

3.4.4 Development Consideration for Industrial Area

(1) General

The Industrial Area of Astana City is located in the northern part of the city, mainly north of the railway, whilst part of the accumulation such as the Astana Technopark occupy some of the area south of the railway. The area defined as the Industrial Area is composed of Northern Industrial Zone, Central Industrial Zone, Western Industrial Zone, and Industrial Zone Station 40. In the future, the Cargo Center located southeast of the Northern Buffer Zone will function as the logistic center supporting the industrial activities in Astana.

For the development scenario of Astana, the Master Plan proposes a government, business and industrial city, whereas the industrial activities are aimed at producing goods to be consumed mainly within Astana. The population of Astana will profit from the increase of GRDP originating from the growth of industries. Thus, it is deemed important to carefully consider the development of the Industrial Area, relating economic growth, working population and land area necessary for the factories, in order to grasp the future image of industrial activities.

At the same time, the mitigation of negative impacts caused by the industrial activities in urban areas, especially the residential areas, must be thoroughly considered in the development scheme to improve the urban environment. The establishments located within the urban areas shall be given full regard in the due course of considerations.

In order to analyze the present situation and to consider the future development scheme of the Industrial Area, industrial activities are divided into the following sectors.

- a) Industry sector: activities related to production and manufacturing of goods.
- b) Construction sector: public and private sector construction activities.
- c) Trade and Repair: warehouse transaction, procurement, repair of machinery, etc.
- d) Transport and Communication: activities related to transportation system transportation of passengers and goods, and communication means.
- e) Other industrial activities

(2) Present Condition

1) Proportion of Sectors

The total number of establishments attributed to industry is approximately 400, where the percentage of each sector is shown below.

Proportion of Sectors based on Land Area (1996)

Percentage of Total Area by Sectors				
Industry	Construction	Trade & Repair	Transport & Communication	Others
28%	19%	24%	12%	17%

Source: Ak Orda's Master Plan "Planning of Industrial Zone of the City"

2) Spatial Characteristics

The gross area of the zones and the area presently used within the Industrial Area is as tabulated below.

Relationship between Area of Zones and Factory Plots (1996)

	Industrial Zones			
	Northern	Central	Western	Station 40
Total Zone Area (ha)	2,146	2,313	561	616
Factory Plot Area (ha)	544	506	122	247
Percentage of Zone Used	25%	15%	33%	21%

Source: Ak Orda's Master Plan "Planning of Industrial Zone of the City"

The area of plots currently utilized are the areas occupied although they are not fully utilized due to the present low rate of operation.

In addition to the above, an area of 149 ha in aggregate in the urban area is occupied by industrial establishments.

In general, the various industrial activities are dispersed evenly in all zones, except for the Northern and Central Industrial Zones where the high percentage of industry sector is prominent as shown in Figure 3.4.8.

3) Rate of Operation

The industries in Astana are still suffering from the economic slump and are operating at a very low rate with small numbers of employment compared to their design capacities. Therefore, the existing plot of land is not producing at full capacity, and further growth in production is possible without additional land until the capacity of the existing establishments reach full capacity.

(3) Concept for Industrial Area Development

This Master Plan contemplated that Astana should have an industrial development strategy appropriate to the capital city. The proposed strategy is such that in the meantime the growing demand for consumer goods and construction materials should be catered for by enhancing import substitution. This will be followed by harnessing of research and development (R&D) and information technology (IT) types of new industries, capitalizing on well-educated youngsters chiefly graduated from universities and colleges located in Astana.

With the future prospect for improvement regional transportation conditions, logistic functions such as cargo center is contemplated as appropriate to Astana. Planned completion of the Astana International Airport will accelerate the movement of freight traffic, particularly of high added value products. Logistic function will depend largely on the extent of improvement of rail freight transportation network, as proposed in Eurasian Land-bridge project.

(4) Approaches for the Consideration on Development

The basic approaches for considering the development of the Industrial Area are as follows.

1) Values Utilized

- a) The value of total output for each industry sector and output/worker for 2010, 2020 and 2030 of Section 2.2 Economic Framework will be utilized in the consideration.
- b) The number of working population and their distribution for 2010, 2020 and 2030 will be taken from Section 3.4 Urban Planning Framework.
- c) For the development scenarios for sub-sectors of industry sector, Chapter 10 Regional Planning will be referred to.
- d) The present situation of factories for the industries is calculated based on the data of Ak Orda's Master Plan.

2) Assumptions

- a) The number of workers and land area necessary for production is

proportional within each type of industrial activity.

- b) The value of worker/ha remains constant within each industrial activity.
- c) The value of output/worker increases in the different planning phases, but at any given phase, the value is the same within each of the sectors.
- d) The area of Industrial Zone Station 40 that is to be converted into a park area (216 ha) by 2020 and that of the Western Industrial Area to be converted into land reserved for future development (168 ha) by 2030 will be regarded as a decrease of zone area, because these areas cannot be utilized for industrial activities.

(5) Development Framework for the Consideration on Development

1) Projection of Growth of Industry in Astana

The growth of industries is depicted in the Section 2.2 Economic Framework. It is projected that trade and repair sector shows the highest growth in the future, followed by the steady growth in the industry sector. The growth of construction sector is expected to turn negative after 2020 when the volume of the construction works associated with the building of the new capital diminish.

The following table summarizes the growth of each sector for the whole of Astana.

Projected Output and Output per Worker by Sector in Astana

Sector	Projected Output (Tenge Billion)			
	Projected Working Population (Thousand)			
	Projected Output per Worker (Tenge Thousand)			
	1999 (Estimate)	2010	2020	2030
Industry	16	67	133	188
	15.9	28.0	37.3	44.0
	988	2,269	3,173	3,624
Construction	36	98	133	126
	13.6	20.4	26.1	22.0
	2,629	4,576	4,532	4,832
Trade & Repair	17	133	267	377
	8.6	17.9	29.8	44.0
	1,930	7,132	7,932	7,248
Transport & Communication	1	9	36	63
	14.1	25.5	37.3	44.0
	78	333	846	1,208

Note: figures from Section 2.2 Economic Framework

2) Industry in the Industrial Area

Out of the total working population of Astana, the projection of the number of workers in the Industrial Area is as follows.

Projected Output and Projected Working Population by Sector in Industrial Area

Sector	Projected Output (Tenge Billion)			
	Projected Working Population (Thousand)			
	1999 (Estimate)	2010	2020	2030
Industry	7.5	67	133	188
	7.6	28.0	37.3	44.0
Construction	11.9	98	133	126
	4.5	20.4	26.1	22.0
Trade & Repair	6.8	68	135	191
	3.5	9.1	15.1	22.2
Transport & Communication	0.3	0.5	2.9	6.5
	4.0	1.5	3.0	4.5

Note: figures of working population from Section 3.4 Urban Planning and Output calculated based on output/worker of Section 2.2 Economic Framework

The value of output per worker is the same as that for the whole of Astana.

3) Sub-Sectors of Industry Sector

Industry sector is further sub-divided into the following sub-sectors.

- i) Agro-processing
- ii) Textile/clothing
- iii) Non-metal mineral products
- iv) Metallurgy/metal processing
- iv) Machinery/equipment
- v) Others

The table below summarizes the growth of each sub-sector in the industry sector in Astana according to the development scenario stipulated in Chapter 10 Regional Planning, together with the value for the whole of Kazakhstan as reference.

Projected Growth by Sub-Sectors of Industry in Astana

Sub-sector	1997 – 1999	2010	2020	2030	Kazakhstan in 1999
Agro-processing *	50.5%	53%	56%	60%	39.7%
Textile/ Clothing *	3.3%	5%	7%	10%	2.9%
Non-metal mineral products	17.2%	16%	15%	10%	3.3%
Metallurgy/ metal processing	9.4%	8%	6%	5%	31.6%
Machinery/ equipment *	6.7%	7%	8%	10%	22.5%
Others	12.9%	11%	8%	5%	

*) the sub-sectors projected to show rapid growth in the future

Although all sub-sectors will grow in output value, agro-processing, textile and machinery/equipment are expected to increase their proportion in the future. These promising industrial activities are included in the State Investment Committee's list for tax privilege, and also comply with the development direction depicted in "Blooming of Astana" that suggests that the industries located within Astana shall mainly produce goods that are to be consumed in the city. At the same time, the growths in the goods produced in these sub-sectors have the effect of import-substitution, which is the basic strategy for industrial development. On the other hand, the processing of metal and non-metal products is to be left for Karaganda where raw materials are abundant.

(6) Spatial Allotment of Industrial Activities

1) Concept of Allocation and Relocation

The allocation and relocation of the industrial activities will be considered according to the following criteria.

Industrial Area

- a) New industries are to be located north of the railway, especially to Central Industrial Zone because there is a limit to the actual capacity of Northern Industrial Zone due to the existing high-voltage cables from the KEGOK substation.
- b) The residential areas remaining in the Industrial Area (369.83 ha in Northern and 34.5 in Central Industrial Zone) will gradually be relocated to the south. The exceptions are Zheleznodoezhny Settlement and the residential area encompassing the western tip of Northern Industrial Zone, where the living environment is satisfactory. The area remaining after demolishing the residential area will be used as parking lots or for greenery aiming for the following effects.

- i) Improvement of the environment within the Industrial Area
- ii) To function as a fire-prevention buffer
- c) The industrial accumulation south of the railway (Astana Technopark and the area east to it) will remain in its original location, because of its importance as the center of industrial activities at present. However, heavy industries will not be introduced in this area.

Cargo Center

The Cargo Center located at the east of the Northern Buffer Zone will be the center of logistics to support the growing industrial activities in Astana. The Cargo Center will be the node for loading and unloading of goods to/from other regions of Kazakhstan, namely the AAKR. The Cargo Center is expected to increase area as well as working population as the industrial activities in Astana proliferate.

Urban Areas

- a) Industry and construction sector enterprises located in urban areas shall be relocated to the Industrial Area north of the railway, especially to the Central Industrial Zone to mitigate negative impacts on the urban areas.
- b) The remaining areas within the urban areas after the relocation of factories are proposed to be utilized as public facilities or commercial services.

2) Unit Area of Production

Unit area of production indicates the plot area necessary to conduct an industrial activity and can be stipulated by output/ha or workers/ha. The existing data of the industrial activities in Astana shows that the coefficient of correlation for the latter is higher than the former, and therefore the working population density will be utilized in the consideration.

The working population density varies from sector to sector, and thus each sector shall be given different values. The values for each of the sectors will be set as shown in the table below.

Working Population Density by Sectors

Working Population Density (workers/ha)				
Industry	Construction	Trade & Repair	Transport & Communication	Others
73*	60	60	60	300**

*: Average of values of the sub-sectors stipulated below.

**: "Others" include office workers and therefore the density is set high.

Working Population Density by Sub-sectors of Industry

Working Population Density (workers/ha)					
Agro-processing	Textile/clothing	Non-metal mineral products	Metallurgy/metal processing	Machinery/equipment	Other goods
71	179	23	49	53	64

The above values are based on the data in Japan and others, where the density is lowered by 15% considering the plentiful land in Astana.

3) Projected Plot Area

The necessary plot areas for each zone in the development phases are derived as shown below, whilst the diagrams of spatial distribution of the industries are depicted in Figures 3.4.9 to 3.4.11. The detailed calculations are shown in Tables 3.4.16 to 3.4.18.

The projected values for the development phases indicate the plot area necessary at full production level (i.e. rate of operation = 100%). Therefore, additional plot area is only necessary when the value exceeds the design area assuming that the new establishments are inaugurated after the existing ones reach full capacity. In reality, the new establishments will be inaugurated before this time. However, with the abundant unutilized land available still in 2030 as shown in the table below, all the new industrial activities could be well housed within the Industrial Area, assuming that 60% of the total area of each zone could be utilized for industrial activities.

Projected Plot Area in the Industrial Area by Zones

	Plot Areas (ha)					
	Northern	Central	Western	Stat. 40	Cargo Center	Total
Total Zone Area	2,146	2,313	393 ¹	400 ²	270	5,756
Design ³	544	506	121	248	120	1,419
1999 ⁴	162	221	17	12	0	411
2010	401	623	62	48	40	1,174
2020	597	790	81	36	80	1,584
2030	573	749	70	55	120	1,567
% of zone in 2030	27%	32%	18%	14%	44%	-

¹: Value indicates area after land for future expansion is deducted

²: Value indicates area after park area is deducted

³: The total of the area of the existing plot areas.

⁴: Area calculated by estimated working population x worker/ha

Similarly, the necessary plot areas by sectors are shown below.

Projected Plot Area in the Industrial Area by Sectors

	Plot Area (ha)					
	Industry	Construction	Trade & Repair	Transport & Communication	Others	Total
Design*	610	198	287	203	121	1,419
1999**	150	75	58	67	60	411
2010	576	367	168	56	7	1,174
2020	743	435	280	118	8	1,584
2030	655	367	371	167	7	1,567

*: The total of the area of the existing factory plot areas.

**: Area calculated by estimated working population x worker/ha

It should be noted that the necessary plot area shows a slight decrease in 2030, even though the working population continues to grow. This is because industrial activities such as agro-processing and textile/clothing where the working population density are high increase their share whilst those with lower densities decrease.

The reason for the sharp decline of the "Others" is that most non-industrial enterprises and facilities will be moved to the south of the railroad.

Projected Plot Area in the Industrial Area by Sub-sectors

	Plot Area (ha)					
	Agro-processing	Textile/clothing	Non-metal mineral products	Metallurgy / metal processing	Machinery/equipment	Other goods
1999	53	1	56	15	10	15
2010	227	9	200	48	39	52
2020	310	15	259	47	60	49
2030	325	23	168	39	73	31

3.5 Future Land Use and District Plan

3.5.1 Assessment of Development Potential

As the new capital of RK is constructed in parallel with the existing city of Astana, assessment of development potential in the areas adjacent to the existing urban fabric needs to be made to delineate the general direction of future development. In this Sub-section, the potential for development will be reviewed from two perspectives; natural and urban.

(1) Assessment from Natural Condition

The potential of land area primarily pertains to its natural condition. From the geomorphological characteristics, the land area around Astana could be roughly classified into the following 5 categories. The evaluation for each geomorphological type is established as shown in the following.

Assessment of Potential for Development from Natural Conditions

Geomorphological type	Assessment for Development	Evaluation
Low hill	Suitable for development	A
Peneplain	Suitable for development	A
River terrace	Suitable for development	A
High flood plain	Not favorable area for construction	B
Low flood plain (water-logged)	Unsuitable area for construction from geo-technical and financial viewpoints	C

(2) Assessment from Urban Condition

The present land use will also significantly affect the possibility for future development of the land area. Existing urban area will impose difficulty in extensive development in future, while an area with *dachas* could be developed if proper countermeasures such as gradual relocation/compensation could be made. The following table summarizes the assessment.

Geo-technical counter measures for construction of Astana area

Present Land Use / type	Assessment for Development	Evaluation
Unused land	Suitable for development	A
Farm land and pasture	Suitable for development	A
Dachas	Basically unsuitable area for construction	B
Existing urban area	Unsuitable for development	C

(3) Overall Assessment

Based on the foregoing, an overall assessment of development potential is made by establishing a cross evaluation matrix as given below. Basic presumption in this cross evaluation is that the assessment of development potential from natural and urban conditions is mutually independent. The overall assessment could be made following the matrix below which integrates the natural and urban conditions. Figure 3.5.1 presents the natural, urban and overall assessment of development potential in and around Astana City.

Cross Evaluation Matrix

		Natural		
		A	B	C
Urban	A	5	4	3
	B	4	3	2
	C	3	2	1

The bulk of the areas on the left bank of the Ishim is assessed good for development with the rating of 4 or more. Some of the areas west of the road to the Airport is assessed fair for development with the rating of 3, and thus intensive development thereon is carefully avoided.

3.5.2 Formulation and Selection of Area Expansion Variants⁹

In this Sub-Section, a comparison of alternative plans of area expansion shall be undertaken.

(1) Characteristics of Area Expansion Variant Alternatives

The plans subjected for comparison are the following three alternatives.

- Plan A; the plan formulated by Kisho Kurokawa as an entry for the International Tender for the Draft of the Master Plan of Development of the New Center of Astana, which won the first prize,
- Plan B; the existing master plan of Astana worked out by a Saudi group, and approved in a RK Government decree in February 2000, and
- Plan C; an alternative plan formulated anew by M/P Team specifically for the present Study.

⁹ Full text of the formulation and comparison of area expansion variants will appear in Section A.3 of Volume III: Supporting Report.

Figures 3.5.2, 3.5.3 and 3.5.4 respectively show the alternatives A, B and C in detail in the same scale.

(2) Format of Comparison

The comparison was made on the following four respects.

1) Characteristics of Residential Districts

Most of the new development shall be devoted to creating residential districts chiefly on the left bank of the Ishim. Attention was paid to the area, density and allotment of new residential districts under each expansion alternative.

2) Characteristics of Central Business Districts

New central business district, accommodating the business, commercial and state managerial functions is one of the most important, prominent and influential district of the new development area. The characteristics of the new central business district, such as the area, configuration and axially, functions and allotment are the factors on which the comparison of alternatives shall be made.

3) Characteristics of Parks and Green Areas

With one of the basic concepts of Astana set as a *Symbiotic* city, where the artificial and manmade environment and the natural environment have to find a *symbiotic* harmony, the characteristics of the parks and green areas is an important factor for comparison.

4) Characteristics of Road Network

The road network not only determines the physical configuration of a city but also will constitute the logistic backbone. The conception and configuration of the road network in the new city is also an important consideration in the comparison.

(3) Selection of Area Expansion Variant

Based on the discussion of the foregoing, Plan C is adopted. The following are the considerations as to the selection;

1) Adoption of Linear Zoning System

The city of Astana has been composed as a linearly structured city bounded by the rail tracks on the north and by the Ishim on the south, and this structure will not be changed significantly in the future. As the city

grows in the future to achieve the socio-economic framework already established up to 2030, it is important to maintain balanced urban functions and facilities in every intermediate stages of development. The linear zoning system as adopted in Plan C is suitable and appropriate as a planning concept for an ever growing city such as Astana, not only from the urban planning aspect but also from the Value for Money viewpoint.

2) Well-maintained amenity for urban dwellers

New residential areas mainly on the left bank of the Ishim shall be developed in clusters in Plan C, where each cluster shall have access to the greenery within the cluster and outside. The residential environment thus created shall have high level of amenity for urban dwellers with respect to the green and water body network the city provides. Plan C also has alleviated the effects of expected noises from the new International airport by re-arranging the configuration of residential areas.

3) Formation of green network

Plan C adopts a conception of urban greenery in network system, which capitalizes on the ecological linkage of nature. This introduces connection of vast buffer greenery along the Ishim together with greenery areas along its tributaries, urban parks, roadside trees and even sporadic pocket parks in the city in a spatially extended network linkage. The network of greenery would provide not only buffer for separating otherwise continuous urban areas and bound the urban areas from natural areas around.

4) Effective Transportation Network

Plan C adopts a ring-road system of arterial roads, consisting three circular roads around the city, which is an effective solution for the projected future traffic volumes. The ring-road system will accommodate traffic flows not only between the existing and new urban areas, but also provide detour routes for the traffic passing through Astana as in bypass road, and give increased access for all the areas in the city to inter-city highway network.

5) Balanced Development in New and Old Urban Areas

Astana shall be composed of the existing urban areas as of now and a new city that will be constructed mainly on the left bank of the Ishim,

and maximum attention needs to be paid to the balance of the existing and new urban areas. Plan C proposes to remedy the shortfalls of the existing city, such as lack of urban parks, and incorporates a plan to redevelop some of the low-density, underdeveloped residential areas in the existing urban fabric.

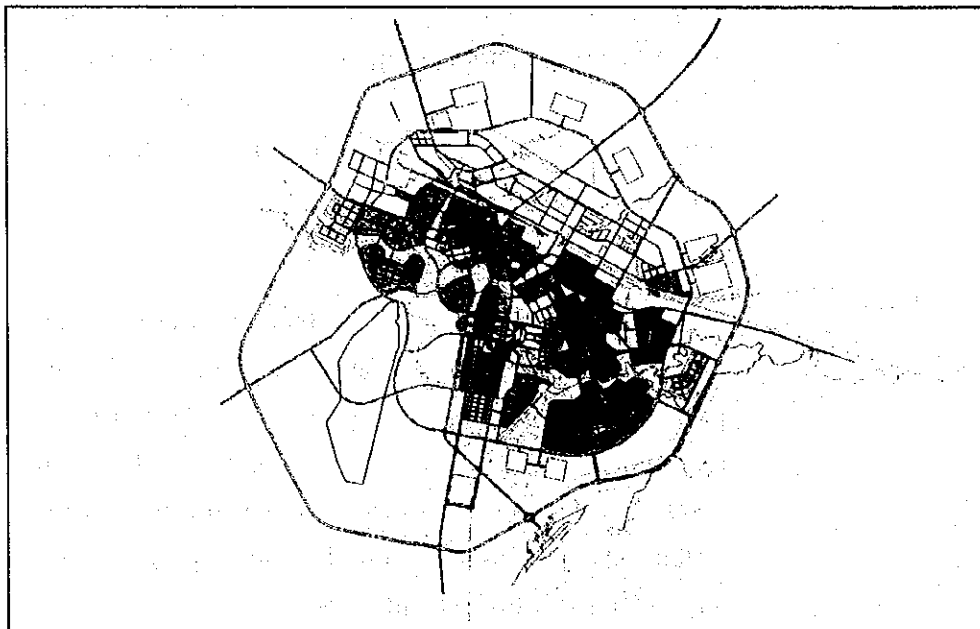
As discussed above, the area expansion plans are scrutinized from various perspectives, and Plan C, the present plan formulated by M/P Team surpasses other plans, and adapts the good and healthy planning directions in other plans. It is therefore concluded here that Plan C is to be adopted as the area expansion plan.

The Master Plan hereafter shall be based on this area expansion plan.

3.5.3 Formulation of Basic Spatial Allotment

(1) Residential District

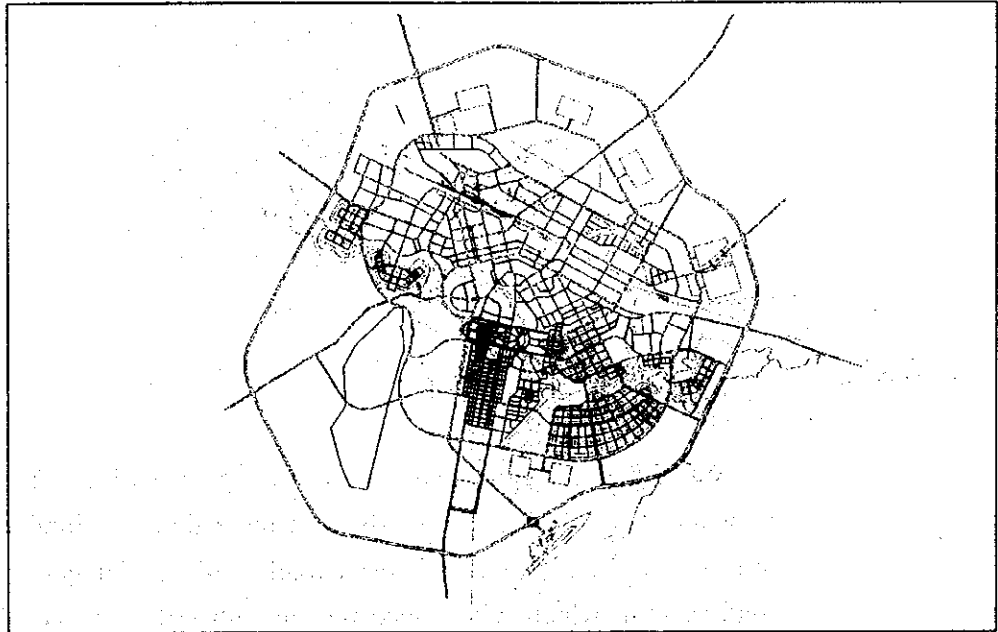
The allotment of residential districts in Astana is delineated mostly along the Ishim River on the both banks. This allotment follows the basic concept of forming a riverine city in Astana, which presently extends on one side of the river (right bank). With the extension of residential districts on the both sides of the river, the Ishim River shall form a natural greenery and water axis leading the development of the city symbolizing the motherly flow of livelihood.



(2) Central Business District

Aside from the existing central business district, located in the southern part of the urban fabric near the river, a new central business district is planned in

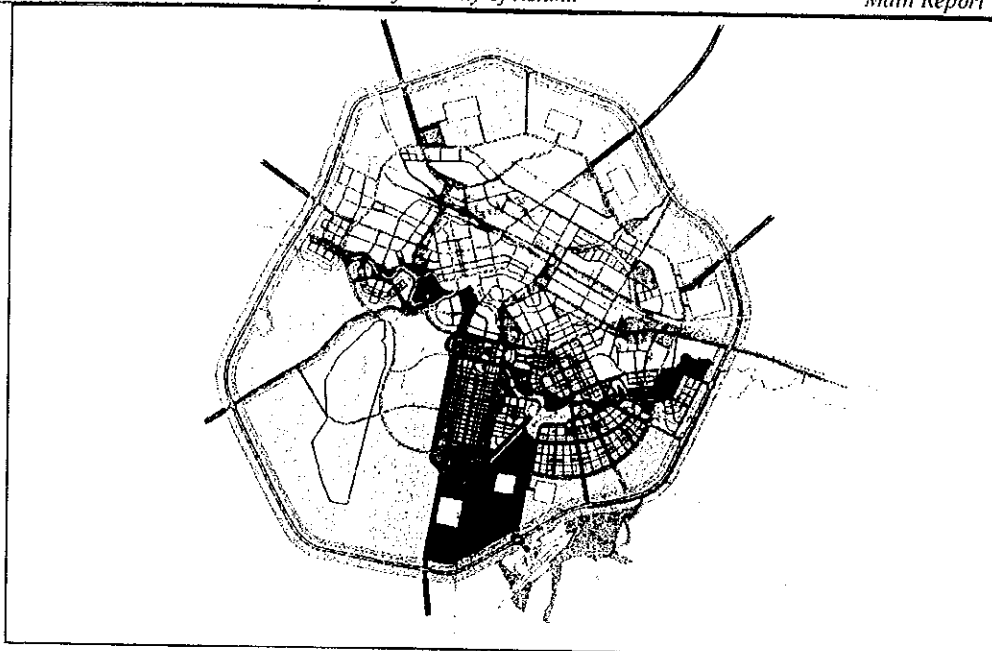
the center of development area on the left bank. The area around the business district will accommodate most of the central government functions, such agencies and ministries, and houses most of the diplomatic missionaries. This new business district will be the symbol of the new capital of RK.



The basic structure of the new business district follows the pattern established in the existing Master Plan by a Saudi group in essence, although new ideas were put in to strengthen the integrity of the area consolidating the business, governmental and diplomatic functions within the spacious and well-designed super blocks appropriate for the new capital.

(3) Green Areas

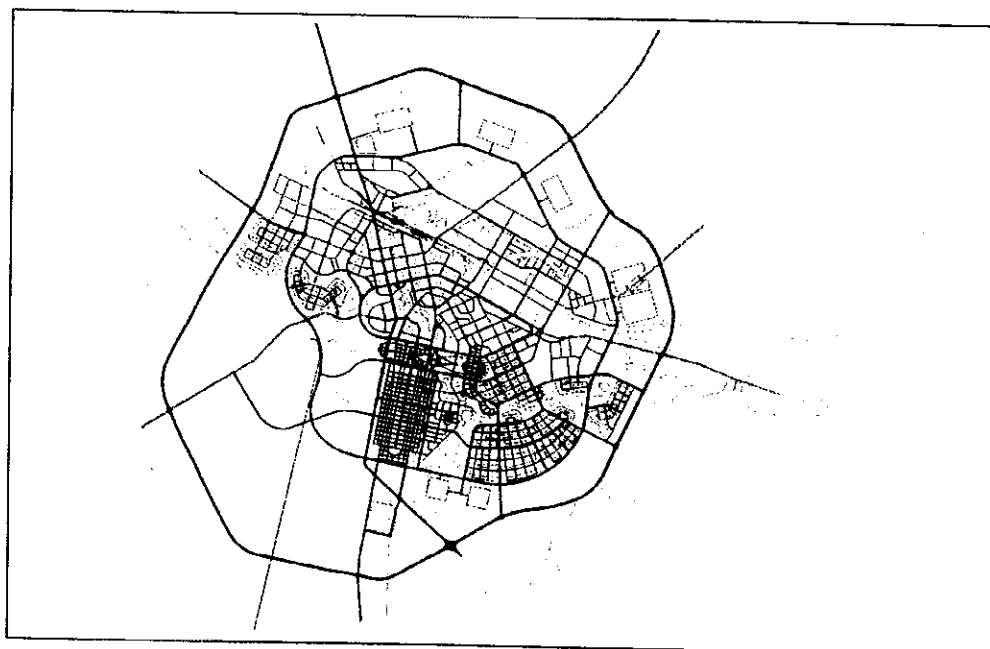
To create a symbiotic city, where the city dwellers could enjoy the abundant greenery and water bodies in the close vicinity from their living quarters, a green corridor along the Ishim River is to be introduced. This will serve as the eco-corridor of the city where not only human beings, but also small animals and insects could reside in harmony. Around the proposed new development, a belt of greenery will be created to serve as an eco forest that will protect the city from the florid winds in winter, and dusty storm in summer.



(4) Road Network

To consolidate the existing and new urban areas with efficient transportation network, a system of ring roads with three tiers of circular routes will be introduced. The regional arterial roads will be connected to this circular road system, which will reduce the through traffic to seep into the central city area.

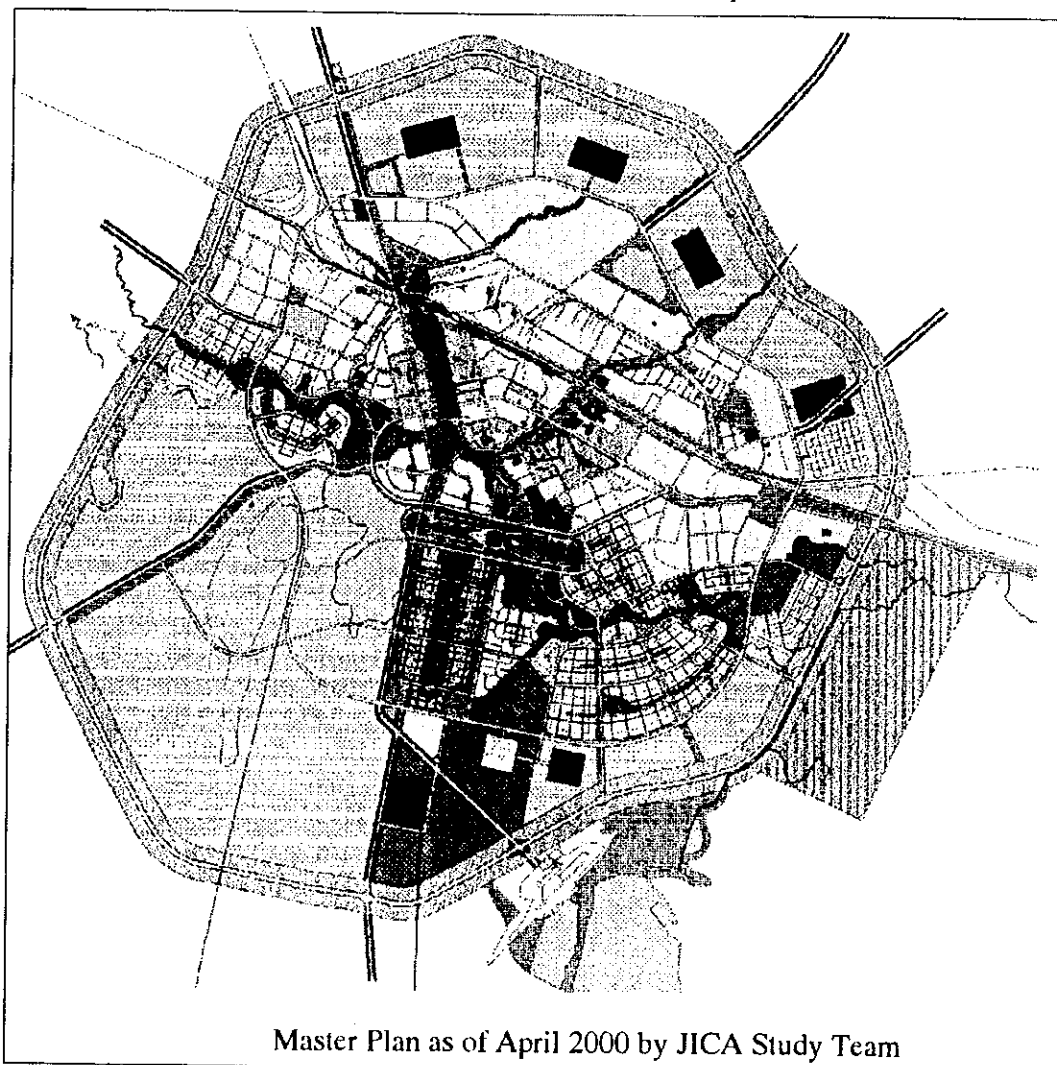
The areas outside of the R-2 ring shall be devoted mostly to eco-forest and a few specific development for future, such as a university, cargo center and high-tech industrial parks. The areas within the urban areas shall be served by grid type of roads.



3.5.4 Changes and Modifications on Master Plan

(1) Master Plan Discussed in Progress Meeting in April

The M/P Team first revealed the Master Plan for Astana, which includes the functional zoning, road network, green network and water bodies in the Progress Report issued in April, 2000. This first version of the Master Plan was based on the philosophy of Kurokawa's prize winning work submitted for the International Competition of 1998, while major part of the existing master plan by a Saudi group was incorporated and consolidated in the original plan. The major philosophy of the first prize master plan work prepared by Ak Orda in 1996 for the domestic competition was referenced.

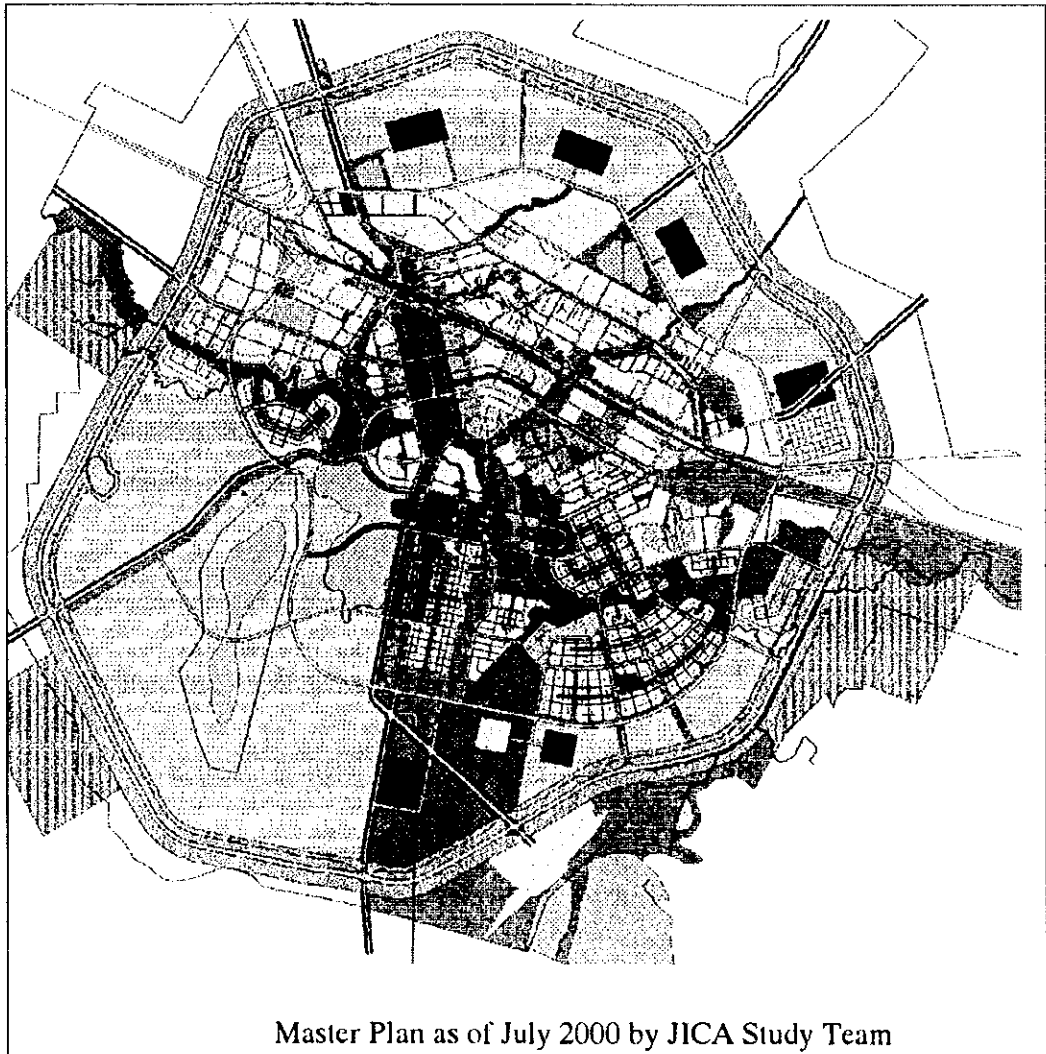


In the Progress Meeting held on 14th April, the land use plan was in principle accepted by the Kazakhstan side, as noted in the Minutes of Meeting. In specific locations, conflicts were pointed out with regard to the on-going and approved construction. Problems pertaining to the relocation of dacha's

and a village were also pointed out. It was agreed upon that modification and adjustment of the land use plan would be conducted in the course of the Study.

(2) Master Plan Discussed in Progress Meeting in July

A series of meetings were held between the Department of Architecture and Urban Planning of Astana Municipality and M/P Team in June and July to discuss the comments expressed in the Progress Meeting in April, as summarized above. Consequently various modification and revision was made to the original Master Plan presented in April.



Master Plan as of July 2000 by JICA Study Team

The major changes are noted below.

- In the industrial area north of the railway track, sporadic residential areas now in bad living conditions are to be removed, where greenery and additional roads are to be provided. A freight rail line is to be

relocated northwards and an area is to be provided for a new freight station separate from the existing passenger station.

- In the area west of the existing railway station, alignment of the proposed road connecting to Sary Arka Avenue was adjusted to fit into the existing buildings and small watercourse.
- Some of alignments of major roads, such as the western part of R2 road, Imanova Street and eastern part of Abai Street, are to be adjusted to avoid demolishing of existing buildings and villages.
- In the existing city fabric, the areas along Pobeda and Respublika Avenues are to induce heightening of buildings, whereas the areas along Beibithilik Street are to remain predominantly low, with the existing historical buildings preserved and greenery provided wherever possible.
- In the areas where a number of villages are located, the area for the Diplomatic City is to be reduced and phasing of the development adjusted to mitigate the necessary for urgent demolition of *dachas*, and provide alternative areas of 5,000 ha in all for summer houses outside of the outer ring road.
- The size of the Business City is to be reduced to match the required development, and the allotment adjusted so as to avoid the existing village of Prigorodnoye.
- In the eastern River City cluster, shape of the residential area is to be adjusted to stay away from the existing village of Prigorodnoye and Telman, and the phasing modified to make the necessary demolition between 2010 and 2020.
- Taldy Kol reservoir needs more specific considerations than merely land-filling for forestation.

The Master Plan drawings were modified based on the above, and presented in Interim Report issued in November. The revised plan was discussed in the Progress Meeting in July and the revised future land use plan was accepted by the Kazakhstan side, as mentioned in the Minutes of Meeting.

(3) Master Plan Presented in this Report

The major points of modifications on the Master Plan drawing between the Interim and Draft Final Reports are summarized below.

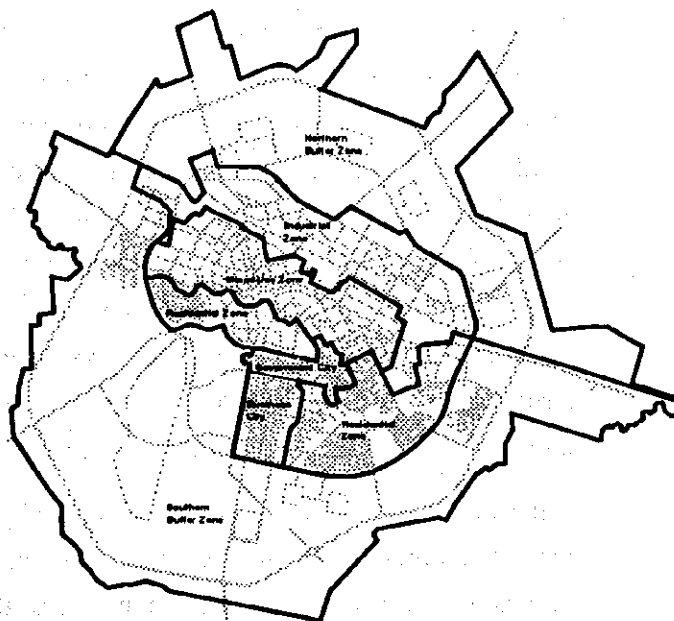
- Residential areas in District 16, 19 and 20 in the southern part of the left bank of the Ishim was readjusted in order to mitigate the noise annoyance issue possibly caused by the international airport of Astana, now being designed for reconstruction. As a result, the alignment of residential areas is to be adjusted generally northwards, which also necessitates relocation of the R2 road slightly northwards. A green belt is to be allocated connecting to the Ishim from the south-east direction.
- In order to accommodate the above change, slight increase of population density was made to follow the population framework already agreed upon.
- A slight change was made in the nature of the local commercial centers mostly in the residential areas to match with the already agreed upon commercial floor area framework.
- Some minor changes were made in the road network plan, based on the transportation network analysis, such as addition of a road connecting District 10 and 13, realignment of over-pass in extension of Respublika Avenue to cross the railroad at a right angle, etc.
- Based on the industrial development framework as depicted in Sub-section 3.4.4., some of the phasing of industrial areas were modified. The major change in this regard was the deferral of industrial estate development outside of the outer ring road until after 2030.
- The size of the proposed artificial lake west of the Government City was reduced considerably, to minimize the possible impacts on the environment.
- Type and spatial composition of urban greenery was adjusted to the greenery framework established in Section 3.10 by establishing clear distinction between green open space and urban greenery.

The present Master Plan drawings contemplate all the modifications mentioned above in a comprehensive form. The necessary land areas for estimated functional zoning follow the planning framework discussed in Section 3.4, contents of which have already been agreed upon in the seminar and Interim Meeting.

Figures 3.5.5, 3.5.6 and 3.5.7 respectively present the future land use plans of 2010, 2020 and 2030.

3.5.5 Proposed Land Use and District Plan¹⁰

Based on the selected area expansion plan above and the planning framework discussed in Section 3.4, land use plans were formulated for the target years of 2010, 2020 and 2030. The following describes the seven components of the land use plan.



(1) Government City

Studies have confirmed the most appropriate location for the new Government City to be the area south of the existing Chubary Village on the left bank of the Ishim River. It is close to the existing City, and is relatively under-developed agricultural land used for growing vegetables. With this planned location for the Government City, it will provide for an impressive approach of the city from the International Airport to the south and the Ishim River will become a central feature of the City.

The basic structure of the Government City is formed by a chain of Presidential, governmental, semipublic and institutional areas, diplomatic areas as well as cultural and commercial areas.

¹⁰ Full text of proposed land use and district plan will appear in Section A.4 of Volume III: Supporting Report.

The total land area allocated for Government City is close to 950 hectares, of which 400 hectares are located on the left bank of the Ishim River. Out of the total land area, 200 hectares of land has been reserved for the development of Diplomatic Quarters, including the Diplomatic Village south of Chubary Village. Approximately 40 hectares of land has been allocated for the majority of Ministries, Parliament, High Court and Presidents' Affairs. Semi-public and commercial facilities will occupy an area of 60 hectares. The remaining 650 hectares of land will be allocated for landscaping and water bodies, including a section of the Ishim River.

Public urban spaces like a plaza are planned in the Government City zone. A commemorative plaza is set at the cross-point of the Government City Axis and the Business City Axis. Between the Parliament Building and the High Court, a parade plaza is set for welcoming foreign delegations. All pedestrian routes through the Government City are to be densely landscaped for a pleasant walking environment and to provide protection against the elements. Elevated walkways are projected to provide comfortable pedestrian movement during the long winter months. Most podium structures of the main building structures are proposed to house commercial and public facilities with residence realize a 24-hour city.

It is estimated that a total number of 75,000 people will find employment in the Government City by the year 2030, or 17.25% of the total working population, while in the first ten years the numbers of employees is estimated at 54,000. Including all public and semi-public facilities, including hotels, commercial facilities, sports-, cultural and entertainment facilities, the total built up floor area has been estimated at 2,174,000 m², of which 1,750,000 m² will be for office areas. As to facilitate the employment growth of 40% over a period of twenty years, a well balanced phasing map should be developed as to ensure a continuous growth, but wherein each phase will live up to the image of a complete City.

(2) Business City

The urban fabric of the existing city center (mixed use zone) is estimated to accommodate an increase in office employment of 25%, whilst the Government City can absorb around 17.5% of the total office workers. Accordingly additional floor space has to be allocated to house the remaining 16%, or approximately 70,000 office workers, of the total office working population by the year 2030.

It is assumed that the new businesses will have a close working relationship with the government agencies, as such a new business city is planned south of the Government City, along the main access road from the airport into the city. In addition to office buildings, this area is planned to provide commercial facilities and high density housing for approximately 5.7% of the city's population.

This new Business City is planned in the extension of the north-south Business City axis of the existing city center. As such the city's business accumulation can be described as being divided into two parts, one in existing city center, the other located in southern new development area, with its center in the Government City.

Both of the business areas serve as major business and commercial cores and are connected to other zones by a means of public transport as well as by the main city roads. Both have a strong linear shape. The northern one, which is called future business corridor, is surrounded by the Mixed Use Zone and will have an intensive interaction with the functions of the Mixed use Zone. The southern part, which is called the Business Area, is surrounded by high-density residential areas and will be different in shape and use from the residential areas in the River City. This high-density residential area is planned so as to interact intensively with the Business City, Government City and River City and surrounding parklands.

The total population in the new Business City is expected to grow to 45,000 residents by the year 2030, occupying a land area of approximately 300 hectares. The business and commercial land areas are estimated at 45 hectares accommodating the estimated 1,200,000 m² of gross office and commercial floor areas.

(3) Residential Zone

The population of Astana City is expected to grow from its present level of 320,000 inhabitants to a projected level of 800,000 inhabitants by the year 2030. The present urban fabric of Astana City mainly on the right bank of the Ishim can absorb an additional 80,000 inhabitants by increasing the density of existing residential developments in the City Mixed Use Zone and in the existing residential zones east and west of the Mixed Use Zone. Therefore additional areas have to be allocated for the development of residences to house an additional 400,000 people.

The new Residential Zone will be developed for new Capital City of Kazakhstan to provide a safe and convenient living environment with

sufficient amenities and public facilities, making each zone self-sufficient on the micro level. The zones are planned following the basic concept of master plan of *symbiosis* in order to meet the needs for the new era.

The Residential Zone consists of groups of residential clusters along the borders of the Ishim River "River Cities" as well residential clusters bordering the existing townscape fabric "International City" area.

The chain of residential clusters running along the Ishim River are located on both banks of the river at favorable, flood safe, locations. This concept allows the river to meander inside a green network. While embankment on the river banks combining pedestrian promenades and access roads will function as flood prevention measures..

Each residential cluster is surrounded by a ring road providing the main access to the residential areas. The ring road is separated from the housing areas by a green belt; this greenbelt forms a link in the green network running through the center of the residential clusters. The residential areas are built in a hierarchy from mid to high density facing the green central zone to mid to low density in the outer areas of the residential clusters.

The central green zone is to facilitate public amenities supporting the basic needs of the residents, such as schools, commercial district and neighborhood centers, community centers, sports and leisure activities. The residential clusters vary in size and density, closer to the existing city development the net density on an average is 170 persons per hectare, while further from the city center the net density reduces to an average of 70 persons per hectare.

The green belt spaces around and within the residential clusters are provided with a direct access to larger green areas and as such form part of the total city green network. They provide high ecological value, a pleasant environment, visually and physically and serve protective functions such as microclimatic buffers and wind buffers.

(4) Mixed Use Zone

The mixed-use zone can be loosely identified by the existing city area bordered to the north by the railway tracks, to the south by the Ishim River. In this area the origin of Astana City is found and it is not surprising that this area is the hub for business and commercial activities in the city. The total land-area is approximately 4,200 hectares, with a total population of 288,300 people in the year 2000. While it houses more than 50% of the present

population of Astana, the land-area represents less than 25% of the total original City boundaries. Towards the east and the west across the Solyanka Balka and the Sarybaluk Balka, these areas with mixed development, more restricted to the use of light industries and stockyards in combination with residential development. It is proposed that these areas, particular zones 1 and 2 and zones 8 and 10, between the railway tracks and the main roads leading in and out of Astana, will be slowly transformed to residential use only.

While at present the mixed-use zone incorporates residential, commercial, light industries, trade and all government functions from a state level to the local municipal level, this area will see drastic changes by the development of the Government City on the left bank of the Ishim River.

The existing city axis running from the railway station to the existing Town Park on the left bank of the Ishim River is proposed to be strengthened and to be developed as a Business City Axis. The graphical center of this axis is formed by Beitshilik (Mira) Street and is bordered by the main thoroughfares of Sary Arka Street and Respublika Street, both giving access to the developing areas south of the Ishim River. The center of this axis consists of mostly historical buildings of up to three stories high, and it is proposed to develop this area as a linear green heart, with an emphasis on pedestrian movements while protecting the historical buildings duly.

As such newly developed buildings in this area are proposed to be of similar low-rise structures and the plot ratio is to be kept low as to allow for extensive greening of the area.

The areas along the main thoroughfares, along the Sary Arka and Respublika Streets, are lined with residential blocks of up to nine stories, with mixed use podium structures of up to three stories along the Respublika Street. It is proposed to increase the density in these zones, by developing open land areas, with a variety of residential types, mixed with public and private services. Thus the population of this mixed-use zone can increase by 50% to house a total of 421,000 people or 53% of the total population by the year 2030.

(5) Industrial Zone

The industrial zone consists of the existing northern and central industrial areas, the western industrial zone, Station 40 and will extend towards the north up to the inner ring road to allow for future expansion. The total land

area reserved will be 8,504 hectares or 12.15% of the total land area for Astana City.

The existing industrial buildings are mostly under-used and are in a state of deterioration for the majority. Furthermore in the industrial area there are some incidental residential areas to be found. The Master Plan proposes to reduce the residential areas and limit these areas to two locations, Zheleznodoezhny Settlement to the east and the existing settlement to the west in the northern industrial area, while the remaining residential settlements will be demolished.

As new industries will be developed in this area, not always land will be immediately available, demolishing of abandoned industrial buildings and cleaning up of soil conditions will require time and funds. As such it is proposed that the existing industrial area will be expanded to the north, east and west, bordering to the northern buffer zone.

The land areas that will become available after demolishing of existing structures and clean-up of land areas are proposed to be landscaped. In particular the areas along the extensions of the Solyanka Balka and the Sarbulak Balka will be developed as green fingers and will form an important link in the Eco-Corridor Green Network.

In line with the regional development plan for Astana City significant development of industry is not assumed except for construction. Priority is given to the modernization of production industry for those industries fulfilling the increasing demand for Astana City, especially in the small and medium scale industries. The industries targeting markets outside Astana or environmentally harmful industries need to be closed, transformed or relocated.

The southern part of Station 40 incorporates existing dacha areas and it is proposed that these dacha areas will be relocated to make room for future development of residential areas. An area of 136 hectares will house a total of 10,000 people, absorbing the existing Promyshlenny Settlement by the year 2010.

Overall the industrial zone is estimated to employ a total of 94,000 persons or 21.5% of the total working population by the year 2030.

(6) Northern Buffer Zone

The Northern Buffer Zone is identified as an area bordered to the north by the expanded city boundaries and to the south by the existing northern and

central industrial zones. The Zone encompasses an area of approximately 15,173 hectares, or 21,68 % of the total city territory. Main features in this area are the proposed city ring-road, Hi-Tech Industrial Zones, a Cargo Center located north of the proposed new Cargo-Train Terminal and a Military Academy.

It is proposed to transform this northern buffer zone into a wind buffer zone and an Eco-forest. The proposed outer ring road will be lined with trees on both sides to protect the road from drift snow in winter seasons from the south west and dust storms in summer from the agricultural fields to the north-east. The land areas between the existing industrial zones and the ring road will be transformed in an Eco-forest, with "islands" of high-tech industrial parks. This Eco-forest will assist in improving the Eco-environment of the city and surrounding improving the air quality. The proposed Hi-Tech Industry zone consists mainly of three Hi-Tech Parks planned for development after 2030.

The Hi-Tech Industrial Parks are expected to house clean industries, such as research and development facilities on advanced (information) technology, scientific research institutes covering humanitarian, mathematical, technical and biochemical fields, laboratories, electronics and computer related industries.

The area for the Military Academy is estimated to be developed between 2010 and 2030 in two stages, growing from an initial land area of 50 hectares to its final size occupying 145 hectares.

The Cargo Center in the Northern Buffer zone, planned north of the newly proposed Cargo Train Terminal, east of Astana City, is planned to be developed in three stages, each stage taking up an area of 90 hectares to a total land area of 270 hectares. The newly proposed Cargo Terminal outside the urban city fabric, will relieve the city center from undesirable goods traffic, from loading and unloading facilities, goods storage facilities and goods road transport. A new railway line is also proposed to branch off from the new Cargo Train Terminal into the industrial zone as such relieving the existing railway station from any goods traffic and thus leaving this area to be developed for passenger rail traffic only. A further advantage of the location of the Cargo Center is its access to the proposed ring road system and direct link with the Astana Airport.

(7) Southern Buffer

The Southern Buffer Zone is identified by an area bordering to the south of the expanded city boundaries and to the north by the newly to developed River City residential clusters and the Business City. The total area encompasses an area of approximately 32,632 hectares, or 46.6 % of the total city territory. Main features in this area are the proposed city highway southern bypass, sites for a University Campus, a Sports City, International Exhibition Center, the International Airport of Astana and Lake Taldy Kol.

It is proposed to transform this Southern buffer zone into a wind buffer zone and Eco-forest. The proposed outer ring road will be lined with trees on both sides to protect the road from drift snow in winter seasons from the south west and dust storms in summer from the agricultural fields to the north-east. This Eco-forest will assist in improving the Eco-environment of the city and assist in improving the air quality.

Mainly caused by very unfavorable soil and hydrological conditions, the majority of land areas in the Southern Buffer Zone will not be developed but designed as climatic buffer and landscape component, as well as water regulating component and area for leisure activities. Improving the water quality, ensuring safety of dikes, possibly rearranging the huge Taldy Kol reservoir to provide irrigation water for outer lying agricultural lands, are an important task to raise the environmental quality at the southern parts of Astana.

The International Airport of Astana is undergoing re-construction works to increase the capacity of the number of flights and even provide facilities to cater for a large percentage of international flights. Although the main business functions have been planned to be located close to the existing city and a cargo center is planned to be located north of a new cargo train station, this increased capacity of the airport will work as a catalyst for development in and around the airport. In Astana as a Government City, there will be a need for promoting Kazakhstan's investment opportunities in trade and industry. For this purpose an International Exhibition center is proposed north of the International Airport Astana, the total site area reserved is 180 hectares and is planned to be developed in three stages up to the year 2030.

In addition south of the River City, two sites have been identified to locate an International Sports City, as a training center for athletes competing in International competitions, such as the Olympic Games. The total land area envisaged for these facilities is around 110 hectares. Further, plans have been

drawn up to locate Kazakhstan's main center of learning, The Eurasia University, in the vicinity of the International Sports City. Both facilities are proposed to be designed as village type settings in the proposed Eco-Forest, as to promote healthy sports and learning.

3.6 Guidelines for Urban Facilities¹¹

3.6.1 Commercial Facilities

The gross floor area per inhabitant has been identified as 0.95 m². It should be noted that the SNiP 2.07.01-89, appendix 7, states an acceptable level of commercial floor area to be a minimum of 0.28 m²/person. The aforementioned figure of 0.95 m² is well above the minimum acceptable level but is justified by the economical analysis. Looking at the total population of Astana City in the year 2030 of 800,000 people, the total Retail and Commercial areas come to a total of 760,000 m² of gross floor areas.

Retail and Commercial activities on a neighborhood level consist mainly of small shops providing daily necessities and already can be found throughout the existing city fabric. The total number of anticipated neighborhood centers is around 300 by the year 2030, with an average retail floor area of such centers at just over 500 m². This seemingly large number of neighborhood centers and their relative small size is justified as it integrates the existing pattern of shops found throughout the city, at relative close range of the residential units, which is relative to the climatic conditions of Astana City.

Taking into account the growth of car ownership, the development of supermarkets, the increased popularity of multiple stores justifies the development of district centers. The number of anticipated District Centers has been estimated at 17 by the year 2030. These District Centers will not only consist of commercial activities, but are to serve as full community centers with additional functions, such as educational, cultural, medical, and other community services described in the following paragraphs. The land area for district centers has been estimated at a plot ratio of 1 to 4, allowing for the integration of supporting community facilities and small businesses. In addition, space reservations have to be made to allow for sufficient car parking areas. These District Centers will include land areas to develop the traditional Bazaar type of retail found at present in Astana City.

As for the City Centers, one area as such can be identified by the combination of Sine Tempore (the old *TSUM* Shopping Center), the Millennium Shopping Center and the shopping areas along Respublika, Abai, Kenesary, and Beibitshilik Streets. In these areas the total commercial and retail areas is to boost to approximately

¹¹ Full text of guidelines for urban facilities will appear in Section A.2 of Volume III: Supporting Report. Information on the location of urban facilities is also summarized therein.

70,000 m² to serve a quarter of Astana's population in the year 2030. While a second City Center is projected south of the Ishim River with an additional gross retail floor area of 240,000 m², which will finally grow to be the main City Center, combining Retail, Culture, Sports, Government facilities and Commercial Offices in one vibrant City Center.

Figure 3.6.1 shows the proposed locations of District Centers and City Centers.

3.6.2 Educational Facilities

The educational system is based on a three tier educational system. From the age of 0 to 6 children are attending Kindergartens or so called Pre-schools. From the age of six till fifteen or seventeen, children will attend the Secondary School. The Secondary School consist of a total of eleven grades, the first three grades are also sometimes identified as Primary School, but are housed in the same structure as the higher grades. After completing a total of nine forms, students have the choice of joining a four year college study (something similar to a vocational study) or continue to complete the full eleven forms. After completion the full eleven forms of the Secondary School the students have an option to continue their education at a University or join a College. In addition students who have completed their vocational college training have the opportunity to continue their study at University level.

(1) Kindergartens

Based on the demographic data the percentage of 0 to 6 year old children would be 9.8% of the total population in the year 2000. However the survey data of existing kindergartens shows that the percentage of attendance has been falling down through past eight years from 64.2% in 1993 to 25.7% in 2000 followed by reduction of number of kindergartens. Therefore it will be required to gradually increase the number of kindergarten facilities to match the existing age group. Considering latest demographic tendency, the future percentage of kindergarten age children can be assumed at 10% of the total population. However as attendance to a kindergarten form of education is not compulsory, the future percentage of attendance can be assumed at 30% in the year 2010, 40% in 2020, 50% in 2030.

For the year 2010 the number of kindergarten pupils is estimated to be 14,700 pupils. From the analysis of the existing situation it can be estimated that the average kindergarten has a capacity to accommodate 330 pupils. This number is expected to reduce in future as the geographical location of

the kindergartens in relation to the residential areas becomes more important. In high residential areas it is assumed that the capacity will remain around 300 to 350 pupils, while in low residential areas this capacity will reduce to around 150 pupils per kindergarten, assuming the walking distance from the residence to the kindergarten will not exceed 500 meters.

For the planning years 2010, 2020 and 2030, the number of kindergartens required have been estimated as 45, 84 and 121 respectively.

Number of seats (330) per kindergarten and the number of kindergartens in each case are assumed figures and may be changed accordingly to Districts as it is shown in the attached scheme shown in Figure 3.6.2.

(2) Secondary Schools

Based on a survey over the past 5 to 6 years 17% of the population is of the age eligible to attend a secondary school. Assuming that the size of secondary schools is averaging 1,500 students in the future, the number of schools can thus be calculated for the years 2010, 2020 and 2030 as 56, 78 and 90 respectively.

Figure 3.6.3 shows the proposed locations of Secondary Schools.

(3) Colleges

As of 2000, the existing number of students of professional schools and colleges was 7,628 students. Based on the existing total population in the city of 330,748 people, the percentage of students of professional schools and colleges makes up $7,628 / 330,748 = 0.023 = 2.3\%$ of the total population. In accordance to the Department of Secondary and Special Education, the existing availability of professional schools and colleges make up 70% of the total demand. In the view of absence of urban planning norms for schools for vocational studies, this data of 70% was taken as a basis for calculations. Thus a 100% availability rate for vocational students can thus be calculated as $0.023 / 0.7 = 0.033$ or 3.3% of the population.

In the planning year 2010, the estimated population number is 490,036 people, with a pupil population $490,036 \times 0.033 = 10,915$ pupils. The assumed capacity of one school is 400 seats, which gives a total number of required vocational schools of $10,915 / 400 = 27$ schools. The number of colleges for the various planning years has thus been estimated as follows;

Target Years	2010	2020	2030
No. colleges	27	57	66

Figure 3.6.4 shows the proposed locations of Colleges.

(4) Higher Education

There are 19 higher education institutions such as universities and academies in Astana City, including the two universities; Eurasian University and Agrarian University. The total number of students attending these forms of higher education in the year 2000 was 33,611 students or 10.1% of Astana's population. This figure is large in comparison with the whole of Kazakhstan, where on average only 2.4% of the population is attending some form of higher education. As the capital, Astana City is expected to continue this high rate of higher education on an average of 8% to 9% of the population. By the year 2030 it is thus estimated that a total number of $796,024 \times 0.08 = 61,522$ student places are required. With exception of the present Eurasia expansion program it is expected that the existing institutes of higher education will not expand drastically. As modern teaching techniques will be more and more common ground, a newly developed area for a 21st century Eurasia University campus is proposed south of the new developing area of Astana City. A total land area of 120 hectares will be reserved, to be developed in two stages of 60 hectares each. This development is proposed to start after the year 2010.

Up to the year 2010 the existing facilities of higher education are to be expanded to cater for an addition of around 11,000 students. The new Eurasia University will finally be planned to accommodate up to 70% of the total student population or 45,000 students.

Figure 3.6.5 shows the proposed locations of Institutions of Higher Education.

3.6.3 Health Care

(1) Hospitals

At present there are a total of 32 medical facilities in Astana City, consisting of hospitals and polyclinics. There 15 facilities with beds providing a total of 2,905 beds, based on the year 2000 population gives a service level of 2,905

$/ 330,748 \times 1,000 = 8.8$ bed per 1,000 inhabitants. This figure is relatively high compared to figures from other major cities in the world. As such it is not anticipated that this figure will rise in future, considering the expectation that service and health of the general population will improve.

In the year 2030, the total population will reach 796,024 and with a ratio of 8.8 beds per 1,000 inhabitants, the total demand of hospital beds will be $796,024 / 1,000 \times 8.8 = 7,005$ beds. It is expected that new hospital facilities will be able to accommodate around 500 beds, which would require a total of 7 new hospitals. These 7 new hospitals are planned in the newly developed areas.

(2) Health Centers

At present there are a total of 19 outpatient health centers in Astana serving a population of 330,748. Statistical data shows that at present 14.4 people out of 1,000 people per day visit these outpatient health centers, resulting on average a capacity of each health center of around 250 patients per day. It is difficult to provide a forecast of future projections as it depends on many factors. At present the number of people visiting these outpatient health centers are low. As services and national health insurance schemes will improve, so will the general health of the population improve due to increasing economical prosperity.

The majority of the outpatient centers can be combined with hospital facilities and the forecast demand has identified an addition of 7 hospitals by the year 2030. In addition to the existing health centers or polyclinics and the newly planned outpatient health centers associated with new hospitals it is proposed to provide additional health centers at residential districts centers which do not have a hospital or existing polyclinic.

Figure 3.6.6 shows the proposed locations of Hospitals and Health Centers.

3.6.4 Police and Fire Fighting Facilities

(1) Police Stations

Police is under the City Department of Interior Affairs. There are two District offices; one in Almaty District of Astana, one in Sary-Arka District. At present there are a total of 19 police stations in Astana serving the total population of 330,748 inhabitants or one police station per an average population catchment are of 17,500 residents. The existing urban planning

norms do not contain norms for such organization types. Calculations, therefore, were based on existing number of police stations, since the City Police Department reported that existing number of police stations (19 points) in terms of quantity and location fully satisfy the demand of Astana City with population of 330,748 people. In this regard, the situation as per the year 2000 is acceptable and will be adopted as the norm for future planning development.

Projected demand for number of Police Stations:

	2010	2020	2030
Population number	490,036	687,432	796,024
Catchment Area	17.500	17.500	17.500
Number of police stations	28	39	44

Total Number of proposed Police Stations per District can be seen in Figure 3.6.7.

(2) Fire Stations

There are six fire departments in Astana City. The central fire station is located in the north of the CBD in Omarov Street. The number of Fire engines at each fire station varies between two to eight fire engines per station. According to the SNiP 2.07.01-89 "Urban Planning", Annex 7, page 51, one vehicle (fire-engine) is required per 8,000 citizens up to 500,000 total city population, while for a population over 500,000 inhabitants the norm requires one fire engine per 10,000 citizens. Based on these norms the total number of fire engines required can be calculated, however as important as the number of fire engines, is the response time to reach the scene of emergency. The final locations of fire station is to be determined based on the number of fire engines per catchment area and the response time, in consultation with the Astana City Fire Department. The approximate locations of fire stations have been calculated using the SNiP code and is shown in Figure 3.6.8.

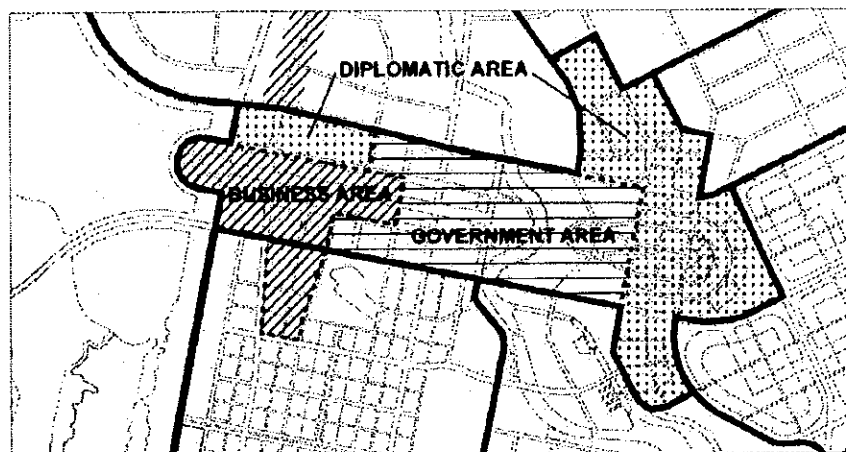
3.6.5 Other Community Services

Whilst many community needs could be accommodated in the community wings attached to schools, the demand for club rooms with storage, halls for dances and

meetings, and hobby workshops, still has to be met. Whenever feasible district centers should be extended for community use, to cater for the interests of all ages, and to serve as social focal points for surrounding residential areas.

3.7 District Planning for New City Center¹²

3.7.1 Objective of District Planning



New City Center

The New City Center is defined as the total of the Government City (District 13) and the business and commercial center of the Business City (District 14) up to 2030, as depicted in the figure below.

The New City Center is composed of Government Area, Business Area and Diplomatic Area. The Government Area accommodates the government facilities including the President's Administration and Parliament. The Business Area accommodates the business offices and the commercial facilities, out of which the section within the boundaries of Government City (District 13) mainly accommodates offices of semi-public organizations. The Diplomatic Area accommodates embassies, residence for diplomatic missions, as well as international institutions. In the New City Center as a whole, there are also cultural facilities, leisure facilities, parks and promenades.

The objective of district planning is to provide more detailed plans for the central part of the new development. While the Master Plan for the entire city is conducted mostly in the scale of 1:10,000, the district planning of the New City Center shall produce plans at a scale of 1:2,000 and 1:5,000.

¹² Full text of District Planning for New City Center will appear in Section A.5 of Volume III: Supporting Report.

3.7.2 Site Conditions

(1) Accessibility

The proposed site is located south of the existing city along the arterial road to the international airport. The distance from the site to the airport is about 10 km, and to the Ak-mola (Astana) railroad station is about 6 km. The site has a generally favorable condition with relatively easy access to the city's present and future private and public transportation network.

The site could easily be connected to the wider hinterland via the existing regional arterial road system; northwestwards toward Karaganda; southeastwards towards Kokshetau, Shechensk and the resort town of Baravoe; and southeastwards towards the natural reservation area of Tengiz and Korgalzhinsky Lake system.

(2) Natural Condition

The proposed site for New City Center is an almost flat river terrace formed on the left bank of the Ishim River. In New City Center area, the ground surface is gradually sloped towards the west, with the difference of elevations of about 4 m over the 2 km length, with a few scattered ponds with 20 to 30 m diameter. Overall, no prominent forests or woods exist in the proposed site, except some small-scale river line forests.

As for the geological substructure, the loam layer increases its thickness towards the Ishim River, with the maximum thickness around 8 m near the river. The groundwater table is generally not deeper than -2 m from the ground level, and in some locations is as shallow as -0.4m. With high groundwater table, underground structures are said to be costly, due mainly to necessity for temporary dewatering for construction, and should be avoided wherever possible.

West of the newly proposed bypass road to the airport, the geological condition is unfavorable for construction, as the area is mostly low-lying marshy grassland.

(3) Urban Development and Land Use

For Diplomatic Area (left bank) in the northern part of New City Center, Astana Municipality has conducted tenders for the provision of infrastructure installation and preparatory work for construction is underway.

Directly adjunct to the north of this is the existing settlements of Chubary

Micro District, where mostly detached houses have been built since 1970's. A number of privately owned *dachas* and some sporadic storage structures are located in the areas on the right bank of the Ishim, where future extension of Diplomatic Area is planned.

(4) Landscape and Townscape Elements

The Ishim River is probably the most important elements in the landscape of the proposed site. The city itself has enjoyed the name of a city on the bank of the Ishim River throughout the history (as detailed in Section 3.2), and the greenery formed along the riverbanks makes the conspicuous landscape accent peculiar to Astana City.

The vast areas of steppe surrounding the city's boundary exert permanent impression of the city's characteristics. A typical example of such steppe landscape is to be seen west of the proposed site, with grassland with sporadic ponds and marshes, pasture and cattle, and vast and open flat land. This area around Taldy Kol Reservoir is considered as the vernacular landscape of Kazakhstan and its preservation must be considered to realize the concept of *symbiosis* with nature.

(5) Land Ownership

The land areas in the proposed site are divided into the areas under the management of the City Committee on Land Resources Management and those privately owned by *dacha* holders. Ministry of Foreign Affairs already retains the land areas of Diplomatic Area for various diplomatic missionaries and the land plot to its east for the site of the ministerial building. In the Circle District, tenders are either ongoing or in preparation for the construction of Ministry of Transport and Communication, *Kazakh Oil* and *Kaztrans Oil* companies and others. Land areas adjacent to this is said to be held by foreign investor(s).

Near the Ishim River, land areas are said to be already secure for the Presidential Residence, Republic Parliament and Ministry of Defense, with the permission already rendered.

3.7.3 Basic Concept for New City Center

The New City Center area is where the development of the new capital of RK is most prominent. If the existing city center pertains to the city and the nation's past and present, the New City Center will symbolizes its future and dreams. As discussed in Sub-section

The New City Center will create an excellent environment with shady greenery lining streets and lively urban parks where the residents and visitors alike could relax and enjoy the amenity in the city. The newly build citizen's park will house cascades, streams and fountains, and provide information and vending stations accommodated in *Yulta's*.

The skyline of the New City Center will have rhythmic changes as in a piece of symphony, created by strict limitation of the maximum height of buildings according to the blocks they are located. For the New City Center to form a memorable and integral townscape, control of building lines shall be enforced by which a vista along major streets wide open to the sky even at the ground level shall be created. There will be four prominent landmarks within the New City Center area; Presidential Residence, Presidential Administration and Parliament, Monument and Circus District. They will add the accent to the overall townscape of the area. Color of facades and exteriors of buildings will be controlled to create an integrated color impression of the city.

In consideration of the severe weather condition in winter, covered promenades and pedestrian decks will be provided to provide shelter to shoppers and workers. Parking spaces shall be covered with roofs in the future as the city grows. Shops and cafes shall be placed mostly on the first and second floors of commercial buildings in Business City area.

Religious facilities will be provided in the cultural area. Consideration will be given to the multiplicity of religion in Astana, land areas will be reserved not only for mosques but also Russian Orthodox churches and others, which will be an important measure for *symbiosis* of ethnic groups.

In the core area of the New City Center automobiles will have restricted entry, while shuttle buses and city buses will circulate for easy movement within the area.

Figures 3.7.1 and 3.7.2 show the zoning plan and road network of the New City Center area, respectively

3.7.4 Planning Framework for District Planning

(1) Development Strategy

The present floor areas for offices were estimated to be 1,300 thousand m² of offices and 120 thousand m² of commercial and retail, which indicates that the average floor to area ratio is about 300%.

Assuming that the existing office stock shall be utilized in the future, although the type of usage might change, only the additional demand for the office floor shall be met in new development areas mainly on the left bank.

Based on the economic forecast and the employment distribution thereof, the total gross required floor area for government, cultural and commercial facilities has been calculated to be around 3,200,000 m² for the new Government City and Business City. Land areas have been allocated for the various functions for government and commercial activities, taking into consideration the availability of land and the climatological conditions of Astana. For the new business and commercial center a slightly higher floor to land ratio have been adopted to suit local conditions. For the more representative function of the Government facilities and in general the assumptions that the government building heights will be limited, the floor to land ratio is assumed to be half of that of the existing city business areas.

The following table shows that for the Business Area of the New City Center the floor to land ratio will reach a maximum of 250% by the year 2030. Refer to Section 3.5 for the description of New City Center. The land use area indicated in the tables below represent the net area which could realistically be utilized as office space, and therefore excludes open space (parks, promenades, rivers, etc), cultural facilities, roads, etc.

Area	Floor area (m ²)	Net Land Use Area (ha)	%
Government Area in New City Center	606,800	40.4	150
Business Area in New City Center	2,571,100	103.3	248
Total	3,177,900	143.7	221

Based on this the land areas necessary for business districts are to be summarized in the following.

Existing and New Business Areas in Astana up to 2030 (in ha)

Item / Year	2000	2010	2020	2030
Existing Business Areas (ha)	55	55	55	55
New Business Areas (ha)	0	84	94	103.3
Total Business Areas (ha)	55	139	149	158.3

Phasing of New City Center (in ha)

	Business Area	Government Area	Total
2010	84	40.4	124.4
2020	94	40.4	134.4
2030	103.3	40.4	143.7

(2) Method for Establishing Framework

1) Government Area

The gross unit floor area including meeting spaces of Government Area is established at $30\text{m}^2/\text{person}$, 57% above the gross unit floor area ($16.7\text{m}^2/\text{person}$) established for the normal offices for Astana, as mentioned in Section 3.4, because this Area is composed of governmental offices that administrate the important republican issues, and at the same time symbolize the country. This unit floor area, however, does not apply for buildings of special functions such as the Presidential Palace, Parliament, and the Supreme Court.

2) Business Area

The gross unit floor area including meeting spaces of Business Area of District 13 is established at $20\text{m}^2/\text{person}$ and District 14 is $16\text{m}^2/\text{person}$ in order for the average unit floor area of Government Area and Business Area to be $16.7\text{m}^2/\text{person}$ as described in Section 3.4. For the commercial facilities located in this Area, the gross unit floor area will be established at $16.7\text{m}^2/\text{person}$, while that for the selling area will be $0.95\text{m}^2/\text{person}$ as indicated in Section 3.4.

3) Diplomatic Area

The gross unit floor area including meeting spaces and the area for one local staff on average of the Diplomatic Area is established at $30\text{m}^2/\text{person}$. For the residential area, the gross unit floor area is established at $60\text{m}^2/\text{person}$, assuming that there will be on average 1 (one) accompanying family member.

(3) Floor Area Framework

Floor area framework is derived by multiplying the gross unit floor area mentioned above and the working population calculated in the Economic Framework. The planned floor area of the Presidential Palace indicated by the Presidential Office, and the floor areas estimated by some of the departments are separately referred.

1) Government Area

Building Type	Working Population	Unit Area / P (m ²)	Total Floor Area (m ²)
Government Buildings	24,163	30	735,500
Other Buildings	Exclude local user 7,100	---	131,465
Grand total	31,263	---	866,965

2) Business Area (Including Commercial Area)

	District	Working Population	Unit Area / P (m ²)	Total Floor Area (m ²)
1	Business District 13	45,478	20	887,825
2	Business District 14	72,957	16	1,182,840
	Total	118,435	17	2,070,665

3) Diplomatic Missions

Required number of Embassy and other International Institutions, as informed by MOFA at the time of the international competition in 1988, and adopted in this Master Plan, are as below.

		2000	2010	2020	2030
1	Number of Embassy	45	60	70	80
	Site area for Embassy (ha)	83.46	111.28	130	148
	Site area for Residence (ha)	10.13	13.50	16	18
	Total	93.59	124.78	146	166
2	Number of International Institutions	15	17	20	20
	Required floor area for the above (m ²)	15,000	17,000	20,000	20,000
3	Population of Diplomatic Corps	910	1,078	1,260	1,400
	Residential total floor		32,340	37,800	42,000

* source MOFA "Project of Diplomatic Enclave in Astana City" Appendix 2

In consideration of the number of diplomatic personnel estimated at 1,400 by the Ministry of Foreign Affairs, the number excluding the accompanying family member will be 700. By multiplying this and the unit floor area of 90m²/person, the total floor area floor necessary becomes 63,000 m² in 2030, out of which 21,000 m² is office area and 42,000 m² is residential area. On the other hand, the total floor area of

the service facilities is calculated to be 203,696m² (plot area 26.88 ha) based on the population forecast conducted by the Ministry of Foreign Affairs. The floor area will be 145.5 m²/person, which is in accordance with the level of the developed nations.

3.7.5 Establishment of the Landscape Concept

This Sub-Section aims to establish the basic principle and policy of the landscape design and skyline of each of the areas, realistically according to their scale and function based on the guidelines depicted in Section 3.8.

By utilizing the site area according to the framework established in Section 3.4, estimation of the architectural gross floor area is derived as below.

Area	Total Site Area (m ²)	Gross Floor Area (m ²)	Floor Area Ratio (%)	Height Limitation (m)	Number of Floors	Building to Land Ratio (%)
Government	1,000,000	866,965	86.69%	30	7~8	11
Business	1,750,000	2,070,655	118.323%	100	25~26	5
				200	40~50	
Diplomatic	2,000,000	266,696	13.33%	15	3~4	4

The above table indicates that the floor area ratio of the Business Area is about 10 times as large as that of the Diplomatic Area composed of low-rise buildings, and that the floor area ratio of the Government Area lies between the two. This spatial composition is in accordance with the concept of skyline in depicted in Section 3.8 Townscape Guideline.

3.7.6 Principles of Transport Planning and Zoning

For each of the areas in the New City Center, the main lines of transport which serve and handle the generating and concentrating traffic are identified, and the zoning according to function of each of the Areas will be as follows.

- 1) As depicted in the traffic plan, the New City Center can be accessed by the two north-south and the two east-west trunk roads. The four intersections of these trunk roads within the New City Center will be defined as the access points of the New City Center. An LRT system will be established to pass some of these access points as shown in Figure 3.6.3.
- 2) Since the east-west distance of the New City Center is rather long, a shuttle bus system of low emission vehicles will be established on the roads along the Citizen's Park extending east to west on the left bank of the New City Center,

providing the workers and visitors in the area with a means of public transport. The two major roads (Street 1 and 2) which at present are being developed by the *Akimat* will function as trunk roads within the New City Center.

- 3) The structure of the New City Center will be characterized basically by roads of wide width arranged in a grid pattern, which makes the city center attractive and orderly. Other roads serve for diverse functions such as for pedestrians or for parades.

Permanent parking lots will be built together with buildings, and the temporary parking lots will be established mainly along Street 1 and 2.

- 4) The LRT will be introduced as a mass rapid transport for both the north-south direction as well as the east-west direction. The LRT in the north-south direction will function to link the New City Center with the railway station, the existing city center area, the airport, and the major facilities along the north-south urban axis. On the other hand, the LRT on the east-west axis provides fluid transportation within the New City Center and also functions to link the existing residential areas with the new city center. In order to insure smooth traffic of both the motor vehicles and the LRT, the LRT will be elevated above the intersecting trunk road. To complement the LRT, low emission buses (e.g. trolley bus and electric bus) will be introduced.
- 5) To function as pleasant and accessible greenery for the workers with offices in the New City Center on the left bank of the Ishim River, a strip of greenery 3.3 km long and 80m wide will be located along the east-west axis of the New City Center.
- 6) Adjacent to the New City Center on the north, south and east are the residential districts, whereas the west side borders the Landscape Pond. The zoning of the New City Center is delineated and aligned by the following three greenery networks.
 - a) Greenery along the Ishim River
 - b) Greenery between the north-south road leading to the airport and the bypass parallel to it
 - c) Greenery along the north-south urban axis

The Government Area housing the Parliament and other governmental facilities is located between the Ishim River and c). The Business Area including commercial facilities is located between c) and b) whilst the southern section is left open for future expansion. West of b) is the

recreational zone harmonized with the natural environment.

Each of the green network houses parks, promenades, and cultural facilities for the use of residents and office workers.

- 7) The New City Center is given diverse functions by locating the commercial facilities, cultural centers and exhibition centers adjacent to the business facilities. By doing so, the New City Center becomes a location not only for the working population but also for the whole population of Astana City.

Figures 3.7.3 and 3.7.4 show the land use and the site plan of the New City Center. Figures 3.7.5 and 3.7.6 show the images of the New City Center and major facilities. Figure 3.7.7 shows the proposed phasing plan of development. Figure 3.7.8 shows the priority development plan for the New City Center by 2010.

3.7.7 Establishment of Lot Scale

(1) Lots to be Utilized as Open Space

1) Lots to be utilized as parking lots

The number of cars projected to park is 7,481 in District 13 and 4,799 in the Business Area of District 14, adding up to a total of 12,280 in 2030. In accordance with the regulation of 25m² per car for parking lots stated in the SNiP, the total area necessary for parking lots is 307,000m².

2) Lots to be utilized as parks

From the viewpoint of nature preservation and to function as a buffer to prevent uncontrolled urban sprawl, the planning of a large scaled park is deemed necessary. One park will be the Citizen's Park extending east to west between Street 1 and 2, whilst the other is located between the Presidential Palace and the Diplomatic Area on the right bank of District 13, and functions as a core of the Greenery Axis along the Ishim River. The area of the latter park is approximately 200 ha, which is equivalent to 20% of the total area of District 13 and the Business Area of District 14. For comparison, the area devoted for parks in the Makuhari New Central Business District constructed on the outskirts of Metropolitan Tokyo, is 19.6% (total area 437.7 ha, park area 85.8 ha) in order to maintain a favorable environment.

(2) Lots to be Utilized for Construction of Buildings

The minimum lot scale is in principle established at 10,000m² in order to avoid the lot area from subdividing and deteriorating the townscape of the New City Center. As the lot area are established at present as blocks in the scale up to 10,000m², the office buildings at large blocks should be designed with courtyards and atriums, so that they merge smoothly with the urban fabric of the city. In addition, these buildings will contain commercial facilities that are connected with those in the neighboring buildings by means of a commercial mall, which will in effect produce a multi-purpose environment of diverse functions.

3.8 Townscape Guidelines

3.8.1 Basic Concept for Townscape Guidelines

This section presents the outline of the conception necessary in creating and maintaining the favorable and harmonious urban townscape and environment in Astana. In particular, considering that the new city requires a large scale, multi-functional development, an integrated approach for townscape creation shall be necessary.

The objectives of the guideline boil down to the following;

- To cherish cultural values in the city's townscape, to which the dwellers of the city, not only of the present but also of the future, could take pride,
- To establish *symbiosis* of the city with nature,
- To strengthen *symbiosis* between the present city and the newly constructed urban areas,
- To harmonize the pedestrians and automobiles,
- To induce stage-wise, balanced development.

This guideline shall cover the central parts of the new and existing urban areas in Astana City, where the essential common elements are the following;

- To formulate a network of greenery spanning the parks, trees along the streets and forests to facilitate a beautiful and amiable urban environment
- To establish a north-south urban axis adjoining the existing and new urban centers
- To consolidate the urban areas by a outer ring road (R3) to alleviate the future traffic conditions
- To accommodate the increase in automobiles by providing underground and ground level parking space with a roof and preserve the townscape in the city centers
- To provide streets with spacious sidewalks and construct where applicable parkways with abundant greenery
- To adopt a linear zoning concept to allow for balanced urban functions at every stage of urban expansion

3.8.2 New Development Areas – New City Center

(1) Skyline

To create a dynamic and attractive urban skyline of the New City Center, the area will be facilitated with a rhythm in the skyline given by the changing height of buildings tinted by four landmark structures as eyestops. The landmarks in the area are (from the east) the Official Residence of President; Presidential Administrative Office and Parliament as functioning as a gate; Independence Square with the Monument; and Circus Square with a circle pedestrian bridge with four high-rise buildings.

The following are specific considerations for the control of the townscape in this area.

Figure 3.8.1 shows the following design guidelines of the New City Center.

(2) Architectural Control

1) Height Limitation

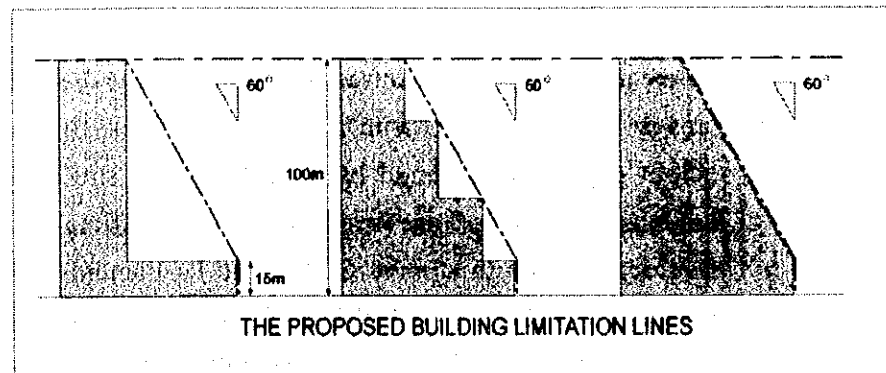
The maximum building height limitations (and where applicable minimum also) are needed to create an integral skyline image. This will be an indispensable part of controlling the population and volumes of various urban infrastructures and allowing for preserving the appropriate urban environment.

Proposed building height limitations are as given below;

- | | |
|--|-----------|
| • Circus Square area; | Max. 200m |
| • Business Area; | Max. 100m |
| • Government Area; | Max. 30m |
| • Recreational, Mid-density residential, Cultural areas; | Max. 20m |
| • Low-density residential, Diplomatic Area; | Max. 15m |

2) Building Limitation Line

Along the central axis zone within Government City, building limitation is proposed by inclined limit lines in which buildings can be built. This will facilitate a townscape vista opening towards the sky, and introduce enough sunshine to the citizens park. The limit line will constitute a vertical line from the edge of the road up to 15 m above the ground, and then connected to a line turning at 60 degrees outwards. This limit shall be applied to the maximum height area of 100 or above.



3) Wall Line Set-back

In the part of land plots facing public roads, wall line set back shall be introduced. This will allow for open and wide pedestrian spaces, continuous greenery provision and vibrant economic activities along the streets. In the Government City Area, a set-back of 20 m shall be proposed while the land owner shall bear the duty of providing greenery in this set-back zone. In other areas, the set-back of 10 m shall be proposed (6 m in the present regulation by Municipality). In addition, ratio of greenery within the plot area shall be determined depending on the zones or streets.

4) Color

The colors of walls and facades shall be managed in harmony with the color balance with surrounding environment. Basically the colors to be used shall be light warm and moderate. A color coordination guideline utilizing color codes shall be established. All selected color criteria will be provided to the clients of proposed development with a note on possible allowable range.

Selection of colors should take into consideration various aspects such as climatic conditions of Kazakhstan, national traditions, culture, customs, regionality of Astana and preferable colors for Astana citizens.

Astana City has a very long and cold winter and the weather is often cloudy and chilly, which is why cold and gloomy colors should be avoided, and warm and light colors should be used.

Consideration is to be given to the use of natural and elegant colors traditional for building design use.

The color coordination zone are classified into; Government Area / Business Area / Diplomatic Area including the cultural zone / recreational zone / commercial zone / the housing areas. The color management plan will be implemented accordingly to the specific characteristics of each area.

The colors of roofs, walls, ground floors and mid-walls of buildings of in one zone needs to be coordinated in similar colors, although some color variation should be permissible within some regular color pattern.

Figure 3.8.2 shows the proposed plan of color management.

5) Architectural shapes

Design of architectural forms and color codes is considered crucial to create and maintain harmony with surroundings. Finishing materials for middle-high buildings need to be selected so as to provide appropriate outlook with close attention on coloring and texture of roofs and walls and provision of greenery. Harmony with surrounding buildings in terms of architectural design is another important consideration.

As a landmark building is to be seen from all directions, the design strategy for such should pay attention to the silhouette of the building from all directions.

Shops and commercial facilities facing pedestrian streets and malls, including those in covered pedestrian decks, should have display windows for shoppers and pedestrians alike. Placement of showcases in commercial areas should be promoted to enhance desirable atmosphere and comfort for pedestrians, especially at night. Buildings and parking areas connected to the pedestrian decks shall enable smooth flow of pedestrians including the disabled.

Water tanks, TV antennas and other appurtenant equipment facing streets shall have appropriate shapes and follow suitable color codes.

Outdoor signboards and other display and advertisement facilities need to be controlled properly in the surrounding townscape. Some regulation should be advocated against placing rooftop commercial boards.

6) Residential Complex

The proposed residential complex shall have a inner patio secluded by the surrounding apartment buildings. This will provide comfortable inner space for the resident particularly in winter.

Figure 3.8.3 shows a structure of the proposed residential complex.

(3) Street

1) Tree-Lining

Lining of trees along the streets shall reflect the characteristics of each street, providing an element of eco corridor.

2) Naming

All major streets, squares, ponds, lakes and parks shall be given proper names. The names could be taken from historical names of politicians, artists, academic or scientist; names of other cities; names of trees and flowers and so on. The names should add familiarity to the facilities towards the citizens of Astana

(4) Parking System

In order to reduce on-the-road parking and facilitate smooth traffic flow, collective covered parking spaces shall be provided. The covered parking spaces shall be basically on the ground level with continuous roofs that could be in the future as part of the proposed pedestrian bridges. Entrance and exists to parking spaces shall be located to avoid the park sides. Covered roofs of parking facilities are planned for construction after 2020 when the architecture of the New City Center comes to a sufficient density level.

(5) Circular Public Transport Service

The roads around the Citizen's Park shall be specially reserved for shuttle buses operated in one-way circular routes as convenient public transport in New City Center. Bus stops shall have shelters to cover the waiting passengers outdoors.

(6) Pedestrian Spaces

1) Network

A pedestrian network shall be planned in an effort to provide a safe and comfortable environment for pedestrians. The general principle in the planning shall be vertical separation of pedestrian and automobile traffic. In consideration of the severe and long winter, a system of internalized (covered) pedestrian bridges and shopping malls will be continuously located and connected to the indoor parking spaces.

2) Shopping Mall

Shopping malls shall be planned to secure a comfortable environment for the retailers and shoppers alike. The shopping malls shall be planned at the Circus Square, east-west streets and north-south streets within the Business Area, where basically shops shall be placed in the first and second floors and residence on the 3rd floor.

(7) Parks

1) Landscape Axis

The Citizen's Park within the east-west axis of New City Center shall have water work such as cascades, streams and fountains, pocket parks, about 100 *yultas* housing information booths, kiosk, galleries, public toilets etc. The street furniture, such as benches, street lights and sculpture, shall be designed systematically. Lighting during the night time shall be contemplated so as to add attractiveness at night.

2) Green Belt

For the formation of a green belt and buffer against strong winds, appropriate planting of trees shall be applied in proper locations. In particular, the areas east of bypass road (for protection against winter winds); the areas east of north-south urban axis (as part of green network); river park along the Ishim; and lining of trees along major streets.

3) Selection of tree sorts for green network

Network of forests and city parks will be created and maintained as an important component of otherwise dry and barren town center environment. Each element of the network shall be given its own name and a character in terms of species of trees planted.

4) Eco-system

Every district in urban area will have its own character strengthened with careful selection of tree species peculiar to the district, suitable for the condition there.

Along the main streets in residential areas, green belts with 20m or wider will be provided, wherever necessary and appropriate, to connect to the riverside forests and creation a greater scale eco-corridor.

In the periphery of the city particular in the southwest, a number of trees shall be planted to form Eco-Forest that will mitigate the severe weather during the winter, and prevent the dust blown in to the city

(8) Cultural and Religious Facilities

In the cultural zone adjoining to Diplomatic Area in the east shall accommodate various international culture centers, Christian and Russian Orthodox Churches and international schools.

(9) Sports and recreation facilities

Sports and recreation facilities including a yacht harbor for the city citizens will be provided in the Entertainment located in the zone west of New City Center.

(10) Lighting

1) Purpose

The purposes of lighting are normally safety of traffic, prevention of crimes, energizing of commerce activities and decoration of townscape. Appropriate lighting techniques shall have to be applied depending on the purpose of lighting.

2) Lighting of Building

The three important buildings, namely Presidential Palace, Presidential Administrative Office and Parliament, shall be lighted up individually. This lighting shall add to the dignity and attractiveness of the buildings.

3) Lighting of Monument

The Monument commemorating the independence of RK shall be lit up so as to be prominent from afar.

4) Lighting of Citizen's Park

As mentioned in 5) above, Citizen's Park in the landscape axis of New City Center shall be lit up duly, so as to facilitate the joy of walking as part of the 24 hour city center.

(11) Barrier-free

Measures shall be incorporated in the designing of the area so that the handicapped and the aged could be safely and comfortably move and utilize the facilities in the new city. Maintenance and management of facilities and buildings to be always in a good condition is also an important consideration.

3.8.3 Existing Urban Areas – Green Corridor

Green Corridor is proposed for the belt between Respublika Avenue on the east and Pobeda Avenue on the west. This belt start conceptually from the existing City Park across the Ishim, stretches to the north, crosses Bogembai Avenue and reaches the railway station.

The central axis of the corridor shall be Beibitshilik Street, which was called Mira (Peace) Street until 1997. This street is a culturally active street with Congress Hall (a concert hall) in the south and Central Square in front of the Parliament House immediate to the north, where city's various festive events take place. Along Beibitshilik Street, there are quite a few two and three story classic row-house buildings of 1940's and 50's. The belt houses most of the fashionables cafes, restaurants and retail shops.

(1) Townscape

Beibitshilik Street has already somewhat thick lining of trees and spacious sidewalk. Further strengthening of the amenity of the belt is conceived to boost commercial activities and reactivate the otherwise stagnant existing urban fabric.

For the purpose of being townscape friendly for pedestrians and shoppers, construction of large scale buildings should be restricted. Planting of additional trees both in the street and within the surrounding blocks shall contribute to fortifying the nature of the belt as a parkway of the city.

Preservation of historic buildings inheriting from the early years of Akmolisk and Tselinograd should be given a high priority. The townscape

thus created in Green Corridor shall have a sense of endearment to the nation's past. For description of the city's stock of historic buildings, refer to Sub-Section 3.1.

(2) Design guideline

In order to increase green areas within the existing mixed use zone, planning of trees along the major streets and inside residential blocks, shall be promoted. On some of the streets, conversion of lanes to footpath with additional provision of trees may be considered to provide for pedestrian promenade.

Additionally, in order to discourage construction of large-scale buildings, which is often harmful for preservation of buildings with historical heritage, regulation of buildings such as the height limitation of 15 m and minimum requirement of green areas of 50% per every land plot shall be considered for the areas along the historical axis shown in Fig.3.8.4. In the same area, application of building height limitation of 45 meters is proposed for enforcement. Moreover, tree plantation will be implemented on the base of a careful selection of tree sorts.

Around buildings with historical heritage and memorial architecture, careful selection of tree species needs to be exercised for better harmony with the building.

(3) Proposal of Transit Mall

A transit mall is a widely practiced method of harmonizing the automobile and pedestrian traffic in the street. If possible, part of existing lanes (4 lanes both ways now) shall be converted to sidewalks so as to widen the pedestrian space. Such concept seems to be appropriate for the section of Beibitshilik Street between Abai Avenue and Bogembai Avenue. Although this section of the road already displays comfortable and amiable townscape gifted with classic architecture of 1940's and 50's, further improvement and fortification of townscape focusing on amenity and safety of pedestrians and shoppers will bring in a magnetic effect of boosting commerce and livelihood.

3.8.4 Existing Urban Areas – East West Parkways

Perpendicular to Green Corridor mentioned above, formation of two parkways is proposed; one along Abai Avenue and the other Bogembai Avenue

(1) Abai Parkway

Abai Avenue is one of the longest east-west streets running through the existing urban leading to the Sarybulak River to the west and Akbulak River to the east. A large number of trees have been planted along Abai Avenue and maintained in good condition, particularly in the 1,800 m long section between Pobeda and Varikhanov Streets. Western part of the section of Abai Avenue has accumulation of government buildings, and eastern part accommodates a large hotel and a number of street shops. Considering the easy accessibility of the areas along Abai to the existing CBD, the relatively low density existing residential areas around the both ends of the section of Abai shall be redeveloped in near future.

(2) Bogembai Parkway

The area along Batyr Bogembai Avenue is approximately 100m wide and 4km long. The west side is bordered by the Sarybulak River, and on the east side it runs up to the railway tracks.

The current conditions are as follows: Batyr Bogembai Avenue is a main avenue; it is wide and traffic flow is heavy. There is a lot of greenery spreading about 1200m in the central area, between Respublica Avenue. and Sary Arka Street. The southern part, in particular, has a green corridor. Except for this area, few trees exist, making this an area to be developed further. (The city has already started plantation in this area.)

(3) Guideline

Increase of plantation and connection to the green urban corridor along the South-North axis is to be implemented. To enhance the formation of the green network, tree lining of boulevards and greenery provision within residential areas at the time of future redevelopment shall be important.

3.8.5 Existing Urban Areas – Double Business Corridor

The two belts on both sides of Green Corridor mentioned in (2) above shall be gradually transformed into Double Business Corridors. The eastern corridor spans an area covering a few blocks along Respublica Avenue, leading into Pushikin Street. The western corridor is a belt principally between Pobeda and Sary Arka Avenues.

(1) Townscape

Both Ruspublika and Pobeda Avenues are already arterial roads serving the existing urban areas, while Sary Arka will have a much increased importance as an artery in the future, with the ongoing construction of the second bridge on the Ishim and future connection to the southern and northern area of the city. Along the avenues, there is accumulation of relatively high and large buildings accommodating government, residential, educational, cultural and medical functions. Inducing construction of relatively high and large scale buildings in these belts is essential in the fortifying the commercial and business functions in the existing fabric of the city structure. The double ridged business corridors could be thought of as continuation to the proposed Business Area in the south.

(2) Architectural design forms

In compliance with the necessity of inducing medium to high rise buildings the height limit for buildings of this area shall be set at 100m, similar to the new city center area.

(3) Minimum Land Plot

To prevent irregular subdivision of land plots to small areas, the minimum area of land plot needs to be established and enforced.

3.8.6 Preservation of Townscape Heritage

(1) Necessity and Issues

Preservation of townscape heritage, such as architectures of merit and monuments, is not only essential in maintaining the traditional heritage which is quick to disappear, but also an important step towards consolidating the cultural identity of the city towards the future. When a city goes through structural changes in the wake of economic development, renewal of buildings and land use is generally unavoidable. It is important to maintain a robust balance between the preservation of heritage and structural changes of a city in the due course of urban development. Consensus needs to be achieved in relation to the measures for preservation amongst the central and local governments, building and land owners and city dwellers in the spirit of partnership.

Presently, Society of Protection of Historical and Cultural Monument under *State Inspection on Protection and Use of Cultural and Historical Heritage*

Monuments of Kazakhstan looks after the preservation of the historical heritages, while the Division Office of Protection of Historical and Cultural Monument of Astana Municipality carries out daily management. Historically, Committee of Cultural Preservation was responsible for research, preservation and publication of historical buildings under the Soviet regime, when corporations contributed 0.5% of their profit for the funding for such activities in a philanthropy system. At present, this system is coming to a dead end, as the financial conditions of municipalities and private firms are difficult, and the priority for such cultural activities low. As most of these buildings are owned privately, new mechanism for financing the preservation activities is thereby needed.

(2) Preservation Subjects and Guidelines¹³

There are basically two approaches to townscape preservation, and for the townscape to be preserved effectively, they must be conducted simultaneously. The first approach is to preserve the individual architectures of merit, and the second is to preserve a specific area, such as streets and districts, containing numerous architectures of merit.

Architectures of merit could be categorized into the following.

- a) architecture of historical value
- b) architecture functioning as landmarks
- c) vernacular architecture

The preservation of the first two has been practiced in Kazakhstan and there are two building of historical heritage under state protection and 15 others under local protection in Astana. According to the latest information, a further 42 are proposed for preservation. However, much respect should be paid to the vernacular architectures that are the witnesses of the history of the city. Examples of vernacular architecture in Astana are Soviet style apartments of 1940's and 1950's near the station and along Kenesary Street between Pobeda and Beibitsilik Streets and the Leningrad and Moskow style panel apartments constructed the 1960's mostly along Beibitshilik Street. In addition to those under consideration, vernacular architectural monuments mentioned above, consisting of 89 pieces, are proposed for protection in this Master Plan. The objects proposed for preservation is listed in Table 3.8.1.

¹³ Full text and list of proposed subjects will appear in Section A.5 of Volume III: Supporting Report.

The location and overview of respective buildings are shown in Figure 3.8.4 and 3.8.5.

Preservation of historic buildings is more effective if the vernacular environment in which they were made is fostered. In this context the following elements constituting an important part of the relevant environment is proposed for additional preservation;

- Trees: A few poplar trees, presumably more than 100 years old, in the City Park.
- Bridge: Pedestrian Bridge to the Citizen's Park.

This was formerly a wooden bridge, but collapsed in 1960's due to overload. Reconstructed afterwards with a concrete structure.

- Trail: Historic Trails

Trail from First Settlement (Uzkaya Street): This is 200m long and 10m wide dating back to 1830's. This trail runs in a diagonal direction as opposed to most of the roads in the grid, as it constituted a road in the fortress mentioned in Subsection 3.2.1(1) dating back to 1830's.

Historic Trail in City Park: This is a 200m long historic trail now in the City Park, lined with old and tall poplar trees. A number of merchants presumably traveled in this trail to the city's market (present day's Central Square) via an isle in the Ishim River.

Since a townscape is composed not only of architectures of merit, but of numerous other buildings as well, it is effective to take measures to control the reconstruction of the ordinary buildings and the construction of new buildings adjacent to the architectures of merit. In order to do so, it may be necessary to impose some type of architectural regulations for the area as a whole, stipulating the items below.

- a) maintenance procedures on architectures of merit
- b) prohibition or regulation on reconstruction of architecture of merit
- c) design codes (color, height, texture, shape, etc.) for reconstruction of ordinary buildings and new buildings in the preserved area, so to harmonize with the existing townscape
- d) subsidizing scheme to gives incentive to private building owners to preserve architecture of merit

- e) purchase of architectures of merit by local government to preserve or to use efficiently as public facilities

At the same time, in accordance with Republic Law Article 29 stipulating that “the historical heritage of Kazakhstan shall be utilized for restoration and development of spiritual and cultural tradition, and for the purpose of science and historical education”, the following actions are effective to deepen the awareness of the citizens towards the preservation of townscape.

- a) establishing explanatory signboards on site
- b) issuing leaflets or booklets with elaborate description of each heritage
- c) introduction in text books and school trips to architectural merits

(3) Planning of Scenic Zone: Beibitshilik and Akzhayk Streets Precincts

A scenic zone is an area regulated usually under municipal bylaws not only to preserve the townscape but also to propel orderly development to improve the amenity of the area by improving the appurtenant components of the city such as parks, pavements, street furniture, etc. To register and to regulate an area as a scenic zone is effective, because the townscape is improved and the awareness of the citizens towards preservation is deepened. It also helps to create an animated topos where people of the city will gather.

An area with potential as a scenic zone in Astana City is Beibitshilik and Akzhayk Streets between the Congress Hall and the Kazakhstan Ballet and Opera Theater where historical buildings and vernacular buildings are concentrated as depicted in Figure 3.8.6.

1) Beibitshilik Street Precincts

Beibitshilik Street is a nice and cozy street for comfortable walk, endowed with fashionable cafes and restaurants housed in historical buildings of 1950's and 60's. The atmosphere of the street is attractive, provided with shady trees and wide sidewalks. Simultaneously, Beibitshilik Street composes a section of the Green Corridor in the Master Plan and is proposed in Sub-section 3.10.4 as a greenery enhancement area, and shall be developed accordingly.

2) Planning of Scenic Zone: Akzhayk Precinct

Akzhayk Street close to the station is less lively, but has more consolidated townscape with vernacular buildings mainly of 1940's 50's. The buildings

are in similar texture and the façade is well balance. Newly refurbished Kazakhstan Opera and Ballet Theater adds to the townscape of this precinct.

Enhancement of the scenic value of this area through the improvement of the sidewalk and lining of trees and shrubs similar to those proposed for Beibitshilik Street precinct shall be necessary. Few of the historic buildings in this area are under protection, state nor municipal. Additional proposal of the bulk of the historic buildings in this precinct for protection shall have a crucial importance in the preservation of historic heritages of this city.

As this precinct stretches along the Opera and Ballet Theater, enhancement of townscape along Akzhaiyk Street would make this precinct capable of accommodating artistic and fashionable shops and galleries. One leading example might be the areas around the Old Opera house in Paris. Preservation of historical buildings would make a first step onwards in this direction.

3) Concept

As a proposal, Beibitshilik Street could be developed as a scenic zone with wider tree-lined sidewalks with shrubs and occasional pocket parks connecting the attractive facades of the diverse architectures, while more fashionable cafes and small shops would be invited to the first floor area. At the same time, street furniture such as benches, garbage cans, streetlights and pavements would be designed characteristically to match the townscape, while overhead electricity lights and disorderly signboards shall be prohibited.

Street furniture such as shelters for bus bays, benches, signboards and others need sophisticated design to harmonize with the townscape. Color and texture of pavement also need to be contemplated as part of the preserved townscape. Erection of statues and sculpture should be given a priority in this area to harness the atmosphere of the streets.

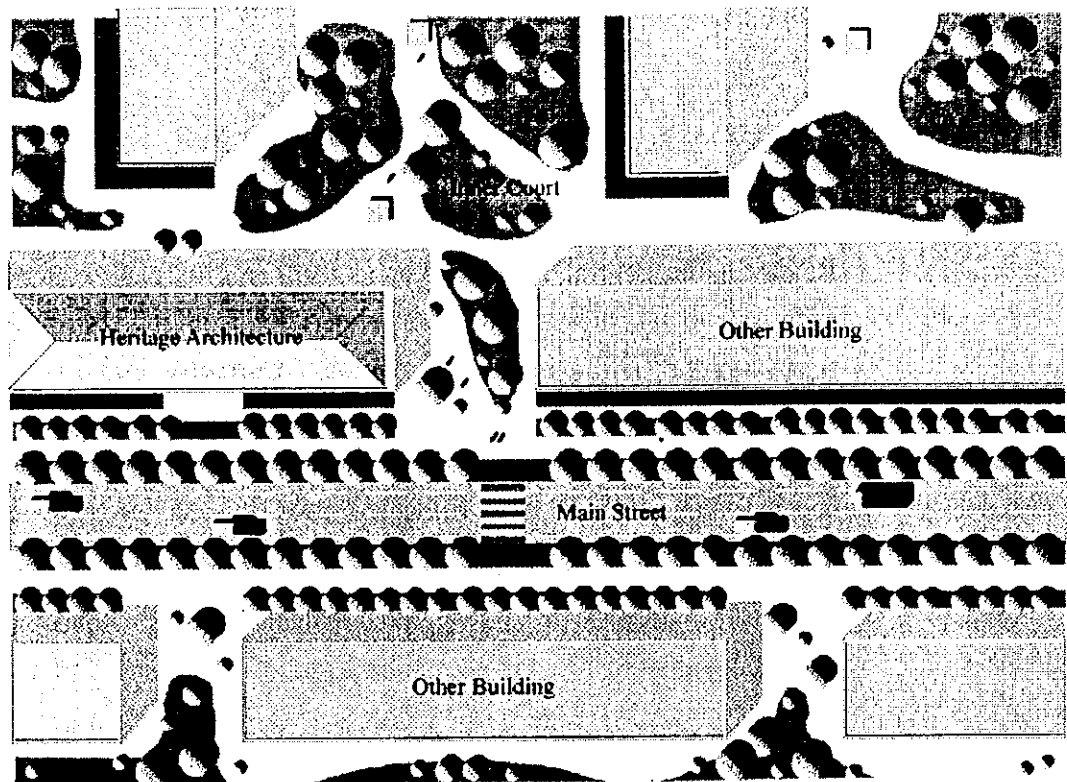


Image Plan of Townscape Heritage Preservation

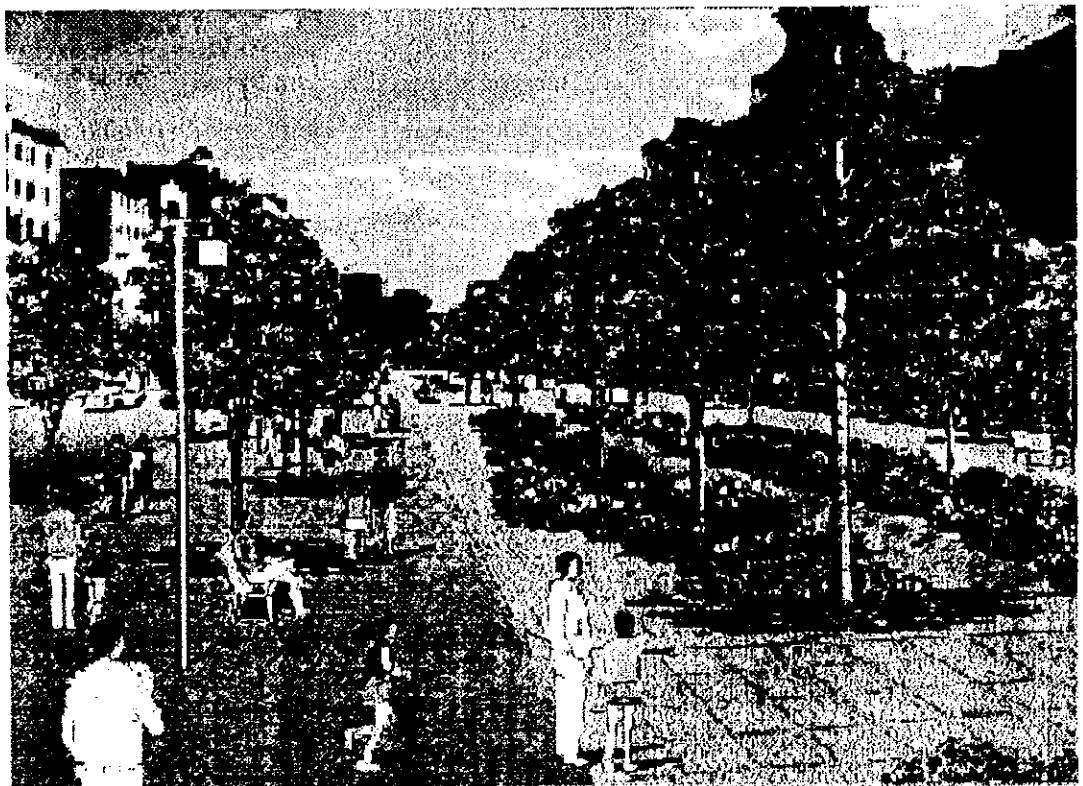


Image Sketch of Scenic Zone