development plan of en-route navaids is shown in **Table 4.6.5** and location of en-route navaids and proposed air route network of 2020 is shown in **Fig. 4.6.2**.

Table 4.6.5 Development Plan of Nationwide Air Navigation System

Point	2005	2010	2015	2020
Tamdybulak			VOR/DME	
Karakhtay	VOR/DME			
Makhtaly		VOR/DME		
Toytepa		VOR/DME		
Dzhizak	VOR/DME			VOR/DME
Dalverzin	VOR/DME			VOR/DME
Syrdarya	VOR/DME			VOR/DME
Nurata	VOR/DME			VOR/DME
Bulungur	VOR/DME			VOR/DME
Nagornaya	VOR/DME			VOR/DME
Urgut	VOR/DME			VOR/DME
Guzar		VOR/DME		

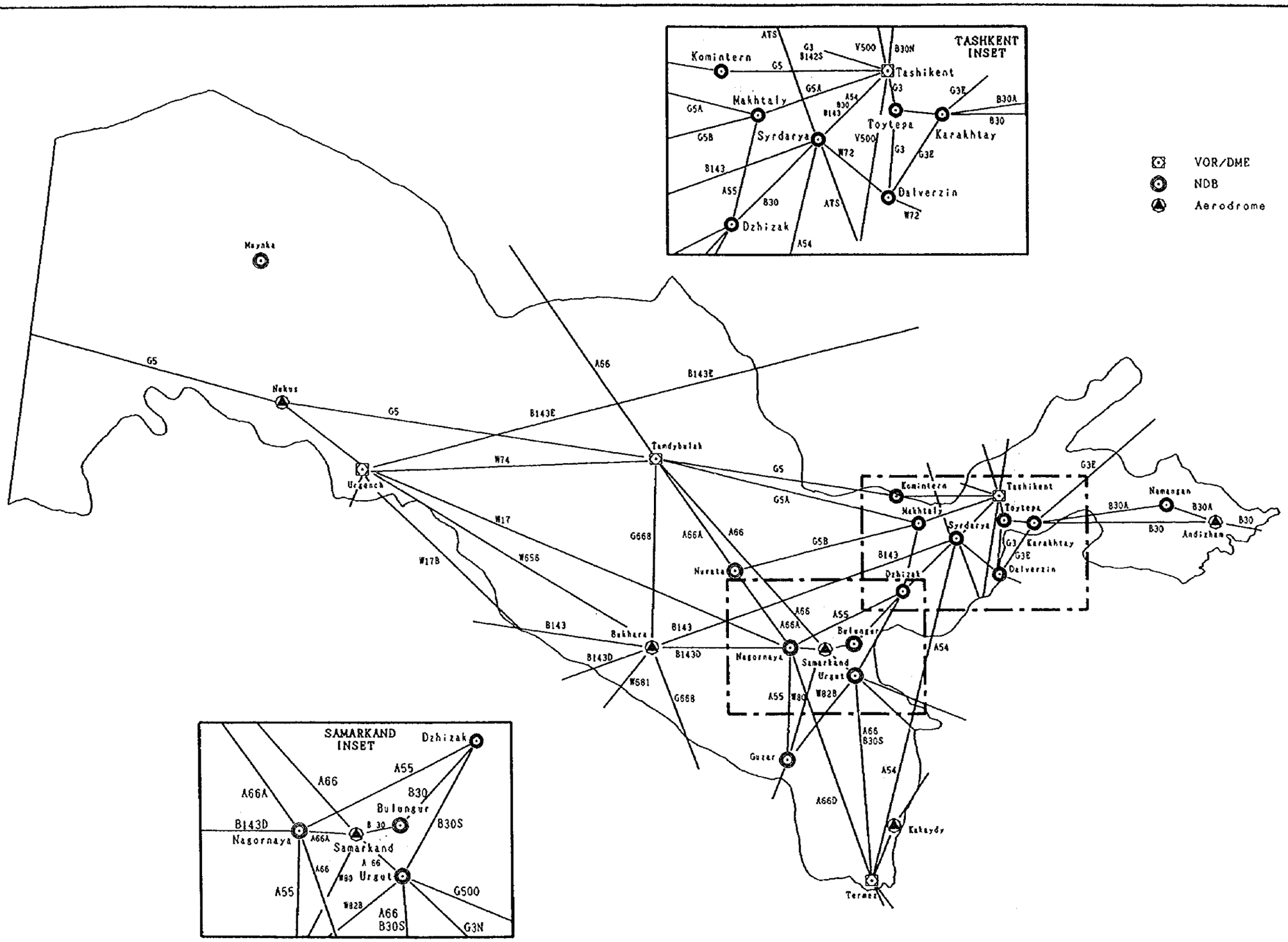


Fig. 4.6.1 Air Route Network (1997)

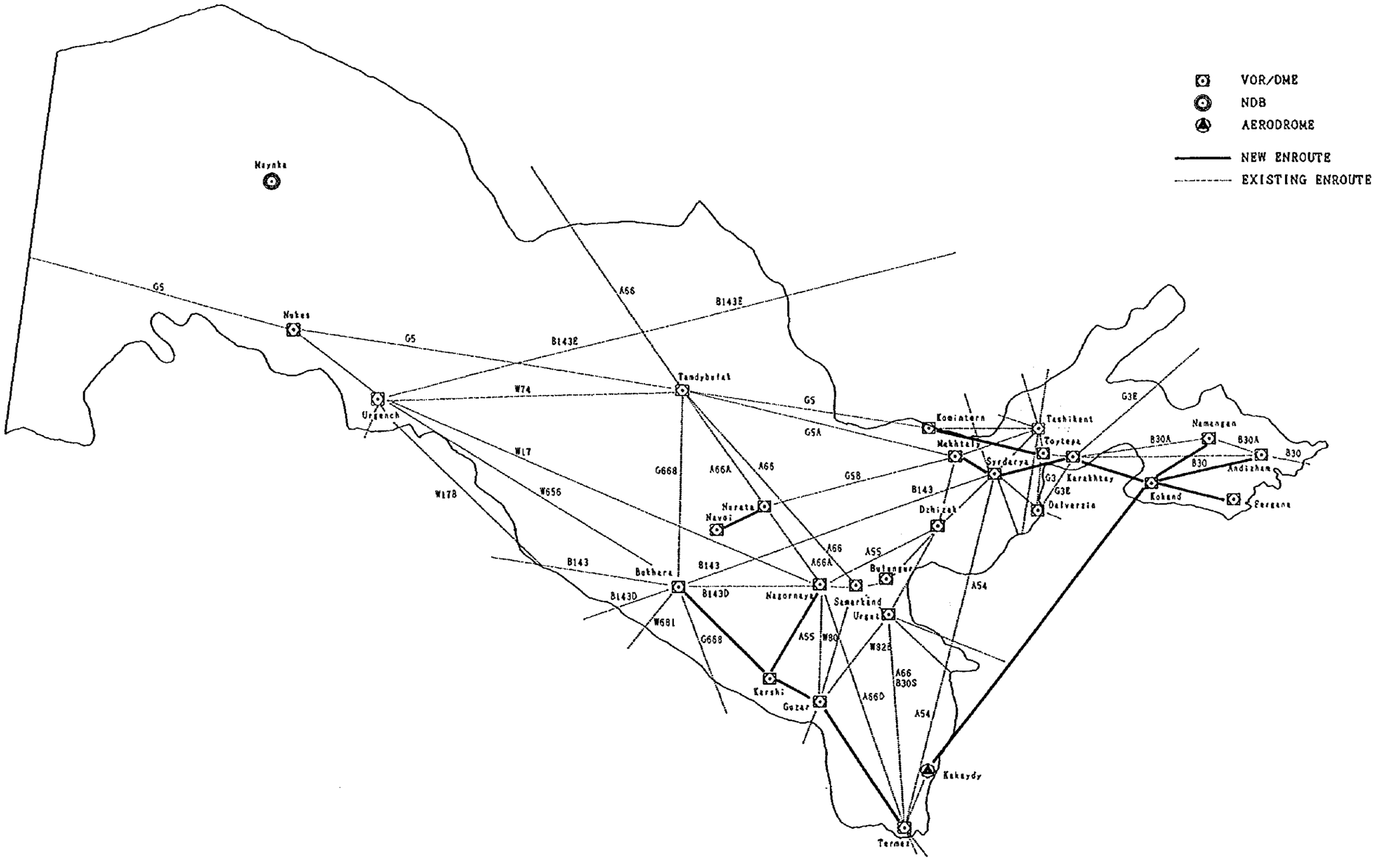


Fig. 4.6.2 Air Route Network (2020)

4.6.5 Development of Future Air Navigation System (FANS)

(1) Global Navigation Satellite System (GNSS)

Future Air Navigation System (FANS), which is developed and proposed by ICAO, shall be incorporated into long-term development of the air navigation system.

The FANS concept, known as Communications, Navigation, Surveillance and Air Traffic Management (CNS/ATM), is based on the use of satellite technology for improved communications, point-to-point navigation, and surveillance in areas not to be covered with radar.

Main structure of the satellite concept is the Global Navigation Satellite System (GNSS). At this moment and for the immediate future, the only positioning constellations available as candidates for GNSS are the Global Positioning System (GPS), owned and managed by the United States of America, and the Global Orbiting Navigation Satellite System (GLONASS), owned by the Russian Federation Government.

(2) Proposed Function of FANS

a) Communication

Development target on communication function in FANS is to establish a data link between air and ground by using VHF and SSR mode S, and to provide Aeronautical mobile Satellite Service (AMSS). It is necessary to establish Aeronautical Telecommunication Network (ATN) using Satellite.

b) Navigation

Future navigation in the air route network is expected to be supported exclusively by GNSS in place of the present navigation using NDB and VOR/DME. Accordingly, aircraft will be able to select freely any flight courses and apply precision approach.

c) Surveillance

New system named Automatic Dependent Surveillance (ADS) is being studied. ADS is a new surveillance system in air space beyond radar coverage.

On the other hand, in air space within radar coverage, it will be possible to increase surveillance ability, and to improve communication method with aircraft using SSR mode S.

d) Air Traffic Management

In addition, the ultimate purpose of FANS is to achieve total management of air space and air traffic. This concept is called "Air Traffic Management (ATM)".

ATM consists of three procedures, namely, Air Traffic Control (ATC), Air Traffic Flow Management (ATFM), and Air Space Management (ASM), and its principal role is to manage and control air traffic in order to allow aircraft to operate safely and economically.

Table 4.6.6 Development of CNS System

Type of airspace	Current System			Proposed FANS		
	C	N	S	C	N	S
VHF voice HF voice	OMEGA/LORAN-C NDB VOR/DME Barometric altitude INS/IRS	Primary radar/SSR Voice position reports	VHF voice/data AMSS data/voice HF over poles only (2)	RNAV/RNPC, GNSS Barometric altitude High altitude GNSS altimeter (3) INS/IRS	ADS	
Continental airspace with high density traffic	VHF voice	OMEGA/LORAN-C NDB VOR/DME Barometric altitude INS/IRS	Primary radar SSR mode A/C	VHF voice/data AMSS data/voice SSR mode S data link	RNAV/RNPC GNSS Barometric altitude High altitude GNSS altimeter (3) VOR/DME (4) INS/IRS	SSR mode A/C or SSR mode S ADS
Oceanic airspace with high density traffic	HF voice	MNPS OMEGA/LORAN-C NDB VOR/DME Barometric altitude INS/IRS	Voice position reports	AMSS data/voice	RNAV/RNPC GNSS Barometric altitude High altitude GNSS altimeter (3) INS/IRS	ADS
Terminal areas with high density traffic	VHF voice	NDB VOR/DME ILS Barometric altitude INS/IRS	Primary radar SSR mode A/C	VHF voice/data SSR mode S data link	RNAV/RNPC GNSS MLS NDB (5) VOR/DME (4) Barometric altitude INS/IRS	SSR mode A/C or SSR mode S ADS (6)

Key:

AMSS : aeronautical mobile-satellite service
MNPS : minimum navigation performance specifications
RNAV/RNCP : area navigation/required navigation performance capability
ADS : global navigation satellite system
INS/IRS : internal navigation system/internal reference system

Notes:

(1) : Include low-altitude, off-shore and remote areas.
(2) : Until such time as satellite communication is available.
(3) : To be used where barometric altimeter is not functional.
(4) : VOR/DME will be progressively withdrawn.
(5) : NDB will be progressively withdrawn.
(6) : The need for primary radar is reduced.

4.7 Air Traffic Control Systems Development

4.7.1 General

The purpose of improvement of the ATC System is to enhance the safety and the capacity of air space use, so as to meet the expansion and variety of air traffic in the future, according to the airport development and the new establishment of air transportation network. It is important to cope with the modernized adjustment of Airport and Air Traffic System, on the basis of the adjustment of Air Transportation in the master plan, and the air traffic volume expected, and in particular to work towards an appropriate measure of compliance with the FANS of ICAO, by the ATC procedure and the information network and the appropriate establishment of Air Traffic Management(ATM).

4.7.2 Air Space Use Planning

(1) Planning Criteria

For this purpose, it is necessary to construct an integrated system of general control of air space use, instead of the current system, which is rather a priority for the military authority. This should be established in connection with the transfer to FANS and ATM. ATM is to be conducted generally for Air Traffic Control, Air Traffic Flow Management and Airspace Management and establishment of the appropriate system of conduct for it.

For the purpose of effective air space use, the coverage of surveillance of Radar on the ground shall be extended first. In the future, the usage of the whole air space shall be available technically as a result of the introduction of FANS. To be specific, an assessment of FIR and of the jurisdictional area of air space related to neighbouring countries, should be conducted and the establishment and promotion of a cooperative system of regional ATM should be examined.

(2) Development of Air Space Organization

- In the future, the appropriateness of controlled air space and the standardization of the ICAO for Obstacle Limitation Surfaces(OLS) and the flight procedures of instrument approach and departure, shall be conducted first as part of the short or medium term plan. Basically, the efficiency of air space shall be conducted gradually and the NDB Airways shall be changed to the VOR Airways by means of the replacement of significant NAVAIDS from NDB to VOR or VOR/DME.
- In the long term plan, the efficiency and effective usage of air space shall be assured with ICAO FANS/ATM. And the TMA(Terminal Control Areas) at some airports shall be combined and integrated to promote the efficiency of ATC services. The RNP(Required Navigation Performance) shall be introduced for Area(En-route) Control according to ICAO standards and be designated on the route of arrival and departure in the future.

(3) Upper Airspace and Airways

In the upper airspace, especially for international over-flights and the ATC provided, the practical service of FANS may take shape soon, and the efficient usage of air space shall be conducted according to the variety of flight routes by means of the R-NAV(Area Navigation). Corresponding to the introduction of FANS in the upper air space, the establishment of optional and efficient flight routes shall be possible. It is necessary to

adjust the system for providing efficient and flexible or dynamic routes according to weather and ATC conditions.

At present, the air space for civil air traffic is limited in the CTR(Control Zone), TMA(Terminal Control Area) and Airways, but it is necessary to ensure effective airspace control by the Area Control Services, except the restricted areas or the prohibited areas to be used for Radar Vector and others. In particular, it is important to provide for the efficient use of air space, given the coexistence of civil and military air traffic.

In the first stage, the R-NAV shall be conducted on the Area(En-route) control face by VOR/DME and in the future it shall be changed and conducted by the FANS, which are located around Tashkent airport(and new airport), the main airways of south – north(Termez VOR/DME – Tamdybulak VOR/DME), Samarkand airport, Bukhara airport and Nukus airport. The appropriateness of air traffic shall be planned at these locations which are the new territorial gateways of Uzbekistan for departure, arrival and over-flights. They connect to routes of Europe to South-east Asia, then the coordination should be necessary with the relevant authorities of other countries.

In particular, the establishment of a new international ATS route which connects the Fergana region and the eastern countries such as China shall be necessary soon. Also, a parallel south-north bound ATS route will be necessary, in relation to the efficiency of air transportation

(4) General Use of Air port space

For the airspace requirement of the 12 airports, it is first necessary to maintain the OLS appropriately. At the airport, all airfield obstacles should be removed as much as possible, except for some significant equipment for aircraft operating, especially the dispatch cabin(start control position) near the RWY end must be removed, which is found at some local airports, and the transmitter and receiver antenna and the apron flood lights, etc. shall be dealt with, without exception.

As for the controlled air space of an airport, it is proper that the CTR shall be designated and reconstructed on the basis of visual ATC. (Generally the shape of it appears cylindrical with a radius of 9.3km and about 900m in height.) The lower limit of the approach control area is about 200m in height above ground and also above the minimum safety height. And the lower limit of controlled air space out of the approach control area is generally 900m off above ground level.

In Uzbekistan, the CTR is designated as being 4500m in height above ground and an indefinite shape depending on the status of air traffic around the airport. Above this, the air space of Area control services is set within the FIR. The basic idea is the same as that of ICAO, but the altitude is so specific as to divide the air space vertically. As a result, there are some areas remaining out of the controlled air space and below 4500m in height.

It is proper that TRACON(Terminal Radar Approach Control) shall be established in the approach-controlled-areas of the airports Namangan, Andizhan, Fergana and Kokand, shall be combined over the Fergana area in the future. As for the approach procedures, the 3° GP of ILS approach shall be established instead of the current 2 ° 40' GP according to the standardization for ICAO. And the rule of OCA(H)(Obstacle

Clearance Altitude(Height)) for the ICAO precision segment shall be applied.

The precision approach is provided as Cat- I , with intermediate facilities of aeronautical lights at the majority of local airports, and the upper categories are not necessary to install, but only at important international airports such as Tashkent airport(new airport). The VOR/DME shall be installed at the airports in the future, comprising intermediate approach to assist for the ILS approach or, establish the VOR/DME approach(non-precision approach). In the future GNSS precision approach (Cat- I) might be established.

Proper noise abatement procedures for departure and approach(landing) must be established at all airports and adjusted according to the population density of the urban areas.

(5) Air Space Requirement at New Tashkent Airport

Air space condition of new Tashkent airport is better tha existing Tashkent airport to be on plane area without terrain obstacle. Standard instrument departure procedure and instrument approach procedure will be proper to be established on any direction.

When both Tashkent airport and Tashkent new airport coexist, instrument flight procedures on either airport must be limited but keep efficiency with safe. It is proper that TRACON(Terminal Radar Approach Control) shall be established.

4.7.3 Air Traffic Control System Development

At the Air Traffic Control field, the improvements and functional advances of global operations systems shall be conducted, and since the adaptation to the integrated system on a world-wide scale is desirable, it is necessary to gradually adjust to this as ICAO develops in Uzbekistan, related to ATC, AIS, COM, SAR, MET, etc. shall be planned, being at the center of functional advance and performance of FANS/ATM.

Radar Data Processing System, Flight Data Processing System and RCAG(Remote Center Air-Ground Communication) or Control system of communication and data-link, etc. shall be introduced in a positive manner.

For the future, the total ATC center will most likely be established at the new Tashkent airport and it shall be the only facility using FANS and ATM(Air Traffic Control, Air Traffic Flow Management and Air Space Management) integration, including critical situation management for Air Traffic Services(ATS).

Finally, the regulation and practice procedures of ATC should be studied and applied to the ATS through adjustment of the technical conditions as SSR mode S, ACAS, VHS Data-link, ADS, MLS, GNSS, ILS(Cat-III) and R-NAV, etc..

4.7.4 Air Traffic Control Service Development

(1) Procedural Improvement

ATC Service Development shall be geared to the improvements of the airports. The increase in traffic volume and the global and regional trends at ICAO or other organizations, shall be taken into account. Especially cooperation with other CIS countries in the Central Asia region and the up-grade of ATC procedures corresponding to the enforcement of the ATC system should be necessary. It is also important to

conduct gradual improvements, on the basis of ATC operations and to establish the operational interface condition, between ATC equipment or system and controller's work.

- At the Aerodrome control, the ATC services, shall be established by visual control at the aircraft take-off or landing stage (Local control) and for local flight in the CTR, and the stage(Ground control) of maneuvering of aircraft or other vehicles on the ground.
- At the Approach Control and Area(En-route) Control, the provision of ATC services shall be conducted appropriately according to the improvements of the ATC equipment, Radar and Communication.
- Corporation with the neighboring ATC authority to establish regional effective ATC procedure.

To meet the future increase in and variety of, air traffic volume, it is therefore appropriate to conduct these first improvement steps in the current ATC systems and it is wise in the long term, to introduce or make qualitative advances of ATC services, according to the development in new types of aircraft and the introduction of FANS, etc.. At first, it is necessary to establish the ATC procedures corresponding to the ADS(Automated Dependent Surveillance) which is expected to be introduced as well as R-NAV on the stage of Area(En-route) control level.

And the definite improvement or adjustment is considered necessary for practical reasons as follows:

- The system of conducting ATC services efficiently shall be established for introducing the appropriate shift-system.
- Visual ATC by flashing 'light-gun' signals should be established.
- The procedure of ATC without radar service should be established as ICAO standards.

(2) ATC Institution of Training

The training system for the modernized or advanced ATC such as FANS, should be established in the future. As the advanced western made ATC equipment is gradually introduced at the local airports, familiarity with or technical development of, Air Traffic Controller should be assured. Regarding the ATC of International over-flights, International arrivals or departures, controllers should communicate in English, and conduct the ATC of ICAO standards, and understand the performance of western made aircraft. So a proper organization of ATC services and the ATC training system should be established. In the future, the training center should be advanced and generalized with an integrated training system.

According to the development or improvement of ATC systems, the enforcement of the constitution of 'Uzaeronavigation' should be necessary with regard to the completion of the rating system of ATC services and controllers, the advance of air safety inspection related to the case of mistaken provision of ATC service, the appropriate management of personnel affairs, the efficient assignment of personnel, the effective technical transfer from Russian specialists to local(Uzbekistan) staff and the appointment of female staff, etc.

4.8 Cost and Implementation Plan of Projects

4.8.1 Preliminary Cost Estimates

The summary of cost estimates for the long-term development of the priority airports is shown in **Table 4.8.1**.

4.8.2 Implementation Plan

Table 4.8.3 presents a general schedule for implementing an airport project.

Project costs by stage is shown in **Table 4.8.2**. required amount for the 1st Stage up to 2005 is estimated roughly at US$ 1,123 million, which is 40% of the total cost of the long-term development.

Table 4.8.2 Project Cost by Stages

(US$ 1,000)

Airport	I	II	III	IV	Total
[Airports]					
1. Tashkent	131,210	3,495	163,636	34,401	332,732
2. New Tashkent	156,593	439,650	172,818	21,980	791,041
3. Namangan	198,126	0	18,015	35,950	252,091
4. Andizhan (Extension)	83,708	6,206	30,019	16,223	136,156
5. Andizhan (New Runway)	125,028	6,206	30,300	16,223	177,757
6. Fergana	183,257	0	26,409	35,950	245,616
7. Kokand	3,128	0	28,512	966	32,606
8. Samarkand	1,934	61,532	33,050	2,900	99,416
9. Termez	89,622	15,830	36,036	35,852	177,340
10. Karshi	12,070	83,917	0	966	96,953
11. Bukhara	1,934	61,799	58,051	16,169	137,953
12. Navoi	40,365	0	77,952	966	119,283
13. Urgench	0	58,653	53,598	7,621	119,872
14. Nukus	96,665	22,459	9,212	49,620	177,956
[Nationwide Air Navigation System]	19,164	7,186	2,395	19,164	47,909
Total	**1,142,804**	**766,933**	**740,003**	**294,951**	**2,944,681**
	40%	27%	23%	10%	100 %

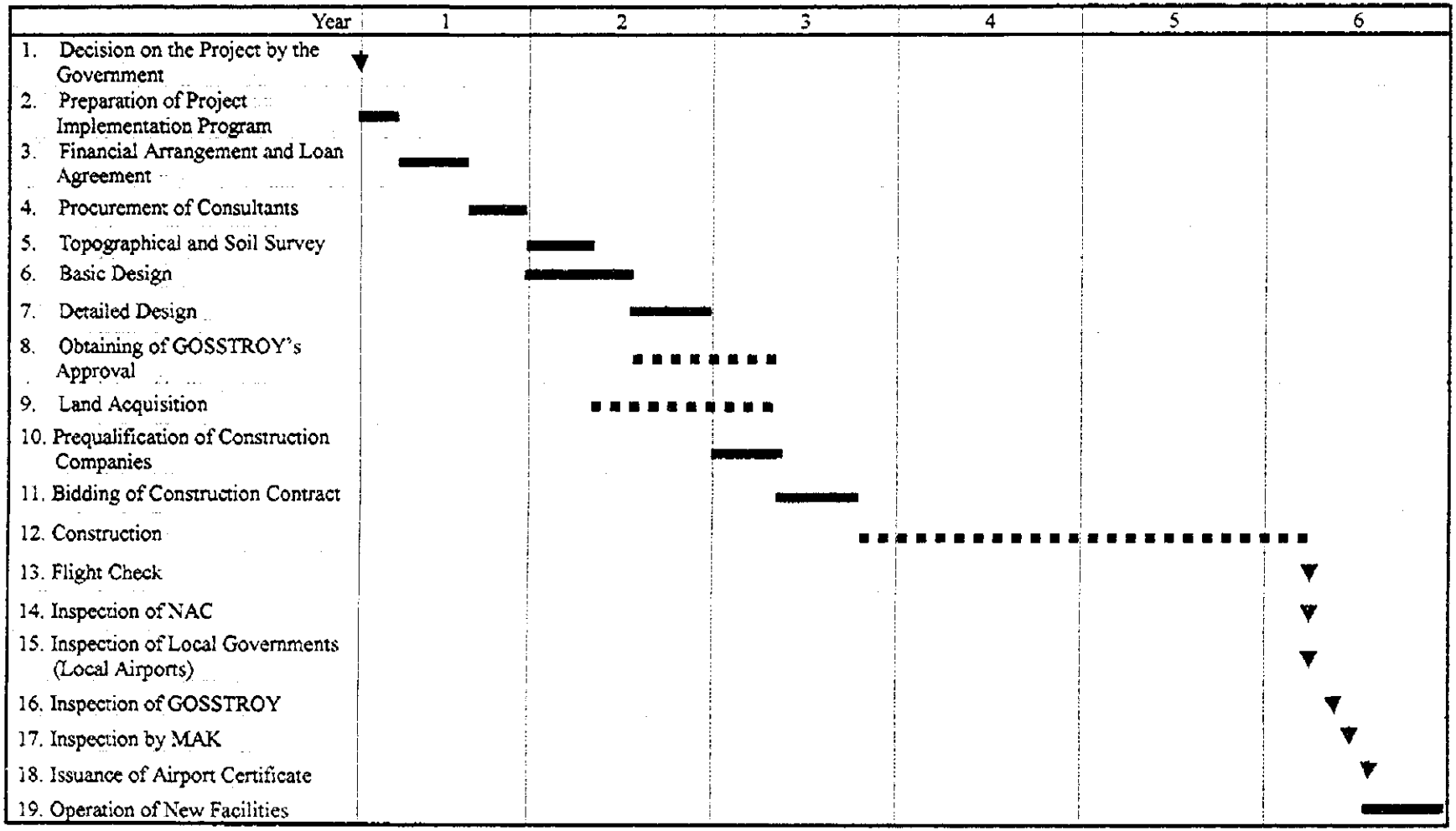
Table 4.8.1 Preliminary Cost Estimates for Long-Term Development of Priority Airports

(US$ 1,000)

Airport	Airfield Facilities	Terminal Area Facilities	Air Navigation Facilities	Airport Specila Equipment	Utilities	Project Administration Expenses	Compensation	Subtotal	Contingencies	Total	(%)
	1	2	3	4	5	6	7	8	9	10	11
[Airports]											
1. Tashkent	48,118	104,451	96,477	7,580	30,212	45,894	0	332,732	33,273	366,005	11%
2. New Tashkent	285,615	259,868	42,491	5,264	78,406	80,597	38,800	791,041	79,104	870,145	27%
3. Namangan	93,185	46,125	61,149	647	13,283	34,302	3,400	252,091	25,209	277,300	9%
4. Andizhan (Extension)	24,960	46,849	27,144	832	17,591	18,780	0	136,156	13,616	149,772	5%
5. Andizhan (New Runway)	60,823	46,849	27,144	832	17,591	24,518	0	177,757	17,776	195,533	6%
6. Fergana	76,819	54,409	61,149	832	18,529	33,878	0	245,616	24,562	270,178	8%
7. Kokand	6,077	6,855	12,450	46	1,776	4,352	1,050	32,606	3,261	35,867	1%
8. Samarkand	11,886	29,865	32,658	601	10,694	13,712	0	99,416	9,942	109,358	3%
9. Termez	13,647	59,754	60,981	739	17,586	24,433	200	177,340	17,734	195,074	6%
10. Karshi	15,353	40,522	13,451	546	13,708	13,373	0	96,953	9,695	106,648	3%
11. Bukhara	21,554	49,334	32,658	739	14,640	19,028	0	137,953	13,795	151,748	5%
12. Navoi	33,389	33,626	25,151	508	10,156	16,453		119,283	11,928	131,211	4%
13. Urgench	17,715	38,917	30,991	785	14,930	16,534	0	119,872	11,987	131,859	4%
14. Nukus	25,910	48,903	60,981	739	16,877	24,546	0	177,956	17,796	195,752	6%
[Nationwide Air Navigations System]			41,660			6,249	0	47,909	4,791	52,700	2%
(%)	25%	29%	21%	1%	9%	13%	1%	(100%)			
Total	**735,051**	**866,327**	**626,535**	**20,690**	**275,979**	**376,649**	**43,450**	**2,944,681**	**294,468**	**3,239,149**	**100%**

Note : Total amount is the sum of the above all cases.

Table 4.8.3 Implementation Schedule of an Airport



4.9 Preliminary Economic Analysis

Purpose of the preliminary economic analysis is to make an evaluation of the economic worth brought about in the Republic of Uzbekistan by implementing development project of the study airport.

The economic evaluation is generally made in terms of the Economic Internal Rate of Return (EIRR) on the net present value (NPV) of the Project derived from the cost-benefit analysis made from the viewpoint of the national economy.

Table 4.9.1 Concept of Cost-Benefit Analysis

	The Base Case "with the project" (B)	The Project Case "without the project" (P)	Difference (D)=(B)-(P)	EIRR (Economic Internal Rate of Return) (E)
Costs	Cb	Cp	Cd = Cb - Cp	EIRR = E ; calculating from the following formula $\sum_{t} \frac{(Bd-Cd)}{(1+E)^t} = 0$ where t = year (1, 2....)
Benefits	Bb	Bp	Bd = Bb - Bp	

4.10 Evaluation of Priority Projects

4.10.1 Priority Projects

(1) Air Transportation Facility Development Projects

Through the master planning for long-term development plan of airports and nationwide air navigation system, the following ten (10) projects are selected as the priority projects for modernization of the air transportation development in Uzbekistan.

Project 1 **(PJ-1)**	Development of Existing Tashkent Airport (Class I Airport)
Project 2 **(PJ-2)**	Development of New Tashkent Airport (Class I Airport)
Project 3 **(PJ-3)**	Development of Namangan Airport (Class II Airport)
Project 4 **(PJ-4)**	Development of Fergana Airport (Class II Airport)
Project 5 **(PJ-5)**	Development of Samarkand Airport (Class II Airport)
Project 6 **(PJ-6)**	Development of Termez Airport (Class II Airport)
Project 7 **(PJ-7)**	Development of Bukhara Airport (Class II Airport)
Project 8 **(PJ-8)**	Development of Urgench Airport (Class II Airport)
Project 9 **(PJ-9)**	Development of Nukus Airport (Class II Airport)
Project 10 **(PJ-10)**	Development of Nationwide Air Navigation System

(2) Management Development Projects

In addition to the above projects, through the review on the organization and

management procedure of NAC as stated in Chapters 6 and 7, the following four (4) projects related to the institutional and management modernization of NAC are selected.

Project 11 **(PJ-11)**	Program for Establishment of Department of Civil Aviation
Project 12 **(PJ-12)**	Improvement Program of Accounting and Management System of Airport Operation
Project 13 **(PJ-13)**	Program for Establishment of Corporate Planning Procedure for Airline Management
Project 14 **(PJ-14)**	Strengthengening Program for Safety Operation in Aviation Sector

4.10.2 Evaluation Criteria of Priority Projects

(1) Evaluation Criteria of Air Transportation Facility Development Projects

Regarding the ten (10) Air Transportation Facility Development, evaluation was made from the viewpoints of the priority in national development plan, urgency of improvement, and efficiency of investment in order to select the high priority airports for subsequent pre-feasibility study. Evaluation was made at 3 grades, namely high (1), medium (2), and low (3). Evaluation criteria consist of the following items:

a) Necessity of Urgent Improvement for Safety and Services

b) National Development Priorities

c) Importance in Air Transport Network of Uzbekistan

d) Project Cost

e) National Economic Cost and Benefit

f) Environmental Impact by Airport Development

(2) Evaluation Criteria of Management Development Projects

Regarding the four (4) Management Development Projects, it is difficult to adopt the same criteria for evaluation of air transportation facility development projects. Therefore, those projects are evaluated through the review of the present situation of management procedures in NAC.

4.10.3 Selection of High Priority Projects

(1) Selection of Air Transportation Facility Development Projects

Results of evaluation are shown in **Table 4.10.5**. Based on the results of evaluation, among ten (10) projects of air transport facility development, the following four (4) airports are selected as the High Priority Airports for the Pre-Feasibility Study, except Samarkand, Bukhara and Urgench airports, of which the modernization projects are now being implemented, and Fergana airport being controlled by military.

- Tashkent (including New Airport)
- Namangan Airport
- Termez Airport
- Nukus Airport

- Nationwide Air Navigation System

(2) Selection of Management Development Projects

As shown in **Table 4.10.5**, the following projects are selected in order to make recommendation on organization, operation and management related to air transportation development in Uzbekistan.

- Program for Establishment of Department of Civil Aviation
- Improvement Program of Accounting and Management System of Airport Operation
- Program for Establishment of Corporate Planning Procedure for Airline Management
- Strengthening Program for Safety Operation in Aviation Sector

Table 4.10.5 Evaluation of Air Transportatation Development Projects

Evaluation Items	Long-Term Developemnt Projects for Air Transportation in Uzbeksitan													
	PJ-1	PJ-2	PJ-3	PJ-4	PJ-5	PJ-6	PJ-7	PJ-8	PJ-9	PJ-10	PJ-11	PJ-12	PJ-13	PJ-14
	Master Plans for Air Transportation Facilities													
	Metropolitan Airport		Local Airprots											
	Existing Tashkent	New Tashkent	Namangan	Fergana	Samarkand	Termez	Bukhara	Urgench	Nukus	Air Navigation System	Program for Establishment of Department of Civil Aviation	Improvement Program of Airport Management	Training Program for Airline Management	Strengthening Program of Safety Operation
Outline of Projects	Improvement of Existing Facilitates	New Airport	New Runway	New Runway	Improvement of Existing Facilities	Improvement of Existing Facilities	Improvement of Existing Facilities	Improvement of Existing Facilities	Improvement of Existing Facilities	Modernization of Nationwide Air Navigation Facilities	Establishment of New Department of Civil Aviation	Improvement of Airport Management	Improvement of Corporate Planning Improvement	Improvement of Training Program for Pilot and Mechanics
A Urgency of Improvement	1	2	1	1	3	2	3	3	1	1	1	1	1	1
B National Development Priority	1	1	3	2	2	2	2	2	3	1	1	1	1	1
D Importance of Air Transport Network	1	1	2	2	2	2	2	2	2	1	3	1	1	3
E Air Transport Demand	1	1	3	2	2	3	3	3	3	-	-	-	-	-
(Passengor demand in 2020: thousand)	(4,470)	(4,470)	(700)	(1,220)	(950)	(630)	(750)	(870)	(570)					
F Project Cost	1	2	3	2	1	3	2	1	3	-	-	-	-	-
(Cost/Passenger)	(US$5)	(US$15)	(US$25)	(US$11)	(US$7)	(US$20)	(US$13)	(US$10)	(US$22)					
G National Economic Benefit	1	1	2	1	2	2	3	3	1	-	-	-	-	-
(EIRR)	(20.50%)	(10.01%)	(5.58%)	(11.01%)	(7.95%)	(5.66%)	(Invalid)	(Invalid)	(9.64%)					
H Environmental Impact	3	2	2	2	2	1	2	2	2	-	-	-	-	-
I **Total Point**	**9**	**10**	**16**	**12**	**14**	**15**	**17**	**16**	**15**					
J Overall Evaluation	High priority project due to international hub airport	High priority project due to international hub airport	High priority project due to regional core airport	A high priority airport, but under military control	Not a high priority project due to the ongoing project	High priority project due to regional core airport	Not a high priority project due to the ongoing project	Not a high priority project due to the ongoing project	High priority project due to regional core airport	High priority project due to superannuation of the existing facilities	High priority project in order to modernize the present organization	High priority project in order to improve the present account system and management procedures.	High priority project in order to improve the management procedures for airline business.	High priority project in order to strengthen the safety operation.
(Order of Priority)	1	2	5	9	6	3	8	7	4					
L **Selection of High Priority Projects**	●	●	●			●			●	●	●	●	●	●

CHAPTER 5
ENVIRONMENTAL STUDY

CHAPTER 5 ENVIRONMENTAL STUDY

5.1 Standard

5.1.1 Aircraft Noise Level

The standard method for evaluation of aircraft noise level used in Japan is WECPNL. Although the standards between Uzbekistan and other countries are different to simply compare, according to converted L_{Aeq}, the aircraft noise level standard of Uzbekistan seems to be the same as the standard of other countries.

5.1.2 Air Quality

The quality norms of ambient air of Uzbeksitan are based on the norms prepared by specialist of Ministry of Health of the USSR in 1991.

5.1.3 Water Quality

The water quality standards in Uzbekistan are based on the water protection in USSR. Ministry of Health of the USSR established the water quality standard in 1988.

5.2 Issues at Present

5.2.1 Meteorology

(1) Uzbekistan

Uzbekistan has a warm, sharply continental and very arid clime same as the other Central Asia republics. Temperature of the air climbs to 40 - 45°C at noontime in the summer months. There is considerable difference between summer and winter temperature and sudden sharp changes in the weather.

(2) Tashkent City (Tashkent airport)

Tashkent Airport is influenced under two major climes, namely, severe continental and dryness. It is unstable and wet in winter that starts in December and ends in March, the date of snow-cover appearance is marked approximately from 15 December to 20 February.

The climatological data were measured at 430m height of sea level in Tashkent airport (41°15' 26" N, 69°16' 54" E). The monthly average wind speed is in the range of 1.5 to 2.2 m/sec, the prevailing wind throughout the year generally comes from northwest.

The monthly average, maximum and minimum temperatures are in the ranges of 0.8°C to 27.0°C, 6.4°C to 35.7°C and -3.6°C to 19.4°C, respectively.

(3) Sirdarya Town

The monthly average wind speed is in the range of 1.4 to 2.2 m/sec, dominant wind directions are north, north-west and west.

The monthly average, maximum and minimum temperatures are the range of-17.8°C to 26.7°C, 19°C to 45.0°C and -32°C to 9.0°C in 1936-1992.

5.2.2 Environmental Quality

(1) Air Quality

The air quality was measured near Tashkent loess valley once by UZGYdraMet for four air substances: inorganic dusts, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and carbon monoxide (CO). Air quality of all substances does not exceed the standard.

(2) Water Quality

Water quality of organic matters was monitored in Chirchik River, Boz-suv channel, Sirdarya River and Keles river for the period of 1988-1992. The range of BOD5 was from 1.10mg/l to 3.87mg/l. BOD5 of Chirchik River were highest comparing level with each other. The range of phenol concentration were 0.001mg/l to 0.008mg/l, each river concentration were same level.

5.3 Initial Environmental Evaluation (IEE)

5.3.1 Basic Concept

The purpose of Initial Environmental Evaluation (IEE) is to examine the environmental impact which might be caused by the airport development, and to select items for Environmental Impact Analysis, which is to be carried out in the 2nd field survey in Uzbekistan for Feasibility Study on selected priority projects.

5.3.2 Environmental Condition of the Project Site

Environmental condition of the 14 project sites was examined in terms of social and natural environment, and pollution.

5.3.3 Screening

Screening is a process to identify whether or not a project requires environmental impact assessment and the level of assessment. This process was performed by using a check list method.

5.3.4 Scoping

Scoping is a process to select the major environmental items, which may cause impact to surrounding area of the airport by the implementation of the project. This process was performed by using a check list method.

Table 5.4.1 Summary of Scoping of Priority Airports

	Environmental Items	New Tashkent	Tashkent	Andizhan	Namangan	Fergana	Kokand	Samarkand	Termez	Karshi	Bukhara	Navoi	Urgench	Nukus
[Social Environment]														
1	Resettlement	B	D	D	D	D	D	D	D	D	D	D	D	D
2	Economic Activities	B	D	D	D	D	D	D	D	D	D	D	D	D
3	Traffic & Public Facilities	B	C	C	C	C	D	D	D	C	D	D	C	C
4	Split of Communities	B	D	D	D	D	D	D	D	D	D	D	D	D
5	Cultural Property	C	D	D	D	D	D	D	D	D	D	D	D	D
6	Water Right & Right of Comm.	C	D	D	D	D	D	D	D	D	D	D	D	D
7	Public Health Condition	B	D	D	D	D	D	D	D	D	D	D	D	D
8	Waste	B	D	D	D	D	D	D	D	D	D	D	D	D
9	Hazards (Risk)	B	B	B	B	B	D	B	D	D	C	D	C	D
[Natural Environment]														
10	Topography & Geology	A	D	D	D	D	D	D	D	D	D	D	D	D
11	Soil Erosion	A	D	D	D	D	D	D	D	D	D	D	D	D
12	Ground Water	A	D	D	D	D	D	D	D	D	D	D	D	D
13	Hydrological Situation	A	D	D	D	D	D	D	D	D	D	D	D	D
14	Coastal Zone	D	D	D	D	D	D	D	D	D	D	D	D	D
15	Fauna and Flora	C	D	D	D	D	D	D	D	D	D	D	D	D
16	Meteorology	C	D	D	D	D	D	D	D	D	D	D	D	D
17	Landscape	A	D	D	D	D	D	D	D	D	D	D	D	D
[Pollution]														
18	Air Pollution	C	C	C	C	C	D	D	D	C	D	D	C	C
19	Water Pollution	C	D	D	D	D	C	C	C	C	C	C	D	D
20	Soil Contamination	C	D	D	D	D	C	C	C	C	C	C	D	D
21	Noise and Vibration	C	B	B	B	B	D	D	D	C	D	D	B	B
22	Land Subsidence	C	D	D	D	D	D	D	D	D	D	D	D	D
23	Offensive Odor	C	D	D	D	D	D	D	D	D	D	D	D	D

Note : Evaluation Category

A: Serious impact is expected
B: Some impact is expected.
C: Extent of impact is unknown. (Examination is needed. Impacts may become clear as study progress)
D: No impact is expected. IEE/EIA is not necessary.

CHAPTER 6

PRE-FEASIBILITY STUDIES FOR HIGH PRIORITY PROJECTS

CHAPTER 6 PRE-FEASIBILITY STUDIES FOR HIGH PRIORITY PROJECTS

6.1 General

6.1.1 High Priority Projects

Selected High Priority Projects, which were agreed by NAC, are as follows:

- Development of the capital airport, i.e. development of the existing Tashkent Airport or New Tashkent Airport;
- Development of local airports including Namangan, Termez and Nukus Airports; and
- Development of Nationwide Air Navigation System.

6.1.2 Target Year for Development

Facility and land requirement analysis was made to provide adequate capacity to cope with the demand in;

- 5 years for facility;
- 10 years for land area;

After completion of the development, thus targeting the years 2010 for facility development, and 2015 for land acquisition.

However, regarding development of New Tashkent Airport, target year for development and implementation period have been shifted to 5 years later, taking into account the development of the existing international passenger terminal building at Tashkent airport financed by EBRD (European Bank for Rehabilitation and Development).

- Target Year for Development

Facility	Year 2010 (except New Tashkent)
	Year 2015 (New Tashkent)
Area	Year 2015 (except New Tashkent)
	Year 2020 (New Tashkent)

- Project Implementation Period — Present – 2005 (except New Tashkent)
  Year 2000 – 2010 (New Tashkent)

6.1.3 Scope of Development

Based on the demand forecast and results of discussions with respective airport organization during the second field survey, scope of development was established as shown in **Table 6.1.2**.

Table 6.1.2 Summary of Development Plan

○ Rehabilitation ● Newly

Development Item	Tashkent	New Tashkent	Namangan	Termez	Nukus
1. Airfield facilities					
1.1 Runway		●			
1) Extension of length			○		
2) Expansion of width			○	○	
3) Overlay	○		○	○	○
4) Shoulder	○		○	○	○
5) Turning Pad	○		○		
1.2 Runway strip					
1) Overrun		●			
2) Earthwork (Expansion Area)			○		
3) Drainage(Expansion Area)			○		
4) Perimeter Road			○	○	
5) Perimeter Fence			○		
1.3 Taxiway		●			
1) Extension of Length				○	○
2) Expansion of Width	○			○	○
3) Overlay	○		○	○	○
4) Shoulder			○		
1.4 Apron		●		○	○
1) Expansion			○	○	○
2) Overlay	○Dom.		○	○	○
3) Shoulder and Service Road	○Dom.		○		
2. Terminal Facilities					
2.1 Passenger Terminal Building	○Dom	●Int'l	○Int'l	○Int'l	○Int'l
2.2 Cargo Terminal Building	○	●Int'l	○	○	○
2.3 Tower and Administration Bldg		●	○	○	○
2.4 Fire station		●	○	○	○
2.5 Power station		●	○	○	○
2.6 Road and car park		●Int'l	○	○	○
2.7 Aircraft hanger	○	●			
2.8 Utilities		●	○	○	○
2.9 Fuel supply system	○	●			
3.Air Navigation System					
3.1 Radio Navaids					
1) ILS ,Locator		●	○	○	○
2) VOR/DME	○	●	●	●	●
3.2 ATC System and Telecomm.					
1) Control Tower Facilities, TRDPS					
2) ASR/SSR, AFTN		●	●	●	●
3) ASDE		●	○	○	○
3.3 Airfield Lighting System	●				
1) PALS, SALS, PAPI					
2) REDL, RTHL, TWEL, AFL		●	●	●	●
3) Aerodrome Beacon, Power		●	○	○	○
Supply system for Navaids		●	●	●	●
3.4 Meteorological Observation System					
1) Wind direction, and Speed Sensor, Air temperature and Humidity Sensor, Barometer		●	○	○	○
2) RVR and Ceilometer, Data Collection and Processing System, Weather data Monitor, Forecast Equipment		●	●	●	●
3) Weather Radar	●	●			

Note Int'l: International Dom.: Domestic

6.2 Preliminary Design

6.2.1 Development of Existing Tashkent Airport

(1) Summary Development Plan

As the short-term development plan, the scope of the project has been set based on the forecast airport traffic of the target year 2010 taking into account the requirements mentioned above.

- airfield and air navigation facilities to satisfy international standards;
- provide comfortable facilities and qualified services suitable for the gateway to the Central Asia;
- achieve comfortable and speedy service grade for transfer (between International and CIS flights, between International and Domestic flights) passengers adequate for international hub airport;
- develop air cargo transportation center for CIS countries.

The scope of the project excludes the modernization of the international-related facilities being undertaken on the basis of EBRD finance.

Tables 6.2.2 shows summary development plan of this project of this project, and **Fig.6.2.1** presents facility layout plan of the year 2010.

Table 6.2.2 Summary Development Plan of Existing Tashkent Airport

FACILITIES		CONTENTS
Planning Parameters		Passenger Int'l/CIS 2032thousand Dom. 1079 thousand Cargo 41.3thousand
Largest Aircraft		B767(Medium-Jet)
Airfield	**Runway**	
	Taxiway	(Widen taxiways 1 to 6,11 to 15 to 23m with 7.5m wide shoulders. Reinforce pavement by overlay.)
	Apron	(Int'l Apron :Improvement of apron under Planning) Domestic Apron : Improvement Area 8.6ha
Terminal	**Passenger Bldg.**	(Int'l/CIS :Improvement under construction and under planning) Domestic : Expansion of floor space to 8,400m^2
	Cargo Bldg.	Expansion of floor space to 8,000m^2
	Other Facilities	Rescue & Fire Fighting 1,460m^2(CAT.8) Car park 5.1ha (1460 spaces)
Air-Nav.	**Airfield Lighting**	-
	Radio-Nav. & Telecom.	Install ASDE. Renew VOR/DME.

Note: Items shown in ( ) are to be implemented separately and are out of the scope of this project.

(2) Preliminary Design and Scope of this Project

a) Airfield Facilities

Rehabilitation of taxiways and international apron is to be carried out by EBRD financed project and, therefore, domestic apron improvement only is included in the scope of this project.

Existing apron capacity is adequate to cater for the demand of the target year 2010, however,

the existing pavement of the domestic aprons needs to be reinforced by phased demolition and reconstruction of cement concrete.

b) Passenger Terminal Building

The domestic passenger terminal building requires total floor area of 8,400 m² in order to cater for the forecast traffic of the target year 2010, 5,480 m² more compared to the existing floor area of 2,920 m².

The existing domestic passenger building lacks for arrival facilities, which need to be developed for passenger and greeter's convenience.

It is preferable to expand the existing domestic passenger building to southward (toward the airside).

One (1) level passenger-processing concept has been adopted considering the following:

- there is ample apron area and relocation of parking stands is acceptable,
- nose-in/push-out aircraft parking concept is not achievable and therefore aircraft embarkation/disembarkation by ramp bus is inevitable even in future.

Expansion of the domestic passenger building needs to be made in the manner shown in **Table 6.2.4**, in order to maintain operation of the building:

- construct the expansion area with adequate separation from the existing one to keep the existing building operable (Phase 1),
- after completion of the expansion, transfer the building function to the expanded area, and demolish a part of the existing one to build corridor connecting the expanded and existing buildings (Phase 2),
- convert the existing lobby to office, shop and restaurant (Phase 3),
- completion of expansion work (Phase 4).

Expansion plan of the domestic passenger terminal building is shown in **Fig.6.2.2**.

c) Other Terminal Facilities

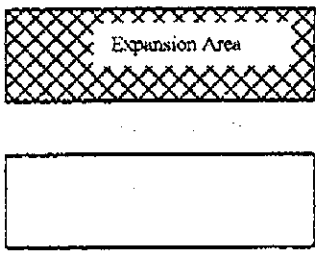
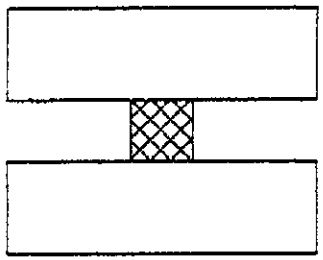
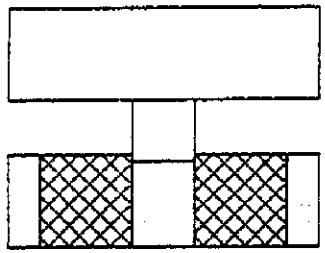
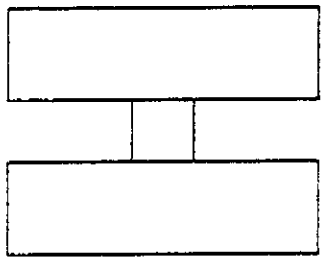
Cargo terminal building and car park need to be expanded in order to cater for the forecast demand of the target year 2010 while the other facilities need not to be expanded.

(3) Air Navigation Aids

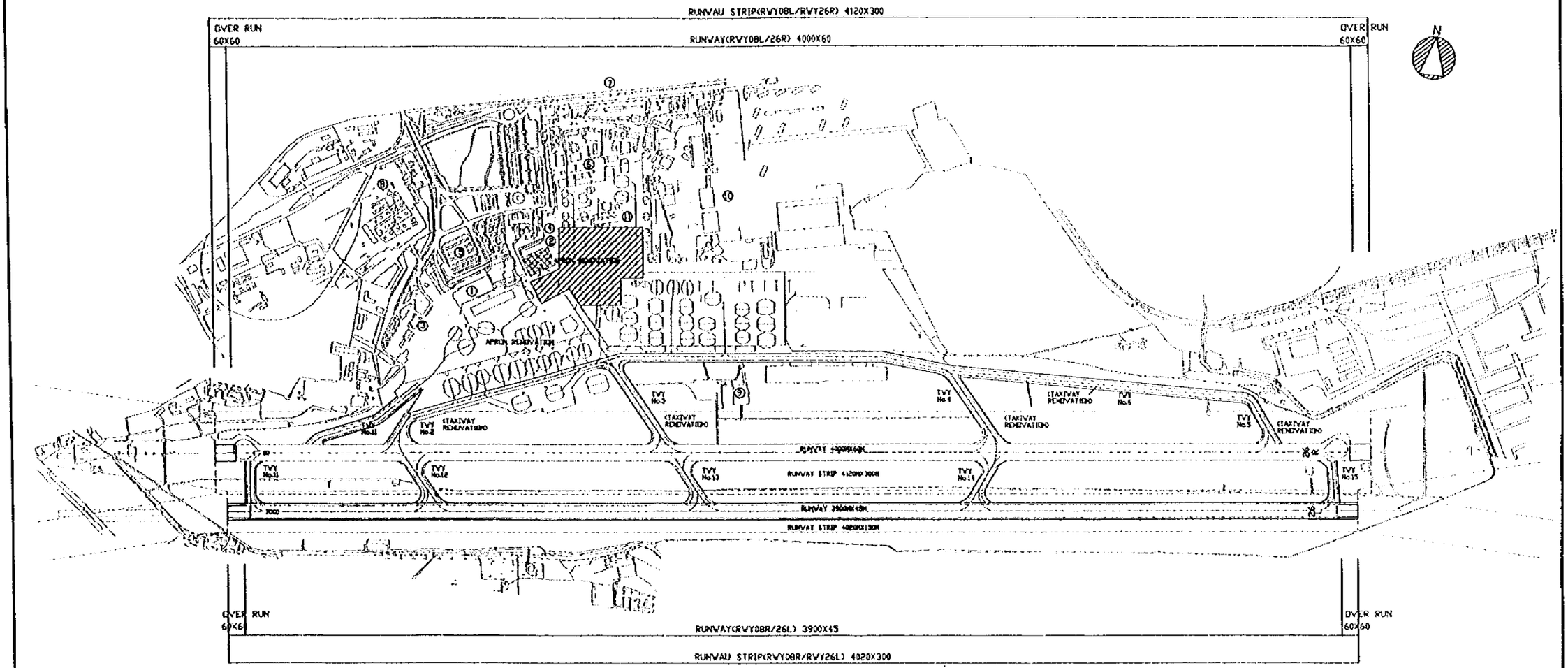
Following facilities should be installed or renewed:

- renewal of VOR/DME,
- installation of new Airport Surface Detection Equipment(ASDE),
- renewal of weather radar.

Table 6.2.4 Phasing Plan for Expansion of the Existing Domestic Passenger Terminal Building

Phase I	Phase II	Phase III	Phase IV
Expansion Area  **Existing Area**	**Expansion Area**  **Existing Area**	**Expansion Area**  Conversion of lobby to office, shop and restaurant **Existing Area**	**Expansion Area**  **Existing Area**
Provide adequate separation between expansion and existing areas so as to maintain the existing one operable.	After completion of the expansion area, transfer the building function from existing building to expanded one. Demolish a part of existing area to build corridor connecting the expanded and existing areas.	Convert the existing lobby to office, shop and restaurant.	Completion of expansion work.

6-5



Development Plan (Case-1) Tashkent

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger Int'l/CIS 2032thousand Dom. 1079 thousand Cargo 48.3thousand
Max. Aircraft		B767(Medium-Int)
Air-field	Runway	RWY08R/26L Improvement Shoulder 7.5m wide Both Runway Pavement overlay
	Taxiway	No 1-6,11-15 Widen up to width 23m with 7.5m shoulder Pavement overlay
	Apron	Int'l Apron :Improvement of apron under Planning Domestic Apron : Improvement Area 8.6ha
Terminal	Passenger Bldg.	Int'l/CIS Improvement under Construction and under Planning Domestic : Expansion up to 8,400m²
	Cargo Bldg.	8,000m²
	Other Facilities	Rescue & Fire Fighting 1,460m²(CAT 8) Car parking 5.1ha (1460 lots)
Air-Nav	Airfield Lighting	
	Radio-Nav.& Telecom.	New ASDE Renewal VOR/DME

Fig. 6.2.1 Tashkent Airport Development Plan (2010)

TERMINAL AREA			
1	Int'l Passenger Terminal Building	8	Fuel Tank Farm
2	Dom. Passenger Terminal Building	9	Fire Station
3	VIP Building	10	Aircraft Maintenance Area
4	Control Tower and Operation	11	Aircraft Maintenance Office
5	Car Park		
6	Cargo Handling Area		
7	Administration Area		

AIRPORT DATA			
Airport Name	Tashkent	Elevation	431m
Class	I	Reference Temperature	29°C
Province	Tashkent	Runway	4000mx60m
Main City	Tashkent		3900mx45m
Distance from city	6km south	Direction (True north)	N 82° E
Reference Point	N 41° 15' 24"	Instrument Runway	08L/08R/26R
Coordinates	E069° 16' 24"	ILS Category	CAT-II

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Tashkent Airport		
Drawing Tittle	Airport Layout Plan (Year 2010)		
Date		Scale	

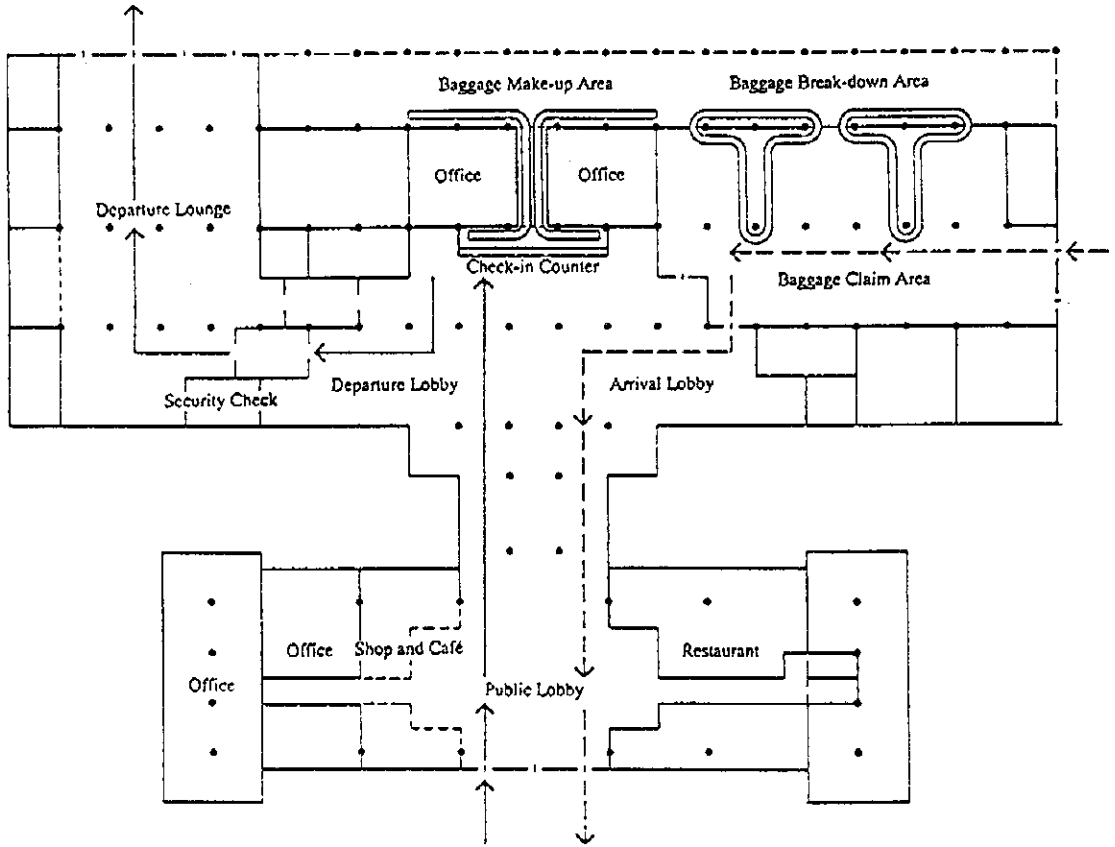


Fig. 6.2.2 Tashkent Airport Domestic Passenger Terminal Layout Plan (2010)

6.2.2 New Tashkent Airport

(1) Summary Development Plan of New Tashkent Airport

Development of the existing Tashkent Airport imply some problems shown below:

- increase of aircraft noise pollution on residential area;
- impediment of Tashkent City development due to occupation of large area by the airport; and
- difficulty in expanding the existing Tashkent Airport due to geographical constraint,

which may hinder the existing Tashkent Airport from playing the role as the hub airport of the Central Asia.

Construction of New Tashkent Airport has been discussed hereunder as an alternative solution to the development of the existing airport.

The new airport also needs to meet the same requirements as the hub airport specified for the existing Tashkent Airport. However, in order to minimize initial investment, one 4,300m long runway only is included in the scope of the project, securing future possibility of constructing a second close parallel runway.

Attention has also been paid to land use of the terminal area in order to provide adequate space for future relocation of aircraft maintenance facilities from the existing airport.

Development of the New Tashkent Airport is to be made in accordance with the functional distribution of capital airports shown in Table 4.5.9 of Chapter 4, and construction of the following facilities is included in the short-term development plan of this project:

- airfield facilities such as runway, taxiway and apron,
- international and CIS related passenger and cargo facilities,
- administration facilities.

Summary development plan of the New Tashkent Airport has been set as shown in **Table 6.2.5**, and airport layout plan is shown in **Fig.6.2.4**.

(2) Location and Orientation of Runway

Location and orientation of the runway has been determined as shown in **Fig.6.2.5** considering the following:

- Environmental impact
- Economical development
- Adequate usability factor
- Location of site : Approx. Lat. N41° 01.5', Lon. E68° 53.5'
- Runway Orientation : Approx. N58.7° E

Table 6.2.5 Summary Development Plan of New Tashkent Airport

FACILITIES		CONTENTS
Air Traffic (Yr.2015)		Passenger 3,800 thousand (Int'l/CIS) Cargo 4.7 thousand (Int'l/CIS)
Largest Aircraft		B747(Large-Jet)
Airport Area		390ha
Airfield	Runway	Length 4300m Width 60m
	Taxiway	One full parallel and two apron taxiways plus four rapid exit and two exit taxiways
	Apron and aircraft parking	For Pax. : L-Jet 7, M-Jet 21, S-Jet/MP 3, Total 31 For Cargo : M –Jet 3 Maintenance Apron
Terminal	Passenger Bldg.	International/CIS 27,400m^2
	Cargo Bldg.	International/CIS 8,700m^2
	Others	Operation &Control Tower 5,700m^2 Aircraft Fuel Supply 6,820kl 14,300m^2 Rescue & Fire Fighting 900m^2(CAT.8) Car park 7ha (2,020 spaces)
Navaids	Airfield Lighting	ALS, SFL, PAPI, RCL, RWL, TWL, AFL
	Radio-Nav. & Telecom.	ILS, VOR/DME, NDB, ASR/SSR, ASDE

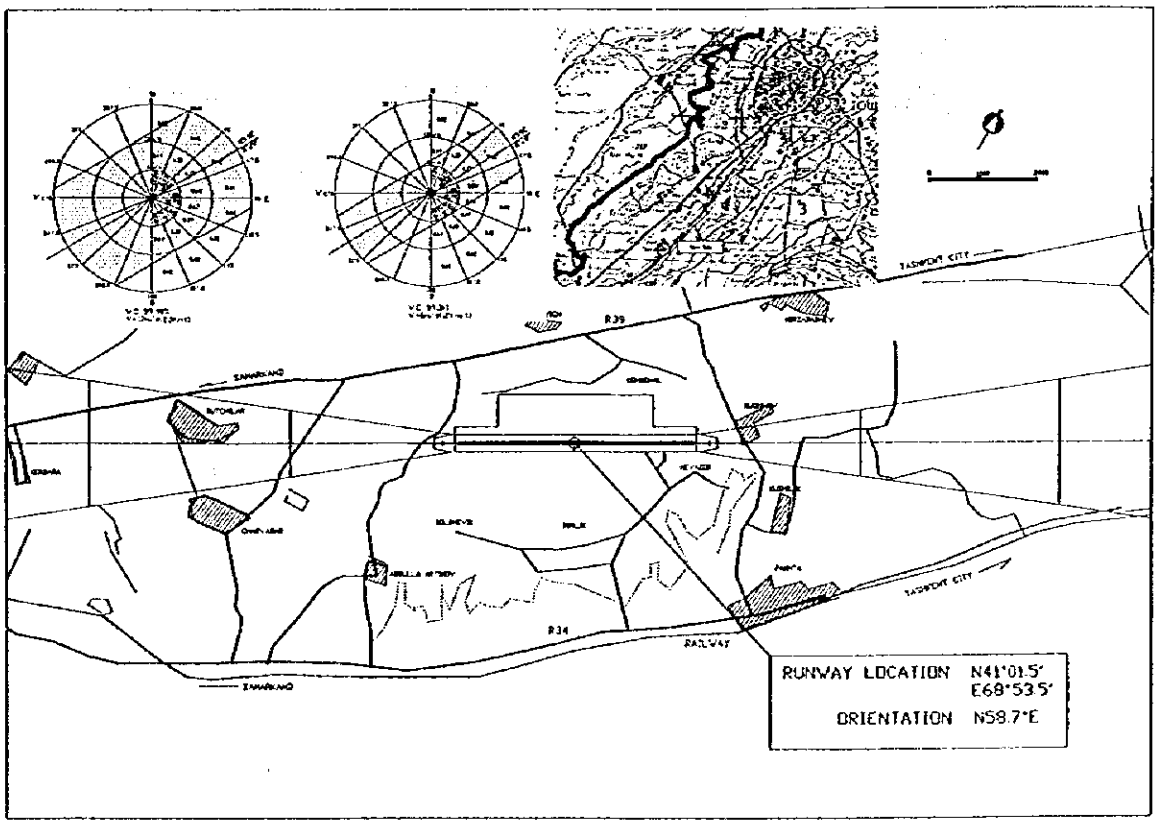


Fig. 6.2.5 Location and Orientation of Runway (New Tashkent Airport)

(3) Site Conditions

a) Geography

The average ground elevation of the site is 340 m ranging from 325 m at the lowest to 355 m at the highest. The ground moderately declines from northwest (terminal side) to southeast (runway side) at an average slope of 1.2 % from height of 350 m to 300 m.

b) Geological Conditions

According to the results of soil investigation, the soil in the proposed site for construction of new airport consists of mainly of sand loam fairly well consolidated with N value of around 10, and CBR value of around 4%.

c) Land Use

Most of the site is cotton field. There are also cotton fields and farmer houses near the site.

(4) Land Preparation Plan

Site Area	: Approx. 390ha
Average Planned Elevation	: Approx. 340m
Volume of Earthwork	: Fill volume 7,500,00m^3
	Cut volume 7,900,000 m^3

Average Height of Embankment and Excavation

: Approx. $\pm$2m

(5) Airfield Facilities

a) Runway

The dimension of the runway will be 4300 m long and 60 m wide with 7.5 m wide shoulder on each side of the runway, so that B747 class aircraft will be able to operate without any operational restrictions.

b) Apron

Following number of aircraft parking stands should be provided in order to meet forecast traffic of the target year 2015:

- 7 stands for L-JET aircraft,
- 21 stands for M-JET aircraft,
- 3 stands for S-JET and MP aircraft,
- 3 stands for freighter aircraft.

In addition to the aircraft parking stands mentioned above, maintenance apron, which will also be utilized as the overnight apron, needs to be provided.

(6) Terminal Area Facilities

As specified in Chapter 4, international and CIS related passenger traffic only will be handled at New Tashkent Airport at opening day.

a) Passenger Terminal Concept

Selection of the terminal concept is made, taking into account land area available, number of passengers and aircraft parking stands, and among them, the linear terminal concept has been employed for New Tashkent Airport.

b) Floor Plan of Passenger Terminal Building

Fig.6.2.18 presents floor plan of the international passenger terminal building.

(7) Other Terminal Facilities

Following facilities will be developed to meet forecast traffic of the target year 2015:

- cargo terminal building,
- car park,
- administration building and control tower,
- electrical substation.

(8) Air Navigation Facilities

Following navigation aids are required to meet the requirement of the target year 2015.

- Radio Navigation Aids
- ATC System and Telecommunications
- Airfield Lighting System
- Meteorological Observation System

(9) Access Facilities

The main access route is R39 (high-grade two-lane road for each way) which is to be connected by 1.5 km long approach road to the new airport.

Visitors using R34 or rail will need to come to the airport via rural road connecting R34 or rail station to R39, and finally the approach road.

Provision of a ramp has been proposed to connect R39 and the approach road so that airport related traffic can smoothly be split from the other traffic.

(10) Other Facilities related to Airport Development

a) Diversion of Water Channels and Power Cable Lines

Water channels and power cable lines need to be diverted.

b) Utility

Following utility facilities need to be provided to the new airport:

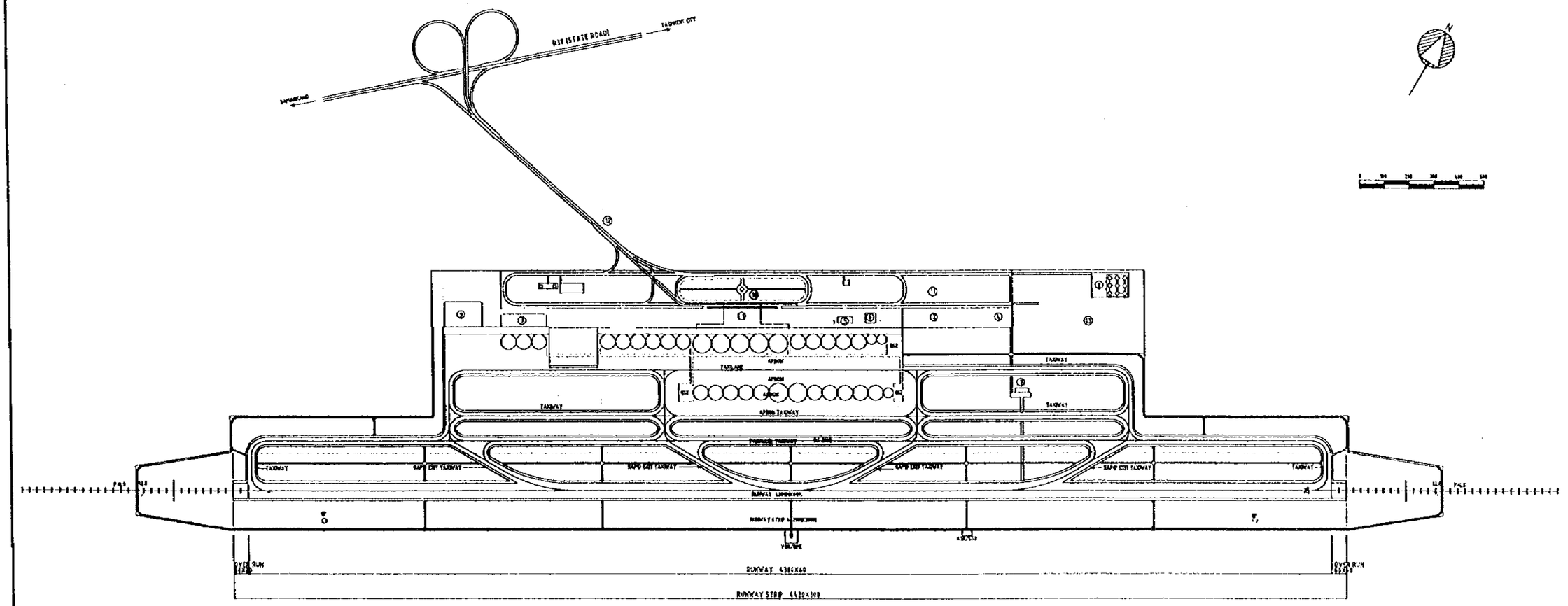
- power supply ; 6700 to 7210 KVA (20000 KVA if power for related facilities

are to be supplied) will be supplied from neighboring high voltage (220 KV) power cable line via newly built substation and power line,

- water ; 1170 to 1230 m^3 /day to be supplied from surrounding area,
- sewage ; 1170 to 1230 m^3 /day to be treated in the new airport and discharged to surrounding rivers,
- Waste; 3.4 to 3.6 t/day to be incinerated in the new airport and/or surrounding area.

c) Others

Some of the employees of the existing airport will need to be relocated to the new airport area, and their housing should be developed in the neighboring area or airport-related facility area (approx. 10 ha) within the new airport.



FACILITY REQUIREMENTS

FACILITIES		CONTENTS
Air Traffic (Yr.2015)		Passenger 3,800 thousand (Int'l/CIS) Cargo 4.7 thousand (Int'l/CIS)
Max. Aircraft		B747(Large-Jet)
Airport Area		390ha
Air-field	Runway	Length 4300m Width 60m
	Taxiway	1 Full Parallel ,2 Apron Taxiway , 4 Rapid Exit ,2 Exit
	Apron Passenger Others	Large-Jet 7 ,Medium-Jet 21 ,Small-Jet/Mint-Plane) Total 31 Cargo Medium -Jet 3 , Maintenance Apron
Terminal	Passenger Bldg.	International/CIS 27,400m²
	Cargo Bldg.	International/CIS 8,700m²
	Others	Operation & Control Tower 5,700m² Aircraft Fuel Supply 6,820kl 14,300m² Rescue&Fire Fighting 900m²(CAT 8) Car parking 7ha (2,020 lots)
Air-Nav	Airfield Lighting	ALS, SFL, PAPI, RCL, RWL, TWL, AFL. .
	Radio-Nav.& Telecom.	ILS,VOR/DME,NDB,ASR/SSR,ASDE

Fig. 6.2.4 New Tashkent Airport Development Plan (2015)

TERMINAL AREA			
1	International Passenger Terminal Bldg	8	Fuel Tank Farm
2	(Domestic Passenger Terminal Bldg.)	9	Hanger
3	International Cargo Terminal Bldg.	10	International Car Park
4	(Domestic Cargo Terminal Building)	11	(Domestic Car Park)
5	Operation and Control Tower	12	Access Road
6	Power Station	13	Dormitory,Operation Center etc.
7	Fire and Rescue Station		( )constructed at 2nd stage

AIRPORT DATA			
Airport Name	New Tashkent	Elevation (Rwy Center)	338m
Airport Classification	1	Reference Temperature	(29°C)
Province	Tashkent	Runway	4300mx60m
Main City	Tashkent		
Distance from city	45km south-west	Direction (True north)	N 58.7° E
Reference Point	N41° 02'	Instrument Runway	06/24
Coordinates	E68° 54'	ILS Category	CAT-II

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	New Tashkent Airport		
Drawing Tittle	Airport Layout Plan (Year 2015)		
Date		Scale	

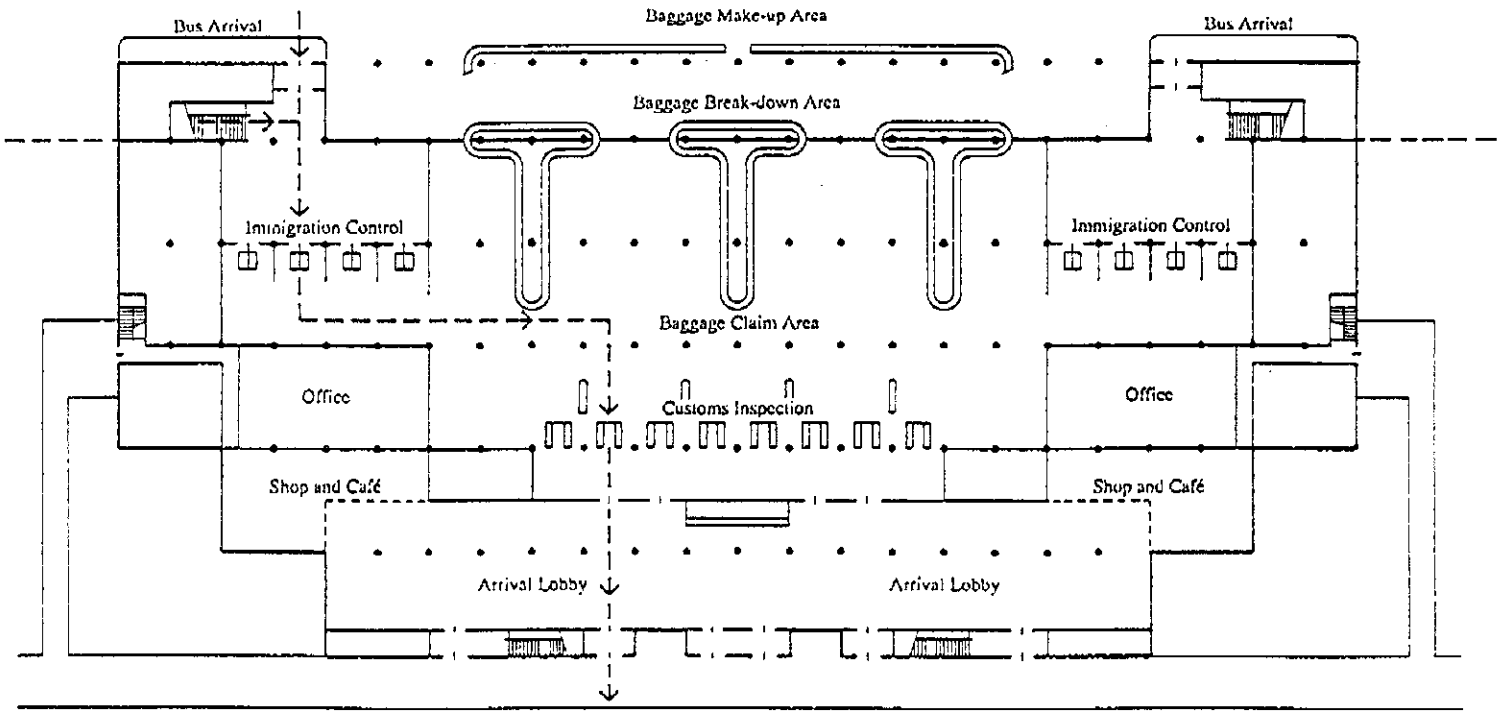


Fig. 6.2.19(1) New Tashkent Airport International Passenger Terminal Bldg. Layout Plan –1st Floor (2015)

0 10 20 30M

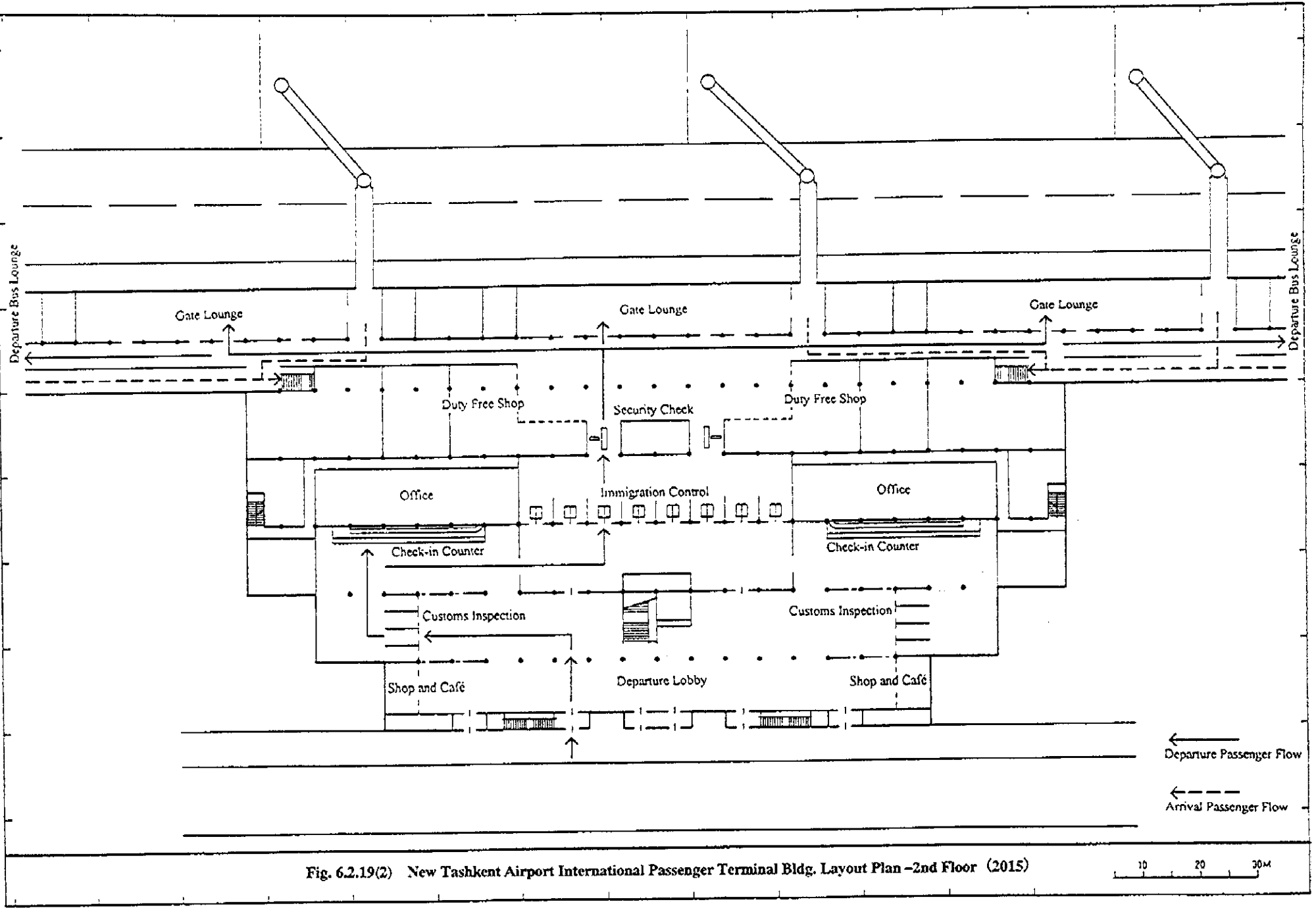


Fig. 6.2.19(2) New Tashkent Airport International Passenger Terminal Bldg. Layout Plan –2nd Floor (2015)

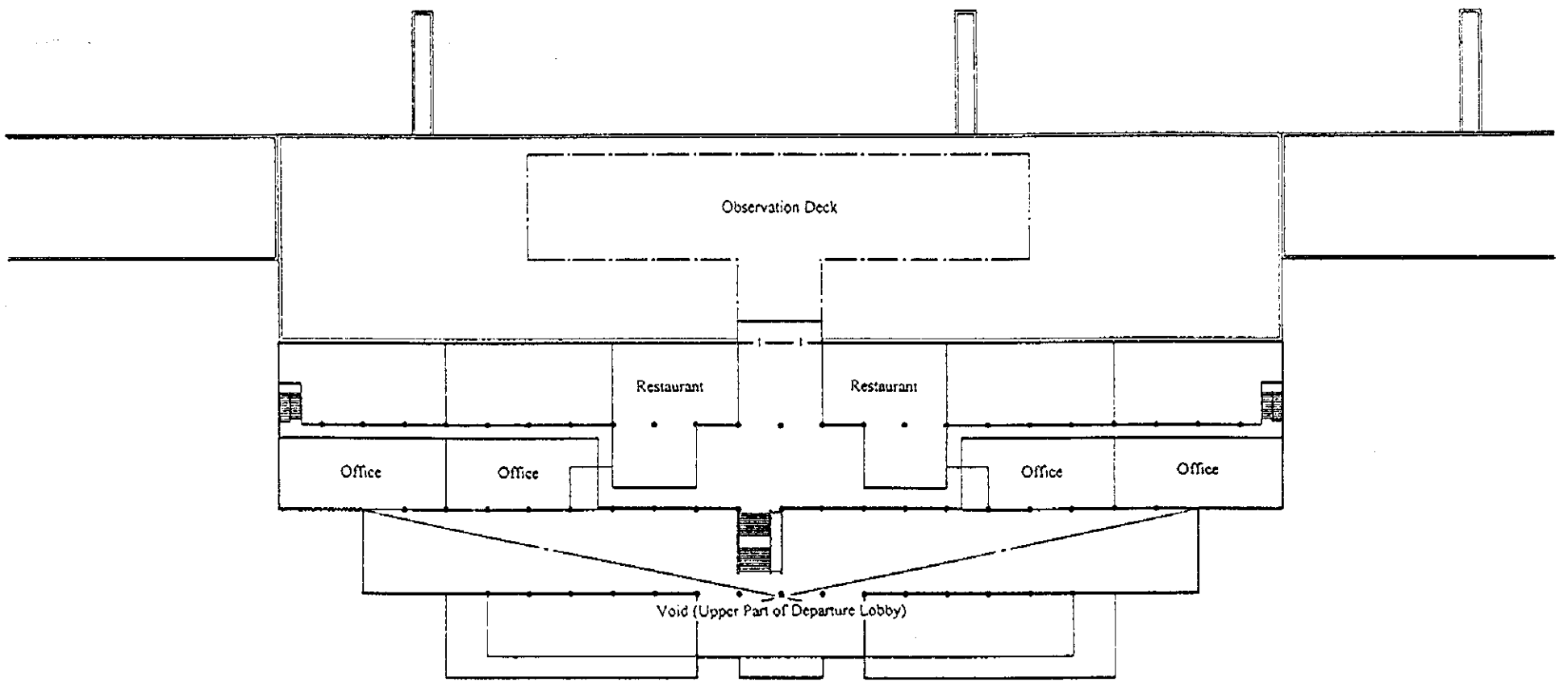
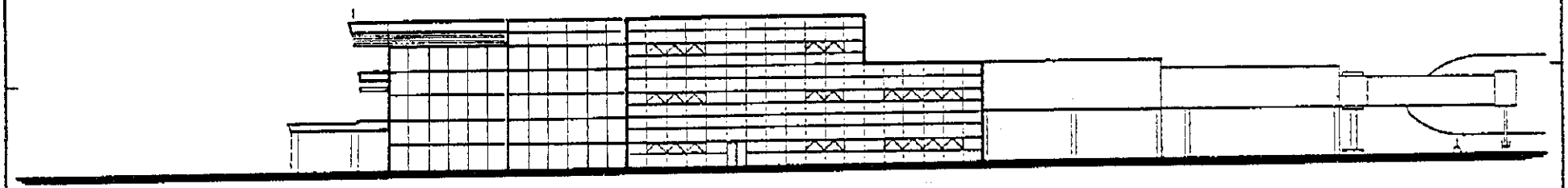


Fig. 6.2.19(3) New Tashkent Airport International Passenger Terminal Bldg. Layout Plan –3rd Floor (2015)

New Tashkent Airport International Passenger Terminal Building Front Elevation



New Tashkent Airport International Passenger Terminal Building Side Elevation

Fig. 6.2.19(4) New Tashkent Airport International Passenger Terminal Building Elevation Plan (2015)

6.2.3 Namangan Airport

(1) Summary Development Plan

In the master plan, construction of a new runway has been proposed considering difficulty of correction of the longitudinal slope (1.6 %) of the existing runway to meet ICAO recommendation (no more than 1 %). However, based on the discussions with NAC and the administration office of Namangan Airport it has been decided that extension of the existing runway adequate to cater for B767 class aircraft without correction of the longitudinal slope is more preferable considering the following:

- There will be no significant problem such as restriction of allowable cabin load of aircraft even if the existing longitudinal slope is maintained ,
- Extension of the existing runway is more economical than construction of a new runway.

Table 6.2.8 shows summary development plan of Namangan Airport and **Fig.6.2.20** presents airport development plan.

Table 6.2.8 Summary Development Plan of Namangan Airport

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger : 485 thousand Cargo : 4400 t
Largest Aircraft		B767(Medium-Jet)
Extension Area		19.7 ha
Airfield	**Runway**	Extension 3270m→3500m ,Provision of a turnaround pad, Pavement overlay ,Shoulder improvement width 7.5m
	Taxiway	Widening 20m→23m ,Shoulder Improvement width 7.5m ,Pavement overlay
	Apron	Passenger : Medium-Jet 3 stands ,Small-Jet/Mini-Plane 3 stands Cargo : Medium -Jet 1 stand Expansion Area 13,800 m^2 ,Overlay Area 36,500 m^2
Terminal	**Passenger Bldg.**	Int'l/CIS 8,400 m^2, Dom. 2,500m^2
	Cargo Bldg.	3,100m^2
	Other Facilities	New Operations & Control Tower Bldg 2,800m^2 Rescue & Fire Fighting 600m^2(CAT.6) Car park 2.2ha (610 spaces)
Air-Nav	**Airfield Lighting**	New PALS, PAPI, SALS, etc. Renewal REDL, RTHL, TWEL, AFL etc.
	Radio-Nav.&Telecom.	New VOR/DME etc. Renewal ILS(Cat I), NDB, ASR/SSR etc.

(2) Preliminary Design and Scope of the Project

a) Airfield Facilities

- Existing Runway Improvement

The existing runway (3270 m long and 45 m wide) needs to be extended to the west by 230 m to the overall length of 3500 m.

The existing pavement of the runway should be reinforced by bituminous overlay.

- Existing Taxiway Improvement

The existing taxiways are 20 m wide, and should be widened to 23 m together with provision of 7.5 m wide shoulder on each side of the taxiways.

Pavement structure of widened portion should be the same as the extended portion of the runway, and pavement overlay on the existing portion should be undertaken for reinforcement.

- Existing Apron Improvement

The existing apron capacity is inadequate and expansion of the apron by 13,800 m^2 is required in order to cope with the demand of target year 2010.

The existing apron (36,500 m^2) should be reinforced by bituminous overlay. Apron service road (20 m wide) should be provided along the edge of apron.

b) Terminal Area Facilities

- Passenger Terminal Building

The existing passenger terminal building should be expanded toward the apron. The expanded portion of the building should be two-story so that required floor space can be obtained in the limited land space. The second floor will be utilized for departure so that passenger boarding bridge can be provided in future. Floor plan of the passenger terminal building is shown in **Fig.6.2.21**.

- Other Terminal Facilities

Following facilities should be expanded to cater for requirements of the target year 2010:

- Cargo terminal building,
- Car park,
- Rescue & fire fighting facility.

The administration building, control tower and substation should be built in line with modernization of navigation aids.

6.2.4 Development of Termez Airport

(1) Summary Development Plan

Termez Airport has been selected as a High Priority Project in southern area of Uzbekistan for which development plan has been prepared based on the master plan presented in Chapter 4 of this report.

Summary development of Termez Airport is shown in **Table 6.2.12**, and airport layout plan of the year 2010 is presented in **Fig.6.2.23**.

Table 6.2.12 Summary Development Plan of Termez Airport

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger : 440 thousand Cargo : 1.9thousand
Largest Aircraft		B767(Medium-Jet)
Expansion Area		3.6 ha
Airfield	Runway	Widen 42m to 45m with provision of 7.5 m wide shoulder. Provision of one Turnaround pad, Pavement overlay
	Taxiway	No.1-3 Widen 20m to 23m with provision of 7.5 m wide shoulder. No.4 Provision of 7.5 m wide shoulder Pavement overlay
	Apron	Medium-Jet 2 stands ,Small-Jet/Mini-Plane 3 stands Expansion : 18,700 m^2 ,Overlay : 13,700 m^2
Terminal	Passenger Bldg.	CIS 4,200 m^2,Dom. 2,500m^2
	Cargo Bldg.	1,700m^2
	Other Facilities	New Operations & Control Tower Bldg.2,800m^2 Rescue & Fire Fighting 600m^2(CAT.6) Car park 1.4ha (390 spaces)
Air-Nav	Airfield Lighting	New PALS, PAPI, SALS etc. Renewal REDL, RTHL, TWEL, AFL etc.
	Radio-Nav. & Telecom.	Renewal ILS (Cat I), NDB, VOR/DME, ASR/SSR etc.

(2) Preliminary Design and Scope of this Project

a) Airfield Facilities

- Existing Runway Improvement

The existing runway is 3000 m long and 42 m wide, and is to be widened to 45 m with 7.5 m shoulder on each side of the runway in accordance with ICAO Annex 14. Reinforcement of the existing pavement should be made by bituminous overlay.

- Existing Taxiway Improvement

The existing taxiways are to be maintained for the future operation.Existing taxiways require the following:

- bituminous overlay on existing pavement,
- widen width of the taxiway form 20 m to 23 m,
- provision of 7.5 m wide shoulder on both sides of the taxiways.

- Existing Apron Improvement

The existing apron capacity is inadequate and should be expanded by 18,700 m^2 in order to cope with the forecast demand of the target year 2010. The existing apron (13,700m^2) needs to be reinforced by bituminous overlay.

b) Terminal Area Facilities

Planning parameters, facility requirement and planning philosophy for terminal area facilities of Termez Airport are the same as those for Namangan Airport. Floor plan of the passenger terminal building is shown in **Fig.6.2.24**.

6.2.5 Development of Nukus Airport

(1) Summary Development Plan

Nukus Airport has been selected as a High Priority Project in northwestern area of Uzbekistan, and for the purpose of this pre-feasibility study the development plan for the year 2010 has been prepared based on the master plan presented in Chapter 4.

Table 6.2.13 shows summary development plan and **Fig.6.2.26** presents facility layout plan respectively.

Table 6.2.13 Summary of Development Plan for Nukus Airport

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger : 379 thousand Cargo : 1.6 thousand
Largest Aircraft		B767(Medium-Jet)
Airfield	Runway	Widening of shoulder ,Provision of one turnaround pad, Pavement overlay
	Taxiway	Widen taxiways No.2, 3, 6 and 7 to 23m with 7.5m shoulder and provide 7.5 m wide shoulder. Pavement overlay
	Apron	Medium-Jet 3 stands ,Small-Jet/Mini-Plane 3 stands Expansion 8,400 m^2 ,Overlay 33,400 m^2
Terminal	Passenger Bldg.	Int'l/CIS 8,400 m^2 ,Dom. 2,500m^2
	Cargo Bldg.	2,100m^2
	Other Facilities	New Operations & Control Tower Bldg.2,800m^2 Rescue & Fire Fighting 600m^2(CAT.6) Car park 2.2ha (610 spaces)
Air-Nav	Airfield Lighting	New PALS, PAPI, SALS etc. Renew REDL, RTHL, TWEL, AFL etc.
	Radio-Nav. & Telecom.	New VOR/DME Renew ILS (Cat I), NDB, ASR/SSR etc.

(2) Preliminary Design and Scope of this Project

a) Airfield Facilities

- Existing Runway Improvement

The existing runway is 3000 m long and 48 m wide and is sufficient to accommodate the medium class jets. However, 6 m wide shoulder should be provided on each side of the runway in accordance with ICAO Annex 14.

Pavement overlay work by bituminous concrete should be undertaken for reinforcement.

- Existing Taxiway Improvement

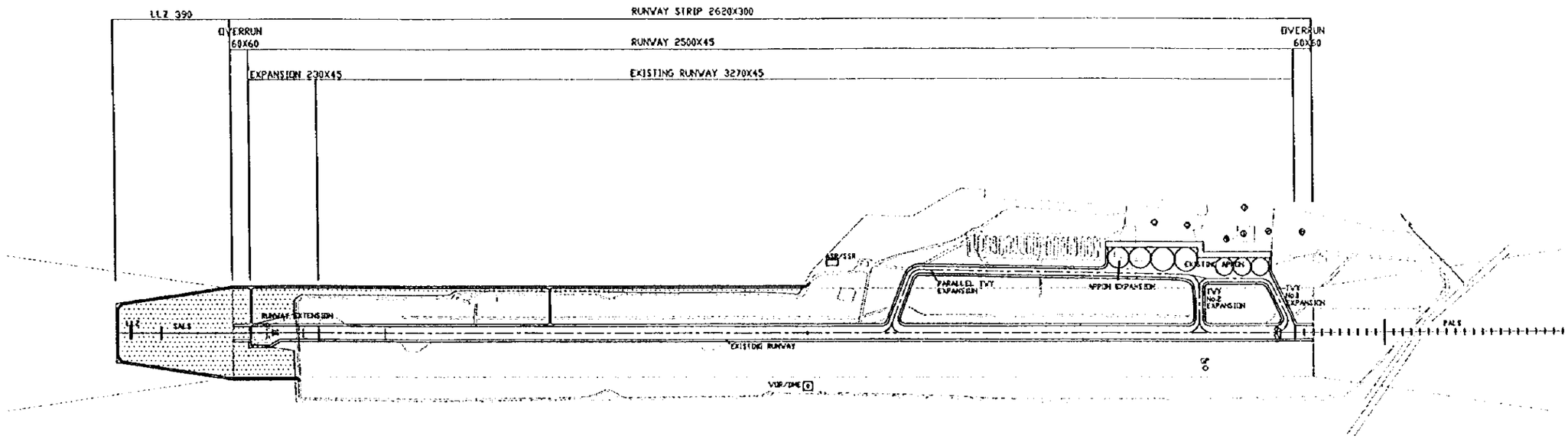
The existing taxiways are to be maintained for the future operation. Pavement overlay work by bituminous concrete should be undertaken for reinforcement.

- Existing Apron Improvement

The existing apron capacity is inadequate and needs to be expanded by 8,400 m^2 in order to cope with the demand of the target year 2010. Pavement of the existing apron (33,400 m^2) should be reinforced by bituminous overlay. Apron service road (20 m wide) should be provided along the edge of apron.

b) Terminal Area Facilities

Planning parameters, facility requirement and planning philosophy for terminal area facilities of Nukus Airport are the same as those for Namangan Airport. Floor plan of the passenger terminal building is shown in **Fig.6.2.27** and terminal area layout plan is shown in **Fig.6.2.28**.



Development Plan (Case-1) Namangan

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger 485 thousand Cargo 4.4 thousand
Max. Aircraft		B767(Medium-Jet)
Air-field	Runway	Extension 3270m→3500m ,One Turning Pad Pavement overlay ,Shoulder improvement width 7.5m
	Taxiway	Widening 20m→23m ,Shoulder Improvement width 7.5m ,Pavement overlay
	Apron	Medium-Jet 3 stands ,Small-Jet/Mini-Plane 3 stands Cargo Medium -Jet 1 stand Expansion Area 13,800 m², Overlay Area 36,500 m²
Terminal	Passenger Bldg.	Int'l/CIS 8,400 m², Dom. 2,500m²
	Cargo Bldg.	3,100m²
	Other Facilities	New Operations & Control Tower Bldg 2,800m² Rescue & Fire Fighting 600m²(CAT.6) Car parking 2.2ha (610 lots)
Air-Nav	Airfield Lighting	New PALS ,PAPI ,SALS etc. Renewal REDL, RTHL, TWEL, AFL etc.
	Radio-Nav.& Telecom.	New VOR/DME etc. Renewal ILS(Cat I), NDB, ASR/SSR etc.

0 100 200 300 400 500

Fig. 6.2.20 Namnangan Airport Development Plan (2010)

TERMINAL AREA			
1	Passenger Terminal Building	8	Car Park
2	VIP building		
3	Cargo Storage(under construction)		
4	Control Tower		
5	Administration Building		
6	Storage and Garage Area		
7	Fuel Farm		

AIRPORT DATA			
Airport Name	Namangan	Elevation	515m
Class	II	Reference Temperature	35°C
Province	Namangan	New Runway	3500m
Main City	Namangan	(Existing)	(3270m)
Distance from city	8km south-west	Direction (True north)	N 112° 33' E
Reference Point	N 40° 59' 05"	Instrument Runway	29
Coordinates	E071° 33' 27"	ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Namangan Airport		
Drawing Tittle	Airport Layout Plan (Year 2010)		
Date		Scale	

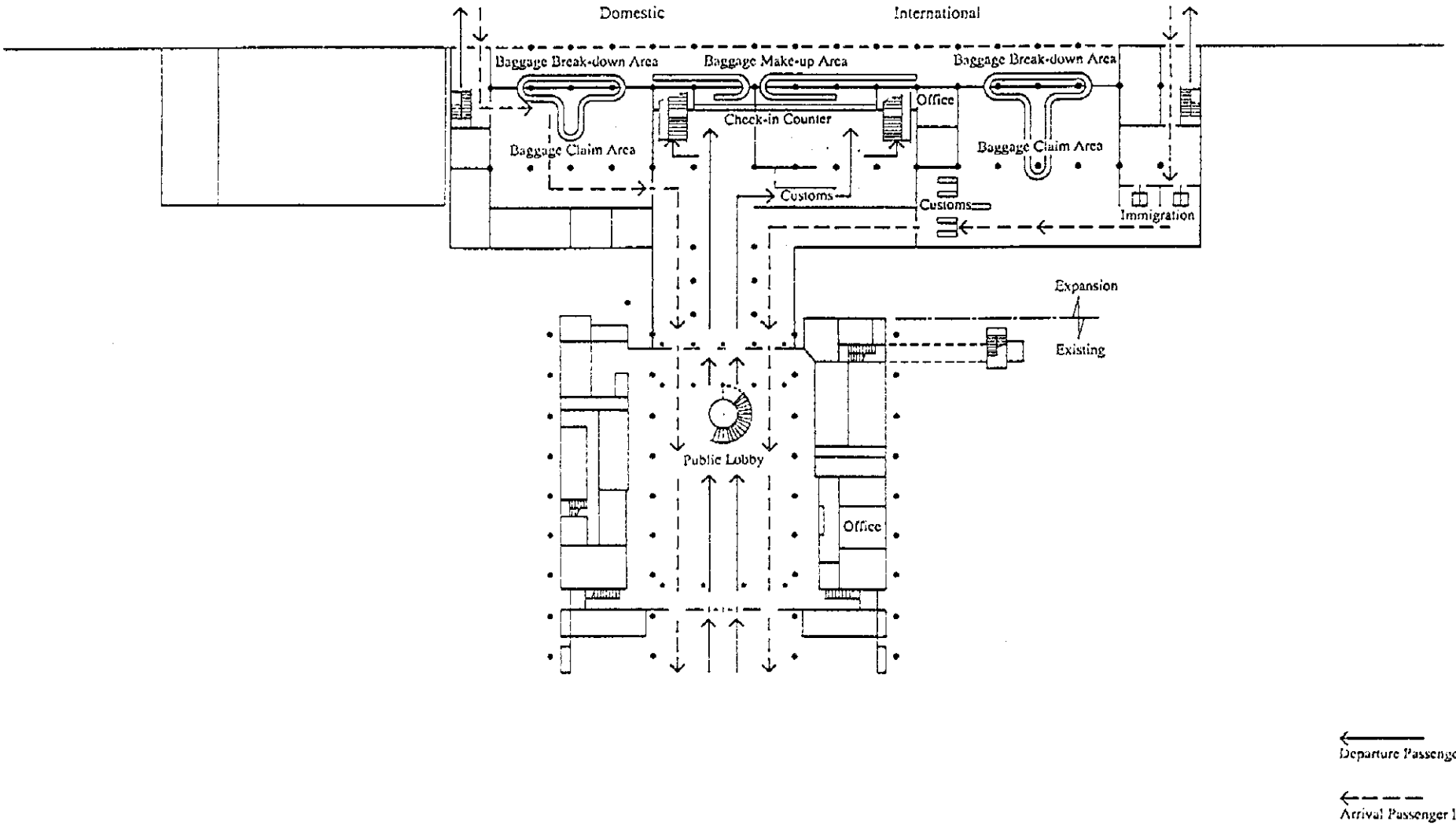


Fig. 6.2.21(1) Namangan Airport Passenger Terminal Bldg. Layout Plan –1st Floor (2010)

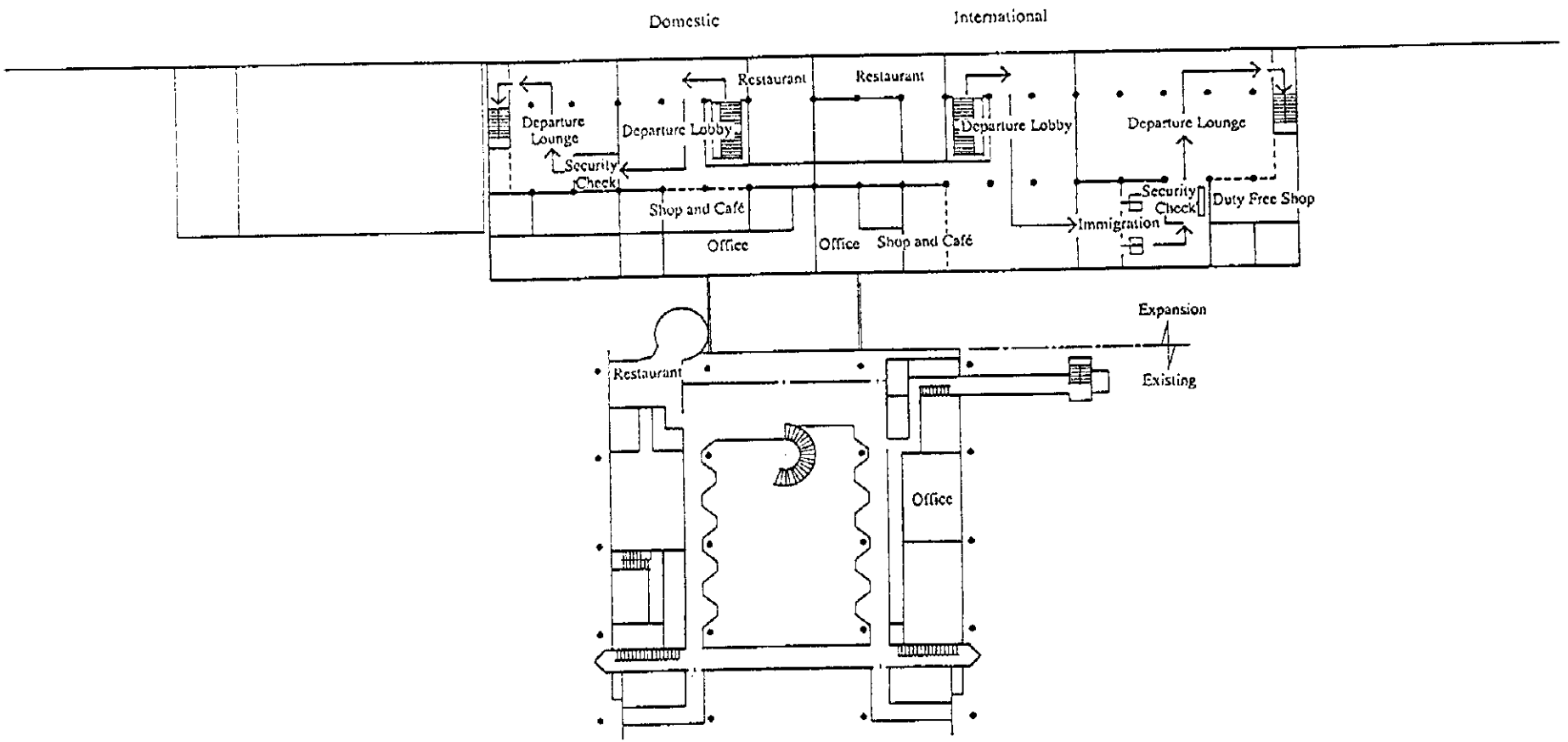
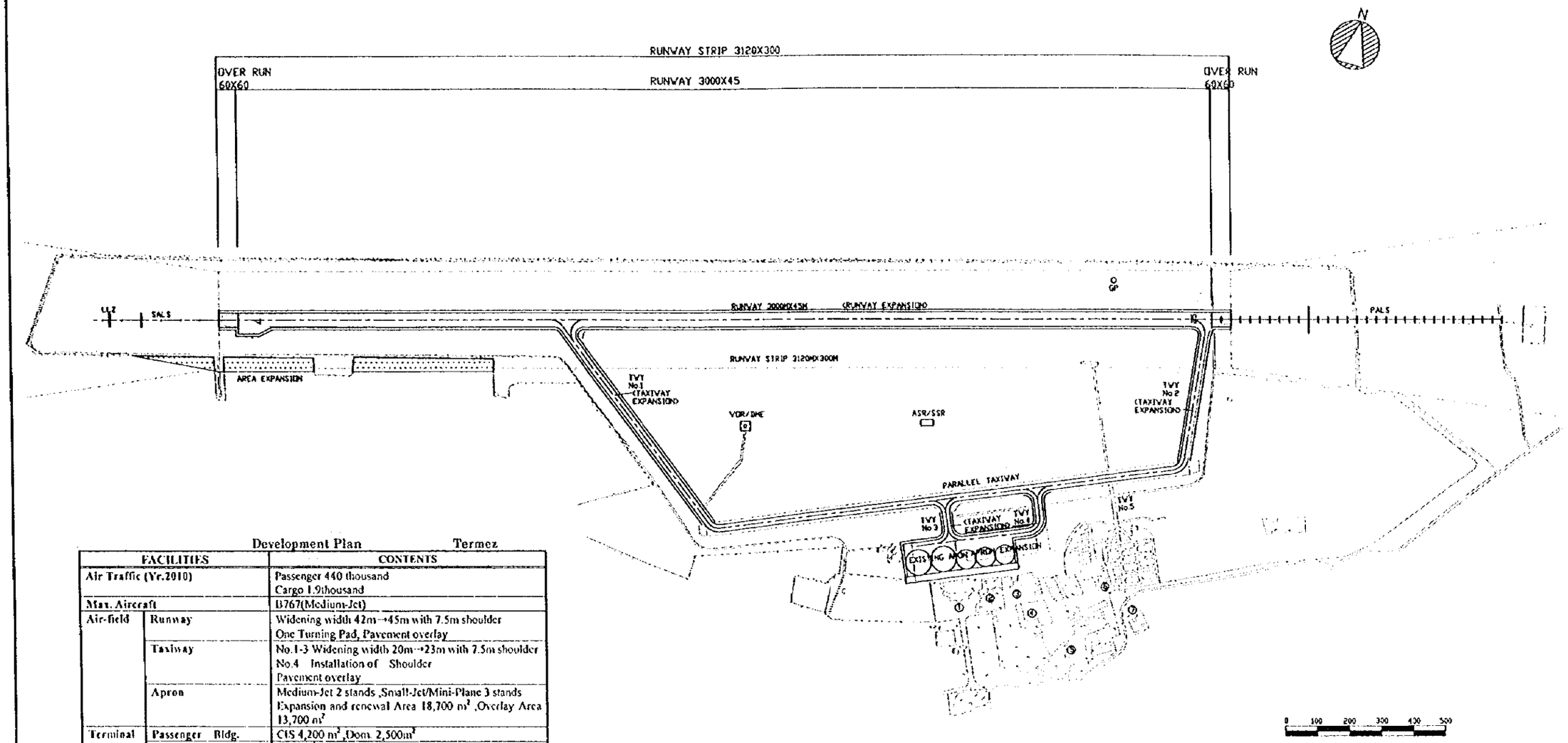


Fig. 6.2.21(2) Namangan Airport Passenger Terminal Bldg. Layout Plan –2nd Floor (2010)



Development Plan Termez

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger 440 thousand Cargo 1.9thousand
Max. Aircraft		B767(Medium-Jet)
Air-field	Runway	Widening width 42m→45m with 7.5m shoulder One Turning Pad, Pavement overlay
	Taxiway	No.1-3 Widening width 20m→23m with 7.5m shoulder No.4 Installation of Shoulder Pavement overlay
	Apron	Medium-Jet 2 stands ,Small-Jet/Mini-Plane 3 stands Expansion and renewal Area 18,700 m² ,Overlay Area 13,700 m²
Terminal	Passenger Bldg.	CIS 4,200 m² ,Dom. 2,500m²
	Cargo Bldg.	1,700m²
	Other Facilities	New Operations & Control Tower Bldg 2,800m² Rescue & Fire Fighting 600m²(CAT.6) Car parking 1.4ha (390 lots)
Air-Nav	Airfield Lighting	New PALS ,PAPI ,SALS etc. Renewal REDL, RTIL, TWEL, AFL etc.
	Radio-Nav.&Telecom.	Renewal ILS(Cat I), NDB, VOR/DME, ASR/SSR etc.

Fig. 6.2.23 Termez Airport Development Plan (2010)

TERMINAL AREA			
1	Passenger Terminal Building	7	Canteen
	Controll Tower		
2	VIP Building		
3	Fire Station		
4	Garage		
5	Sotrage		
6	Hanger		

AIRPORT DATA			
Airport Name	Termez	Elevation	313m
Class	II	Reference Temperature	38°C
Province	Sukhandaria	Runway	3000
Main City	Termez	(Existing)	(3000)
Distance from city	9km	Direction (True north)	N 74° 09' E
Reference Point	N 37° 17' 11"	Instrument Runway	25
Coordinates	E067° 18' 33"	ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Termez Airport		
Drawing Tittle	Airport Layout Plan (Year 2010)		
Date		Scale	

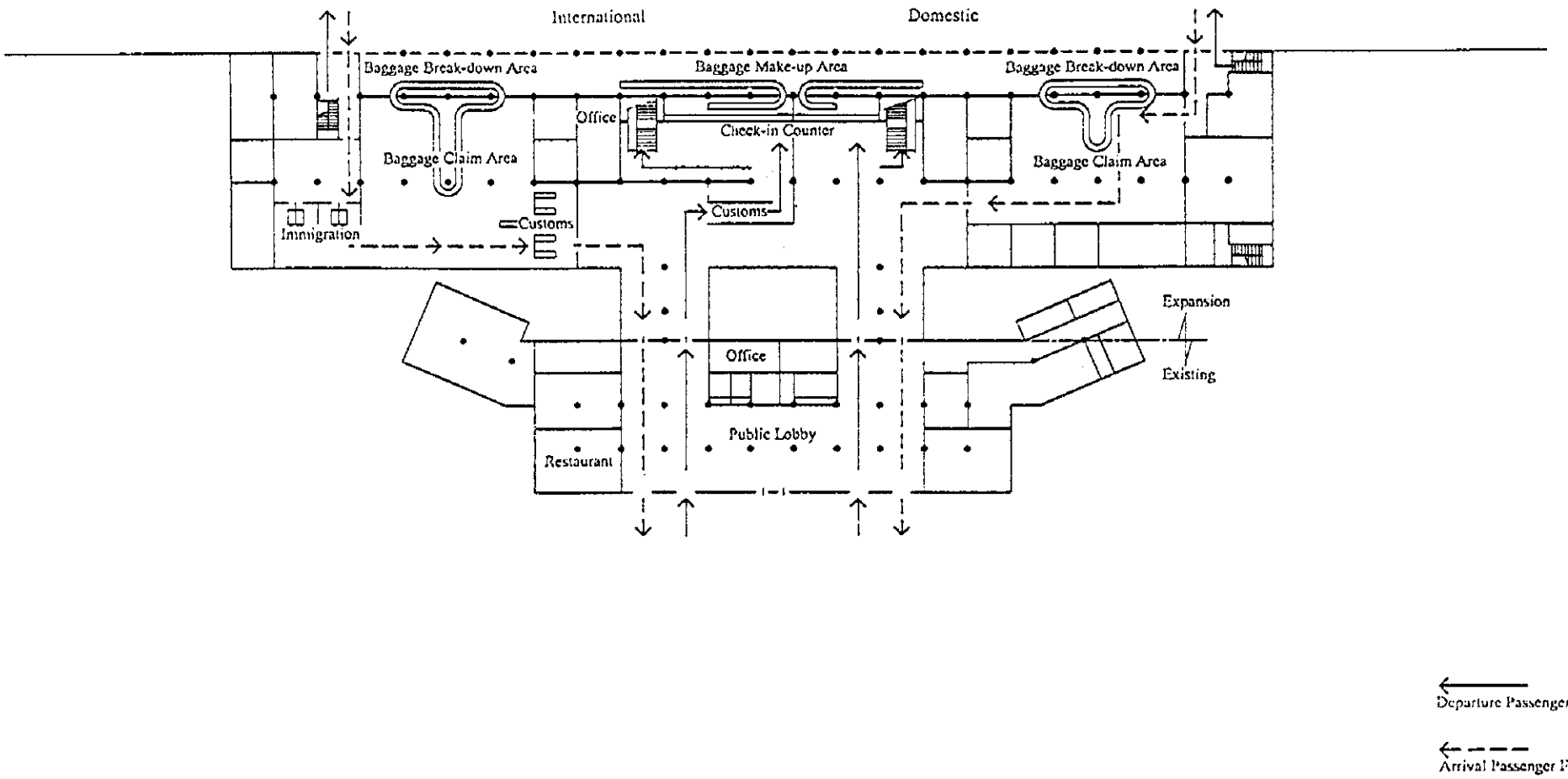


Fig. 6.2.24(1) Termez Airport Passenger Terminal Bldg. Layout Plan –1st Floor (2010)

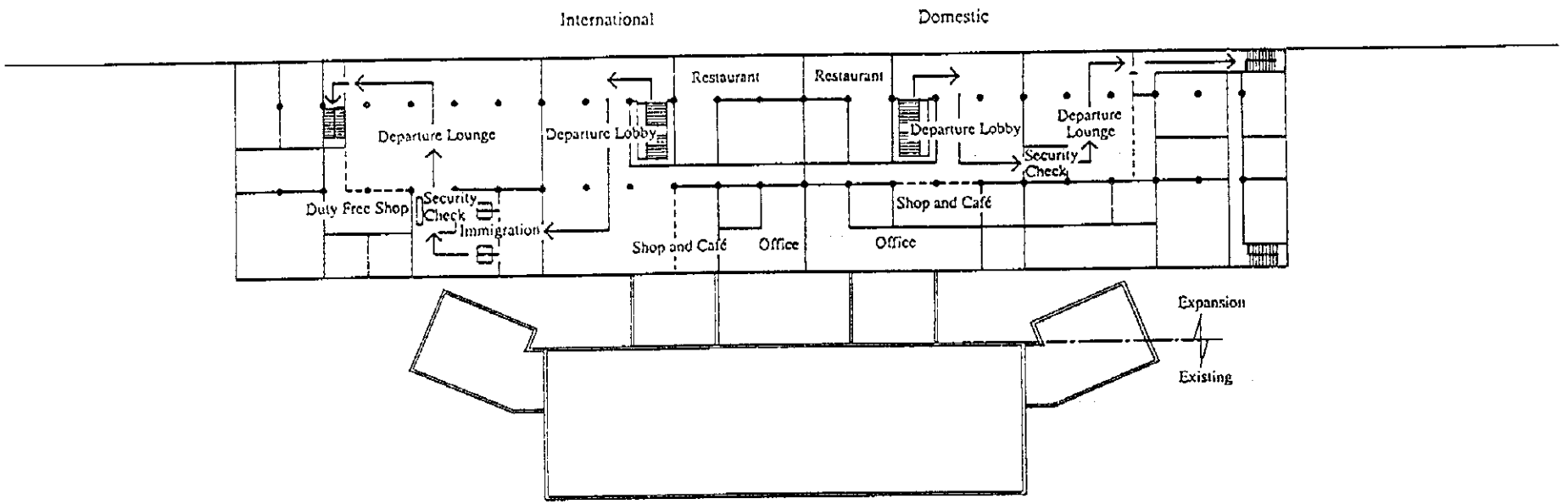
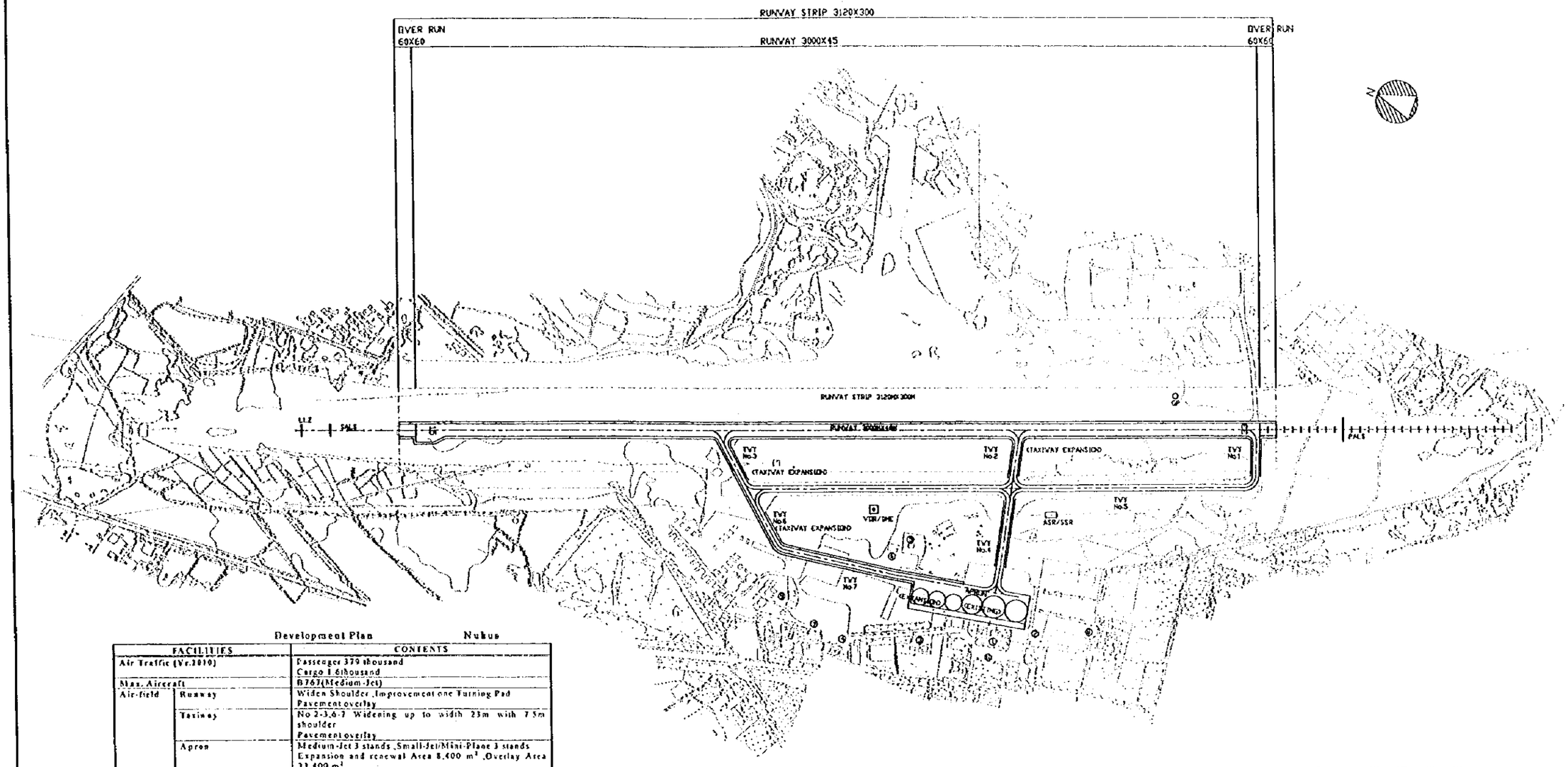


Fig. 6.2.24(2) Termez Airport Passenger Terminal Bldg. Layout Plan –2nd Floor (2010)

0 10 20 30M



Development Plan Nukus

FACILITIES		CONTENTS
Air Traffic (Yr.2010)		Passenger 379 thousand Cargo 1.6thousand
Max. Aircraft		B767(Medium-Jet)
Air-field	Runway	Widen Shoulder ,Improvement one Turning Pad Pavement overlay
	Taxiway	No 2-3,6-7 Widening up to width 23m with 7.5m shoulder Pavement overlay
	Apron	Medium-Jet 3 stands ,Small-Jet/Mini-Plane 3 stands Expansion and renewal Area 8,400 m² ,Overlay Area 33,400 m²
Terminal	Passenger Bldg.	Int'l/CIS 8,400 m² ,Dom. 2,500m²
	Cargo Bldg.	2,100m²
	Other Facilities	New Operations & Control Tower Bldg 2,800m² Rescue & Fire Fighting 600m²(CAT 6) Car parking 2.2ha (610 lots)
Air-Nav	Airfield Lighting	New PALS ,PAPI ,SALS etc. Renewal REDL, RTIIL, TWEL, AFL etc.
	Radio-Nav.& Telecom.	New VOR/DME Renewal ILS(Cat I), NDB, ASR/SSR etc.

Fig. 6.2.26 Nukus Airport Development Plan (2010)

TERMINAL AREA			
1	Passenger Terminal Building	8	Fuel Tank Farm
2	VIP Building	9	Aircraft Maintenance
3	Cargo Storage	10	Car Park
4	Administration Building		
5	Control Tower		
6	Fire Station		
7	Garage,Storage		

AIRPORT DATA			
Airport Name	Nukus	Elevation	76m
Class	II	Reference Temperature	(36°C)
Province	Karakalpakstan	Runway	3000mx45m
Main City	Nukus	(Existing)	(3000mx48m)
Distance from city	7km north-west	Direction (True north)	N 159° 31' E
Reference Point	N 42° 29' 18"	Instrument Runway	33
Coordinates	E059° 37' 24"	ILS Category	CAT-I

The Republic of Uzbekistan National Air Company "Uzbekistan Havo Yullari"			
The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Nukus Airport		
Drawing Tittle	Airport Layout Plan (Year 2010)		
Date		Scale	

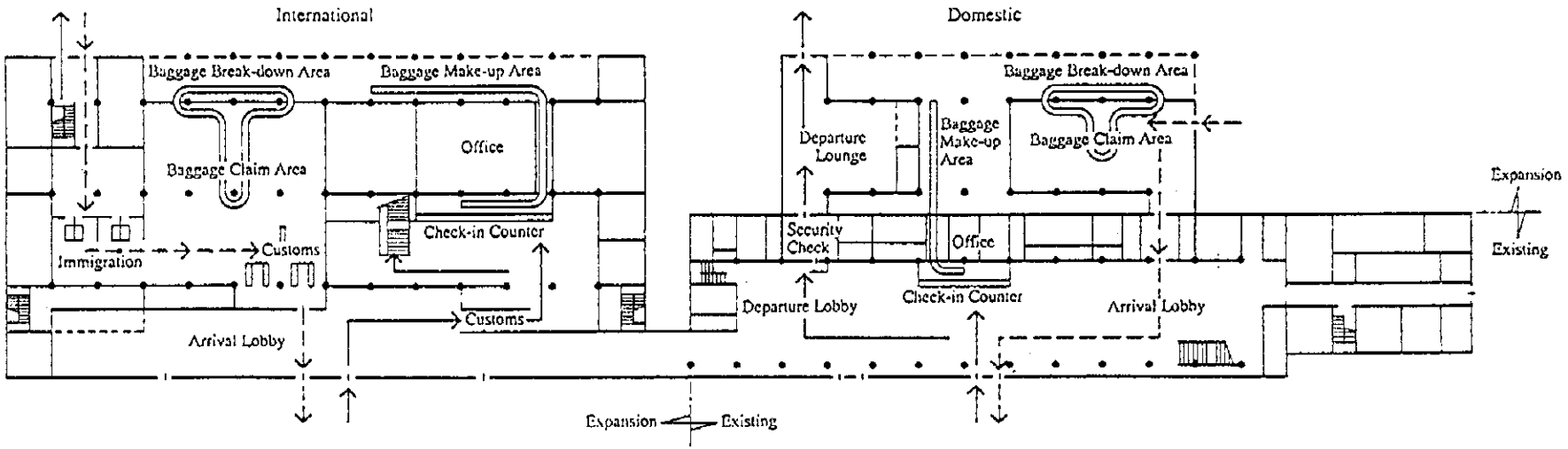


Fig. 6.2.27(1) Nukus Airport Passenger Terminal Bldg. Layout Plan –1st Floor (2010)

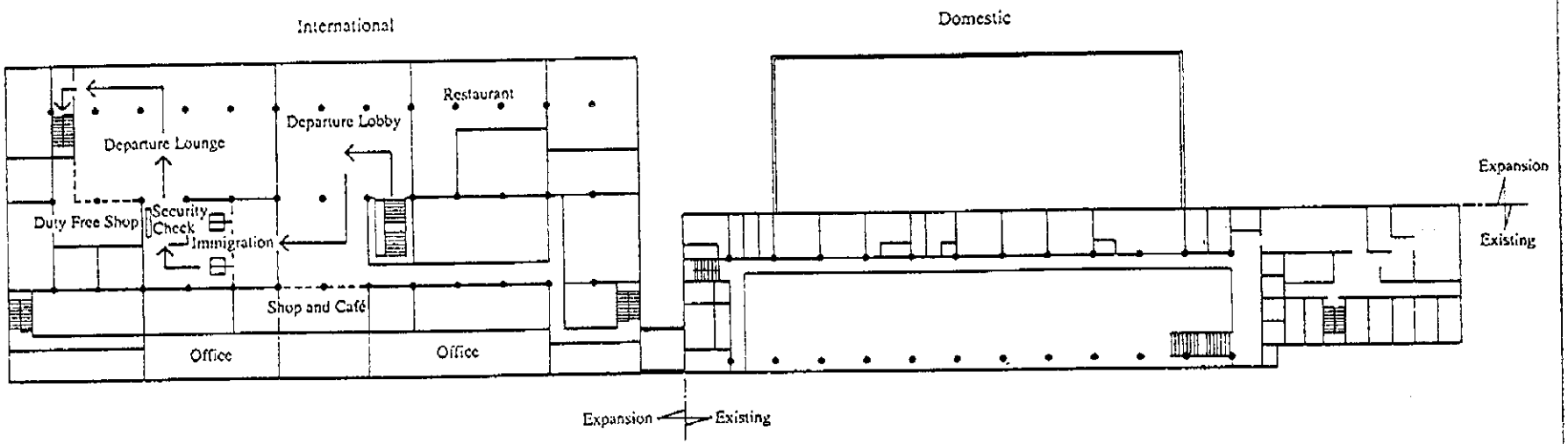


Fig. 6.2.27(1) Nukus Airport Passenger Terminal Bldg. Layout Plan –2nd Floor (2010)

6.2.6 Nationwide Air Navigation System

(1) Development Plan

Air routes in Uzbekistan are mainly comprised of four (4) sets of VOR/DME, and twenty (20) sets of NDB, which were installed on and off the airports. Present air routes are concentrated at the areas of Tashkent, Samarkand and on the borders.

However, regarding the worldwide en-route navaids, since NDB has disadvantages of radio wave interference, VOR/DME is commonly used as the en-route navaids in order to improve accuracy of air navigation on the air routes, with the following advantages;

- To avoid mutual radio wave interference between NDB;
- To install VOR/DME as basic facility enabling Regional Area Navigation System (RNAV);
- Ensure the alternative function of FANS routes.

Considering the above situations, it is recommendable that en-route navaids should be replaced by VOR/DME from the present NBD facilities. Eight (8) sets of NDB are planned to be replaced by VOE/DME as a first phase up to 2005.

Table 6.2.14 Nationwide Air Navigation System

Point	Year of Installation of NDB
Karakhtay	1989
Dzhizak	1986
Dalverzin	1986
Syrdarya	1990
Nurata	1979
Bulungur	1988
Nagornaya	1982
Urgut	1989