4.5.5 Namangan Airport Development Plan

(1) Development Plan

Namangan airport is classified as a Class II Airport. Existing runway slope of 1.58% does not comply with the standards (1%) of both ICAO and MAK. During the 1st Stage, runway extension will be required in order to accommodate Medium Class Jets such as B-767.

However, the correction work of runway slope together with runway extension will require a great deal of investment and the closing of the runway, so that this is not recommendable. Considering that Namangan airport will be expected to serve international and CIS flights, the runway slope should conform to the standards of ICAO. Therefore, construction of a new runway will be profitable for the long-term development of Namangan airport. Required length of the new runway is calculated at 3,300 m. Summarized development plan of Namangan airport is shown in **Table 4.5.11**.

Table 4.5.11 Development Plan of Namangan Airport (Class II)

Item			Existing	1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Demand	Passenger ('000)		40 (1995)	390	490	590	700
	Max. Aircraft		IL76	O B767(Medium-Jet)			
Development	Air-field	Runway	3,270m	O New Runway 3300m			
		Taxiway	Partial Paral.			O Full Parallel	
		Apron				O Expansion	
		Pavement		O Overlay (T/W & Apron)			
	Terminal	Pax. Bldg.		O Int. (New)		O Expansion (Dom.)	
	Air-Nav.			O Cat-I ILS, ASR/SSR, VOR/DME O ATC, Met., Airfield Lighting FANS O			
Remarks							

(2) Facility Planning

a) Runway

The new runway is planned to the south side of the existing runway with a separation of 225 m so as to reduce restrictions in the operation of the existing runway during the construction of the new runway, as shown in **Fig. 4.5.6**. The width of the new runway shall be 45 m in accordance with ICAO standards, in spite of the 50 m-width of the existing runway. The existing runway will be used as a taxiway after completion of the new runway.

b) Taxiway

The existing runway will be converted into a parallel taxiway, and three exit taxiways will be added to connect with the new runway.

The existing taxiways are 20 m-wide, and will be widened to 23 m with 7.5 m-shoulders.

Strength of pavement is PCN 33/F/C/X/T for the existing runway, and 34-37/F/C/X/T for the existing taxiways, being insufficient for operation of B-767, in addition to deterioration of the pavement surface. Therefore, during the 1st Stage, overlay work will require a 19

cm-thickness for the existing runway, and 8 cm-thickness for the existing taxiway.

c) Apron

Apron capacity is adequate for the required demand during the 1st Stage, but, overlay work will be needed. During the 3rd Stage, expansion and overlay of the apron will be required.

d) Terminal Area Facilities

- Passenger Terminal Building

The existing terminal building has a floor area of 4,219 m^2 and is sufficient for the demand of up to 2020. During the 1st Stage, a new international passenger building will be required having 4,200 m^2 floor area, and a new CIS passenger building of 4,200 m^2 floor area will also be required.

Possible location for the two buildings is an area between the apron and existing passenger building.

- Cargo Terminal Building

The required area of the cargo terminal building in 2020 is estimated at 3,500 m^2. At present, there is no specific cargo terminal building, but a half-constructed cargo building located to the west of the terminal area can be used subject to rehabilitation work.

- Car Parking Area

The existing car parks have a capacity of 80 cars (1,100 m^2). Required capacity for 2020 is estimated at 660 cars (23,100 m^2), and expansion will be required.

- Control Tower and Administration Facilities

The control tower with operation and administration office buildings, and an electric power supply substation are planned to be developed during the 1st Stage, in accordance with improvement of air navigation facilities.

- Fire Fighting and Rescue Station

Airport category of Namangan airport for fire fighting and rescue based on ICAO regulations is classified as "6", requiring 600 m^2 area for the station. The existing station (450 m^2) will be expanded during the 1st Stage.

- Aircraft Fuel Facilities

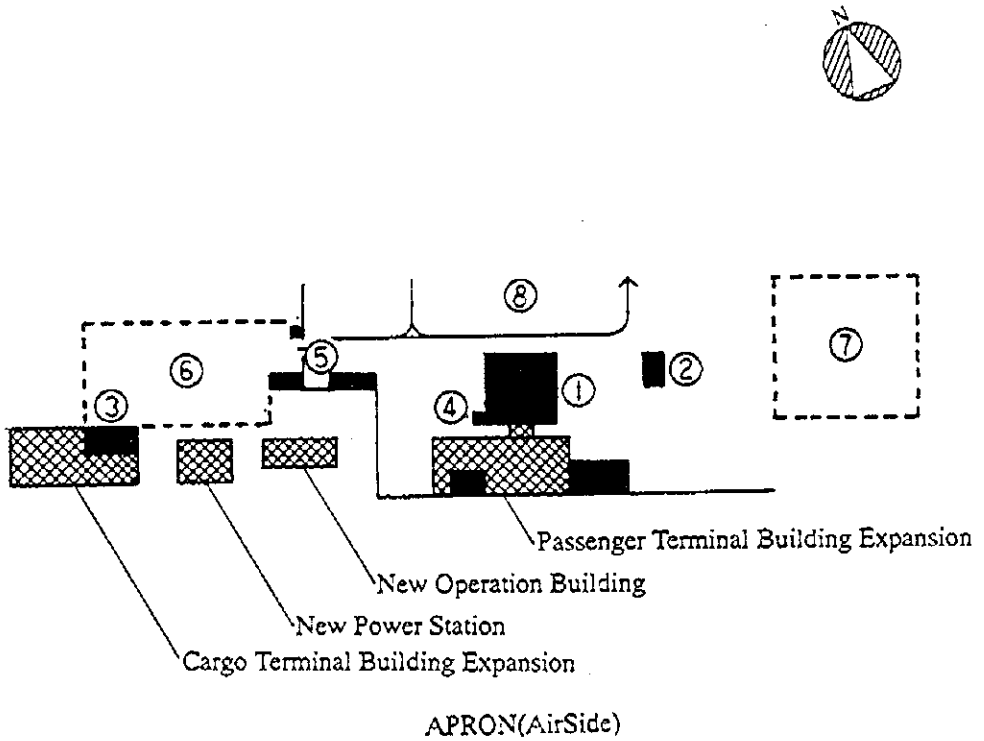
Storage capacity of the existing fuel facilities is 4,000 kiloliters, and is sufficient for the demand (540 kiloliters) for 2020.

- Other Facilities

Other facilities such as a VIP building and maintenance facilities for airport and vehicles will be met by regular maintenance work.

e) Air Navigation Facilities and ATC System

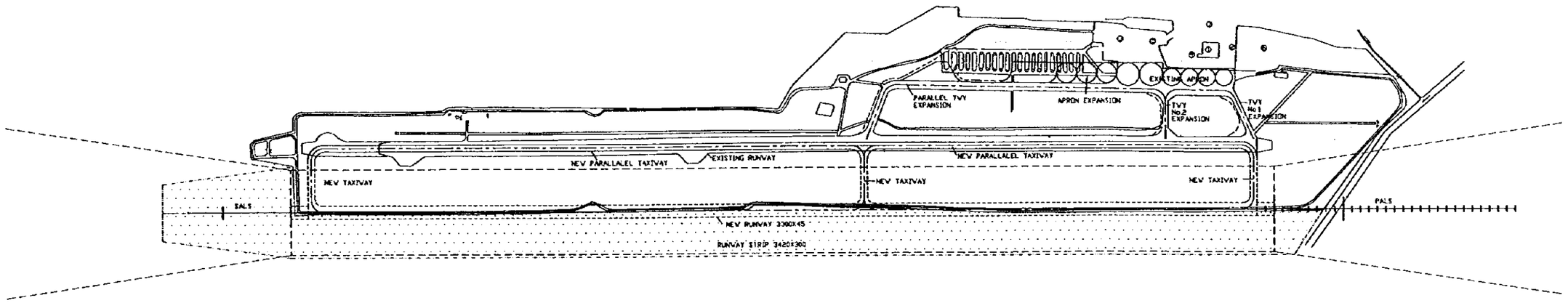
Air navigation facilities required for Cat-I ILS operation is planned to be installed during the 1st Stage. Detailed plan of air navigation facilities and ATC system are shown in Chapters 4.6 and 4.7 respectively.



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		

Fig. 4.5.6 (1)

Namangan Airport Terminal Area Layout Plan (S=approx.1/5,000)



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

0 100 200 300 400 500

Fig. 4.5.6 (2) Namangan 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

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

4.5.6 Andizhan Airport Development Plan

(1) Development Plan

Andizhan airport is planned as a Class III Airport, and its development plan is shown in **Table 4.5.12**. A runway extension from 2,900 m to 3,000 m length shall be required due to the introduction of B-767.

The new parallel runway is considered for the exclusive service of civil aviation which is under study by the local community as the existing airfield facilities are controlled by the military.

So the following two cases are to be studied for Andizhan airport development Plan.

- Case - 1 New runway construction
- Case - 2 Existing runway extension

Based on the results of the facility requirements analysis, construction of the new runway is planned to be made at the 1st Stage in the Master Plan. However, implementation of runway extension work should be studied fully in respect to the availability and allocation of investment funds, future demand of CIS and international passengers and type of aircraft to be served.

Table 4.5.12 Development Plan of Andizhan Airport (Class III)

Item			Existing	1st stage (-2005)	2nd stage (2006-2010)	3rd stage (2011-2015)	4th stage (2016-2020)
Demand	Passengers ('000)		59(1995)	620	760	920	1,080
	Max. Aircraft		TU154	○ B767(Medium-Jet)			
Development	Airfield	Runway	2,900m	○ 3,000m (New or Extension)			
		Taxiway	Full Paral.	○ Full Parallel Extension			
		Pavement		○ Overlay of Runway (Extension Case) ○ Widening & Overlays of Taxiways			
	Terminal			○ Expansion (Int.) ○ Expansion			
	Air-Nav			○ Cat-I ILS, VOR/DME, ASR/SSR ○ ATC, Met. Airfield Lighting FANS ○			
Remarks							

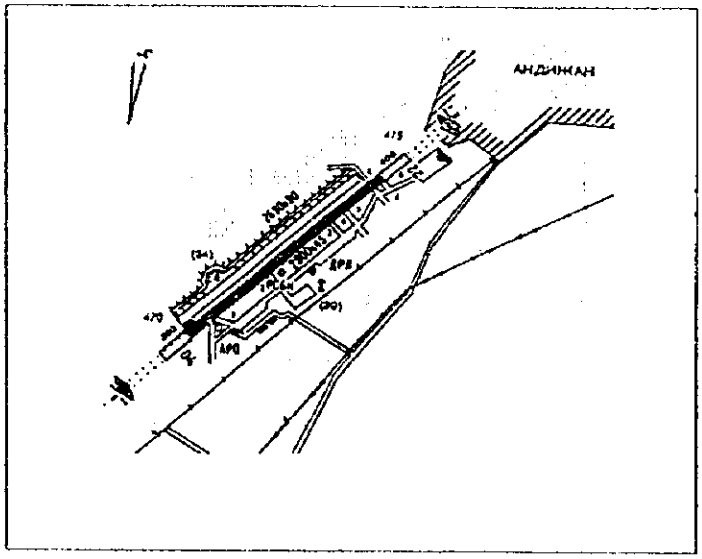
(2) Facility Planning

a) Runway

New runway is planned to be located at the north side of the existing runway with a separation of 225 m to the existing runway.

In the case of extension to the existing runway, the densely populated residential area towards the east side of the runway, will necessitate an extension to the west side only. The existing runway is 2,900 m in length and 45 m in width without shoulders, installation of shoulders will be made at the same time as the runway extension. As to the pavement, strength of the existing runway pavement it is PCN 14/R/A/W/T, and overlay work of 20 cm-thick will be required by asphalt concrete.

Fig. 4.5.7 Circumference Conditions of Andizhan Airport



b) Taxiway

Only T/W No. 8 is managed by NAC, but, according to increasing air traffic demand and introduction of B 767 aircraft, Parallel taxiway and taxiways No.1, 2 and 7 are required to be improved for civil aviation use.

In the case of construction of a new runway, three (3) existing taxiways will be additionally required to connect to the new runway with the existing runway.

The width of taxiways is 28 m for parallel taxiway, 26 m for T/W No.1, and 23 m for T/W No.8 m respectively, and widening is not required. But, installation of shoulders at both sides of the taxiways will be needed by 5 m in width for the parallel taxiway, 6 m for T/W No.1 and 7.5 m for T/W No.8.

The width of T/W No.2 is 18 m, and 20 m for T/W No.7, and both taxiways are required to be widened to 23 m with a 7.5 m-wide shoulder on both sides.

As the pavement of the taxiways managed by military are concrete cement and asphalt concrete, and strength of taxiways No.1 (PCN 14/R/A/W/T), No.2, No.7 and parallel (20/F/C/X/T) is not enough for operation of B-767 aircraft, overlay work with 20 cm-thickness will be needed.

The exit taxiway No.8 under NAC's control was overlaid in 1996, and is of sufficient strength to accommodate Medium Class Jets. However, at the 3rd Stage, overlay work will be necessary with 5 cm thickness for rehabilitation of the surface course due to the expiry of the design life of the pavement.

c) Apron

As Andizhan airport is largely occupied by military facilities, the existing apron for use by civil aviation is located in a small part of the west corner of the airport territory. Therefore, the linear layout of aircraft parking stands in front of the passenger terminal building is physically difficult,.

In view of the above situation, basically the apron is to be expanded from the existing terminal area.

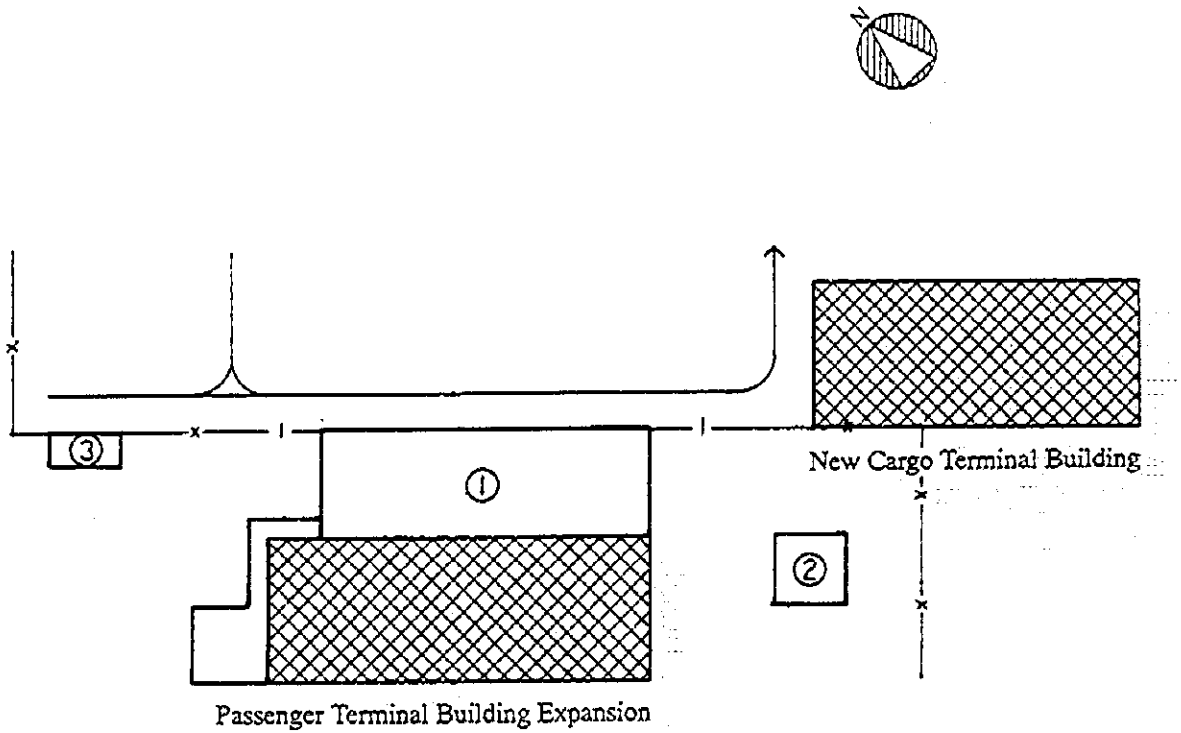
d) Terminal Area Facilities

Development plan for the year 2020 of the terminal area is shown in **Fig. 4.5.8.**

- Passenger Terminal Building
  The existing building is to be enlarged up to 15,120 m^2 for the forecasted demand of year 2020 at the front-garden between the existing building and apron.
- Cargo Terminal Building
  Tent is temporarily used as a cargo building. New building is to be constructed near to VIP building, and the temporary tent is to be removed.
- Car Parking Area
  Existing car parking area is to be expanded up to 31,150 m^2 for the forecasted demand in year 2020.
- Administration Facilities
  Existing facilities are under the military control, so it is necessary for the addition of facilities for civil aviation service.
- Aircraft Fuel Facilities
  It is not necessary to install aircraft fuel facilities at the terminal area for civil aviation.
- Others Facilities
  The existing facilities such as VIP building etc. do not need to be modified and can be used in their present condition.

e) Air Navigation Facilities and ATS System

Development plan for air navigation facilities is summarized in Chapter 4.6 and the study on ATC system in Chapter 4.7 respectively.



1.	Passenger Terminal Building
2.	VIP Building
3.	Garage

Fig. 4.5.8
Andizhan Airport Terminal Area Layout Plan (S=approx.1/2,000)

4.5.7 Fergana Airport Development Plan

(1) Development Plan

Fergana airport is classified as a Class II Airport. The airport development plan is shown in **Table 4.5.13.** A new runway for exclusive civil aviation use is to be constructed in parallel with the existing runway:

- Average longitudinal slope (1.4%) of the existing runway does not comply with the regulations (1.0%) of both ICAO and MAK;
- Major facilities, such as runway and taxiway, are controlled by the military.

Based on the results of the facility requirements analysis, construction of the new runway is planned to be made at the 1st Stage in the Master Plan. However, implementation of runway extension work should be studied fully in respect to the availability and allocation of investment funds, future demand of CIS and international passengers and type of aircraft to be served.

Table 4.5.13 Development Plan of Fergana Airport (Class II)

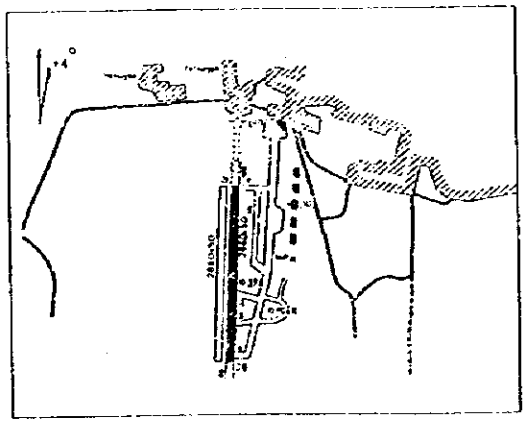
Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		52	650	850	1,020	1,220
	Max. Aircraft		IL 62	○ B 767 (Med. Jet)			
Development	Airfield	Runway	2860 m	○ 3,300 m (New Runway)			
		Taxiway	Parallel	○ Full Parallel Extension			
		Pavement		○ Widening of Taxiway, Shoulder ○ Overlay of Taxiway			
	Terminal	Pax. Bldg.		○ Expansion (Int.) ○ Expansion			
	Air Navigation			○ Cat-I ILS, VOR/DME, ASR/SSR ○ ATC, Met. Airfield Facilities FANS ○			
Remark							

(2) Facility Planning

a) Runway

The new runway of 3,300 meter length and 45 meter width, with 7.5 meter-wide shoulders is planned to be constructed on the western side, and in parallel with the existing runway. The separation between the new runway and existing runway is to be maintained at 225 meters, in view of the simultaneous pavement works under the airport operation.

Fig. 4.5.9 Circumference Conditions of Fergana Airport



b) Taxiway

All taxiway systems are under military control except for the exit taxiway No.6. The existing exit taxiways such as No.1, No.2 and No.4 and parallel taxiway are to be used with the necessary improvement.

Three new exit taxiways are to be constructed to connect the new runway with the existing one.

The existing exit taxiways No. 1, No. 2 and No. 4 of 18 meter width are to be widened up to 23 meters with 7.5 m-shoulders on both sides, to accommodate the medium size jet aircraft operation.

The existing exit taxiway No. 6 (24 meters wide) is sufficient for medium size jet aircraft operation. However, the shoulder pavement is to be constructed allowing for 7 meters on both sides of the existing exit taxiway.

Strength of the taxiway asphalt concrete pavement is PCN 22~28/F/B/X/T. For the medium size jet aircraft operation, overlay of 20 centimeters for taxiway No. 1, 2, 4 and 5 centimeters for taxiway No. 6 is necessary during the 1st Stage.

c) Apron

The majority of the airport territory is occupied by military facilities, a remote apron for civil aviation is located in a corner of the airport territory.

Development of the terminal area and apron is desirable, creating a new area in the airport, the apron is to be expanded at the existing terminal area.

d) Terminal Area Facilities

Development plan for the year 2020 of the terminal area is shown in **Fig. 4.5.10**.

- Passenger Terminal Building
  Basically, for the development of the passenger terminal building, the existing terminal building is to be used. At the 1st Stage, expansion for international and CIS passengers is required. At the 4th Stage, required floor area is estimated at 6,700 m^2 for domestic passengers, and 8,400 m^2 for international and CIS passengers.

- Cargo Terminal Building
  New building is to be enlarged up to 4,930 m^2 for the forecast demand of the year 2020

- Car Parking Area
  The existing car parking area is to be expanded up to 31,150 m^2 for the forecast demand of the year 2020.

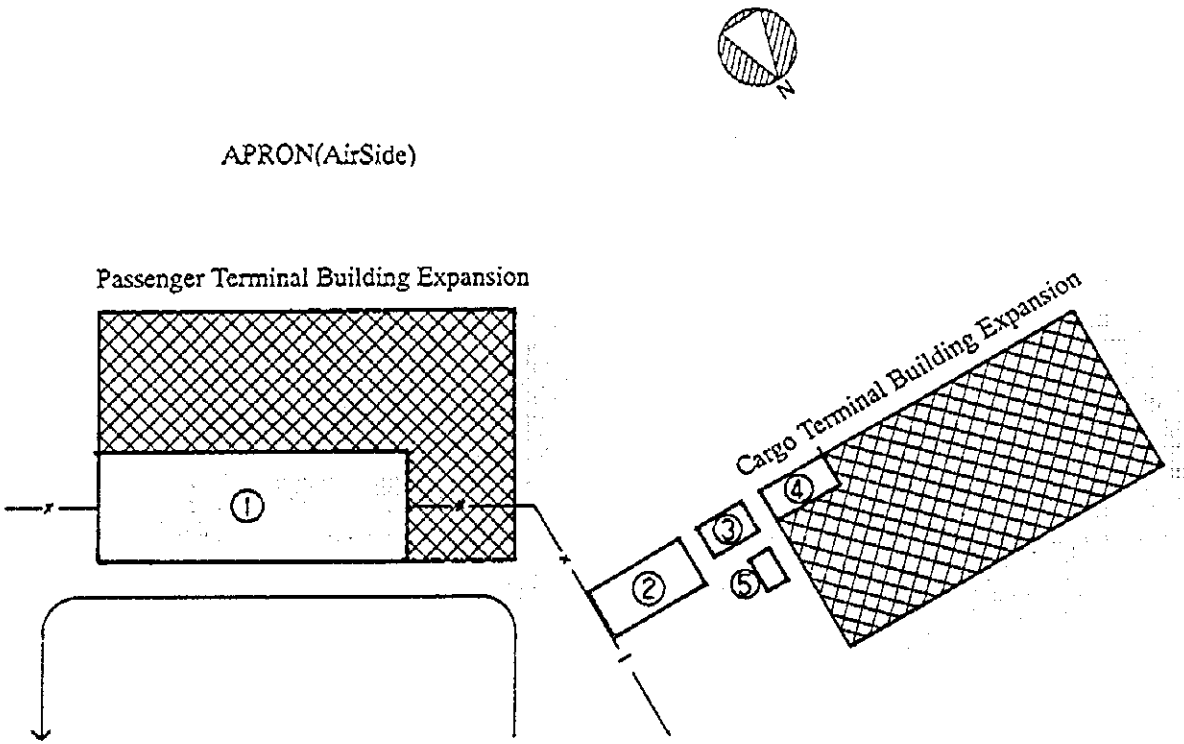
- Administration Facilities
  Existing facilities are under the military control.

- Aircraft Fuel Facilities
  Aircraft fuel facilities are not installed in the terminal area for civil aviation.

- Others Facilities
  Existing facilities such as VIP building etc. are to be used continuously.

e) Air Navigation Facilities and ATS System

Development plan of air navigation facilities is summarized in Chapter 4.6 and the study on ATC system in Chapter 4.7 respectively.



1.	Passenger Terminal Building
2.	VIP Building
3.	Garage
4.	Cargo Storage and Office Building
5.	Storage

Fig. 4.5.10

Fergana Airport Terminal Area Layout Plan (S=approx.1/2,000)

4.5.8 Kokand Airport Development Plan

(1) Development Plan

Kokand airport is classified as a Class III airport.

The airport development plan is shown in **Table 4.5.1**. The existing runway is to be extended up to 2,200 meters from 1,600 meters during the 2nd Stage. Development plan for the year 2020 is shown in **Fig. 4.5.11**.

Table 4.5.14 Development Plan of Kokand Airport (Class III)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		24 (1995)	17	19	47	54
	Max. Aircraft		AN 24	O IL 114 (Med. Jet)			
Development	Airfield	Runway	1,600 m	O 2,200 m			
		Taxiway	Parallel				
		Pavement		O Overlay of runway and Taxiway			
	Terminal	Pax. Bldg.		O Expansion			
	Air Navigation			O VOR/DME, ATC Met. Airfield Lighting			
Remarks							

(2) Facility Planning

a) Runway

The plan was to extend the runway to 3,000 meters in length, and land use for future extension area was controlled. An extension of 600 meters is to be made along the direction originally planned.

The width of 40 meters of the existing runway is satisfactory to the minimum requirements in width for IL 114 operation.

The strength of existing flexible pavement (PCN 12/F/A/X/T) is enough for IL114 operation. As surface of the runway is superannuated and has deteriorated, urgent overlay works are required with 5 centimeters in thickness.

b) Taxiway

Basically the existing taxiway system, except for exit taxiway No. 3 and the parallel taxiway, are to be used as much as possible for future demand. T/W No.3 and parallel taxiways are extremely superannuated, and are not planned for improvement from the viewpoint of aircraft movements and cost saving.

The exit taxiway No. 1 (14 meters wide) and No. 2 (16 meters wide) are to be widened up to 18 meters at the first stage, in accordance with ICAO regulations.

Strength of the existing flexible pavement is PCN 11/F/A/X/T. This is adequate for future operation of IL-114. However, the surface of the exiting taxiways has seriously deteriorated, and, overlay work of 5 centimeter thickness is required at the 1st Stage.

c) Apron

During the long-term development, expansion of the existing apron is not required.

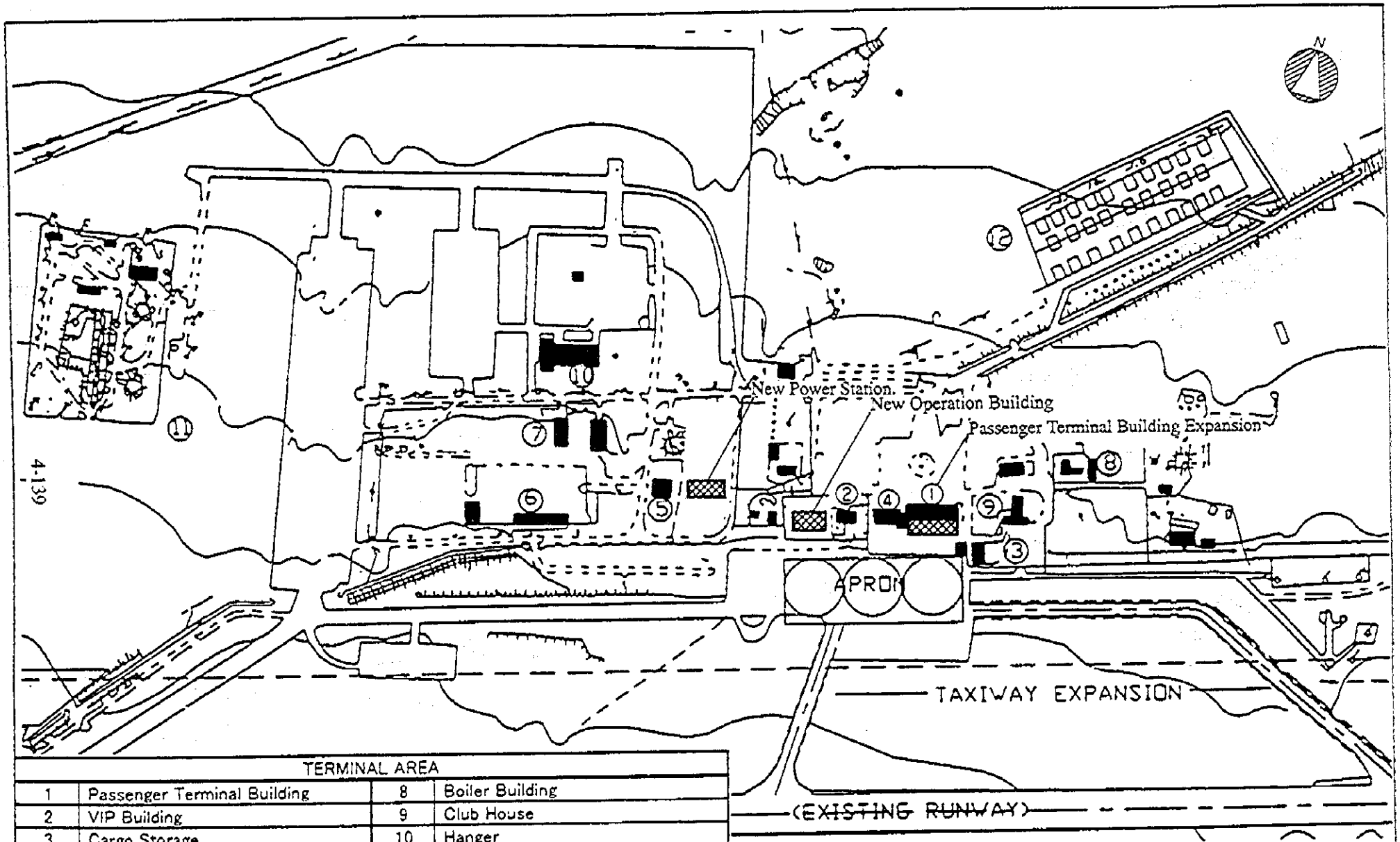
d) Terminal Area Facilities

- Passenger Terminal Building
  The existing building is to be enlarged up to 840 m^2 to meet the demand of the year 2020, and extended between the existing building and apron.
- Cargo Terminal Building
  Existing building (60 square meters) is to be enlarged up to 150 square meters to meet the demand of the year 2020, at the eastern area of the existing building.
- Car Parking Area
  Existing car parking area is to be expanded up to 2,100 m^2 for the demand of the year 2020.
- Administration Facilities
  Control tower, administration building, power supply station are to be newly constructed at the 2nd Stage, in accordance with the timing of the renewal of the air navigation facilities.

  The existing rescue and five fighting station (640 m^2) is enough for the demand (500 m^2) to the year 2020.
- Aircraft Fuel Facilities
  The existing storage capacity (3,200 kiloliters) is enough for the demand (14 kiloliters) of the year 2020.
- Others Facilities
  Existing facilities such as VIP building etc. are to continue in service.

e) Air Navigation Facilities and ATS System

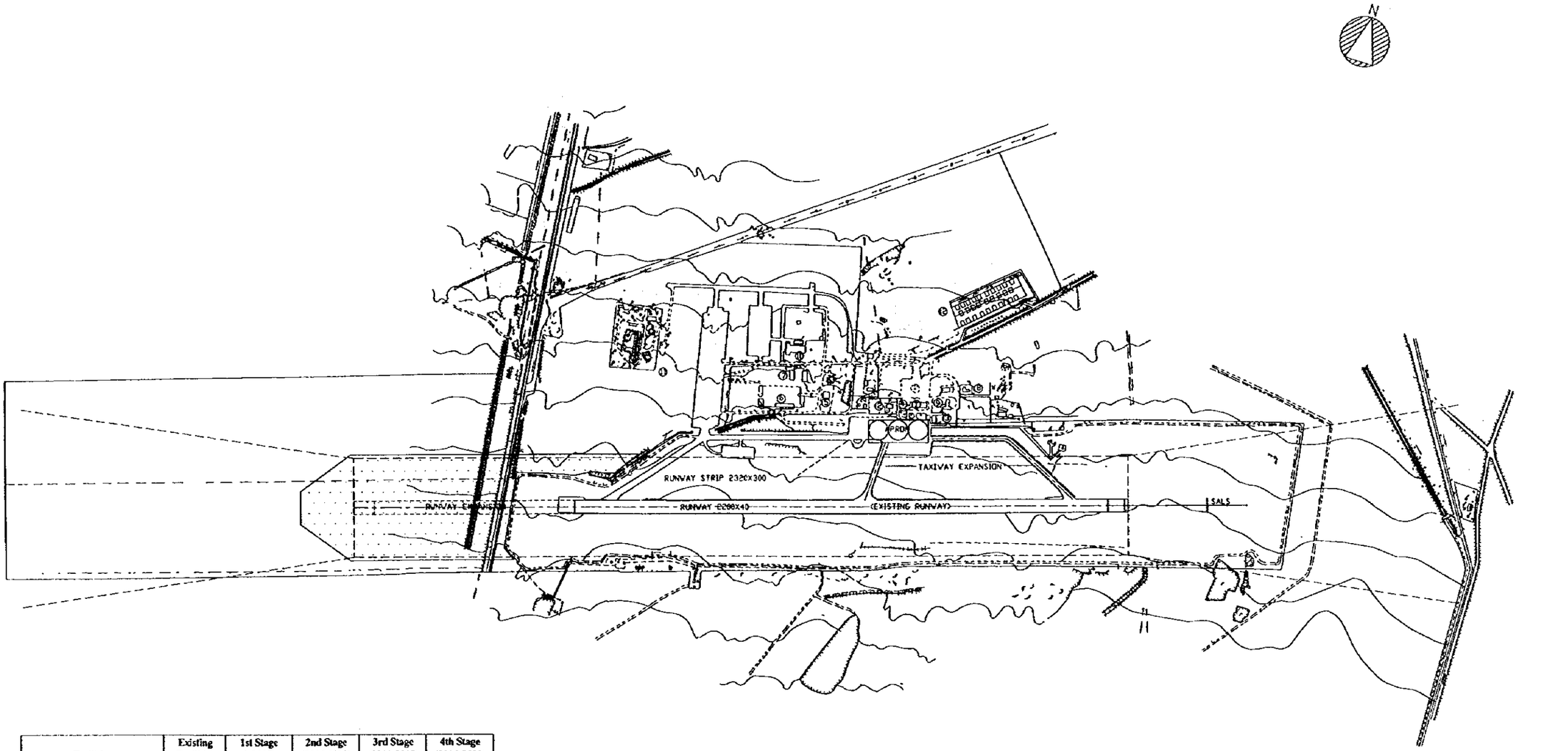
Development plan of air navigation facilities is summarized in Chapter 4.6 and the study on ATC system in Chapter 4.7 respectively.



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		

Fig. 4.5.11 (1)

Kokand Airport Terminal Area Layout Plan (S=1/5,000)



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

Fig. 4.5.11 (2) 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	2200m
Main City	Kokand	(Existing)	(1600m)
Distance from city	4km south	Direction (True north)	N 73° 'E
Reference Point	N 40° 26'	Main Runway	25
Coordinates	E070° 59'	ILS Category	-

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

4.5.9 Samarkand Airport Development Plan

(1) Development Plan

The modernization project of Samarkand airport is in progress, geared to the demand target of 2005.

Samarkand airport is one of the major airports in Uzbekistan, and functions as an alternative airport of Tashkent airport.

Samarkand airport is classified as a Class II airport, and the development plan is summarized in **Table 4.5.15**, and general plan is shown in **Fig. 4.5.12**.

Table 4.5.15 Development Plan of Samarkand Airport (Class II)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		46 (1995)	500	640	780	950
	Max. Aircraft		TU 154	○ B 767			
Development	Airfield	Runway	3,100 m			○ Full Parallel	
		Taxiway	Partial Parallel	○ Widening & Shoulders(T/W 3, 4 & Parallel)			
		Apron		○ Expansion			
		Pavement		○ Overlay (R/W) Overlay (T/W 1, 2) ○ Overlay (T/W 3, 4 & parallel)			
	Terminal	Pax. Bldg.		○ Expansion			
	Air Navigation					○ Renewal FANS ○	
Remarks							

(2) Facility Planning

a) Runway

Towards the target year of 2005 in the modernization projects, .the existing runway is now being improved to accommodate medium size jet operation. Thereafter, no substantial improvement of the runway will be required. But, between the 2nd and 3rd Stages, as pavement surface to be repaved newly under the modernization project will reach its useful life, overlay work for rehabilitation of surface course will be required at the 2nd Stage.

b) Taxiway

The existing taxiways, except the parallel taxiways, and taxiways No.3 and No.4 will be improved and be completed up to 1998 to accommodate medium size jets, to the target year of 2005 in the modernization project.

Thereafter, the following improvement is required at the 2nd stage.

Taxiway	Present Width	Planned Width	Overlay thickness	Improvement Stage
• Parallel	21 m	23 m & 7.5 m shoulders	10 cm	2nd Stage
• No.1	23 m		5 cm	2nd Stage
• No.2	23m		5 cm	2nd Stage
• No.3	18 m	23 m & 7.5 m shoulders	10 cm	2nd Stage
• No.4	21 m	23 m & 7.5 m shoulders	10 cm	2nd Stage

c) Apron

Two (2) stands for B 767 and three (3) stands for IL 114 will be available after completion of the modernization project. After the 1st stage, expansion of apron is required to meet the increased demand accordingly.

d) Terminal Area Facilities

- Passenger Terminal Building
  The passenger terminal building to be constructed under the modernization project (6,890 m^2 for 2005 demand) is to be expanded towards the air-side area up to 10,920 $m^2$to meet the 2020 demand.
- Cargo Terminal Building
  The cargo terminal building to be constructed under the modernization project (1430 m^2) is to be enlarged up to 4,170 m^2 to cope with the 2020 demand.
- Car Parking Area
  The car parking area to be constructed under the modernization project (100 vehicles) is to be expanded westwards or southwards up to 610 vehicles to meet the 2020 demand.
- Administration Facilities
  Control tower administration building, power supply station to be constructed under the modernization project are to continue in use.

  As to the rescue and fire fighting station, development work is in progress to meet the requirements of Aerodrome Category 6 of ICAO regulations, under the modernization project. Aerodrome Category at the 4th Stage is also "6", and no additional facilities will be required.
- Aircraft Fuel Facilities
  The existing fuel complex is estimated at about 15,000 m^2. This is enough for the required area (6,000 m^2) of the 2020 demand
- Others Facilities
  The existing facilities such as VIP building are to be used continuously.

e) Air Navigation Facilities and ATS System

Development plan of air navigation facilities is summarized in Chapter 4.6 and the study on ATC system in Chapter 4.7 respectively.

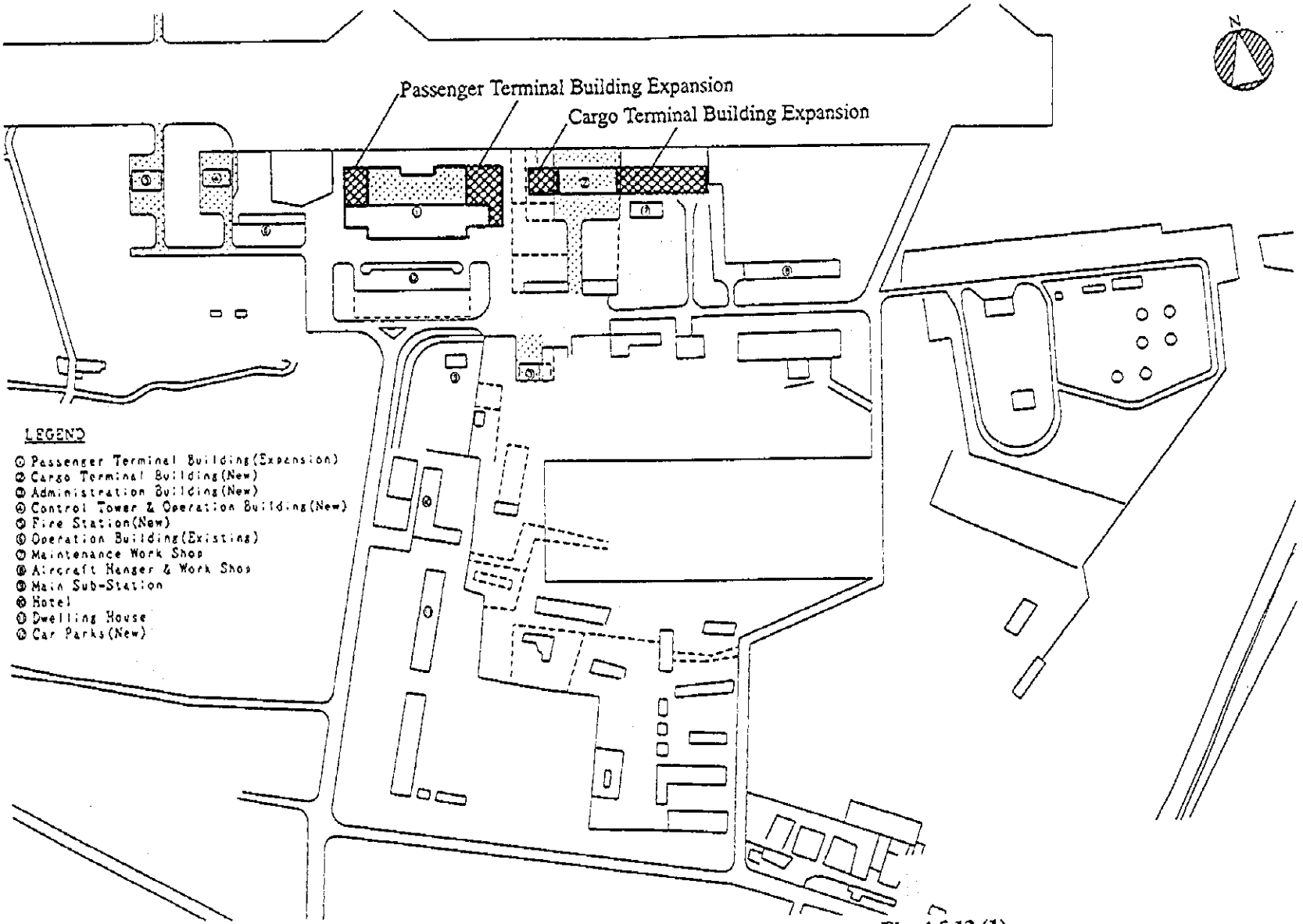
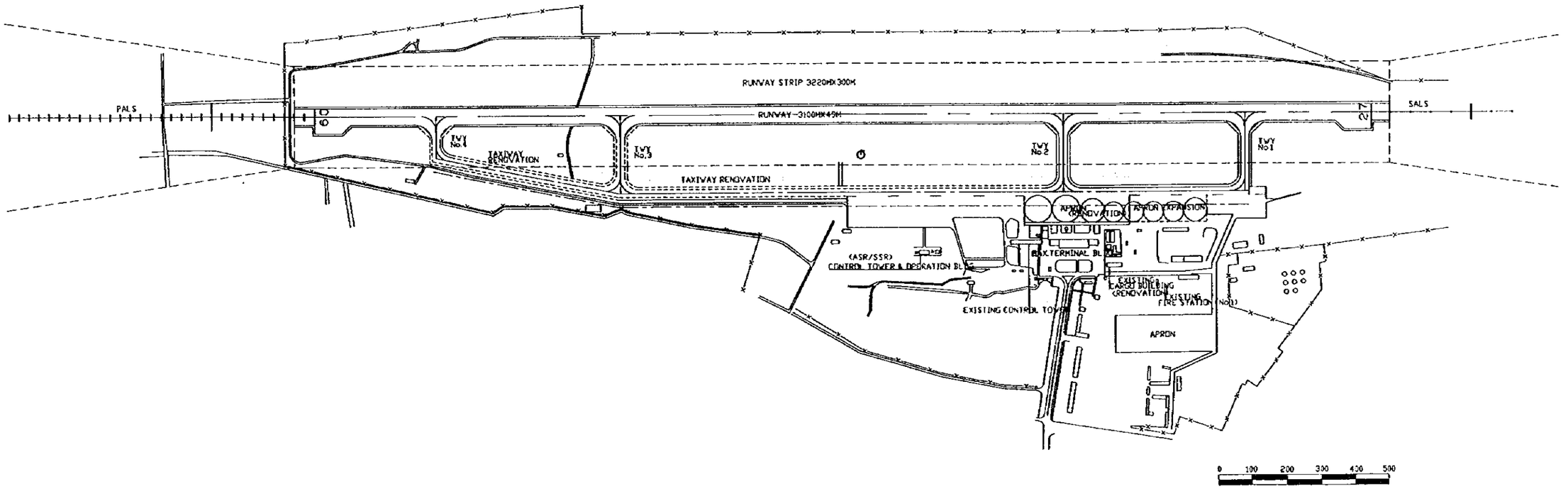


Fig. 4.5.12 (1)

Samarkand Airport Terminal Area Layout Plan (S=1/5,000)



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

Fig. 4.5.12 (2) Samarkand Airport Development Plan (2020)

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

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Airport	Samarkand Airport		
Drawing Title	Airport Layout Plan (Year 2020)		
Date		Scale	

4.5.10 Termez Airport Development Plan

(1) Development Plan

Termez airport is classified as a Class II airport and as the core airport of the southern area. The airport development plan is shown in **Table 4.5.16**, general development plan for the year 2020 is shown in **Fig. 4.5.13**.

Table 4.5.16 Development Plan of Termez Airport (Class II)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		86 (1995)	320	420	530	630
	Max. Aircraft		IL 76			O B 767	
Development	Airfield	Runway	3,000 m			O Shoulders	
		Taxiway				O widening & Shoulders	
		Apron		O Expansion			
		Pavement				O Overlay (R/W, T/W)	
	Terminal	Pax. Bldg.	2,200 m²	O Expansion		O Expansion (Int.)	
	Air Navigation			O Cat-I ILS, VOR/DME ATC, Met. Airfield Lighting			O Renewal O FANS
Remarks							

(2) Facility Planning

a) Runway

The existing 42 m-wide runway is to be widened up to 45 meters with 7.5 m shoulders to accommodate medium size jets.

According to the site investigation, it was decided that there is no need to improve the existing runway pavement as it is in a satisfactory surface conditions and enough strength (PCN 19/R/A/X/U) of rigid pavement. This pavement consists of precasted concrete panels. However, 20 centimeters thickness of overlay is necessary with asphalt concrete at the Third stage for introduction of B 767-300 on international routes.

b) Taxiway

The existing taxiway systems are to be maintained basically for the future operation, as shown below.

Taxiway	Present Width	Planned Width	Overlay thickness	Improvement Stage
• Parallel	42 m	23 m & 7.5 m shoulders	9 cm	
• No.1	20 m	23 m & 7.5 m shoulders	9 cm	3rd Stage
• No.2	20 m	23 m & 7.5 m shoulders	9 cm	3rd Stage
• No.3	20 m	23 m & 7.5 m shoulders	9 cm	3rd Stage
• No.4	30 m	23 m & 7.5 m shoulders	29 cm	3rd Stage
•				

c) Apron

Parking stands are planned to be of the "linear type" along the existing passenger terminal building. However, due to the short depth of the apron dimension, expansion of the apron is required in order to keep proper wing-tip clearance for medium class jets in ramp maneuvering.

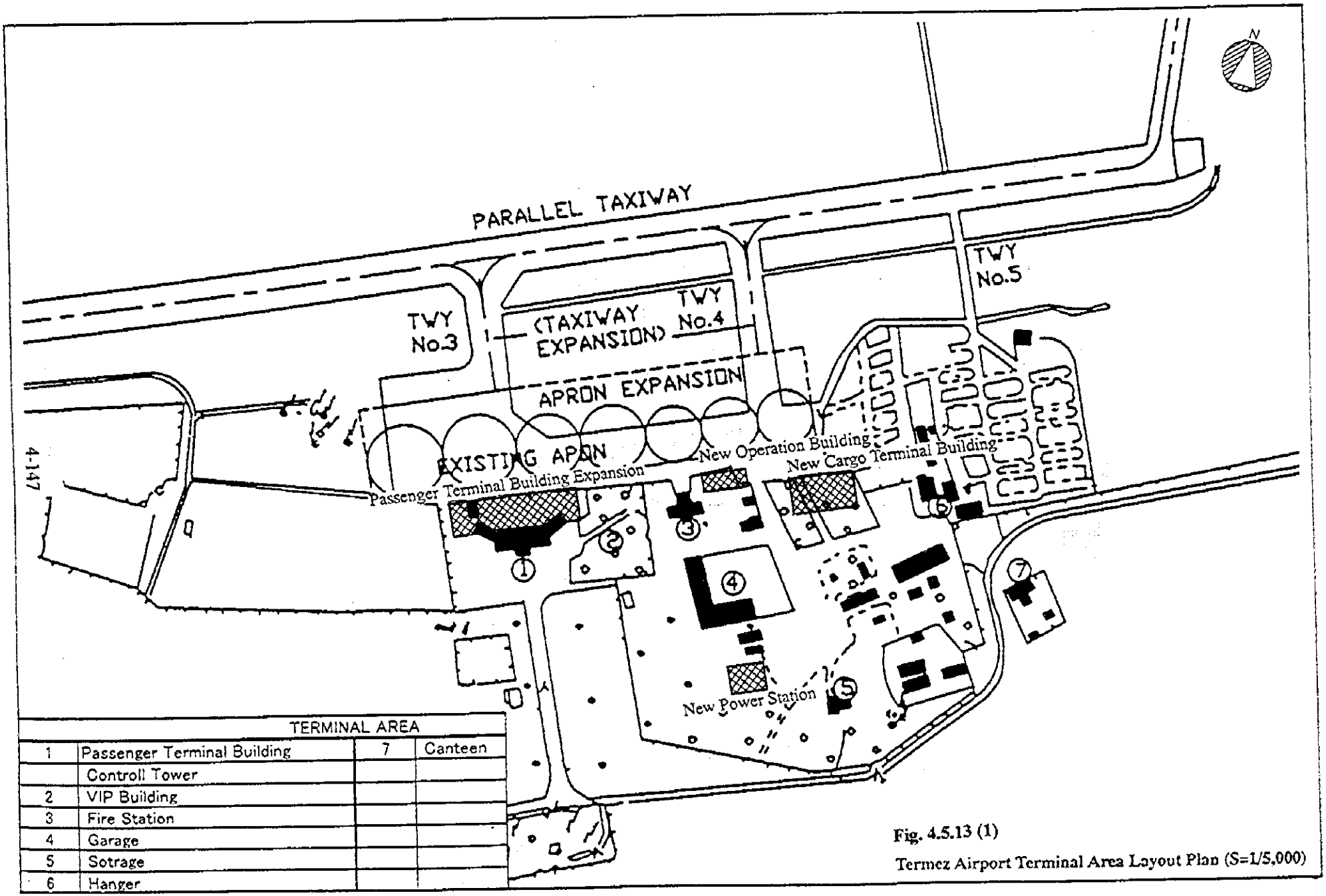
d) Terminal Area Facilities

- Passenger Terminal Building
  The existing passenger terminal building (2200 m^2) is to be enlarged towards the air side area up to 5,000 m^2 for the 2020 demand of domestic service. New buildings are to be constructed on the western area adjacent to the existing building, which comprise the international building (4,200 m^2) and the inter-CIS buildings (4,200 m^2).
- Cargo Terminal Building
  At present, air cargo handling is made at the store house located in the administration area. Thus, a new building is to be constructed at the administration area, facing the air side.
- Car Parking Area
  The existing car parking area (1,200 $m^2$for 80 vehicles) is to be expanded up to 27,300 $m^2$for 780 vehicles for the 2020 demand.
- Administration Facilities
  The control tower, administration building, and power supply station are to be constructed and to serve the demand of the year 2005, the same timing as that for the renewal of the air navigation facilities.

  The existing rescue and fire fighting station is to be enlarged to 600 m^2 for the 2020 demand.
- Aircraft Fuel Facilities
  The existing fuel storage (capacity: 1,600 kiloliters) is satisfactory with the requirements (450 kiloliters) for the demand in 2020.
- Others Facilities
  The existing facilities such as VIP building are to continue in service.

e) Air Navigation Facilities and ATS System

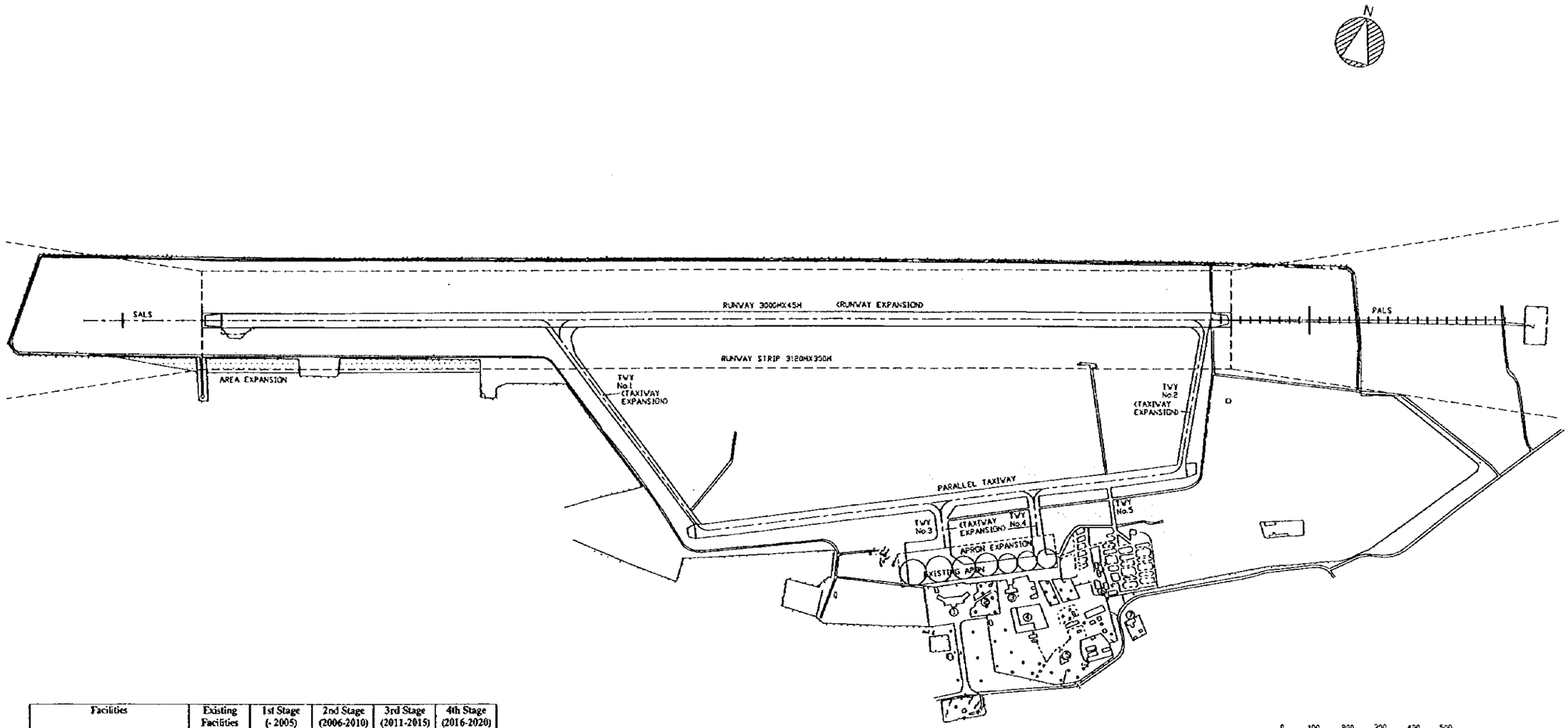
Development plan of air navigation facilities is summarized in Chapter 4.6 and the study on ATC system in Chapter 4.7 respectively.



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

Fig. 4.5.13 (1)

Termez Airport Terminal Area Layout Plan (S=1/5,000)



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,000 m			O Shoulders	
	Taxiway				O widening & Shoulders	
	Apron		O Expansion			
	Pavement				O Overlay (R/W, T/W)	
Terminal	Pax. Bldg.	2,200 m²	O Expansion		O Expansion (Int.)	
Air Navigation			O Cat-IILS, VOR/DME ATC, Met. Airfield Lighting		O Renewal O FANS	

Fig. 4.5.13 (2) 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	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

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Airport	Termez Airport	
Drawing Tittle	Airport Layout Plan (Year 2020)	
Date		Scale

4.5.11 Karshi Airport Development Plan

(1) Development Plan

Karshi airport is classified as a Class III airport. The airport development plan is shown in **Table 4.5.17**, and the general layout plan for the 2020 development is shown in **Fig. 4.5.15.** Runway extension is required at the 2nd Stage.

Table 4.5.17 Development Plan of Karshi Airport (Class III)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		34 (1995)	260	340	420	510
	Max. Aircraft			○ B 767			
Development	Airfield	Runway	2,900 m	○ Extension (3,000 m) & 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			
Remark							

(2) Facility Planning

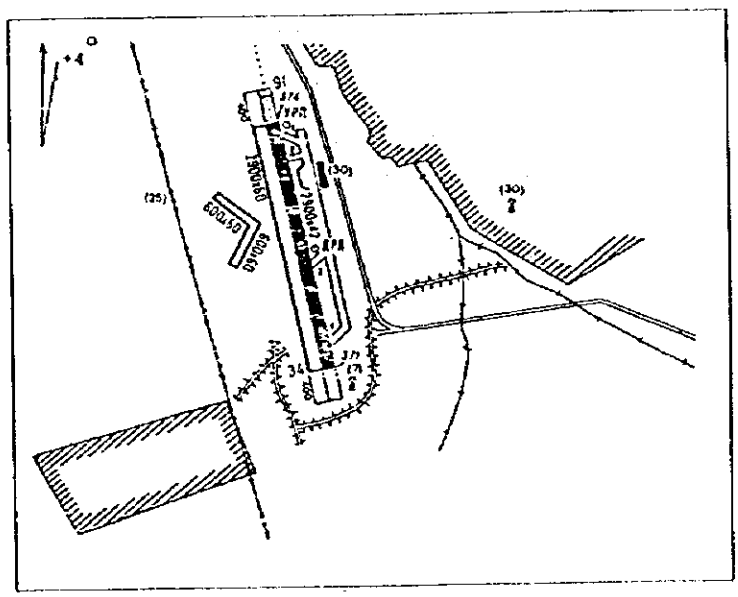
a) Runway

Avoiding the residential area near to the northern end of the runway, the existing runway is to be extended 100 meters southwards at the Second Stage.

The existing runway (42 meters wide) is to be widened up to 45 meters in width with 7.5 m-wide shoulders to accommodate the medium class jet.

The strength of the existing pavement is adequate to meet the future demand, but urgent overlay works of 5cm thickness on the runway is needed for rehabilitation of the seriously damaged surface, and to prevent any further progress of deterioration (except for the portions already repaved).

Fig. 4.5.14 Circumference Conditions of Karshi Airport



b) Taxiway

The existing taxiways of 20 meters width are to be widened up to 23 meters with 7.5 m-wide shoulders on both sides, to accommodate medium class jet operation.

Overlay works of the taxiways is required with 8 centimeters in thickness at the first stage due to insufficient strength (PCN 12-17/F/B/X/T) for medium jets operations and the serious damage on the existing surface.

c) Apron

The existing apron has sufficient space to accommodate the facility requirement for the year 2020, so that improvement work is to be made for the pavement structure in accordance with the future demand.

Parking stands will be of the linear type and provided by the existing terminal building. The existing apron edge taxiway is to be shifted, to keep proper wing tip clearance between parked aircraft and the medium class jet aircraft taxing on the apron edge taxiway.

d) Terminal Area Facilities

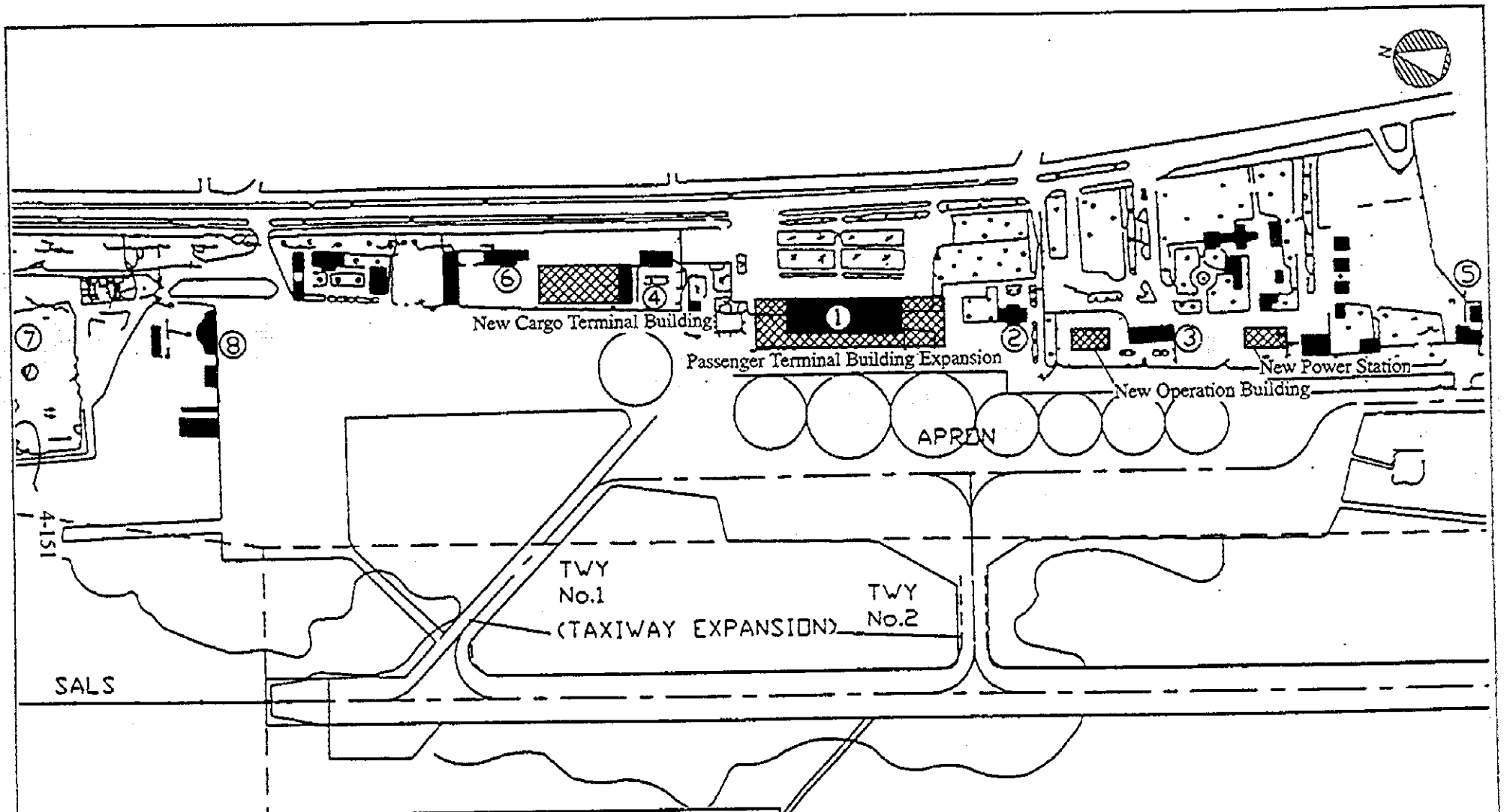
- Passenger Terminal Building
  The existing building (2,400 m^2) is to be enlarged up to 2,520 m^2 for 2020 demand of the domestic passenger service.

  New buildings for international passengers (4,200 square meters) and CIS passengers (4,200 square meters) are required at the 2nd Stage.
- Cargo Terminal Building
  At present, cargo handling take place in the existing passenger terminal building. Thus, a new building is to be constructed adjacent to the existing passenger building.
- Car Parking Area
  The existing car parking area is to be expanded up to 21,350 m^2 for the demand in 2020.
- Administration Facilities
  Control tower, administration building and power supply station are to be renewed in the 2nd Stage, together with the renewal of the air navigation facilities.

  The existing rescue and fire fighting station is to be enlarged to 600 m^2 for the demand in 2020.
- Aircraft Fuel Facilities
  The existing fuel complex is estimated at about 23,800 m^2. This is sufficient for the required area (3,850 square meters) to meet demand in 2020.
- Other Facilities
  The existing facilities such as VIP building are to continue in use.

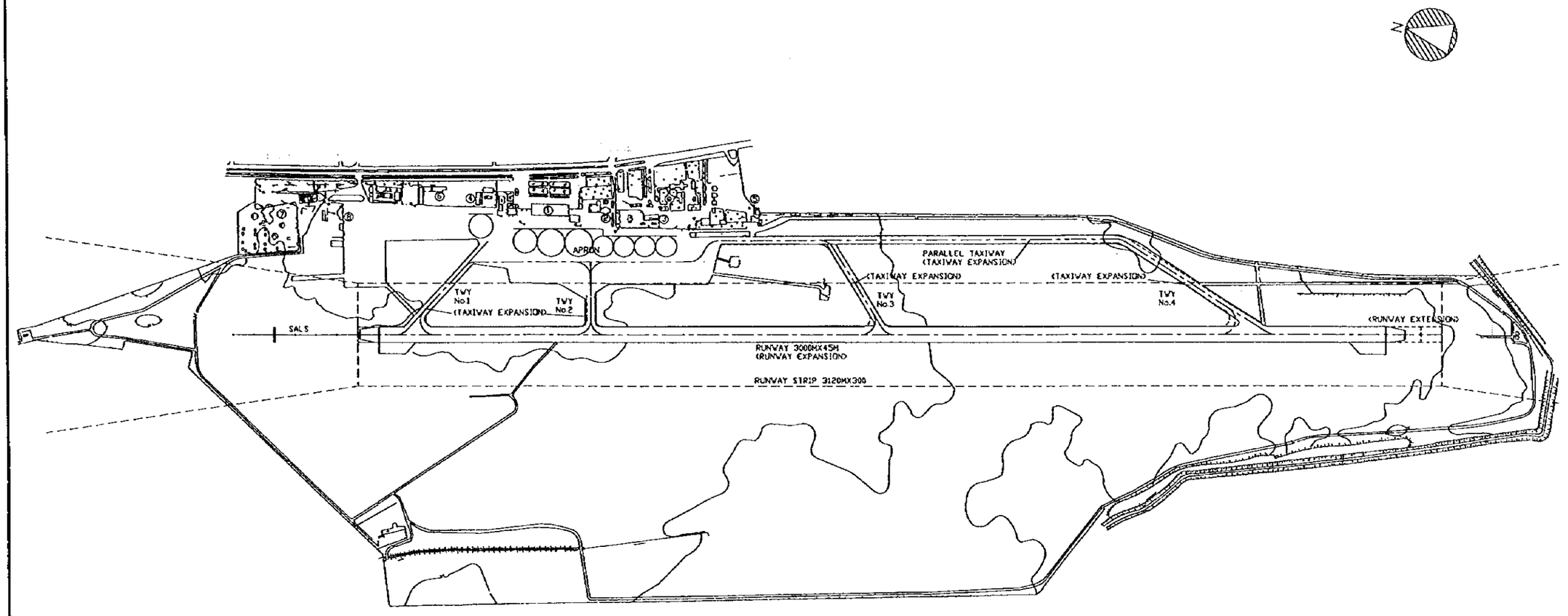
e) Air Navigation Facilities and ATC System

Development plan of air navigation facilities is summarized in Chapter 4.6, and the study on ATC system in Chapter 4.7 respectively.



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		

Fig. 4.5.15 (1)
Karshi Airport Terminal Area Layout Plan (S=1/5,000)



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2026)
Airfield	Runway	2,900 m				○ Extension (3,000 m) & 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. 4.5.15 (2) 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	Kashikadarya	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	-

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Airport	Karshi Airport
Drawing Tittle	Airport Layout Plan (Year 2020)
Date	Scale

4.5.12 Bukhara Airport Development Plan

(1) Development Plan

The Bukhara airport modernization project is in progress to meet the demand target for the year 2005.

Bukhara airport is classified as a Class II airport and a core airport of the western area. The airport development plan is shown in **Table 4.5.18**, and the general layout plan is shown in **Fig. 4.5.17**.

As the modernization project excluded runway extension, extension of the runway is required at the 1st Stage to accommodate medium class jets.

Table 4.5.18 Development Plan of Bukhara Airport (Class II)

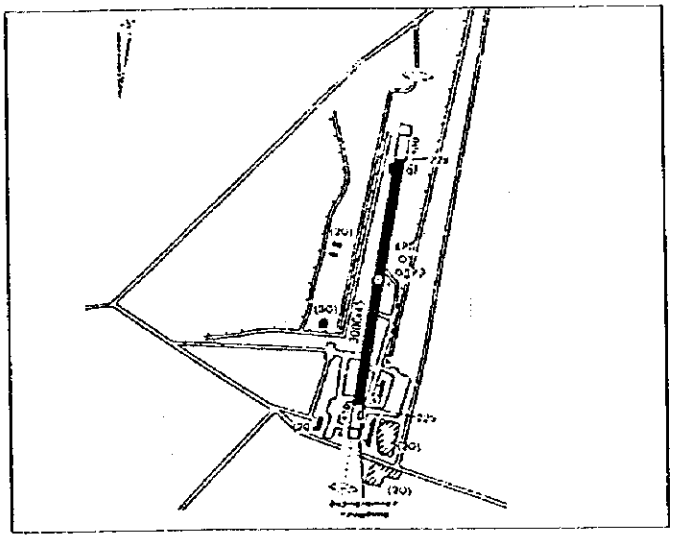
Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		44 (1995)	400	500	600	730
	Max. Aircraft		TU 154	○ B 767			
Development	Airfield	Runway	3,000 m	○ 3,100 m			
		Taxiway	No Parallel	○ Partial Parallel			
		Apron		○ Expansion			
		Pavement			○ Overlay (R/W, T/W)		
	Terminal	Pax. Bldg.			○ Expansion	Expansion ○	
	Air Navigation			○ VOR/DME		○ Renewal	FANS ○
Remarks							

(2) Facility Planning

a) Runway

By the target year of 2005 for the modernization project, the existing runway that is now being improved will accommodate medium size jet operation. However, the runway is required to be extended to 3,100 m due to a slight shortage in length of the existing runway, for medium class jet operation with maximum weight at the 1st Stage.

Fig. 4.5.16 Circumference Conditions of Bukhara Airport



The runway pavement is to be repaved at the 2nd Stage, because the runway pavement overlaid under the modernization project will reach its useful life between 2nd and 3rd Stages.

b) Taxiway

The existing taxiways will be improved and be completed under the modernization project up to 1998 to accommodate medium size jets at the target of the year 2005 demand. Since the overlaid pavement will reach its useful life between the 2nd and 3rd Stages, overlay work for rehabilitation of the surface course will be required at the 2nd Stage.

c) Apron

Two (2) stands for B 767 aircraft and two (2) stands for IL 114 aircraft will be available after completion of the modernization project. After the 1st Stage, expansion of the apron will be required to meet the increasing demand, accordingly.

d) Terminal Area Facilities

- Passenger Terminal Building
  The passenger terminal building to be constructed under the modernization project (8,420 m^2 for demand in 2005) is to be expanded towards the air-side area up to 13,440 m^2 to meet the demand in 2020.
- Cargo Terminal Building
  The cargo terminal building to be constructed under the modernization project (650 m^2) is to be enlarged up to 4,130 m^2 to cope with the demand in 2020.
- Car Parking Area
  The car parking area to be constructed under the modernization project (50 vehicles) is to be expanded westwards or southwards up to 780 vehicles for demand in 2020.
- Administration Facilities
  Control tower administration building and power supply station to be constructed under the modernization project are to be continue in use.

  As to the rescue and fire fighting station, development work is in progress to meet the requirements of Aerodrome Category 6 of ICAO regulations, under the modernization project. Aerodrome Category at the 4th Stage is also category "6", and no additional development will be required.
- Aircraft Fuel Facilities
  Required area of fuel facilities for the 2020 demand is 4,800 m^2.
- Others Facilities
  The existing facilities such as VIP building are to be continuously used.

e) Air Navigation Facilities and ATC System

Development plan of air navigation facilities is summarized in Chapter 4.6, and the study on ATC system in Chapter 4.7 respectively.

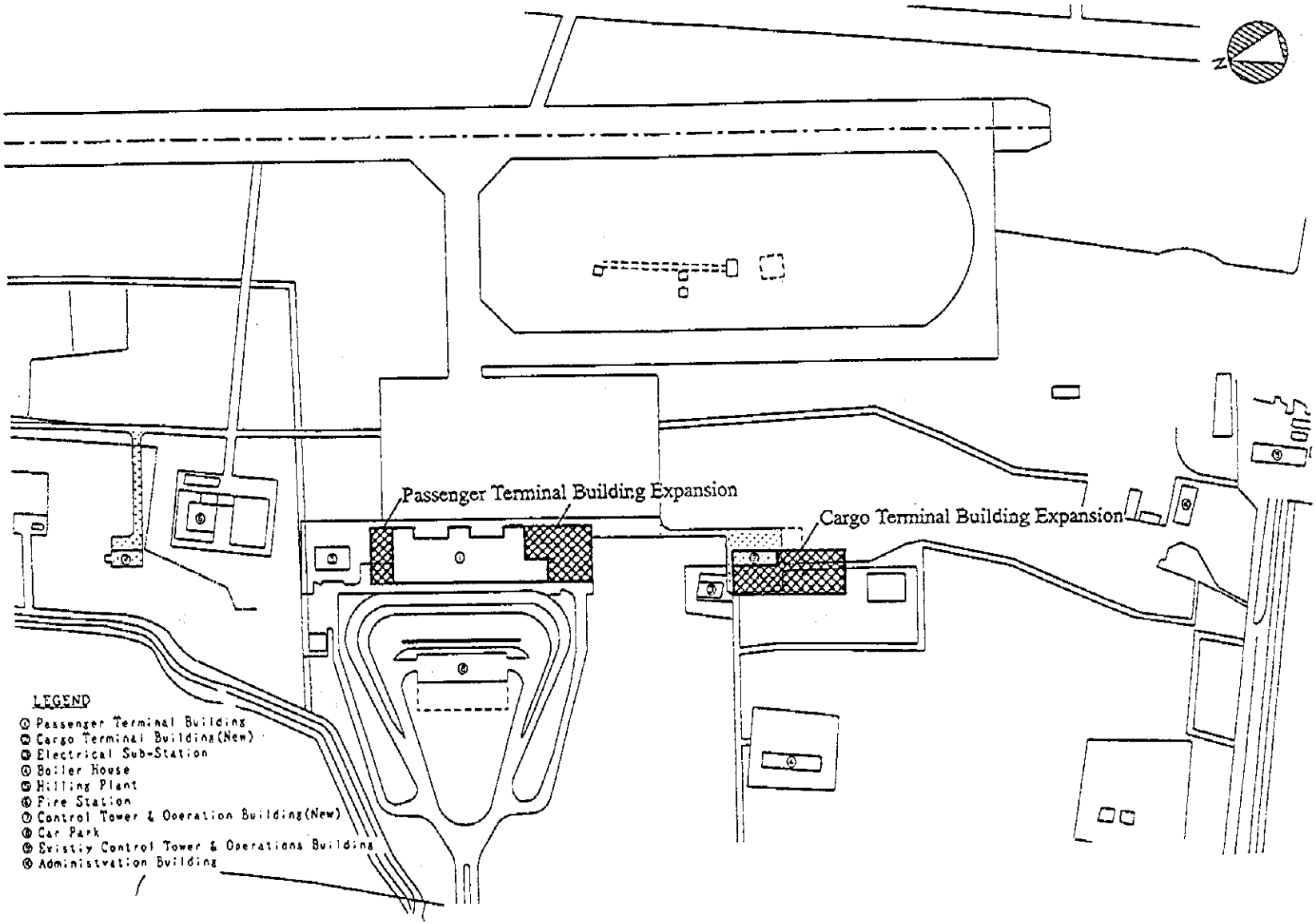
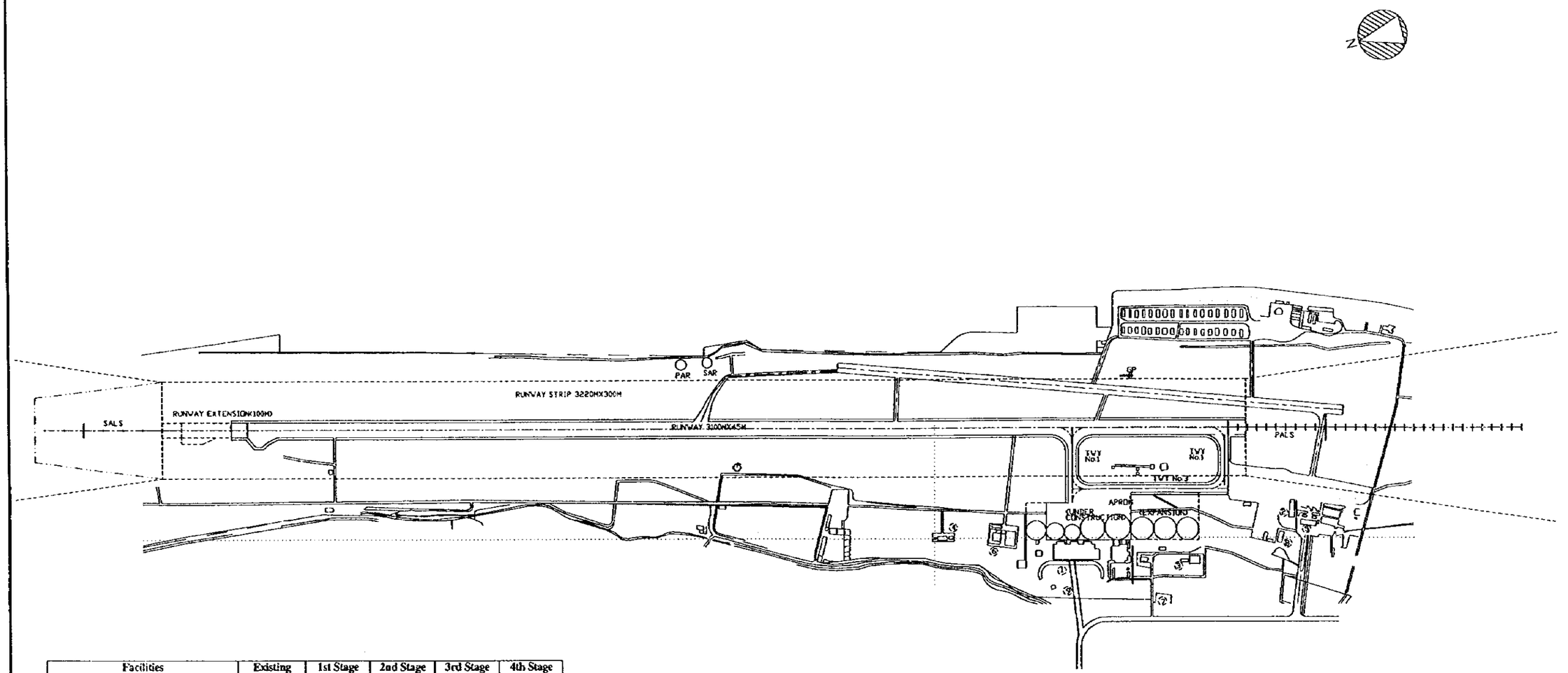


Fig. 4.5.17 (1)
Bukhara Airport Terminal Area Layout Plan (S=1/5,000)



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,000 m	○ 3,100 m			
	Taxiway	No Parallel	○ Partial Parallel			
	Apron		○ Expansion			
	Pavement				○ Overlay (R/W, T/W)	
Terminal	Pax. Bldg..				○ Expansion	Expansion ○
Air Navigation			○ VOR/DME			○ Renewal FANS ○

Fig. 4.5.17 (2) 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

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Airport	Bukhara Airport		
Drawing Tittle	Airport Layout Plan (Year 2020)		
Date		Scale	

4.5.13 Navoi Airport Development Plan

(1) Development Plan

Navoi airport is classified as a Class III airport. The airport development plan is shown in **Table 4.5.19**. The runway is to be extended up to 2600 meters in length at the first stage, 3100 meters in length during the third stage and the fourth stage. The general layout plan for the 2020 development is shown in **Fig. 4.5.18**.

Table 4.5.19 Development Plan of Navoi Airport (Class III)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		14 (1995)	130	190	240	290
	Max. Aircraft		AN 24	O A 310			O B 767
Development	Airfield	Runway	1,410 m	O 2,600 m			O 3,100 m
		Taxiway	No Parallel	O Widening & Partial Parallel			
		Apron		O Expansion		O Expansion	
		Pavement		O Overlay (R/W)			
	Terminal	Pax. Bldg.					O Expansion
	Air Navigation			O VOR/DME, ASR/SSR ATC, Met, Airfield Lighting			O Renewal FANS O
Remarks							

(2) Facility Planning

a) Runway

At the1st Stage, the existing runway (45 meters wide, 1,410 meter long) is to be extended up to 2,600 meters in length with 7.5 m wide shoulders, towards the west side of the runway, where the extension work was made before suspension in 1991 to accommodate medium class jets.

At the 3rd Stage, further extension of the runway to 3,100 m is required to accommodate B767 aircraft operation.

As to the runway pavement, overlay work of 25 cm thickness is required at the 1st Stage, together with the runway extension.

b) Taxiway

The existing taxiway system consists of two exit taxiways and a parallel taxiway, however only one exit taxiway is in service at present.

The existing taxiways (18 meters wide) are to be widened up to 23 meters with 7.5 m shoulders, to accommodate medium size jet operation.

As to the taxiway pavement, the overlay work with 25 cm in thickness is required at the 1st Stage.

c) Apron

The apron requires improvement to accommodate medium size jet operation at the 1st and 3rd Stage. At the same time, the apron edge taxiway is to be shifted to keep enough separation between parked aircraft and taxing aircraft.

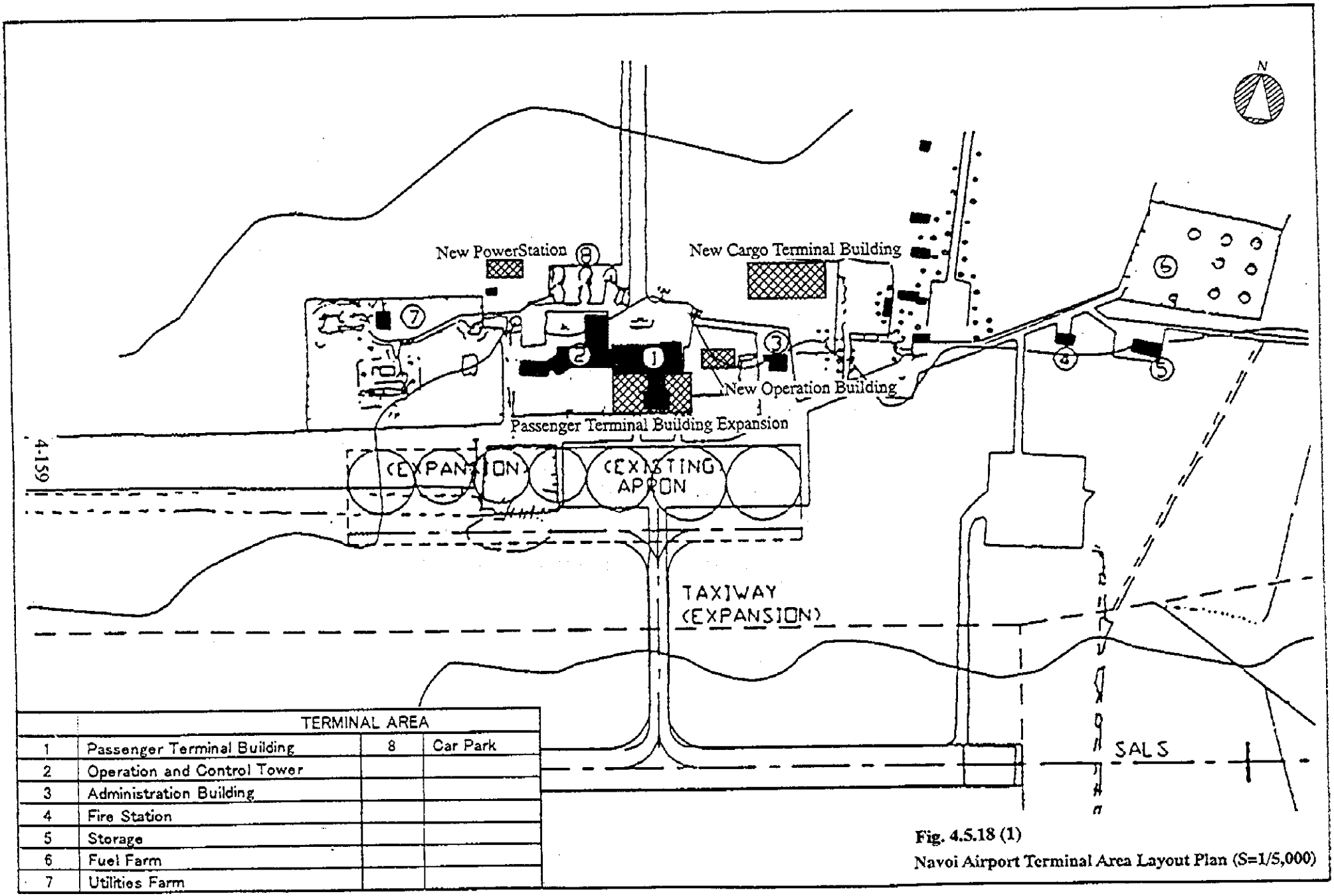
d) Terminal Area Facilities

- Passenger Terminal Building
  The existing building (4,000 m^2 approximately) is to be enlarged up to 9,240 m^2, between the existing building and apron for the demand of year 2020.
- Cargo Terminal Building
  There is a specific cargo terminal building. But a new building is to be constructed at the land side area to the east of the existing passenger terminal building.
- Car Parking Area
  The existing car parking area is to be expanded up to 17,500 m^2 for the demand of the year 2020.
- Administration Facilities
  Control tower, administration building, power supply station are to be constructed newly at the 1st Stage.

  The existing rescue and fire fighting station is to be enlarged up to 600 square meters at the 1st Stage.
- Aircraft Fuel Facilities
  Required space for the demand of the year 2020 is 3,850 m^2.
- Other Facilities
  The existing facilities such as VIP building are to continue in use.

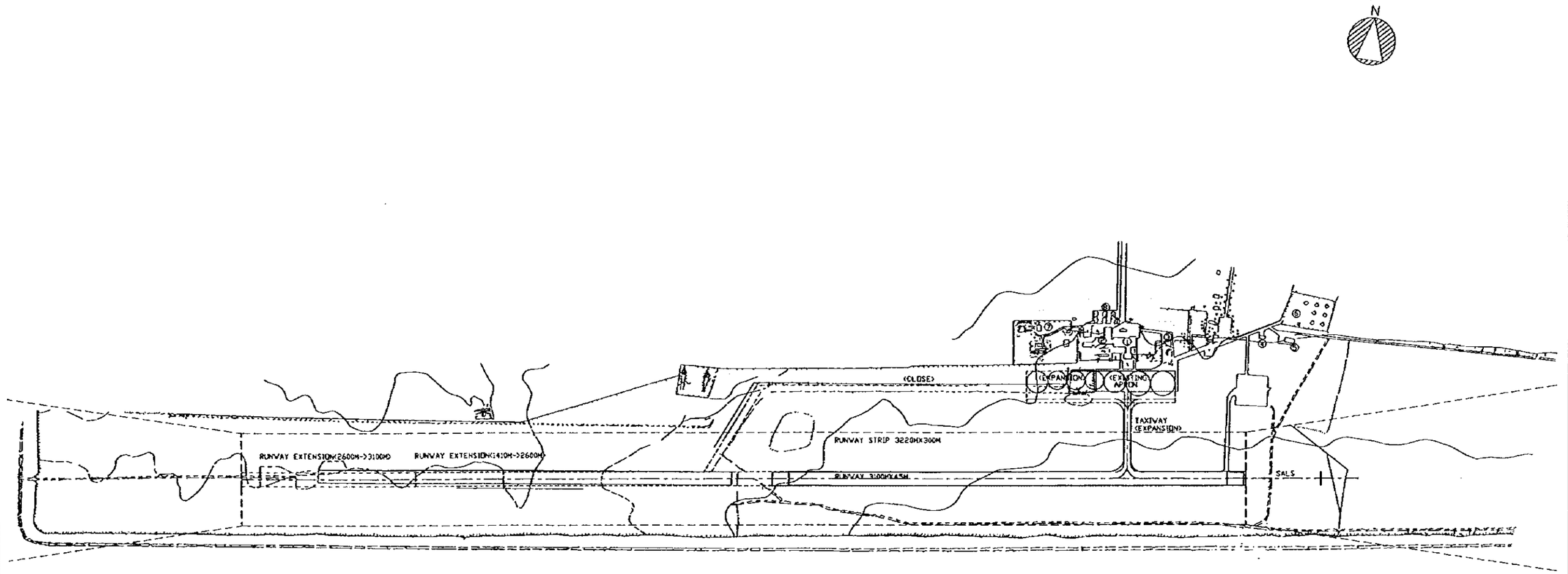
e) Air Navigation Facilities and ATC System

Development plan of air navigation facilities is summarized in Chapter 4.6, and the study on ATC system in Chapter 4.7 respectively.



	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		

Fig. 4.5.18 (1)
Navoi Airport Terminal Area Layout Plan (S=1/5,000)



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	1,410 m		○ 2,600 m		○ 3,100 m
	Taxiway	No Parallel		○ Widening & Partial Parallel		
	Apron			○ Expansion		○ Expansion
	Pavement			○ Overlay (R/W)		
Terminal	Pax. Bldg.					○ Expansion
Air Navigation				○ VOR/DME, ASR/SSR ATC, Met, Airfield Lighting		○ Renewal FANS ○

0 100 200 300 400 500

Fig. 4.5.18 (2) 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	3100mx45m
Main City	Navoi	(Existing)	(1410mx45m)
Distance from city	25km south-west	Direction (True north)	N 82° 25' E
Reference Point	N 40° 07'	Main Runway	25
Coordinates	E065° 12'	ILS Category	-

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

4.5.14 Urgench Airport Development Plan

(1) Development Plan

The Urgench airport modernization project is in progress to meet the demand target of the year 2005.

Urgench airport is classified as a Class II airport and a core airport of the north western area of Uzbekistan. The airport development plan is shown in Table **4.5.20**, and the general layout plan for the 2020 development is shown in **Fig.4.5.19**.

Table 4.5.20 Development Plan of Urgench Airport (Class II)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		69 (1995)	460	580	730	870
	Max. Aircraft		IL 76	O B 767 (Jet Aircraft)			
Development	Airfield	Runway	3000 m				
		Taxiway	Partial Parallel			O Full Parallel	
		Apron			O Expansion		
		Pavement			O Overlay (R/W, T/W)		
	Terminal	Pax. Bldg.			O Expansion	Expansion O	
	Air Navigation				O VOR/DME	O Renewal	FANS O
Remarks							

(2) Facility Planning

a) Runway

By the demand target for the year 2005 under the modernization projects, the existing runway is now being improved to accommodate medium size jet operation.

Since the runway pavement overlaid under the modernization project will reach its useful life between the 2nd and 3rd Stages, overlay work for rehabilitation of surface course will be required at the 2nd Stage.

b) Taxiway

The existing taxiways will be improved and be completed under the modernization project up to 1998 to accommodate medium size jet at the target of the year 2005 demand. Between the 2nd and 3rd Stages, as pavement surface to be newly repaved under the modernization project will reach its useful life, overlay work for rehabilitation of surface course is required at the 2nd Stage. At the 4th Stage, extension of parallel taxiway and overlay of existing taxiway No. 3 and No. 4 will be required.

c) Apron

Three (3) stands for B 767 aircraft and one (1) stand for IL 114 aircraft will be available after completion of the modernization project. After the 1st Stage, expansion of apron is required to meet the increasing demand accordingly.

d) Terminal Area Facilities

- Passenger Terminal Building
  The passenger terminal building to be constructed under the modernization project (6,890 m^2 for the demand in 2005) is to be expanded up to 14,280 m^2 to

meet the demand in 2020.

- Cargo Terminal Building
  The cargo terminal building to be constructed under the modernization project (400 m^2) is to be enlarged up to 3,730 m^2 to cope with the demand in 2020.
- Car Parking Area
  The car parking area to be constructed under the modernization project (50 vehicles) is to be expanded westwards or southwards up to 830 vehicles for the demand in 2020.
- Administration Facilities
  Control tower administration building, power supply station to be constructed under the modernization project are to be continuously used.

  As to the rescue and fire fighting station, development work is in progress to meet the requirements of Aerodrome Category 6 of ICAO regulations, under the modernization project. Aerodrome Category at the 4th Stage is also category "6", and no additional development will be required.
- Aircraft Fuel Facilities
  Required area of fuel facilities for the 2020 demand is 4,800 m^2.
- Others Facilities
  The existing facilities such as VIP building are to be continuously used.

e) Air Navigation Facilities and ATC System

Development plan of air navigation facilities is summarized in Chapter 4.6, and the study on ATC system in Chapter 4.7 respectively.

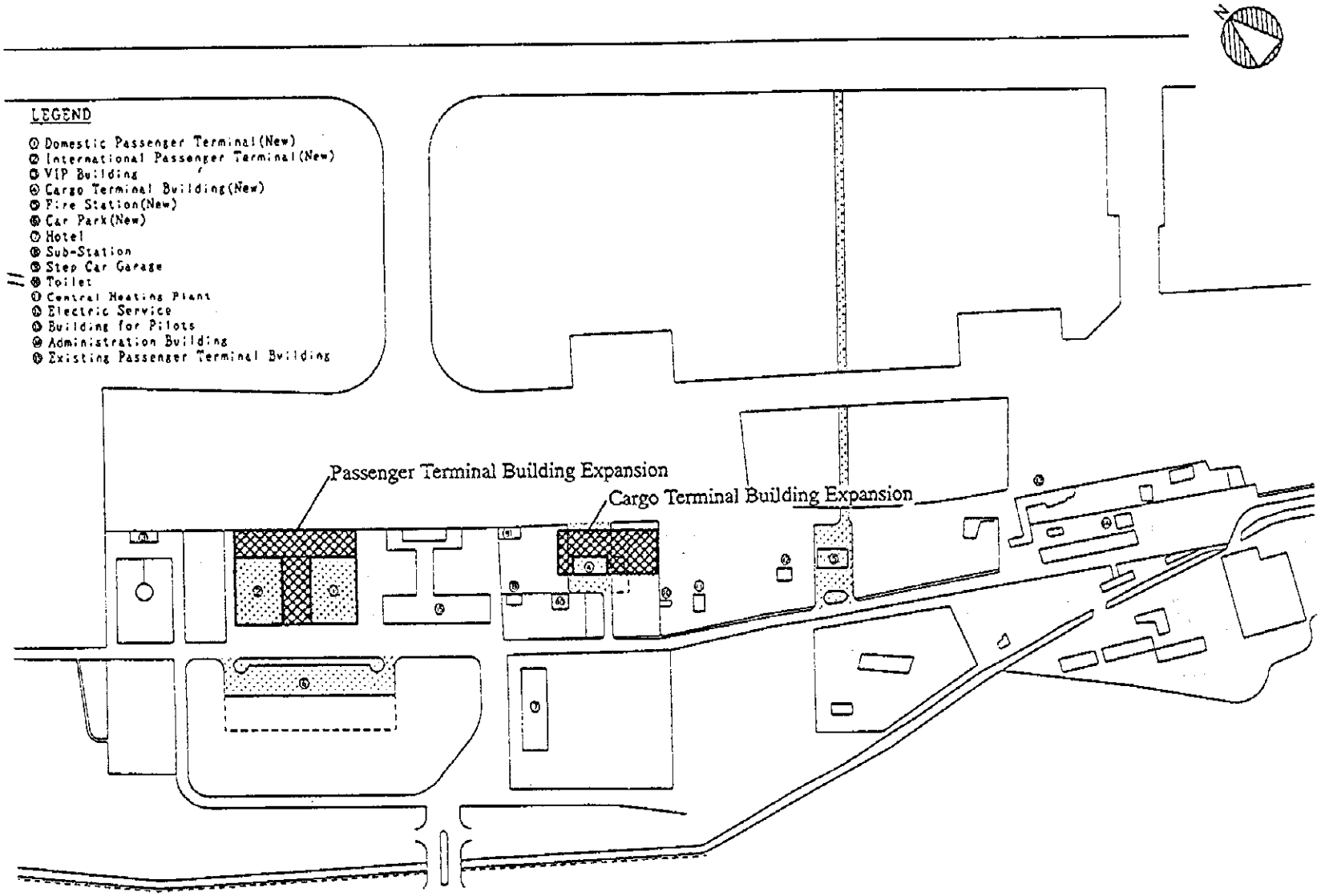

Fig. 4.5.19 (1)

Urgench Airport Terminal Area Layout Plan (S=1/5,000)

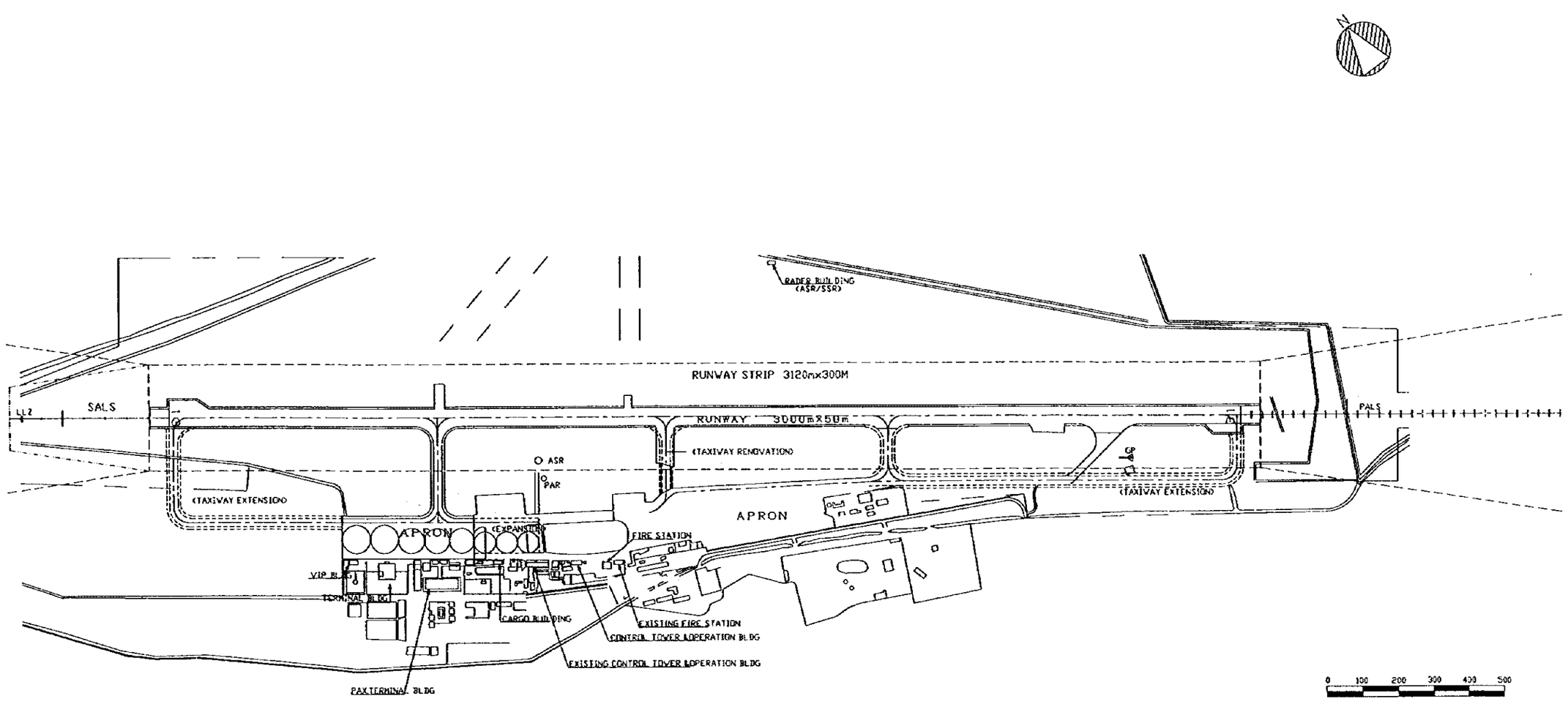

Fig. 4.5.19 (2) Urgench Airport Development Plan (2020)

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

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

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The Study for The Air Transportation Development in The Republic of Uzbekistan			
Airport	Urgench Airport		
Drawing Tittle	Airport Layout Plan (Year 2020)		
Date		Scale	

4.5.15 Nukus Airport Development Plan

(1) Development Plan

Nukus airport is classified as a Class II airport. The airport development plan is shown in **Table 4.5.21**. Development plan for the year 2020 is shown in **Fig. 4.5.20**.

Table 4.5.21 Development Plan of Nukus Airport (Class II)

Item			Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Demand	Passenger ('000)		50 (1995)	300	380	460	570
	Max. Aircraft		IL 62	O B 767			
Development	Airfield	Runway	3,000 m	O Shoulders (6 m)			
		Taxiway	Partial Parallel	O Widening & Shoulders			
		Apron		O Expansion			
		Pavement		O Overlay (R/W, T/W)			
	Terminal	Pax. Bldg.	2,200 m²	O Expansion (Dom. & CIS O Expansion (Int.) Expansion O			
	Air Navigation			O Cat-I ILS,VOR/DME,ASR/SSR ATC, Met, Airfield Lighting Renewal O FANS O			
Remarks							

(2) Facility Planning

a) Runway

The existing runway is 3,000 meters long and 48 meters wide, and is sufficient to accommodate medium class jets. However, 6 m wide shoulder pavement is needed for both sides of the runway.

Strength of the precasted concrete panels of the existing runway is PCN 20/R/A/X/T, and is not enough to accommodate medium class jets. Surface of the existing pavement has extremely deteriorated. Therefore, overlay work of 20 cm thickness is required at the 1st Stage.

b) Taxiway

The existing taxiway system is to be maintained basically for future operation, as shown below.

Taxiway	Present Width	Planned Width	Overlay thickness	Improvement Stage
• Parallel	38 m (Taxiway + Shoulders)		8 cm	1st Stage
• No.1	38 m (Taxiway + Shoulders)		8 cm	1st Stage
• No.2	22 m	23 m + Shoulders	8 cm	1st Stage
• No.3	22 m	23 m + Shoulders	8 cm	1st Stage
• No.4	38 m (Taxiway + Shoulders)		8 cm	1st Stage
• No.5	38 m (Taxiway + Shoulders)		8 cm	1st Stage
• No.6	16 m	23 m + Shoulders	5 cm	1st Stage
• No.7	16 m	23 m + Shoulders	5 cm	1st Stage

c) Apron

Parking stands are of linear type style and provided along the existing terminal building. After the 1st stage, expansion of apron is required to meet increasing demands accordingly.

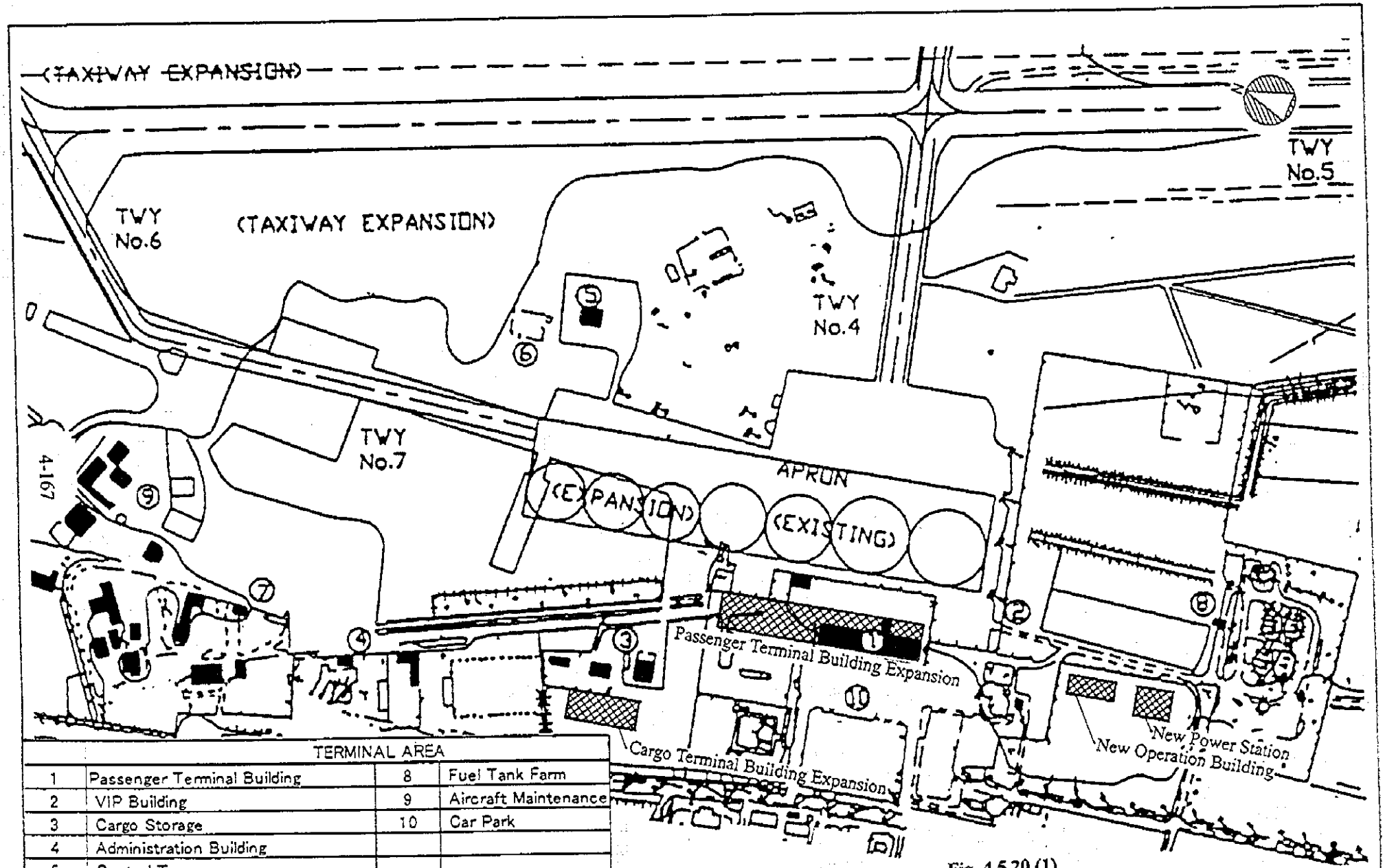
d) Terminal Area Facilities

- Passenger Terminal Building
  Required floor area for the demand of year 2020 is 4,200 m^2 for international and CIS passengers respectively, and 5,400 m^2 for domestic passengers. New CIS passenger building is required at the 1st Stage.
- Cargo Terminal Building
  The existing cargo building (550 m^2) is to expanded to 2,780 m^2, to the west side of the existing cargo building.
- Car Parking Area
  The existing car parking area (2,000 m^2) is to be expanded up to 27,300 m^2 for the demand of year 2020.
- Administration Facilities
  Control tower, administration building, power supply station are to be constructed newly at the 1st Stage.

  The existing rescue and fire fighting station (445 m^2) are to be enlarged up to 600 m^2 at the 1st Stage.
- Aircraft Fuel Facilities
  The existing fuel complex is estimated at about 20.000 m^2. This is enough for the required area (3,850 m^2) to meet the demand of 2020.
- Other Facilities
  The existing facilities such as VIP building are to continue in use.

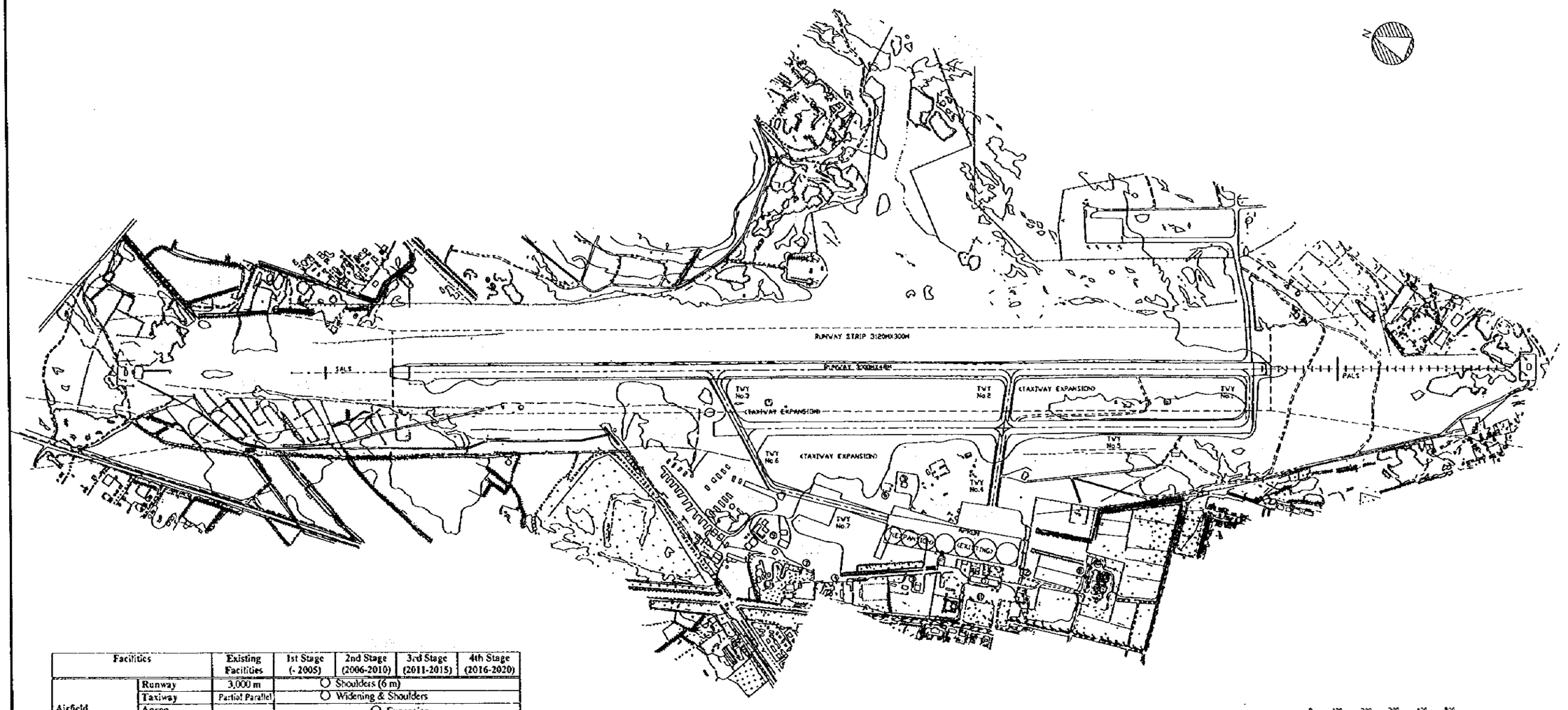
e) Air Navigation Facilities and ATC System

Development plan of air navigation facilities is summarized in Chapter 4.6, and the study on ATC system in Chapter 4.7 respectively.



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		

Fig. 4.5.20 (1)
Nukus Airport Terminal Area Layout Plan (S=1/5,000)



Facilities		Existing Facilities	1st Stage (- 2005)	2nd Stage (2006-2010)	3rd Stage (2011-2015)	4th Stage (2016-2020)
Airfield	Runway	3,000 m	○ Shoulders (6 m)			
	Taxiway	Partial Parallel	○ Widening & Shoulders			
	Apron		○ Expansion			
	Pavement		○ Overlay (R/W, T/W)			
Terminal	Pax. Bldg.	2,200 m²	○ Expansion (Dom. & CIS	○ Expansion (Int.)		Expansion ○
Air Navigation			○Cat-I ILS,VOR/DME,ASR/SSR ATC, Met, Airfield Lighting			Renewal ○ FANS ○

Fig. 4.5.20 (2) 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 north-west	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.

As shown in **Table 4.6.1**, 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.

Table 4.6.1 Installation Year of Major Navaids

Airport	ILS	VOR/DME	ASR/SSR	Control Tower	Airfield Lighting	Met. Facilities
Tashkent	1996	1988	1986	1996	1996	1990
Namangan	1996	-	1996	1987	1984	1982
Andizhan	1997	-	1988	1987	M	1982
Fergana	1997 *	-	M	1988	M	1982
Kokand	-	-	1986	1993	-	1982
Samarkand	1986 (1997)	-	1986 (1999)	1988 (1999)	1987 (1997)	1986 (1997)
Termez	1990	1987	1985	1988	1989	1986
Karshi	1994	-	1990	1988	1982	1986
Bukhara	1986 (1997)	-	1984 (1999)	1985 (1999)	1980 (1997)	1986 (1997)
Navoi	-	-	-	1987	-	1986
Urgench	1986 (1997)	1996	1984 (1999)	1990 (1999)	1987 (1997)	1986 (1997)
Nukus	1988	-	1986	1979	1986	1986

Note : M : Installed and managed by Military.
(year) : Installation is on-going. (*) Replaced with the ILS equipped at Bukhara Airport

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**. Basically, Class I airports shall be developed so as to serve Category II ILS operation, and Class II airports for Category I ILS operation. Class III airports shall be developed for use for landing and take-off at night.

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**, and details are described below:

(1) Tashkent Airport

a) Radio Navaids

The existing VOR/DME shall be renewed.

b) ATC System and Telecommunication

Airport Surface Detecting Equipment (ASDE) shall be installed.

c) Airfield Lighting System

Existing facilities shall be used continuously with proper maintenance.

d) Meteorological Observation System

The existing weather radar shall be renewed.

(2) New Tashkent Airport

a) Radio Navaids

- ILS
  Category II Instrument Landing System (ILS) shall be installed for both sides of the RWY. The ILS system shall conform to standards and recommendations of ICAO Annex 10.
- Locator (NDB)
  Locator Beacon for the ILS approach shall be installed.
- VOR/DME
  VOR/DME shall be installed for the approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities
  New communication control system and ATC consoles shall be installed.
- ASDE
  Airport Surface Detecting Equipment (ASDE) shall be installed.
- ASR/SSR
  Airport Surveillance Radar and Secondary Surveillance Radar (ASR/SSR) shall be installed. SSR system shall conform to both ICAO and CIS standards.
- TRDPS
  Terminal Radar Data Processing System shall be installed.
- AFTN
  Automatic Message Switching System for AFTN shall be installed.

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)

c) Airfield Lighting System

The following Airfield Lights and related power supply systems, including back-up engine generator shall be installed.

- Precision Approach Lighting System (PALS, both side of the RWY)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor
- Weather forecasting equipment
- Weather radar

(3) Namangan Airport

a) Radio Navaids

- ILS
  Existing Category I Instrument Landing System (ILS) for RWY 28 shall be renewed in conformity with standards and recommendations of ICAO Annex 10.
- Locator (NDB)
  Locator Beacon for the ILS approach shall be renewed.
- VOR/DME
  VOR/DME shall be installed for the approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities
  Communication control system and ATC consoles shall be installed.
- ASR/SSR
  Airport Surveillance Radar and Secondary Surveillance Radar (ASR/SSR) shall be renewed.

SSR system shall conform to both ICAO and CIS standards.

- TRDPS
  Terminal Radar Data Processing System shall be installed.
- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance its reliability.

c) Airfield Lighting System

The following airfield lights and related power supply system, including back-up engine generator shall be renewed or installed.

- Precision Approach Lighting System (PALS)
- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor
- Forecast equipment

(4) Andizhan Airport

a) Radio Navaids

- Locator (NDB)
  Locator Beacon for the approach shall be installed.
- VOR/DME
  VOR/DME shall be installed for the approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities

New communication control system and ATC consoles shall be installed.

- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance its reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system, including back-up engine generator shall be installed.

- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor

(5) Fergana Airport

a) Radio Navaids

- ILS
  Category I Instrument Landing System (ILS) for RWY 18 shall be installed in conformity with standards and recommendations of ICAO Annex 10.
- Locator (NDB)
  Locator Beacon for the ILS approach shall be installed.
- VOR/DME
  VOR/DME shall be installed for the approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities
  New communication control system and ATC consoles shall be installed.
- ASR/SSR

Airport Surveillance Radar and Secondary Surveillance Radar (ASR/SSR) shall be installed. SSR system shall conform to both ICAO and CIS standards.

- TRDPS
  Terminal Radar Data Processing System shall be installed.
- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system, including back-up engine generator shall be installed.

- Precision Approach Lighting System (PALS)
- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

(6) **Kokand Airport**

a) Radio Navaids

- VOR/DME
  VOR/DME shall be installed for use of approach en-route flight.
- Locator (NDB)
  Locator Beacon for the approach shall be renewed.

b) ATC System and Telecommunication

- Control Tower Facilities
  VHF Transmitter and Receiver for the ATC air-ground communication shall be renewed.
- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system including back-up engine generator shall be installed.

- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)

- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor

(7) Samarkand, Bukhara and Urgench Airports

As the ongoing modernization project for these three airports include, installation of Cat-I ILS,NDB, control tower with ATC equipment, meteorological facilities and airfield lighting facilities, urgent improvement will not necessary, except for the installation of VOR/DME which is not included in the above project.

However, during the period up to 2020, all air navigation facilities shall be replaced by new one.

(8) Termez Airport

a) Radio Navaids

- ILS
  Category I Instrument Landing System (ILS) for RWY 25 shall be renewed in conformity with standards and recommendations of ICAO Annex 10.
- Locator (NDB)
  Locator Beacon for the ILS approach shall be renewed.
- VOR/DME
  VOR/DME shall be renewed for the approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities
  New communication control system and ATC consoles shall be installed.
- ASR/SSR
  Airport Surveillance Radar and Secondary Surveillance Radar (ASR/SSR) shall be renewed. SSR system shall conform to both ICAO and CIS standards.
- TRDPS

Terminal Radar Data Processing System shall be installed.

- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance its reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system including back-up engine generator shall be renewed or installed.

- Precision Approach Lighting System (PALS)
- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor
- Weather forecast equipment

(9) **Karshi Airport**

a) Radio Navaids

- Locator (NDB)
  Locator Beacon for the approach shall be renewed.
- VOR/DME
  VOR/DME shall be installed for use of approach and en-route flights.

b) ATC System and Telecommunication

- Control Tower Facilities
  New communication control system and ATC consoles shall be installed.
- AFTN

Automatic Message Switching System for AFTN shall be installed to enhance of its reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system, including back-up engine generator shall be renewed or installed.

- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor

(10) **Navoi Airport**

a) Radio Navaids

- VOR/DME
  VOR/DME shall be installed for use of approach and en-route flight.
- Locator (NDB)
  Locator Beacon for the approach shall be renewed.

b) ATC System and Telecommunication

- Control Tower Facilities
  VHF Transmitter and Receiver for the ATC air-ground communication shall be renewed.
- AFTN
  Automatic Message Switching System for AFTN shall be installed to enhance its reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system, including back-up engine

generator shall be installed.

- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor

(11) Nukus Airport

a) Radio Navaids

- ILS
  Category I Instrument Landing System (ILS) for RWY 33 shall be renewed in conformity with to standards and recommendations of ICAO Annex 10.
- Locator (NDB)
  Locator Beacon for the ILS approach shall be renewed.
- VOR/DME
  VOR/DME shall be installed for use of approach and en-route flight.

b) ATC System and Telecommunication

- Control Tower Facilities
  New communication control system and ATC consoles shall be installed.
- ASR/SSR
  Airport Surveillance Radar and Secondary Surveillance Radar (ASR/SSR) shall be renewed. SSR system shall conform to both ICAO and CIS standards.
- TRDPS
  Terminal Radar Data Processing System shall be installed.
- AFTN
  Automatic Massage Switching System for AFTN shall be installed to enhance of its

reliability.

c) Airfield Lighting System

The following Airfield Lights and related power supply system, including back-up engine generator shall be renewed or installed.

- Precision Approach Lighting System (PALS)
- Simple Approach Lighting System (SALS)
- Precision Approach Path Indicator (PAPI)
- Runway Edge Lights
- Runway Threshold Lights
- Taxiway Edge Lights
- Apron Flood Lights
- Aerodrome Beacon
- Power supply system for Navaids

d) Meteorological Observation System

The following Meteorological Observation equipment shall be renewed or installed.

- Wind direction and speed sensors
- Air temperature and humidity sensors
- Barometers
- RVR and Ceilometers
- Data Collection and Processing System
- Weather Data Monitor
- Forecast 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 are summarized as follows:

a) Tamdybulak (VOR/DME)

VOR/DME located in the center of Uzbekistan, is a cross point on the air routes to northern-east area, southern area, Kazakhstan and Tashkent.

b) Karakhtay (NDB)

NDB at Karakhatay is a cross point on the air routes to Fergana valley from Tashkent.

c) Makhtaly (NDB)

NDB at Makhtaly is a cross point on the air routes to Samarkand and Tamdybulak from Tashkent.

d) Toytepa (NDB)

NDB at Toytepa is a fixed point for approach and departure, and holding point of Tashkent airport.

e) Dzhizak (NDB)

NDB at Dzhizak is a cross point on the air routes to Samarkand from Tashkent.

f) Dalverzin (NDB)

NDB at Dalverzin is a cross point on the air routes to Tajikistan and Uzbekistan.

g) Syrdarya (NDB)

NDB at Syrdarya is a cross point on the air routes to Samarkand, Bukhara, Urgench and Termez from Tashkent and a holding point of Tashkent airport.

h) Nurata (NDB)

NDB at Nurata located to the north-east of Samarkand, is a cross point on the air routes to Tamdybulak and Termez.

i) Bulungur (NDB)

NDB at Bulungur is a fixed point for approach and departure of Samarkand airport.

j) Nagornaya (NDB)

NDB at Nagornaya is a fixed point for approach and departure of Samarkand airport, and a cross point on the air routes to Tamdybulak and Termez..

k) Urgut (NDB)

NDB at Urgut is a fixed point for approach and departure of Samarkand airport, and a cross point on the air routes to Termez.

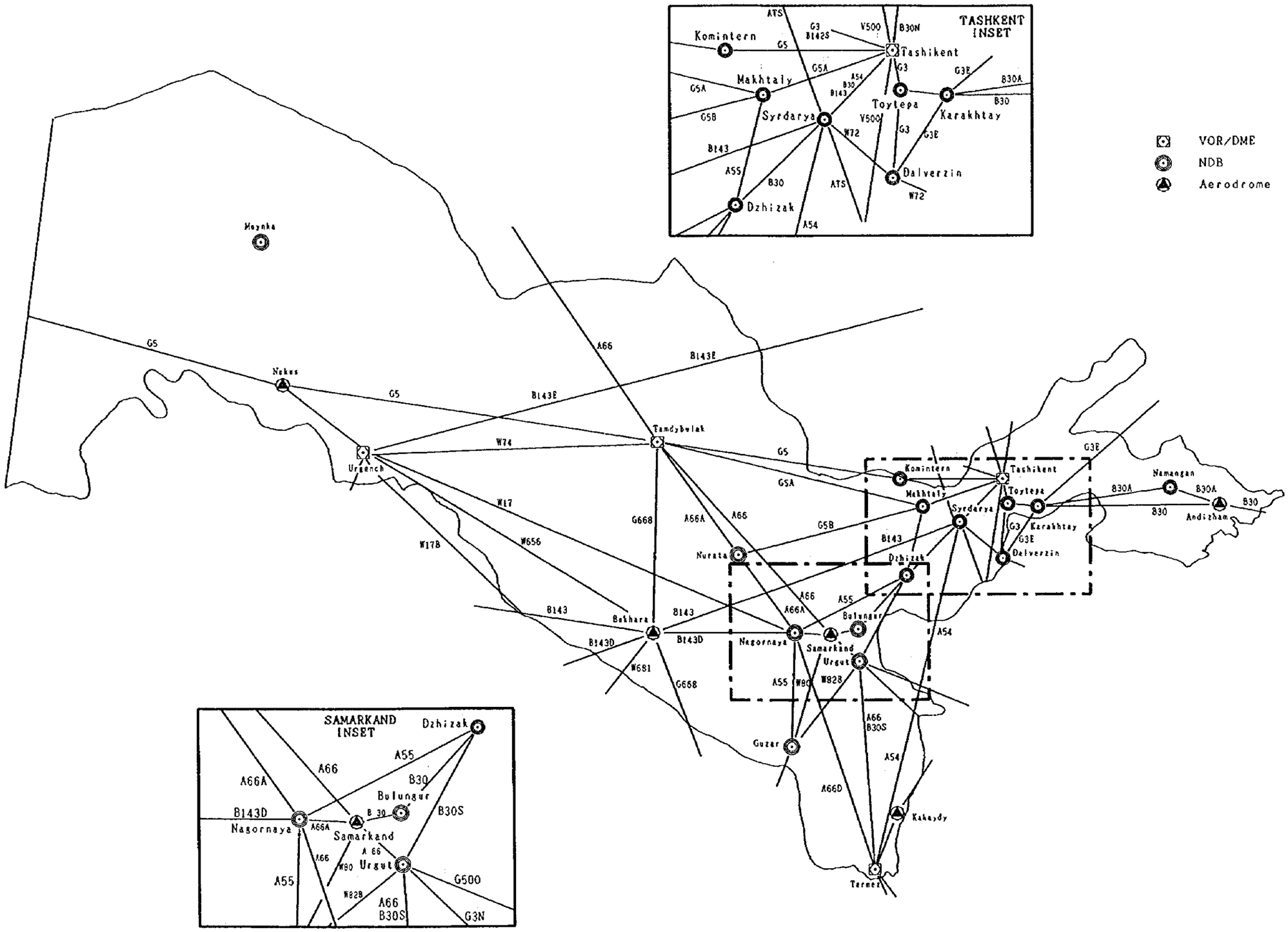


Fig. 4.6.1 Air Route Network (1997)

l) Guzar (NDB)

NDB at Guzar is a cross point on the air routes for Turkmenistan.

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, 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 the precision of air navigation on the air routes, and enable Region Navigation System.

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. 4.6.2 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. **Table 4.6.6** shows the transition of CNS functions from the current system to FANS.

The FANS concept, now 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 that cannot be covered with radar.

Main structure of the satellite concept is the Global Navigation Satellite System (GNSS) which uses a satellite-positioning constellation to provide point-to-point navigation. 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 and operated by the Russian Federation Government.

(2) Proposed Function of FANS

Proposed functions of major elements of FANS, namely Communication, Navigation and Surveillance are summarized as follows:

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, which allow users such as aircraft in-flight and air traffic authorities to access optimally data link without unconsciousness of differences of communication mode between VHF and SSR mode S.

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 being, equipped with a high precision navigation device such as navigator for GNSS, will be able to select freely any flight courses. Furthermore, the possible application of GNESS to precision approach is also being studied.

c) Surveillance

As to surveillance function in FANS, a new system named Automatic Dependent Surveillance (ADS) is being studied. ADS is a new surveillance system which can make it possible for air traffic controller to watch aircraft flying in air space beyond radar coverage, using display method similar to a radar screen.

Displaying aircraft out of radar coverage is made by computer in the air traffic center on the ground, automatically receiving position data from the navigator on aircraft through AMSS supported by Satellite.

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

S.

d) Air Traffic Management

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

Air Traffic Management 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 as planned flight route and time, and then to increase capacity of air space and air route.

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).

For this purpose, it is necessary to carry out in an appropriate manner the gradual adjustment of ATC services and the training of staff related to ATC services. The establishment of ATC services corresponding to the updated ATC System and ATC equipment, shall then be regarded successively for the main airports and the ACCs which are related to the development of international air transportation directly, and requiring to be adapted to western standards of air traffic, and the composition and utility of air space and the establishment of ATC procedures, ATC organizations and ATC rules shall be conducted in cooperation with the neighboring authorities of other countries and ICAO, etc.

4.7.2 Air Space Use Planning

(1) Planning Criteria

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.

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. 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). The arrangement of NAVAIDS on the ground is important, and the pertinent procedures for instrument approach and departure are necessary to establish, in conjunction with the adjustment of ILS to the ICAO standard, for example. But, in the controlled airspace of an airport, it is important that the flight procedure of instrument approach and departure should be established depending on the traffic volume.

This helps to improve the institution of services in the current ATC system, in view of the need for revision of related regulations, but it is likely to be carried out according to the improvement plan of air transportation. To be specific, an assessment of FIR and of the

jurisdictional area of air space related to neighboring countries, should be conducted and the establishment and promotion of a cooperative system of regional ATM should be examined. Additionally, the conditions of air space use shall be adjusted and an optimum match with the gradual airport improvement plan, air navigation systems and an increase of traffic volume is expected.

(2) Modernization of Air Space Organization

As for the modernization of air space organization, the first requirement is that the current air space organization should be standardized with the ICAO by the assignment of air space classification, etc. 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. At present the adjustment plan is progressing with consideration for making the controlled air space appropriate. This is to match the ICAO standards more appropriately.

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, and 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.

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. The Airways(ATS routes) and the flight procedures for instrument approach and departure should be newly established to ICAO standards and the efficient usage of air space shall be assured. However, it is assumed that the gradual establishment of flight procedures shall be conducted on the assumption of there being a mixture of both western modern type aircraft and old type aircraft made in the former U.S.S.R to assure an appropriate protected area of ATS routes(the protected area or the calculated area against obstacles becomes narrower than the present.). As for ATS routes, according to the pertinent flow of traffic, they shall be defined and divided on the basis of the international and the domestic routes, if necessary.

On the other hand, the OLS shall be designated on the basis of Annex14 of ICAO. The exclusion of obstacles and the control of airspace by the OLS shall be conducted according to the ICAO Airport Service Manual. At some airports, there are some obstacles in the airfield, which are not exact equipment needed so seriously for aircraft operations as GP, RVR measuring equipment, wind measuring equipment, etc.. The OLS should be based

properly on the ICAO category and adjusted necessarily to the applicable area for ATC.

(3) Upper Airspace and Airways

Upper Airspace and Airways should be adjusted according to the tendency of ICAO standards of the FANS itself, and the applicable ATS routes for FANS, etc. In Uzbekistan the whole upper airspace should be the provisional area of Radar control services, especially of Radar vector outside of the restricted areas and training/examining areas(for both civil traffic and military traffic). The upper airspace is then defined as the practical airspace for the first stage of FANS, but the establishment of airways shall be conducted efficiently, with consideration to the remaining old type aircraft from the former U.S.S.R, for which it is impossible to adapt the new system. Also, the concentration of air traffic volume increasing over some points, shall be avoided by means of the appropriateness of air route composition, which is arranged by NAVAIDS(VOR/DME) on the ground.

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 west Asia, Middle-East, south Europe, east Europe, south Asia, south-east Asia, Oceania, Hongkong/south-eastern part of China, north America via Siberia and the north pole, 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 in the short or middle term. 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.

The traffic volume of domestic and international(arrival or departure) traffic expected in the future may be even below 100 traffic movements per hour, throughout the whole of the country in 2020, so that there will be no severe traffic concentration problem. However, the traffic volume of international over-flights is likely to increase very much.

In addition to the ATS routes, which are composed at the center of Tashkent airport, it is appropriate that the new ATS route between the Fergana region and the west part of the territory, between the Fergana region and the south part of territory(Termez) and between the west part of territory(Bukhara) and the south(Termez) as a short-cut-way, shall be established. This network of ATS routes should be linked up with VOR/DMEs which are mostly newly replaced from NDBs. Also, being linked up are the new NAVAIDs (VOR/DMEs) which are expected to be installed at some airports, such as Karshi, Navoi and Kokand, with the other NAVAIDs on the existing ATS routes, the new ATS routes shall be established, and the airways between each airport may become effective in Uzbekistan. This route should be established without affecting the departure and arrival routes of Tashkent airport.

(4) General Requirements of Air space Use

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.

At three local airports, as Namangan, Andizhan and Fergana, the new RWYs shall be desirably constructed and, especially at Fergana airport, a detailed study for the establishment of departure and approach procedures will be necessary, because of the approach toward the restricted area on the west side of the current RWY to be newly constructed.

It is proper that TRACON(Terminal Radar Approach Control) shall be established when both Tashkent airport and Tashkent new airport coexist. Further, the approach-controlled-areas of the airports Namangan, Andizhan, Fergana and Kokand, shall be combined over the Fergana area in the future.

In the long term, the approach controlled area of Navoi airport shall be properly integrated to the approach controlled area of Bukhara airport, which is not so far from Navoi airport in order to provide efficient ATC services.

As for future planning, at first, the establishment of the FANS procedures for Area/(En-route) control area and the procedures of GNSS approach(Cat- I), should commence in the near future. The R-NAV on the En-route level, shall be expected in the short or medium term of planning. In the long term plan, the application of R-NAV on the SID and the STAR by FANS in the terminal area, is likely to be advanced. But, at most of Uzbekistan airports, this kind of positive Terminal R-NAV will not be necessary so much, depending on the traffic volume and it is better to be established for the basic level of application of ICAO standards(FANS in the Terminal air space).

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 so that it will be better for the Cat- I , DH(Decision Height) to be assigned to 60m on the basis of ICAO standards instead of the current 70m. 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). 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 Airports

Therefore, the requirements of air space at each airport are shown in the table 4.7.1(1)~(4). These are arranged according to the study of air space use under the following conditions:

- Basic conditions of RWY, type of aircraft, etc. are referred to the basic plan of airport development and the field levels of the extended RWY assumed to be the same level as

the current RWY. The field levels of the new RWYs at Namangan, Andizjan and Fergana airports are assumed to be at the average level of the current ones.

- The applicable condition of precision approach(ILS approach), non-precision approach(VOR/DME approach) and circling approach shall be planned according to the kind of approach and the weather minimum (OCA/H: Obstacle Clearance Altitude/Height, VIS: Visibility), so as to regulate the limit of the approaching elevation. The applicable conditions for SID, STAR and Transition Route shall then be planned. Thus, the feasibility of establishment of these instrument procedures shall be studied by means of the ICAO PANS-OPS and the AWO (All Weather Operation) Manual.
- The evaluation of OCA(H) is estimated roughly to make reference to the data of obstacle and terrain which are shown in the procedure charts of approach or departure flight.
- The type and evaluation of OLS, the outline of configuration and the applicable condition of the CTR and TMA, and the establishment of noise abatement procedures, plus all other important conditions of air space shall be arranged, accordingly.